

SYSTEMS STANDARD DRAWINGS

MARCH 2024

STANDARD DRAWINGS ENSURE THE APPLICATION OF UNIFORM STANDARDS FOR THE DESIGN, FABRICATION, INSTALLATION, AND CONSTRUCTION OF SPECIFIC ITEMS OF WORK FOR THE SOUND TRANSIT LINK LIGHT RAIL, SOUNDER COMMUTER RAIL, REGIONAL EXPRESS BUS, AND STRIDE BUS RAPID TRANSIT SYSTEMS. STANDARD DRAWINGS ARE PRESCRIPTIVE DOCUMENTS FOR ALL PROJECTS.

STANDARD DRAWINGS SHALL BE USED IN THE DESIGN OF INTERFACE POINTS, PROJECT SPECIFIC ITEMS OF WORK OR AS A BASIS FOR PRESENTATION OF DESIGN INFORMATION. THE DESIGNER OF RECORD SHALL REVIEW THE STANDARD DRAWINGS IN CONJUNCTION WITH OTHER CONTRACT DOCUMENTS, AND VALIDATE, FINALIZE, STAMP, AND SIGN THESE DRAWINGS FOR INCLUSION INTO THE PROJECT CONTRACT DOCUMENTS.

IF THE DESIGNER RECOMMENDS THAT AN ASPECT OR ASPECTS OF THESE STANDARD DRAWINGS BE MODIFIED, THE DESIGNER SHALL INFORM THE DESIGN MANAGER ON THE PROJECT AND SECURE CONCURRENCE FROM ENGINEERING FOLLOWING MODIFICATION PROCESS IDENTIFIED IN ENGINEERING PROCEDURES.

THE STANDARD DRAWINGS DO NOT SUBSTITUTE FOR THE DESIGNER'S USE OF INDEPENDENT ENGINEERING JUDGEMENT AND SOUND ENGINEERING PRACTICE, NOR DO THEY RELIEVE THE DESIGN CONSULTANT FROM THE PROFESSIONAL RESPONSIBILITY OF DEVELOPING AN APPROPRIATE DESIGN AND COMPLYING WITH THE STANDARD OF CARE.

SYSTEMS STANDARD DRAWINGS
APPLICABILITY OF CURRENT VERSION
SUPERSEDES AUGUST 2019 VERSION
FOR PROJECTS THAT ARE BASELINED AFTER MARCH 29, 2024

| | |
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| DRAWING No.: | STD-JZT001 |
| REV: | 0 |



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**APPLICABILITY FOR
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Project teams shall refer to their executed project contracts for applicable document versions/revisions.

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| DRAWN BY: | | | | | |
| CHECKED BY: | | | | | |
| APPROVED BY: | | | | | |
| No. | DATE | DSN | CHK | APP | REVISION |
| 2 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |
| 1 | 8/2019 | | | | REVISED SYSTEMS DIRECTIVE DRAWINGS |
| 0 | 1/2019 | | | | 2019 GUIDANCE DWG REVISIONS - GENERAL UPDATE |

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| STD-JOD511 | 1 | OVERHEAD CATENARY SYSTEM POLE MOUNTED BYPASS DISCONNECT ASSEMBLIES DS-3 & DS-4 |
| STD-JOD512 | 1 | OVERHEAD CATENARY SYSTEM POLE MOUNTED BYPASS DISCONNECT ASSEMBLY DS-5 |
| STD-JOD513 | 1 | OVERHEAD CATENARY SYSTEM FEEDER CABLE ASSEMBLIES FC-1 & FC-2 |
| STD-JOD514 | 1 | OVERHEAD CATENARY SYSTEM FEEDER CABLE ASSEMBLIES FC-3 & FC-3 |
| STD-JOD520 | 1 | OVERHEAD CATENARY SYSTEM SURGE ARRESTER ASSEMBLIES SA-1, SA-2, SA-3 & SA-4 |
| STD-JOD530 | 1 | OVERHEAD CATENARY SYSTEM SECTION INSULATOR ASSEMBLIES SI-1, SI-2 & SI-3 |
| STD-JOD600 | 1 | OVERHEAD CATENARY SYSTEM BALANCE WEIGHT ANCHOR ASSEMBLY BW-1 & BW-3 |
| STD-JOD601 | 1 | OVERHEAD CATENARY SYSTEM BALANCE WEIGHT ANCHOR ASSEMBLY BW-2 |
| STD-JOD602 | 1 | OVERHEAD CATENARY SYSTEM BALANCE WEIGHT ANCHOR ASSEMBLY BW-1, BW-2, BW-3, BW-4, BW-5 & BW-6 |
| STD-JOD603 | 0 | OVERHEAD CONTACT SYSTEMS CONSTANT TENSION SPRING TERMINATION CTST-1,CTST-2 |
| STD-JOD610 | 1 | OVERHEAD CATENARY SYSTEM FIXED ANCHOR ASSEMBLIES FA-1, FA-1T, FA-2, FA-2T & FA-3 |
| STD-JOD611 | 1 | OVERHEAD CATENARY SYSTEM FIXED ANCHOR Y-TERMINATIONS FA-4 & FA-5 |
| STD-JOD615 | 1 | OVERHEAD CATENARY SYSTEM MID-POINT SPAN GUY ASSEMBLY MP-1 |
| STD-JOD620 | 1 | OVERHEAD CATENARY SYSTEM WIDE FLANGE POLE DOWN/HEAD GUY ASSEMBLIES DG-1, DG-2, DG-3 & HG1 |
| STD-JOD621 | 1 | OVERHEAD CATENARY SYSTEM TAPERED TUBULAR POLE DOWN/HEAD GUY ASSEMBLIES DG-4, DG-5, DG-6 & HG-2 |

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|--------------|--------|-----|-----|---|--|--------------------------------|
| DESIGNED BY: | | | |  SCALE: NTS FILENAME: STD-JZI001-002 CONTRACT No.: RTA/LR DATE: 2/2024 | SOUND TRANSIT STANDARD DRAWINGS SYSTEMS INDEX OF DRAWINGS | DRAWING No.: STD-JZI002 |
| DRAWN BY: | | | | | | FACILITY ID: |
| CHECKED BY: | | | | | | SHEET No.: _____ REV: _____ |
| APPROVED BY: | | | | | | 2 |
| No. | DATE | DSN | CHK | APP | REVISION | |
| 2 | 2/2024 | | | | 2024 REVISED SYSTEMS DRAWINGS | |
| 1 | 8/2019 | | | | REVISED SYSTEMS DIRECTIVE DRAWINGS | |
| 0 | 1/2019 | | | | 2019 GUIDANCE DWG REVISIONS - GENERAL UPDATE | |

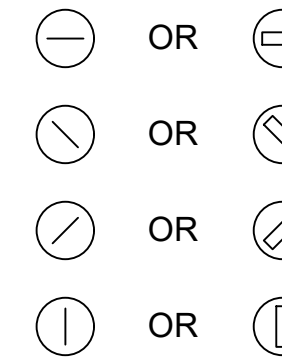
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SIGNALS LEGEND

SIGNAL LIGHTS

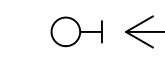
- AMBER: STOP
- WHITE: DIVERGE LEFT
- WHITE: DIVERGE RIGHT
- WHITE: PROCEED ON STRAIGHT ROUTE

SYMBOLS



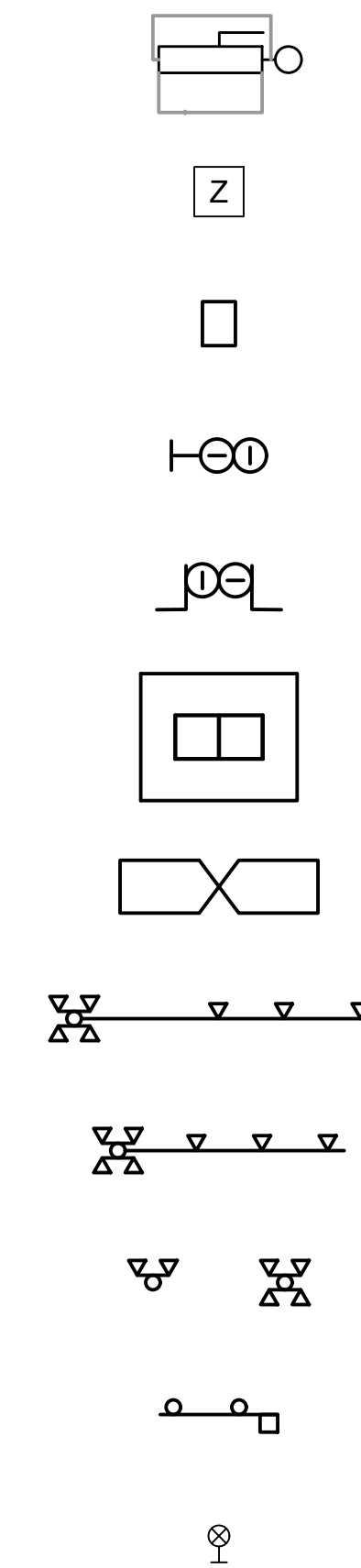
SIGNAL ORIENTATION

TRAIN APPROACH DIRECTION



LAYOUT PLANS

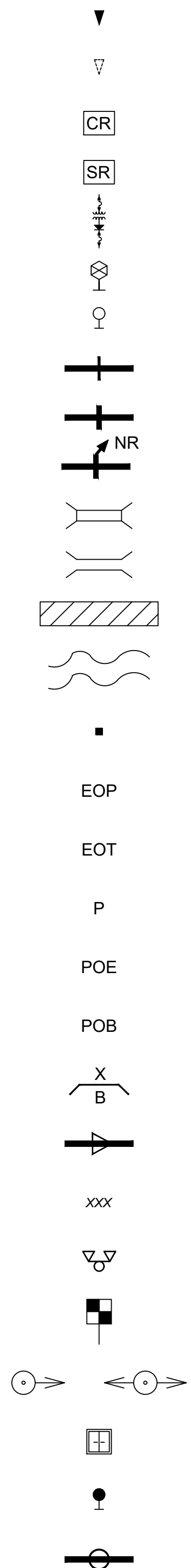
- DUAL CONTROL ELECTRIC SWITCH MACHINE
- Z-BOND
- PULLBOX
- SIGNAL, POLE MOUNTED
- SIGNAL, WALL MOUNTED
- MANHOLE
- TRAIN TO WAYSIDE COMMUNICATION ANTENNA (TWC)
- SINGLE GATE AND FLASHERS
- PED GATE AND FLASHERS
- PEDESTRIAN FLASHER
- SLIDING GATE
- PED BELL



SINGLE LINE DIAGRAM & CONTROL LINE DIAGRAM

- TWC LOOP
- (DEFERRED) TWC LOOP
- COMM ROOM
- SIGNAL ROOM
- TRACTION POWER SUBSTATION (TPSSXX)
- BUMPER POST SIGNAL
- SIGNAL
- INSULATED JOINT BETWEEN TRACK CIRCUITS
- IMPEDANCE BOND
- NEGATIVE RETURN CONNECTION TO IMPEDANCE BOND
- LRT TUNNEL
- U.C. (LRV UNDERCROSSING)
- PASSENGER STATION
- RIVER, LAKE
- CROSS PASSAGE
- END OF PLATFORM
- END OF TRACK
- POWER DUAL- CONTROL SWITCH MACHINE
- POINT OF ENDING
- POINT OF BEGINNING
- CROSS BOND
- RECEIVE POINT LOOP
- ITALICIZED NUMBER REPRESENTS TRACK CIRCUIT NUMBER
- GRADE CROSSING FLASHING LIGHT SIGNAL
- POINT OF EQUATION
- AUDIO FREQUENCY OVERLAY TRACK CIRCUIT
- SWITCH HEATER CASE OR TWC CASE
- PEDESTRIAN CROSSING SIGNAL
- IMPEDANCE BOND ONLY (CONTROL LINE DIAGRAM)

SYMBOLS



| No. | DATE | DSN | CHK | APP | REVISION |
|-----|--------|------|------|------|------------------------------------|
| 1 | 2/2024 | ---- | ---- | ---- | 2024 REVISED STANDARD DRAWINGS |
| 0 | 8/2019 | ---- | ---- | ---- | REVISED SYSTEMS DIRECTIVE DRAWINGS |

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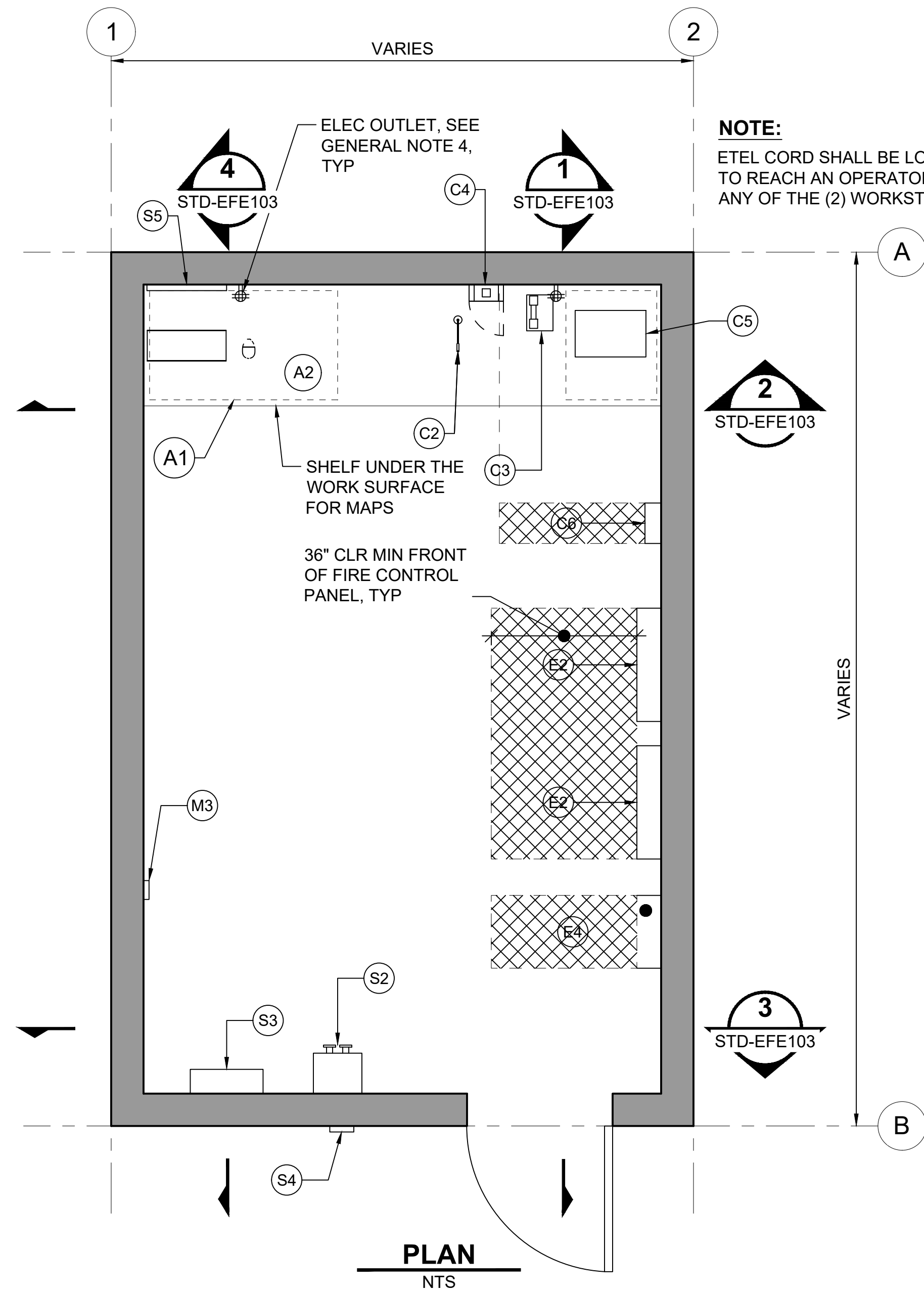
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 FILENAME: STD-JZN007
 CONTRACT No.: RTA/LR
 DATE: 2/2024

**SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS**

SIGNAL
GENERAL SYMBOLS & LEGEND

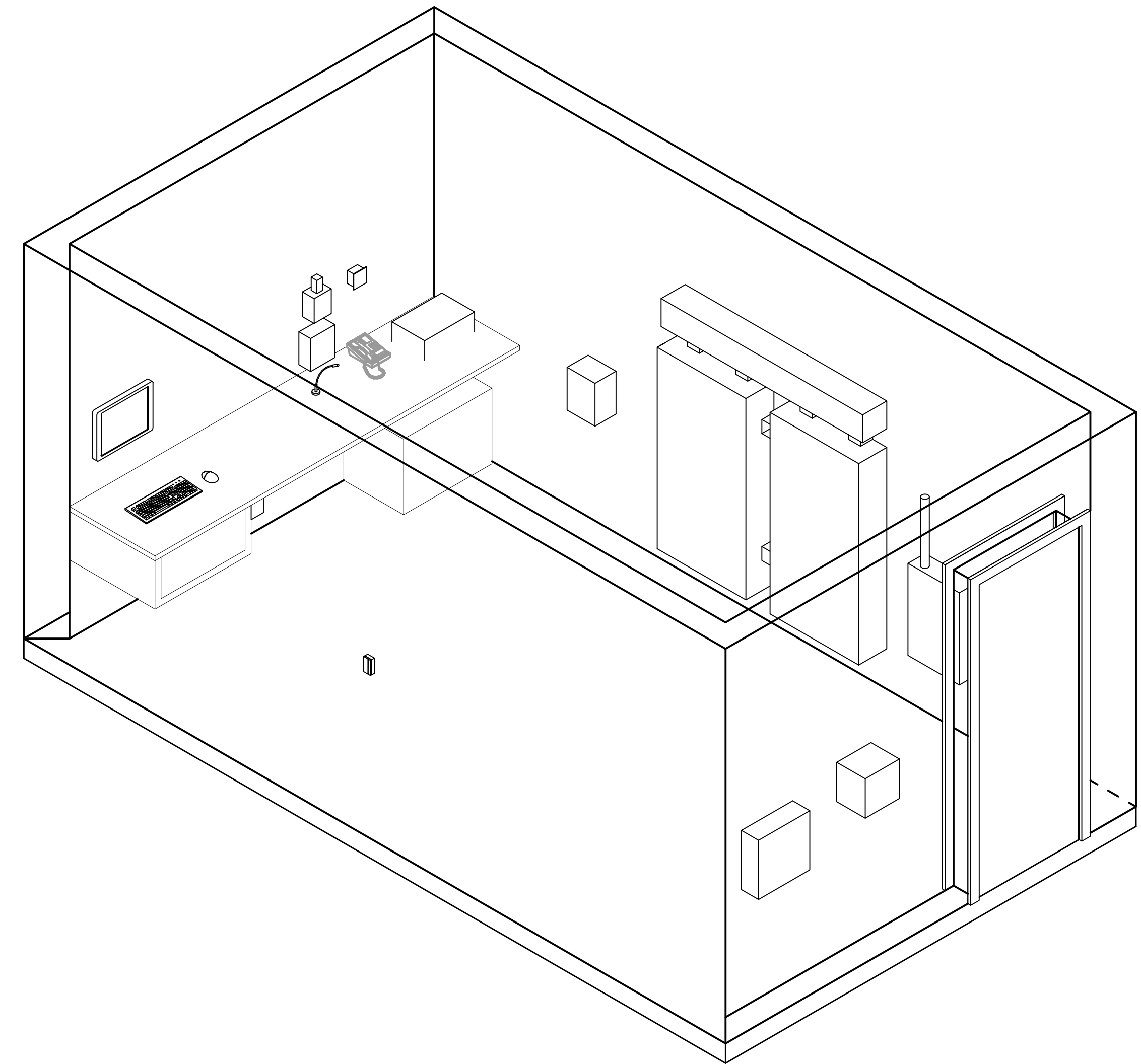
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| DRAWING No.: STD-JZN007 |
| FACILITY ID: |
| SHEET No.: 1 |

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NOTE:
 ETEL CORD SHALL BE LONG ENOUGH TO REACH AN OPERATOR SITTING AT ANY OF THE (2) WORKSTATIONS.

| REF # | DESCRIPTION | DIMENSIONS HxWxD (INCHES) | DISCIPLINE |
|-------|---|---------------------------|----------------|
| A1 | SHELVES FOR O&M MANUALS/DRAWINGS | 12x48x30 | ARCH |
| A2 | WORK SURFACE | VARIES | ARCH |
| A3 | 19" EQUIPMENT RACK (UNDER DESK) | 23x21x31 | ARCH |
| C2 | PA MICROPHONE | VARIES | COMMUNICATIONS |
| C3 | PRIVATE BRANCH EXCHANGE TELEPHONE (PBX) | VARIES | COMMUNICATIONS |
| C4 | EMERGENCY TELEPHONE (ETEL) | VARIES | COMMUNICATIONS |
| C5 | MULTI-UNIT, TWO-WAY RADIO CHARGER | 6x17 1/2x11 1/2 | COMMUNICATIONS |
| C6 | RADIO BDA MONITORING PANEL | 10x8x4 | COMMUNICATIONS |
| E2 | FIRE ALARM CONTROL PANEL (FACP) | 50x62x8 | ELEC |
| E4 | AES/CELLULAR RADIO DIALER | 28x18x6 | ELEC |
| M3 | THERMOSTAT | VARIES | MECH |
| S2 | TRACTION POWER EMERGENCY TRIP STATION (ETS) | VARIES | SYSTEMS |
| S3 | FCR SPEAKER VOLUME CONTROL REOSTAT | 18x18x6 | SYSTEMS |
| S4 | ACCESS CARD READER (ACR) | VARIES | SYSTEMS |
| S5 | BUILDING MANAGEMENT SYSTEM (BMS) LOCAL COMPUTER WORKSTATION | VARIES | SYSTEMS |



GENERAL NOTES:


- FIRE CONTROL ROOM (FCR) FOR GRADE SEPARATED STATIONS MUST NOT BE LESS THAN 140SF WITH A MINIMUM DIMENSION OF 10 FEET AND SHALL BE THE LOCATION OF THE FIRE ALARM PANEL AND WILL BE DETERMINED IN CONJUNCTION WITH THE AUTHORITY HAVING JURISDICTION.
- XXXX - INDICATES EQUIPMENT CLEARANCE ZONE
- ANY CONDUITS SHOWN ARE FOR REFERENCE ONLY. DESIGNER TO COORDINATE CONDUIT NEEDS AND ENSURE ROUTING DOES NOT CREATE CONFLICT FOR EQUIPMENT MOUNTING.
- PROVIDE ADEQUATE POWER QUAD RECEPTACLES OUTLETS FOR ALL WORKSTATIONS AND PRINTER EQUIPMENT EVERY SIX FEET AND POWER FROM STATION UPS.
- ADDITIONAL RELAY BOXES/PANELS SUPPORTING VARIOUS SYSTEMS ARE LIKELY NECESSARY. ENSURE THAT THESE ARE CONSIDERED DURING DESIGN.
- DESIGNER SHALL VERIFY ALL EQUIPMENT DIMENSIONS. ROOM SIZE SHALL BE ADJUSTED AS NECESSARY.
- REQUIRED SYSTEMS ARE DETERMINED BY THE TYPE OF STATION DEFINED IN THE DCM ALONG WITH AHJ REQUIREMENTS.
- ACCESS POINTS FOR NON RELATED UTILITIES OR EQUIPMENT (I.E. SUMP HATCH) NOT SERVING THE FCR SHALL NOT BE LOCATED IN THE ROOM THAT MIGHT INTERFERE WITH FUNCTION. IF THIS IS UNAVOIDABLE, CLEARANCES FOR FCR FUNCTION SHALL NOT BE IMPEDED BY ACCESS CLEARANCES.
- FCR ROOM SHALL NOT BE COMBINED WITH EMERGENCY RESPONDER EQUIPMENT ROOM WITHOUT ST APPROVAL.
- LARGE EQUIPMENT AND SUPPORTING INFRASTRUCTURE ELEMENTS, SUCH AS RELAY PANELS ARE SHOWN IN ROOM FOR REFERENCE AND PLANNING PURPOSES. COORDINATE SPECIFIC LOCATIONS APPROPRIATELY WITH STATION DESIGN, IF ELEMENTS NOT INVOLVED DIRECTLY IN FIRE EMERGENCY RESPONSE.

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| No. | DATE | DSN | CHK | APP | REVISION |
|-----|--------|-----|-----|-----|---|
| 2 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |
| 1 | 8/2019 | | | | REVISED SYSTEMS DIRECTIVE DRAWINGS |
| 0 | 1/2019 | | | | 2019 GUIDANCE DWG REVISIONS -S GENERAL UPDATE |

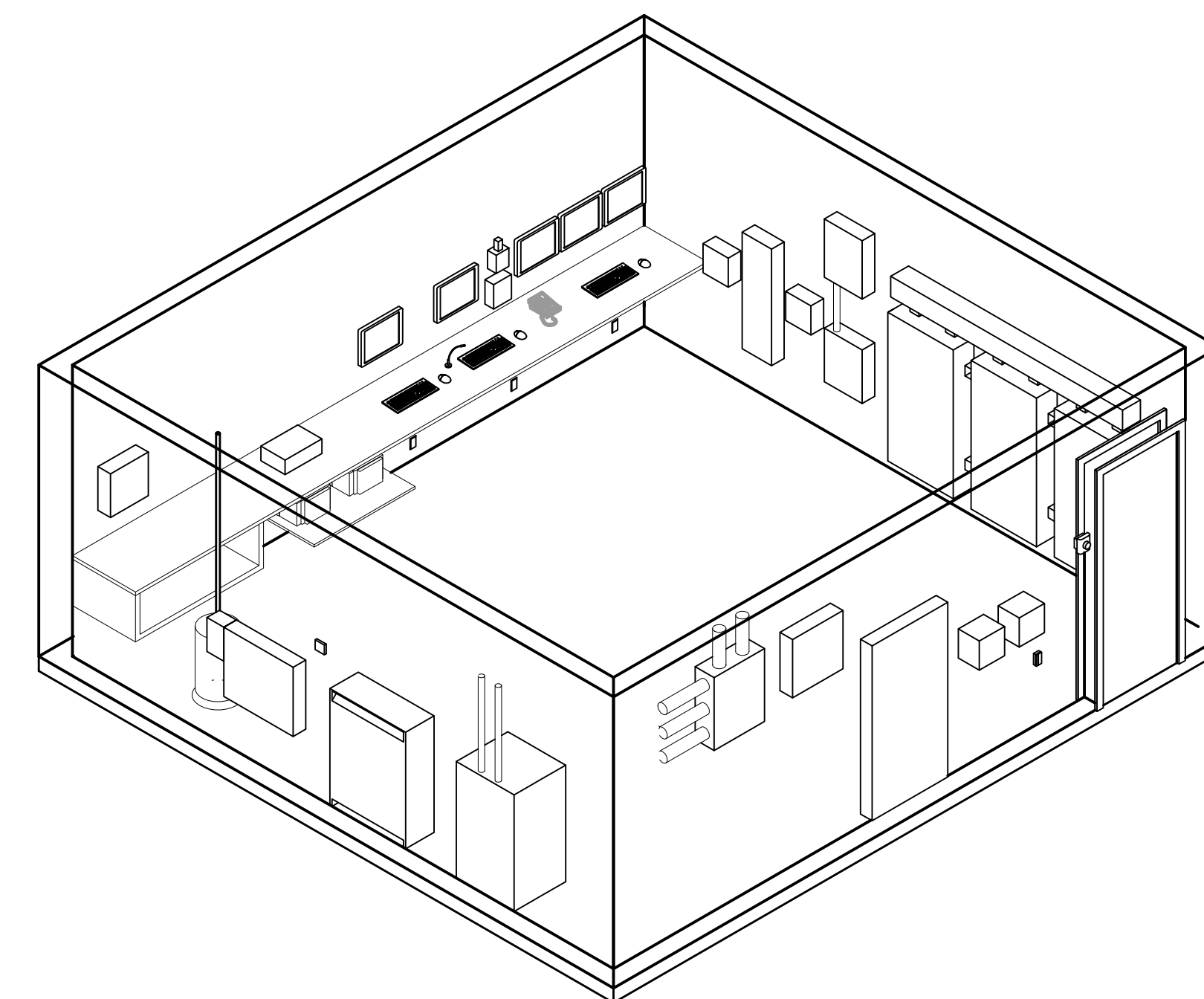
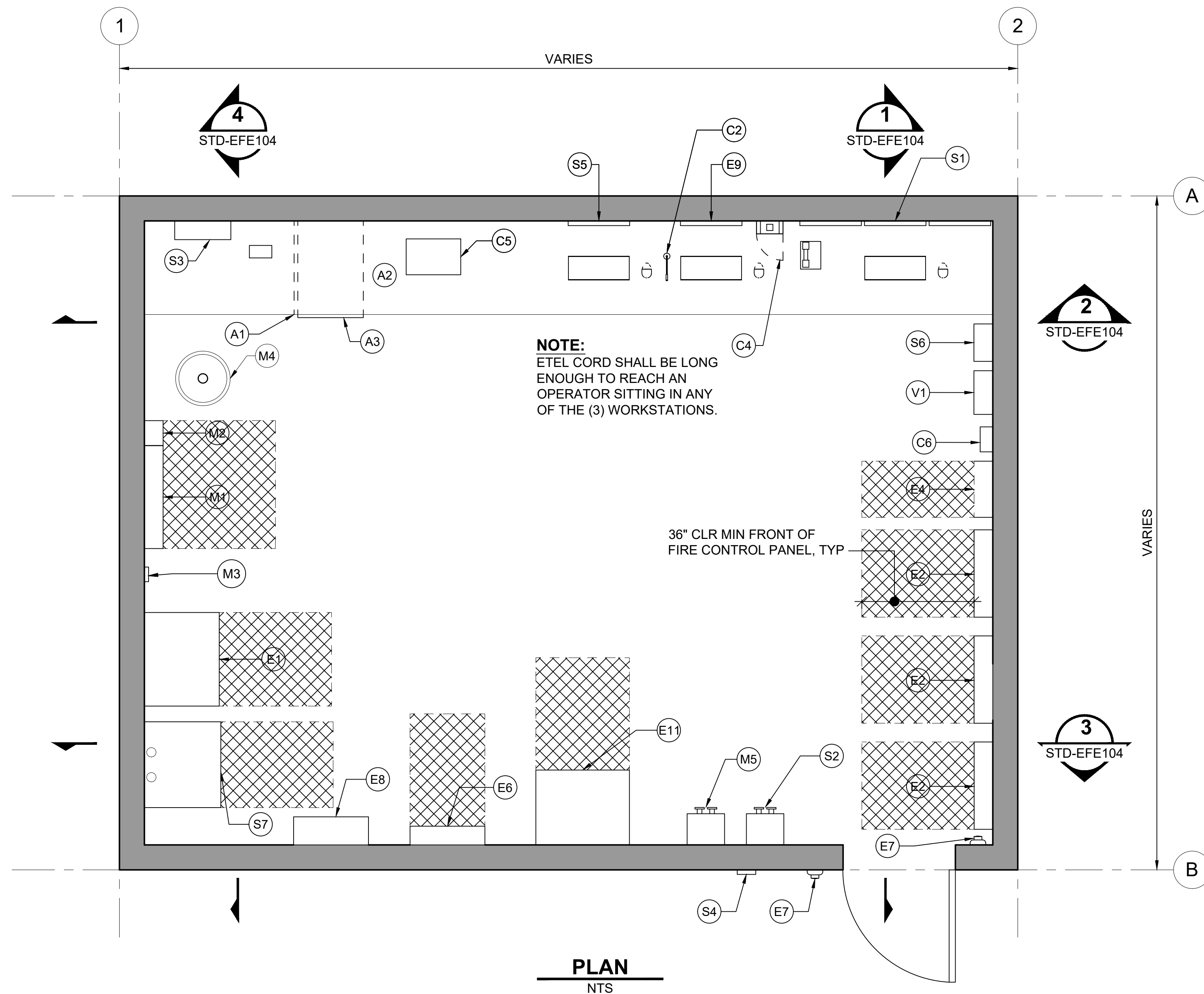
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| FILENAME: STD-EFP100 | |
| CONTRACT No.: RTA/LR | |
| DATE: 2/2024 | |

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| SOUND TRANSIT STANDARD DRAWINGS SYSTEMS FIRE LIFE SAFETY FIRE CONTROL ROOM FLOOR PLAN | DRAWING No.: | STD-EFP100 |
| | FACILITY ID: | |
| | SHEET No.: | REV: 2 |

| REF # | DESCRIPTION | DIMENSIONS HxWxD (INCHES) | DISCIPLINE |
|-------|---|---------------------------|----------------|
| A1 | SHELVES FOR O&M MANUALS/DRAWINGS | 12x48x30 | ARCH |
| A2 | WORK SURFACE | VARIES | ARCH |
| A3 | 19" EQUIPMENT RACK (UNDER DESK) | 23x21x31 | ARCH |
| C1 | PAGING SYSTEM (NOT SHOWN - LOCATE IN EQUIPMENT RACK) | 25x22 1/2x24 | COMMUNICATIONS |
| C2 | PA MICROPHONE | VARIES | COMMUNICATIONS |
| C3 | PRIVATE BRANCH EXCHANGE TELEPHONE (PBX) | VARIES | COMMUNICATIONS |
| C4 | EMERGENCY TELEPHONE (ETEL) | VARIES | COMMUNICATIONS |
| C5 | MULTI-UNIT, TWO-WAY RADIO CHARGER | 6x17 1/2x11 1/2 | COMMUNICATIONS |
| C6 | RADIO BDA MONITORING PANEL | 10x8x4 | COMMUNICATIONS |
| E1 | EVS CABINET | 72x30x24 | ELEC |
| E2 | FIRE ALARM CONTROL PANEL (FACP) | 50x100x8 | ELEC |
| E3 | FACP ALARM PRINTER | VARIES | ELEC |
| E4 | AES/CELLULAR RADIO DIALER | 18x18x6 | ELEC |
| E6 | BUILDING MANAGEMENT SYSTEM (BMS) ITC | 24x24x6 | ELEC |
| E7 | FIRE ALARM STROBE LIGHT (FOR CLEAN AGENT) | VARIES | ELEC |
| E8 | EXAMPLE ELECTRICAL PULLBOX | 30x24x9 | ELEC |
| E9 | FIRE ALARM HMI | VARIES | ELEC |
| E11 | BMS CABINET | 72x30x24 | ELEC |
| E12 | GENERAL PRINTER | VARIES | ELEC |
| M1 | CLEAN AGENT PANEL | 28 1/2x33x6 | MECH |
| M2 | CLEAN AGENT RELAY PANEL | 14x8x6 | MECH |
| M3 | THERMOSTAT | VARIES | MECH |
| M4 | CLEAN AGENT GAS (CA) TANK | VARIES | MECH |
| M5 | CA MANUAL STATIONS (MANUAL RELEASE AND ABORT SWITCH) | VARIES | MECH |
| S1 | SCADA COMPUTER WORKSTATION (BMS, TCS, EVS) | VARIES | SYSTEMS |
| S2 | TRACTION POWER EMERGENCY TRIP STATION (ETS) | VARIES | SYSTEMS |
| S3 | PA CONTROL FCR SPEAKER VOLUME CONTROL REOSTAT | 18x18x6 | SYSTEMS |
| S4 | ACCESS CARD READER (ACR) | VARIES | SYSTEMS |
| S5 | BUILDING MANAGEMENT SYSTEM (BMS) LOCAL COMPUTER WORKSTATION | VARIES | SYSTEMS |
| S6 | EMERGENCY VENTILATION CONTROL PANEL (EVCP) | 12x12x6 | SYSTEMS |
| S7 | SYSTEM INTERFACE TERMINAL CABINET | 48x27 1/2x25 | SYSTEMS |
| V1 | ELEVATOR ANNUNCIATION/CONTROL PANEL | 48x14x6 | VERTICAL |



GENERAL NOTES:

- FIRE COMMAND CENTER (FCC) FOR TUNNEL STATION SHALL BE NOT LESS THAN 200 SQUARE FEET WITH A MINIMUM DIMENSION OF 10' AND INCLUDE A WORK SURFACE WITH SPACE POWER AND DATA FOR MULTIPLE COMPUTER WORK STATIONS AS SHOWN.
- XXXXXX - INDICATES EQUIPMENT CLEARANCE ZONE.
- ANY CONDUITS SHOWN ARE FOR REFERENCE ONLY. DESIGNER TO COORDINATE CONDUIT NEEDS AND ENSURE ROUTING DOES NOT CREATE CONFLICT FOR EQUIPMENT MOUNTING.
- PROVIDE ADEQUATE POWER QUAD RECEPTACLE OUTLETS FOR ALL WORKSTATIONS AND PRINTER EQUIPMENT EVERY SIX FEET AND POWER FROM STATION UPS. (SEE STD-EPS101)
- ADDITIONAL RELAY BOXES/PANELS SUPPORTING VARIOUS SYSTEMS ARE LIKELY NECESSARY. ENSURE THAT THESE ARE CONSIDERED DURING DESIGN.
- DESIGNER SHALL VERIFY ALL EQUIPMENT DIMENSIONS. ROOM SIZE SHALL BE ADJUSTED AS NECESSARY
- REQUIRED SYSTEMS ARE DETERMINED BY THE TYPE OF STATION DEFINED IN THE DCM ALONG WITH AHJ REQUIREMENTS. DESIGNER TO COORDINATE SPACE FOR PHYSICAL AND FUNCTIONAL REQUIREMENTS OF ALL ELEMENTS.
- CONFIRM ANY RADIO ANTENNA REQUIREMENTS WITH SYSTEM DESIGNER TO ENSURE ADEQUATE COVERAGE AND LOCATE APPROPRIATELY.
- ACCESS POINTS FOR NON RELATED UTILITIES OR EQUIPMENT (I.E. SUMP HATCH) NOT SERVING THE FCC SHALL NOT BE LOCATED IN THE ROOM THAT MIGHT INTERFERE WITH FUNCTION.
- LARGE EQUIPMENT, SUCH AS TRANSFORMER, DIST. CABINET AND CA TANK SHOWN IN ROOM FOR REFERENCE OF NEEDED COORDINATION. COORDINATE SPECIFIC LOCATIONS APPROPRIATELY WITH STATION DESIGN, IF ELEMENTS NOT INVOLVED DIRECTLY IN EMERGENCY RESPONSE.

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| No. | DATE | DSN | CHK | APP | REVISION |
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| 2 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |
| 1 | 8/2019 | | | | REVISED SYSTEMS DIRECTIVE DRAWINGS |
| 0 | 1/2019 | | | | 2019 GUIDANCE DWG REVISIONS - GENERAL UPDATE |

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| CONTRACT No.: | |
| DATE: | 2/2024 |

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| SOUND TRANSIT STANDARD DRAWINGS SYSTEMS | |
| FIRE LIFE SAFETY FIRE COMMAND CENTER FLOOR PLAN LAYOUT | |

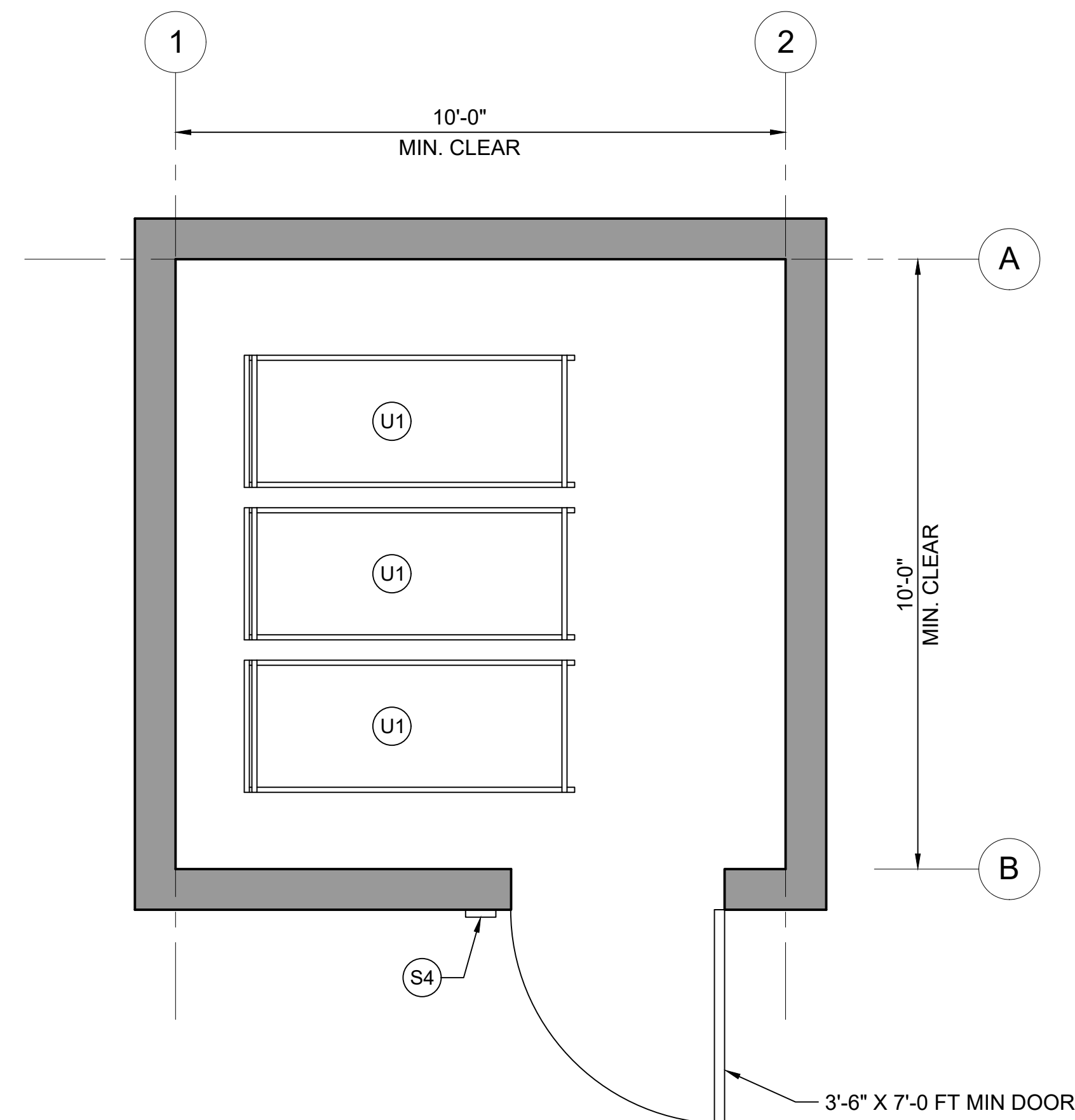
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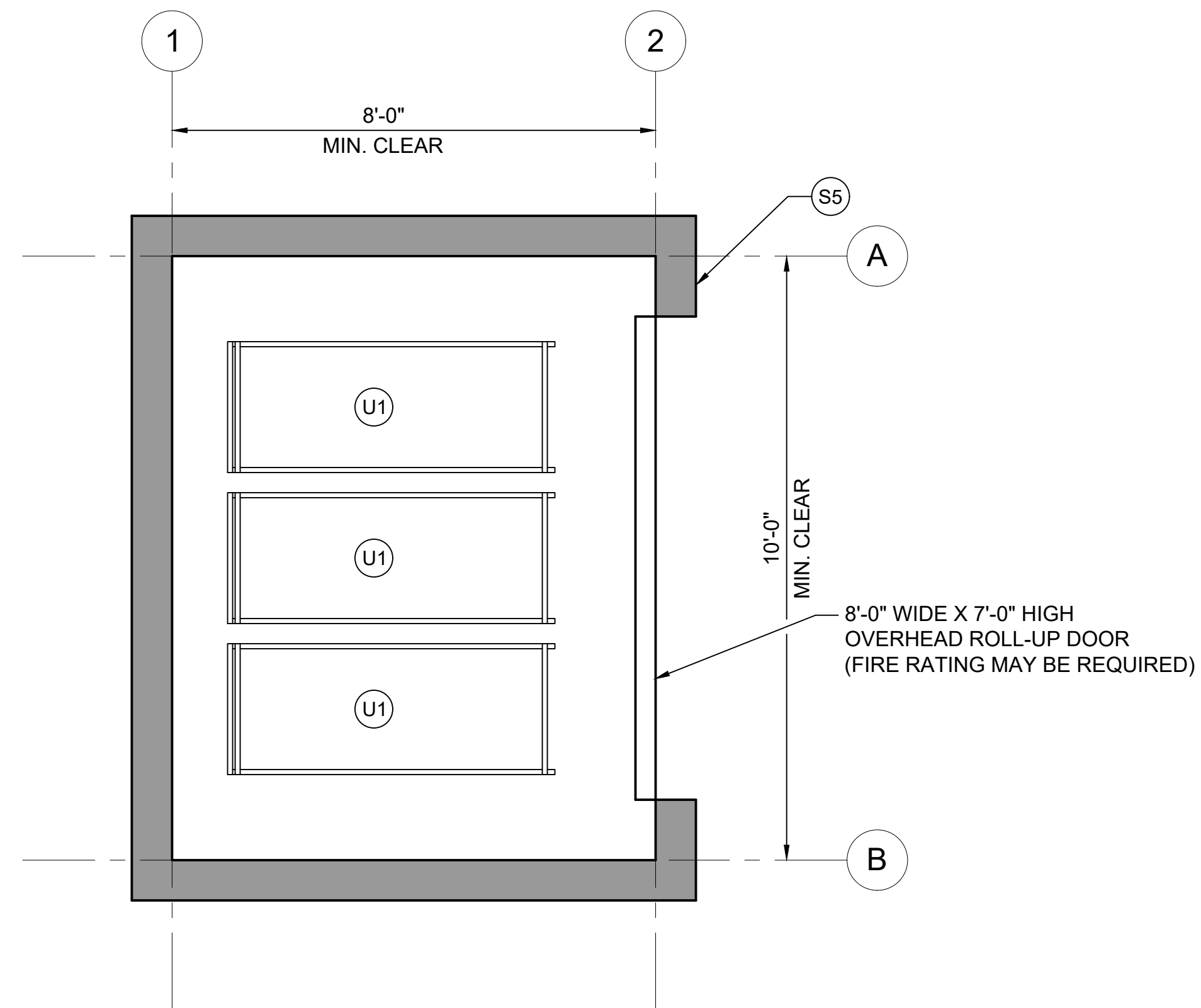
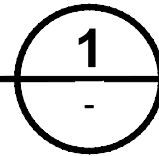
GENERAL NOTES:

- SEE FIRE/LIFE SAFETY SET 601 FOR REQUIREMENTS.
- ACCESS POINTS FOR NON RELATED UTILITIES OR EQUIPMENT (I.E. SUMP HATCH) NOT SERVING THE ERER SHALL NOT BE LOCATED IN THE ROOM THAT MIGHT INTERFERE WITH FUNCTION. CLEARANCES FOR ERER FUNCTION SHALL NOT BE IMPEDED BY ACCESS CLEARANCES.
- EMERGENCY RESPONDER EQUIPMENT ROOM (ERER) SHALL HAVE ADEQUATE CONVENIENCE OUTLETS.



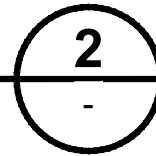
ERER PLAN VIEW - OPTION A

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



ERER PLAN VIEW - OPTION B

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




| REF # | DESCRIPTION | DIMENSIONS HxWxD (INCHES) | DISCIPLINE |
|-------|--|---------------------------|-------------|
| S4 | ACCESS CARD READER (ACR) | VARIES | SYSTEMS |
| S5 | CARD READER AND ROLL DOOR POWER CONTROLS | VARIES | SYSTEMS |
| U1 | ERER CART | 80 x 24 x 60 | ST PROVIDED |

| No. | DATE | DSN | CHK | APP | REVISION |
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| 2 | 2/2024 | ---- | ---- | ---- | 2024 REVISED STANDARD DRAWINGS |
| 1 | 8/2019 | ---- | ---- | ---- | REVISED SYSTEMS DIRECTIVE DRAWINGS |
| 0 | 1/2019 | ---- | ---- | ---- | 2019 GUIDANCE DWG REVISIONS 0 GENERAL UPDATE |

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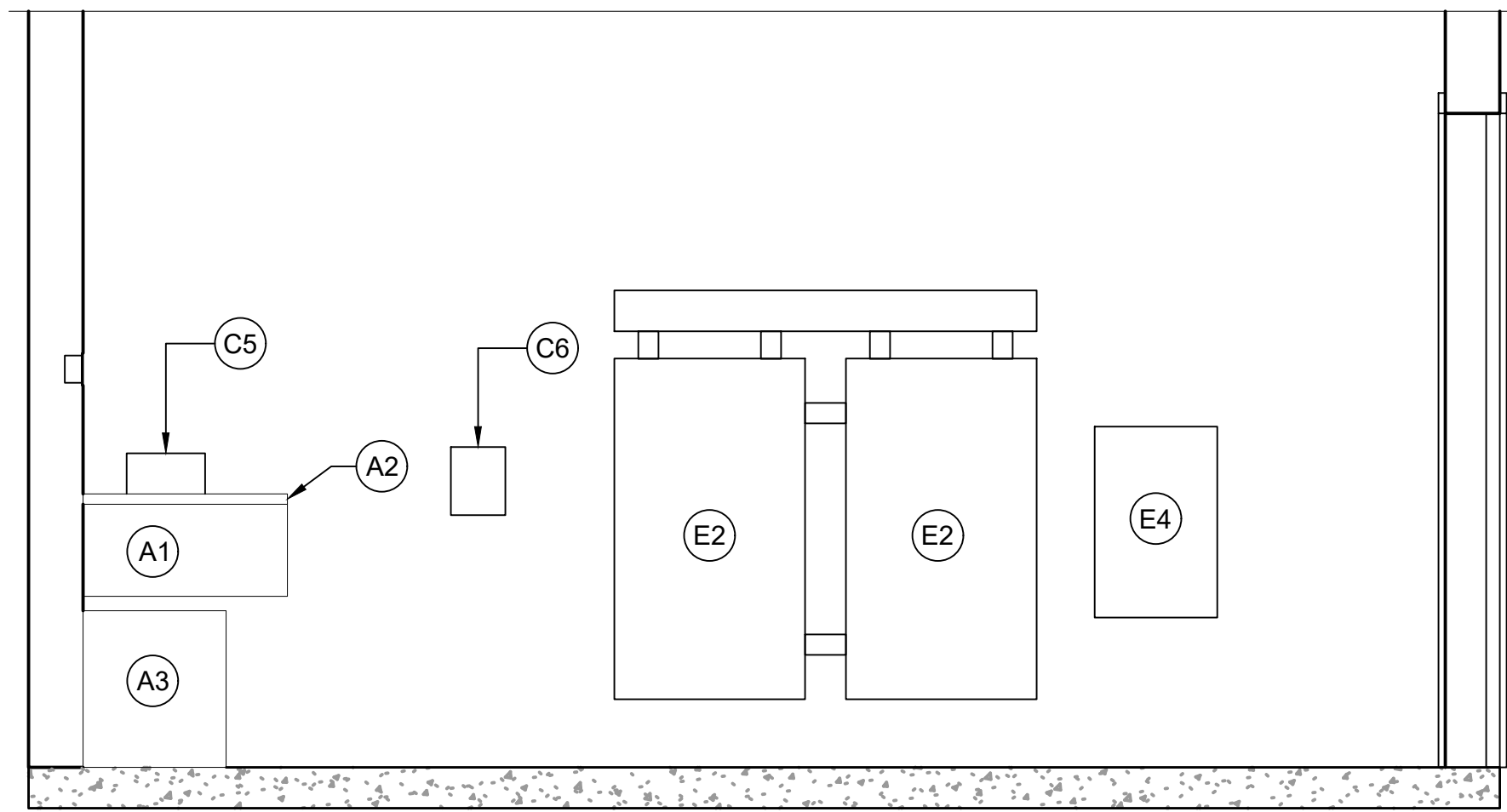


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 CONTRACT No.: RTA/LR
 DATE: 2/2024

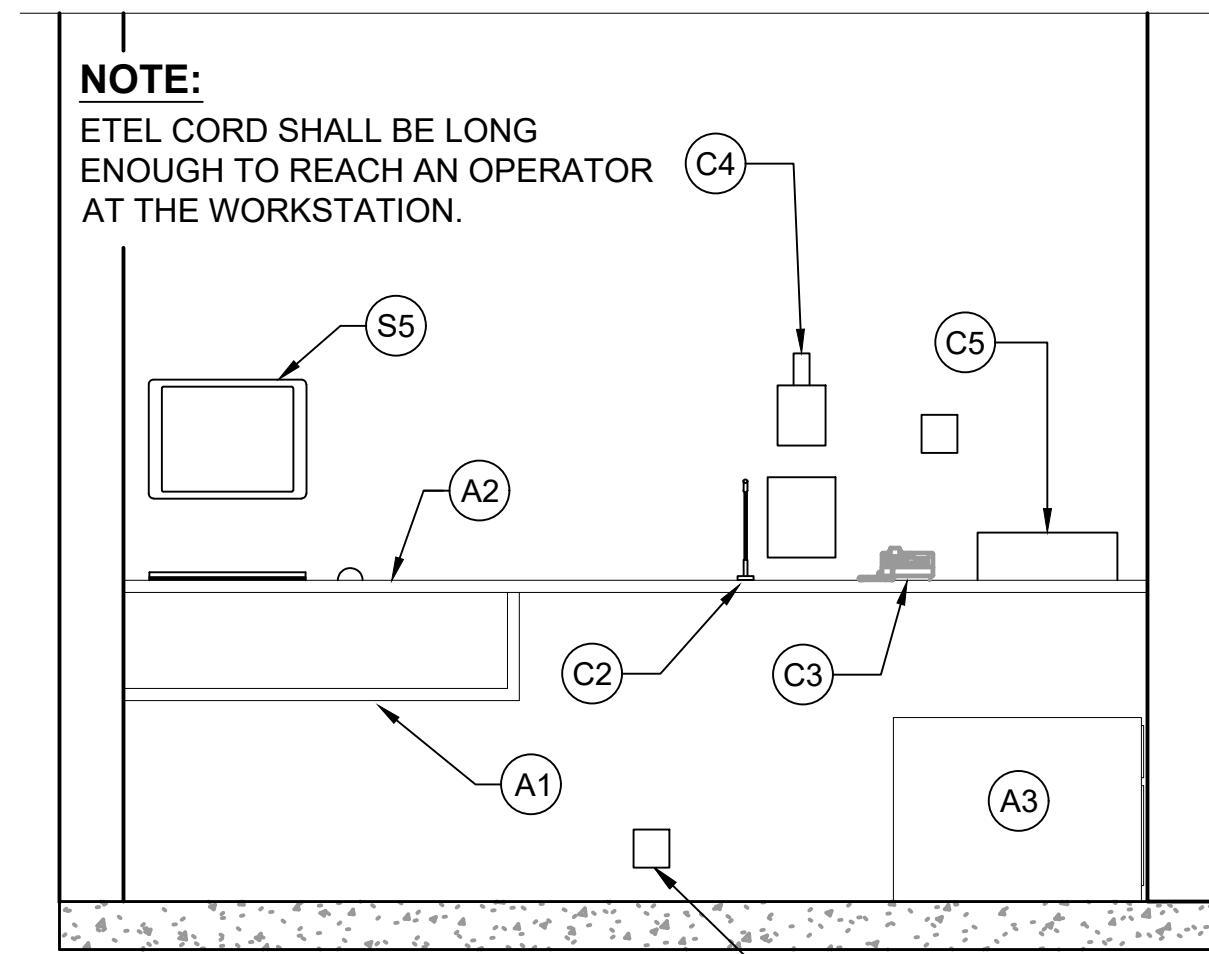
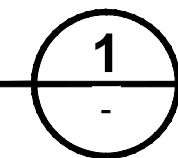
**SOUND TRANSIT
 STANDARD DRAWINGS
 SYSTEMS**

FIRE LIFE SAFETY
 EMERGENCY RESPONDER EQUIPMENT ROOM

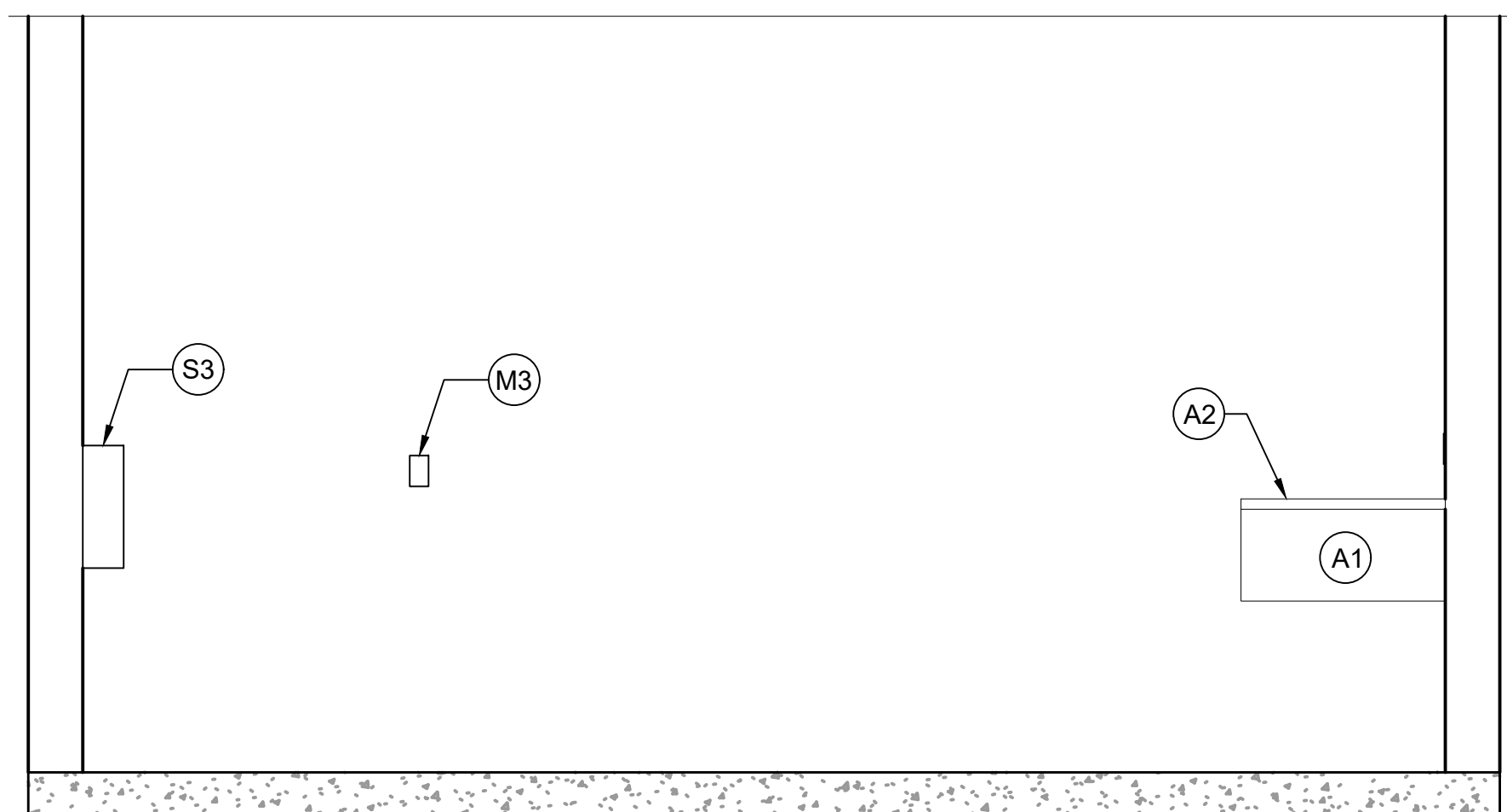
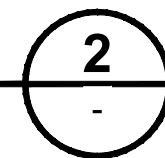
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| FACILITY ID: | |
| SHEET No.: | REV: 2 |



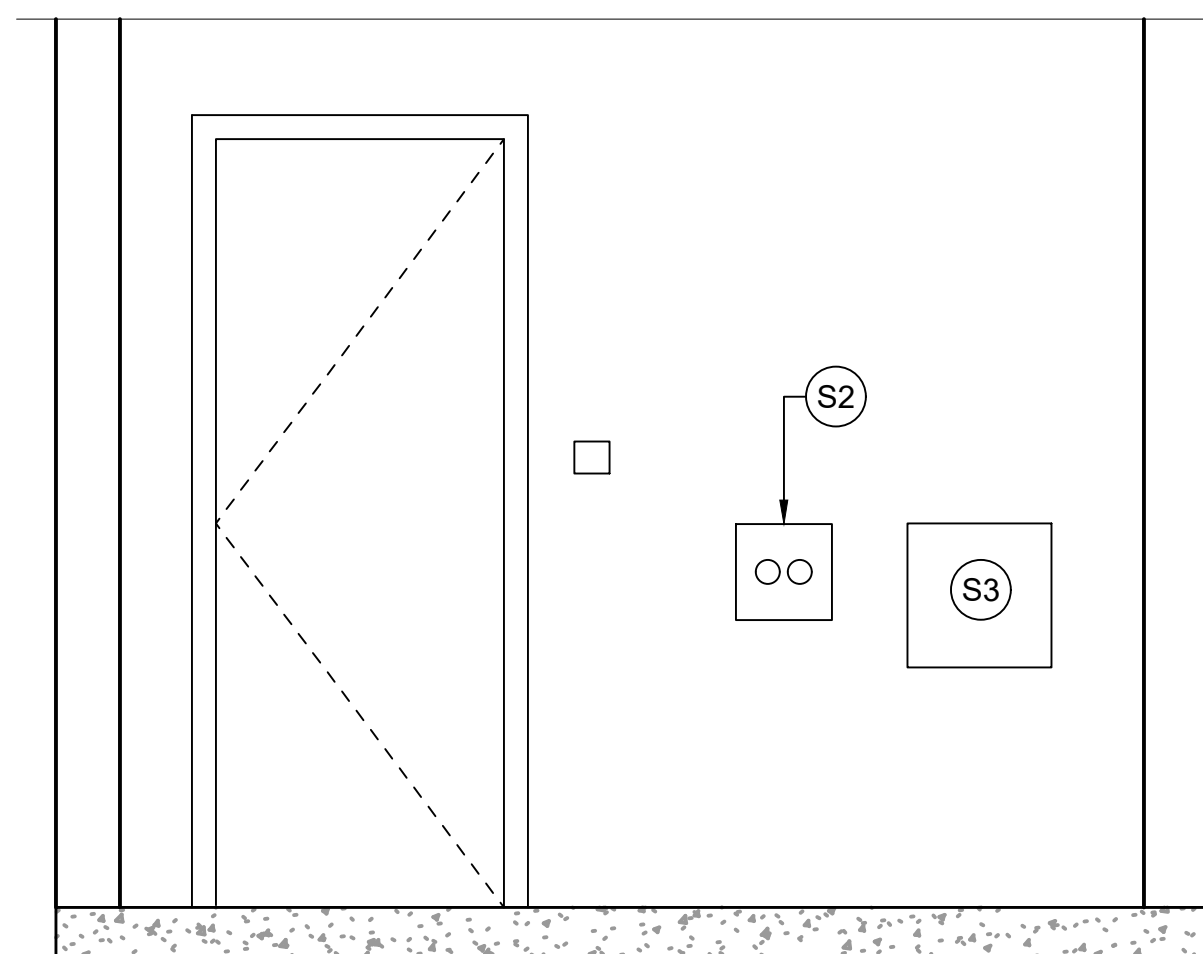
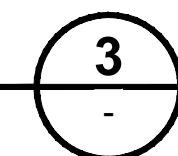
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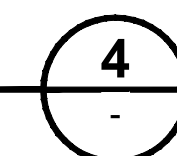
SECTION
SCALE: 1/2"=1'-0"



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



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



| REF # | DESCRIPTION | DIMENSIONS HxWxD (INCHES) | DISCIPLINE |
|-------|---|---------------------------|----------------|
| A1 | SHELVES FOR O&M MANUALS/DRAWINGS | 12x48x30 | ARCH |
| A2 | WORK SURFACE | VARIES | ARCH |
| A3 | 19" EQUIPMENT RACK (UNDER DESK) | 23x21x31 | ARCH |
| C2 | PA MICROPHONE | VARIES | COMMUNICATIONS |
| C3 | PRIVATE BRANCH EXCHANGE TELEPHONE (PBX) | VARIES | COMMUNICATIONS |
| C4 | EMERGENCY TELEPHONE (E TEL) | VARIES | COMMUNICATIONS |
| C5 | MULTI-UNIT, TWO-WAY RADIO CHARGER | 6x17 1/2x11 1/2 | COMMUNICATIONS |
| C6 | RADIO BDA MONITORING PANEL | 10x8x4 | COMMUNICATIONS |
| E2 | FIRE ALARM CONTROL PANEL (FACP) | 50x62x8 | ELEC |
| E4 | AES/CELLULAR RADIO DIALER | 28x18x6 | ELEC |
| M3 | THERMOSTAT | VARIES | MECH |
| S2 | TRACTION POWER EMERGENCY TRIP STATION (ETS) | VARIES | SYSTEMS |
| S3 | FCR SPEAKER VOLUME CONTROL REOSTAT | 18x18x6 | SYSTEMS |
| S4 | ACCESS CARD READER (ACR) | VARIES | SYSTEMS |
| S5 | BUILDING MANAGEMENT SYSTEM (BMS) LOCAL COMPUTER WORKSTATION | VARIES | SYSTEMS |

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| No. | DATE | DSN | CHK | APP | REVISION |
|-----|--------|-----|-----|-----|--|
| 4 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |
| 3 | 3/2021 | | | | NTD TU-1010 ELEVATOR CONTROL PANEL |
| 2 | 8/2019 | | | | REVISED SYSTEMS DIRECTIVE DRAWINGS |
| 1 | 1/2019 | | | | 2019 GUIDACNE DWG REVISIONS - GENERAL UPDATE |
| 0 | 8/2017 | | | | GUIDANCE DRAWINGS |

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| CHECKED BY: | |
| APPROVED BY: | |

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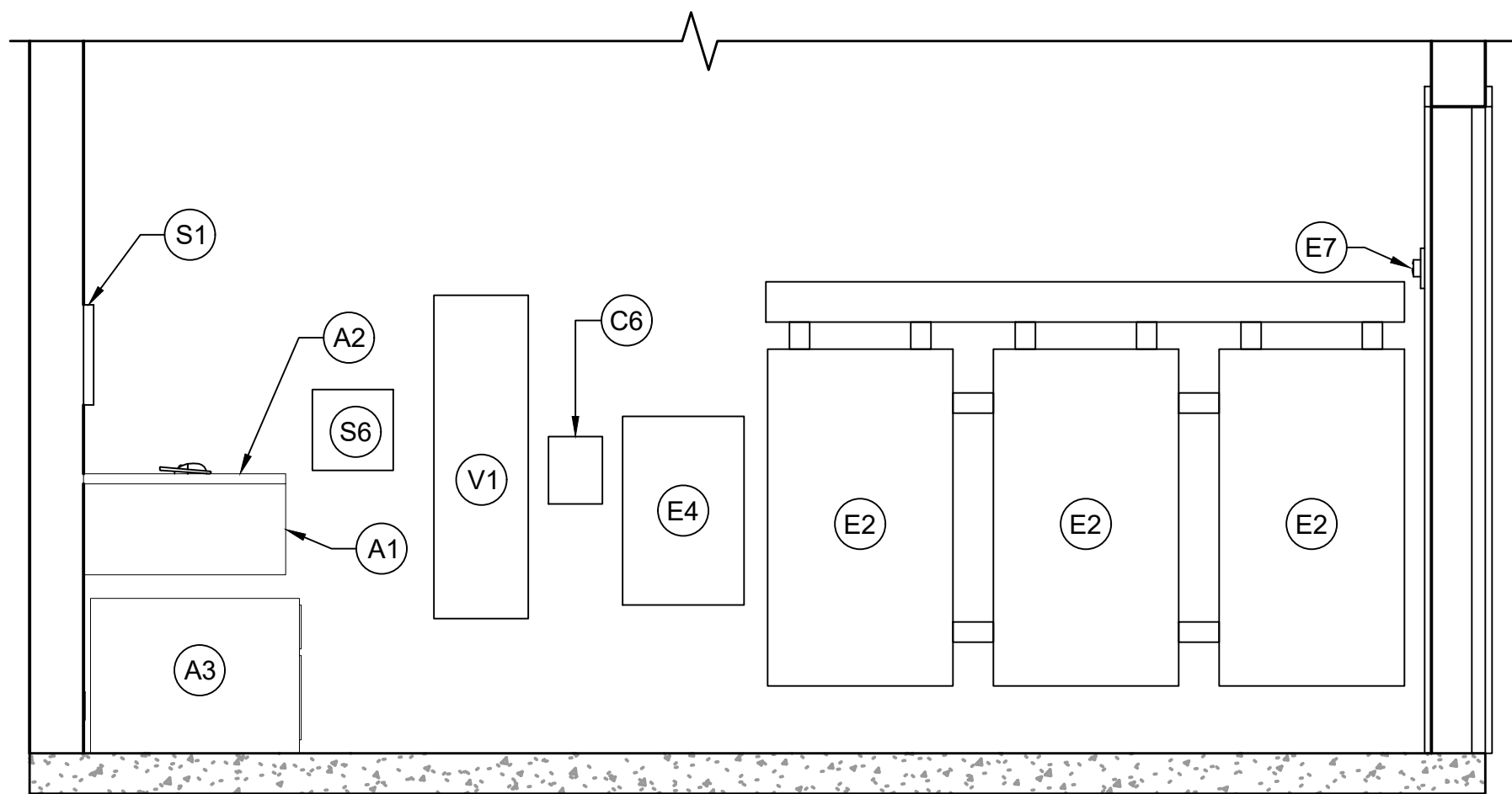
LINE IS 1" AT FULL SCALE

SCALE: 1/2"=1'-0"
FILENAME: STD-EFE103
CONTRACT No.: RTA/LR
DATE: 2/2024

**SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS**

FIRE LIFE SAFETY
FIRE CONTROL ROOM
SECTIONS

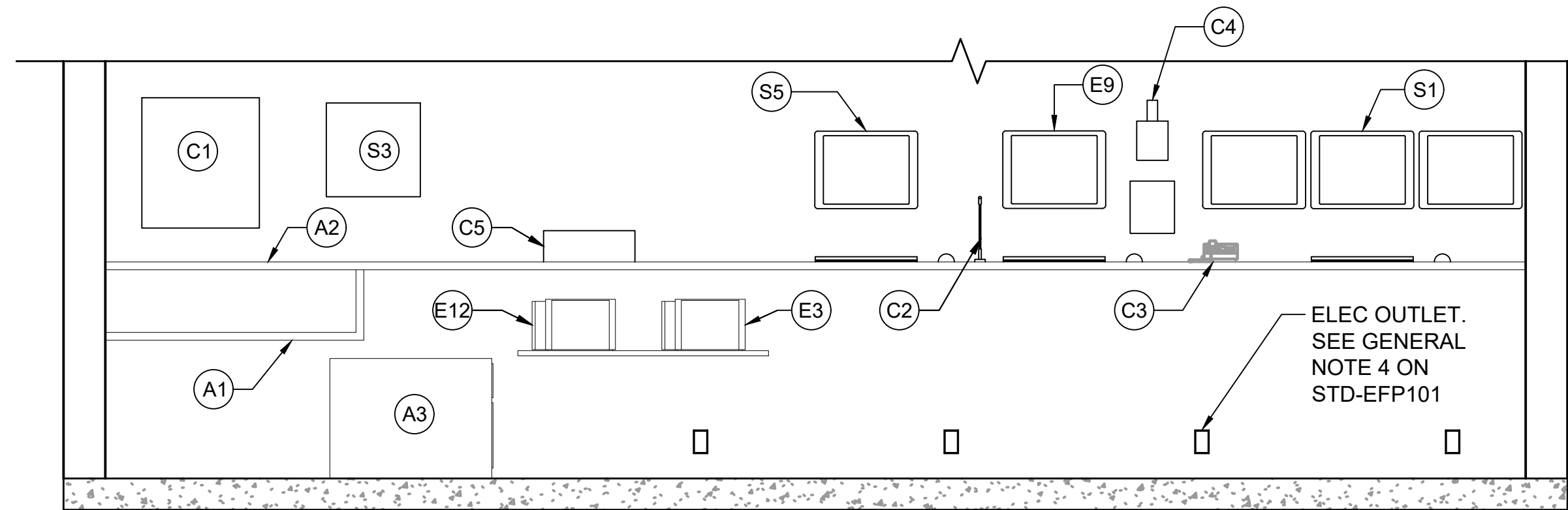
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| DRAWING No.: | STD-EFE103 |
| FACILITY ID: | |
| SHEET No.: | REV: 4 |



SECTION

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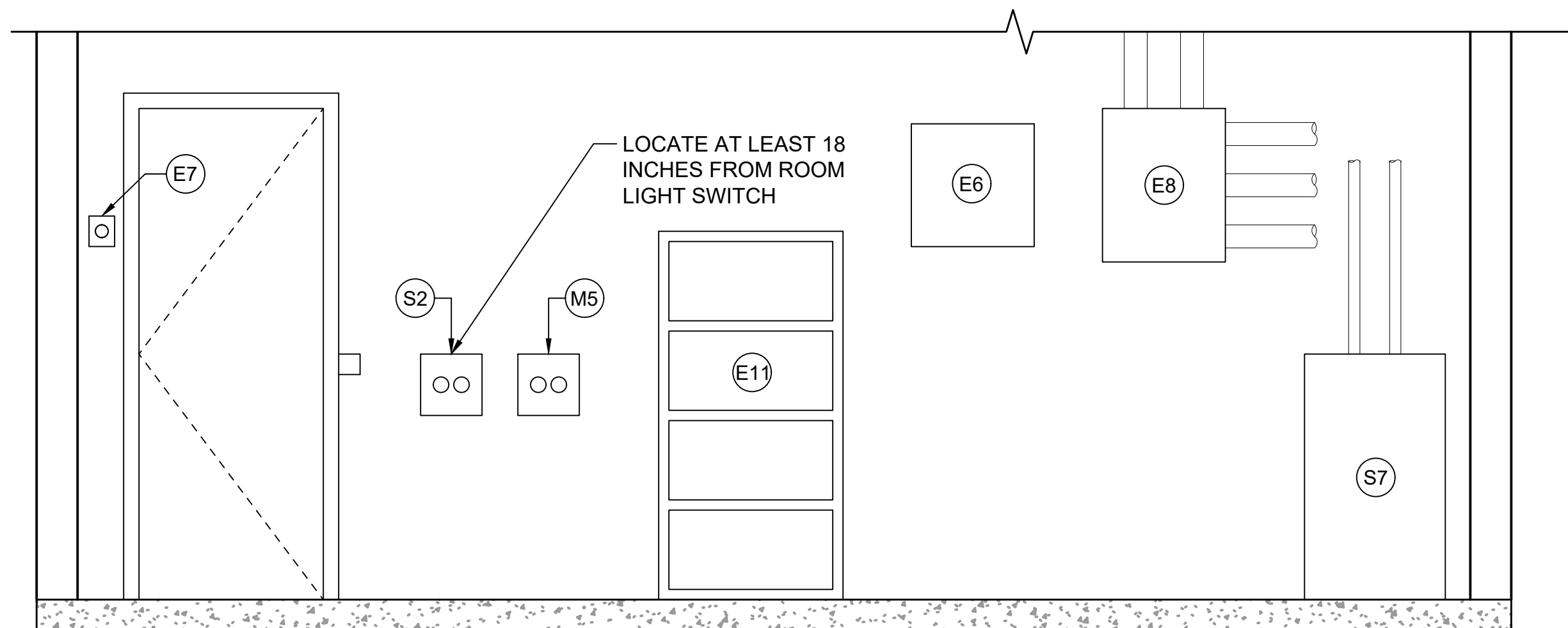
1



SECTION

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

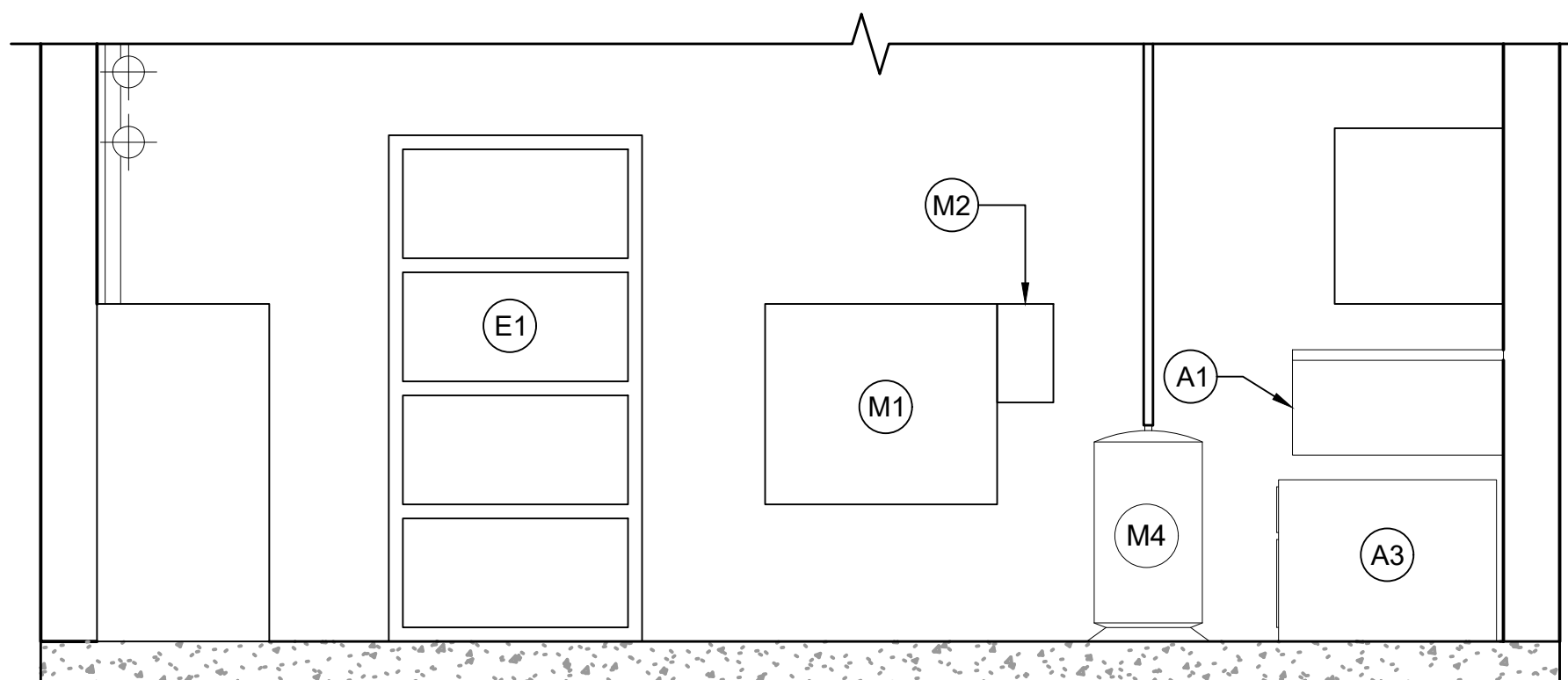
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SECTION

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

3



SECTION

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

4

| REF # | DESCRIPTION | DIMENSIONS HxWxD (INCHES) | DISCIPLINE |
|-------|---|---------------------------------|----------------|
| A1 | SHELVES FOR O&M MANUALS/DRAWINGS | 12x48x30 | ARCH |
| A2 | WORK SURFACE | VARIES | ARCH |
| A3 | 19" EQUIPMENT RACK (UNDER DESK) | 23x21x31 | ARCH |
| C1 | PAGING SYSTEM | 25x22 1/2x24 | COMMUNICATIONS |
| C2 | PA MICROPHONE | VARIES | COMMUNICATIONS |
| C3 | PRIVATE BRANCH EXCHANGE TELEPHONE (PBX) | VARIES | COMMUNICATIONS |
| C4 | EMERGENCY TELEPHONE (ETEL) | VARIES | COMMUNICATIONS |
| C5 | MULTI-UNIT, TWO-WAY RADIO CHARGER | 6x17 1/2x11 1/2 | COMMUNICATIONS |
| C6 | RADIO BDA MONITORING PANEL | 10x8 | COMMUNICATIONS |
| E1 | EVS CABINET | 72X36X6 | ELEC |
| E2 | FIRE ALARM CONTROL PANEL (FACP) | 50x100x8 | ELEC |
| E3 | FACP ALARM PRINTER | VARIES | ELEC |
| E4 | AES/CELLULAR RADIO DIALER | 28x18x6 | ELEC |
| E6 | BUILDING MANAGEMENT SYSTEM (BMS) ITC | 24x24x6 | ELEC |
| E7 | FIRE ALARM STROBE LIGHT (FOR CLEAN AGENT) | VARIES | ELEC |
| E8 | EXAMPLE ELECTRICAL PULLBOX | 30x24x9 | ELEC |
| E9 | FIREWORKS STATION HMI | VARIES | ELEC |
| E11 | BMS CABINET | 72x36x6 | ELEC |
| E12 | GENERAL PRINTER | VARIES | ELEC |
| M1 | CLEAN AGENT PANEL | 28 1/2x33x6 | MECH |
| M2 | CLEAN AGENT RELAY PANEL | 14x8x6 | MECH |
| M3 | THERMOSTAT | VARIES | MECH |
| M4 | CLEAN AGENT GAS (CA) TANK | VARIES | MECH |
| M5 | CA MANUAL STATIONS (MANUAL RELEASE AND ABORT SWITCH) | VARIES | MECH |
| S1 | SCADA COMPUTER WORKSTATION (BMS, TCS, EVS) | VARIES | SYSTEMS |
| S2 | TRACTION POWER EMERGENCY TRIP STATION (ETS) | VARIES | SYSTEMS |
| S3 | FCR SPEAKER VOLUME CONTROL REOSTAT | 18x18x6 | SYSTEMS |
| S4 | ACCESS CARD READER (ACR) | VARIES | SYSTEMS |
| S5 | BUILDING MANAGEMENT SYSTEM (BMS) LOCAL COMPUTER WORKSTATION | VARIES | SYSTEMS |
| S6 | EMERGENCY VENTILATION CONTROL PANEL (EVCP) | 12x12x6 | SYSTEMS |
| S7 | DISTRIBUTION CABINET | 48x27 1/2x25 | SYSTEMS |
| V1 | ELEVATOR ANNUNCIATION/CONTROL PANEL | 48x14x6 | VERTICAL |

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| No. | DATE | DSN | CHK | APP | REVISION |
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| 3 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |
| 2 | 8/2019 | | | | REVISED SYSTEMS DIRECTIVE DRAWINGS |
| 1 | 1/2019 | | | | 2019 GUIDACNE DWG REVISIONS - GENERAL UPDATE |
| 0 | 8/2017 | | | | GUIDANCE DRAWINGS |

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| SCALE: 1/2"=1'-0" |
| FILENAME: STD-EFE104 |
| CONTRACT No.: RTA/LR |
| DATE: 2/2024 |

LINE IS 1" AT FULL SCALE



**SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS**

FIRE LIFE SAFETY
FIRE COMMAND CENTER
SECTIONS

| | |
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| DRAWING No.: | STD-EFE104 |
| FACILITY ID: | |
| SHEET No.: | REV: |
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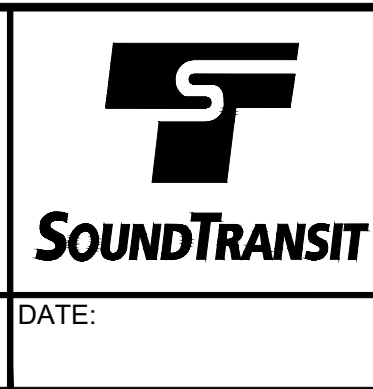
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| No. | DATE | DSN | CHK | APP | REVISION |
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| 0 | 8/2017 | | | | GUIDANCE DRAWINGS |
| 1 | 1/2019 | | | | 2019 GUIDANCE DWG REVISIONS - GENERAL UPDATRE |
| 2 | 8/2019 | | | | REVISED SYSTEMS DIRECTIVE DRAWINGS |
| 3 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |

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| FILENAME: | STD-EFS201 |
| CONTRACT No.: | RTA/LR |
| DATE: | 2/2024 |

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| SOUND TRANSIT STANDARD DRAWINGS SYSTEMS FIRE LIFE SAFETY FIRE ALARM PANEL INTERFACE DIAGRAM | DRAWING No.: | STD-EFS201 |
| | FACILITY ID: | |
| | SHEET No.: | 3 |

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| FIRE ALARM RESPONSE MATRIX | | OUTPUTS | | | | | | | | | | | | | | | | | | | | | | | |
|--------------------------------|--|----------------------------|--------------------------------------|---------------------------|-----------------------|------------------------|--------------------|----------------------------------|------------------------------------|-------------------------------|---|--|----------------------------|------------------------------------|------------------------------------|---------------------------------|---------------------------------------|---------------------------------------|-----------------------------|--|-----------|------------------------------|--------------------------|-----------------------|--------------------------|
| | | FACP | | | | | | | | | | | VIA BMS | VIA EVS | | | | VIA TCN | | | | UL MONITORING ⁵ | | | |
| | | ALARM ANNUNCIATION AT FACP | ACTIVATE FACP AUDIBLE/VISUAL DEVICES | SUPERVISORY ALARM AT FACP | TROUBLE ALARM AT FACP | ACTIVATE EXTERNAL BELL | RELEASE FIRE DOORS | RECALL ELEVATOR TO PRIMARY LEVEL | RECALL ELEVATOR TO ALTERNATE LEVEL | TUNNEL STANDPIPE DELUGE VALVE | CLOSE PASSIVE FIRE/SMOKE DAMPERS ⁷ | DRY CONTACT IN ITC FOR POTENTIAL TPSS POWER TRIP | FCU/FCR ROOM ACCESS UNLOCK | GENERAL HVAC SHUTDOWN ⁸ | START ELEVATOR PRESSURIZATION FANS | START STAIR PRESSURIZATION FANS | INITIATE TUNNEL EMERGENCY VENTILATION | INITIAL STATION EMERGENCY VENTILATION | ACTIVE PA SYSTEM EVACS MODE | ACTIVATE PLATFORM VMS EVACUATION MESSAGE | LCC ALARM | LCC SUPERVISORY ⁹ | LCC TROUBLE ⁹ | LCC FIREWORKS TROUBLE | UL CENTRAL STATION ALARM |
| ALARM ¹ | HEAT & SMOKE DETECTION (GENERAL) | X | X | | | X | | | X | X | X | 6 | 6 | 6 | 6 | X | X | X | | | | | X | | |
| | PRIMARY ELEVATOR LOBBY SMOKE/HEAT DETECTION | X | X | | | X | X | | X | X | X | 6 | 6 | 6 | 6 | X | X | X | | | | | X | | |
| | SECONDARY LOBBY/HOISTWAY PIT/MACHINE ROOM DETECTION | X | X | | | X | X | | X | X | X | 6 | 6 | 6 | 6 | X | X | X | | | | | X | | |
| | ELEVATOR MACHINE ROOM HEAT DETECTION (ADJACENT SPRINKLER HEADS) ³ | X | X | | | X | X | | X | X | X | 6 | 6 | 6 | 6 | X | X | X | | | | | X | | |
| | CLEAN AGENT PANEL ALARM | X | X | | | X | | | X | X | X | 6 | 6 | 6 | 6 | X | X | X | | | | | X | | |
| | SPRINKLER SYSTEM WATERFLOW | X | X | | X | X | | | X | X | X | 6 | 6 | 6 | 6 | X | X | X | | | | | X | | |
| | MANUAL PULL STATION | X | X | | | X | | | X | X | X | 6 | 6 | 6 | 6 | X | X | X | | | | | X | | |
| | TPSS ROOM HEAT DETECTION | X | X | | | X | | | X | X | X | 6 | 6 | 6 | 6 | X | X | X | | | | | X | | |
| TPSS ROOM SMOKE DETECTION | X | X | | | X | | | X | X | X | 6 | 6 | 6 | 6 | X | X | X | | | | | X | | | |
| SUPERVISORY | SPRINKLER/STANDPIPE VALVE TAMPER | | | X | | | | | | | | | | | | | | | | | X | | | X | |
| | DRY-PIPE SPRINKLER SYSTEM HI/LOW AIR PRESSURE | | | X | | | | | | | | | | | | | | | | | X | | | X | |
| | CLEAN AGENT SYSTEM PRE-ALARM (ONE SMOKE DETECTOR) | | | X | | | | | | | | | | | | | | | | | X | | | X | |
| | CLEAN AGENT SYSTEM SUPERVISORY | | | X | | | | | | | | | | | | | | | | | X | | | X | |
| | EMERGENCY RADIO SYSTEM SUPERVISORY | | | X | | | | | | | | | | | | | | | | | X | | | X | |
| | DUCT SMOKE DETECTION | | | X | | | | | | | | | | | | | | | | | X | | | X | |
| | HYDROGEN GAS DETECTION SYSTEM SUPERVISORY | | | X | | | | | | | | | | | | | | | | | X | | | X | |
| PA SYSTEM TROUBLE ² | | | X | | | | | | | | | | | | | | | | | X | | | X | | |
| EVS SYSTEM SUPERVISORY | | | X | | | | | | | | | | | | | | | | | X | | | X | | |
| ELEVATOR SHUNT POWER MONITOR | | | X | | | | | | | | | | | | | | | | | X | | | X | | |
| TROUBLE | FACP SYSTEM TROUBLE | | | X | | | | | | | | | | | | | | | | | X | | | X | |
| | STATION FIREWORKS SYSTEM TROUBLE | | | X | | | | | | | | | | | | | | | | | X | X | | | |
| | CLEAN AGENT SYSTEM TROUBLE | | | X | | | | | | | | | | | | | | | | | X | | | X | |
| | HYDROGEN GAS DETECTION SYSTEM TROUBLE | | | X | | | | | | | | | | | | | | | | | X | | | X | |
| | PA SYSTEM TROUBLE ² | | | X | | | | | | | | | | | | | | | | | X | | | X | |
| LCC | EVS SYSTEM TROUBLE | | | X | | | | | | | | | | | | | | | | | X | | | X | |
| | LCC MODE LAUNCH TUNNEL | | | | | | | 6 | | | | 6 | 6 | 6 | 6 | | | | | | | | | | |
| | LCC MODE LAUNCH STATION | | | | | | | 6 | | | 6 | 6 | 6 | 6 | | | | | | | | | | | |

1. HYDROGEN GAS DETECTION SYSTEM ALARMS MUST BE MONITORED BY THE BMS SYSTEM.
2. WHEN PA IS USED FOR AUDIBLE NOTIFICATION AND EVACS.
3. NOT APPLICABLE IN SEATTLE. ELEVATOR POWER SHUNT PER LOCAL RULE.
4. CLEAN AGENT, EMERGENCY RADIO, GAS DETECTION AND OTHER SUBSYSTEM ALARMS ARE SUMMARY ALARMS. PROVIDE ONE POINT ONLY REGARDLESS OF THE NUMBER OF ELEMENTS BEING MONITORED FOR SUPERVISORY OR TROUBLE CONDITIONS.
5. NOT APPLICABLE IN THE CITY OF SEATTLE WHERE THE LCC SERVES AS A PROPRIETARY CENTRAL STATION.
6. RESPONDS PER ERM WHICH IS TYPICALLY MANUAL ACTIVATION ONLY FROM THE LCC OR BY SELECTING A MODE AT THE STATION EVCP. CONFIRM WITH ST AND AHJ.
7. SEE CLEAN AGENT SYSTEM RESPONSE MATRIX FOR LOCAL HVAC SHUTDOWN AND ROOM FSDS. ROOM FSDS ARE TYPICALLY CONTROLLED DIRECTLY FROM THE CLEAN AGENT PANEL.
8. GENERAL HVAC SHUT DOWN WHEN REQUIRED BY THE IMC.
9. LCC RECIEVES SUMMARY ALARM ONLY FOR EACH SIGNAL TYPE.

GENERAL NOTES:

1. PRE- ALARM:
THE FIRST DETECTOR ASSOCIATED WITH A CLEAN AGENT SYSTEM WHICH RESULTS IN A SUPERVISORY ALARM TO THE MAIN BUILDING FOR ALARM CONTROL PANEL.
2. ALARM:
INDICATES FULL FIRE ALARM ACTIVATION INCLUDING ALARM NOTIFICATION AND FIRE DEPARTMENT NOTIFICATION.
3. SUPERVISORY:
A CONDITION WHICH TYPICALLY RELATES TO AN ISSUE WITH A SYSTEM, PROCESS, OR EQUIPMENT THAT IS MONITORED BY THE FIRE ALARM SYSTEM. FOR EXAMPLE, SOMETHING LIKE A SPRINKLER VALVE BEING CLOSED (OUT OF NORMAL POSITION), LOW AIR PRESSURE IN A DRY-PIPE SYSTEM, FIRE PUMP CONDITION (LOSS OF POWER, ETC.)
4. TROUBLE:
DETECTION OF A CONDITION WHICH TYPICALLY INDICATES AN ISSUE OR FAULT (SOMETHING HAS FAILED OR IS ABOUT TO FAIL) LIKE AN ELECTRICAL COMPONENT (POWER SUPPLY) FAILURE, BATTERY CHARGER FAILURE, A GROUBD FAULT, AN OPEN CIRCUIT, OR OFF SITE MONITORING FAILURE, FOR EXAMPLE.
5. FACP TO NOTIFY PAVMS SYSTEM OF PRE-RECORDED MESSAGES PLAYED IN ASSOCIATION WITH EMERGENCY RESPONSE MODES. VMS TO DISPLAY MESSAGE ACCORDINGLY. (WHERE ALLOWED BY THE AHJ)
6. COORDINATE I/O FOR EVS AND BMS.
7. FIRE ALARM SYSTEM MATRIX SHOWN IS FOR REFERENCE. DESIGNER SHALL DEVELOP STATION SPECIFIC MATRIX AND COORDINATE WITH RESPECTIVE DISCIPLINES AND EMERGENCY RESPONSE MATRIX.

| | | CLEAN SYSTEM ACTIONS | | | | | | | | | | | | | | TO BUILDING FACP | VIA BMS | | | | | | | | |
|-------------|---|----------------------------|---------------------------------|---|---|--|--|---------------------------------------|---|-------------------------|-----------------------------------|--------------------------|--|-------------------------------------|---------------------------------|------------------|---------|----------------------|---------------------------|----------------------------|---------------------|--|--|---|---|
| | | ALARM AT CLEAN AGENT PANEL | VISUAL ALARMS (INTERIOR) ACTIVE | VISUAL ALARM (EXTERIOR) AGENT DISCHARG WHEN TIMER COMPLETE AND FOR MANUAL RELEASE | HORNS- INTERMITTAT PULSE AT 60 BEATS PER MINUTE | HORNS- INTERMITTAT PULSE AT 120 BEATS PER MINUTE | HORNS- CONSTANT WHEN TIMER COMPLETE AND FOR MANUAL RELEASE | 30 SECOND AGENT DISCHARGE TIMER START | TIMER PUAUSE WHEN PRESSED AND RESET TO 30 SECONDS WHEN RELEASED | AGENT RELEASE IMMEDIATE | AGENT RELEASE WHEN TIMER COMPLETE | CLOSE FIRE/SMOKE DAMPERS | RELEASE DOOR CLOSER FOR ROOM (IF PROVIDED) | CLEAN AGENT PANEL SUPERVISORY ALARM | CLEAN AGENT PANEL TROUBLE ALARM | | | ALARM SIGNAL TO FACP | SUPERVISORY ALARM TO FACP | TROUBLE SIGNAL TO THE FACP | SHUT DOWN ROOM HVAC | | | | |
| ALARM | FIRST SMOKE DETECTOR | X | X | | X | | | | | | | | | | | | | | | | | | | X | X |
| | SECOND SMOKE DETECTOR | X | X | X | X | X | X | X | | | | | | | | | | | | | | | | X | X |
| | MANUAL RELEASE STATION ABORT BUTTON (DEADMAN STYLE) | X | X | X | | | X | | | | | | | | | | X | | | | | | | X | X |
| SUPERVISORY | CLEAN AGENT SYSTEM SUPERVISORY | | | | | | | | | | | | | | | | | | | | | | | X | X |
| | CYCLINDER ACTUATION DEVICE REMOVED | | | | | | | | | | | | | | | | | | | | | | | X | X |
| | MAINTENANCE BYPASS KEY SWITCH | | | | | | | | | | | | | | | | | | | | | | | X | X |
| | NOTIFICATION DEVICE BYPASS (PROGRAMMABLE BUTTON) | | | | | | | | | | | | | | | | | | | | | | | X | X |
| | FIRE ALARM RELAY BYPASS (PROGRAMMABLE BUTTON) | | | | | | | | | | | | | | | | | | | | | | | X | X |
| TROUBLE | AGENT PRESSURE SWITCH ABORT BUTTON ACTIVE (NO ALARMS) | | | | | | | | | | | | | | | | | | | | | | | X | X |
| | CLEAN AGENT SYSTEM TROUBLE* | | | | | | | | | | | | | | | | | | | | | | | X | X |



SCALE: NTS
FILENAME: STD-EFS202
CONTRACT No.: RTA/LR
DATE: 2/2024

SOUND TRANSIT STANDARD DRAWINGS SYSTEMS
FIRE LIFE SAFETY
FIRE ALARM CONTROL PANEL
SEQUENCE OF OPERATIONS

DRAWING No.: **STD-EFS202**
FACILITY ID:
SHEET No.: REV: 2

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| DESIGNED BY: | |
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| 2 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |
| 1 | 8/2019 | | | | REVISED SYSTEM DIRECTIVE DRAWINGS |
| 0 | 1/2019 | | | | 2019 GUIDANCE DWG REVISIONS - GENERAL UPDATE |

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| No. | DATE | DSN | CHK | APP | REVISION |
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| 0 | 8/2017 | ---- | ---- | ---- | GUIDANCE DRAWINGS |
| 1 | 1/2019 | ---- | ---- | ---- | 2018 GUIDANCE DWG REVISIONS - GENERAL UPDATE |
| 2 | 8/2019 | ---- | ---- | ---- | REVISED SYSTEMS DIRECTIVE DRAWINGS |
| 3 | 2/2024 | ---- | ---- | ---- | 2024 REVISED STANDARD DRAWINGS |

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LINE IS 1" AT FULL SCALE

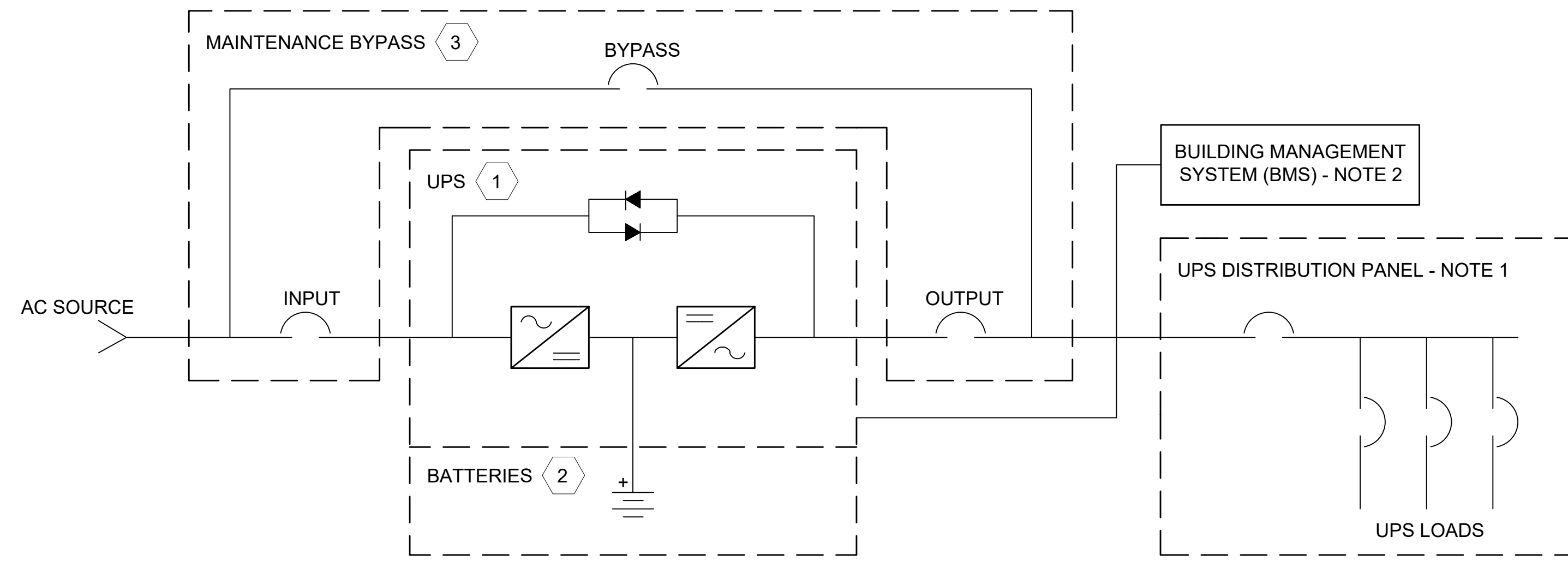


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| SCALE: | NTS |
| FILENAME: | STD-EFS204 |
| CONTRACT No.: | RTA/LR |
| DATE: | 2/2024 |

**SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS**

FIRE LIFE SAFETY
TYPICAL STATION FAC/ PA/SCU
INTERFACE BLOCK DIAGRAM

| | |
|--------------|-------------------|
| DRAWING No.: | STD-EFS204 |
| FACILITY ID: | - |
| SHEET No.: | 3 |



UPS SCHEMATIC

- GENERAL NOTES:**
- TABLE OUTLINES POWER SOURCE FOR KEY SYSTEMS AND EQUIPMENT AT A TYPICAL ST STATION.
- NOTES:**
- EXTERNAL UPS DISTRIBUTION PANEL REQUIRED. NO DISTRIBUTION EQUIPMENT INSIDE UPS ENCLOSURE.
 - PROVIDE RELAY CARD WITH CONTACT CLOSURES TO BMS. SEE XXXXX FOR TYPICAL POINTS REQUIRED. PROVIDE NETWORK CARD WITH BACnet CONNECTION TO TUNNEL CONTROL NETWORK (TCN) SWITCH.

| TYPICAL STATION EQUIPMENT - POWER SOURCE (GENERAL NOTE 1) | | | | |
|---|-------------|----------|--------------------------|---|
| EQUIPMENT / SYSTEMS | STATION UPS | COMM UPS | DEDICATED BATTERY BACKUP | NOTES |
| LIGHTING | | | | |
| EMERGENCY LIGHTS / EXIT SIGNS | X | | | |
| ESCALATOR SKIRT LIGHTS | X | | | |
| FIRE ALARM / FIRE PROTECTION | | | | |
| FIRE ALARM CONTROL PANEL (FACP) | X | | | FACP ALSO INCLUDES LOCAL BATTERY PER NFPA 72 |
| CLEAN AGENT (CAG) CONTROL PANEL | X | | | CAG ALSO INCLUDES LOCAL BATTERY PER NFPA 72 |
| FIRE ALARM BOOSTER POWER SUPPLY FOR NOTIFICATION CIRCUITS | X | | | |
| DELUGE VALVES | | | | |
| OTHER | | | | |
| QUAD RECEPTACLES IN FCC ROOM | X | | | RECEPTACLES USED FOR BMS, EVS, FIRE ALARM WORKSTATIONS |
| ELEVATOR AND ESCALATOR INDICATOR LIGHT | X | | | |
| POWER DISTRIBUTION | | | | |
| AC / DC SWITCHGEAR CONTROLS | | | X | |
| SYSTEMS | | | | |
| EMERGENCY VENTILATION SYSTEM (EVS) | | X | | EVS PROGRAMMABLE LOGIC CONTROLLERS (PLC), INPUT/OUTPUT MODULES, NETWORK SWITCHES, ROUTERS/COMMUNICATION EQUIPMENT |
| BUILDING MANAGEMENT SYSTEM (BMS) | | X | | BMS PROGRAMMABLE LOGIC CONTROLLERS (PLC), INPUT/OUTPUT MODULES, NETWORK SWITCHES, ROUTERS/COMMUNICATION EQUIPMENT |
| ACCESS CONTROL SYSTEM (ACS) | | X | | ACS CONTROLLERS, POWER SUPPLIES, COMMUNICATION EQUIPMENT |
| PUBLIC ADDRESS (PA) SYSTEM | | X | | PA EQUIPMENT INCLUDING CONTROLLERS, POWER SUPPLIES, COMMUNICATION EQUIPMENT |
| CCTV SYSTEM | | X | | CCTV EQUIPMENT INCLUDING CONTROLLERS, POWER SUPPLIES, COMMUNICATION EQUIPMENT |
| PASSENGER INFORMATION SYSTEMS (PIMS) | | X | | PIMS EQUIPMENT INCLUDING CONTROLLERS, POWER SUPPLIES, COMMUNICATION EQUIPMENT |
| RADIO SYSTEMS | | | X | |
| DEVICES | | | | |
| PASSENGER EMERGENCY TELEPHONES (PET) | | X | | |
| EMERGENCY TELEPHONES (ETEL) | | X | | |
| CUSTOMER EMERGENCY STATION (BLUE LIGHT) | | X | | |
| VARIABLE MESSAGE SIGNS (VMS) | | X | | |

| KEY EQUIPMENT CRITERIA | |
|------------------------|--|
| 1 | - ON-LINE DOUBLE CONVERSION UPS - UL924, UL1778 - MODULAR CONSTRUCTION WITH DRAW OUT ASSEMBLIES - STATIC BYPASS - LCD DISPLAY - RELAY CARD AND BACnet COMPATIBLE NETWORK ADAPTER |
| 2 | - EXTERNAL BATTERY CABINET - MODULAR BATTERY SYSTEM USING DC QUICK DISCONNECTS - VALVE REGULATED LEAD ACID (VRLA) BATTERIES - 90 MINUTE DURATION (MIN), SCALABLE - THERMAL RUNAWAY CONTROL |
| 3 | - EXTERNAL MAINTENACE BYPASS REQUIRED. WALL MOUNT PREFERRED, SIDECAR ACCEPTABLE. |

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| No. | DATE | DSN | CHK | APP | REVISION |
|-----|--------|------|------|------|--|
| 3 | 2/2024 | ---- | ---- | ---- | 2024 REVISED STANDARD DRAWINGS |
| 2 | 8/2019 | ---- | ---- | ---- | REVISED SYSTEM DIRECTIVE DRAWINGS |
| 1 | 1/2019 | ---- | ---- | ---- | 2019 GUIDANCE DWG REVISION - GENERAL UPDATES |
| 0 | 8/2017 | ---- | ---- | ---- | GUIDANCE DRAWINGS |

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| DESIGNED BY: | |
| DRAWN BY: | |
| CHECKED BY: | |
| APPROVED BY: | |

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| SUBMITTED BY: | DATE: | REVIEWED BY: | DATE: |
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SCALE: NTS
FILENAME: STD-EPS101
CONTRACT No.: RTA/LR
DATE: 2/2024

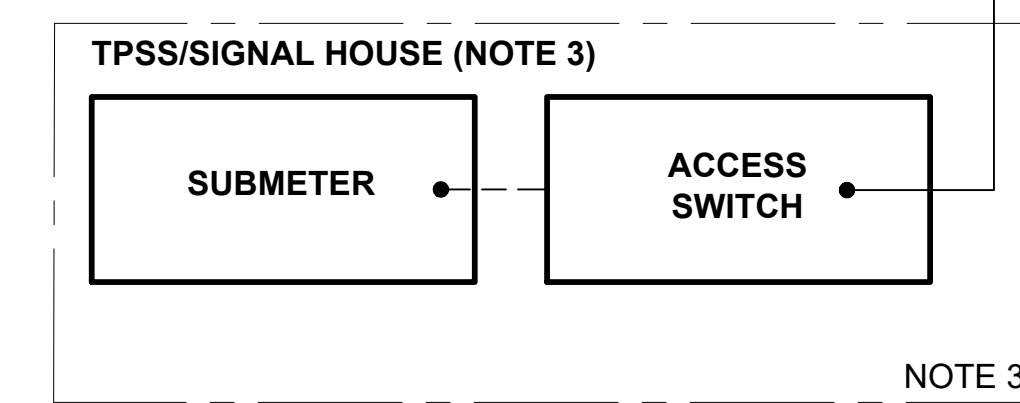
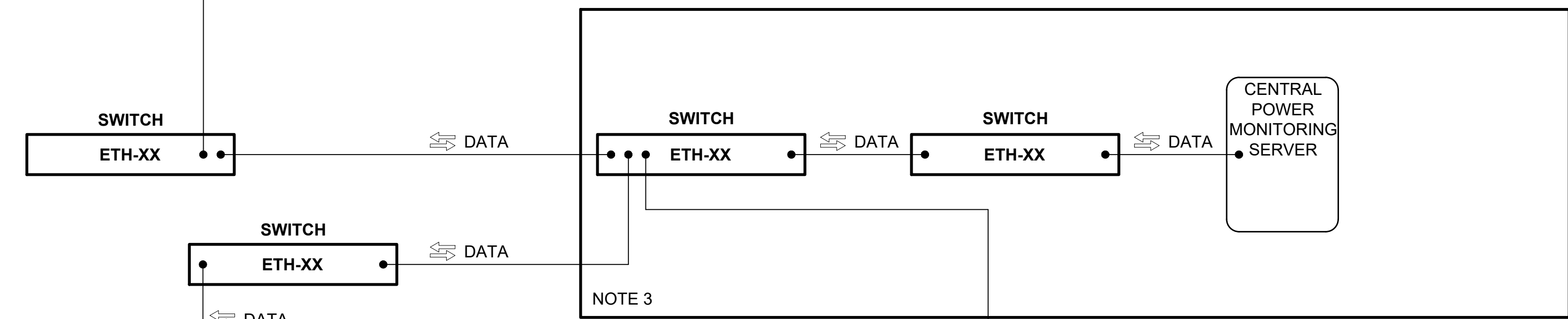
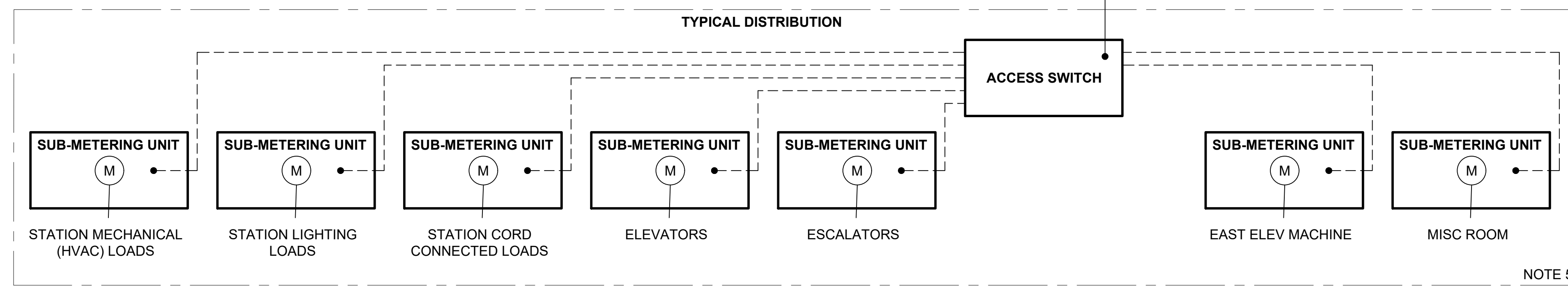
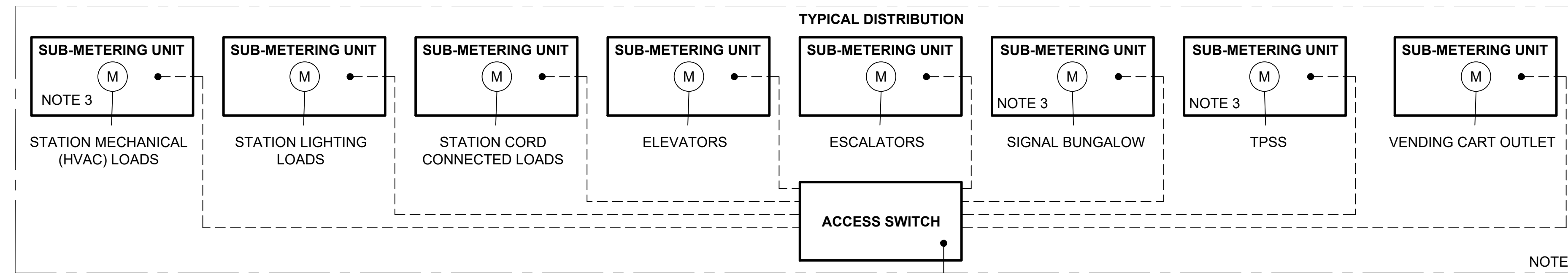
SOUND TRANSIT STANDARD DRAWINGS SYSTEMS

ELECTRICAL EQUIPMENT POWER REQUIREMENT AND COMM STATION UPS CONTROL WIRING DIAGRAM

| |
|--------------------------------|
| DRAWING No.: STD-EPS101 |
| FACILITY ID: |
| SHEET No.: 3 |

GENERAL NOTES:

1. THE INTERFACES SHOWN ARE TYPICAL FOR STATION ELECTRICAL SYSTEM SUB-METERING EQUIPMENT. FOR REQUIRED FUNCTIONALITY AND OPERATIONAL PARAMETERS, COORDINATE SPECIFIC FUNCTION WITH ST. NOT ALL IMPLEMENTATIONS WILL UTILIZE ALL THE COMPONENTS SHOWN.
2. SIGNAL COMMUNICATIONS BETWEEN CENTRAL POWER MONITORING SERVER AND METERING EQUIPMENT SHALL BE COORDINATED BY DESIGN TEAM, AS WELL AS PHYSICAL LOCATIONS.
3. IF SIGNALS OR TPSS POWER COMES FROM STATION POWER, AN ADDITIONAL SUBMETER IS REQUIRED.
4. FOLLOW APPLICABLE ENERGY CODE REQUIREMENTS FOR HVAC SYSTEM AND DOMESTIC HOT WATER (DHW) ENERGY USE.
5. SCHEMATIC IS SHOWN FOR CONCEPT AND GENERAL GROUPING OF DISTRIBUTION LOADS. END USE METERING IS DEPENDENT ON ELECTRICAL DESIGN AND MUST MEET APPLICABLE ENERGY CODES.



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| No. | DATE | DSN | CHK | APP | REVISION |
|-----|--------|-----|-----|-----|-----------------------------------|
| 2 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |
| 1 | 8/2019 | | | | REVISED SYSTEM DIRECTIVE DRAWINGS |
| 0 | 8/2017 | | | | GUIDANCE DRAWINGS |

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| DRAWN BY: | |
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SCALE: NTS
 FILENAME: STD-JBS502
 CONTRACT No.: RTA/LR
 DATE: 2/2024

**SOUND TRANSIT
 STANDARD DRAWINGS
 SYSTEMS**

BUILDING MANAGEMENT SYSTEM
 ENERGY MONITORING SYSTEM
 DIAGRAM

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| DRAWING No.: | STD-JBS502 |
| FACILITY ID: | |
| SHEET No.: | REV: 2 |

BMS-SCADA POINTS LIST

| SYSTEM | EQUIPMENT TYPE | EQUIP ID | PLC I/O DESCRIPTION | POINT TYPE | PLC TAG | | LOCAL BMS | | REMOTE BMS SCADA (LCC) | | NOTES |
|----------|------------------------------|----------|--|------------|------------------------------|----------------------------|-----------------------|----------------|------------------------|----------------|-------|
| | | | | | TEMPLATE | EXAMPLE | INDICATE /ALARM INPUT | CONTROL OUTPUT | INDICATE /ALARM INPUT | CONTROL OUTPUT | |
| SECURITY | ACCESS CARD READER | ACR | ACR ROOM/DOOR OPEN | DI | LXX_ACR_ZZ_OPEN_DI | E09_ACR_06_OPEN_DI | X | | X | | |
| SECURITY | ACCESS CARD READER | ACR | ACR DOOR ALARM | DI | LXX_ACR_ZZ_ALARM_DI | N11_ACR_06_ALARM_DI | X | | X | | |
| SECURITY | ACCESS CARD READER | ACR | ACR REQUEST TO EXIT / UNLOCK | DO | LXX_ACR_ZZ_REX_DO | N09_ACR_07_REX_DO | | X | | X | |
| HVAC | AIR CONDITIONING UNIT | ACU | SUPPLY AIR TEMPERATURE | MB/TCP | LXX_ACU_ZZ_SA_TEMP_AI | E09_ACU_01_SA_TEMP_AI | X | | | | |
| HVAC | AIR CONDITIONING UNIT | ACU | OUTSIDE AIR TEMPERATURE | MB/TCP | LXX_ACU_ZZ_OA_TEMP_AI | E09_ACU_01_OA_TEMP_AI | X | | | | |
| HVAC | AIR CONDITIONING UNIT | ACU | RETURN AIR (DRY BULB) TEMPERATURE | MB/TCP | LXX_ACU_ZZ_RA_DB_TEMP_AI | E09_ACU_01_RA_DB_TEMP_AI | X | | | | |
| HVAC | AIR CONDITIONING UNIT | ACU | RETURN AIR (WET BULB) TEMPERATURE | MB/TCP | LXX_ACU_ZZ_RA_WB_TEMP_AI | E09_ACU_01_RA_WB_TEMP_AI | X | | | | |
| HVAC | AIR CONDITIONING UNIT | ACU | ROOM TEMPERATURE | AI | LXX_ACU_ZZ_THRM_YYYY_AI | E09_ACU_02_THRM_S10_AI | X | | X | | |
| HVAC | AIR CONDITIONING UNIT | ACU | FILTER DIFF PRESSURE HIGH / DIRTY | DI | LXX_ACU_ZZ_PRESS_N_HIGH_DI | N09_ACU_02_PRESS_2_HIGH_DI | X | | X | | |
| HVAC | AIR CONDITIONING UNIT | ACU | ZONE TEMPERATURE | MB/TCP | LXX_ACU_ZZ_ZONE_TEMP_AI | N07_ACU_01_ZONE_TEMP_AI | X | | | | |
| HVAC | AIR CONDITIONING UNIT | ACU | ZONE TEMPERATURE SETPOINT | MB/TCP | LXX_ACU_ZZ_ZONE_TEMP_SP_AO | N07_ACU_01_ZONE_TEMP_SP_AO | | X | | | |
| HVAC | AIR CONDITIONING UNIT | ACU | ACU RUNNING | DI | LXX_ACU_ZZ_RUNNING_DI | N09_ACU_02_RUNNING_DI | X | | X | | |
| HVAC | AIR CONDITIONING UNIT | ACU | ACU HOA SWITCH IN AUTO | DI | LXX_ACU_ZZ_IN_AUTO_DI | E09_ACU_02_IN_AUTO_DI | X | | | | |
| HVAC | AIR CONDITIONING UNIT | ACU | ACU TROUBLE ALARM | DI | LXX_ACU_ZZ_TROUBLE_DI | N09_ACU_02_TROUBLE_DI | X | | X | | |
| HVAC | AIR CONDITIONING UNIT | ACU | ACU ENABLE COMMAND | DO | LXX_ACU_ZZ_ENABLE_DO | N11_ACU_03_ENABLE_DO | | X | | | |
| HVAC | AIR CONDITIONING UNIT | ACU | ACU LEAD COMMAND | DO | LXX_ACU_ZZ_LEAD_DO | N07_ACU_02_LEAD_DO | | X | | | |
| HVAC | AIR HANDLING UNIT | AHU | OUTSIDE AIR TEMPERATURE | MB/TCP | LXX_AHU_ZZ_OA_TEMP_AI | | X | | | | |
| HVAC | AIR HANDLING UNIT | AHU | SUPPLY AIR TEMPERATURE | MB/TCP | LXX_AHU_ZZ_SA_TEMP_AI | | X | | | | |
| HVAC | AIR HANDLING UNIT | AHU | VFD SPEED | MB/TCP | LXX_AHU_ZZ_VFD_SPD_AI | | X | | | | |
| HVAC | AIR HANDLING UNIT | AHU | OUTSIDE AIR DAMPER POSITION | MB/TCP | LXX_AHU_ZZ_OA_DMP_POS_AI | | X | | | | |
| HVAC | AIR HANDLING UNIT | AHU | EXHAUST AIR DAMPER POSITION | MB/TCP | LXX_AHU_ZZ_EA_DMP_POS_AI | | X | | | | |
| HVAC | AIR HANDLING UNIT | AHU | RETURN AIR DAMPER POSITION | MB/TCP | LXX_AHU_ZZ_RA_DMP_POS_AI | | X | | | | |
| HVAC | AIR HANDLING UNIT | AHU | AVERAGE ZONE TEMP | MB/TCP | LXX_AHU_ZZ_ZONE_TEMP_AI | | X | | | | |
| HVAC | AIR HANDLING UNIT | AHU | AHU RUNNING | DI | LXX_AHU_ZZ_RUNNING_DI | N09_AHU_03_RUNNING_DI | X | | X | | |
| HVAC | AIR HANDLING UNIT | AHU | VFD FAULT | MB/TCP | LXX_AHU_ZZ_VFD_FAULT_DI | | X | | X | | |
| HVAC | AIR HANDLING UNIT | AHU | VFD READY | MB/TCP | LXX_AHU_ZZ_VFD_RDY_DI | | X | | | | |
| HVAC | AIR HANDLING UNIT | AHU | FILTER DIFF PRESSURE HIGH / DIRTY | DI | LXX_AHU_ZZ_PRESS_N_HIGH_DI | N07_AHU_01_PRESS_1_HIGH_DI | X | | X | | |
| HVAC | AIR HANDLING UNIT | AHU | AHU TROUBLE ALARM | DI | LXX_AHU_ZZ_TROUBLE_DI | N11_AHU_01_TROUBLE_DI | X | | X | | |
| HVAC | AIR HANDLING UNIT | AHU | SUPPLY AIR TEMPERATURE SETPOINT | MB/TCP | LXX_AHU_ZZ_SA_TEMP_SP_AO | | | X | | | |
| HVAC | AIR HANDLING UNIT | AHU | AHU ENABLE COMMAND | DO | LXX_AHU_ZZ_ENABLE_DO | N09_AHU_02_ENABLE_DO | | X | | | |
| BMS | BMS PLC / REMOTE IO | PLC | POWER SUPPLY FAIL | DI | LXX_PLC_ZZ_PSFAL_DI | | X | | X | | |
| BMS | BMS PLC / REMOTE IO | PLC | RACK/SLOT OK | DI | LXX_PLC_ZZ_RACKSLT_STATUS_DI | | X | | X | | |
| BMS | BMS PLC / REMOTE IO | PLC | RACK/SLOT POWER | DI | LXX_PLC_ZZ_RACKPWR_STATUS_DI | | X | | | | |
| BMS | BMS PLC / REMOTE IO | PLC | HARDWARE STATUS | DI | LXX_PLC_ZZ_CPU_STATUS_DI | | X | | | | |
| BMS | BMS PLC / REMOTE IO | PLC | HEARTBEAT EVS | DI | LXX_PLC_ZZ_HB_DI | | X | | | | |
| HVAC | CHILLER PRESSURE TRANSMITTER | PT | CHILLED WATER PRESSURE TRANSMITTER | AI | LXX_PT_ZZ_PRESSURE_AI | N07_PT_07_PRESSURE_AI | X | | X | | |
| SECURITY | DOOR INTRUSION DEVICE | DID | DOOR OPEN INTRUSION ALARM | DI | LXX_DID_ZZ_OPEN_DI | N09_DID_28_OPEN_DI | X | | X | | |
| ELEC | ELECTRICAL SWITCHGEAR | SWGR | MAIN BREAKER OPEN | DI | LXX_SWGR_ZZ_MAIN_OPEN_DI | E03_SWGR_01_MAIN_OPEN_DI | X | | X | | |
| ELEC | ELECTRICAL SWITCHGEAR | SWGR | MAIN BREAKER CLOSED | DI | LXX_SWGR_ZZ_MAIN_CLOSED_DI | E03_SWGR_01_MAIN_CLOSED_DI | X | | X | | |
| ELEC | ELECTRICAL SWITCHGEAR | SWGR | GENERATOR BREAKER OPEN | DI | LXX_SWGR_ZZ_GBKR_OPEN_DI | E03_SWGR_01_GBKR_OPEN_DI | X | | X | | |
| ELEC | ELECTRICAL SWITCHGEAR | SWGR | GENERATOR BREAKER CLOSED | DI | LXX_SWGR_ZZ_GBKR_CLOSED_DI | E03_SWGR_01_GBKR_CLOSED_DI | X | | X | | |
| ELEC | ELECTRICAL SWITCHGEAR | SWGR | MAIN BREAKER REMOTE CLOSE COMMAND | DO | LXX_SWGR_ZZ_MAIN_CLOSE_DO | E03_SWGR_01_MAIN_CLOSE_DO | | X | | X | |
| ELEC | ELECTRICAL SWITCHGEAR | SWGR | MAIN BREAKER REMOTE TRIP COMMAND | DO | LXX_SWGR_ZZ_MAIN_TRIP_DO | E03_SWGR_01_MAIN_TRIP_DO | | X | | X | |
| ELEC | ELECTRICAL SWITCHGEAR | SWGR | GENERATOR BREAKER REMOTE CLOSE COMMAND | DO | LXX_SWGR_ZZ_GBKR_CLOSE_DO | E03_SWGR_01_GBKR_CLOSE_DO | | X | | X | |
| ELEC | ELECTRICAL SWITCHGEAR | SWGR | GENERATOR BREAKER REMOTE TRIP COMMAND | DO | LXX_SWGR_ZZ_GBKR_TRIP_DO | E03_SWGR_01_GBKR_TRIP_DO | | X | | X | |

GENERAL NOTES:

1. CONTRACTOR RESPONSIBLE TO PROVIDE A COMPLETE POINTS AND SIDT LIST BASED ON EQUIPMENT TO BE INSTALLED AT EACH FACILITY. EACH TYPICAL EQUIPMENT TYPE MAY NOT BE REQUIRED AT A FACILITY.
2. THIS IS A SAMPLE POINTS LIST, ADDITIONAL POINTS MAY BE REQUIRED TO IMPLEMENT A WORKING SYSTEM. DESIGNER TO COORDINATE MINIMUM LIST FOR CONTRACT SPECIFIC LIST.
3. PROVIDE SOFT I/O POINTS AS REQUIRED TO MEET THE FUNCTIONAL REQUIREMENTS OF EQUIPMENT WITH A COMMUNICATIONS INTERFACE.
4. PROVIDE MAP OF ALL ADDRESS INFORMATION FOR LOCAL BMS HMI AND REMOTE SCADA LCC INTERFACE. DEMONSTRATE MAPPING AND CROSS-REFERENCE INFORMATION IS CORRECT.
5. CONTRACTOR SHALL PROVIDE 25% HARDWARE I/O SPARES.
6. DESIGNER TO DETERMINE WHICH POINTS ARE SUPERVISED CIRCUITS FROM FACP.
7. DESIGNER TO COORDINATE POINTS WITH ALL SEQUENCE OF OPERATIONS, INCLUDING BUT NOT LIMITED TO MECHANICAL, ELECTRICAL, FIRE ALARM AND COMMUNICATIONS SYSTEMS.
8. BDA POINTS WIRED TO FACP FOR ALL OTHER FACILITIES.

TAG LEGEND

| | |
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| L | LINK SEGEMENT {C-CENTRAL, N-NORTH, S-SOUTH, E-EAST} |
| XX | STATION/ FACILITY NUMBER {01, 03, 05 ETC.} |
| ZZ | EQUIPMENT/ DEVICE NUMBER |
| YY | ROOM/ LOCATION ID |
| N | NUMBER INSTANCE |

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| 3 | 2/2024 | ---- | ---- | ---- | 2024 REVISED STANDARD DRAWINGS |
| 2 | 8/2019 | ---- | ---- | ---- | REVISED SYSTEMS DIRECTIVE DRAWINGS |
| 1 | 1/2019 | ---- | ---- | ---- | 2019 GUIDANCE DW REVISIONS - GENERAL UPDATE |
| 0 | 8/2017 | ---- | ---- | ---- | GUIDANCE DRAWINGS |
| No. | DATE | DSN | CHK | APP | REVISION |

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| CHECKED BY: | |
| APPROVED BY: | |

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SCALE: NTS
FILENAME: STD-JBS503
CONTRACT No.: RTA/LR
DATE: 2/2024

**SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS**

BUILDING MANAGEMENT SYSTEM
BMS SUMMARY INDICATIONS

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| DRAWING No.: | STD-JBS503 |
| FACILITY ID: | |
| SHEET No.: | REV: 3 |

BMS-SCADA POINTS LIST (CONT)

| SYSTEM | EQUIPMENT TYPE | EQUIP ID | PLC I/O DESCRIPTION | POINT TYPE | PLC TAG | | LOCAL BMS | | REMOTE BMS SCADA (LCC) | | NOTES |
|--------|-----------------------|----------|------------------------------------|------------|----------------------------|----------------------------|-----------------------|----------------|------------------------|----------------|---|
| | | | | | TEMPLATE | EXAMPLE | INDICATE /ALARM INPUT | CONTROL OUTPUT | INDICATE /ALARM INPUT | CONTROL OUTPUT | |
| HVAC | EXHAUST FAN | EFAN | EXHAUST FAN RUNNING | DI | LXX_EFAN_ZZ_RUNNING_DI | N07_EFAN_01_RUNNING_DI | X | | X | | |
| HVAC | EXHAUST FAN | EFAN | DIFFERENTIAL PRESSURE SWITCH LOW | DI | LXX_EFAN_ZZ_PRESS_LOW_DI | N07_EFAN_01_PRESS_LOW_DI | X | | X | | |
| HVAC | EXHAUST FAN | EFAN | EXHAUST FAN FAULT | DI | LXX_EFAN_ZZ_FAULT_DI | N07_EFAN_01_FAULT_DI | X | | X | | |
| HVAC | EXHAUST FAN | EFAN | AIR FLOW SWITCH | DI | LXX_EFAN_ZZ_FLOW_DI | | X | | X | | FOR UPS ROOM - FAN DISCHARGE DUCT |
| HVAC | EXHAUST FAN | EFAN | EXHAUST FAN CALL TO RUN | DO | LXX_EFAN_ZZ_CALL_RUN_DO | N07_EFAN_01_CALL_RUN_DO | | X | | | |
| EVS | EVS PLC | PLC | EVS PLC STATUS | DI | LXX_EVS_ZZ_PLC_OK_DI | N07_EVS_PLC_OK_DI | X | | X | | |
| FIRE | FIRE ALARM | FACP | HAZMAT INDICATION | DI | LXX_FACP_ZZ_HAZMAT_DI | N07_FACP_01_HAZMAT_DI | X | | X | | |
| FIRE | FIRE ALARM | FACP | STATION FIRE ALARM ACTIVE (BOH) | DI | LXX_FACP_ZZ_ALARM_DI | N07_FACP_01_ALARM_DI | X | | X | | |
| FIRE | FIRE ALARM | FACP | PLATFORM ZONE ALARM ACTIVE | DO | LXX_FACP_ZZ_PLATFORM_NN_DI | N07_FACP_01_PLATFORM_01_DI | X | | X | | |
| FIRE | FIRE ALARM | FACP | ERM MODE LXX_MM ACTIVE | DO | LXX_FACP_ZZ_MODE_LXX_MM_DI | N09_FACP_01_MODE_N06_11_DI | X | | X | | Quantity and designation of EVS Modes are specified by the ERM for each Station |
| FIRE | FIRE/SMOKE DAMPERS | FSD | DAMPER OPEN | DI | LXX_FSD_ZZ_OPEN_DI | N09_FSD_55_OPEN_DI | X | | X | | |
| FIRE | FIRE/SMOKE DAMPERS | FSD | DAMPER CLOSED | DI | LXX_FSD_ZZ_CLOSED_DI | N09_FSD_55_CLOSED_DI | X | | X | | |
| PLUMB | HEAT TRACE CONTROLLER | HTCC | HEAT TRACE CONTROLLER FAULT | DI | LXX_HTCC_ZZ_FAULT_DI | | X | | | | |
| HVAC | HYDROGEN GAS SENSOR | HGS | HYDROGEN LEVEL HIGH ALARM | DI | LXX_HGS_ZZ_HAH_DI | N07_HGS_02_HAH_DI | X | | X | | |
| HVAC | HYDROGEN GAS SENSOR | HGS | HYDROGEN LEVEL HIGH-HIGH ALARM | DI | LXX_HGS_ZZ_HAHH_DI | N07_HGS_02_HAHH_DI | X | | X | | |
| HVAC | HYDROGEN GAS SENSOR | HGS | HYDROGEN ALARM BEACON INSIDE ROOM | DO | LXX_HB_ZZA_HAHH_DI | N07_HB_02A_HAHH_DO | | X | | | |
| HVAC | HYDROGEN GAS SENSOR | HGS | HYDROGEN ALARM BEACON OUTSIDE ROOM | DO | LXX_HB_ZZB_HAHH_DI | N07_HB_02B_HAHH_DO | | X | | | |

GENERAL NOTES:

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- PROVIDE SOFT I/O POINTS AS REQUIRED TO MEET THE FUNCTIONAL REQUIREMENTS OF EQUIPMENT WITH A COMMUNICATIONS INTERFACE.
- PROVIDE MAP OF ALL ADDRESS INFORMATION FOR LOCAL BMS HMI AND REMOTE SCADA LCC INTERFACE. DEMONSTRATE MAPPING AND CROSS-REFERENCE INFORMATION IS CORRECT.
- CONTRACTOR SHALL PROVIDE 25% HARDWARE I/O SPARES.
- DESIGNER TO DETERMINE WHICH POINTS ARE SUPERVISED CIRCUITS FROM FACP.
- DESIGNER TO COORDINATE POINTS WITH ALL SEQUENCE OF OPERATIONS, INCLUDING BUT NOT LIMITED TO MECHANICAL, ELECTRICAL, FIRE ALARM AND COMMUNICATIONS SYSTEMS.
- BDA POINTS WIRED TO FACP FOR ALL OTHER FACILITIES.

TAG LEGEND

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| L | LINK SEGEMENT {C-CENTRAL, N-NORTH, S-SOUTH, E-EAST} |
| XX | STATION/ FACILITY NUMBER {01, 03, 05 ETC.} |
| ZZ | EQUIPMENT/ DEVICE NUMBER |
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| SCALE: NTS |
| FILENAME: STD-JBS504 |
| CONTRACT No.: RTA/LR |
| DATE: 2/2024 |

**SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS**

BUILDING MANAGEMENT SYSTEM
BMS SUMMARY INDICATIONS

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| DRAWING No.: | STD-JBS504 |
| FACILITY ID: | |
| SHEET No.: | REV: 3 |

BMS-SCADA POINTS LIST (CONT)

| SYSTEM | EQUIPMENT TYPE | EQUIP ID | PLC I/O DESCRIPTION | POINT TYPE | PLC TAG | | LOCAL BMS | | REMOTE BMS SCADA (LCC) | | NOTES |
|----------|--------------------------------|----------|---------------------------------------|------------|-----------------------------|-------------------------------|-----------------------|----------------|------------------------|----------------|--|
| | | | | | TEMPLATE | EXAMPLE | INDICATE /ALARM INPUT | CONTROL OUTPUT | INDICATE /ALARM INPUT | CONTROL OUTPUT | |
| LIGHTING | LIGHTING CONTROL PANEL | LCP | LCP REVENUE PERIOD LIGHTS ON COMMAND | DO | LXX_LCP_ZZ_REVENUE_ON_DO | N11_LCP_05_REVENUE_ON_DO | | X | | | |
| LIGHTING | LIGHTING CONTROL PANEL | LCP | LCP EXTERIOR LIGHTS ON COMMAND | DO | LXX_LCP_ZZ_EXT_LIGHTS_ON_DO | N09_LCP_B2S2_EXT_LIGHTS_ON_DO | | X | | X | |
| LIGHTING | LIGHTING CONTROL PANEL | LCP | LCP INTERIOR LIGHTS ON COMMAND | DO | LXX_LCP_ZZ_INT_LIGHTS_ON_DO | N09_LCP_B2S2_INT_LIGHTS_ON_DO | | X | | X | |
| HVAC | MOTORIZED DAMPER | MDPR | DAMPER POSITION COMMAND | AO | LXX_MDPR_ZZ_POSITION_AO | N09_MDPR_02_POSITION_AO | | X | | | FOR MODULATING UNITS |
| HVAC | MOTORIZED DAMPER | MDPR | DAMPER POSITION | AI | LXX_MDPR_ZZ_POSITION_AI | N09_MDPR_02_POSITION_AI | X | | | | FOR MODULATING UNITS |
| HVAC | MOTORIZED DAMPER | MDPR | DAMPER OPEN | DI | LXX_MDPR_ZZ_OPEN_DI | N09_MDPR_01_OPEN_DI | X | | | | |
| HVAC | MOTORIZED DAMPER | MDPR | DAMPER CLOSED | DI | LXX_MDPR_ZZ_CLOSED_DI | N09_MDPR_01_CLOSED_DI | X | | | | |
| HVAC | MOTORIZED DAMPER | MDPR | DAMPER CALL OPEN COMMAND | DO | LXX_MDPR_ZZ_CALL_OPEN_DO | N09_MDPR_01_CALL_OPEN_DO | | X | | | FOR NORMALLY CLOSED UNITS |
| HVAC | MOTORIZED DAMPER | MDPR | DAMPER CALL CLOSE COMMAND | DO | LXX_MDPR_ZZ_CALL_CLOSE_DO | N09_MDPR_01_CALL_CLOSE_DO | | X | | | FOR NORMALLY OPEN UNITS |
| COMMS | NETWORK VIDEO RECORDER | NVR | NVR FAULT | DI | LXX_NVR_ZZ_FAULT_DI | | X | | X | | |
| SECURITY | OH COILING DOOR/ROLL-UP GRILLE | RD/GRL | OPEN | DI | LXX_RD/GRL_ZZ_OPEN_DI | N09_RD_03_OPEN_DI | X | | X | | |
| SECURITY | OH COILING DOOR/ROLL-UP GRILLE | RD/GRL | CLOSED | DI | LXX_RD/GRL_ZZ_CLOSED_DI | N09_RD_03_CLOSED_DI | X | | X | | |
| SECURITY | OH COILING DOOR/ROLL-UP GRILLE | RD/GRL | INTRUSION ALARM | DI | LXX_RD/GRL_ZZ_DID_DI | | X | | | | |
| SECURITY | OH COILING DOOR/ROLL-UP GRILLE | RD/GRL | PERMISSIVE COMMAND | DO | LXX_RD/GRL_ZZ_PERM_DO | N09_RD_03_PERM_DO | | X | | | |
| SECURITY | OH COILING DOOR/ROLL-UP GRILLE | RD/GRL | OPEN COMMAND | DO | LXX_RD/GRL_ZZ_OPEN_DO | N09_RD_03_OPEN_DO | | X | | X | |
| SECURITY | OH COILING DOOR/ROLL-UP GRILLE | RD/GRL | CLOSE COMMAND | DO | LXX_RD/GRL_ZZ_CLOSE_DO | N09_RD_03_CLOSE_DO | | X | | | |
| BMS | PLC DC POWER SUPPLY | PS | POWER SUPPLY FAIL A | DI | LXX_PLC_ZZA_PSFALDI | | X | | X | | |
| BMS | PLC DC POWER SUPPLY | PS | POWER SUPPLY FAIL B | DI | LXX_PLC_ZZB_PSFALDI | | X | | X | | |
| COMMS | RADIO BI-DIRECTIONAL AMPLIFIER | BDA | BDA ANTENNA FAILURE ALARM | DI | LXX_BDA_ZZ_ANT_FAIL_DI | | X | | | | STATIONS ONLY (Note 8) |
| COMMS | RADIO BI-DIRECTIONAL AMPLIFIER | BDA | BDA FAILURE ALARM | DI | LXX_BDA_ZZ_FAIL_DI | | X | | X | | STATIONS ONLY (Note 8) |
| COMMS | RADIO BI-DIRECTIONAL AMPLIFIER | BDA | BDA AC POWER SUPPLY FAILURE | DI | LXX_BDA_ZZ_ACPWR_FAIL_DI | | X | | | | STATIONS ONLY (Note 8) |
| COMMS | RADIO BI-DIRECTIONAL AMPLIFIER | BDA | BDA BATTERY CHARGER FAILURE | DI | LXX_BDA_ZZ_BATT_CHG_FAIL_DI | | X | | | | STATIONS ONLY (Note 8) |
| COMMS | RADIO BI-DIRECTIONAL AMPLIFIER | BDA | BDA BATTERY CAPACITY LOW | DI | LXX_BDA_ZZ_BATT_LOW_DI | | X | | | | STATIONS ONLY (Note 8) |
| HVAC | ROOM HEATER | HTR | HEATER CALL ON COMMAND | DO | LXX_HTR_ZZ_CALL_ON_DO | N09_HTR_06_CALL_ON_DO | | X | | | |
| HVAC | ROOM TEMPERATURE SENSOR | THRM | ROOM TEMPERATURE | AI | LXX_THRM_YYYY_TEMP_AI | N09_THRM_B218_TEMP_AI | X | | X | | |
| PLUMB | SUMP PUMP CONTROLLER | SPC | SUMP HIGH HIGH LEVEL ALARM | DI | LXX_SPC_ZZ_LEVEL_HIGH_DI | N09_SPC_01_LEVEL_HIGH_DI | X | | X | | |
| PLUMB | SUMP PUMP CONTROLLER | SPC | SUMP PUMP CONTROLLER TROUBLE ALARM | DI | LXX_SPC_ZZ_FAULT_DI | N09_SPC_01_FAULT_DI | X | | X | | |
| HVAC | SUPPLY FAN | SFAN | SFAN HOA SWITCH IN AUTO | AO | LXX_SFAN_ZZ_IN_AUTO_DI | N09_SFAN_03_IN_AUTO_DI | X | | | | |
| HVAC | SUPPLY FAN | SFAN | SFAN VFD SPEED COMMAND | AO | LXX_SFAN_ZZ_SPEED_AO | N09_SFAN_03_SPEED_AO | | X | | | |
| HVAC | SUPPLY FAN | SFAN | SUPPLY FAN RUNNING STATUS | DI | LXX_SFAN_ZZ_RUNNING_DI | N09_SFAN_03_RUNNING_DI | X | | X | | |
| HVAC | SUPPLY FAN | SFAN | SUPPLY FAN CALL TO RUN | DO | LXX_SFAN_ZZ_CALL_RUN_DO | N07_SFAN_03_CALL_RUN_DO | | X | | | |
| HVAC | SUPPLY FAN | SFAN | SFAN DIFFERENTIAL PRESSURE SWITCH LOW | DI | LXX_SFAN_ZZ_PRESS_LOW_DI | N07_SFAN_02_PRESS_LOW_DI | X | | X | | |
| HVAC | SUPPLY FAN | SFAN | SFAN CONTROLLER FAULT | DI | LXX_SFAN_ZZ_FAULT_DI | N09_SFAN_03_FAULT_DI | X | | X | | |
| ELEC | UNINTERRUPTIBLE POWER SUPPLY | UPS | UPS ACTIVE | DI | LXX_UPS_ZZ_ACTIVE_DI | E03_UPS_01_ACTIVE_DI | X | | X | | |
| ELEC | UNINTERRUPTIBLE POWER SUPPLY | UPS | UPS READY | DI | LXX_UPS_ZZ_READY_DI | E03_UPS_01_READY_DI | X | | X | | FOR FUTURE USE: PROVIDE CONDUCTORS, DO NOT TERMINATE |
| ELEC | UNINTERRUPTIBLE POWER SUPPLY | UPS | UPS LOAD ON BYPASS | DI | LXX_UPS_ZZ_BYPASS_DI | E03_UPS_01_BYPASS_DI | X | | X | | |
| ELEC | UNINTERRUPTIBLE POWER SUPPLY | UPS | UPS SUMMARY ALARM | DI | LXX_UPS_ZZ_ALARM_DI | E03_UPS_01_ALARM_DI | X | | X | | |
| ELEC | UNINTERRUPTIBLE POWER SUPPLY | UPS | UPS MAINTENANCE BYPASS CLOSED | DI | LXX_UPS_ZZ_MAINT_DI | E03_UPS_01_MAINT_DI | X | | | | |
| HVAC | VARIABLE AIR VOLUME CONTROLLER | VAV | VAV TEMPERATURE SETPOINT | AO | LXX_VAV_ZZ_TEMP_SP_AO | N11_VAV_03_TEMP_SP_AO | | X | | | |
| HVAC | VARIABLE AIR VOLUME CONTROLLER | VAV | VAV TROUBLE ALARM | DI | LXX_VAV_ZZ_TROUBLE_DI | N11_VAV_03_TROUBLE_DI | X | | X | | |

GENERAL NOTES:

- CONTRACTOR RESPONSIBLE TO PROVIDE A COMPLETE POINTS AND SIDT LIST BASED ON EQUIPMENT TO BE INSTALLED AT EACH FACILITY. EACH TYPICAL EQUIPMENT TYPE MAY NOT BE REQUIRED AT A FACILITY.
- THIS IS A SAMPLE POINTS LIST, ADDITIONAL POINTS MAY BE REQUIRED TO IMPLEMENT A WORKING SYSTEM. DESIGNER TO COORDINATE MINIMUM LIST FOR CONTRACT SPECIFIC LIST.
- PROVIDE SOFT I/O POINTS AS REQUIRED TO MEET THE FUNCTIONAL REQUIREMENTS OF EQUIPMENT WITH A COMMUNICATIONS INTERFACE.
- PROVIDE MAP OF ALL ADDRESS INFORMATION FOR LOCAL BMS HMI AND REMOTE SCADA LCC INTERFACE. DEMONSTRATE MAPPING AND CROSS-REFERENCE INFORMATION IS CORRECT.
- CONTRACTOR SHALL PROVIDE 25% HARDWARE I/O SPARES.
- DESIGNER TO DETERMINE WHICH POINTS ARE SUPERVISED CIRCUITS FROM FACP.
- DESIGNER TO COORDINATE POINTS WITH ALL SEQUENCE OF OPERATIONS, INCLUDING BUT NOT LIMITED TO MECHANICAL, ELECTRICAL, FIRE ALARM AND COMMUNICATIONS SYSTEMS.
- BDA POINTS WIRED TO FACP FOR ALL OTHER FACILITIES.

TAG LEGEND

| | |
|----|---|
| L | LINK SEGMENT {C-CENTRAL, N-NORTH, S-SOUTH, E-EAST} |
| XX | STATION/ FACILITY NUMBER {01, 03, 05 ETC.} |
| ZZ | EQUIPMENT/ DEVICE NUMBER |
| YY | ROOM/ LOCATION ID |
| N | NUMBER INSTANCE |


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| DRAWN BY: | | | | | |
| CHECKED BY: | | | | | |
| APPROVED BY: | | | | | |
| No. | DATE | DSN | CHK | APP | REVISION |
| 3 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |
| 2 | 8/2019 | | | | REVISED SYSTEMS DIRECTIVE DRAWINGS |
| 1 | 1/2019 | | | | 2019 GUIDANCE DWG REVISION - GENERAL UPDATE |
| 0 | 8/2017 | | | | GUIDANCE DRAWINGS |

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| | | | |

LINE IS 1" AT FULL SCALE



SCALE: NTS
FILENAME: STD-JBS505
CONTRACT No.: RTA/LR
DATE: 2/2024

**SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS**

BUILDING MANAGEMENT SYSTEM
BMS SUMMARY INDICATIONS

| | |
|--------------|-------------------|
| DRAWING No.: | STD-JBS505 |
| FACILITY ID: | |
| SHEET No.: | REV: |
| | 3 |

EVS-SCADA POINTS LIST

| SYSTEM | EQUIPMENT TYPE | EQUIP ID | PLC I/O DESCRIPTION | POINT TYPE | PLC TAG | | LOCAL EVS | | REMOTE SCADA (LCC) | | NOTES |
|--------|-------------------------|----------|--|------------|---------------------------------|---------------------------------|-----------------------|----------------|-----------------------|----------------|--|
| | | | | | TEMPLATE | EXAMPLE | INDICATE /ALARM INPUT | CONTROL OUTPUT | INDICATE /ALARM INPUT | CONTROL OUTPUT | |
| BMS | BMS STATUS | BMS | BMS UPS OK FROM BMS PLC | DI | LXX_BMS_UPS_OK_DI | | X | | X | | |
| BMS | BMS STATUS | BMS | VENTILATION EQUIPMENT FAULT ALARM FROM BMS PLC | DI | LXX_BMS_VENT_ALARM_DI | | X | | X | | |
| BMS | BMS STATUS | BMS | EVS PLC STATUS TO BMS | DO | LXX_EVS_PLC_OK_DO | | | X | X | | |
| HVAC | EMERGENCY BYPASS DAMPER | EMBD | DAMPER ZZ LOCAL CONTROL MODE SWITCH | DI | LXX_EMBD_ZZ_LOCAL_MODE_DI | N09_EMBD_05_LOCAL_MODE_DI | X | | X | | |
| HVAC | EMERGENCY BYPASS DAMPER | EMBD | DAMPER ZZ CALL OPEN COMMAND | DO | LXX_EMBD_ZZ_CALL_OPEN_DO | N09_EMBD_02_CALL_OPEN_DI | | X | | X | USE FOR FAIL CLOSE DAMPERS |
| HVAC | EMERGENCY BYPASS DAMPER | EMBD | DAMPER ZZ CALL CLOSE COMMAND | DO | LXX_EMBD_ZZ_CALL_CLOSE_DO | N09_EMBD_05_CALL_CLOSE_DI | | X | | X | USE FOR FAIL OPEN DAMPERS |
| HVAC | EMERGENCY BYPASS DAMPER | EMBD | DAMPER ZZ SECTION N ACTUATOR FULLY OPEN | DI | LXX_EMBD_ZZ_SNA_OPEN_DI | N09_EMBD_02_S2A_OPEN_DI | X | | | | USE FOR FAIL CLOSE DAMPER |
| HVAC | EMERGENCY BYPASS DAMPER | EMBD | DAMPER ZZ SECTION N ACTUATOR FULLY CLOSED | DI | LXX_EMBD_ZZ_SNA_CLOSED_DI | N09_EMBD_05_S1A_CLOSED_DI | X | | | | USE FOR FAIL OPEN DAMPERS |
| HVAC | EMERGENCY BYPASS DAMPER | EMBD | DAMPER ZZ SECTION N FULLY OPEN | DI | LXX_EMBD_ZZ_SN_OPEN_DI | N09_EMBD_05_S1_OPEN_DI | X | | X | | |
| HVAC | EMERGENCY BYPASS DAMPER | EMBD | DAMPER ZZ SECTION N FULLY CLOSED | DI | LXX_EMBD_ZZ_SN_CLOSED_DI | N09_EMBD_05_S1_CLOSED_DI | X | | X | | |
| HVAC | EMERGENCY BYPASS DAMPER | EMBD | DAMPER ZZ SECTION N FULLY OPEN INDICATION | DO | LXX_EMBD_ZZ_SN_OPEN_IND_DO | N09_EMBD_05_S1_OPEN_IND_DO | | X | | | USE FOR LOCAL EVCP PANEL LIGHTS |
| HVAC | EMERGENCY BYPASS DAMPER | EMBD | DAMPER ZZ SECTION N FULLY CLOSED INDICATION | DO | LXX_EMBD_ZZ_SN_CLOSED_IND_DO | N09_EMBD_05_S1_CLOSED_IND_DO | | X | | | USE FOR LOCAL EVCP PANEL LIGHTS |
| HVAC | EMERGENCY BYPASS DAMPER | EMBD | DAMPER ZZ EMERGENCY MODE COMMAND | DO | LXX_EMBD_ZZ_EMERG_MODE_DO | N09_EMBD_05_EMERG_MODE_DO | | X | | | |
| HVAC | EMERGENCY BYPASS DAMPER | EMBD | DAMPER ZZ LOCAL OPEN REQUEST SWITCH | DI | LXX_EMBD_ZZ_LOCAL_OPEN_REQ_DI | N09_EMBD_02_LOCAL_OPEN_REQ_DI | X | | | | USE FOR FAIL CLOSE DAMPERS |
| HVAC | EMERGENCY BYPASS DAMPER | EMBD | DAMPER ZZ LOCAL CLOSE REQUEST SWITCH | DI | LXX_EMBD_ZZ_LOCAL_CLOSE_REQ_DI | N09_EMBD_05_LOCAL_CLOSE_REQ_DI | X | | | | USE FOR FAIL OPEN DAMPERS |
| HVAC | EMERGENCY FAN | EMFN | FAN ZZ EXHAUST CONTACTOR ENERGIZED (FORWARD) | DI | LXX_EMFN_ZZ_EXH_RUN_DI | N09_EMFN_01_EXH_RUN_DI | X | | X | | |
| HVAC | EMERGENCY FAN | EMFN | FAN ZZ SUPPLY CONTACTOR ENERGIZED (REVERSE) | DI | LXX_EMFN_ZZ_SUP_RUN_DI | N09_EMFN_01_SUP_RUN_DI | X | | X | | |
| HVAC | EMERGENCY FAN | EMFN | FAN ZZ BYPASS CONTACTOR ENERGIZED | DI | LXX_EMFN_ZZ_BYPASS_DI | N09_EMFN_01_BYPASS_DI | X | | X | | USE FOR SOFT-START MOTOR CONTROLLERS |
| HVAC | EMERGENCY FAN | EMFN | FAN ZZ MOTOR HEATER ON | DI | LXX_EMFN_ZZ_HTR_ON_DI | N09_EMFN_01_HTR_ON_DI | X | | X | | |
| HVAC | EMERGENCY FAN | EMFN | FAN ZZ EXHAUST AIR FLOW SWITCH | DI | LXX_EMFN_ZZ_EXH_AIR_DI | N09_EMFN_01_EXH_AIR_DI | X | | X | | |
| HVAC | EMERGENCY FAN | EMFN | FAN ZZ SUPPLY AIR FLOW SWITCH | DI | LXX_EMFN_ZZ_SUP_AIR_DI | N09_EMFN_01_SUP_AIR_DI | X | | X | | |
| HVAC | EMERGENCY FAN | EMFN | FAN ZZ EXHAUST RUN COMMAND | DO | LXX_EMFN_ZZ_CALL_EXH_DO | N09_EMFN_01_CALL_EXH_DO | | X | | X | |
| HVAC | EMERGENCY FAN | EMFN | FAN ZZ SUPPLY RUN COMMAND | DO | LXX_EMFN_ZZ_CALL_SUP_DO | N09_EMFN_01_CALL_SUP_DO | | X | | X | |
| HVAC | EMERGENCY FAN | EMFN | FAN ZZ DRIVE-END BEARING VIBRATION (INBOARD) | AI | LXX_EMFN_ZZ_DRV_BRG_VIB_AI | N09_EMFN_02_DRV_BRG_VIB_AI | X | | X | | |
| HVAC | EMERGENCY FAN | EMFN | FAN ZZ OPPOSITE-DRIVE-END BEARING VIBRATION (OUTBOARD) | AI | LXX_EMFN_ZZ_ODE_BRG_VIB_AI | N09_EMFN_02_ODE_BRG_VIB_AI | X | | X | | |
| HVAC | EMERGENCY FAN | EMFN | FAN ZZ DRIVE-END BEARING TEMPERATURE (INBOARD) | AI | LXX_EMFN_ZZ_DRV_BRG_TEMP_AI | N09_EMFN_02_DRV_BRG_TEMP_AI | X | | X | | |
| HVAC | EMERGENCY FAN | EMFN | FAN ZZ OPPOSITE-DRIVE-END BEARING TEMPERATURE (OUTBOARD) | AI | LXX_EMFN_ZZ_ODE_BRG_TEMP_AI | N09_EMFN_02_ODE_BRG_TEMP_AI | X | | X | | |
| HVAC | EMERGENCY FAN | EMFN | FAN ZZ PHASE A MOTOR WINDING TEMPERATURE | AI | LXX_EMFN_ZZ_WIND_A_TEMP_AI | N09_EMFN_02_WIND_A_TEMP_AI | X | | X | | |
| HVAC | EMERGENCY FAN | EMFN | FAN ZZ PHASE B MOTOR WINDING TEMPERATURE | AI | LXX_EMFN_ZZ_WIND_B_TEMP_AI | N09_EMFN_02_WIND_B_TEMP_AI | X | | X | | |
| HVAC | EMERGENCY FAN | EMFN | FAN ZZ PHASE C MOTOR WINDING TEMPERATURE | AI | LXX_EMFN_ZZ_WIND_C_TEMP_AI | N09_EMFN_02_WIND_C_TEMP_AI | X | | X | | |
| HVAC | EMERGENCY FAN | EMFN | FAN ZZ MOTOR CONTROLLER ENCLOSURE TEMPERATURE | AI | LXX_EMFN_ZZ_CNTRL_ENCL_TEMP_AI | N09_EMFN_02_CNTRL_ENCL_TEMP_AI | X | | X | | |
| HVAC | EMERGENCY FAN | EMFN | FAN ZZ EMERGENCY MODE COMMAND | DO | LXX_EMFN_ZZ_EMERG_MODE_DO | N09_EMFN_01_EMERG_MODE_DO | | X | | | |
| HVAC | EMERGENCY FAN | EMFN | FAN ZZ EXHAUST RUN INDICATION | DO | LXX_EMFN_ZZ_EXH_RUN_IND_DO | N09_EMFN_01_EXH_RUN_IND_DO | | X | | | |
| HVAC | EMERGENCY FAN | EMFN | FAN ZZ SUPPLY RUN INDICATION | DO | LXX_EMFN_ZZ_SUP_RUN_IND_DO | N09_EMFN_01_SUP_RUN_IND_DO | | X | | | |
| HVAC | EMERGENCY FAN | EMFN | FAN ZZ OFF INDICATION | DO | LXX_EMFN_ZZ_OFF_IND_DO | N09_EMFN_01_OFF_IND_DO | | X | | | |
| HVAC | EMERGENCY FAN | EMFN | FAN ZZ LOCAL CONTROL PERMISSIVE INDICATION | DO | LXX_EMFN_ZZ_LOCAL_CNTRL_PERM_DO | N09_EMFN_01_LOCAL_CNTRL_PERM_DO | | X | | | |
| HVAC | EMERGENCY FAN | EMFN | FAN ZZ LOCAL EXHAUST REQUEST SWITCH | DI | LXX_EMFN_ZZ_LOCAL_EXH_REQ_DI | N09_EMFN_01_LOCAL_EXH_REQ_DI | X | | | | |
| HVAC | EMERGENCY FAN | EMFN | FAN ZZ LOCAL SUPPLY REQUEST SWITCH | DI | LXX_EMFN_ZZ_LOCAL_SUP_REQ_DI | N09_EMFN_01_LOCAL_SUP_REQ_DI | X | | | | |
| HVAC | EMERGENCY FAN | EMFN | FAN ZZ REMOTE CONTROL MODE SWITCH | DI | LXX_EMFN_ZZ_REMOTE_MODE_DI | N09_EMFN_01_REMOTE_MODE_DI | X | | X | | |
| HVAC | EMERGENCY FAN | EMFN | FAN ZZ LOCAL ISOLATION SWITCH | DI | LXX_EMFN_ZZ_ISOL_SWITCH_DI | N09_EMFN_01_ISOL_SWITCH_DI | X | | X | | |
| HVAC | EMERGENCY FAN | EMFN | FAN ZZ FDCP POWER AVAILABLE | DI | LXX_EMFN_ZZ_FDCP_POWER_DI | N09_EMFN_01_FDCP_POWER_DI | X | | X | | |
| HVAC | EMERGENCY FAN | EMFN | FAN ZZ MOTOR CONTROLLER POWER AVAILABLE | DI | LXX_EMFN_ZZ_CNTRL_POWER_DI | N09_EMFN_01_CNTRL_POWER_DI | X | | X | | USE FOR VFD AND SOFT-START MOTOR CONTROLLERS |
| HVAC | EMERGENCY FAN | EMFN | FAN ZZ MOTOR CONTROLLER STATUS NORMAL | DI | LXX_EMFN_ZZ_CNTRL_NORMAL_DI | N09_EMFN_01_CNTRL_NORMAL_DI | X | | X | | USE FOR SOFT-START MOTOR CONTROLLERS |
| HVAC | EMERGENCY FAN | EMFN | FAN ZZ MOTOR STATUS NORMAL | DI | LXX_EMFN_ZZ_MTR_NORMAL_DI | N09_EMFN_01_MTR_NORMAL_DI | X | | X | | USE FOR SOFT-START MOTOR CONTROLLERS |
| HVAC | EMERGENCY FAN | EMFN | FAN ZZ MOTOR ENERGIZED | DI | LXX_EMFN_ZZ_MOTOR_RUN_DI | N07_EMFN_03_MOTOR_RUN_DI | X | | X | | USE FOR VFD MOTOR CONTROLLERS |
| HVAC | EMERGENCY FAN | EMFN | FAN ZZ VARIABLE FREQ DRIVE READY | DI | LXX_EMFN_ZZ_VFD_READY_DI | N07_EMFN_03_VFD_READY_DI | X | | X | | USE FOR VFD MOTOR CONTROLLERS |
| HVAC | EMERGENCY FAN | EMFN | FAN ZZ VARIABLE FREQ DRIVE FAULT | DI | LXX_EMFN_ZZ_VFD_FAULT_DI | N07_EMFN_03_VFD_FAULT_DI | X | | X | | USE FOR VFD MOTOR CONTROLLERS |
| HVAC | EMERGENCY FAN | EMFN | FAN ZZ MOTOR SPEED | AI | LXX_EMFN_ZZ_SPEED_AI | N07_EMFN_03_SPEED_AI | X | | X | | USE FOR VFD MOTOR CONTROLLERS |
| HVAC | EMERGENCY FAN | EMFN | FAN ZZ MOTOR SPEED INDICATION | AO | LXX_EMFN_ZZ_SPEED_IND_AO | N07_EMFN_03_SPEED_IND_AO | X | | X | | USE FOR VFD MOTOR CONTROLLERS |

GENERAL NOTES:

1. CONTRACTOR RESPONSIBLE TO PROVIDE A COMPLETE POINTS AND SIDT LIST BASED ON EQUIPMENT TO BE INSTALLED AT EACH FACILITY. EACH TYPICAL EQUIPMENT TYPE MAY NOT BE REQUIRED AT A FACILITY.
2. THIS IS A SAMPLE POINTS LIST, ADDITIONAL POINTS MAY BE REQUIRED TO IMPLEMENT A WORKING SYSTEM. DESIGNER TO COORDINATE MINIMUM LIST FOR CONTRACT SPECIFIC LIST.
3. PROVIDE SOFT I/O POINTS AS REQUIRED TO MEET THE FUNCTIONAL REQUIREMENTS OF EQUIPMENT WITH A COMMUNICATIONS INTERFACE.
4. PROVIDE MAP OF ALL ADDRESS INFORMATION FOR LOCAL BMS HMI AND REMOTE SCADA LCC INTERFACE. DEMONSTRATE MAPPING AND CROSS-REFERENCE INFORMATION IS CORRECT.
5. CONTRACTOR SHALL PROVIDE 25% HARDWARE I/O SPARES.
6. DESIGNER TO DETERMINE WHICH POINTS ARE SUPERVISED CIRCUITS FROM FACP.
7. DESIGN TEAM TO DEVELOP EMERGENCY RESPONSE MATRIX FOR COORDINATION OF MULTIPLE SYSTEMS.

TAG LEGEND

| | |
|----|--|
| L | LINK SEGEMENT {C-CENTRAL, N-NORTH, S-SOUTH, E-EAST} |
| XX | STATION/ FACILITY NUMBER {01, 03, 05 ETC.} |
| ZZ | EQUIPMENT/ DEVICE NUMBER |
| YY | ROOM/ LOCATION ID |
| MM | EVS EMERGENCY RESPONSE MODE ID |
| N | NUMBER INSTANCE |

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| DRAWN BY: | |
| CHECKED BY: | |
| APPROVED BY: | |

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| 2 | 2/2024 | 2024 REVISED STANDARD DRAWINGS | | | |
| 1 | 8/2019 | REVISED SYSTEMS DIRECTIVE DRAWINGS | | | |
| 0 | 1/2019 | 2019 GUIDANCE DWG REVISIONS - GENERAL UPDATE | | | |
| No. | DATE | DSN | CHK | APP | REVISION |

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| SUBMITTED BY: | DATE: | REVIEWED BY: | DATE: |
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LINE IS 1" AT FULL SCALE



SCALE: NTS
FILENAME: STD-JBS510
CONTRACT No.: RTA/LR
DATE: 2/2024

**SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS**

EMERGENCY VENTILATION SYSTEM
EVS SUMMARY INDICATIONS

DRAWING No.: **STD-JBS510**
FACILITY ID:
SHEET No.: REV: 2

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EVS-SCADA POINTS LIST

| SYSTEM | EQUIPMENT TYPE | EQUIP ID | PLC I/O DESCRIPTION | POINT TYPE | PLC TAG | | LOCAL EVS | | REMOTE SCADA (LCC) | | NOTES |
|--------|--------------------------|----------|---|------------|--------------------------------|--------------------------------|-----------------------|----------------|-----------------------|----------------|---|
| | | | | | TEMPLATE | EXAMPLE | INDICATE /ALARM INPUT | CONTROL OUTPUT | INDICATE /ALARM INPUT | CONTROL OUTPUT | |
| HVAC | EMERGENCY FAN DAMPER | EMFD | DAMPER ZZ LOCAL CONTROL MODE SWITCH | DI | LXX_EMFD_ZZ_LOCAL_MODE_DI | N07_EMFD_02_LOCAL_MODE_DI | X | | X | | |
| HVAC | EMERGENCY FAN DAMPER | EMFD | DAMPER ZZ CALL OPEN COMMAND | DO | LXX_EMFD_ZZ_CALL_OPEN_DO | N07_EMFD_02_CALL_OPEN_DI | | X | | X | USE FOR FAIL CLOSE DAMPERS |
| HVAC | EMERGENCY FAN DAMPER | EMFD | DAMPER ZZ CALL CLOSE COMMAND | DO | LXX_EMFD_ZZ_CALL_CLOSE_DO | N07_EMFD_03_CALL_CLOSE_DI | | X | | X | USE FOR FAIL OPEN DAMPERS |
| HVAC | EMERGENCY FAN DAMPER | EMFD | DAMPER ZZ SECTION N ACTUATOR FULLY OPEN | DI | LXX_EMFD_ZZ_SNA_OPEN_DI | N07_EMFD_02_S2A_OPEN_DI | X | | | | USE FOR FAIL CLOSE DAMPERS |
| HVAC | EMERGENCY FAN DAMPER | EMFD | DAMPER ZZ SECTION N ACTUATOR FULLY CLOSED | DI | LXX_EMFD_ZZ_SNA_CLOSED_DI | N07_EMFD_03_S1A_CLOSED_DI | X | | | | USE FOR FAIL OPEN DAMPERS |
| HVAC | EMERGENCY FAN DAMPER | EMFD | DAMPER ZZ SECTION N FULLY OPEN | DI | LXX_EMFD_ZZ_SN_OPEN_DI | N07_EMFD_03_S1_OPEN_DI | X | | X | | |
| HVAC | EMERGENCY FAN DAMPER | EMFD | DAMPER ZZ SECTION N FULLY CLOSED | DI | LXX_EMFD_ZZ_SN_CLOSED_DI | N07_EMFD_03_S1_CLOSED_DI | X | | X | | |
| HVAC | EMERGENCY FAN DAMPER | EMFD | DAMPER ZZ SECTION N FULLY OPEN INDICATION | DO | LXX_EMFD_ZZ_SN_OPEN_IND_DO | N07_EMFD_03_S1_OPEN_IND_DO | | X | | | USE FOR LOCAL EVCP PANEL LIGHTS |
| HVAC | EMERGENCY FAN DAMPER | EMFD | DAMPER ZZ SECTION N FULLY CLOSED INDICATION | DO | LXX_EMFD_ZZ_SN_CLOSED_IND_DO | N07_EMFD_03_S1_CLOSED_IND_DO | | X | | | USE FOR LOCAL EVCP PANEL LIGHTS |
| HVAC | EMERGENCY FAN DAMPER | EMFD | DAMPER ZZ EMERGENCY MODE COMMAND | DO | LXX_EMFD_ZZ_EMERG_MODE_DO | N07_EMFD_01_EMERG_MODE_DO | | X | | | |
| HVAC | EMERGENCY FAN DAMPER | EMFD | DAMPER ZZ LOCAL OPEN REQUEST SWITCH | DI | LXX_EMFD_ZZ_LOCAL_OPEN_REQ_DI | N07_EMFD_01_LOCAL_OPEN_REQ_DI | X | | | | USE FOR FAIL CLOSE DAMPERS |
| HVAC | EMERGENCY FAN DAMPER | EMFD | DAMPER ZZ LOCAL CLOSE REQUEST SWITCH | DI | LXX_EMFD_ZZ_LOCAL_CLOSE_REQ_DI | N07_EMFD_03_LOCAL_CLOSE_REQ_DI | X | | | | USE FOR FAIL OPEN DAMPERS |
| | | | | | | | | | | | |
| HVAC | EMERGENCY TUNNEL DAMPER | EMTD | DAMPER ZZ LOCAL CONTROL MODE SWITCH | DI | LXX_EMTD_ZZ_LOCAL_MODE_DI | N09_EMTD_04_LOCAL_MODE_DI | X | | X | | |
| HVAC | EMERGENCY TUNNEL DAMPER | EMTD | DAMPER ZZ CALL OPEN COMMAND | DO | LXX_EMTD_ZZ_CALL_OPEN_DO | N09_EMTD_04_CALL_OPEN_DI | | X | | X | USE FOR FAIL CLOSE DAMPERS |
| HVAC | EMERGENCY TUNNEL DAMPER | EMTD | DAMPER ZZ CALL CLOSE COMMAND | DO | LXX_EMTD_ZZ_CALL_CLOSE_DO | N07_EMTD_02_CALL_CLOSE_DI | | X | | X | USE FOR FAIL OPEN DAMPERS |
| HVAC | EMERGENCY TUNNEL DAMPER | EMTD | DAMPER ZZ SECTION N ACTUATOR FULLY OPEN | DI | LXX_EMTD_ZZ_SNA_OPEN_DI | N09_EMTD_04_S2A_OPEN_DI | X | | | | USE FOR FAIL CLOSE DAMPERS |
| HVAC | EMERGENCY TUNNEL DAMPER | EMTD | DAMPER ZZ SECTION N ACTUATOR FULLY CLOSED | DI | LXX_EMTD_ZZ_SNA_CLOSED_DI | N07_EMTD_02_S3A_CLOSED_DI | X | | | | USE FOR FAIL OPEN DAMPERS |
| HVAC | EMERGENCY TUNNEL DAMPER | EMTD | DAMPER ZZ SECTION N FULLY OPEN | DI | LXX_EMTD_ZZ_SN_OPEN_DI | N09_EMTD_04_S2_OPEN_DI | X | | X | | |
| HVAC | EMERGENCY TUNNEL DAMPER | EMTD | DAMPER ZZ SECTION N FULLY CLOSED | DI | LXX_EMTD_ZZ_SN_CLOSED_DI | N09_EMTD_04_S2_CLOSED_DI | X | | X | | |
| HVAC | EMERGENCY TUNNEL DAMPER | EMTD | DAMPER ZZ SECTION N FULLY OPEN INDICATION | DO | LXX_EMTD_ZZ_SN_OPEN_IND_DO | N09_EMTD_04_S2_OPEN_IND_DO | | X | | | USE FOR LOCAL EVCP PANEL LIGHTS |
| HVAC | EMERGENCY TUNNEL DAMPER | EMTD | DAMPER ZZ SECTION N FULLY CLOSED INDICATION | DO | LXX_EMTD_ZZ_SN_CLOSED_IND_DO | N09_EMTD_04_S2_CLOSED_IND_DO | | X | | | USE FOR LOCAL EVCP PANEL LIGHTS |
| HVAC | EMERGENCY TUNNEL DAMPER | EMTD | DAMPER ZZ EMERGENCY MODE COMMAND | DO | LXX_EMTD_ZZ_EMERG_MODE_DO | N09_EMTD_04_EMERG_MODE_DO | | X | | | |
| HVAC | EMERGENCY TUNNEL DAMPER | EMTD | DAMPER ZZ LOCAL OPEN REQUEST SWITCH | DI | LXX_EMTD_ZZ_LOCAL_OPEN_REQ_DI | N09_EMTD_04_LOCAL_OPEN_REQ_DI | X | | | | USE FOR FAIL CLOSE DAMPERS |
| HVAC | EMERGENCY TUNNEL DAMPER | EMTD | DAMPER ZZ LOCAL CLOSE REQUEST SWITCH | DI | LXX_EMTD_ZZ_LOCAL_CLOSE_REQ_DI | N07_EMTD_02_LOCAL_CLOSE_REQ_DI | X | | | | USE FOR FAIL OPEN DAMPERS |
| | | | | | | | | | | | |
| HVAC | EMERGENCY STATION DAMPER | EMSD | DAMPER ZZ LOCAL CONTROL MODE SWITCH | DI | LXX_EMSD_ZZ_LOCAL_MODE_DI | N09_EMSD_01_LOCAL_MODE_DI | X | | X | | |
| HVAC | EMERGENCY STATION DAMPER | EMSD | DAMPER ZZ CALL OPEN COMMAND | DO | LXX_EMSD_ZZ_CALL_OPEN_DO | N09_EMSD_01_CALL_OPEN_DI | | X | | X | USE FOR FAIL CLOSE DAMPERS |
| HVAC | EMERGENCY STATION DAMPER | EMSD | DAMPER ZZ CALL CLOSE COMMAND | DO | LXX_EMSD_ZZ_CALL_CLOSE_DO | N09_EMSD_03_CALL_CLOSE_DI | | X | | X | USE FOR FAIL OPEN DAMPERS |
| HVAC | EMERGENCY STATION DAMPER | EMSD | DAMPER ZZ SECTION N ACTUATOR FULLY OPEN | DI | LXX_EMSD_ZZ_SNA_OPEN_DI | N09_EMSD_01_S3A_OPEN_DI | X | | | | USE FOR FAIL CLOSE DAMPERS |
| HVAC | EMERGENCY STATION DAMPER | EMSD | DAMPER ZZ SECTION N ACTUATOR FULLY CLOSED | DI | LXX_EMSD_ZZ_SNA_CLOSED_DI | N09_EMSD_03_S1A_CLOSED_DI | X | | | | USE FOR FAIL OPEN DAMPERS |
| HVAC | EMERGENCY STATION DAMPER | EMSD | DAMPER ZZ SECTION N FULLY OPEN | DI | LXX_EMSD_ZZ_SN_OPEN_DI | N09_EMSD_01_S3_OPEN_DI | X | | X | | |
| HVAC | EMERGENCY STATION DAMPER | EMSD | DAMPER ZZ SECTION N FULLY CLOSED | DI | LXX_EMSD_ZZ_SN_CLOSED_DI | N09_EMSD_01_S3_CLOSED_DI | X | | X | | |
| HVAC | EMERGENCY STATION DAMPER | EMSD | DAMPER ZZ SECTION N FULLY OPEN INDICATION | DO | LXX_EMSD_ZZ_SN_OPEN_IND_DO | N09_EMSD_01_S3_OPEN_IND_DO | | X | | | USE FOR LOCAL EVCP PANEL LIGHTS |
| HVAC | EMERGENCY STATION DAMPER | EMSD | DAMPER ZZ SECTION N FULLY CLOSED INDICATION | DO | LXX_EMSD_ZZ_SN_CLOSED_IND_DO | N09_EMSD_01_S3_CLOSED_IND_DO | | X | | | USE FOR LOCAL EVCP PANEL LIGHTS |
| HVAC | EMERGENCY STATION DAMPER | EMSD | DAMPER ZZ EMERGENCY MODE COMMAND | DO | LXX_EMSD_ZZ_EMERG_MODE_DO | N09_EMSD_01_EMERG_MODE_DO | | X | | | |
| HVAC | EMERGENCY STATION DAMPER | EMSD | DAMPER ZZ LOCAL OPEN REQUEST SWITCH | DI | LXX_EMSD_ZZ_LOCAL_OPEN_REQ_DI | N09_EMSD_01_LOCAL_OPEN_REQ_DI | X | | | | USE FOR FAIL CLOSE DAMPERS |
| HVAC | EMERGENCY STATION DAMPER | EMSD | DAMPER ZZ LOCAL CLOSE REQUEST SWITCH | DI | LXX_EMSD_ZZ_LOCAL_CLOSE_REQ_DI | N09_EMSD_03_LOCAL_CLOSE_REQ_DI | X | | | | USE FOR FAIL OPEN DAMPERS |
| | | | | | | | | | | | |
| FIRE | FIRE ALARM | FACP | STATION AUTOMATIC FIRE ALARM ACTIVE | DI | LXX_FACP_ZZ_ALARM_DI | N07_FACP_01_ALARM_DI | X | | X | | |
| FIRE | FIRE ALARM | FACP | FIRE ALARM CONTROL PANEL SILENCE MESSAGE PUSHBUTTON | DI | LXX_FACP_ZZ_PA_VMS_SIL_DI | E09_FACP_01_PA_VMS_SIL_DI | X | | X | | |
| FIRE | FIRE ALARM | FACP | FIRE ALARM SUMMARY SUPERVISORY ALARM | DI | LXX_FACP_ZZ_SUPERVISORY_DI | N07_FACP_01_SUPERVISORY_DI | X | | X | | |
| FIRE | FIRE ALARM | FACP | FIRE ALARM SUMMARY TROUBLE ALARM | DI | LXX_FACP_ZZ_TROUBLE_DI | N07_FACP_01_TROUBLE_DI | X | | X | | |
| FIRE | FIRE ALARM | FACP | SET FIRE PANEL IN ALARM | DO | LXX_FACP_ZZ_SETALM_DO | N09_FACP_01_SETALM_DO | | X | | X | |
| FIRE | FIRE ALARM | FACP | CLEAN AGENT ALARM | DI | LXX_FACP_ZZ_CA_YY_ALARM_DI | N07_FACP_01_CA_01_ALARM_DI | X | | X | | |
| FIRE | FIRE ALARM | FACP | CLEAN AGENT PRE-ALARM | DI | LXX_FACP_ZZ_CA_YY_PRE_ALARM_DI | N07_FACP_01_CA_01_PRE_ALARM_DI | X | | X | | |
| FIRE | FIRE ALARM | FACP | CLEAN AGENT TROUBLE ALARM | DI | LXX_FACP_ZZ_CA_YY_TROUBLE_DI | N07_FACP_01_CA_01_TROUBLE_DI | X | | X | | |
| | | | | | | | | | | | |
| FIRE | FIRE ALARM | FACP | ACTIVATE ERM MODE LXX_MM CONTROL | DO | LXX_FACP_ZZ_MODE_LXX_MM_DO | N09_FACP_01_MODE_N06_11_DO | | X | | X | QUANTITY AND DESIGNATION OF EVS MODES ARE SPECIFIED BY THE ERM FOR EACH STATION |

GENERAL NOTES:

1. CONTRACTOR RESPONSIBLE TO PROVIDE A COMPLETE POINTS AND SIDT LIST BASED ON EQUIPMENT TO BE INSTALLED AT EACH FACILITY. EACH TYPICAL EQUIPMENT TYPE MAY NOT BE REQUIRED AT A FACILITY.
2. THIS IS A SAMPLE POINTS LIST, ADDITIONAL POINTS MAY BE REQUIRED TO IMPLEMENT A WORKING SYSTEM. DESIGNER TO COORDINATE MINIMUM LIST FOR CONTRACT SPECIFIC LIST.
3. PROVIDE SOFT I/O POINTS AS REQUIRED TO MEET THE FUNCTIONAL REQUIREMENTS OF EQUIPMENT WITH A COMMUNICATIONS INTERFACE.
4. PROVIDE MAP OF ALL ADDRESS INFORMATION FOR LOCAL BMS HMI AND REMOTE SCADA LCC INTERFACE. DEMONSTRATE MAPPING AND CROSS-REFERENCE INFORMATION IS CORRECT.
5. CONTRACTOR SHALL PROVIDE 25% HARDWARE I/O SPARES.
6. DESIGNER TO DETERMINE WHICH POINTS ARE SUPERVISED CIRCUITS FROM FACP.
7. DESIGN TEAM TO DEVELOP EMERGENCY RESPONSE MATRIX FOR COORDINATION OF MULTIPLE SYSTEMS.

TAG LEGEND

| | |
|----|--|
| L | LINK SEGEMENT {C-CENTRAL, N-NORTH, S-SOUTH, E-EAST} |
| XX | STATION/ FACILITY NUMBER {01, 03, 05 ETC.} |
| ZZ | EQUIPMENT/ DEVICE NUMBER |
| YY | ROOM/ LOCATION ID |
| MM | EVS EMERGENCY RESPONSE MODE ID |
| N | NUMBER INSTANCE |

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|---|--|--|--|--|------------------------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| | | | | | | | | | | | | | | | | | | | |
| DESIGNED BY: | | | | | DRAWN BY: | | | | | CHECKED BY: | | | | | APPROVED BY: | | | | |
| 3 2/2024 | | | | | 2 8/2019 | | | | | 1 1/2019 | | | | | 0 8/2017 | | | | |
| 2024 REVISED STANDARD DRAWING | | | | | REVISED SYSTEMS DIRECTIVE DRAWINGS | | | | | 2019 GUIDANCE DWG REVISION - GENERAL UPDATE | | | | | GUIDANCE DRAWINGS | | | | |
| SUBMITTED BY: | | | | | DATE: | | | | | REVIEWED BY: | | | | | DATE: | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | SCALE: NTS FILENAME: STD-JBS511 CONTRACT No.: RTA/LR DATE: 2/2024 | | | | | | | | | |
| SOUND TRANSIT STANDARD DRAWINGS SYSTEMS | | | | | | | | | | | | | | | DRAWING No.: STD-JBS511 FACILITY ID: SHEET No.: REV: | | | | |
| EMERGENCY VENTILATION SYSTEM EVS SUMMARY INDICATIONS | | | | | | | | | | | | | | | 3 | | | | |

EVS-SCADA POINTS LIST

| SYSTEM | EQUIPMENT TYPE | EQUIP ID | PLC I/O DESCRIPTION | POINT TYPE | PLC TAG | | LOCAL EVS | | REMOTE SCADA (LCC) | | NOTES |
|---------------|------------------------------|----------|---|------------|-------------------------------|-------------------------------|-----------------------|----------------|-----------------------|----------------|--|
| | | | | | TEMPLATE | EXAMPLE | INDICATE /ALARM INPUT | CONTROL OUTPUT | INDICATE /ALARM INPUT | CONTROL OUTPUT | |
| HVAC | JET FAN | JEFN | BEARING VIBRATION INBOARD | MB/TCP | LXX_JEFN_ZZ_VIBIB_AI | | X | | X | | |
| HVAC | JET FAN | JEFN | BEARING VIBRATION OUTBOARD | MB/TCP | LXX_JEFN_ZZ_VIBOB_AI | | X | | X | | |
| HVAC | JET FAN | JEFN | WINDING TEMPERATURE A1 HI ALARM | MB/TCP | LXX_JEFN_ZZ_WTEMP1_AI | | X | | X | | |
| HVAC | JET FAN | JEFN | WINDING TEMPERATURE B1 HI ALARM | MB/TCP | LXX_JEFN_ZZ_WTEMP2_AI | | X | | X | | |
| HVAC | JET FAN | JEFN | WINDING TEMPERATURE C1 HI ALARM | MB/TCP | LXX_JEFN_ZZ_WTEMP3_AI | | X | | X | | |
| HVAC | JET FAN | JEFN | WINDING TEMPERATURE A2 ALARM | MB/TCP | LXX_JEFN_ZZ_WTEMP4_AI | | X | | X | | |
| HVAC | JET FAN | JEFN | WINDING TEMPERATURE B2 ALARM | MB/TCP | LXX_JEFN_ZZ_WTEMP5_AI | | X | | X | | |
| HVAC | JET FAN | JEFN | WINDING TEMPERATURE C2 ALARM | MB/TCP | LXX_JEFN_ZZ_WTEMP6_AI | | X | | X | | |
| HVAC | JET FAN | JEFN | BEARING TEMPERATURE 1 | MB/TCP | LXX_JEFN_ZZ_BTEMP1B_AI | | X | | X | | |
| HVAC | JET FAN | JEFN | BEARING TEMPERATURE 2 | MB/TCP | LXX_JEFN_ZZ_BTEMP0B_AI | | X | | X | | |
| HVAC | JET FAN | JEFN | AIR TEMPERATURE 1 | MB/TCP | LXX_JEFN_ZZ_AIREMP1_AI | | X | | X | | |
| HVAC | JET FAN | JEFN | AIR TEMPERATURE 2 | MB/TCP | LXX_JEFN_ZZ_AIREMP2_AI | | X | | X | | |
| HVAC | JET FAN | JEFN | FAN REMOTE / LOCAL | DI | LXX_JEFN_ZZ_REMLOC_DI | | X | | X | | |
| HVAC | JET FAN | JEFN | RUNNING FORWARD | DI | LXX_JEFN_ZZ_RNFV_DI | | X | | X | | |
| HVAC | JET FAN | JEFN | RUNNING REVERSE | DI | LXX_JEFN_ZZ_RNRV_DI | | X | | X | | |
| HVAC | JET FAN | JEFN | FORWARD CONFIRMED | DI | LXX_JEFN_ZZ_FWCNF_DI | | X | | X | | |
| HVAC | JET FAN | JEFN | REVERSE CONFIRMED | DI | LXX_JEFN_ZZ_RVCNF_DI | | X | | X | | |
| HVAC | JET FAN | JEFN | MOTOR HEATER ON | DI | LXX_JEFN_ZZ_HTON_DI | | X | | X | | |
| HVAC | JET FAN | JEFN | FAULT | DI | LXX_JEFN_ZZ_FLT_DI | | X | | X | | |
| HVAC | JET FAN | JEFN | AT SPEED | DI | LXX_JEFN_ZZ_TOR_DI | | X | | X | | |
| HVAC | JET FAN | JEFN | CALL START | DO | LXX_JEFN_ZZ_START_DO | | | X | | X | |
| HVAC | JET FAN | JEFN | CALL FORWARD | DO | LXX_JEFN_ZZ_CALLFWD_DO | | | X | | X | |
| HVAC | JET FAN | JEFN | CALL REVERSE | DO | LXX_JEFN_ZZ_CALLREV_DO | | | X | | X | |
| HVAC | JET FAN | JEFN | CALL STOP | DO | LXX_JEFN_ZZ_CALLSTOP_DO | | | X | | X | |
| COMMS | PUBLIC ADDRESS SYSTEM | PA | PA SYSTEM SUMMARY TROUBLE ALARM | DI | LXX_PA_ZZ_TRBL_DI | E09_PA_01_TRBL_DI | X | | X | | |
| EVS/EVCP/FDCP | POWER SUPPLY/PLC HEALTH | DCPS | DCPS ZZ DC POWER SUPPLY FAULT | DI | LXX_DCPS_YYYY_ZZ_FAULT_DI | N09_DCPS_B342_01A_FAULT_DI | X | | X | | |
| EVS/EVCP/FDCP | POWER SUPPLY/PLC HEALTH | DCPS | DCPS ZZ PANEL DC POWER SUPPLY FAULT | DI | LXX_DCPS(PANEL)_ZZ_FAULT_DI | N07_DCPS_EVCP_A_FAULT_DI | X | | X | | |
| COMMS | STATION CONTROL UNIT | SCU | INTERRUPT NORMAL MESSAGE ROUTING | DO | LXX_SCU_ZZ_INTRPT_NORM_MSG_DO | E09_SCU_01_INTRPT_NORM_MSG_DO | | X | | X | |
| COMMS | STATION CONTROL UNIT | SCU | SILENCE MESSAGES TO SCU | DO | LXX_SCU_ZZ_MSG_SIL_DO | E09_SCU_01_MSG_SIL_DO | | X | | X | |
| COMMS | STATION CONTROL UNIT | SCU | PLAY EMERGENCY MESSAGE NN | DO | LXX_SCU_ZZ_MSG_NN_DO | E09_SCU_01_MSG_A2_DO | | X | | X | QUANTITY AND DESIGNATION OF MESSAGES ARE SPECIFIED BY THE ERM FOR EACH STATION |
| HVAC | STAIR PRESSURE SUPPLY FAN | SPSF | STAIR PRESSURE SUPPLY FAN RUNNING | DI | LXX_SPSF_ZZ_RUNNING_DI | E15_SPSF_01_RUNNING_DI | X | | X | | |
| HVAC | STAIR PRESSURE SUPPLY FAN | SPSF | STAIR PRESSURE SUPPLY FAN FAULT | DI | LXX_SPSF_ZZ_FAULT_DI | E15_SPSF_01_FAULT_DI | X | | X | | |
| HVAC | STAIR PRESSURE SUPPLY FAN | SPSF | STAIR PRESSURE SUPPLY FAN TROUBLE | DI | LXX_SPSF_ZZ_TROUBLE_DI | E15_SPSF_01_TROUBLE_DI | X | | | | |
| HVAC | STAIR PRESSURE SUPPLY FAN | SPSF | STAIR PRESSURE SUPPLY FAN HAND | DI | LXX_SPSF_ZZ_HAND_DI | E15_SPSF_01_HAND_DI | X | | | | |
| HVAC | STAIR PRESSURE SUPPLY FAN | SPSF | STAIR PRESSURE SUPPLY FAN AUTO | DI | LXX_SPSF_ZZ_AUTO_DI | E15_SPSF_01_AUTO_DI | X | | | | |
| HVAC | STAIR PRESSURE SUPPLY FAN | SPSF | STAIR PRESSURE SUPPLY FAN RUN COMMAND | DO | LXX_SPSF_ZZ_START_DO | E15_SPSF_01_START_DO | | X | | | |
| HVAC | STAIR PRESSURE SUPPLY FAN | SPSF | STAIR PRESSURE SUPPLY FAN SPEED | AI | LXX_SPSF_ZZ_SPEED_AI | E15_SPSF_01_SPEED_AI | X | | | | |
| HVAC | STAIR PRESSURE SUPPLY FAN | SPSF | STAIR PRESSURE SUPPLY FAN SPEED CONTROL | AO | LXX_SPSF_ZZ_SPEED_AO | E15_SPSF_01_SPEED_AO | | X | | | |
| HVAC | STAIR PRESSURE RELIEF DAMPER | SPRD | STAIR PRESSURE RELIEF DAMPER CLOSED | DI | LXX_SPRD_ZZ_CLOSED_DI | E15_SPRD_01_CLOSED_DI | X | | X | | |
| HVAC | STAIR PRESSURE RELIEF DAMPER | SPRD | STAIR PRESSURE RELIEF DAMPER FAULT | DI | LXX_SPRD_ZZ_FAULT_DI | E15_SPRD_01_FAULT_DI | X | | X | | |
| HVAC | STAIR PRESSURE RELIEF DAMPER | SPRD | STAIR PRESSURE RELIEF POSITION FEEDBACK | AI | LXX_SPRD_ZZ_POSITION_AI | E15_SPRD_01_POSITION_AI | X | | | | |
| HVAC | STAIR PRESSURE RELIEF DAMPER | SPRD | STAIR PRESSURE RELIEF POSITION COMMAND | AO | LXX_SPRD_ZZ_POSITION_AO | E15_SPRD_01_POSITION_AO | | X | | | |
| HVAC | STAIR PRESSURE SYSTEM | SPS | STAIR PRESSURE SYSTEM ACTIVE | DI | LXX_SPS_ZZ_ACTIVE_DI | E15_SPS_01_ACTIVE_DI | X | | X | | |
| HVAC | STAIR PRESSURE SYSTEM | SPS | STAIR PRESSURE SYSTEM FAULT | DI | LXX_SPS_ZZ_FAULT_DI | E15_SPS_01_FAULT_DI | X | | X | | |
| HVAC | STAIR PRESSURE SYSTEM | SPS | STAIR PRESSURE SYSTEM AUTO | DI | LXX_SPS_ZZ_AUTO_DI | E15_SPS_01_AUTO_DI | X | | | | |
| HVAC | STAIR PRESSURE SYSTEM | SPS | STAIR PRESSURE SYSTEM HAND | DI | LXX_SPS_ZZ_HAND_DI | E15_SPS_01_HAND_DI | X | | | | |
| HVAC | STAIR PRESSURE SYSTEM | SPS | STAIR PRESSURE SYSTEM START | DO | LXX_SPS_ZZ_START_DO | E15_SPS_01_START_DO | | X | | X | |

- GENERAL NOTES:**
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 - THIS IS A SAMPLE POINTS LIST, ADDITIONAL POINTS MAY BE REQUIRED TO IMPLEMENT A WORKING SYSTEM. DESIGNER TO COORDINATE MINIMUM LIST FOR CONTRACT SPECIFIC LIST.
 - PROVIDE SOFT I/O POINTS AS REQUIRED TO MEET THE FUNCTIONAL REQUIREMENTS OF EQUIPMENT WITH A COMMUNICATIONS INTERFACE.
 - PROVIDE MAP OF ALL ADDRESS INFORMATION FOR LOCAL BMS HMI AND REMOTE SCADA LCC INTERFACE. DEMONSTRATE MAPPING AND CROSS-REFERENCE INFORMATION IS CORRECT.
 - CONTRACTOR SHALL PROVIDE 25% HARDWARE I/O SPARES.
 - DESIGNER TO DETERMINE WHICH POINTS ARE SUPERVISED CIRCUITS FROM FACP.
 - DESIGN TEAM TO DEVELOP EMERGENCY RESPONSE MATRIX FOR COORDINATION OF MULTIPLE SYSTEMS.

TAG LEGEND

| | |
|----|---|
| L | LINK SEGMENT {C-CENTRAL, N-NORTH, S-SOUTH, E-EAST} |
| XX | STATION/ FACILITY NUMBER {01, 03, 05 ETC.} |
| ZZ | EQUIPMENT/ DEVICE NUMBER |
| YY | ROOM/ LOCATION ID |
| MM | EVS EMERGENCY RESPONSE MODE ID |
| N | NUMBER INSTANCE |

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| No. | DATE | DSN | CHK | APP | REVISION |
|-----|--------|------|------|------|--|
| 3 | 2/2024 | ---- | ---- | ---- | 2024 REVISED STANDARD DRAWINGS |
| 2 | 8/2019 | ---- | ---- | ---- | REVISED SYSTEMS DIRECTIVE DRAWINGS |
| 1 | 1/2019 | ---- | ---- | ---- | 2019 GUIDANCE DWG REVISION - GENEREAL UPDATE |
| 0 | 8/2017 | ---- | ---- | ---- | GUIDANCE DRAWING |

DESIGNED BY:
DRAWN BY:
CHECKED BY:
APPROVED BY:

SUBMITTED BY: DATE: REVIEWED BY: DATE:

LINE IS 1" AT FULL SCALE



SCALE: NTS
FILENAME: STD-JBS512
CONTRACT No.: RTA/LR
DATE: 2/2024

**SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS**
EMERGENCY VENTILATION SYSTEM
EVS SUMMERY NOTIFICATIONS

DRAWING No.: **STD-JBS512**
FACILITY ID:
SHEET No.: REV: 3

GENERAL NOTES:

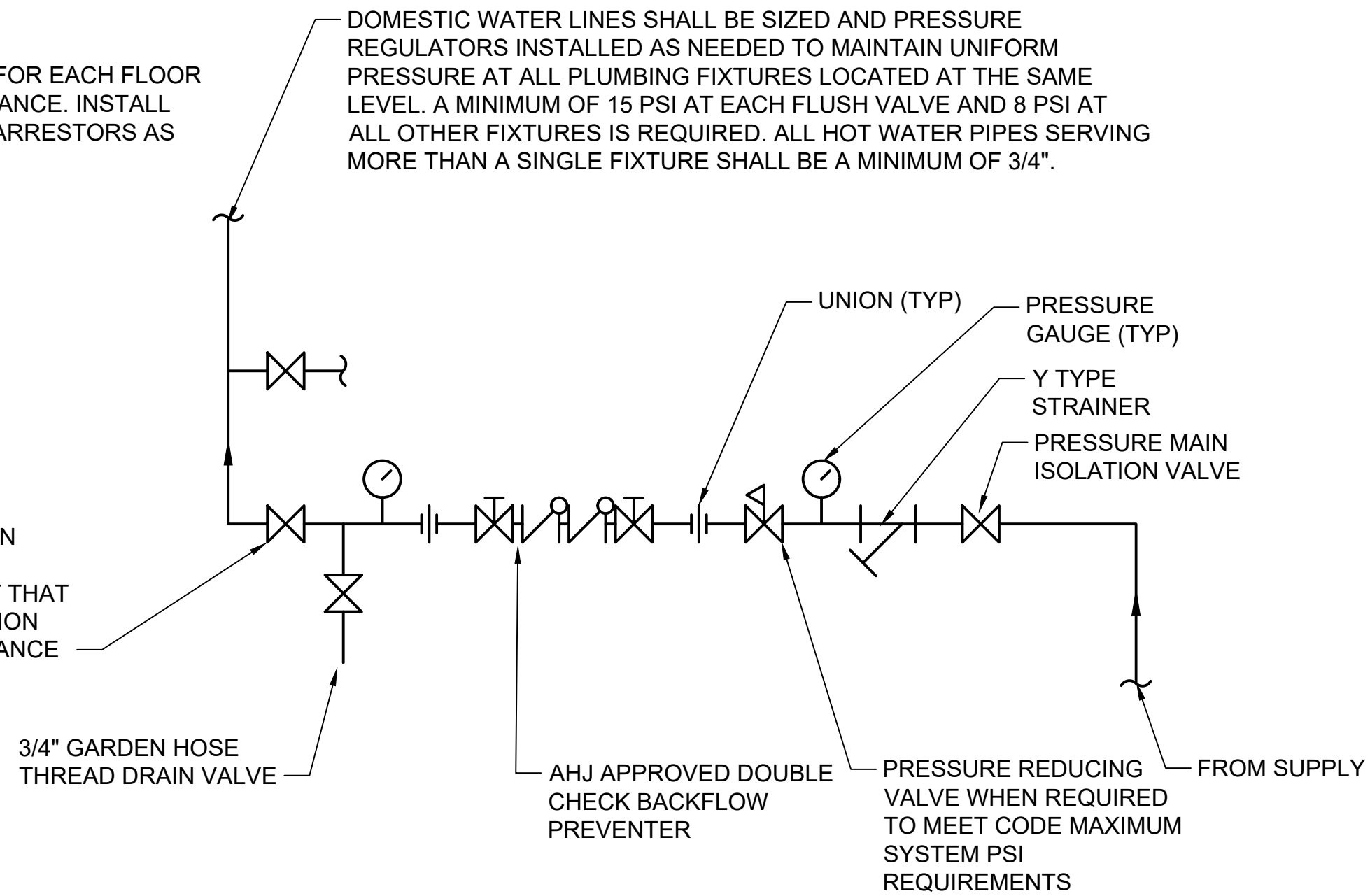
1. SIZING IS FOR REFERENCE ONLY, DESIGNER TO DETERMINE SIZE BASED ON CODE AND FIXTURE REQUIREMENT.
2. DRAWING IS INTENDED TO COMMUNICATE TYPICAL CONFIGURATION, DESIGN SHALL BE DEVELOPED FOR FACILITY REQUIREMENTS.

NOTE:

ISOLATION VALVES REQUIRED FOR EACH FLOOR LEVEL TO FACILITATE MAINTENANCE. INSTALL ACCESSIBLE WATER HAMMER ARRESTORS AS REQUIRED.

DOMESTIC WATER LINES SHALL BE SIZED AND PRESSURE REGULATORS INSTALLED AS NEEDED TO MAINTAIN UNIFORM PRESSURE AT ALL PLUMBING FIXTURES LOCATED AT THE SAME LEVEL. A MINIMUM OF 15 PSI AT EACH FLUSH VALVE AND 8 PSI AT ALL OTHER FIXTURES IS REQUIRED. ALL HOT WATER PIPES SERVING MORE THAN A SINGLE FIXTURE SHALL BE A MINIMUM OF 3/4".

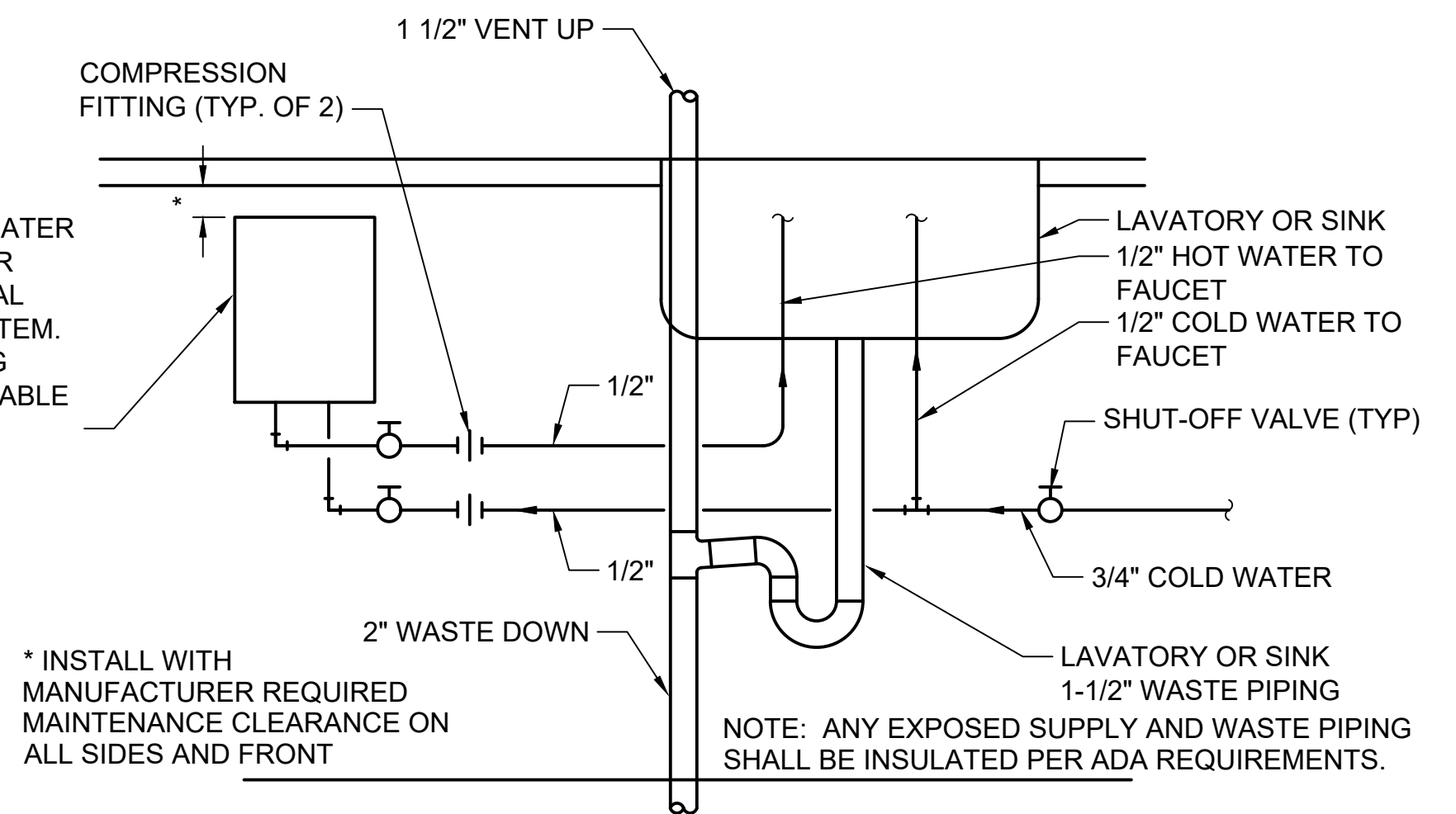
ISOLATION VALVES REQUIRED ON BOTH SIDES OF IN-LINE ACCESSORIES, AND EQUIPMENT THAT REQUIRES REMOVAL OR ISOLATION FROM PRESSURE FOR MAINTENANCE



BACKFLOW PREVENTER DETAIL

NTS

INSTANTANEOUS ELECTRIC WATER HEATER. PROVIDE INSTANTANEOUS WATER HEATER FOR LAVATORY OR SINK FOR FACILITIES WITH NO CENTRAL DOMESTIC HOT WATER SYSTEM. ENSURE WATER TEMPERING METHODS MEET ALL APPLICABLE CODES AND REGULATIONS.

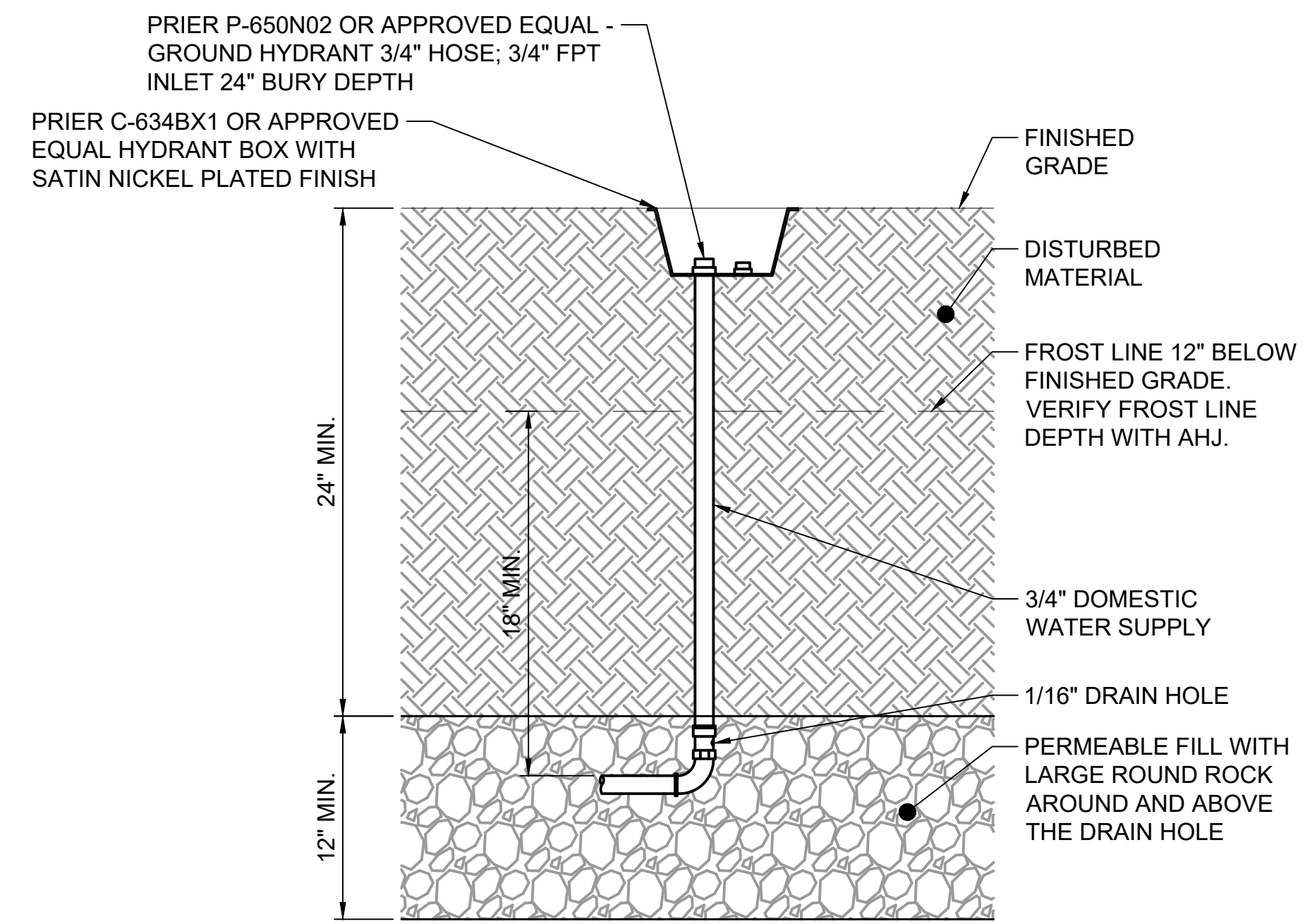


* INSTALL WITH MANUFACTURER REQUIRED MAINTENANCE CLEARANCE ON ALL SIDES AND FRONT

NOTE: ANY EXPOSED SUPPLY AND WASTE PIPING SHALL BE INSULATED PER ADA REQUIREMENTS.

INSTANTANEOUS ELECTRIC WATER HEATER

NTS



FLOOR MOUNTED HYDRANT DETAIL

NTS

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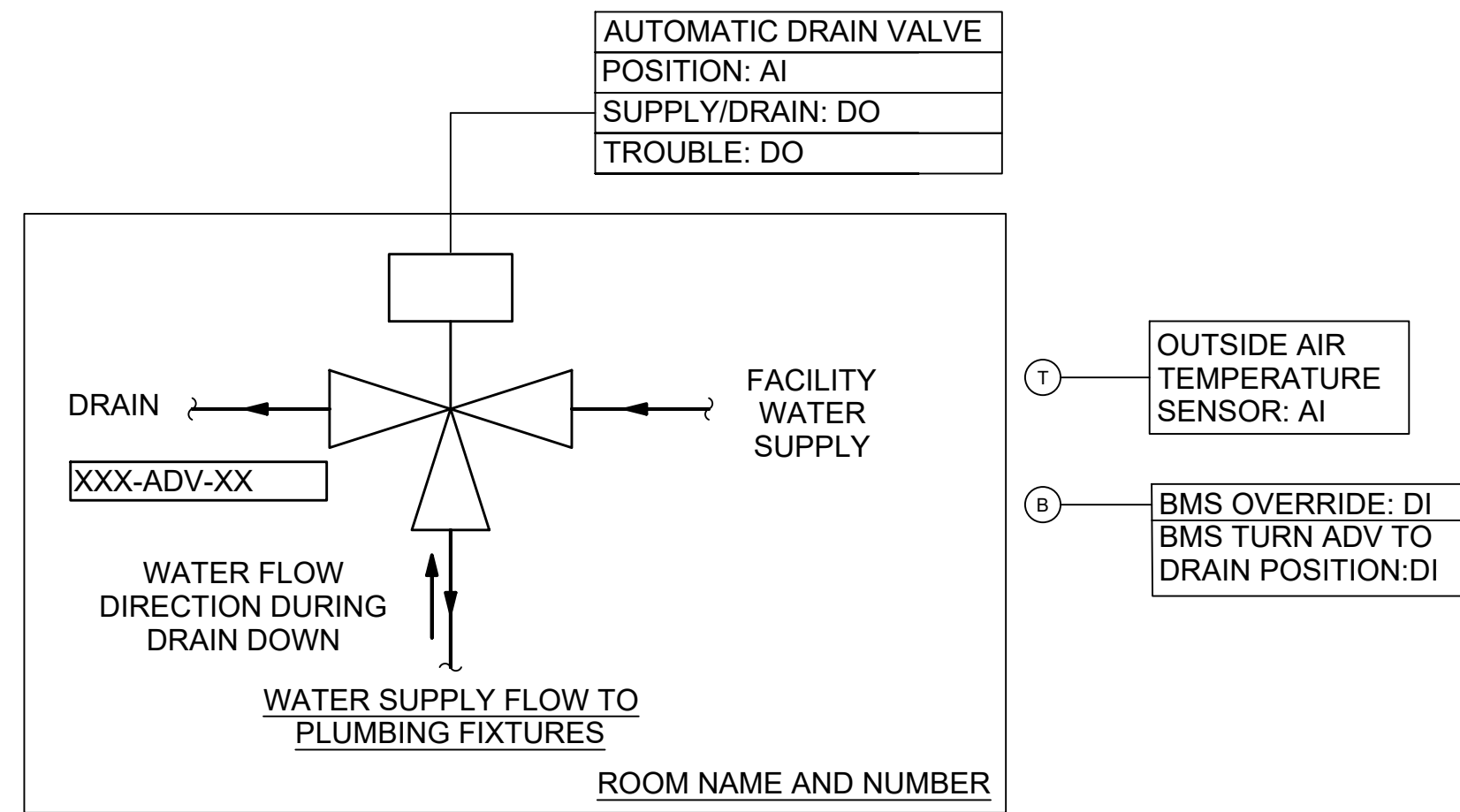
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SCALE: NTS
 FILENAME: STD-MPS130
 CONTRACT No.: RTA/LR
 DATE: 2/2024

**SOUND TRANSIT
 STANDARD DRAWINGS
 SYSTEMS**

DOMESTIC WATER
 SCHEMATIC AND DETAIL

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| DRAWING No.: | STD-MPS130 |
| FACILITY ID: | |
| SHEET No.: | 1 |

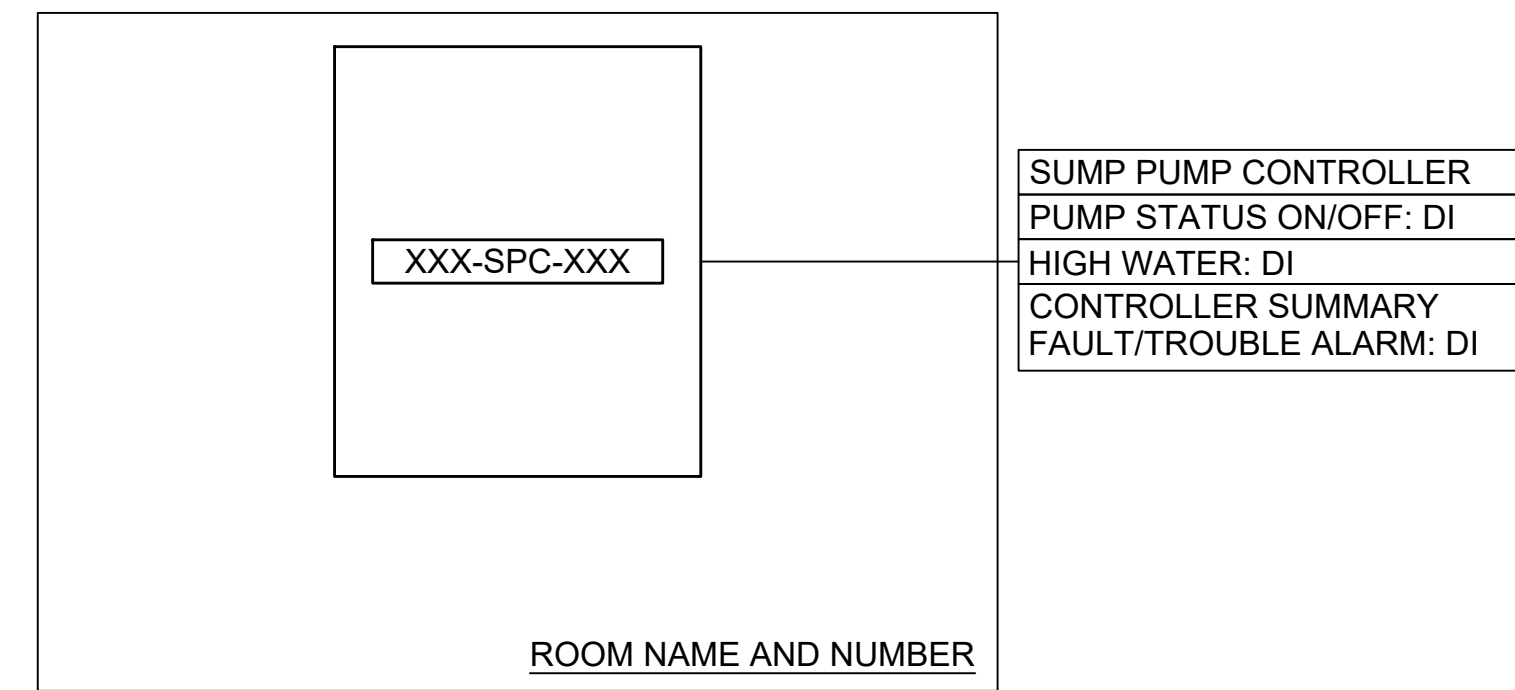


SEQUENCE OF OPERATION:

1. BMS MONITORS THE OUTDOOR AIR TEMPERATURE BY MEANS OF AN ANALOG TEMPERATURE TRANSMITTER.
2. ACTUATED DRAIN VALVE IS COMMANDED VIA DIGITAL INPUT FROM BMS TO DRAIN IN RESPONSE TO OUTSIDE AIR TEMPERATURE DROPPING BELOW SETPOINT (37 F ADJUSTABLE).
3. ACTUATED DRAIN VALVE POSITION IS MONITORED BY BMS, BY MEANS OF 4-20 MA SIGNAL .
4. ACTUATOR PROVIDES A DIGITAL INPUT TO BMS TO INDICATE TROUBLE/FAULT STATUS.
5. PROVIDE 2 OPTIONS TO RESET DRAIN VALVE TO "SUPPLY":
 - 5.1. INPUT REMOTELY BY OPERATIONS AS REQUESTED BY ON-SITE MAINTENANCE STAFF TO SEND DIGITAL INPUT TO BMS WHICH TEMPORARILY OVERRIDES SYSTEM AND PLACES VALVE IN "SUPPLY" FOR DURATION OF 60 MINUTES BEFORE RETUNING TO AUTOMATIC SETPOINT CONTROL. REFER TO DETAIL STD-JCDXXX.
 - 5.2. ON-SITE STATION OPERATION STAFF PUSH MOMENTARY PUSH BUTTON TO SEND DIGITAL INPUT TO BMS WHICH TEMPORARILY OVERRIDES SYSTEM AND PLACES VALVE IN "SUPPLY" FOR DURATION OF 60 MINUTES BEFORE RETUNING TO AUTOMATIC SETPOINT CONTROL. REFER TO DETAIL STD-JCDXXX.
6. LOW POINTS IN THE SYSTEM SHALL BE PROVIDED WITH THERMOSTATIC DRAIN VALVES TO ALLOW DISCHARGE OF ISOLATED PORTIONS OF THE SYSTEM.

ACTUATED DRAIN VALVE FOR LIGHT RAIL ELEVATED STATIONS ONLY- BMS SCHEMATIC

NTS



SEQUENCE OF OPERATION:

1. LOCAL PUMP CONTROLLER TO BE DESIGNED WITH APPROPRIATE FLOAT SWITCHES AND INDICATIONS TO MANAGE WATER LEVELS INDEPENDENTLY OF BMS. PROVIDE INTERFACING POINTS TO BMS FOR REMOTE MONITORING.
2. SUMP PUMP CONTROLLER PROVIDES DIGITAL INPUT TO BMS INDICATING HIGH SUMP WATER LEVEL ALARM CORRESPONDING TO FLOAT SWITCH FEEDBACK.
3. SUMP PUMP CONTROLLER PROVIDES DIGITAL INPUT TO BMS INDICATING SUMP PUMP CONTROLLER FAULT/TROUBLE ALARM STATUS.

SUMP PUMP CONTROLLER - BMS SCHEMATIC

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| CONTRACT No.: | |
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| SOUND TRANSIT STANDARD DRAWINGS SYSTEMS | |
| PLUMBING SYSTEM CONTROL STRATEGY SCHEMATICS | |

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| DRAWING No.: | STD-MPS131 |
| FACILITY ID: | |
| SHEET No.: | 0 |
| REV: | |

GENERAL NOTES:

- BMS CONTINUOUSLY MONITOR BUILDING ENVIRONMENTAL CONDITIONS AND EQUIPMENT OPERATION.
- BMS COMPARES BUILDING ENVIRONMENTAL CONDITIONS AND EQUIPMENT OPERATION TO ACCEPTABLE BUILDING ENVIRONMENTAL VALUES AND OPERATING SCHEDULES.
- BMS ACTIVATES OR DEACTIVATES BUILDING EQUIPMENT AS REQUIRED TO MAINTAIN ACCEPTABLE BUILDING ENVIRONMENTAL VALUES AND OPERATING SCHEDULES.
- BMS REGISTERS FAULT SIGNALS FOR BUILDING EQUIPMENT UNABLE TO MAINTAIN ACCEPTABLE BUILDING ENVIRONMENTAL VALUES AND OPERATING SCHEDULES.
- BMS COMMUNICATES FAULTS TO LCC FOR STATIONS AND ST FACILITIES MAINTENANCE FOR GARAGES.
- BMS MANAGES FIRE ALARM RESPONSE FOR MECHANICAL EQUIPMENT BASED ON FACP INPUT.
- BMS SHOULD USE HYDROGEN (H2) SENSORS TO MONITOR H2 CONCENTRATION LEVELS IN ROOMS CONTAINING LEAD-ACID BATTERIES WHEN REQUIRED BY THE WA FIRE CODE. INTERMITTENT VENTILATION SHOULD LIMIT MAXIMUM CONCENTRATION OF H2 TO LESS THAN 1% OF THE TOTAL ROOM VOLUME IN ACCORDANCE WITH WA FIRE CODE.
- INSTRUMENTATION SHOWN FOR REFERENCE, BUT DESIGNER SHALL COORDINATE APPROPRIATE SENSOR OR INSTRUMENTATION FOR FUNCTIONALITY OF SELF-CONTROLLED EQUIPMENT AND BMS CONTROLLED EQUIPMENT.
- PROVIDE FAULT DETECTION AND DIAGNOSTIC (FDD) FOR ACU AS REQUIRED BY CURRENT WSEC.

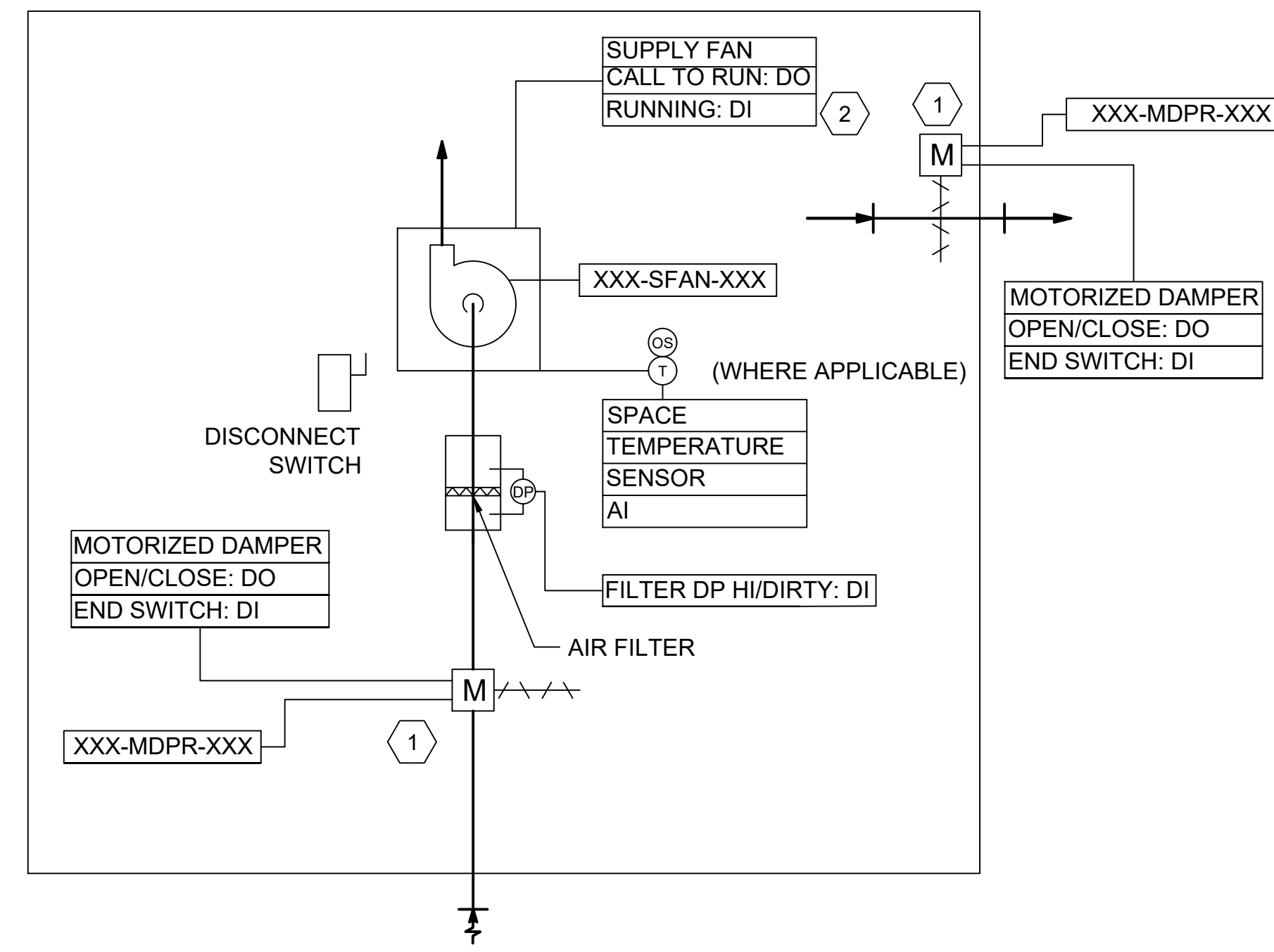
KEY NOTE:

- PROVIDE MDPR AS REQUIRED BY AHJ
- BMS START/STOP FAN BASED ON FACP INPUT. SEE NOTE 6 ABOVE.
- LINK STATION COMMUNICATIONS ROOM PROTECTED BY CLEAN AGENT.

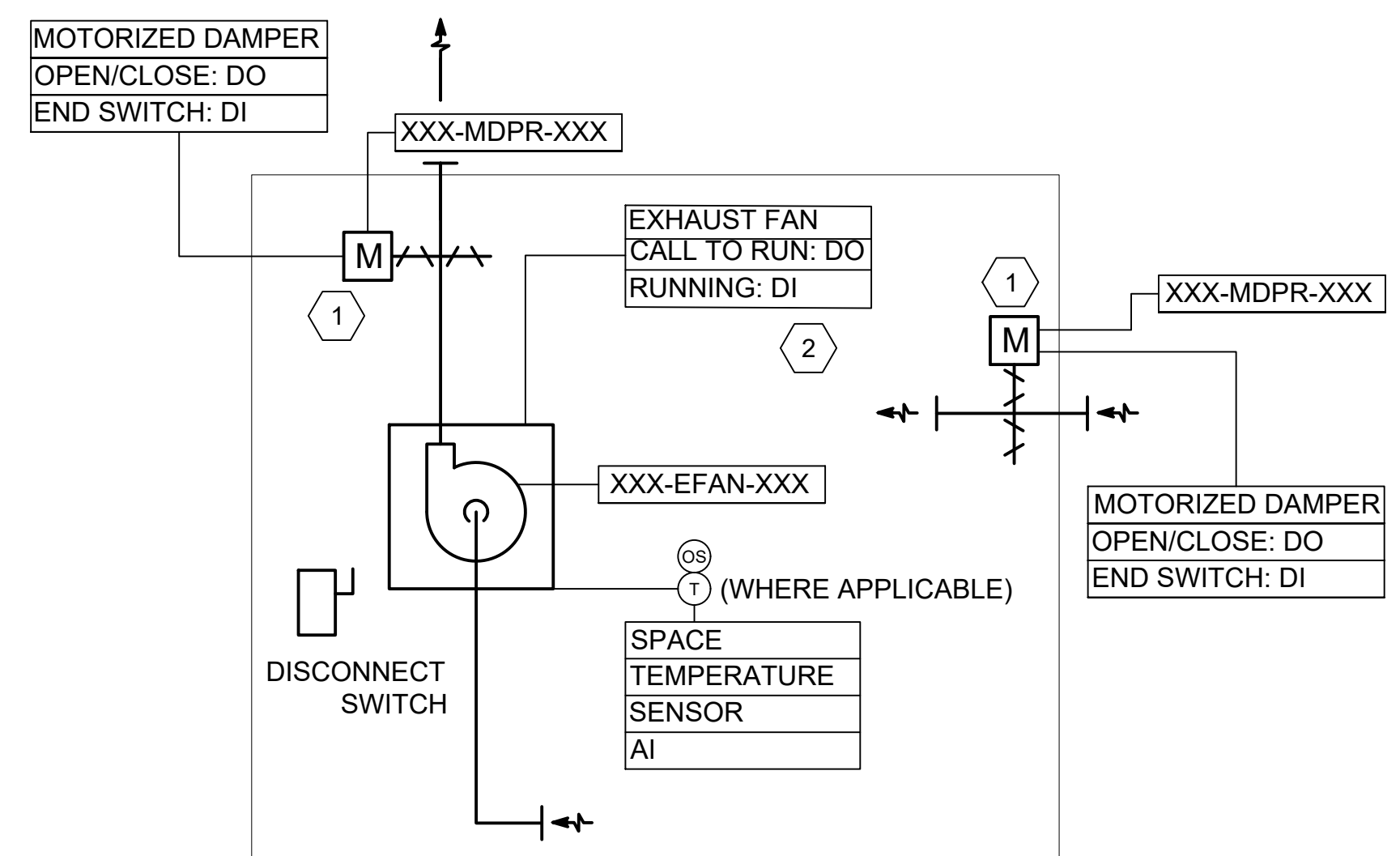
FSD OPEN/CLOSE BY FACP PER NFPA; ACU/EFAN SHUTDOWN BY BMS PER IMC.
 FACILITY COMMUNICATIONS ROOM NOT PROTECTED BY CLEAN AGENT.
 FSD OPEN/CLOSE BY FACP PER IBC; ACU/EFAN SHUTDOWN PER IMC.
 SEE FLS 601 FOR CONTROL OF FIRE SMOKE DAMPERS (FSD)

LEGEND:

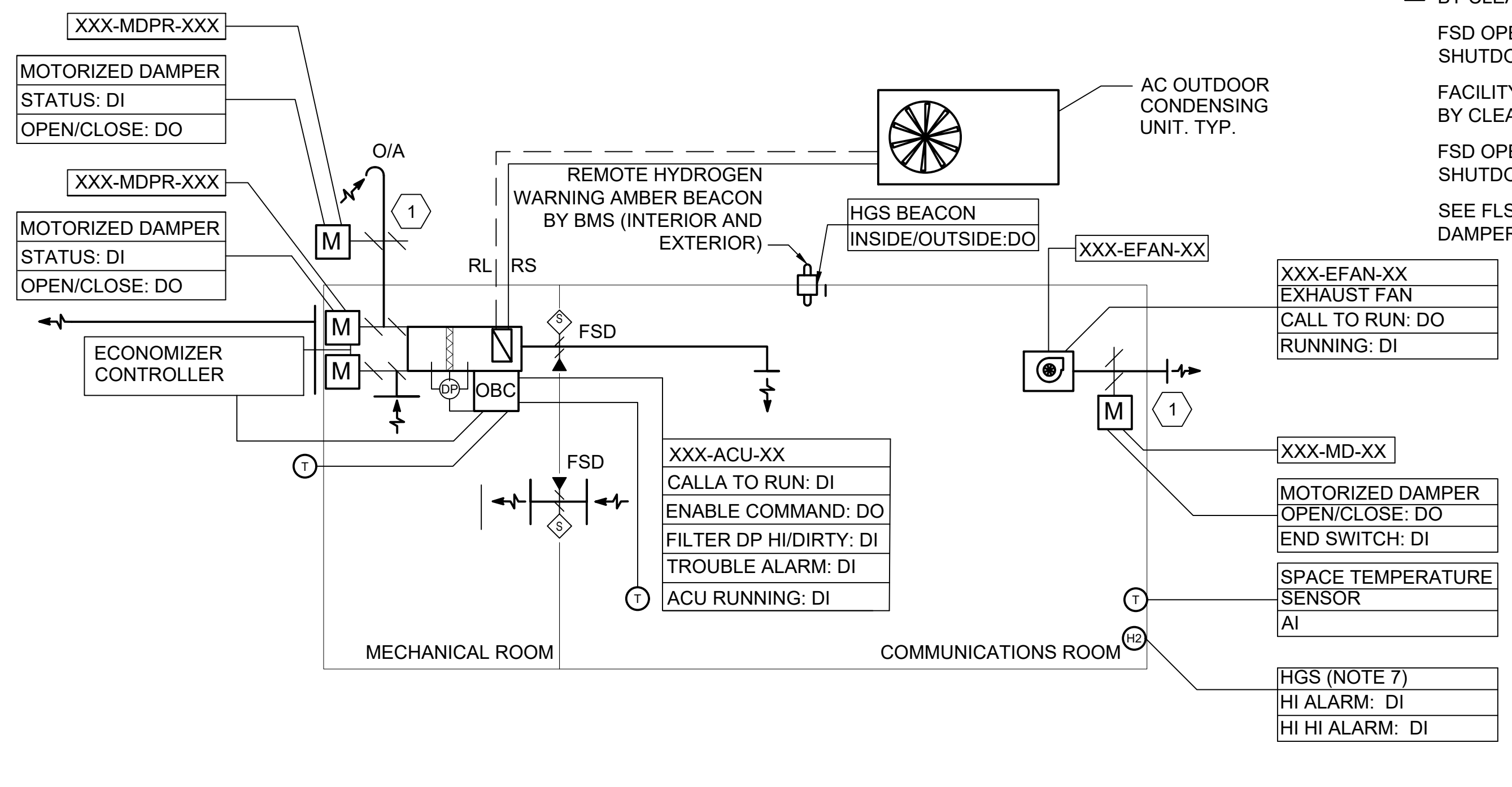
- FSD FIRE AND SMOKE DAMPER
- OS OCCUPANCY SENSOR



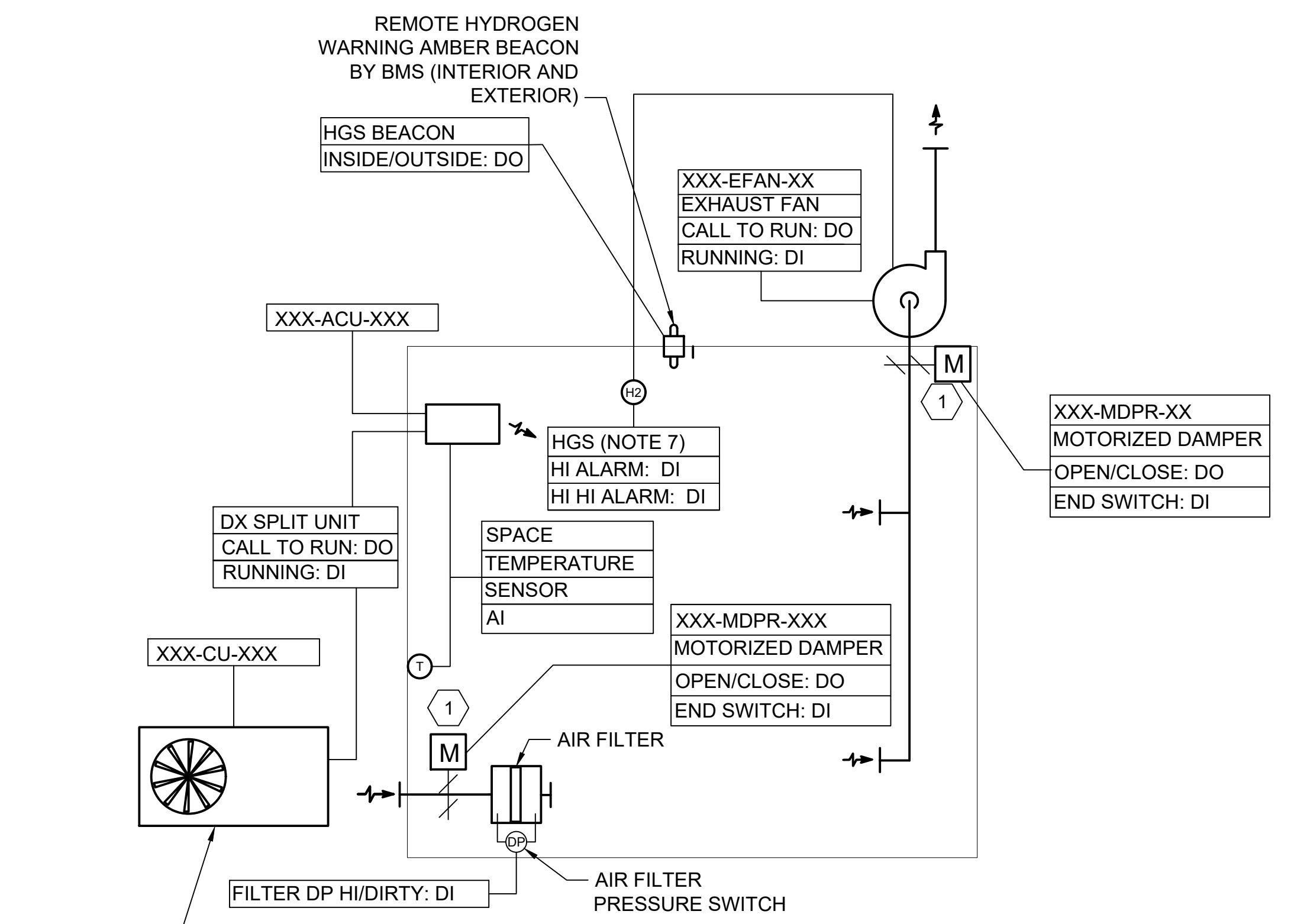
SUPPLY FAN - BMS SCHEMATIC
NTS



EXHAUST FAN - BMS SCHEMATIC
NTS



COMMUNICATION ROOM - BMS SCHEMATIC
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BATTERY OR UPS ROOM - BMS SCHEMATIC
NTS

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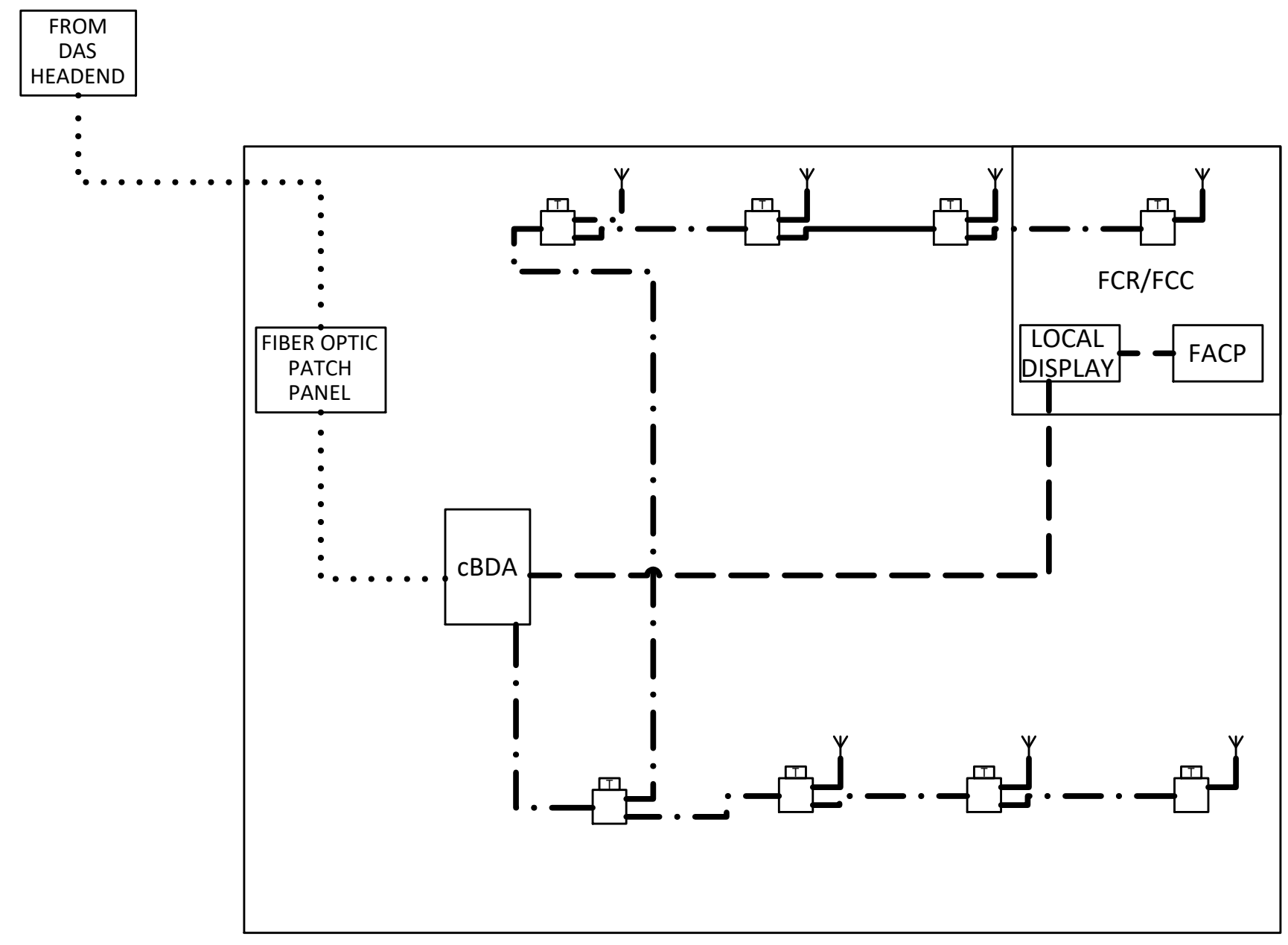
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| CONTRACT No.: | RTA/LR |
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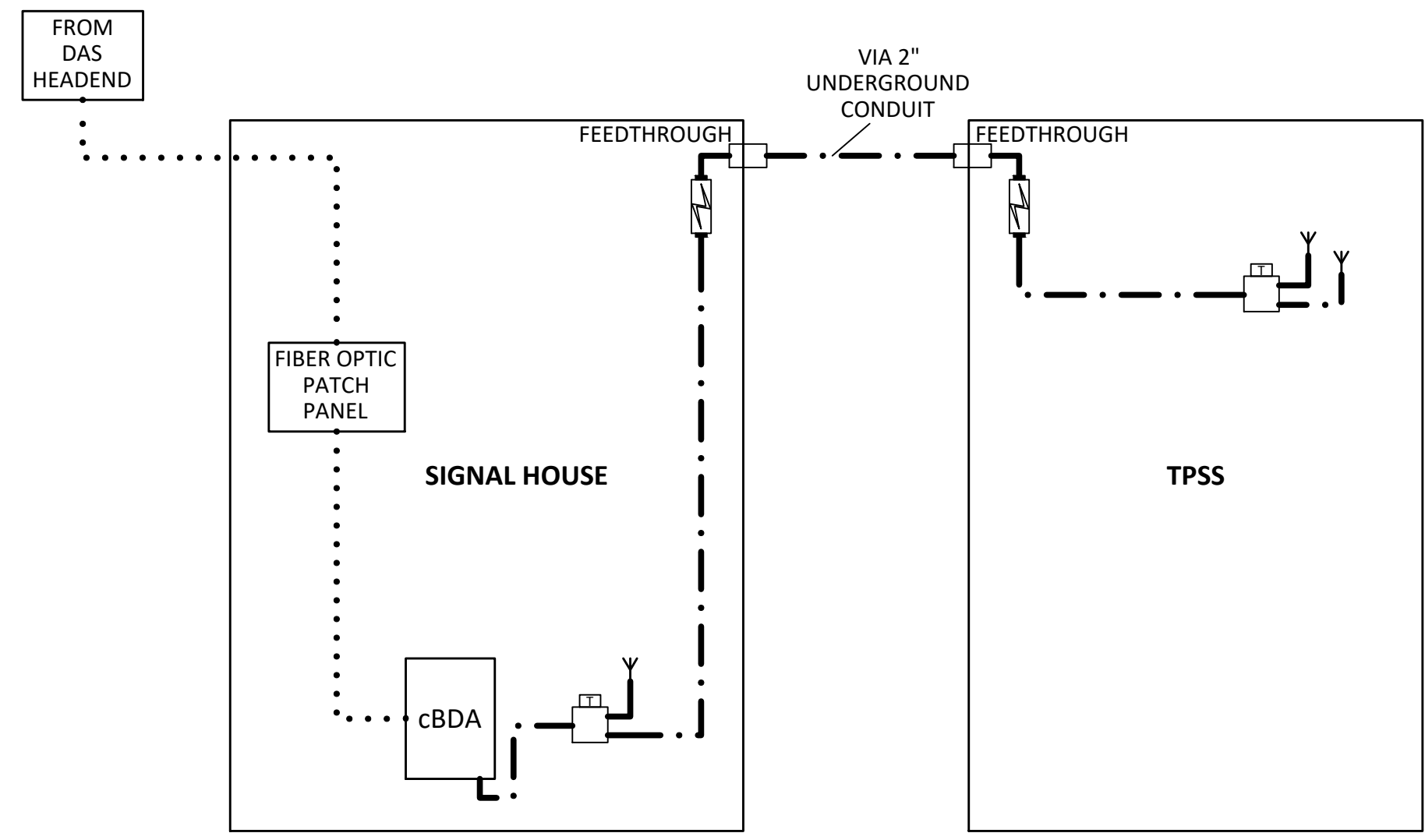
SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS
HVAC BMS CONTROL STRATEGY
SCHEMATICS

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| DRAWING No.: | STD-MHS140 |
| FACILITY ID: | |
| SHEET No.: | REV: |
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BASIC INDOOR RF SIGNAL ENHANCEMENT
NTS

- LEGEND**
- LIGHTNING ARRESTOR
 - COAXIAL CABLE
 - DIRECTIONAL COUPLER
 - INDOOR ANTENNA
 - MONITORED SIGNAL CABLE
 - FIBER OPTIC
 - cBDA = CHANNELIZED BDA**



TPSS AND SIGNAL HOUSE RF SIGNAL ENHANCEMENT
NTS

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| 2 | 2/2024 | ---- | ---- | ---- | 2024 REVISED DIRECTIVE DRAWINGS |
| 1 | 8/2019 | ---- | ---- | ---- | REVISED SYSTEM DIRECTIVE DRAWINGS |
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LINE IS 1" AT FULL SCALE

SCALE: NTS
FILENAME: STD-JRS101
CONTRACT No.: RTA/LR
DATE: 2/2024


**SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS**

COMMUNICATIONS
RADIO OFF THE AIR BDA DISTRIBUTION
SCHEMATIC

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| DRAWING No.: | STD-JRS101 |
| FACILITY ID: | |
| SHEET No.: | REV: 2 |

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| | | | | | DESIGNED BY: | | | |  | SCALE: NTS | SOUND TRANSIT STANDARD DRAWINGS SYSTEMS COMMUNICATIONS TYPICAL STATION BACKBONE TOPOLOGY TCN AND EFN | DRAWING No.: |
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LINE IS 1" AT FULL SCALE



SCALE:
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FILENAME:
STD-JCS103

CONTRACT No.:
RTA/LR

DATE:
2/2024

**SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS**

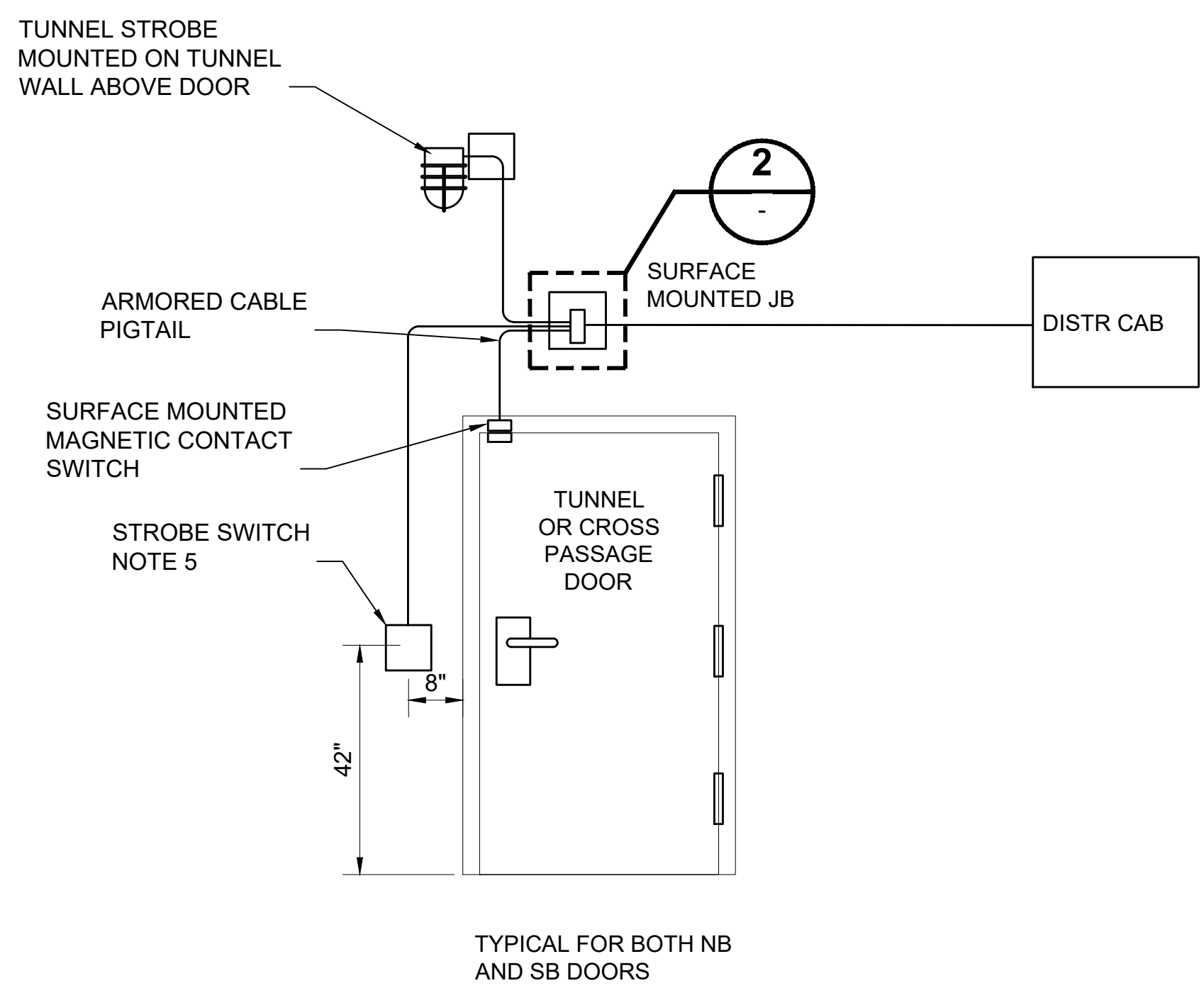
COMMUNICATIONS
TYPICAL STATION NETWORK TOPOLOGY

DRAWING No.:
STD-JCS103

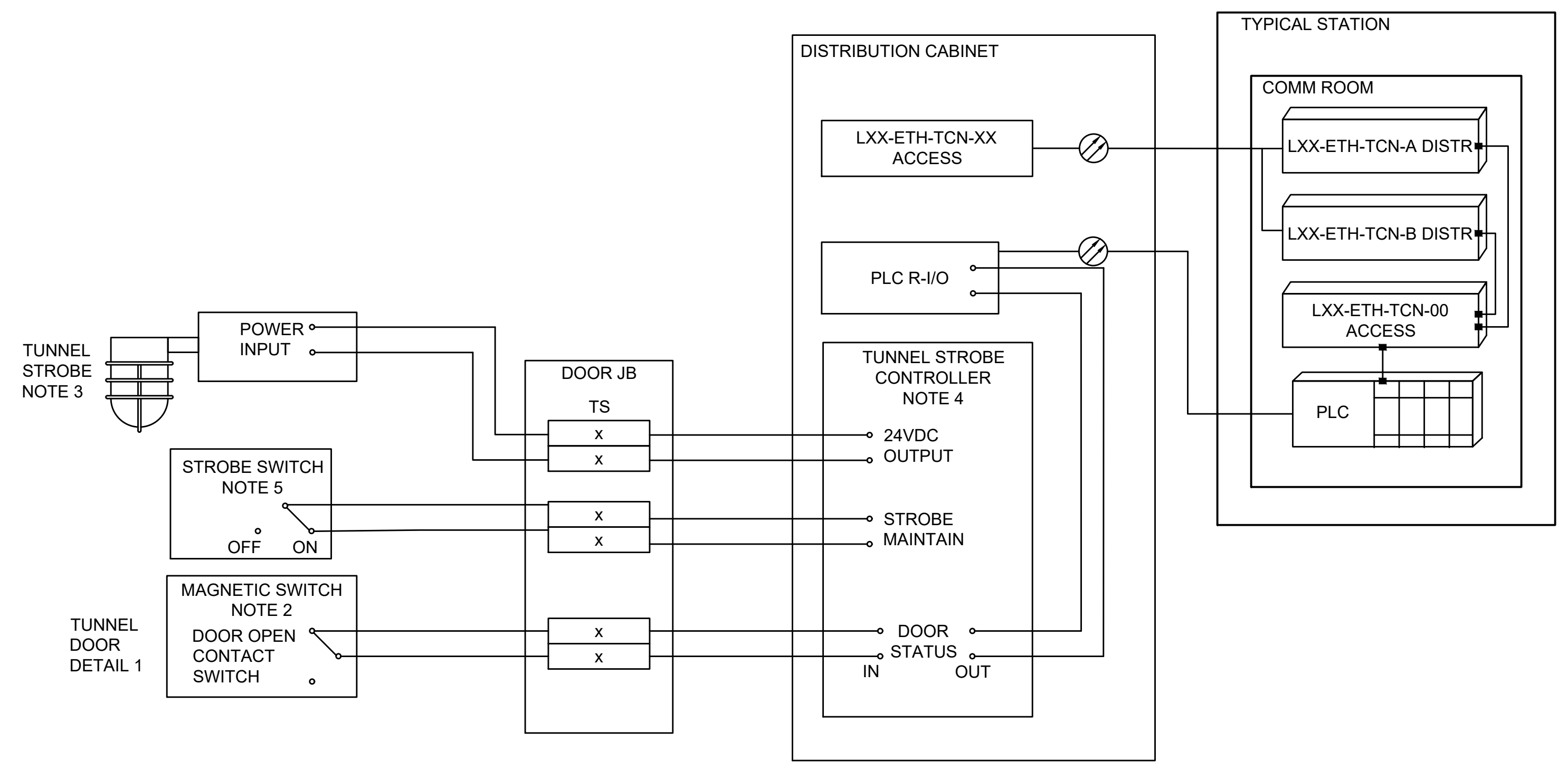
FACILITY ID:

SHEET No.: REV:
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- GENERAL NOTES:**
- COORDINATE WITH TUNNEL PLANS AND DOOR SCHEDULE.
 - DOOR CONTACTS SHALL BE CLOSED WHEN DOOR IS IN THE CLOSED POSITION.
 - ALL TUNNEL OR CROSS PASSAGE DOORS SHALL BE EQUIPPED WITH 90 FLASHES PER MINUTE YELLOW STROBE ABOVE DOOR.
 - TUNNEL DOOR CONTACT WILL INITIATE A SIGNAL TO A STROBE CONTROLLER RELAY WITH A VARIABLE TIMER TO OPERATE THE STROBE.
 - PROVIDE A TWO POSITION SWITCH FOR OPERATIONS PERSONNEL TO MAINTAIN STROBE OPERATION FOR EXTENDED WORK PERIODS.
 - THE DEPICTED CONNECTION FROM PLC TO PLC E-I/O IS A LOGICAL CONNECTION, THE PHYSICAL CONNECTION IS TO BE PROVIDED VIA THE FIBER OPTIC CABLE FROM THE COMM ROOM TO THE DISTRIBUTION CABINET.



TUNNEL OR CROSS PASSAGE DOOR 1
NTS



DOOR WIRING DETAIL - TUNNEL OR CROSS PASSAGE DOOR 2
NTS

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| 2 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |
| 1 | 8/2019 | | | | REVISED SYSTEMS DIRECTIVE DRAWNGS |
| 0 | 8/2017 | | | | GUIDANCE DRAWINGS |

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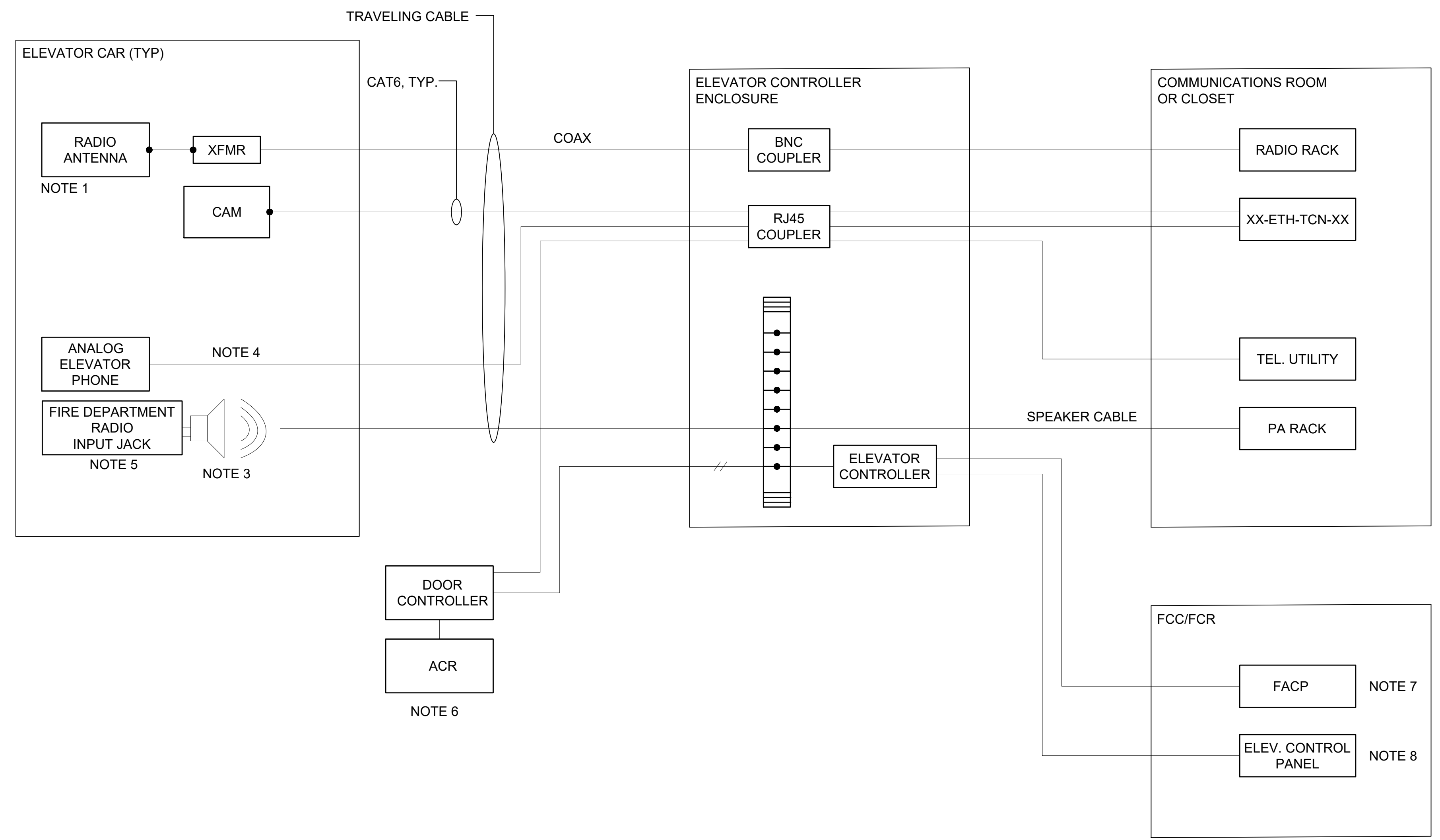
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SCALE: NTS
FILENAME: STD-JCS201
CONTRACT No.: RTA/LR
DATE: 2/2024

SOUND TRANSIT STANDARD DRAWINGS SYSTEMS

COMMUNICATIONS
TYPICAL CROSS PASSAGE DOOR INTRUSION STROBE BLOCK DIAGRAM

| |
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| DRAWING No.: STD-JCS201 |
| FACILITY ID: |
| SHEET No.: 2 |



- GENERAL NOTES:**
- COORDINATE MOUNTING METHODS FOR ANTENNA WITH CIVIL DESIGNER AND CONTRACTOR.
 - TERMINATE EACH CABLE ON A TERMINATION RATED FOR THE INTENDED USE.
 - SPEAKER IN ELEVATOR CAB IN STATION ELEVATORS ONLY (NOT IN GARAGE) OR NON-STATION FACILITY.
 - TELEPHONE LINE SHALL BE MONITORED VIA ELEV CONTROLLER.
 - COORDINATE WITH ST, AHJ AND ARCHITECTURE TO IDENTIFY ADDITIONAL REQUIREMENTS SUCH AS AN FIRE DEPARTMENT RADIO INPUT JACK.
 - ACCESS CONTROL CARD READER LOCATION(S) TO BE DETERMINED BASED ON STATION/ GARAGE CONFIGURATION.
 - RECALL FUNCTIONALITY AS REQUIRED BY CODE. TYPICAL RECALL TRIGGER BY HEAT OR SMOKE IN ELEVATOR SHAFT, HEAT IN LOBBY OR SMOKE IN ELEVATOR MACH ROOM.
 - AS REQUIRED BY AHJ AND AS SHOWN IN FCC/ FCR DRAWINGS.

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| 3 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |
| 2 | 8/2019 | | | | REVISED SYSTEMS DIRECTIVE DRAWINGS |
| 1 | 1/2019 | | | | 2019 GUIDANCE DWGD REVISION - GENERAL UPDATE |
| 0 | 8/2017 | | | | GUIDANCE DRAWINGS |

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 FILENAME: STD-JCS500
 CONTRACT No.: RTA/LR
 DATE: 2/2024



**SOUND TRANSIT
 STANDARD DRAWINGS
 SYSTEMS**

COMMUNICATIONS
 ELEVATOR INTERFACING
 BLOCK DIAGRAM

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| DRAWING No.: | STD-JCS500 |
| FACILITY ID: | |
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| 1 | 8/2019 | ---- | ---- | ---- | REVISED SYSTEMS DIRECTIVE DRAWINGS |
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LINE IS 1" AT
FULL SCALE



SOUNDTRANSIT

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| FILENAME: | STD-JCS700 |
| CONTRACT No.: | RTA/LR |
| DATE: | 2/2024 |

**SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS**

COMMUNICATIONS
SIGNAL HOUSE
INTERFACE DIAGRAM

| | |
|--------------|-------------------|
| DRAWING No.: | STD-JCS700 |
| FACILITY ID: | |
| SHEET No.: | REV: 2 |

GENERAL NOTES:

1. CONTRACTOR IS RESPONSIBLE TO PROVIDE A COMPLETE POINTS AND SIDL LIST BASED ON EQUIPMENT TO BE INSTALLED AT EACH FACILITY. EACH TYPICAL EQUIPMENT TYPE MAY NOT BE REQUIRED AT A FACILITY.
2. CONTRACTOR TO PROVIDE 25% WIRED HARDWARE I/O SPARES FOR EACH TCS CONTROLLER.
3. THIS IS THE MINIMUM POINTS LIST. ADDITIONAL POINTS MAY BE REQUIRED TO IMPLEMENT A WORKING SYSTEM.
4. PROVIDE SOFT I/O POINTS AS REQUIRED TO MEET THE FUNCTIONAL REQUIREMENTS OF EQUIPMENT WITH A COMMUNICATIONS INTERFACE.
5. DISPLAY STATUS AND ALARMS FOR EACH PLC POINT AT LCC.

| TCS PLC I/O POINTS FOR TYPICAL EQUIPMENT | | | | |
|--|-------------------------|-------------------------|--------------------------------|--|
| EQUIPMENT TYPE | PLC I/O DESCRIPTION | POINT TYPE | PLC TAG TEMPLATE | NOTES |
| OCS DISCONNECT | SWITCH OPEN | DI | EXX_OCSD_XX_OPEN_DI | EXX IS LOCATION, XX IS EQUIPMENT INSTANCE NUMBER |
| SIGNAL HOUSE | FIRE ALARM | DI | EXX_SIG_XX_FACP_ALARM_DI | |
| | DOOR OPEN | DI | EXX_SIG_XX_DOOR_OPEN_DI | |
| | INTRUSION DISARM | DI | EXX_SIG_XX_INTRUSION_DISARM_DI | |
| | TWC DECODER OUTPUT | DI | EXX_SIG_XX_TWC_XX_DI | |
| | MAINTENANCE RADIO FAULT | DI | EXX_SIG_XX_RADIO_FAULT_DI | |
| | UPS TROUBLE | DI | EXX_SIG_XX_UPS_TROUBLE_DI | |
| | POWER FAULT | DI | EXX_SIG_XX_POWER_FAIL_DI | |
| | HVAC FAULT | DI | EXX_SIG_XX_HVAC_TROUBLE_DI | |
| | HIGH ROOM TEMPERATURE | DI | EXX_SIG_XX_ROOM_TEMP_DI | |
| | SWITCH HEATER ON 1 | DI | EXX_SIG_XX_HTR_XX_ON_DI | |
| | SWITCH HEATER ON 2 | DI | EXX_SIG_XX_HTR_XX_ON_DI | |
| | SWITCH HEATER ON 3 | DI | EXX_SIG_XX_HTR_XX_ON_DI | |
| SWITCH HEATER ON 4 | DI | EXX_SIG_XX_HTR_XX_ON_DI | | |
| SIGNAL ROOM | TWC DECODER OUTPUT | DI | EXX_SIG_XX_TWC_XX_DI | |
| | UPS TROUBLE | DI | EXX_SIG_XX_UPS_TROUBLE_DI | |
| | POWER FAULT | DI | EXX_SIG_XX_POWER_FAIL_DI | |
| | HVAC FAULT | DI | EXX_SIG_XX_HVAC_TROUBLE_DI | |
| | HIGH ROOM TEMPERATURE | DI | EXX_SIG_XX_ROOM_TEMP_DI | |
| TIDS | INTRUSION | DI | EXX_TIDS_XX_INTRUSION_DI | |
| | TIDS TROUBLE | DI | EXX_TIDS_XX_TROUBLE_DI | |
| | STROBE ACTIVATE | DO | EXX_TIDS_XX_STROBE_DO | |
| | SPEAKER ACTIVATE | DO | EXX_TIDS_XX_SPEAKER_DO | |
| TPSS | DOOR OPEN | DI | EXX_TPSS_XX_DOOR_01_DI | |
| | DOOR OPEN | DI | EXX_TPSS_XX_DOOR_02_DI | |
| | INTRUSION ALARM | DI | EXX_TPSS_XX_INTRUSION_01_DI | |
| | INTRUSION ALARM | DI | EXX_TPSS_XX_INTRUSION_02_DI | |
| | ENCLOSURE DOOR SWITCH | DI | EXX_TPSS_XX_ENC_OPEN_DI | |
| | DC POWER SUPPLY FAULT 1 | DI | EXX_TPSS_XX_DCPS_01_FAULT_DI | |
| | DC POWER SUPPLY FAULT 2 | DI | EXX_TPSS_XX_DCPS_02_FAULT_DI | |
| | SPARE INPUT 01 | DI | EXX_TPSS_XX_SPARE_01_DI | |
| | SPARE INPUT 02 | DI | EXX_TPSS_XX_SPARE_02_DI | |
| | SPARE INPUT 03 | DI | EXX_TPSS_XX_SPARE_03_DI | |
| SPARE INPUT 04 | DI | EXX_TPSS_XX_SPARE_04_DI | | |

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| No. | DATE | DSN | CHK | APP | REVISION |
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| 2 | 2/2024 | ---- | ---- | ---- | 2024 REVISED STANDARD DRAWINGS |
| 1 | 8/2019 | ---- | ---- | ---- | REVISED SYSTEMS DIRECTIVE DRAWINGS |
| 0 | 1/2019 | ---- | ---- | ---- | 2019 GUIDANCE DWG REVISIONS - GENERAL UPDATE |

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LINE IS 1" AT FULL SCALE

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| SCALE: NTS |
| FILENAME: STD-JCS701 |
| CONTRACT No.: RTA/LR |
| DATE: 2/2024 |

SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS


COMMUNICATIONS
TCS PLC I/O POINTS FOR TYPICAL EQUIPMENT

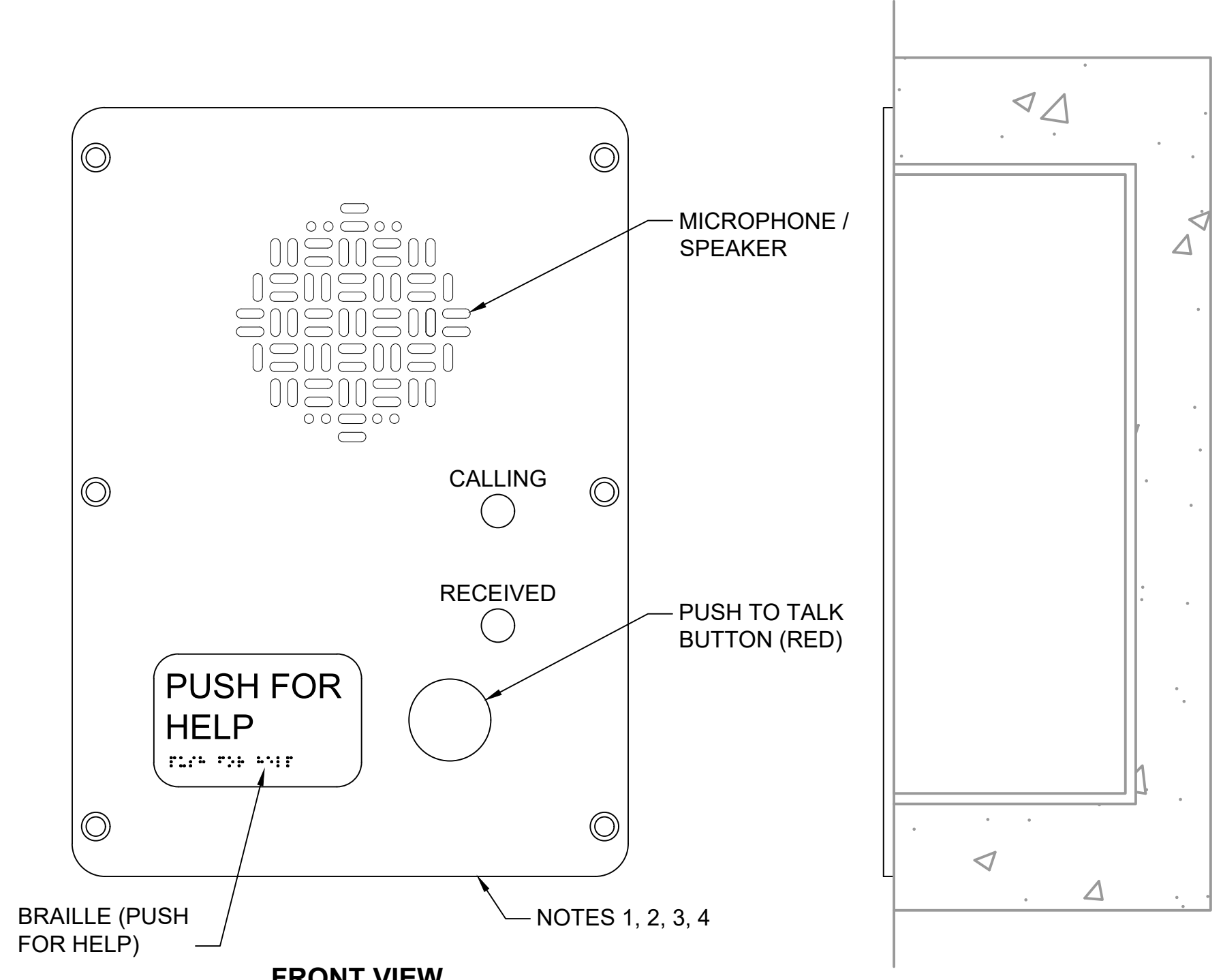
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| DRAWING No.: | STD-JCS701 |
| FACILITY ID: | |
| SHEET No.: | 2 |

| LOCATION | ROOM NUMBER | SWITCH NAME | CABINET | TYPE | MINIMUM COPPER PORT COUNT | MINIMUM FIBER PORT COUNT | # OF UPLINK PORTS | APPROX. # OF PORTS PoE/PoE+ (15W/30W) | BMS VLAN | TCS VLAN | CCTV VLAN | PA/VMS VLAN | PM VLAN | FCN A VLAN | FCN B VLAN | ACCESS CONTROL VLAN | PBX B VLAN | ETEL VLAN | ST IT VLAN | EVS VLAN | PARKING MGMT VLAN |
|---------------------------------|-------------|-------------------|--------------|--------------|---------------------------|--------------------------|-------------------|---------------------------------------|----------|----------|-----------|-------------|---------|------------|------------|---------------------|------------|-----------|------------|----------|-------------------|
| SHORELINE SOUTH / 145TH STATION | N15S06 | N15-ETH-TCN-01 | DC-01 | ACCESS | 41 | 2 | 2 | 41 | X | X | X | | | | | X | X | X | X | | |
| SHORELINE SOUTH / 145TH STATION | N15S06 | N15-ETH-TCN-DISTR | NETWORK RACK | DISTRIBUTION | 2 | 13 | 13 | N/A | X | X | X | X | X | X | X | X | X | X | X | X | X |
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- GENERAL NOTES:**
- FOLLOW SOUND TRANSIT STANDARDS FOR EQUIPMENT NAMING.
 - THE TABLE SHOWN IS EXAMPLE ONLY. THE CONTRACTOR SHALL PROVIDE NETWORK SWITCH SCHEDULE PER THE ACTUAL. THE TABLE WILL BE REVIEWED BY SOUND TRANSIT TO PROCURE AND CONFIGURE NETWORK SWITCHES.
 - ALL NETWORK EQUIPMENT INSTALLED IN UNCONDITIONED SPACE SHALL HAVE EXTENDED TEMPERATURE RANGE.

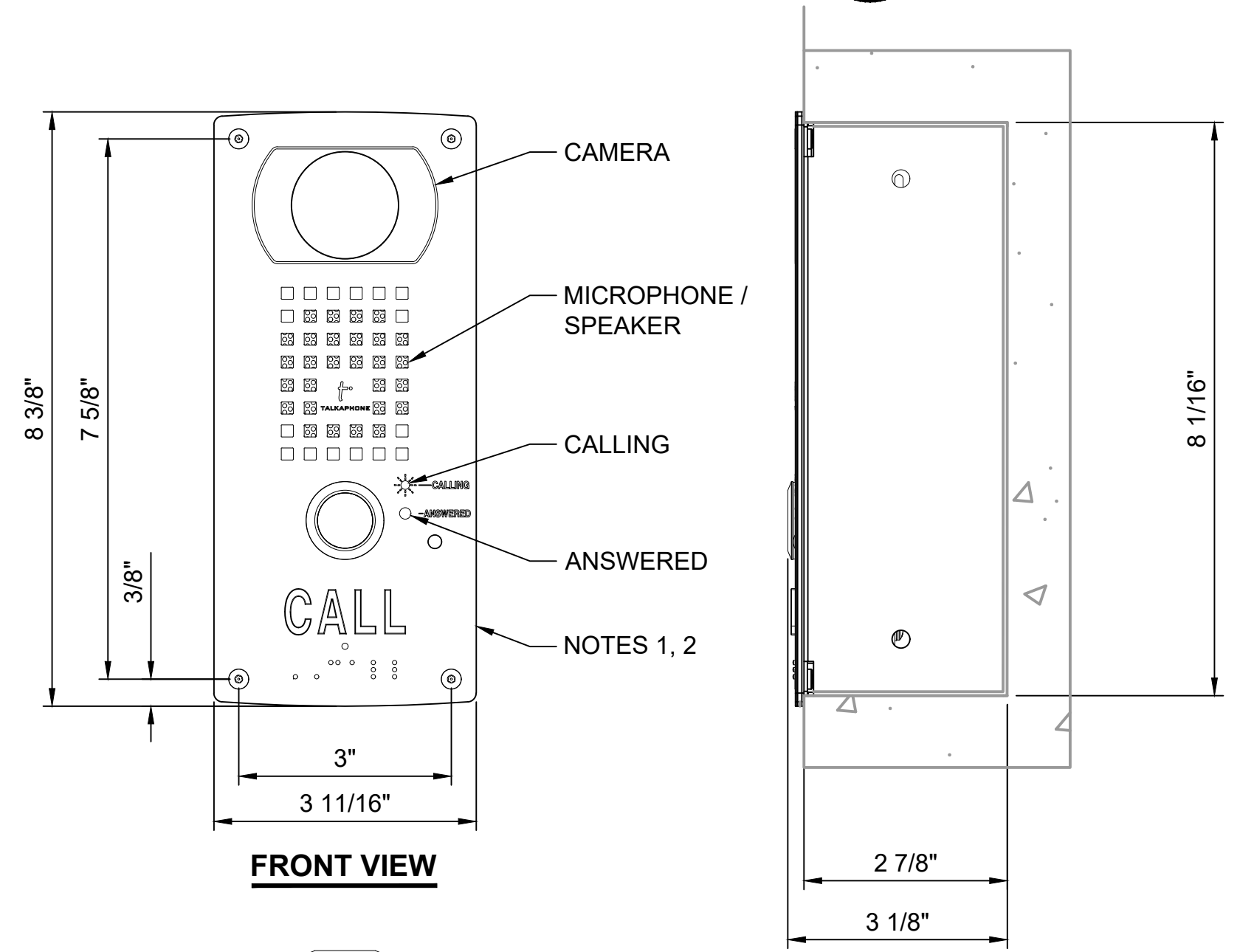
03/21/24 | 12:45 PM | HARRISBK C:\USERS\HARRISBK\SOUND TRANSIT\TECHNICAL STANDARDS AND REQUIREMENTS PROJECTS - DRAWINGS\UPDATE 2023\STANDARD DRAWINGS\SYSTEMS\STD-JCS702.DWG

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|---------------|--------|-----|-------|-----|---------------------------|---|-------------------------|--|--------------|--|--|--------|--|--|
| DESIGNED BY: | | | | | |  | SCALE: NTS | <p style="text-align: center;">SOUND TRANSIT STANDARD DRAWINGS SYSTEMS</p> <p>COMMUNICATIONS NETWORK SWITCH SCHEDULES</p> | DRAWING No.: | | | | | |
| DRAWN BY: | | | | | | | FILENAME: STD-JCS702 | | FACILITY ID: | | | | | |
| CHECKED BY: | | | | | | | CONTRACT No.: | | SHEET No.: | | | | | |
| APPROVED BY: | | | | | | | DATE: | | REV: | | | | | |
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| 0 | 2/2024 | | | | 2024 NEW STANDARD DRAWING | | | | | | | | | |



FRONT VIEW
TYPICAL PET
 SCALE: NTS

1



FRONT VIEW
TYPICAL RESTROOM CALL BOX
 SCALE: 6" = 1'-0"

2

- NOTES:**
1. INSTALL AT PREFERRED DISTANCE ABOVE FLOOR OF 42". AS PER ADA LIMITS OF 36", LOWEST TO 54", HIGHEST.
 2. LOCATION TO BE COORDINATED WITH SOUND TRANSIT.
 3. PET SHALL BE COVERED BY A VIDEO CAMERA VIEW OF THE CCTV SYSTEM.
 4. PET ENCLOSURE MUST BE RED.

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| No. | DATE | DSN | CHK | APP | REVISION |
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| 2 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |
| 1 | 8/2019 | | | | REVISED SYSTEMS DIRECTIVE DRAWINGS |
| 0 | 8/2017 | | | | GUIDANCE DRAWINGS |

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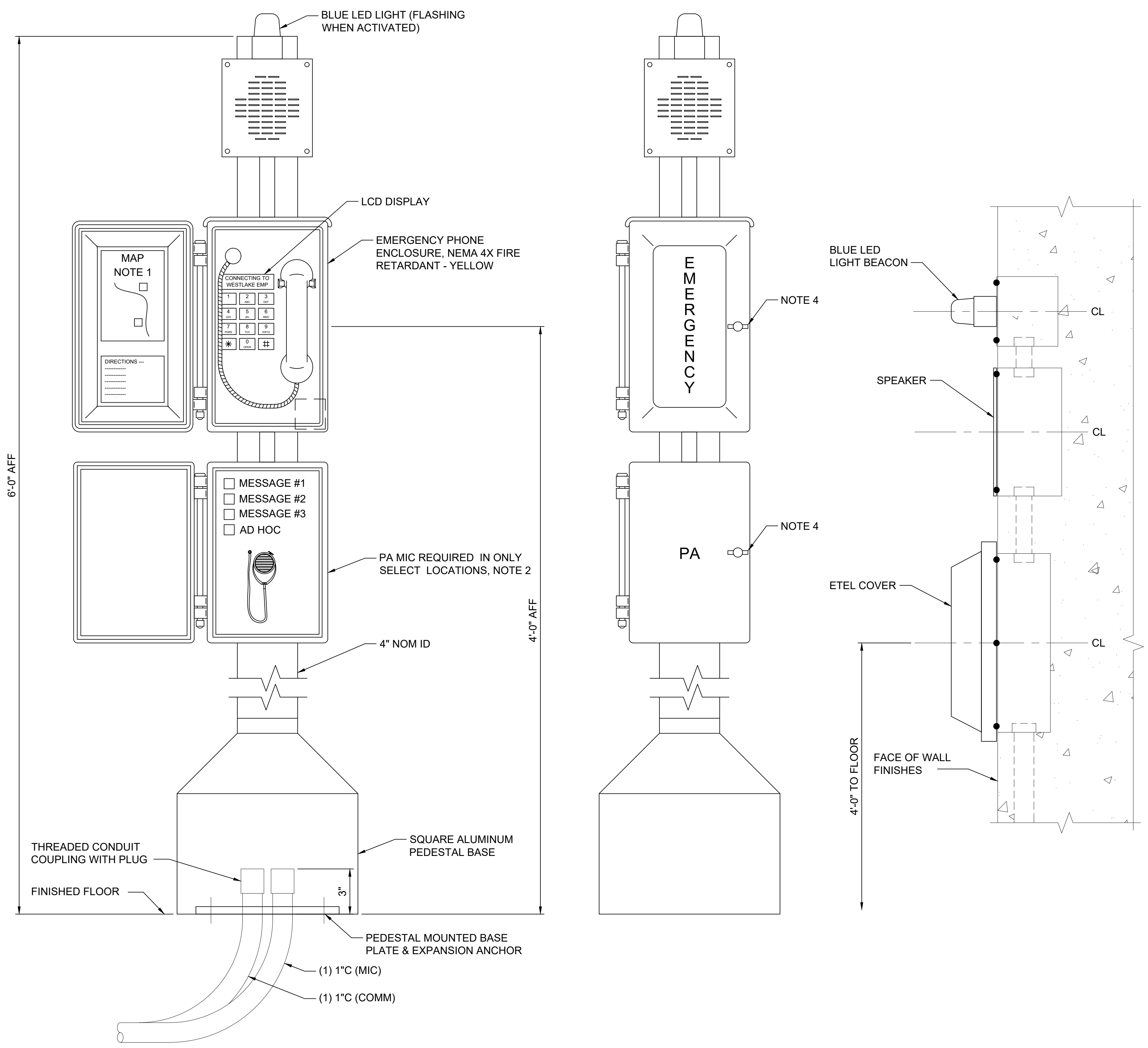
LINE IS 1" AT FULL SCALE

SCALE: NTS
 FILENAME: STD-JCD200
 CONTRACT No.: RTA/LR
 DATE: 2/2024

**SOUND TRANSIT
 STANDARD DRAWINGS
 SYSTEMS**

COMMUNICATIONS
 TYPICAL PASSENGER EMERGENCY PHONE
 RESTROOM CALL BOX

| | |
|--------------|-------------------|
| DRAWING No.: | STD-JCD200 |
| FACILITY ID: | |
| SHEET No.: | REV: 2 |



- GENERAL NOTES:**
1. INSTALL STATION MAP AND DIRECTORY WITH ALL ETEL EXTENSION NUMBERS FOR THAT STATION. INSTALL DIRECTIONS FOR ETEL USE.
 2. AT THE END OF EACH STATION PLATFORM PROVIDE PA JACK FIELD AND REMOVABLE PA MIC. PROVIDE STORAGE CABINET FOR MIC.
 3. DESIGNER TO COORDINATE POWER FOR ETEL, SUCH AS:
- ISOLATED DC SUPPLY PER ETEL OF XX DCV.
- HI POWER POE (ISOLATED OR NOT AT XX DCV).
 4. SECURED FOR RAIL MAINTENANCE PERSONNEL, SECURITY AND FIRST RESPONDERS.
 5. ETEL ENCLOSURE MUST BE YELLOW.

FRONT VIEW - DOOR OPEN

FRONT VIEW - DOOR CLOSED

TYPICAL PROVISIONS FOR PUBLIC AREA WALL MOUNTED ETEL

TYPICAL PEDESTAL MOUNTED ETEL
NTS

1

2

| No. | DATE | DSN | CHK | APP | REVISION |
|-----|--------|-----|-----|-----|------------------------------------|
| 2 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |
| 1 | 8/2019 | | | | REVISED SYSTEMS DIRECTIVE DRAWINGS |
| 0 | 8/2017 | | | | GUIDANCE DRAWINGS |

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SCALE: NTS
 FILENAME: STD-JCD201
 CONTRACT No.: RTA/LR
 DATE: 2/2024

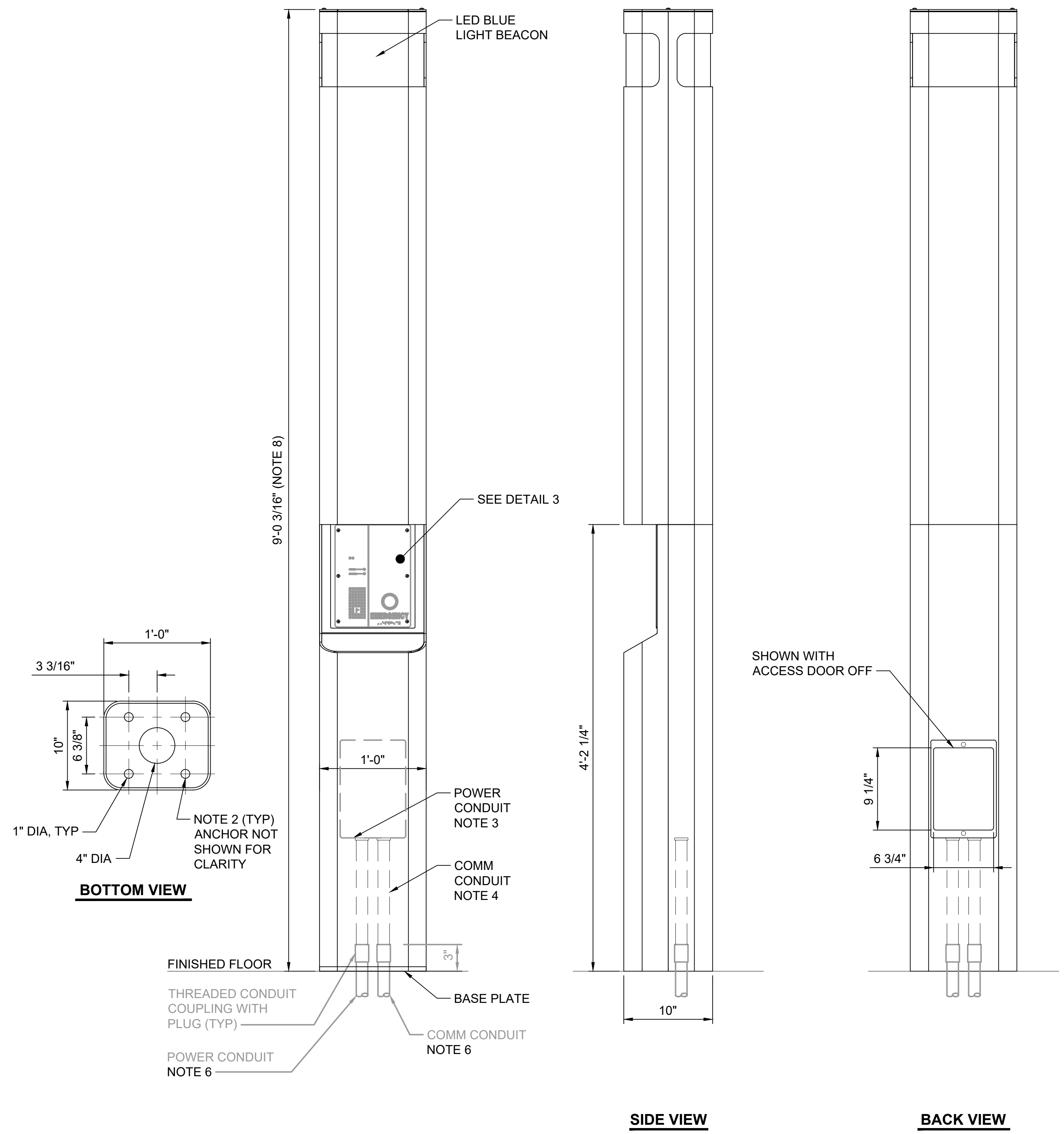
SOUND TRANSIT STANDARD DRAWINGS SYSTEMS
 COMMUNICATIONS
 TYPICAL EMERGENCY TELEPHONE DETAILS

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| DRAWING No.: | STD-JCD201 |
| FACILITY ID: | |
| SHEET No.: | REV: 2 |

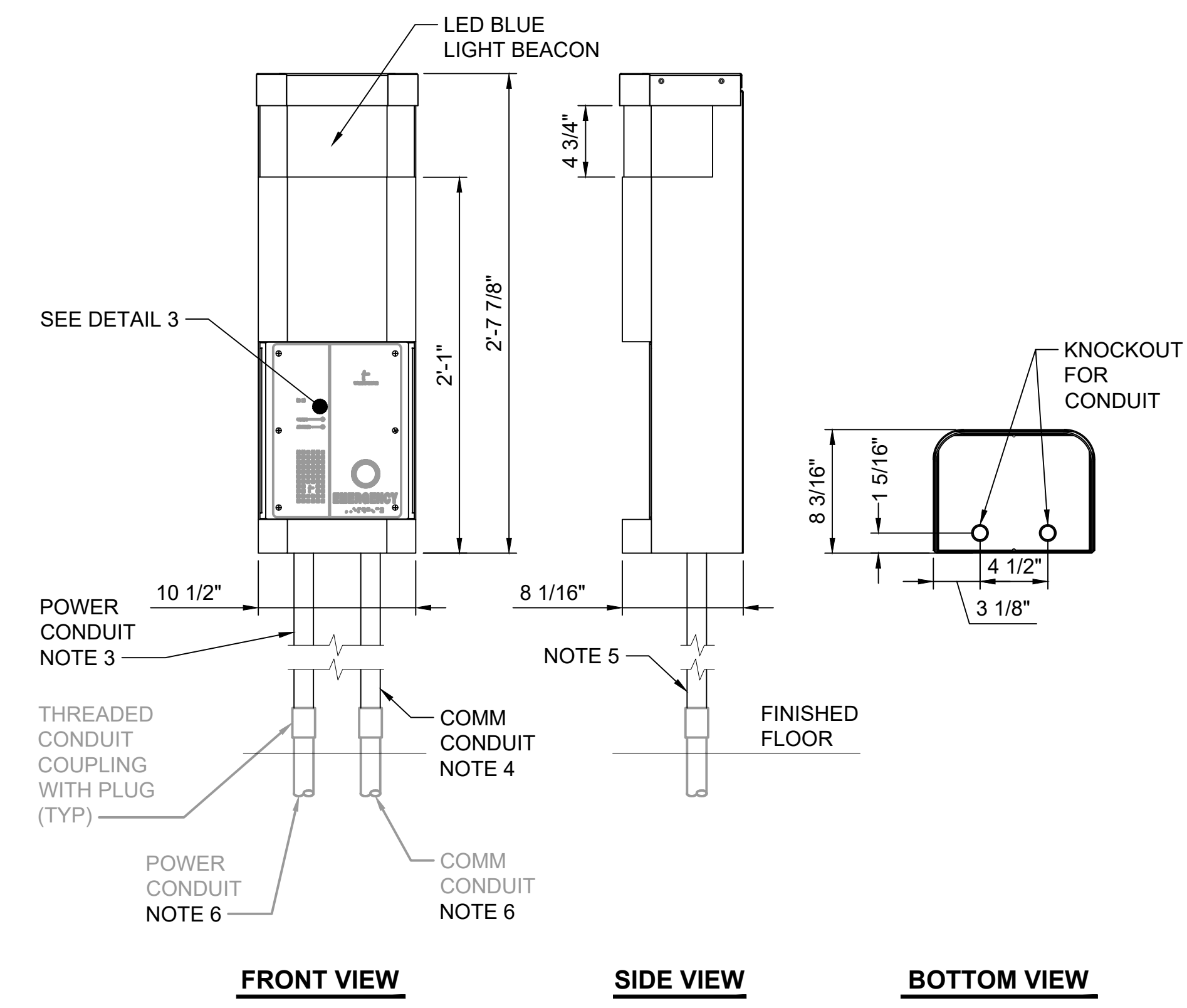
03/26/24 | 7:35 AM | HARRISBK C:\USERS\HARRISBK\Sound Transit\Technical Standards and Requirements Projects - Drawings Update 2023\Standard Drawings\System\STD-JCD202.DWG

NOTES:

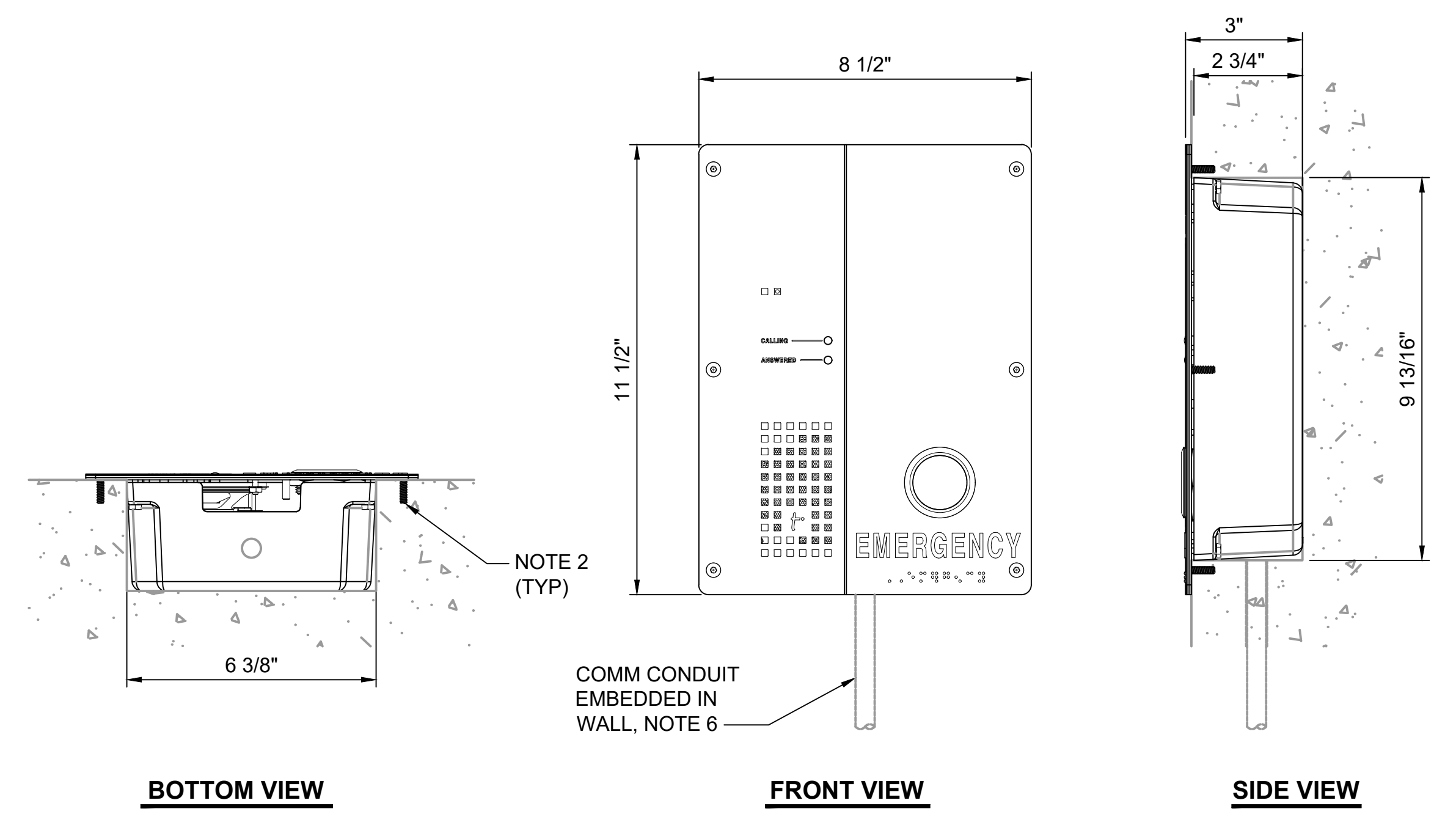
1. INSTALL STATION MAP AND DIRECTORY WITH ALL CES EXTENSION NUMBERS FOR THE GARAGE. INSTALL DIRECTIONS FOR CES USE.
2. ANCHOR BOLTS SHALL BE INSTALLED TO MEET ZONE 3 SEISMIC STANDARDS.
3. SIZE POWER CONDUIT PER NEC REQUIREMENTS.
4. MATCH COMMUNICATIONS CONDUIT STUB-UP SIZE.
5. SEE DRAWING E29-JCD131 FOR TYPICAL WALL MOUNT CONDUIT INSTALLATION.
6. REFER TO DRAWINGS EP29-JCP100 THROUGH EP29-JCP704, EP29-JCP830 THROUGH EP29-JCP832, EP29-JCS950 AND EP29-JCS951 FOR LOCATIONS, CONDUIT AND CABLING.
7. SEE DRAWING EP29-JCS313 FOR COMMUNICATIONS DEVICE SCHEDULE.
8. CES PEDESTAL TO BE UTILIZED ON 6TH FLOOR OF PARKING GARAGE. SEE SHEET EP29-JCS313 FOR PEDESTAL LOCATIONS.



TYPICAL PEDESTAL MOUNTED CES 1
SCALE: 1 1/2" = 1'-0"



TYPICAL WALL MOUNTED CES 2
SCALE: 1 1/2" = 1'-0"



TYPICAL EMBEDDED CES 3
SCALE: 4" = 1'-0"

| No. | DATE | DSN | CHK | APP | REVISION |
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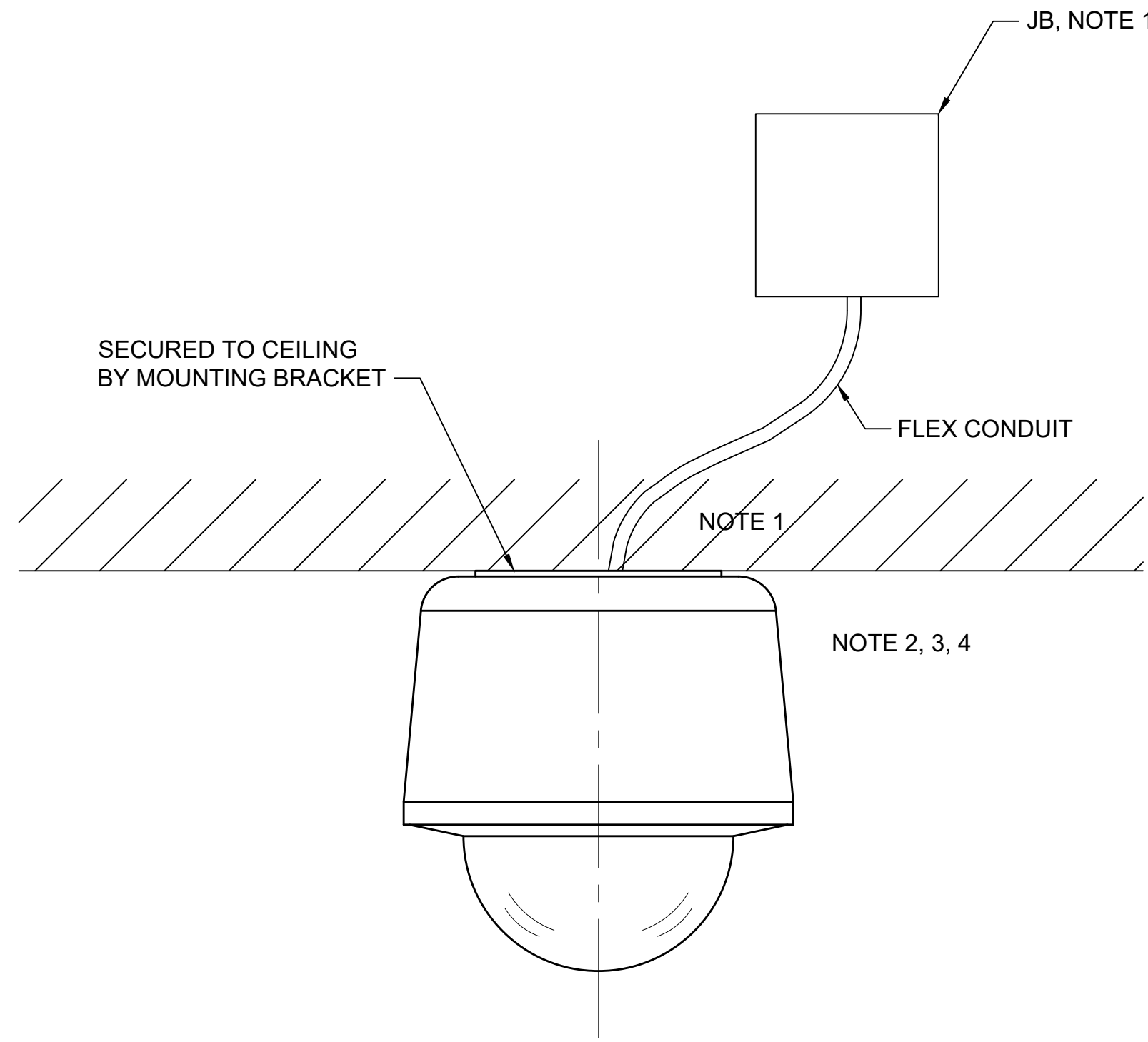
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| CONTRACT No.: RTA/LR | DATE: 2/2024 |

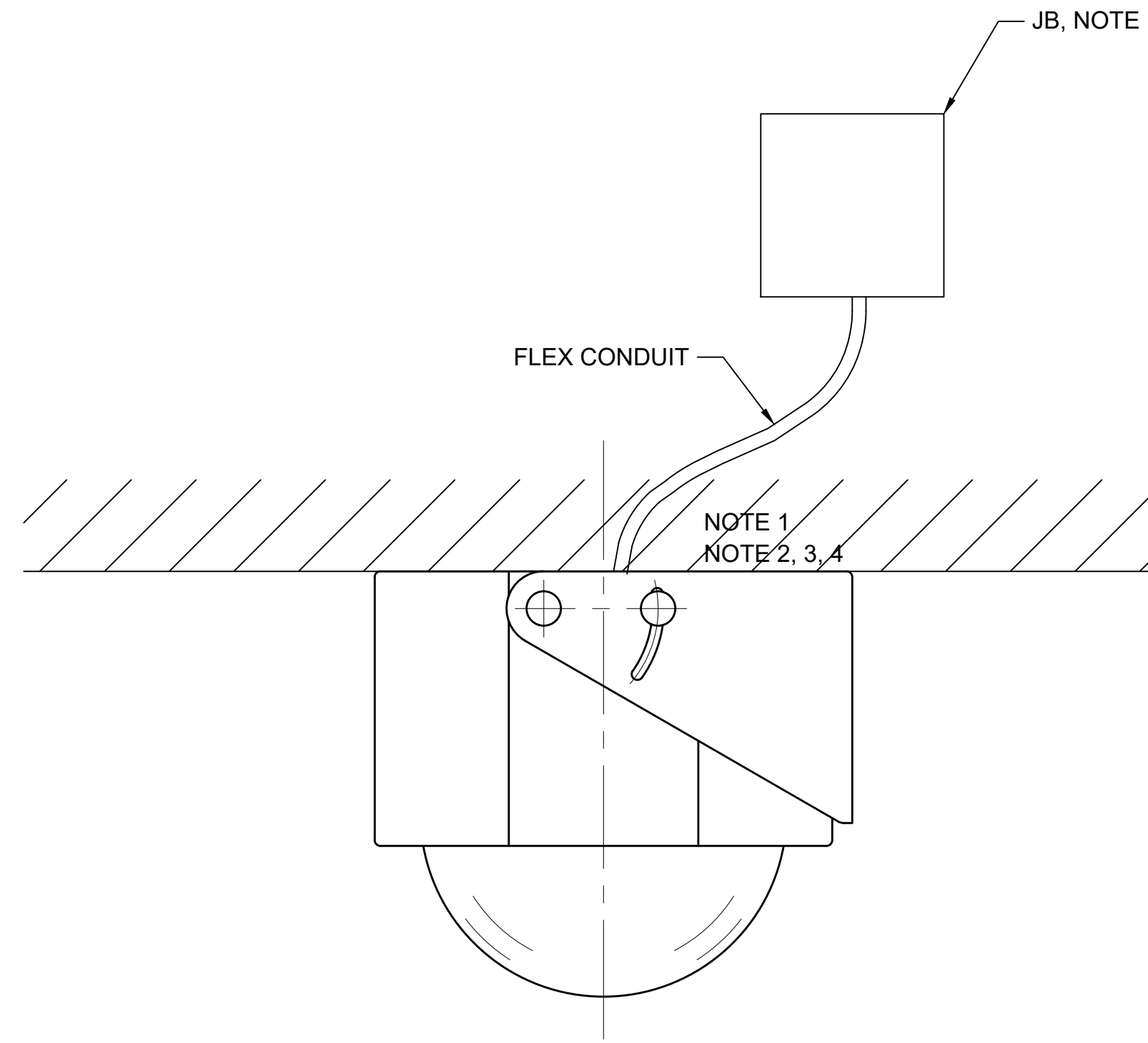
**SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS**

COMMUNICATIONS
TYPICAL CUSTOMER EMERGENCY STATION
DETAILS

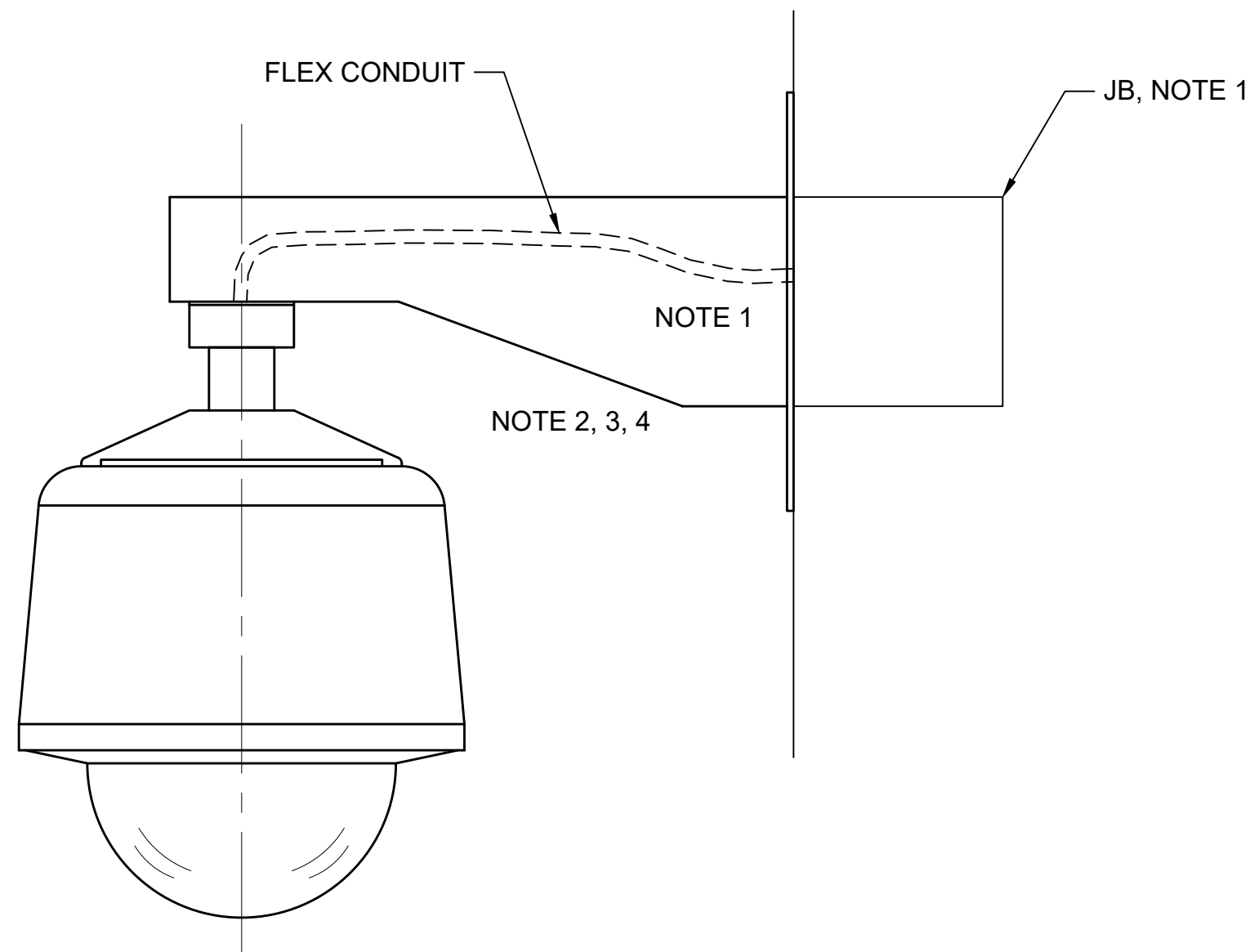
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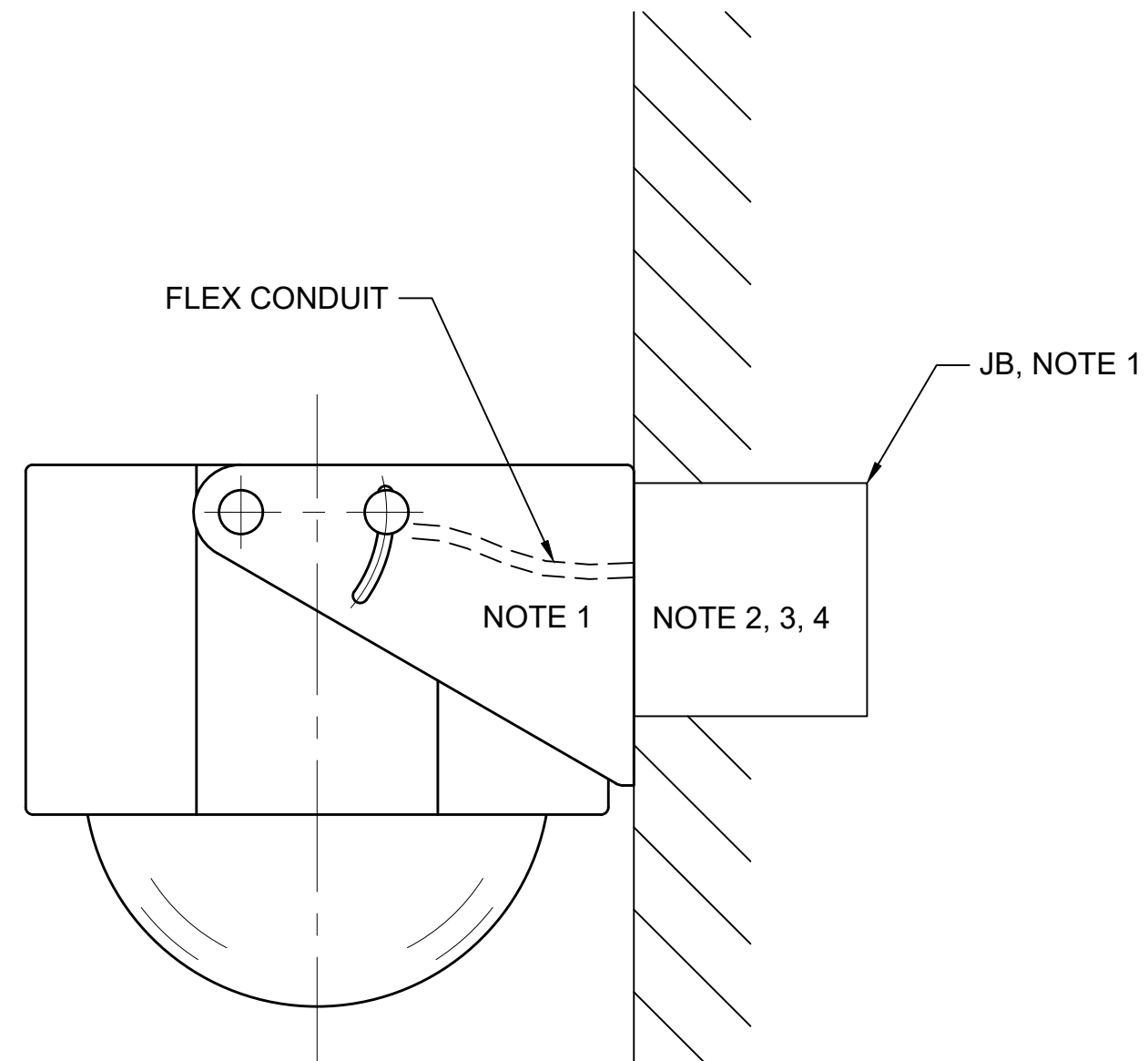
CEILING MOUNT



CEILING MOUNT



WALL MOUNT

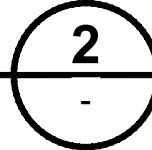


WALL MOUNT

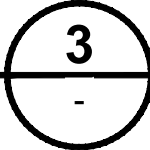
GENERAL NOTES:

1. COORDINATE WITH ARCHITECTURAL AND STRUCTURAL DRAWING FOR SPECIFIC MOUNTING LOCATION.
2. ST SECURITY PREFERS FIXED CAMERAS.
3. CAMERA LOCATIONS AND VIEWS TO BE ACCEPTED BY SOUND TRANSIT SECURITY.
4. ALL PASSENGER EMERGENCY TELEPHONES (PET) SHALL BE COVERED BY A CAMERA.

TYPICAL PTZ DOME
NTS



TYPICAL FIXED CAMERA
NTS



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| No. | DATE | DSN | CHK | APP | REVISION |
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| 1 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |
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LINE IS 1" AT FULL SCALE

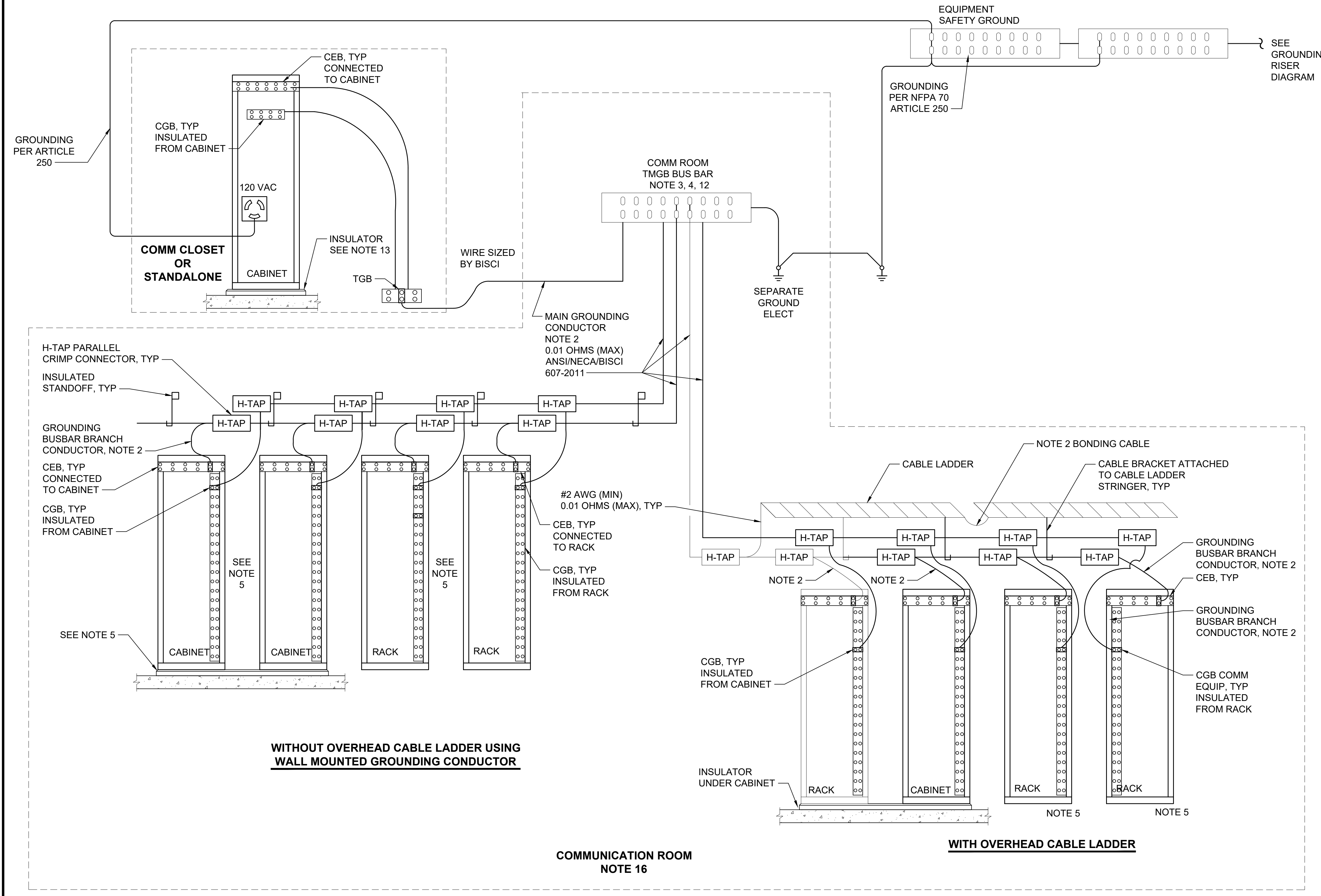
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| FILENAME: STD-JCD301 |
| CONTRACT No.: RTA/LR |
| DATE: 2/2024 |

**SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS
COMMUNICATIONS
TYPICAL CCTV
DETAILS**

| |
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| DRAWING No.: STD-JCD301 |
| FACILITY ID: |
| SHEET No.: 1 |

- GENERAL NOTES:**
- CABLE TRAY IN ROOMS BY CONTRACTOR TO PROVIDE FOR COMM EQUIPMENT CONNECTION.
 - BONDING CONDUCTORS SHALL BE A MINIMUM OF #2 AWG COPPER UNLESS SIZING IN ACCORDANCE WITH CHAPTER 8 OF BICSI TDMM INDICATES A SMALLER GAUGE IS ACCEPTABLE. THE CALCULATIONS SHALL BE SUBMITTED FOR REVIEW.
 - TWO HOLE GROUNDING COMPRESSION LUGS SHALL BE USED IN MAKING CONNECTIONS TO FLAT SURFACES (BUSBARS, STRUCTURAL STEEL, CABINETS, ETC.) EACH CONNECTOR SHALL BE INSTALLED WITH DEDICATED BOLTS. MULTIPLE CONNECTORS SHALL NOT BE SECURED BY THE SAME BOLT ASSEMBLIES."
 - APPLY ELECTRICAL GRADE DE-OXIDIZING GREASE (NO-OX-ID) TO ALL GROUND BAR CONNECTIONS.
 - ADJACENT COMMUNICATION RACKS AND CABINETS SHOULD BE PHYSICALLY & ELECTRICALLY ISOLATED FROM EACH OTHER, THE FLOOR AND EARTH GROUND.
 - ALL COMMUNICATION CABINETS TO HAVE TWO GROUND BUSBARS: ONE FOR COMMUNICATIONS GROUND BUS (CGB) AND ONE FOR COMMUNICATIONS EQUIPMENT GROUND BUS (CEB).
 - LADDER RACK TO BE GROUNDED AT SINGLE POINT GROUND PATH WITH RETURN TO TELECOMMUNICATIONS MAIN GROUND BUS (TMGB). DO NOT CONNECT TO ANY OTHER GROUND PATHS. CABLE LADDER SHALL BE GROUNDED BY RUNNING AN EXPOSED STRANDED COPPER CONDUCTOR WITH GREEN INSULATION WITH A YELLOW TRACER FROM ONE END OF CABLE TRAY TO TMGB USING H-TAP. THE SURFACE OF THE GALVANIZED CABLE LADDER SHALL BE TREATED WITH PENETROX OXIDE INHIBITING COMPOUND. TERMINALS SHALL BE ATTACHED USING 1/4" SILICONE BRONZE HARDWARE (BOLTS, FLAT WASHERS, LOCK WASHERS AND NUTS).
 - EQUIPMENT RACKS AND CABINETS SHALL BE GROUNDED BY RUNNING EXPOSED STRANDED COPPER CONDUCTORS WITH GREEN INSULATION FROM EACH RACK/CABINET TO THE MAIN GROUND CONDUCTOR USING H-TAP CRIMP AND COVERS.
 - NON-COMMUNICATIONS GROUNDS SUCH AS CONDUITS OR BUILDING GROUNDS MUST BE CONNECTED TO ELECTRICAL GROUND GRID (EARTH GROUND) ONLY-BUILDING STRUCTURE OR GROUND GRID. ELECTRICAL GROUNDS CANNOT BE MIXED WITH COMMUNICATION GROUND POINTS.
 - "DO NOT DISCONNECT" TAGS SHALL BE PROVIDED AT BOTH ENDS OF ALL GROUNDING SYSTEM CONDUCTORS AT STRUCTURAL STEEL AND GROUNDING POINTS WHEN THE CONDUCTOR IS A LUG OR OTHER DISCONNECTIBLE DEVICE. WHEN LADDER HAS SECTIONS, BONDING JUMPERS SHALL BE USED TO BOND EACH SECTION.
 - GROUNDS IN EACH ROOM AND AT EACH CASE LOCATION SHALL BE TESTED AND SHALL NOT EXCEED 5 OHMS.
 - RUN 2/0 COPPER GROUND WIRE TO GROUND BUS ON POWER ENTRANCE TO FACILITY.
 - CABINETS ARE PHYSICALLY & ELECTRICALLY ISOLATED FROM THE FLOOR.
 - TELECOMMUNICATIONS GROUND WIRES SHALL BE GREEN WITH YELLOW TRACER XHHW INSULATED WIRE (ARTICLE 800).
 - FIELD DEVICE GROUNDING IS COVERED IN JCD604.
 - COMMUNICATION ROOM GROUNDING PER NFPA70 ARTICLE 800.

- GLOSSARY:**
- BICSI - BUILDING INDUSTRY CONSULTING SERVICE INTERNATIONAL
 - CEB - COMMUNICATION EQUIPMENT BUS
 - CGB - COMMUNICATION GROUND BUS
 - TGB - TELECOMMUNICATION GROUND BAR (MIN 2" WIDE)
 - TMGB - TELECOMMUNICATIONS MAIN GROUND BAR (MIN 4" WIDE)



TYPICAL STATION EQUIPMENT RACKS/CABINETS GROUNDING SYSTEM 1
NTS

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| No. | DATE | DSN | CHK | APP | REVISION |
|-----|--------|-----|-----|-----|---|
| 3 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |
| 2 | 8/2019 | | | | REVISED SYSTEMS DIRECTOVE DRAWINGS |
| 1 | 1/2019 | | | | 2019 GUIDANCE DWG REVISIONS - GENERAL UPDTE |
| 0 | 8/2017 | | | | GUIDANCE DRAWINGS |

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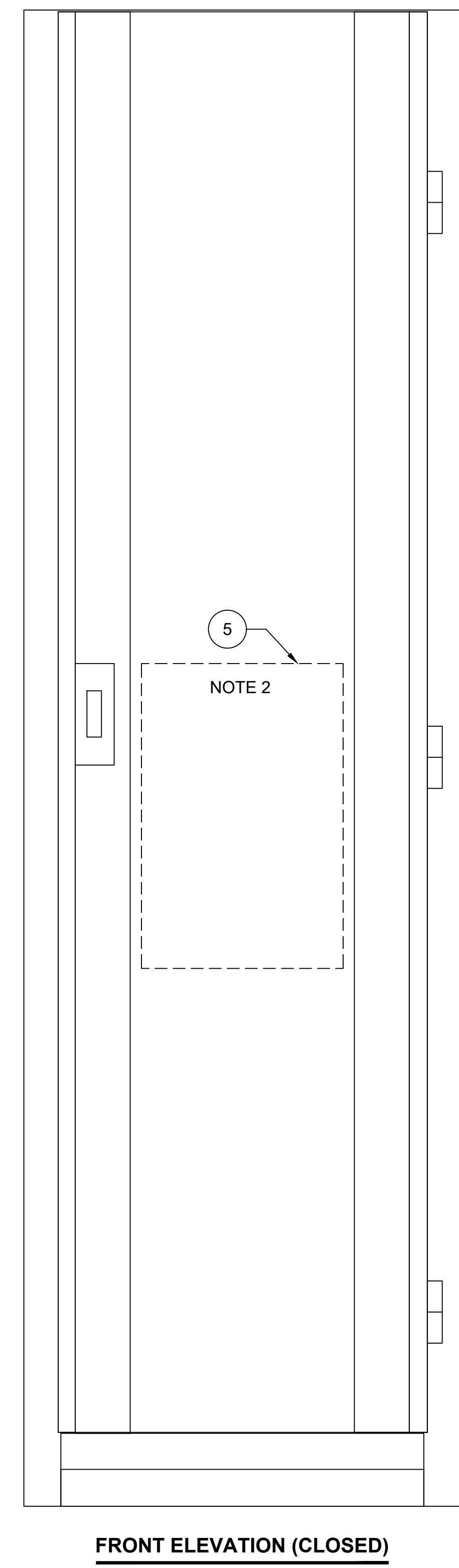
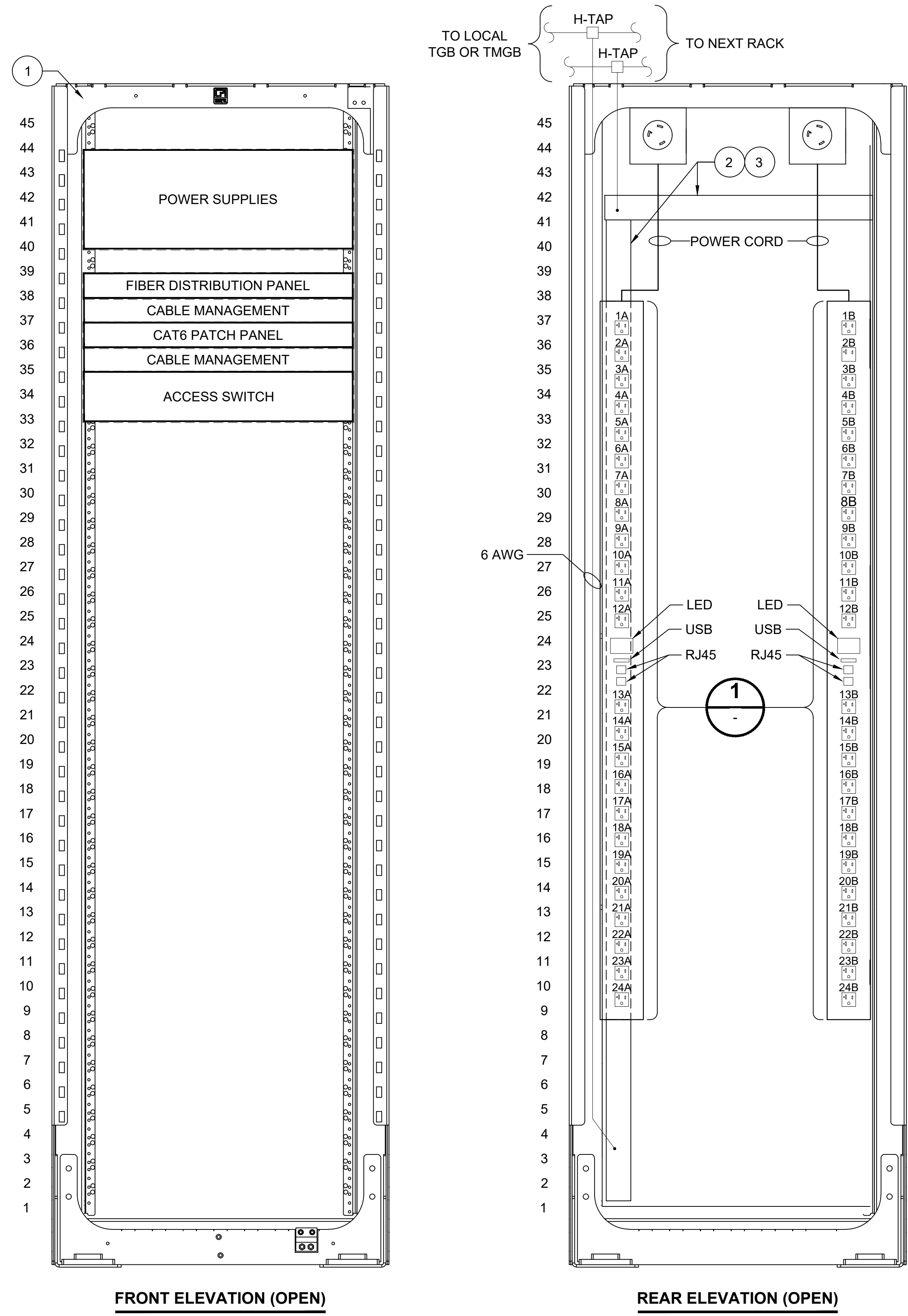
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| CONTRACT No.: | RTA/LR |
| DATE: | 2/2024 |

**SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS**

COMMUNICATIONS
TYPICAL STATION CABINET RACK
GROUNDING SYSTEMS

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| DRAWING No.: | STD-JCD603 |
| FACILITY ID: | |
| SHEET No.: | REV: |
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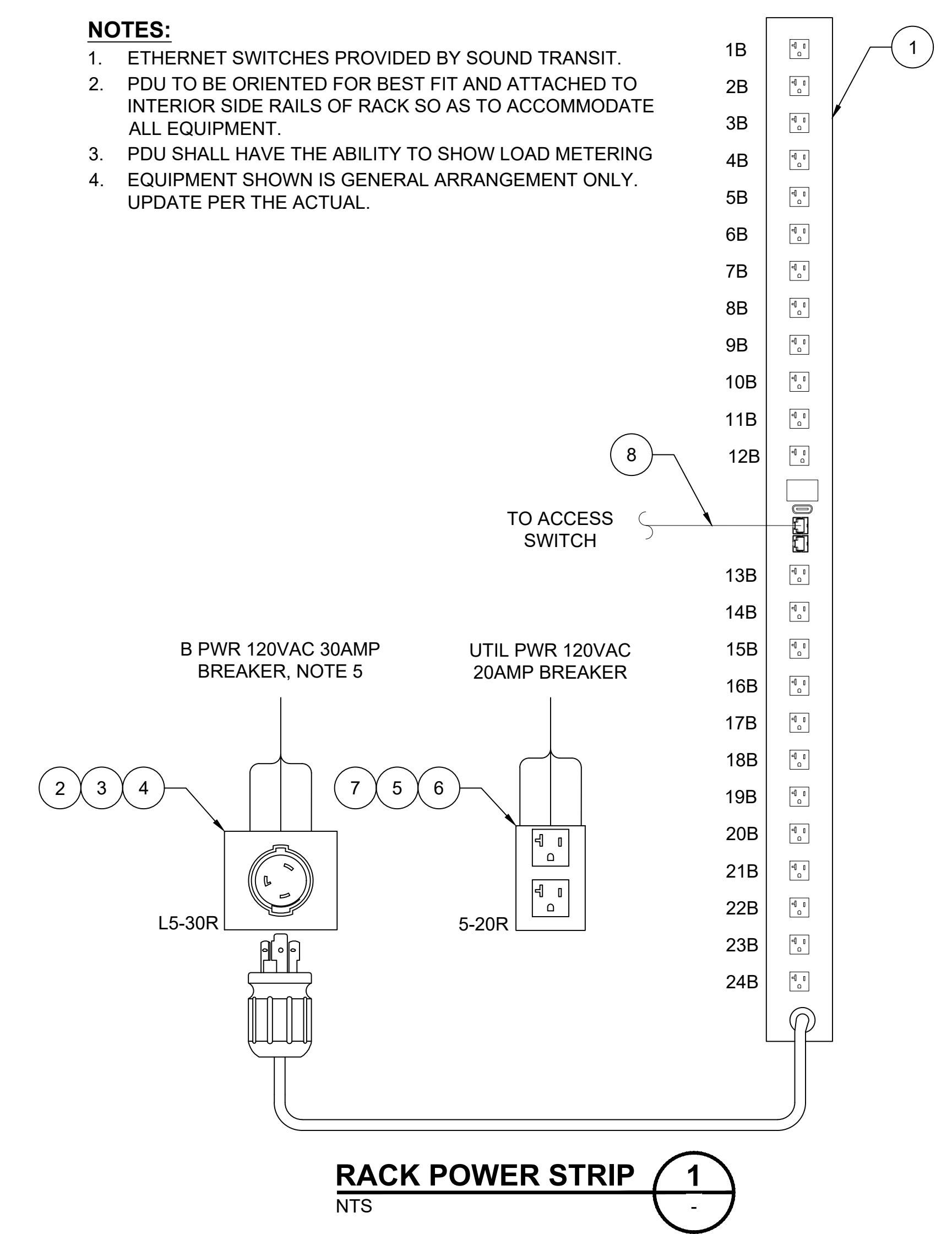
| RACK MATERIAL LIST | | | | |
|--------------------|----------|----------|-------------|-----------------------------|
| ITEM | QUANTITY | BOM REF# | PART NUMBER | DESCRIPTION |
| 1 | 1 | | | CABINET SEISMIC |
| 2 | 2 | | | GROUND BUS BAR |
| 3 | 4 | | | RACK BUSBAR INSULATOR BLOCK |
| 4 | 2 | | | BONDING JUMPER |
| 5 | 1 | | | METAL DOOR POCKET |
| 6 | 2 | | | FAN |
| 7 | 2 | | | HORIZONTAL CABLE MANAGER |

* NOT SHOWN

| POWER STRIP MATERIAL LIST | | | | |
|---------------------------|----------|----------|-------------|-------------------------------------|
| ITEM | QUANTITY | BOM REF# | PART NUMBER | DESCRIPTION |
| 1 | 2 | | | SUPERVISED POWER DISTRIBUTION UNIT |
| 2 | 2 | | | SQUARE ELECTRICAL BOX |
| 3 | 2 | | | COVER TWIST LOCK SIMPLEX RECEPTACLE |
| 4 | 2 | | | NEMA L5-30R SIMPLEX RECEPTACLE |
| 5 | 1 | | | ELECTRICAL BOX 1-GANG |
| 6 | 1 | | | NEMA 5-20R DUPLEX RECEPTACLE |
| 7 | 1 | | | COVER DUPLEX RECEPTACLE 1-GANG |
| 8 | 2 | | | CAT6 PATCH CORD |

NOTES:

- ETHERNET SWITCHES PROVIDED BY SOUND TRANSIT.
- PDU TO BE ORIENTED FOR BEST FIT AND ATTACHED TO INTERIOR SIDE RAILS OF RACK SO AS TO ACCOMMODATE ALL EQUIPMENT.
- PDU SHALL HAVE THE ABILITY TO SHOW LOAD METERING
- EQUIPMENT SHOWN IS GENERAL ARRANGEMENT ONLY. UPDATE PER THE ACTUAL.



| No. | DATE | DSN | CHK | APP | REVISION |
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| 0 | 2/2024 | | | | 2024 NEW STANDARD DRAWING |

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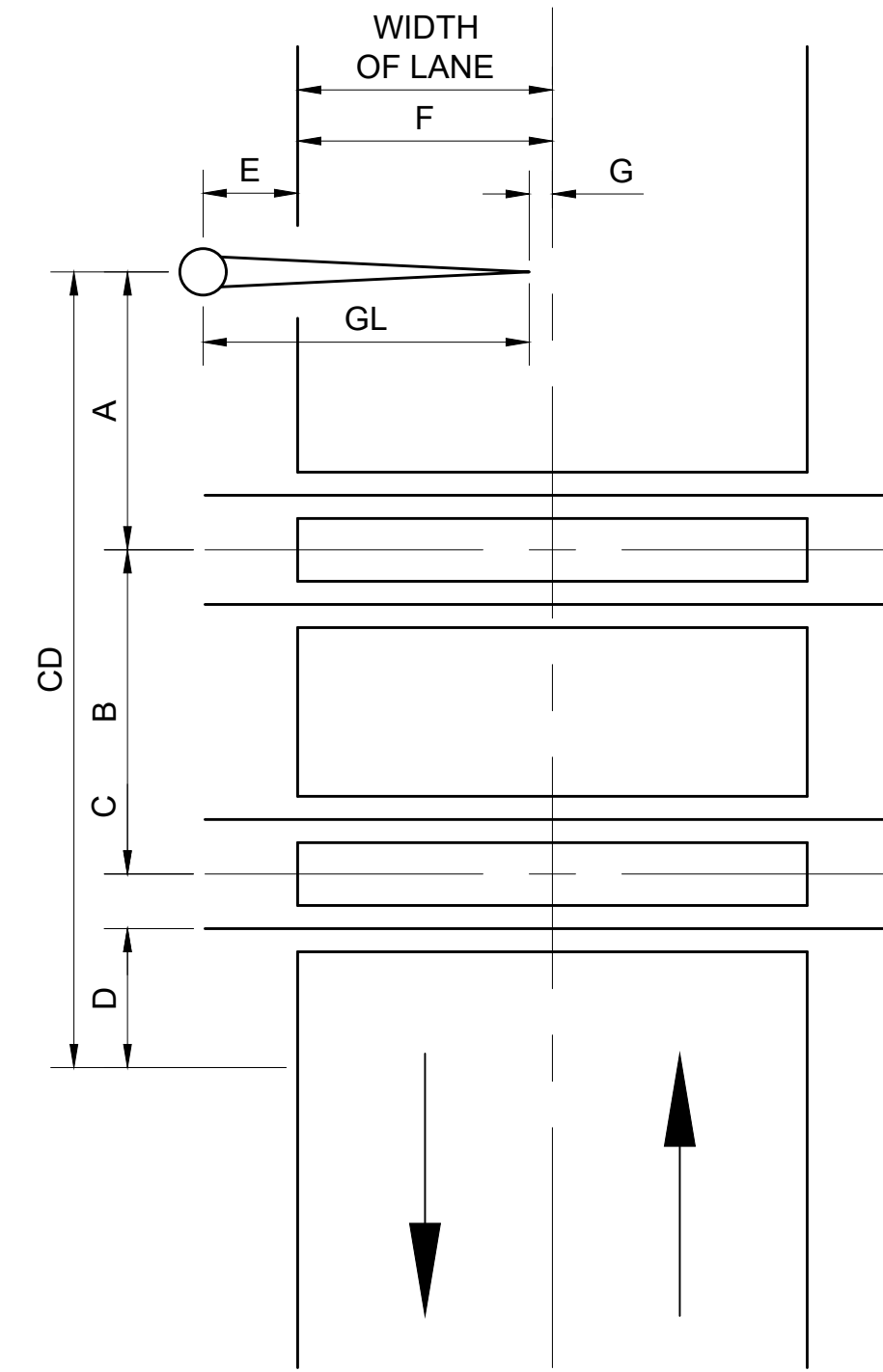
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| SCALE: | NTS |
| FILENAME: | STD-JCD703 |
| CONTRACT No.: | RTA/LR |
| DATE: | 2/2024 |

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| SOUND TRANSIT STANDARD DRAWINGS SYSTEMS | |
| COMMUNICATIONS TYPICAL RACK DETAILS DETAILS | |

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| DRAWING No.: | STD-JCD703 |
| FACILITY ID: | |
| SHEET No.: | REV: 0 |

GENERAL NOTE:

- CROSSING WARNING DESIGNS SHALL ALSO CONFORM TO MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES REQUIREMENTS PLUS ANY COMMENTS OF THE AUTHORITY HAVING JURISDICTION



I. CRITERIA FOR DETERMINING CLEARANCE DISTANCE (CD)

$CD = A + B + C + D$

WHERE A = DISTANCE FROM CENTERLINE OF SIGNAL MAST TO CENTERLINE OF NEAR TRACK: 12 FEET MIN, 15 FEET MAX
 B = TRACK SPREAD
 C = ONE HALF OF GAGE: 4 FT 8 1/2 IN/2 = SAY 2.5 FEET
 D = CLEAR DISTANCE BEYOND FAR RAIL: MIN 6 FEET

II. CRITERIA FOR DETERMINING WARNING TIME (WT)

MIN CD = 35 FT
 ADD'L CD = -- FT

MIN WT = 20 SECS
 ADD'L WT = 1 SEC FOR EACH ADD'L 10 FEET ABOVE MIN CD

EXAMPLE: 1) A = 12 FT
 B = 14 FT
 C = 2.5 FT
 D = 6 FT
CD = 34.5 FT
 ONLY MIN WT REQD = 20 SECS

EXAMPLE: 2) A = 12 FT
 B = 32 FT
 C = 2.5 FT
 D = 6 FT
CD = 52.5 FT
 MIN VALUES = 35 FT
 = 17.5 FT

TOTAL WT = 20 SECS
 2 SECS
 22 SECS

III. CRITERIA FOR DETERMINING GATE LENGTH (GL)

$GL = E + F - G$

WHERE E = DISTANCE FROM CL SIGNAL MAST TO EDGE OF ROADWAY, OR INSIDE FACE OF CURB: MIN 4 FT-1 INCH
 F = WIDTH OF LANE: TYP 11'-0"
 G = DISTANCE FROM CL ROAD TO TIP OF GATE: MAX 1 FT

EXAMPLE: E = 4 FT 1 INCH
 F = 11 FT (TYP)
 G = 1 FT
GL = 14 FT 1 INCH

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LINE IS 1" AT FULL SCALE

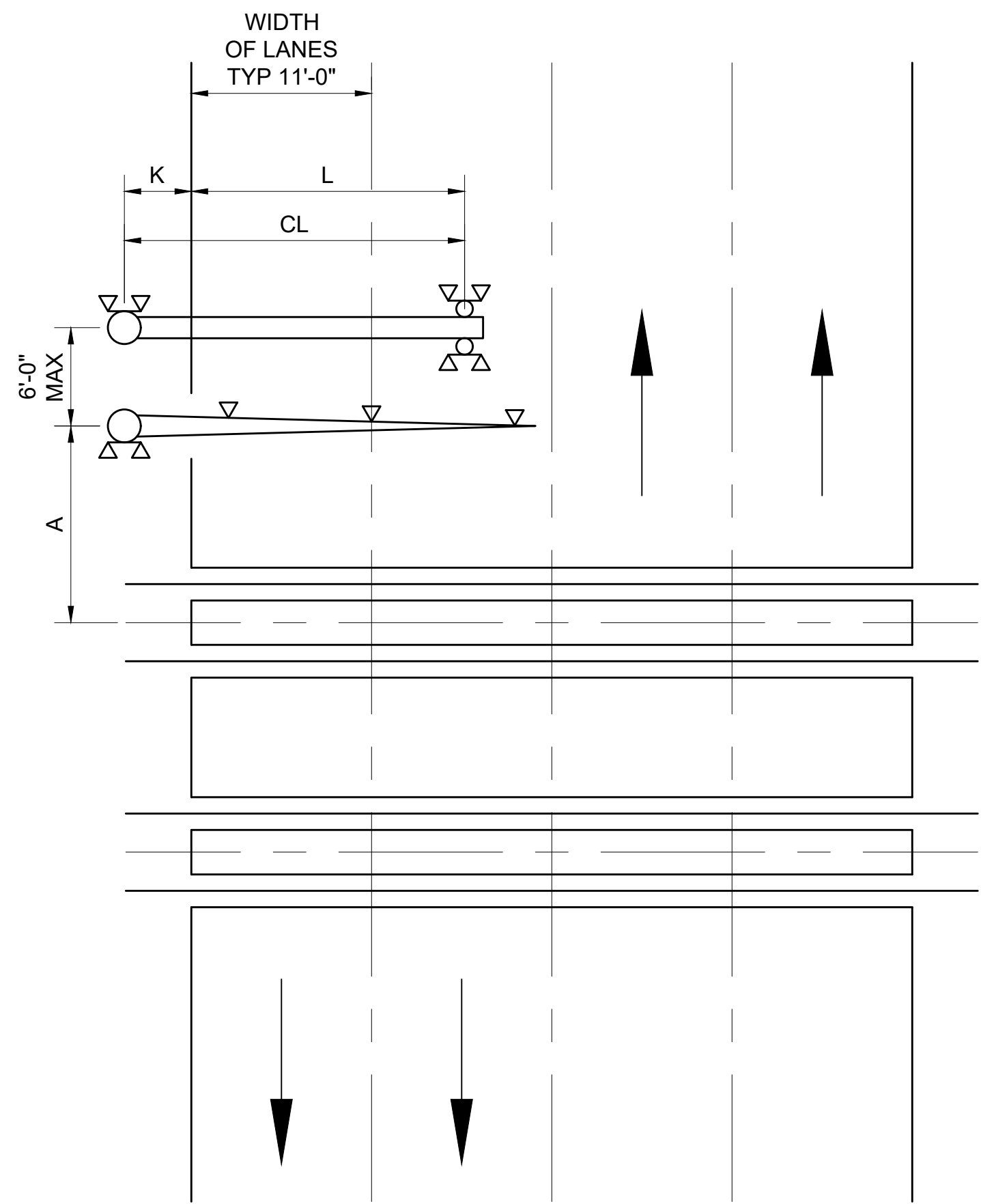
SCALE: NTS
 FILENAME: STD-JSS100
 CONTRACT No.: RTA/LR
 DATE: 2/2024

**SOUND TRANSIT
 STANDARD DRAWINGS
 SYSTEMS**

SIGNALS
 TYPICAL AUTOMATIC HIGHWAY CROSSING
 WARNING SYSTEMS DESIGN CRITERIA

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| DRAWING No.: | STD-JSS100 |
| FACILITY ID: | |
| SHEET No.: | 1 |

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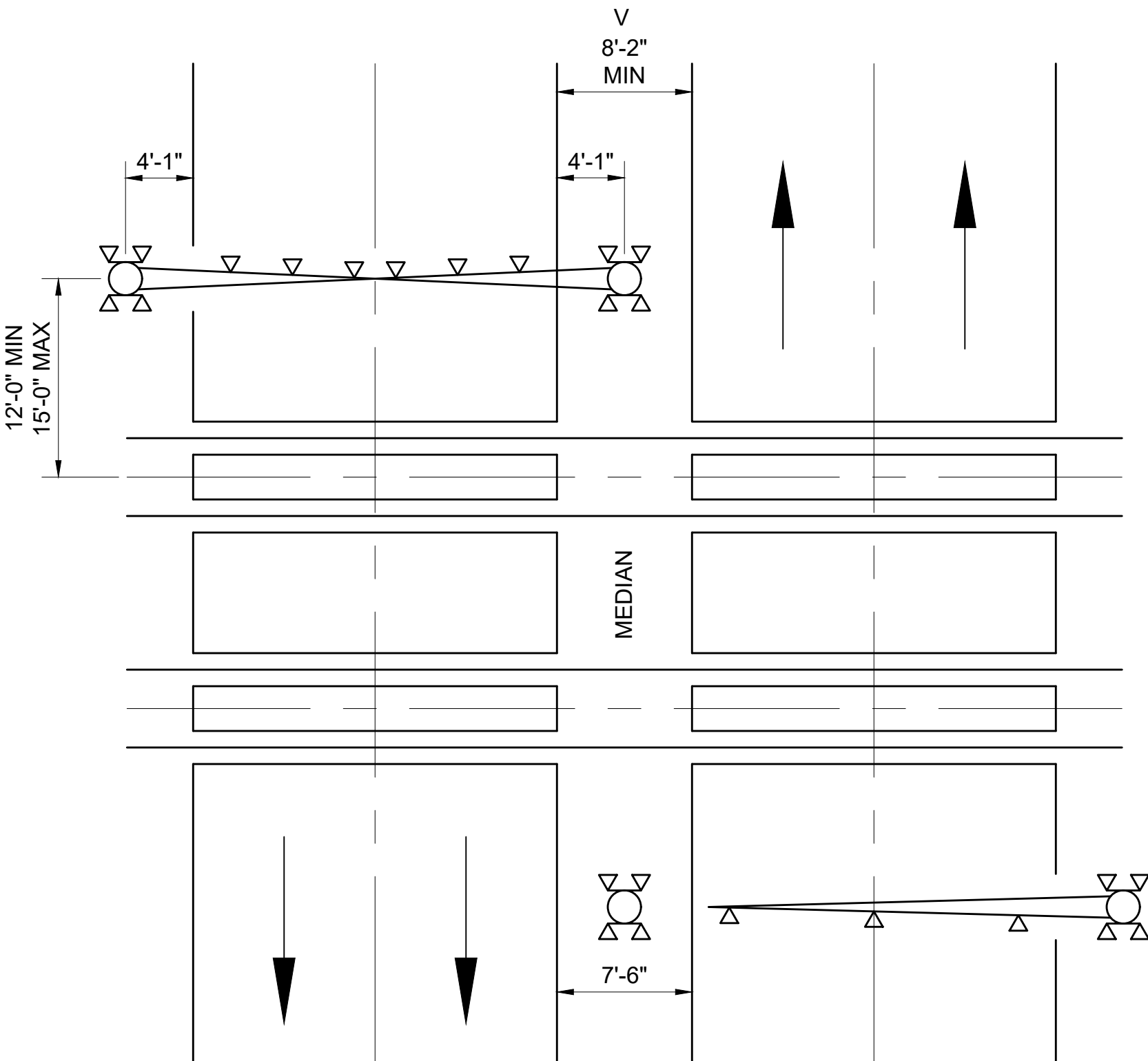
IV. CRITERIA FOR DETERMINING LENGTH OF CANTILEVER SIGNAL ARM (CL) - MULTIPLE LANE ROADWAY

CL = K + L

WHERE K = DISTANCE FROM CENTERLINE OF SIGNAL TO EDGE OF PAVEMENT OR INSIDE FACE OF CURB: MIN 4 FT 1 INCH
L = DISTANCE FROM EDGE OF PAVEMENT TO CENTERLINE OF INSIDE LANE

EXAMPLE: K = 4 FT 1 INCH
L = 16 FT 6 INCH (11 + 5.5)
CL = 20 FT 7 INCH (*)

(*) CANTILEVER ARMS ARE MEASURED TO THE CENTERLINE OF THE END LIGHTS.



V. CRITERIA FOR DETERMINING ALTERNATE AHCW SYSTEM SIGNAL REQUIREMENTS - MULTIPLE LANE ROADWAY WITH MEDIAN

WHEN A MULTIPLE LANE ROADWAY HAS A MEDIAN OF SUFFICIENT WIDTH (7'-6" MIN), IT IS MORE COST EFFECTIVE TO INSTALL FLASHING LIGHT SIGNAL IN MEDIAN AS OPPOSED TO CANTILEVER SIGNAL AT SIDE OF ROAD. IF SECOND GATE IS TO BE USED, THE MEDIAN WIDTH SHALL BE 8'-2" MIN.

TO "PROTECT" THE FLASHING LIGHT SIGNALS FROM POSSIBLE COLLISION, IT IS RECOMMENDED THAT MEDIAN BE RAISED, AT LEAST IN APPROACH TO THE RAIL CROSSING. THIS PROVIDES AN ADDITIONAL BENEFIT OF DISCOURAGING "DRIVE-AROUNDS".

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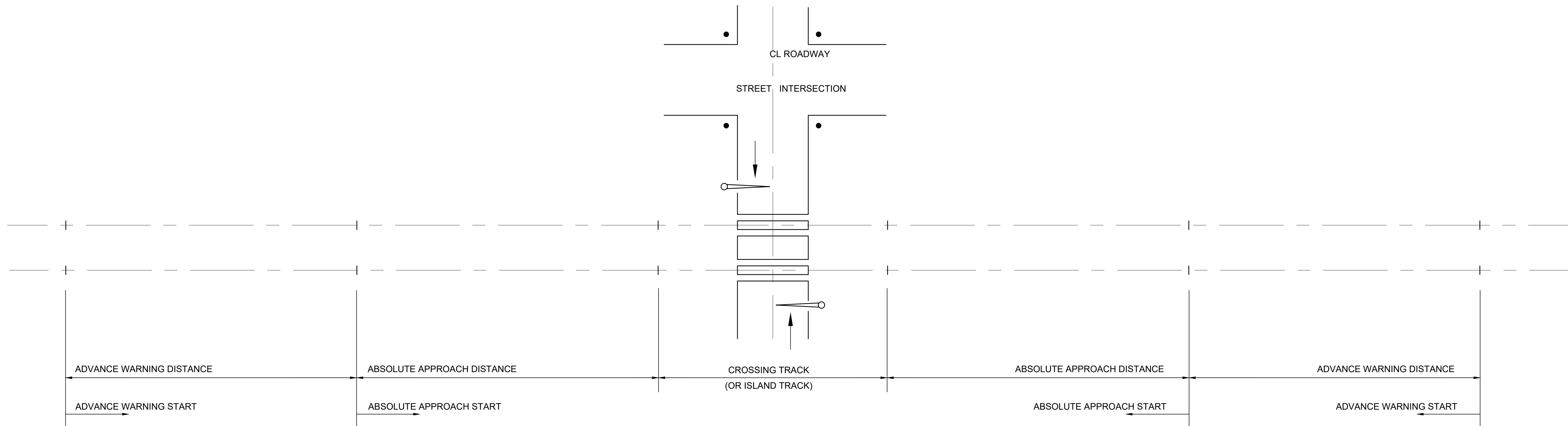
LINE IS 1" AT FULL SCALE

SCALE: NTS
FILENAME: STD-JSS101
CONTRACT No.: RTA/LR
DATE: 2/2024

SOUND TRANSIT STANDARD DRAWINGS SYSTEMS

SIGNALS
TYPICAL AUTOMATIC HIGHWAY CROSSING WARNING SYSTEMS DESIGN CRITERIA

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| DRAWING No.: | STD-JSS101 |
| FACILITY ID: | |
| SHEET No.: | REV: |
| | 1 |



VIII: CRITERIA FOR DETERMINING THE APPROACH DISTANCE FOR AHCW SYSTEM TO INTERFACE WITH TRAFFIC PRE-EMPTION

A. DEFINITIONS

1. **ABSOLUTE APPROACH START** = POINT AT WHICH AHCW SYSTEM IS ACTIVATED BY AN APPROACHING TRAIN.
2. **ABSOLUTE APPROACH** = MINIMUM DISTANCE TO CROSSING TO PROVIDE MINIMUM WARNING TIME.
3. **ADVANCE WARNING START** = POINT AT WHICH THE TRAFFIC CONTROLLER AT THE STREET INTERSECTION IS INFORMED OF AN APPROACHING TRAIN. TO START THE CYCLE TO CLEAR AUTO TRAFFIC FROM RAIL CROSSING. MAY INCLUDE A SEPARATE PRE-EMPT TIME. TO BE COORDINATED WITH AUTHORITY HAVING JURISDICTION.
4. **ADVANCE WARNING** = THE DISTANCE TO THE ABSOLUTE APPROACH TO AFFORD THE TRAFFIC CONTROLLERS SUFFICIENT TIME TO COMPLETE ITS CLEARING CYCLE.

B. CALCULATIONS

1. **ABSOLUTE APPROACH** = WARNING TIME (WT) (IN SEC) x TRAIN SPEED (TS) (IN FEET PER SEC)
 EXAMPLE: TS = 30 MPH OR 44 FT/SEC
 WT = 21 SECS
 ABSOLUTE APPROACH = 44 x 21 OR 924 FEET
2. **ADVANCE WARNING** = TRAFFIC WT (SECS) x TRAIN SPEED (TS) (IN FEET PER SEC)
 EXAMPLE: TS = 30 MPH OR 44 FT/SEC
 PRE-EMPT TIME REQUIRED = 32 SECS
 ADVANCE WARNING = 32 x 44 OR 1408 FT
3. **TOTAL PRE-EMPTION TIME** = ADVANCE WARNING WT + ABSOLUTE APPROACH WT

C. NOTES

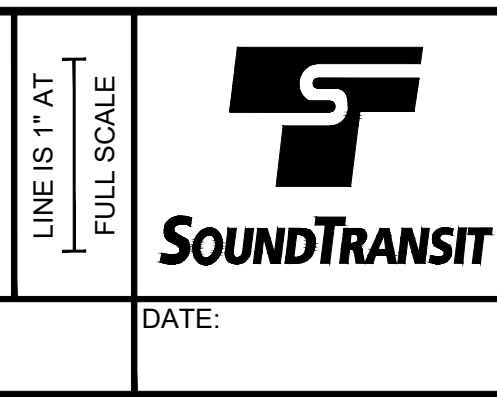
1. CONTRACTOR MUST INCORPORATE PUMP PREVENTION AND ANOTHER TRAIN COMING SIGNAGE FOR TWO TRAIN SCENARIO.

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| SCALE: NTS |
| FILENAME: STD-JSS102 |
| CONTRACT No.: RTA/LR |
| DATE: 2/2024 |


**SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS**

SIGNALS
TYPICAL AUTOMATIC HIGHWAY CROSSING
WARNING SYSTEMS DESIGN CRITERIA

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| DRAWING No.: STD-JSS102 |
| FACILITY ID: |
| SHEET No.: 1 |

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| ---- | ---- | ---- | ---- | ---- | ---- | DRAWN BY: | | | | FILENAME: STD-JSS103 | | FACILITY ID: | | |
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LINE IS 1" AT
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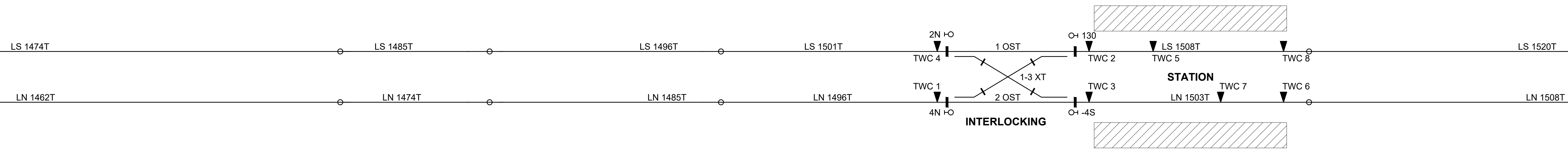
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| | | | | | DESIGNED BY: | | | |  SOUNDTRANSIT | SCALE: NTS | SOUND TRANSIT STANDARD DRAWINGS SYSTEMS SIGNALS SIGNAL HOUSE BLOCK DIAGRAM | DRAWING No.: | STD-JSS104 | |
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| ROUTE AND ASPECT CHART | | | | | | | | | | | | | | | | | | |
|------------------------|-------------|---------------|-------------------------------------|--------------------|----------|-----------------------|-------------------------|--|--|--|--|-----------------|---------|------------------------------|---------------------------------|--|--|-------|
| ENTRANCE SIGNAL | EXIT SIGNAL | SIGNAL ASPECT | AUTOMATIC OPERATION TRACK OCCUPANCY | TWC LOOP OPERATION | TWC CALL | SIGNAL SLOTTING TRACK | TRACK CIRCUITS IN ROUTE | | | | | SWITCHES LOCKED | TRAFFIC | PREVENTS CLEARING OF SIGNALS | APPROACH LOCKING TRACK CIRCUITS | | | NOTES |
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| DESIGNED BY: | | | | | | SCALE: NTS FILENAME: STD-JSS105 CONTRACT No.: RTA/LR DATE: 2/2024 | SOUND TRANSIT STANDARD DRAWINGS SYSTEMS SIGNALS ROUTE AND ASPECT CHART | DRAWING No.: STD-JSS105 | |
| DRAWN BY: | | | | | | | | FACILITY ID: | |
| CHECKED BY: | | | | | | | | SHEET No.: REV: 0 | |
| APPROVED BY: | | | | | | | | | |
| SUBMITTED BY: | | | DATE: | | REVIEWED BY: | | | DATE: | |

SOUTH HEMISPHERE - STORAGE TRACKS S1 TO S6

Table with columns: ENTRANCE LOOP, DESTINATION, SIGN ID, SWITCHES LOCKED NORMAL, SWITCHES LOCKED REVERSE, SWITCHES NOT IN ROUTE, LOCKED, OPPOSING / CONFLICTING SIGNS. Contains 100 rows of track and signal data.

NOTES:

- 1. INTERMEDIATE SIGNS RETAIN THEIR NUMBER UNTIL THEY ARE PASSED.
2. EACH DESTINATION SIGN HAS FIVE (5) POSSIBLE STATES:
2.A. HORIZONTAL BAR DISPLAYED - THIS IS THE NORMAL CONDITION AND MEANS STOP.
2.B. FLASHING HORIZONTAL BAR DISPLAYED - THIS MEANS STOP AND THAT SIGNAL LOGIC FOR THAT "HEMISPHERE" WILL NOT PROCESS OR REMEMBER ANY ADDITIONAL TWC DESTINATION REQUESTS.
2.C. FLASHING NUMERICAL SYMBOL - THIS IS DISPLAYED WHEN A VALID TWC REQUEST IS BEING PROCESSED BY THE SIGNAL LOGIC.
2.D. SOLID ILLUMINATING NUMERICAL SYMBOL - THIS IS DISPLAYED WHEN A VALID TWC REQUEST HAS BEEN MADE AND THE SWITCHES ARE ALIGNED TO THE CORRECT POSITION.
2.E. IF A TWC LOOP ATTEMPTS TO CALL A DESTINATION PHYSICALLY NOT AVAILABLE FROM THE LOOP, THEN THE FACING NUMERICAL SIGN WILL DISPLAY A "NA" FOR 3 SECONDS.
3. IF THERE IS A HAND THROW SWITCH, THE LOCKED POSITION FOR THIS SWITCH REPRESENTS THE POSITION THAT NEEDS TO BE DETECTED FOR THE ROUTE TO BE AVAILABLE.
4. IN ADDITION TO CHECKING SWITCH POSITIONS, TRACK CIRCUITS AND OPPOSING ROUTES AS SHOWN IN THE R&A CHARTS, FOR THE ROUTES EXITING THE YARD INTO THE MAIN LINE, THE SOFTWARE WILL CHECK THE OPPOSING ROUTE STICKS FROM THE INTERFACING INTERLOCKING.
5. FOR ROUTES WITHIN THE YARD THAT THE SOFTWARE WILL BE DESIGNED TO PASS ROUTE STICKS BETWEEN THE TWO HEMISPHERES VIA THE VITAL REMOTE LINK TO ENSURE TRAIN MOVEMENT IS ONLY ALLOWED IN ONE DIRECTION AT A TIME WHEN TRAVELING BETWEEN THE HEMISPHERES.

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Revision table with columns: No., DATE, DSN, CHK, APP, REVISION. Row 0: 2/2024, 2024 NEW STANDARD DRAWINGS.

Approval table with columns: DESIGNED BY, DRAWN BY, CHECKED BY, APPROVED BY.

Submission table with columns: SUBMITTED BY, DATE, REVIEWED BY, DATE.

Scale: NTS, FILENAME: STD-JSS106, CONTRACT No.: RTA/LR, DATE: 2/2024. Includes Sound Transit logo.

SOUND TRANSIT STANDARD DRAWINGS SYSTEMS SIGNALS YARD ROUTE LOCKING TABLE TYPICAL

Drawing information table: DRAWING No.: STD-JSS106, FACILITY ID, SHEET No.: 0, REV: 0.

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| 0 | 2/2024 | | | | 2024 NEW STANDARD DRAWING |

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DATE:

REVIEWED BY:

DATE:

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SCALE: AS NOTED

FILENAME: STD-JSS107

CONTRACT No.: RTA/LR

DATE: 2/2024

**SOUND TRANSIT
STANDARD DRAWINGS**
SYSTEMS
SIGNALS
TYPICAL LOCAL CONTROL PANEL
FOR YARD

DRAWING No.: **STD-JSS107**

FACILITY ID:

SHEET No.: REV: 0

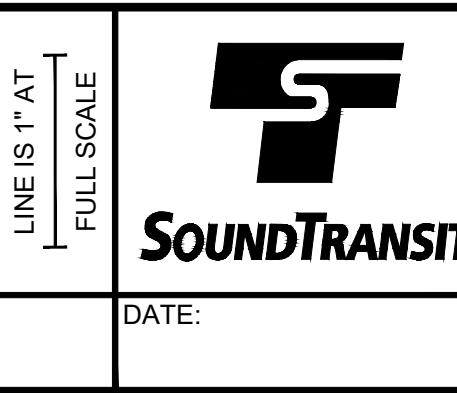
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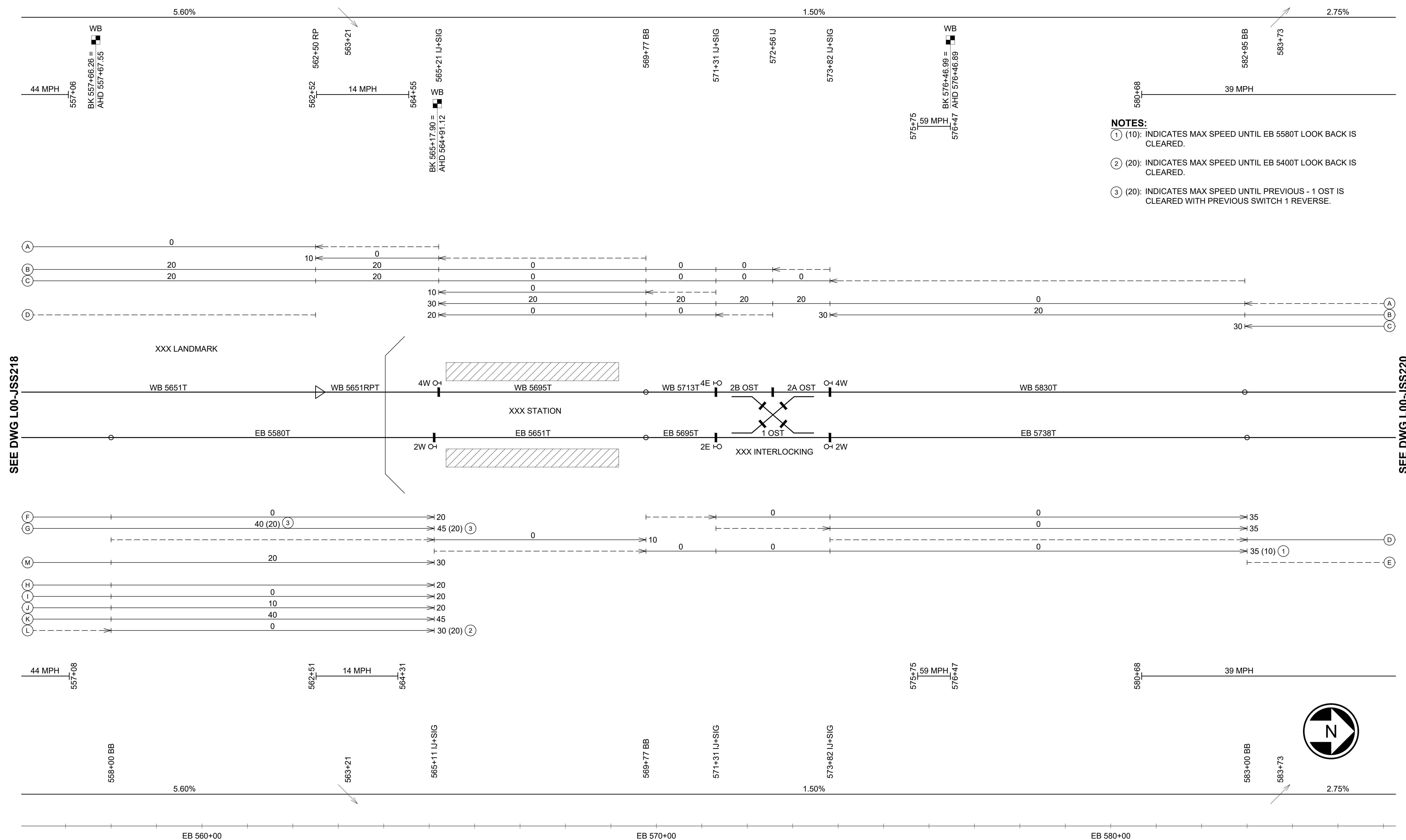


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| FILENAME: | STD-JSS108 |
| CONTRACT No.: | RTA/LR |
| DATE: | 2/2024 |

**SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS**
 SIGNALS
 TYPICAL LOCAL CONTROL PANEL
 FOR MAINLINE

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| FACILITY ID: | |
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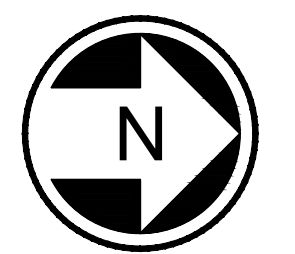
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- NOTES:**
- ① (10): INDICATES MAX SPEED UNTIL EB 5580T LOOK BACK IS CLEARED.
 - ② (20): INDICATES MAX SPEED UNTIL EB 5400T LOOK BACK IS CLEARED.
 - ③ (20): INDICATES MAX SPEED UNTIL PREVIOUS - 1 OST IS CLEARED WITH PREVIOUS SWITCH 1 REVERSE.

SEE DWG L00-JSS218

SEE DWG L00-JSS220



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| CONTRACT No.: RTA/LR | DATE: 2/2024 |

SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS
SIGNALS
CONTROL LINE DIAGRAM
NORMAL DIRECTION

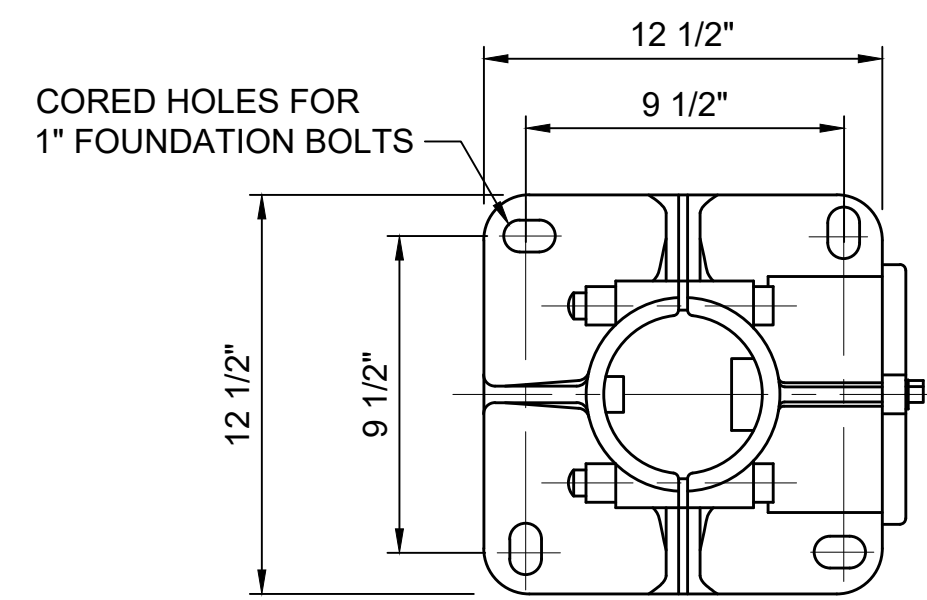
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| FACILITY ID: |
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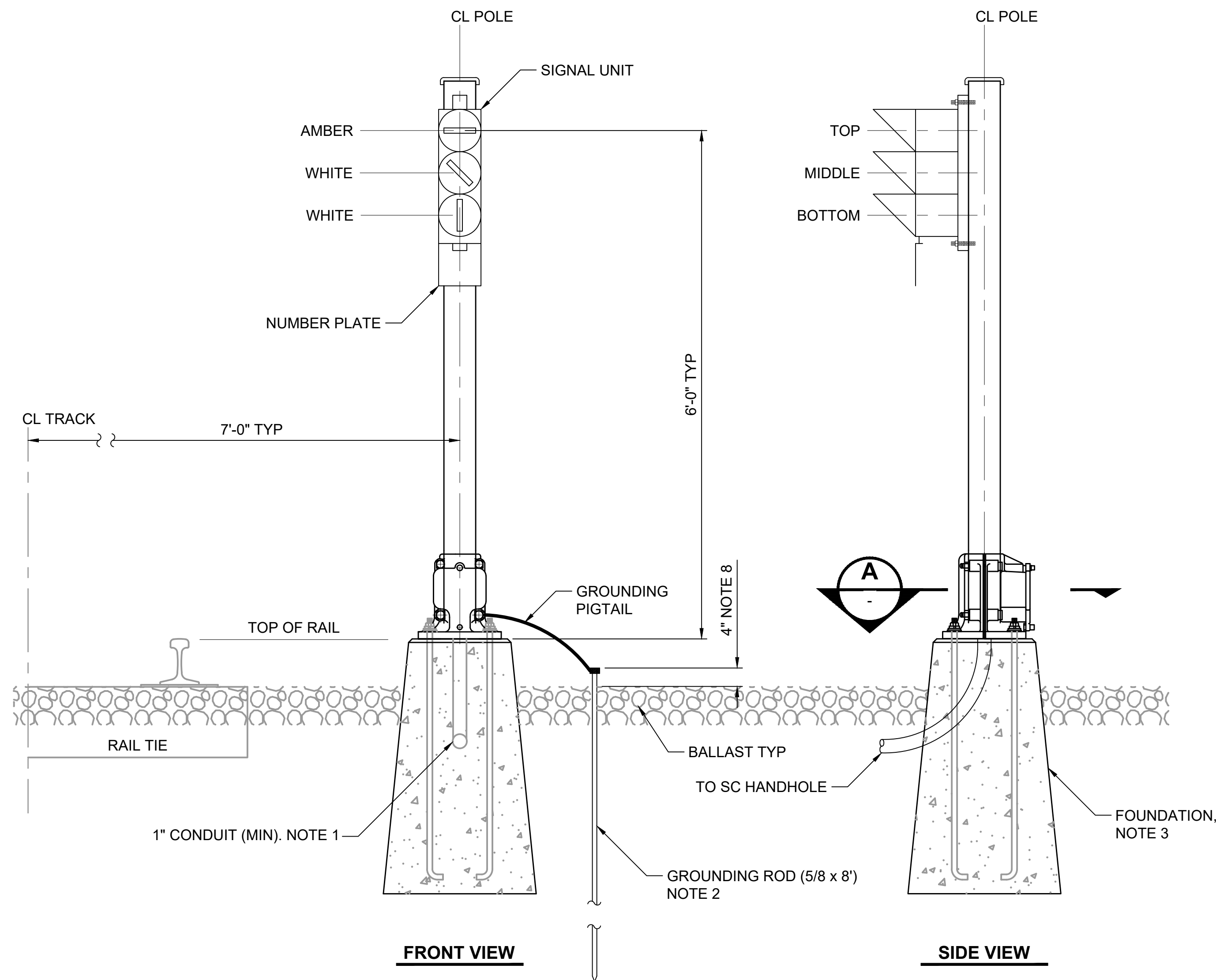
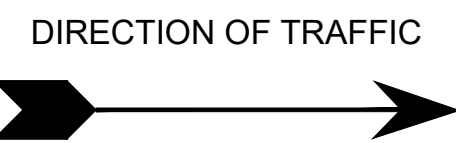
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| | | | | | DESIGNED BY: | | | |  | SCALE: NTS | <p>SOUND TRANSIT STANDARD DRAWINGS SYSTEMS</p> <p>SIGNALS CONTROL AND INDICATION CHART</p> | DRAWING No.: | STD-JSS110 | |
| | | | | | DRAWN BY: | | | | | FILENAME: STD-JSS110 | | FACILITY ID: | | |
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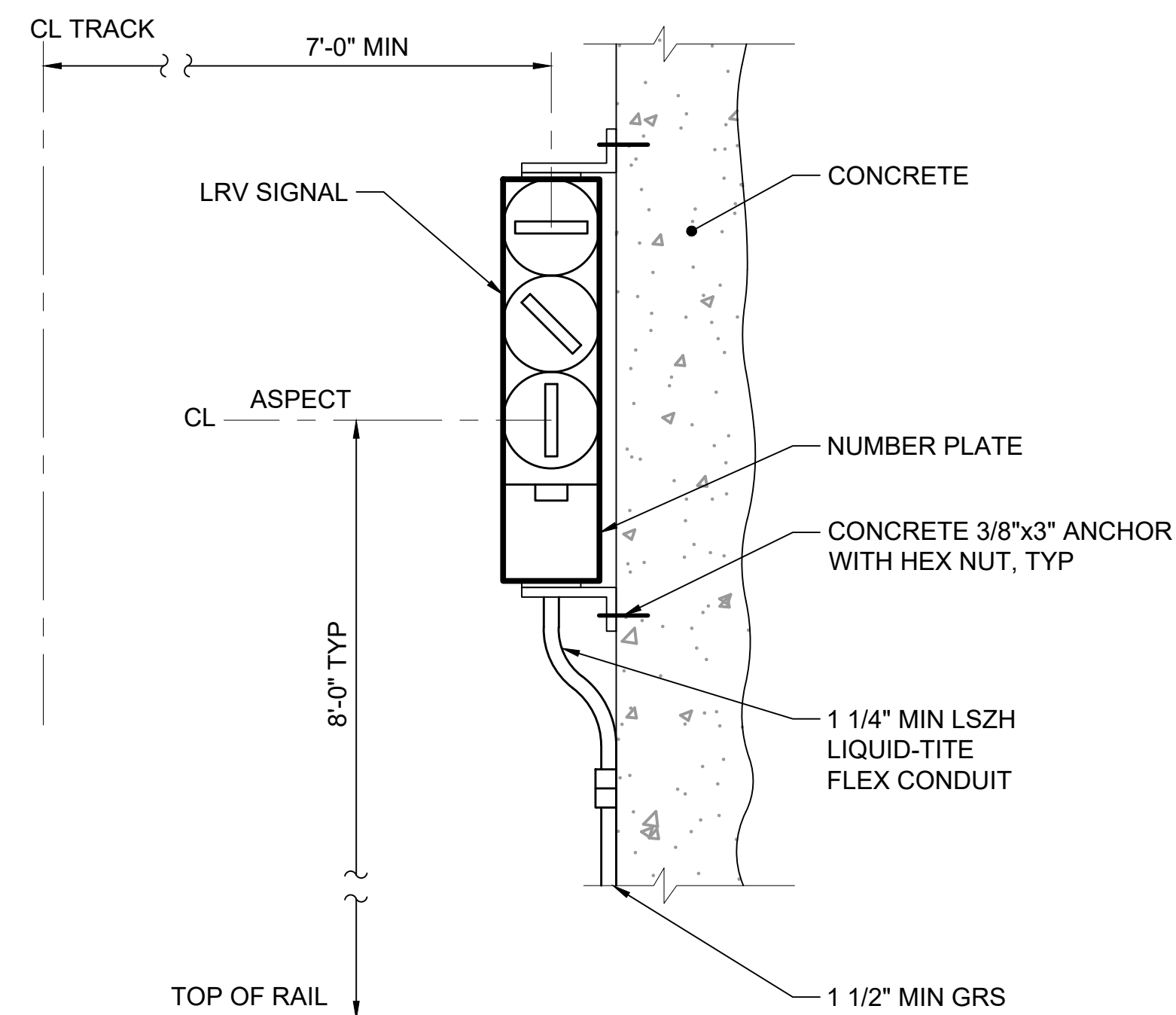
LINE IS 1" AT
FULL SCALE



SECTION PLAN OF BASE (A)
NTS



TYPICAL SIGNAL WITH PRECAST FOUNDATION (1)
NTS



TYPICAL SIGNAL LAYOUT - WALL MOUNTED (2)
NTS

GENERAL NOTES:

1. PROVIDE CONDUIT TO NEAREST HANDHOLE.
2. PROVIDE GROUND ROD, #6 COPPER EQUIPMENT GROUNDING CONNECTION, AND FOUNDATION.
3. PROVIDE PRECAST FOUNDATION FOR MOUNTING SIGNAL.
4. INSTALLATION PROCEDURE SHALL KEEP BALLAST CLEAN; KEEP ALL DISPLACED SUB-BALLAST AND OTHER SOILS SEPARATE FROM BALLAST.
5. EXTEND CONDUIT TO SIGNAL FROM HANDHOLE OR STUB UP.
6. TYPICAL SIGNAL OFFSET FROM IJ LOCATION IS 15'.
7. FOR THE TUNNEL OR AERIAL GROUNDING PIGTAILS, COORDINATE TERMINATIONS.
8. GREEN INSULATED WIRE FOR GROUND.

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| 1 | 8/2019 | | | | REVISED SYSTEMS DIRECTIVE DRAWINGS |
| 0 | 8/2017 | | | | GUIDANCE DRAWINGS |

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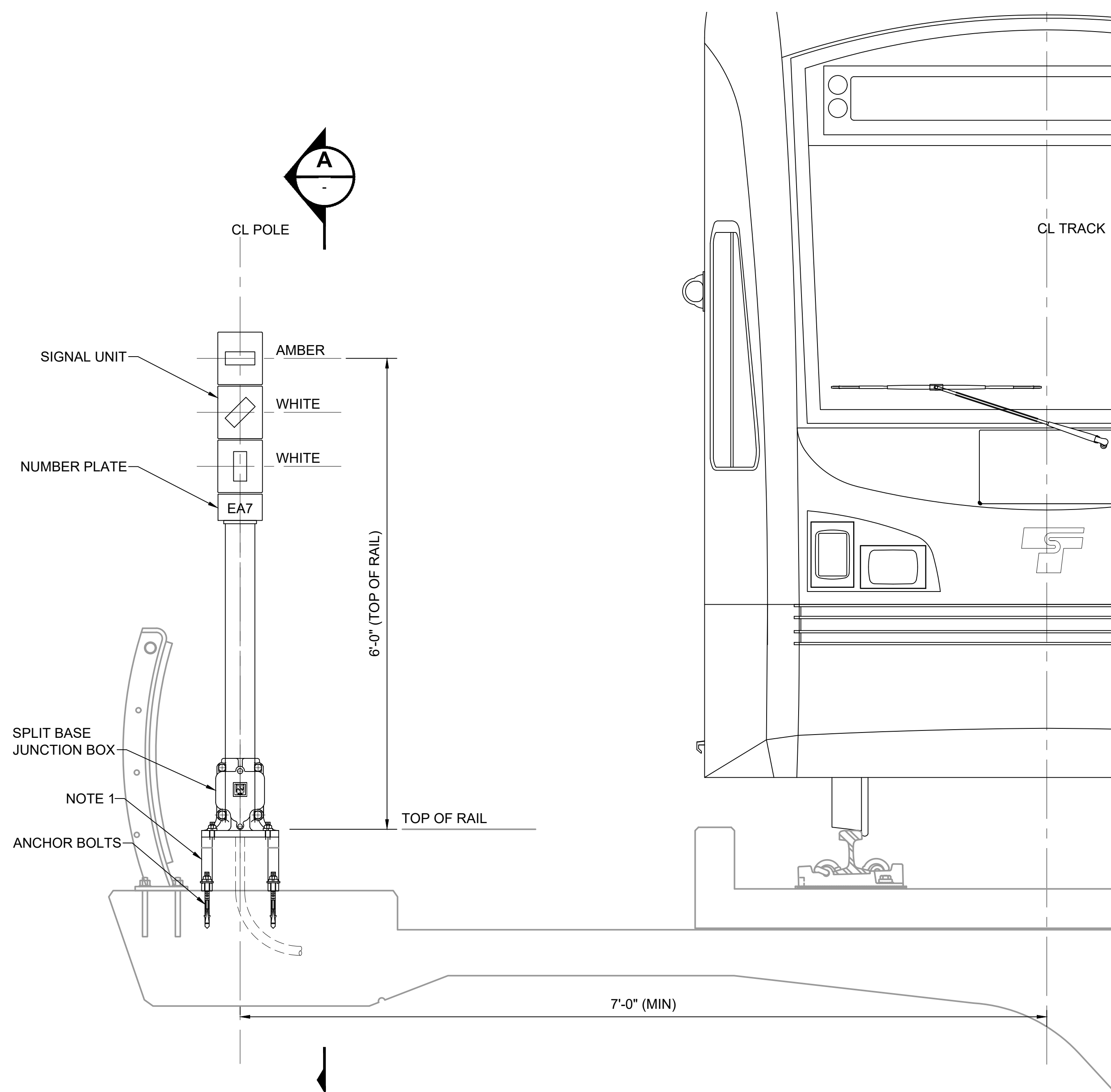
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| | CONTRACT No.: |
| | DATE: 2/2024 |

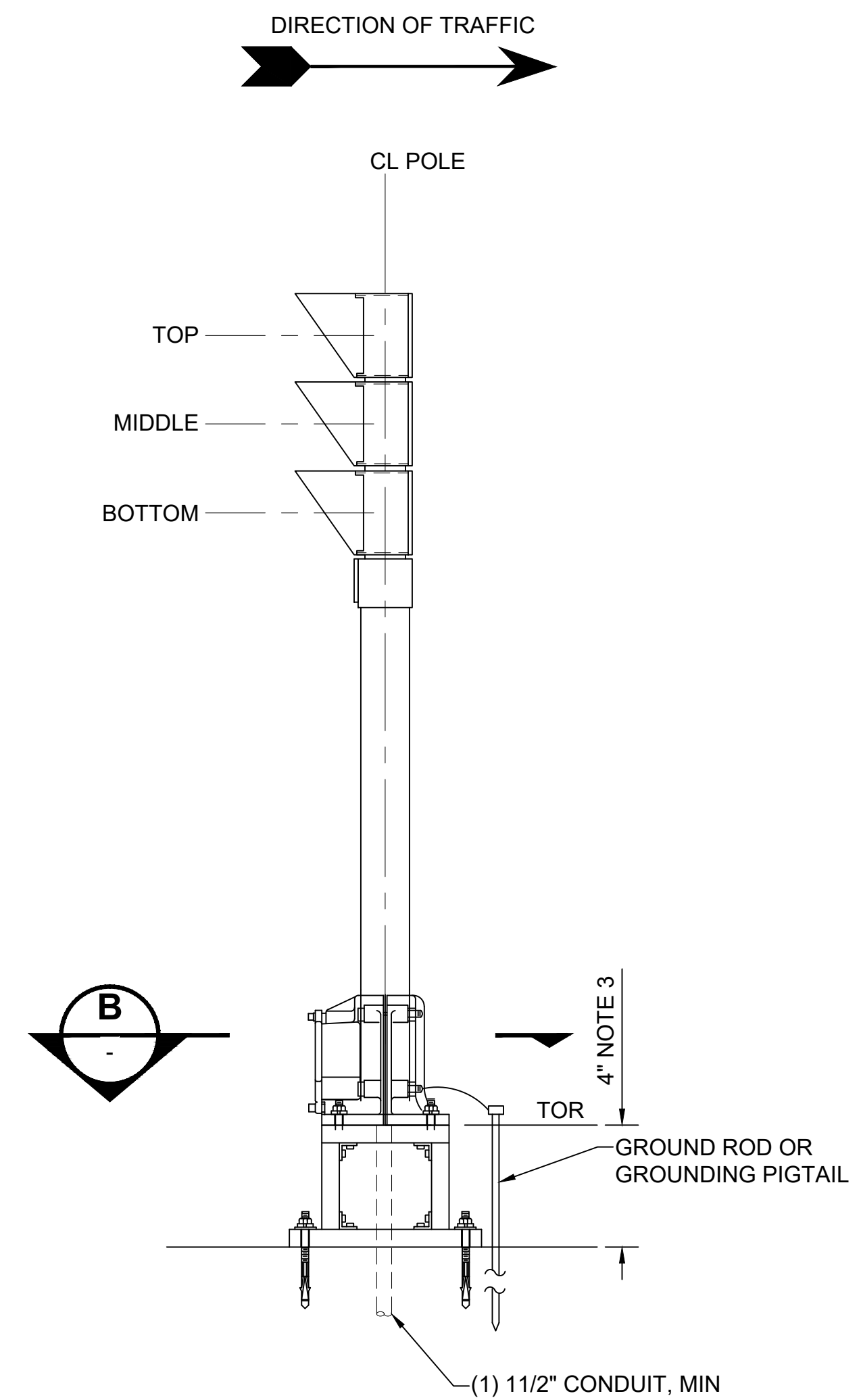
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| SOUND TRANSIT STANDARD DRAWINGS SYSTEMS | |
| SIGNALS | |
| TYPICAL SIGNAL LAYOUT WALL AND BALLASTED TRACK | |

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| DRAWING No.: | STD-JSD100 |
| FACILITY ID: | |
| SHEET No.: | REV: 2 |

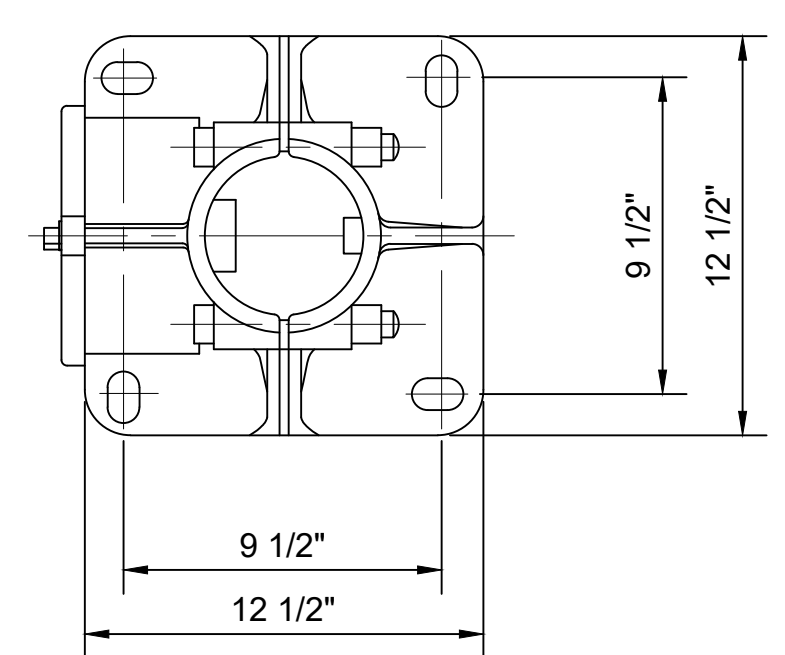
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SIGNAL MOUNTING
AERIAL DIRECT FIXATION TRACK **1**
 SCALE: 1"=1'-0"



SECTION
 SCALE: 1"=1'-0" **A**



SECTION PLAN VIEW
OF SPLIT BASE **B**
 SCALE: 2"=1'-0"

- GENERAL NOTES:**
1. MOUNTING FRAME CONSTRUCTED FROM "U" CHANNEL, SUCH THAT THE SIGNAL IS LEVEL, PLUMB AND AT THE SPECIFIED ELEVATION.
 2. SECTION B CAN ALSO BE USED FOR SIGNAL MOUNTED BETWEEN TRACKS.
 3. 1/0 AWG GREEN INSULATED COPPER WIRE FOR GROUND.

| No. | DATE | DSN | CHK | APP | REVISION |
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| 2 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |
| 1 | 8/2019 | | | | REVISED SYSTEMS DIRECTIVE DRAWINGS |
| 0 | 8/2017 | | | | GUIDANCE DRAWINGS |

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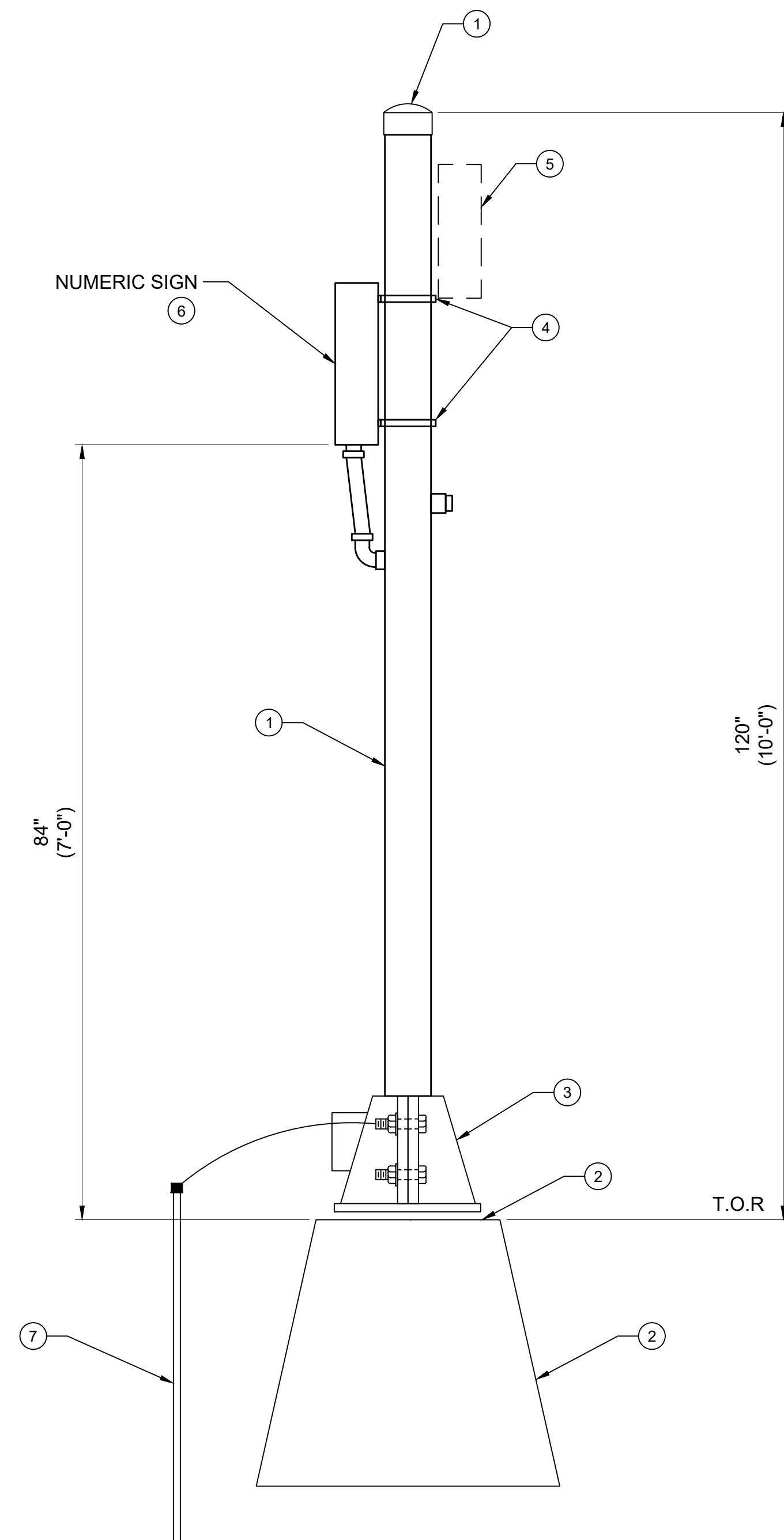
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| FILENAME: STD-JSD101 | |
| CONTRACT No.: | |
| RTA/LR | |
| DATE: | 2/2024 |

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| SOUND TRANSIT STANDARD DRAWINGS SYSTEMS SIGNALS TYPICAL SIGNAL LAYOUT AERIAL TRACKWAY | |
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| DRAWING No.: | STD-JSD101 |
| FACILITY ID: | |
| SHEET No.: | REV: |
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KEY NOTES:

- ① 5 INCH ALUMINUM MAST WITH CAP.
- ② MAST MOUNTED ON PRECAST FOUNDATION ON ELASTOMERIC OR NEOPRENE PAD. PROVIDE GROUND ROD.
- ③ PROVIDE SPLIT BASE JB EQUIPPED WITH ELECTRONIC LIGHTNING PROTECTION FOR NUMERIC SIGN.
- ④ MOUNTING SHALL PERMIT FLEXIBILITY FOR SIGN VISIBILITY TO REQUESTING TWC LOOPS
- ⑤ IF YARD OPERATIONAL LAYOUT REQUIRES, A SECOND SIGN CAN BE MOUNTED ON DIFFERENT SIDE OF POLE.
- ⑥ SIGN WITH AMBER DOUBLE SYMBOLS THAT SHALL BE 12 INCH HIGH MIN.
- ⑦ GROUND SIGNAL WITH #6 AWG GREEN INSULATED COPPER WIRE CONNECTION TO GROUND ROD, 4" ABOVE GRADE. MATERIAL TO BE PROVIDED BY CONTRACTOR.

| No. | DATE | DSN | CHK | APP | REVISION |
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| 0 | 2/2024 | | | | 2024 NEW STANDARD DRAWINGS |

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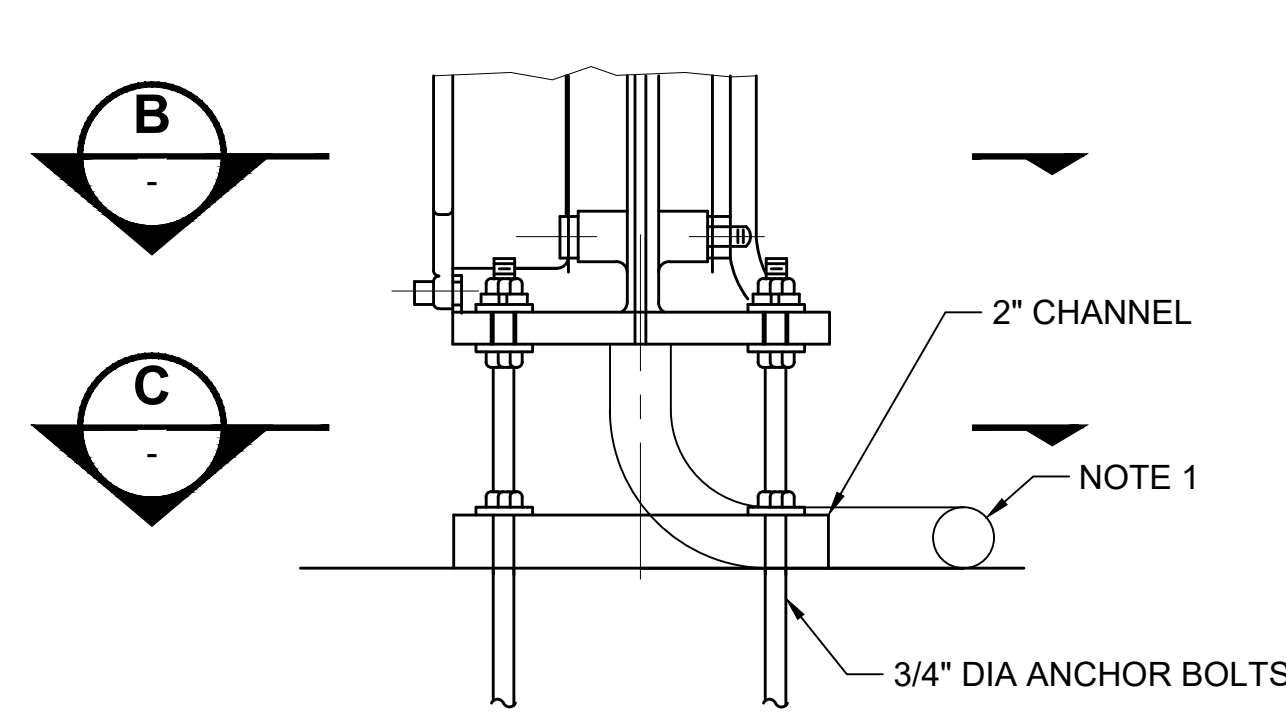
LINE IS 1" AT FULL SCALE

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| CONTRACT No.: | RTA/LR |
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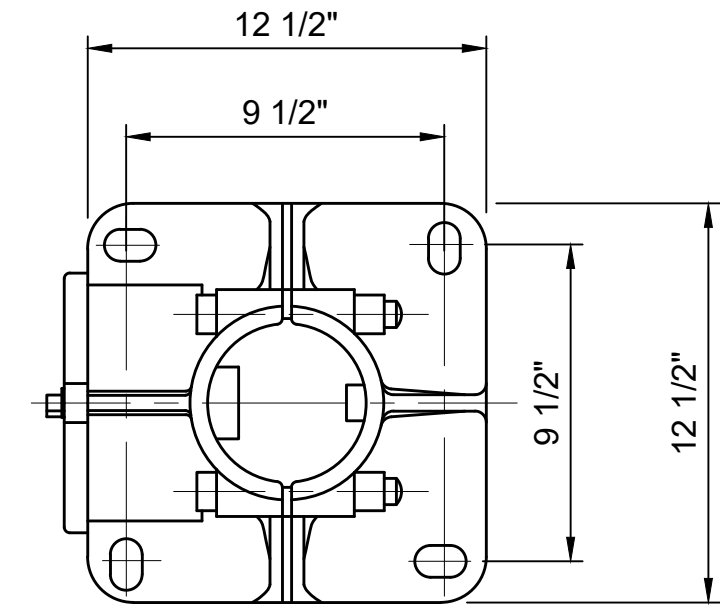
**SOUND TRANSIT
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SIGNALS
TYPICAL NUMERIC SIGN AND
MAST LAYOUT

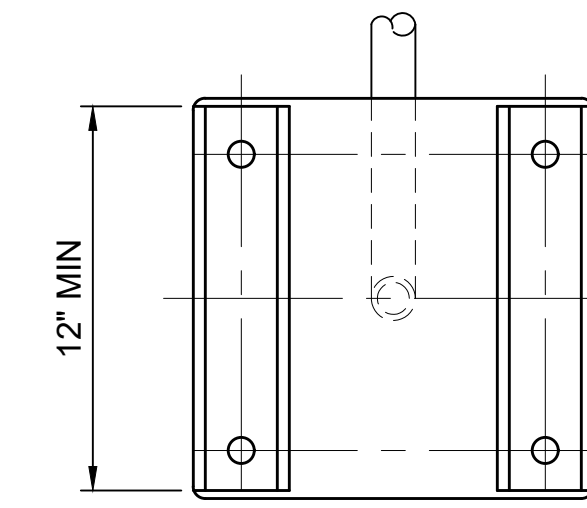
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SIDE VIEW OF BASE MOUNTING (A)
SCALE: NTS

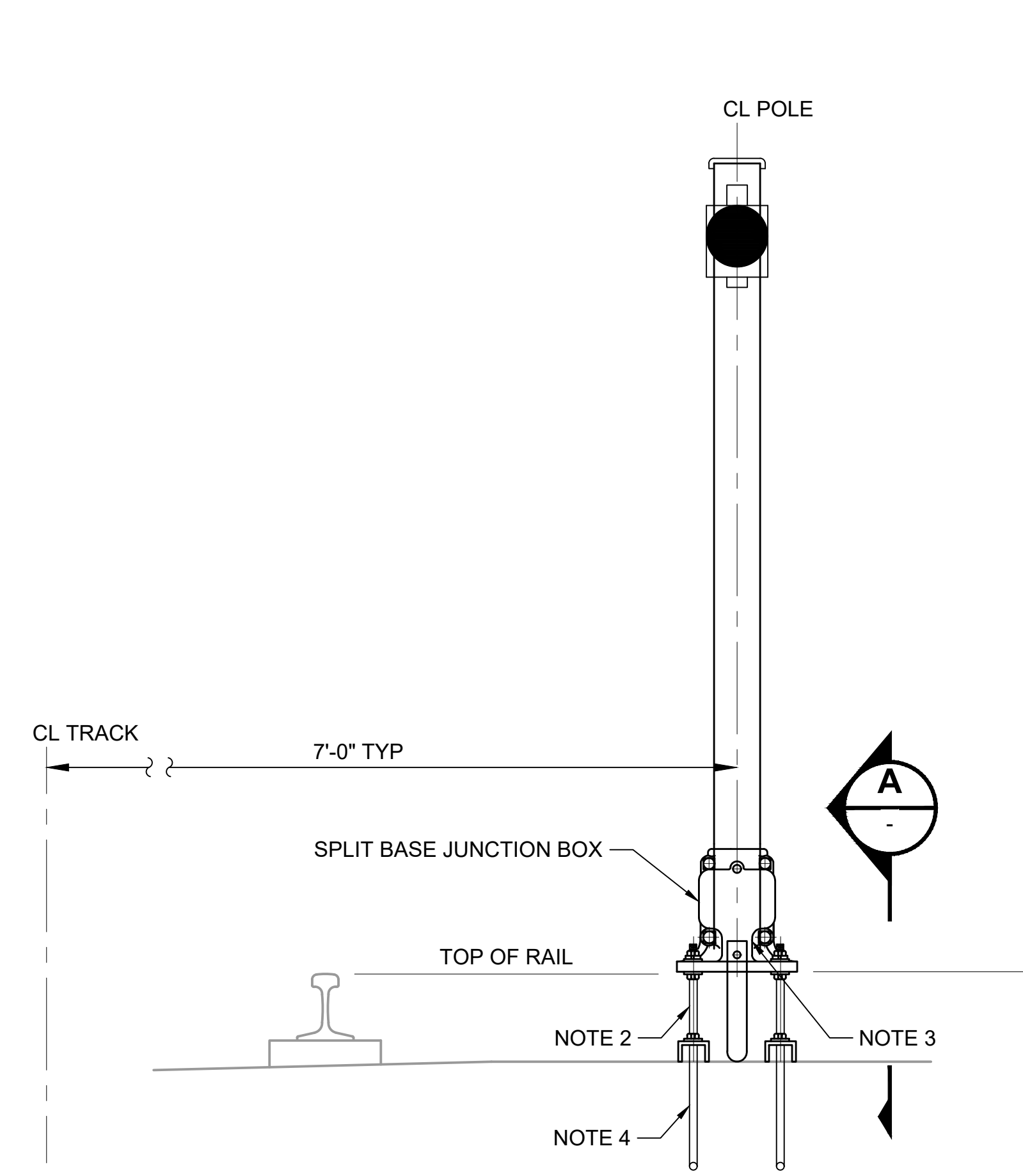


SECTION PLAN VIEW OF SPLIT BASE (B)
SCALE: NTS

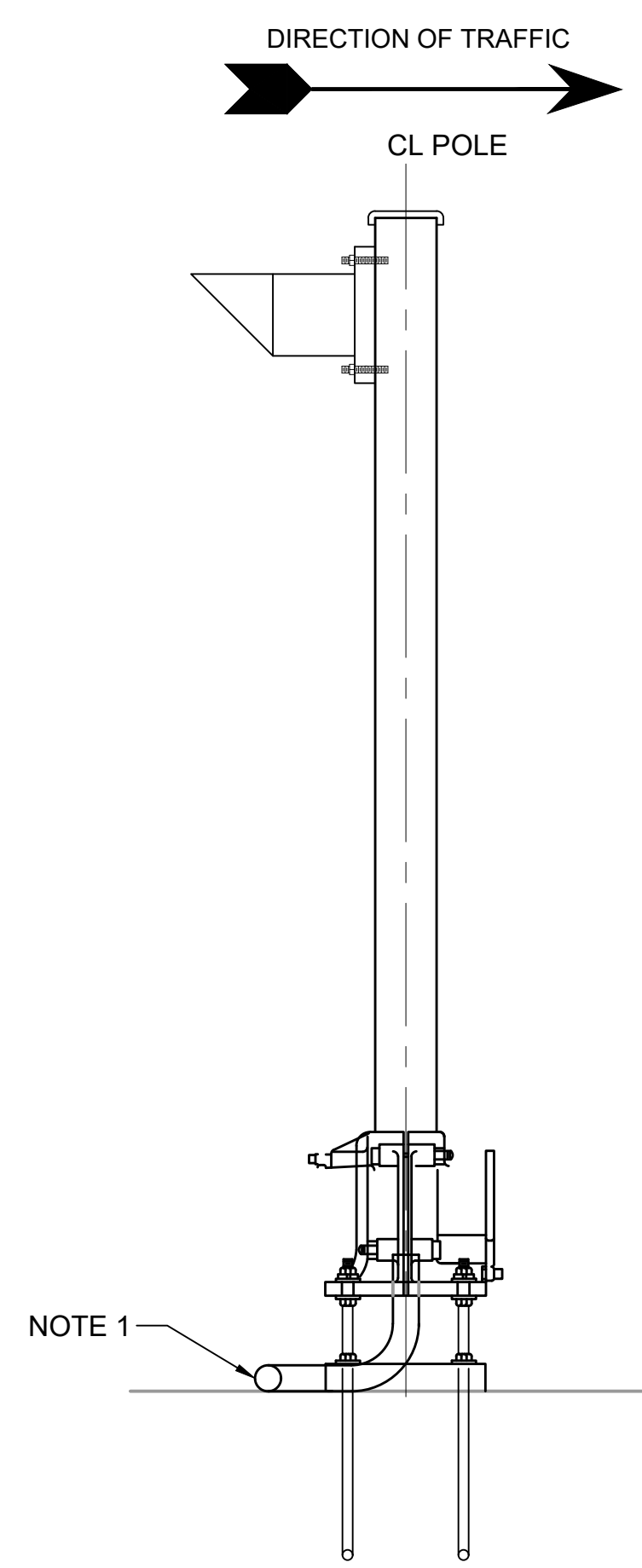


TOP VIEW OF BASE MOUNTING (C)
SCALE: NTS

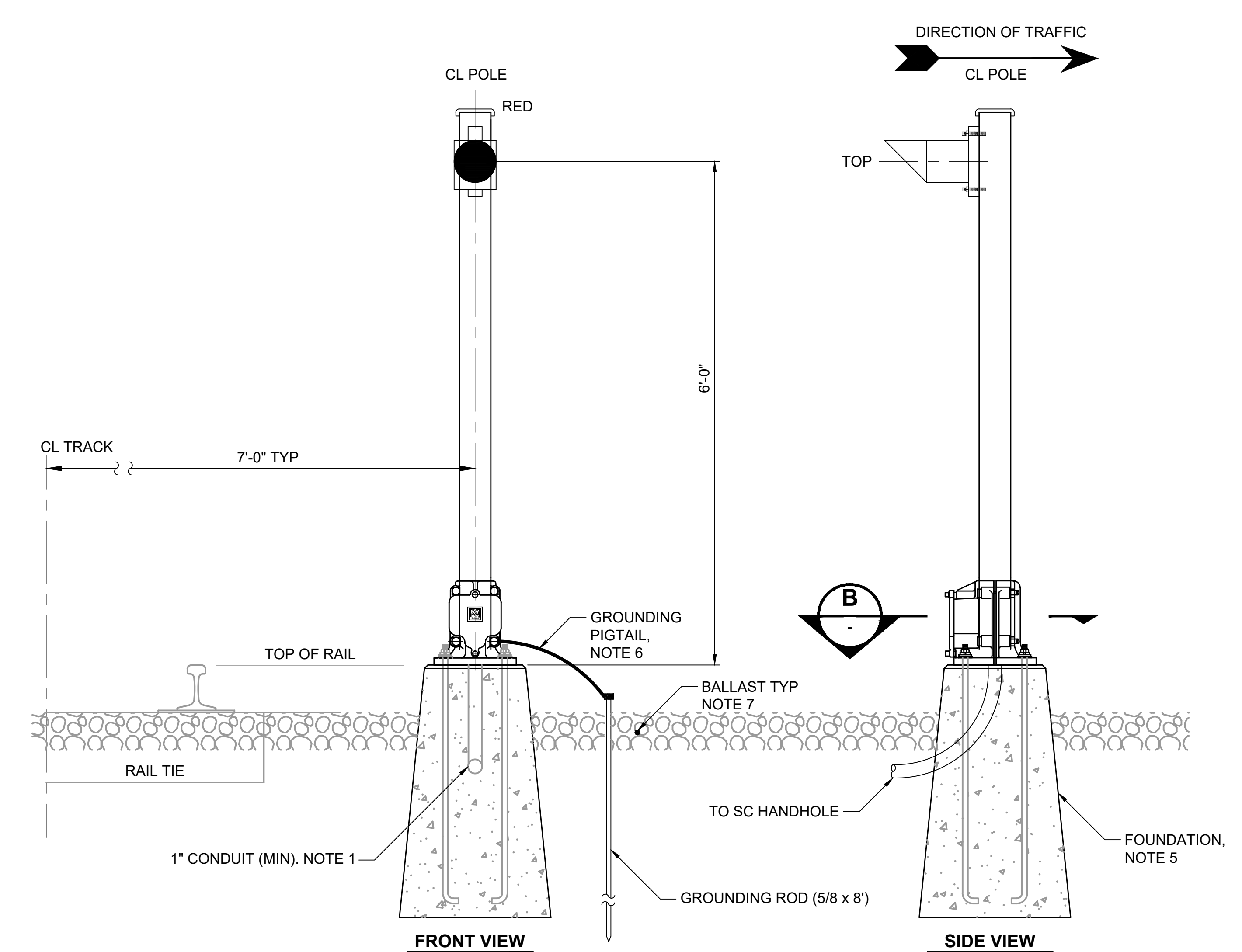
- NOTES:**
1. PROVIDE CONDUIT TO NEAREST HANDHOLE PROVIDED BY CIVIL.
 2. MOUNTING FRAME CONSTRUCTED FROM "U" CHANNEL SUCH THAT SIGNAL IS LEVEL, PLUMB AND AT ELEVATION SHOWN.
 3. GROUND SIGNAL WITH #6 AWG GREEN INSULATED COPPER WIRE TO EQUIPMENT GROUND PROVIDED BY OTHERS IN DUCTBANK HANDHOLE.
 4. PROVIDE ALL-THREAD TYPE EPOXY ANCHORS DRILLED INTO CONCRETE FOR SECURING MOUNTING FRAME. PRIOR TO DRILLING, PERFORM SCAN TO LOCATE AND AVOID REBAR.
 5. PROVIDE PRECAST FOUNDATION FOR MOUNTING SIGNAL.
 6. GROUND SIGNAL WITH #6 AWG GREEN INSULATED COPPER WIRE CONNECTION TO GROUND ROD. MATERIAL TO BE PROVIDED BY CONTRACTOR.
 7. INSTALLATION PROCEDURE SHALL KEEP BALLAST CLEAN. KEEP ALL DISPLACED SUB-BALLAST AND OTHER SOILS SEPARATE FROM BALLAST.



FRONT VIEW
BUMPING POST SIGNAL - DIRECT FIXATION (1)
SCALE: NTS



SIDE VIEW



FRONT VIEW
BUMPING POST SIGNAL WITH PRECAST FOUNDATION (2)
SCALE: NTS

SIDE VIEW

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LINE IS 1" AT FULL SCALE

SCALE: NTS
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CONTRACT No.: RTA/LR
DATE: 2/2024

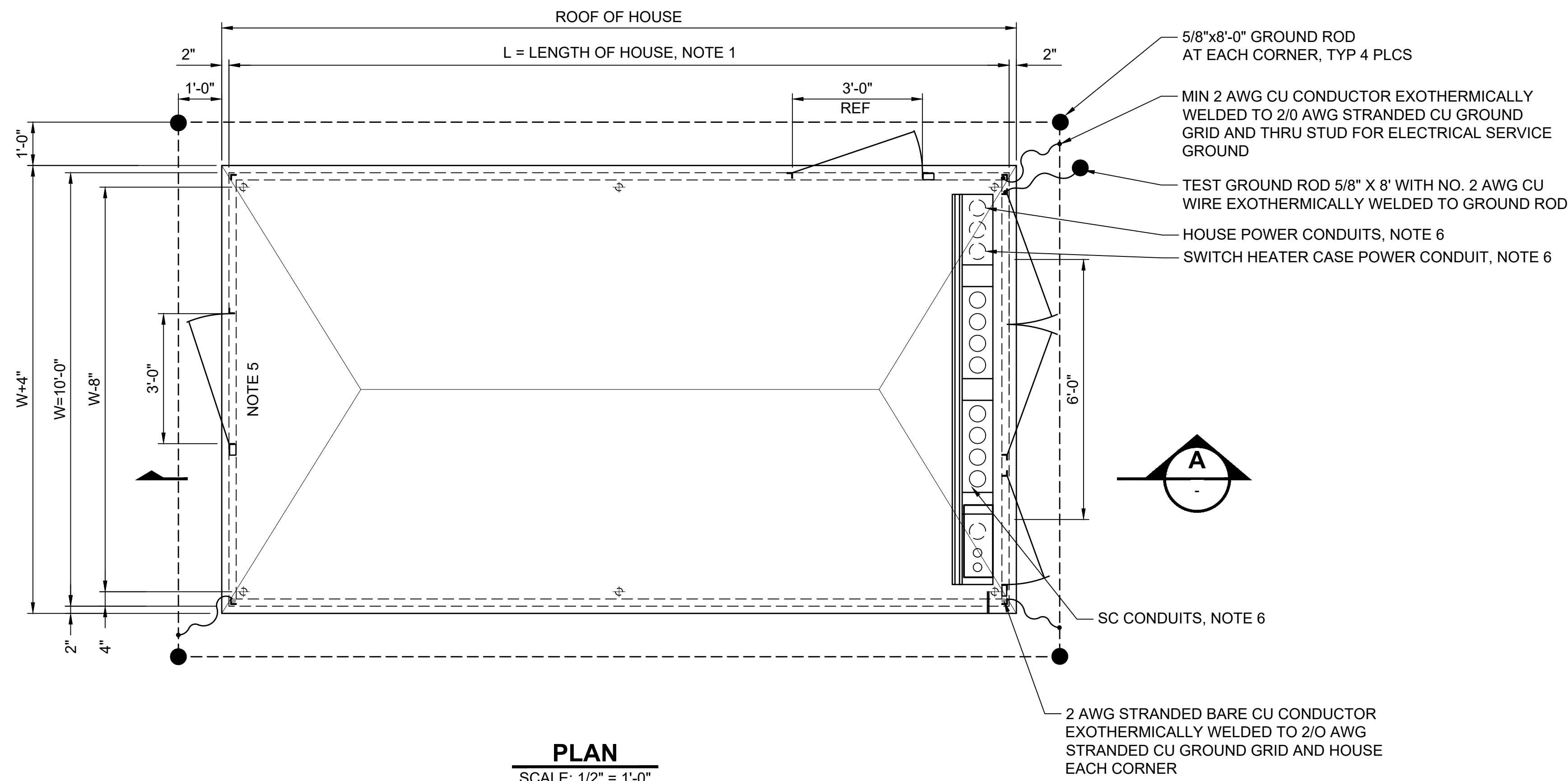
SOUND TRANSIT STANDARD DRAWINGS SYSTEMS

SIGNALS
TYPICAL SIGNAL LAYOUT
DIRECT FIXATION TRACK

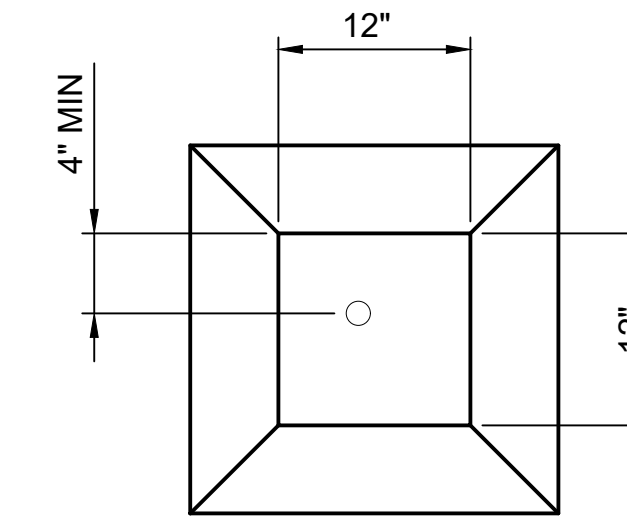
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GENERAL NOTES:

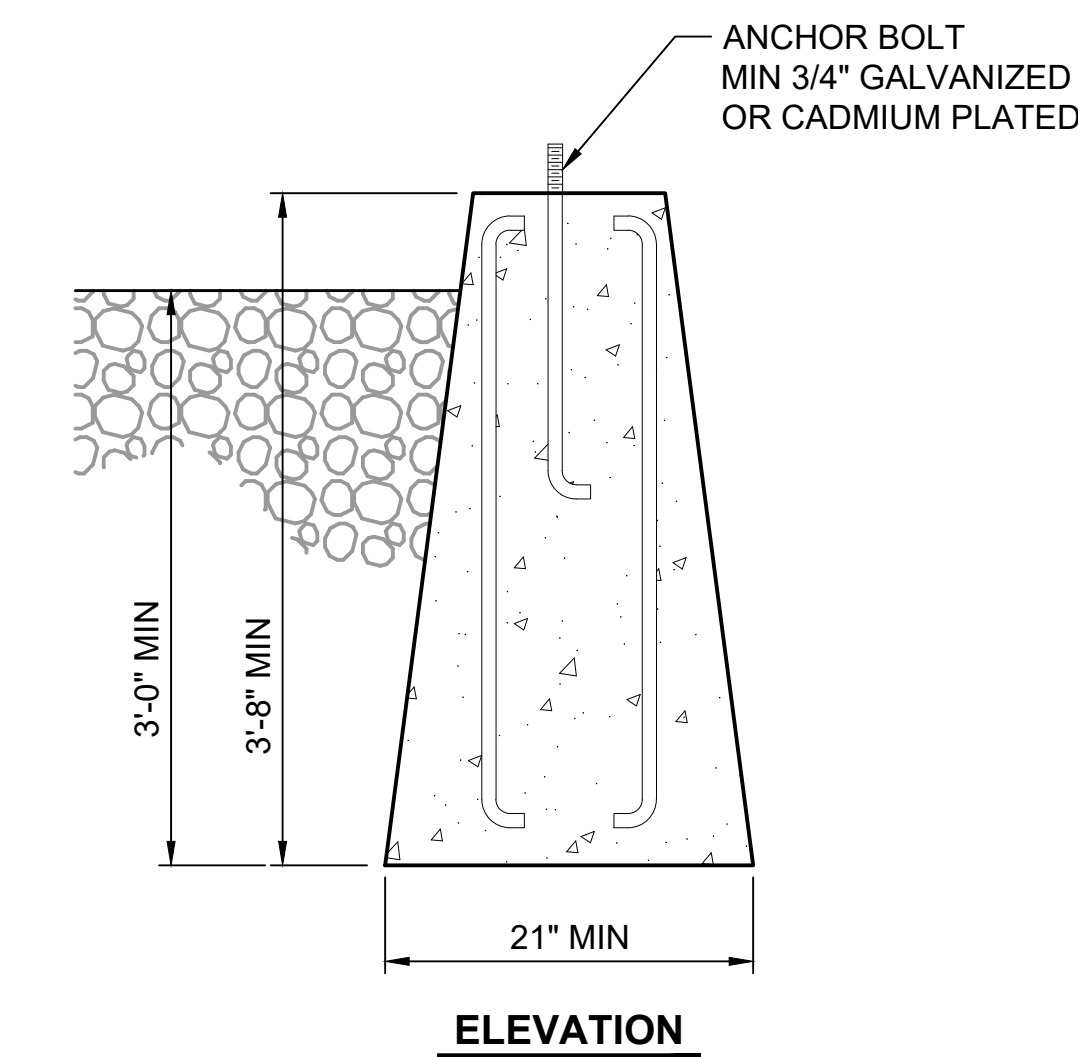
- SIGNAL HOUSE LENGTH VARIES IN SIZE FROM 20'-0" UP TO 32'-0", BY INCREMENTS OF FOUR FEET. THE ACTUAL SIZE OF THE HOUSE IS DETERMINED BY THE CONTRACTOR. MAXIMUM ALLOWABLE SIZE SHOWN ON EQUIPMENT LAYOUTS.
- CONTRACTOR SHALL FURNISH AND INSTALL PREFAB CONCRETE PIER FOUNDATIONS. QUANTITY AND SIZE SHALL BE CALCULATED BY THE CONTRACTOR TO MEET THE SEISMIC REQUIREMENTS FOR THE FINAL HOUSE SIZE.
- BOTTOM OF HOUSE SHALL BE 8" ABOVE FINAL GRADE.
- PROVIDE CLOSED CIRCUIT CAMERA COVERAGE AT ENTRANCE DOORS. COORDINATE WITH COMMUNICATIONS CONTRACTOR FOR LOCATIONS.
- CENTER DOOR ON OPPOSITE WALL FROM ENTRANCE RACK.
- SEE TYPICAL CONCRETE PAD HOUSE INSTALLATION FOR CONDUIT ENTRANCE PLACEMENT. IF SWITCH HEATER POWER GOES DIRECTLY TO SWITCH HEATER, THIS IS ACCEPTABLE.
- PROVIDE GENERATOR CONNECTION PLUG ON SAME SIDE OF HOUSE AS SIDE DOOR. AT LOCATION SHOWN ON THE EQUIPMENT LAYOUT DRAWINGS.
- CONTRACTOR SHALL INSTALL A 1/4" NEOPRENE PAD TO PREVENT DIRECT CONTACT OF THE HOUSE STRUCTURE WITH THE CONCRETE PIERS.
- SITE LAYOUT TO BE APPROVED BY SOUND TRANSIT INCLUDING ACCESS, MAINTENANCE, PARKING AND PORTABLE GENERATOR SPACE RESERVATION.



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

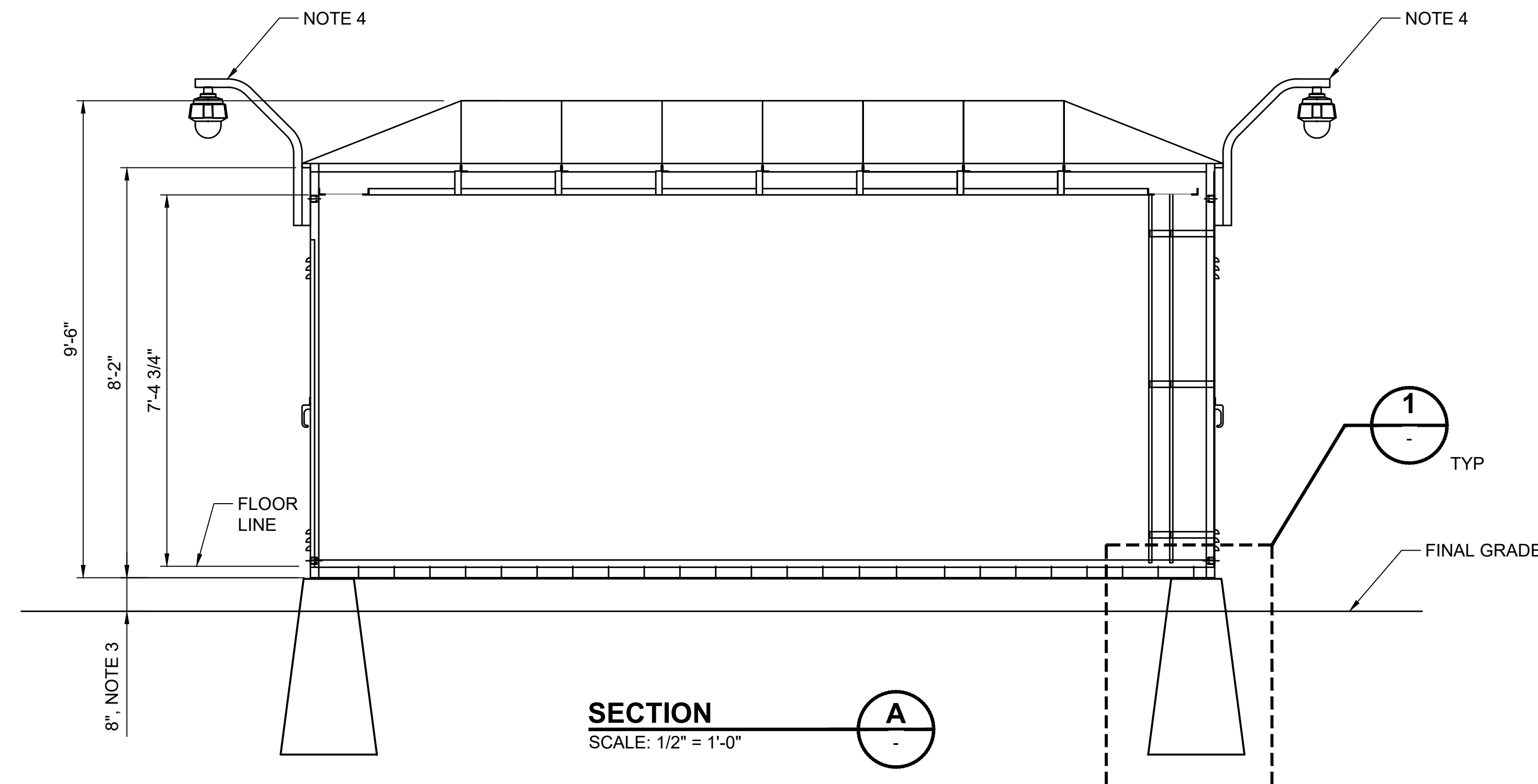


PLAN



ELEVATION

PREFAB CONCRETE PIER FOUNDATION 1
NTS




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

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| 1 | 8/2019 | | | | REVISED SYSTEMS DIRECTIVE DRAWINGS |
| 0 | 1/2019 | | | | 2019 GUIDANCE DWG REVISIONS - GENERAL UPDATE |

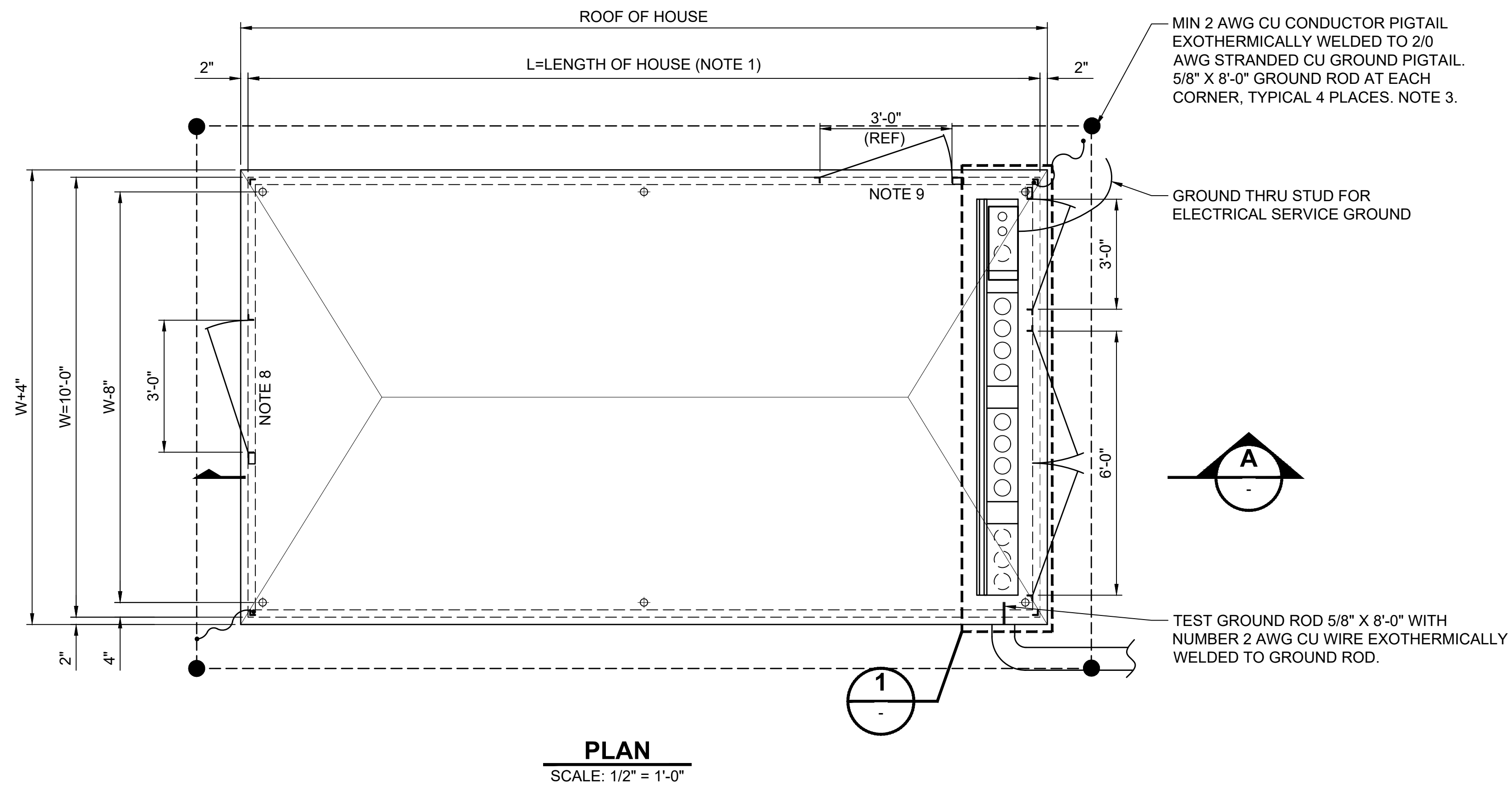
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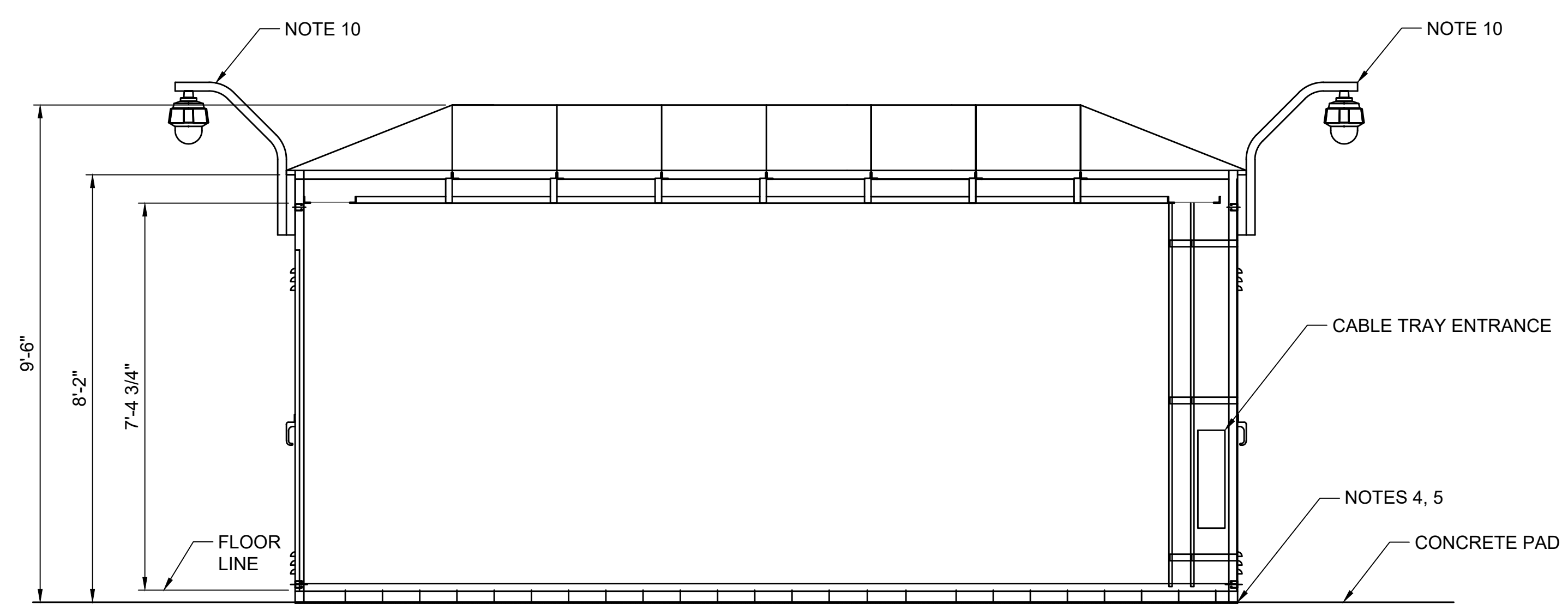
SOUND TRANSIT
STANDARD DRAWINGS
 SYSTEMS
 SIGNALS
 TYPICAL SIGNAL HOUSE CONCRETE PIER
 INSTALLATION PLAN AND DETAILS

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| DRAWING No.: | STD-JSD200 |
| FACILITY ID: | |
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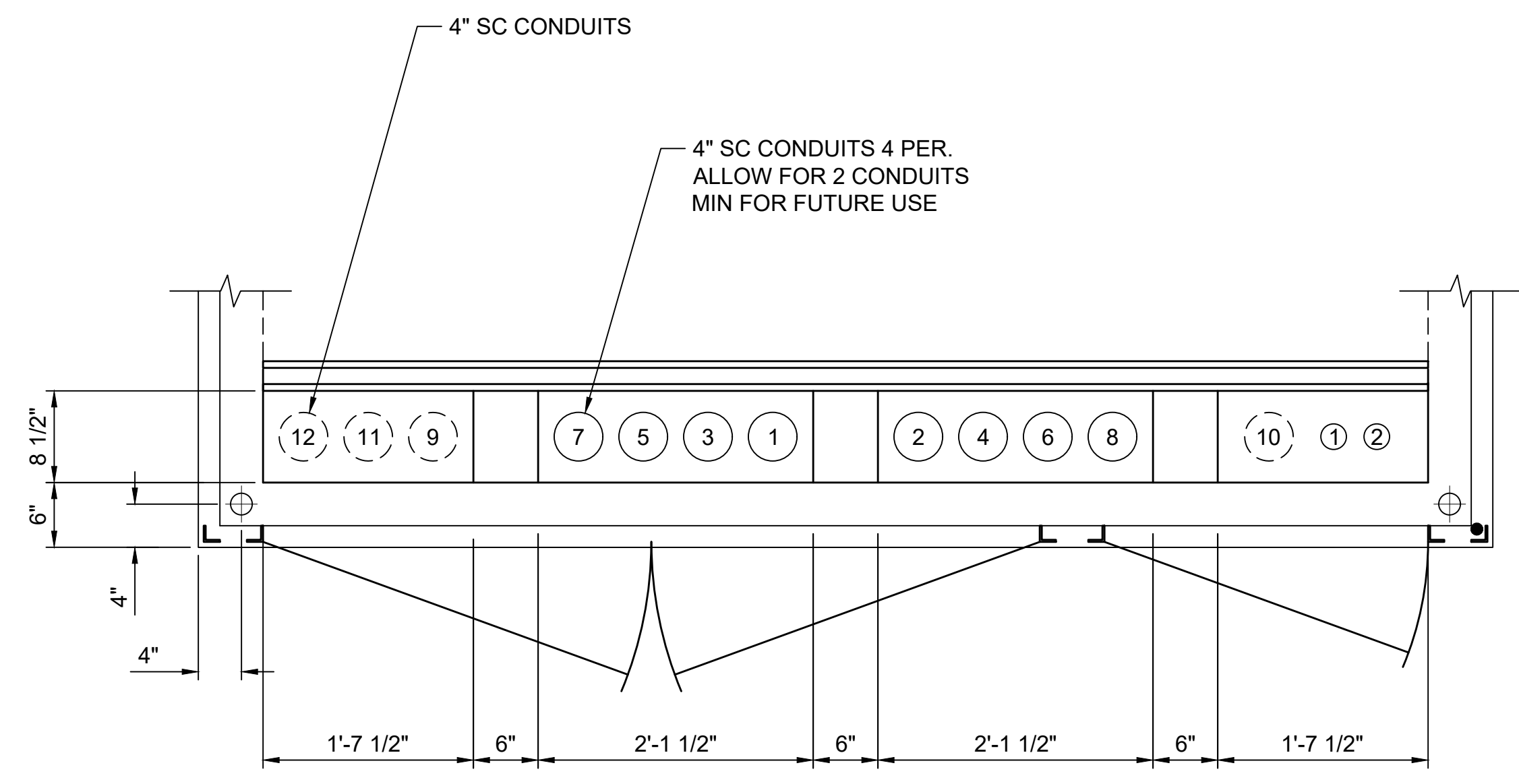


PLAN
SCALE: 1/2" = 1'-0"

- GENERAL NOTES:**
1. SIGNAL HOUSE LENGTH VARIES IN SIZE FROM 20'-0" UP TO 32'-0", BY INCREMENTS OF FOUR FEET. THE ACTUAL SIZE OF THE HOUSE IS DETERMINED BY THE CONTRACTOR.
 2. CONTRACTOR SHALL DESIGN, FURNISH AND INSTALL AN ANCHORING SYSTEM TO MOUNT THE SIGNAL HOUSE TO THE CONCRETE PAD TO MEET THE SEISMIC AND WIND LOAD OF THE FINAL HOUSE SIZE.
 3. PROVIDE 5' LONG, 2/0 AWG STRANDED CU GROUND PIGTAILS.
 4. CONTRACTOR SHALL INSTALL A 1/4" NEOPRENE PAD TO PREVENT DIRECT CONTACT OF THE HOUSE STRUCTURE WITH THE CONCRETE PAD.
 5. CONTRACTOR SHALL SEAL THE BASE OF THE HOUSE WITH CAULK TO PREVENT THE INTRUSION OF WATER AND RODENTS THROUGH ANY GAPS CAUSED BY FLAWS IN THE CONCRETE PAD.
 6. NUMBER OF SC CONDUITS VARIES BY LOCATION, SEE LAYOUT PLANS FOR AMOUNT.
 7. PROVIDE CABLE TRAY TO SURFACE MOUNTED PULL BOX IF TYPICAL CONDUIT STUB UPS ARE NOT FEASIBLE.
 8. CENTER DOOR ON OPPOSITE WALL FROM ENTRANCE RACK.
 9. PROVIDE GENERATOR CONNECTION PLUG ON SAME SIDE OF HOUSE AS SIDE DOOR.
 10. PROVIDE CLOSED CIRCUIT CAMERA COVERAGE AT ENTRANCE DOORS.
 11. SITE LAYOUT TO BE APPROVED BY SOUND TRANSIT INCLUDING ACCESS, MAINTENANCE, PARKING AND PORTABLE GENERATOR.



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




DETAIL
SCALE: 1" = 1'-0"

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| 3 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |
| 2 | 8/2019 | | | | REVISED SYSTEMS DIRECTIVE DRAWINGS |
| 1 | 1/2019 | | | | 2019 GUIDANCE DWG REVISIONS - GENERAL UPDATE |
| 0 | 8/2017 | | | | GUIDANCE DRAWINGS |

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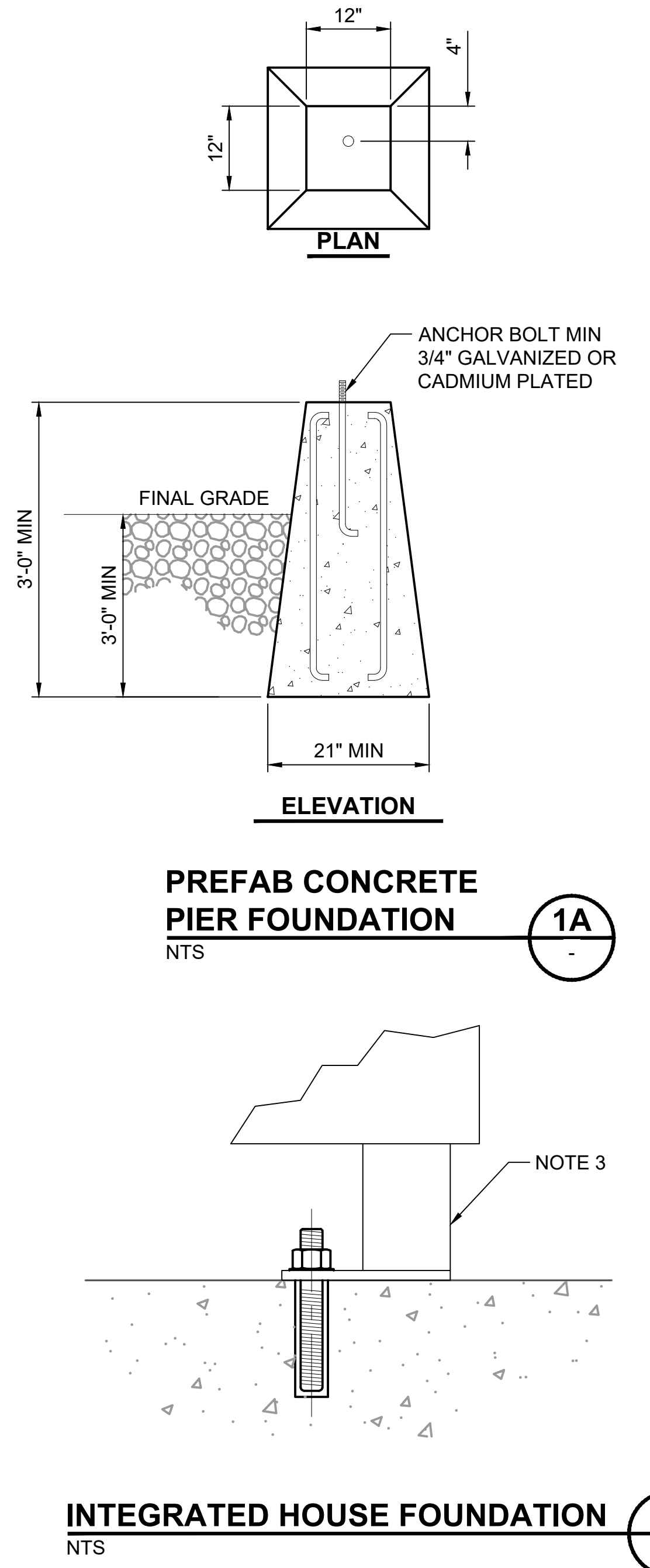
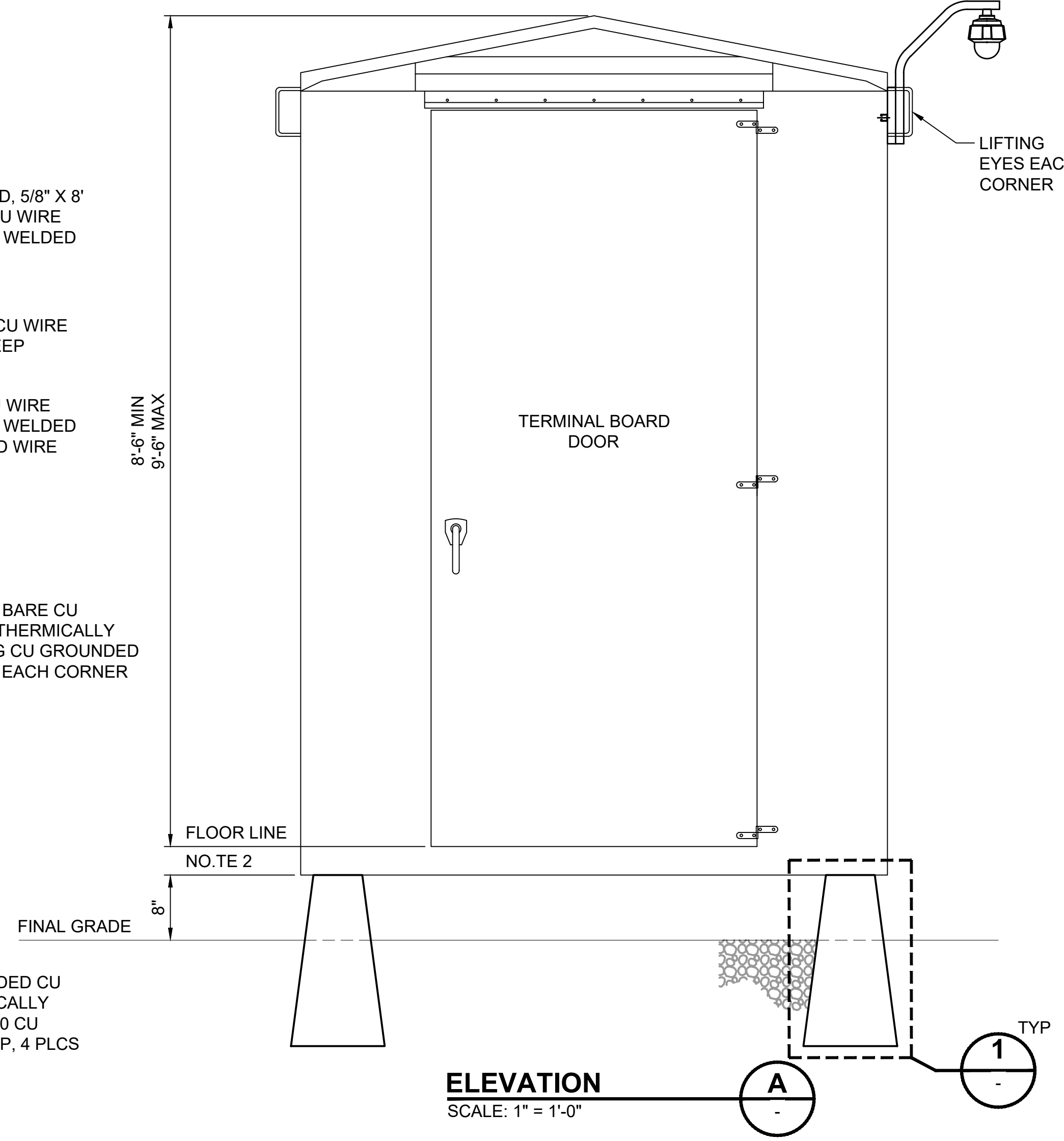
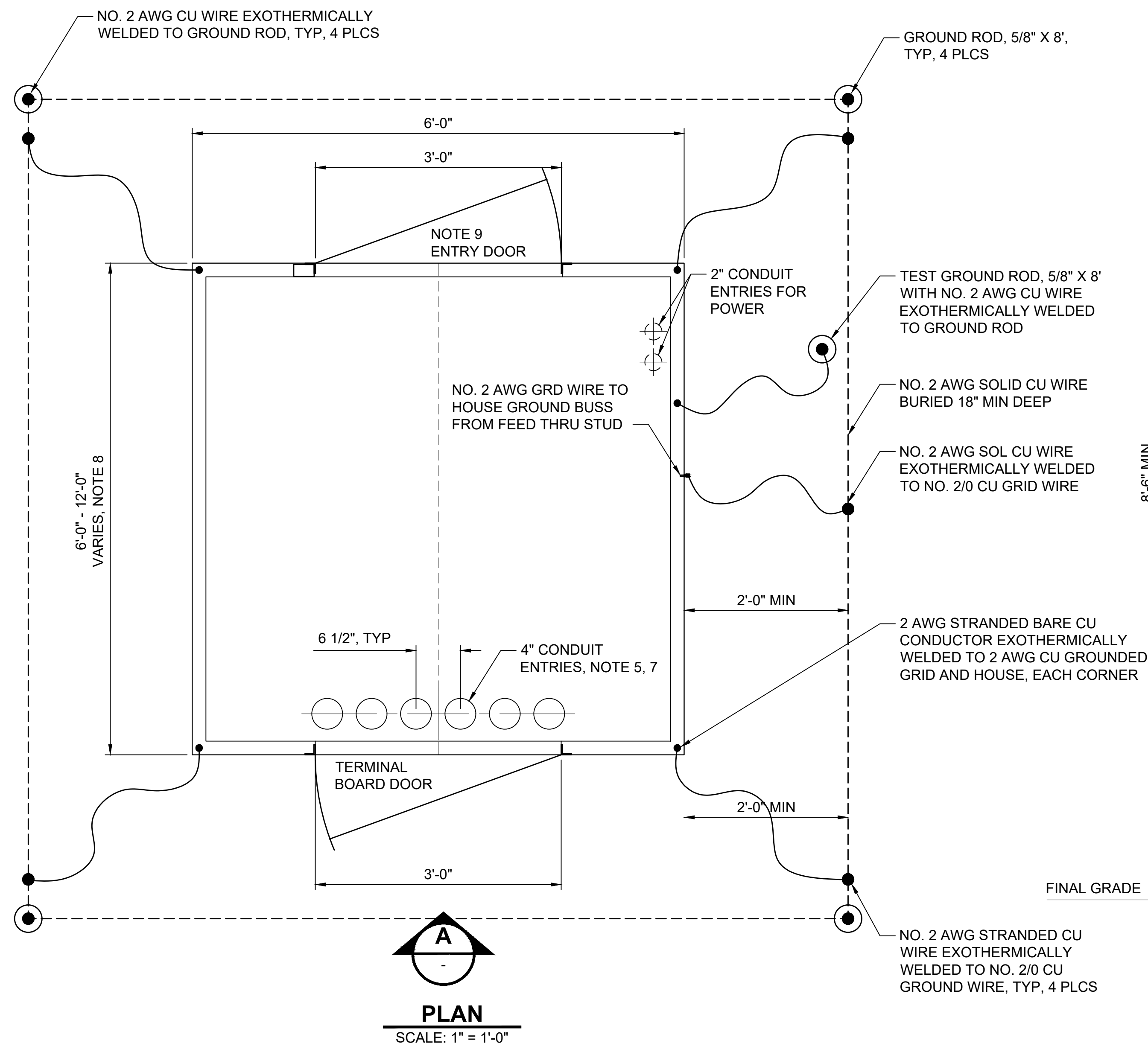
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| DATE: | 2/2024 |

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| SOUND TRANSIT STANDARD DRAWINGS SYSTEMS | |
| SIGNALS TYPICAL SIGNAL HOUSE CONCRETE SLAB INSTALLATION PLAN AND DETAILS | |

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| DRAWING No.: | STD-JSD201 |
| FACILITY ID: | |
| SHEET No.: | REV: |
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GENERAL NOTES:

1. CONTRACTOR SHALL FURNISH AND INSTALL FOUR (4) PREFAB CONCRETE PIER FOUNDATIONS, SIZED FOR CIVIL REQUIREMENTS.
2. BOTTOM OF HOUSE SHALL BE 8" ABOVE FINAL GRADE.
3. AT LOCATIONS THAT THE CROSSING HOUSE IS INSTALLED ON AN EXISTING CONCRETE SLAB PROVIDE A HOUSE WITH AN INTEGRATED HOUSE FOUNDATION SYSTEM AND CONCRETE EPOXY ANCHORS SIZED FOR CIVIL REQUIREMENTS.
4. PROVIDE NEOPRENE PAD FOR MOUNTING ISOLATION.
5. NUMBER AND SIZE OF SC CONDUITS VARIES BY LOCATION, SEE LAYOUT PLAN FOR AMOUNT.
6. PROVIDE ANCHORS DRILLED INTO CONCRETE FOR SECURING MOUNTING FRAME, PRIOR TO DRILLING INTO CONCRETE. PERFORM SCAN TO LOCATE AND AVOID REBAR PER SPEC. SECTION 03 15 25 ANCHORAGE TO CONCRETE.
7. STUB UP AND CAP ALL CONDUITS INTO HOUSE.
8. HOUSE SIZE SHOWN IS MINIMUM.
9. CLOSED CIRCUIT CAMERA COVERAGE AT ENTRANCE DOOR OF GATED CROSSING HOUSES.



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| 0 | 8/2019 | | | | REVISED SYSTEMS DIRECTIVE DRAWINGS |

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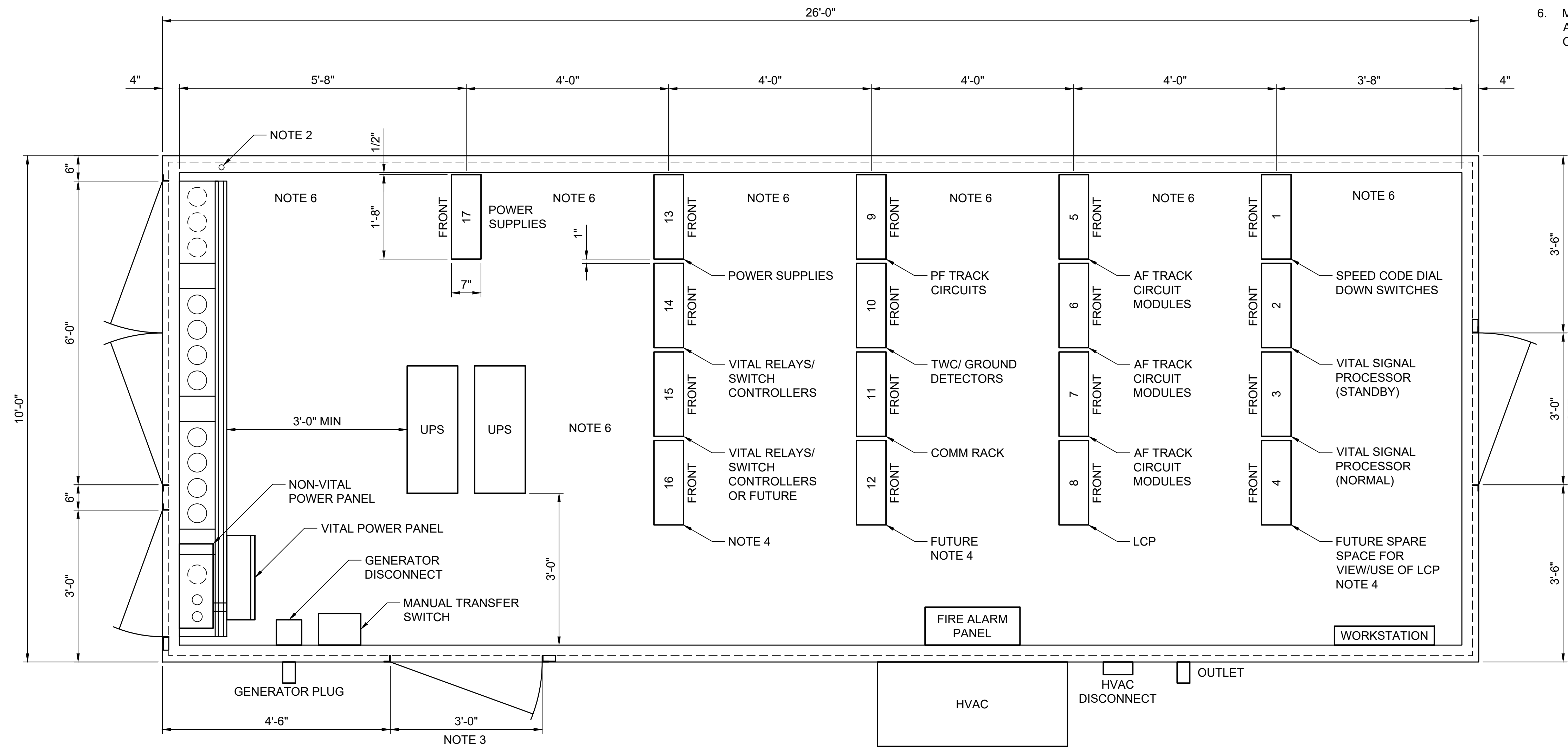
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| CONTRACT No.: | |
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| SOUND TRANSIT STANDARD DRAWINGS SYSTEMS | |
| SIGNALS TYPICAL GRADE CROSSING HOUSE PLAN AND DETAILS | |

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| DRAWING No.: | STD-JSD202 |
| FACILITY ID: | |
| SHEET No.: | REV: 1 |

GENERAL NOTES:

- SEE TYPICAL SIGNAL HOUSE, SIGNAL POWER DISTRIBUTION PLAN, FOR SIGNAL LINE DIAGRAM OF HOUSE POWER.
- RADIO ANTENNA, PROVIDE PROVISIONS FOR A MAST, 10'-0" ABOVE ROOF LINE OF SIGNAL HOUSE, AND ANTENNA COAX CABLE ENTRANCE. BOND ANTENNA MAST TO HOUSE GROUNDING STUD.
- PROVIDE PROVISIONS FOR CLOSED CIRCUIT CAMERA COVERAGE AT ENTRANCE DOORS, COORDINATE WITH COMMUNICATIONS CONTRACTOR FOR LOCATIONS.
- PROVIDE SPACE FOR A MINIMUM OF 2 ADDITIONAL RACKS. AT END OF LINE PROVIDE ADDITIONAL SPACE.
- RACK ASSIGNMENTS AND DIMENSIONS SHOWN MAY ADJUST TO FIT ACTUAL EQUIPMENT PROVIDED PROPOSED LAYOUT FURNISHES EQUIPMENT MAINTAINER ACCESS AND ELECTRICAL CLEARANCE.
- MAINTAIN 30" MINIMUM WORKING CLEARANCE BETWEEN RACKS AND/OR EQUIPMENT ONCE ALL INSTALLED EQUIPMENT AND CONNECTIONS ARE IN PLACE.



10'-0" x 26'-0" SIGNAL HOUSE
SCALE: 3/4" = 1'-0"

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| 2 | 8/2019 | | | | REVISED SYSTEMS DIRECTIVE DRAWINGS |
| 1 | 1/2019 | | | | 2019 GUIDANCE DWG REVISIONS - GENERAL UPDATES |
| 0 | 8/2017 | | | | GUIDANCE DRAWINGS |

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SCALE: NTS
FILENAME: STD-JSD203
CONTRACT No.: RTA/LR
DATE: 2/2024

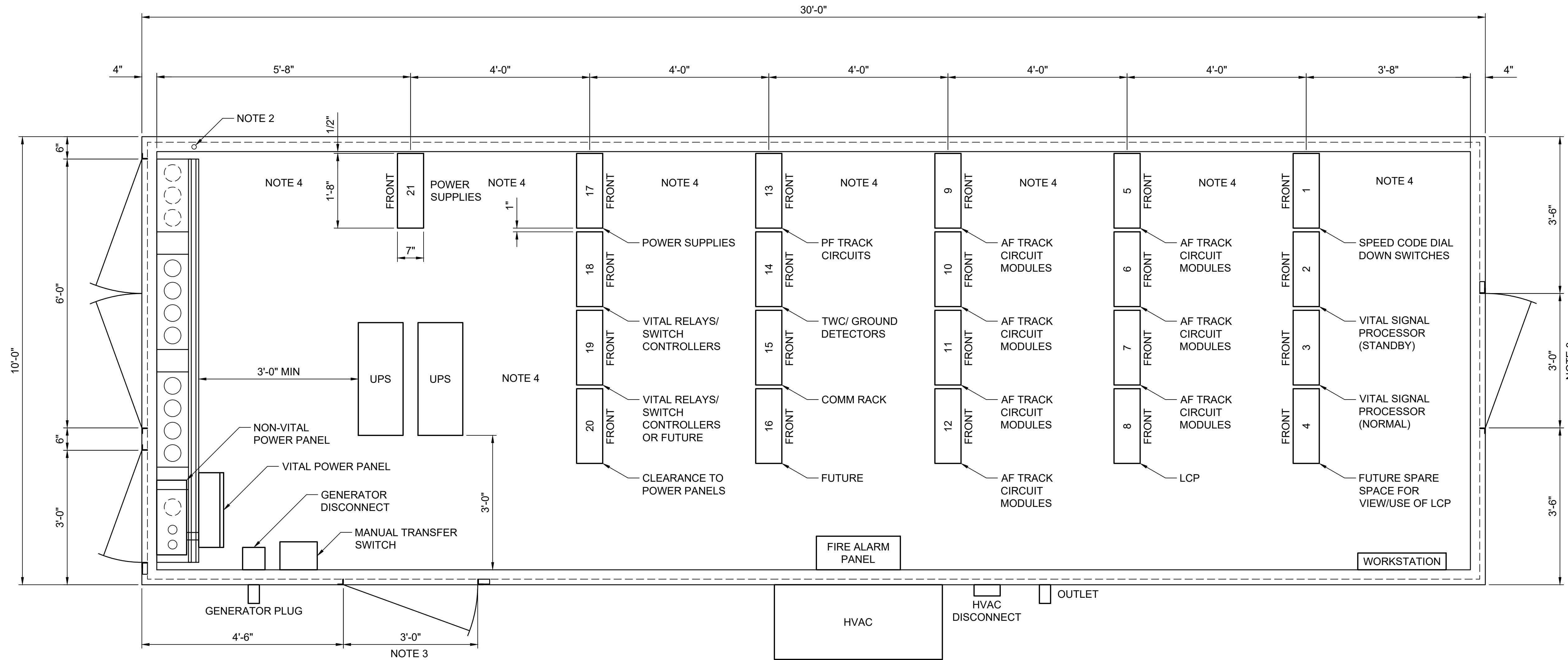
**SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS**

SIGNALS
SIGNAL HOUSE EQUIPMENT LAYOUT
(10X26)

| | |
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| DRAWING No.: | STD-JSD203 |
| FACILITY ID: | |
| SHEET No.: | REV: 3 |

GENERAL NOTES:

- SEE TYPICAL SIGNAL HOUSE, SIGNAL POWER DISTRIBUTION PLAN, STD-JSD208 FOR SIGNAL LINE DIAGRAM OF HOUSE POWER AND OTHER DETAILS.
- RADIO ANTENNA, PROVIDE PROVISIONS FOR A MAST, 10'-0" ABOVE ROOF LINE OF SIGNAL HOUSE, AND ANTENNA COAX CABLE ENTRANCE. BOND ANTENNA MAST TO HOUSE GROUNDING STUD AND BIDIRECTIONAL AMPLIFIER.
- CLOSED CIRCUIT CAMERA COVERAGE AT ENTRANCE DOORS.
- MAINTAIN 30" MINIMUM WORKING CLEARANCE BETWEEN RACKS AND/OR EQUIPMENT ONCE ALL INSTALLED EQUIPMENT AND CONNECTIONS ARE IN PLACE.



10'-0" x 30'-0" SIGNAL HOUSE

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

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| 2 | 8/2019 | | | | REVISED DIRECTIVE DRAWINGS |
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LINE IS 1" AT FULL SCALE



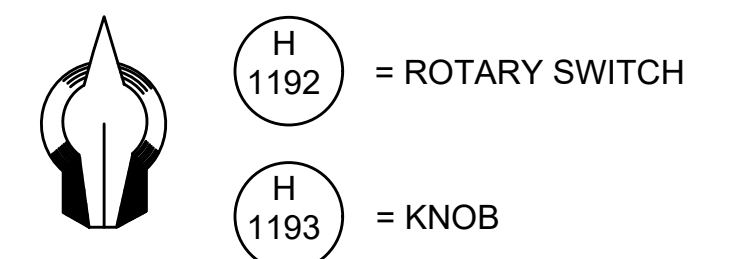
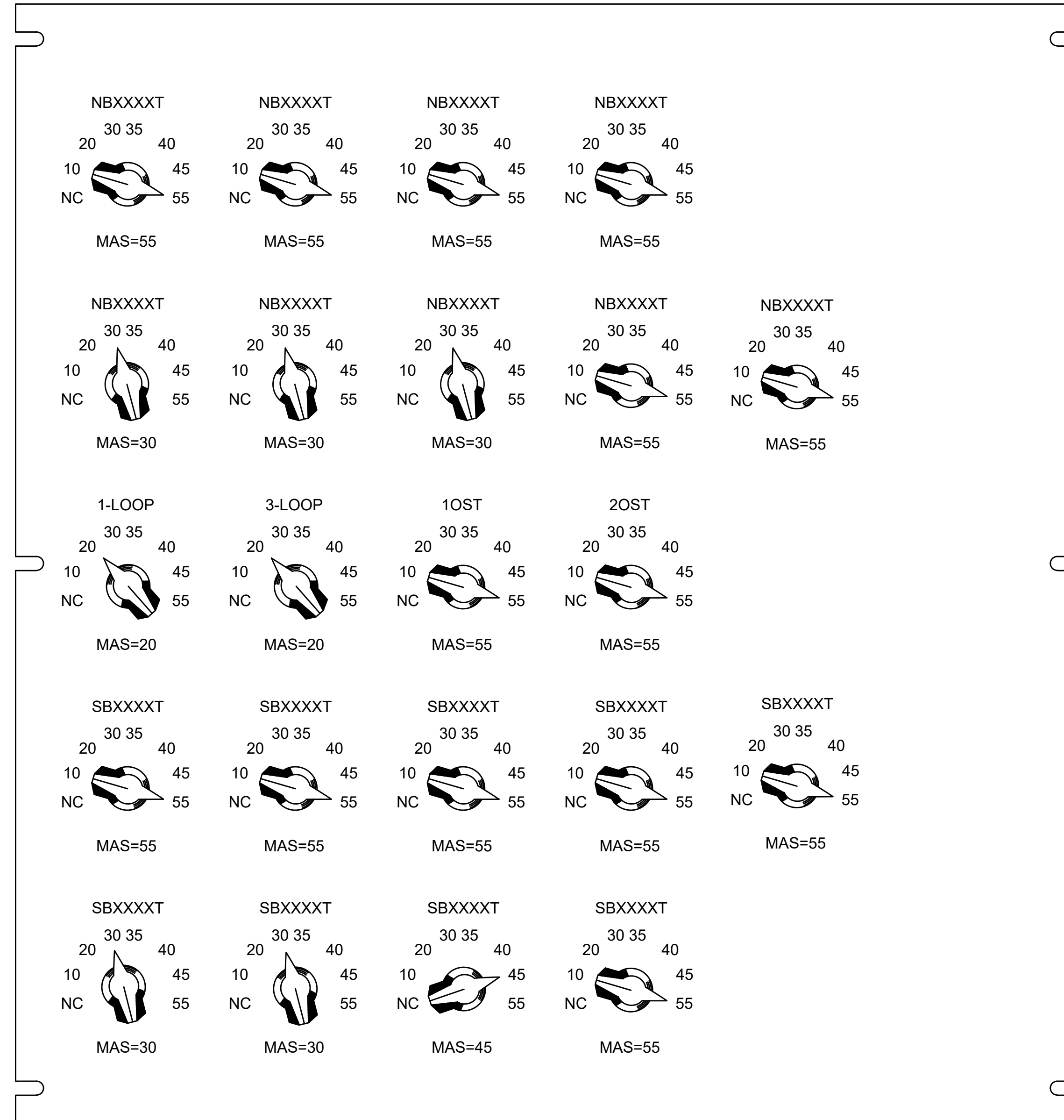
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| CONTRACT No.: | RTA/LR |
| DATE: | 2/2024 |

**SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS**
SIGNALS
SIGNAL HOUSE EQUIPMENT LAYOUT
(10X30)

| | |
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| DRAWING No.: | STD-JSD204 |
| FACILITY ID: | |
| SHEET No.: | REV: |
| | 3 |

CONSTRUCTION NOTES:

- ① PANEL SIZE IS 19"W X 20"H.



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| | FILENAME: STD-JSD206 |
| | CONTRACT No.: RTA/LR |
| | DATE: 2/2024 |

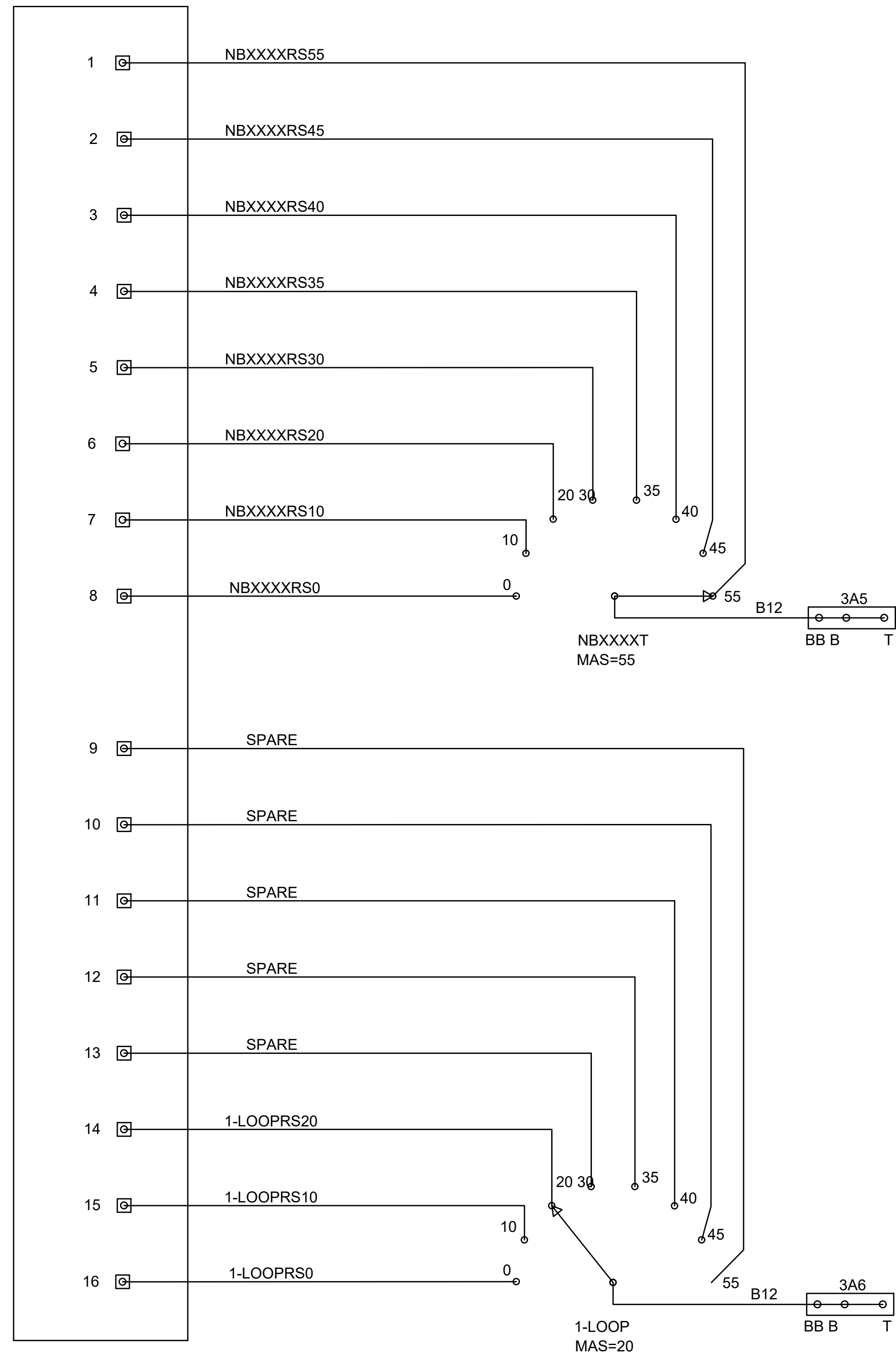
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| SOUND TRANSIT STANDARD DRAWINGS SYSTEMS | |
| SIGNALS TYPICAL SLOW ORDER PANEL FACEPLATE | |

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| FACILITY ID: | |
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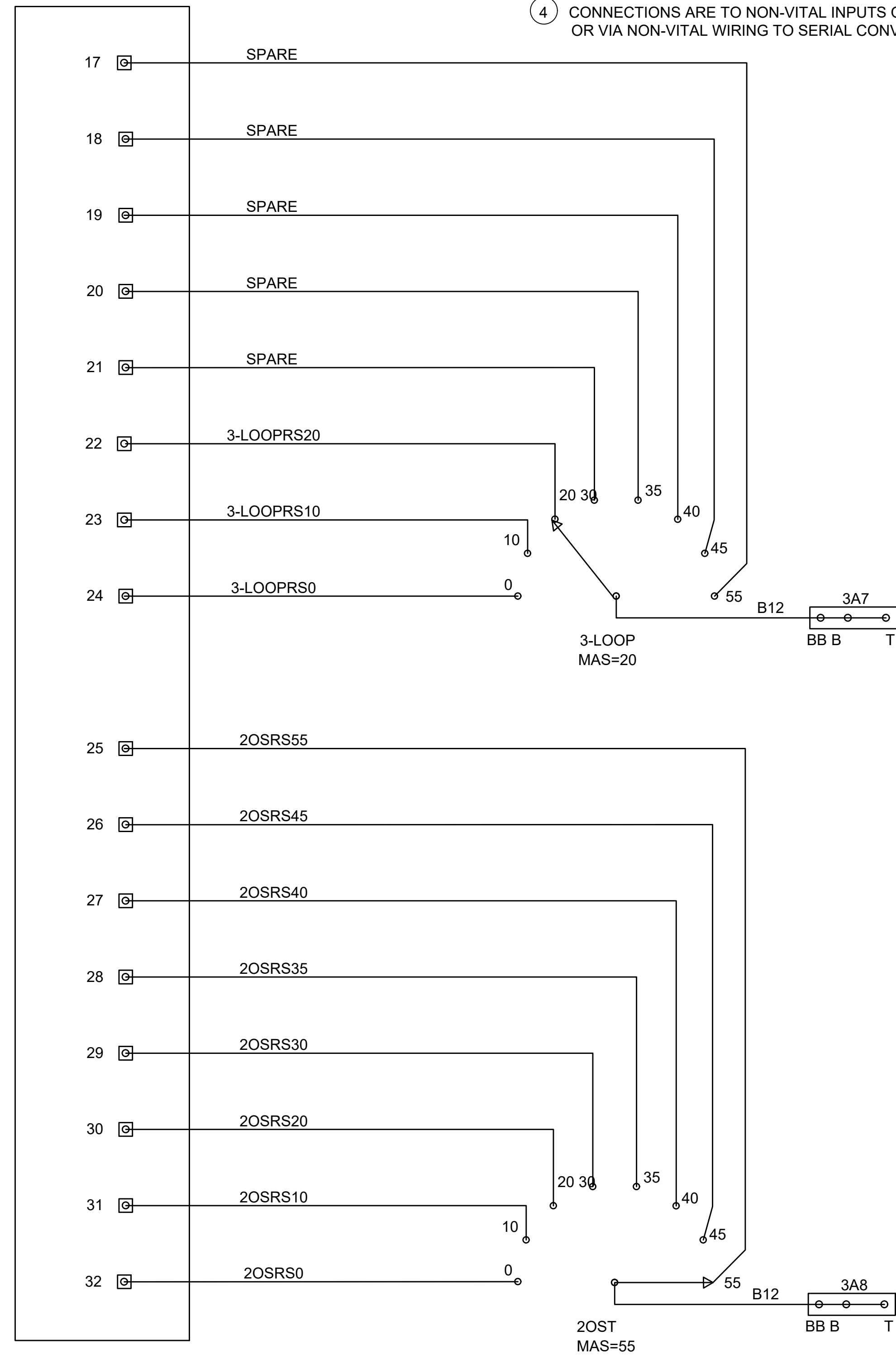
NV6400 MODULE #2 INPUTS 1-32 (TOP)

CONSTRUCTION NOTES:

- ① ALL ROTARY SWITCH WIRING ON THIS SHEET TO BE #22 AWG UNLESS OTHERWISE NOTED.
- ② ALL BUNGALOW WIRING ON THIS SHEET TO BE #16 AWG UNLESS OTHERWISE NOTED.
- ③ MECHANICAL SWITCH STOP TO BE SET AT MAS FOR EACH SLOW ORDER SWITCH.
- ④ CONNECTIONS ARE TO NON-VITAL INPUTS OF THE SIGNAL PROCESSOR EITHER DIRECTLY OR VIA NON-VITAL WIRING TO SERIAL CONVERSION DEVICE.



NOTE 4



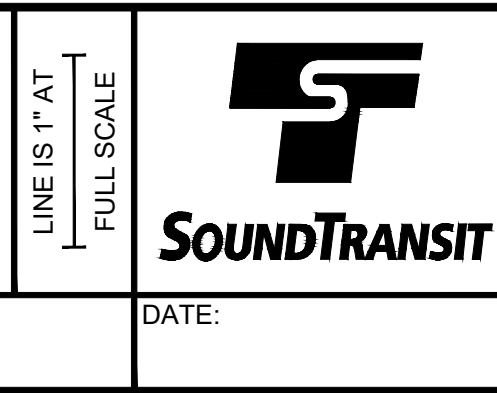
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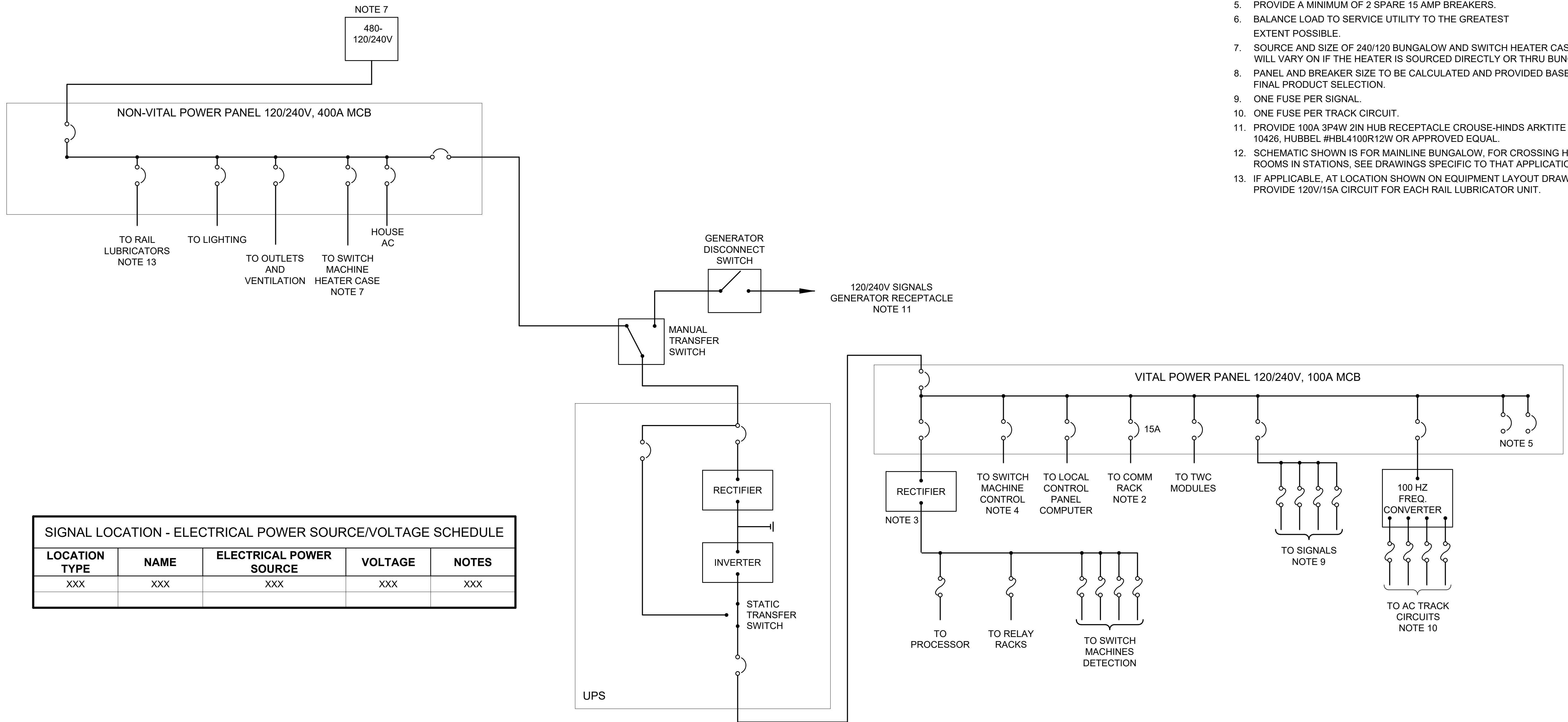
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| CONTRACT No.: | RTA/LR |
| DATE: | 2/2024 |

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| SOUND TRANSIT STANDARD DRAWINGS SYSTEMS | |
| SIGNALS TYPICAL SLOW ORDER SWITCH CIRCUITS | |

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| DRAWING No.: | STD-JSD207 |
| FACILITY ID: | |
| SHEET No.: | REV: 0 |

GENERAL NOTES:

1. THE DESIGN SHOWN IS CONCEPTUAL ONLY. THE ACTUAL DESIGN MUST REFLECT THE TYPES AND QUANTITIES OF MATERIAL FOR AREA CONTROLLED BY THIS SIGNAL BUNGALOW.
2. PROVIDE 15 AMP BREAKER TO COMM RACK. USE 600 WATTS TO CALCULATE LOAD IN BUNGALOW.
3. PROVIDE QUANTITY AND VOLTAGE OF RECTIFIERS AS NECESSARY. PROVIDE ONE BREAKER FOR EACH RECTIFIER. MAIN RECTIFIER FOR LOGIC SHALL BE REDUNDANT.
4. ONE CIRCUIT BREAKER FOR EACH SWITCH OR SWITCH PAIR.
5. PROVIDE A MINIMUM OF 2 SPARE 15 AMP BREAKERS.
6. BALANCE LOAD TO SERVICE UTILITY TO THE GREATEST EXTENT POSSIBLE.
7. SOURCE AND SIZE OF 240/120 BUNGALOW AND SWITCH HEATER CASE POWER WILL VARY ON IF THE HEATER IS SOURCED DIRECTLY OR THRU BUNGALOW.
8. PANEL AND BREAKER SIZE TO BE CALCULATED AND PROVIDED BASED ON FINAL PRODUCT SELECTION.
9. ONE FUSE PER SIGNAL.
10. ONE FUSE PER TRACK CIRCUIT.
11. PROVIDE 100A 3P4W 2IN HUB RECEPTACLE CROUSE-HINDS ARKTITE AREA 10426, HUBBEL #HBL4100R12W OR APPROVED EQUAL.
12. SCHEMATIC SHOWN IS FOR MAINLINE BUNGALOW, FOR CROSSING HOUSE OR ROOMS IN STATIONS, SEE DRAWINGS SPECIFIC TO THAT APPLICATION.
13. IF APPLICABLE, AT LOCATION SHOWN ON EQUIPMENT LAYOUT DRAWING, PROVIDE 120V/15A CIRCUIT FOR EACH RAIL LUBRICATOR UNIT.



| SIGNAL LOCATION - ELECTRICAL POWER SOURCE/VOLTAGE SCHEDULE | | | | |
|--|------|-------------------------|---------|-------|
| LOCATION TYPE | NAME | ELECTRICAL POWER SOURCE | VOLTAGE | NOTES |
| XXX | XXX | XXX | XXX | XXX |

SIGNAL POWER DISTRIBUTION PLAN
NTS

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| 2 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |
| 1 | 8/2019 | | | | REVISED SYSTEMS DIRECTIVE DRAWINGS |
| 0 | 8/2017 | | | | GUIDANCE DRAWINGS |

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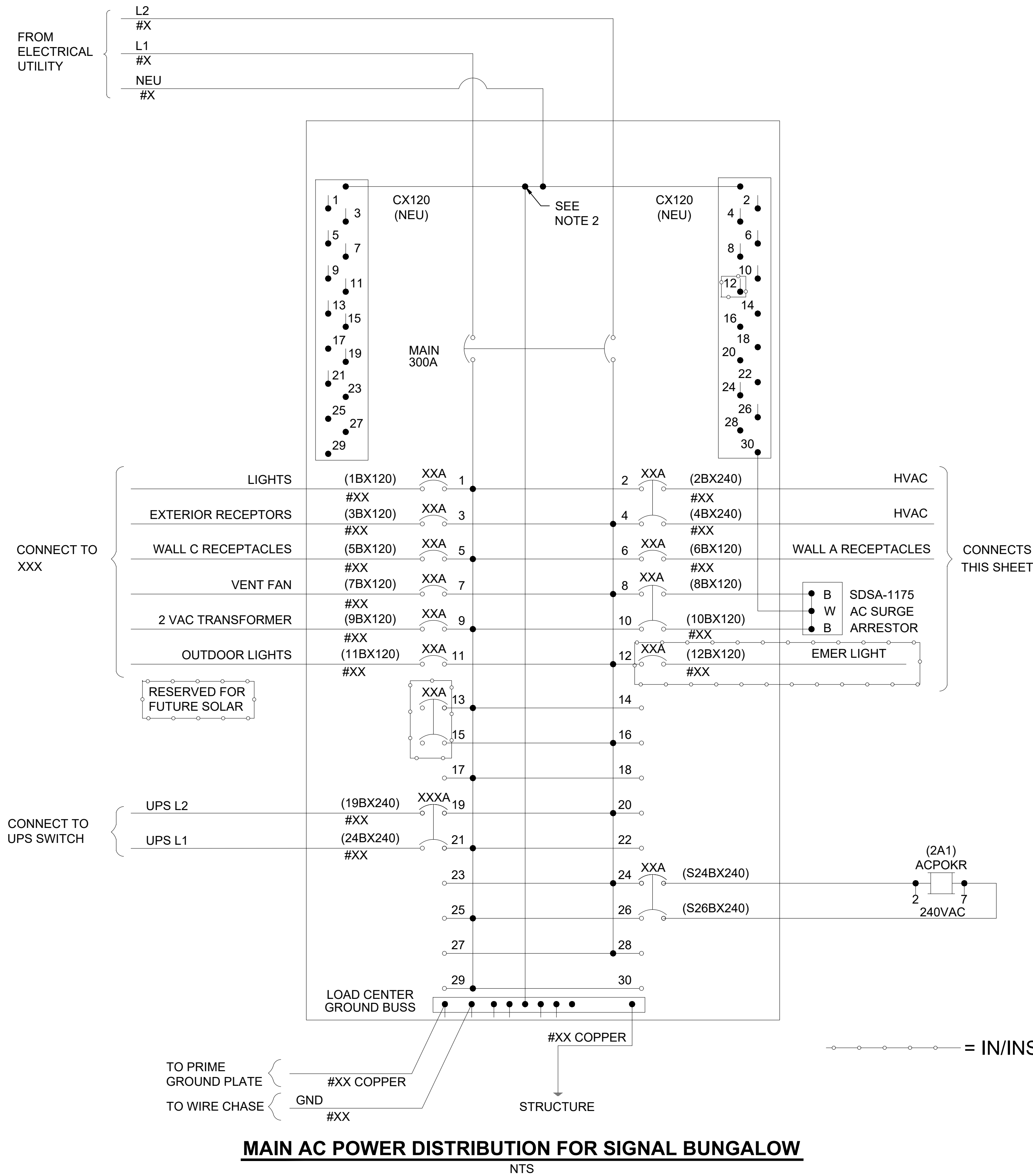
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SCALE: NTS
FILENAME: STD-JSD208
CONTRACT No.: RTA/LR
DATE: 2/2024

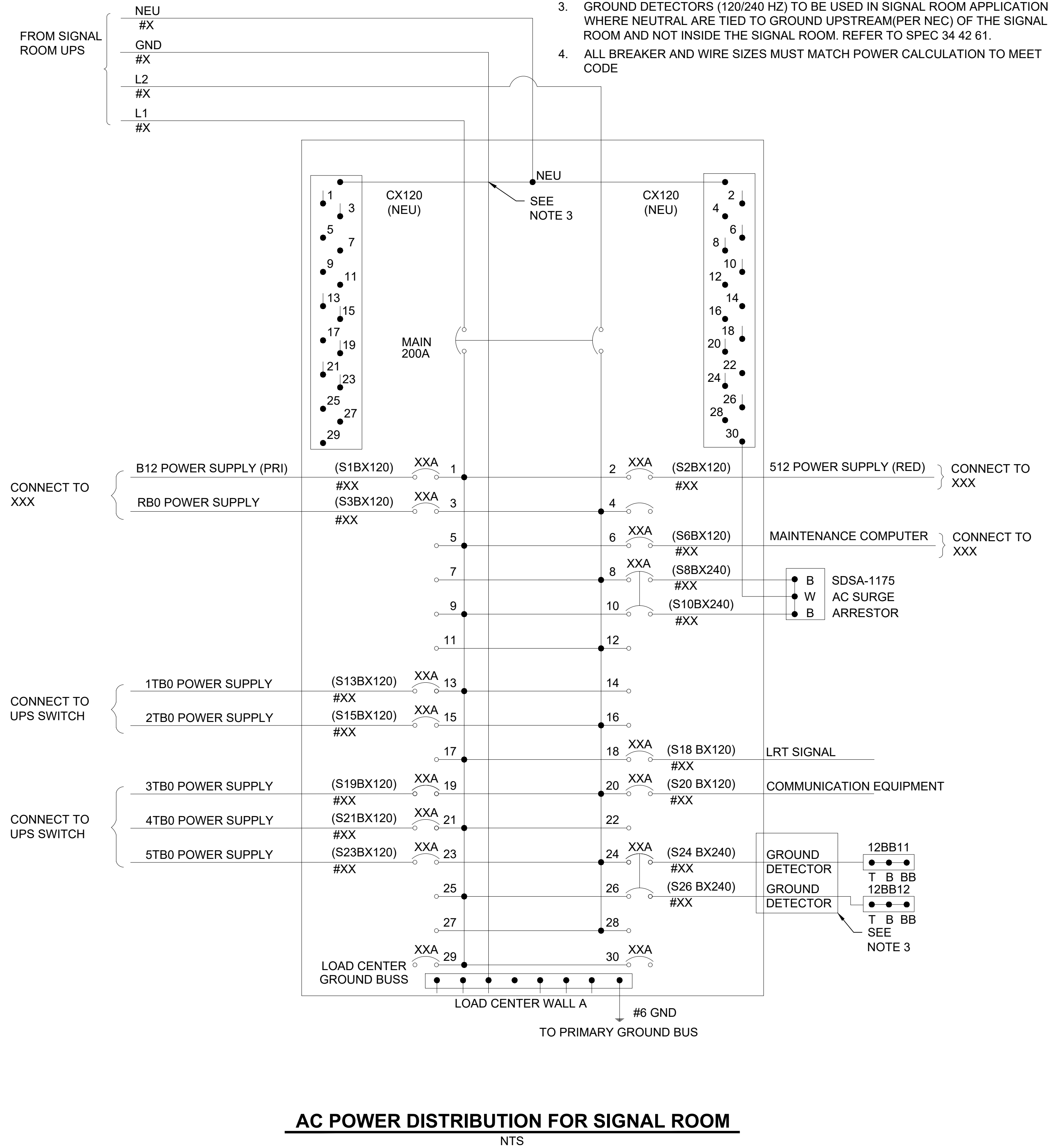
SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS
SIGNALS
TYPICAL SIGNAL HOUSE
SIGNAL POWER DISTRIBUTION PLAN

| | |
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| DRAWING No.: | STD-JSD208 |
| FACILITY ID: | |
| SHEET No.: | REV: |
| | 2 |

- CONSTRUCTION NOTES:**
1. ALL BUNGALOW WIRING ON THIS SHEET TO BE #12 UNLESS OTHERWISE NOTED.
 2. NEUTRAL TO BE BONDED TO LOAD CENTER GROUND BUSS WITH A SCREW ON STRAP SUPPLIED BY THE EQUIPMENT MANUFACTURER PER 2020 NCC 24 (x).
 3. GROUND DETECTORS (120/240 HZ) TO BE USED IN SIGNAL ROOM APPLICATION WHERE NEUTRAL ARE TIED TO GROUND UPSTREAM(PER NEC) OF THE SIGNAL ROOM AND NOT INSIDE THE SIGNAL ROOM. REFER TO SPEC 34 42 61.
 4. ALL BREAKER AND WIRE SIZES MUST MATCH POWER CALCULATION TO MEET CODE



MAIN AC POWER DISTRIBUTION FOR SIGNAL BUNGALOW
NTS



AC POWER DISTRIBUTION FOR SIGNAL ROOM
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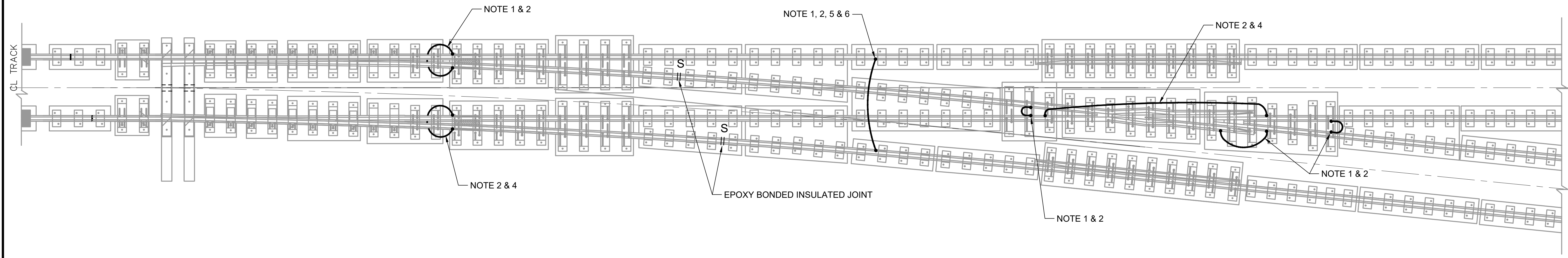
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| FILENAME: | STD-JSD209 |
| CONTRACT No.: | RTA/LR |
| DATE: | 2/2024 |

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| SOUND TRANSIT STANDARD DRAWINGS SYSTEMS | |
| SIGNALS TYPICAL AC POWER DISTRIBUTION | |
| DRAWING No.: | STD-JSD209 |
| FACILITY ID: | |
| SHEET No.: | REV: 0 |

GENERAL NOTES:

1. (2) 250 KCMIL EXTRA FLEX CEMBRE TYPE BOLTED CONNECTION (OR APPROVED EQUAL) TO WEB OF RAIL AT NEUTRAL AXIS, NOT LESS THAN 4" APART.
2. DRESS CABLES CLOSE TO RAIL.
3. FOR TURNOUTS IN DIRECT FIXATION, ROUTE CABLES THROUGH PLINTH BREAKS WHEREVER POSSIBLE. FOR TURNOUTS IN BALLASTED TRACK, ROUTE CABLES ON TOP OF BALLAST AND TIES.
4. (2) 500 KCMIL EXTRA FLEX CEMBRE TYPE BOLTED CONNECTION (OR APPROVED EQUAL) TO WEB OF RAIL AT NEUTRAL AXIS AT EACH STOCK RAIL TO SWITCH RAIL BONDING OF THE NEGATIVE RETURN RAIL, NOT LESS THAN 4" APART.
5. BOND CONNECTIONS TO RAIL MUST BE PLACED 6" MINIMUM FROM RAIL WELDS.
6. BONDING NOT REQUIRED AT ALL LOCATIONS. SEE EQUIPMENT LAYOUT PLANS.
7. ALL NON-INSULATED MECHANICAL JOINTS SHALL BE BONDED.



TYPICAL TURNOUT PLAN
NTS

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| 2 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |
| 1 | 8/2019 | | | | REVISED SYSTEM DIRECTIVE DRAWINGS |
| 0 | 8/2017 | | | | GUIDANCE DRAWINGS |

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LINE IS 1" AT FULL SCALE

SCALE: NTS
FILENAME: STD-JSD300
CONTRACT No.: RTA/LR
DATE: 2/2024

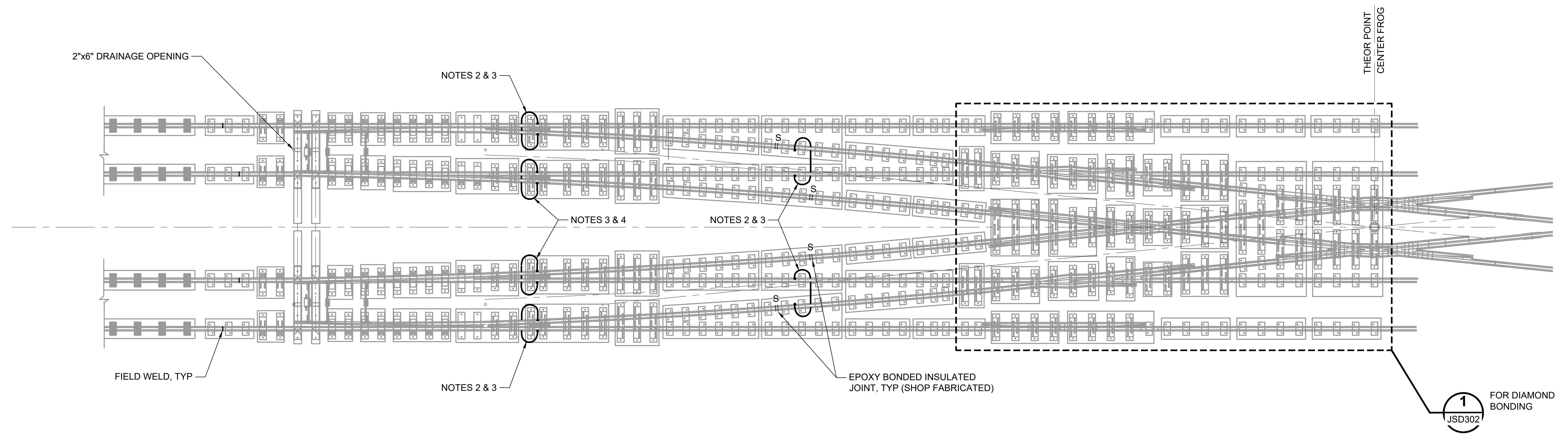
**SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS**

SIGNALS
TYPICAL TURNOUT TRACTION ELECTRIFICATION
SIGNAL BONDING

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| DRAWING No.: | STD-JSD300 |
| FACILITY ID: | |
| SHEET No.: | REV: 2 |

GENERAL NOTES:

1. BOND CONNECTIONS TO RAIL MUST BE PLACED 6" MINIMUM FROM RAIL WELDS.
2. (2) 250 KCMIL EXTRA FLEX CEMBRE TYPE BOLTED CONNECTION (OR APPROVED EQUAL) TO WEB OF RAIL AT NEUTRAL AXIS.
3. DRESS CABLES CLOSE TO RAIL.
4. (2) 500 KCMIL EXTRA FLEX CEMBRE TYPE BOLTED CONNECTION (APPROVED EQUAL) TO WEB OF RAIL AT NEUTRAL AXIS AT EACH STOCK RAIL TO SWITCH RAIL BONDING OF THE NEGATIVE RETURN RAIL.
5. BACKGROUND IS FOR A #10 CROSSOVER BONDING IS THE SAME FOR ALL CROSSOVER SIZES.
6. ONLY SPECIAL TRACKWORK BONDING SHOWN. LAYOUT DRAWINGS AND LOCATIONS 1 XT TRACK CIRCUIT JUMPER INSULATED JOINT LOCATIONS AND OTHER ADDITIONAL REQUIREMENTS TO BE COORDINATED AND DEVELOPED.



DOUBLE CROSSOVER PLAN
NTS

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| 2 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |
| 1 | 8/2019 | | | | REVISED SYSTEM DIRECTIVE DRAWINGS |
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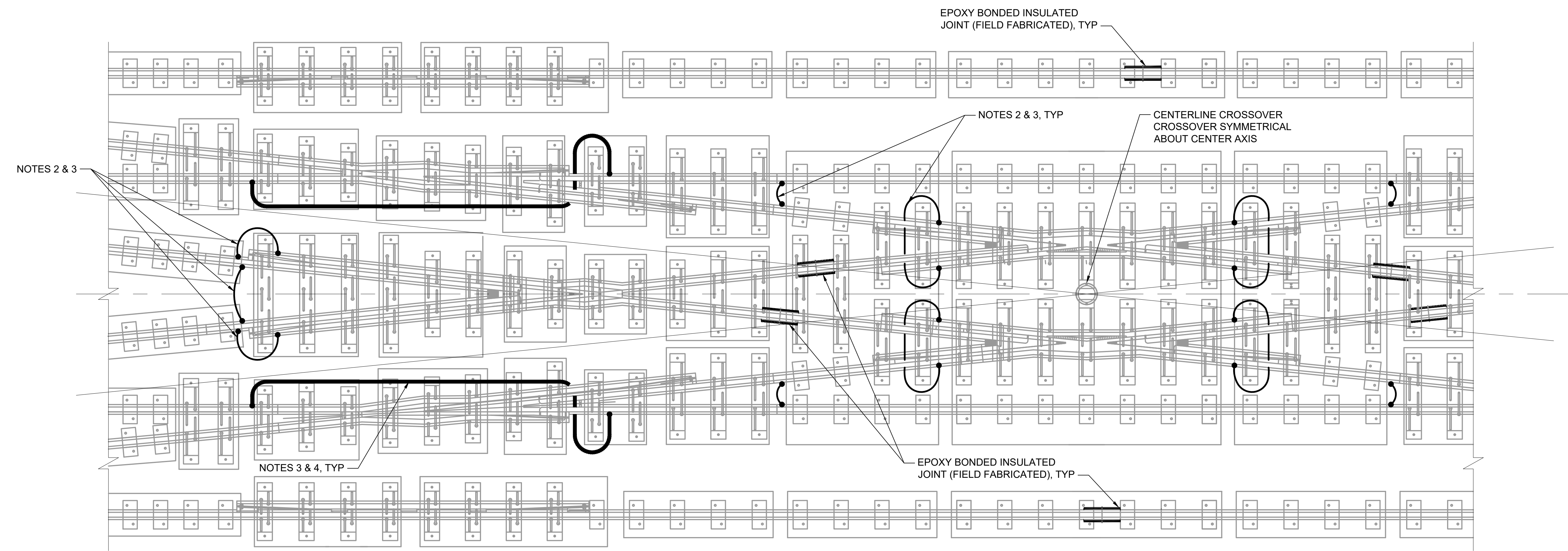
**SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS**

SIGNALS
TYPICAL DOUBLE CROSSOVER BONDING

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| DRAWING No.: | STD-JSD301 |
| FACILITY ID: | |
| SHEET No.: | REV: 2 |

GENERAL NOTES:

1. BOND CONNECTIONS TO RAIL MUST BE PLACED 6" MINIMUM FROM RAIL WELDS.
2. (2) 250 KCMIL EXTRA FLEX CEMBRE TYPE BOLTED CONNECTION (OR APPROVED EQUAL) TO WEB OF RAIL AT NEUTRAL AXIS.
3. DRESS CABLES CLOSE TO RAIL.
4. (2) 500 KCMIL EXTRA FLEX CEMBRE TYPE BOLTED CONNECTION (OR APPROVED EQUAL) TO WEB OF RAIL AT NEUTRAL AXIS AT EACH STOCK RAIL TO SWITCH RAIL BONDING OF THE NEGATIVE RETURN RAIL.
5. BACKGROUND IS FOR A #10 DIAMOND BONDING IS THE SAME FOR ALL SIZES.
6. ONLY SPECIAL TRACKWORK BONDING SHOWN. LAYOUT DRAWINGS AND LOCATIONS FOR 1-3XT TRACK CIRCUIT JUMPER INSULATED JOINT LOCATIONS AND OTHER ADDITIONAL REQUIREMENTS TO BE COORDINATED AND DEVELOPED.



NO. 10 DIAMOND CROSSING PLAN 1
 SCALE: 3/8" = 1'-0" STD-JSD301

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| 0 | 8/2019 | | | | REVISED SYSTEMS DIRECTIVE DRAWINGS |

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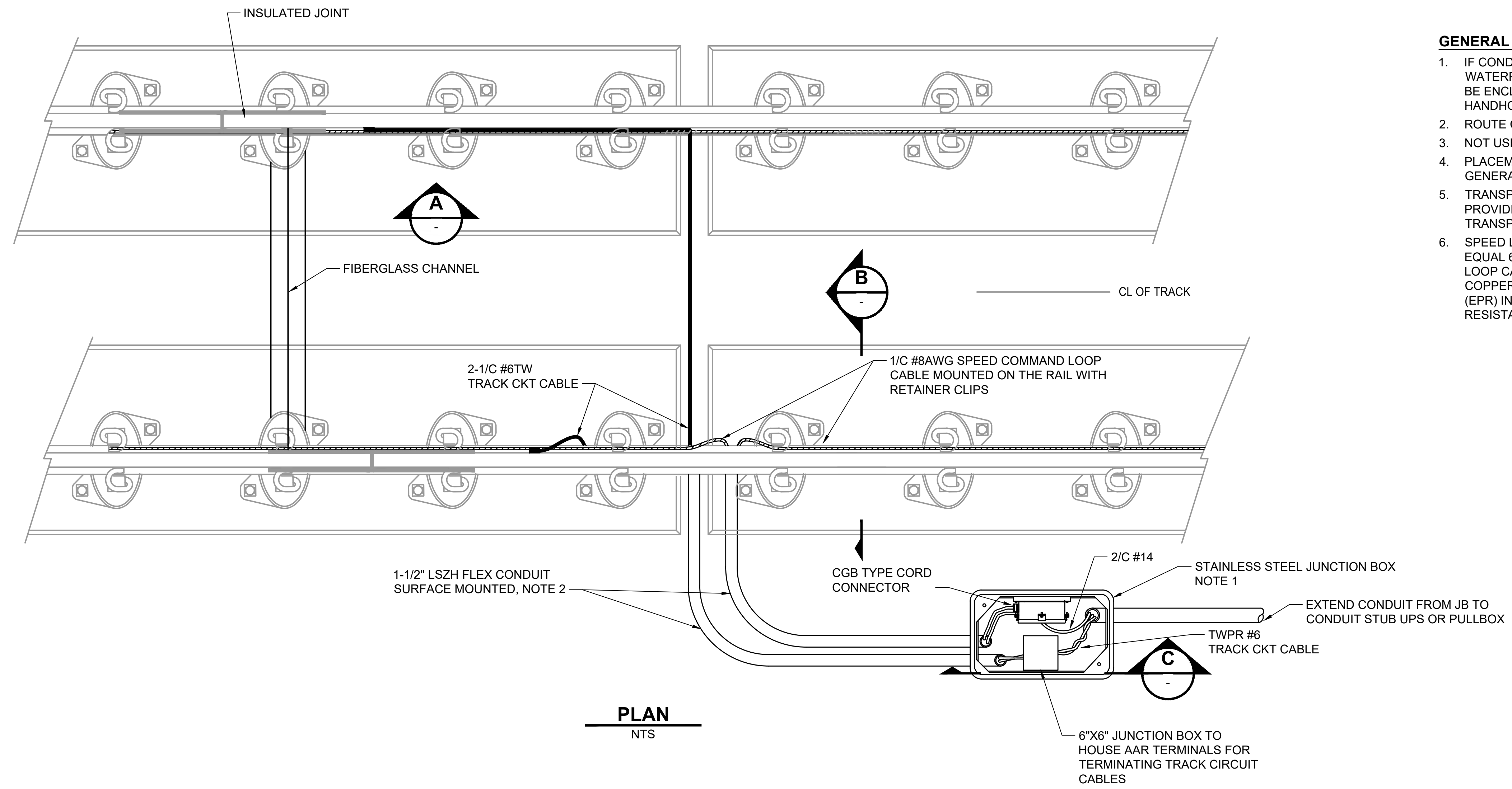
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| | CONTRACT No.: RTA/LR |
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**SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS**

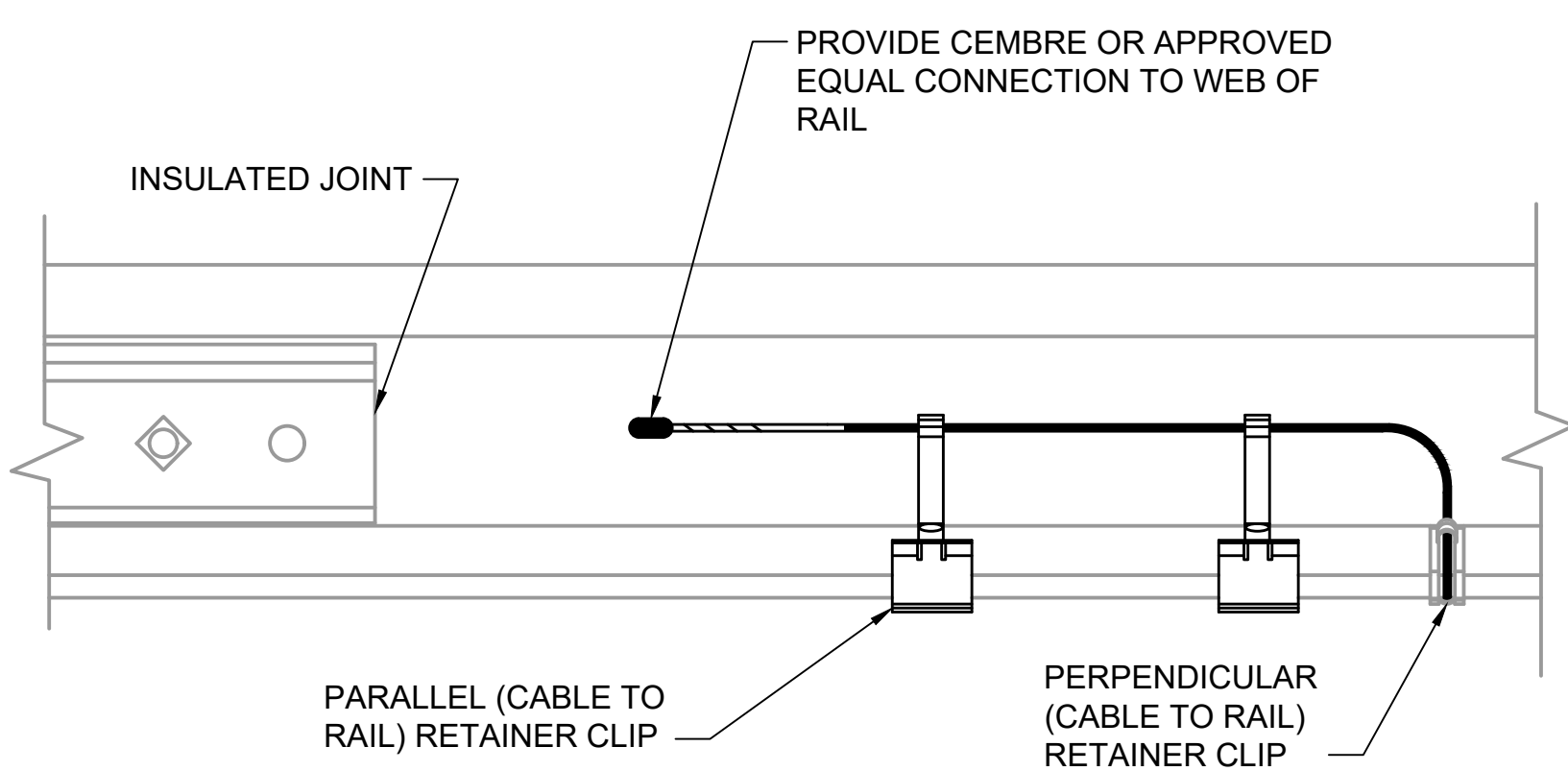
SIGNALS
TYPICAL DIAMOND CROSSOVER

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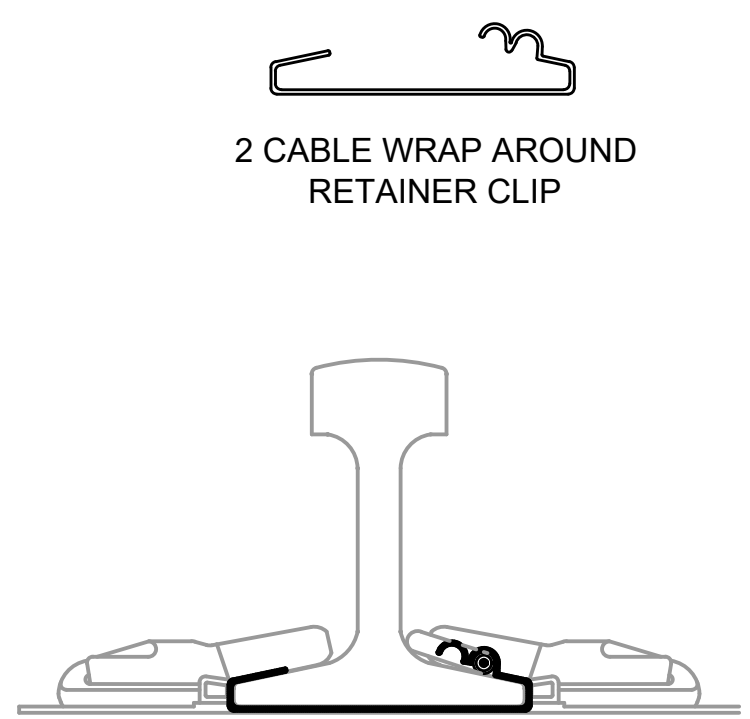


- GENERAL NOTES:**
- IF CONDUITS FROM TRACKWAY AND DUCTBANK DO NOT WATERPROOF CONNECT INTO THE JB, THEN THEY SHALL BE ENCLOSED IN A STAINLESS STEEL BOX ON INVERT OR IN HANDHOLE.
 - ROUTE CONDUITS THRU PLINTH BREAKS WHEN FEASIBLE.
 - NOT USED.
 - PLACEMENT AND QUANTITY OF LOOPS IS SHOWN FOR GENERAL INFORMATION.
 - TRANSPOSE LOOP WIRES APPROXIMATELY EVERY 50' AND PROVIDE AN ODD NUMBER OF EQUALLY SPACED TRANSPOSITIONS.
 - SPEED LOOP CABLE TO BE USED: DRAKA OR APPROVED EQUAL 600 VOLT SINGLE CONDUCTOR SPEED COMMAND LOOP CABLE; 1/C #8 AWG CLASS C (19 STRAND), TINNED COPPER (PER ASTM B 33), ETHYLENE PROPYLENE RUBBER (EPR) INSULATION, WITH AN OVERALL BLACK, UV RESISTANT, POLYURETHANE JACKET, 600 V.

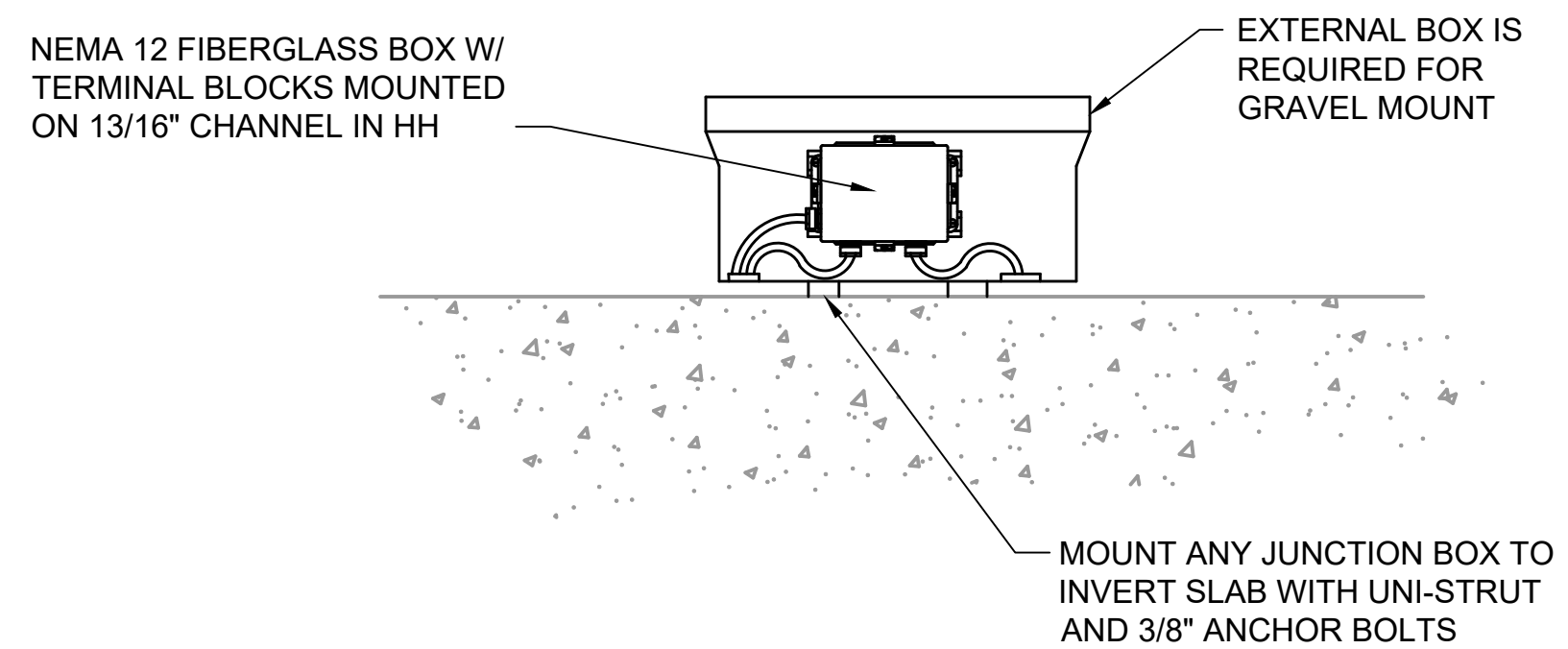
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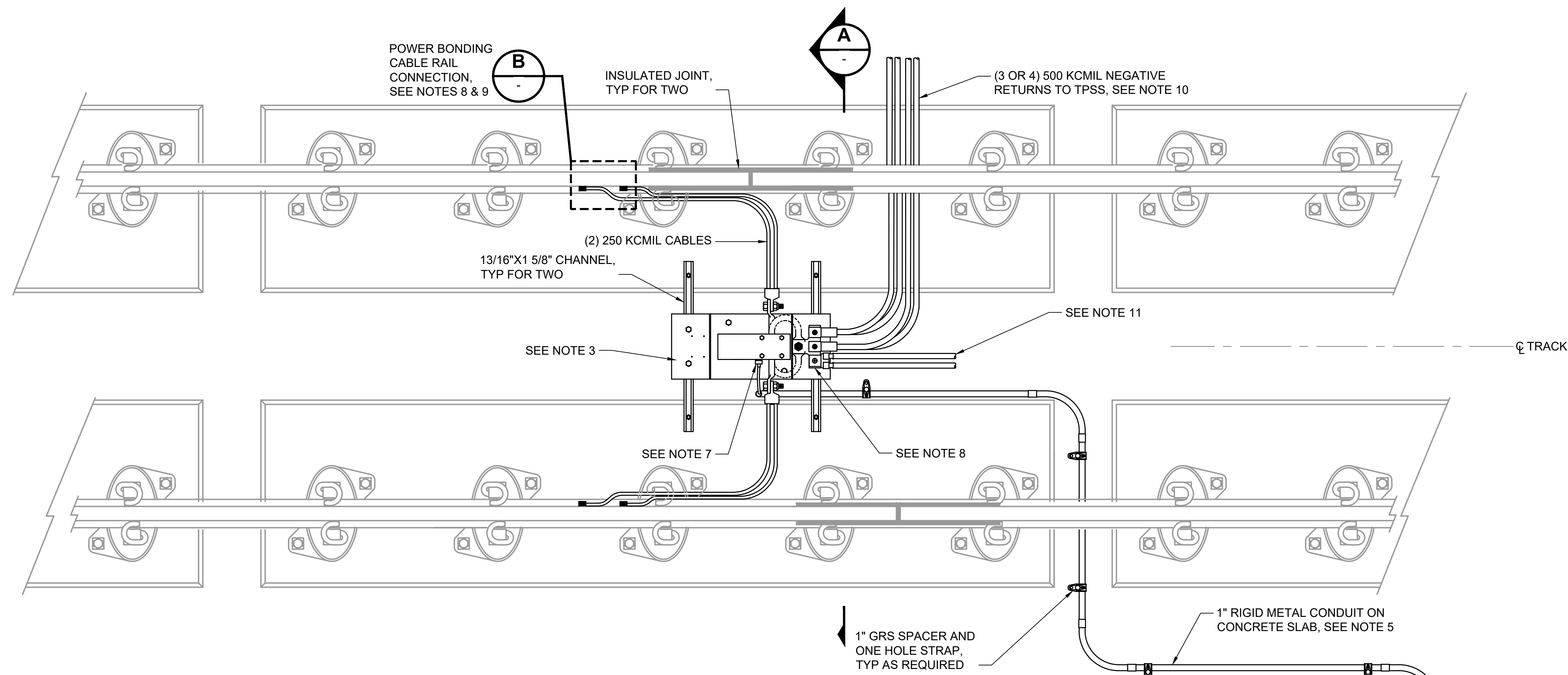
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| SOUND TRANSIT STANDARD DRAWINGS SYSTEMS | |
| SIGNALS TYPICAL TRACK CIRCUIT AND SPEED COMMAND LOOP INSTALLATION LAYOUT | |

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| DRAWING No.: | STD-JSD303 |
| FACILITY ID: | |
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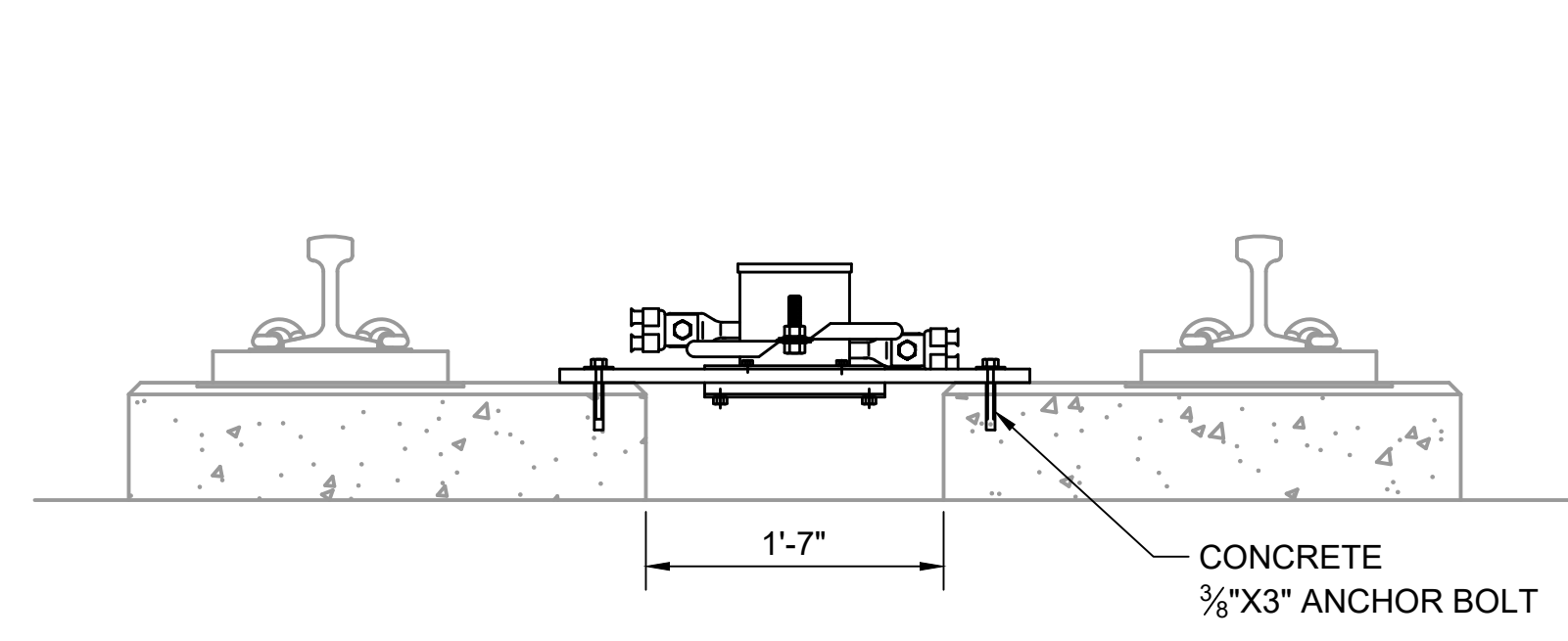
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GENERAL NOTES:

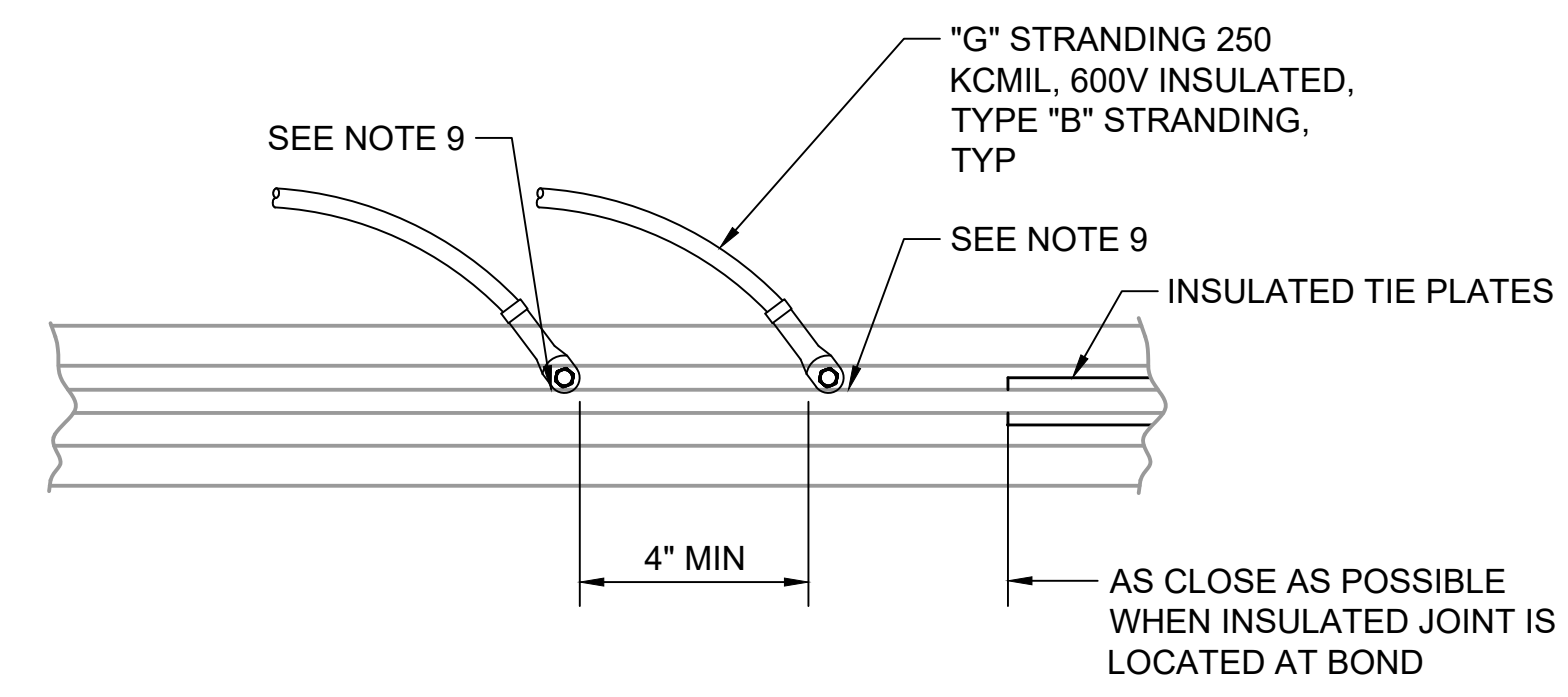
1. MOUNT IMPEDANCE BOND TO CONCRETE PLINTHS IN DF AREAS AND TO TIE WITH STRAPS IN BALLAST AREAS,
2. TOP OF IMPEDANCE BOND ASSEMBLY TO BE 1/2" MIN BELOW THE TOP OF RAILS.
3. TERMINALS & ELECTRICAL CONNECTION LUGS SHALL BE WIRE BRUSH CLEANED AND COATED WITH A CONDUCTIVE, NON-CORROSIVE, SURFACE COMPOUND IMMEDIATELY BEFORE BEING CONNECTED.
4. DO NOT INSTALL IMPEDANCE BOND CABLES WITHIN 12" OF RAIL WELDS.
5. PROVIDE CONDUIT TO EXTEND FROM HANDHOLE OR STUB UP IN BALLAST AREA TO IMPEDANCE BOND. CONNECTION FROM TRACKWAY TO HANDHOLE OR STUB UP SHALL BE IN AIR HOSE FASTENED TO THE BOTTOM CORNER OF TIE WITH STAINLESS STEEL STRAPS.
6. BEND CABLES NOT LESS THAN 8 INCH RADIUS.
7. WATER TIGHT CONNECTOR.
8. COAT CONNECTION AND UNINSULATED CABLE WITH NO-OX-ID.
9. CEMBRE OR APPROVED EQUAL TYPE RAIL CONNECTIONS SHALL BE WITHIN +/- 1/2" OF THE NEUTRAL AXIS OF THE RAIL.
10. NEGATIVE RETURN CABLE REQUIREMENTS TO BE DETERMINED BY DISTANCE TO TPSS.
11. CONNECT (2) 500 KCMIL CABLES BETWEEN CENTER TAPS OF IMPEDANCE BONDS ON EACH SIDE OF INSULATED JOINT PAIRS, ALSO TWO 500 KCMIL CABLES TO NEGATIVE RETURN RAIL OF SINGLE RAIL TRACK CIRCUIT.
12. LAYOUT SHOWN IS TYPICAL FOR DF TRACKWORK FOR BALLAST TRACKWORK SPACING REQUIREMENTS STILL APPLY.



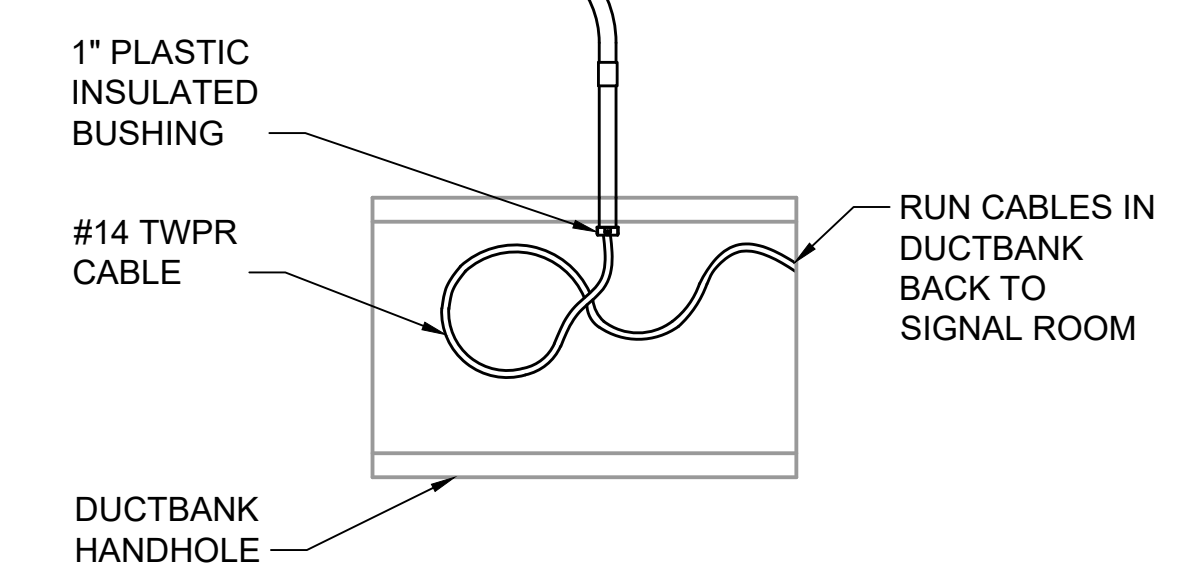
PLAN
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SECTION
SCALE: NTS



CABLE CONNECTION TO RAIL
SCALE: NTS



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| 2 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |
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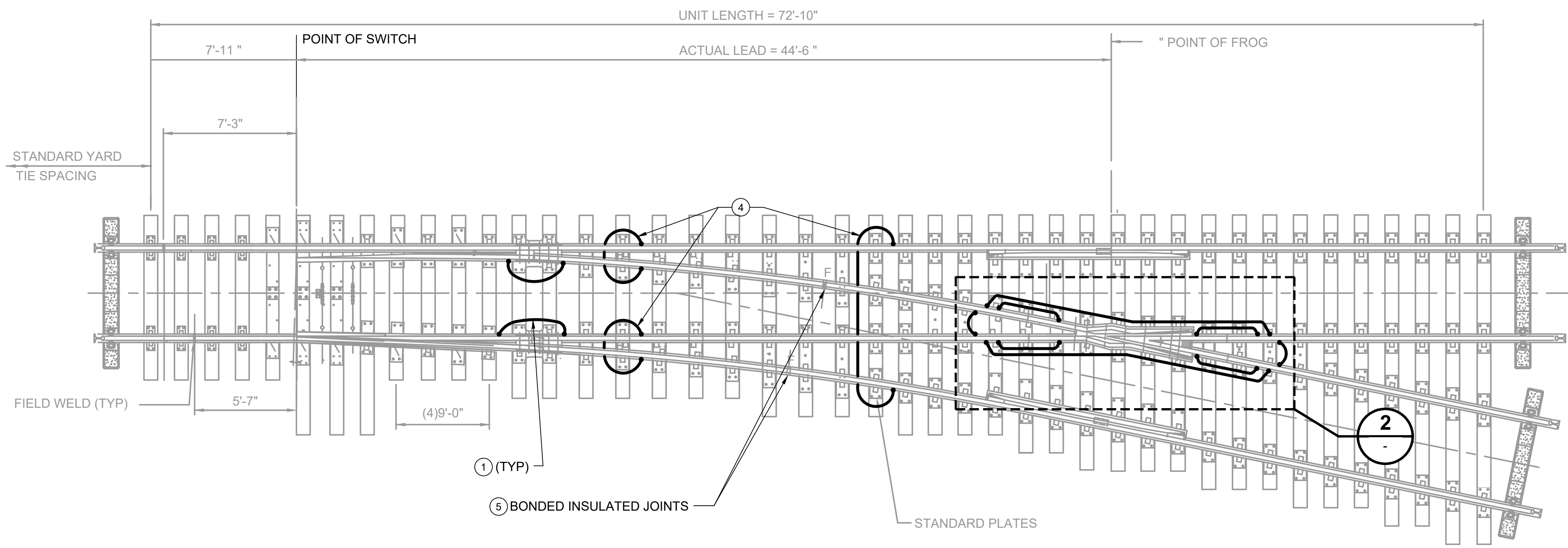
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CONTRACT No.: RTA/LR
DATE: 2/2024

SOUND TRANSIT STANDARD DRAWINGS SYSTEMS

SIGNALS

TYPICAL IMPEDANCE BOND INSTALLATION LAYOUT WITH NEGATIVE RETURN

| | |
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| DRAWING No.: | STD-JSD304 |
| FACILITY ID: | |
| SHEET No.: | REV: 2 |



- NOTES:**
- ① ALL RAIL JUMPER CONNECTIONS SHALL BE SINGLE HOLE LUG TO CEMBRE OR EQUIVALENT SINGLE OR DOUBLE POSTS AT RAIL WEB.
 - ② RAIL HEEL BLOCK JUMPERS SHALL BE DOUBLE 250 KCMIL EXTRA FLEX.
 - ③ FROG BONDING (DETAIL 2) IS SINGLE CONDUCTOR 250 KCMIL FOR SIGNAL FOR SIGNAL RAIL AND 500 KCMIL FOR NEGATIVE RETURN .
 - ④ FOR RAIL TO RAIL BONDING USE EXTRA FLEX DOUBLE 250 KCMIL FOR SIGNAL RAIL AND EXTRA FLEX DOUBLE 500 KCMIL FOR NEGATIVE RETURN.
 - ⑤ SPECIAL AND ADDITIONAL BONDING MAY BE REQUIRED DUE TO IJ AND TRACK CIRCUIT LAYOUT.
 - ⑥ DRESS CABLES CLOSE TO RAIL WITHIN GAUGE.
 - ⑦ THIS BOND NOT REQUIRED IF FROG TO RAIL CONNECTION WELDED.

NO. 5 TURNOUT PLAN ①
SCALE: 1/4" = 1'-0"



YARD FROG BONDING ②
SCALE: 3/4" = 1'-0"

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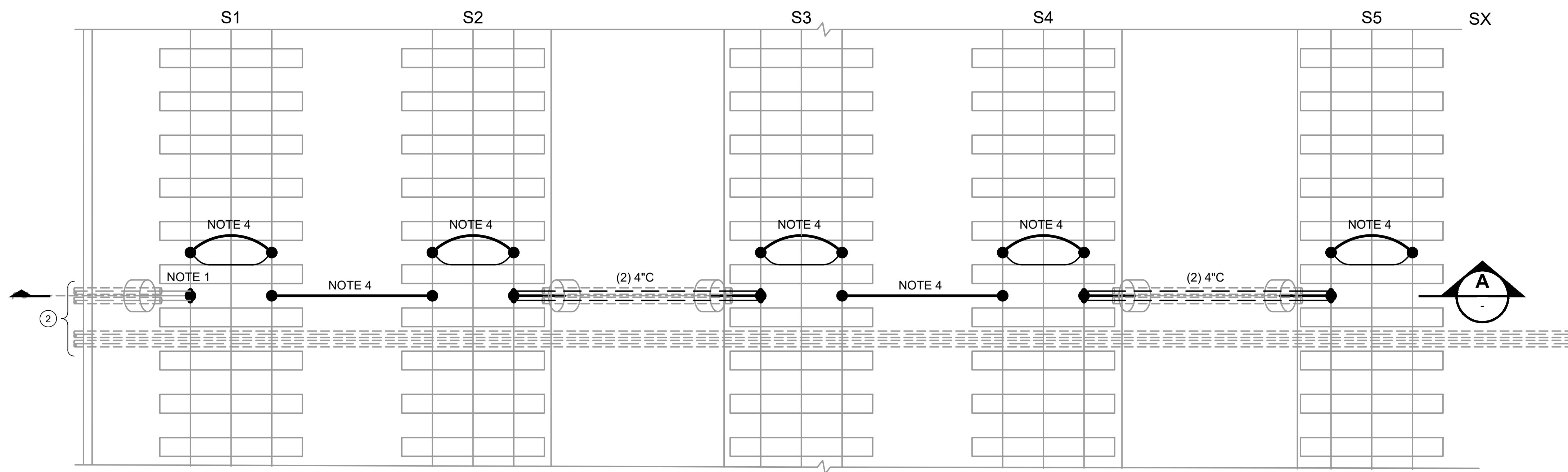
LINE IS 1" AT FULL SCALE

SCALE: AS NOTED
FILENAME: STD-JSD305
CONTRACT No.: RTA/LR
DATE: 2/2024

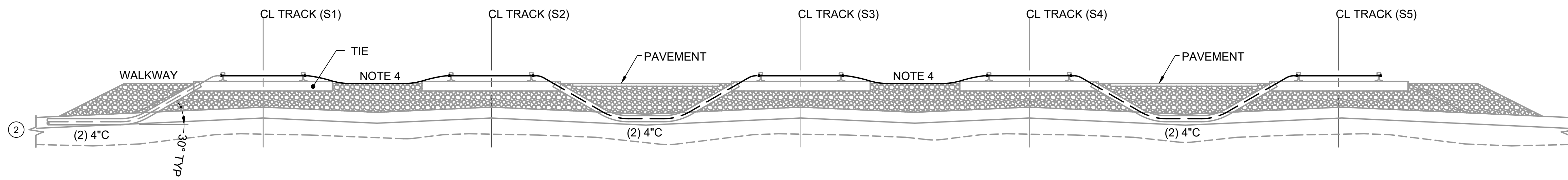
SOUND TRANSIT STANDARD DRAWINGS SYSTEMS

SIGNALS
TYPICAL NEGATIVE RETURN BONDING
NO. 5 TURNOUT IN BALLASTED TRACK

| |
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| DRAWING No.: STD-JSD305 |
| FACILITY ID: |
| SHEET No.: 0 |
| REV: 0 |



- NOTES:**
- ① PROVIDE CROSSBONDS OF 2-500 KCMIL USING SINGLE OR DOUBLE CEMBRE POSTS TO WEB OF RAIL.
 - ② OPTIONALLY THE CROSSBONDS MAY BE INCORPORATED INTO A TRACTION POWER SUBSTATION NEGATIVE RETURN CONNECTION.
 - ③ STORAGE TRACKS HAVE NO TRACK CIRCUITS.
 - ④ CROSSBONDS BETWEEN RAILS WITH NO OBSTRUCTING PAVEMENT CAN FASTEN TO TIE OR LAY ON BALLAST.



SECTION A
SCALE: NTS


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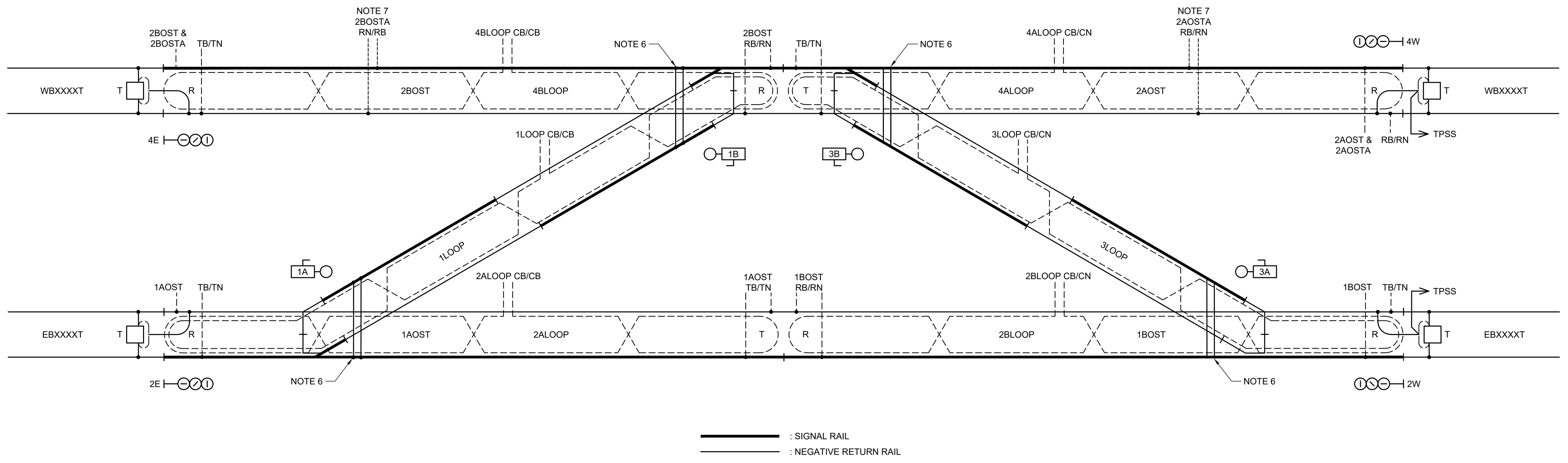
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 CONTRACT No.: RTA/LR
 DATE: 2/2024

**SOUND TRANSIT
 STANDARD DRAWINGS
 SYSTEMS**

SIGNALS
 TYPICAL YARD STORAGE TRACK
 CROSSBONDS INSTALLATION

| | |
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| DRAWING No.: | STD-JSD306 |
| FACILITY ID: | |
| SHEET No.: | REV: 0 |

- NOTES:**
1. PLACEMENT AND QUANTITY OF LOOPS IS SHOWN FOR GENERAL INFORMATION.
 2. TRANSPOSE LOOP WIRES APPROXIMATELY EVERY 50'.
 3. PROVIDE AN ODD NUMBER OF EQUALLY SPACED TRANSPOSITIONS.
 4. LOOPS ARE TO EXTEND TO THE FARTHEST IJ FOR THAT TRACK CIRCUIT.
 5. CAB LOOPS TO BE MOUNTED TO RAIL WITH RETAINING CLIPS OR TIED TO RAIL FASTENER CLIPS.
 6. (2) 250KCML EXTRA FLEX CEMBRE BOLTED CONNECTION TO WEB OF RAIL AT NEUTRAL AXIS.
 7. PROVIDE AUDIO FREQUENCY OVERLAY TRACK CIRCUIT FOR OVERRUN DETECTION ONLY. IF DIRECT INJECTION TRACK CIRCUIT IS USED, PROVIDE EQUIVALENT TRACK CIRCUIT OVERRUN DETECTION METHOD.



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 CONTRACT No.: RTA/LR
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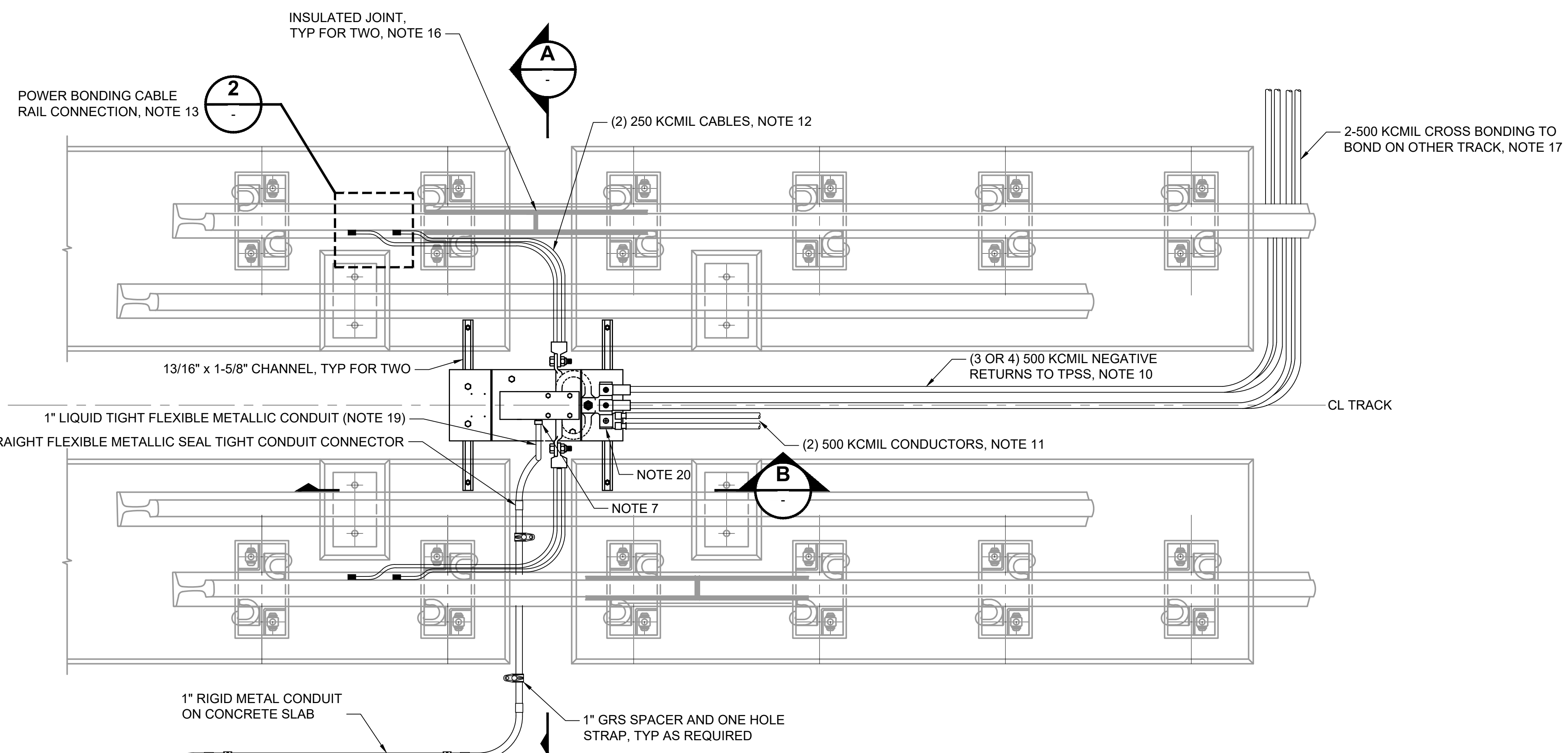
**SOUND TRANSIT
 STANDARD DRAWINGS
 SYSTEMS**

SIGNAL SYSTEM
 TYPICAL UNIVERSAL
 INTERLOCKING LAYOUT

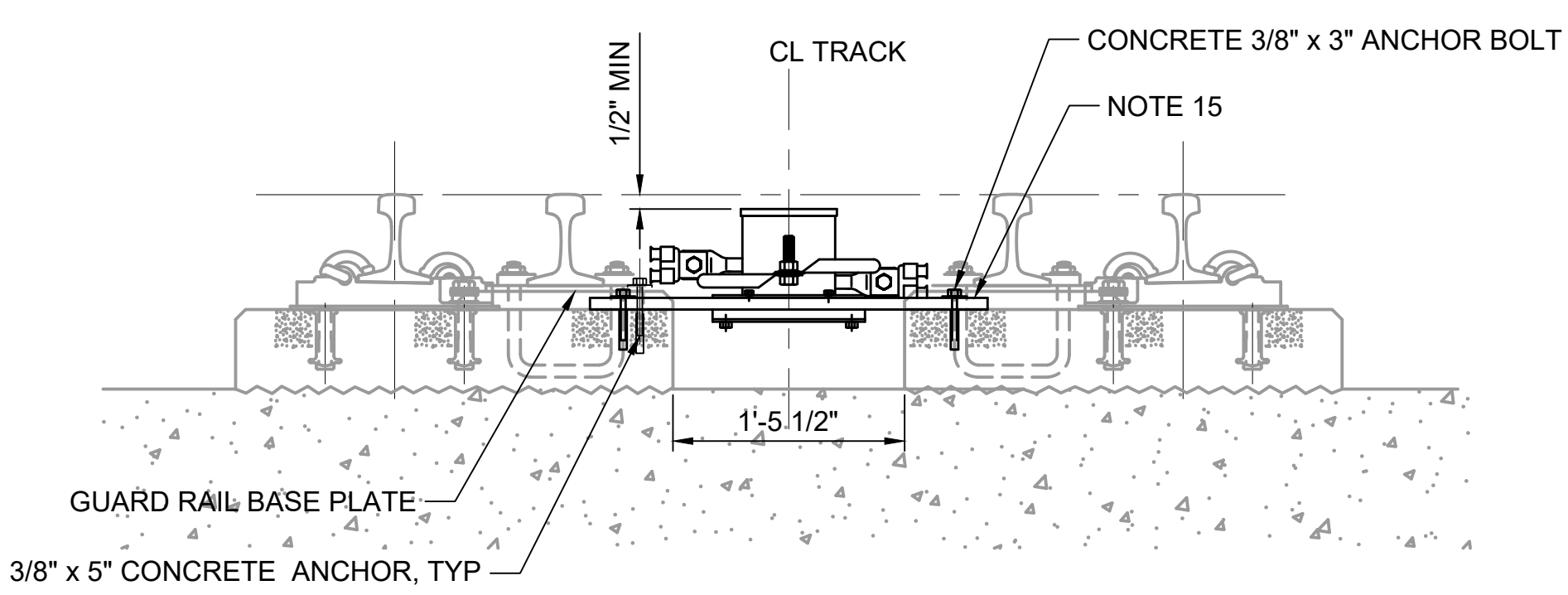
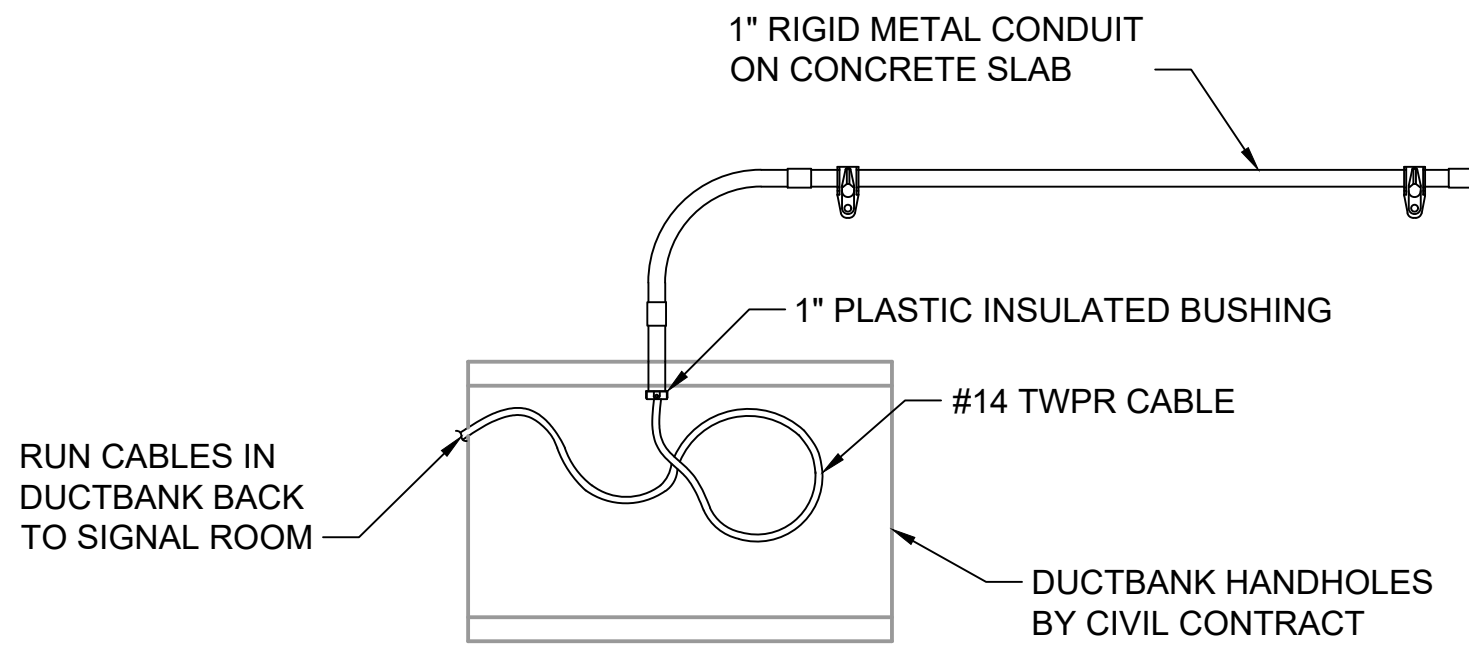
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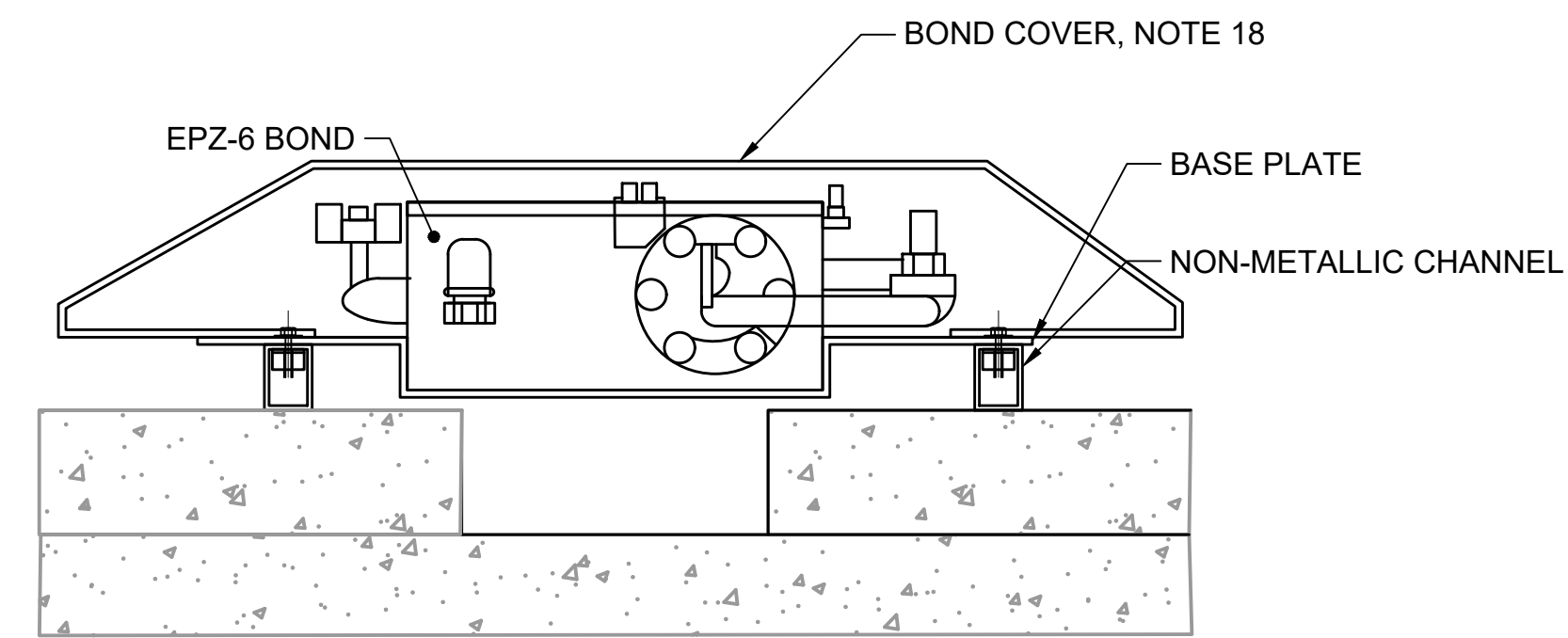
1. MOUNT IMPEDANCE BOND TO CONCRETE PLINTHS.
2. TOP OF IMPEDANCE BOND ASSEMBLY TO BE 1/2" MIN BELOW THE TOP OF RAILS.
3. TERMINALS & ELECTRICAL CONNECTION LUGS SHALL BE WIRE BRUSH CLEANED AND COATED WITH A CONDUCTIVE, NON-CORROSIVE, SURFACE COMPOUND IMMEDIATELY BEFORE BEING CONNECTED.
4. DO NOT INSTALL IMPEDANCE BOND CABLES WITHIN 12" OF RAIL WELDS.
5. PROVIDE CONDUIT TO EXTEND FROM SC PULLBOX OR HANDHOLE TO IMPEDANCE BOND.
6. BEND CABLES NOT LESS THAN 8 INCH RADIUS.
7. WATER TIGHT CONNECTOR.
8. COAT BOLT AND UNINSULATED CABLE WITH NO-OX-ID.
9. RAIL CONNECTIONS SHALL BE CEMBRE BOLTED AND CENTERED WITHIN +/- 1/2" OF THE NEUTRAL AXIS OF THE RAIL.
10. SEE EQUIPMENT LOCATION DRAWINGS FOR QUANTITY OF NEGATIVE RETURN CABLES.
11. CONNECT (2) 500 KCMIL CABLES BETWEEN CENTER TAPS OF IMPEDANCE BONDS ON EACH SIDE OF INSULATED JOINT PAIRS OR TO NEGATIVE RETURN RAIL.
12. SIDE LEAD CABLES SHALL BE OF EQUAL LENGTH.
13. BOLT TO RAIL AS CLOSE AS POSSIBLE TO INSULATED JOINT WITHOUT DAMAGING THE CABLE OR LUG BOLTED TO THE CEMBRE SLEEVE WHEN BOND IS LOCATED AT AN INSULATED JOINT.
14. AT LOCATIONS WITH BOTH GUARD RAIL AND RESTRAINING RAIL, ROUTE THE SIDE LEADS TO CONNECTIONS ON THE FIELD SIDE OF THE RUNNING RAIL. MINIMIZE REMOVAL OF RESTRAINING RAIL NECESSARY TO INSTALL CEMBRE POST.
15. PROVIDE ANCHORS DRILLED INTO CONCRETE FOR SECURING MOUNTING FRAME. PRIOR TO DRILLING INTO CONCRETE, PERFORM SCAN TO LOCATE AND AVOID REBAR.
16. SEE TRACK CHARTS FOR INSULATED JOINT LOCATIONS.
17. ROUTE CROSS BONDING FROM CENTER TAP OF IMPEDANCE BOND ON ONE TRACK TO IMPEDANCE BOND ON OTHER TRACK AT LOCATIONS SHOWN ON THE SIGNAL - SYSTEM, TRACK AND CABLE PLAN DRAWINGS.
18. PROVIDE A RAMP COVER AS REQUIRED (NOT SHOWN ON PLAN VIEW FOR CLARITY).
19. LAST 2'-4" OF CONDUIT RUN IS TO BE 1" LIQUID TIGHT FLEXIBLE METALLIC CONDUIT.
20. AT TRACTION POWER RETURN AND CROSS BONDING LOCATIONS PROVIDE A COPPER BUSS BAR "T" PLATE THAT TO MOUNT THE CABLES TO THE IMPEDANCE BOND CENTER TAP THAT ALLOW THEM TO BE REMOVED ONE AT A TIME.



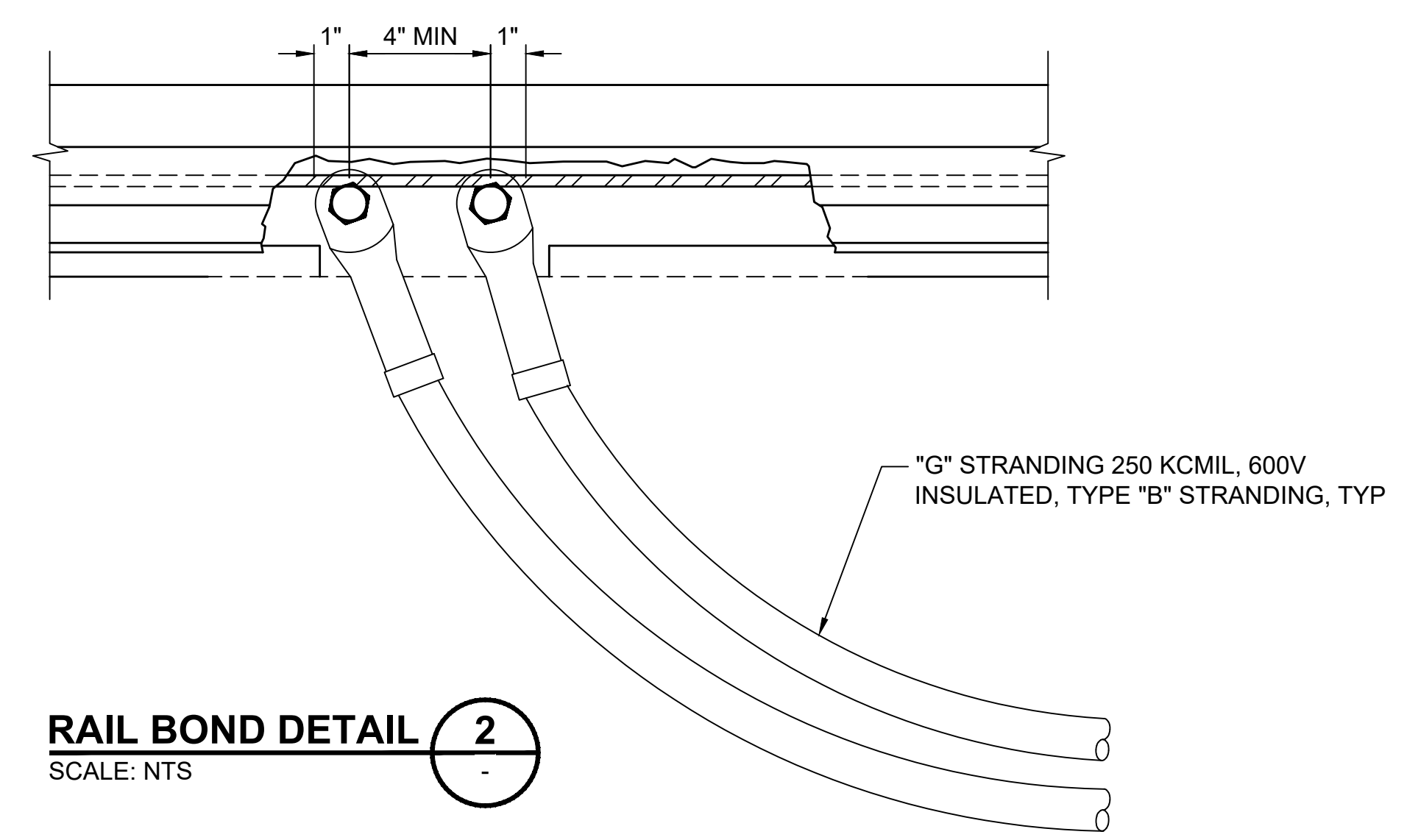
PLAN VIEW
SCALE: NTS



SECTION A
SCALE: NTS



SECTION B
SCALE: NTS



RAIL BOND DETAIL 2
SCALE: NTS

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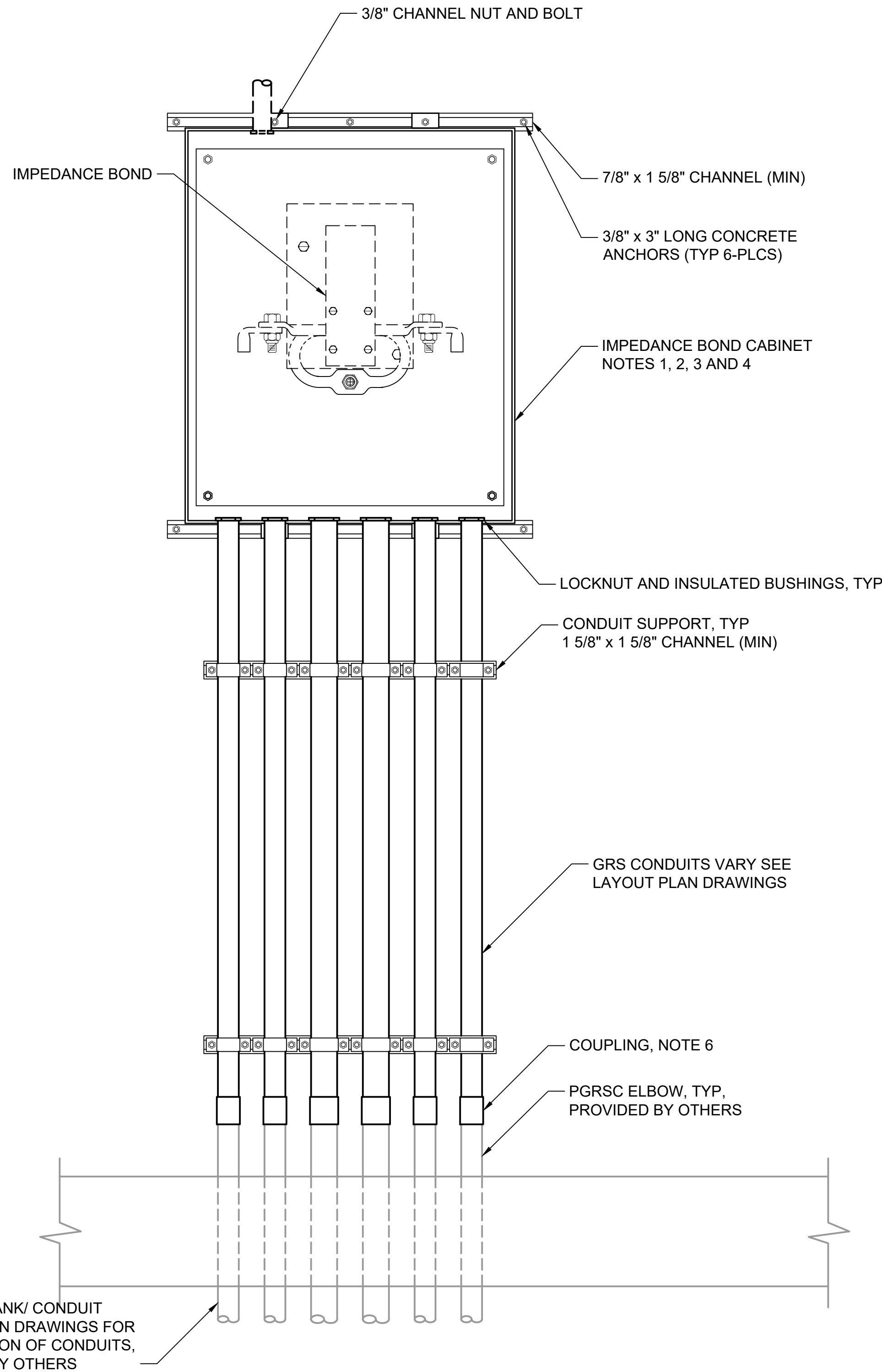
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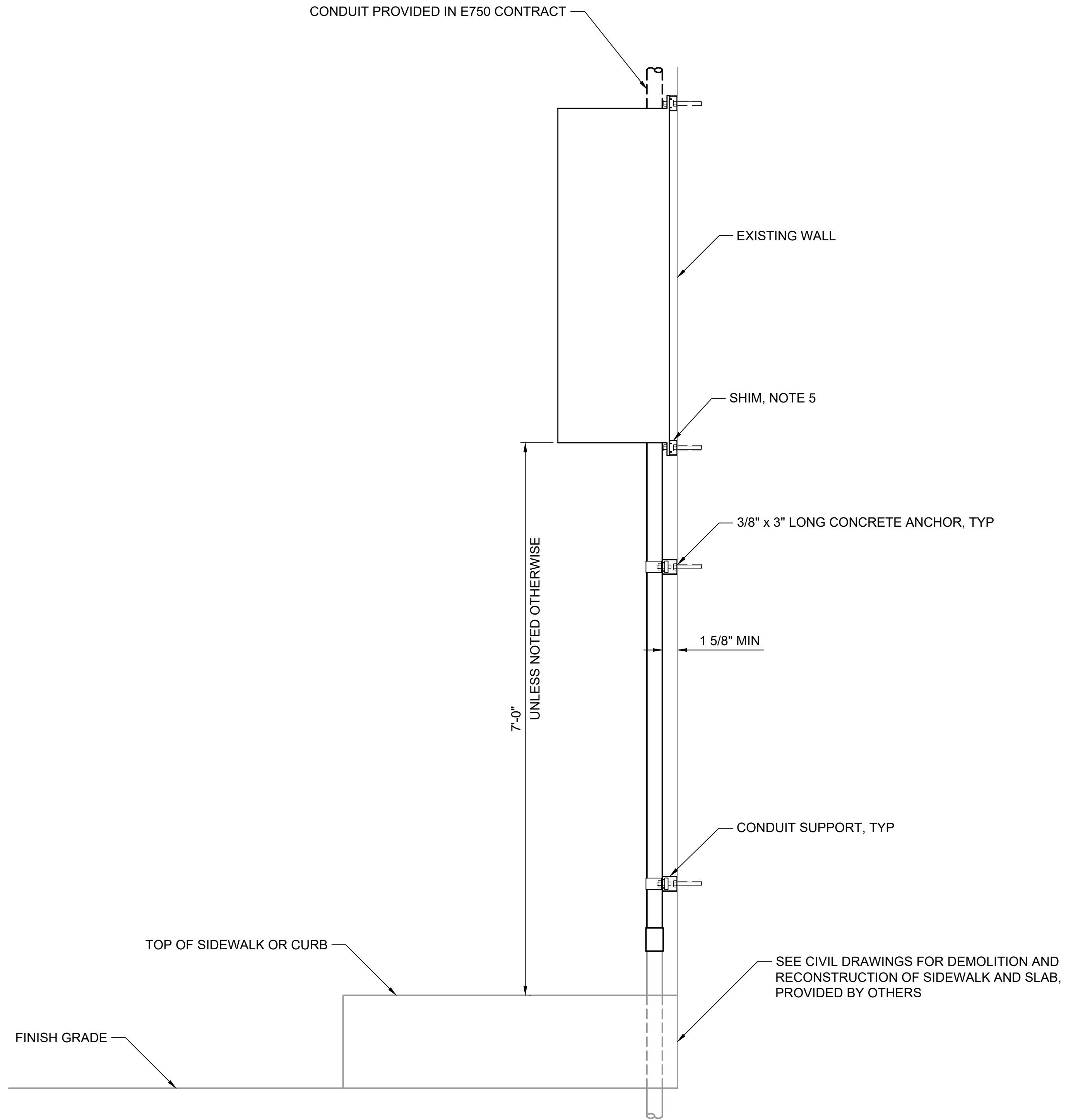
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| CONTRACT No.: RTA/LR | |
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| SOUND TRANSIT STANDARD DRAWINGS SYSTEMS | |
| SIGNALS TYPICAL IMPEDANCE BOND INSTALLATION LAYOUT WITH GUARDRAIL | |

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| DRAWING No.: DIR-JSD311 |
| FACILITY ID: |
| SHEET No.: 0 |



WALL MOUNTED IMPEDANCE BOND CABINET ①
SCALE: NTS



TYPICAL FENCE POST GROUNDING DETAIL ②
SCALE: NTS

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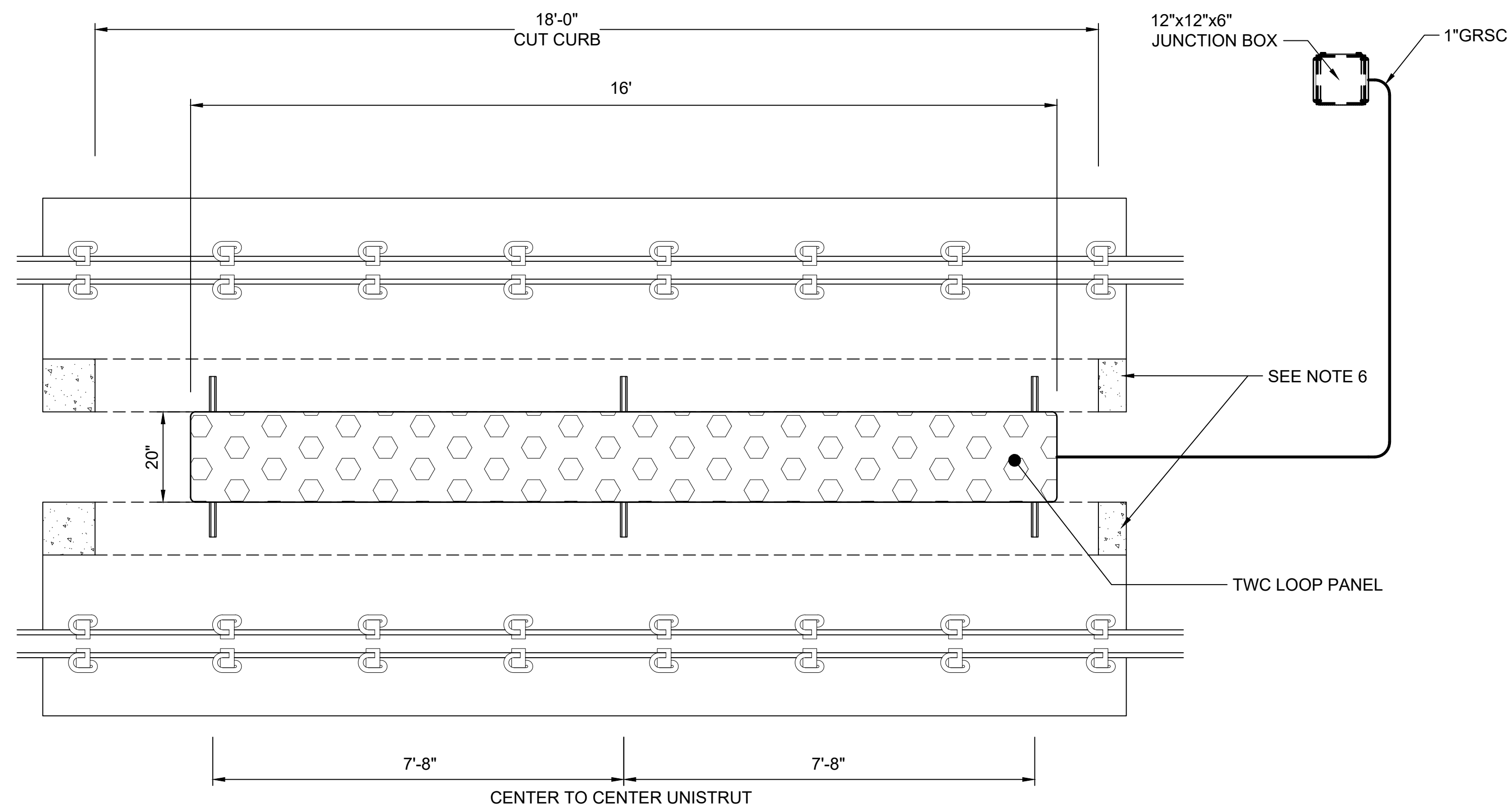
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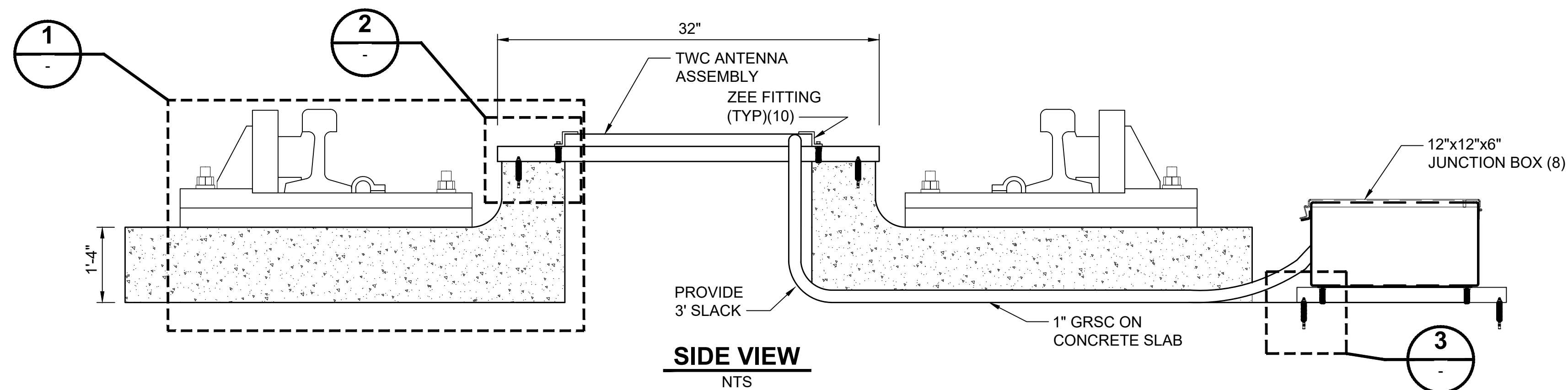
**SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS**

SIGNALS
IMPEDANCE BOND CABINET - TYPE 1
WALL MOUNTED DETAILS

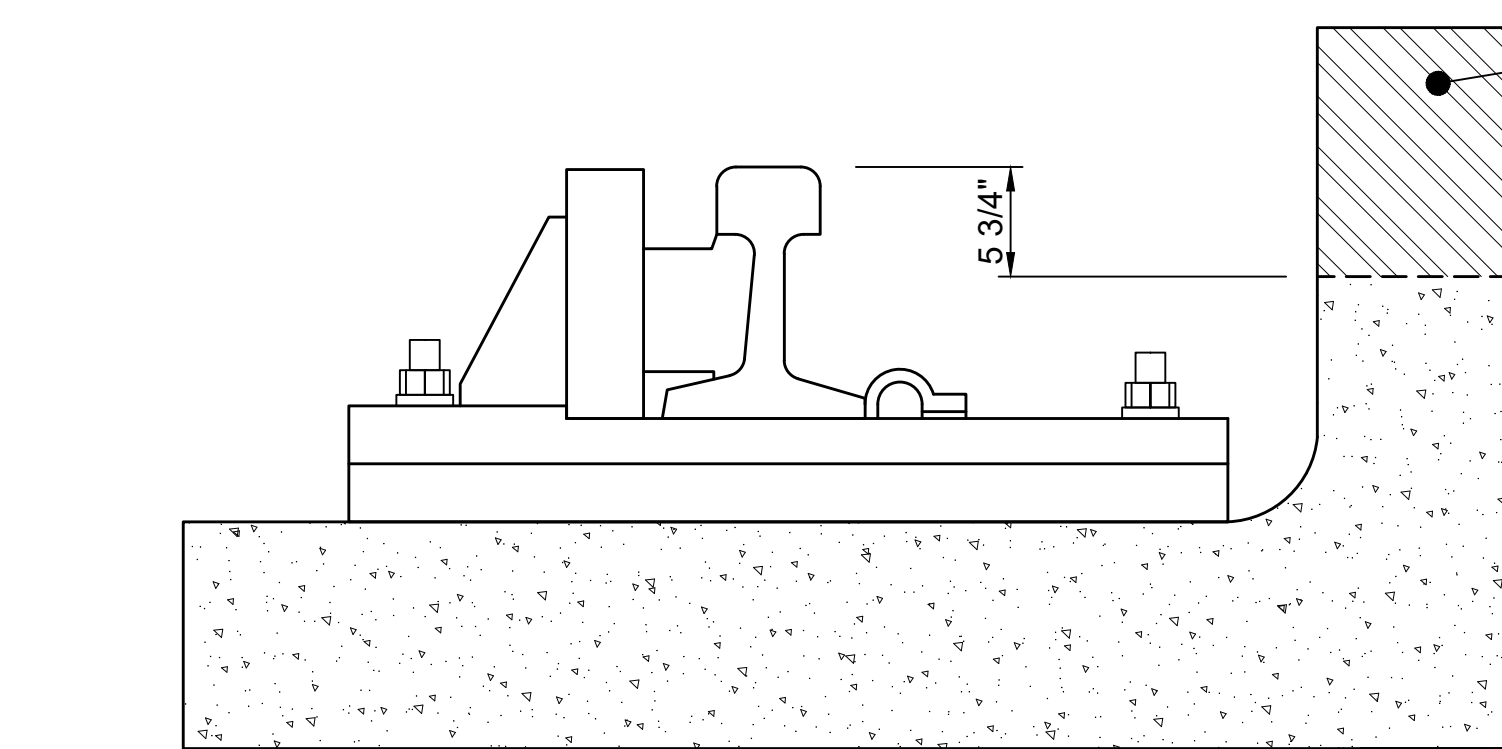
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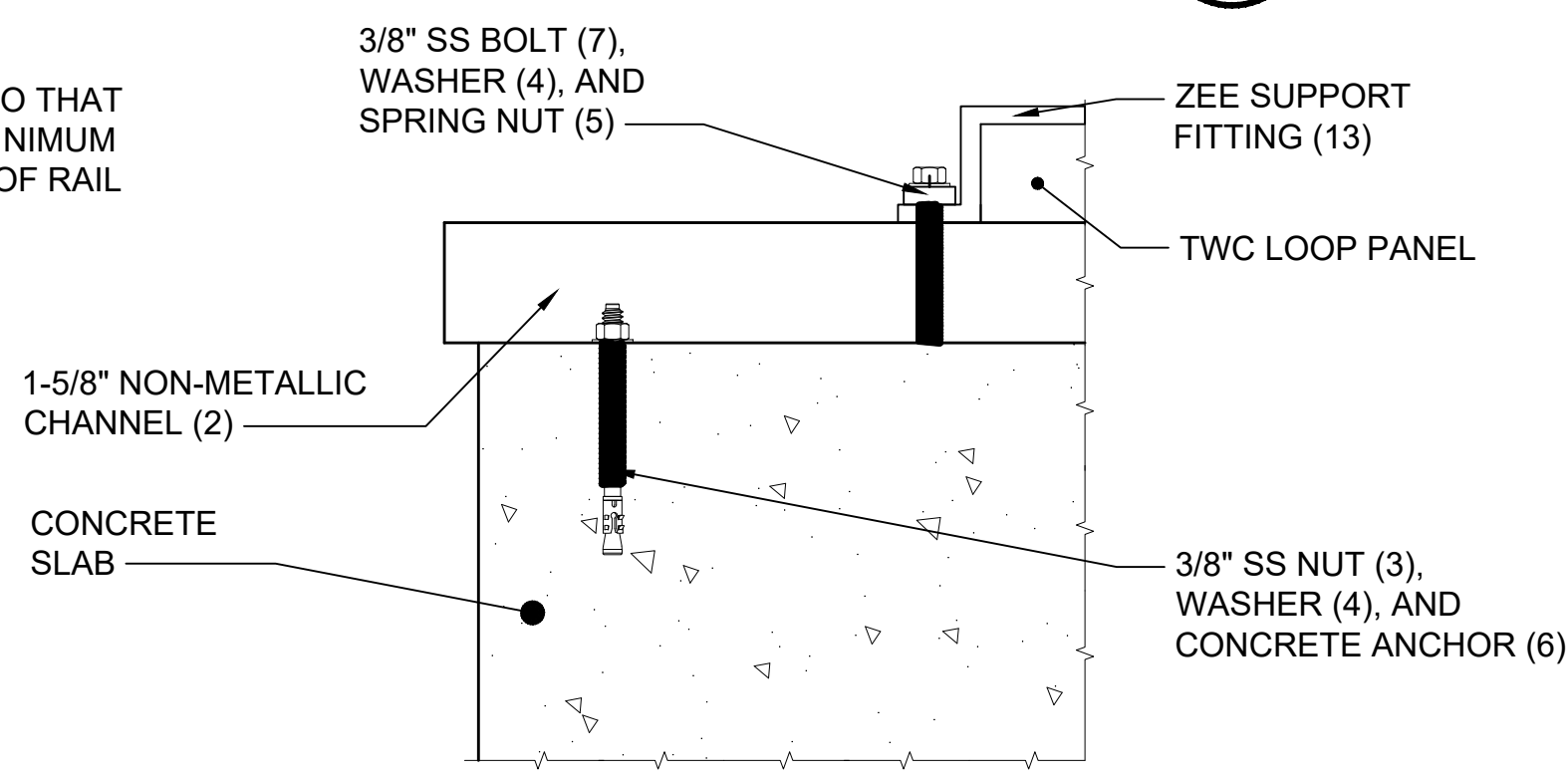
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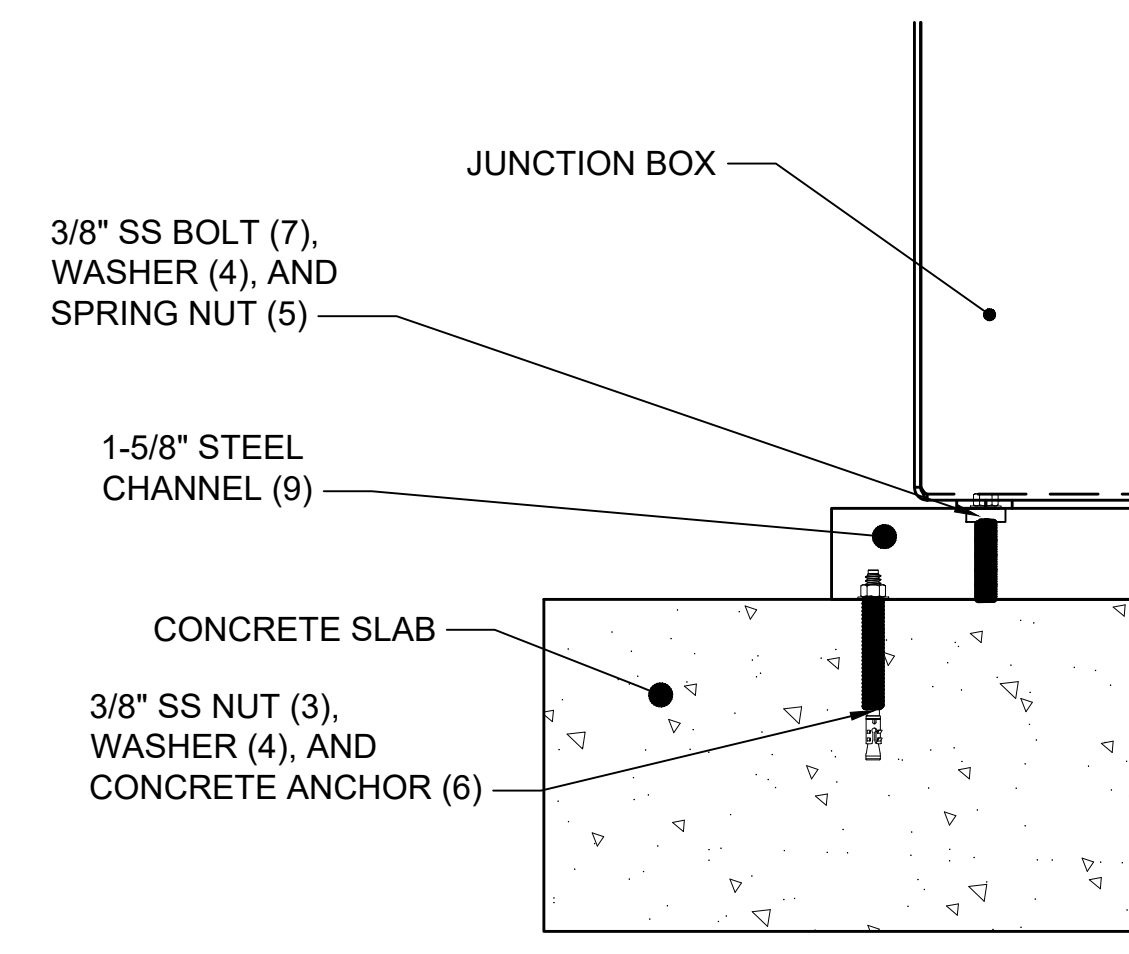
SIDE VIEW
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DETAIL 1
NTS



DETAIL 2
NTS



DETAIL 3
NTS

GENERAL NOTES:

1. TERMINATE WIRES AND INSTALL LOOP CONVERTER INSIDE OF TWC JUNCTION BOX.
2. RUN 1" GRSC FROM BELOW LOOP ALONG PLINTH TO JUNCTION BOX.
3. TWC ANTENNA WILL BE MOUNTED TO THE UNISTRUT USING A S.S. 12-GAUGE Z- CLIP.
4. UNISTRUT MUST BE FASTENED DOWN USING CONCRETE ANCHORS.
5. JUNCTION BOX IS SECURED TO THE DECK WITH UNISTRUT AND CONCRETE ANCHORS.
6. CURB TO BE CUT OUT AT THE TWC LOOP LOCATION TO ALLOW LOOP TO BE INSTALLED

| ITEM NO. | QTY. | DESCRIPTION |
|----------|------|--|
| 2 | 3 | 1-5/8" NON-METALLIC CHANNEL 32" LONG |
| 3 | 10 | 3/8" SS NUT |
| 4 | 20 | 3/8" SS WASHER |
| 5 | 10 | 3/8" SS SPRING NUT |
| 6 | 10 | 3/8" CONCRETE ANCHOR 3" LONG |
| 7 | 10 | 3/8" SS BOLT |
| 8 | 1 | 12" x 12" x 6" SS JUNCTION BOX |
| 9 | 2 | 1-5/8" STEEL CHANNEL 14" LONG TO MOUNT JB TO CONCRETE SLAB |
| 10 | 6 | ZEE FITTING |

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| 0 | 8/2019 | | | | REVISED SYSTEMS DIRECTIVE DRAWINGS |

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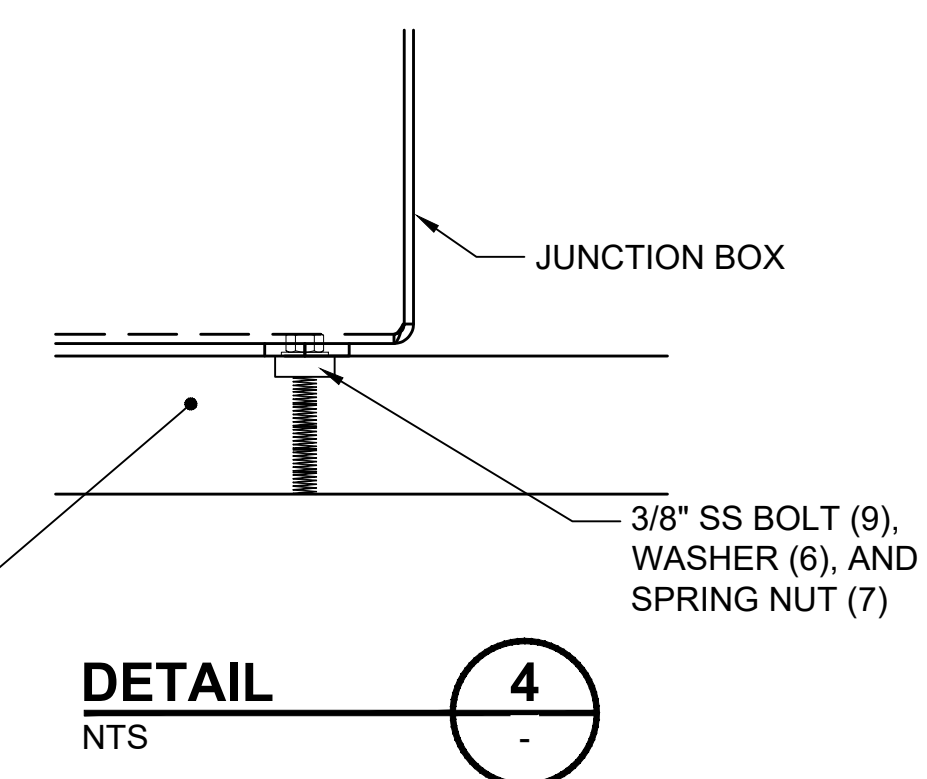
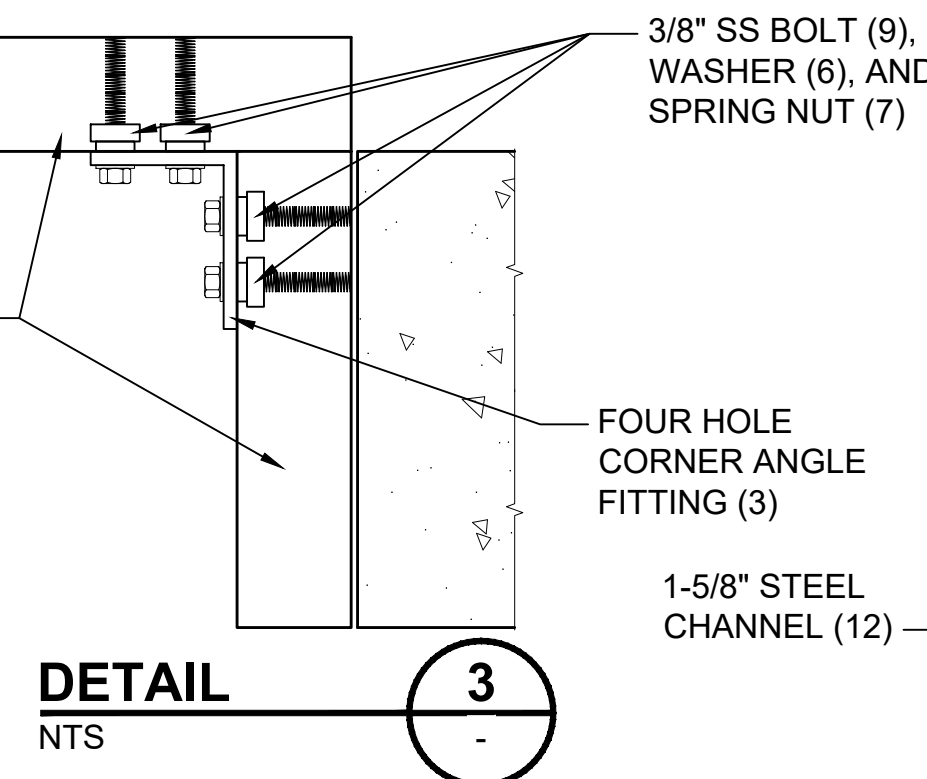
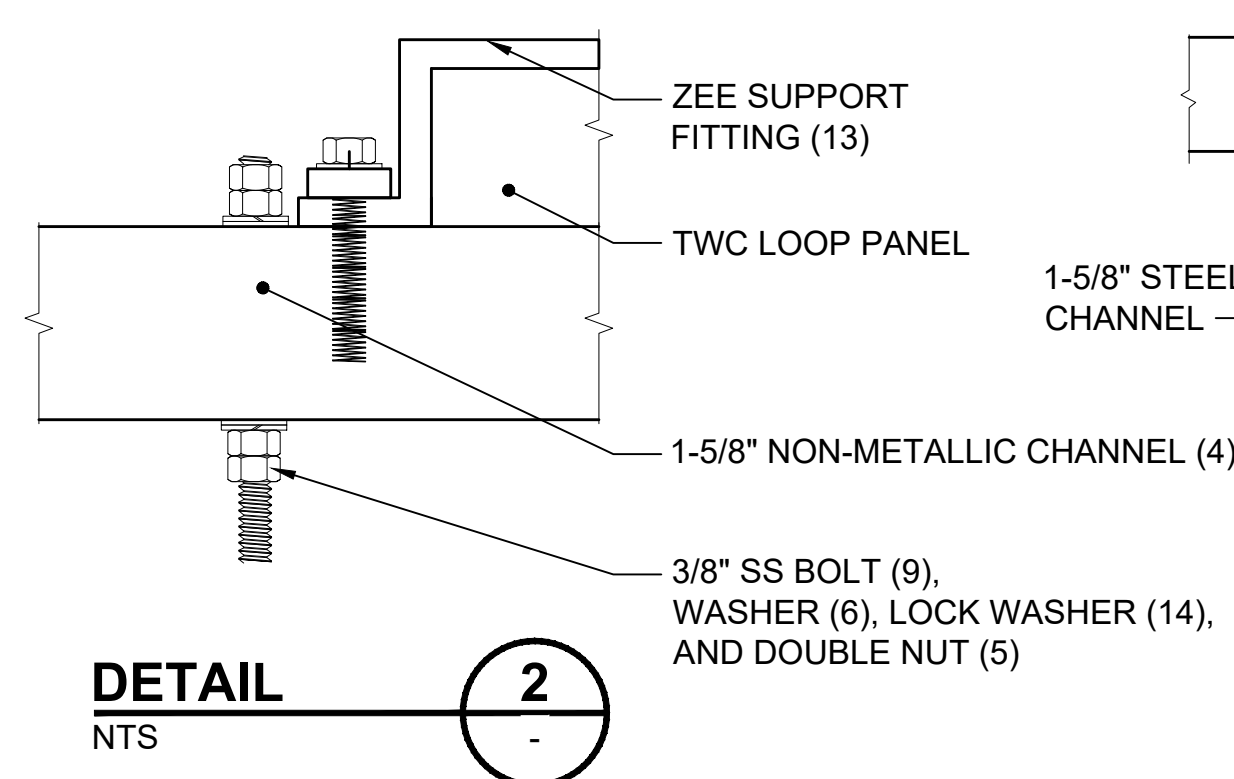
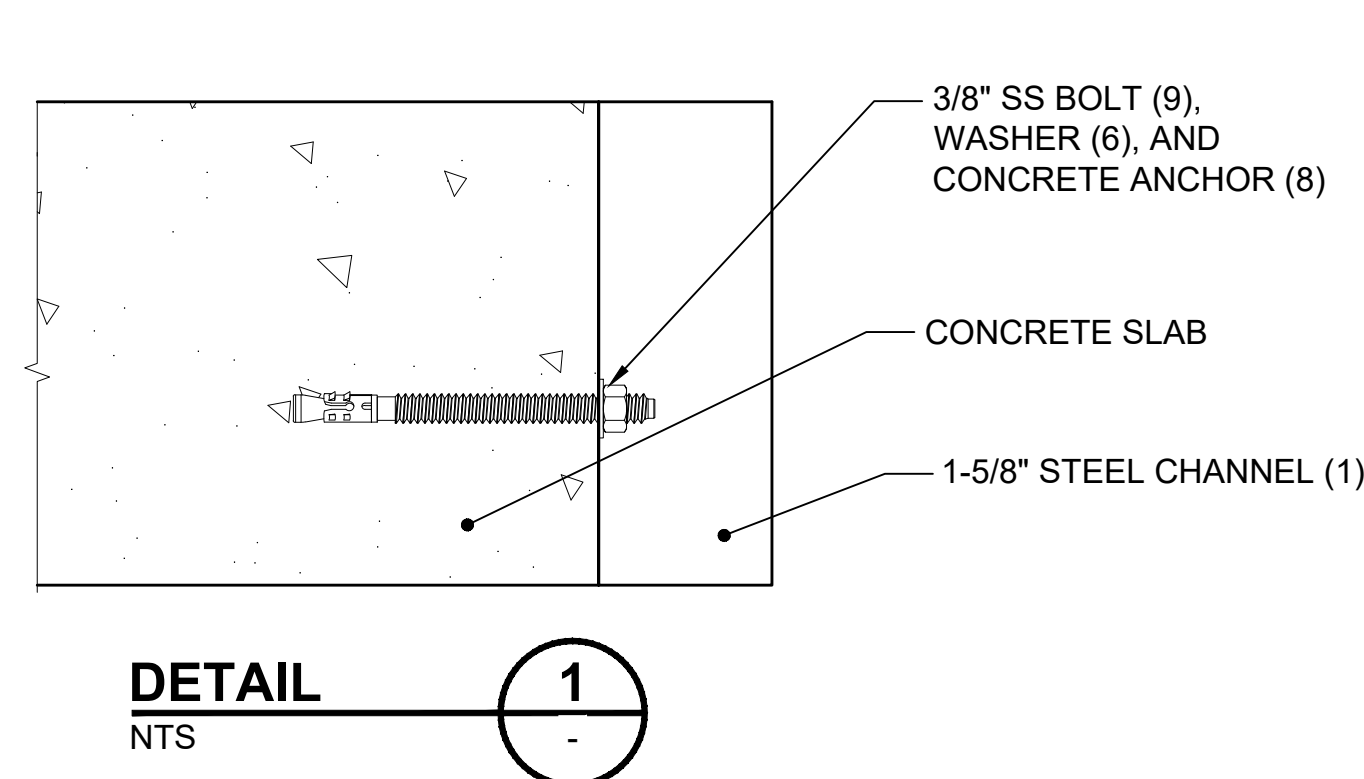
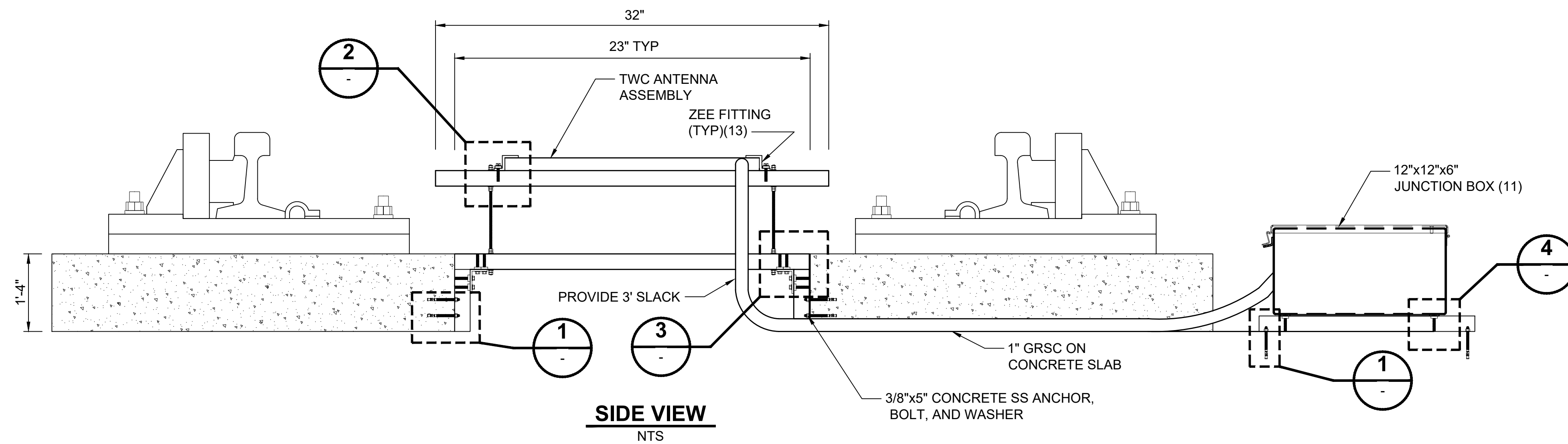
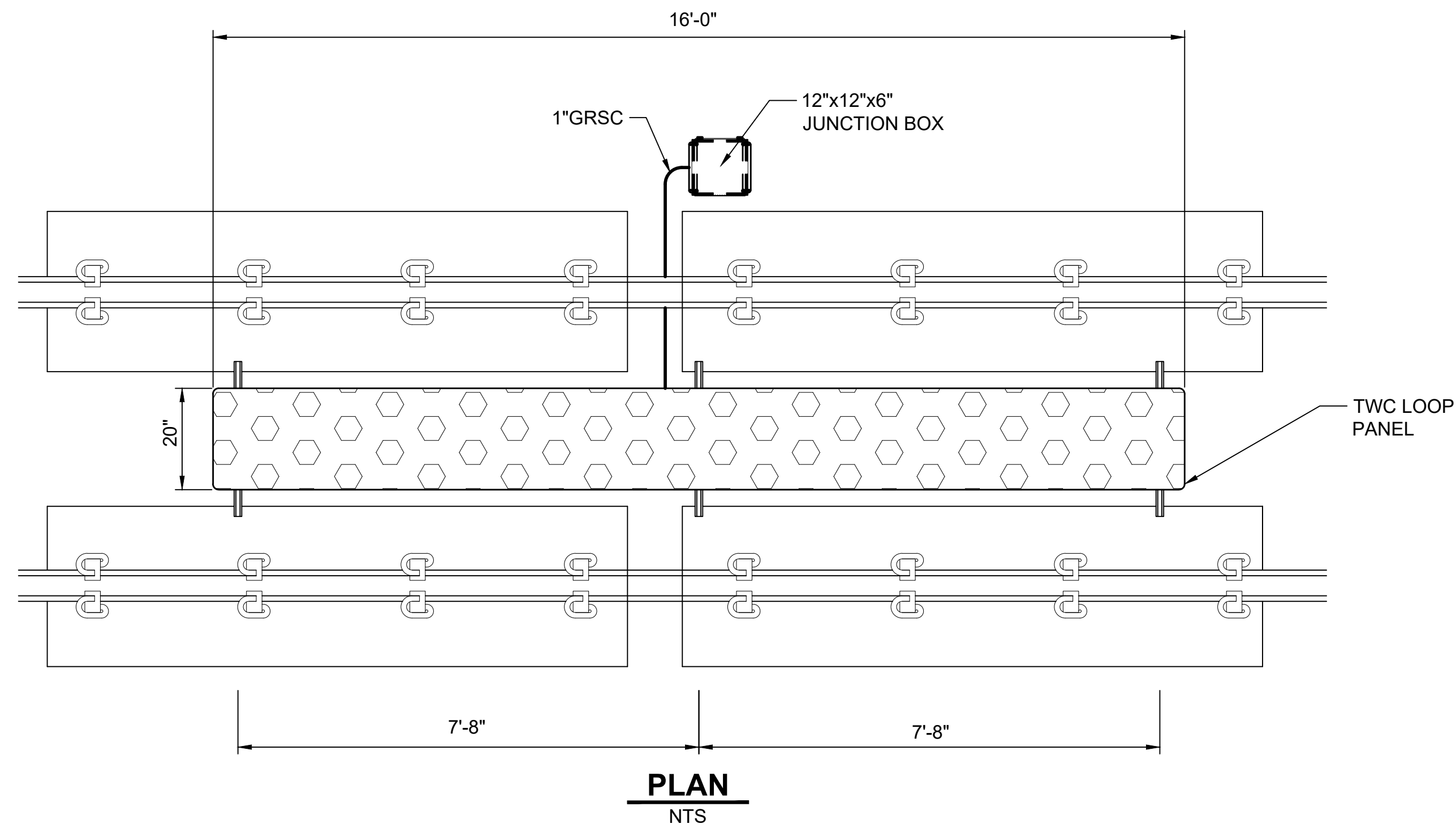
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| SOUND TRANSIT STANDARD DRAWINGS SYSTEMS | |
| SIGNALS | |
| TWC LOOP INSTALLATION LAYOUT - CURB MOUNT | |

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| DRAWING No.: | STD-JSD400 |
| FACILITY ID: | |
| SHEET No.: | REV: |
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GENERAL NOTES:

1. TERMINATE WIRES AND INSTALL LOOP CONVERTER INSIDE OF TWC JUNCTION BOX.
2. RUN 1" GRSC FROM LOOP ALONG PLINTH TO JUNCTION BOX.
3. TWC ANTENNA WILL BE MOUNTED TO THE UNISTRUT USING A S.S. 12-GAUGE Z-CLIP.
4. UNISTRUT MUST BE FASTENED DOWN USING CONCRETE ANCHORS.
5. JUNCTION BOX IS SECURED TO THE DECK WITH UNISTRUT AND CONCRETE ANCHORS.

| ITEM NO. | QTY. | DESCRIPTION |
|----------|------|--|
| 1 | 6 | 1-5/8" NON-METALLIC CHANNEL 12" LONG |
| 2 | 3 | 1-5/8" NON-METALLIC CHANNEL 23" LONG |
| 3 | 6 | 4-1/8" x 3-1/2" 90° L-SHAPE 4-CORNER ANGLE FITTING |
| 4 | 3 | 1-5/8" STEEL CHANNEL 32" LONG |
| 5 | 60 | 3/8" SS NUT |
| 6 | 36 | 3/8" SS WASHER |
| 7 | 28 | 3/8" SS SPRING NUT |
| 8 | 28 | 3/8" CONCRETE ANCHOR 3" LONG |
| 9 | 24 | 3/8" SS BOLT |
| 10 | 6 | 3/8" THREADED BOLT 12" LONG |
| 11 | 1 | 12" x 12" x 6" SS JUNCTION BOX |
| 12 | 2 | 1-5/8" STEEL CHANNEL 14" LONG TO MOUNT JB TO CONCRETE SLAB |
| 13 | 6 | ZEE FITTING |
| 14 | 4 | 3/8" SS LOCK WASHER |




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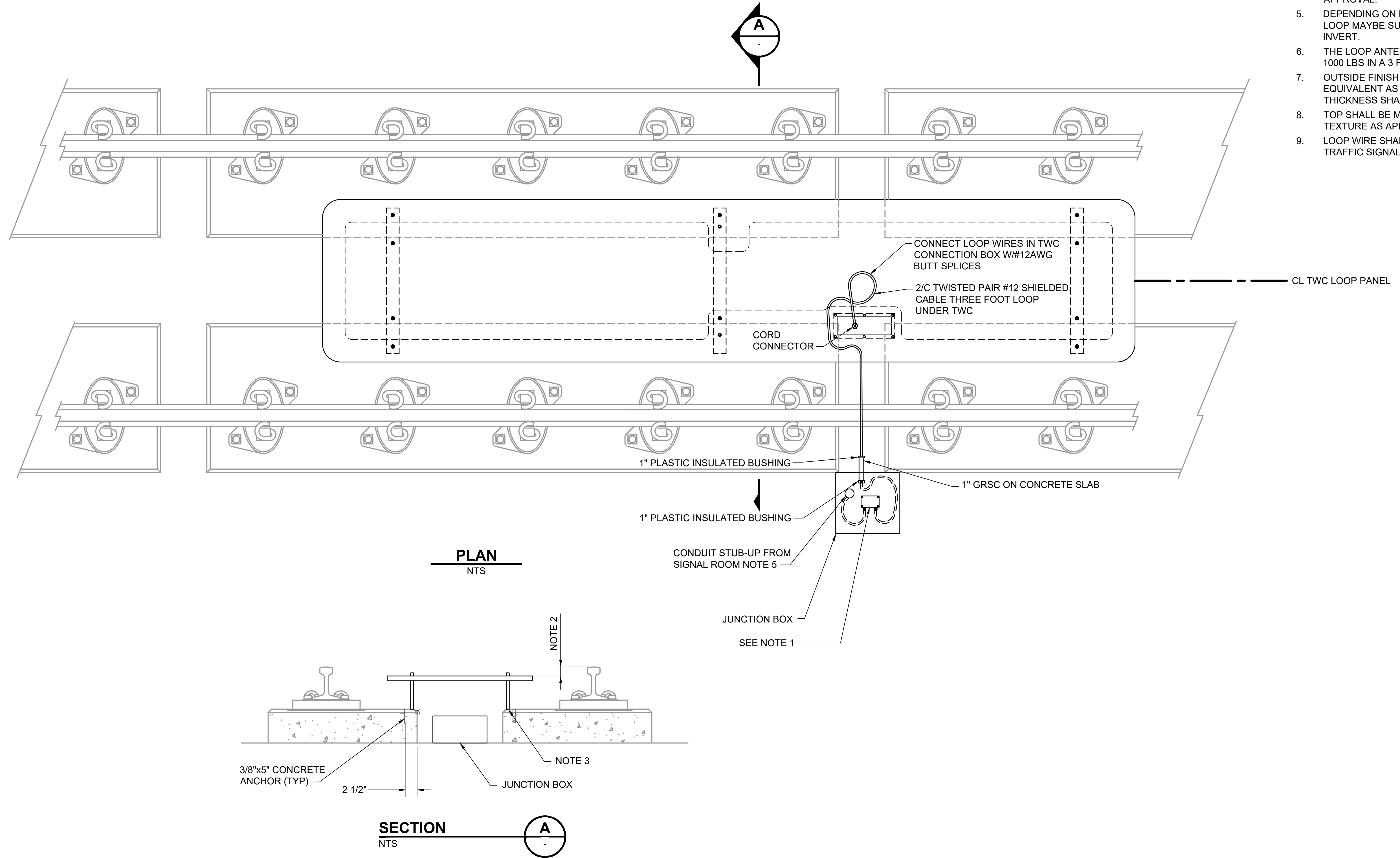
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| CONTRACT No.: | RTA/LR |
| DATE: | 2/2024 |

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| SOUND TRANSIT STANDARD DRAWINGS SYSTEMS | |
| SIGNALS TWC LOOP INSTALLATION LAYOUT JUNCTION BOX MOUNT | |

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| DRAWING No.: | STD-JSD401 |
| FACILITY ID: | |
| SHEET No.: | REV: 1 |

GENERAL NOTES:

1. TERMINATE FILTER OR LOOP IN ACCORDANCE WITH APPROVED CONTRACTOR INSTALLATION AND TUNING PROCEDURES.
2. RAISE TWC LOOP OFF TIE OR CONCRETE PLINTH AS TO APPROXIMATELY 2 INCHES BELOW TOP OF RAIL.
3. SUPPORT LOOP AT MIDDLE AND BOTH ENDS USING A FIBERGLASS STRUT.
4. TWC EMBEDDED LOOP. DESIGN INSTALLATION AND SUBMIT INSTALLATION DRAWINGS TO RESIDENT ENGINEER FOR APPROVAL.
5. DEPENDING ON DUCTBANK DESIGN CONDUIT PATH TO TWC LOOP MAYBE SURFACE MOUNT GRS, OR STUB UP IN BALLAST OR INVERT.
6. THE LOOP ANTENNA ASSEMBLY SHALL BE ABLE TO SUPPORT 1000 LBS IN A 3 FT OUTSIDE SUPPORT SPAN.
7. OUTSIDE FINISH SHALL BE SKY CAP GREY GELCOAT OR EQUIVALENT AS APPROVED BY SOUND TRANSIT. FINISH THICKNESS SHALL BE 20 THOUSANDS OF ONE INCH, MINIMUM.
8. TOP SHALL BE MOLDED WITH AN AGGRESSIVE NON-SKID TEXTURE AS APPROVED BY SOUND TRANSIT.
9. LOOP WIRE SHALL BE AWG #12 XHHW POLYETHYLENE JACKETED TRAFFIC SIGNAL LOOP WIRE.



PLAN
NTS

SECTION
NTS


03/21/24 | 12:50 PM | HARRISBK C:\USERS\HARRISBK\Sound Transit\Technical Standards and Requirements Projects - Drawings Update 2023\Standard Drawings\System\STD-JSD402.DWG

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SOUND TRANSIT

SCALE: NTS
 FILENAME: STD-JSD402
 CONTRACT No.: RTA/LR
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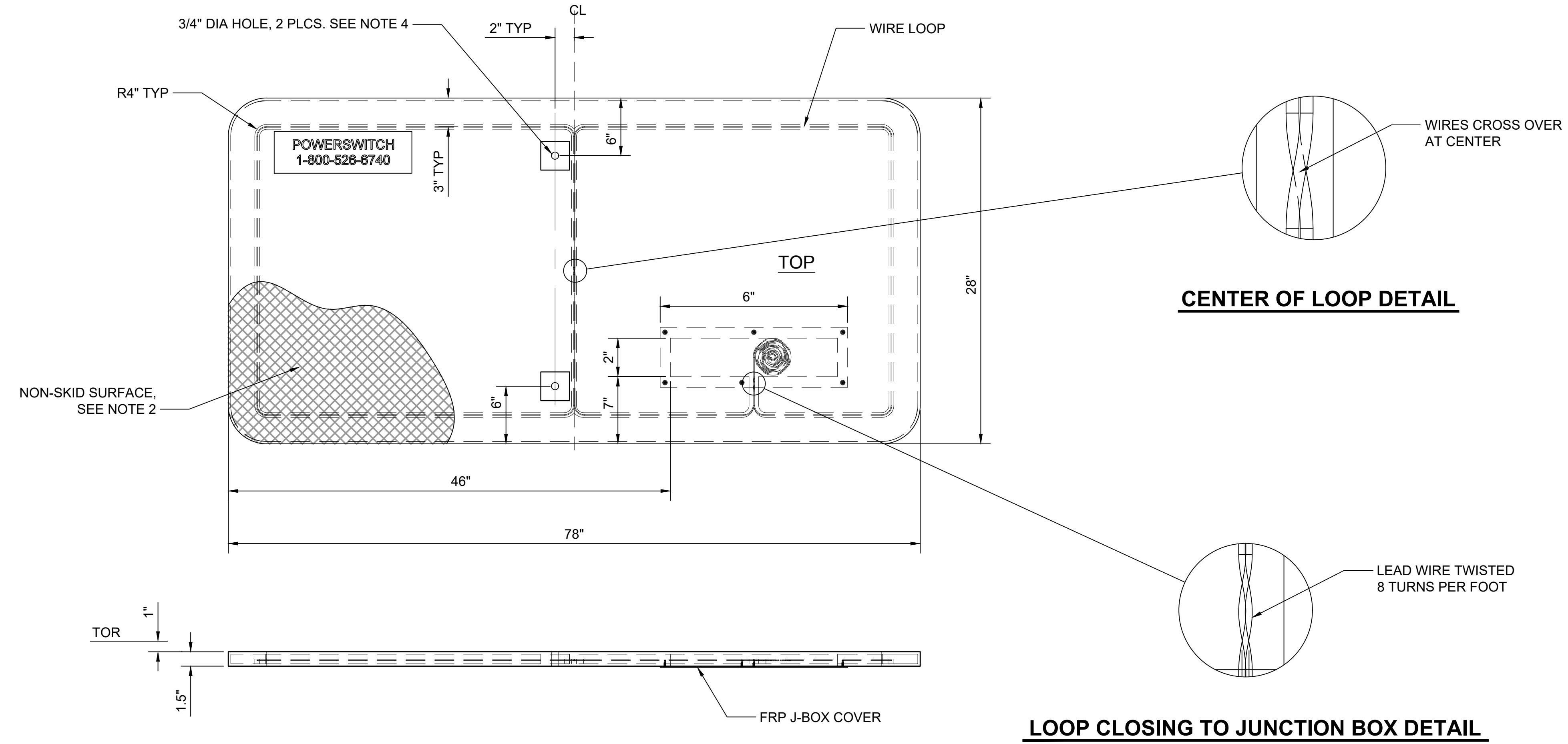
**SOUND TRANSIT
 STANDARD DRAWINGS
 SYSTEMS**

SIGNALS
 TYPICAL TWC LOOP INSTALLATION LAYOUT

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| DRAWING No.: | STD-JSD402 |
| FACILITY ID: | |
| SHEET No.: | REV: 1 |

NOTES:

1. MATERIAL IS RESIN IMPREGNATED OPEN CELL FIBERBOARD ENCASED IN 1/4" THK FIBERGLASS REINFORCED POLYESTER (FRP) LAMINATE CONSISTING OF GLASS FIBER, ALTERNATE LAYERS OF WOVEN ROVING, AND 60% RESIN. RESIN SYSTEM USED SHALL MEET UL 94VE-1 FLAMMABILITY RATING. EXTERIOR SURFACES HAVE 20 MIL THK ANSI 61 LIGHT GREY GEL COAT. JUNCTION BOX COVER TO BE MADE FROM SAME FRP MATERIAL. HARDWARE TO BE STAINLESS STEEL.
2. TOP SHALL BE MOLDED WITH AN AGGRESSIVE NON-SKID TEXTURE. NON-SKID SURFACE NOT SHOWN FOR CLARITY. TOP SIDE ONLY.
3. LOOP WIRE SHALL BE #12 XHHW WIRE. THE WIRE SHALL CROSS AT THE CENTER OF PANEL AND TERMINATE AT JUNCTION BOX CAVITY WITH 120" OF EXTRA LEAD. LEADS TO BE TWISTED FROM LOOP CLOSING TO JUNCTION BOX.
4. MOUNTING HOLES TO BE PRE-DRILLED IN TWO PLACES 2" FROM THE CENTER OF THE LOOP AND 6" FROM EDGE.
5. PANEL SHALL SUPPORT 1000 LBS IN A 3' OUTSIDE SUPPORTED SPAN.
6. TOP TO INCLUDE A 1/4" CROWN ALONG THE LONG AXIS OF THE LOOP.
7. MOUNT TOP OF LOOP 1" BELOW TOP OF RAIL.



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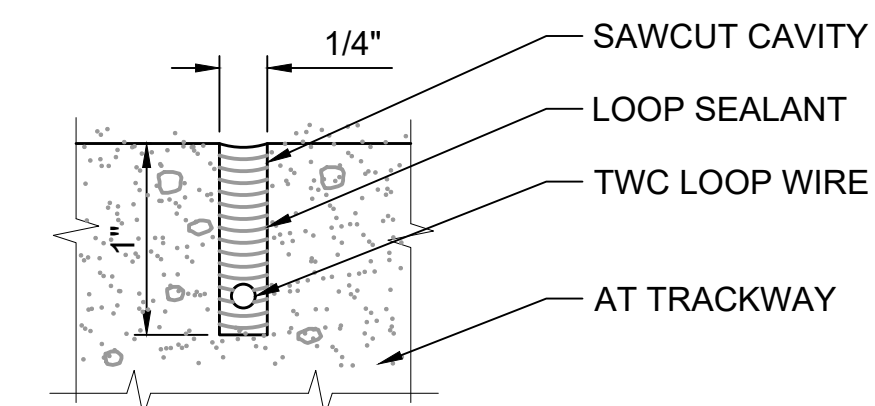
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 CONTRACT No.: RTA/LR
 DATE: 2/2024

**SOUND TRANSIT
 STANDARD DRAWINGS
 SYSTEMS
 SIGNALS
 YARD TWC LOOP**

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| FACILITY ID: | |
| SHEET No.: | REV: 0 |

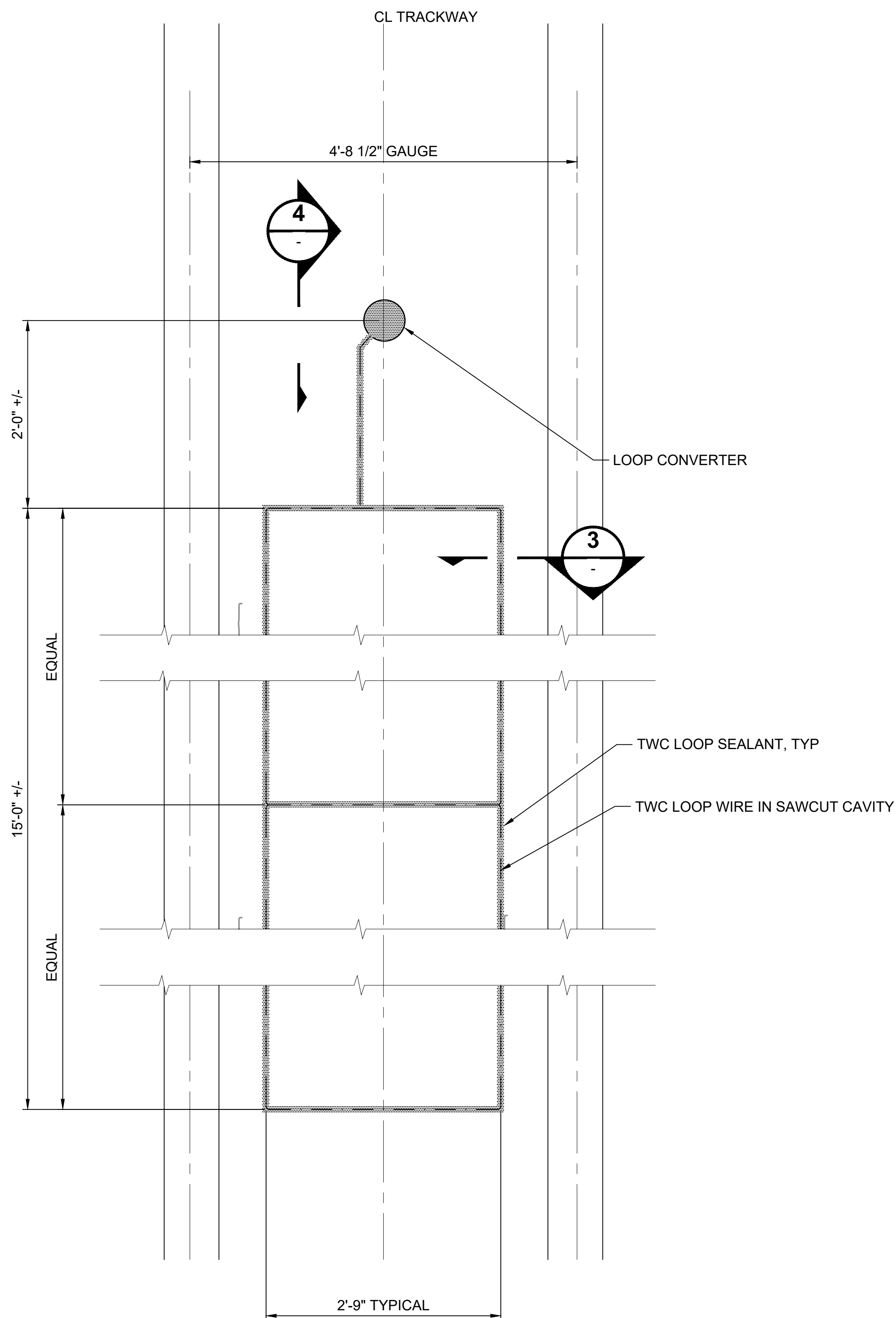
NOTES:

1. PVC PIPE AND CONDUIT WILL BE INSTALLED BY THE CIVIL CONTRACTOR
2. SAW CUTTING, TWC LOOP WIRE, LOOP SEALANT, LOOP CONVERTER, SILICA SAND AND INTERROGATOR LEAD CABLE INSTALLED BY SYSTEMS CONTRACTOR.
3. LOOP CONVERTER CONDUIT MAY EXTEND FROM SIDE INSTEAD OF BOTTOM AT LOCATIONS WHERE NECESSARY.



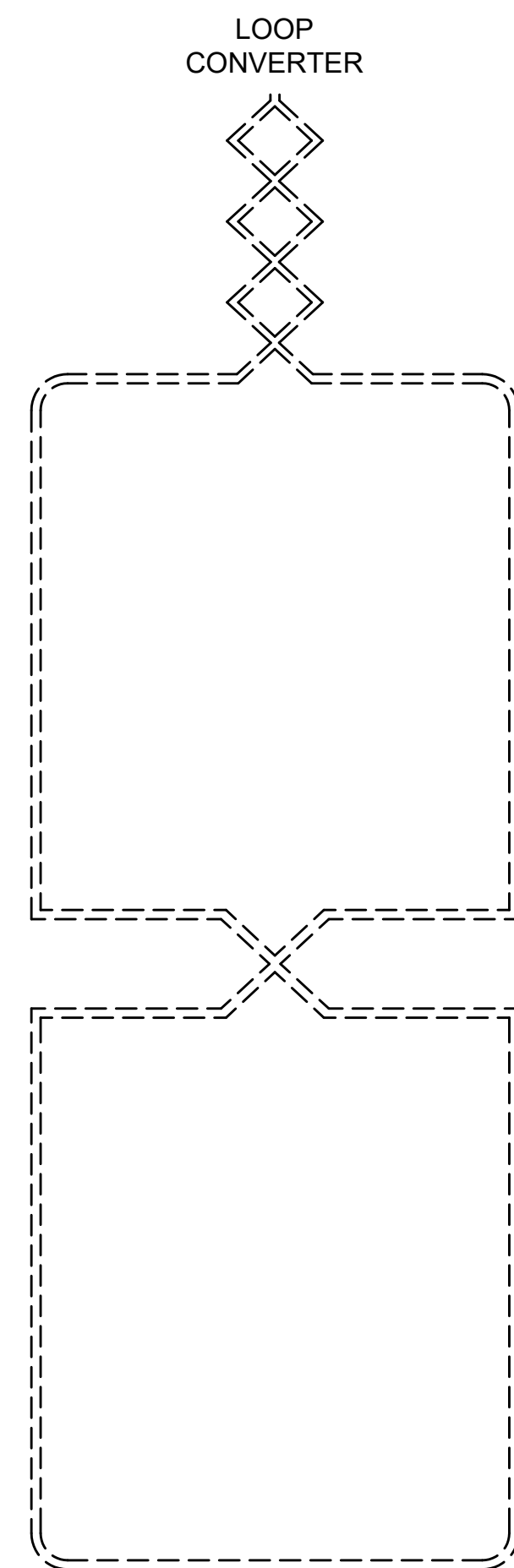
TWC LOOP AT TRACKWAY
SCALE: FULL SCALE

3



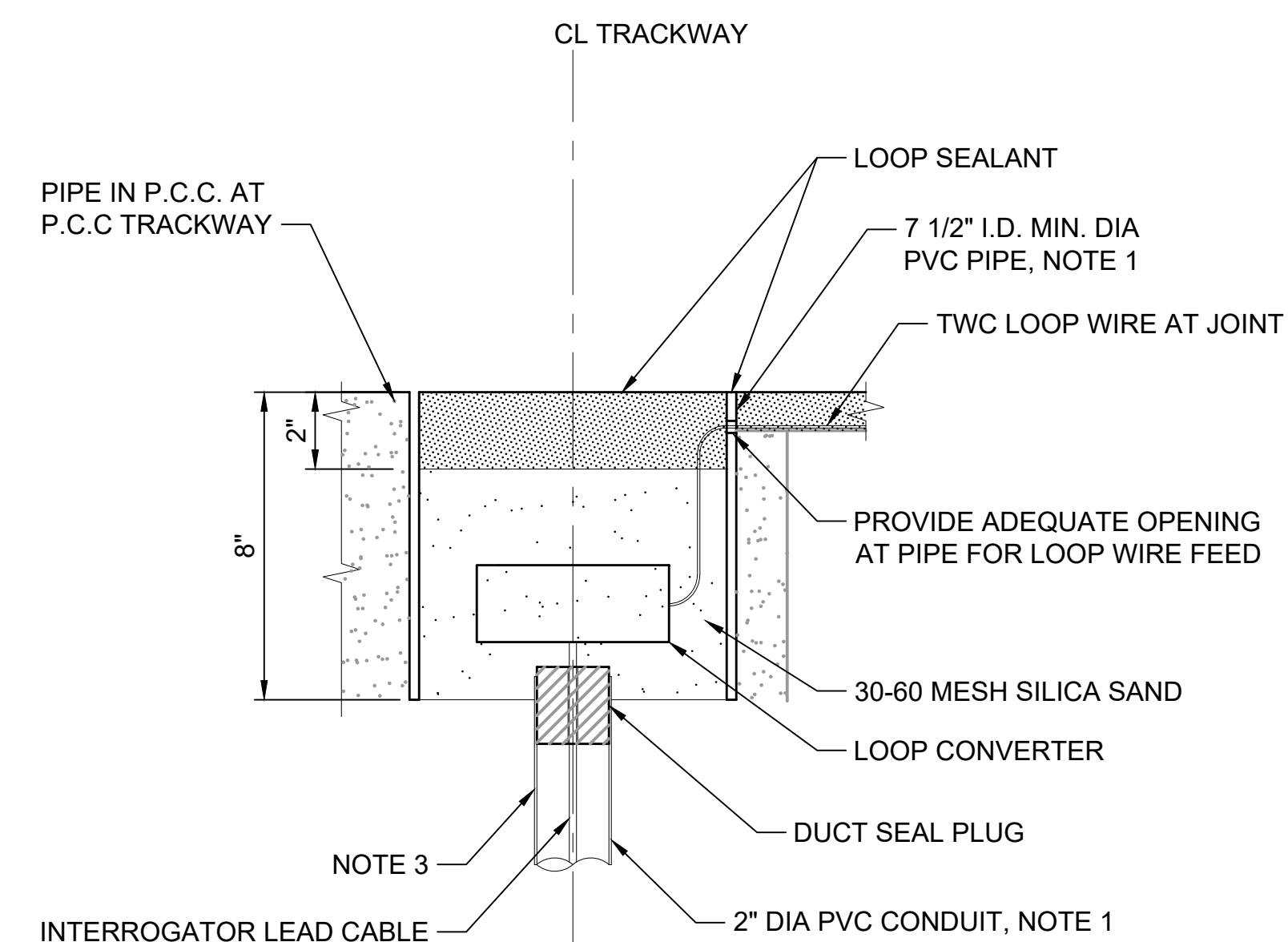
SAWCUT TWC LOOP PAVED TRACK DETAIL
SCALE: 1" = 1'-0"

1
L87-JSD022



LOOP WIRE CONFIGURATION
SCALE: NTS

2



SECTION AT LOOP CONVERTER
SCALE: 3" = 1'-0"

4

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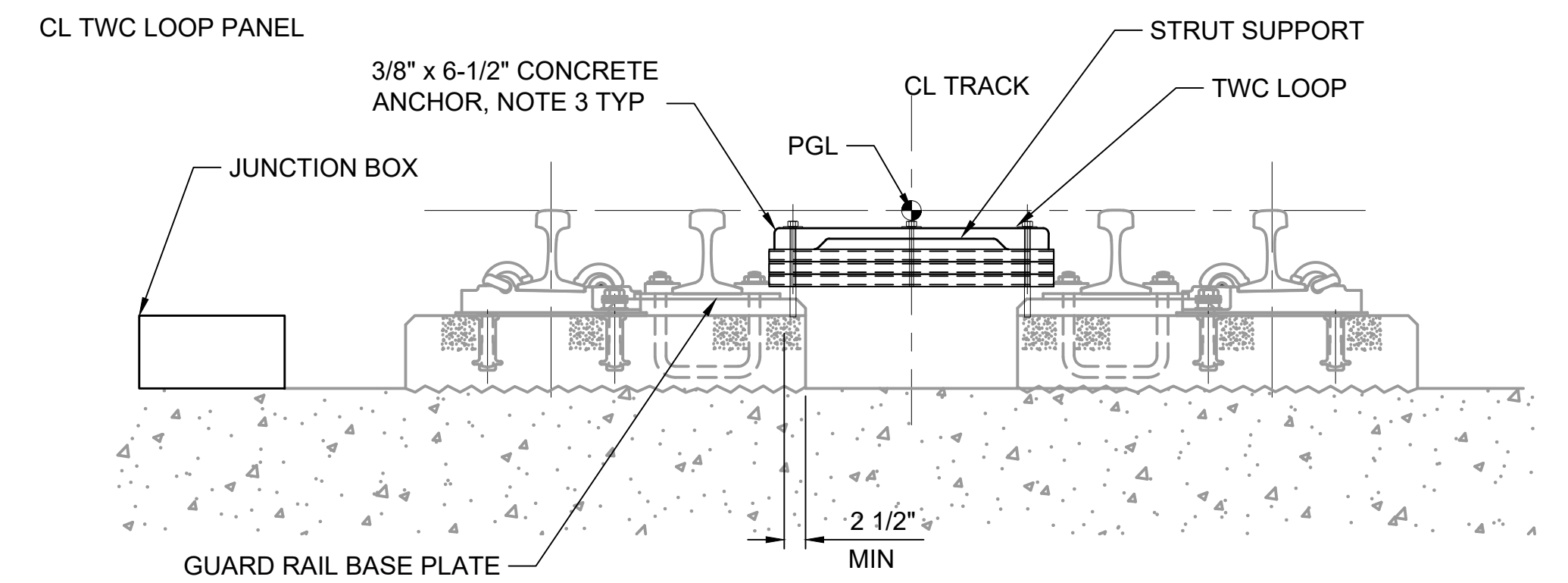
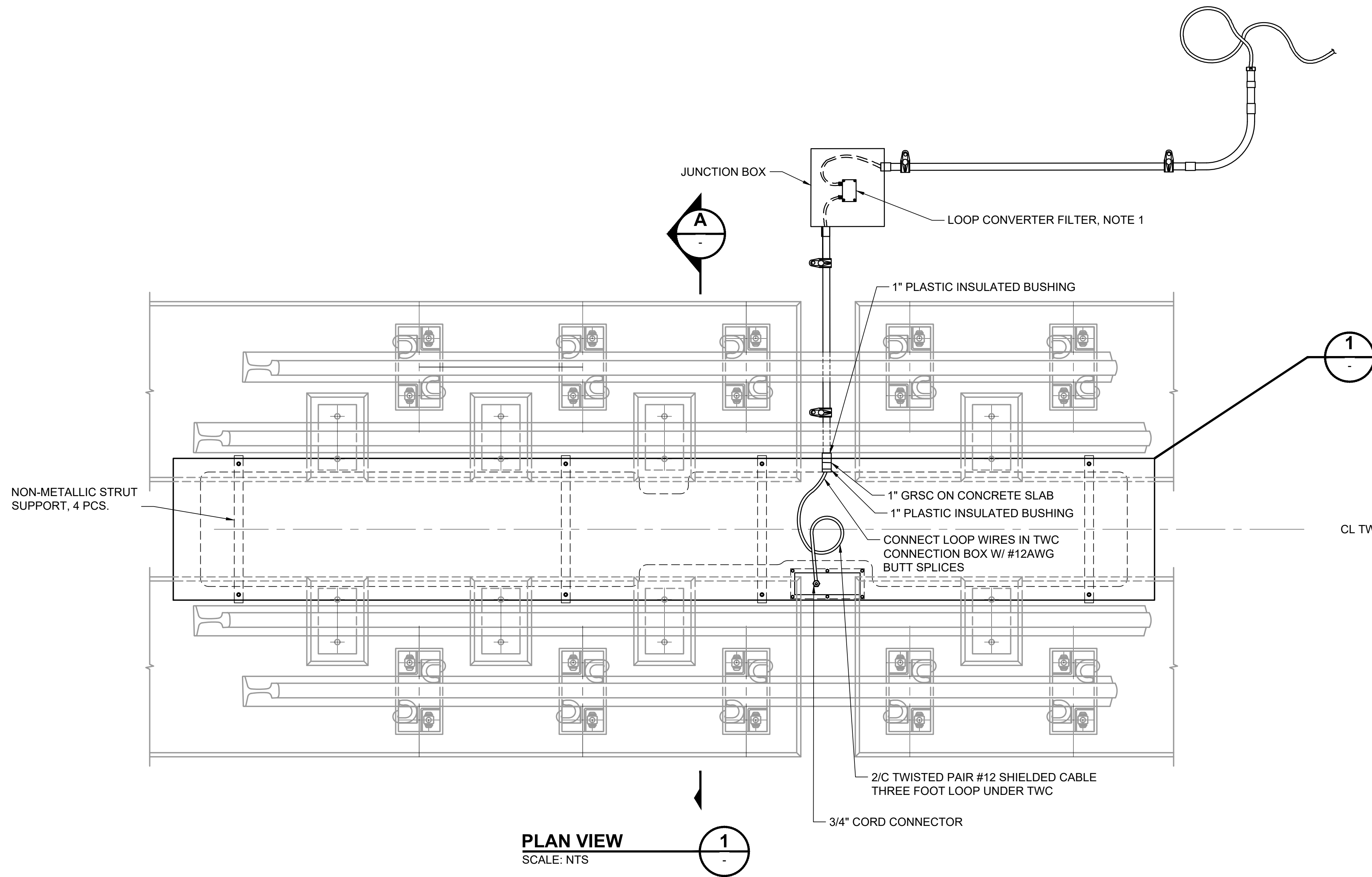
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| CONTRACT No.: RTA/LR |
| DATE: 2/2024 |

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| SOUND TRANSIT STANDARD DRAWINGS SYSTEMS | |
| SIGNALS TYPICAL TWC LOOP EMBEDDED TRACK | |

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| DRAWING No.: | STD-JSD404 |
| FACILITY ID: | |
| SHEET No.: | REV: 0 |

- NOTES:**
1. TERMINATE LOOP CONVERTER IN ACCORDANCE WITH APPROVED CONTRACTOR INSTALLATION AND TUNING PROCEDURES.
 2. RAISE TWC LOOP OFF CONCRETE PLINTH WHERE TWC SURFBOARD IS 1" BELOW TOP OF RAIL TO ENSURE PROPER RECEPTION BY LRV.
 3. PROVIDE ANCHORS DRILLED INTO CONCRETE FOR SECURING MOUNTING FRAME. PRIOR TO DRILLING INTO CONCRETE, PERFORM SCAN TO LOCATE AND AVOID REBAR PER SPEC. SECTION 03 15 25 ANCHORAGE TO CONCRETE.



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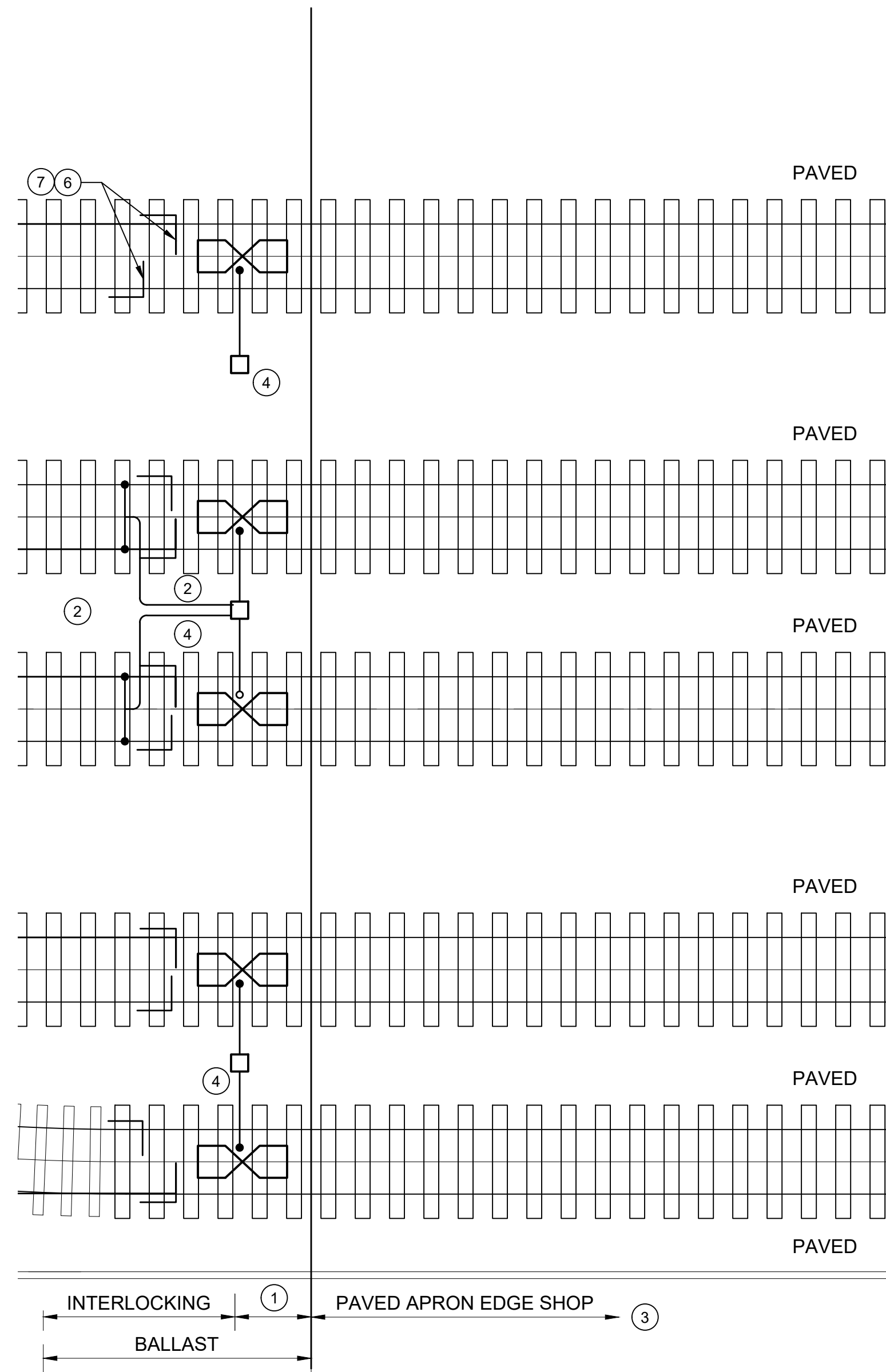
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| | CONTRACT No.: RTA/LR |
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| SOUND TRANSIT STANDARD DRAWINGS SYSTEMS | |
| SIGNALS TYPICAL TWC LOOP INSTALLATION DIRECT FIXATION WITH GUARD RAIL | |

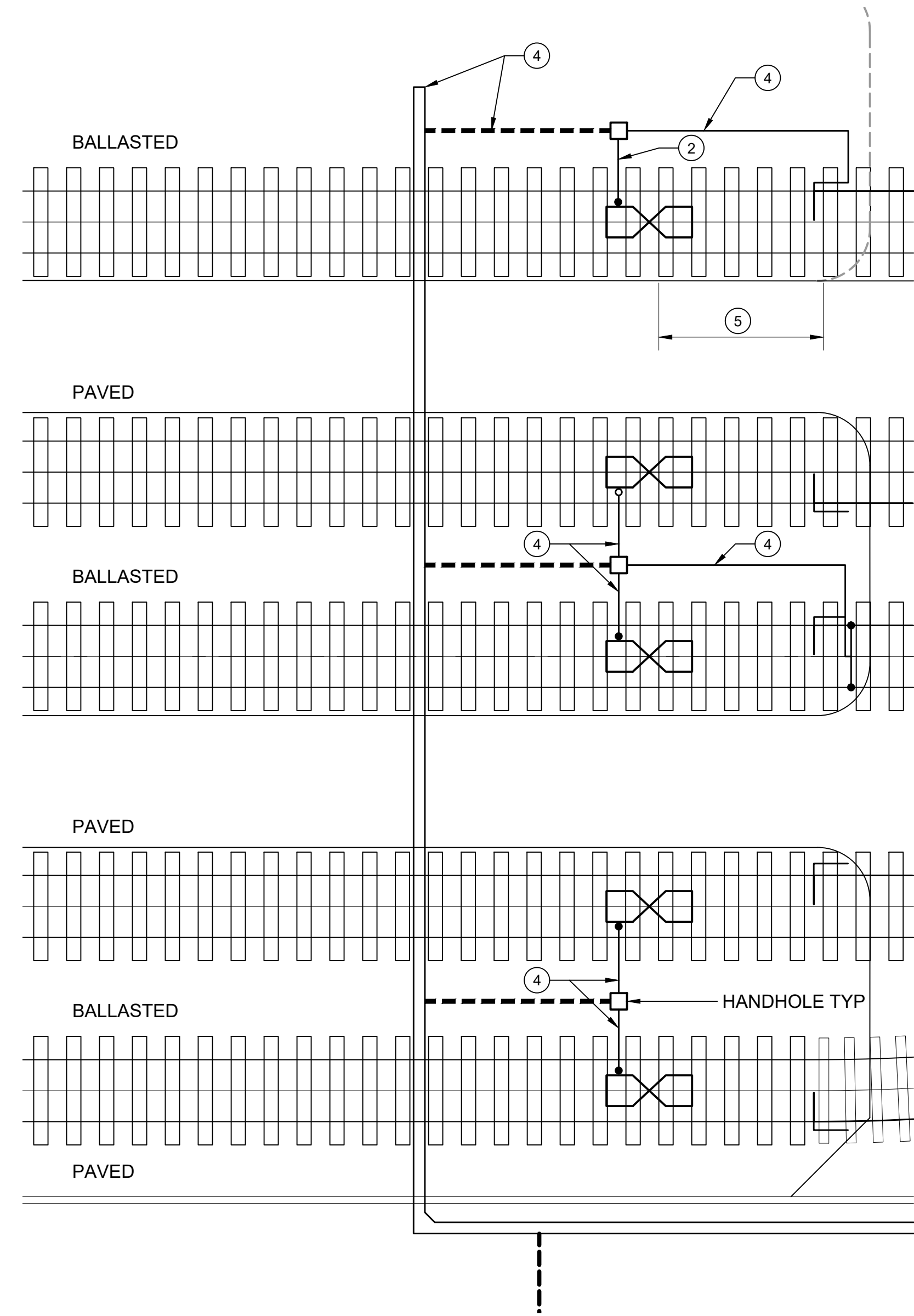
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| DRAWING No.: | STD-JSD405 |
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KEY NOTES:

- ① PLACE IJ IN BALLAST SUFFICIENT DISTANCE FROM PAVEMENT TO INSTALL 6'-6" TWC PREFABRICATED LOOP.
- ② PROVIDE PROTECTIVE HOSE FOR CABLE CONNECTIONS FROM JB TO TWC LOOP OR TRACK CIRCUIT CONNECTION, TYP.
- ③ SHOP APRON PAVEMENT TO ALLOW ONE LRV LENGTH MIN. OUTSIDE OF BUILDING WITHOUT ENTERING INTERLOCKING.
- ④ PROVIDE CONDUIT SYSTEM SIZED FOR TRACK CIRCUIT AND TWC CABLES PER MANUFACTURER'S MANUAL.
- ⑤ COORDINATE TWC & IJ LOCATION WITH YARD ROADS TO ASSURE NO EMBEDDED IJ OR TWC AND THAT 4 CAR TRAINS ON THE TWC LOOP WILL NOT BLOCK ROADS.
- ⑥ DOUBLE IJ NEEDED TO ISOLATE YARD TRACTION POWER FROM SHOP TRACTION POWER AND AT YARD/MAINLINE BOUNDARY.
- ⑦ NEG ISOLATION DOUBLE IJ SHALL COORDINATE TO BE WITHIN 28FT OF POSITIVE OCS BREAK.



SHOP APRON SIGNAL LAYOUT
SCALE: NTS



STORAGE TRACK TO INTERLOCKING INTERFACE
SCALE: NTS

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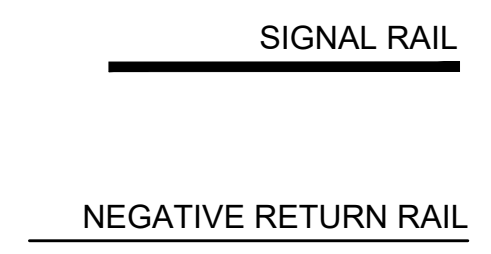
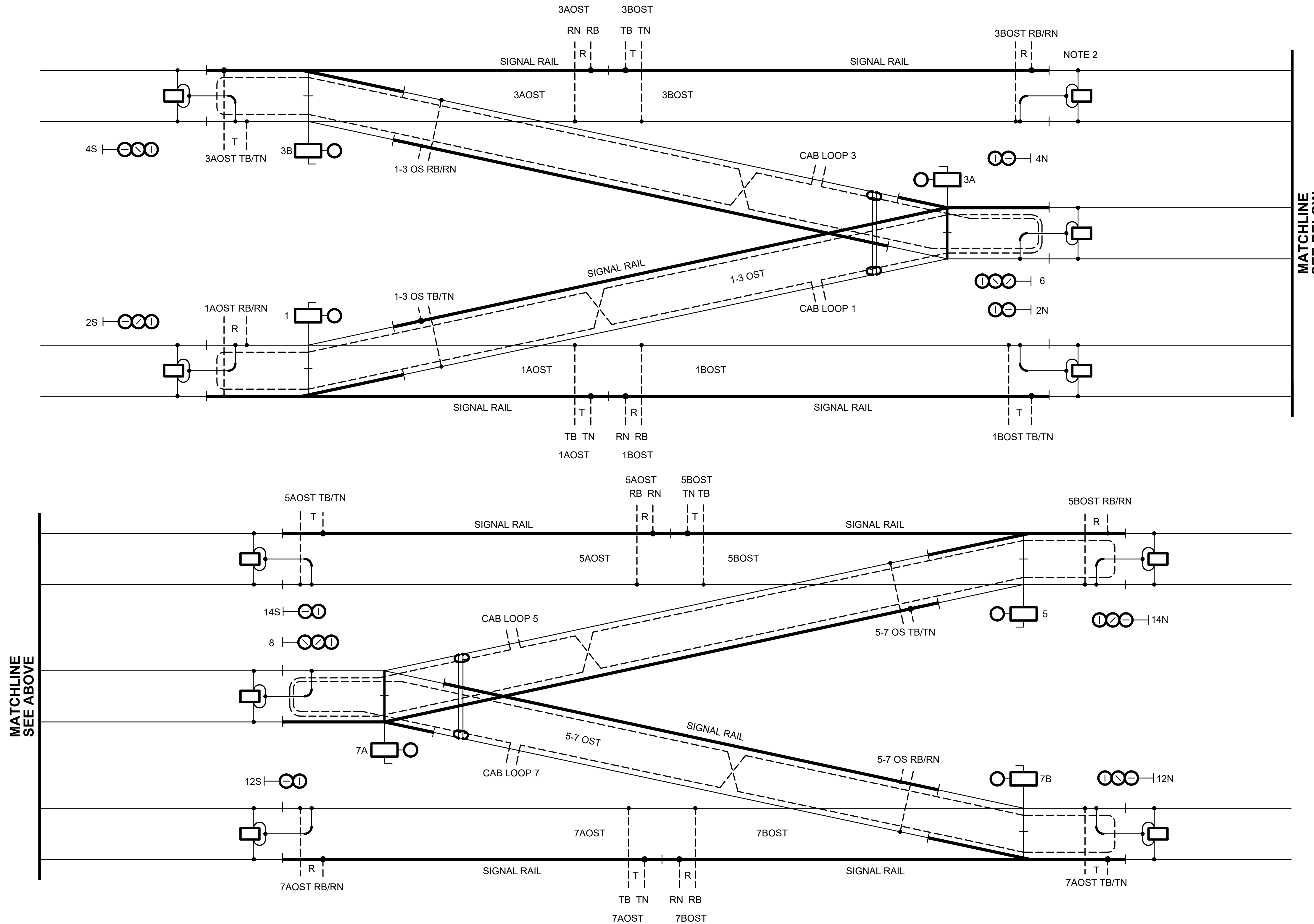
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| CONTRACT No.: | RTA/LR |
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| SOUND TRANSIT STANDARD DRAWINGS SYSTEMS | |
| SIGNALS | |
| SIGNAL SYSTEM EQUIPMENT LAYOUT STORAGE TRACKS AND YARD LAYOUT | |

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| DRAWING No.: | STD-JSD406 |
| FACILITY ID: | |
| SHEET No.: | REV: |
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GENERAL NOTES:

1. BONDING NOT SHOWN.
2. SIGNAL LOCATIONS TO BE DETERMINED BASED ON CLEARANCE WALK WAYS, OR OTHER INTERFACES.




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LINE IS 1" AT FULL SCALE



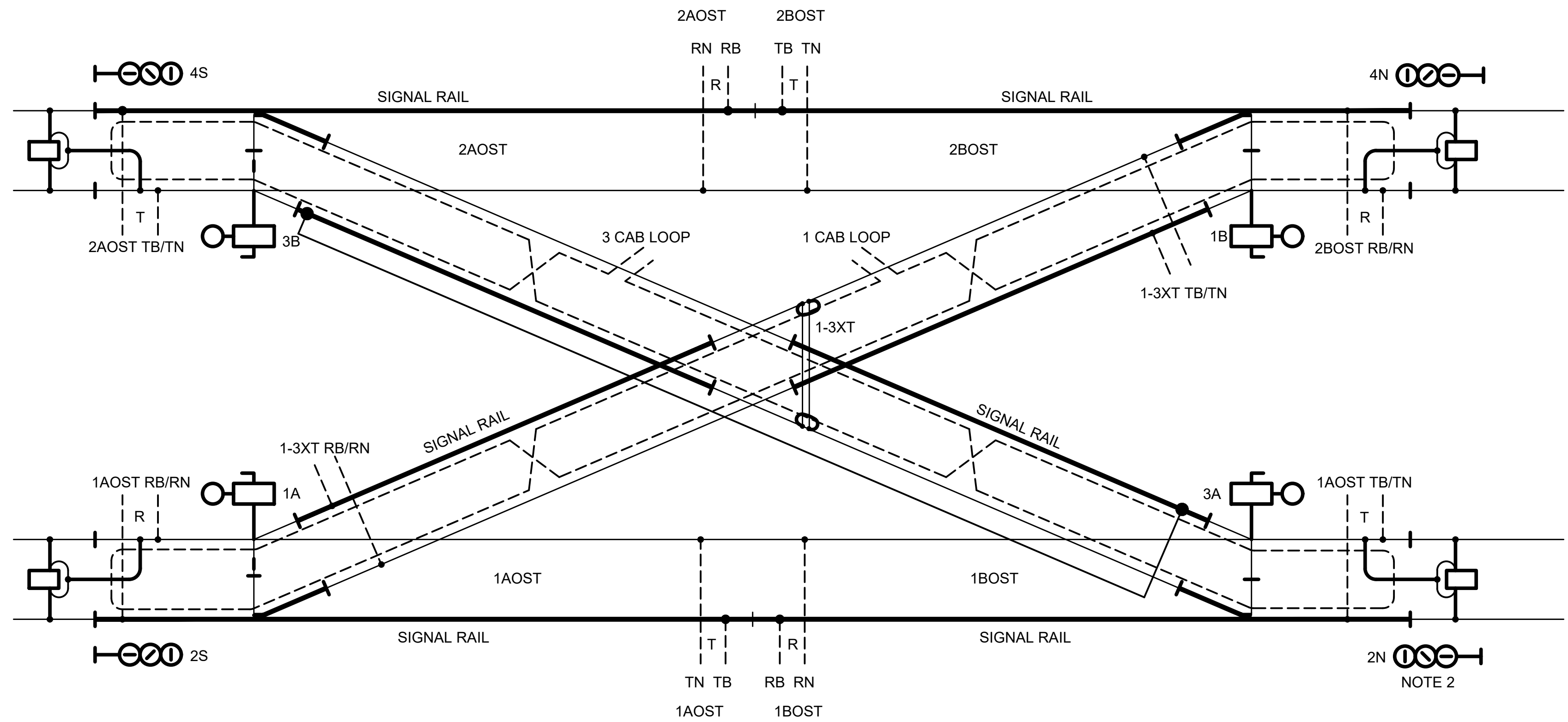
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CONTRACT No.: RTA/LR
DATE: 2/2024

**SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS**

SIGNALS
TYPICAL POCKET TRACK
INTERLOCKING EQUIPMENT LAYOUT

DRAWING No.: **STD-JSD410**
FACILITY ID:
SHEET No.: 1 REV: 1

- GENERAL NOTES:**
- BONDING NOT SHOWN.
 - SIGNAL LOCATIONS TO BE DETERMINED BASED ON CLEARANCE WALK WAYS, OR OTHER INTERFACES.




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SCALE: NTS
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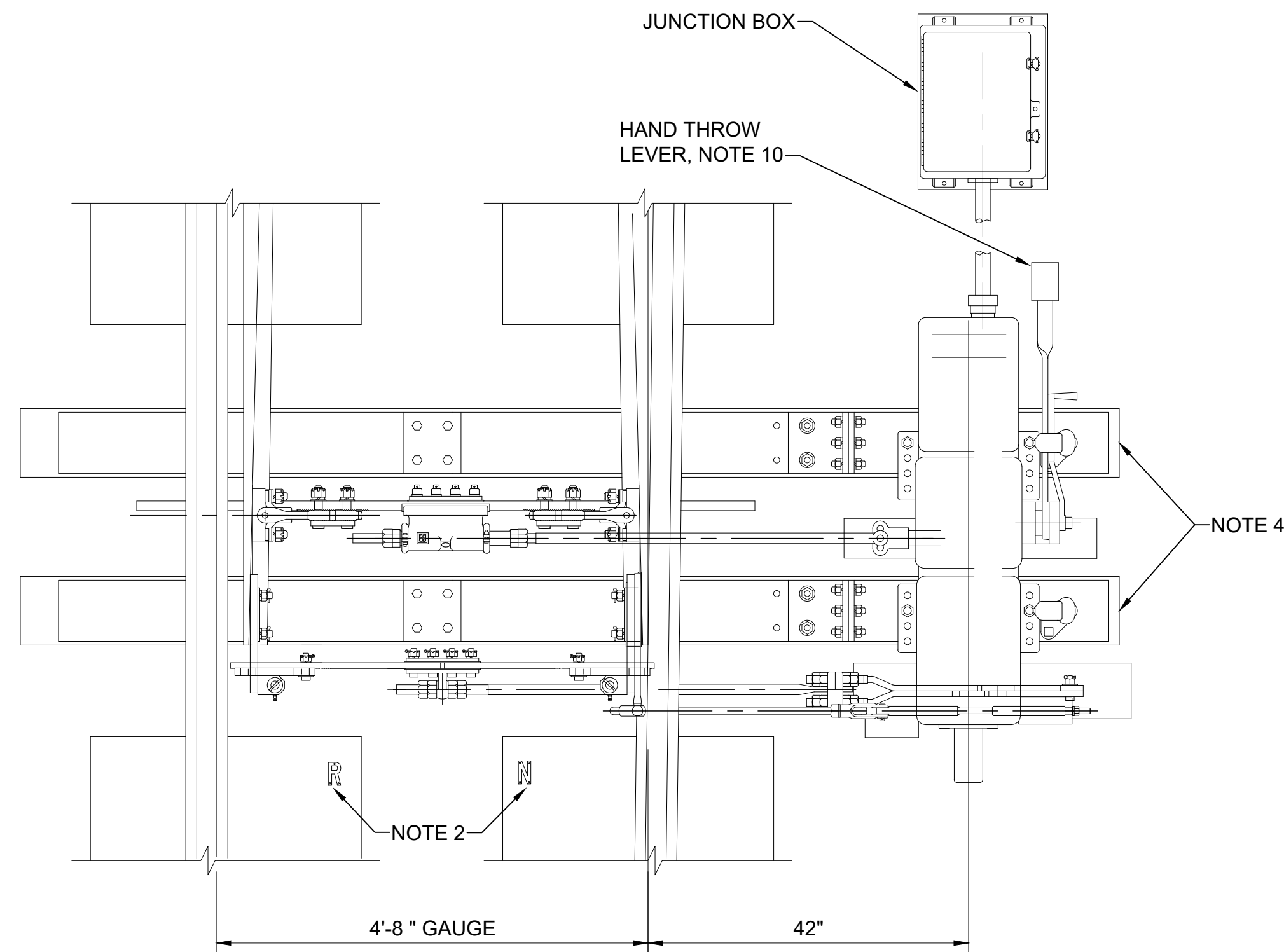
**SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS**

SIGNALS
TYPICAL DIAMOND EQUIPMENT LAYOUT

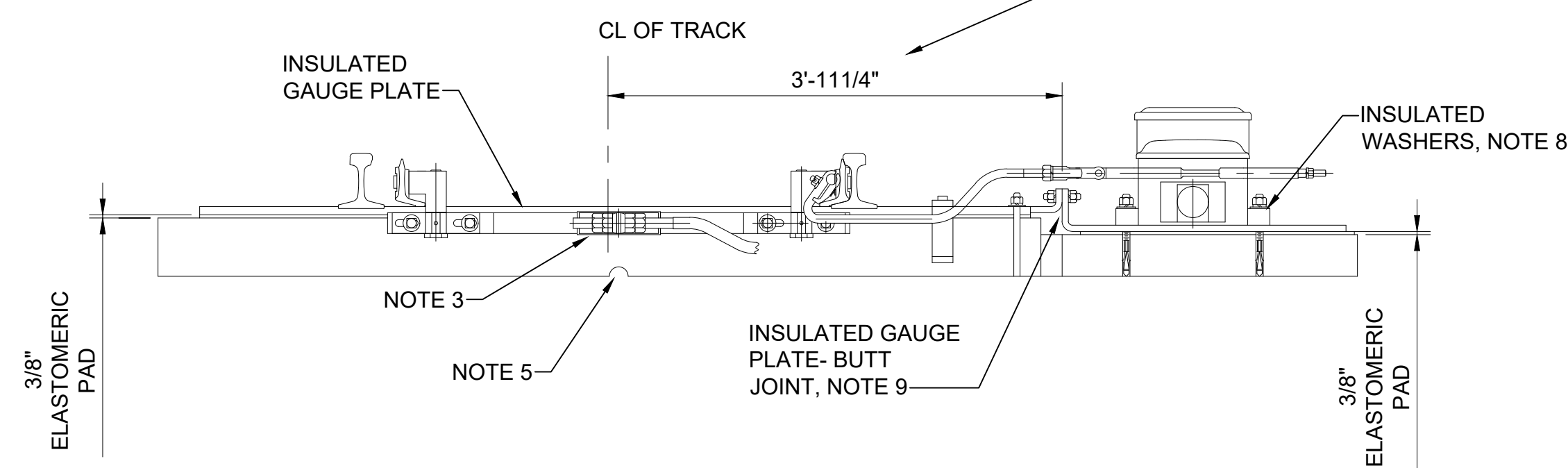
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GENERAL NOTES:

1. LAYOUT SHOWS SWITCH MACHINE ON PREFERRED CLOSED POINT SIDE OF SWITCH LAYOUT. PHYSICAL RESTRICTIONS MAY REQUIRE SWITCH MACHINES TO BE INSTALLED ON OPEN POINT SIDE.
2. PROVIDE N AND R LETTERS.
3. PROVIDE HORIZONTAL SWITCH BASKET AND FRONT ROD WITH DETECTOR LUG.
4. PROVIDE SWITCH PLINTH AS REQUIRED BY SWITCH MACHINE.
5. PROVIDE 2"X6" DRAIN OPENING THROUGH BOTH CONCRETE SWITCH PLINTHS
6. CONTRACTOR RESPONSIBLE FOR FINAL DESIGN FOR THE SWITCH LAYOUT KITS.
7. FOR INTERLOCKINGS THAT PROVIDE INSUFFICIENT SPACE TO STAND AND THROW SWITCHES, PROVIDE LOW PROFILE HAND CRANK TYPE SWITCH MACHINES AND ADJUST SPACING FROM GAUGE.
8. INSTALLATION SHALL MAINTAIN 1K OHM MINIMUM RESISTANCE BETWEEN MACHINE AND RAIL AND MACHINE AND GROUND.
9. AFTER ASSEMBLY, FILL SPACE UNDER SPACER WITH RTV SILICONE OR APPROVED EQUAL.
10. IF SELECTED AND APPROVED SWITCH MACHINE DOES NOT COME WITH A HAND THROW LEVER, CONTRACTOR MUST SUPPLY ONE HAND CRANK PER PAIR OF SWITCHES.



PLAN



ELEVATION

(RIGHT HAND LAYOUT, RIGHT HAND POINT CLOSED, WITH HAND THROW LEVER)

**TYPICAL SWITCH MACHINE LAYOUT
DIRECT FIXATION TRACK**

NTS

(ALL OTHER SWITCH DIRECT FIXATION TRACK MACHINE LAYOUTS SIMILAR TO ABOVE)

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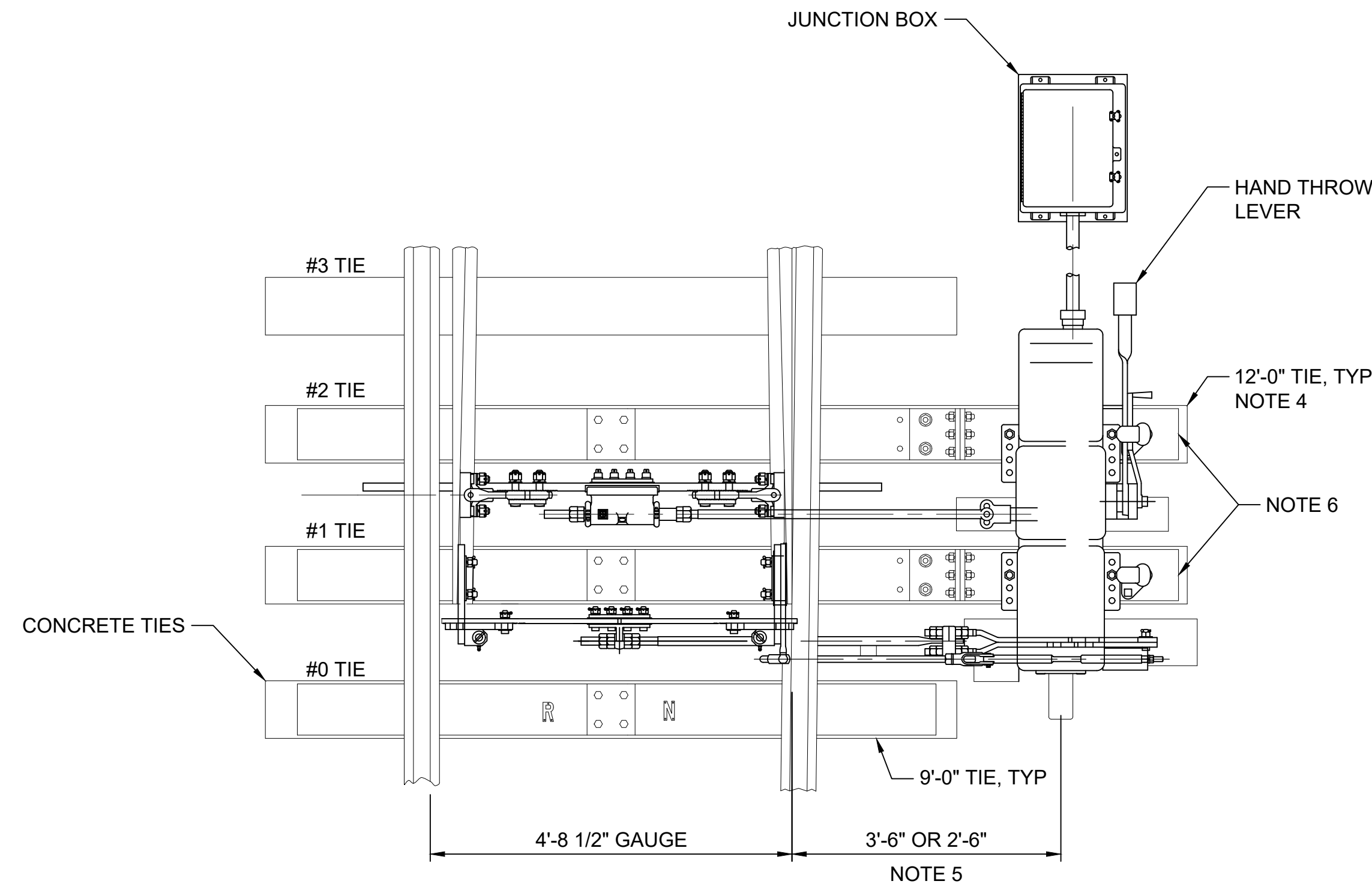
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**SOUND TRANSIT
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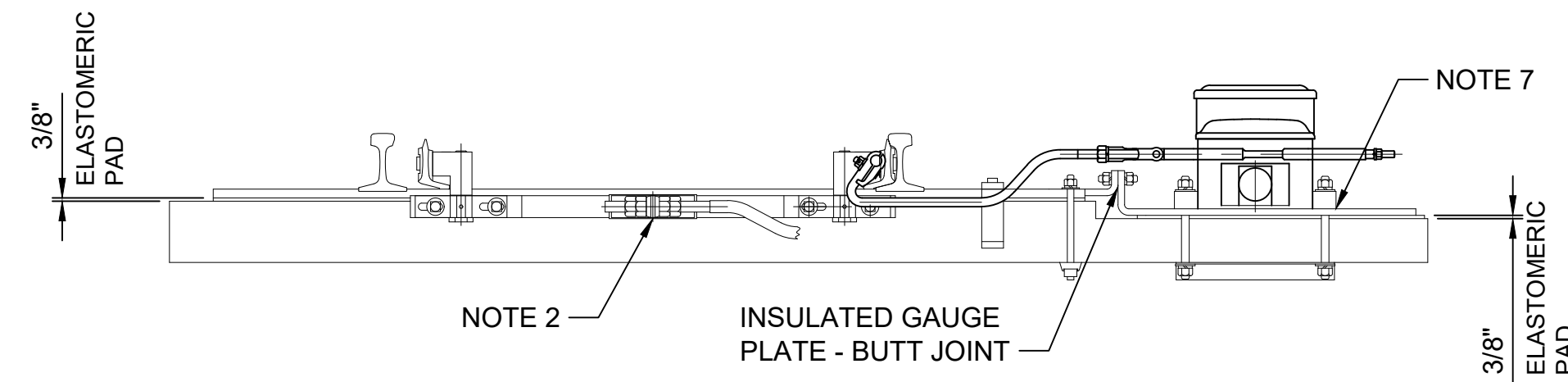
SIGNALS
TYPICAL SWITCH MACHINE LAYOUT
IN DIRECT FIXATION TRACK

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| DRAWING No.: | STD-JSD415 |
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| SHEET No.: | REV: 1 |

- NOTES:**
- LAYOUT SHOWS SWITCH MACHINE ON CLOSED POINT SIDE OF SWITCH LAYOUT. PHYSICAL RESTRICTIONS MAY REQUIRE SWITCH MACHINES TO BE INSTALLED ON OPEN POINT SIDE.
 - PROVIDE HORIZONTAL SWITCH BASKET AND FRONT ROD WITH DETECTOR LUG AND DROP LUGS FOR STRAIGHT LOCK RODS.
 - NOTCHED TIES WILL BE PROVIDED BY CONTRACTOR AS COORDINATED FOR THE REQUIREMENTS OF THE CONTRACTORS' SUBMITTED SWITCH MACHINE. IF NECESSARY, REPLACE TIES OR USE AN APPROVED METHOD TO MODIFY SWITCH TIES FOR PROVIDED SWITCH MACHINES.
 - MAINTAIN ELECTRICAL ISOLATION BETWEEN SWITCH MACHINE AND RAIL AND BETWEEN SWITCH MACHINE AND GROUND.
 - IN REDUCED CLEARANCE LOCATIONS, INSTALL SWITCH MACHINE WITH MINIMUM DISTANCE OF 30" FROM GAUGE TO CENTERLINE OF SWITCH MACHINE AND PROVIDE LOW PROFILE MACHINE WITH HAND CRANK MECHANISM.
 - PROVIDE GAUGE PLATE EXTENSION UNDER SWITCH MACHINE.
 - PROVIDE ANCHORS DRILLED INTO CONCRETE FOR SECURING MOUNTING FRAME. PRIOR TO DRILLING INTO CONCRETE, PERFORM SCAN TO LOCATE AND AVOID REBAR PER SPEC. SECTION 03 15 25 ANCHORAGE TO CONCRETE.



PLAN



ELEVATION

(RIGHT HAND LAYOUT, RIGHT HAND POINT CLOSED, WITH HAND THROW LEVER)

TYPICAL SWITCH MACHINE LAYOUT BALLASTED TRACK

1

SCALE: NTS
(ALL OTHER BALLASTED TRACK SWITCH MACHINE LAYOUTS SIMILAR TO ABOVE)

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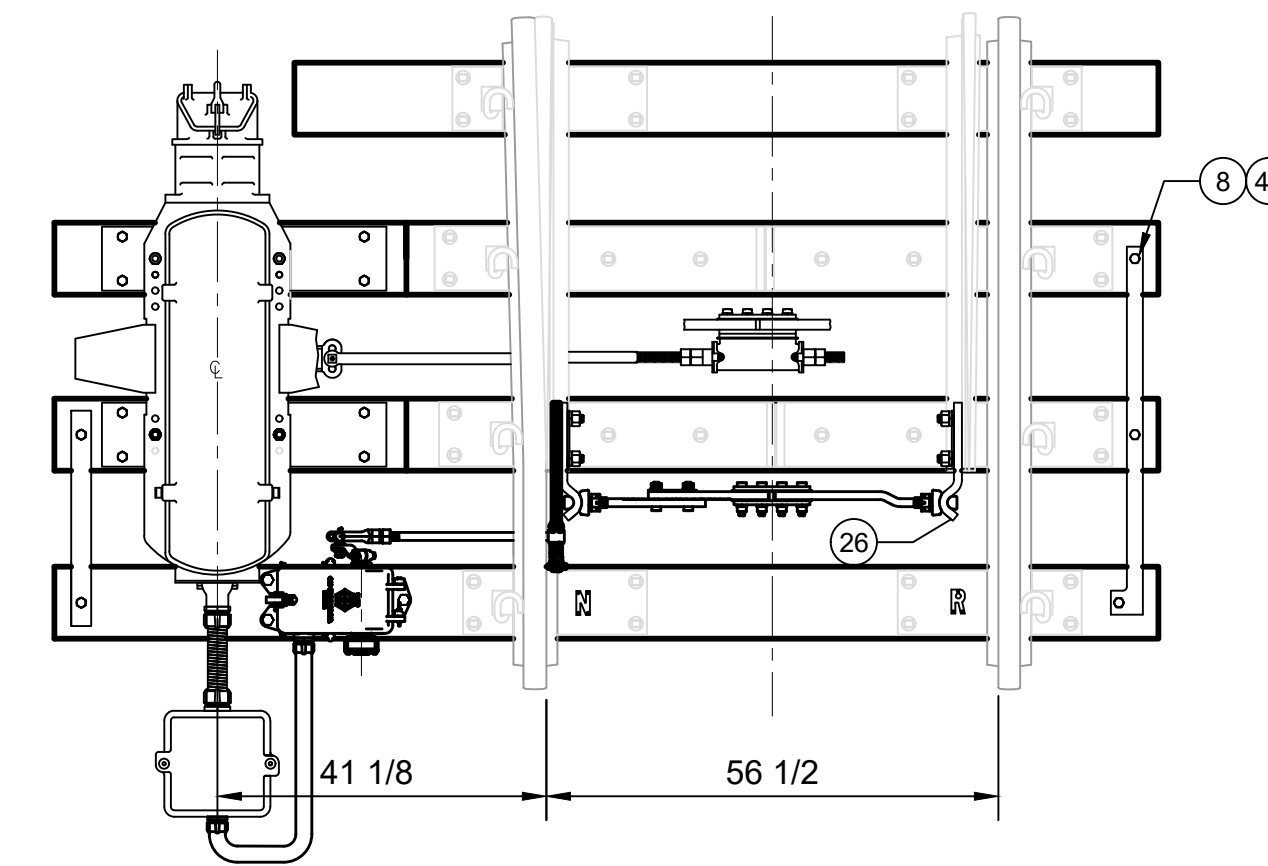
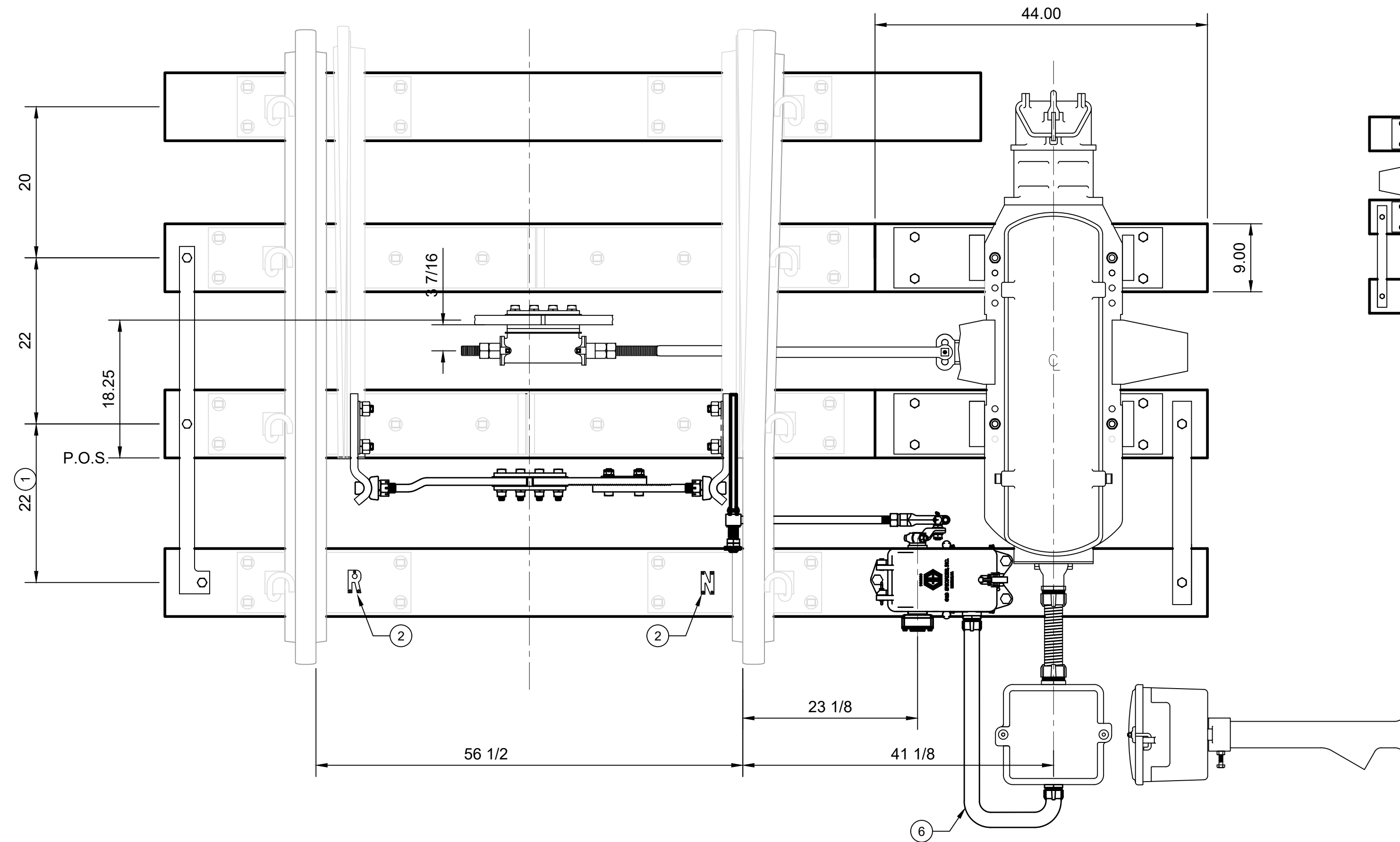
**SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS**

SIGNALS
TYPICAL SWITCH MACHINE LAYOUT
BALLASTED TRACK

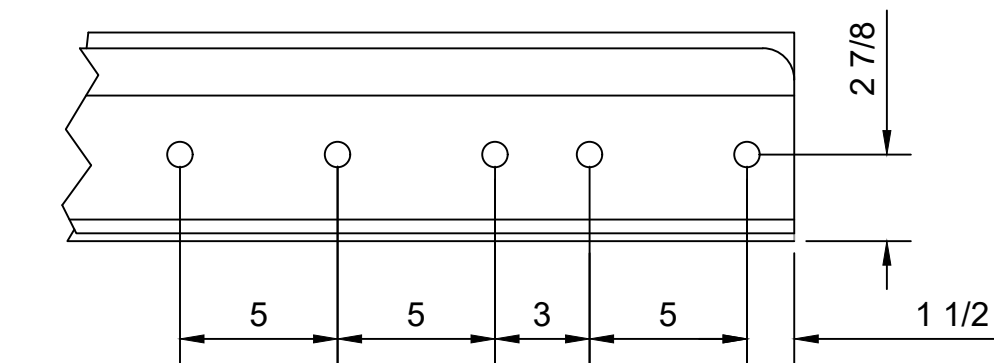
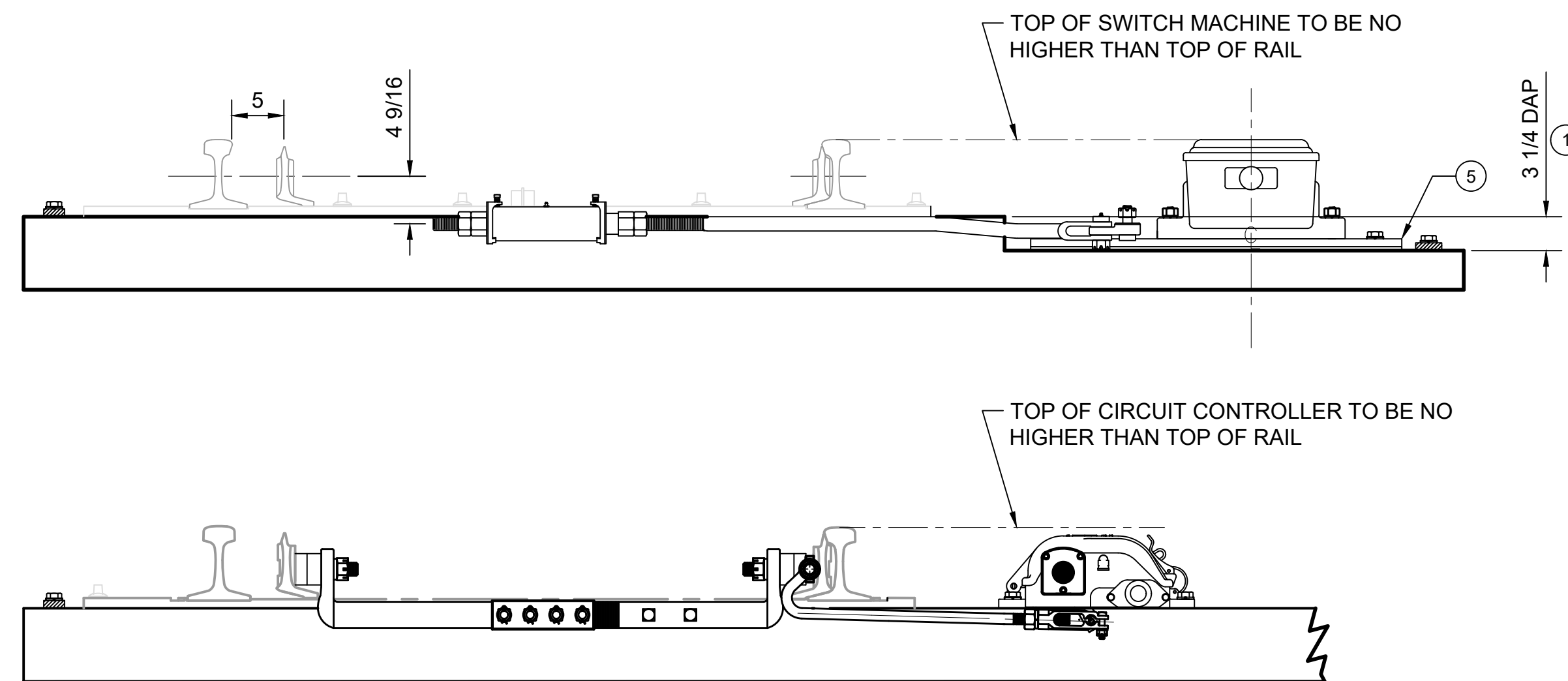
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| FACILITY ID: | - |
| SHEET No.: | 0 |

NOTES:

1. LAYOUT APPLIED TO CONCRETE TIES. HARDWARE MOUNTS TO THREADED SLEEVES DIRECTLY CAST IN TO THE CONCRETE. DETAILS SHALL BE COORDINATED BETWEEN SIGNAL AND TRACK SUPPLIERS.
2. DRILL AND TAP HOLES, USING LETTERS AS TEMPLATES.
3. APPLY ANTI-SEIZE TO ALL SCREWS FASTENING TO THE TIE BEFORE ASSEMBLING.
4. POINT OF SWITCH (P.O.S) TO BE FLUSH WITH FACE OF TIE.
5. FURNISH ELASTOMERIC PAD UNDER STEEL MOUNTING PLATES.
6. JB CONNECTION SHALL BE HOSE WHICH CAN BE CUT TO FIT FIELD REQUIREMENTS.
7. SWITCH TIES SHALL BE PERPENDICULAR TO RAIL.
8. WHEN TRACK SPACING REQUIRES USE A FAR SIDE POINT SWITCH LAYOUT
9. LAYOUT SHOWN USING ALSTOM MODEL 6 MACHINE AND 7K CONTROLLER. MODIFY AS REQUIRED IF USING OTHER PRODUCTS.
10. COORDINATE RAIL MOUNTING HARDWARE, BALLAST, AND ROD INSTALLATION TO FACILITATE CAL-ROD AND CRIB HEATER INSTALLATION.



LEFT HAND LAYOUT
SCALE: NTS



POINT DRILLING DETAIL PER AREMA DETAIL 122
SCALE: NTS

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| CONTRACT No.: RTA/LR |
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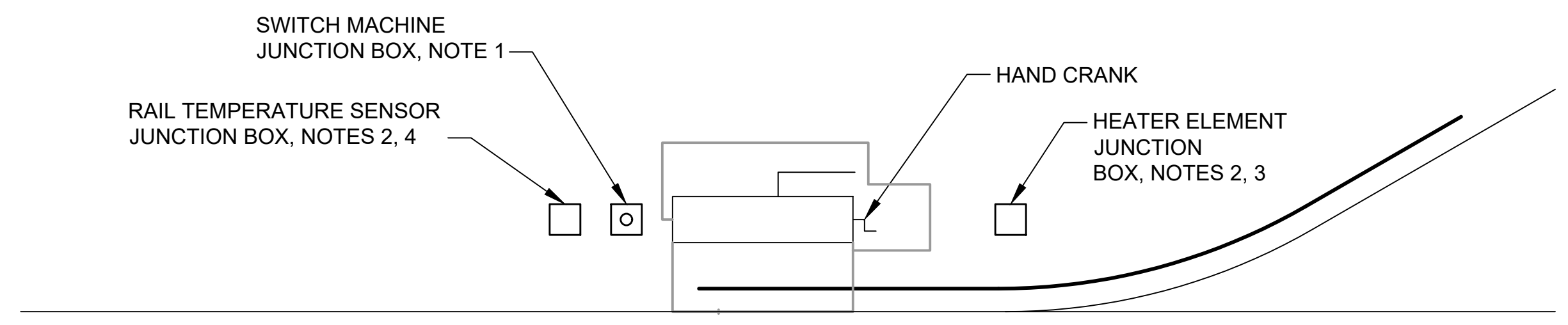
**SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS**

SIGNALS
TYPICAL SWITCH MACHINE LAYOUT
FOR NO. 5 SWITCH IN YARDS

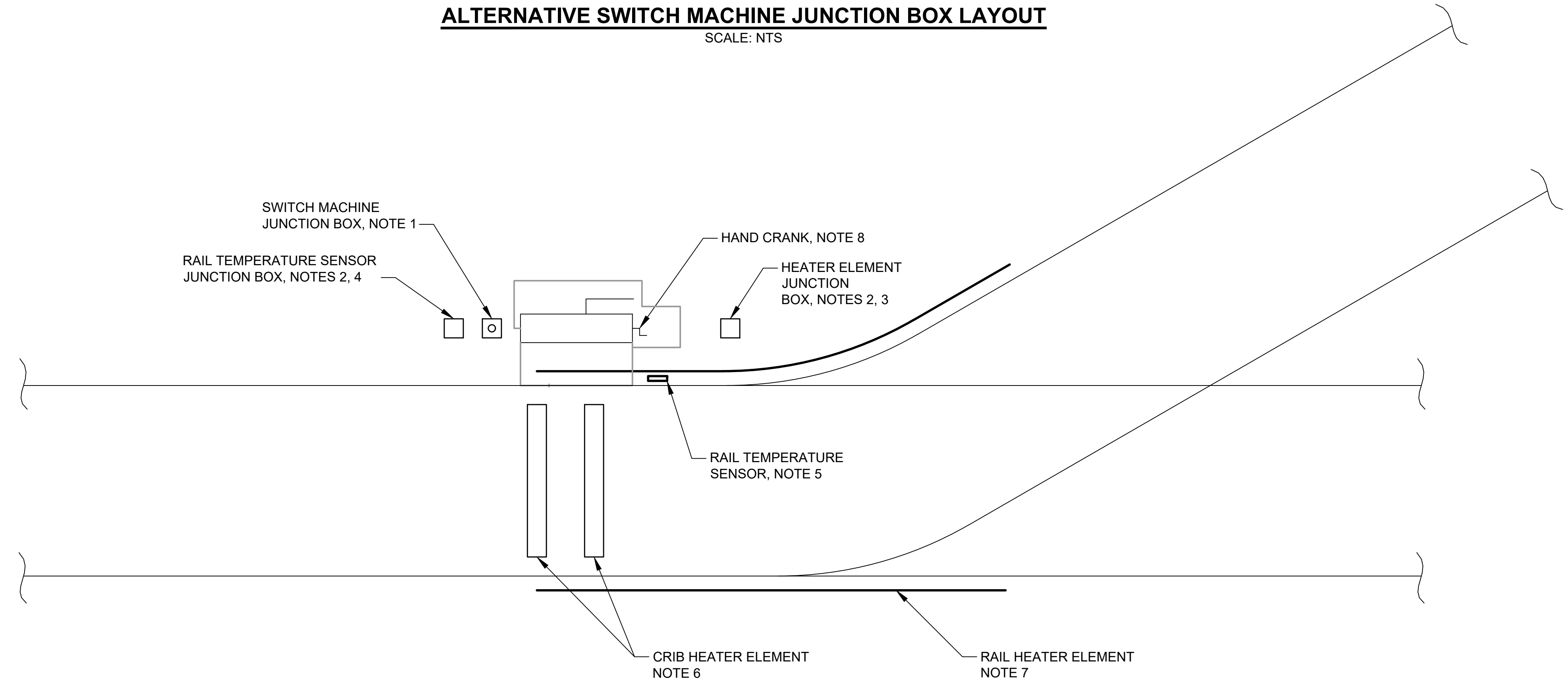
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NOTES:

1. FOR SWITCH MACHINE JUNCTION BOX AND LAYOUT SEE DWG STD-JSD415 OR STD-JSD417.
2. REQUIRED FOR ALL INSTALLATIONS, LOCATIONS THAT HEATING ELEMENTS ARE INSTALLED AND LOCATIONS THAT ARE "SWITCH HEATER READY."
3. FURNISH AND INSTALL A NEMA TYPE 4 OR 12 JUNCTION BOX FOR THE DISTRIBUTION OF ELECTRICAL POWER TO THE RAIL AND CRIB HEATING ELEMENTS. FURNISH AND INSTALL A 2" CONDUIT PATH FROM THE JUNCTION BOX TO THE SWITCH HEATER CONTROL CASE. INSTALL THE JUNCTION BOX ON THE OPPOSITE END OF THE SWITCH MACHINE FROM THE SWITCH MACHINE JUNCTION BOX OR OTHER SUITABLE LOCATION AS SPACE ALLOWS THAT DOES NOT INTERFERE WITH OTHER EQUIPMENT AND THE EMERGENCY EGRESS WALKWAY.
4. FURNISH AND INSTALL A NEMA TYPE 4 OR 12 JUNCTION BOX FOR THE CONNECTION TO RAIL TEMPERATURE SENSOR. FURNISH AND INSTALL A 1-1/4" CONDUIT PATH FROM THE JUNCTION BOX TO THE SWITCH HEATER CONTROL CASE.
5. FURNISH AND INSTALL A RAIL TEMPERATURE SENSOR CLIPPED TO THE RAIL WITHIN THE LENGTH OF THE HEATING ELEMENT.
6. FURNISH AND INSTALL CRIB HEATING ELEMENTS UNDER THE DETECTION, LOCK, AND THROW RODS TO PREVENT THE BUILDUP OF SNOW OR ICE FROM INTERFERING WITH THE OPERATION OF THE RODS. FOR DIRECT FIXATION TRACK, SECURE CRIB HEATING ELEMENT TO THE DECK ON STRUT OR OTHER APPROVED METHOD.
7. FURNISH AND INSTALL ROD TYPE HEATING ELEMENTS AT A MINIMUM FROM THE POINT OF THE SWITCH TO THE HEEL OF THE SWITCH TO PREVENT THE BUILDUP OF SNOW OR ICE FROM INTERFERING WITH THE MOVEMENT OF THE SWITCH POINTS.



ALTERNATIVE SWITCH MACHINE JUNCTION BOX LAYOUT
SCALE: NTS



RAIL HEATER INSTALLATION
SCALE: NTS

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CONTRACT No.: RTA/LR

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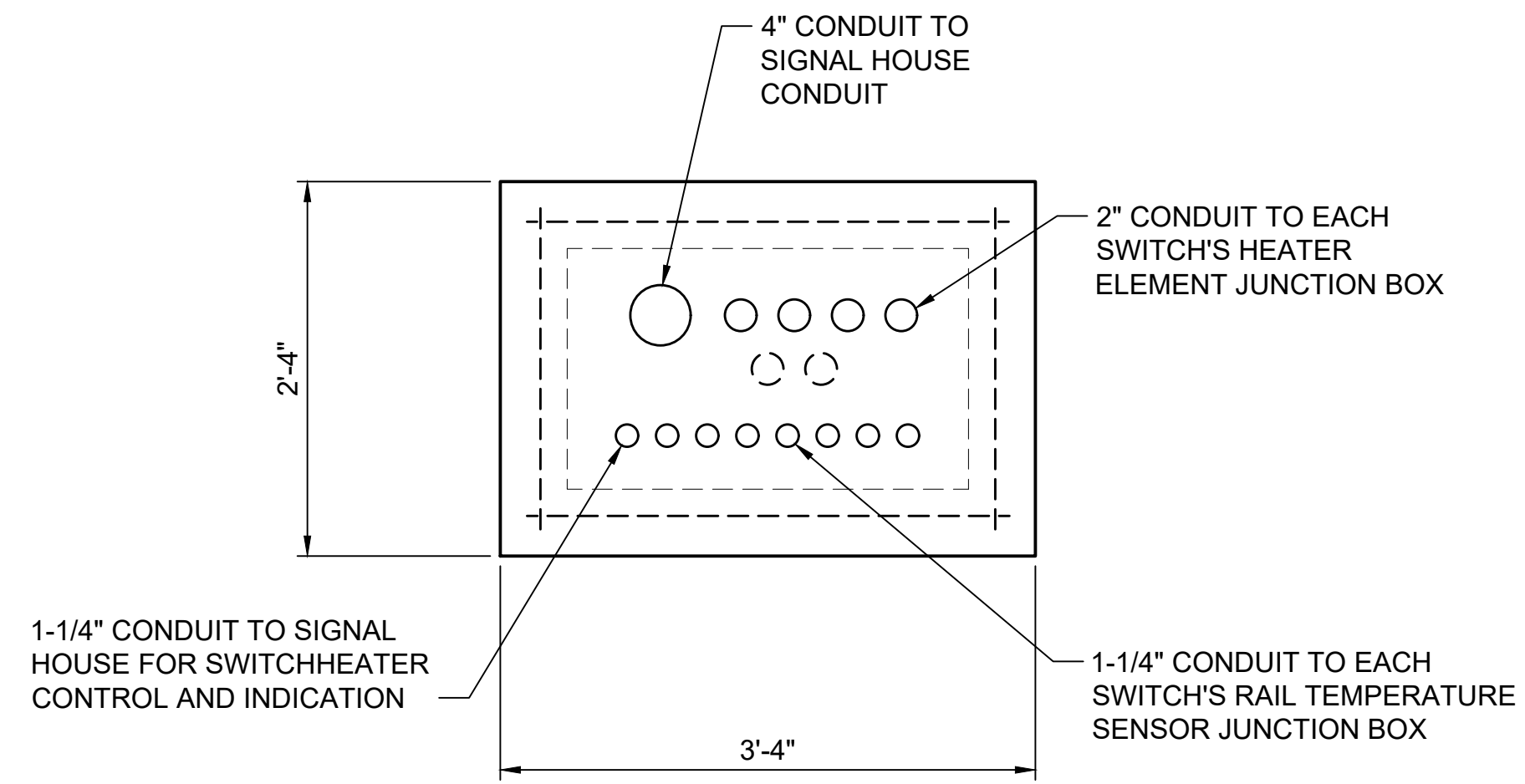
**SOUND TRANSIT
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SYSTEMS**

SIGNALS
TYPICAL SWITCH RAIL HEATER
INSTALLATION FOR MAINLINE

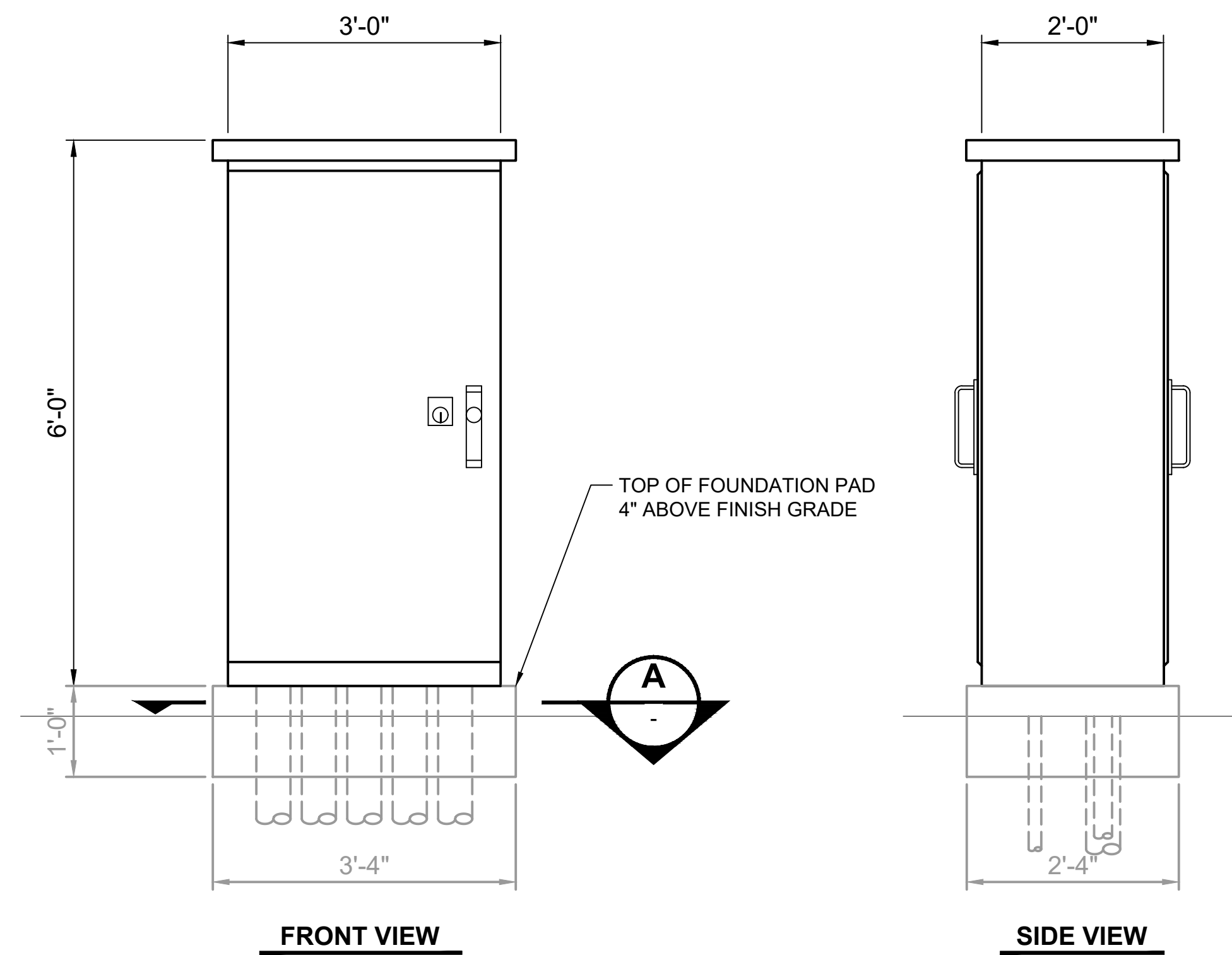
DRAWING No.: **STD-JSD500**

FACILITY ID:

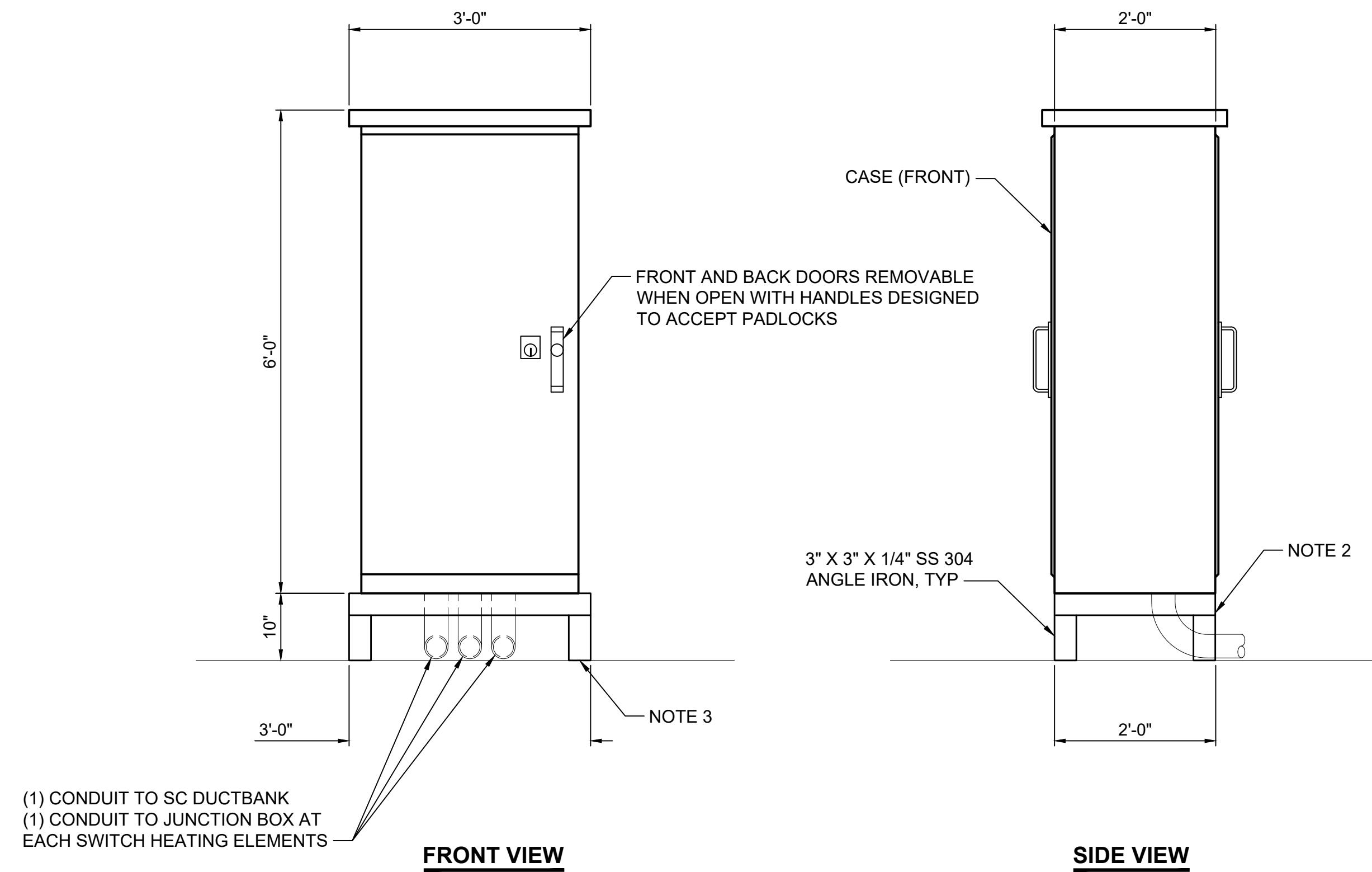
SHEET No.: REV: 0



FOUNDATION PLAN VIEW A
SCALE: NTS



TYPICAL SWITCH HEATER CASE - BALLAST TRACK 1
SCALE: NTS



TYPICAL SWITCH HEATER CASE - DIRECT FIXATION 2
SCALE: NTS

- NOTES:**
1. COAT ALL CUTS OF METAL STRUT WITH A CORROSION PROTECTION COMPOUND.
 2. PROVIDE A SPRING NUT, HEX BOLT, FLAT WASHER, AND LOCK WASHER FOR ALL BOLTED CONNECTIONS.
 3. PROVIDE AN ANCHOR, FLAT WASHER, AND LOCK WASHER FOR ALL ANCHOR CONNECTIONS.
 4. PROVIDE LIQUID TIGHT HUBS FOR ALL CONDUIT ENTRANCES.

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| 0 | 2/2024 | | | | 2024 NEW STANDARD DRAWINGS |

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LINE IS 1" AT FULL SCALE

SCALE: NTS
FILENAME: STD-JSD502
CONTRACT No.: RTA/LR
DATE: 2/2024

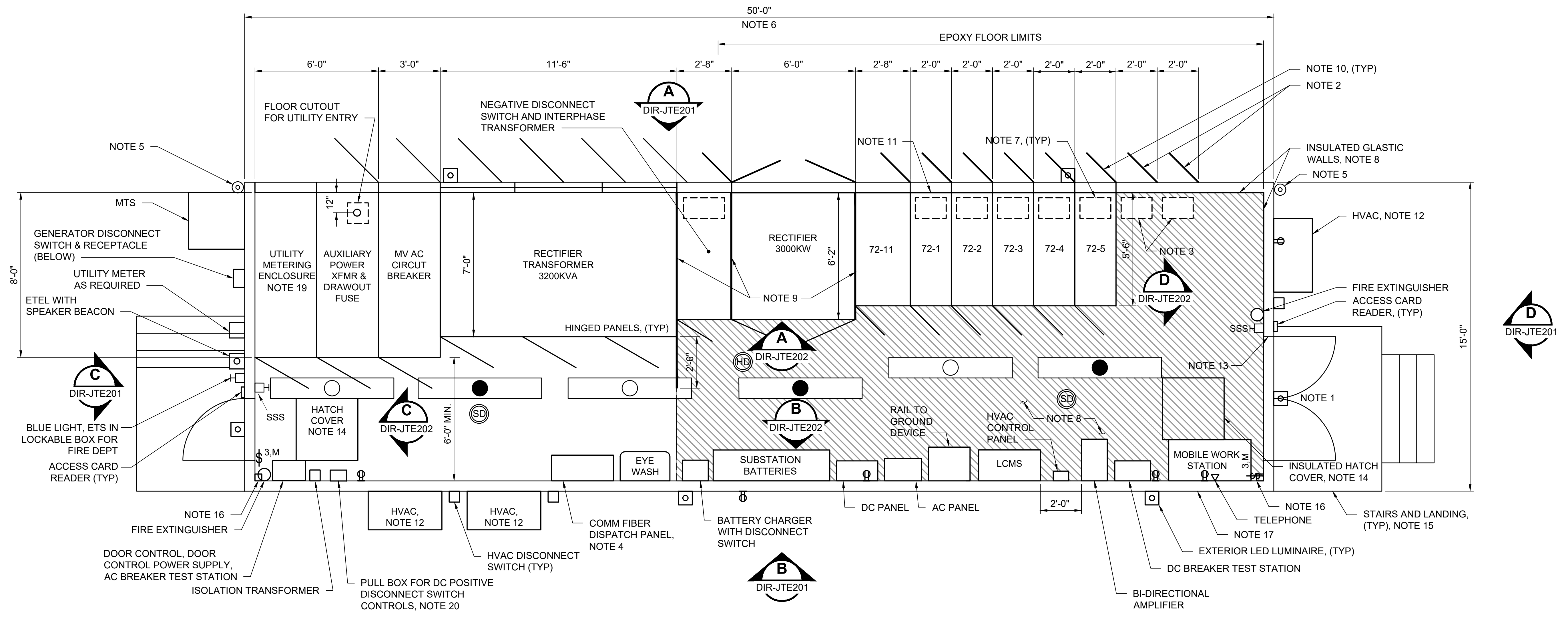
SOUND TRANSIT STANDARD DRAWINGS SYSTEMS

SIGNALS
TYPICAL SWITCH HEATER CONTROL PANEL INSTALLATION LAYOUT

| | |
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| DRAWING No.: | STD-JSD502 |
| FACILITY ID: | |
| SHEET No.: | REV: 0 |

GENERAL NOTES:

1. PROVIDE REMOVABLE TRANSOM AND WALL PANEL ABOVE DOOR.
2. PROVIDE TWO ADDITIONAL REAR ENTRY DOORS FOR ACCESS TO FUTURE DC FEEDER BREAKERS.
3. PROVIDE OPENING IN FLOOR FOR FUTURE FEEDER BREAKERS. COVER WITH 1/4" GLASTIC AND FASTEN TO FLOOR.
4. COMM TO DETERMINE FINAL LOCATION AND SIZE.
5. MOUNT CAMERAS AND CASES TO TPSS FOR WATER TEST AND REMOVE FOR SHIPMENT. REINSTALL AT SITE.
6. COORDINATE BUILDING DIMENSIONS WITH STRUCTURAL ENGINEER.
7. SIZE AND LOCATION OF DC CABLE ENTRANCES TO BE DETERMINED BY CONTRACTOR.
8. PROVIDE ELECTRICAL INSULATION ON ALL WALLS AND FLOOR IN AREAS SHOWN. IF 6" MINIMUM CANNOT BE ACHIEVED, LINE DOORS, FRAMES AND HARDWARE WITH INSULATION. FLOOR INSULATION TO EXTEND TO ALL 3 WALLS.
9. PROVIDE GLASTIC BARRIER BETWEEN RECTIFIER TRANSFORMER AND NEGATIVE DISCONNECT SWITCH. EXTEND GLASTIC 2'-6" BEYOND RECTIFIER TRANSFORMER, AS SHOWN. PROVIDE AN INSULATED SEALED FINISHED EDGE ON EXPOSED GLASTIC EDGE.
10. PROVIDE GLASTIC BARRIER INSIDE REAR DOOR TO COMPLETE WALL INSULATION WHEN DOOR IS CLOSED.
11. SPACE DC SWITCHGEAR AND RECTIFIER 2 INCHES OFF REAR WALL.
12. HVAC UNIT LAYOUT DESIGN IS FOR REFERENCE ONLY.
13. DOOR FRAMES AND DOORS TO BE INSULATED HERE REQUIRED TO MEET 6 FOOT MINIMUM FROM DC SWITCHGEAR TO GROUNDED OBJECT.
14. HATCH COVER SHALL BE RATED TO HANDLE MAXIMUM EQUIPMENT WEIGHT PER WAC 296-876 WITH PROTECTION OF THE FLOOR OPENING USING A GUARD MEETING WAC 296-880-40015
15. PROVIDE STAIRS, LANDINGS AND HANDRAIL.
16. PROVIDE CONTINUOUS GROUND BUS AROUND ENTIRE TPSS.
17. SEE DWG DIR-JTD104 FOR TPSS BASEMENT.
18. NOT REQUIRED IF UTILITY USES EXTERNAL METERING CABINET.
19. NUMBER OF LIGHTS MUST BE SUFFICIENT TO MEET LIGHTING REQUIREMENTS.
20. LOCATE AND SIZE PULL BOX TO SUIT SITE CONDITIONS.



TPSS EQUIPMENT LAYOUT PLAN
SCALE: 3/8" = 1'-0"

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| 1 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |
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| SCALE: 3/8"=1'-0" | FILENAME: STD-JTP200 |
| CONTRACT No.: | DATE: 2/2024 |

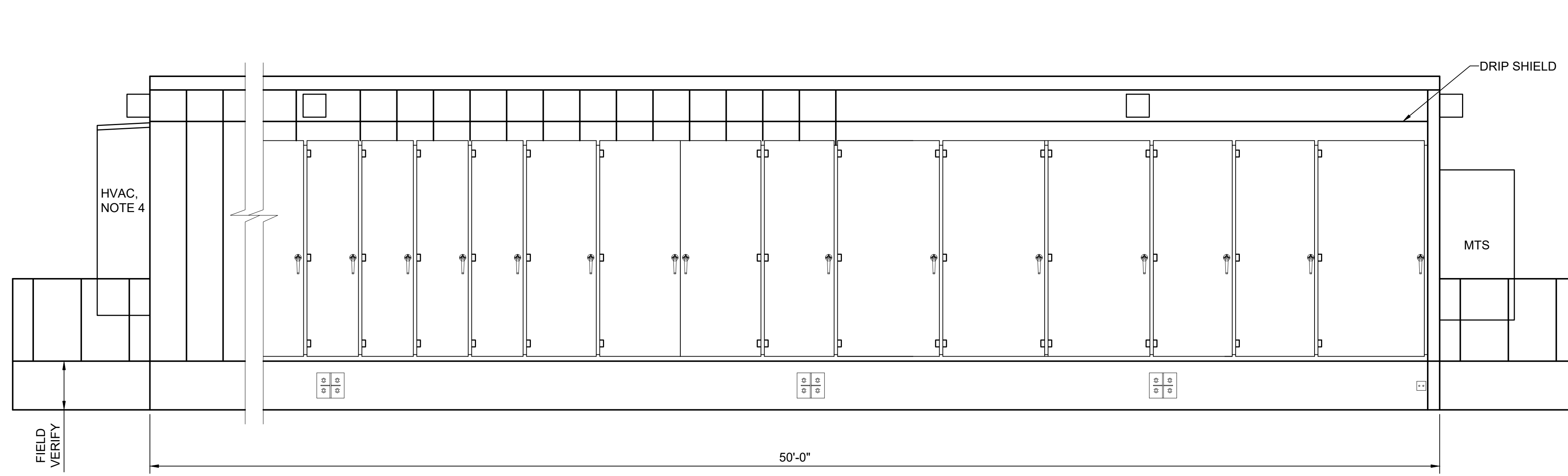
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| SOUND TRANSIT STANDARD DRAWINGS SYSTEMS | |
| TRACTION POWER TPSS EQUIPMENT LAYOUT PLAN | |

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| FACILITY ID: | |
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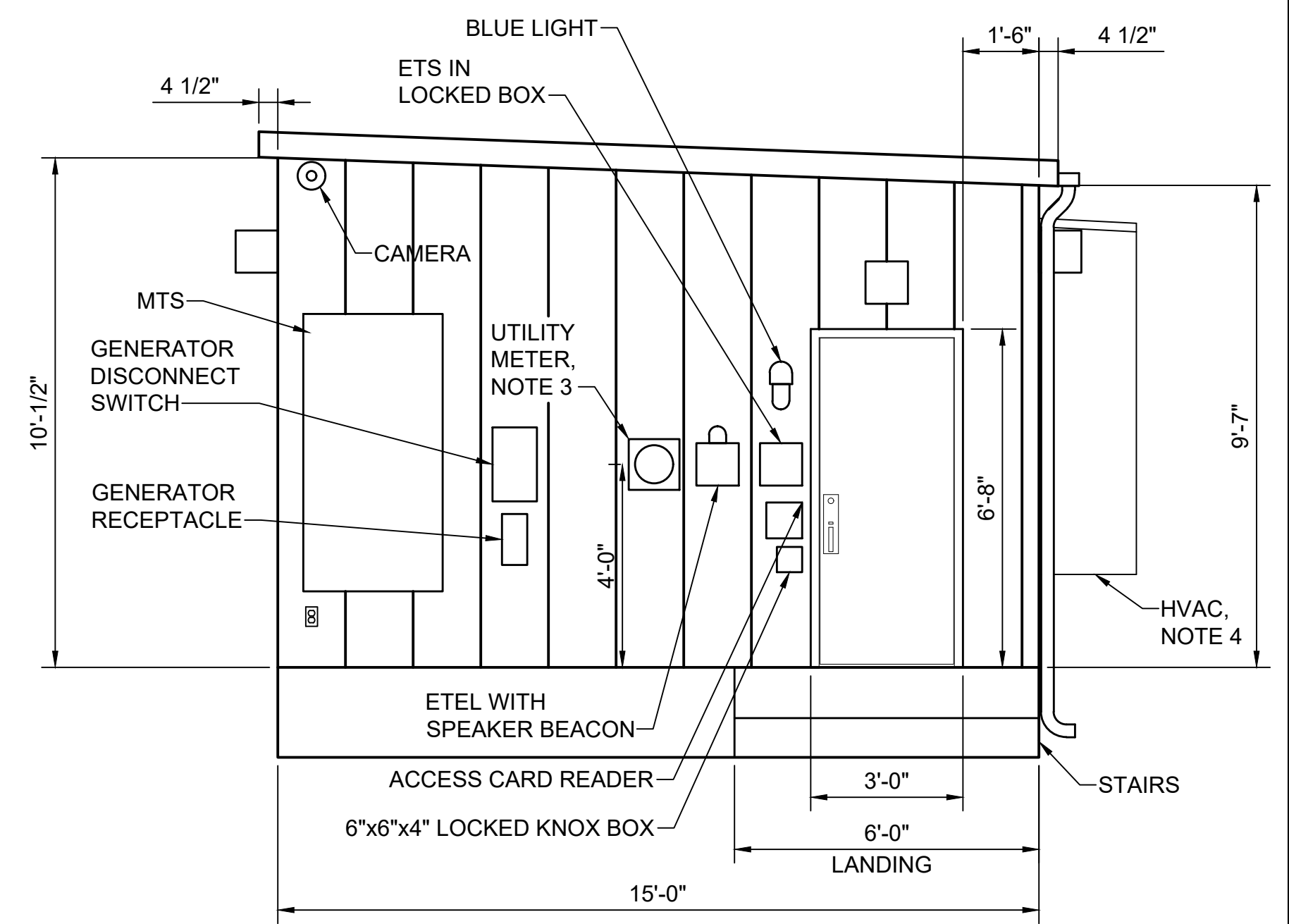
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GENERAL NOTES:

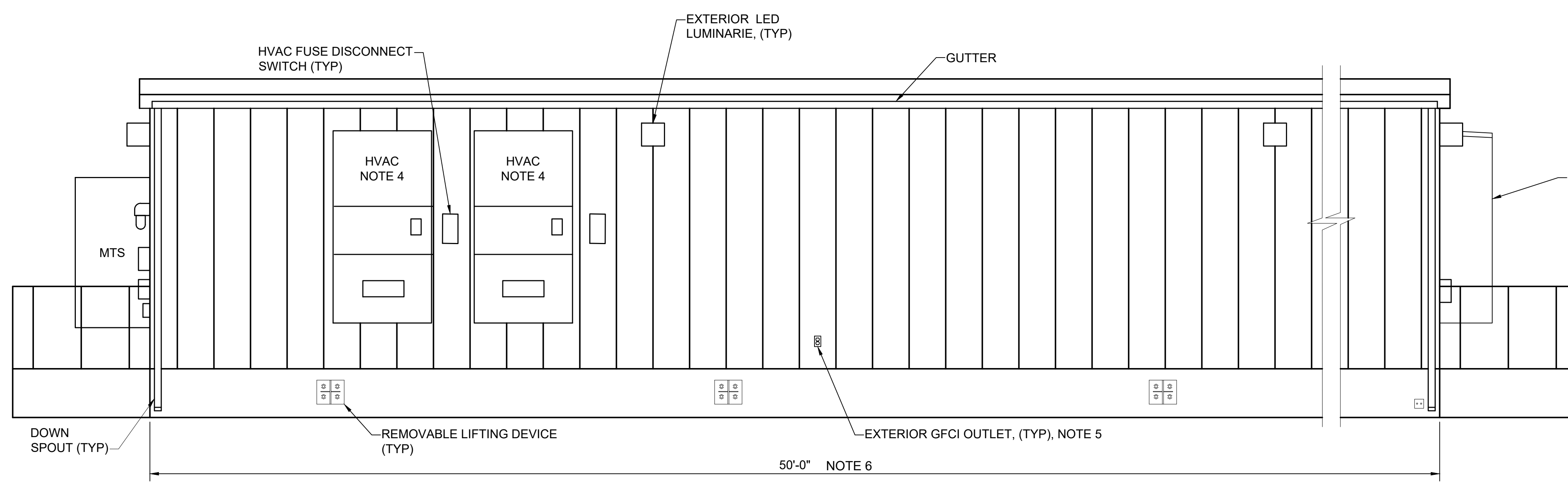
1. DIMENSIONS ARE APPROXIMATE. SUBMIT FINAL DIMENSIONS FOR APPROVAL.
2. PROVIDE 1'-8" REMOVABLE TRANSOM AND WALL PANEL ABOVE DOUBLE DOORS TO ALLOW FOR TOTAL OPENING OF 8'-4".
3. METERING EQUIPMENT AND SOCKET DETAILS SUBJECT TO REQUIREMENTS AND APPROVAL OF UTILITY.
4. HVAC UNIT DESIGN IS FOR REFERENCE ONLY.
5. PROVIDE SEPARATE CIRCUIT FOR EXTERIOR GFCI OUTLETS.
6. ADJUST TPSS LENGTH FOR TPSS WITH ADDITIONAL DC FEEDER CIRCUIT BREAKERS.



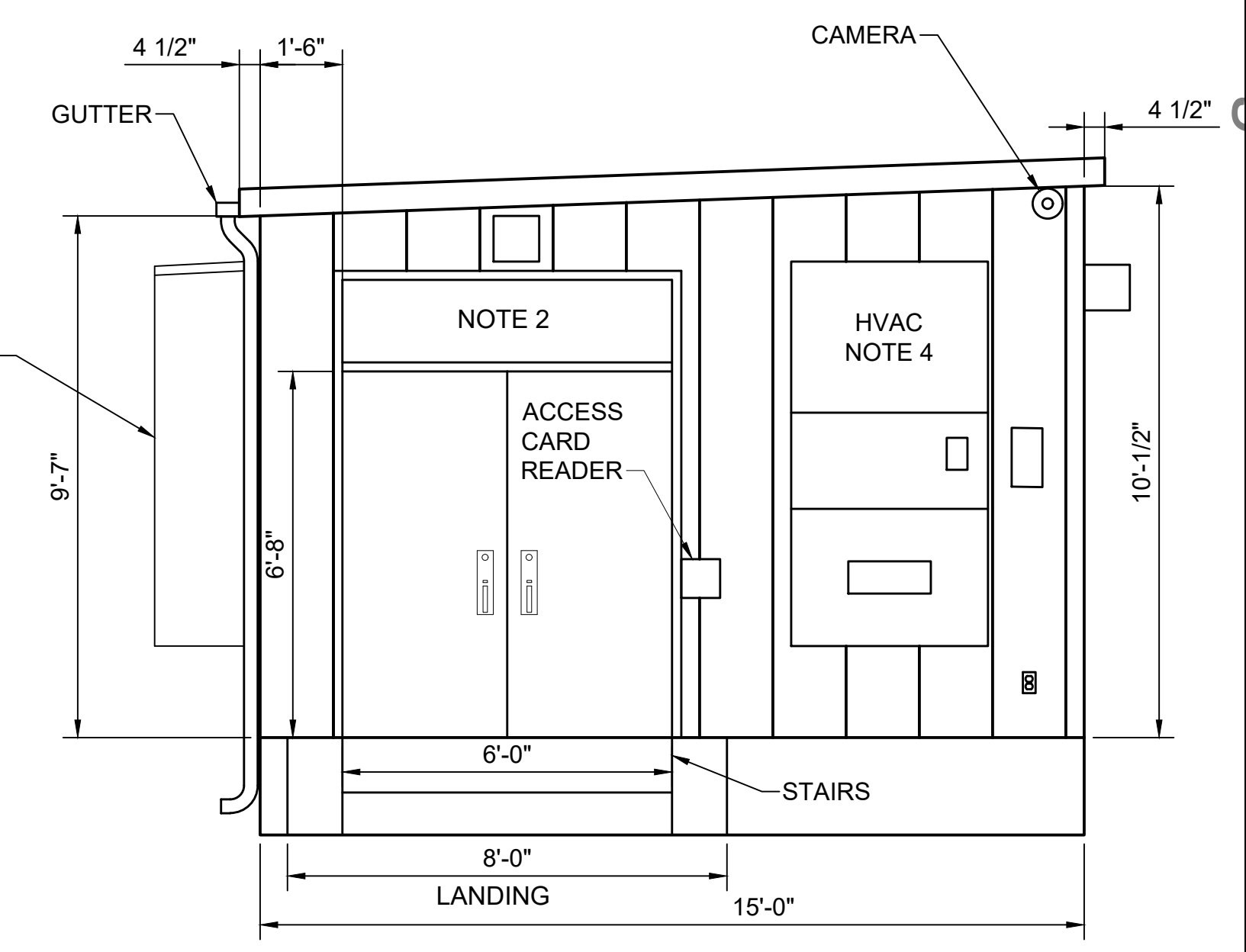
SECTION A
SCALE: 3/8" = 1'-0"
DIR-JTP200



SECTION C
SCALE: 3/8" = 1'-0"
DIR-JTP200



SECTION B
SCALE: 3/8" = 1'-0"
DIR-JTP200



SECTION D
SCALE: 3/8" = 1'-0"
DIR-JTP200

| No. | DATE | DSN | CHK | APP | REVISION |
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LINE IS 1" AT FULL SCALE

SCALE: 3/8"=1'-0"
FILENAME: STD-JTE201
CONTRACT No.: RTA/LR
DATE: 2/2024

**SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS**

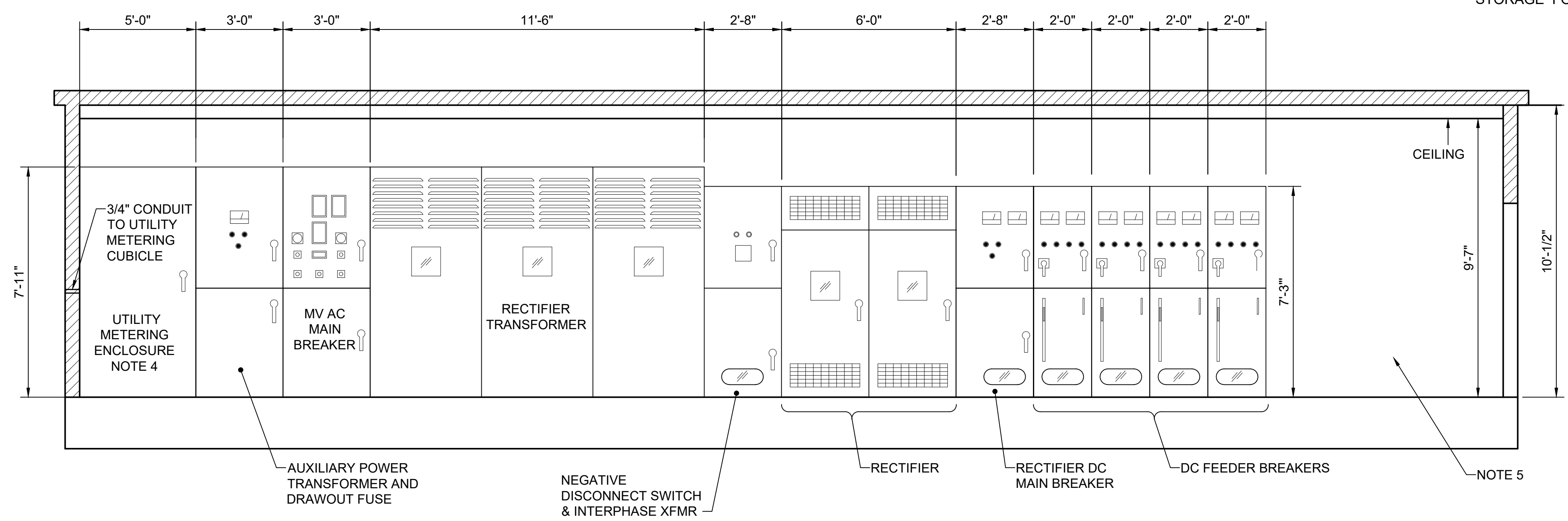
TRACTION POWER
TYPICAL PREFABRICATED TPSS EXTERIOR
EQUIPMENT ELEVATION

DRAWING No.: **STD-JTE201**
FACILITY ID:
SHEET No.: 1 REV:

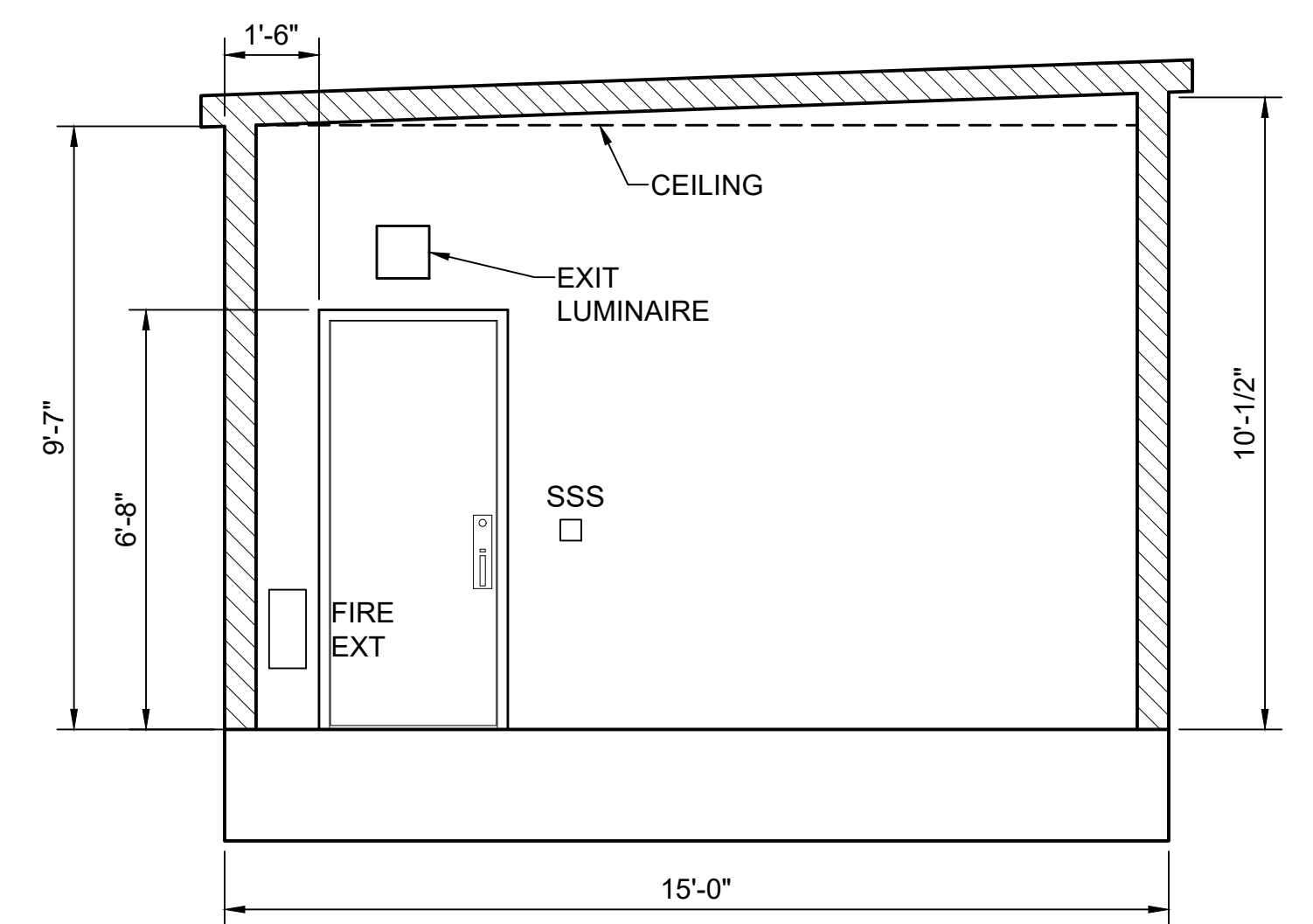
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GENERAL NOTES:

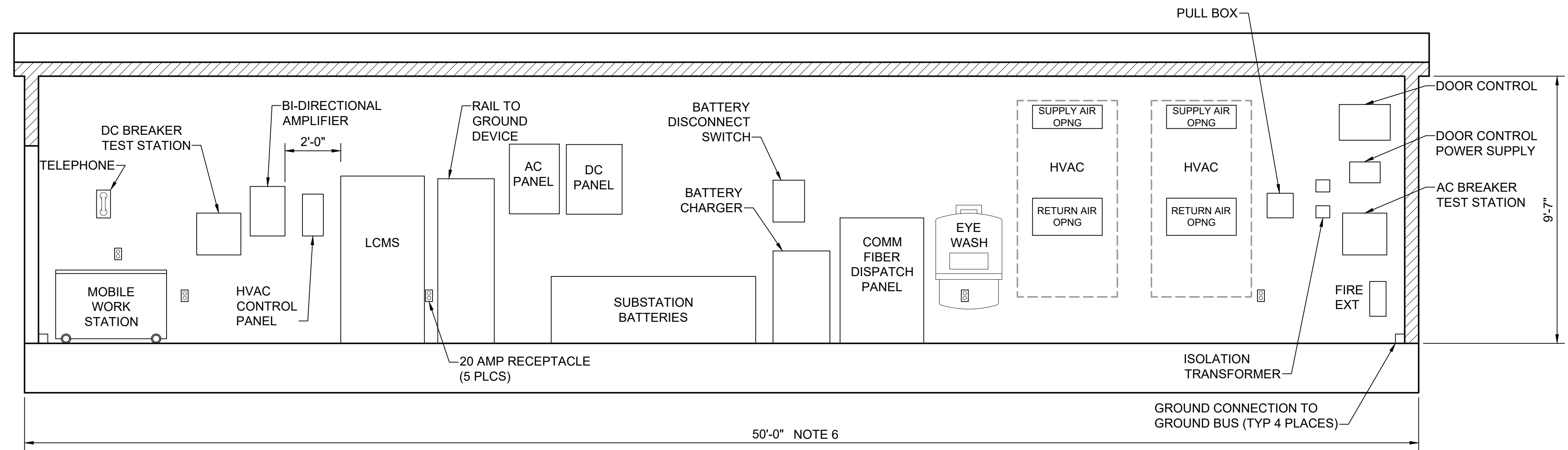
1. ALL DIMENSIONS ARE APPROXIMATE. SUBMIT FINAL DIMENSIONS FOR APPROVAL.
2. PROVIDE 1'-8" REMOVABLE TRANSOM ABOVE DOUBLE DOORS TO ALLOW FOR TOTAL OPENING OF 8'-4".
3. INSTALL 2" x 1/4" CONTINUOUS COPPER GROUND BUS AROUND ENTIRE TPSS.
4. UTILITY METERING ENCLOSURE SPACE SERVES AS EQUIPMENT STORAGE FOR PSE OR SNOHOMISH PUD FED TPSS.
5. EXTERIOR DOORS NOT SHOWN.
6. ADJUST TPSS LENGTH FOR TPSS WITH ADDITIONAL DC FEEDER CIRCUIT BREAKERS.
7. RACEWAY SYSTEMS NOT SHOWN.



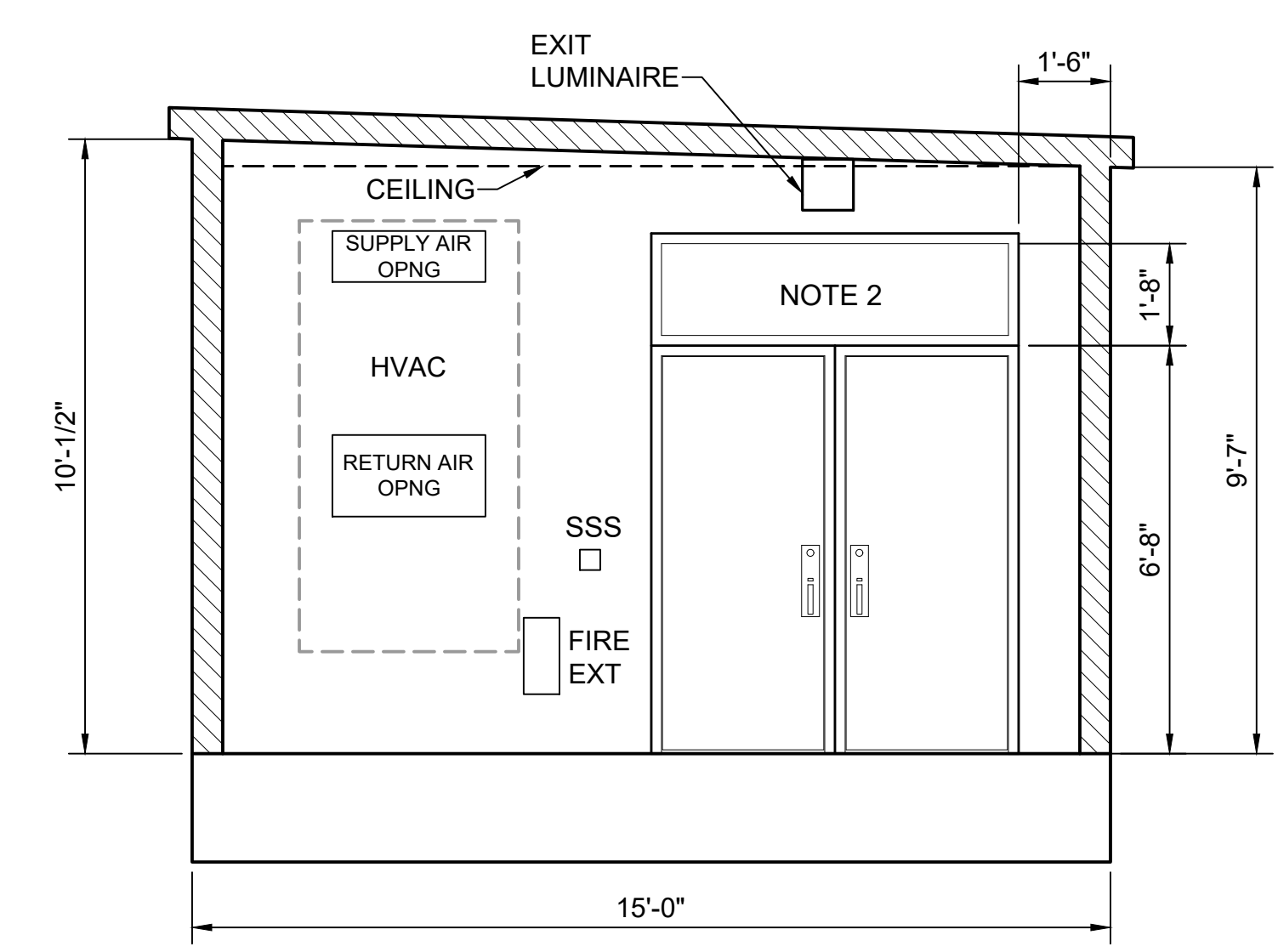
SECTION A
SCALE: 3/8" = 1'-0"
DIR-JTP200



SECTION C
SCALE: 3/8" = 1'-0"
DIR-JTP200



SECTION B
SCALE: 3/8" = 1'-0"
DIR-JTP200



SECTION D
SCALE: 3/8" = 1'-0"
DIR-JTP200


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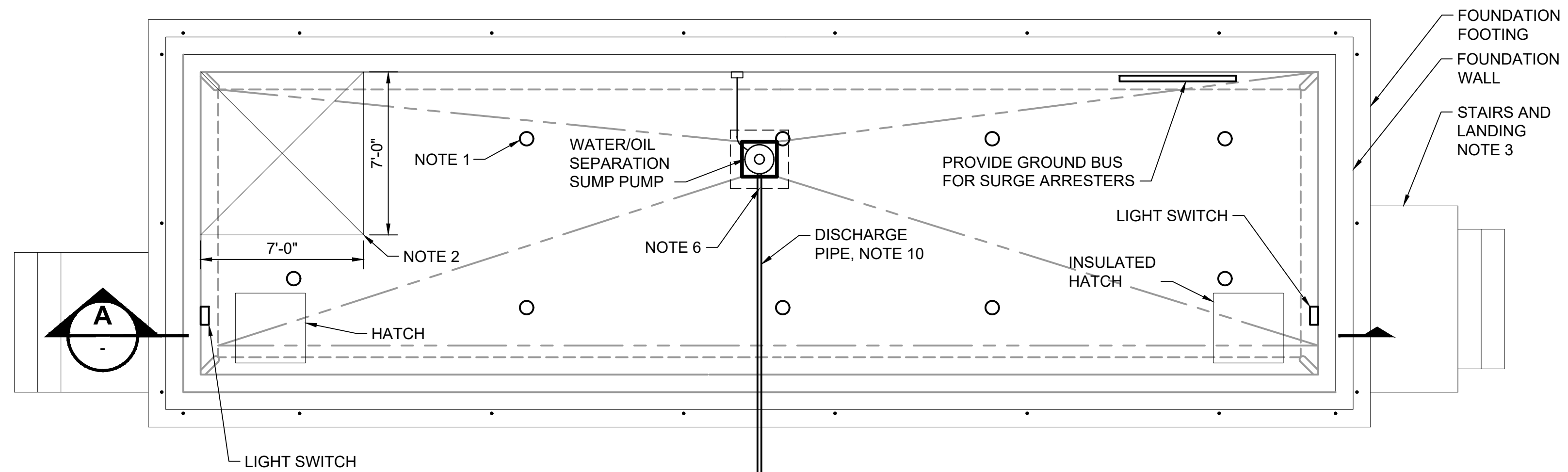
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**SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS**

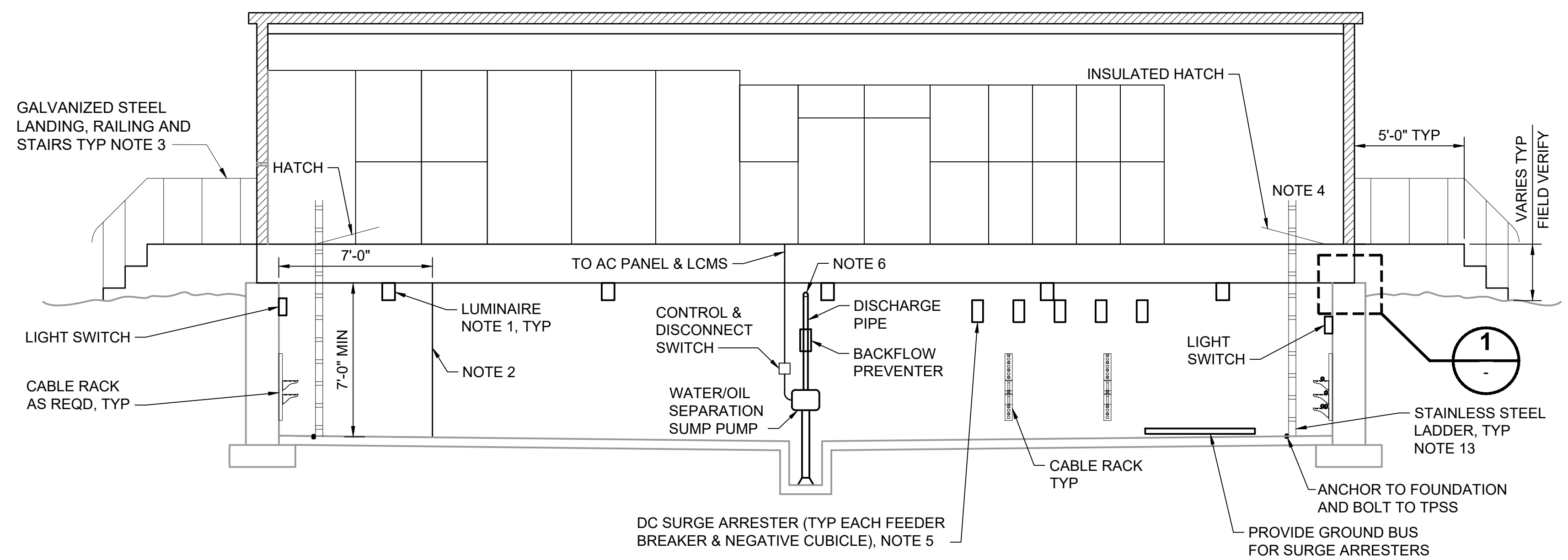
TRACTION POWER
TYPICAL PREFABRICATED TPSS BUILDING
INTERIOR ELEVATIONS

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| DRAWING No.: | STD-JTE202 |
| FACILITY ID: | |
| SHEET No.: | REV: 1 |

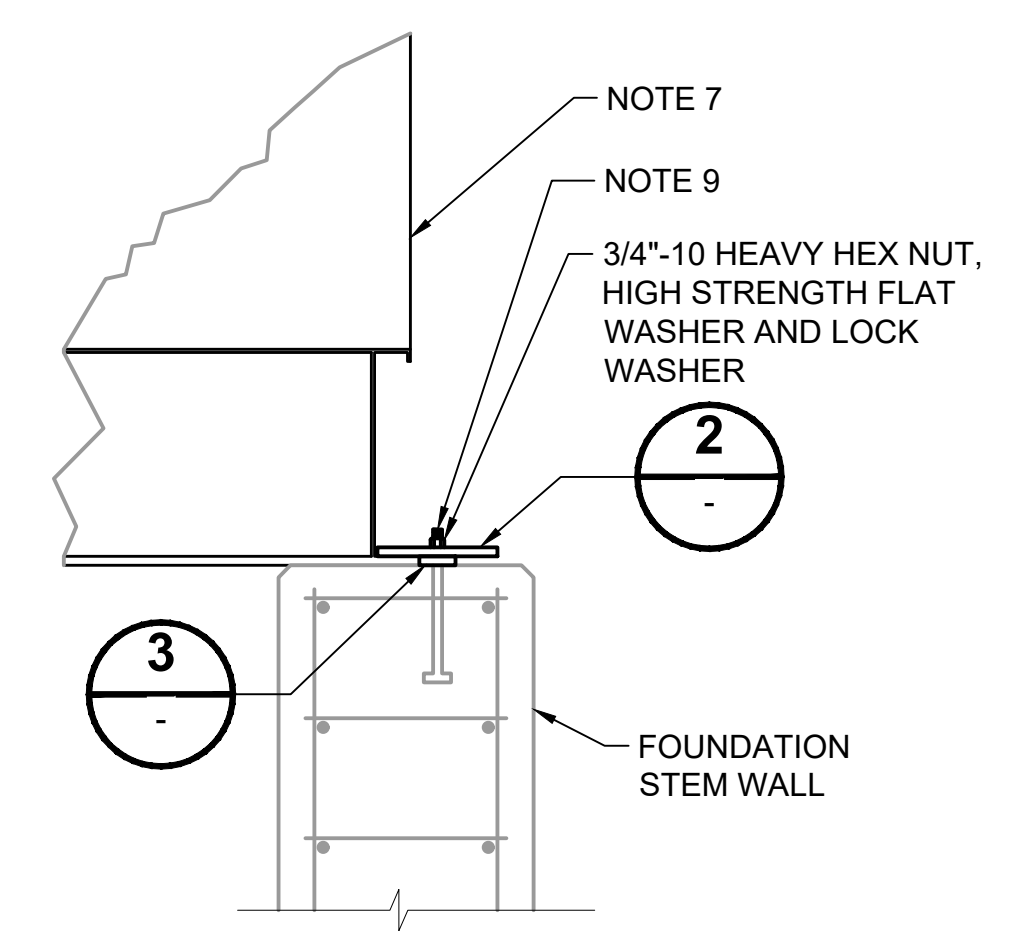
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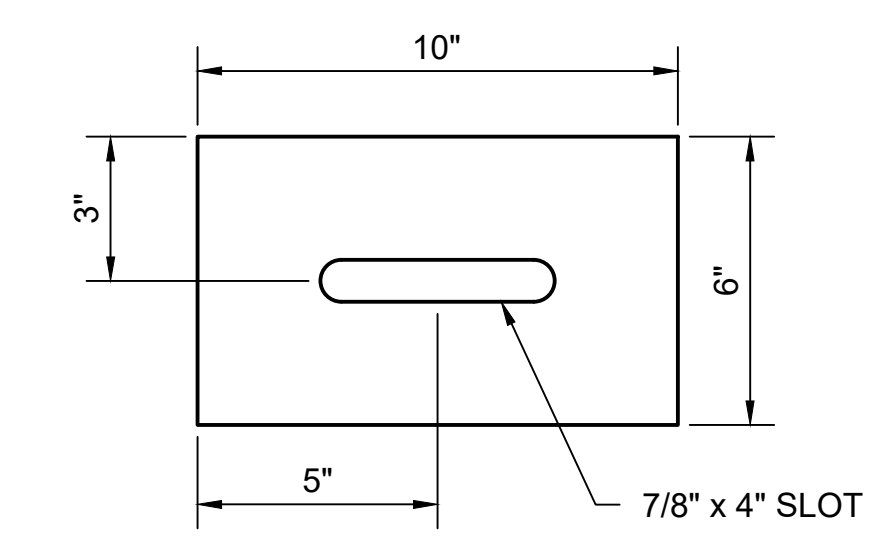
TPSS - BASEMENT EQUIPMENT LAYOUT PLAN
SCALE: 1/4" = 1'-0"



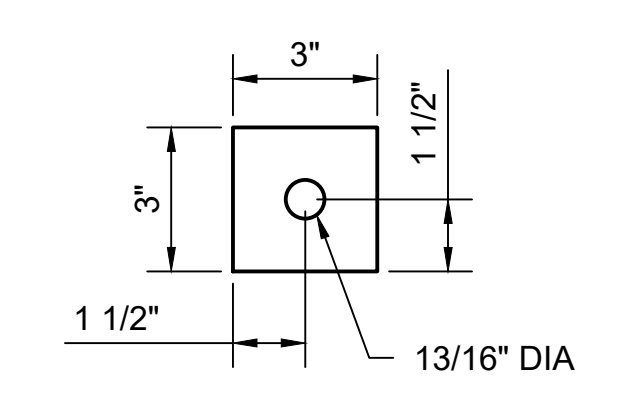
SECTION A
SCALE: 1/4" = 1'-0"



TYPICAL SUGGESTED ANCHOR BOLT DETAIL 1
SCALE: 3/4" = 1'-0"



3/4" x 6" x 10" PLATE DETAIL 2
SCALE: 3" = 1'-0"



3/4" x 3" x 3" PLATE DETAIL 3
SCALE: 3" = 1'-0"

GENERAL NOTES:

1. PROVIDE LED VAPOR TIGHT LUMINAIRES ON UNDERSIDE OF PREFABRICATED TPSS.
2. IF REQUIRED BY UTILITY, PROVIDE 7' x 7' GALVANIZED PULLBOX FASTENED TO FOUNDATION FOR UTILITY FEED. AVOID CONDUITS AND CONDUCTORS IN PULLBOX AREA.
3. GROUND STAIRS & RAILINGS TO TPSS GROUND.
4. TWO ADDITIONAL RUNGS REQUIRED ON SLIDE UP SECTION.
5. REFER TO SPECIFICATIONS FOR SURGE ARRESTER REQUIREMENTS.
6. PUMP CONFIGURATION IS SCHEMATIC ONLY. DESIGN TEAM TO COORDINATE WITH UTILITY AND CIVIL DESIGN FOR APPLICATION OF PUMP. IF A PUMP IS NECESSARY, DESIGN TEAM TO DEVELOP CONSTRUCTION DETAILS, ACCOUNTING FOR INSTALLATION, OPERATION AND SAFETY.
7. BASE IS PART OF SUBSTATION.
8. PLATES, NUTS, WASHERS TO BE HOT DIP GALVANIZED OR EQUIVALENT & PROVIDED BY MANUFACTURER.
9. ANCHOR BOLT AND ANCHORAGE PLATE DETAIL SHOWN ARE TYPICAL. SUBMIT BUILDING ANCHORAGE PLANS AND CALCULATIONS SEALED BY A STRUCTURAL ENGINEER REGISTERED IN THE STATE OF WASHINGTON THAT SHOWS THE ANCHOR BOLT DETAILS AND THE NUMBER OF ANCHOR BOLTS TO BE USED. DESIGN THE BUILDING BASE SO THAT IT CAN BE SECURED TO THE FOUNDATION SHOWN IN THE CONTRACT DOCUMENTS.
10. CONNECT TO SITE DISCHARGE PIPE. OFFSET PIPE RUNS AS NECESSARY TO AVOID CONFLICT WITH CABLES AND RACEWAYS IN BASEMENT AND TO MAINTAIN 6'-0" MIN HEADROOM UNDER PIPES.
11. APPLY MASTIC SEALANT AROUND THE BUILDING BASE PERIMETER TO SEAL THE SUBSTATION TO THE FOUNDATION.
12. SIZE ANCHORAGE PLATE SUCH THAT PLATE 1 AND PLATE 2 VERTICAL EDGES ARE FLUSH.
13. COMPLIANT WITH WAC 296-876 AND ANSI 14.3.

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| 1 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |
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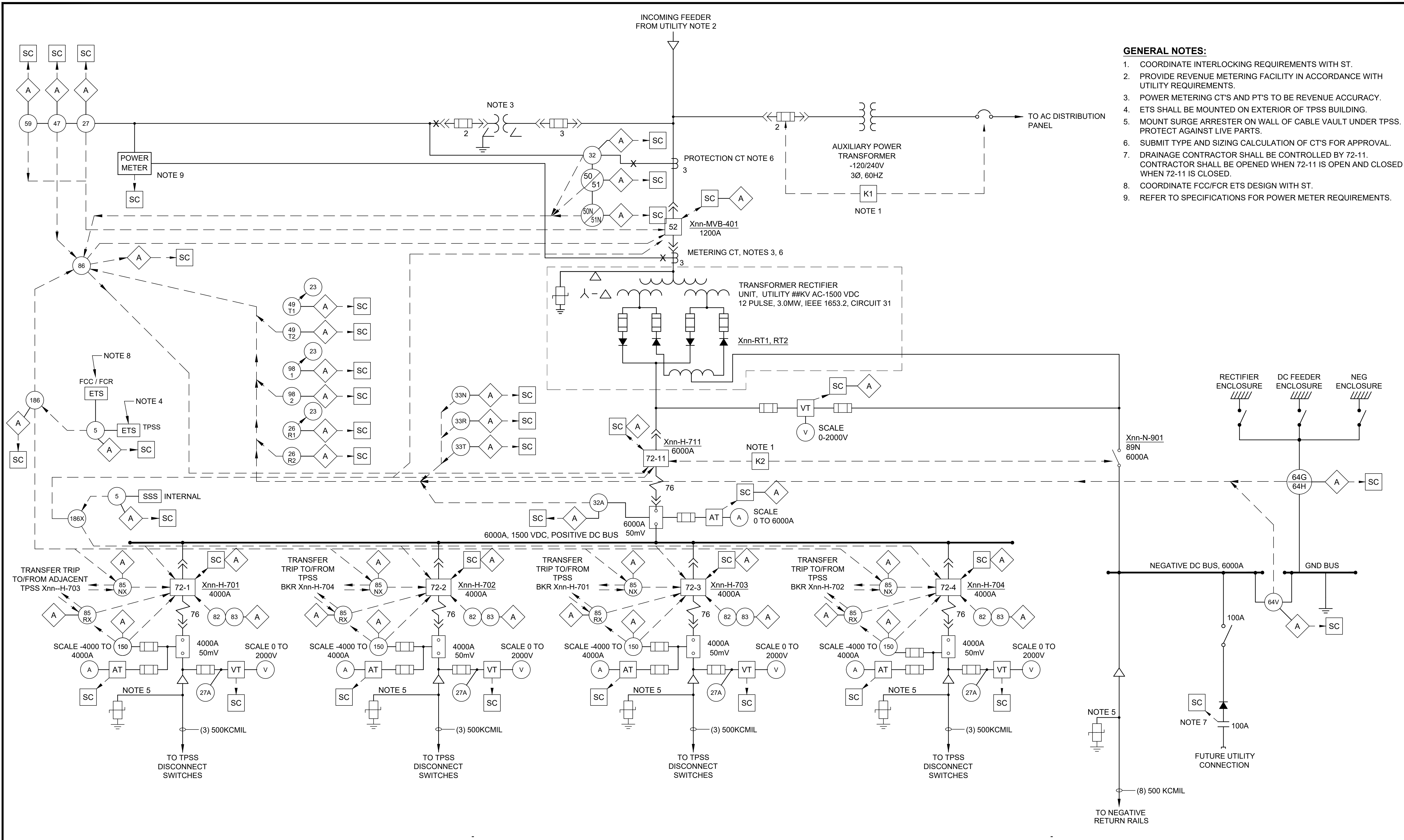
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| CONTRACT No.: RTA/LR | DATE: 2/2024 |

**SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS**

TRACTION POWER
TRACTION POWER SUBSTATION ANCHORAGE
DETAILS

| |
|--------------------------------|
| DRAWING No.: STD-JTD104 |
| FACILITY ID: |
| SHEET No.: 1 |



- GENERAL NOTES:**
1. COORDINATE INTERLOCKING REQUIREMENTS WITH ST.
 2. PROVIDE REVENUE METERING FACILITY IN ACCORDANCE WITH UTILITY REQUIREMENTS.
 3. POWER METERING CT'S AND PT'S TO BE REVENUE ACCURACY.
 4. ETS SHALL BE MOUNTED ON EXTERIOR OF TPSS BUILDING.
 5. MOUNT SURGE ARRESTER ON WALL OF CABLE VAULT UNDER TPSS. PROTECT AGAINST LIVE PARTS.
 6. SUBMIT TYPE AND SIZING CALCULATION OF CT'S FOR APPROVAL.
 7. DRAINAGE CONTRACTOR SHALL BE CONTROLLED BY 72-11. CONTRACTOR SHALL BE OPENED WHEN 72-11 IS OPEN AND CLOSED WHEN 72-11 IS CLOSED.
 8. COORDINATE FCC/FCR ETS DESIGN WITH ST.
 9. REFER TO SPECIFICATIONS FOR POWER METER REQUIREMENTS.

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| 2 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |
| 1 | 8/2019 | | | | REVISED SYSTEMS DIRECTIVE DRAWINGS |
| 0 | 1/2019 | | | | 2019 GUIDANCE DWG REVISIONS - GENERAL UPDATE |

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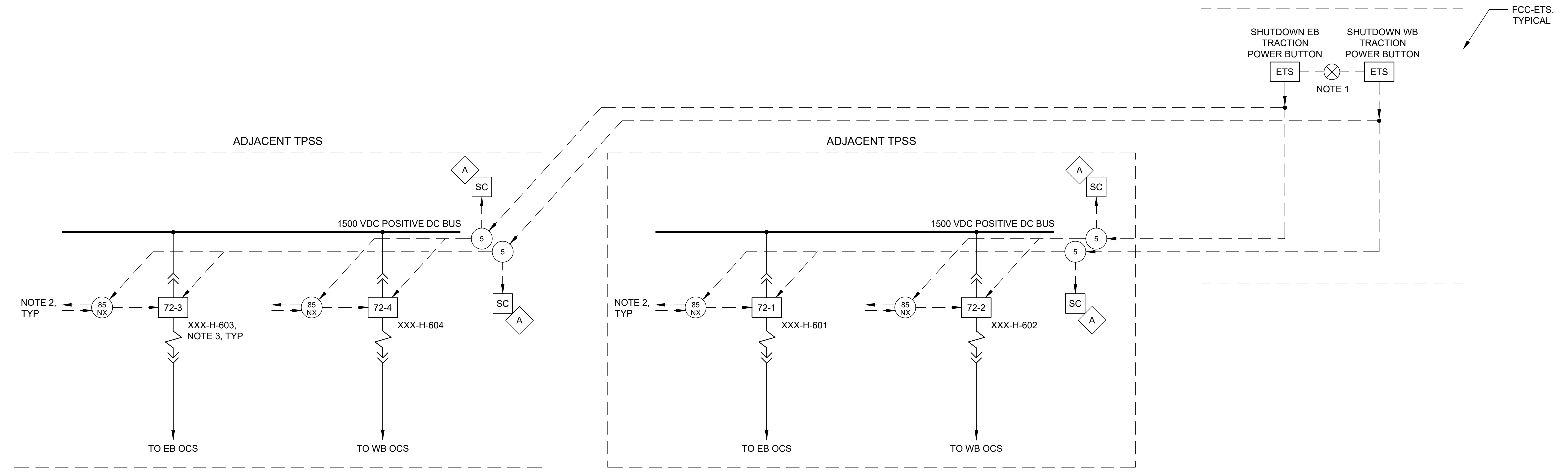
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FILENAME: STD-JTS100
CONTRACT No.: RTA/LR
DATE: 2/2024

SOUND TRANSIT STANDARD DRAWINGS SYSTEMS

TRACTION POWER SYSTEMS TYPICAL PREFABRICATED TPSS LINE DIAGRAM FOR 12.5KV & 26 KV TPSS

| | |
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| DRAWING No.: | STD-JTS100 |
| FACILITY ID: | |
| SHEET No.: | REV: 2 |

- GENERAL NOTES:**
- CONTROL VOLTAGE SUPERVISION LAMP.
 - WHEN TPSS IS IN BYPASS, TRANSFER TRIP TO BREAKER FEEDING THE SAME OCS SECTION FROM THE NEXT TPSS.



SCHEMATIC DIAGRAM
NTS
SEE NOTE 2

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| 2 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |
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LINE IS 1" AT FULL SCALE

SCALE: NTS
FILENAME: STD-JTS101
CONTRACT No.: RTA/LR
DATE: 2/2024

**SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS**

TRACTION POWER
SYSTEMS TYPICAL PREFABRICATED TPSS
ONE LINE DIAGRAM FOR 12.5KV & 26 KV TPSS

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| FACILITY ID: | |
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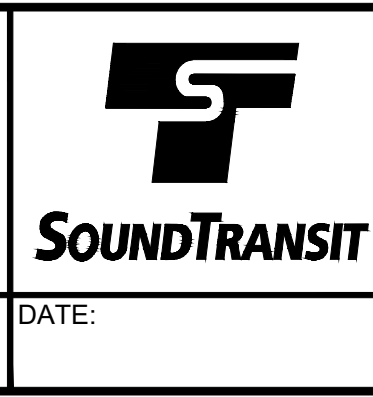
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| 1 | 1/2019 | | | | 2019 GUIDANCE DWG REVISIONS - GENERAL UPDATES |
| 2 | 8/2019 | | | | REVISED SYSTEMS DIRECTIVE DRAWINGS |
| 3 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |

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| SCALE: | NTS |
| FILENAME: | STD-JTS307 |
| CONTRACT No.: | RTA/LR |
| DATE: | 2/2024 |

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| SOUND TRANSIT STANDARD DRAWINGS SYSTEMS COMMUNICATIONS TPSS INTERFACE BLOCK DIAGRAM |
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| DRAWING No.: | STD-JTS307 |
| FACILITY ID: | |
| SHEET No.: | 3 |

TABLE 1 - OVERHEAD CONDUCTOR PARTICULARS

| CONDUCTOR PARTICULARS | UNITS | OPEN ROUTE - MAIN LINE AUTO-TENSIONED SIMPLE CATENARY | |
|---|-------|--|---------------------|
| | | CONTACT WIRE | MESSENGER WIRE |
| | | CONDUCTOR TYPE | |
| | - | 350 KCMIL SOLID GROOVED | 500 KCMIL 19 STRAND |
| MATERIAL | - | HARD DRAWN COPPER | HARD DRAWN COPPER |
| DIAMETER | IN | 0.620 | 0.811 |
| CROSS SECTIONAL AREA | SQ IN | 0.2758 | 0.3928 |
| CONDUCTOR BREAKING STRENGTH | LB | 11810 | 21590 |
| MODULUS OF ELASTICITY | PSI | 17000000 | 17000000 |
| COEFFICIENT OF THERMAL EXPANSION | /°F | 0.0000094 | 0.0000094 |
| WEIGHT OF CONDUCTOR | LB/FT | 1.063 | 1.544 |
| WEIGHT OF HANGERS (ASSUMED) | LB/FT | 0.032 | |
| WEIGHT OF SYSTEM | LB/FT | 2.639 | |
| OPERATING (O) ICE THICKNESS | IN | 0.25 | 0.5 |
| ICE WEIGHT | LB/FT | 0.270 | 0.815 |
| WEIGHT OF SYSTEM WITH ICE (O) | LB/FT | 3.724 | |
| NON-OPERATING (NO) ICE THICKNESS | IN | 0.5 | 0.5 |
| ICE WEIGHT | LB/FT | 0.696 | 0.815 |
| WEIGHT OF SYSTEM WITH ICE (NO) | LB/FT | 4.150 | |
| EQUIVALENT SPAN LENGTH FOR TENSION CALCULATIONS | FT | 145 | 145 |
| CONDUCTOR TENSIONS AT: | | | |
| 5° F, NO WIND, NO ICE | LB | 3300 | 5000 |
| 60° F, NO WIND | LB | 3300 | 5000 |
| 130° F, NO WIND | LB | 3300 | 5000 |
| 0° F, NO ICE, 55 MPH WIND | LB | 3431 | 5199 |
| 0° F, WITH ICE (O), 40 MPH WIND | LB | 3680 | 5576 |
| 0° F, WITH ICE (NO), 70 MPH WIND | LB | 3910 | 5924 |
| FACTOR OF SAFETY (MINIMUM) | | 3.02 | 3.64 |
| SPAN LENGTH (MAXIMUM) | FT | 220 | |
| CONDUCTOR SAG: | | | |
| 5° F, NO WIND | FT | 0 | 3.193 |
| 60° F, NO WIND | FT | 0 | 3.193 |
| 130° F, NO WIND | FT | 0 | 3.193 |
| 32° F, WITH ICE (NO), NO WIND (UNLOCKED) | FT | 1.829 | 5.022 |
| NORMAL SYSTEM HEIGHT | FT | 4.0 | |
| NORMAL CONTACT WIRE HEIGHT | FT | 20.5 | - |
| NORMAL CONTACT WIRE HEIGHT: AERIAL STRUCTURE | FT | 16.0 | - |

| CONDUCTOR PARTICULARS | UNITS | OPEN ROUTE - MAIN LINES (SCAT) | |
|---|-----------|--------------------------------|----------------|
| | | CONTACT WIRE | MESSENGER WIRE |
| | | WORN CONDUCTOR: | |
| WORN (CONTACT CONDITION) PERMISSIBLE WEAR | % OF AREA | 30 | N/A |
| WEIGHT OF WORN CONDUCTOR | LB/FT | 0.744 | 1.544 |
| WEIGHT OF WORN SYSTEM | LB/FT | 2.320 | |
| WORN ICE WEIGHT (O) | LB/FT | 0.21 | 0.815 |
| WEIGHT OF WORN SYSTEM WITH ICE (O) | LB/FT | 3.348 | |
| WORN ICE WEIGHT (NO) | LB/FT | 0.61 | 0.815 |
| WEIGHT OF WORN SYSTEM WITH ICE (NO) | LB/FT | 3.749 | |
| CONDUCTOR TENSIONS AT: | | | |
| 0° F, WITH ICE (NO), 70 MPH WIND | LB | 3910 | 5924 |
| CONDUCTOR BREAKING STRENGTH | LB | 8267 | 21590 |
| FACTOR OF SAFETY | LB | 2.11 | 3.64 |

GENERAL NOTES:

- ICE CONDITIONS:
(O) 1/4" ON CONTACT WIRE, 1/2" ON MESSENGER WIRE
(NO) 1/2" ON CONTACT WIRE, 1/2" ON MESSENGER WIRE
- MAXIMUM WIND SPEED FOR STRUCTURAL DESIGN = 70 MPH (NO)
- MAXIMUM WIND SPEED FOR LRV OPERATIONS = 55 MPH (O)
- DROOP IS THE SAG OF THE CONTACT WIRE FROM NORMAL CONTACT WIRE HEIGHT AT 60°F. FOR SIMPLE CATENARY, CONTACT WIRE SAG VALUE INCLUDES MESSENGER SAG CHANGES.
- WIND CONDITIONS:
(O) 55 MPH WITHOUT ICE
(O) 40 MPH WITH ICE
(NO) 70 MPH WITH ICE

LEGEND:

- (O) IS OPERATING CONDITION
- (NO) IS NON-OPERATING CONDITION

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| No. | DATE | DSN | CHK | APP | REVISION |
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| 1 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |
| 0 | 8/2019 | | | | REVISED SYSTEMS DIRECTIVE DRAWINGS |

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| APPROVED BY: | |

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LINE IS 1" AT FULL SCALE

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| SCALE: NTS |
| FILENAME: STD-JOD100 |
| CONTRACT No.: RTA/LR |
| DATE: 2/2024 |

**SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS**

OVERHEAD CATENARY SYSTEM
TECHNICAL SHEETS CONDUCTOR CHARACTERISTICS
SCAT

| | |
|--------------|-------------------|
| DRAWING No.: | STD-JOD100 |
| FACILITY ID: | |
| SHEET No.: | 1 |

TABLE 1 - OVERHEAD CONDUCTOR PARTICULARS

| CONDUCTOR PARTICULARS | UNITS | MAIN LINE FIXED TERMINATED SIMPLE CATENARY | |
|---|-------|--|---------------------|
| | | CONTACT WIRE | MESSENGER WIRE |
| CONDUCTOR TYPE | - | 350 KCMIL SOLID GROOVED | 500 KCMIL 19 STRAND |
| MATERIAL | - | HARD DRAWN COPPER | HARD DRAWN COPPER |
| DIAMETER | IN | 0.620 | 0.811 |
| CROSS SECTIONAL AREA | SQ IN | 0.2758 | 0.3928 |
| CONDUCTOR BREAKING STRENGTH | LB | 11810 | 21590 |
| MODULUS OF ELASTICITY | PSI | 17000000 | 17000000 |
| COEFFICIENT OF THERMAL EXPANSION | /°F | 0.0000094 | 0.0000094 |
| WEIGHT OF CONDUCTOR | LB/FT | 1.063 | 1.544 |
| WEIGHT OF HANGERS (ASSUMED) | LB/FT | 0.032 | |
| WEIGHT OF SYSTEM | LB/FT | 2.639 | |
| EQUIVALENT SPAN LENGTH FOR TENSION CALCULATIONS | FT | 22 | 66 |
| CONDUCTOR TENSIONS AT: | | | |
| 60° F, NO WIND | LB | 3300 | 5000 |
| 40° F, 55 MPH WIND | LB | 4160 | 6150 |
| 120° F, 55 MPH WIND | LB | 863 | 2410 |
| MINIMUM FACTOR OF SAFETY | | 2.84 | 3.51 |
| SPAN LENGTH (MAXIMUM) | FT | 80 | |
| CONDUCTOR SAG: | | | |
| 60° F, NO WIND | FT | 0 | 0.422 |
| 40° F, 55 MPH WIND | FT | -0.079 | 0.343 |
| 120° F, 55 MPH WIND | FT | 0.454 | 0.876 |
| NORMAL SYSTEM HEIGHT | FT | 1.3 | |
| NORMAL CONTACT WIRE HEIGHT | FT | 13'-10" | - |

GENERAL NOTES:

1. MAXIMUM WIND SPEED FOR LRV OPERATIONS = 55 MPH.
2. DROOP IS THE SAG OF THE CONTACT WIRE FROM NORMAL CONTACT WIRE HEIGHT AT 60°F. FOR SIMPLE CATENARY, CONTACT WIRE SAG VALUE INCLUDES MESSENGER SAG CHANGES.

| CONDUCTOR PARTICULARS | UNITS | MAIN LINES (SCFT) | |
|---|-----------|-------------------|----------------|
| | | CONTACT WIRE | MESSENGER WIRE |
| WORN CONDUCTOR: | | | |
| WORN (CONTACT CONDITION) PERMISSIBLE WEAR | % OF AREA | 30 | N/A |
| WEIGHT OF WORN CONDUCTOR | LB/FT | 0.744 | 1.544 |
| WEIGHT OF WORN SYSTEM | LB/FT | 2.320 | |
| CONDUCTOR TENSIONS AT: | | | |
| 40° F, 55 MPH WIND | LB | 4160 | 6150 |
| CONDUCTOR BREAKING STRENGTH | LB | 8267 | 21590 |
| MINIMUM FACTOR OF SAFETY | LB | 1.99 | 3.51 |

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| No. | DATE | DSN | CHK | APP | REVISION |
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| 1 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |
| 0 | 8/2019 | | | | REVISED SYSTEMS DIRECTIVE DRAWINGS |

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| DRAWN BY: | |
| CHECKED BY: | |
| APPROVED BY: | |

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| SUBMITTED BY: | DATE: | REVIEWED BY: | DATE: |
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LINE IS 1" AT FULL SCALE

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| SCALE: | NTS |
| FILENAME: | STD-JOD101 |
| CONTRACT No.: | RTA/LR |
| DATE: | 2/2024 |

**SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS**

OVERHEAD CATENARY SYSTEM
TECHNICAL SHEETS CONDUCTOR CHARACTERISTICS
SCFT

| | |
|--------------|-------------------|
| DRAWING No.: | STD-JOD101 |
| FACILITY ID: | |
| SHEET No.: | 1 |
| REV: | |

| 20' - 6" CONTACT WIRE HEIGHT, BALLAST TRACK | | | | |
|---|---------------------------|--------------|----------------------------|----------------------------------|
| SPAN (FT) | MINIMUM TRACK RADIUS (FT) | VERSINE (FT) | CONTACT WIRE BLOW OFF (IN) | PERMISSIBLE MID SPAN OFFSET (IN) |
| 20 | 27 | 1.85 | 0.07 | 8.17 |
| 30 | 61 | 1.84 | 0.16 | 8.08 |
| 40 | 109 | 1.83 | 0.29 | 7.95 |
| 50 | 172 | 1.82 | 0.45 | 7.79 |
| 60 | 250 | 1.80 | 0.65 | 7.59 |
| 70 | 344 | 1.78 | 0.89 | 7.35 |
| 80 | 455 | 1.76 | 1.16 | 7.08 |
| 90 | 585 | 1.73 | 1.47 | 6.77 |
| 100 | 734 | 1.70 | 1.82 | 6.42 |
| 110 | 906 | 1.67 | 2.20 | 6.04 |
| 120 | 1101 | 1.64 | 2.62 | 5.62 |
| 130 | 1322 | 1.60 | 3.07 | 5.17 |
| 140 | 1574 | 1.56 | 3.56 | 4.68 |
| 150 | 1859 | 1.51 | 4.09 | 4.15 |
| 160 | 2183 | 1.47 | 4.65 | 3.59 |
| 170 | 2552 | 1.42 | 5.25 | 2.99 |
| 180 | 2972 | 1.36 | 5.89 | 2.35 |
| 190 | 3454 | 1.31 | 6.56 | 1.68 |
| 200 | 4008 | 1.25 | 7.27 | 0.97 |
| 210 | 4651 | 1.19 | 8.02 | 0.22 |
| 215 | 5011 | 1.15 | 8.40 | NOT PERMISSIBLE |
| 220 | 5401 | 1.12 | 8.80 | NOT PERMISSIBLE |

| 16' - 0" CONTACT WIRE HEIGHT, BALLAST TRACK | | | | |
|---|---------------------------|--------------|----------------------------|----------------------------------|
| SPAN (FT) | MINIMUM TRACK RADIUS (FT) | VERSINE (FT) | CONTACT WIRE BLOW OFF (IN) | PERMISSIBLE MID SPAN OFFSET (IN) |
| 20 | 23 | 2.13 | 0.07 | 10.54 |
| 30 | 53 | 2.12 | 0.16 | 10.45 |
| 40 | 95 | 2.11 | 0.29 | 10.32 |
| 50 | 149 | 2.10 | 0.45 | 10.16 |
| 60 | 216 | 2.08 | 0.65 | 9.96 |
| 70 | 297 | 2.06 | 0.89 | 9.72 |
| 80 | 393 | 2.04 | 1.16 | 9.45 |
| 90 | 503 | 2.01 | 1.47 | 9.14 |
| 100 | 630 | 1.98 | 1.82 | 8.79 |
| 110 | 775 | 1.95 | 2.20 | 8.41 |
| 120 | 939 | 1.92 | 2.62 | 7.99 |
| 130 | 1125 | 1.88 | 3.07 | 7.54 |
| 140 | 1334 | 1.84 | 3.56 | 7.05 |
| 150 | 1568 | 1.79 | 4.09 | 6.52 |
| 160 | 1832 | 1.75 | 4.65 | 5.96 |
| 170 | 2130 | 1.70 | 5.25 | 5.36 |
| 180 | 2465 | 1.64 | 5.89 | 4.72 |
| 190 | 2843 | 1.59 | 6.56 | 4.05 |
| 200 | 3272 | 1.53 | 7.27 | 3.34 |
| 210 | 3760 | 1.47 | 8.02 | 2.59 |
| 215 | 4030 | 1.43 | 8.40 | 2.21 |
| 220 | 4319 | 1.40 | 8.80 | 1.81 |

| 13' - 10" CONTACT WIRE HEIGHT, BALLAST TRACK | | | | |
|--|---------------------------|--------------|----------------------------|----------------------------------|
| SPAN (FT) | MINIMUM TRACK RADIUS (FT) | VERSINE (FT) | CONTACT WIRE BLOW OFF (IN) | PERMISSIBLE MID SPAN OFFSET (IN) |
| 20 | 22 | 2.22 | 0.07 | 11.68 |
| 30 | 51 | 2.22 | 0.16 | 11.59 |
| 40 | 91 | 2.21 | 0.29 | 11.46 |
| 50 | 143 | 2.19 | 0.45 | 11.30 |
| 60 | 207 | 2.17 | 0.65 | 11.10 |
| 70 | 284 | 2.16 | 0.89 | 10.86 |
| 80 | 375 | 2.13 | 1.16 | 10.59 |
| 90 | 481 | 2.11 | 1.47 | 10.28 |
| 100 | 602 | 2.08 | 1.82 | 9.93 |
| 110 | 739 | 2.05 | 2.20 | 9.55 |
| 120 | 895 | 2.01 | 2.62 | 9.13 |
| 130 | 1071 | 1.97 | 3.07 | 8.68 |
| 140 | 1268 | 1.93 | 3.56 | 8.19 |
| 150 | 1489 | 1.89 | 4.09 | 7.66 |
| 160 | 1738 | 1.84 | 4.65 | 7.10 |
| 170 | 2017 | 1.79 | 5.25 | 6.50 |
| 180 | 2330 | 1.74 | 5.89 | 5.86 |
| 190 | 2682 | 1.68 | 6.56 | 5.19 |
| 200 | 3080 | 1.62 | 7.27 | 4.48 |
| 210 | 3531 | 1.56 | 8.02 | 3.73 |
| 215 | 3779 | 1.53 | 8.40 | 3.35 |
| 220 | 4044 | 1.50 | 8.80 | 2.95 |

| 13' - 0" CONTACT WIRE HEIGHT, BALLAST TRACK | | | | |
|---|---------------------------|--------------|----------------------------|----------------------------------|
| SPAN (FT) | MINIMUM TRACK RADIUS (FT) | VERSINE (FT) | CONTACT WIRE BLOW OFF (IN) | PERMISSIBLE MID SPAN OFFSET (IN) |
| 20 | 22 | 2.26 | 0.07 | 12.12 |
| 30 | 50 | 2.25 | 0.16 | 12.03 |
| 40 | 89 | 2.24 | 0.29 | 11.90 |
| 50 | 140 | 2.23 | 0.45 | 11.74 |
| 60 | 204 | 2.21 | 0.65 | 11.54 |
| 70 | 279 | 2.19 | 0.89 | 11.30 |
| 80 | 369 | 2.17 | 1.16 | 11.03 |
| 90 | 472 | 2.14 | 1.47 | 10.72 |
| 100 | 591 | 2.11 | 1.82 | 10.37 |
| 110 | 726 | 2.08 | 2.20 | 9.99 |
| 120 | 879 | 2.05 | 2.62 | 9.57 |
| 130 | 1051 | 2.01 | 3.07 | 9.12 |
| 140 | 1244 | 1.97 | 3.56 | 8.63 |
| 150 | 1461 | 1.92 | 4.09 | 8.10 |
| 160 | 1704 | 1.88 | 4.65 | 7.54 |
| 170 | 1976 | 1.83 | 5.25 | 6.94 |
| 180 | 2282 | 1.77 | 5.89 | 6.30 |
| 190 | 2625 | 1.72 | 6.56 | 5.63 |
| 200 | 3012 | 1.66 | 7.27 | 4.92 |
| 210 | 3450 | 1.60 | 8.02 | 4.17 |
| 215 | 3691 | 1.57 | 8.40 | 3.79 |
| 220 | 3948 | 1.53 | 8.80 | 3.39 |

GENERAL NOTES:

- THESE TABLES HAVE BEEN DETERMINED FOR WIND SPEEDS OF 55 MPH.
- FOR DESIGN CONSIDERATIONS THE MAXIMUM SPAN IS REDUCED BY 5 FEET TO CATER FOR SITE ADJUSTMENTS IF OBSTRUCTIONS ARE ENCOUNTERED.
- THE PERMISSIBLE MID SPAN OFFSET IS THE DEVIATION OF THE STATIC CONTACT WIRE FROM THE SUPER ELEVATED CENTERLINE OF TRACK AT MID SPAN.
- MAXIMUM STAGGER = 12" AT 16'-0" CONTACT WIRE HEIGHT.
- MAXIMUM STAGGER = 11" AT 20'-6" CONTACT WIRE HEIGHT.
- CONTACT WIRE INSTALLATION TOLERANCE = ± 1 INCH.
- IN THE VICINITY OF GRADE CROSSINGS THE MAXIMUM SPAN SHOULD BE REDUCED BY 10'-0"
- EXAMPLE SPAN DETERMINATION:
 GIVEN - RADIUS OF CURVATURE = 3100 FT ON BALLASTED TRACK AT 16'-0" CONTACT WIRE HEIGHT.
 FIND - MAXIMUM CONSTRUCTED SPAN = 196 FT
 - MAXIMUM DESIGN SPAN = 191 FT
 - PERMISSIBLE MIDSPAN OFFSET = 3.6 IN
- USE LINEAR INTERPOLATION FOR INTERMEDIATE SPAN LENGTHS.

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| 1 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |
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SCALE: NTS

FILENAME: STD-JOD102

CONTRACT No.: RTA/LR

DATE: 2/2024

SOUND TRANSIT

STANDARD DRAWINGS

SYSTEMS

OVERHEAD CATENARY SYSTEM

TECHNICAL SHEETS BALLASTED TRACK BLOW OFF & MIDSPAN OFFSET

| |
|--------------------------------|
| DRAWING No.: STD-JOD102 |
| FACILITY ID: |
| SHEET No.: 1 |

| 20' - 6" CONTACT WIRE HEIGHT, EMBEDDED OR DIRECT FIXATION TRACK | | | | |
|---|---------------------------|--------------|----------------------------|----------------------------------|
| SPAN (FT) | MINIMUM TRACK RADIUS (FT) | VERSINE (FT) | CONTACT WIRE BLOW OFF (IN) | PERMISSIBLE MID SPAN OFFSET (IN) |
| 20 | 22 | 2.28 | 0.07 | 12.34 |
| 30 | 50 | 2.27 | 0.16 | 12.25 |
| 40 | 88 | 2.26 | 0.29 | 12.13 |
| 50 | 139 | 2.25 | 0.45 | 11.96 |
| 60 | 202 | 2.23 | 0.65 | 11.76 |
| 70 | 277 | 2.21 | 0.89 | 11.53 |
| 80 | 366 | 2.19 | 1.16 | 11.25 |
| 90 | 468 | 2.16 | 1.47 | 10.94 |
| 100 | 586 | 2.13 | 1.82 | 10.60 |
| 110 | 720 | 2.10 | 2.20 | 10.22 |
| 120 | 871 | 2.07 | 2.62 | 9.80 |
| 130 | 1041 | 2.03 | 3.07 | 9.34 |
| 140 | 1233 | 1.99 | 3.56 | 8.85 |
| 150 | 1447 | 1.94 | 4.09 | 8.33 |
| 160 | 1687 | 1.90 | 4.65 | 7.76 |
| 170 | 1956 | 1.85 | 5.25 | 7.16 |
| 180 | 2258 | 1.79 | 5.89 | 6.53 |
| 190 | 2597 | 1.74 | 6.56 | 5.85 |
| 200 | 2979 | 1.68 | 7.27 | 5.14 |
| 210 | 3410 | 1.62 | 8.02 | 4.40 |
| 215 | 3647 | 1.58 | 8.40 | 4.01 |
| 220 | 3900 | 1.55 | 8.80 | 3.62 |

| 16' - 0" CONTACT WIRE HEIGHT, EMBEDDED OR DIRECT FIXATION TRACK | | | | |
|---|---------------------------|--------------|----------------------------|----------------------------------|
| SPAN (FT) | MINIMUM TRACK RADIUS (FT) | VERSINE (FT) | CONTACT WIRE BLOW OFF (IN) | PERMISSIBLE MID SPAN OFFSET (IN) |
| 20 | 21 | 2.44 | 0.07 | 14.24 |
| 30 | 46 | 2.43 | 0.16 | 14.14 |
| 40 | 83 | 2.42 | 0.29 | 14.02 |
| 50 | 130 | 2.40 | 0.45 | 13.85 |
| 60 | 188 | 2.39 | 0.65 | 13.65 |
| 70 | 259 | 2.37 | 0.89 | 13.42 |
| 80 | 341 | 2.35 | 1.16 | 13.14 |
| 90 | 436 | 2.32 | 1.47 | 12.84 |
| 100 | 546 | 2.29 | 1.82 | 12.49 |
| 110 | 670 | 2.26 | 2.20 | 12.11 |
| 120 | 809 | 2.22 | 2.62 | 11.69 |
| 130 | 966 | 2.19 | 3.07 | 11.24 |
| 140 | 1142 | 2.15 | 3.56 | 10.74 |
| 150 | 1338 | 2.10 | 4.09 | 10.22 |
| 160 | 1558 | 2.05 | 4.65 | 9.65 |
| 170 | 1802 | 2.00 | 5.25 | 9.05 |
| 180 | 2075 | 1.95 | 5.89 | 8.42 |
| 190 | 2381 | 1.90 | 6.56 | 7.74 |
| 200 | 2723 | 1.84 | 7.27 | 7.04 |
| 210 | 3107 | 1.77 | 8.02 | 6.29 |
| 215 | 3317 | 1.74 | 8.40 | 5.90 |
| 220 | 3540 | 1.71 | 8.80 | 5.51 |

GENERAL NOTES:

- THESE TABLES HAVE BEEN DETERMINED FOR WIND SPEEDS OF 55 MPH.
- FOR DESIGN CONSIDERATIONS THE MAXIMUM SPAN IS REDUCED BY 5 FEET TO CATER FOR SITE ADJUSTMENTS IF OBSTRUCTIONS ARE ENCOUNTERED.
- THE PERMISSIBLE MID SPAN OFFSET IS THE DEVIATION OF THE STATIC CONTACT WIRE FROM THE SUPER ELEVATED CENTERLINE OF TRACK AT MID SPAN.
- MAXIMUM STAGGER = 12" AT 14'-0", 16'-0" AND 20'-6" CONTACT WIRE HEIGHTS.
- CONTACT WIRE INSTALLATION TOLERANCE = ± 1 INCH.
- IN THE VICINITY OF GRADE CROSSINGS THE MAXIMUM SPAN SHOULD BE REDUCED BY 10'-0"
- EXAMPLE SPAN DETERMINATION:
 GIVEN - RADIUS OF CURVATURE = 2400 FT ON EMBEDDED TRACK AT 16'-0" CONTACT WIRE HEIGHT.
 FIND - MAXIMUM CONSTRUCTED SPAN = 190 FT
 - MAXIMUM DESIGN SPAN = 185 FT
 - PERMISSIBLE MIDSPAN OFFSET = 7.7 IN
- USE LINEAR INTERPOLATION FOR INTERMEDIATE SPAN LENGTHS.

| 13' - 10" CONTACT WIRE HEIGHT, EMBEDDED OR DIRECT FIXATION TRACK | | | | |
|--|---------------------------|--------------|----------------------------|----------------------------------|
| SPAN (FT) | MINIMUM TRACK RADIUS (FT) | VERSINE (FT) | CONTACT WIRE BLOW OFF (IN) | PERMISSIBLE MID SPAN OFFSET (IN) |
| 20 | 20 | 2.51 | 0.07 | 15.15 |
| 30 | 45 | 2.50 | 0.16 | 15.06 |
| 40 | 80 | 2.49 | 0.29 | 14.93 |
| 50 | 126 | 2.48 | 0.45 | 14.77 |
| 60 | 183 | 2.46 | 0.65 | 14.57 |
| 70 | 251 | 2.44 | 0.89 | 14.33 |
| 80 | 330 | 2.42 | 1.16 | 14.06 |
| 90 | 423 | 2.40 | 1.47 | 13.75 |
| 100 | 528 | 2.37 | 1.82 | 13.40 |
| 110 | 648 | 2.34 | 2.20 | 13.02 |
| 120 | 783 | 2.30 | 2.62 | 12.60 |
| 130 | 934 | 2.26 | 3.07 | 12.15 |
| 140 | 1103 | 2.22 | 3.56 | 11.66 |
| 150 | 1292 | 2.18 | 4.09 | 11.13 |
| 160 | 1502 | 2.13 | 4.65 | 10.57 |
| 170 | 1736 | 2.08 | 5.25 | 9.97 |
| 180 | 1998 | 2.03 | 5.89 | 9.33 |
| 190 | 2289 | 1.97 | 6.56 | 8.66 |
| 200 | 2615 | 1.91 | 7.27 | 7.95 |
| 210 | 2979 | 1.85 | 8.02 | 7.20 |
| 215 | 3178 | 1.82 | 8.40 | 6.82 |
| 220 | 3389 | 1.79 | 8.80 | 6.42 |

| 13' - 0" CONTACT WIRE HEIGHT, EMBEDDED OR DIRECT FIXATION TRACK | | | | |
|---|---------------------------|--------------|----------------------------|----------------------------------|
| SPAN (FT) | MINIMUM TRACK RADIUS (FT) | VERSINE (FT) | CONTACT WIRE BLOW OFF (IN) | PERMISSIBLE MID SPAN OFFSET (IN) |
| 20 | 20 | 2.54 | 0.07 | 15.50 |
| 30 | 44 | 2.53 | 0.16 | 15.41 |
| 40 | 79 | 2.52 | 0.29 | 15.28 |
| 50 | 125 | 2.51 | 0.45 | 15.12 |
| 60 | 181 | 2.49 | 0.65 | 14.92 |
| 70 | 248 | 2.47 | 0.89 | 14.68 |
| 80 | 326 | 2.45 | 1.16 | 14.41 |
| 90 | 418 | 2.42 | 1.47 | 14.10 |
| 100 | 522 | 2.40 | 1.82 | 13.75 |
| 110 | 640 | 2.36 | 2.20 | 13.37 |
| 120 | 773 | 2.33 | 2.62 | 12.95 |
| 130 | 922 | 2.29 | 3.07 | 12.50 |
| 140 | 1089 | 2.25 | 3.56 | 12.01 |
| 150 | 1275 | 2.21 | 4.09 | 11.48 |
| 160 | 1482 | 2.16 | 4.65 | 10.92 |
| 170 | 1712 | 2.11 | 5.25 | 10.32 |
| 180 | 1969 | 2.06 | 5.89 | 9.68 |
| 190 | 2256 | 2.00 | 6.56 | 9.01 |
| 200 | 2575 | 1.94 | 7.27 | 8.30 |
| 210 | 2933 | 1.88 | 8.02 | 7.55 |
| 215 | 3128 | 1.85 | 8.40 | 7.17 |
| 220 | 3335 | 1.81 | 8.80 | 6.77 |

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| 1 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |
| 0 | 8/2019 | | | | REVISED SYSTEMS DIRECTIVE DRAWINGS |

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| DESIGNED BY: |
| DRAWN BY: |
| CHECKED BY: |
| APPROVED BY: |

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LINE IS 1" AT FULL SCALE

SCALE: NTS

FILENAME: STD-JOD103

CONTRACT No.: RTA/LR

DATE: 2/2024

SOUND TRANSIT

STANDARD DRAWINGS

SYSTEMS

OVERHEAD CATENARY SYSTEM

TECHNICAL SHEETS EMBEDDED TRACK BLOW OFF & MIDSPAN OFFSET

| |
|--------------------------------|
| DRAWING No.: STD-JOD103 |
| FACILITY ID: |
| SHEET No.: 1 |

| ERECTION TENSIONS FOR AUTO-TENSIONED CONTACT WIRE | | | | |
|---|-----|------|------|------|
| L = EQUIVALENT SPAN (FT) | | 22 | 25 | 30 |
| tn = NEW TEMPERATURE | 0 | 5937 | 5935 | 5931 |
| | 10 | 5497 | 5496 | 5492 |
| | 20 | 5057 | 5055 | 5052 |
| | 30 | 4617 | 4616 | 4613 |
| | 40 | 4177 | 4176 | 4174 |
| | 50 | 3738 | 3738 | 3737 |
| | 60 | 3300 | 3300 | 3300 |
| | 70 | 2862 | 2863 | 2865 |
| | 80 | 2427 | 2430 | 2434 |
| | 90 | 1995 | 2000 | 2008 |
| | 100 | 1571 | 1580 | 1597 |
| | 110 | 1165 | 1183 | 1213 |
| 120 | 809 | 839 | 889 | |

GENERAL NOTES:

- ERECTION TENSIONS SHOWN FOR AT CATENARY APPLY ONLY WITH BALANCE WEIGHTS LOCKED AT 60° F POSITION.
- FOR INTERMEDIATE EQUIVALENT SPANS BETWEEN THOSE INDICATED IN THE GRAPH, THE TENSION VALUES CAN BE INTERPOLATED ON A STRAIGHT LINE BASIS.
- EQUIVALENT SPAN IS DETERMINED BY THE FOLLOWING FORMULA:

$$\frac{L_1^3 + L_2^3 + L_3^3 + \dots + L_N^3}{L_1 + L_2 + L_3 + \dots + L_N}$$

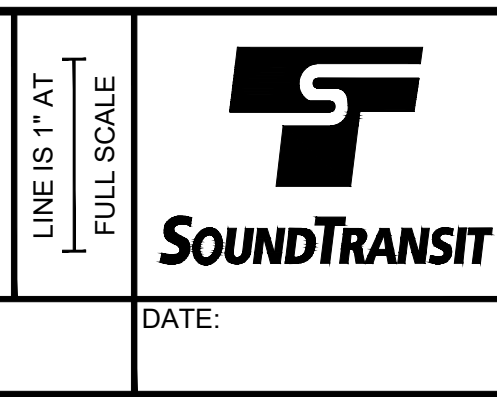
WHERE L₁, L₂, L₃ ... L_N ARE THE LENGTHS OF THE SPANS IN EACH FULL TENSION LENGTH (ANCHOR TO ANCHOR)

| ERECTION TENSIONS FOR FIXED TERMINATED CONTACT WIRE | | | | | | | |
|---|-----|------|------|------|------|------|------|
| L = EQUIVALENT SPAN (FT) | | 22 | 25 | 50 | 65 | 80 | 100 |
| tn = NEW TEMPERATURE | 0 | 5937 | 5935 | 5910 | 5886 | 5856 | 5808 |
| | 10 | 5497 | 5496 | 5471 | 5449 | 5422 | 5377 |
| | 20 | 5057 | 5055 | 5034 | 5015 | 4989 | 4951 |
| | 30 | 4617 | 4616 | 4598 | 4581 | 4561 | 4527 |
| | 40 | 4177 | 4176 | 4163 | 4150 | 4135 | 4110 |
| | 50 | 3738 | 3738 | 3729 | 3722 | 3713 | 3699 |
| | 60 | 3300 | 3300 | 3300 | 3300 | 3300 | 3300 |
| | 70 | 2862 | 2863 | 2875 | 2886 | 2898 | 2916 |
| | 80 | 2427 | 2430 | 2459 | 2484 | 2513 | 2555 |
| | 90 | 1995 | 2000 | 2058 | 2103 | 2153 | 2222 |
| | 100 | 1571 | 1580 | 1681 | 1754 | 1829 | 1929 |
| | 110 | 1165 | 1183 | 1349 | 1452 | 1553 | 1677 |
| 120 | 809 | 839 | 1079 | 1209 | 1328 | 1472 | |

| No. | DATE | DSN | CHK | APP | REVISION |
|-----|--------|-----|-----|-----|------------------------------------|
| 1 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |
| 0 | 8/2019 | | | | REVISED SYSTEMS DIRECTIVE DRAWINGS |

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| DRAWN BY: | |
| CHECKED BY: | |
| APPROVED BY: | |

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| SUBMITTED BY: | DATE: | REVIEWED BY: | DATE: |
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| SCALE: | NTS |
| FILENAME: | STD-JOD104 |
| CONTRACT No.: | RTA/LR |
| DATE: | 2/2024 |

**SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS**

OVERHEAD CATENARY SYSTEM
TECHNICAL SHEETS CONTACT WIRE TEMPERATURE
TENSION CHARTS

| | |
|--------------|------------|
| DRAWING No.: | STD-JOD104 |
| FACILITY ID: | |
| SHEET No.: | 1 |

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| ERECTION TENSIONS FOR AUTO-TENSIONED MESSENGER WIRE (UNLOADED) | | | | | | | | | | |
|--|------|------|------|------|------|------|------|------|------|------|
| L = EQUIVALENT SPAN (FT) | | 60 | 75 | 90 | 100 | 125 | 145 | 150 | 175 | 200 |
| tn = NEW TEMPERATURE | 0 | 8520 | 8383 | 8217 | 8092 | 7728 | 7391 | 7301 | 6827 | 6326 |
| | 10 | 7897 | 7764 | 7604 | 7481 | 7130 | 6809 | 6723 | 6278 | 5819 |
| | 20 | 7276 | 7148 | 6992 | 6876 | 6541 | 6239 | 6159 | 5750 | 5338 |
| | 30 | 6658 | 6534 | 6387 | 6276 | 5963 | 5684 | 5612 | 5246 | 4890 |
| | 40 | 6042 | 5925 | 5787 | 5685 | 5398 | 5151 | 5087 | 4772 | 4476 |
| | 50 | 5430 | 5323 | 5198 | 5106 | 4856 | 4643 | 4590 | 4334 | 4102 |
| | 60 | 4824 | 4730 | 4623 | 4545 | 4338 | 4171 | 4130 | 3936 | 3767 |
| | 70 | 4227 | 4152 | 4068 | 4009 | 3856 | 3738 | 3710 | 3581 | 3472 |
| | 80 | 3645 | 3597 | 3544 | 3508 | 3419 | 3354 | 3338 | 3269 | 3213 |
| | 90 | 3088 | 3075 | 3062 | 3053 | 3032 | 3017 | 3014 | 2999 | 2987 |
| | 100 | 2571 | 2603 | 2635 | 2655 | 2700 | 2730 | 2736 | 2767 | 2791 |
| | 110 | 2115 | 2198 | 2273 | 2319 | 2420 | 2487 | 2501 | 2567 | 2622 |
| 120 | 1741 | 1867 | 1978 | 2045 | 2188 | 2281 | 2303 | 2397 | 2473 | |

GENERAL NOTES:

- UNLOADED MESSENGER WIRE TENSIONS SHOWN FOR APPLICATION DURING WIRE ERECTION PRIOR TO THE ERECTION OF CONTACT WIRE.
- ERECTION TENSIONS SHOWN FOR A/T CATENARY APPLY ONLY WITH BALANCE WEIGHTS LOCKED AT 60° F POSITION.
- FOR INTERMEDIATE EQUIVALENT SPANS BETWEEN THOSE INDICATED IN THE GRAPH, THE TENSION VALUES CAN BE
- EQUIVALENT SPAN IS DETERMINED BY THE FOLLOWING FORMULA:

$$\frac{L_1^3 + L_2^3 + L_3^3 + \dots + L_N^3}{L_1 + L_2 + L_3 + \dots + L_N}$$

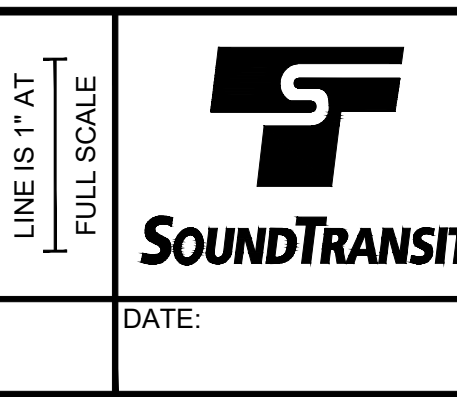
WHERE L₁, L₂, L₃, ... L_N ARE THE LENGTHS OF THE SPANS IN EACH FULL TENSION LENGTH (ANCHOR TO ANCHOR)

| ERECTION TENSIONS FOR FIXED TERMINATED MESSENGER WIRE (UNLOADED) | | | | | | | | |
|--|------|------|------|------|------|------|------|------|
| L = EQUIVALENT SPAN (FT) | | 45 | 50 | 60 | 65 | 80 | 90 | 145 |
| tn = NEW TEMPERATURE | 0 | 8627 | 8595 | 8520 | 8477 | 8330 | 8217 | 7391 |
| | 10 | 8002 | 7970 | 7897 | 7856 | 7713 | 7604 | 6809 |
| | 20 | 7379 | 7347 | 7276 | 7236 | 7099 | 6992 | 6239 |
| | 30 | 6756 | 6726 | 6658 | 6619 | 6487 | 6387 | 5684 |
| | 40 | 6133 | 6105 | 6042 | 6005 | 5882 | 5787 | 5151 |
| | 50 | 5514 | 5489 | 5430 | 5396 | 5283 | 5198 | 4643 |
| | 60 | 4899 | 4876 | 4824 | 4794 | 4696 | 4623 | 4171 |
| | 70 | 4289 | 4269 | 4227 | 4204 | 4126 | 4068 | 3738 |
| | 80 | 3686 | 3673 | 3645 | 3629 | 3579 | 3544 | 3354 |
| | 90 | 3099 | 3096 | 3088 | 3083 | 3071 | 3062 | 3017 |
| | 100 | 2540 | 2551 | 2571 | 2582 | 2614 | 2635 | 2730 |
| | 110 | 2031 | 2059 | 2115 | 2143 | 2224 | 2273 | 2487 |
| 120 | 1601 | 1649 | 1741 | 1785 | 1907 | 1978 | 2281 | |

| No. | DATE | DSN | CHK | APP | REVISION |
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| 1 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |
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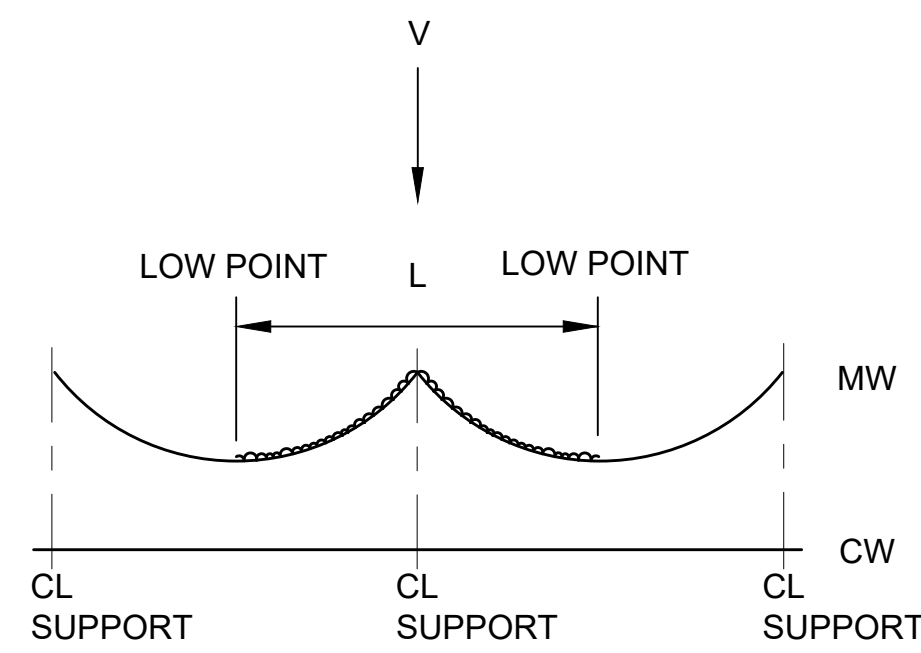


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| SCALE: | NTS |
| FILENAME: | STD-JOD105 |
| CONTRACT No.: | RTA/LR |
| DATE: | 2/2024 |

**SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS**

OVERHEAD CATENARY SYSTEM
TECHNICAL SHEETS MESSENGER WIRE TEMPERATURE
TENSION CHARTS

| | |
|--------------|-------------------|
| DRAWING No.: | STD-JOD105 |
| FACILITY ID: | |
| SHEET No.: | 1 |



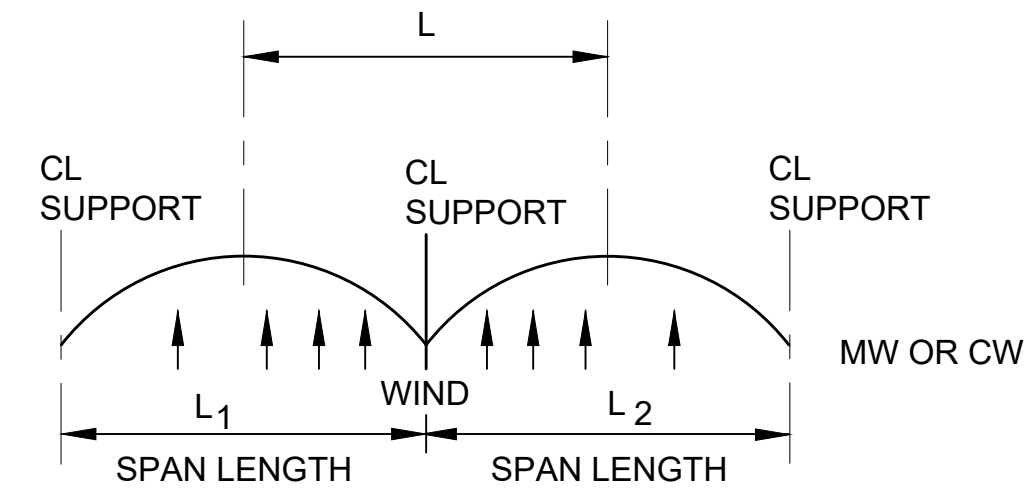
MW = MESSENGER WIRE

CW = CONTACT WIRE

L = SUM OF THE DISTANCE TO THE LOW POINT OF THE CONDUCTOR ON EACH SIDE OF THE SUPPORT

W = WEIGHT PER FOOT OF SYSTEM

V = VERTICAL LOAD = W x L



$$L = \frac{L_1 + L_2}{2}$$

MW = MESSENGER WIRE

CW = CONTACT WIRE

P = PRESSURE FROM WIND = .00256 V²

V = WIND SPEED IN MPH

D = EFFECTIVE DIAMETER OF CONDUCTOR (WITH OR WITHOUT ICE)

$$W = \frac{P \times D \times L}{12}$$

| VERTICAL LOADS (LB) | | | |
|---------------------|------------|------------|---------------|
| SPAN LENGTH (FT) | BARE WIRES | ICED WIRES | |
| | | OPERATING | NON-OPERATING |
| 30 | 79.17 | 111.72 | 124.50 |
| 40 | 105.56 | 148.96 | 166.00 |
| 50 | 131.95 | 186.20 | 207.50 |
| 60 | 158.34 | 223.44 | 249.00 |
| 70 | 184.73 | 260.68 | 290.50 |
| 80 | 211.12 | 297.92 | 332.00 |
| 90 | 237.51 | 335.16 | 373.50 |
| 100 | 263.90 | 372.40 | 415.00 |
| 110 | 290.29 | 409.64 | 456.50 |
| 120 | 316.68 | 446.88 | 498.00 |
| 130 | 343.07 | 484.12 | 539.50 |
| 140 | 369.46 | 521.36 | 581.00 |
| 150 | 395.85 | 558.60 | 622.50 |
| 160 | 422.24 | 595.84 | 664.00 |
| 170 | 448.63 | 633.08 | 705.50 |
| 180 | 475.02 | 670.32 | 747.00 |
| 190 | 501.41 | 707.56 | 788.50 |
| 200 | 527.80 | 744.80 | 830.00 |
| 210 | 554.19 | 782.04 | 871.50 |
| 220 | 580.58 | 819.28 | 913.00 |

| WIND LOADS (LB) | | | | | | | | |
|------------------|---------------------------------|-----------|--|-----------|--|-----------|--|-----------|
| SPAN LENGTH (FT) | OPERATING BARE WIRE 55 MPH WIND | | NON-OPERATING ICE MW - 1/2", CW - 1/2" 70 MPH WIND | | OPERATING ICE MW - 1/2", CW - 1/4" 40 MPH WIND | | NON-OPERATING ICE MW - 1/2", CW - 1/2" 40 MPH WIND | |
| | CONTACT | MESSENGER | CONTACT | MESSENGER | CONTACT | MESSENGER | CONTACT | MESSENGER |
| 30 | 12.0 | 15.6 | 50.7 | 56.7 | 11.4 | 18.6 | 16.5 | 18.6 |
| 40 | 16.0 | 20.8 | 67.6 | 75.6 | 15.2 | 24.8 | 22.0 | 24.8 |
| 50 | 20.0 | 26.0 | 84.5 | 94.5 | 19.0 | 31.0 | 27.5 | 31.0 |
| 60 | 24.0 | 31.2 | 101.4 | 113.4 | 22.8 | 37.2 | 33.0 | 37.2 |
| 70 | 28.0 | 36.4 | 118.3 | 132.3 | 26.6 | 43.4 | 38.5 | 43.4 |
| 80 | 32.0 | 41.6 | 135.2 | 151.2 | 30.4 | 49.6 | 44.0 | 49.6 |
| 90 | 36.0 | 46.8 | 152.1 | 170.1 | 34.2 | 55.8 | 49.5 | 55.8 |
| 100 | 40.0 | 52.0 | 169.0 | 189.0 | 38.0 | 62.0 | 55.0 | 62.0 |
| 110 | 44.0 | 57.2 | 185.9 | 207.9 | 41.8 | 68.2 | 60.5 | 68.2 |
| 120 | 48.0 | 62.4 | 202.8 | 226.8 | 45.6 | 74.4 | 66.0 | 74.4 |
| 130 | 52.0 | 67.6 | 219.7 | 245.7 | 49.4 | 80.6 | 71.5 | 80.6 |
| 140 | 56.0 | 72.8 | 236.6 | 264.6 | 53.2 | 86.8 | 77.0 | 86.8 |
| 150 | 60.0 | 78.0 | 253.5 | 283.5 | 57.0 | 93.0 | 82.5 | 93.0 |
| 160 | 64.0 | 83.2 | 270.4 | 302.4 | 60.8 | 99.2 | 88.0 | 99.2 |
| 170 | 68.0 | 88.4 | 287.3 | 321.3 | 64.6 | 105.4 | 93.5 | 105.4 |
| 180 | 72.0 | 93.6 | 304.2 | 340.2 | 68.4 | 111.6 | 99.0 | 111.6 |
| 190 | 76.0 | 98.8 | 321.1 | 359.1 | 72.2 | 117.8 | 104.5 | 117.8 |
| 200 | 80.0 | 104.0 | 338.0 | 378.0 | 76.0 | 124.0 | 110.0 | 124.0 |
| 210 | 84.0 | 109.2 | 354.9 | 396.9 | 79.8 | 130.2 | 115.5 | 130.2 |
| 220 | 88.0 | 114.4 | 371.8 | 415.8 | 83.6 | 136.4 | 121.0 | 136.4 |

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| No. | DATE | DSN | CHK | APP | REVISION |
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| 1 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |
| 0 | 8/2019 | | | | REVISED SYSTEMS DIRECTIVE DRAWINGS |

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| DRAWN BY: |
| CHECKED BY: |
| APPROVED BY: |

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| SUBMITTED BY: | DATE: | REVIEWED BY: | DATE: |
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LINE IS 1" AT FULL SCALE

SCALE: NTS
 FILENAME: STD-JOD106
 CONTRACT No.: RTA/LR
 DATE: 2/2024

**SOUND TRANSIT
 STANDARD DRAWINGS
 SYSTEMS**

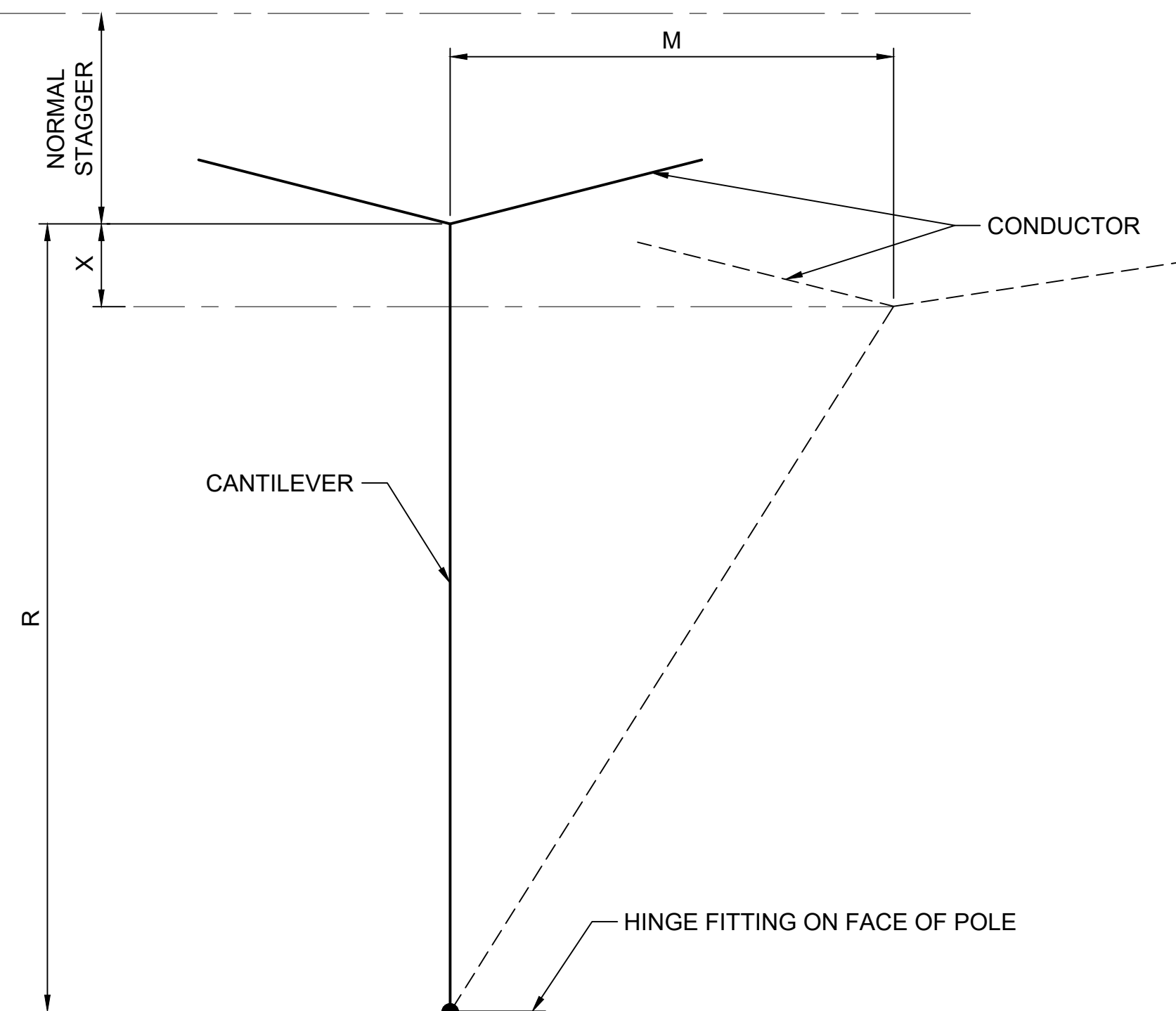
OVERHEAD CATENARY SYSTEM
 TECHNICAL SHEETS VERTICAL LOADS AND WIND LOADS

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| DRAWING No.: STD-JOD106 |
| FACILITY ID: |
| SHEET No.: 1 |
| REV: 1 |

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SUPERELEVATED TRACK CL



GENERAL NOTE:

1. ALONG TRACK MOVEMENT IS TO BE CONSIDERED IN ADJUSTMENT OF CANTILEVER ASSEMBLIES, STEADY ARMS, CROSS CONTACT BRIDGE ASSEMBLIES, JUMPERS, FEEDERS, SPAN WIRES, AND ANY OTHER ASSEMBLIES OR COMPONENTS THAT MAY BE AFFECTED BY THIS MOVEMENT.

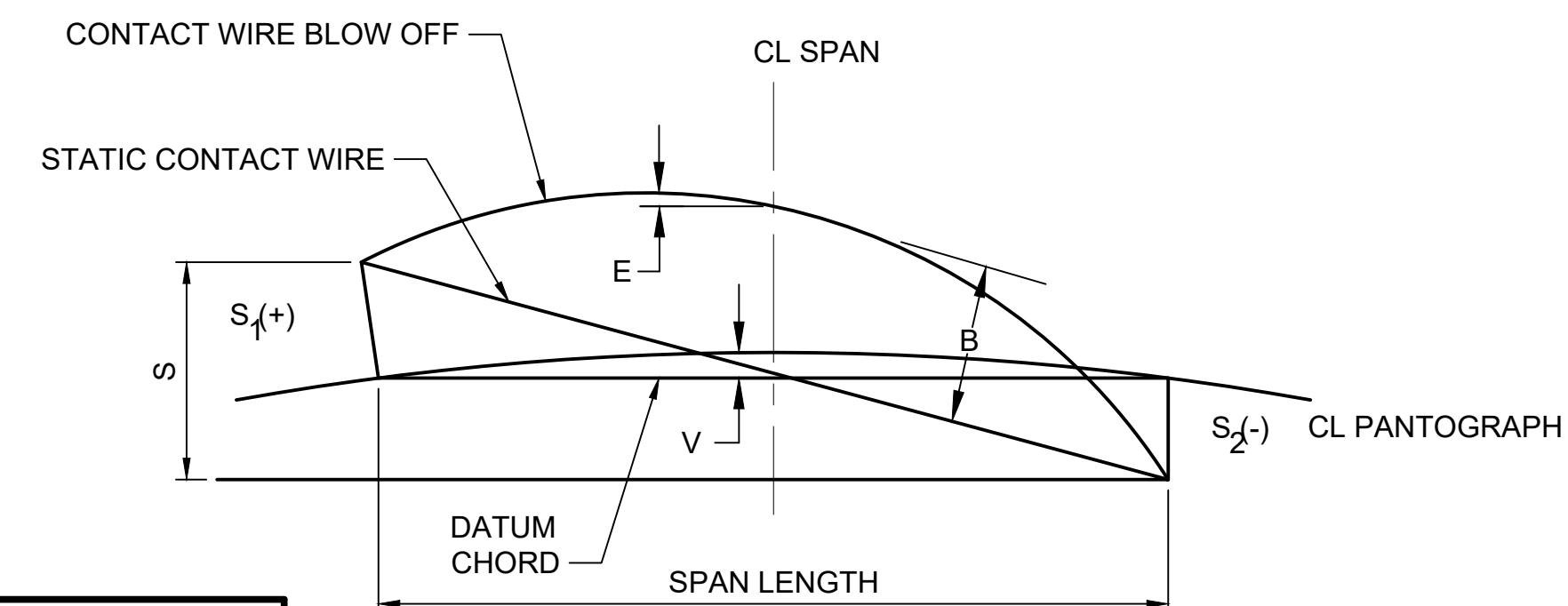
| | | ALONG TRACK MOVEMENT (IN) | | | | | | | | | | | | | | |
|-------------|-----|--|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|--------|--------|--------|--------|
| | | DISTANCE FROM MIDPOINT TO TERMINATION (FT) | | | | | | | | | | | | | | |
| | | 200 | 400 | 600 | 800 | 1000 | 1200 | 1400 | 1600 | 1800 | 2000 | 2200 | 2400 | 2600 | 2800 | 3000 |
| TEMPERATURE | 0 | -1.35 | -2.71 | -4.06 | -5.41 | -6.77 | -8.12 | -9.48 | -10.83 | -12.18 | -13.54 | -14.89 | -16.24 | -17.60 | -18.95 | -20.30 |
| | 10 | -1.13 | -2.26 | -3.38 | -4.51 | -5.64 | -6.77 | -7.90 | -9.02 | -10.15 | -11.28 | -12.41 | -13.54 | -14.66 | -15.79 | -16.92 |
| | 20 | -0.90 | -1.80 | -2.71 | -3.61 | -4.51 | -5.41 | -6.32 | -7.22 | -8.12 | -9.02 | -9.93 | -10.83 | -11.73 | -12.63 | -13.54 |
| | 30 | -0.68 | -1.35 | -2.03 | -2.71 | -3.38 | -4.06 | -4.74 | -5.41 | -6.09 | -6.77 | -7.44 | -8.12 | -8.80 | -9.48 | -10.15 |
| | 40 | -0.45 | -0.90 | -1.35 | -1.80 | -2.26 | -2.71 | -3.16 | -3.61 | -4.06 | -4.51 | -4.96 | -5.41 | -5.87 | -6.32 | -6.77 |
| | 50 | -0.23 | -0.45 | -0.68 | -0.90 | -1.13 | -1.35 | -1.58 | -1.80 | -2.03 | -2.26 | -2.48 | -2.71 | -2.93 | -3.16 | -3.38 |
| | 60 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | 70 | 0.23 | 0.45 | 0.68 | 0.90 | 1.13 | 1.35 | 1.58 | 1.80 | 2.03 | 2.26 | 2.48 | 2.71 | 2.93 | 3.16 | 3.38 |
| | 80 | 0.45 | 0.90 | 1.35 | 1.80 | 2.26 | 2.71 | 3.16 | 3.61 | 4.06 | 4.51 | 4.96 | 5.41 | 5.87 | 6.32 | 6.77 |
| | 90 | 0.68 | 1.35 | 2.03 | 2.71 | 3.38 | 4.06 | 4.74 | 5.41 | 6.09 | 6.77 | 7.44 | 8.12 | 8.80 | 9.48 | 10.15 |
| | 100 | 0.90 | 1.80 | 2.71 | 3.61 | 4.51 | 5.41 | 6.32 | 7.22 | 8.12 | 9.02 | 9.93 | 10.83 | 11.73 | 12.63 | 13.54 |
| | 110 | 1.13 | 2.26 | 3.38 | 4.51 | 5.64 | 6.77 | 7.90 | 9.02 | 10.15 | 11.28 | 12.41 | 13.54 | 14.66 | 15.79 | 16.92 |
| | 120 | 1.35 | 2.71 | 4.06 | 5.41 | 6.77 | 8.12 | 9.48 | 10.83 | 12.18 | 13.54 | 14.89 | 16.24 | 17.60 | 18.95 | 20.30 |

NEGATIVE VALUE (-) INDICATES MOVEMENT TOWARD FIXED ANCHOR
 POSITIVE VALUE INDICATES MOVEMENT AWAY FROM FIXED ANCHOR
 ALONG TRACK MOVEMENT IS IN INCHES

ALONG TRACK MOVEMENT - AUTO - TENSIONED O.C.S

M = ALONG TRACK MOVEMENT
 X = STAGGER CHANGE
 R = DISTANCE FROM FACE OF POLE TO CONDUCTOR
 $M = \alpha (T-60)$

WHERE α = COEFFICIENT OF EXPANSION OF CONDUCTOR
 L = DISTANCE FROM FIXED ANCHOR
 T = TEMPERATURE
 $X = R - \sqrt{R^2 - M^2}$



S = STAGGER DIFFERENCE
 S1 & S2 = STAGGER AT EACH SUPPORT
 V = VERSINE OF CURVE BETWEEN SUPPORTS
 B = CONTACT WIRE BLOW OFF
 E = STAGGER EFFECT
 $STAGGER DIFFERENCE (S) = S1-S2$
 $STAGGER EFFECT (E) = \frac{(S)^2}{16(B-V)}$

| ALONG TRACK MOVEMENT (INCHES) | CANTILEVER REACH (DIMENSION R FEET-INCHES) | | | | | | | | | | | | | |
|-------------------------------|--|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|--------|--------|
| | 6'-0" | 6'-6" | 7'-0" | 7'-6" | 8'-0" | 8'-6" | 9'-0" | 9'-6" | 10'-0" | 10'-6" | 11'-0" | 11'-6" | 12'-0" | 12'-6" |
| 2 | 0.03 | 0.03 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.01 | 0.01 | 0.01 |
| 4 | 0.11 | 0.10 | 0.10 | 0.09 | 0.08 | 0.08 | 0.07 | 0.07 | 0.07 | 0.06 | 0.06 | 0.06 | 0.06 | 0.05 |
| 6 | 0.25 | 0.23 | 0.21 | 0.20 | 0.19 | 0.18 | 0.17 | 0.16 | 0.15 | 0.14 | 0.14 | 0.13 | 0.13 | 0.12 |
| 8 | 0.45 | 0.41 | 0.38 | 0.36 | 0.33 | 0.31 | 0.30 | 0.28 | 0.27 | 0.25 | 0.24 | 0.23 | 0.22 | 0.21 |
| 10 | 0.70 | 0.64 | 0.60 | 0.56 | 0.52 | 0.49 | 0.46 | 0.44 | 0.42 | 0.40 | 0.38 | 0.36 | 0.35 | 0.33 |
| 12 | 1.01 | 0.93 | 0.86 | 0.80 | 0.75 | 0.71 | 0.67 | 0.63 | 0.60 | 0.57 | 0.55 | 0.52 | 0.50 | 0.48 |
| 14 | 1.37 | 1.27 | 1.17 | 1.10 | 1.03 | 0.97 | 0.91 | 0.86 | 0.82 | 0.78 | 0.74 | 0.71 | 0.68 | 0.65 |
| 16 | 1.80 | 1.66 | 1.54 | 1.43 | 1.34 | 1.26 | 1.19 | 1.13 | 1.07 | 1.02 | 0.97 | 0.93 | 0.89 | 0.86 |
| 18 | 2.29 | 2.11 | 1.95 | 1.82 | 1.70 | 1.60 | 1.51 | 1.43 | 1.36 | 1.29 | 1.23 | 1.18 | 1.13 | 1.08 |
| 20 | 2.83 | 2.61 | 2.42 | 2.25 | 2.11 | 1.98 | 1.87 | 1.77 | 1.68 | 1.60 | 1.52 | 1.46 | 1.40 | 1.34 |
| 22 | 3.44 | 3.17 | 2.93 | 2.73 | 2.55 | 2.40 | 2.26 | 2.14 | 2.03 | 1.94 | 1.85 | 1.76 | 1.69 | 1.62 |
| 24 | 4.12 | 3.78 | 3.50 | 3.26 | 3.05 | 2.86 | 2.70 | 2.55 | 2.42 | 2.31 | 2.20 | 2.10 | 2.01 | 1.93 |

STAGGER CHANGE - AUTO - TENSIONED O.C.S.

STAGGER CHANGE VALUES IN INCHES

| B-V (INCHES) | STAGGER DIFFERENCE (S) INCHES | | | | | | | | | | | |
|--------------|-------------------------------|------|------|------|------|------|------|------|-------|-------|-------|-------|
| | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 22 | 24 |
| 2 | 0.13 | 0.50 | 1.13 | 2.00 | 3.13 | 4.50 | 6.13 | 8.00 | 10.13 | 12.50 | 15.13 | 18.00 |
| 4 | 0.06 | 0.25 | 0.56 | 1.00 | 1.56 | 2.25 | 3.06 | 4.00 | 5.06 | 6.25 | 7.56 | 9.00 |
| 6 | 0.04 | 0.17 | 0.38 | 0.67 | 1.04 | 1.50 | 2.04 | 2.67 | 3.38 | 4.17 | 5.04 | 6.00 |
| 8 | 0.03 | 0.13 | 0.28 | 0.50 | 0.78 | 1.13 | 1.53 | 2.00 | 2.53 | 3.13 | 3.78 | 4.50 |
| 10 | 0.03 | 0.10 | 0.23 | 0.40 | 0.63 | 0.90 | 1.23 | 1.60 | 2.03 | 2.50 | 3.03 | 3.60 |
| 12 | 0.02 | 0.08 | 0.19 | 0.33 | 0.52 | 0.75 | 1.02 | 1.33 | 1.69 | 2.08 | 2.52 | 3.00 |
| 14 | 0.02 | 0.07 | 0.16 | 0.29 | 0.45 | 0.64 | 0.88 | 1.14 | 1.45 | 1.79 | 2.16 | 2.57 |
| 16 | 0.02 | 0.06 | 0.14 | 0.25 | 0.39 | 0.56 | 0.77 | 1.00 | 1.27 | 1.56 | 1.89 | 2.25 |
| 18 | 0.01 | 0.06 | 0.13 | 0.22 | 0.35 | 0.50 | 0.68 | 0.89 | 1.13 | 1.39 | 1.68 | 2.00 |
| 20 | 0.01 | 0.05 | 0.11 | 0.20 | 0.31 | 0.45 | 0.61 | 0.80 | 1.01 | 1.25 | 1.51 | 1.80 |

STAGGER EFFECT - ALL O.C.S. STYLES

STAGGER EFFECT VALUES IN INCHES

| No. | DATE | DSN | CHK | APP | REVISION |
|-----|--------|-----|-----|-----|------------------------------------|
| 1 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |
| 0 | 8/2019 | | | | REVISED SYSTEMS DIRECTIVE DRAWINGS |

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| DRAWN BY: | |
| CHECKED BY: | |
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| SCALE: | NTS |
| FILENAME: | STD-JOD107 |
| CONTRACT No.: | RTA/LR |
| DATE: | 2/2024 |

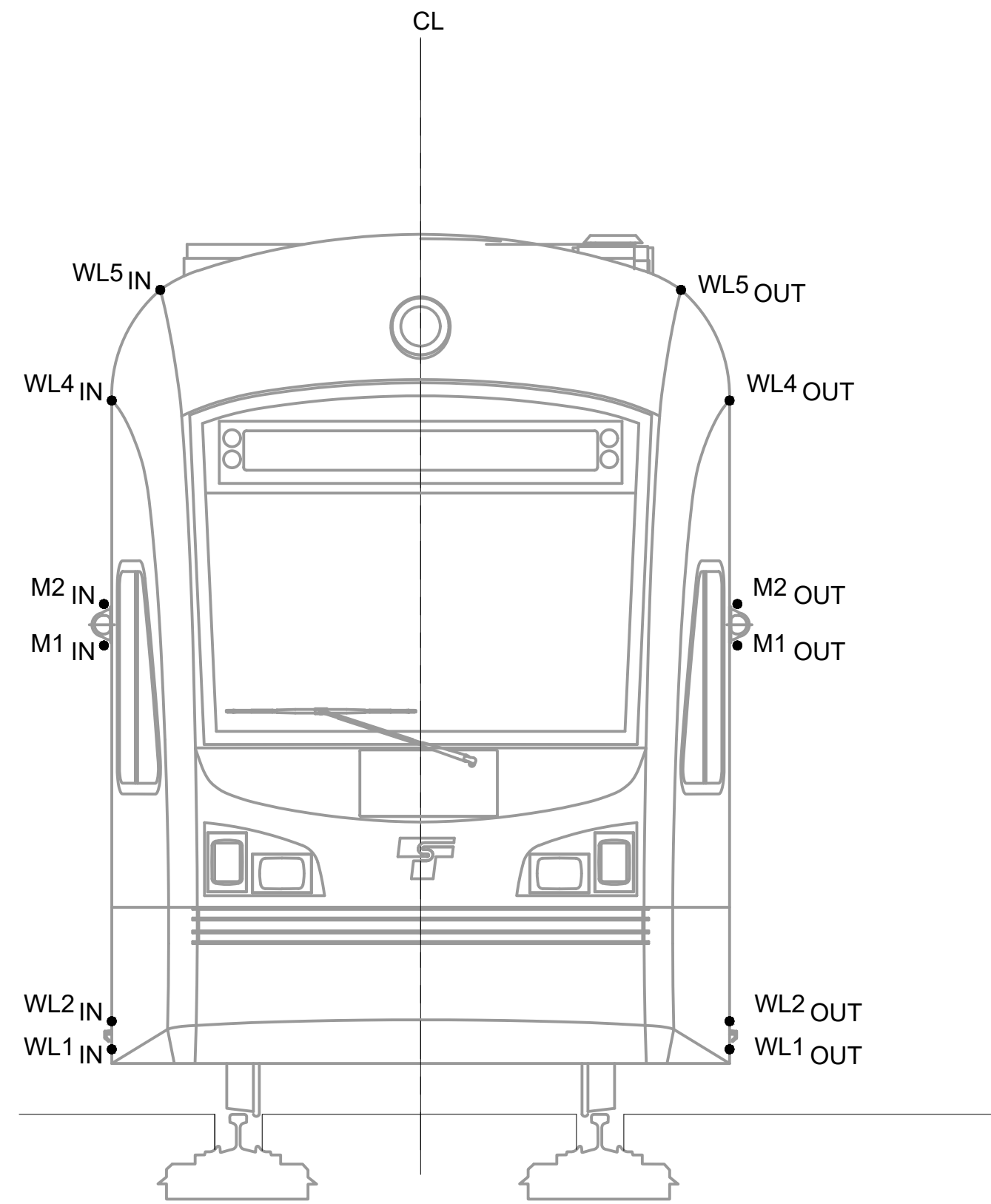
**SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS**

OVERHEAD CATENARY SYSTEM
TECHNICAL SHEETS ALONG TRACK MOVEMENT

| | |
|--------------|------------|
| DRAWING No.: | STD-JOD107 |
| FACILITY ID: | |
| SHEET No.: | REV: 1 |

GENERAL NOTES:

1. THE OCS STRUCTURE CLEARANCE ENVELOPE IS DEFINED AS THE SPACE OCCUPIED BY THE VEHICLE DYNAMIC ENVELOPE PLUS CONSTRUCTION AND MAINTENANCE TOLERANCES, PLUS RUNNING CLEARANCES.
2. THE PANTOGRAPH CLEARANCE ENVELOPE IS DESCRIBED ON DRAWING JOD112.
3. COORDINATES FOR THE VEHICLE DYNAMIC ENVELOPE ON CURVED AND SUPERELEVATED TRACK ARE SHOWN IN THE TABLES PROVIDED IN THE SPECIFICATIONS.
4. COORDINATES ARE BASED ON ST1 KINKISHARYO VEHICLES. COORDINATES FOR ST2 SIEMENS VEHICLES TO BE CONFIRMED WITH SOUND TRANSIT AND INCORPORATED INTO FINAL DRAWINGS.
5. TRACK MAINTENANCE TOLERANCES AT OCS POLES AND STRUCTURES SHALL BE .5 INCHES FOR DIRECT FIXATION TRACK OR 2.5 INCHES FOR BALLASTED TRACK. RUNNING CLEARANCE AT OCS POLES AND STRUCTURES SHALL BE 2.0 INCHES.
6. COORDINATES SHOWN ARE IN INCHES.
7. COORDINATES ARE REFERENCED FROM A POINT LOCATED AT CENTER OF TRACK GAUGE AND TOP OF RAIL (0,0).
8. SUPERELEVATION IS APPLIED RELATIVE TO TOP OF LOW RAIL.



VEHICLE STATIC OUTLINE
NTS

| STATIC BODY POINTS | | | | | |
|--------------------|-------|--------|-------|--------|--------|
| | X | Y | | X | Y |
| WL1OUT | 52.24 | 8.86 | WL1IN | -52.24 | 8.86 |
| WL2OUT | 52.24 | 14.00 | WL2IN | -52.24 | 14.00 |
| WL4OUT | 52.24 | 126.00 | WL4IN | -52.24 | 126.00 |
| WL5OUT | 48.31 | 140.35 | WL5IN | -48.31 | 140.35 |
| WL6OUT | 38.39 | 148.82 | WL6IN | -39.39 | 148.82 |
| M1OUT | 55.08 | 80.00 | M1IN | -55.08 | 80.00 |
| M2OUT | 55.08 | 85.00 | M2IN | -55.08 | 85.00 |

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SCALE: NTS
 FILENAME: STD-JOD110
 CONTRACT No.: RTA/LR
 DATE: 2/2024



**SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS**

OVERHEAD CATENARY SYSTEM
TECHNICAL SHEETS STRUCTURE
CLEARANCE ENVELOPE

DRAWING No.: **STD-JOD110**

FACILITY ID: _____

SHEET No.: _____ REV: 1

| CONTACT WIRE HEIGHT (FT) | BALLAST TRACK | | | | DIRECT FIXATION TRACK | | | |
|---|---------------|-------|-------|-------|-----------------------|-------|-------|-------|
| | 20.50 | 16.00 | 13.83 | 13.00 | 20.50 | 16.00 | 13.83 | 13.00 |
| LATERAL OFFSET DUE TO CROSS LEVEL TOLERANCE (IN) | 4.35 | 3.40 | 2.94 | 2.76 | 2.18 | 1.70 | 1.47 | 1.38 |
| LATERAL ALLOWANCE FOR TRACK AND VEHICLE TOLERANCE (IN) | 6.85 | 5.90 | 5.44 | 5.26 | 2.68 | 2.20 | 1.97 | 1.88 |
| LATERAL VEHICLE MOVEMENT DUE TO 1.50 ROLL (IN) (NOTE 2) | 6.05 | 4.63 | 3.95 | 3.69 | 6.05 | 4.63 | 3.95 | 3.69 |
| TOTAL MOVEMENT AT PANTOGRAPH WITH 1.50 ROLL (IN) | 18.26 | 15.89 | 14.75 | 14.31 | 14.08 | 12.19 | 11.28 | 10.93 |
| MAXIMUM ALLOWABLE WIRE DISPLACEMENT AT MIDSPAN (IN) | 11.24 | 13.61 | 14.75 | 15.19 | 15.42 | 17.31 | 18.22 | 18.57 |

GENERAL NOTES:

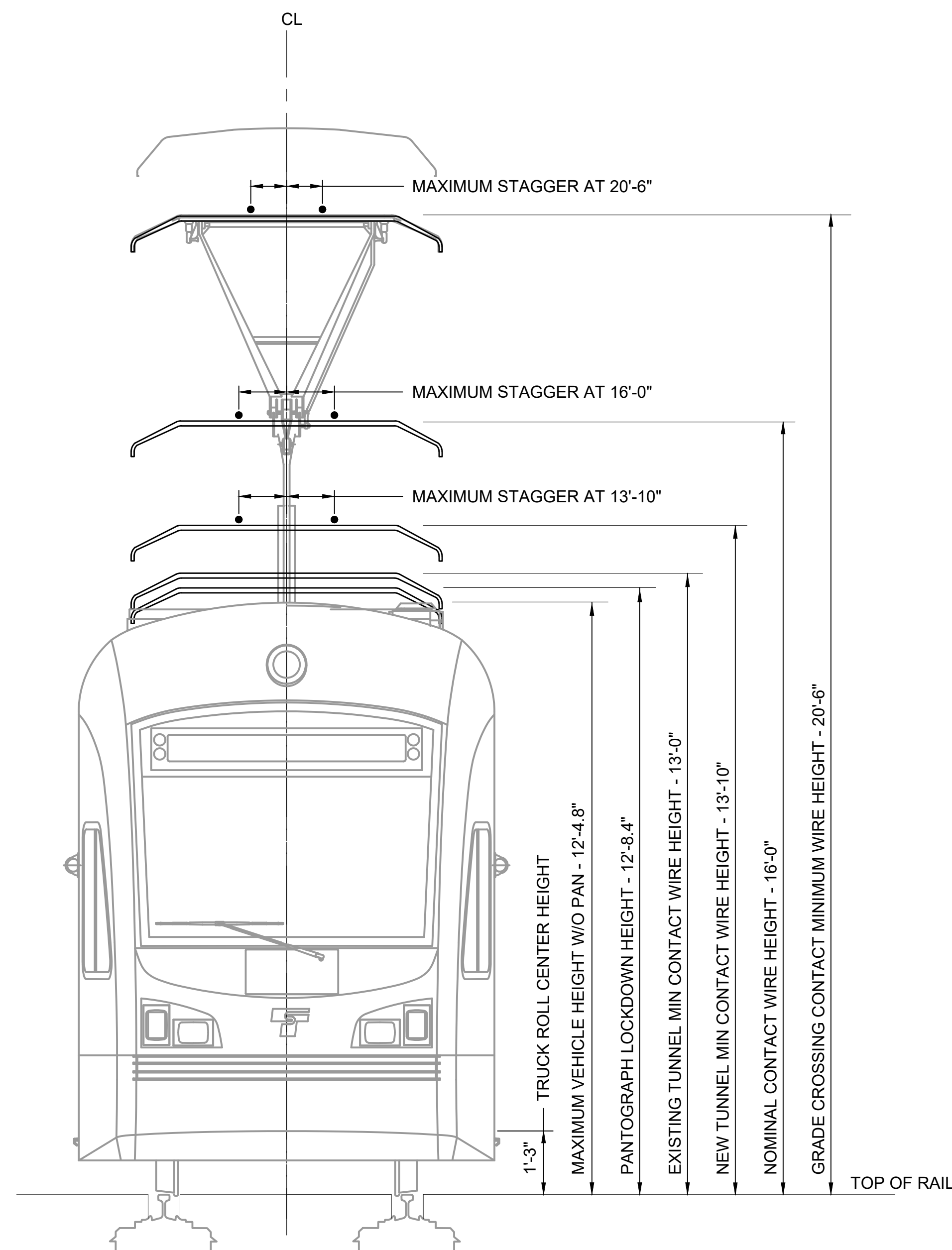
- CONTACT WIRE DISPLACEMENT IS DUE TO WIRE STAGGER AT THE POLE PLUS WIRE BLOW-OFF AT MIDSPAN.
- AREMA SECTION # 33:4.2.44 RECOMMENDED 50% OF MAXIMUM VEHICLE ROLL INTO WIND.
- REDUCE STAGGERS AT REGISTRATIONS MORE THAN 2000' FROM A MPA OR FA.
- BASED ON 6'-3" CANTILEVER REACH, 60°F TEMPERATURE CHANGE, AND 2000 FT LONG TENSION LENGTH.
- VEHICLE AND PANTOGRAPH PARAMETERS ARE BASED ON ST1 KINKISHARYO VEHICLES. PARAMETERS FOR ST2 SIEMENS VEHICLES TO BE CONFIRMED WITH SOUND TRANSIT AND INCORPORATED INTO FINAL DRAWINGS.

| PANTOGRAPH PARAMETERS | | |
|---|--------|-------|
| DESCRIPTION | IN | FT |
| OVERALL WIDTH OVER HORNS | 75.0 | 6.25 |
| CARBON WIDTH | 47.0 | 3.92 |
| PANTOGRAPH SWAY AT ALL HEIGHTS (SIDE TO SIDE) | 3.00 | 0.25 |
| PANTOGRAPH UPLIFT ALLOWANCE | 3.00 | 0.25 |
| PANTOGRAPH SECURITY ALLOWANCE | 6.00 | 0.50 |
| MAXIMUM PANTOGRAPH OPERATING HEIGHT | 267.60 | 22.30 |
| MINIMUM PANTOGRAPH OPERATING HEIGHT | 156.00 | 13.00 |
| PANTOGRAPH LOCKDOWN HEIGHT | 152.40 | 12.70 |

| OVERHEAD CONTACT SYSTEM PARAMETERS | | |
|---|------|--------|
| DESCRIPTION | IN | FT |
| MAXIMUM CATENARY SPAN | - | 220.00 |
| OPERATING WIND SPEED WITHOUT ICE | | 55 MPH |
| OPERATING WIND SPEED WITH RADIAL ICE | | 40 MPH |
| POLE DEFLECTION AT CONTACT WIRE HEIGHT DUE TO WIND | 1.00 | 0.08 |
| STAGGER CHANGE DUE TO ALONG TRACK MOVEMENT (NOTES 3, 4) | 1.23 | 0.10 |
| OCS TOLERANCE | 1.00 | 0.08 |
| PANTOGRAPH SECURITY ALLOWANCE | 6.00 | 0.50 |

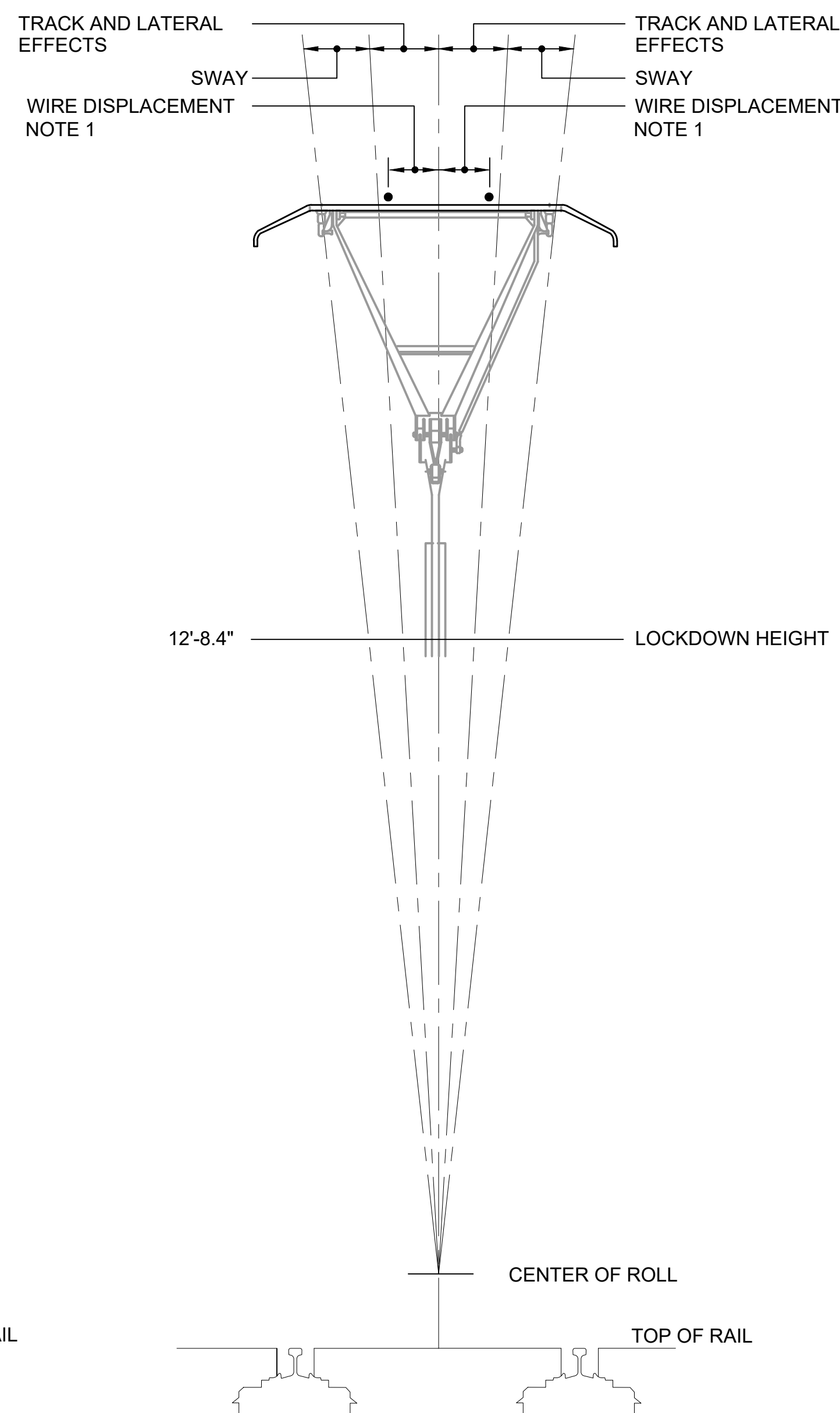
| TRACK PARAMETERS | | |
|--|-------|------|
| DESCRIPTION | IN | FT |
| TRACK GAUGE | 56.50 | 4.71 |
| DIRECT FIXATION TRACK HORIZONTAL ALIGNMENT TOLERANCE | 0.50 | |
| DIRECT FIXATION TRACK CROSS LEVEL TOLERANCE | 0.50 | |
| BALLAST TRACK HORIZONTAL ALIGNMENT TOLERANCE | 2.50 | |
| BALLAST TRACK CROSS LEVEL TOLERANCE | 1.00 | |
| RAIL GAUGE TOLERANCE | 0.236 | |
| WEAR ON RAIL GAUGE (PER RAIL) | 0.512 | |

| VEHICLE PARAMETERS | | |
|---|--------|-----------|
| DESCRIPTION | IN | FT |
| TRUCK ROLL CENTER HEIGHT | 15.0 | 1.25 |
| LATERAL MOTION AT TRUCK ROLL CENTER | 3.86 | 0.32 |
| MAXIMUM VEHICLE ROLL ANGLE BY DEGREES | | 3 DEGREES |
| MAXIMUM DISTANCE OF PANTOGRAPH SHOE TO CENTERLINE TRUCK | 46.00 | 3.83 |
| MAXIMUM HEIGHT OF VEHICLE EQUIPMENT (EXCEPT PANTOGRAPH) | 148.80 | 12.40 |



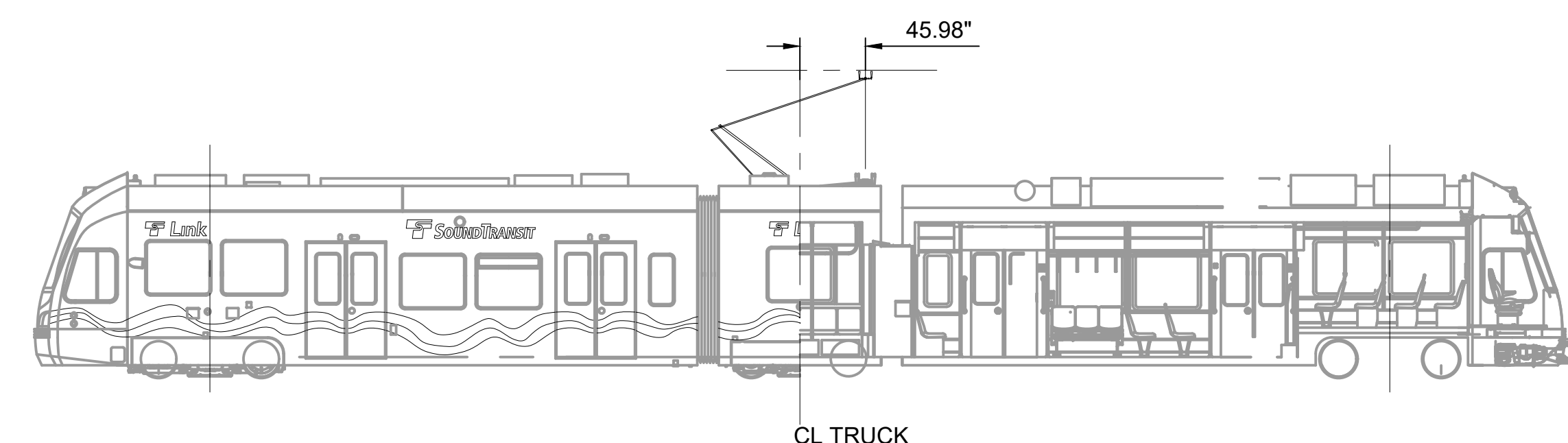
PANTOGRAPH RANGE OF MOTION-VERTICAL

NTS



PANTOGRAPH RANGE OF MOTION-HORIZONTAL

NTS



VEHICLE CRITERIA


NTS

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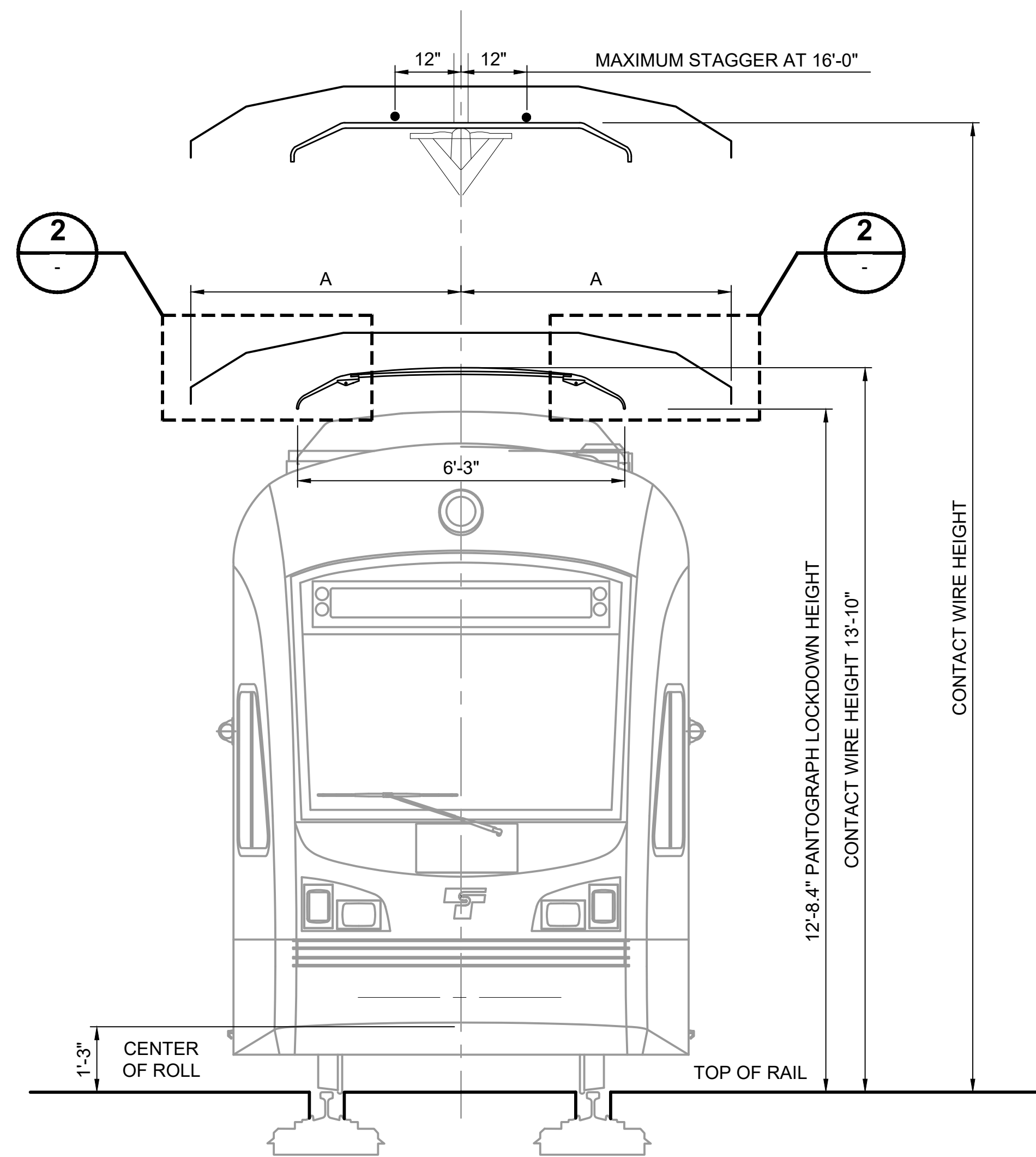
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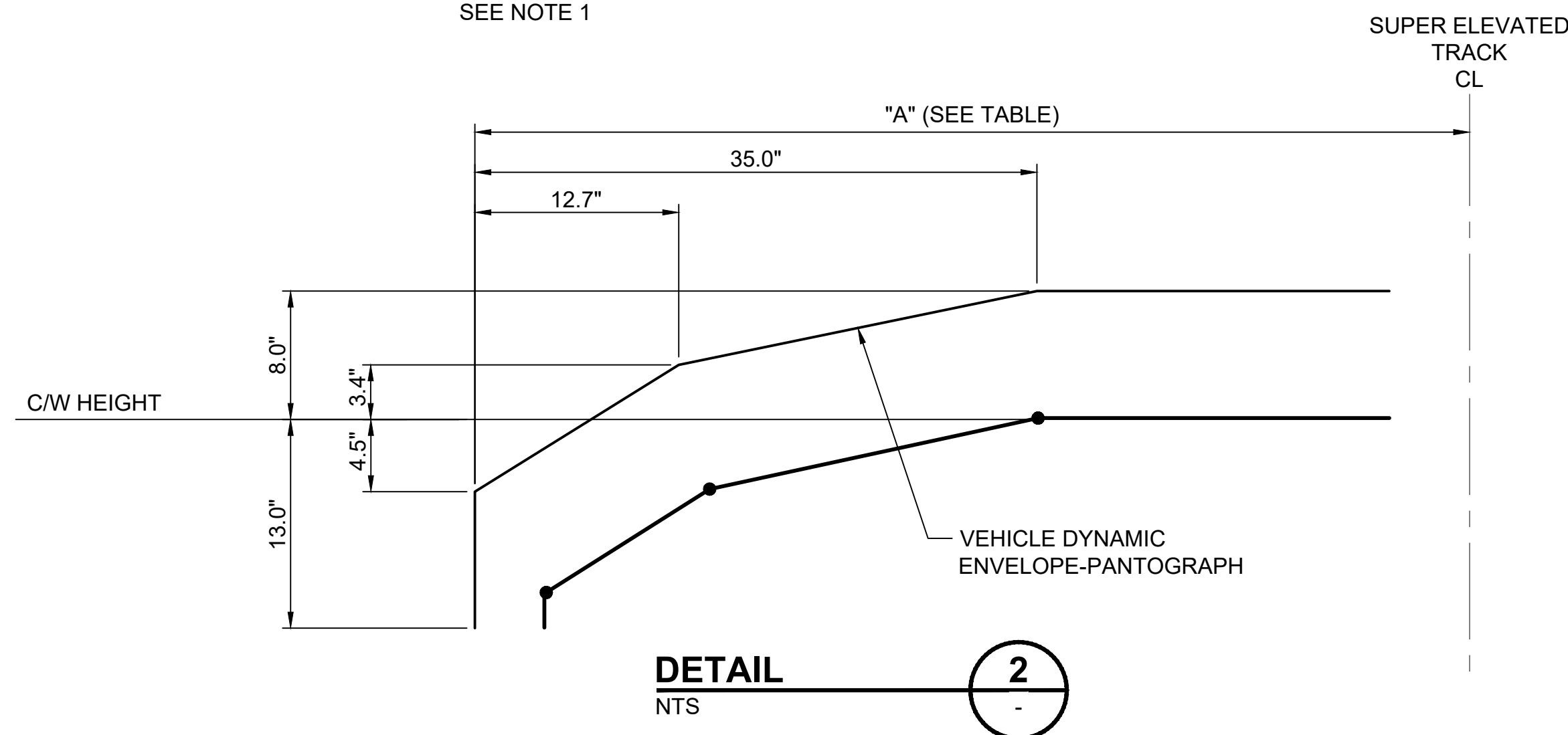
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| SOUND TRANSIT STANDARD DRAWINGS SYSTEMS | |
| OVERHEAD CATENARY SYSTEM TECHNICAL SHEETS PANTOGRAPH INTERFACE | |

| | |
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| DRAWING No.: | STD-JOD111 |
| FACILITY ID: | |
| SHEET No.: | REV: |
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PANTOGRAPH CLEARANCE ENVELOPE 1

NTS
SEE NOTE 1



DETAIL 2
NTS

GENERAL NOTES:

1. THE PANTOGRAPH CLEARANCE ENVELOPE DIMENSIONS AS SHOWN SHALL APPLY WHEN OCS, TRACK AND OCS SUPPORTS, MASONRY WALLS AND OTHER STRUCTURES ARE BUILT. THEY ARE TO BE MEASURED RELATIVE TO THE SUPERELEVATED TRACK.
2. USE LINEAR INTERPOLATION TO OBTAIN DIMENSION "A" VALUES FOR CONTACT WIRE HEIGHTS OTHER THAN LISTED.
3. VEHICLE AND PANTOGRAPH PARAMETERS ARE BASED ON ST1 KINKISHARYO VEHICLES. PARAMETERS FOR ST2 SIEMENS VEHICLES TO BE CONFIRMED WITH SOUND TRANSIT AND INCORPORATED INTO FINAL DRAWINGS.

| PANTOGRAPH PARAMETERS | | |
|-------------------------------------|--------|-------|
| DESCRIPTION | IN | FT |
| OVERALL WIDTH OVER HORNS | 75.00 | 6.25 |
| CARBON WIDTH | 47.00 | 3.92 |
| PANTOGRAPH UPLIFT ALLOWANCE | 3.00 | 0.25 |
| PANTOGRAPH SECURITY ALLOWANCE | 6.00 | 0.50 |
| ELECTRICAL PASSING CLEARANCE | 3.00 | 0.25 |
| ELECTRICAL STATIC CLEARANCE | 5.00 | 0.42 |
| MAXIMUM PANTOGRAPH OPERATING HEIGHT | 267.60 | 22.30 |
| MINIMUM PANTOGRAPH OPERATING HEIGHT | 156.00 | 13.00 |
| PANTOGRAPH LOCKDOWN HEIGHT | 152.40 | 12.70 |

| TRACK PARAMETERS | | |
|--|-------|------|
| DESCRIPTION | IN | FT |
| TRACK GAUGE | 56.50 | 4.71 |
| DIRECT FIXATION TRACK HORIZONTAL ALIGNMENT TOLERANCE | 0.50 | |
| DIRECT FIXATION TRACK CROSS LEVEL TOLERANCE | 0.50 | |
| BALLAST TRACK HORIZONTAL ALIGNMENT TOLERANCE | 2.50 | |
| BALLAST TRACK CROSS LEVEL TOLERANCE | 1.00 | |
| WEAR ON RAIL GAUGE (PER RAIL) | 0.51 | |
| RAIL GAUGE TOLERANCE | 0.236 | |
| MAXIMUM SUPERELEVATION | 6.00 | 0.50 |

| VEHICLE PARAMETERS | | |
|---|-----------|-------|
| DESCRIPTION | IN | FT |
| TRUCK ROLL CENTER HEIGHT | 15.00 | 1.25 |
| LATERAL MOTION AT TRUCK ROLL CENTER | 3.86 | 0.32 |
| MAXIMUM VEHICLE ROLL ANGLE BY DEGREES | 3 DEGREES | |
| MAXIMUM DISTANCE OF PANTOGRAPH SHOE TO CENTERLINE TRUCK | 46.00 | 3.83 |
| MAXIMUM HEIGHT OF VEHICLE EQUIPMENT (EXCEPT PANTOGRAPH) | 148.80 | 12.40 |

| BALLAST TRACK ENVELOPE DIMENSION | | |
|----------------------------------|-------|-------|
| NOMINAL CONTACT WIRE HEIGHT (FT) | 20.50 | 16.00 |
| DIMENSION "A" (IN) | 63.03 | 59.30 |


| DIRECT FIXATION TRACK ENVELOPE DIMENSION | | |
|--|-------|-------|
| NOMINAL CONTACT WIRE HEIGHT (FT) | 20.50 | 16.00 |
| DIMENSION "A" (IN) | 60.57 | 57.30 |

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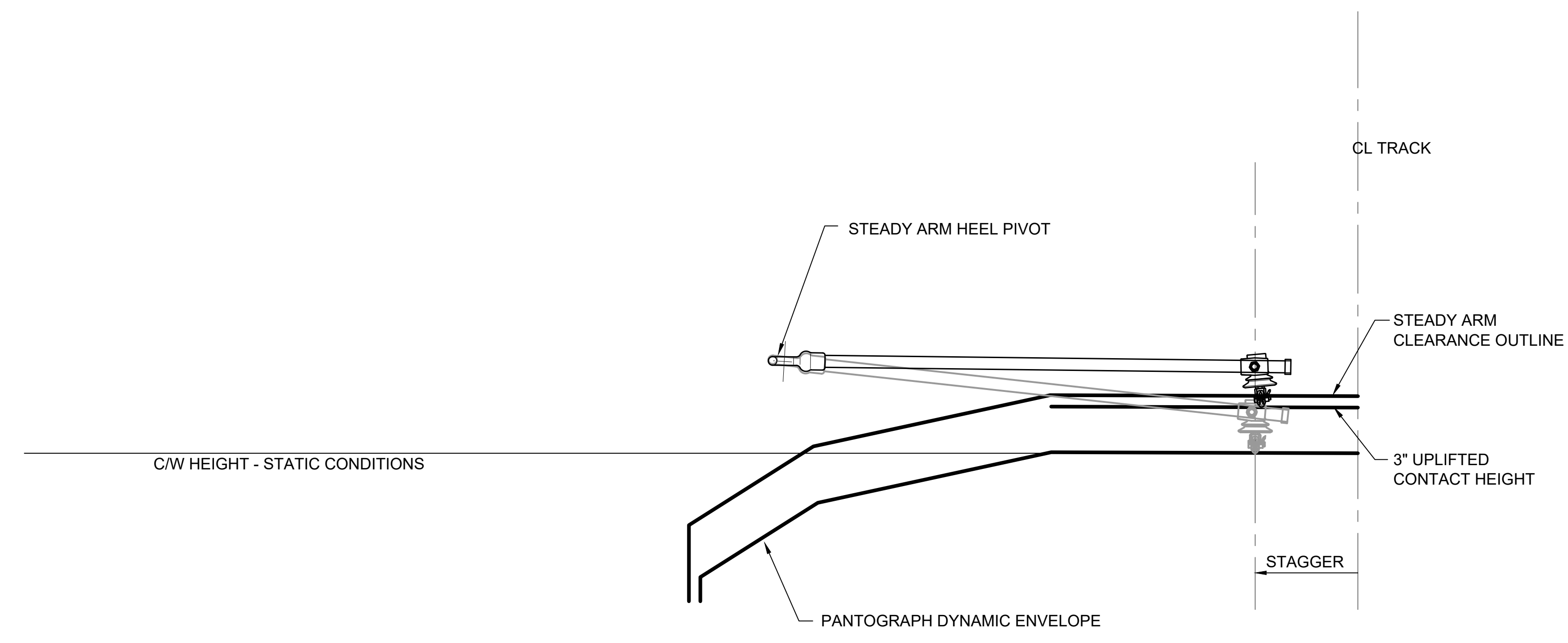
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| SOUND TRANSIT STANDARD DRAWINGS SYSTEMS OVERHEAD CATENARY SYSTEM TECHNICAL SHEETS PANTOGRAPH CLEARANCE ENVELOPE | DRAWING No.: | STD-JOD112 |
| | FACILITY ID: | |
| | SHEET No.: | REV: |

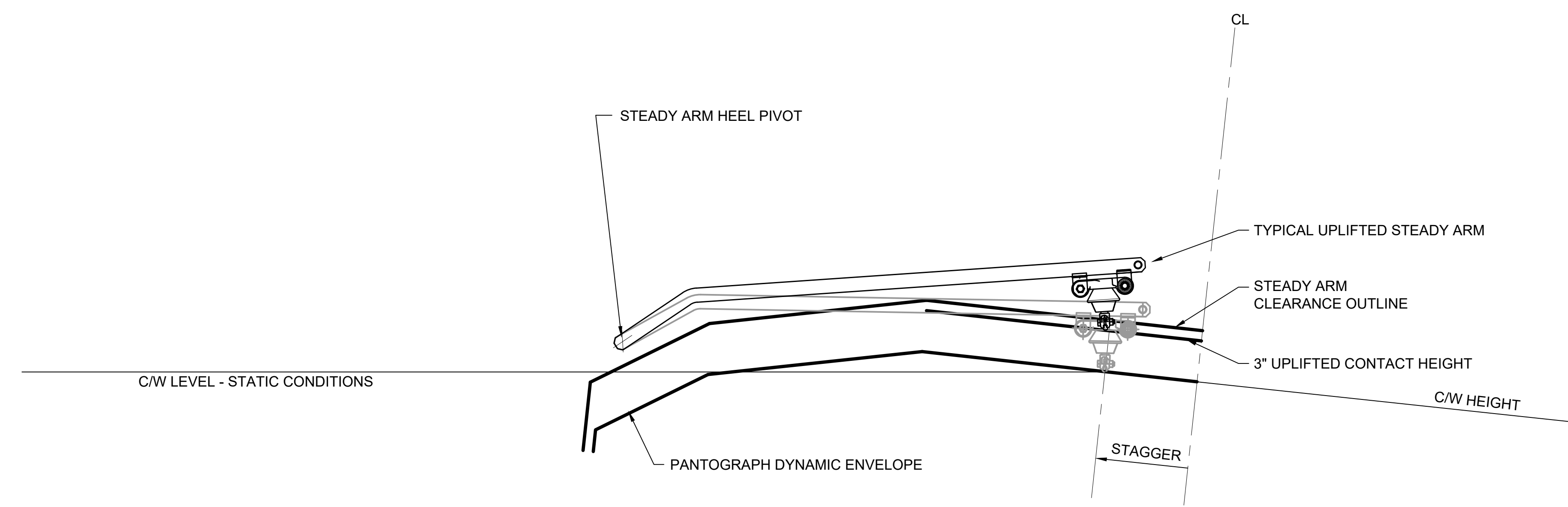
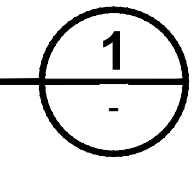
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GENERAL NOTES:

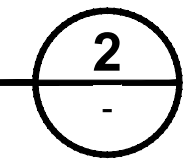
1. THIS DRAWING IS TO BE USED FOR THE DESIGN AND APPLICATION OF STEADY ARMS REGISTERING IN-RUNNING CONTACT WIRES. IT DOES NOT APPLY TO UPLIFT RESTRICTING STEADY ARMS SPECIFIED FOR USE IN TUNNELS.
2. ALL STEADY ARMS SHALL BE SHAPED SO AS NOT TO ENCROACH INSIDE THE UPLIFTED PANTOGRAPH TO STEADY ARM CLEARANCE OUTLINE OR WITHIN 1" RUNNING CLEARANCE OF THE PANTOGRAPH DYNAMIC CLEARANCE AT ANY TIME, EXCEPTING FOR CONTACT WIRE CLAMP COMPONENTS.



SUPERELEVATION = 0
NTS



TRACK WITH UP TO 6" SUPERELEVATION
NTS



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LINE IS 1" AT FULL SCALE

SCALE: NTS
FILENAME: STD-JOD113
CONTRACT No.: RTA/LR
DATE: 2/2024

**SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS**

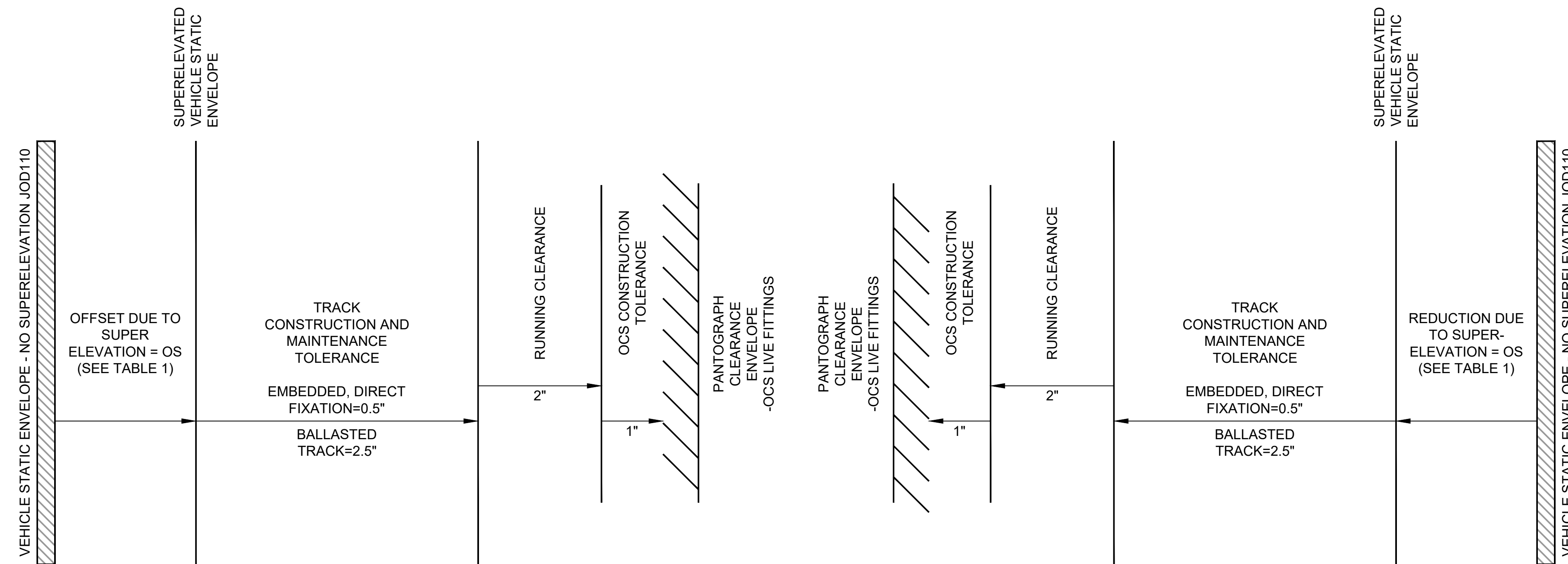
OVERHEAD CATENARY SYSTEM
TECHNICAL SHEETS STEADY ARM CLEARANCE
TO LIVE FITTINGS

| | |
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| DRAWING No.: | STD-JOD113 |
| FACILITY ID: | |
| SHEET No.: | REV: 1 |

| HORIZONTAL OFFSET DUE TO TRACK SUPERELEVATION (OS) | | | | | | |
|--|---------------------|------|------|------|------|------|
| CONTACT WIRE HEIGHT (FT) | SUPERELEVATION (IN) | | | | | |
| | 1.00 | 2.00 | 3.00 | 4.00 | 5.00 | 6.00 |
| 23'-0" | 4.9 | 9.8 | 14.7 | 19.5 | 24.4 | 29.3 |
| 20'-6" | 4.4 | 8.7 | 13.1 | 17.4 | 21.8 | 26.1 |
| 18'-6" | 3.9 | 7.9 | 11.8 | 15.7 | 19.6 | 23.6 |
| 16'-0" | 3.4 | 6.8 | 10.2 | 13.6 | 17.0 | 20.4 |
| 13'-10" | 2.9 | 5.9 | 8.8 | 11.8 | 14.7 | 17.6 |
| 13'-0" | 2.8 | 5.5 | 8.3 | 11.0 | 13.8 | 16.6 |

GENERAL NOTES:

- THE DRAWING PROVIDES RELATIONSHIPS AND DIMENSIONS FOR DETERMINATION OF MINIMUM CLEARANCES BETWEEN A PANTOGRAPH AND ADJACENT LIVE OCS, FITTINGS, EXCEPT FOR IN RUNNING STEADY ARMS.
- FOR THE PURPOSE OF DETERMINATION OF CLEARANCES TO A PANTOGRAPH, AN OCS FITTING SHALL BE CONSIDERED LIVE ONLY WHERE IT IS SEPARATED FROM GROUNDED POLES OR LIVE WIRING OF ADJACENT TRACKS, BY AT LEAST ONE LEVEL OF SYSTEM RATED INSULATION.
 - CLEARANCES FOR OTHER LIVE OCS FITTINGS TO BE DETERMINED FROM THIS DRAWING
 - ALL OTHER STRUCTURES, POLES OR EQUIPMENT REQUIRE CLEARANCES DETERMINED FROM DRAWING JOD110.
- FOR OBJECTS DIAGONALLY SEPARATED, BOTH HORIZONTAL AND VERTICAL CLEARANCES ARE TO BE APPLIED. RUNNING CLEARANCES COMPONENTS MAY BE MEASURED RADIALLY.
- MINIMUM CLEARANCES BETWEEN LIVE WIRES OR FITTINGS AND OTHER FIXED INFRASTRUCTURE SHALL BE DETERMINED FROM NATIONAL ELECTRICAL SAFETY CODE (N.E.S.C.) AND DRAWING JOD115.

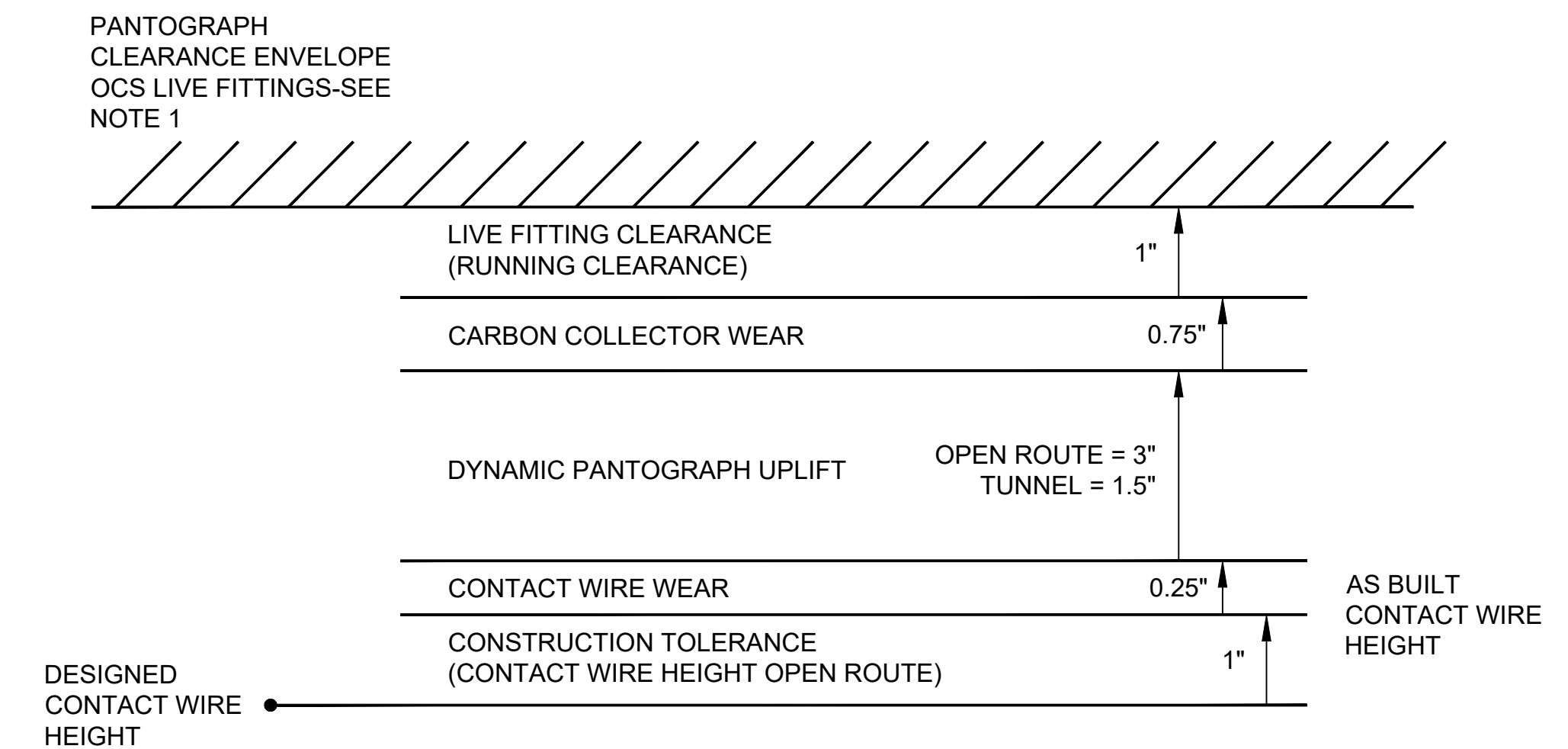


HORIZONTAL CLEARANCE TO A PANTOGRAPH FROM OBJECTS ON THE INSIDE OF CURVE

NTS

HORIZONTAL CLEARANCE TO A PANTOGRAPH FROM OBJECTS ON THE OUTSIDE OF CURVE

NTS



VERTICAL CLEARANCE TO A PANTOGRAPH

NTS

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| FILENAME: | STD-JOD114 |
| CONTRACT No.: | RTA/LR |
| DATE: | 2/2024 |

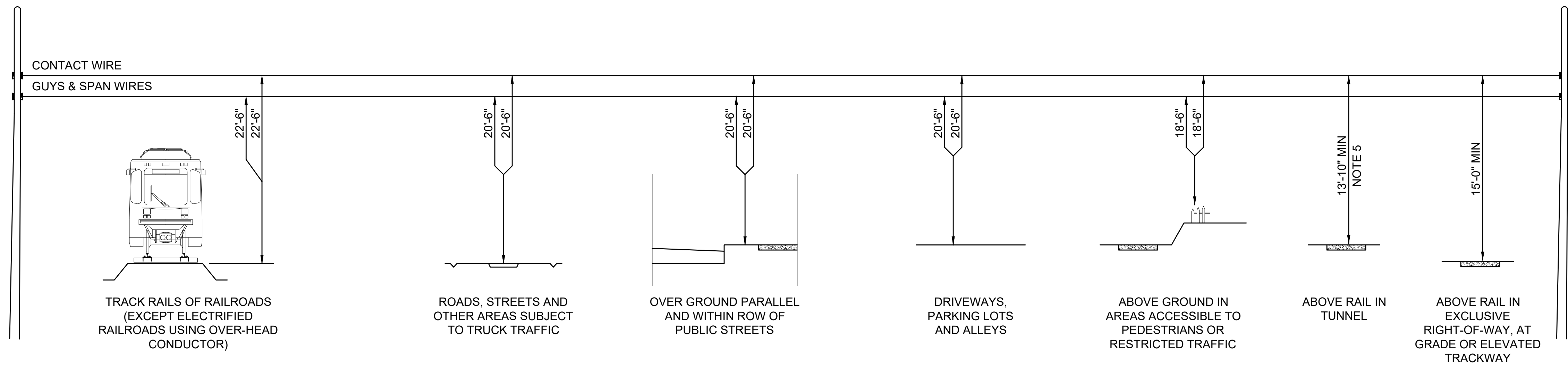
**SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS**

OVERHEAD CATENARY SYSTEM
TECHNICAL SHEETS PANTOGRAPH CLEARANCE
TO LIVE FITTINGS

| | |
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| DRAWING No.: | STD-JOD114 |
| FACILITY ID: | |
| SHEET No.: | 1 |

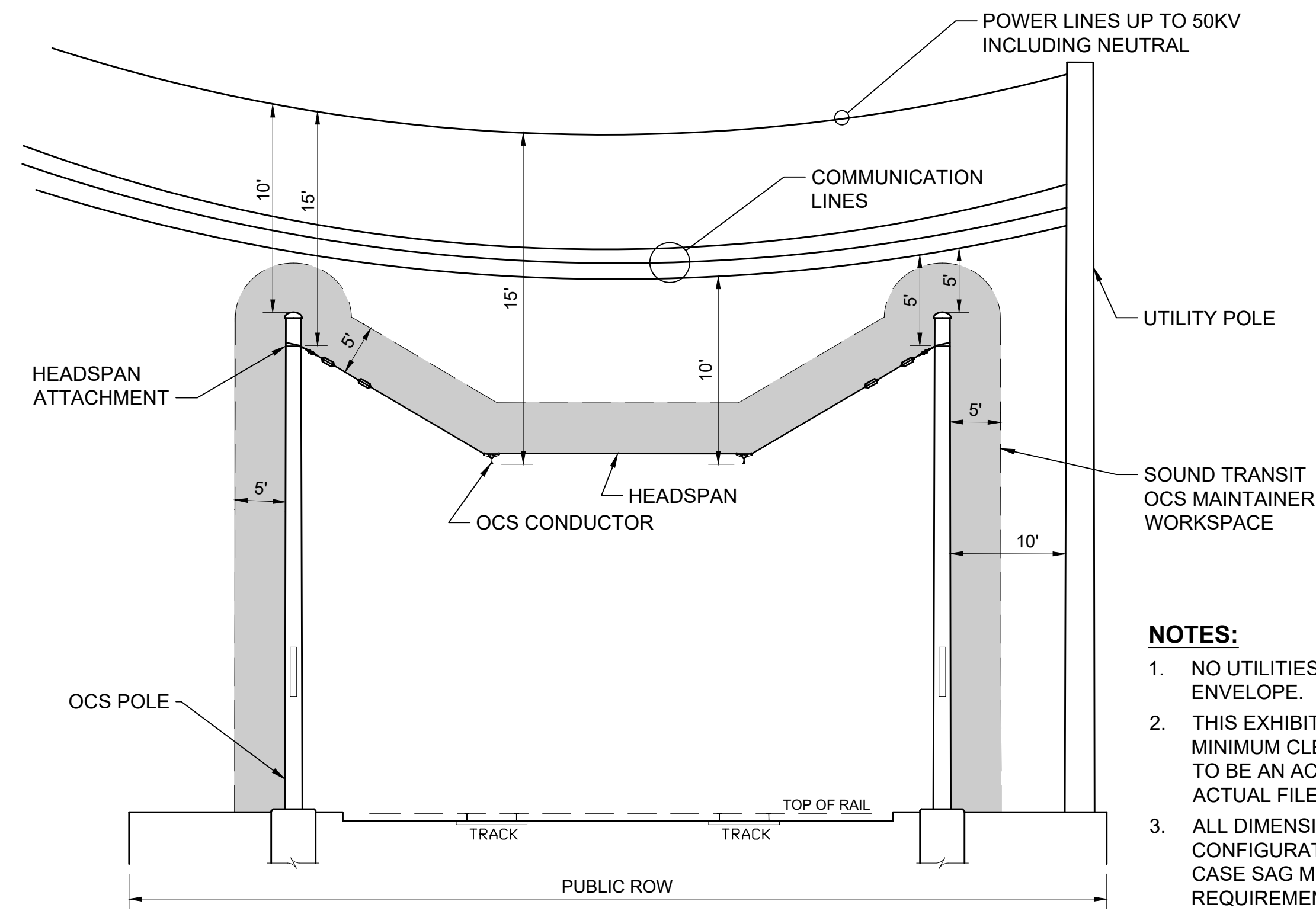
GENERAL NOTES:

1. THE CLEARANCES APPLY UNDER THE FOLLOWING CONDITIONS:
 - 1.1. CONDUCTOR TEMPERATURE OF 60°F, NO WIND, WITH FINAL UNLOADED SAG IN THE WIRE.
 - 1.2. SPAN LENGTHS NOT GREATER THAN THE FOLLOWING:
 - SINGLE CONTACT LINE - 100 FT
 - SIMPLE CATENARY - 220 FT
2. ALL CLEARANCES ARE MINIMUM.
3. FOR VOLTAGES EXCEEDING 50KV (UP TO 470KV) THE 50KV CLEARANCE SHALL BE INCREASED BY 0.4 INCHES FOR EACH 1KV, OR FRACTION THEREOF, IN EXCESS OF 50KV.
4. THE CLEARANCES APPLY UNDER THE FOLLOWING CONDITIONS:
 - 4.1. CONDUCTOR SAG AT 120°F OR
 - 4.2. MAXIMUM CONDUCTOR TEMPERATURE IF GREATER THAN 120°F OR
 - 4.3. 32°F WITH RADIAL ICE OF 0.25 INCHES.
5. FOR NEW TUNNELS MINIMUM CONTACT WIRE HEIGHT SHALL BE 13'-10". FOR EXISTING TUNNELS MINIMUM CONTACT WIRE HEIGHT SHALL BE 13'-0".
6. CLEARANCES SHOWN ARE MINIMUM WIRE TO WIRE CLEARANCES BASED ON THE NESC. FINAL REQUIRED CLEARANCES BETWEEN OVERHEAD UTILITIES AND OCS MUST BE COORDINATED WITH AND APPROVED BY SOUND TRANSIT.



VERTICAL CLEARANCES OF CONTACT WIRE ABOVE GROUND, ROADWAY OR RAILS

NTS
SEE NOTE 1



VERTICAL CLEARANCES BETWEEN CROSSING WIRES

NTS
SEE NOTE 4, 6

NOTES:

1. NO UTILITIES OR SERVICES WILL BE PERMITTED INSIDE ENVELOPE.
2. THIS EXHIBIT IS A GRAPHIC REPRESENTATION TO ILLUSTRATE MINIMUM CLEARANCE REQUIREMENTS AND IS NOT INTENDED TO BE AN ACCURATE DEPICTION OF ALL CROSS SECTIONS OR ACTUAL FILED CONDITIONS.
3. ALL DIMENSIONS SHOWN ARE MINIMUM. FINAL CONFIGURATION OF OVERHEAD UTILITY LINES AT WORST CASE SAG MUST MEET ALL INDIVIDUAL CLEARANCE REQUIREMENTS SHOWN.

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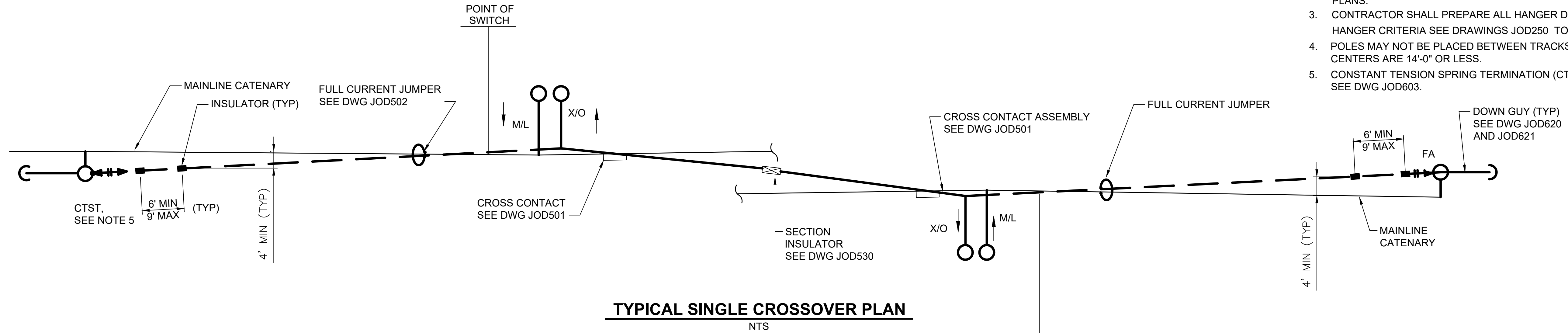
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| FILENAME: STD-JOD115 | DATE: 2/2024 |

**SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS**

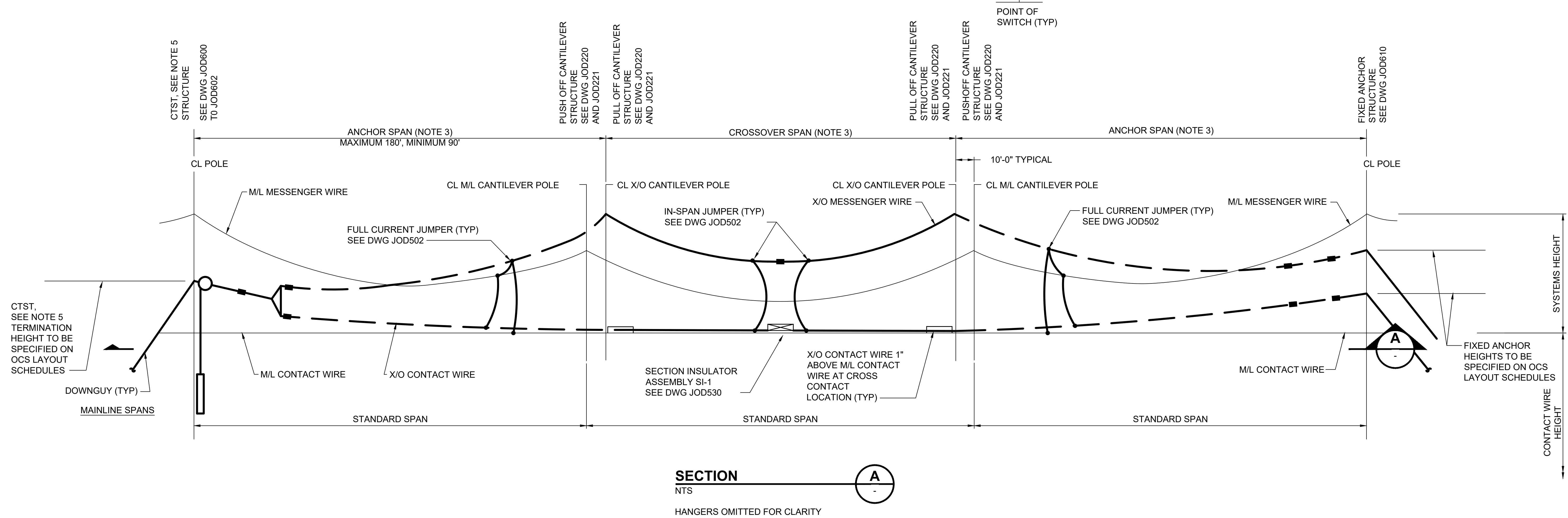
OVERHEAD CATENARY SYSTEM
TECHNICAL SHEETS CLEARANCE
FROM OVERHEAD CONDUCTORS

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| DRAWING No.: | STD-JOD115 |
| FACILITY ID: | |
| SHEET No.: | REV: 2 |

- GENERAL NOTES:**
- FOR SYMBOLS, ABBREVIATIONS AND LEGEND SEE DWG JZN001, JZN002 AND JZN006.
 - SITE SPECIFIC REQUIREMENTS TO BE SHOWN ON OCS LAYOUT PLANS.
 - CONTRACTOR SHALL PREPARE ALL HANGER DIMENSIONS FOR HANGER CRITERIA SEE DRAWINGS JOD250 TO JOD253.
 - POLES MAY NOT BE PLACED BETWEEN TRACKS WHEN TRACK CENTERS ARE 14'-0" OR LESS.
 - CONSTANT TENSION SPRING TERMINATION (CTST) PREFERRED, SEE DWG JOD603.



TYPICAL SINGLE CROSSOVER PLAN
NTS



SECTION A
NTS
HANGERS OMITTED FOR CLARITY


03/21/24 | 1:48 PM | HARRISBK C:\USERS\HARRISBK\Sound Transit\Technical Standards and Requirements Projects - Drawings Update 2023\Standard Drawings\System\STD-JOD200.DWG

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| 1 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |
| 0 | 8/2019 | | | | REVISED SYSTEMS DIRECTIVE DRAWINGS |

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LINE IS 1" AT FULL SCALE



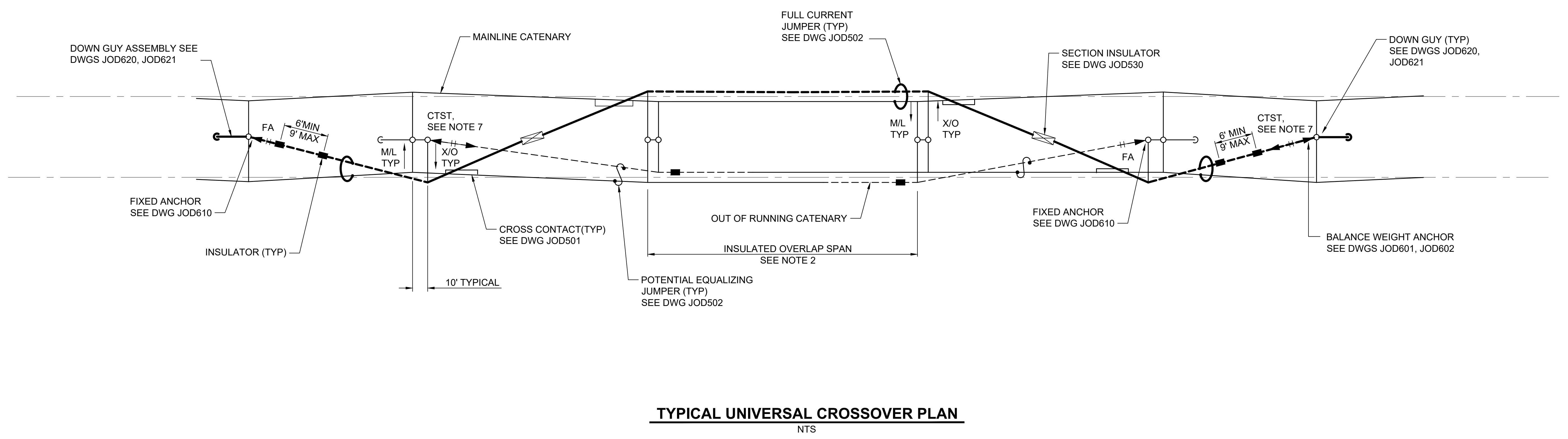
SCALE: NTS
FILENAME: STD-JOD200
CONTRACT No.: RTA/LR
DATE: 2/2024

**SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS**

OVERHEAD CATENARY SYSTEM
GENERAL ARRANGEMENT SINGLE CROSSOVER

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| DRAWING No.: | STD-JOD200 |
| FACILITY ID: | |
| SHEET No.: | REV: |
| | 1 |

- GENERAL NOTES:**
- FOR SYMBOLS, ABBREVIATIONS AND LEGEND SEE DWG JZN001, JZN002 AND JZN006.
 - SITE SPECIFIC REQUIREMENTS TO BE SHOWN ON OCS LAYOUT PLANS.
 - CROSSOVER CATENARY HAS A 3'-11" SYSTEM HEIGHT AT SUPPORT (TYP).
 - MAINLINE CATENARY HAS A 5'-0" SYSTEM HEIGHT AT SUPPORT (TYP).
 - STAGGERS IN TURNOUTS ARE TO BE MEASURED FROM TURNOUT TRACK CENTERLINE.
 - CANTILEVERS SHALL BE SET NORMAL TO THE MAINLINE TRACK AT 60° F.
 - CONSTANT TENSION SPRING TERMINATION (CTST) PREFERRED, SEE DWG JOD603.



TYPICAL UNIVERSAL CROSSOVER PLAN
NTS


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| 1 | 2/2024 | ---- | ---- | ---- | 2024 REVISED STANDARD DRAWINGS |
| 0 | 8/2019 | ---- | ---- | ---- | REVISED SYSTEMS DIRECTIVE DRAWINGS |
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LINE IS 1" AT FULL SCALE



SCALE: NTS
 FILENAME: STD-JOD201
 CONTRACT No.: RTA/LR
 DATE: 2/2024

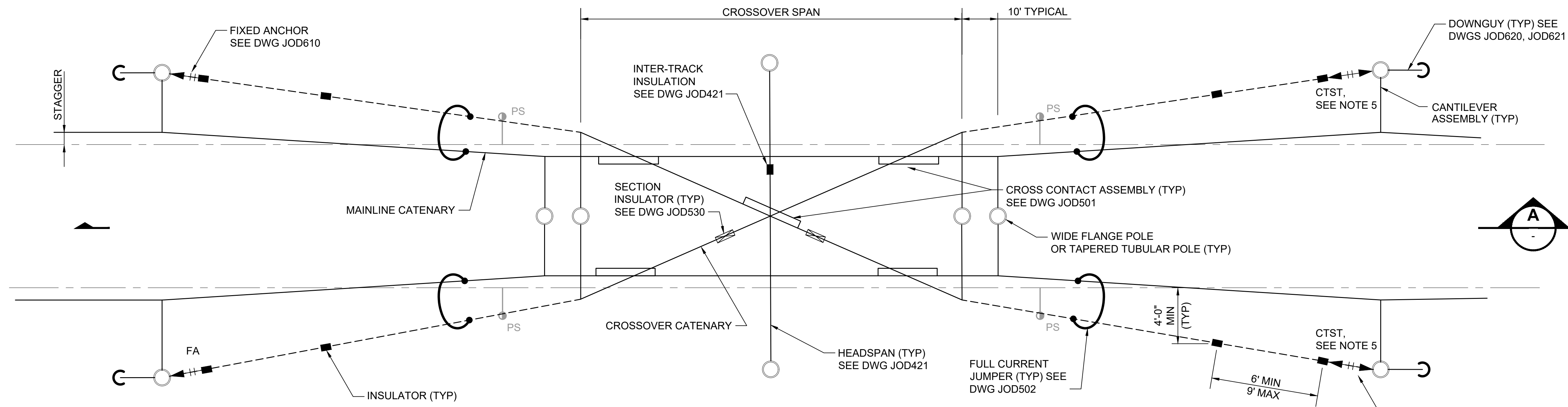
**SOUND TRANSIT
 STANDARD DRAWINGS
 SYSTEMS**

OVERHEAD CATENARY SYSTEM
 GENERAL ARRANGEMENT UNIVERSAL CROSSOVER

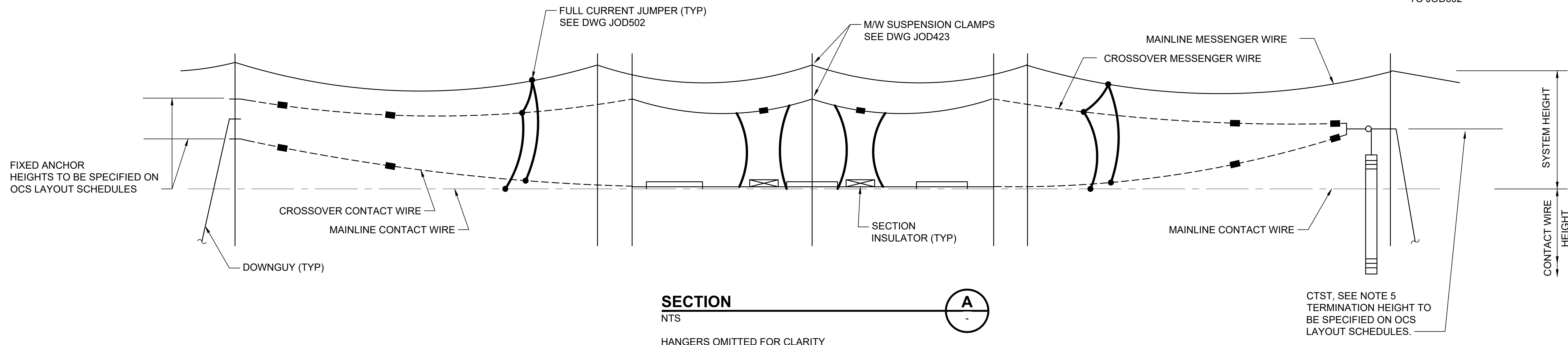
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| DRAWING No.: | STD-JOD201 |
| FACILITY ID: | |
| SHEET No.: | REV: 1 |

GENERAL NOTES:

1. FOR SYMBOLS, ABBREVIATIONS AND LEGEND SEE DWG JZN001, JZN002 AND JZN006.
2. SITE SPECIFIC REQUIREMENTS TO BE SHOWN ON OCS LAYOUT PLANS.
3. CANTILEVERS SHALL BE NORMAL TO MAINLINE TRACK AT 60° F.
4. TERMINATION MAY BE CENTER POLES.
5. CONSTANT TENSION SPRING TERMINATION (CTST) PREFERRED, SEE DWG JOD603.



TYPICAL DIAMOND CROSSOVER ARRANGEMENT SIDE POLES PLAN
NTS



SECTION A
NTS
HANGERS OMITTED FOR CLARITY

CTST, SEE NOTE 5
TERMINATION HEIGHT TO
BE SPECIFIED ON OCS
LAYOUT SCHEDULES.

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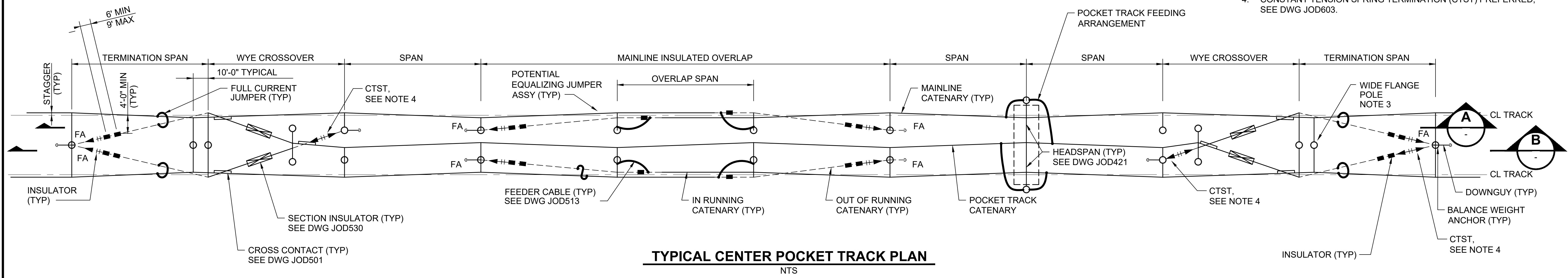
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| FILENAME: | STD-JOD202 |
| CONTRACT No.: | RTA/LR |
| DATE: | 2/2024 |

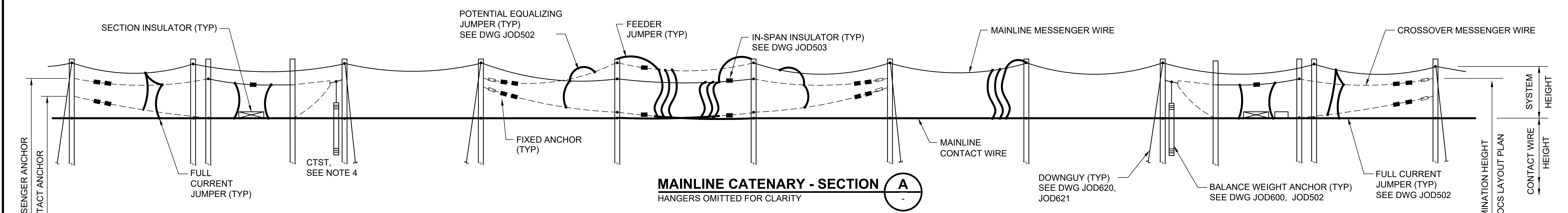
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| SOUND TRANSIT STANDARD DRAWINGS SYSTEMS | |
| OVERHEAD CATENARY SYSTEM GENERAL ARRANGEMENT DIAMOND CROSSOVER | |

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| DRAWING No.: | STD-JOD202 |
| FACILITY ID: | |
| SHEET No.: | REV: |
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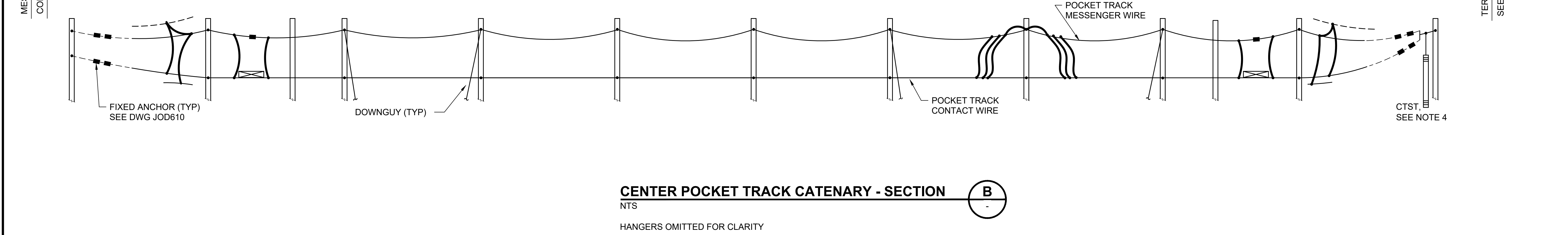
- GENERAL NOTES:**
- FOR SYMBOLS, ABBREVIATIONS AND LEGEND SEE DWG JZN001, JZN002 AND JZN006.
 - SITE SPECIFIC REQUIREMENTS TO BE SHOWN ON OCS LAYOUT PLANS.
 - ROUND TAPERED TUBULAR POLE MAY BE SUBSTITUTED FOR WIDE FLANGE POLE. POLE TYPES TO BE SPECIFIED ON CONTRACT DRAWINGS.
 - CONSTANT TENSION SPRING TERMINATION (CTST) PREFERRED, SEE DWG JOD603.



TYPICAL CENTER POCKET TRACK PLAN
NTS



MAINLINE CATENARY - SECTION A
HANGERS OMITTED FOR CLARITY



CENTER POCKET TRACK CATENARY - SECTION B
HANGERS OMITTED FOR CLARITY

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| No. | DATE | DSN | CHK | APP | REVISION |
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| 1 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |
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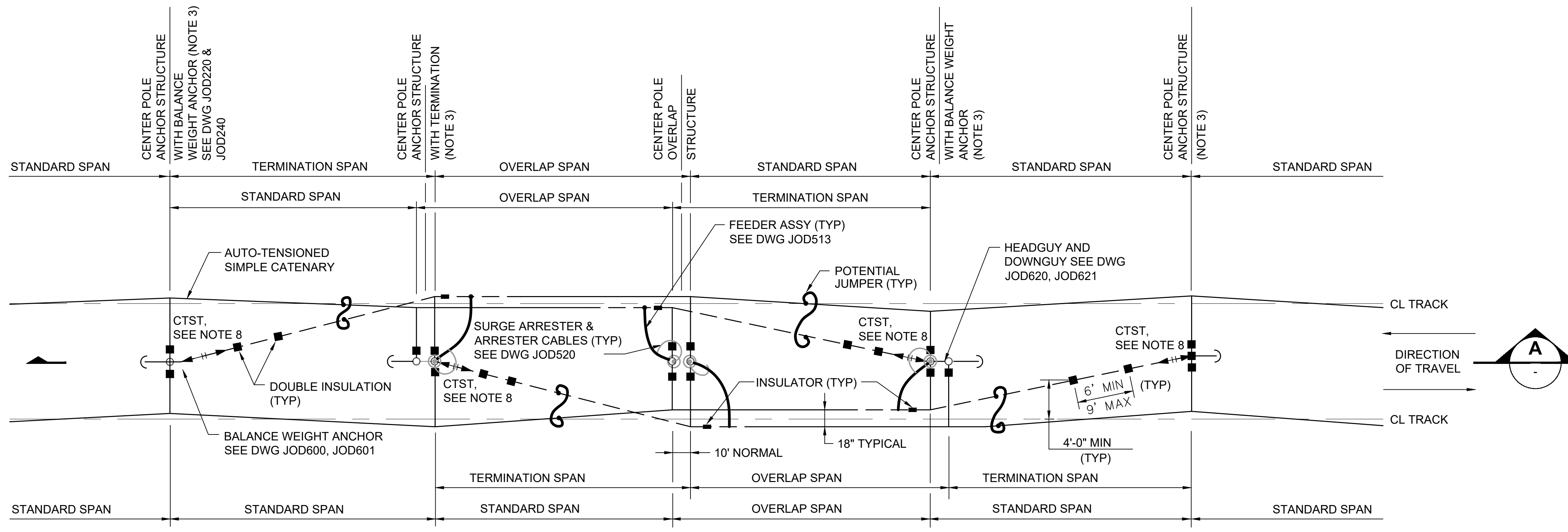
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| SCALE: NTS | CONTRACT No.: RTA/LR |
| FILENAME: STD-JOD203 | |
| DATE: 2/2024 | |

**SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS**

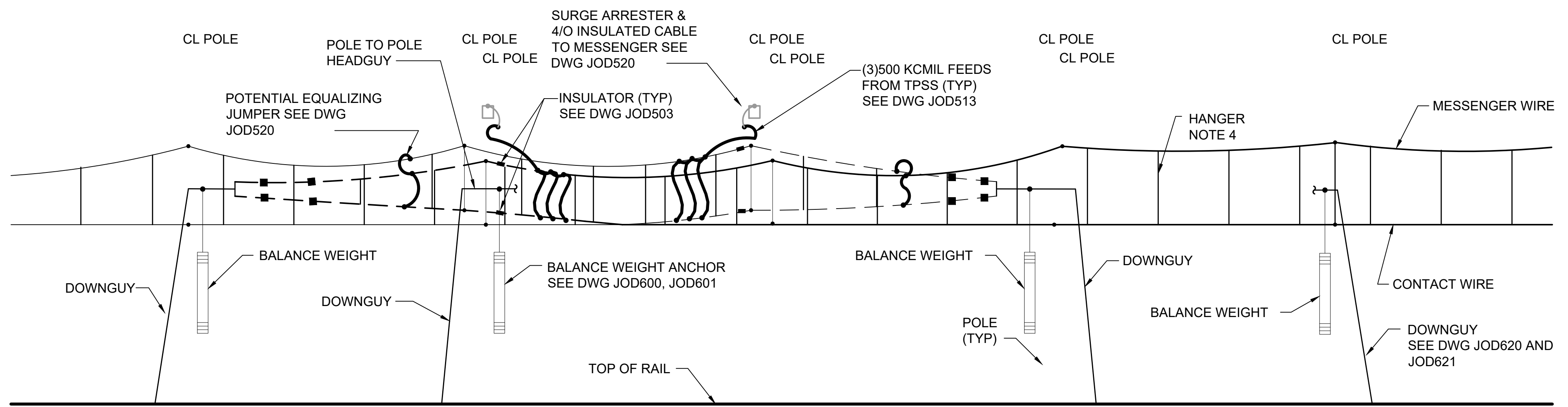
OVERHEAD CATENARY SYSTEM
GENERAL ARRANGEMENT CENTER POCKET TRACK

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| DRAWING No.: | STD-JOD203 |
| FACILITY ID: | |
| SHEET No.: | REV: |
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- GENERAL NOTES:**
- FOR SYMBOLS, ABBREVIATIONS, AND LEGEND SEE DWG JZN001, JZN002, AND JZN006.
 - CONDUCTOR HEIGHTS, ANCHOR HEIGHTS, SPAN LENGTHS, STAGGER VALUES AND DIRECTIONS TO BE SHOWN ON OCS LAYOUT PLANS.
 - FIXED ANCHOR TERMINATION MAY BE SUBSTITUTED FOR BALANCE WEIGHT ANCHOR. SITE SPECIFIC REQUIREMENTS TO BE SHOWN ON OCS LAYOUT PLANS.
 - FOR TYPICAL STANDARD OVERLAP AND TERMINATION SPAN DETAILS AND HANGER SETOUT, SEE DWGS JOD250, JOD251 & JOD253.
 - CANTILEVERS SHALL BE NORMAL TO MAINLINE TRACK AT 60° F.
 - POLE-MOUNTED SWITCHES MAY BE USED. SITE SPECIFIC DETAILS TO BE SHOWN ON OCS LAYOUT PLANS.
 - LOCATION AND TYPE OF SURGE ARRESTERS TO BE SHOWN ON OCS LAYOUT PLANS.
 - CONSTANT TENSION SPRING TERMINATION (CTST) PREFERRED, SEE DWG JOD603.

INSULATED OVERLAP PLAN - CENTER POLES
NTS



SECTION A
NTS

03/21/24 | 1:49 PM | HARRISBK C:\USERS\HARRISBK\Sound Transit\TECHNICAL STANDARDS AND REQUIREMENTS PROJECTS - DRAWINGS\UPDATE 2023\STANDARD DRAWINGS\SYSTEMS\STD-JOD210.DWG

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LINE IS 1" AT FULL SCALE

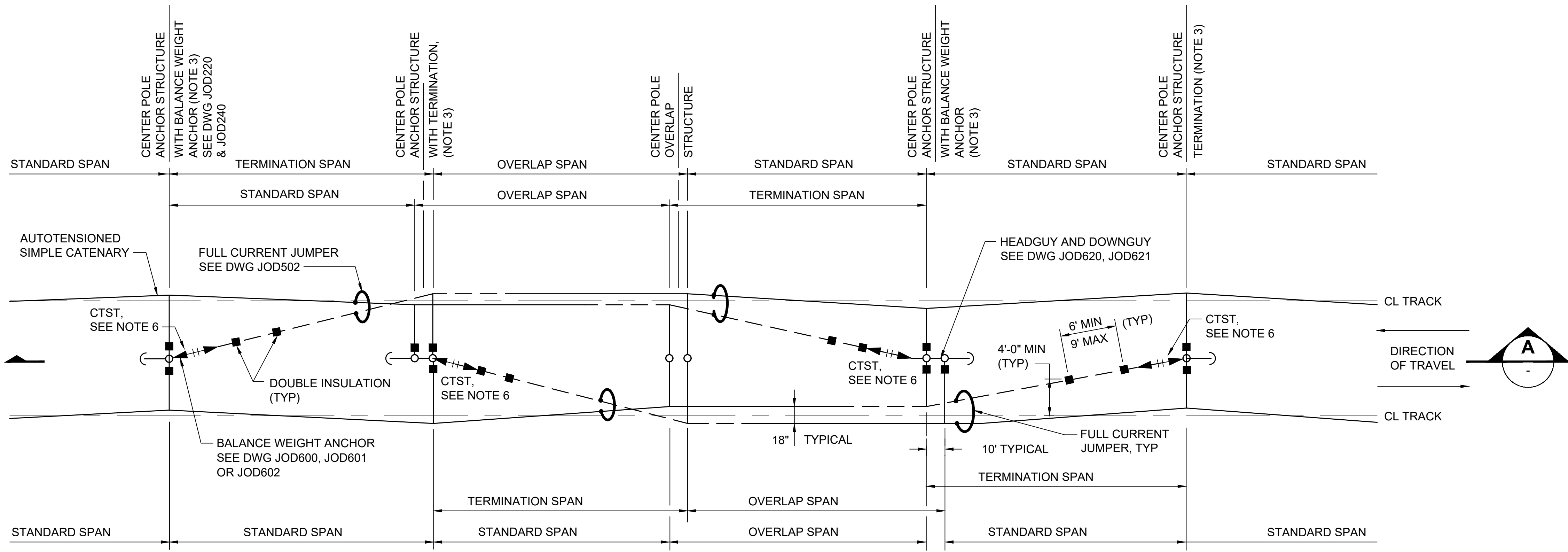
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FILENAME: STD-JOD210
CONTRACT No.: RTA/LR
DATE: 2/2024

**SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS**

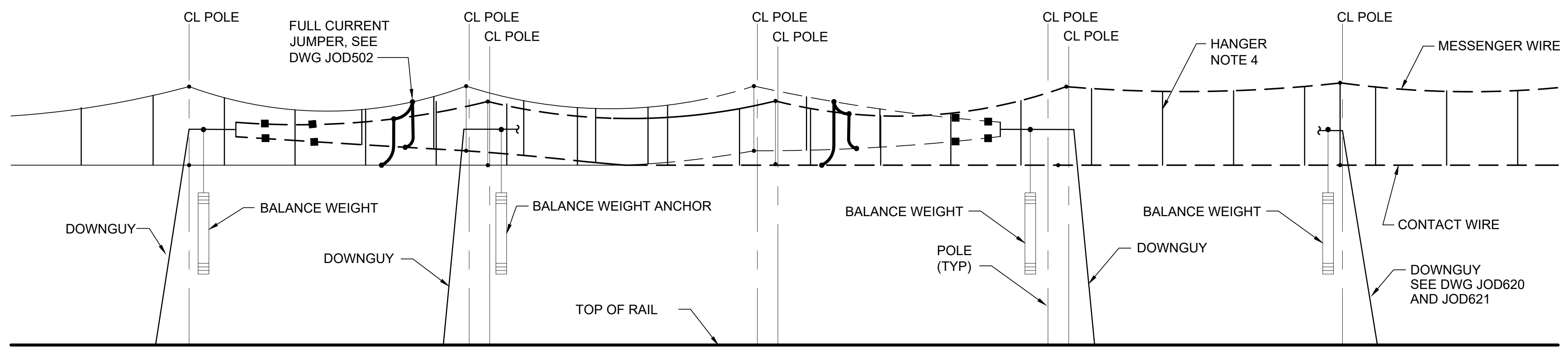
OVERHEAD CATENARY SYSTEM
GENERAL ARRANGEMENT INSULATED OVERLAP
CENTER POLES

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| DRAWING No.: | STD-JOD210 |
| FACILITY ID: | |
| SHEET No.: | REV: 1 |

- GENERAL NOTES:**
- FOR SYMBOLS, ABBREVIATIONS, AND LEGEND SEE DWG JZN001, JZN002, AND JZN006.
 - CONDUCTOR HEIGHTS, ANCHOR HEIGHTS, SPAN LENGTHS, STAGGER VALUES AND DIRECTIONS TO BE SHOWN ON OCS LAYOUT PLANS.
 - FIXED ANCHOR TERMINATION MAY BE SUBSTITUTED FOR BALANCE WEIGHT ANCHOR. SITE SPECIFIC REQUIREMENTS TO BE SHOWN ON OCS LAYOUT PLANS.
 - FOR TYPICAL STANDARD OVERLAP AND TERMINATION SPAN DETAILS & HANGER SETOUT, SEE DWG JOD250, JOD251, & JOD253.
 - CANTILEVERS SHALL BE NORMAL TO MAINLINE TRACK AT 60° F.
 - CONSTANT TENSION SPRING TERMINATION (CTST) PREFERRED, SEE DWG JOD603.



UNINSULATED OVERLAP PLAN - CENTER POLES
NTS



SECTION A
NTS


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LINE IS 1" AT FULL SCALE



SCALE: NTS
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CONTRACT No.: RTA/LR
DATE: 2/2024

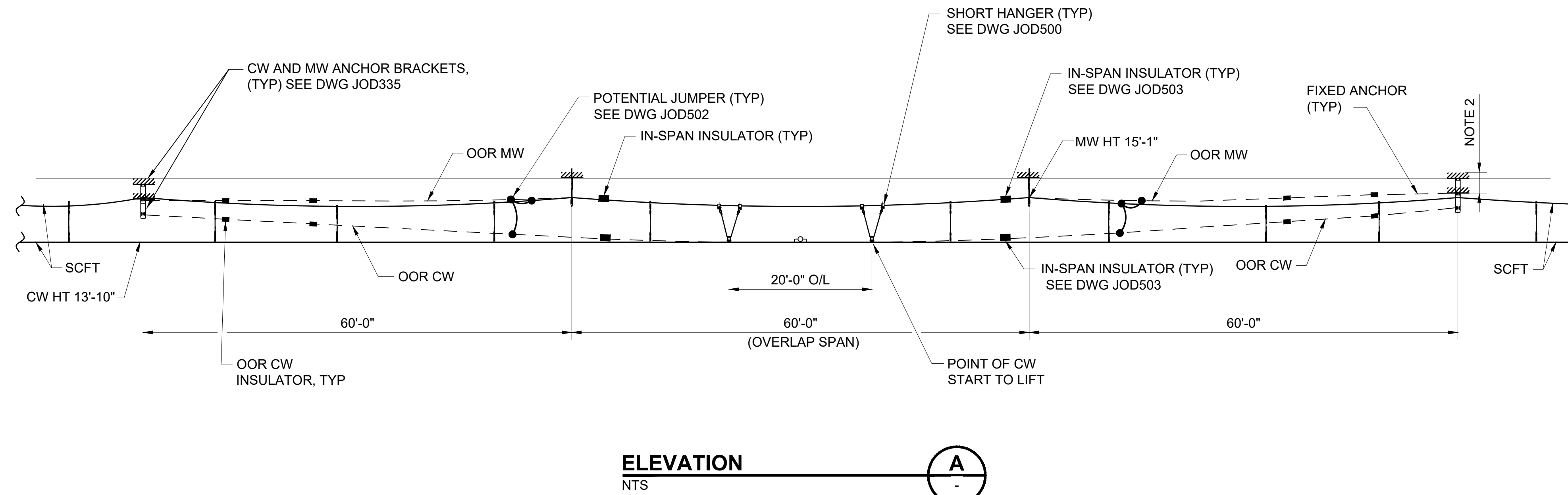
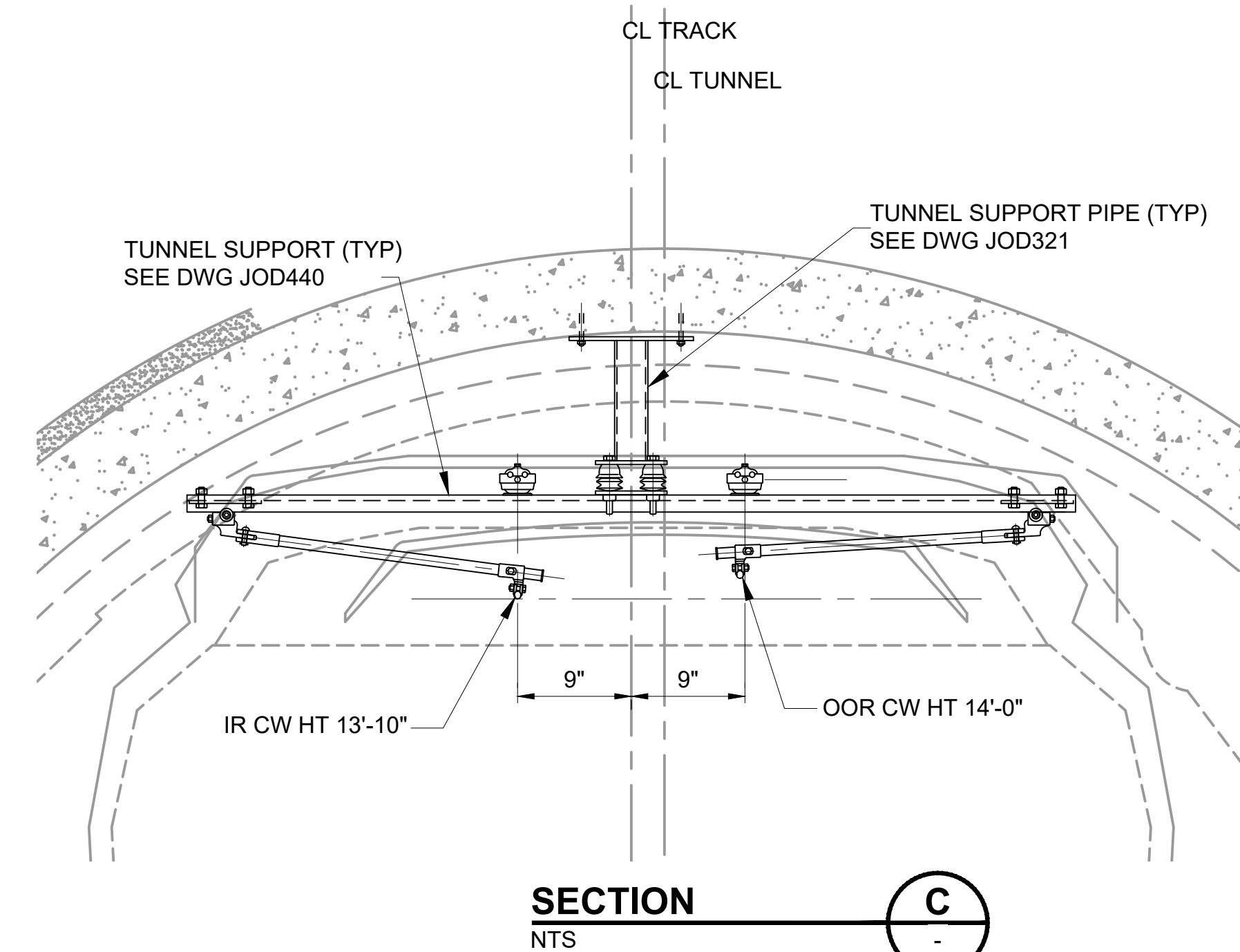
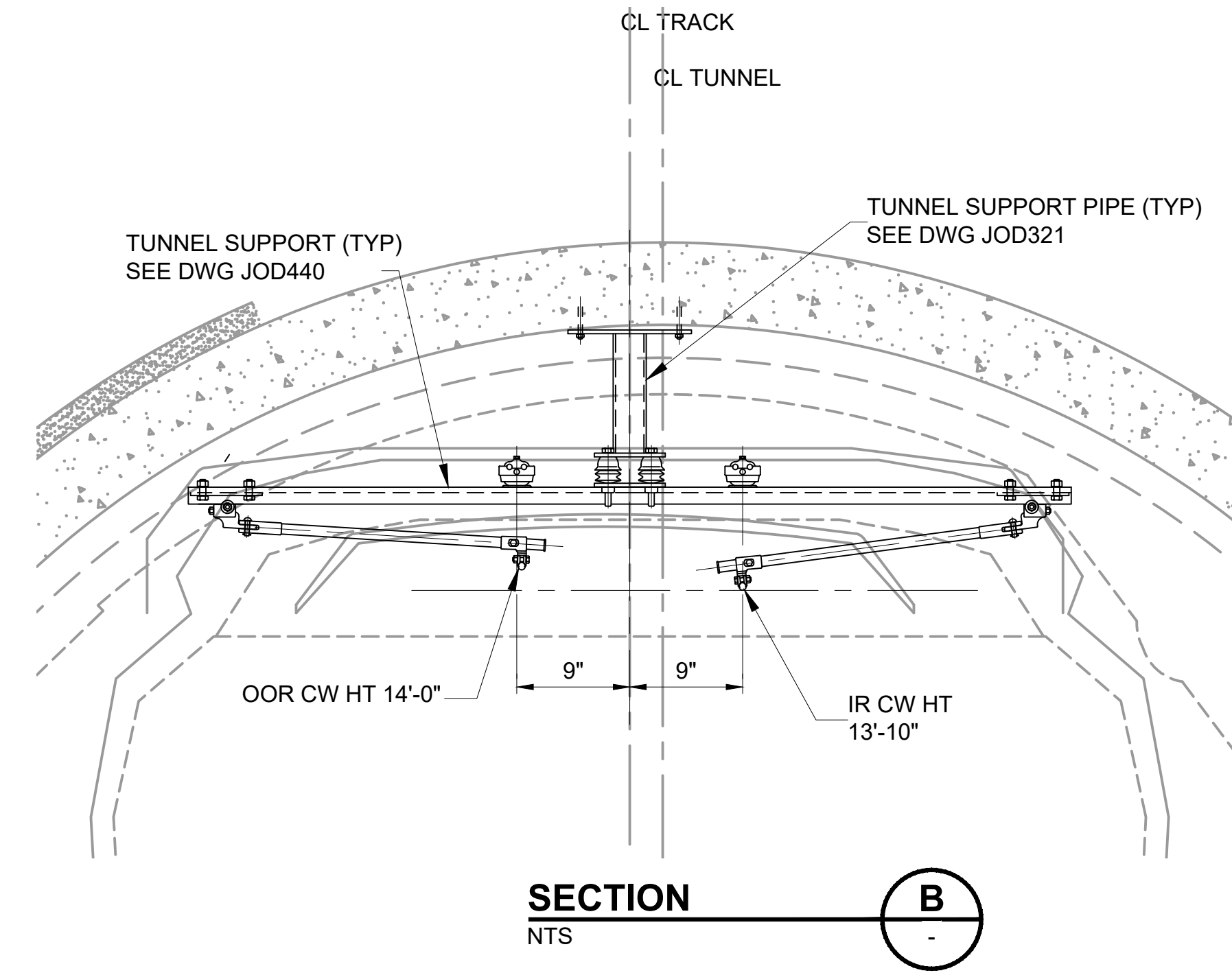
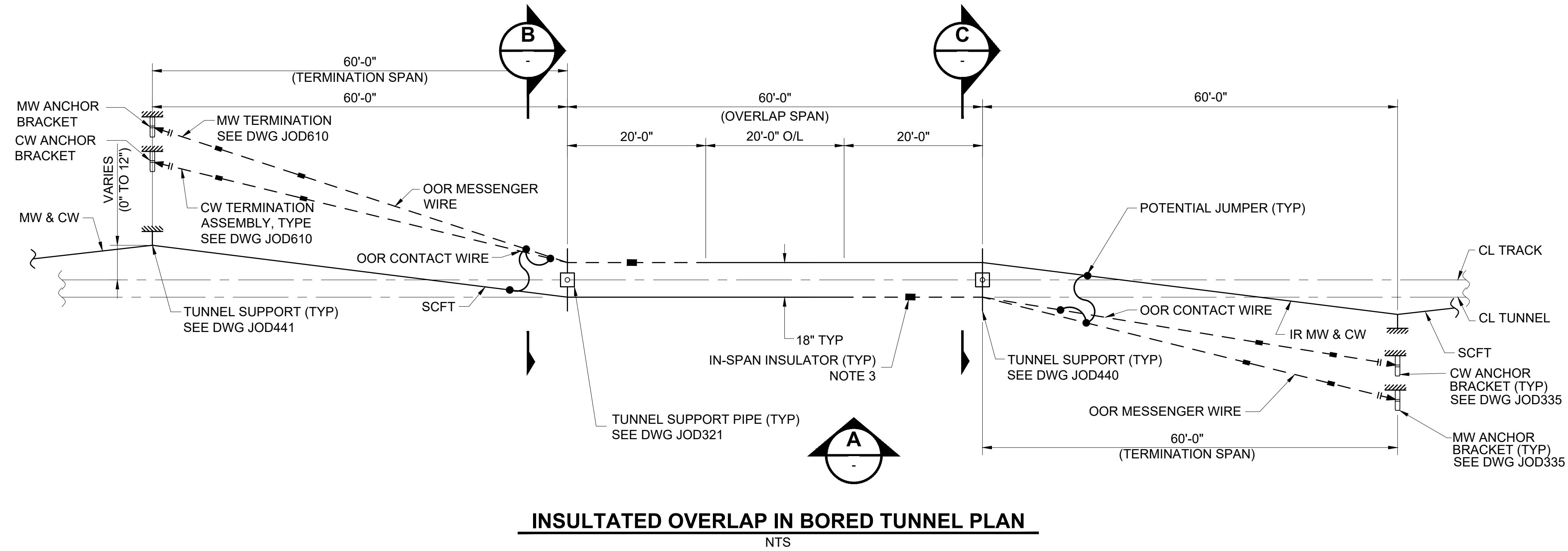
**SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS**

OVERHEAD CATENARY SYSTEM
GENERAL ARRANGEMENT UNINSULATED OVERLAP
CENTER POLES

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| DRAWING No.: | STD-JOD211 |
| FACILITY ID: | |
| SHEET No.: | REV: 1 |

GENERAL NOTES:

- FOR SYMBOLS, ABBREVIATIONS AND LEGEND, SEE DWG JZN001, JZN002 AND JZN006.
- CLEARANCE BETWEEN DESIGNED MESSENGER WIRE HEIGHT AND THE TUNNEL SOFFIT VARIES.
- IN-RUNNING CW INSULATORS ARE REQUIRED AT THIS LOCATION FOR AN INSULATED OVERLAP.
- HEIGHTS, STAGGERS AND ASSEMBLY CALL-OUTS TO BE SPECIFIED ON OCS LAYOUT PLANS AND SCHEDULES.



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| 1 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |
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| FILENAME: | STD-JOD212 |
| CONTRACT No.: | RTA/LR |
| DATE: | 2/2024 |

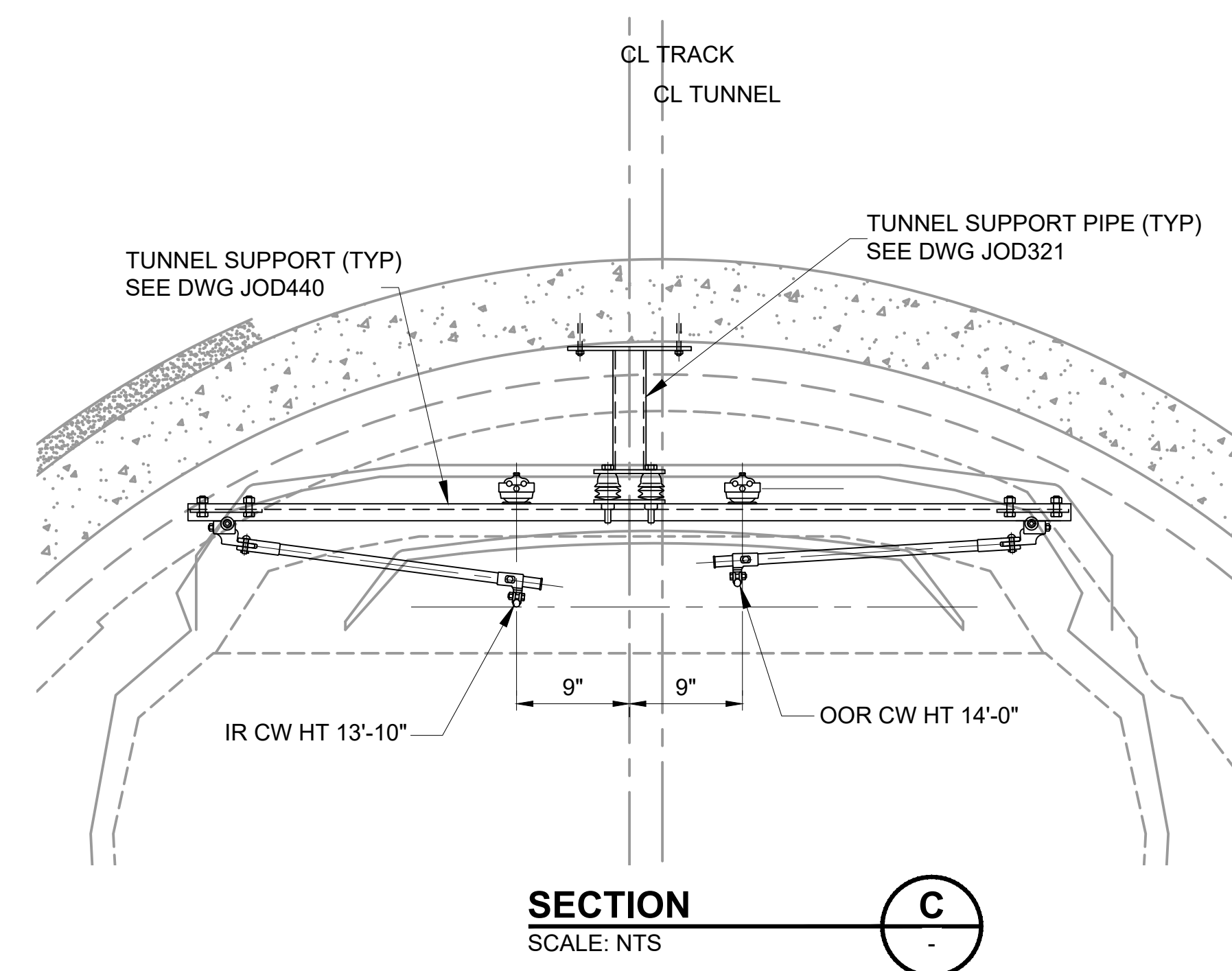
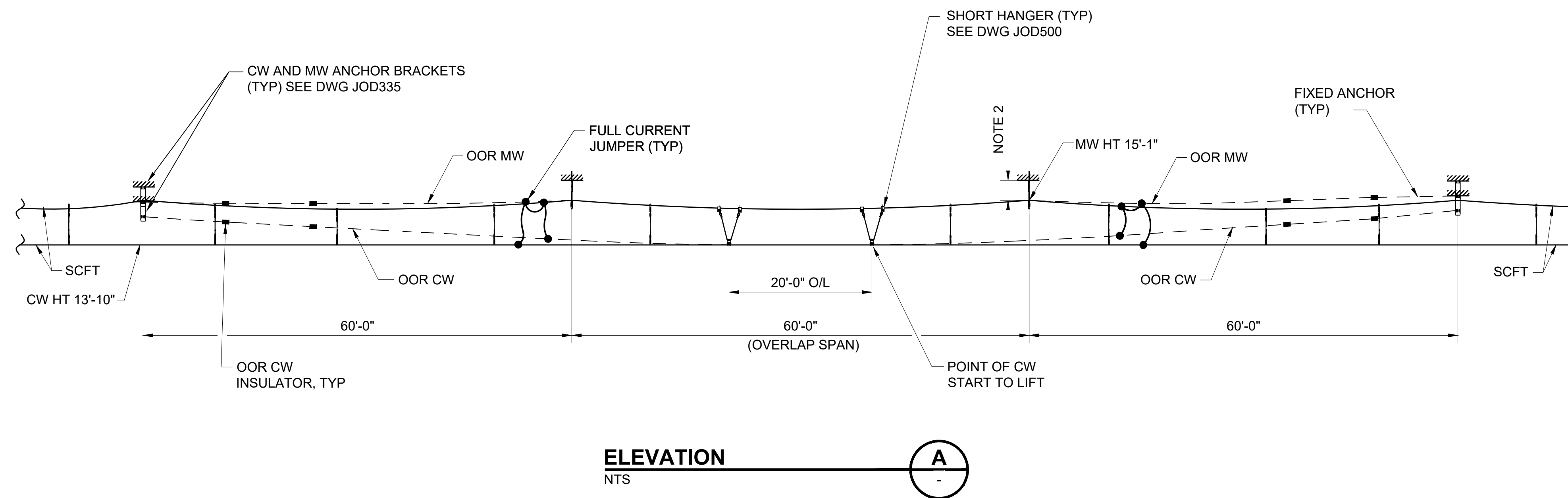
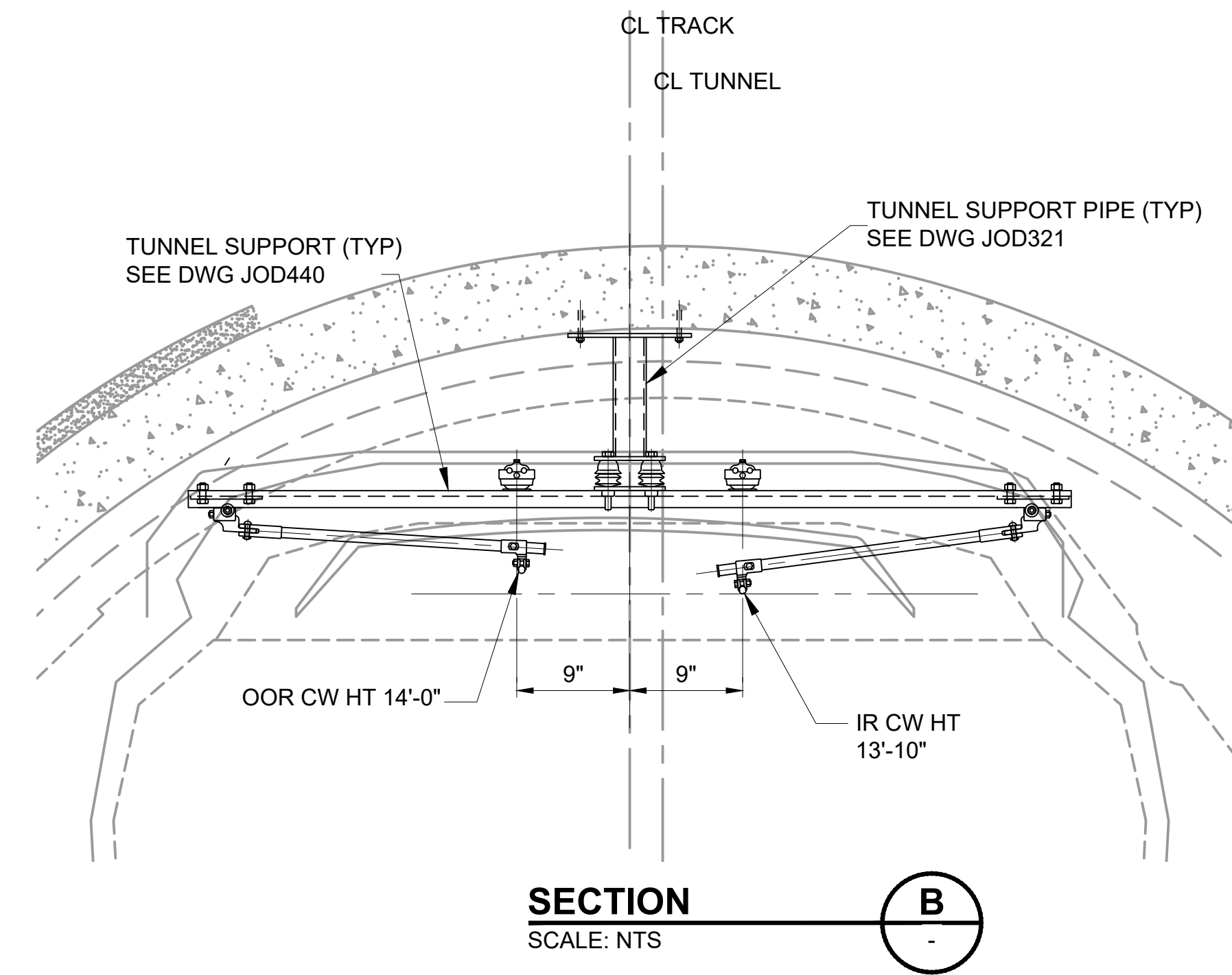
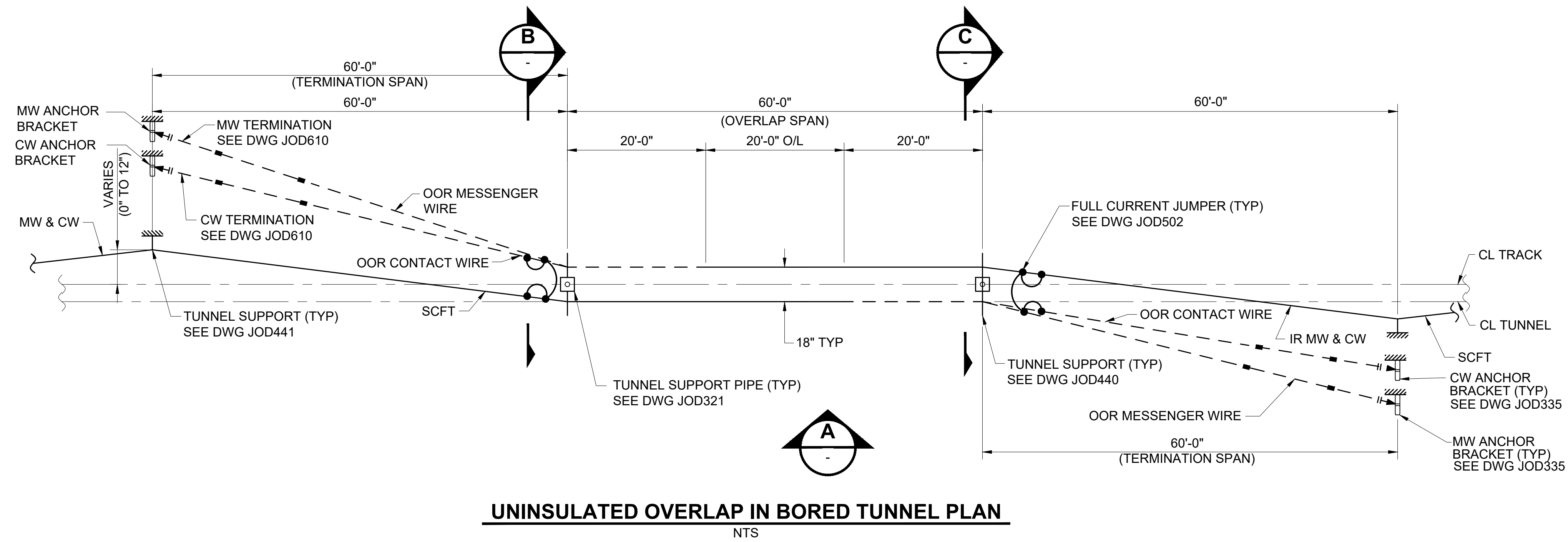
**SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS**

OVERHEAD CATENARY SYSTEM
GENERAL ARRANGEMENT INSULATED OVERLAP
IN TUNNEL

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| DRAWING No.: | STD-JOD212 |
| FACILITY ID: | |
| SHEET No.: | REV: |
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GENERAL NOTES:

- FOR SYMBOLS, ABBREVIATIONS AND LEGEND, SEE DWG JZN001, JZN002 AND JZN006.
- CLEARANCE BETWEEN DESIGNED MESSENGER WIRE HEIGHT AND TUNNEL SOFFIT VARIES.
- HEIGHTS, STAGGERS AND ASSEMBLY CALL-OUTS TO BE SPECIFIED ON OCS LAYOUT PLANS AND SCHEDULES.



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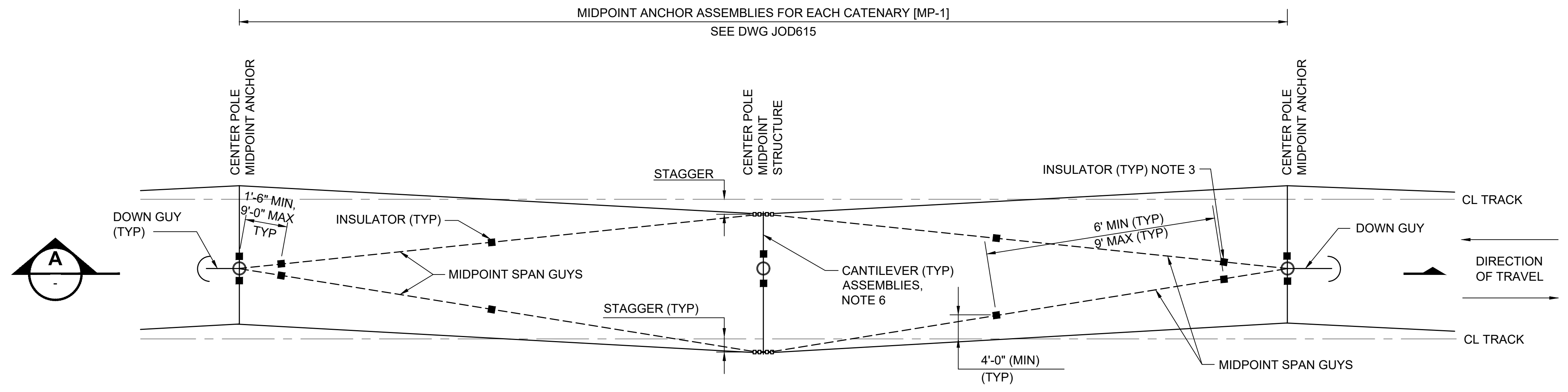
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| FILENAME: | STD-JOD213 |
| CONTRACT No.: | RTA/LR |
| DATE: | 2/2024 |

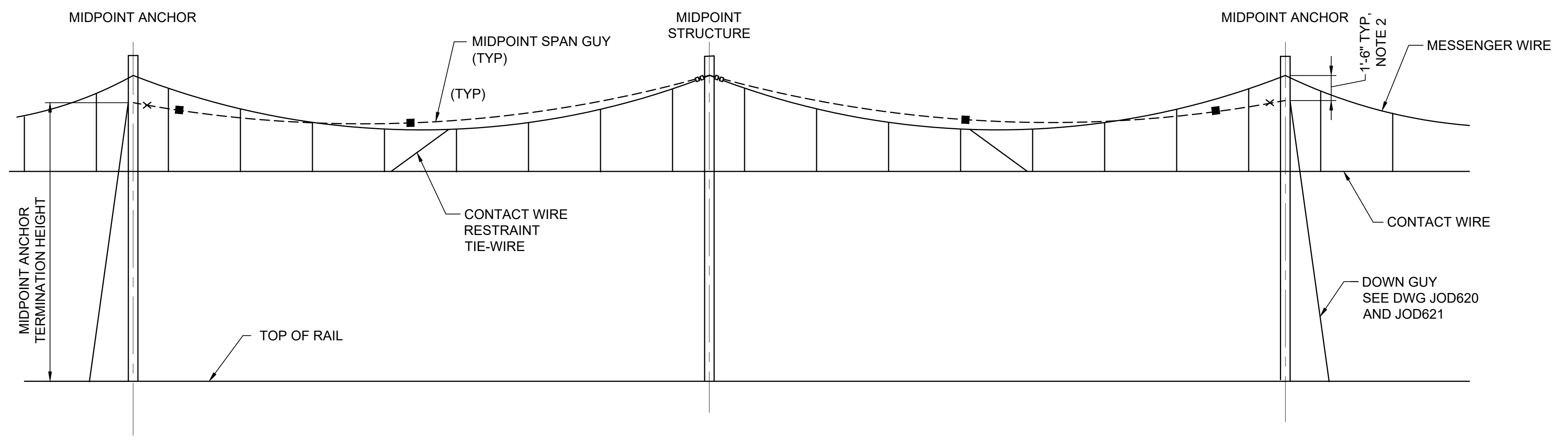
**SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS**

OVERHEAD CATENARY SYSTEM
GENERAL ARRANGEMENT UNINSULATED OVERLAP
IN TUNNEL

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| DRAWING No.: | STD-JOD213 |
| FACILITY ID: | |
| SHEET No.: | REV: |
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MIDPOINT CENTER POLES PLAN
NTS



SECTION A
NTS

GENERAL NOTES:

1. FOR SYMBOLS, ABBREVIATIONS, AND LEGEND SEE DWG JZN001, JZN002, AND JZN006.
2. NORMAL MIDPOINT SPAN GUY WIRE TERMINATION HEIGHT SHALL BE 1'-6" BELOW THE MESSENGER WIRE HEIGHT.
3. LOCATE TERMINATION INSULATORS SO THAT THEY PREVENT INTERFERING WITH ADJACENT INSULATORS AT ALL TIMES.
4. SITE SPECIFIC VALUES OF SPAN LENGTHS, WIRE HEIGHTS, STAGGER VALUE & DIRECTION AND TERMINATION HEIGHTS TO BE SHOWN ON OCS LAYOUT PLANS.
5. MIDPOINT SPAN GUY WIRES SHALL RESTRAIN MESSENGER WIRE AND CONTACT WIRE ON ONE SIDE UNDER BROKEN WIRE CONDITIONS.
6. CONTRACTOR TO MODIFY MIDPOINT CANTILEVER AS REQUIRED TO SUPPORT BOTH DEAD AND LIVE LOADS GENERATED BY THE MIDPOINT ANCHOR ASSEMBLY UNDER ALL CONDITIONS AND FAILURE MODES.


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LINE IS 1" AT FULL SCALE

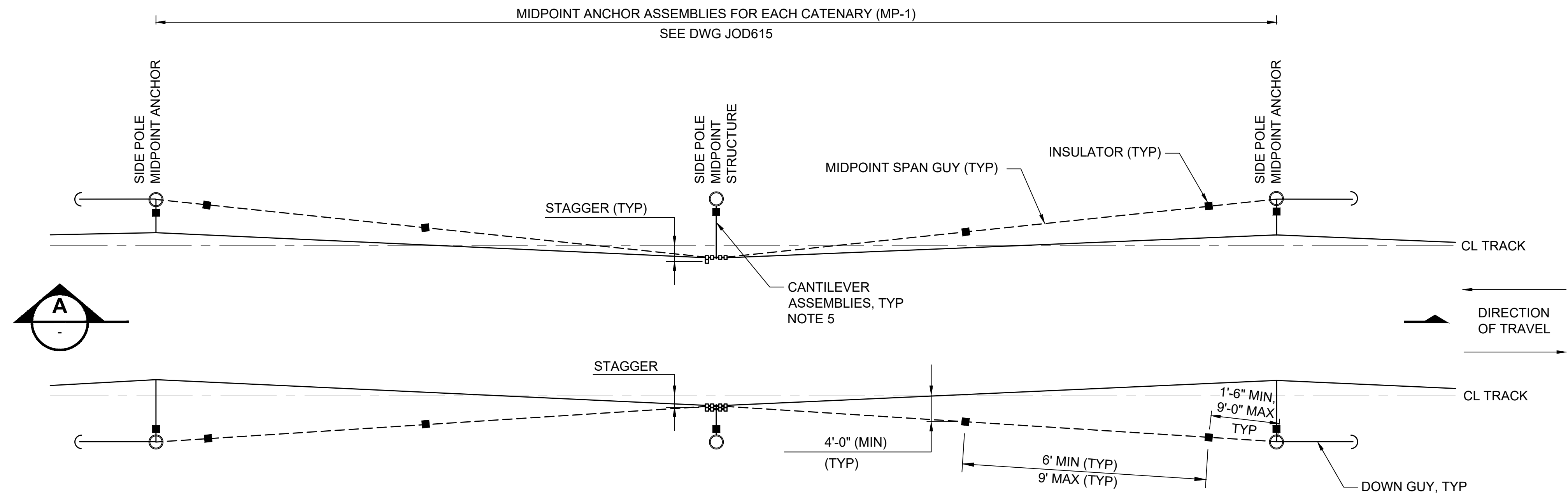


SCALE: NTS
FILENAME: STD-JOD214
CONTRACT No.: RTA/LR
DATE: 2/2024

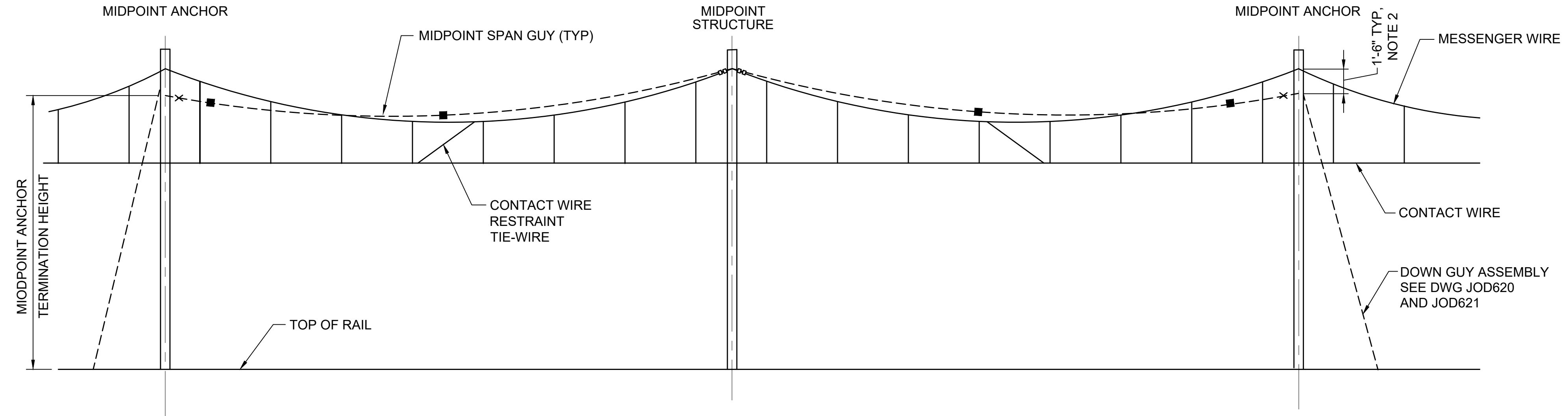
SOUND TRANSIT STANDARD DRAWINGS SYSTEMS

OVERHEAD CATENARY SYSTEM
GENERAL ARRANGEMENT MIDPOINT ANCHOR ON CENTER POLES

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| DRAWING No.: STD-JOD214 |
| FACILITY ID: |
| SHEET No.: 1 |



MIDPOINT ANCHOR ON SIDE POLES PLAN
NTS



ELEVATION
NTS

GENERAL NOTES:

1. FOR SYMBOLS, ABBREVIATIONS, AND LEGEND SEE DWG JZN001, JZN002, AND JZN006.
2. NORMAL MIDPOINT SPAN GUY WIRE TERMINATION HEIGHT SHALL BE 1'-6" BELOW THE MESSENGER WIRE HEIGHT.
3. SITE SPECIFIC VALUES OF SPAN LENGTHS, WIRE HEIGHTS, STAGGER VALUE & DIRECTION AND TERMINATION HEIGHTS TO BE SHOWN ON OCS LAYOUT PLANS.
4. MIDPOINT SPAN GUY WIRES SHALL RESTRAIN MESSENGER WIRE AND CONTACT WIRE ON ONE SIDE UNDER BROKEN WIRE CONDITIONS.
5. CONTRACTOR TO MODIFY MIDPOINT CANTILEVER AS REQUIRED TO SUPPORT BOTH DEAD AND LIVE LOADS GENERATED BY THE MIDPOINT ANCHOR ASSEMBLY UNDER ALL CONDITIONS AND FAILURE MODES.

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LINE IS 1" AT FULL SCALE

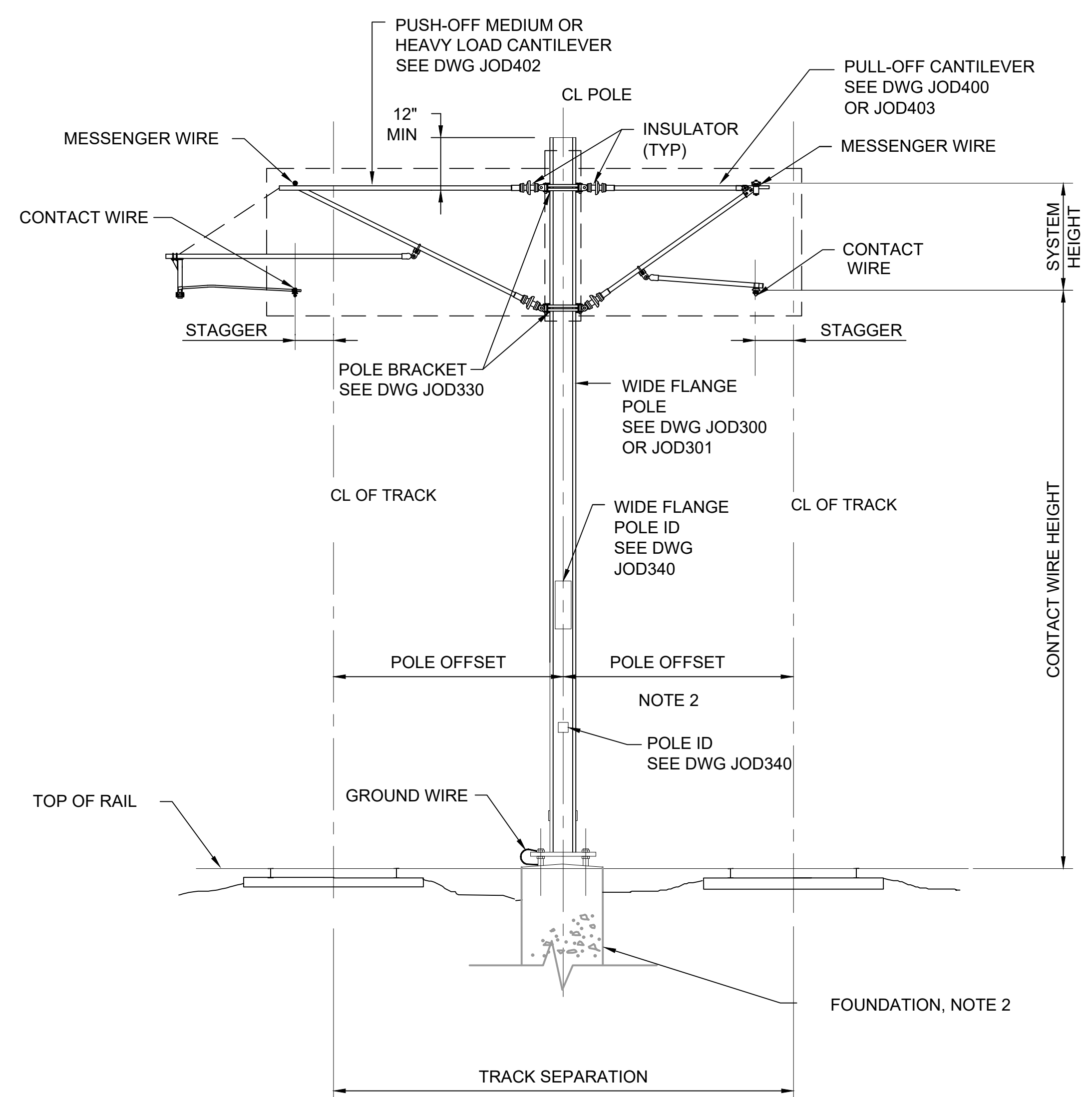
SCALE: NTS
FILENAME: STD-JOD215
CONTRACT No.: RTA/LR
DATE: 2/2024

**SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS**

OVERHEAD CATENARY SYSTEM
GENERAL ARRANGEMENT MIDPOINT ANCHOR
ON SIDE POLES

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| DRAWING No.: | STD-JOD215 |
| FACILITY ID: | |
| SHEET No.: | 1 |

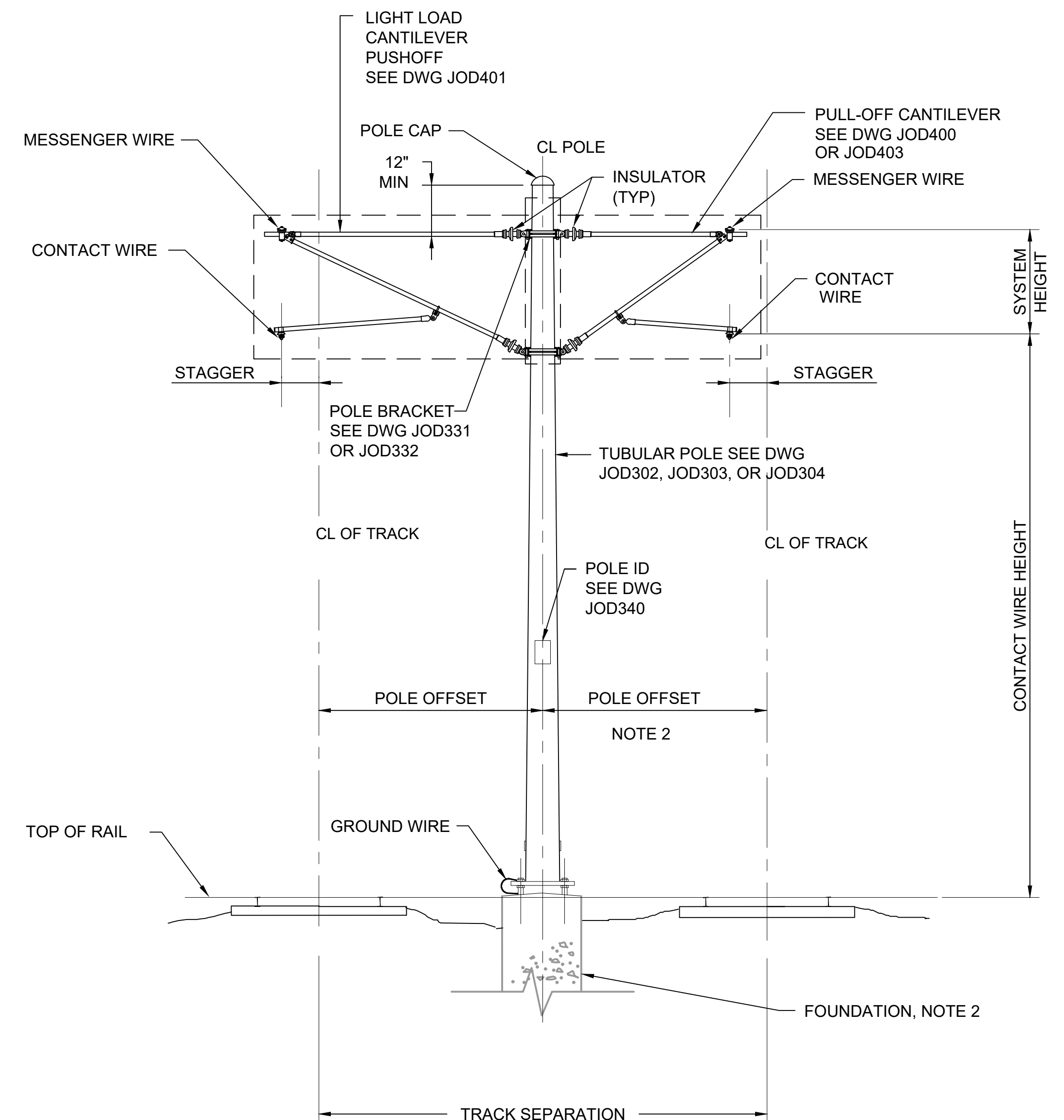
- GENERAL NOTES:**
- FOR SYMBOLS, ABBREVIATIONS AND LEGEND SEE DRAWINGS JZN001, JZN002 AND JZN006.
 - SITE SPECIFIC DETAILS AT EACH LOCATION TO BE SPECIFIED ON OCS LAYOUT PLANS.



PUSH-PULL OFF **PULL OFF**

WIDE FLANGE CENTER POLE **1**

NTS



DIRECT PUSH OFF **PULL OFF**

TAPERED TUBULAR CENTER POLE **2**

NTS

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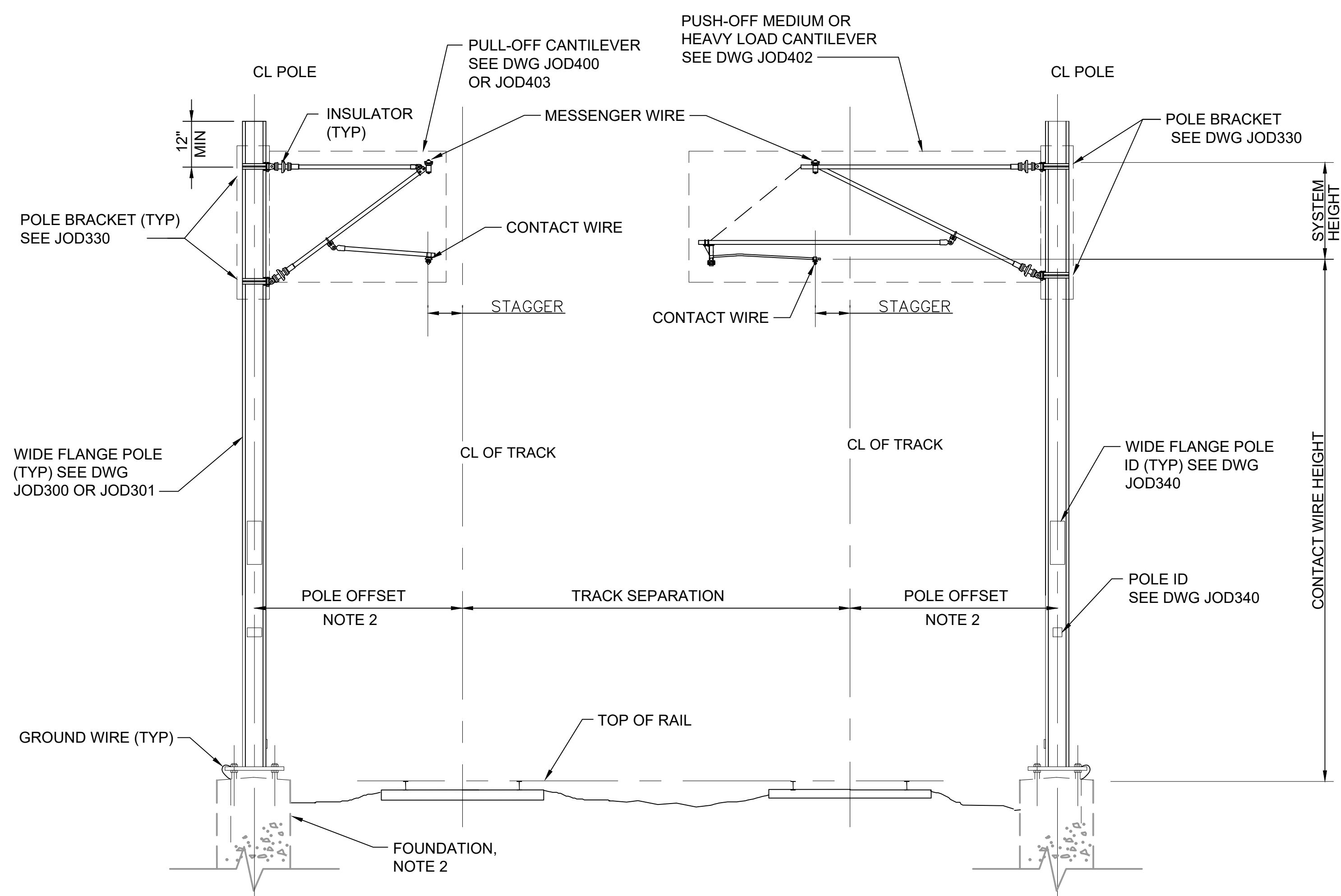
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| SCALE: NTS | CONTRACT No.: |
| FILENAME: STD-JOD220 | RTA/LR |
| | DATE: 2/2024 |

**SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS**

OVERHEAD CATENARY SYSTEM
GENERAL ARRANGEMENT CENTER POLE CANTILEVER

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| DRAWING No.: | STD-JOD220 |
| FACILITY ID: | |
| SHEET No.: | REV: 1 |

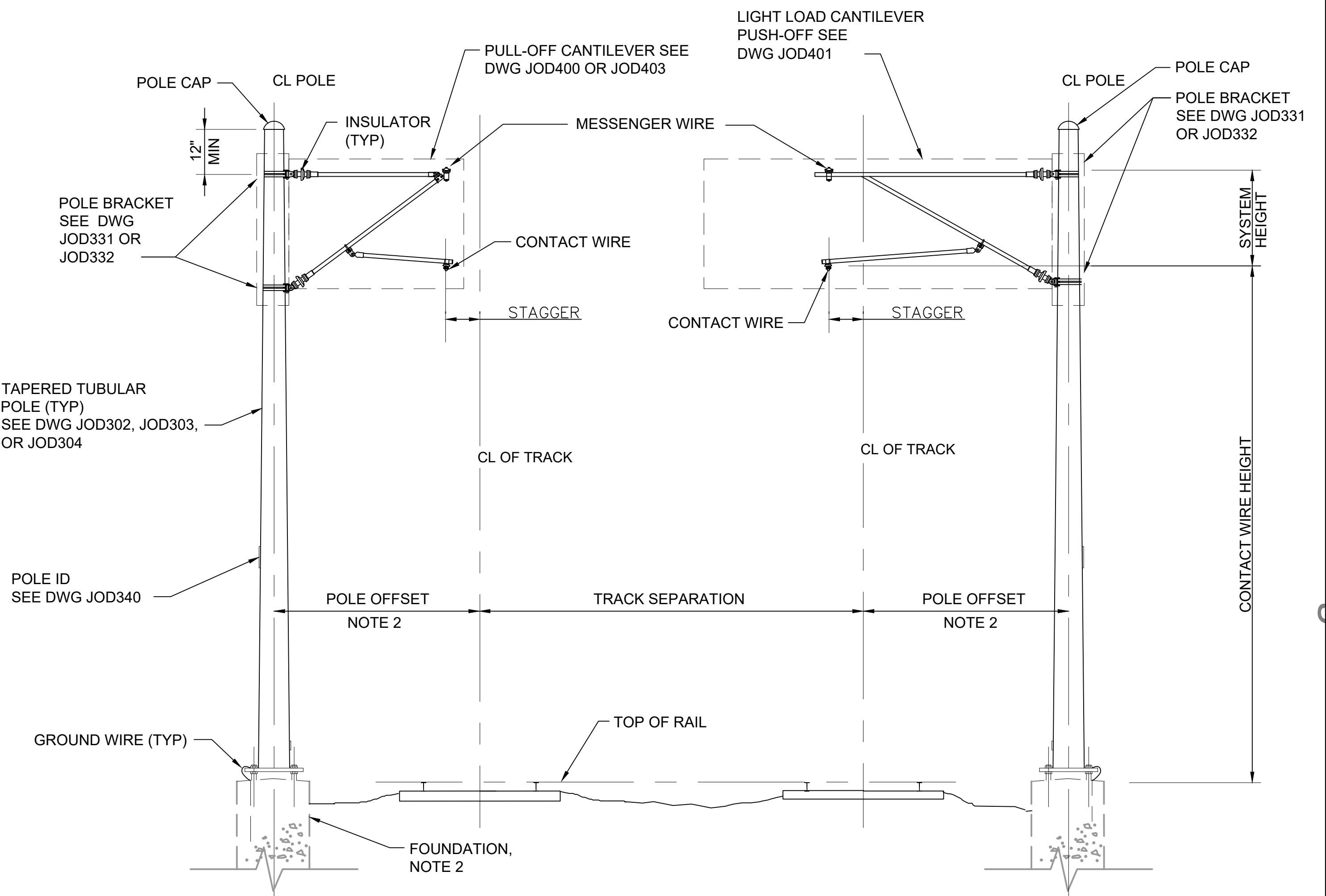
- GENERAL NOTES:**
- FOR SYMBOLS, ABBREVIATIONS AND LEGEND SEE DRAWINGS JZN001, JZN002 AND JZN006.
 - SITE SPECIFIC DETAILS AT EACH LOCATION TO BE SPECIFIED ON OCS LAYOUT PLANS.



PULL OFF

PUSH-PULL OFF

WIDE FLANGE OUTSIDE POLES 1
NTS



PULL OFF

DIRECT PUSH OFF

TAPERED TUBULAR OUTSIDE POLES 2
NTS

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LINE IS 1" AT FULL SCALE

SCALE: NTS
 FILENAME: STD-JOD221
 CONTRACT No.: RTA/LR
 DATE: 2/2024

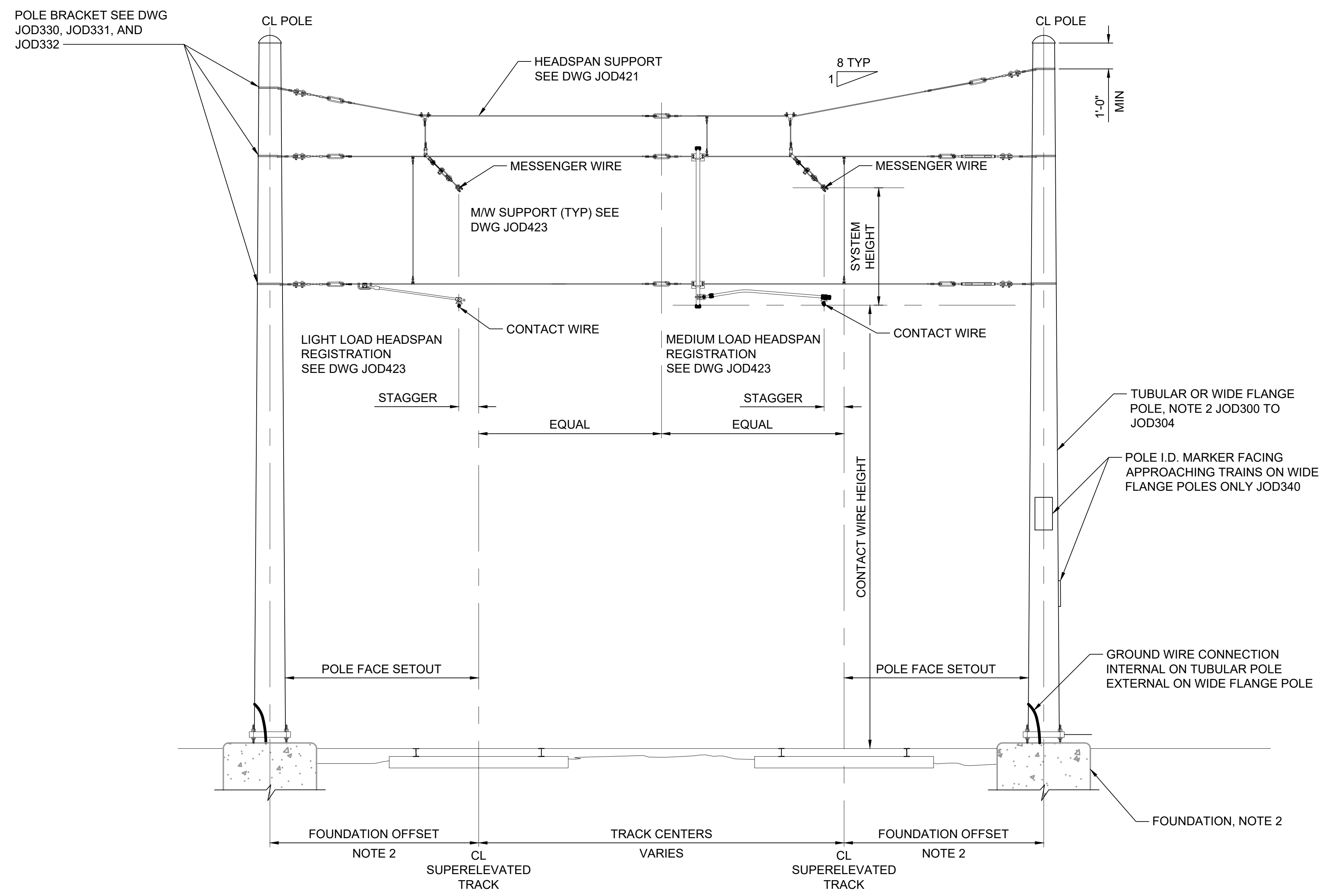
**SOUND TRANSIT
 STANDARD DRAWINGS
 SYSTEMS**

OVERHEAD CATENARY SYSTEM
 GENERAL ARRANGEMENT SIDE POLE CANTILEVER

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| DRAWING No.: | STD-JOD221 |
| FACILITY ID: | |
| SHEET No.: | REV: 1 |

GENERAL NOTES:

- FOR SYMBOLS, ABBREVIATIONS AND LEGEND SEE DWG JZN001, JZN002 AND JZN006.
- SITE SPECIFIC DETAILS AT EACH LOCATION TO BE SPECIFIED ON OCS LAYOUT PLANS.
- CONTRACTOR TO DETERMINE POLE BRACKET ATTACHMENT HEIGHTS.
- CONTRACTOR TO ENSURE THAT PANTOGRAPH CLEARANCE AND STEADY ARM CLEARANCE REQUIREMENTS AND ELECTRICAL CLEARANCE REQUIREMENTS ARE MET.
- MESSENGER SUSPENSION AS SHOWN FOR AUTO-TENSIONED SIMPLE CATENARY. WITH SOUND TRANSIT APPROVAL, ALTERNATIVE MESSENGER SUSPENSION METHODS MAY BE USED TO ACCOMMODATE ALONG-TRACK MOVEMENT OR PROVIDE BODY SPAN WIRE CLEARANCE.
- STEADY ARM ASSEMBLY SHALL BE CAPABLE OF ACCOMMODATING ALONG TRACK MOVEMENT. CONTRACTOR SHALL FURNISH ALTERNATIVE SUSPENSION DESIGN IF STANDARD STEADY ARM CANNOT BE USED DUE TO SPACE LIMITATIONS.



TYPICAL LIGHT AND MEDIUM LOAD TWO TRACK HEADSPAN STRUCTURE
NTS


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LINE IS 1" AT FULL SCALE



SCALE: NTS
FILENAME: STD-JOD230
CONTRACT No.: RTA/LR
DATE: 2/2024

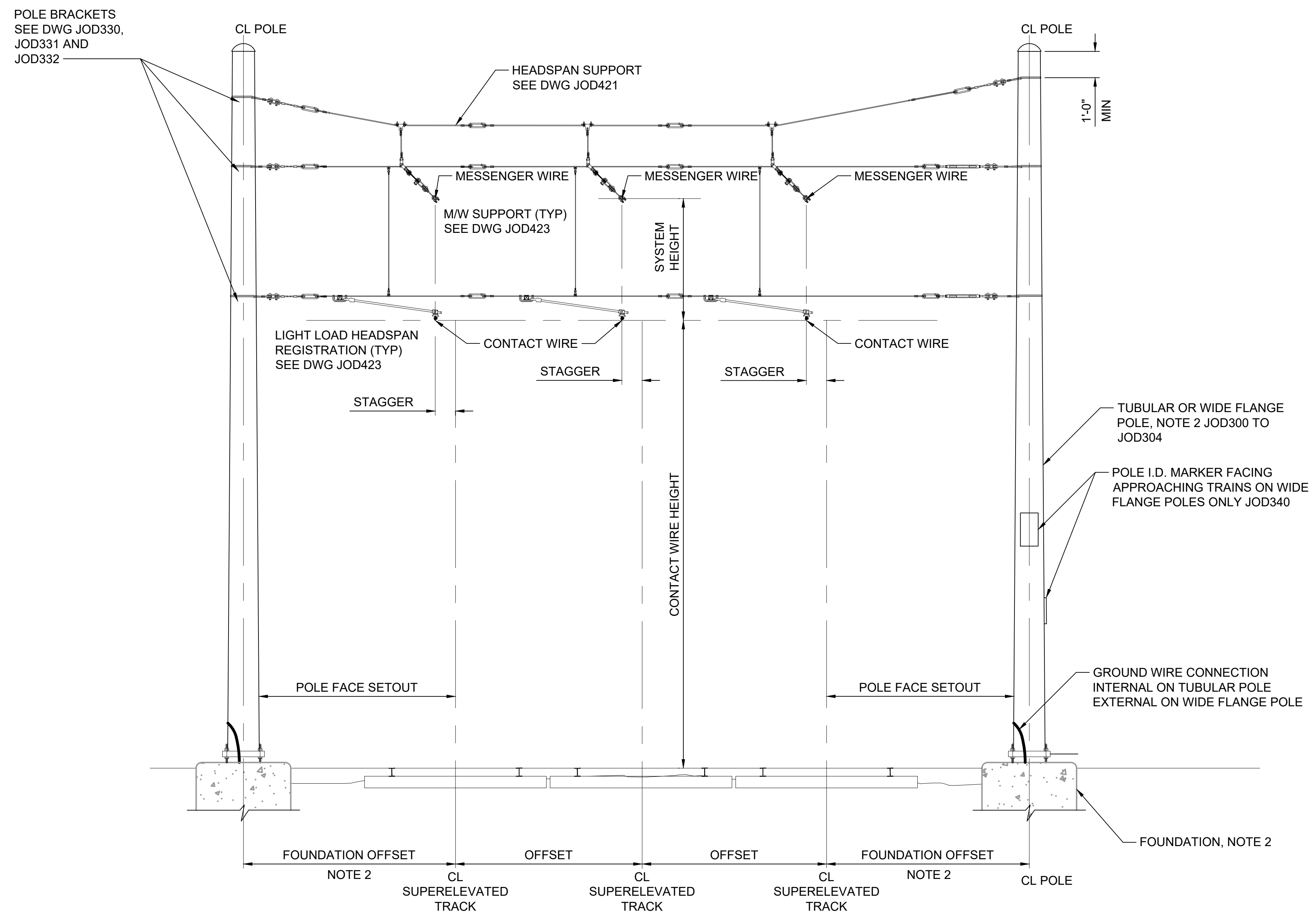
**SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS**

OVERHEAD CATENARY SYSTEM
GENERAL ARRANGEMENT TWO TRACK HEADSPAN

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| DRAWING No.: | STD-JOD230 |
| FACILITY ID: | |
| SHEET No.: | REV: 1 |

GENERAL NOTES:

1. FOR SYMBOLS, ABBREVIATIONS AND LEGEND SEE DWG JZN001, JZN002 AND JZN006.
2. SITE SPECIFIC DETAILS AT EACH LOCATION TO BE SPECIFIED ON OCS LAYOUT PLANS.
3. CONTRACTOR TO DETERMINE POLE BRACKET ATTACHMENT HEIGHTS.
4. CONTRACTOR TO ENSURE THAT PANTOGRAPH CLEARANCE AND STEADY ARM CLEARANCE REQUIREMENTS AND ELECTRICAL CLEARANCE REQUIREMENTS ARE MET.
5. MESSENGER SUSPENSION AS SHOWN IN FOR AUTO-TENSIONED SIMPLE CATENARY. WITH SOUND TRANSIT APPROVAL, ALTERNATIVE MESSENGER SUSPENSION METHODS MAY BE USED TO ACCOMMODATE ALONG-TRACK MOVEMENT OR PROVIDE BODY SPAN WIRE CLEARANCE.
6. STEADY ARM ASSEMBLY SHALL BE CAPABLE OF ACCOMMODATING ALONG TRACK MOVEMENT. CONTRACTOR SHALL FURNISH ALTERNATIVE SUSPENSION DESIGN IF STANDARD STEADY ARM CANNOT BE USED DUE TO SPACE LIMITATIONS.



TYPICAL LIGHT LOAD THREE TRACK HEADSPAN STRUCTURE
NTS


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LINE IS 1" AT FULL SCALE



SCALE: NTS
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CONTRACT No.: RTA/LR
DATE: 2/2024

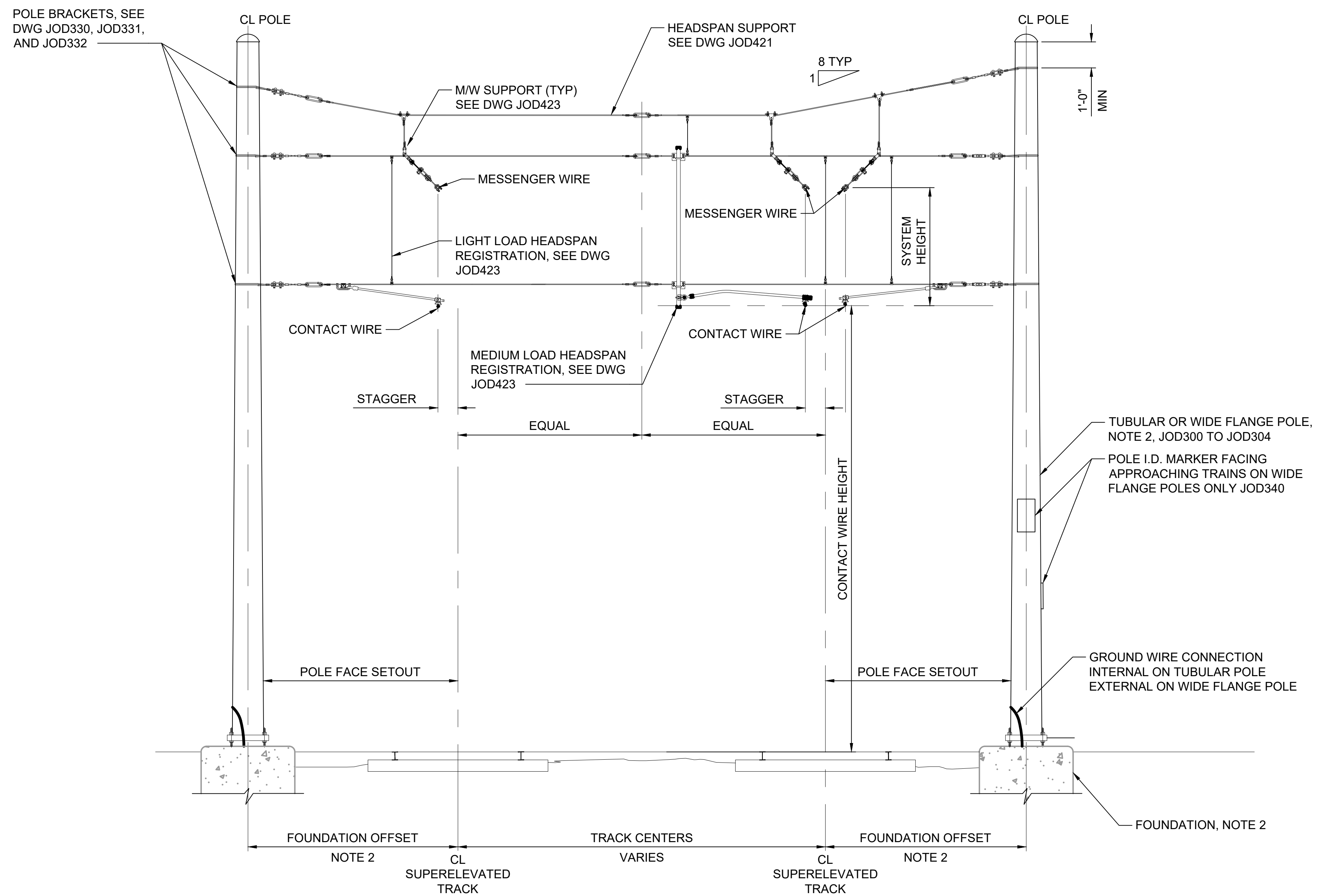
**SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS**

OVERHEAD CATENARY SYSTEM
GENERAL ARRANGEMENT THREE TRACK HEADSPAN

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| DRAWING No.: | STD-JOD231 |
| FACILITY ID: | |
| SHEET No.: | REV: 1 |

GENERAL NOTES:

1. FOR SYMBOLS, ABBREVIATIONS AND LEGEND SEE DWG JZN001, JZN002 AND JZN006.
2. SITE SPECIFIC DETAILS AT EACH LOCATION TO BE SPECIFIED ON OCS LAYOUT PLANS.
3. CONTRACTOR TO DETERMINE POLE BRACKET ATTACHMENT HEIGHTS.
4. CONTRACTOR TO ENSURE THAT PANTOGRAPH CLEARANCE AND STEADY ARM CLEARANCE REQUIREMENTS AND ELECTRICAL CLEARANCE REQUIREMENTS ARE MET.
5. MESSENGER SUSPENSION AS SHOWN IN FOR AUTO-TENSIONED SIMPLE CATENARY. WITH SOUND TRANSIT APPROVAL, ALTERNATIVE MESSENGER SUSPENSION METHODS MAY BE USED TO ACCOMMODATE ALONG-TRACK MOVEMENT OR PROVIDE BODY SPAN WIRE CLEARANCE.
6. STEADY ARM ASSEMBLY SHALL BE CAPABLE OF ACCOMMODATING ALONG TRACK MOVEMENT. CONTRACTOR SHALL FURNISH ALTERNATIVE SUSPENSION DESIGN IF STANDARD STEADY ARM CANNOT BE USED DUE TO SPACE LIMITATIONS.



TYPICAL LIGHT AND MEDIUM LOAD TURNOUT HEADSPAN STRUCTURE

NTS


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LINE IS 1" AT FULL SCALE



SCALE: NTS
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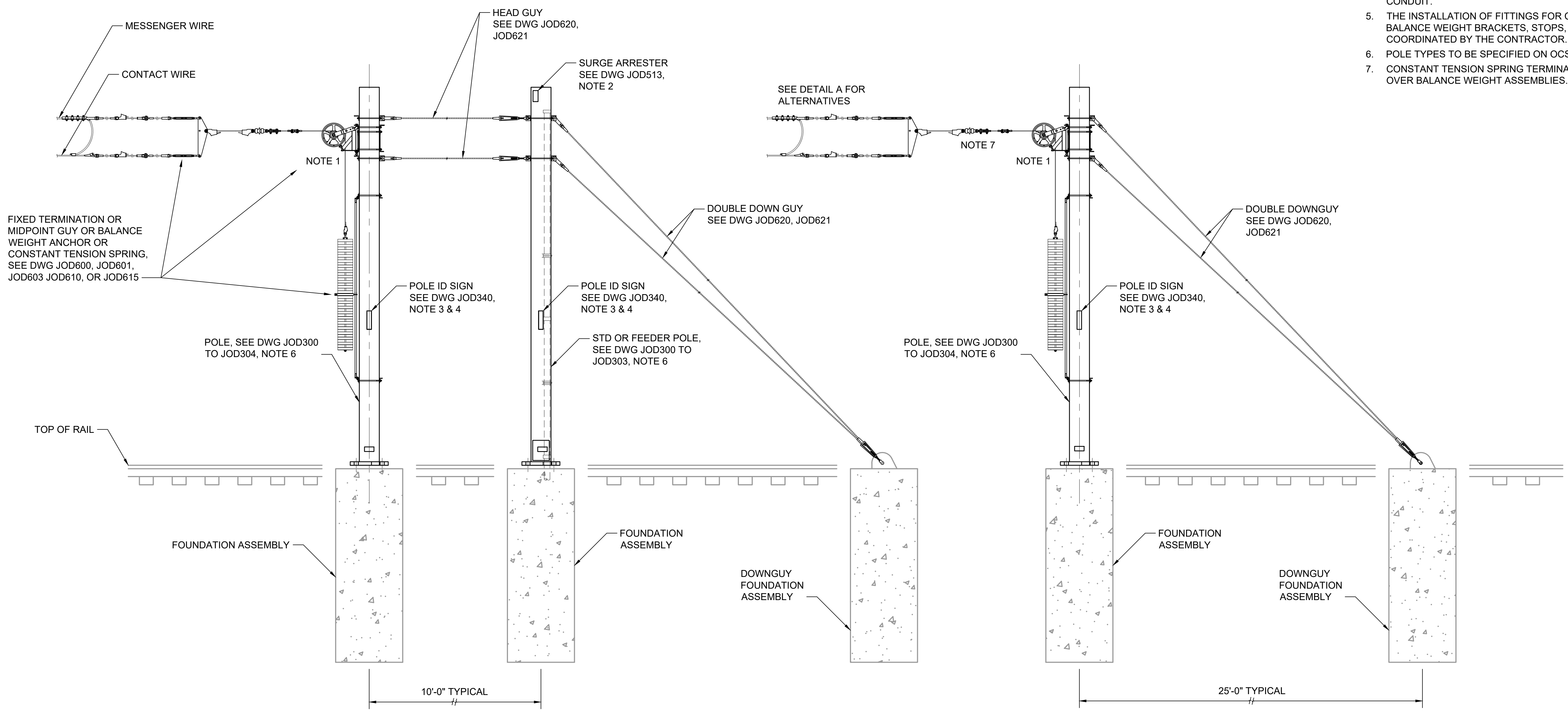
**SOUND TRANSIT
 STANDARD DRAWINGS
 SYSTEMS**

OVERHEAD CATENARY SYSTEM
 GENERAL ARRANGEMENT TURNOUT HEADSPAN

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| DRAWING No.: | STD-JOD232 |
| FACILITY ID: | |
| SHEET No.: | REV: 1 |

GENERAL NOTES:

1. CANTILEVER BRACKETS SHALL NOT INTERFERE WITH AUTO-TENSION TERMINATION ASSEMBLY MOVEMENT.
2. ALL FEEDER RISER CABLES SHALL BE PROTECTED BY SURGE ARRESTERS.
3. POLE ID SIGN SHALL BE INSTALLED FOR MAXIMUM VISIBILITY.
4. POLE ID SIGN MAY BE LOCATED ON A TRACKSIDE POLE FACE WHEN VISIBILITY IS OBSTRUCTED BY BW, DOWNGUY, OR CONDUIT.
5. THE INSTALLATION OF FITTINGS FOR CONDUITS, TERMINATIONS, BALANCE WEIGHT BRACKETS, STOPS, AND DOWN GUYS SHALL BE COORDINATED BY THE CONTRACTOR.
6. POLE TYPES TO BE SPECIFIED ON OCS LAYOUT PLANS.
7. CONSTANT TENSION SPRING TERMINATIONS ARE PREFERRED OVER BALANCE WEIGHT ASSEMBLIES. SEE DWG JOD603.



TYPICAL TERMINATION STRUCTURE WITH HEADGUY AND DOWNGUY (A)
NTS

TYPICAL TERMINATION STRUCTURE WITH DOWNGUY (B)
NTS

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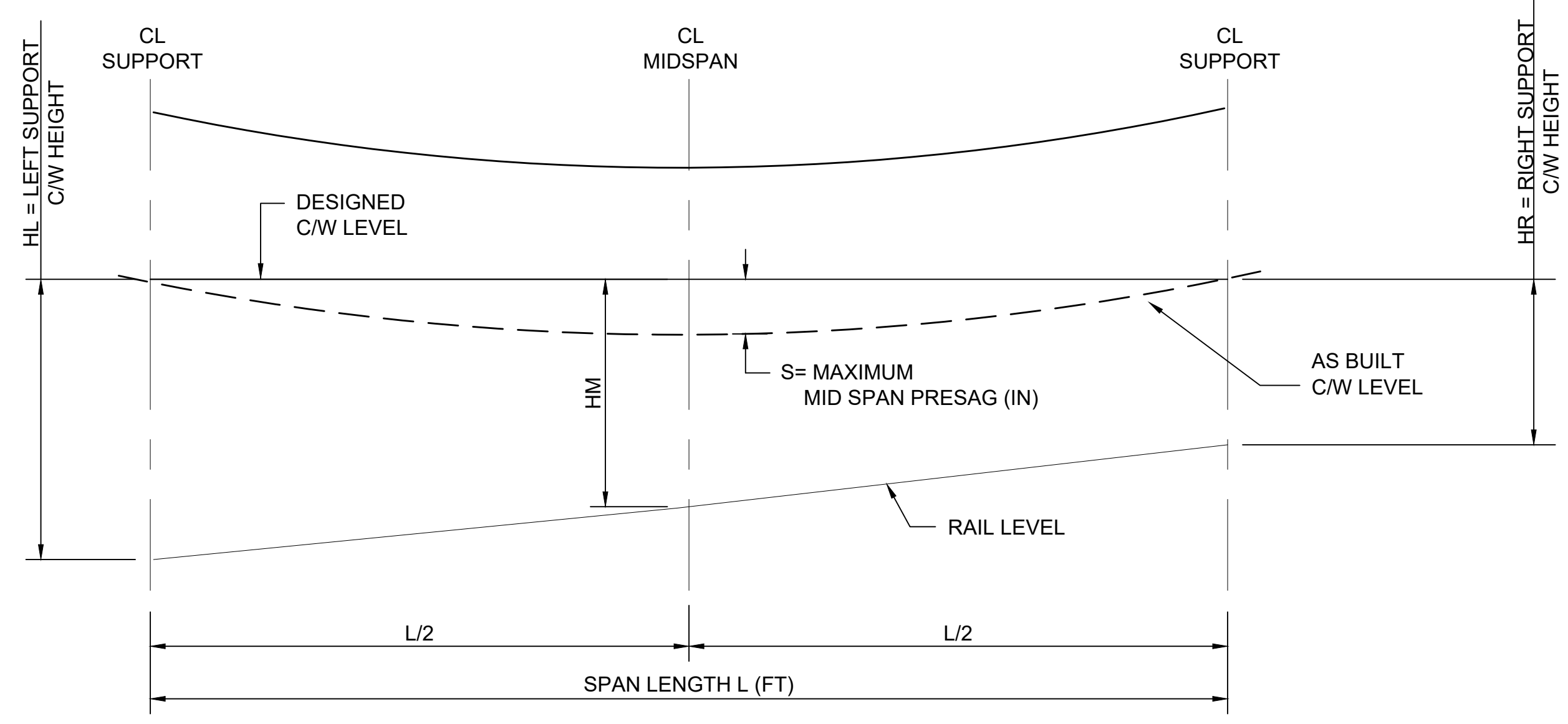
LINE IS 1" AT FULL SCALE

SCALE: NTS
FILENAME: STD-JOD240
CONTRACT No.: RTA/LR
DATE: 2/2024

SOUND TRANSIT STANDARD DRAWINGS SYSTEMS

OVERHEAD CATENARY SYSTEM
GENERAL ARRANGEMENT TYPICAL ANCHOR

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| DRAWING No.: | STD-JOD240 |
| FACILITY ID: | |
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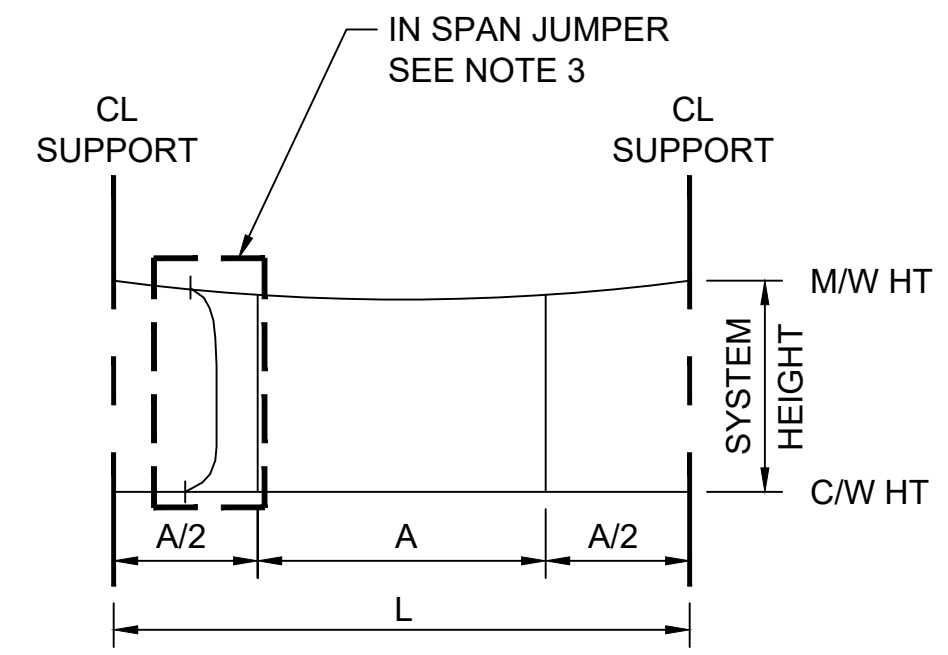


DESIGNED MIDSPAN HEIGHT: $HM = (HL+HR)/2$
 MAXIMUM MID SPAN PRESAG: $S = [L \times 0.05 / (\text{LINE SPEED}) (\text{MPH})] \times 12$
 EXCEPT THAT S SHALL NOT EXCEED 3" OR BE LESS THAN 0". CONTACT WIRE IS NOT TO HOG.

- GENERAL NOTES:**
- STANDARD SPANS SHALL HAVE HANGER LENGTHS DETERMINED AND INSTALLED BY THE CONTRACTOR TO MEET THE STANDARD SPAN CONTACT WIRE PROFILE REQUIREMENTS SHOWN.
 - HANGER LENGTHS SHALL BE DETERMINED TO SUIT THE AS-BUILT SPAN LENGTHS.
 - IN SPAN JUMPERS TO BE INSTALLED TO ASSEMBLY JS-1 ON DWG JOD502 AND MARKED ON OCS LAYOUT PLANS.
 - AS-BUILT HANGER SET SHALL PROVIDE A SMOOTH PATH FOR A PANTOGRAPH OVER THE LENGTH OF EACH SPAN.
 - THE CONTRACTOR'S HANGER LENGTH CALCULATIONS SHALL INCLUDE CONSIDERATION OF THE MASS OF THE CONTRACTOR'S HANGER ASSEMBLIES, POINT LOADS, SPAN INCLINATION, AND CONTACT WIRE PROFILES.
 - FOR TYPICAL HANGER ASSEMBLIES SEE DWG JOD500.
 - FOR SPANS OVER 200 FEET INSTALL SECOND JUMPER AT THIS LOCATION

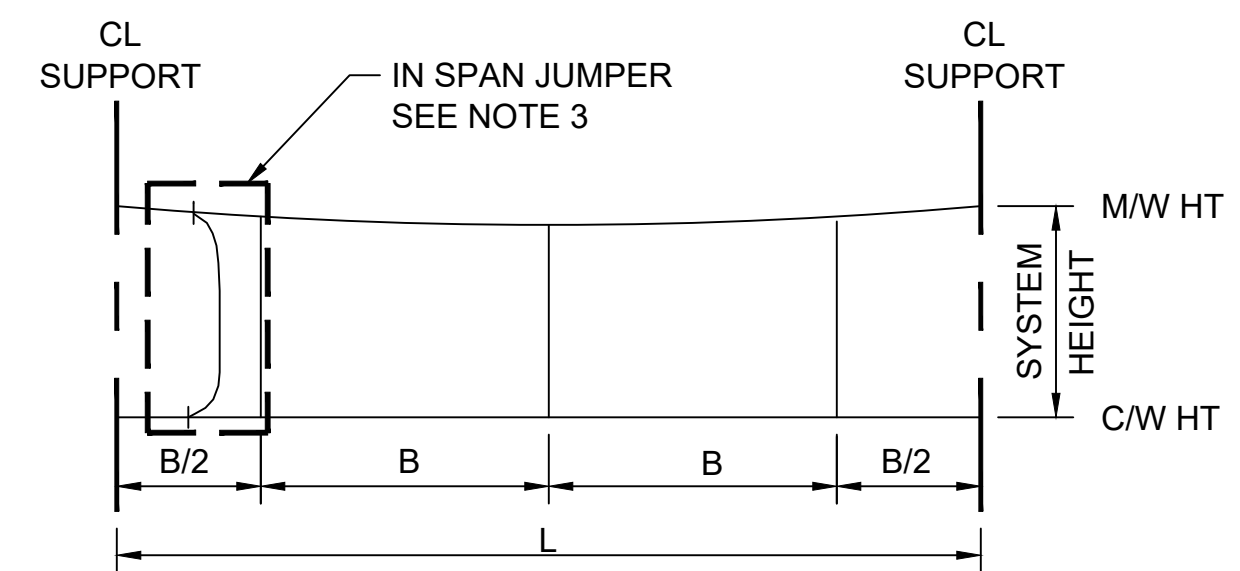
STANDARD SPAN CONTACT WIRE PRESAG REQUIREMENTS 1

NTS
SEE NOTE 1



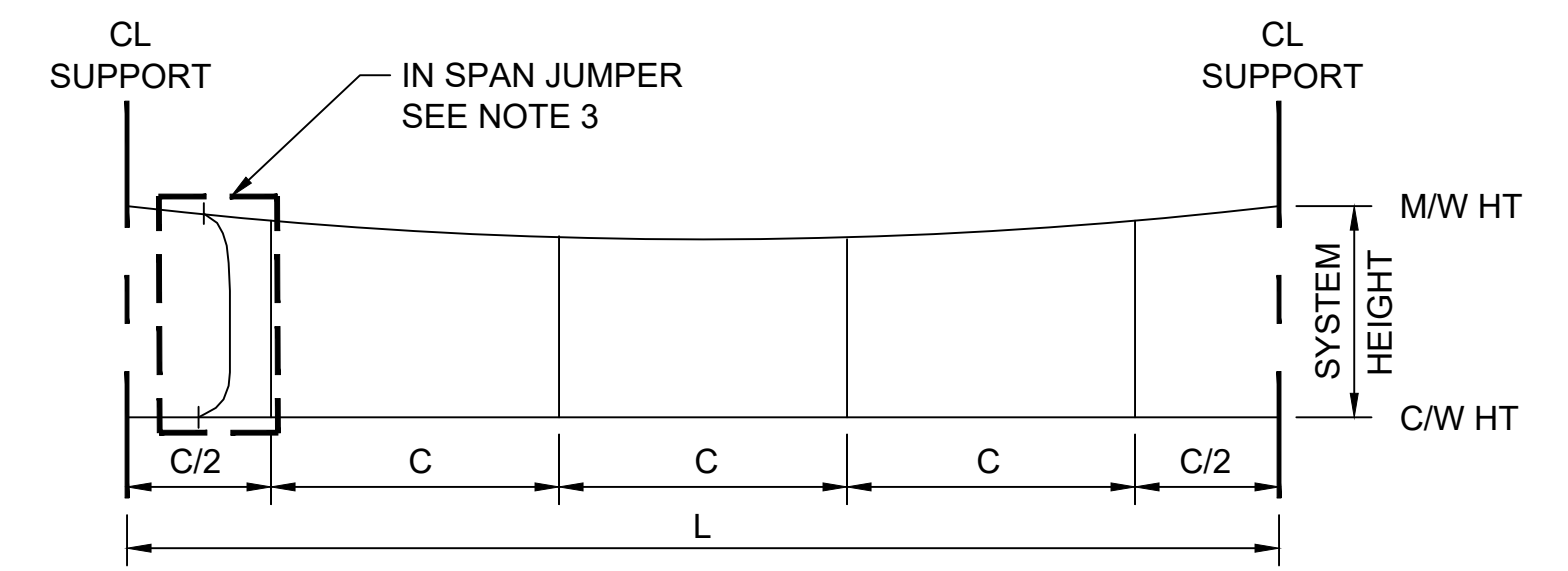
STANDARD SPANS 28' TO 57' 2

NTS
NOTE: A= L/2



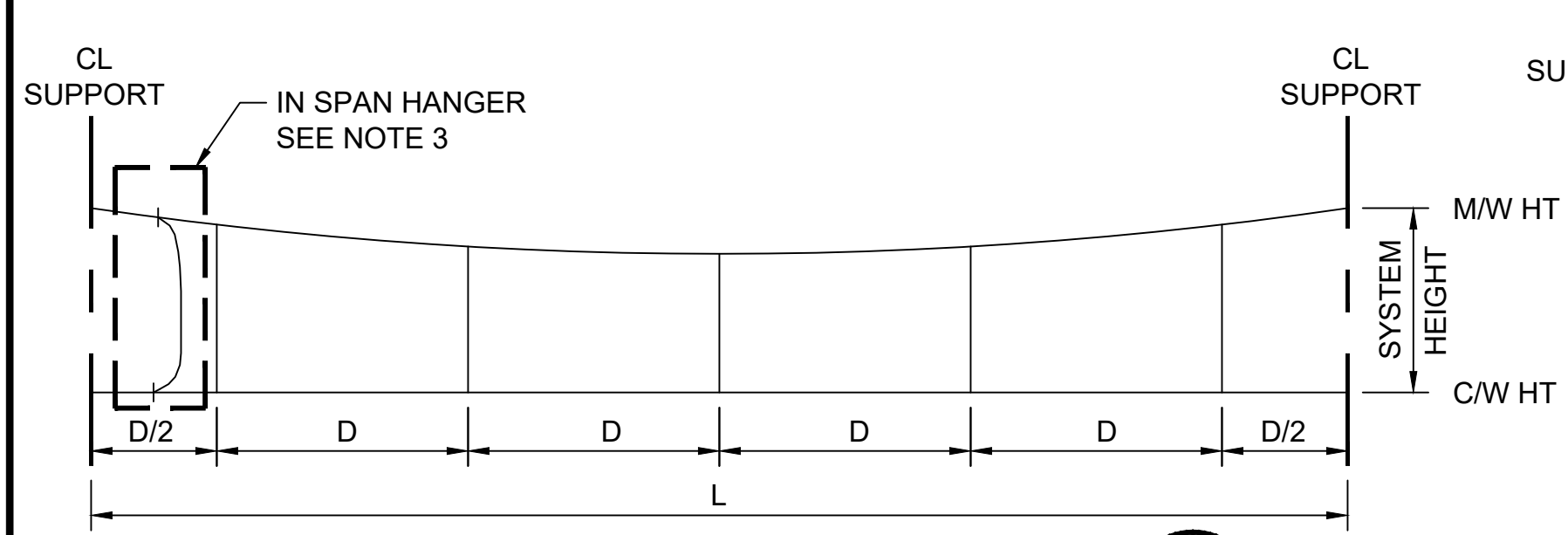
STANDARD SPANS 58' TO 87' 3

NTS
NOTE: B= L/3



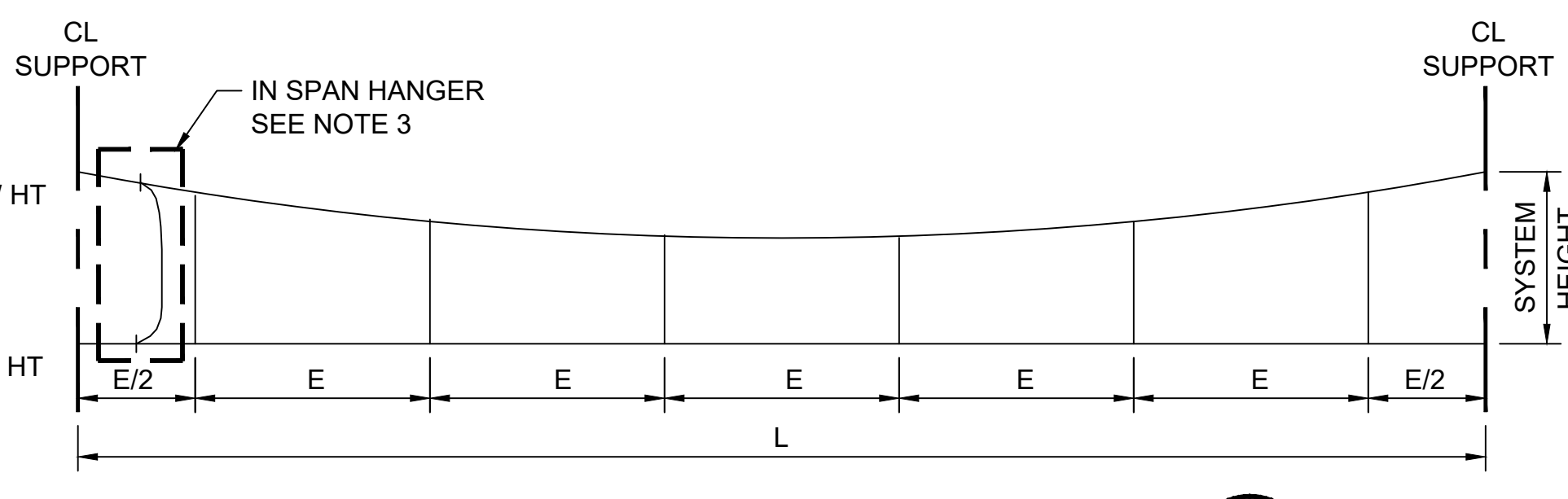
STANDARD SPANS 88' TO 117' 4

NTS
NOTE: C= L/4



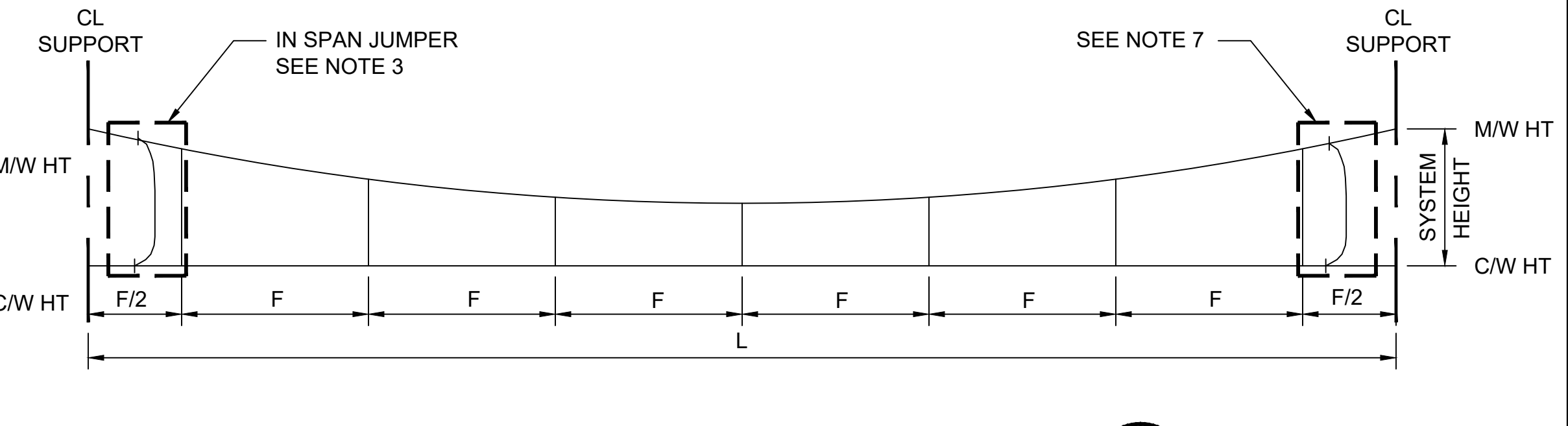
STANDARD SPANS 118' TO 147' 5

NTS
NOTE: D= L/5



STANDARD SPANS 148' TO 177' 6

NTS
NOTE: E= L/6



STANDARD SPANS 178' TO 210' 7

NTS
NOTE: F= L/7

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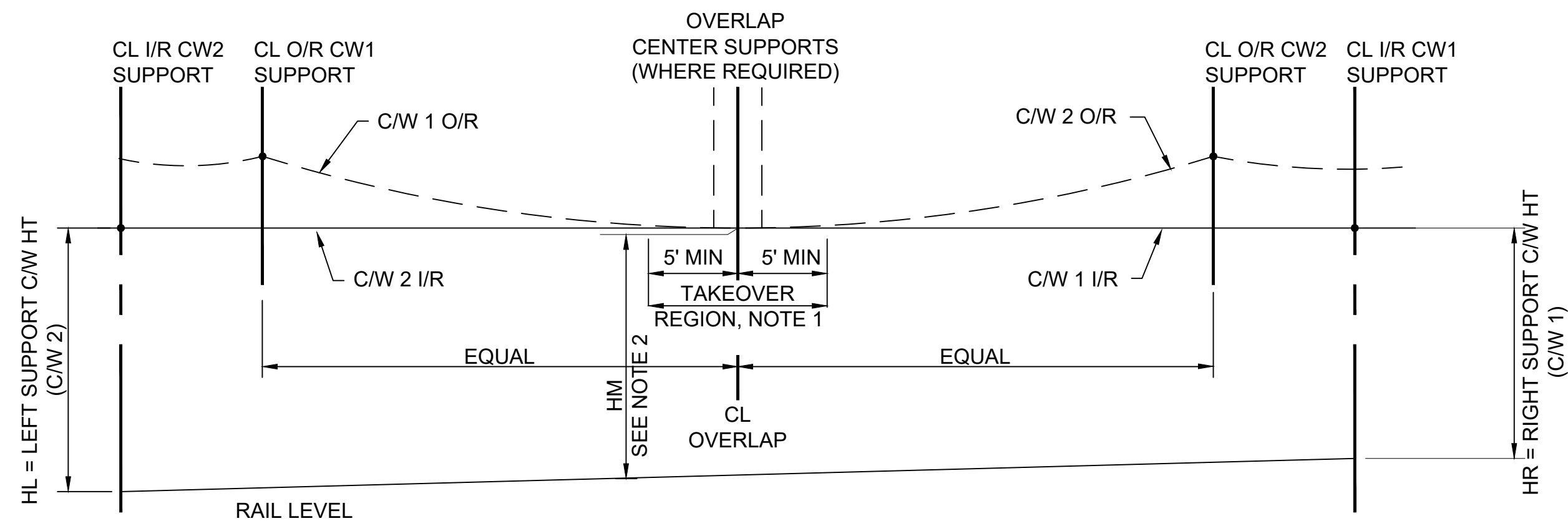
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| CONTRACT No.: RTA/LR | |
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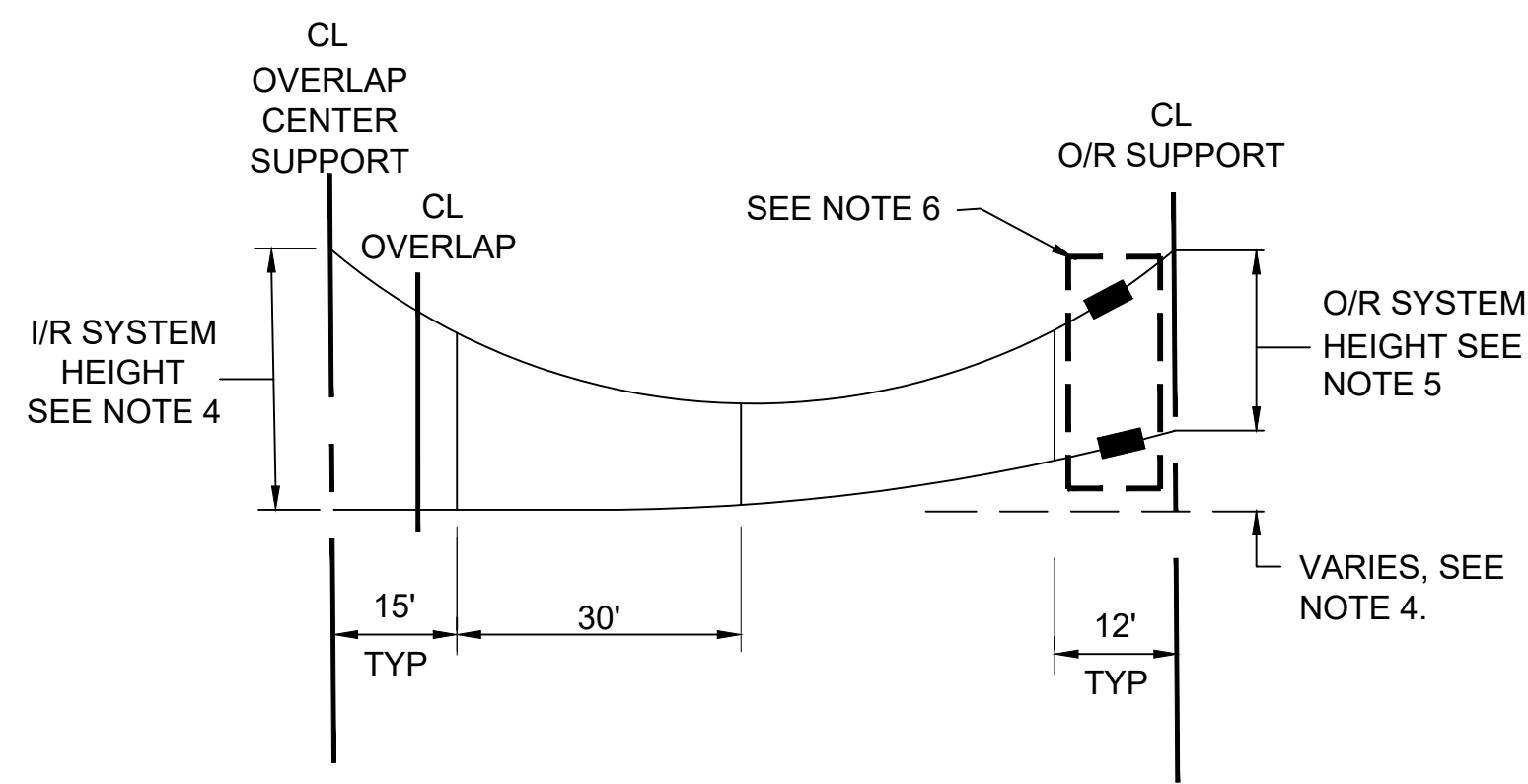
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| SOUND TRANSIT STANDARD DRAWINGS SYSTEMS | |
| OVERHEAD CATENARY SYSTEM GENERAL ARRANGEMENT STANDARD SPANS | |

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| DRAWING No.: | STD-JOD250 |
| FACILITY ID: | |
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WIRE PROFILES REQUIREMENTS FOR OVERLAP SPANS AND HALF OVERLAP SPANS
NTS

1

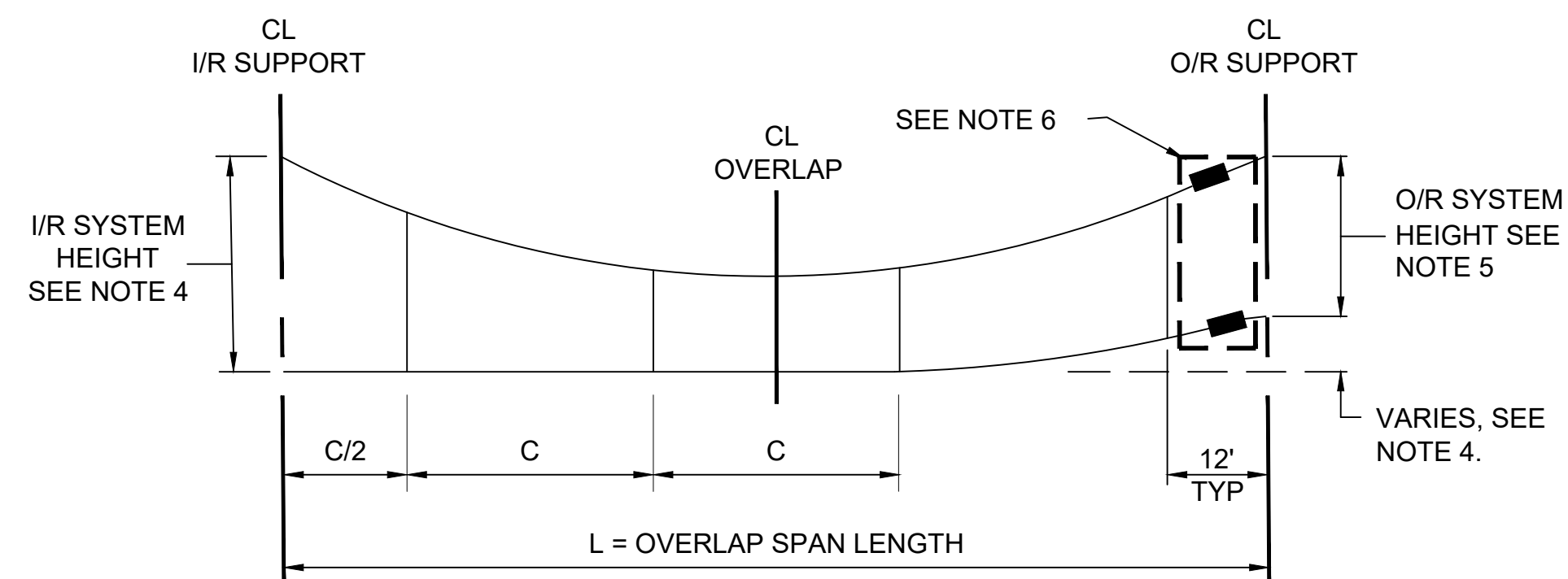


HALF OVERLAP SPAN 58' TO 87'
NTS

2

GENERAL NOTES:

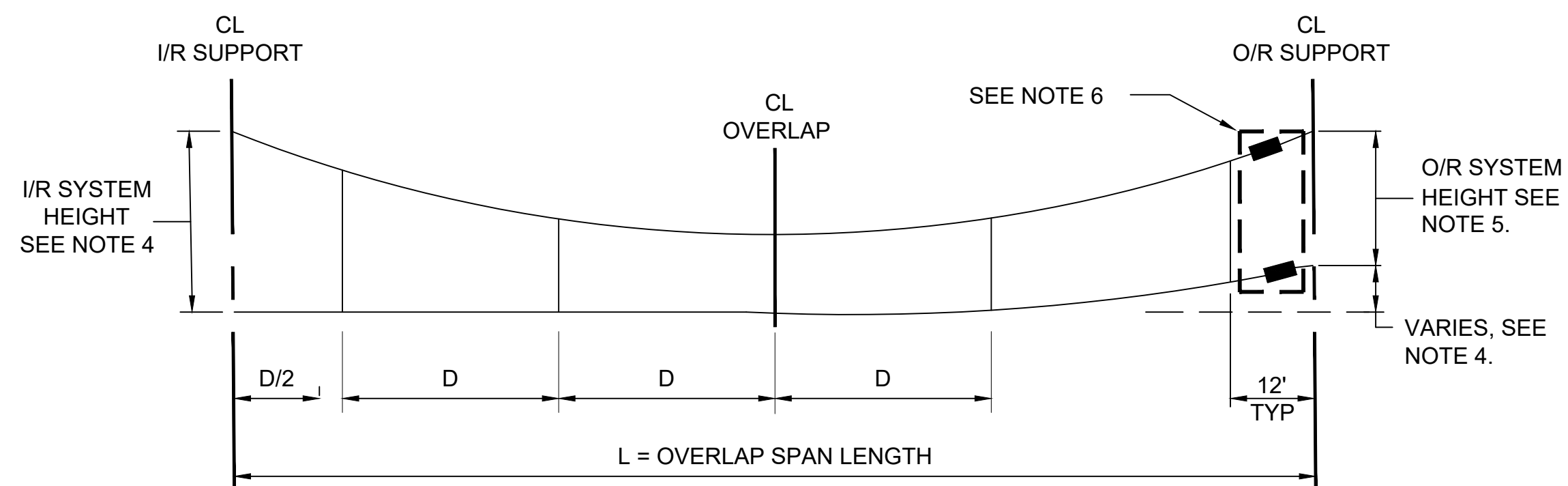
- HANGER LENGTHS ARE TO BE FIELD ADJUSTED FOR BOTH CONTACT WIRES OF THE OVERLAP. CONTACT WIRES ARE TO BE IN CONTACT WITH THE PANTOGRAPH THROUGHOUT THE TAKE OVER REGION SHOWN, AND BE AT THE MIDSPAN HEIGHT (HM) DESCRIBED IN NOTE 2.
- REQUIRED AS-BUILT MIDSPAN HEIGHT $HM = (HL+HR)/2$, TOLERANCE ON HM IS +/- 1 INCH.
- FINAL HANGER ADJUSTMENTS SHALL BE MADE ONLY AFTER ALL INSULATION, JUMPERS, AND FEEDER CABLES ARE INSTALLED.
- AT IN-RUNNING SUPPORTS, SYSTEM HEIGHT VALUES WILL TYPICALLY BE:
 - 5 FT WHERE THE WIRING IS CLOSEST TO THE SUPPORTING POLE.
 - 4 FT WHERE THE WIRING IS FURTHEST FROM THE SUPPORTING POLE.
 - SITE SPECIFIC DETAILS TO BE SHOWN ON OCS LAYOUT PLANS.
- AT OUT-OF-RUNNING SUPPORTS, SYSTEM HEIGHT VALUES WILL TYPICALLY BE:
 - 4'-3" WHERE THE WIRING IS CLOSET TO THE SUPPORTING POLE
 - 3'-3" WHERE THE WIRING IS FURTHEREST FROM THE SUPPORTING POLE.
- IN SPAN INSULATION ASSEMBLIES ARE REQUIRED IN INSULATED OVERLAPS SHOWN ON OCS LAYOUT PLANS. SEE DWG JOD503 FOR TYPICAL ASSEMBLIES.
- FOR TYPICAL HANGER ASSEMBLIES, SEE DWG JOD500.



OVERLAP SPAN 88' TO 117'
NTS

NOTE: C= L/4

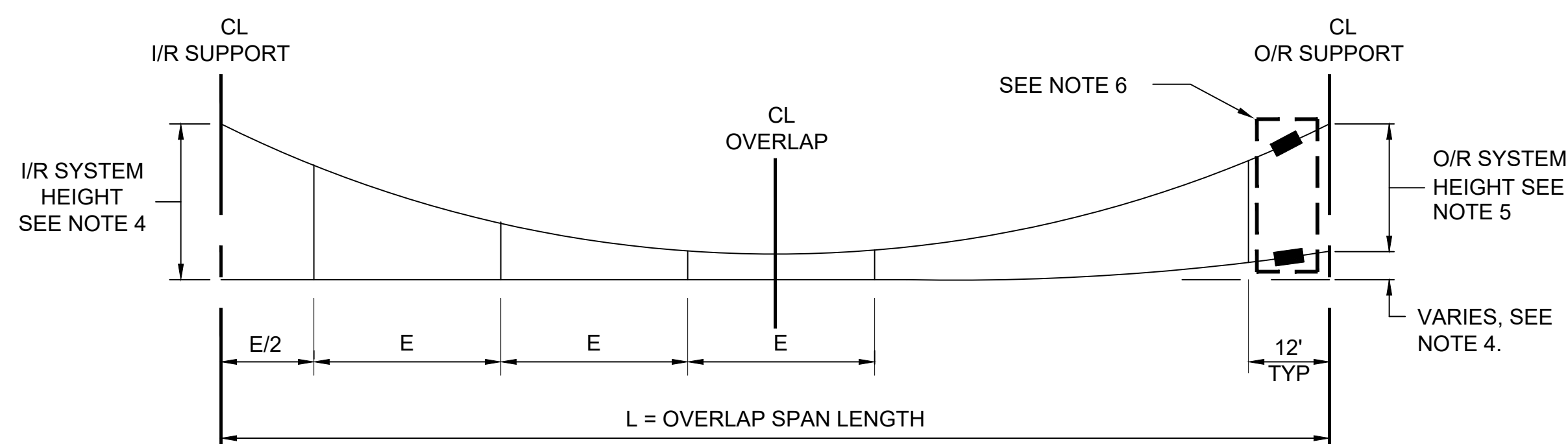
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OVERLAP SPAN 118' TO 147'
NTS

NOTE: D= L/5

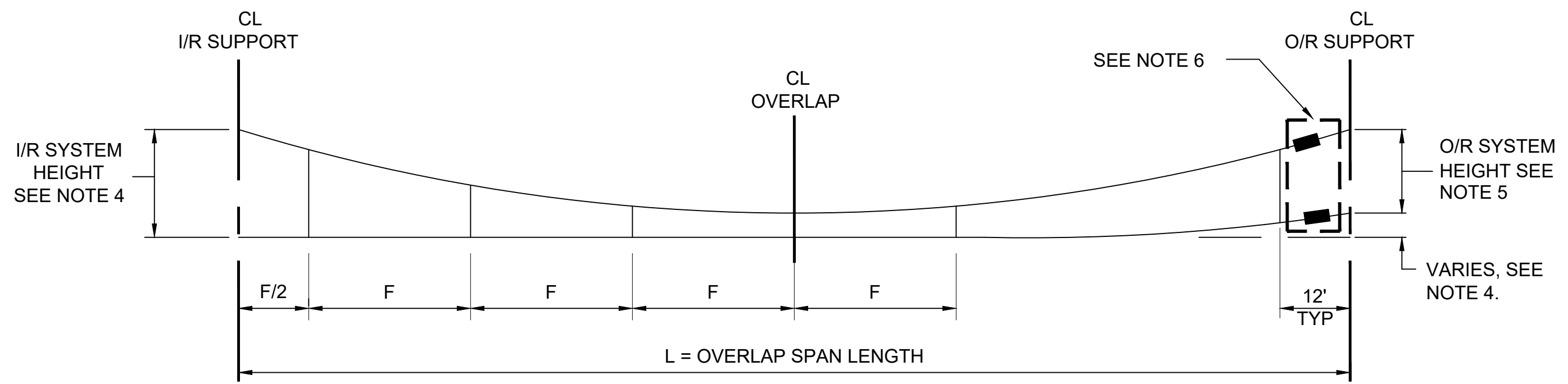
4



OVERLAP SPAN 148' TO 177'
NTS

NOTE: E= L/6

5



OVERLAP SPAN 178' TO 210'
NTS

NOTE: F= L/7

6

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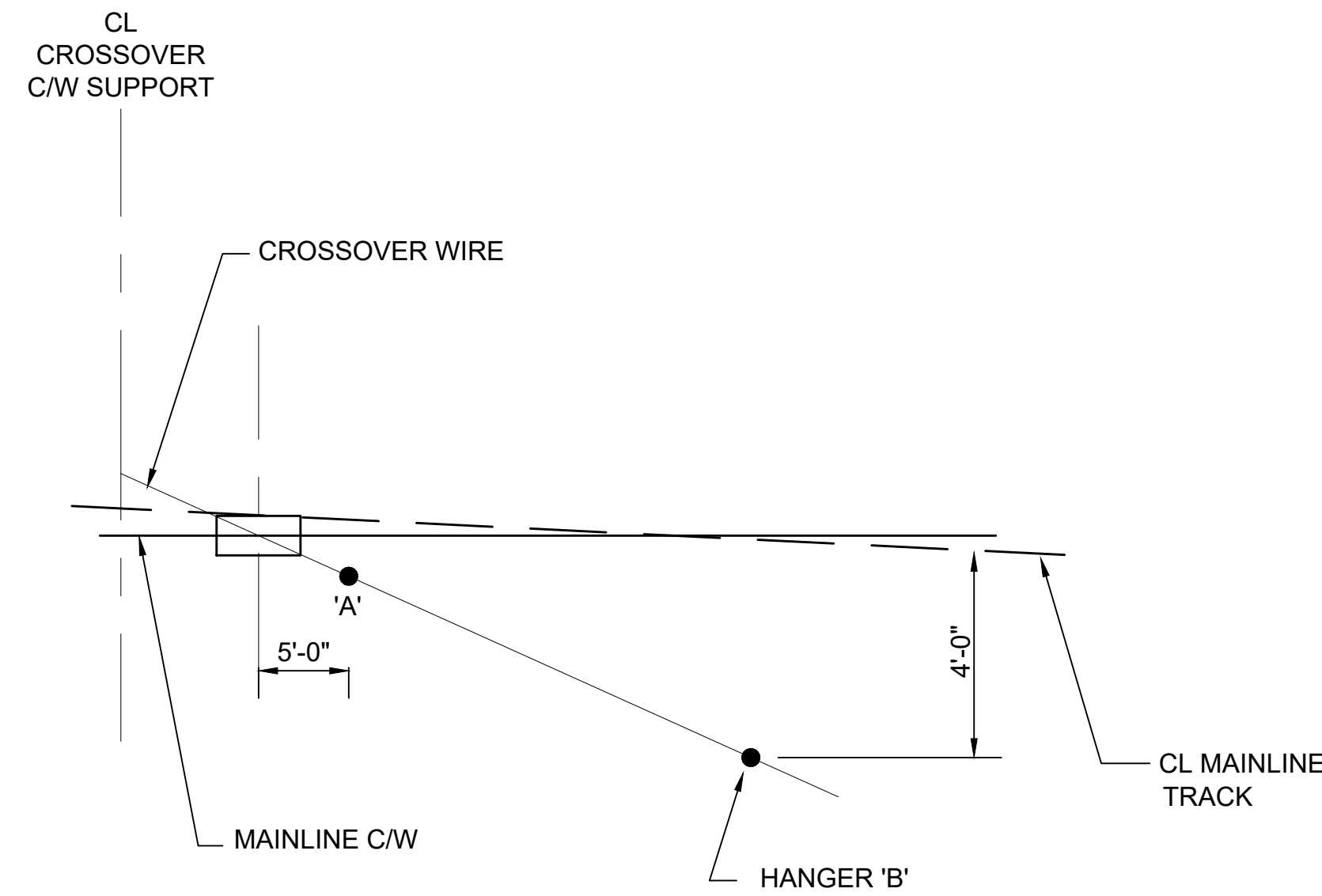
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| 0 | 8/2019 | | | | REVISED SYSTEMS DIRECTIVE DRAWINGS |

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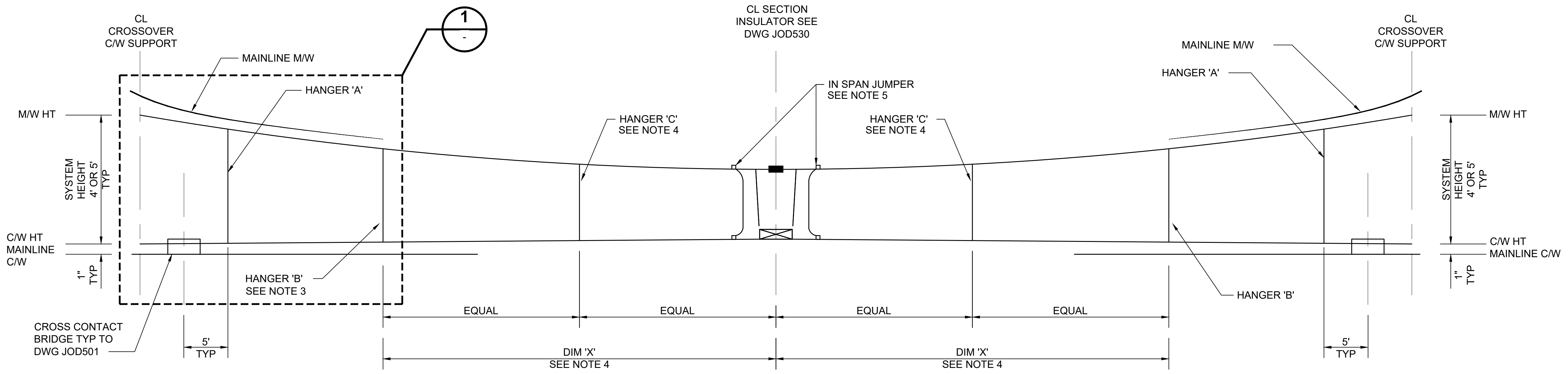
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| CONTRACT No.: RTA/LR | DATE: 2/2024 |

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| SOUND TRANSIT STANDARD DRAWINGS SYSTEMS | |
| OVERHEAD CATENARY SYSTEM GENERAL ARRANGEMENT OVERLAP SPANS | |
| DRAWING No.: STD-JOD251 | FACILITY ID: |
| SHEET No.: | REV: 1 |



PLAN - SHOWING PALCEMENT OF HANGER 'B' 1
 NTS
 SEE NOTE 3

- GENERAL NOTES:**
- SECTION INSULATORS ARE TO BE LOCATED WITHIN 2" OF TRACK CENTERLINE UNLESS OTHERWISE NOTED ON OCS LAYOUT PLANS.
 - CROSSOVER SPAN SHALL HAVE THE CONTACT WIRE HOGGED TO 1 1/2" ± 1", UNLESS INSTRUCTED OTHERWISE BY THE SECTION INSULATOR MANUFACTURER AND APPROVED BY THE RESIDENT ENGINEER.
 - HANGER 'B' IS TO BE POSITIONED RELATIVE TO THE MAINLINE PANTOGRAPH CENTERLINE AS SHOWN IN DETAIL A.
 - HANGER 'C' MAY BE OMITTED IF DIM 'X' IS LESS THAN 30FT.
 - IN SPAN JUMPERS TO BE INSTALLED, SEE JS-1 ON DWG JOD502. LOCATION TO BE SHOWN ON OCS LAYOUT PLANS.
 - HANGERS TO BE FIELD ADJUSTED TO MINIMIZE CONTACT WITH MAINLINE PANTOGRAPHS.



CROSSOVER SPAN
 NTS
 SEE NOTE 2

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| No. | DATE | DSN | CHK | APP | REVISION |
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| 1 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |
| 0 | 8/2019 | | | | REVISED SYSTEMS DIRECTIVE DRAWINGS |

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SCALE: NTS
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 CONTRACT No.: RTA/LR
 DATE: 2/2024

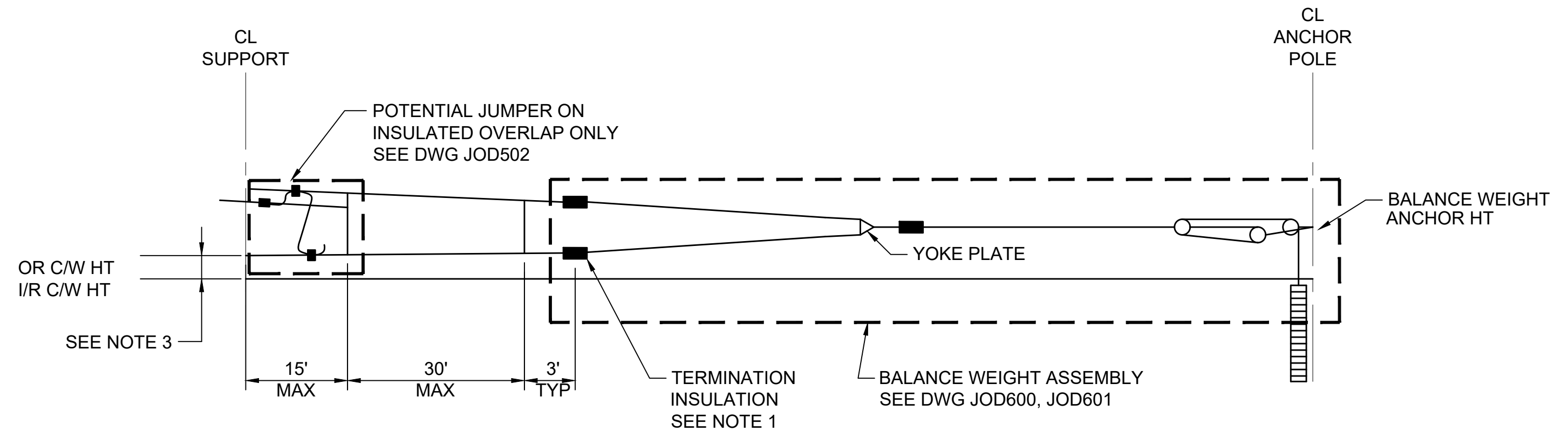
**SOUND TRANSIT
 STANDARD DRAWINGS
 SYSTEMS**

OVERHEAD CATENARY SYSTEM
 GENERAL ARRANGEMENT CROSSOVER SPANS

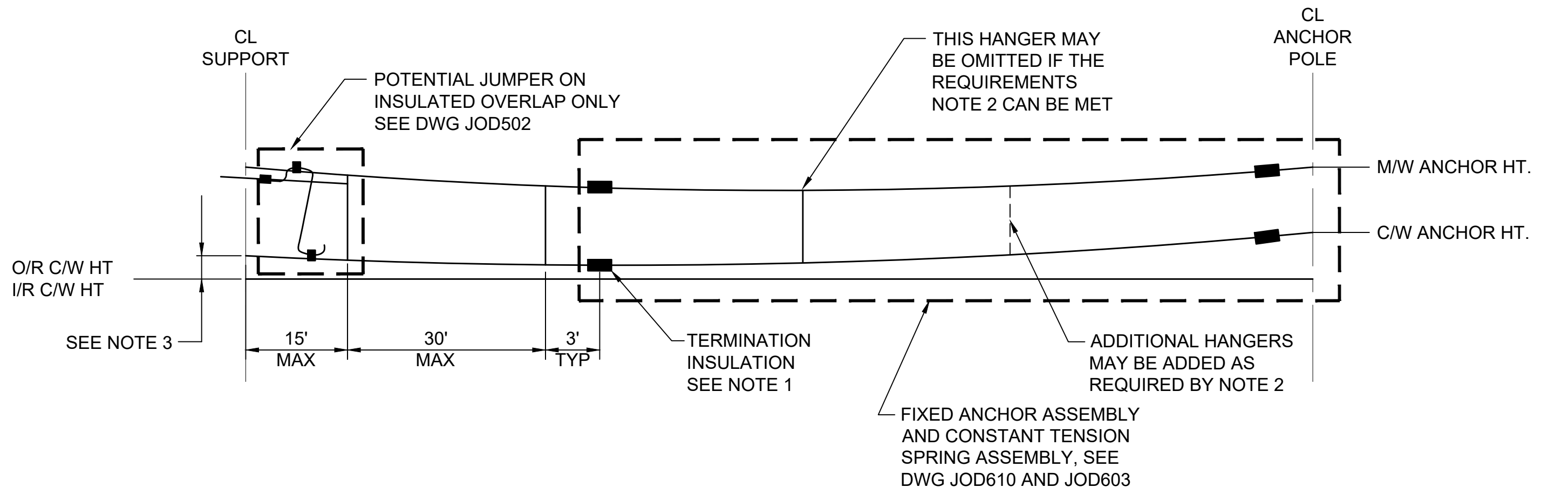
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| DRAWING No.: | STD-JOD252 |
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| SHEET No.: | REV: 1 |

GENERAL NOTES:

1. TERMINATION INSULATION SUB-ASSEMBLIES ARE TO BE LOCATED AT 4'-0" MIN HORIZONTAL OFFSET FROM SUPER ELEVATED CENTERLINE.
2. HANGERS ARE TO BE LOCATED AND ADJUSTED TO CAUSE THE O/R CONTACT TO BE ABOVE I/R CONTACT WIRE LEVEL OVER THE WHOLE SPAN.
3. THE VERTICAL DISTANCE BETWEEN IN RUNNING C/W AND OUT OF RUNNING C/W WILL BE 1 INCH FOR TURNOUT ARRANGEMENTS, OR TYPICALLY 9 INCHES FOR OVERLAP ARRANGEMENTS. SITE SPECIFIC REQUIREMENTS TO BE SHOWN ON OCS LAYOUT PLANS.
4. FOR TYPICAL HANGER ASSEMBLIES, SEE DWG JOD500.



BALANCE WEIGHT ANCHOR SPAN (1)



CONSTANT TENSION SPRING AND FIXED ANCHOR SPAN (2)

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CONTRACT No.: RTA/LR
DATE: 2/2024

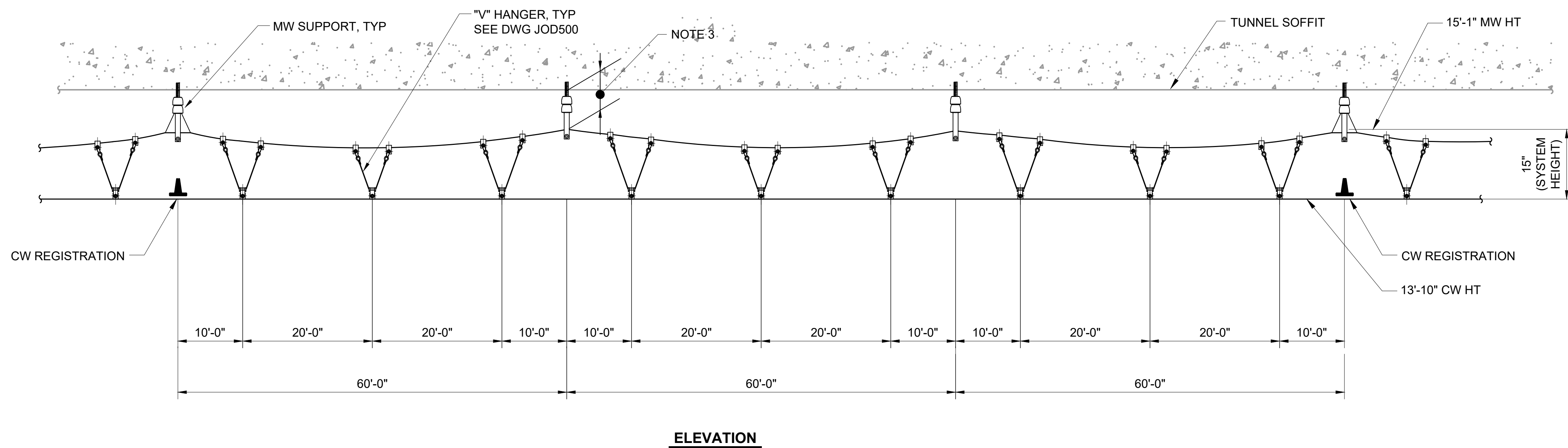
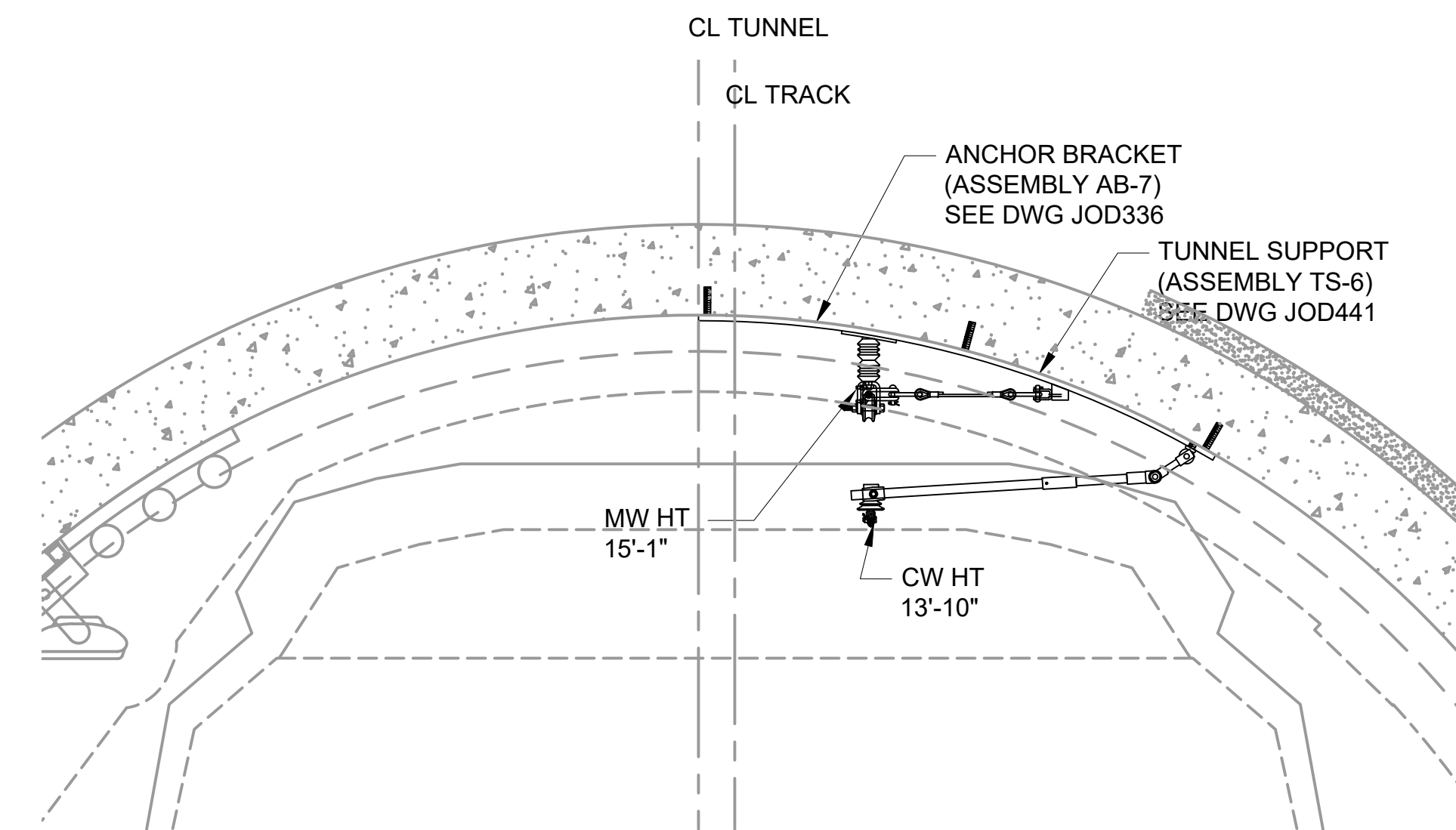
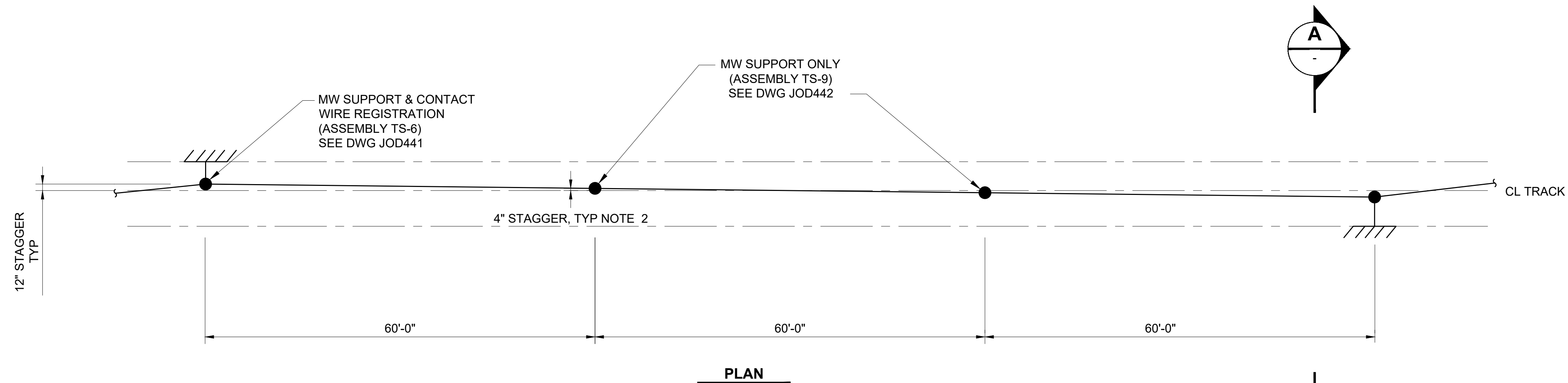
**SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS**

OVERHEAD CATENARY SYSTEM
GENERAL ARRANGEMENT TERMINATION SPANS

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| DRAWING No.: | STD-JOD253 |
| FACILITY ID: | |
| SHEET No.: | 1 |

GENERAL NOTES:

1. FOR SYMBOLS, ABBREVIATIONS AND LEGEND SEE DWG JZN001, JZN002 AND JZN006.
2. CONTRACTOR SHALL INSTALL SUPPORT ASSEMBLIES DIRECTLY IN LINE FROM ADJACENT CONTACT WIRE.
3. CLEARANCE BETWEEN DESIGNED MESSENGER WIRE HEIGHT AND TUNNEL SOFFIT VARIES.
4. HEIGHTS, STAGGERS AND ASSEMBLY CALL-OUTS TO BE SPECIFIED ON OCS LAYOUT PLANS AND SCHEDULES.



TYPICAL OCS ARRANGEMENT (TANGENT TRACK) TUNNEL

NTS

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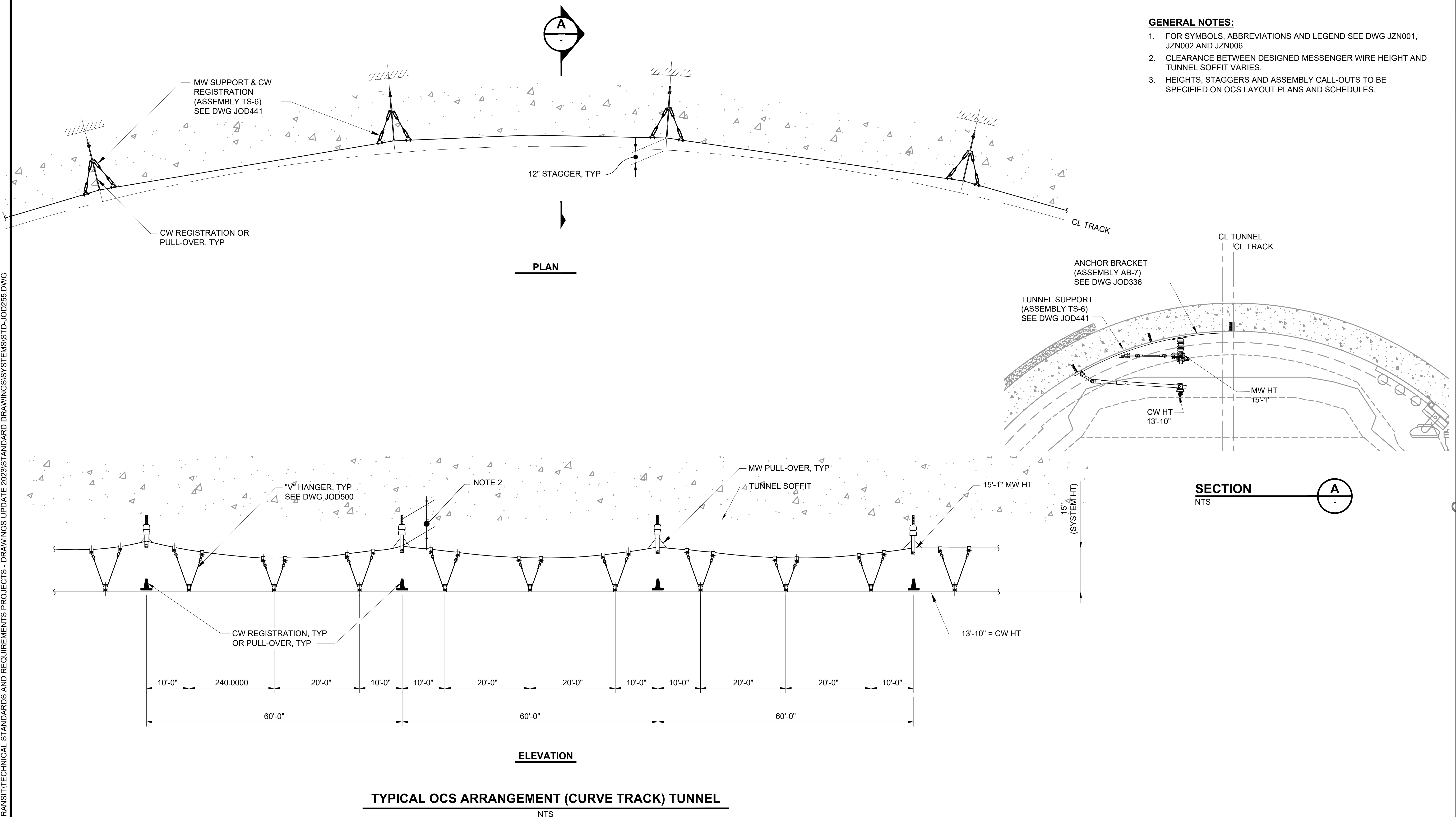
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| | FILENAME: | STD-JOD254 |
| | CONTRACT No.: | RTA/LR |
| | DATE: | 2/2024 |

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| <p>SOUND TRANSIT</p> <p>STANDARD DRAWINGS</p> <p>SYSTEMS</p> <p>OVERHEAD CATENARY SYSTEM</p> <p>GENERAL ARRANGEMENT TANGENT SPAN IN TUNNEL</p> |
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| DRAWING No.: | STD-JOD254 |
| FACILITY ID: | |
| SHEET No.: | REV: |
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- GENERAL NOTES:**
- FOR SYMBOLS, ABBREVIATIONS AND LEGEND SEE DWG JZN001, JZN002 AND JZN006.
 - CLEARANCE BETWEEN DESIGNED MESSENGER WIRE HEIGHT AND TUNNEL SOFFIT VARIES.
 - HEIGHTS, STAGGERS AND ASSEMBLY CALL-OUTS TO BE SPECIFIED ON OCS LAYOUT PLANS AND SCHEDULES.




TYPICAL OCS ARRANGEMENT (CURVE TRACK) TUNNEL
NTS

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| No. | DATE | DSN | CHK | APP | REVISION |
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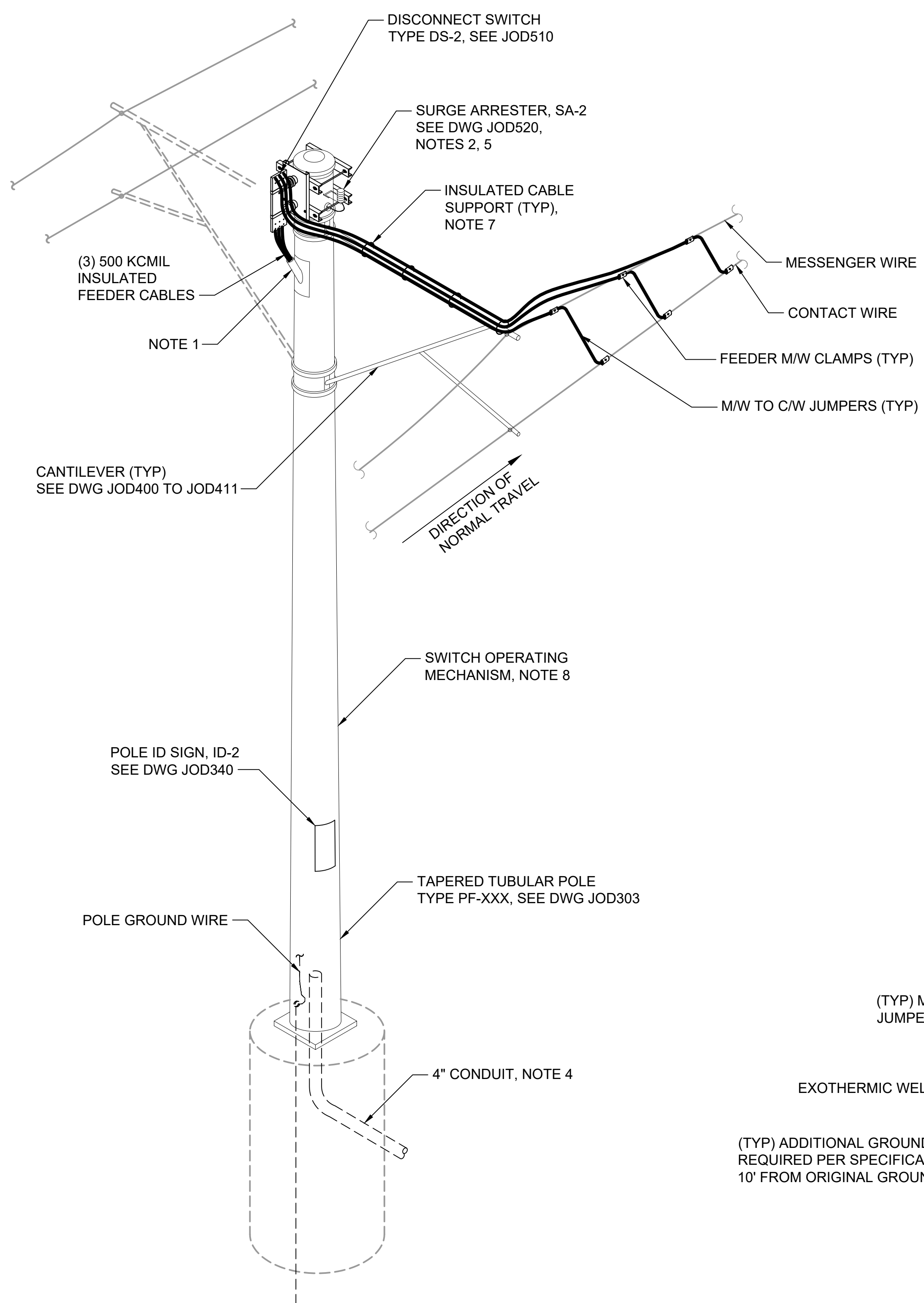
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| RTA/LR | |
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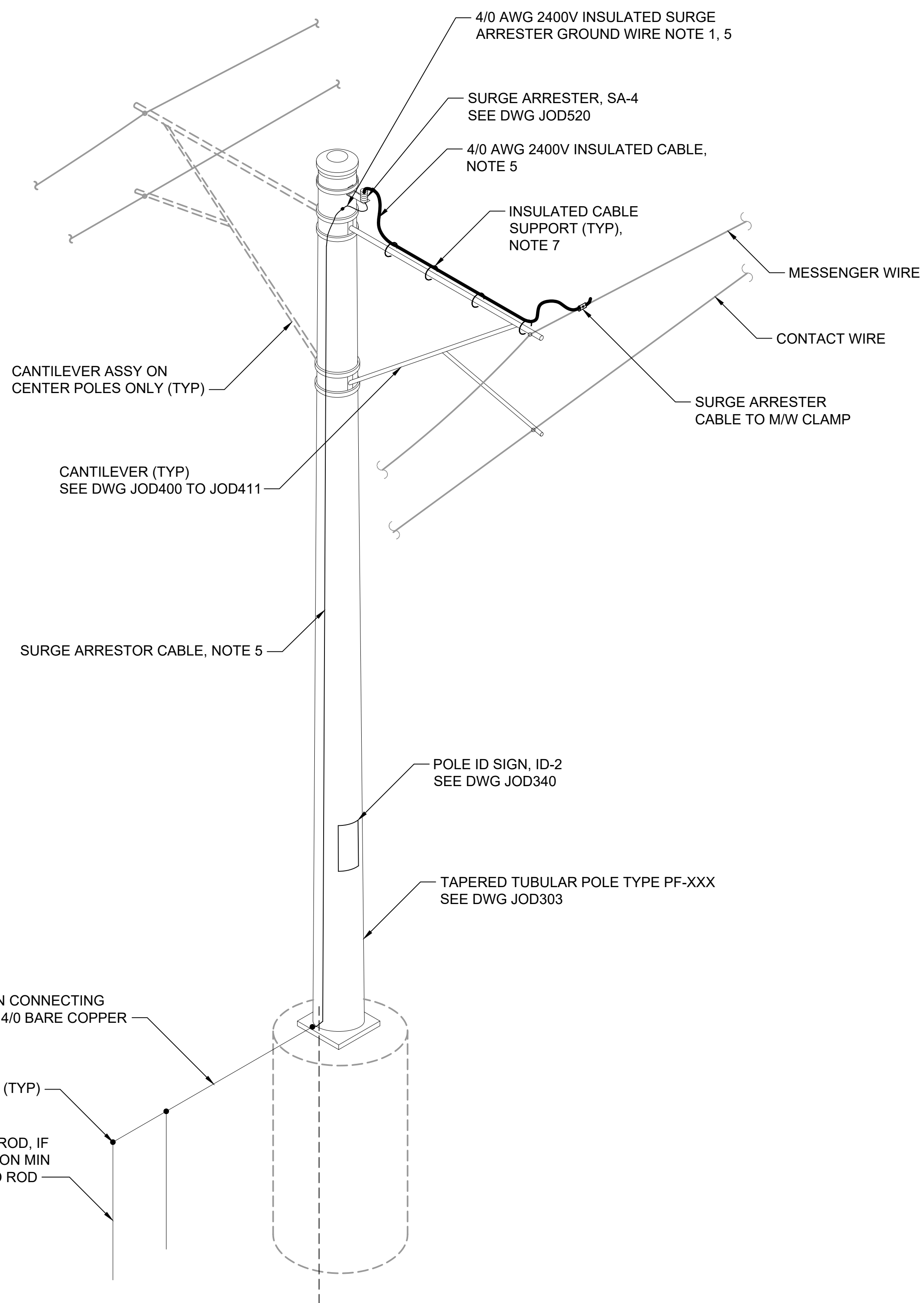
**SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS**

OVERHEAD CATENARY SYSTEM
GENERAL ARRANGEMENT CURVE SPAN IN TUNNEL

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| DRAWING No.: | STD-JOD255 |
| FACILITY ID: | |
| SHEET No.: | REV: |
| | 1 |



FEEDER ARRANGEMENT-CANTILEVER 1
NTS



SURGE ARRESTER ARRANGEMENT 2
NTS

GENERAL NOTES:

1. PROVIDE SEALING AND STRAIN RELIEF BUSHINGS ON SPOUTS AND CABLE ENTRY HOLES.
2. IN AREAS USING POLE-MOUNTED DISCONNECT SWITCHES, EACH FEEDER CABLE ASSEMBLY TO BE PROTECTED BY A SURGE ARRESTER ASSEMBLY CONNECTED TO THE LOAD SIDE OF EACH DISCONNECT SWITCH.
3. LOCATIONS OF FEEDING ARRANGEMENTS, AND SURGE ARRESTER ARRANGEMENTS TO BE SHOWN ON SECTIONING DIAGRAMS AND OCS LAYOUT PLANS.
4. THE FEEDER CONDUIT FOR TAPERED TUBULAR FEEDER POLE ENTERS THE CENTER OF THE FOUNDATION.
5. SURGE ARRESTER CONNECTIONS TO OCS AND GROUND SHALL BE BY EXOTHERMIC WELD. FOR BORED FOUNDATIONS, SURGE ARRESTER GROUND CABLE IS TO BE CONNECTED TO A DEDICATED SURGE ARRESTER GROUND ROD. FOR AERIAL STRUCTURE MOUNTED POLES, SURGE ARRESTER GROUND CABLE IS TO BE CONNECTED TO A SEPARATE GROUND SYSTEM. MAXIMUM ALLOWABLE TESTED RESISTANCE TO GROUND TO BE INCLUDED IN SPECIFICATIONS.
6. SITE SPECIFIC FEEDER CABLE QUANTITIES TO BE SHOWN ON OCS LAYOUT PLANS AND ASSEMBLY DRAWINGS.
7. INSULATED CABLE SUPPORT REQUIREMENTS TO BE PROVIDED IN SPECIFICATIONS.
8. THE SWITCH OPERATING MECHANISM AND SCADA JB SHALL NOT ENCROACH ON THE CLEARANCE ENVELOPE. DEFINED AS THE VEHICLE DYNAMIC ENVELOPE PLUS 2.0" FOR EMBEDDED TRACK MAINTENANCE TOLERANCE OR 4.0" FOR BALLASTED TRACK MAINTENANCE TOLERANCE PLUS 2" RUNNING CLEARANCE.


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LINE IS 1" AT FULL SCALE



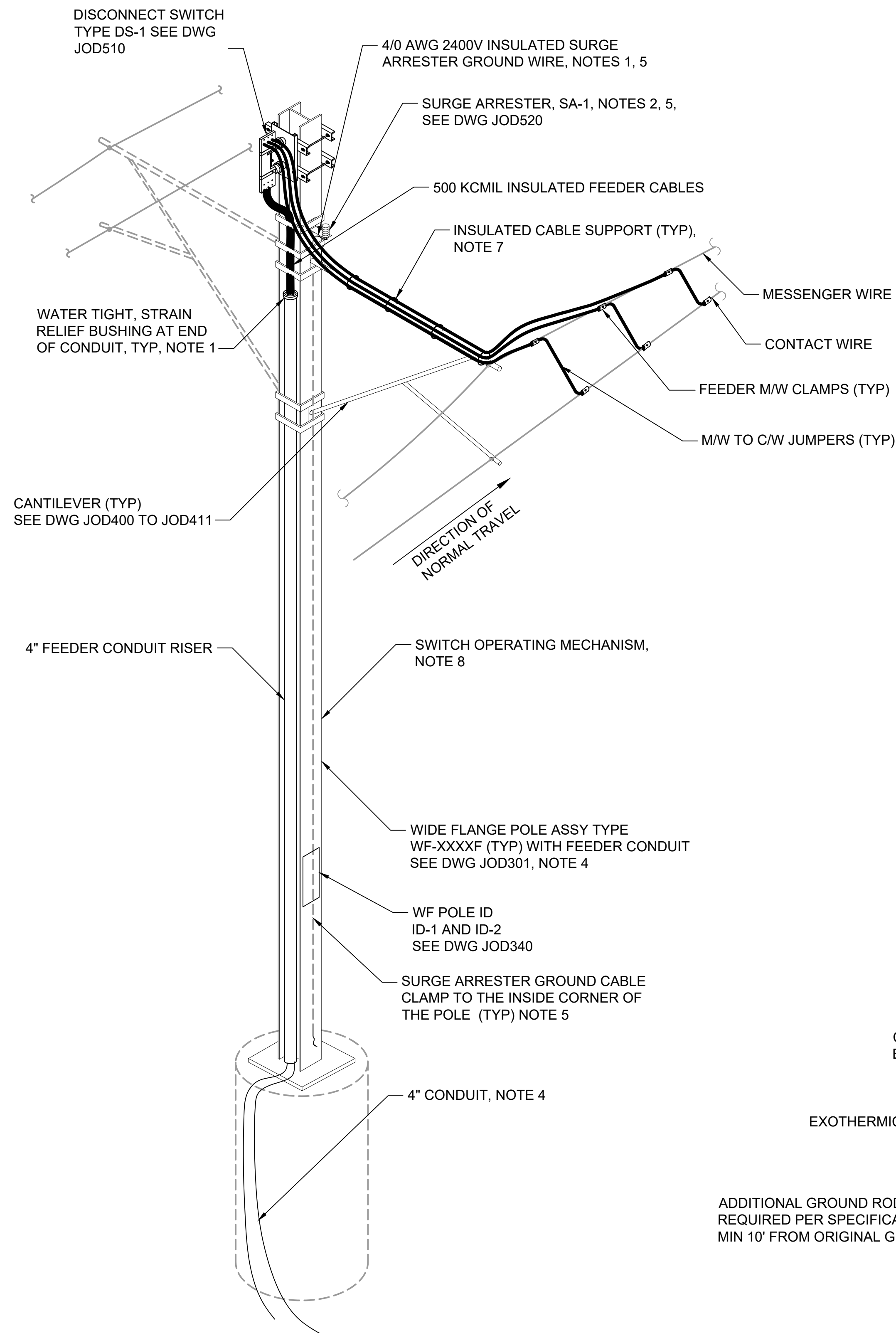
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CONTRACT No.: RTA/LR
DATE: 2/2024

SOUND TRANSIT STANDARD DRAWINGS SYSTEMS

OVERHEAD CATENARY SYSTEM
GENERAL ARRANGEMENT TAPERED TUBULAR FEEDER POLE & SURGE ARRESTER

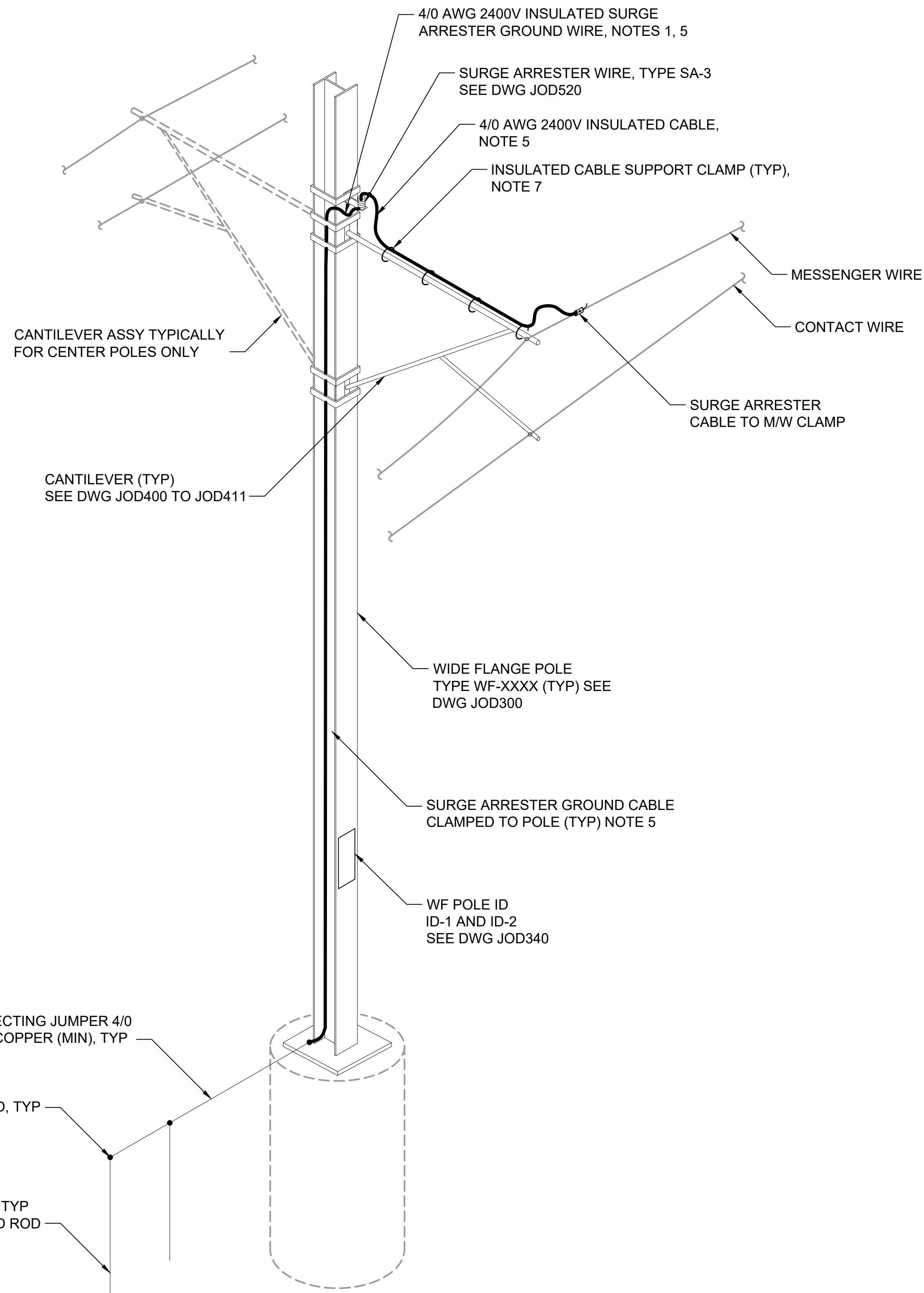
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FEEDER ARRANGEMENT-CANTILEVER

1
-
NTS



SURGE ARRESTER ARRANGEMENT

2
-
NTS

GENERAL NOTES:

1. PROVIDE SEALING AND STRAIN RELIEF BUSHINGS ON THE HIGH END OF ALL CONDUITS.
2. IN AREAS USING POLE-MOUNTED DISCONNECT SWITCHES, EACH FEEDER CABLE ASSEMBLY IS TO BE PROTECTED BY A SURGE ARRESTER ASSEMBLY CONNECTED TO THE LOAD SIDE OF EACH DISCONNECT SWITCH.
3. LOCATIONS OF FEEDER ARRANGEMENTS AND SURGE ARRESTER ARRANGEMENTS TO BE SHOWN ON SECTIONING DIAGRAM AND OCS LAYOUT PLANS.
4. THE FEEDER CONDUIT FOR WIDE FLANGE FEEDER POLE ENTERS NEAR THE PERIMETER OF THE FOUNDATION AND SHOULD BE ROUTED BETWEEN THE FLANGES.
5. SURGE ARRESTER CONNECTIONS TO OCS AND GROUND SHALL BE CONTINUOUS. ALL GROUND CONNECTIONS SHALL BE EXOTHERMIC WELD. FOR BORED FOUNDATIONS, SURGE ARRESTER GROUND CABLE IS TO BE CONNECTED TO A DEDICATED SURGE ARRESTER GROUND ROD. FOR AERIAL STRUCTURE MOUNTED POLES, SURGE ARRESTER GROUND CABLE IS TO BE CONNECTED TO A SEPARATE GROUND SYSTEM. MAXIMUM ALLOWABLE TESTED RESISTANCE TO GROUND TO BE INCLUDED IN SPECIFICATIONS.
6. SITE SPECIFIC FEEDER CABLE QUANTITIES TO BE SHOWN ON OCS LAYOUT PLANS AND ASSEMBLY DRAWINGS.
7. INSULATED CABLE SUPPORT REQUIREMENTS TO BE PROVIDED IN SPECIFICATIONS.
8. THE SWITCH OPERATING MECHANISM AND SCADA JB SHALL NOT ENCROACH ON THE CLEARANCE ENVELOPE. DEFINED AS THE VEHICLE DYNAMIC ENVELOPE PLUS 2.0" FOR EMBEDDED TRACK MAINTENANCE TOLERANCE OR 4.0" FOR BALLASTED TRACK MAINTENANCE TOLERANCE PLUS 2" RUNNING CLEARANCE.

| No. | DATE | DSN | CHK | APP | REVISION |
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| 1 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |
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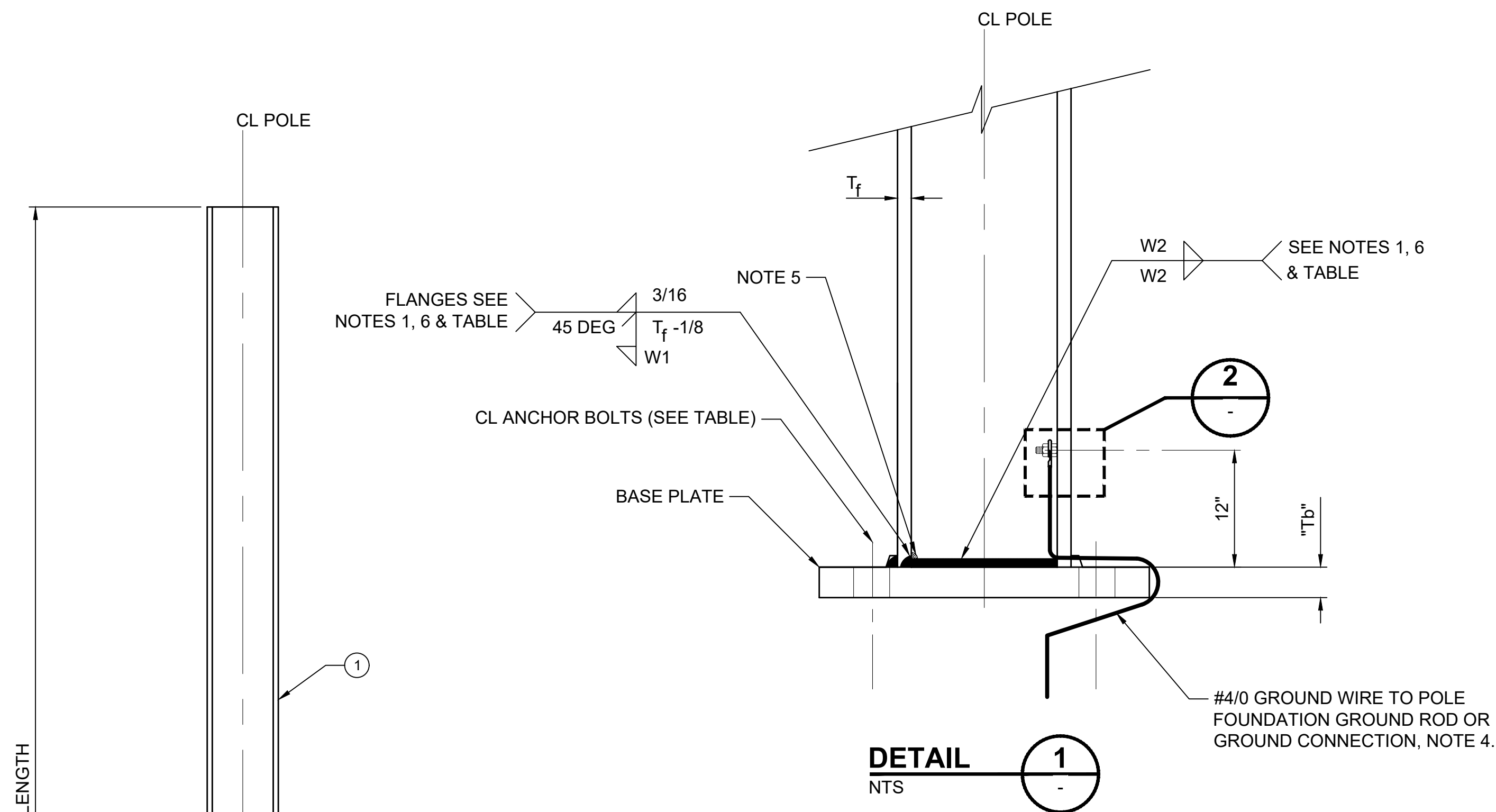
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 DATE: 2/2024

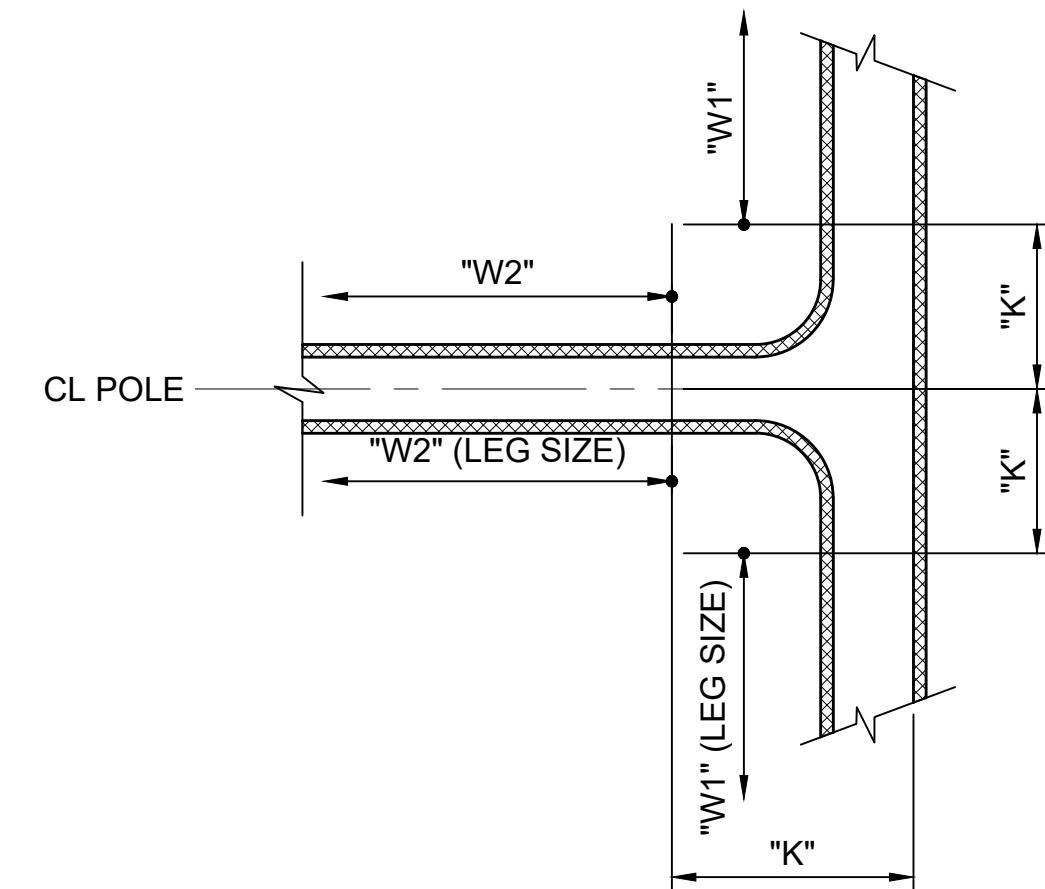
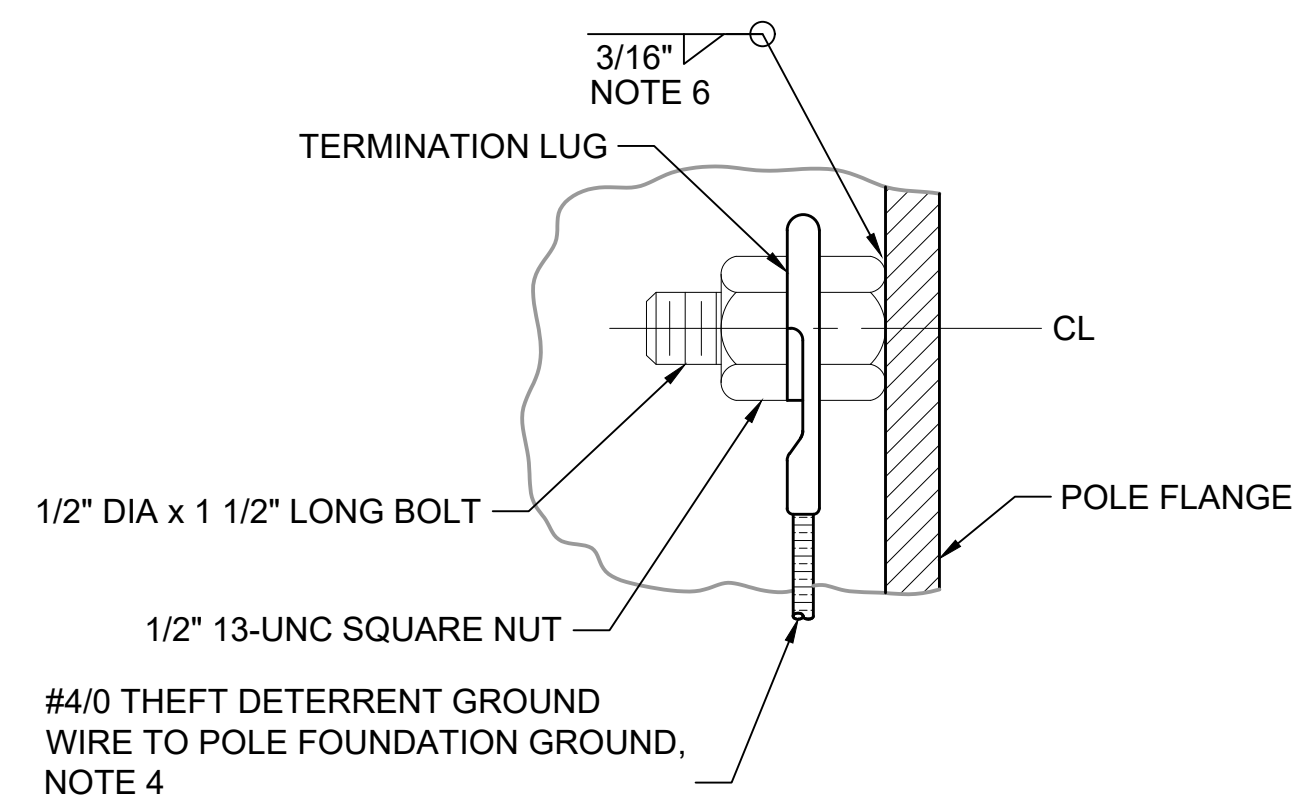
SOUND TRANSIT STANDARD DRAWINGS SYSTEMS

OVERHEAD CATENARY SYSTEM
 GENERAL ARRANGEMENT WIDE FLANGE FEEDER POLE & SURGE ARRESTER

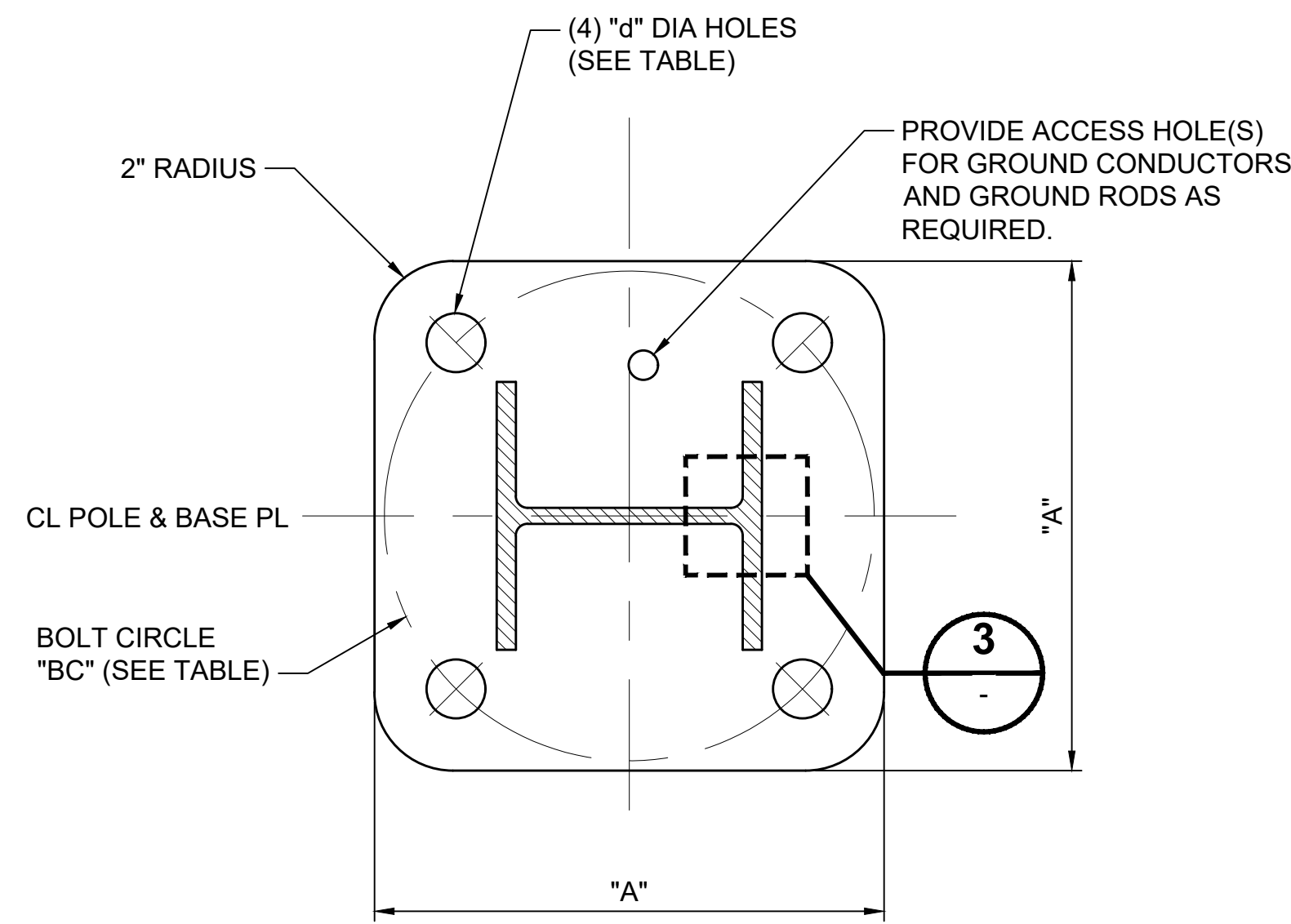
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"L" TOTAL POLE LENGTH
NOTE 2



FLANGE TO BASE PLATE WELDING



WIDE FLANGE POLE
NTS
NOTE 3

SECTION A
NTS

DETAIL 2
NTS

DETAIL 3
NTS
NOTES 1, 6

| POLE TYPE | MAX WORKING MOMENT (K-FT) | SHAFT SIZE | POLE ASSEMBLY | | | | | | | FOUNDATION TYPE |
|-----------|---------------------------|------------|---------------|-----|--------|--------|--------------------|------|----------|-----------------|
| | | | BASE PLATE | | | | WELDING DIMENSIONS | | | |
| | | | A | BC | Tb | d | W1 | W2 | K | |
| WF-08XX | 29.1 | W8X31 | 16" | 16" | 1 1/2" | 1 3/4" | 3/8" | 3/8" | 15/16" | FD-08W |
| WF-10XX | 44.7 | W10X39 | 18" | 18" | 1 3/4" | 2" | 7/16" | 3/8" | 1 1/16" | FD-10W |
| WF-20XX | 61.9 | W10X49 | 20" | 20" | 2" | 2 3/8" | 1/2" | 3/8" | 1 3/16" | FD-20W |
| WF-21XX | 73.2 | W12X53 | 20" | 20" | 2" | 2 3/8" | 1/2" | 3/8" | 1 3/16" | FD-21W |
| WF-22XX | 113.7 | W12X72 | 24" | 24" | 2 1/2" | 3" | 9/16" | 1/2" | 1 3/8" | FD-22W |
| WF-32XX | 156.2 | W12X96 | 24" | 24" | 2 1/2" | 3" | 11/16" | 1/2" | 1 11/16" | FD-32W |

'XX' - DENOTES LENGTH OF POLE IN INTEGRAL FEET IN POLE ASSEMBLY REFERENCE.

| BILL OF MATERIALS | | | | | | | | | |
|----------------------|---------|---------|---------|---------|---------|-------|-------------------------|----------|------------------|
| QUANTITIES EACH TYPE | | | | | | UNITS | DESCRIPTION | ITEM NO. | PART NO./REMARKS |
| WF-08XX | WF-10XX | WF-20XX | WF-21XX | WF-22XX | WF-32XX | | | | |
| 1 | 1 | 1 | 1 | 1 | 1 | EACH | POLE SHAFT & BASE PLATE | 1 | |

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| 2 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |
| 1 | 8/2019 | | | | REVISED SYSTEMS DIRECTIVE DRAWINGS |
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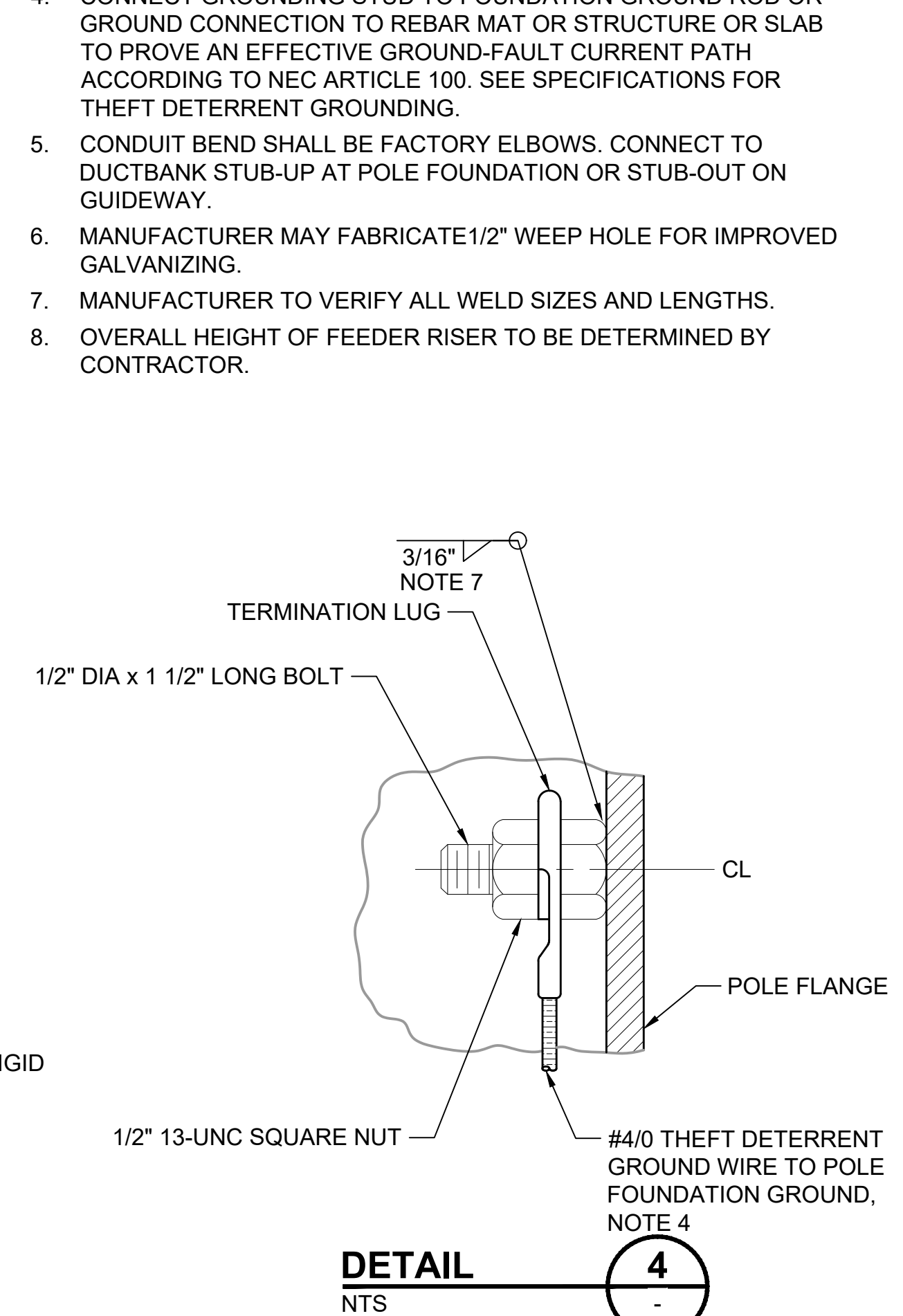
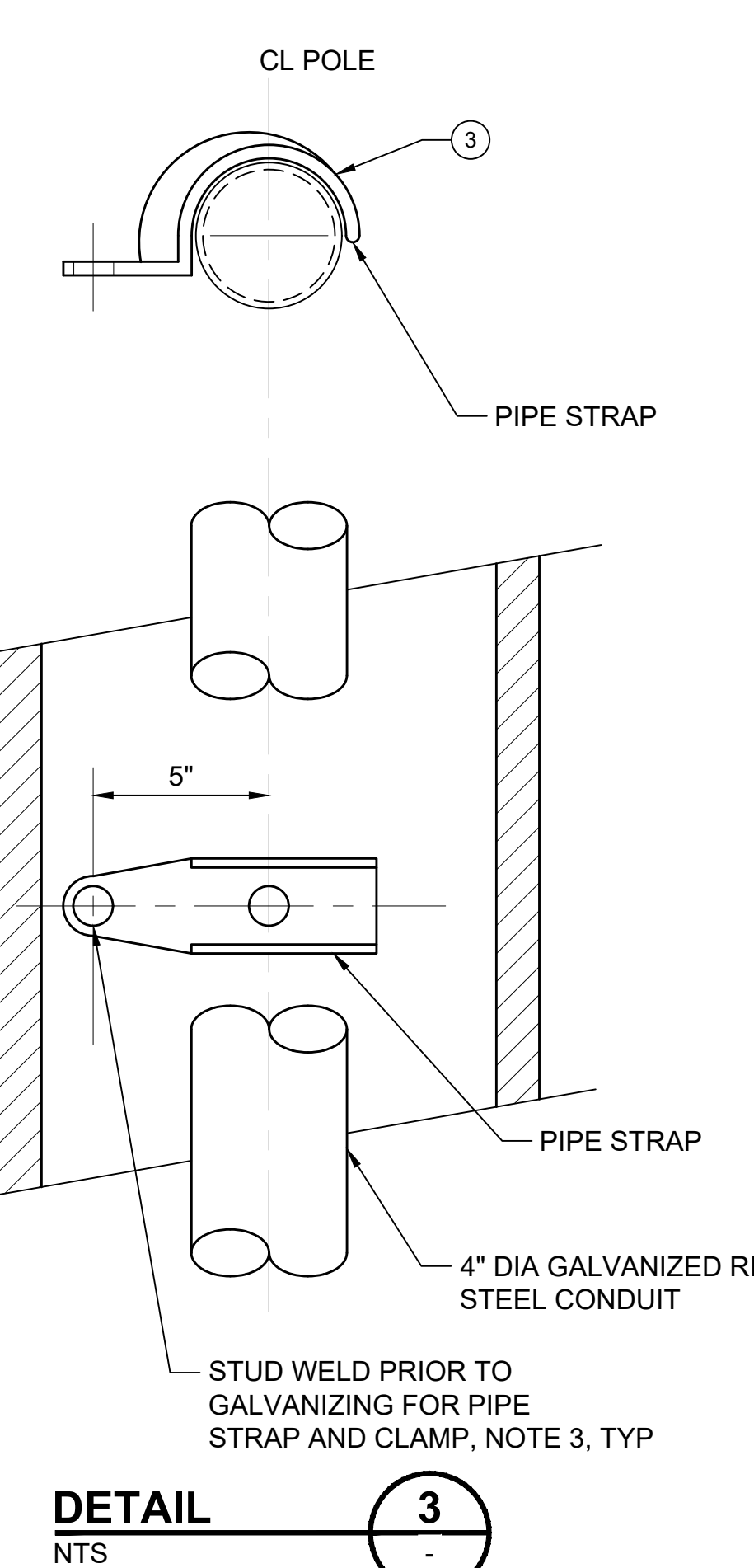
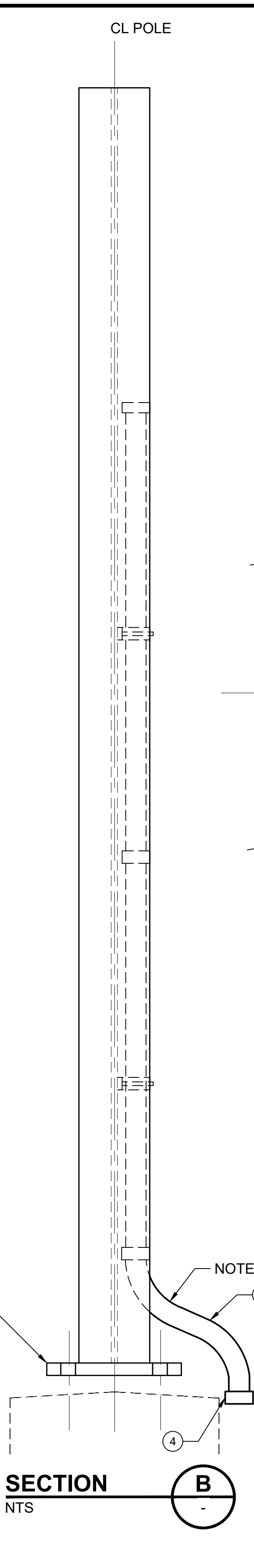
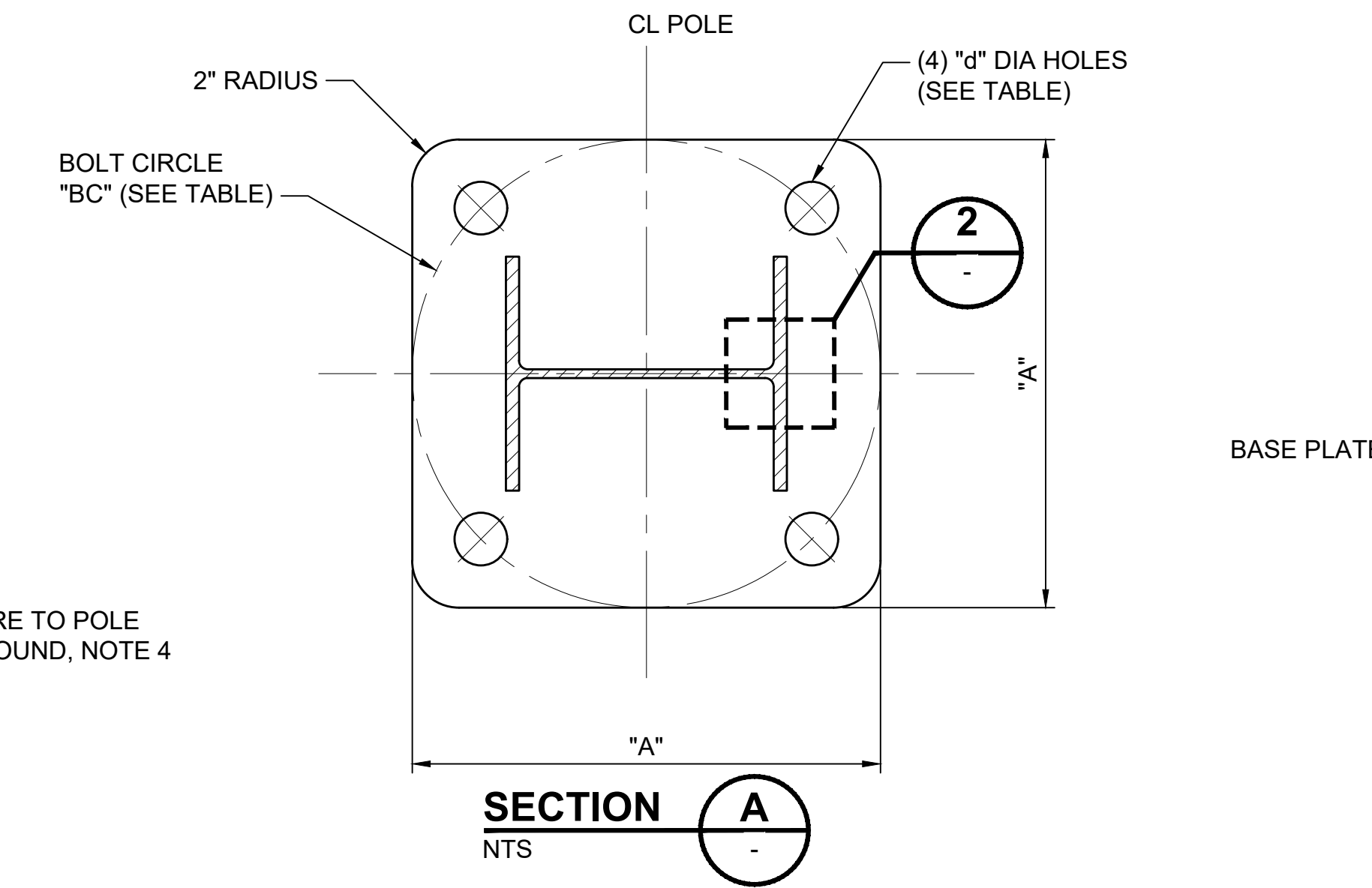
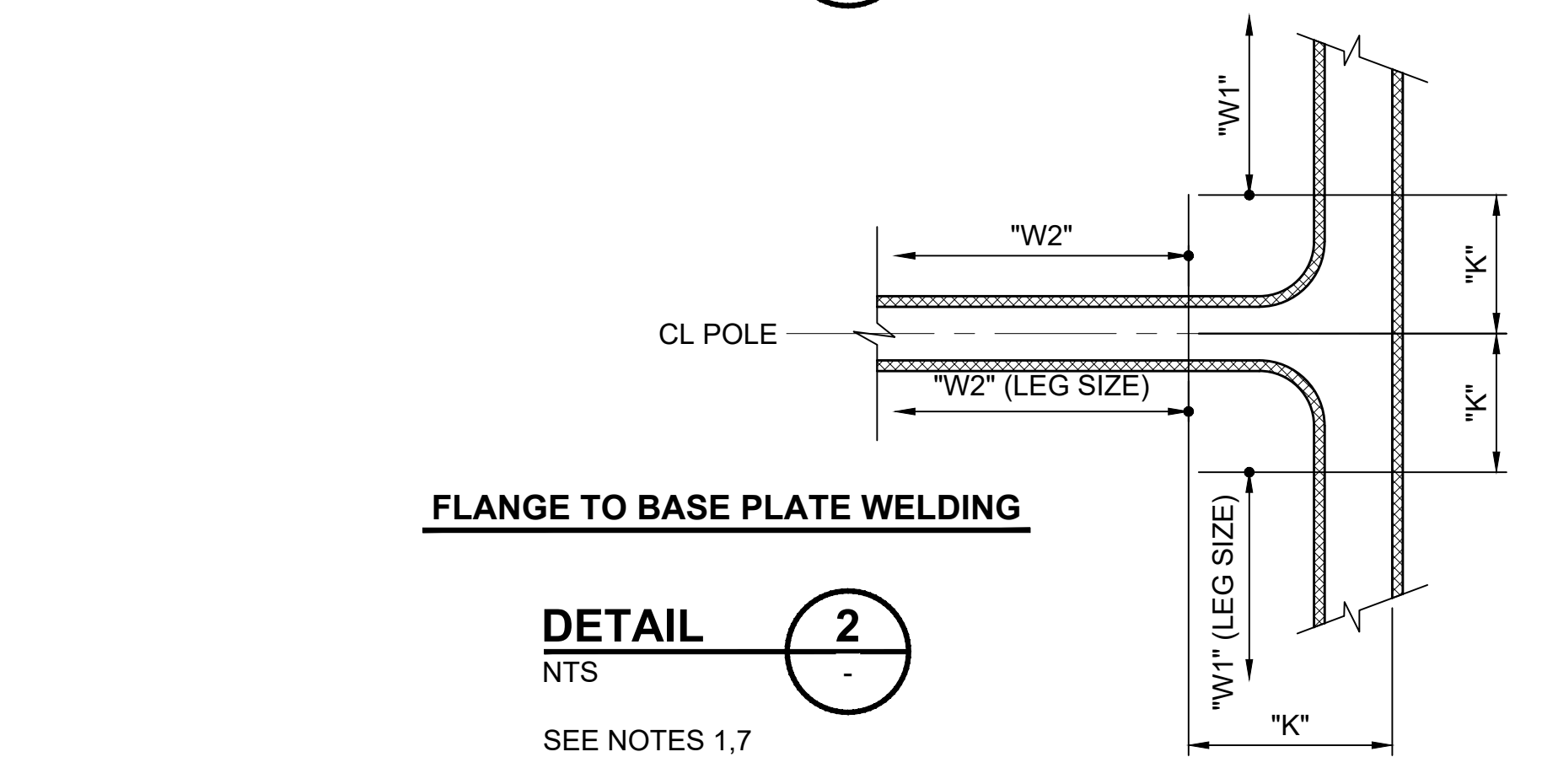
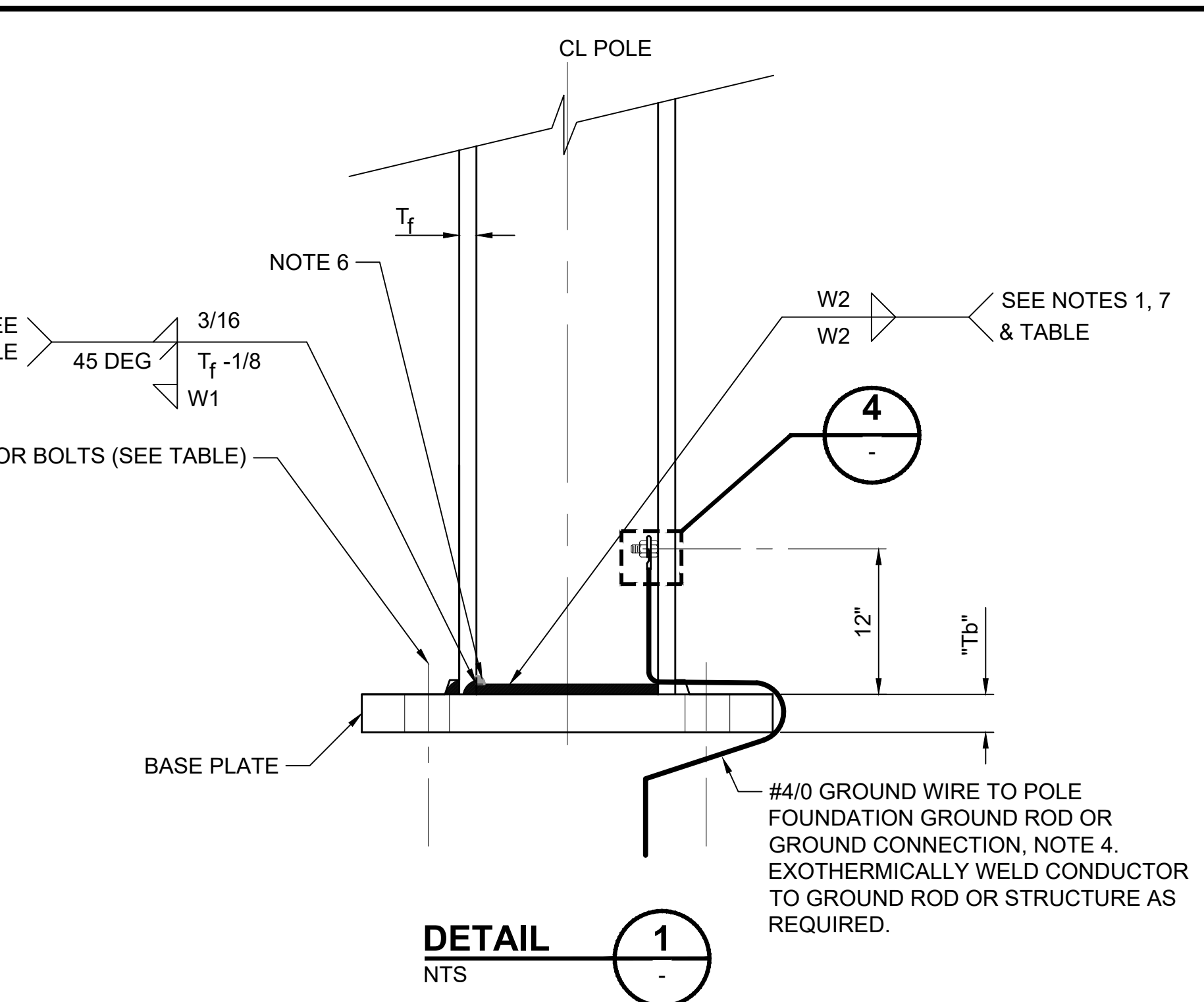
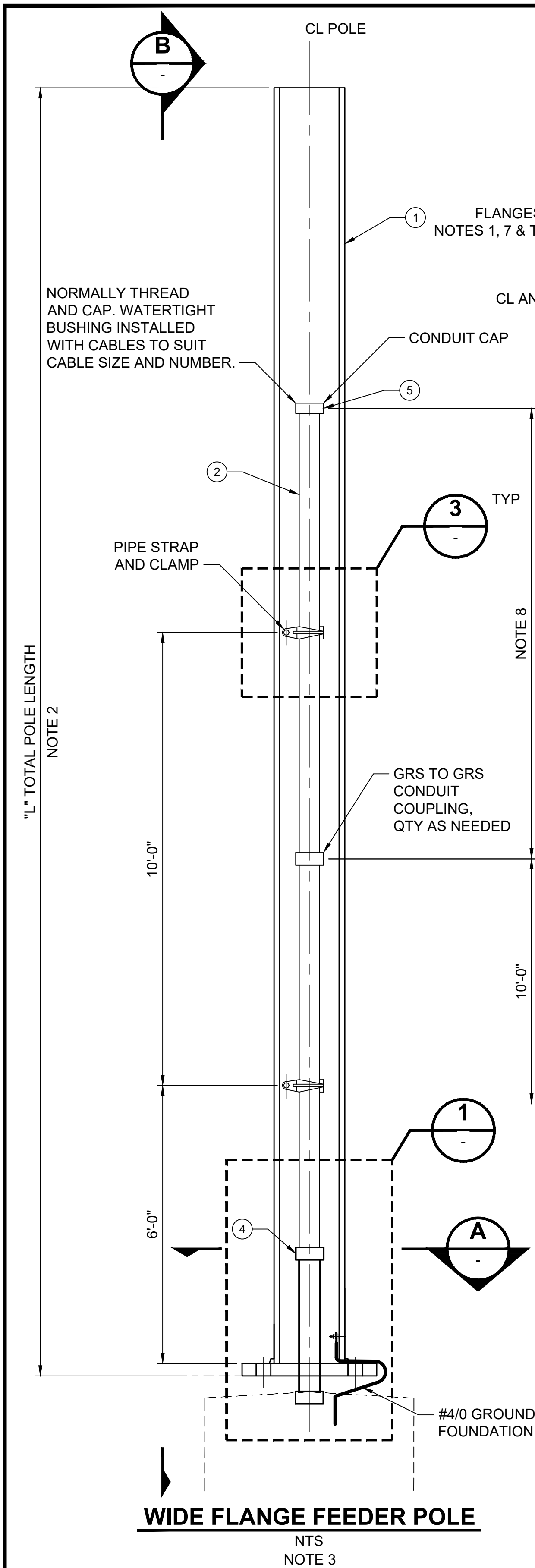
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SCALE: NTS
FILENAME: STD-JOD300
CONTRACT No.: RTA/LR
DATE: 2/2024

SOUND TRANSIT STANDARD DRAWINGS SYSTEMS
OVERHEAD CATENARY SYSTEM
GENERAL ARRANGEMENT WIDE FLANGE POLE ASSEMBLIES WF-XXXXF

| | |
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| DRAWING No.: | STD-JOD300 |
| FACILITY ID: | |
| SHEET No.: | REV: 2 |

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- GENERAL NOTES:**
- FOR TYPICAL OCS WIDE FLANGE POLE ASSEMBLY NOTES, SEE DRAWING JOD300.
 - POLE LENGTHS TO BE SHOWN ON OCS LAYOUT PLAN AND SCHEDULE DRAWINGS.
 - ANY ADDITIONAL HOLES REQUIRED BY CONTRACTOR ARE DETAILED BY CONTRACTOR, AND MADE BY POLE MANUFACTURER PRIOR TO GALVANIZING. NO FIELD HOLE DRILLING ALLOWED.
 - CONNECT GROUNDING STUD TO FOUNDATION GROUND ROD OR GROUND CONNECTION TO REBAR MAT OR STRUCTURE OR SLAB TO PROVE AN EFFECTIVE GROUND-FAULT CURRENT PATH ACCORDING TO NEC ARTICLE 100. SEE SPECIFICATIONS FOR THEFT DETERRENT GROUNDING.
 - CONDUIT BEND SHALL BE FACTORY ELBOWS. CONNECT TO DUCTBANK STUB-UP AT POLE FOUNDATION OR STUB-OUT ON GUIDEWAY.
 - MANUFACTURER MAY FABRICATE 1/2\"/>

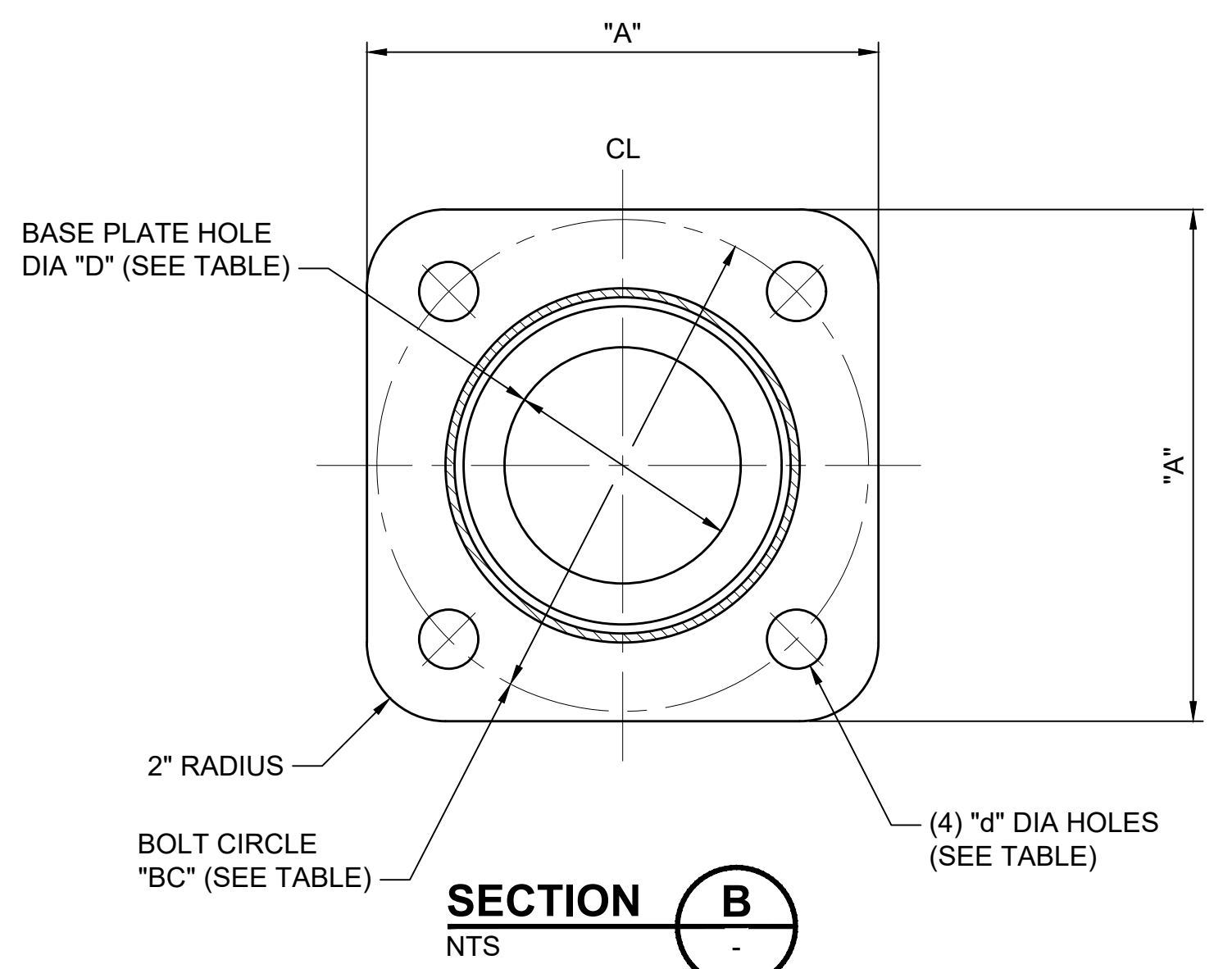
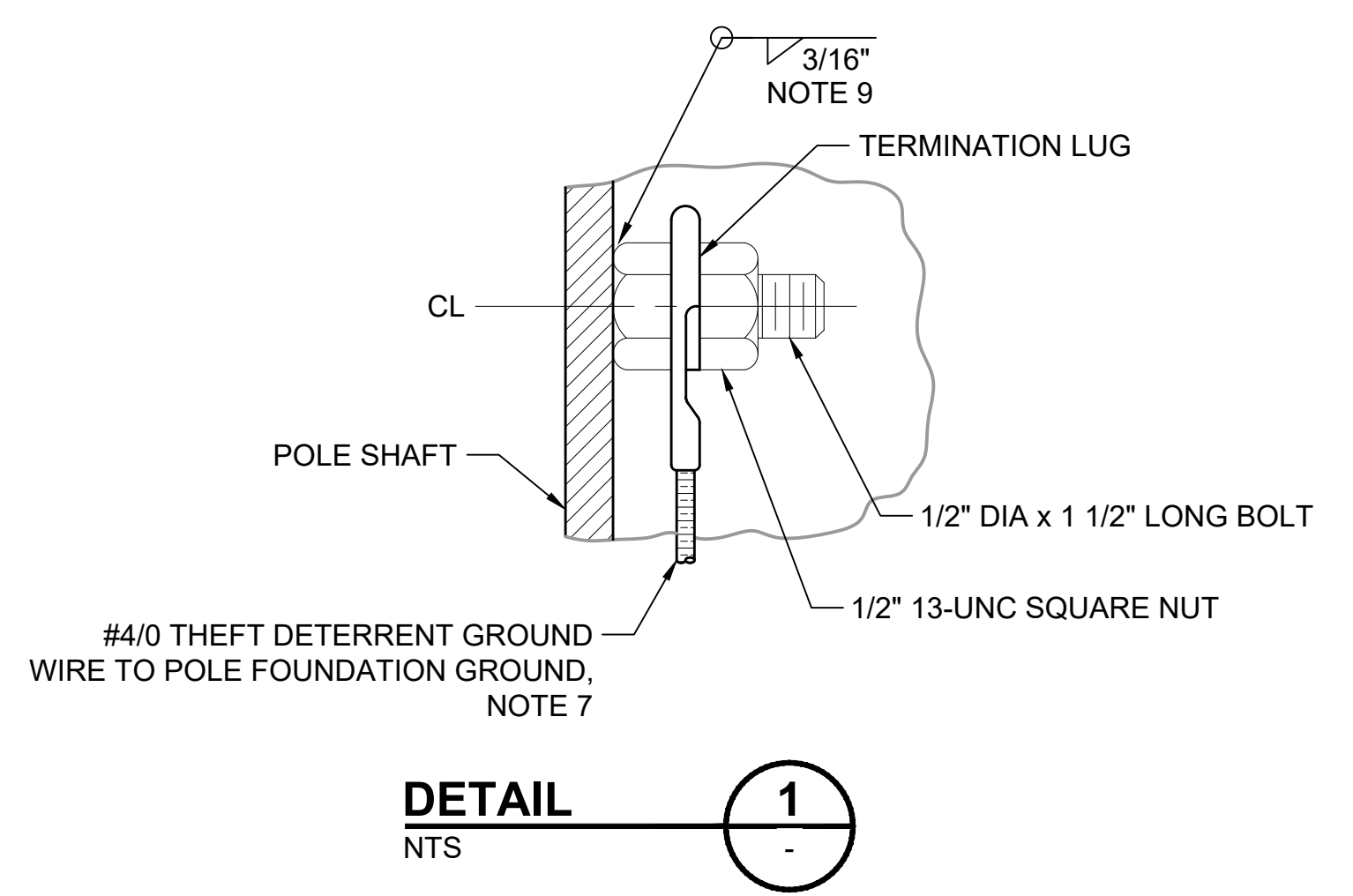
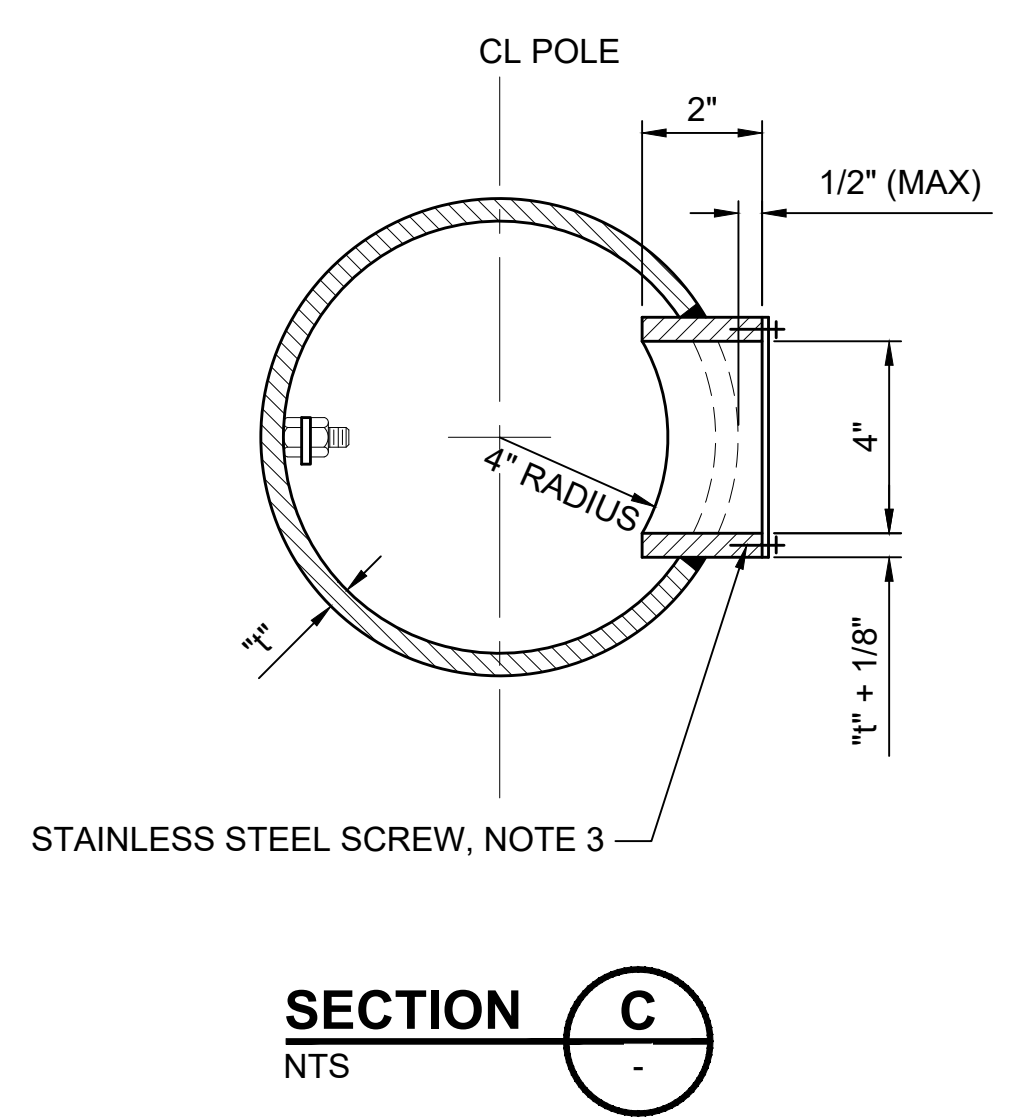
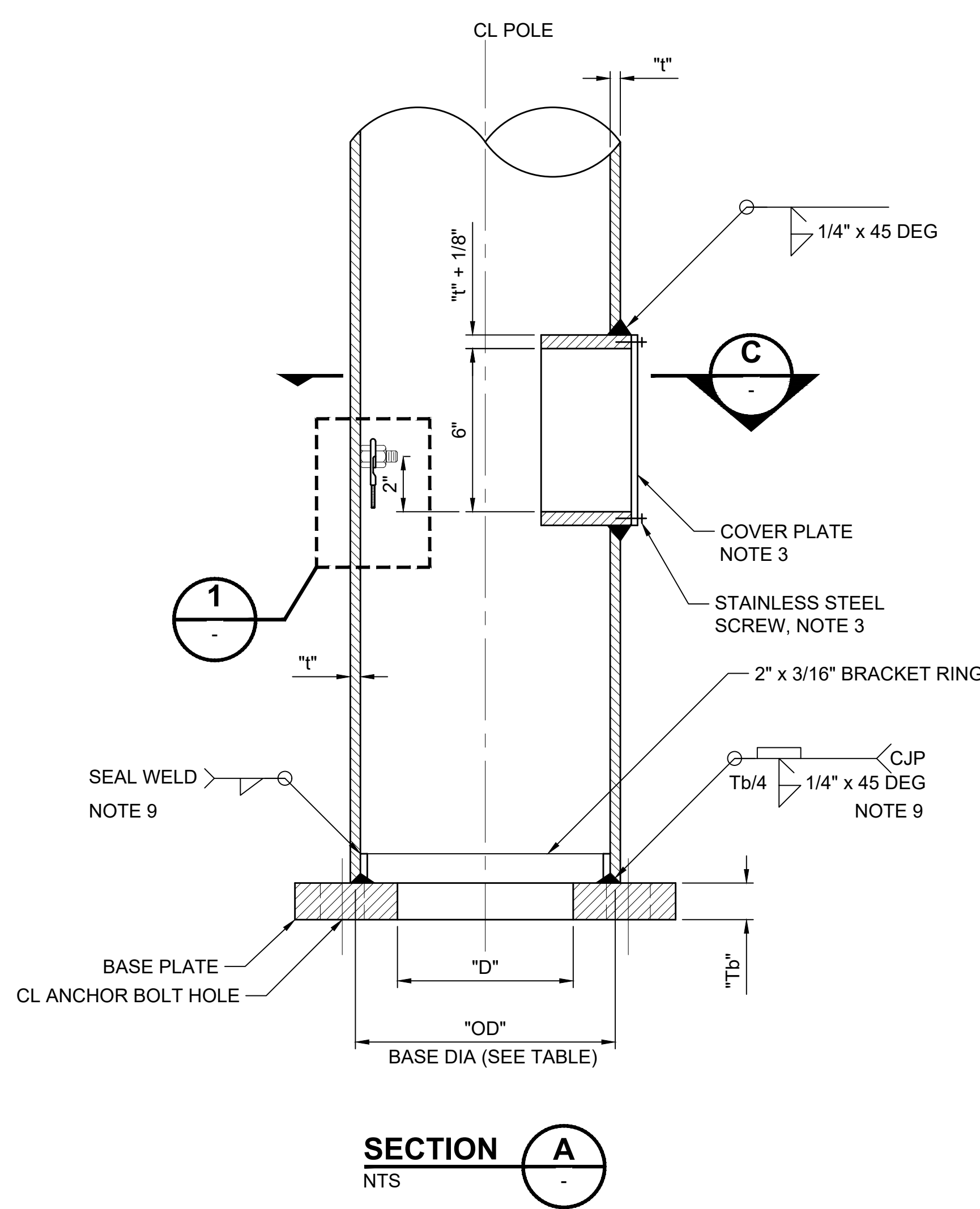
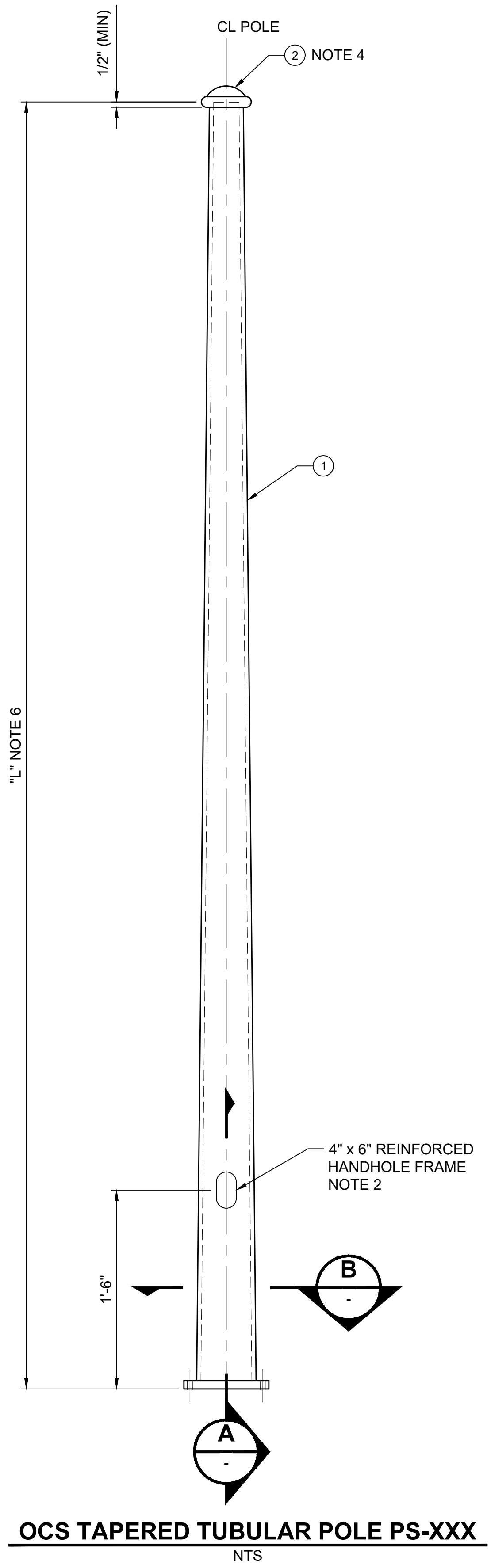
| POLE TYPE | MAX WORKING MOMENT (K-FT) | SHAFT SIZE | BASE PLATE | | | | WELDING DIMENSIONS | | | FOUNDATION TYPE |
|-----------|---------------------------|------------|------------|-----|--------|--------|--------------------|-------|---------|-----------------|
| | | | A | BC | Tb | d | W1 | W2 | K | |
| | | | (INCHES) | | | | | | | |
| WF-10XXF | 44.7 | W10X39 | 18" | 18" | 1 3/4" | 2" | 7/16" | 1/4" | 1 1/16" | FD-10W |
| WF-21XXF | 73.2 | W12X53 | 20" | 20" | 2" | 2 3/8" | 1/2" | 5/16" | 1 3/16" | FD-21W |
| WF-22XXF | 113.7 | W12X72 | 24" | 24" | 2 1/2" | 3" | 9/16" | 3/8" | 1 3/8" | FD-22W |
| WF-32XXF | 153.2 | W12X96 | 24" | 24" | 2 1/2" | 3" | 3/4" | 1/2" | 1 3/8" | FD-32W |

"XX" - DENOTES LENGTH OF POLE IN INTEGRAL FEET IN POLE ASSEMBLY REFERENCE.

| BILL OF MATERIALS | | | | | | | |
|----------------------|----------|----------|----------|-------|-------------------------|----------|-------------------|
| QUANTITIES EACH TYPE | | | | UNITS | DESCRIPTION | ITEM NO. | PART NO. /REMARKS |
| WF-10XXF | WF-21XXF | WF-22XXF | WF-32XXF | | | | |
| 1 | 1 | 1 | 1 | EACH | POLE SHAFT & BASE PLATE | 1 | |
| AS REQD | AS REQD | AS REQD | AS REQD | LF | 4" GRS CONDUIT | 2 | |
| AS REQD | AS REQD | AS REQD | AS REQD | EACH | PIPE STRAP COMPLETE | 3 | |
| 2 | 2 | 2 | 2 | EACH | PIPE COUPLING | 4 | |
| AS REQD | AS REQD | AS REQD | AS REQD | EACH | CONDUIT CAP | 5 | |

| | | | | | |
|--------------|--------|---------------|------------|--------------|------------|
| DESIGNED BY: | | SCALE: | NTS | DRAWING No.: | STD-JOD301 |
| DRAWN BY: | | FILENAME: | STD-JOD301 | | |
| CHECKED BY: | | CONTRACT No.: | RTA/LR | FACILITY ID: | |
| APPROVED BY: | | DATE: | 2/2024 | SHEET No.: | REV: |
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| POLE TYPE | MAX WORKING MOMENT (K-FT) | OD t d A D BC Tb | | | | | | | FOUNDATION TYPE |
|-----------|---------------------------|------------------|---------|--------|-----|-----|-----|--------|-----------------|
| | | (INCHES) | | | | | | | |
| PS-1XX | 40.0 | 10" | 0.2391" | 1 3/4" | 16" | 8" | 16" | 1 1/2" | FD-1T |
| PS-2XX | 75.0 | 12" | 0.3125" | 2" | 18" | 10" | 18" | 1 3/4" | FD-2T |
| PS-3XX | 103.0 | 14" | 0.3125" | 2 1/4" | 20" | 11" | 20" | 2 1/4" | FD-3T |
| PS-4XX | 166.5 | 15" | 0.4500" | 2 3/4" | 22" | 12" | 22" | 2 1/2" | FD-4T |
| PS-5XX | 243.5 | 18" | 0.4500" | 2 3/4" | 24" | 12" | 24" | 2 1/2" | FD-5T |

XX' - DENOTES LENGTH OF POLE IN INTEGRAL FEET IN POLE ASSEMBLY REFERENCE.

| BILL OF MATERIALS | | | | | | | | | |
|----------------------|--------|--------|--------|--------|-------|----------------------------------|----------|------------------|--|
| QUANTITIES EACH TYPE | | | | | UNITS | DESCRIPTION | ITEM NO. | PART NO./REMARKS | |
| PS-1XX | PS-2XX | PS-3XX | PS-4XX | PS-5XX | | | | | |
| 1 | 1 | 1 | 1 | 1 | EACH | POLE SHAFT, BASE PLATE, HANDHOLE | 1 | | |
| 1 | 1 | 1 | 1 | 1 | EACH | POLE CAP & SCREWS | 2 | | |

- GENERAL NOTES:**
- POLES SHALL HAVE IDENTIFICATION MARKED FOR THEIR TYPE REFERENCE WITH A 3/8" LETTER PUNCH ON TOP OF THE BASE PLATE.
 - HANDHOLE SHALL BE ORIENTED ON SIDE OF POLE OPPOSITE APPROACHING VEHICLE UNDER NORMAL OPERATION OF ITS REFERENCE TRACK.
 - HANDHOLE SHALL BE COVERED WITH A MINIMUM OF 7 GAGE PLATE BY FASTENING OF (4) 3/16" DIA STAINLESS STEEL SET SCREWS.
 - POLE CAP SHALL BE REMOVABLE, DOMED, GALVANIZED STEEL CAP FASTENED TO POLE USING 3/16" DIA STAINLESS STEEL SET SCREWS (3 REQD). FOR PAINTED POLES, POLE CAP SHALL BE PAINTED TO MATCH.
 - ANY ADDITIONAL HOLES REQUIRED BY CONTRACTOR ARE DETAILED BY CONTRACTOR, AND MADE BY POLE MANUFACTURER PRIOR TO GALVANIZING. NO FIELD HOLE DRILLING ALLOWED.
 - POLE LENGTHS TO BE SHOWN ON OCS LAYOUT PLAN AND SCHEDULE DRAWINGS.
 - CONNECT GROUNDING STUD TO FOUNDATION GROUND ROD OR GROUND CONNECTION TO REBAR MAT OF STRUCTURE OR SLAB TO PROVIDE AN EFFECTIVE GROUND-FAULT CURRENT PATH ACCORDING TO NEC ARTICLE 100. SEE SPECIFICATIONS FOR THEFT DETERRENT GROUNDING.
 - POLE TAPER TO BE 0.14 INCH DIAMETER REDUCTION PER FOOT OF POLE LENGTH.
 - MANUFACTURER TO VERIFY ALL WELD SIZES AND LENGTHS.

OCS TAPERED TUBULAR POLE PS-XXX
NTS

SECTION B
NTS

SECTION C
NTS

DETAIL 1
NTS

| No. | DATE | DSN | CHK | APP | REVISION |
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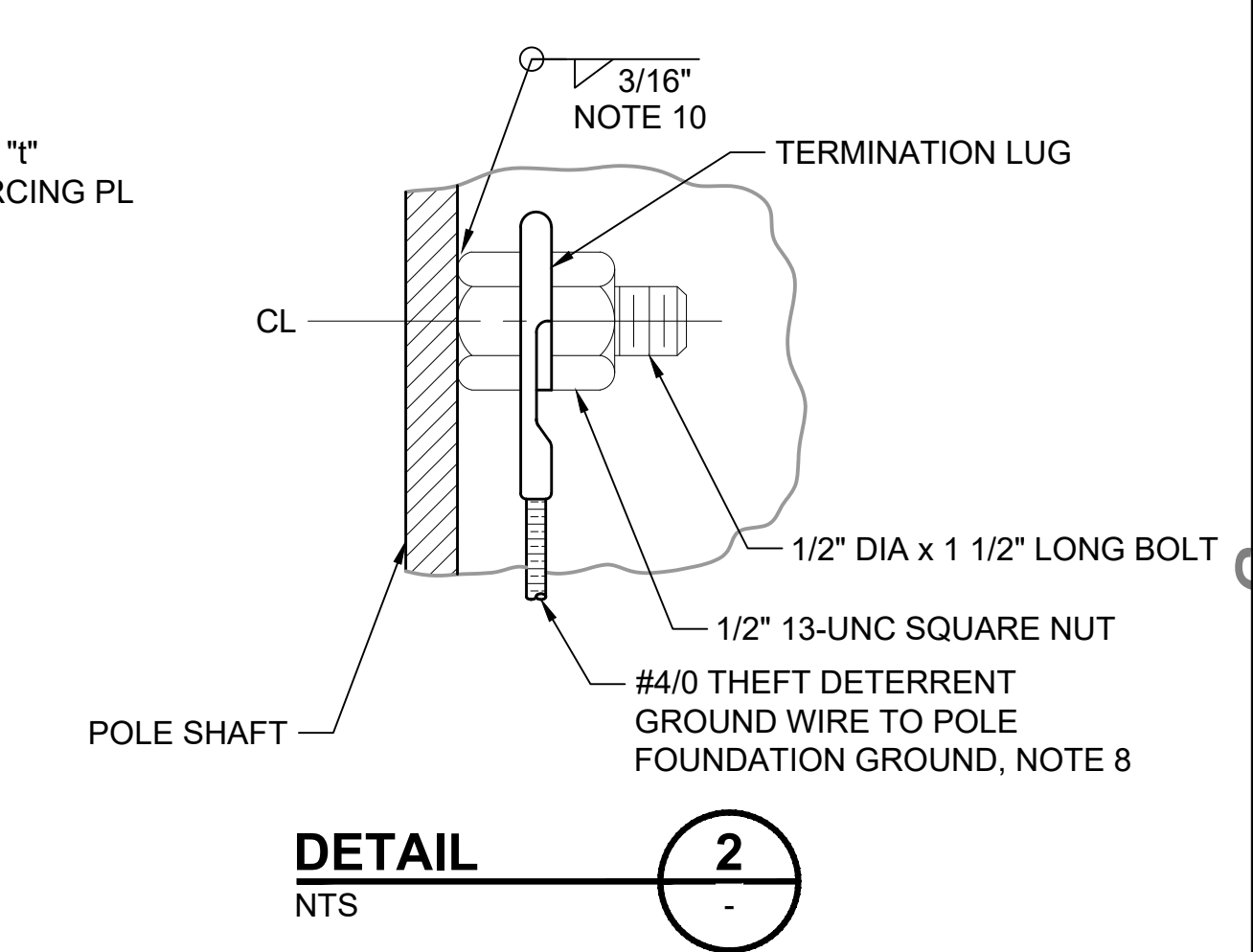
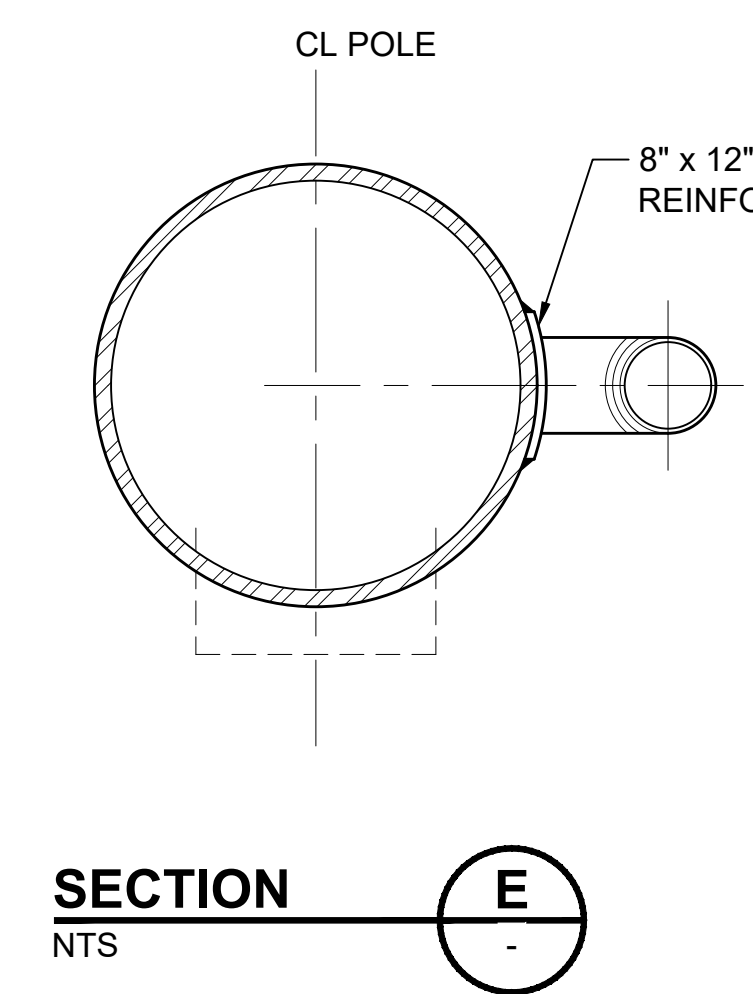
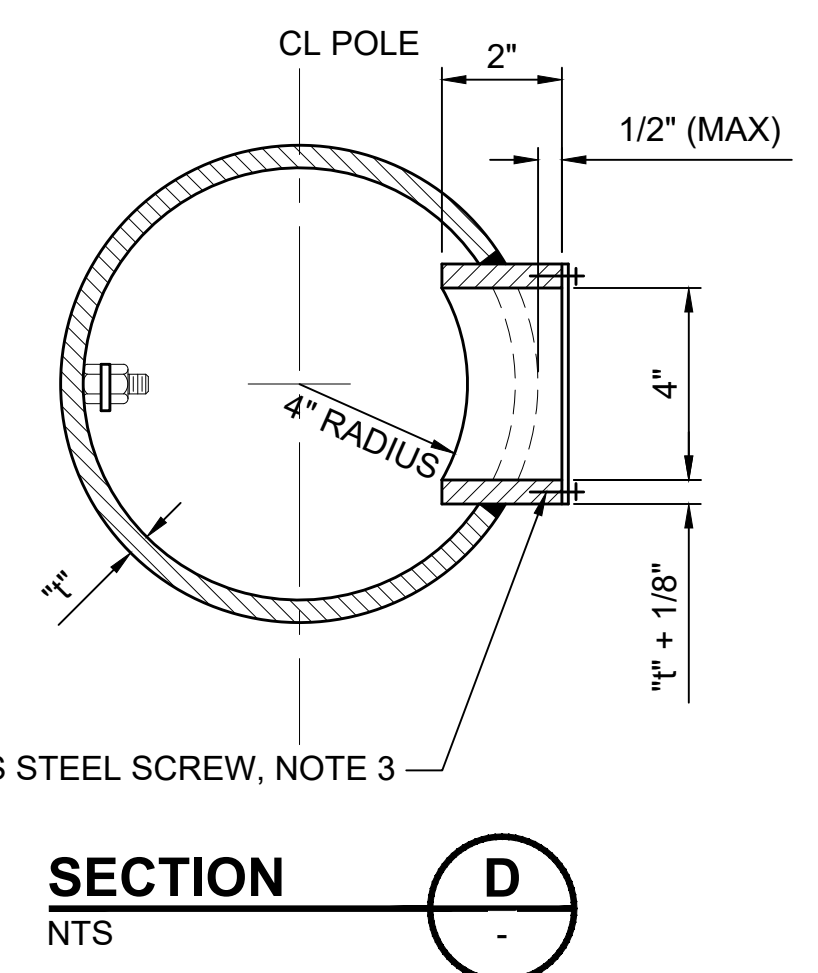
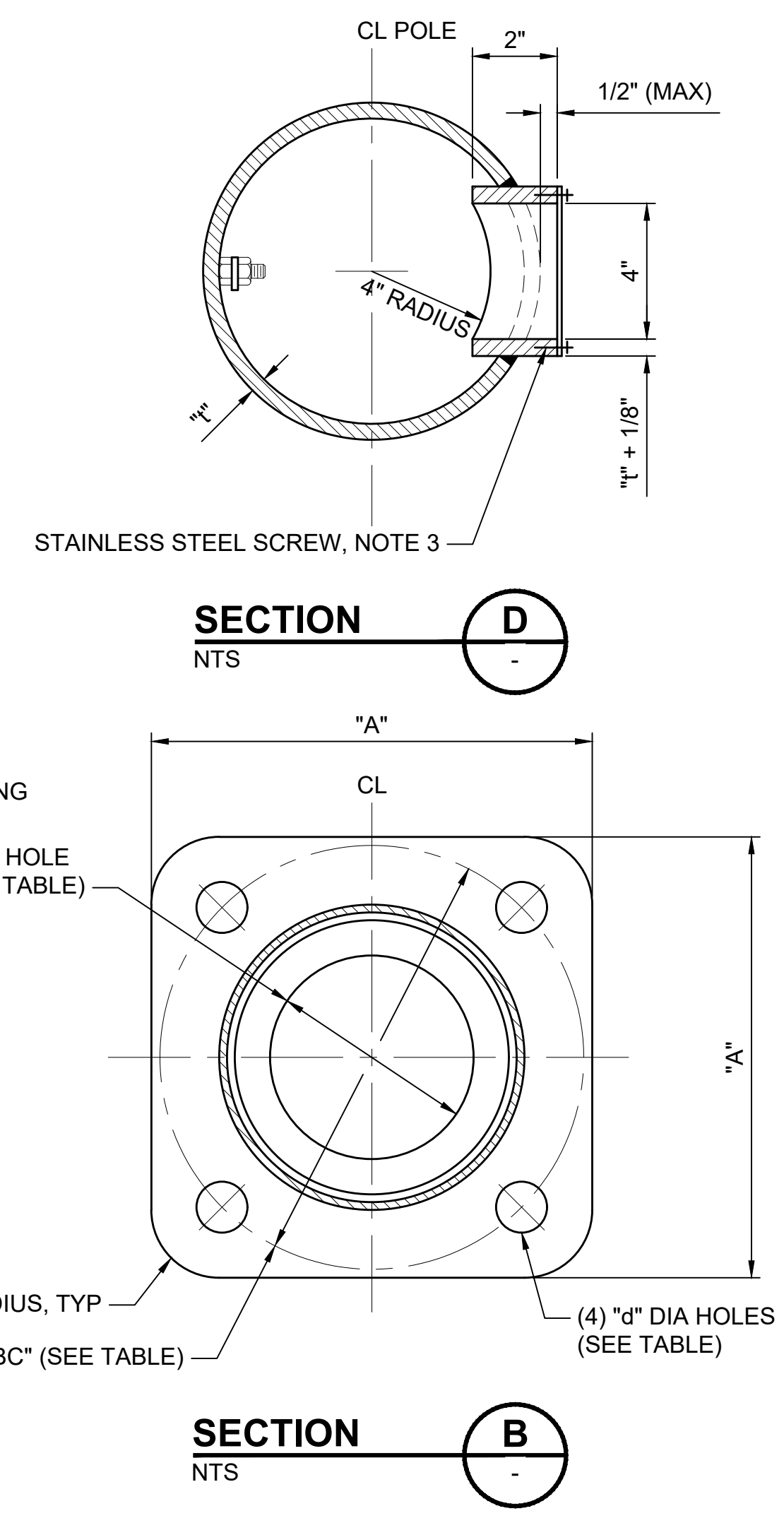
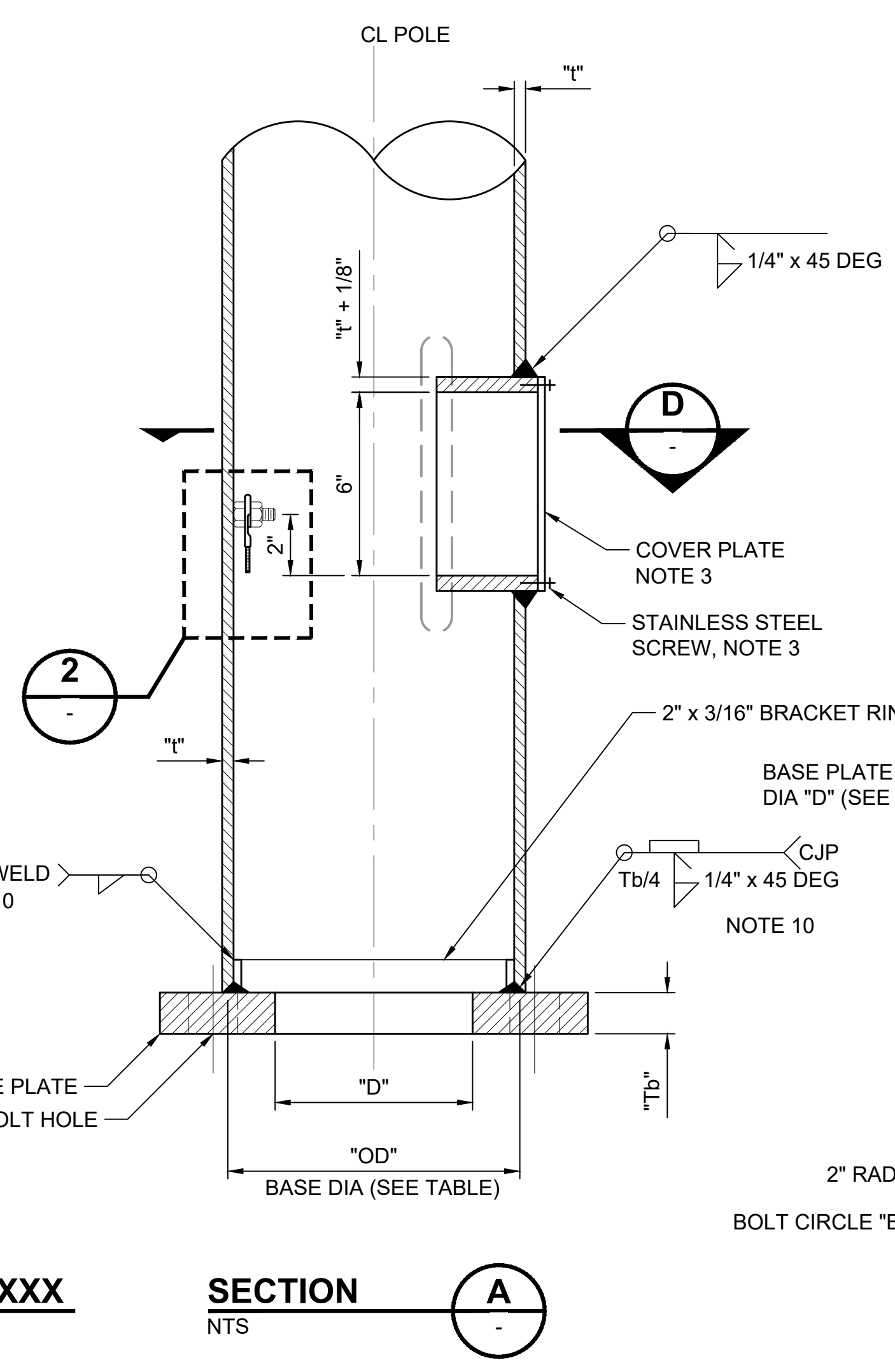
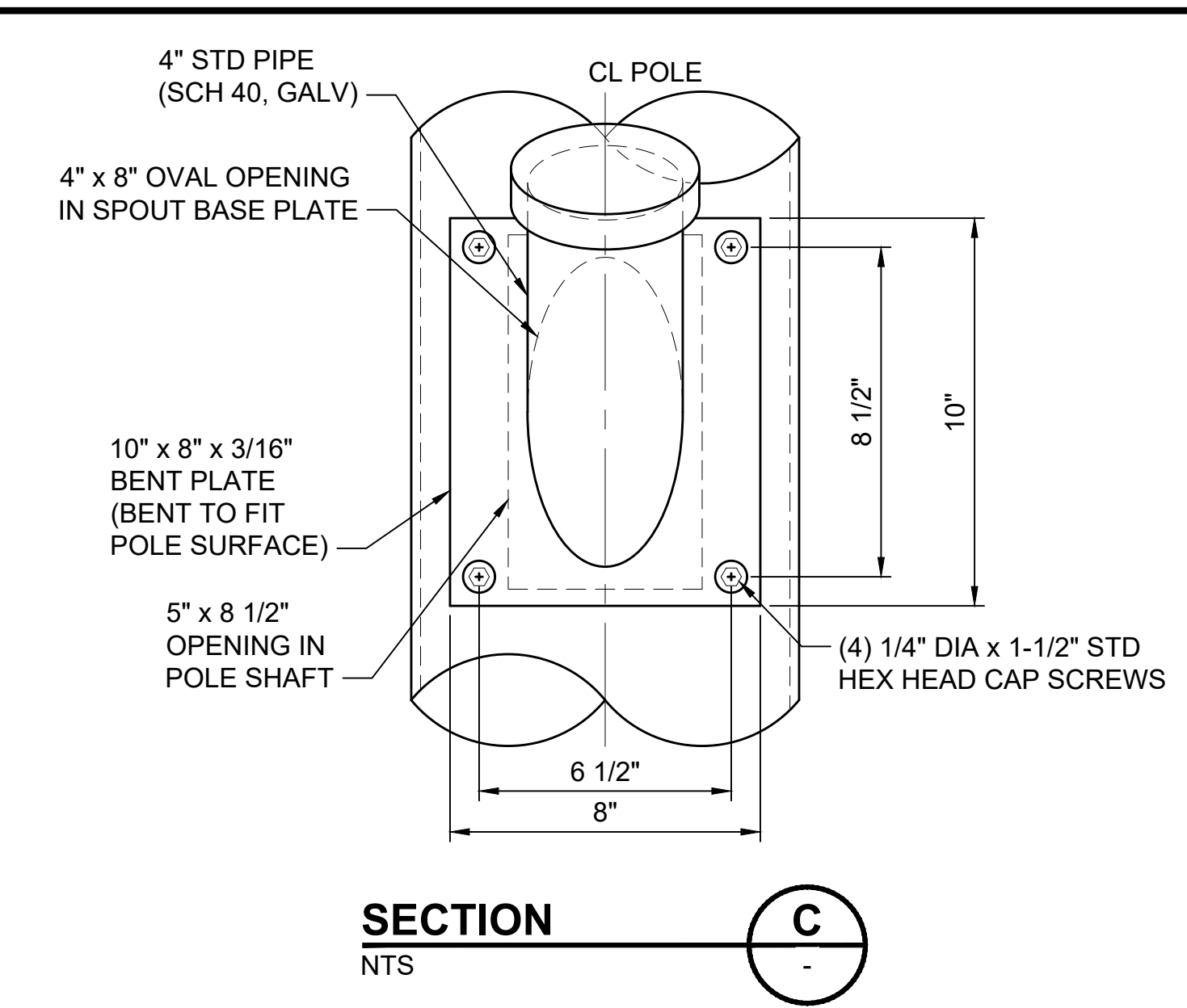
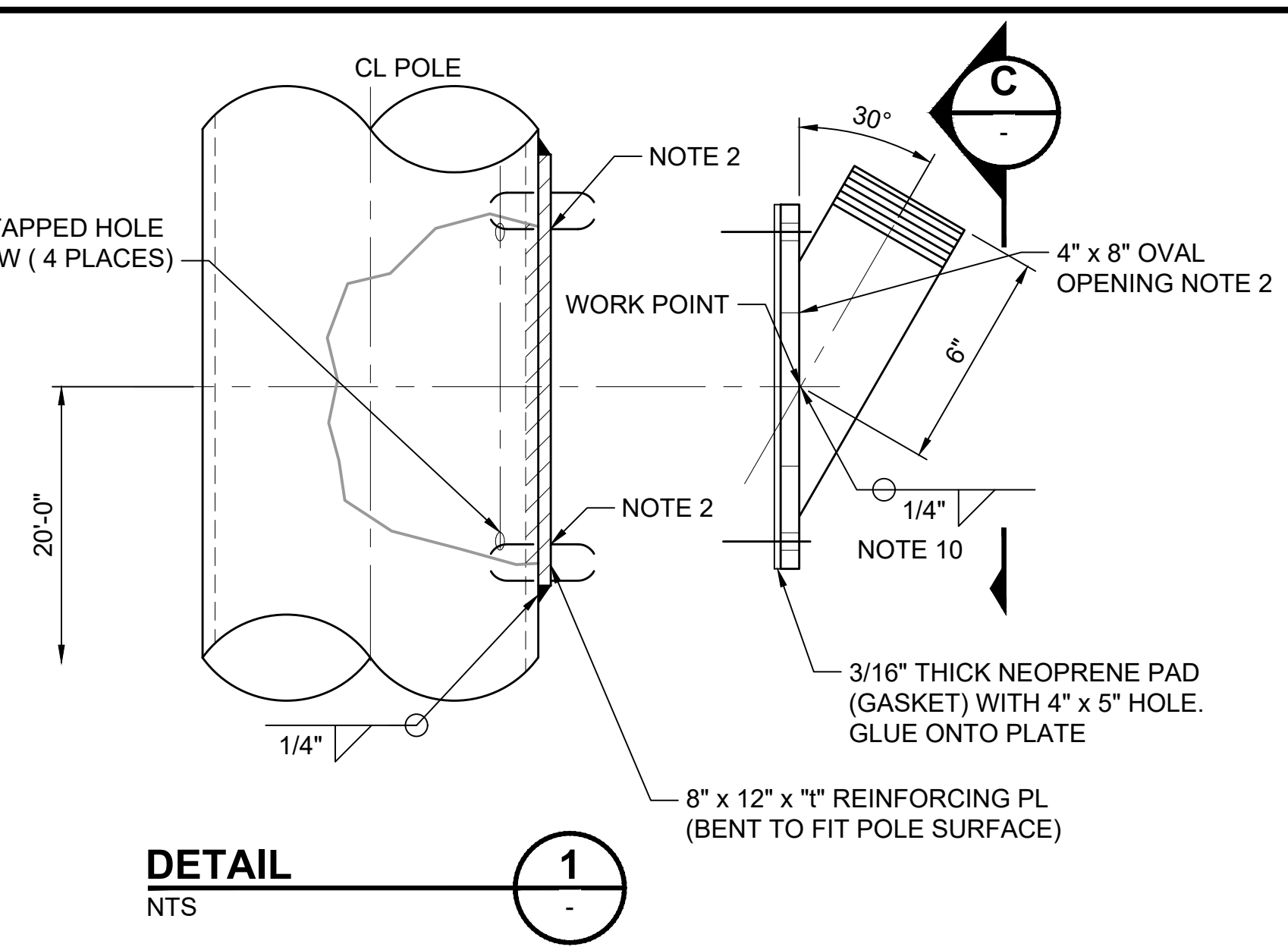
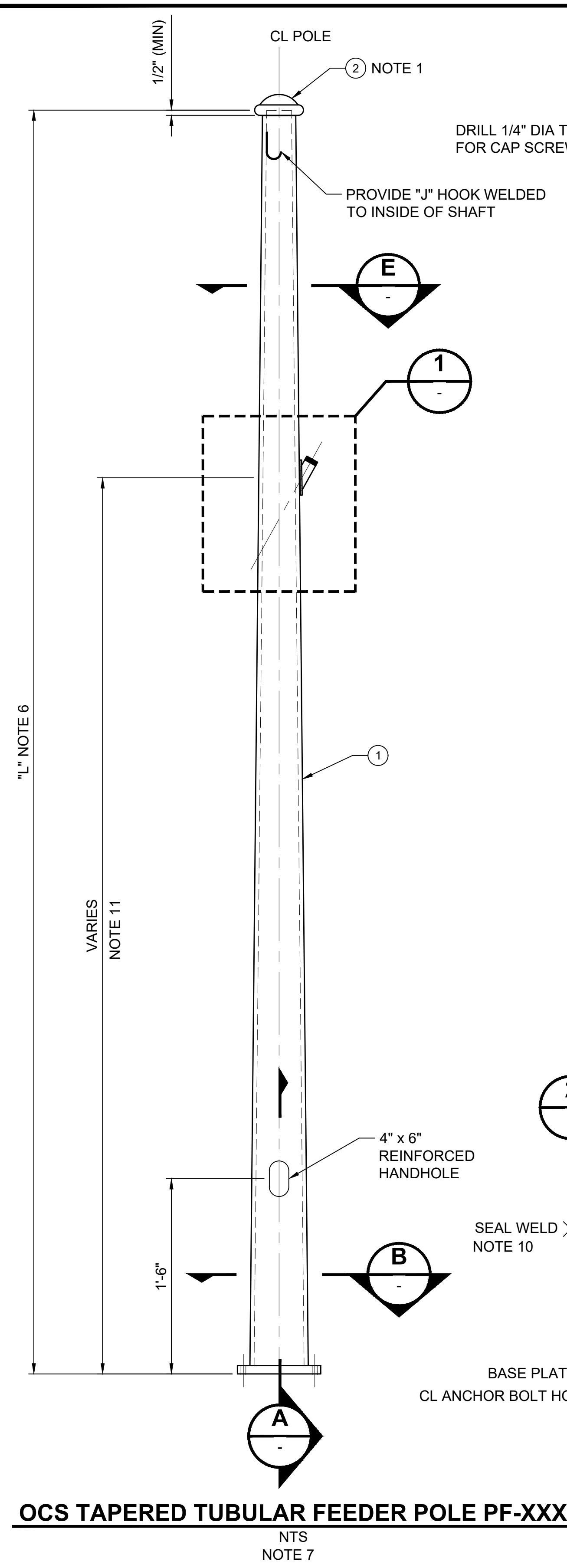
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CONTRACT No.: RTA/LR
DATE: 2/2024

SOUND TRANSIT STANDARD DRAWINGS SYSTEMS
OVERHEAD CATENARY SYSTEM
TAPERED TUBULAR POLE ASSEMBLIES
PF-XXX

DRAWING No.: **STD-JOD302**
FACILITY ID:
SHEET No.: REV: 1

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GENERAL NOTES:

- POLE CAP SHALL BE REMOVABLE DOMED, GALVANIZED STEEL CAP FASTENED TO POLE USING 3/16" DIA STAINLESS STEEL SET SCREWS (3 REQ'D) FOR PAINTED POLES, POLE CAP SHALL BE PAINTED TO MATCH.
- ROUND-OFF THE INSIDE EDGES TO PROTECT CABLE INSULATION DURING FEEDER CABLE INSTALLATION.
- HANDHOLE SHALL BE COVERED BY A MINIMUM OF 7 GAGE THICK PLATE AND FASTENED BY (4) 3/16" DIA STAINLESS STEEL SET SCREWS.
- POLE SHALL HAVE IDENTIFICATION MARKED FOR THEIR TYPE REFERENCE WITH A 3/8" LETTER PUNCH ON TOP OF THE BASE PLATE.
- HANDHOLE SHALL BE ORIENTED ON SIDE OF POLE OPPOSITE APPROACHING VEHICLE UNDER NORMAL OPERATION OF ITS REFERENCE TRACK.
- POLE LENGTHS TO BE SHOWN ON OCS LAYOUT PLAN AND SCHEDULE DRAWINGS.
- ANY ADDITIONAL HOLES REQUIRED BY CONTRACTOR ARE DETAILED BY CONTRACTOR, AND MADE BY POLE MANUFACTURER PRIOR TO GALVANIZING. NO FIELD HOLE DRILLING ALLOWED
- CONNECT GROUNDING STUD TO FOUNDATION GROUND ROD OR GROUND CONNECTION TO REBAR MAT OF STRUCTURE OR SLAB TO PROVIDE AN EFFECTIVE GROUND-FAULT CURRENT PATH ACCORDING TO NEC ARTICLE 100. SEE SPECIFICATIONS FOR THEFT DETERRENT GROUNDING.
- POLE TAPER TO BE 0.14 INCH DIAMETER REDUCTION PER FOOT OF POLE LENGTH.
- MANUFACTURER TO VERIFY ALL WELD SIZES AND LENGTHS.
- CONTRACTOR TO COORDINATE FEEDER SPOUT HEIGHT BASED ON MATERIAL SELECTION AND INFORMATION FROM OCS LAYOUT PLANS AND SCHEDULES.

| POLE TYPE | MAX WORKING MOMENT (K-FT) | POLE ASSEMBLY | | | | | | | FOUNDATION TYPE | REMARKS |
|-----------|---------------------------|---------------|---------|--------|-----|-----|-----|--------|-----------------|--------------|
| | | OD | t | d | A | D | BC | Tb | | |
| PF-1XX | 40.0 | 10" | 0.2391" | 1 3/4" | 16" | 8" | 16" | 1 1/2" | FD-1FT | SINGLE SPOUT |
| PF-2XX | 75.0 | 12" | 0.3125" | 2" | 18" | 10" | 18" | 1 3/4" | FD-2FT | SINGLE SPOUT |
| PF-3XX | 103.0 | 14" | 0.3125" | 2 1/4" | 20" | 11" | 20" | 2 1/4" | FD-3FT | SINGLE SPOUT |
| PF-4XX | 166.5 | 15" | 0.45" | 2 3/4" | 22" | 12" | 22" | 2 1/2" | FD-4FT | SINGLE SPOUT |
| PF-5XX | 243.5 | 18" | 0.45" | 2 3/4" | 24" | 12" | 24" | 2 1/2" | FD-5FT | SINGLE SPOUT |

'XX' - DENOTES LENGTH OF POLE IN INTEGRAL FEET IN POLE ASSEMBLY REFERENCE.

| QUANTITIES EACH TYPE | | | | | UNITS | DESCRIPTION | ITEM NO. | PART NO./REMARKS |
|----------------------|--------|--------|--------|--------|-------|------------------------------------|----------|------------------|
| PF-1XX | PF-2XX | PF-3XX | PF-4XX | PF-5XX | | | | |
| 1 | 1 | 1 | 1 | 1 | EACH | POLE SHAFT, BASE PLATE, SPOUT & HH | 1 | |
| 1 | 1 | 1 | 1 | 1 | EACH | POLE CAP & SCREWS | 2 | |
| 1 | 1 | 1 | 1 | 1 | EACH | CONDUIT CAP | 3 | |

OCS TAPERED TUBULAR FEEDER POLE PF-XXX

NTS NOTE 7

SECTION A

NTS

SECTION B

NTS

| No. | DATE | DSN | CHK | APP | REVISION |
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| 0 | 8/2019 | | | | REVISED SYSTEMS DIRECTIVE DRAWINGS |

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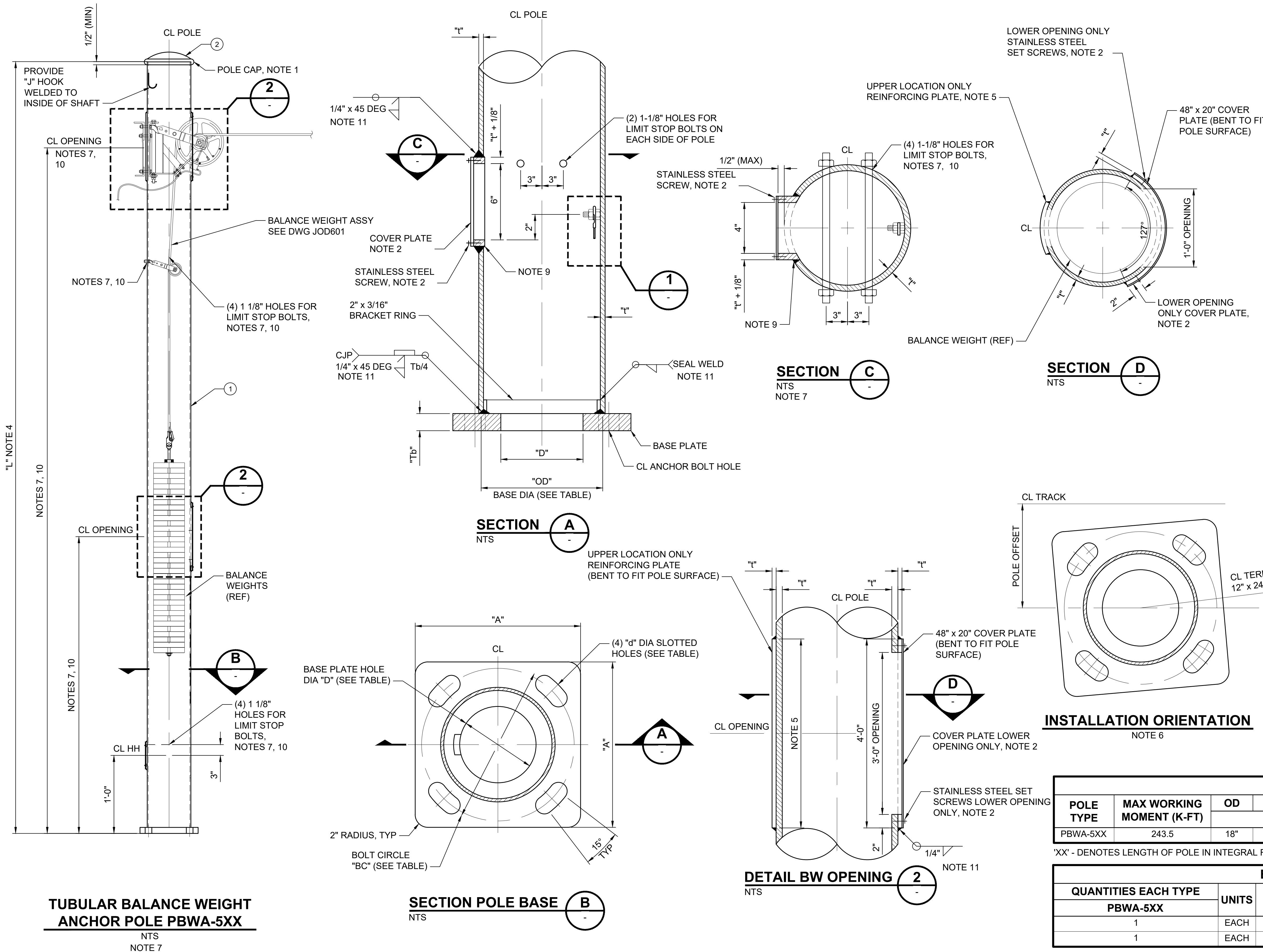
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CONTRACT No.: RTA/LR
DATE: 2/2024

SOUND TRANSIT STANDARD DRAWINGS SYSTEMS

OVERHEAD CATENARY SYSTEM
TAPERED TUBULAR FEEDER POLE ASSEMBLIES PF-XXX

| | |
|--------------|-------------------|
| DRAWING No.: | STD-JOD303 |
| FACILITY ID: | |
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- GENERAL NOTES:**
- POLE CAP SHALL BE REMOVABLE DOMED, GALVANIZED STEEL CAP FASTENED TO POLE USING 3/16" DIA STAINLESS STEEL SET SCREWS (3 REQUIRED). FOR PAINTED POLES, POLE CAP SHALL BE PAINTED TO MATCH.
 - HANDHOLE SHALL BE COVERED BY A MINIMUM OF 7 GAGE THICK PLATE AND FASTENED BY (4) 3/16" DIA STAINLESS STEEL SET SCREWS.
 - POLE SHALL HAVE IDENTIFICATION MARKED FOR THEIR TYPE REFERENCE WITH A 3/8" LETTER PUNCH ON TOP OF THE BASE PLATE.
 - POLE LENGTHS TO BE SHOWN ON OCS LAYOUT PLAN AND SCHEDULE DRAWINGS.
 - CONTRACTOR TO SIZE PLATE SUCH THAT 1-1/2" MIN EDGE DISTANCE IS MAINTAINED FROM EQUIPMENT MOUNTING HOLES TO EDGE OF PLATE.
 - CONTRACTOR TO INSTALL POLE SUCH THAT 12"x24" OPENINGS ARE PERPENDICULAR TO TERMINATION SPAN.
 - ANY ADDITIONAL HOLES OR HANDHOLES REQUIRED BY CONTRACTOR ARE DETAILED BY CONTRACTOR, AND MADE BY POLE MANUFACTURER PRIOR TO GALVANIZING. NO FIELD HOLE DRILLING ALLOWED.
 - CONNECT GROUNDING STUD TO FOUNDATION GROUND ROD OR GROUND CONNECTION TO REBAR MAT OF STRUCTURE OR SLAB TO PROVIDE AN EFFECTIVE GROUND-FAULT CURRENT PATH ACCORDING TO NEC ARTICLE 100. SEE SPECIFICATIONS FOR THEFT DETERRENT GROUNDING.
 - PROVIDE HANDHOLE REINFORCEMENT FLUSH WITH INSIDE OF POLE. ENSURE HANDHOLE DOES NOT COMPROMISE POLE STRENGTH.
 - LOCATION OF HOLES TO BE DETERMINED BASED ON CONTRACTORS MATERIAL SELECTION AND FIELD VERIFIED TERMINATION HEIGHTS.
 - MANUFACTURER TO VERIFY ALL WELD SIZES AND LENGTHS.
 - TUBULAR POLES WITH INTERNAL BALANCE WEIGHTS ARE NON-PREFERRED COMPARED TO EXTERNAL BALANCE WEIGHTS. USE OF BW-2 INTERNAL BALANCE WEIGHT ASSEMBLIES SHOWN ON DWG JOD601 MUST BE APPROVED BY SOUND TRANSIT ON A SITE SPECIFIC BASIS.

| POLE ASSEMBLY | | | | | | | | | | |
|---------------|---------------------------|----------|-------|--------|-----|-----|-----|--------|-----------------|---------|
| POLE TYPE | MAX WORKING MOMENT (K-FT) | (INCHES) | | | | | | | FOUNDATION TYPE | REMARKS |
| | | OD | t | d | A | D | BC | Tb | | |
| PBWA-5XX | 243.5 | 18" | 0.45" | 2 3/4" | 26" | 12" | 24" | 2 1/2" | FD-5T | |

XX' - DENOTES LENGTH OF POLE IN INTEGRAL FEET IN POLE ASSEMBLY REFERENCE.

| BILL OF MATERIALS | | | | |
|----------------------|-------|----------------------------------|----------|------------------|
| QUANTITIES EACH TYPE | UNITS | DESCRIPTION | ITEM NO. | PART NO./REMARKS |
| 1 | EACH | POLE SHAFT, BASE PLATE, HANDHOLE | 1 | |
| 1 | EACH | POLE CAP & SCREWS | 2 | |

TUBULAR BALANCE WEIGHT ANCHOR POLE PBWA-5XX
NTS
NOTE 7

SECTION POLE BASE B
NTS

DETAIL BW OPENING 2
NTS

INSTALLATION ORIENTATION
NOTE 6

DETAIL 1
NTS

| No. | DATE | DSN | CHK | APP | REVISION |
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| 1 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |
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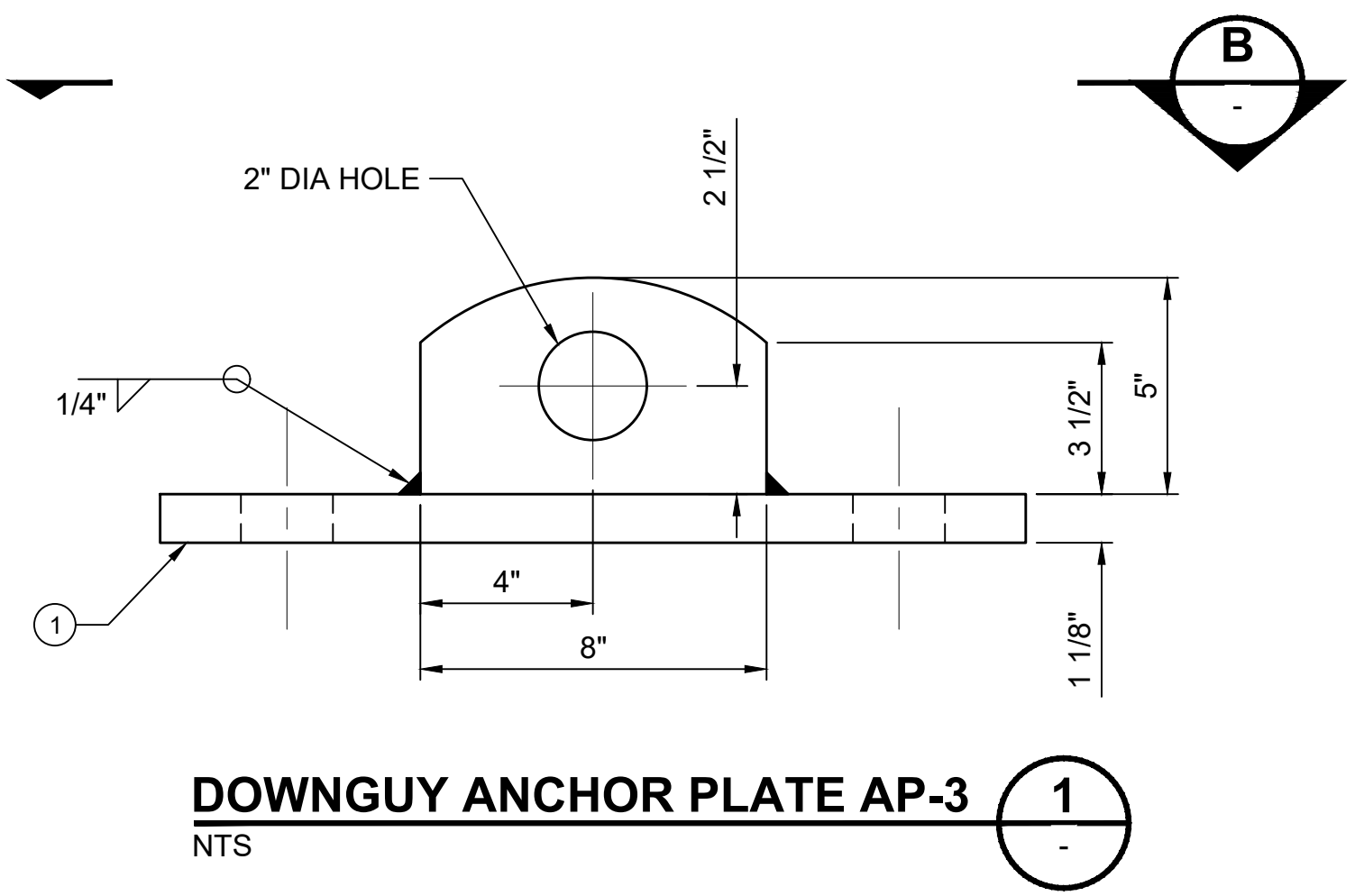
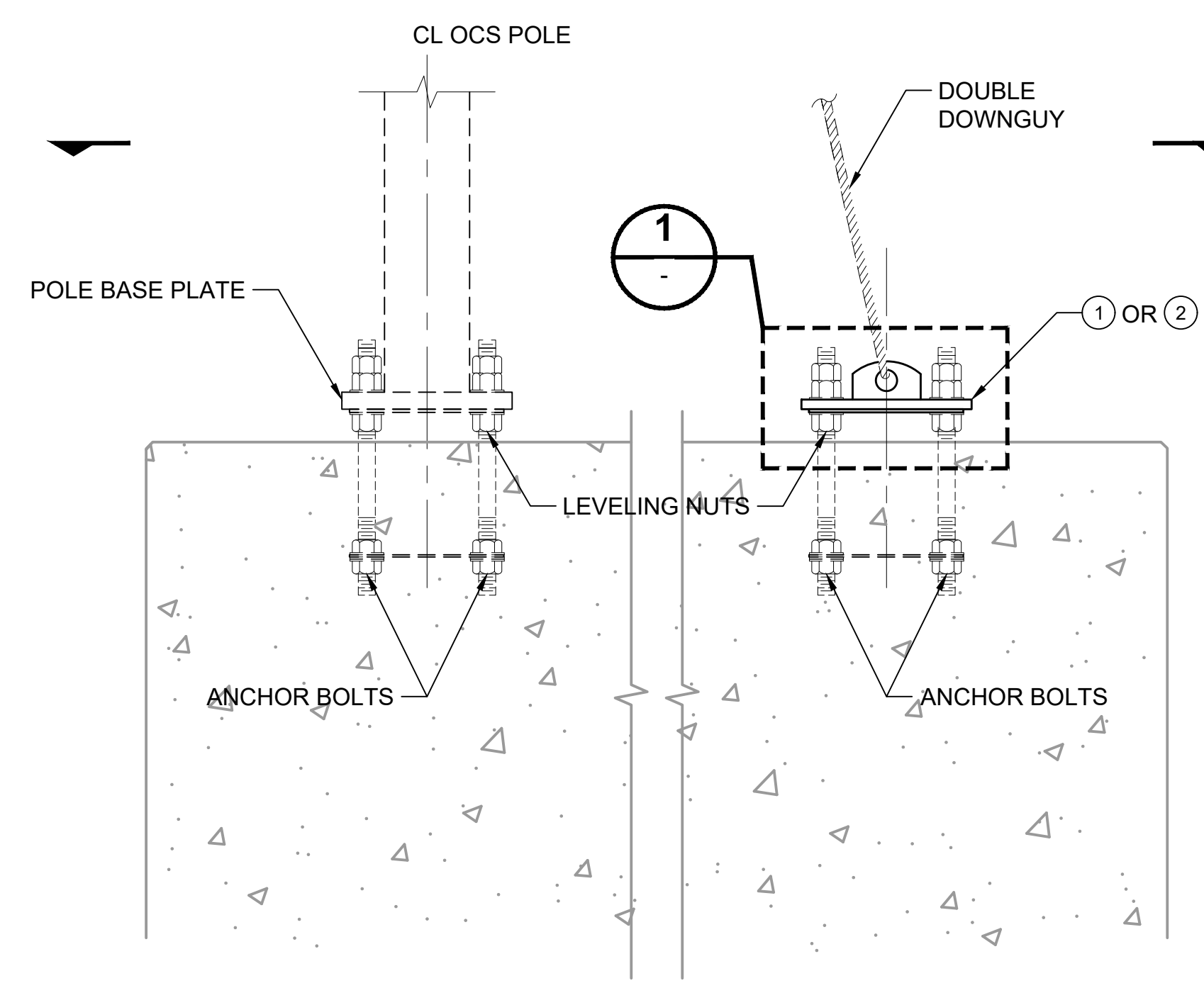
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CONTRACT No.: RTA/LR
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SOUND TRANSIT STANDARD DRAWINGS SYSTEMS
OVERHEAD CATENARY SYSTEM
TUBULAR BALANCE WEIGHT ANCHOR POLE ASSEMBLIES PBWA-5XX

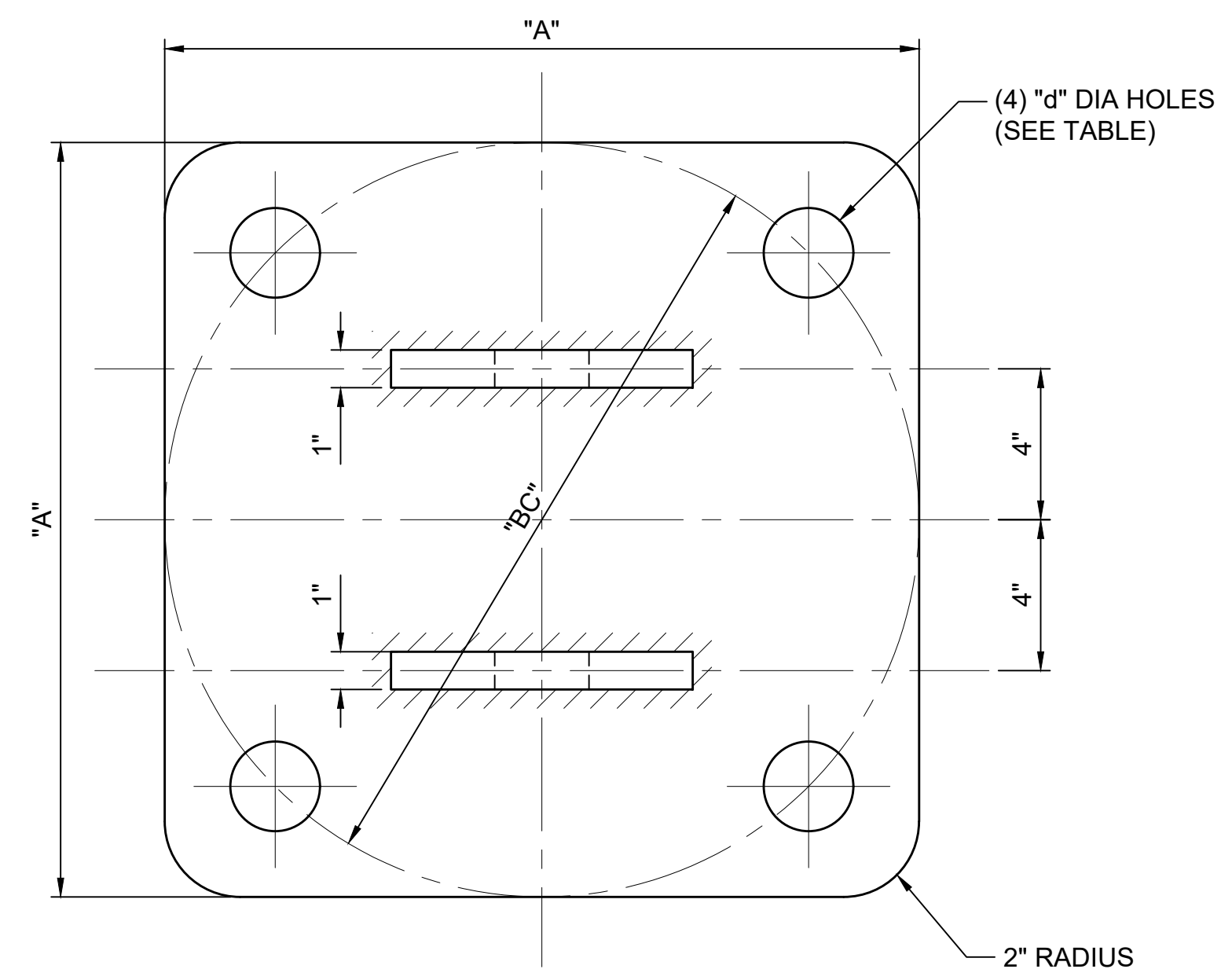
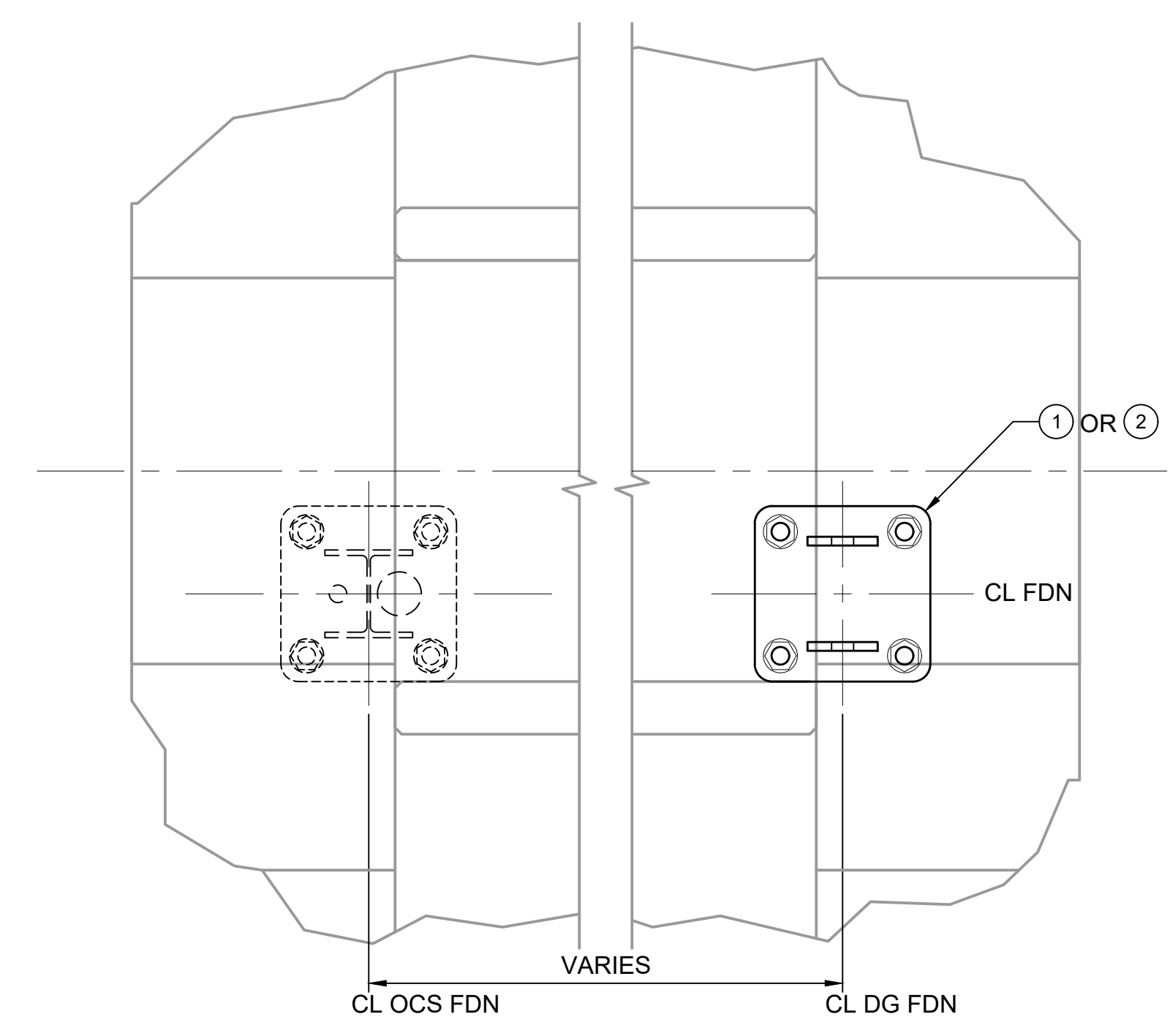
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FACILITY ID:
SHEET No.: REV: 1

GENERAL NOTES:
 1. MANUFACTURER TO VERIFY ALL WELD SIZES AND LENGTHS.



FOUR BOLT ANCHORAGE FOR DOWNGUY ANCHOR PLATE AP-3
 SCALE: NTS

DOWNGUY ANCHOR PLATE AP-3
 NTS



SECTION A
 NTS

SECTION B
 NTS

| DOWNGUY ANCHOR PLATE ASSEMBLY | | | | | | | | |
|-------------------------------|-------|------------|-----|--------|-----|-----------------|----------|------------------|
| TYPE | UNITS | BASE PLATE | | | | FOUNDATION TYPE | ITEM NO. | PART NO./REMARKS |
| | | A | BC | d | B | | | |
| AP-3 | EA | 20" | 20" | 2-3/8" | N/A | FD-3T | 1 | |

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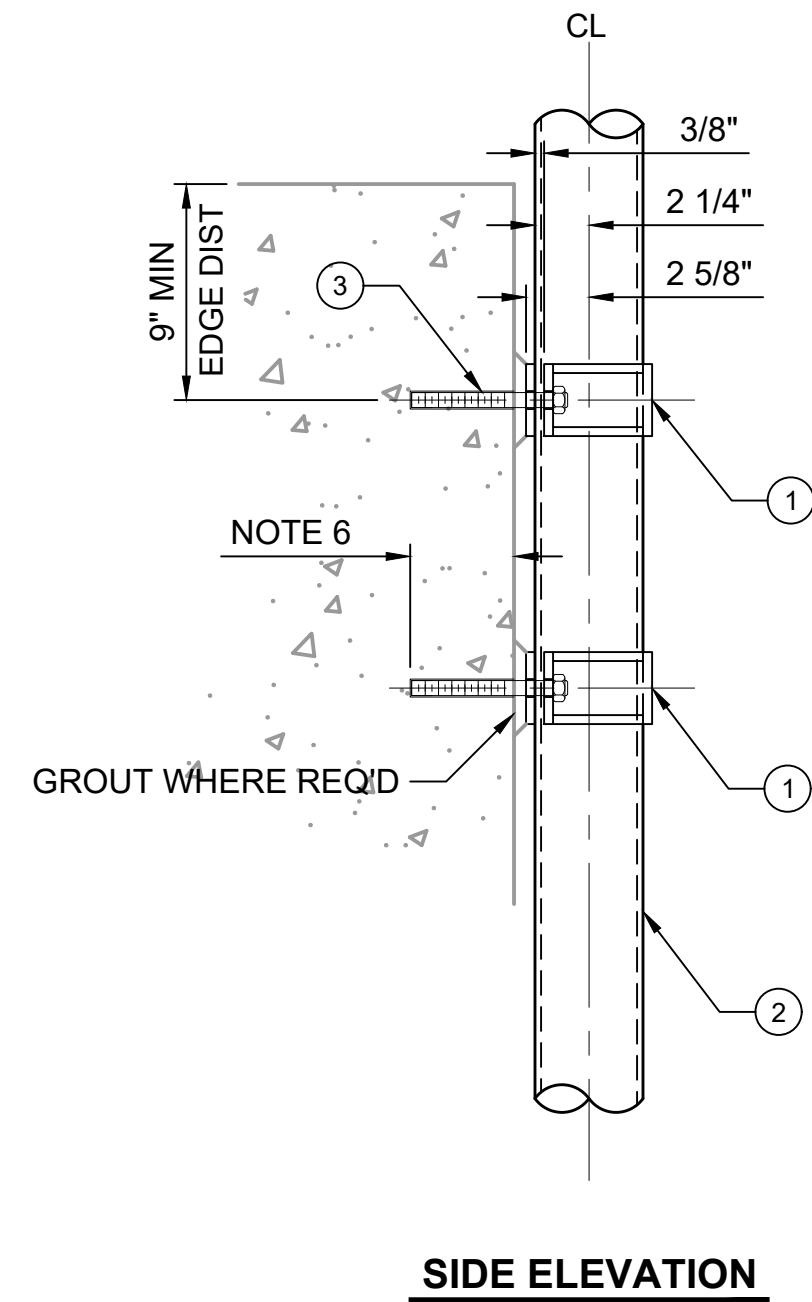
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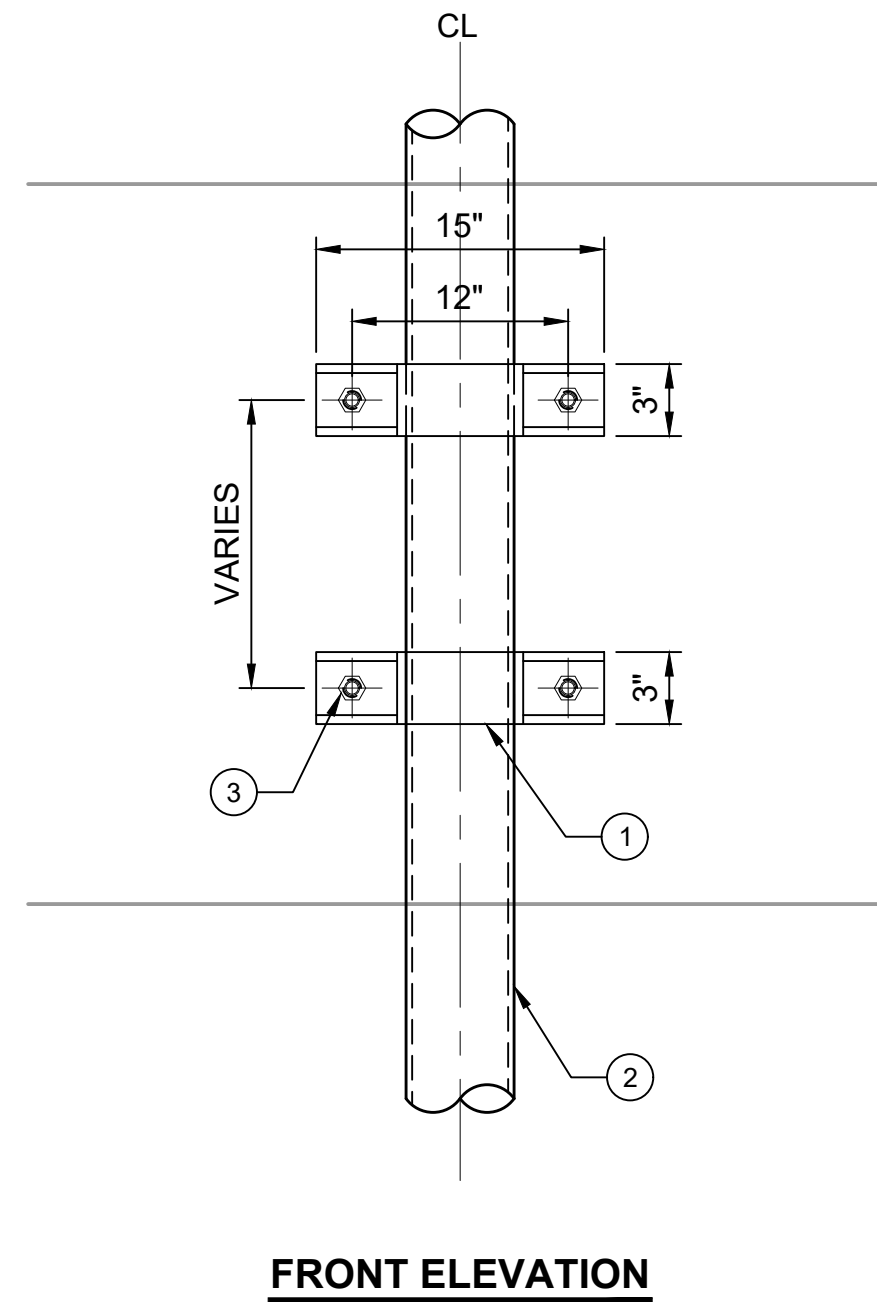
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 CONTRACT No.: RTA/LR
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SOUND TRANSIT
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 SYSTEMS
 OVERHEAD CATENARY SYSTEM
 DOWN GUY ANCHOR PLATE ASSEMBLIES
 AP-3 AND AP-4

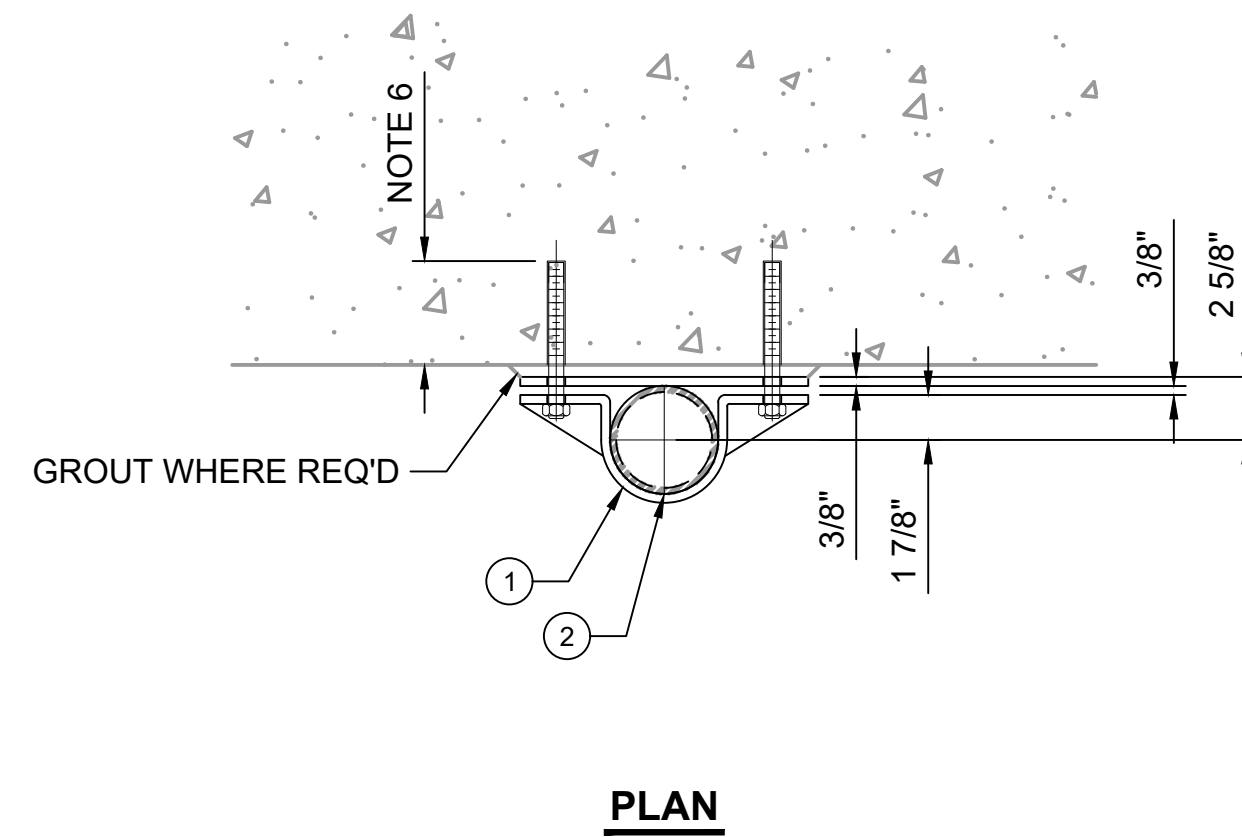
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SIDE ELEVATION



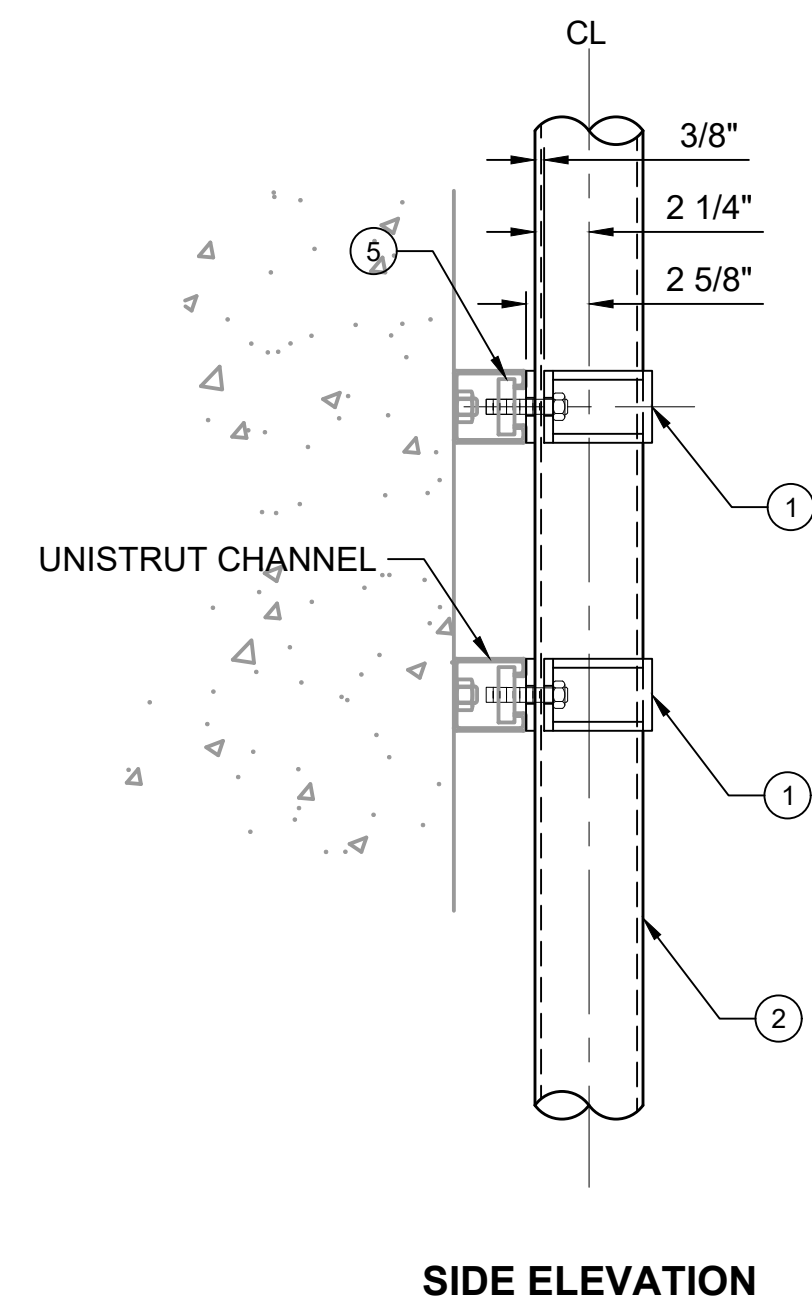
FRONT ELEVATION



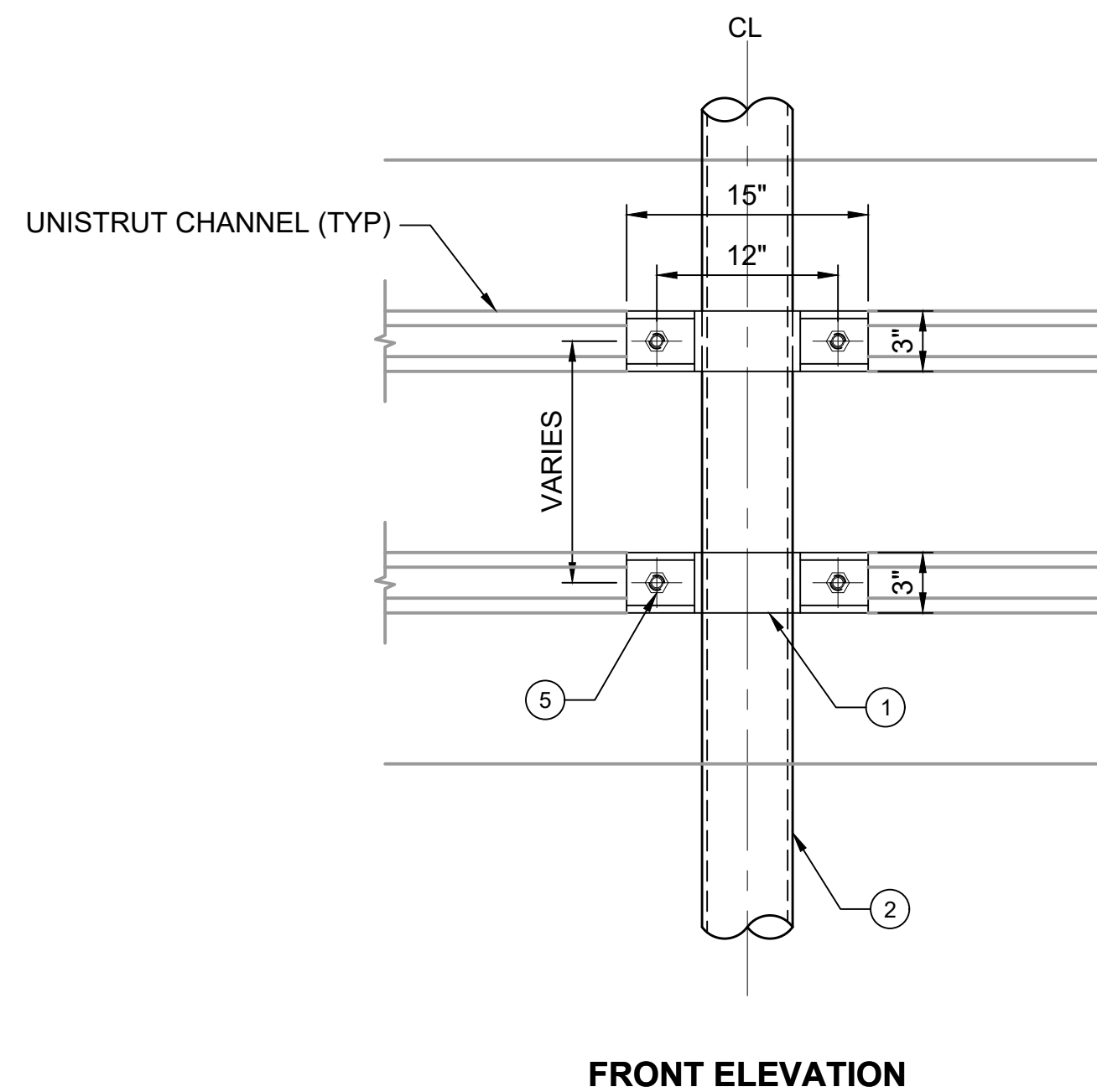
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OCS TUNNEL SUPPORT PIPE TSP-1

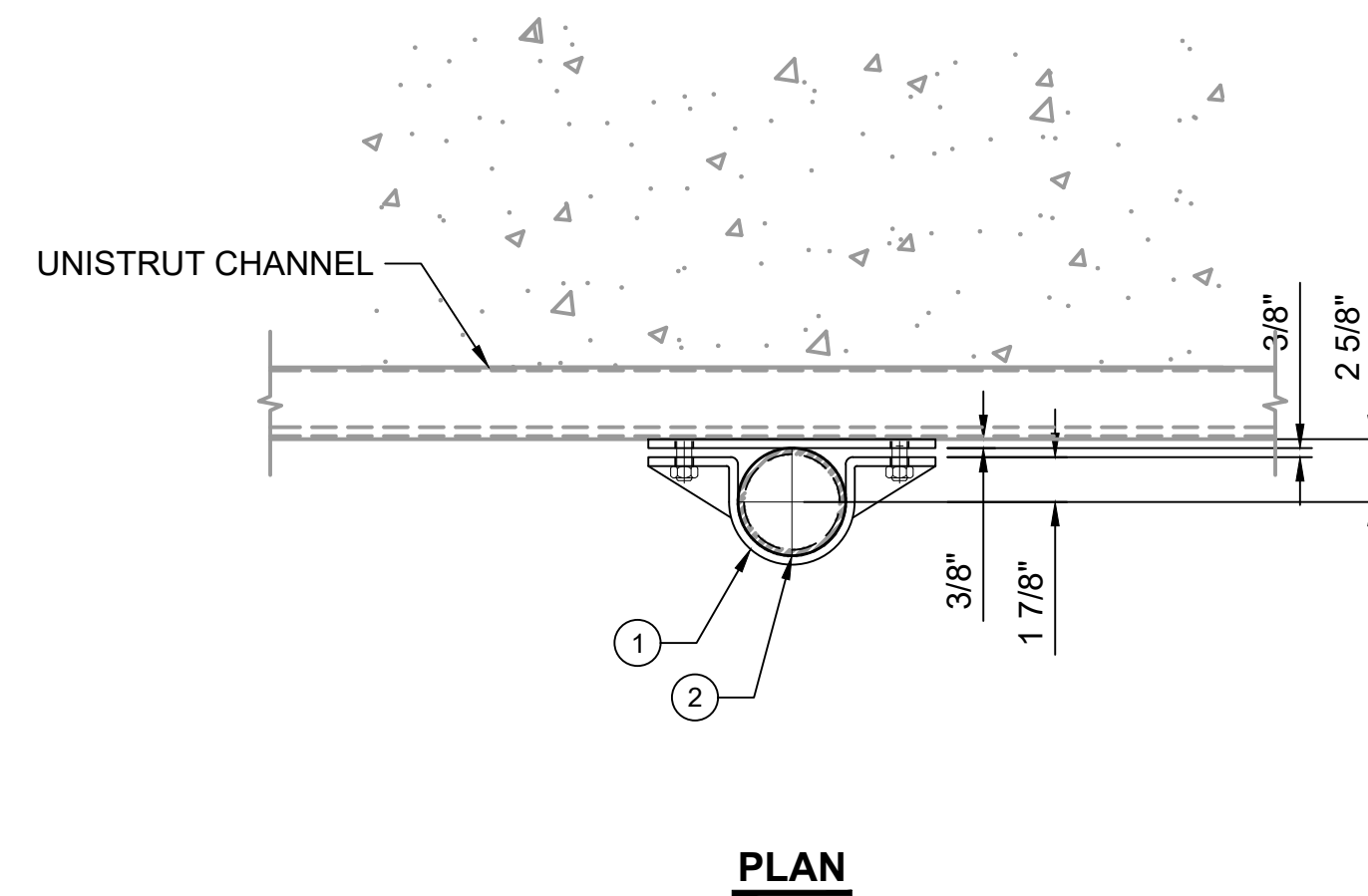
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SIDE ELEVATION



FRONT ELEVATION



PLAN

OCS TUNNEL SUPPORT PIPE TSP-2

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GENERAL NOTES:

1. CONTRACTOR TO DETERMINE COMPONENT DETAIL AND SAFE WORKING LOADS.
2. FOR SYMBOLS, LEGEND AND ABBREVIATIONS SEE DRAWINGS JZN001 AND JZN002.
3. CONTRACTOR TO VERIFY ALL QUANTITIES ON THE BILL OF MATERIALS.
4. THE CONTRACTOR IS RESPONSIBLE FOR THE DESIGN OF EACH ASSEMBLY AS A WHOLE AND EACH COMPONENT MEETING OR EXCEEDING THE LOADING TABLES WHERE PROVIDED. WHERE THE WORKING LOAD CAPABILITIES OF THE CONTRACTOR'S ASSEMBLIES EXCEED THOSE SHOWN IN THE LOADING TABLE, THE CONTRACTOR SHALL UPDATE THE TABLE IN THEIR SUBMISSION OF ASSEMBLY.
5. THE BILL OF MATERIALS ARE TYPICAL FOR THE ASSEMBLY STYLES SHOWN. THE CONTRACTOR SHALL ITEMIZE THE TABLE WITH DESCRIPTIONS AND PART NUMBERS OF COMPONENTS REQUIRED TO COMPLETE EACH ASSEMBLY.
6. CONCRETE ANCHORS SHALL BE SS PRESET UNDERCUT ANCHORS. EMBEDMENT LENGTH AS REQUIRED BY ANCHOR MANUFACTURER. THREAD PROJECTION LENGTH AS REQUIRED TO ATTACH SUPPORT ASSEMBLY.
7. CONTRACTOR SHALL VERIFY STEEL REINFORCEMENT LOCATIONS IN CONCRETE STRUCTURES PRIOR TO DRILLING AT OCS SUPPORT LOCATIONS. DETAILED REQUIREMENTS TO BE PROVIDED IN SPECIFICATIONS.


| BILL OF MATERIALS | | | | | |
|----------------------|-------|-------|----------------------|----------|------------------|
| QUANTITIES EACH TYPE | | UNITS | DESCRIPTION | ITEM NO. | PART NO./REMARKS |
| TSP-2 | TSP-1 | | | | |
| 2 | 2 | EA | 3/8" PIPE BRACKET | 1 | |
| 1 | 1 | EA | 4" SCH 80 PIPE | 2 | LENGTH AS REQ'D |
| - | 4 | EA | 5/8" CONCRETE ANCHOR | 3 | NOTE 6 |
| | | | NOT USED | 4 | |
| 4 | - | EA | CHANNEL NUT W/SPRING | 5 | |

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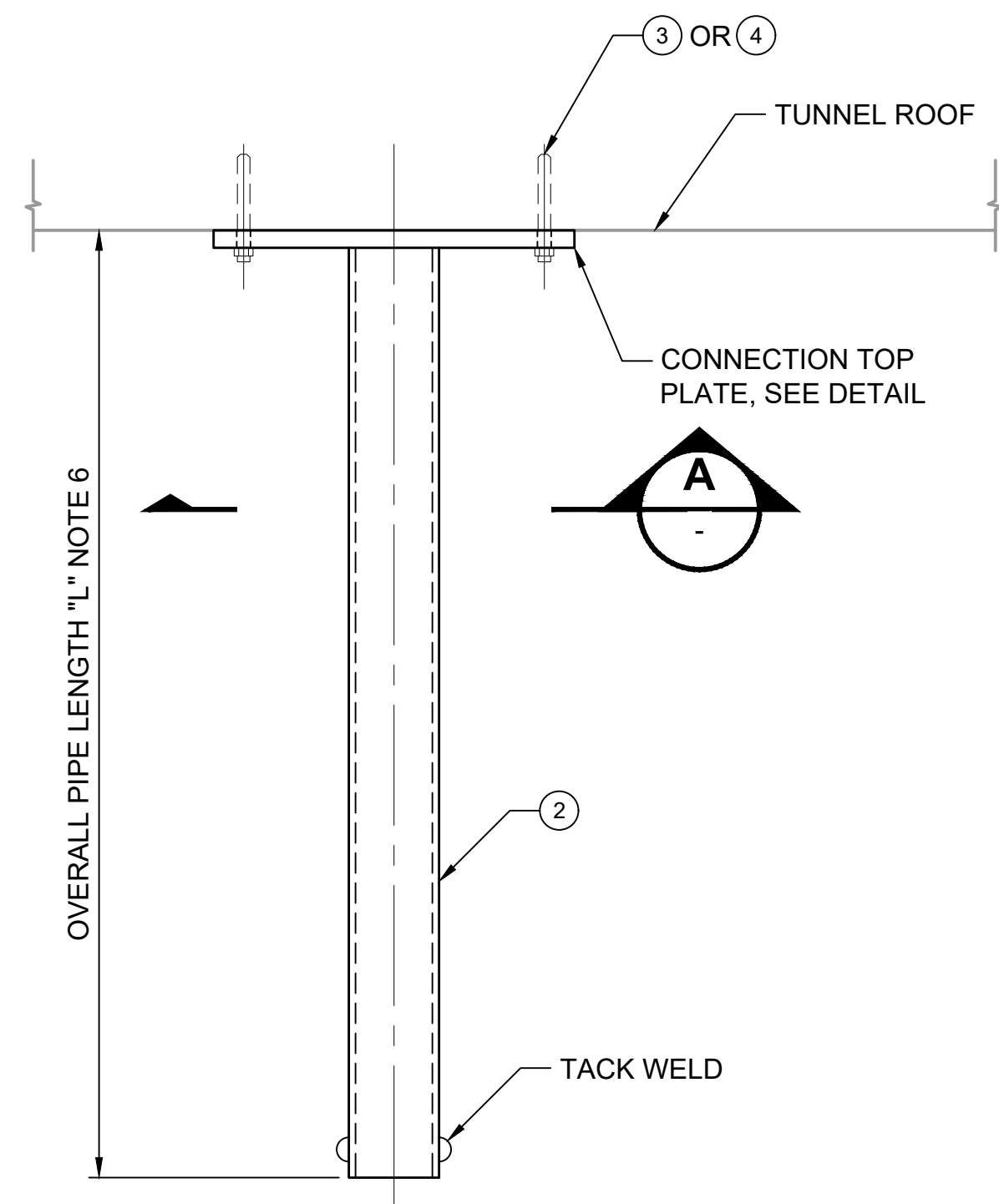
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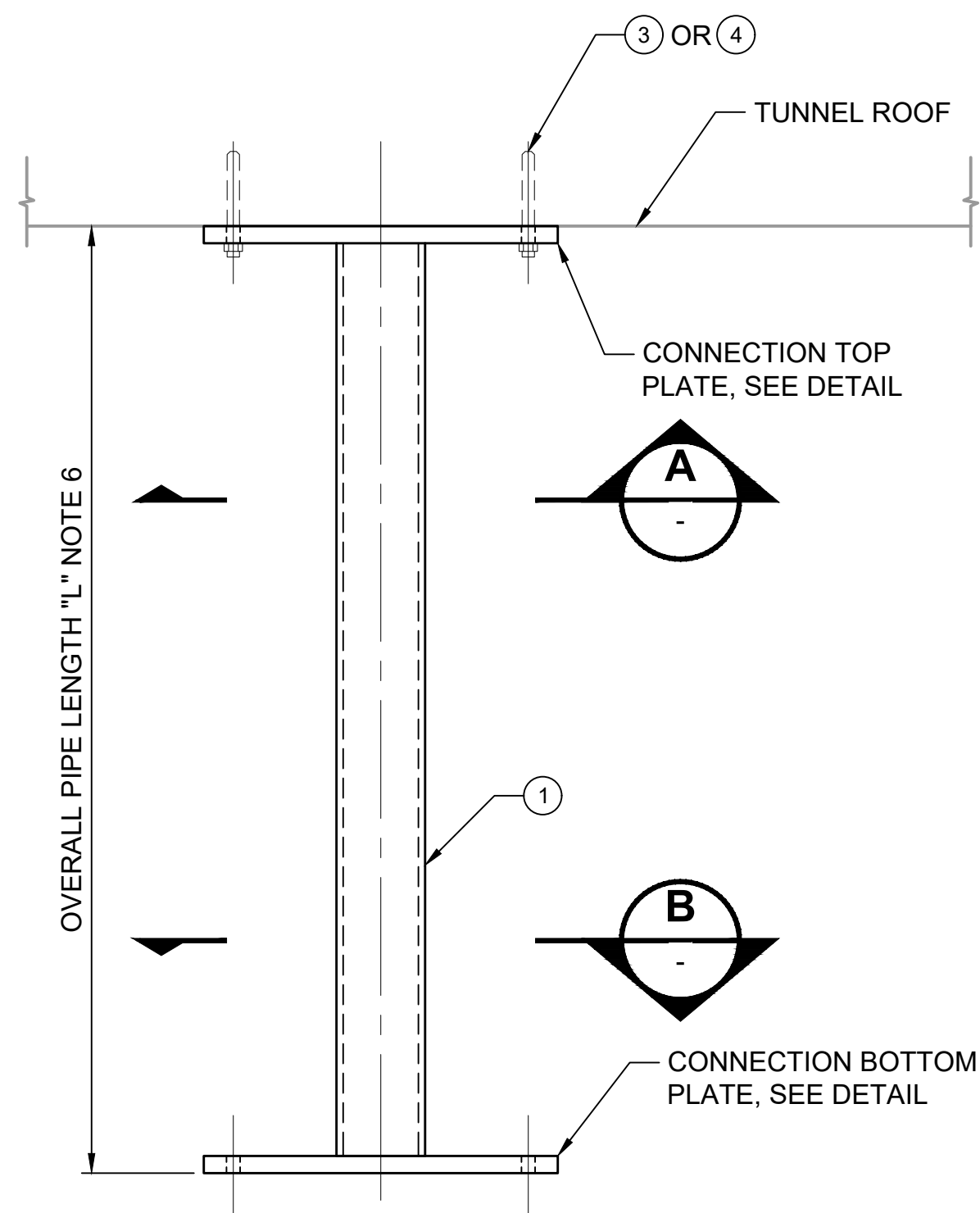
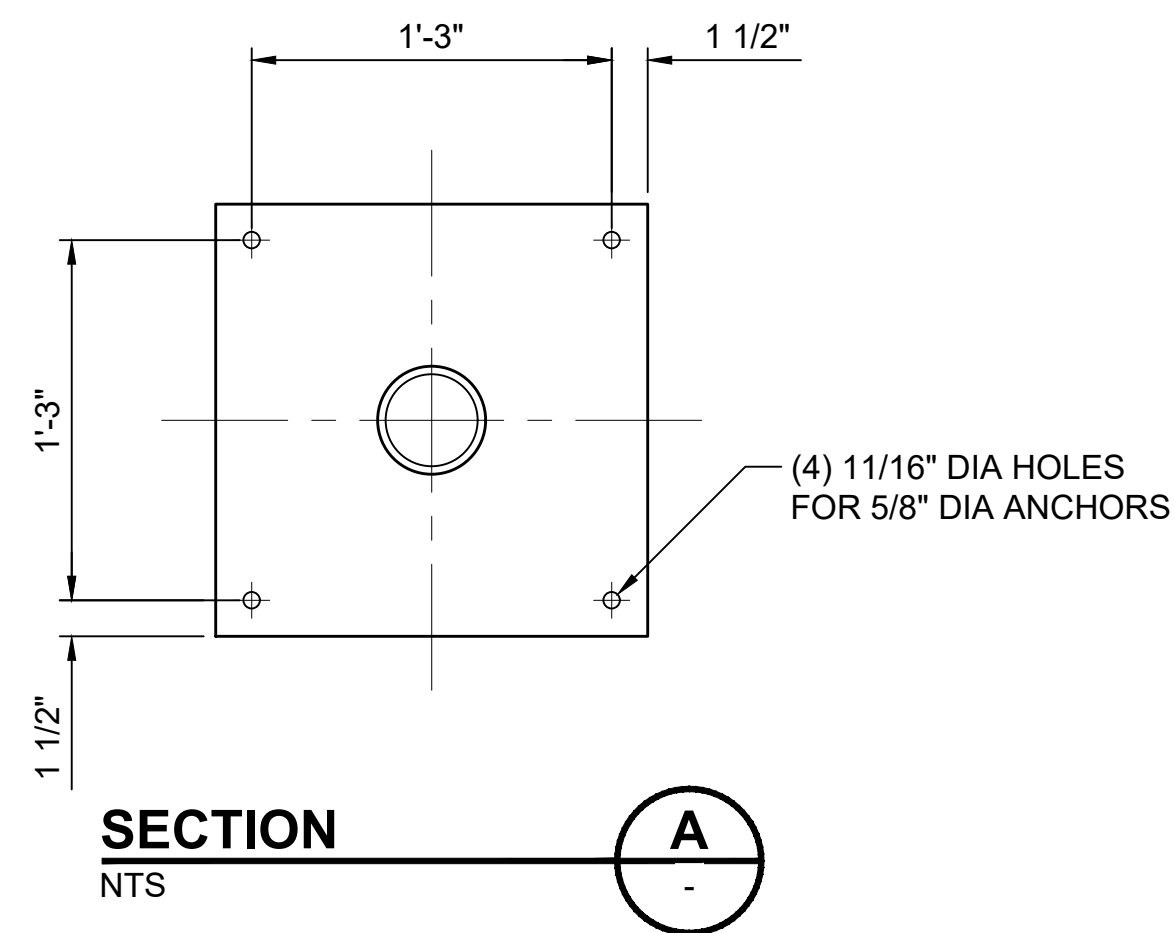
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| SOUND TRANSIT STANDARD DRAWINGS SYSTEMS OVERHEAD CATENARY SYSTEM TUNNEL & AERIAL SUPPORT ASSEMBLIES TSP-1 & TSP-2 | DRAWING No.: | STD-JOD320 |
| | FACILITY ID: | |
| | SHEET No.: | REV: 1 |

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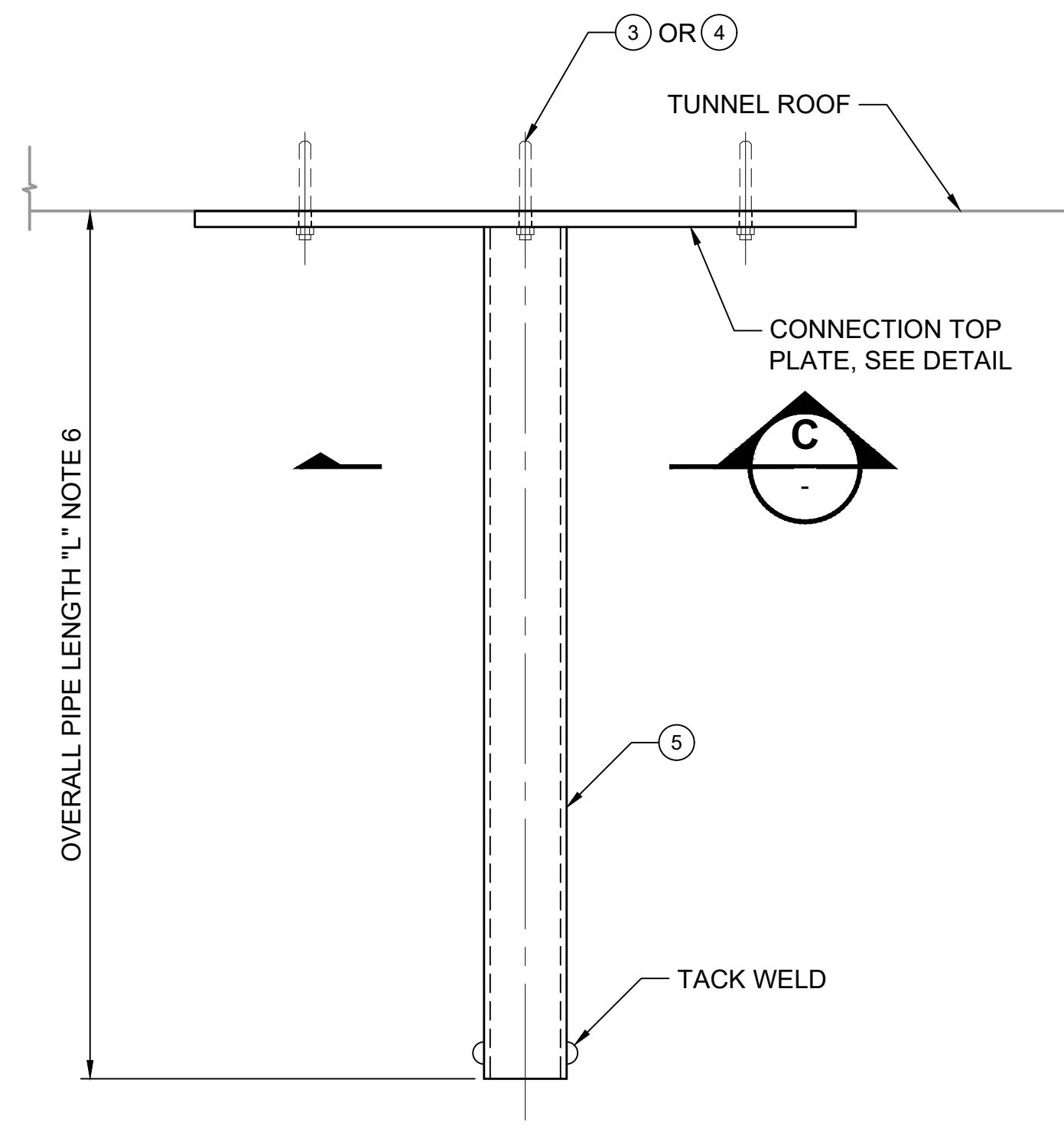
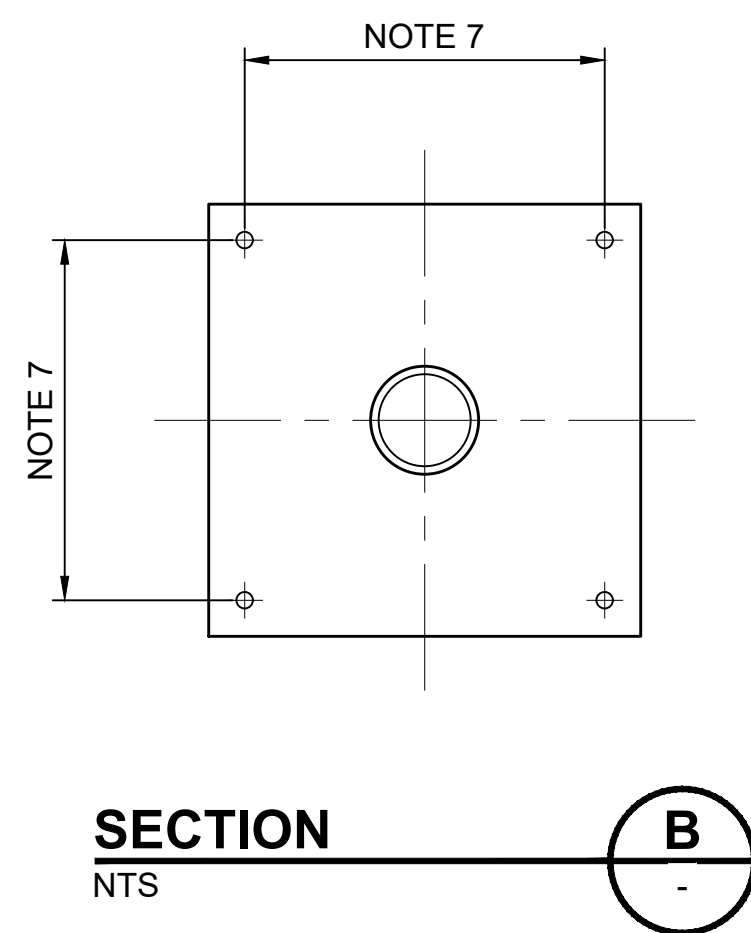
TUNNEL SUPPORT PIPE DETAIL TSP-3

NTS
TSP-3 FOR ATTACHMENT TO CONCRETE ANCHORS
TSP-3F FOR ATTACHMENT TO FRAMING INSERTS



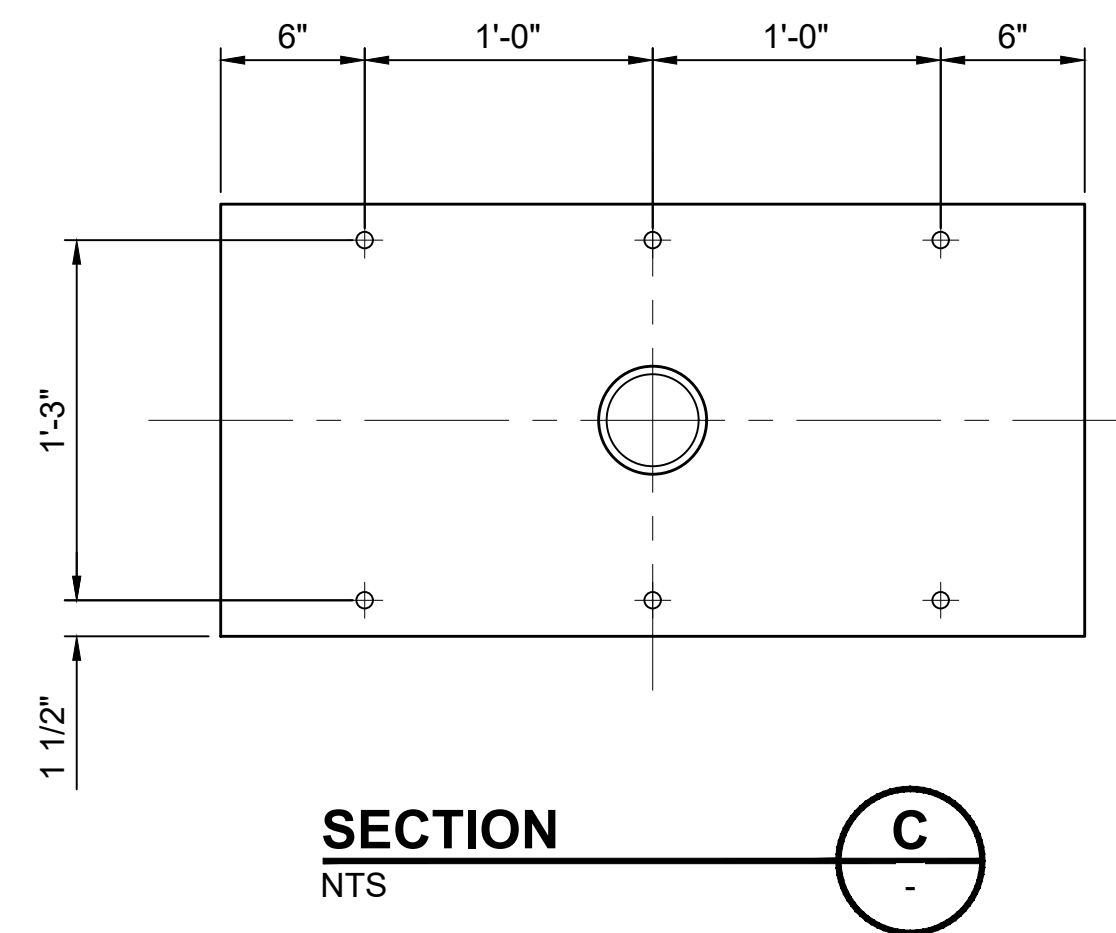
TUNNEL SUPPORT PIPE DETAIL TSP-4

NTS
TSP-4 FOR ATTACHMENT TO CONCRETE ANCHORS
TSP-4F FOR ATTACHMENT TO FRAMING INSERTS



TUNNEL SUPPORT PIPE DETAIL TSP-5

NTS
TSP-5 FOR ATTACHMENT TO CONCRETE ANCHORS
TSP-5F FOR ATTACHMENT TO FRAMING INSERTS



GENERAL NOTES:

1. DROP PIPE STEEL SHALL CONFORM TO ASTM A53 GRADE B.
2. CONNECTION PLATE STEEL SHALL CONFORM TO ASTM A572 GRADE 50 WITH A MINIMUM YIELD STRESS $F_y = 50$ KSI.
3. DROP PIPE ASSEMBLY SHALL BE HOT DIPPED GALVANIZED IN ACCORDANCE WITH ASTM A123.
4. WELDING OF CONNECTION SHALL BE IN ACCORDANCE WITH AWS D1.1 SPECIFICATIONS, LATEST EDITION, USING E70XX WELDING ELECTRODES.
5. THE DROP PIPE ASSEMBLY NUMBER SHALL BE HAND MARKED WITH A MINIMUM INDENTATION OF 1/16". THE HAND MARK SHALL BE STAMPED ON THE EXPOSED FACE OF THE CONNECTION PLATE.
6. CONTRACTOR TO DETERMINE LENGTH OF EACH PIPE BASED ON GEOMETRY OF CANTILEVER ASSEMBLY AND PANTOGRAPH CLEARANCE PARAMETERS.
7. DIMENSIONS OF CONNECTION BOTTOM PLATE TO BE DETERMINED BY CONTRACTOR TO FIT THE ATTACHED REGISTRATION ASSEMBLIES.
8. CONTRACTOR TO DETERMINE COMPONENT DETAIL AND SAFE WORKING LOADS.
9. FOR SYMBOLS, LEGEND AND ABBREVIATIONS SEE DRAWINGS JZN001 AND JZN002.
10. CONTRACTOR TO VERIFY ALL QUANTITIES ON THE BILL OF MATERIALS.
11. THE CONTRACTOR IS RESPONSIBLE FOR THE DESIGN OF EACH ASSEMBLY AS A WHOLE AND EACH COMPONENT MEETING OR EXCEEDING THE LOADING TABLES WHERE PROVIDED. WHERE THE WORKING LOAD CAPABILITIES OF THE CONTRACTOR'S ASSEMBLIES EXCEED THOSE SHOWN IN THE LOADING TABLE, THE CONTRACTOR SHALL UPDATE THE TABLE IN THEIR SUBMISSION OF ASSEMBLY.
12. THE BILL OF MATERIALS ARE TYPICAL FOR THE ASSEMBLY STYLES SHOWN. THE CONTRACTOR SHALL ITEMIZE THE TABLE WITH DESCRIPTIONS AND PART NUMBERS OF COMPONENTS REQUIRED TO COMPLETE EACH ASSEMBLY.
13. CONCRETE ANCHORS SHALL BE SS PRESET UNDERCUT ANCHORS. EMBEDMENT LENGTH AS REQUIRED BY ANCHOR MANUFACTURER. THREAD PROJECTION LENGTH AS REQUIRED TO ATTACH SUPPORT ASSEMBLY.
14. THE CONTRACTOR SHALL DETERMINE OVERALL PIPE DIAMETER FOR THE APPLICATION.
15. AT FERRULE LOCATIONS PROVIDE BOLTS AND WASHERS INSTEAD OF UNISTRUT HARDWARE.
16. CONTRACTOR SHALL VERIFY STEEL REINFORCEMENT LOCATIONS IN CONCRETE STRUCTURES PRIOR TO DRILLING AT OCS SUPPORT LOCATIONS. DETAILED REQUIREMENTS TO BE PROVIDED IN SPECIFICATIONS.

| BILL OF MATERIALS | | | | | | | | | |
|----------------------|--------|--------|-------|-------|-------|-------|--|----------|------------------|
| QUANTITIES EACH TYPE | | | | | | UNITS | DESCRIPTION | ITEM NO. | PART NO./REMARKS |
| TSP-5F | TSP-4F | TSP-3F | TSP-5 | TSP-4 | TSP-3 | | | | |
| - | 1 | - | - | 1 | - | EA | 4" SCH 80 PIPE W/ TOP AND BOTTOM PLATE | 1 | LENGTH AS REQ'D |
| - | - | 1 | - | - | 1 | EA | 4" SCH 80 PIPE W/ TOP PLATE | 2 | |
| - | - | - | 6 | 4 | 4 | EA | 5/8" CONCRETE ANCHORS | 3 | NOTE 13 |
| 6 | 4 | 4 | - | - | - | EA | FRAMING CHANNEL HARDWARE | 4 | NOTE 15 |
| 1 | - | - | 1 | - | - | EA | PIPE W/ LARGE TOP PLATE | 5 | NOTE 14 |

| No. | DATE | DSN | CHK | APP | REVISION |
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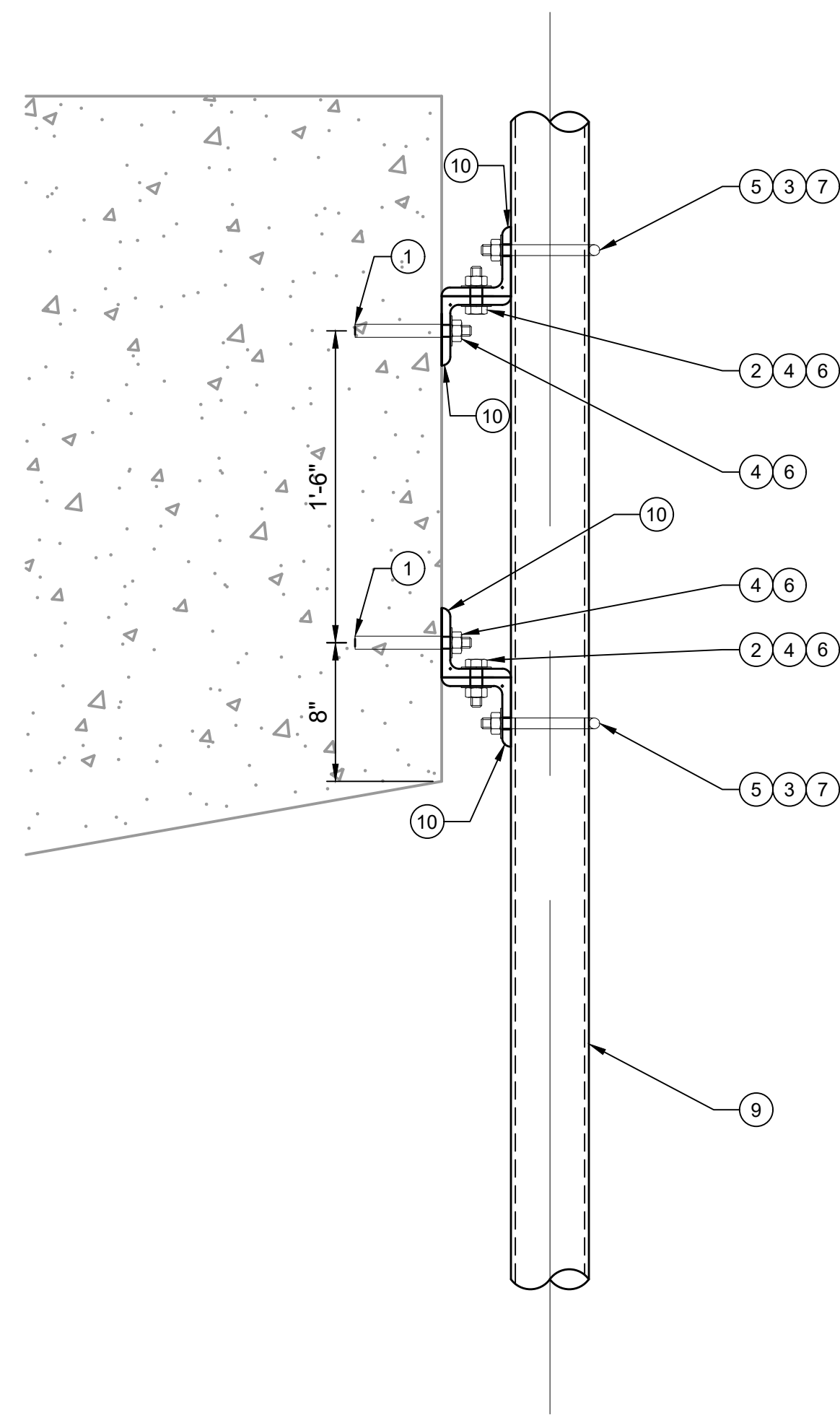
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CONTRACT No.: RTA/LR
DATE: 2/2024

**SOUND TRANSIT
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SYSTEMS**

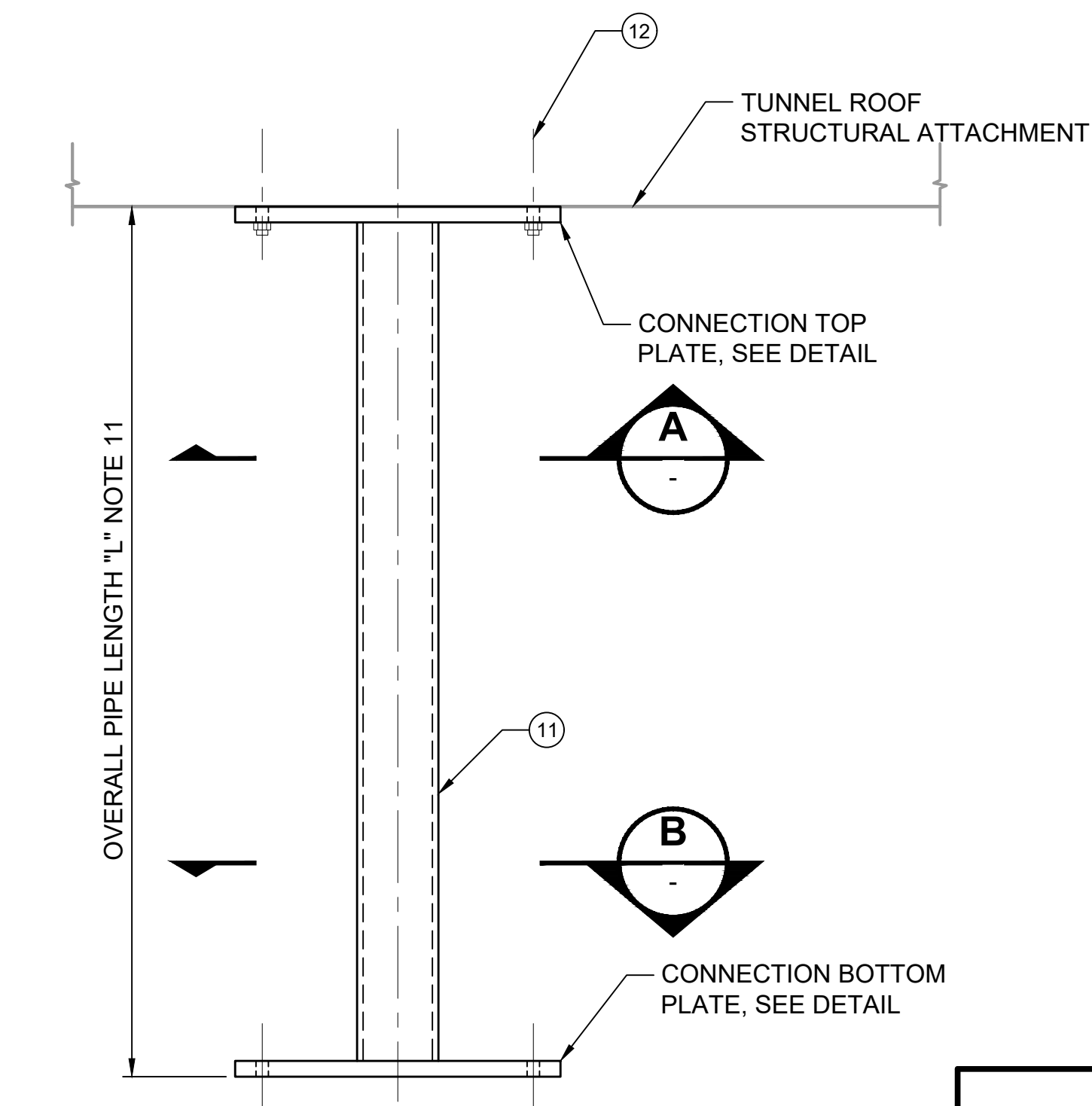
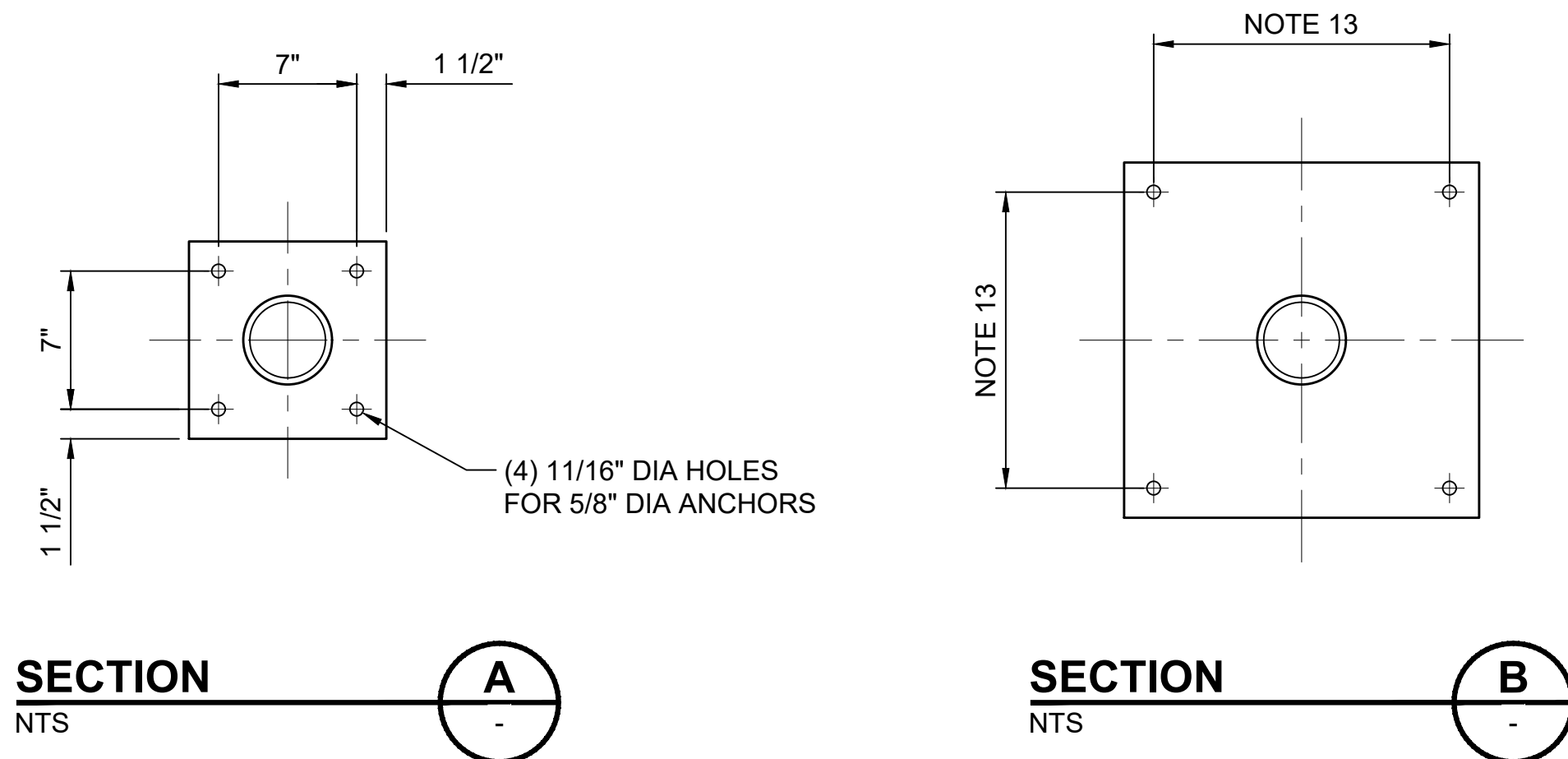
OVERHEAD CATENARY SYSTEM
TUNNEL & AERIAL SUPPORT ASSEMBLIES
TSP-3, TSP-4, TSP-5

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| DRAWING No.: | STD-JOD321 |
| FACILITY ID: | |
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BRACKET ASSEMBLY FOR STRUT ATTACHMENT TSP-6
NTS



TUNNEL SUPPORT PIPE DETAIL TSP-7
NTS

GENERAL NOTES:

- CONTRACTOR TO DETERMINE COMPONENT DETAIL AND SAFE WORKING LOADS.
- FOR SYMBOLS, LEGEND AND ABBREVIATIONS SEE DRAWINGS JZN001 AND JZN002.
- CONTRACTOR TO VERIFY ALL QUANTITIES ON THE BILL OF MATERIALS.
- THE CONTRACTOR IS RESPONSIBLE FOR THE DESIGN OF EACH ASSEMBLY AS A WHOLE AND EACH COMPONENT MEETING OR EXCEEDING THE LOADING TABLES WHERE PROVIDED. WHERE THE WORKING LOAD CAPABILITIES OF THE CONTRACTOR'S ASSEMBLIES EXCEED THOSE SHOWN IN THE LOADING TABLE, THE CONTRACTOR SHALL UPDATE THE TABLE IN THEIR SUBMISSION OF ASSEMBLY.
- THE BILL OF MATERIALS ARE TYPICAL FOR THE ASSEMBLY STYLES SHOWN. THE CONTRACTOR SHALL ITEMIZE THE TABLE WITH DESCRIPTIONS AND PART NUMBERS OF COMPONENTS REQUIRED TO COMPLETE EACH ASSEMBLY.
- CONCRETE ANCHORS SHALL BE SS PRESET UNDERCUT ANCHORS. EMBEDMENT LENGTH AS REQUIRED BY ANCHOR MANUFACTURER. THREAD PROJECTION LENGTH AS REQUIRED TO ATTACH SUPPORT ASSEMBLY.
- DROP PIPE STEEL SHALL CONFORM TO ASTM A53 GRADE B.
- CONNECTION PLATE STEEL SHALL CONFORM TO ASTM A572 GRADE 50 WITH A MINIMUM YIELD STRESS $F_y = 50$ KSI.
- WELDING OF CONNECTION SHALL BE IN ACCORDANCE WITH AWS D1.1 SPECIFICATIONS LATEST EDITION, USING E70XX WELDING ELECTRODES.
- THE DROP PIPE ASSEMBLY NUMBER SHALL BE HAND MARKED WITH A MINIMUM INDENTATION OF 1/16" THE HAND MARK SHALL BE STAMPED ON THE EXPOSED FACE OF THE CONNECTION PLATE.
- CONTRACTOR TO DETERMINE LENGTH OF EACH PIPE BASED ON GEOMETRY OF CANTILEVER ASSEMBLY AND PANTOGRAPH CLEARANCE PARAMETERS.
- CONTRACTOR TO DETERMINE COMPONENT DETAIL AND SAFE WORKING LOADS.
- DIMENSIONS OF CONNECTION BOTTOM PLATE TO BE DETERMINED BY CONTRACTOR TO FIT THE ATTACHED REGISTRATION ASSEMBLIES.
- CONTRACTOR SHALL VERIFY STEEL REINFORCEMENT LOCATIONS IN CONCRETE STRUCTURES PRIOR TO DRILLING AT OCS SUPPORT LOCATIONS. DETAILED REQUIREMENTS TO BE PROVIDED IN SPECIFICATIONS.


| BILL OF MATERIALS | | | | | |
|----------------------|-------|-------|--|----------|------------------|
| QUANTITIES EACH TYPE | | UNITS | DESCRIPTION | ITEM NO. | PART NO./REMARKS |
| TSP-7 | TSP-6 | | | | |
| - | 4 | EA | 5/8" CONCRETE ANCHORS | 1 | NOTE 6 |
| - | 4 | EA | HEX BOLT 3/4" HDG | 2 | |
| - | 4 | EA | HEX NUT 5/8" HDG | 3 | |
| - | 12 | EA | HEX NUT 3/4" HDG | 4 | |
| - | 2 | EA | U BOLT 5/8" HDG | 5 | |
| - | 16 | EA | WASHER 3/4" HDG | 6 | |
| - | 4 | EA | WASHER 5/8" HDG | 7 | |
| NOT USED | | | | | |
| - | 1 | EA | 4" SCH 80 PIPE | 9 | LENGTH AS REQ'D |
| - | 4 | EA | STAND OFF ANGLES | 10 | |
| 1 | - | EA | 4" SCH 80 PIPE W/ TOP AND BOTTOM PLATE | 11 | LENGTH AS REQ'D |
| 4 | - | EA | HARDWARE AS REQ'D | 12 | |

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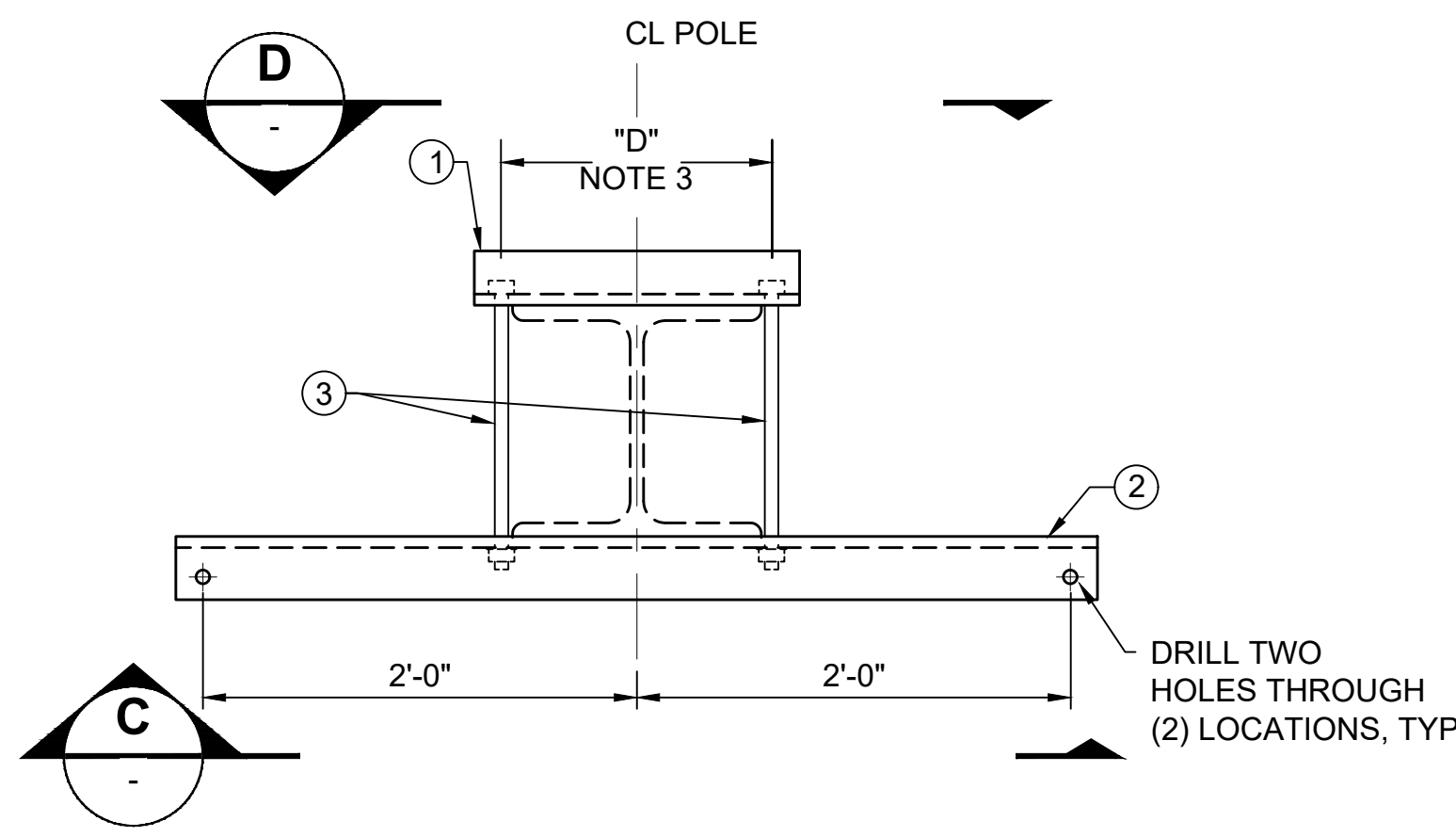
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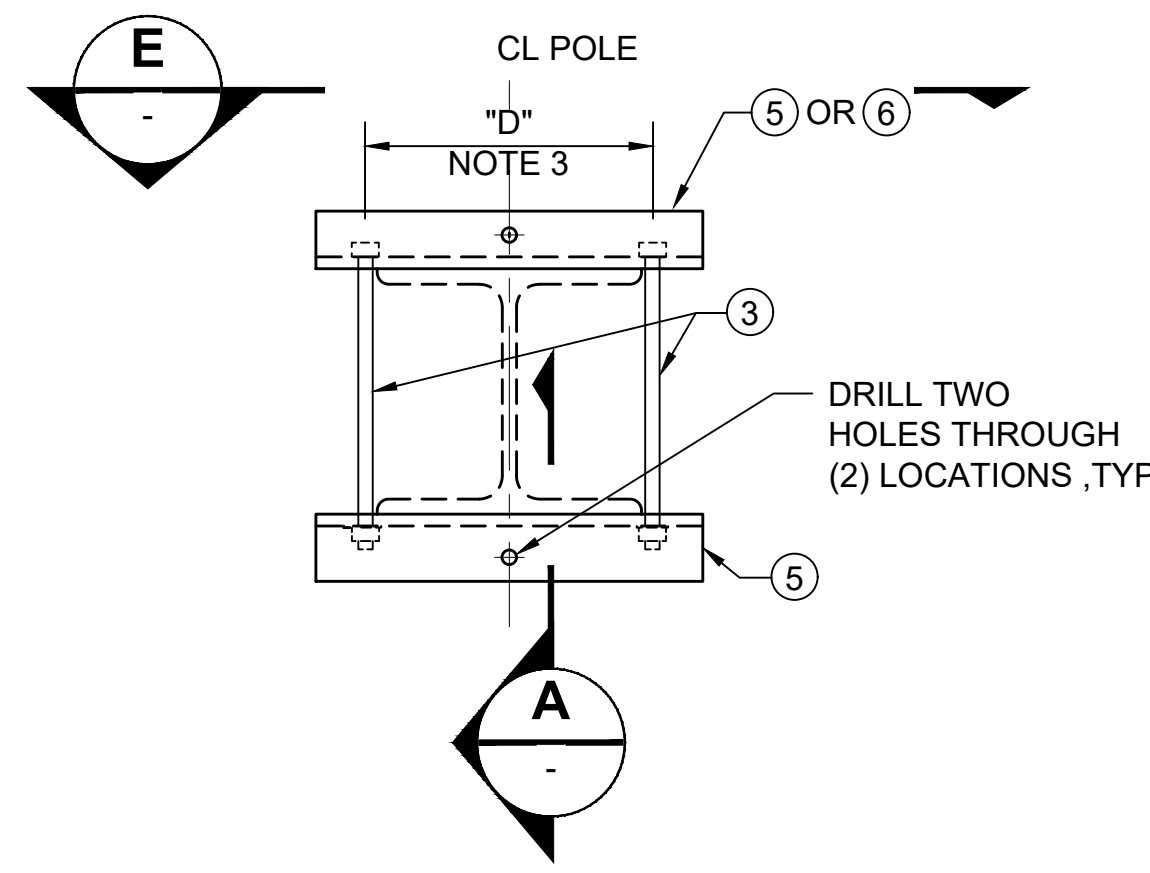
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| DATE: 2/2024 | |

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| SOUND TRANSIT STANDARD DRAWINGS SYSTEMS | |
| OVERHEAD CATENARY SYSTEM TUNNEL & AERIAL SUPPORT ASSEMBLIES TSP-6, TSP-7 | |

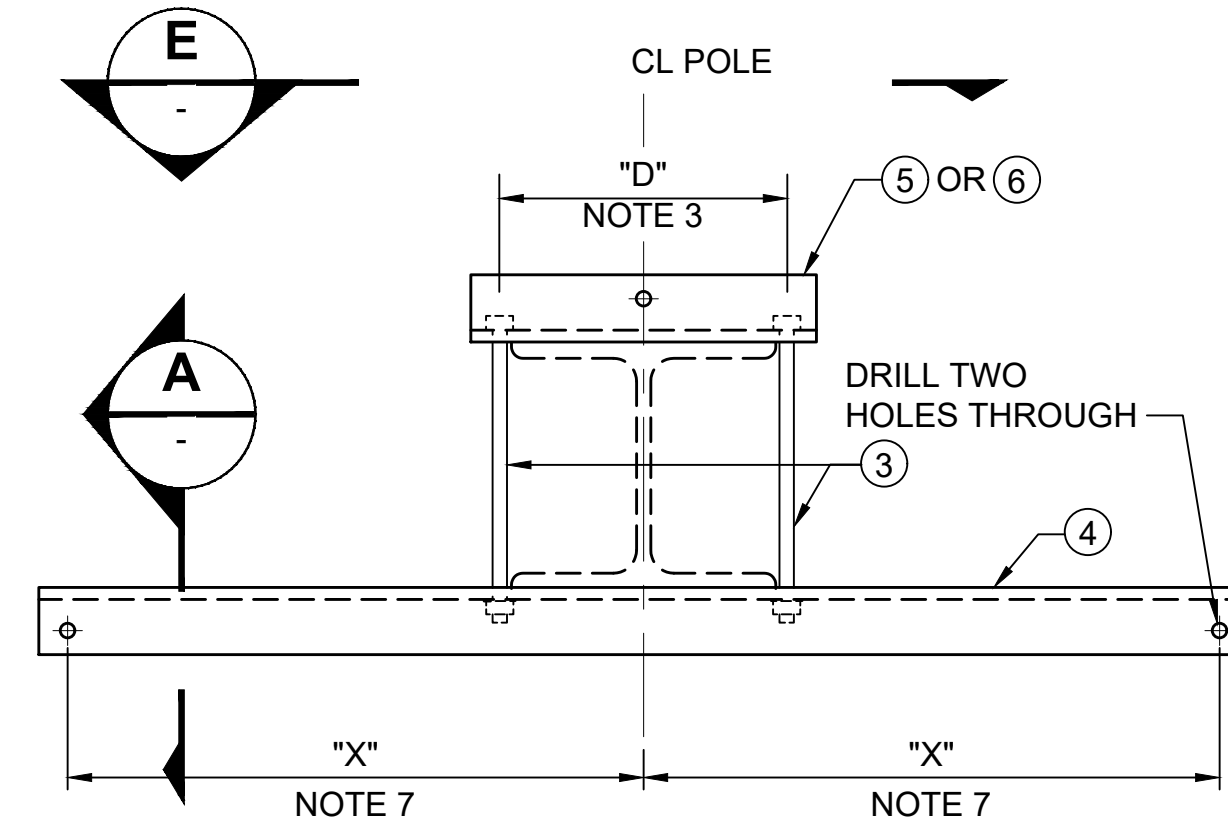
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POLE BRACKET ASSEMBLY FOR ACROSS TRACK FEEDER BTF-XX
NTS



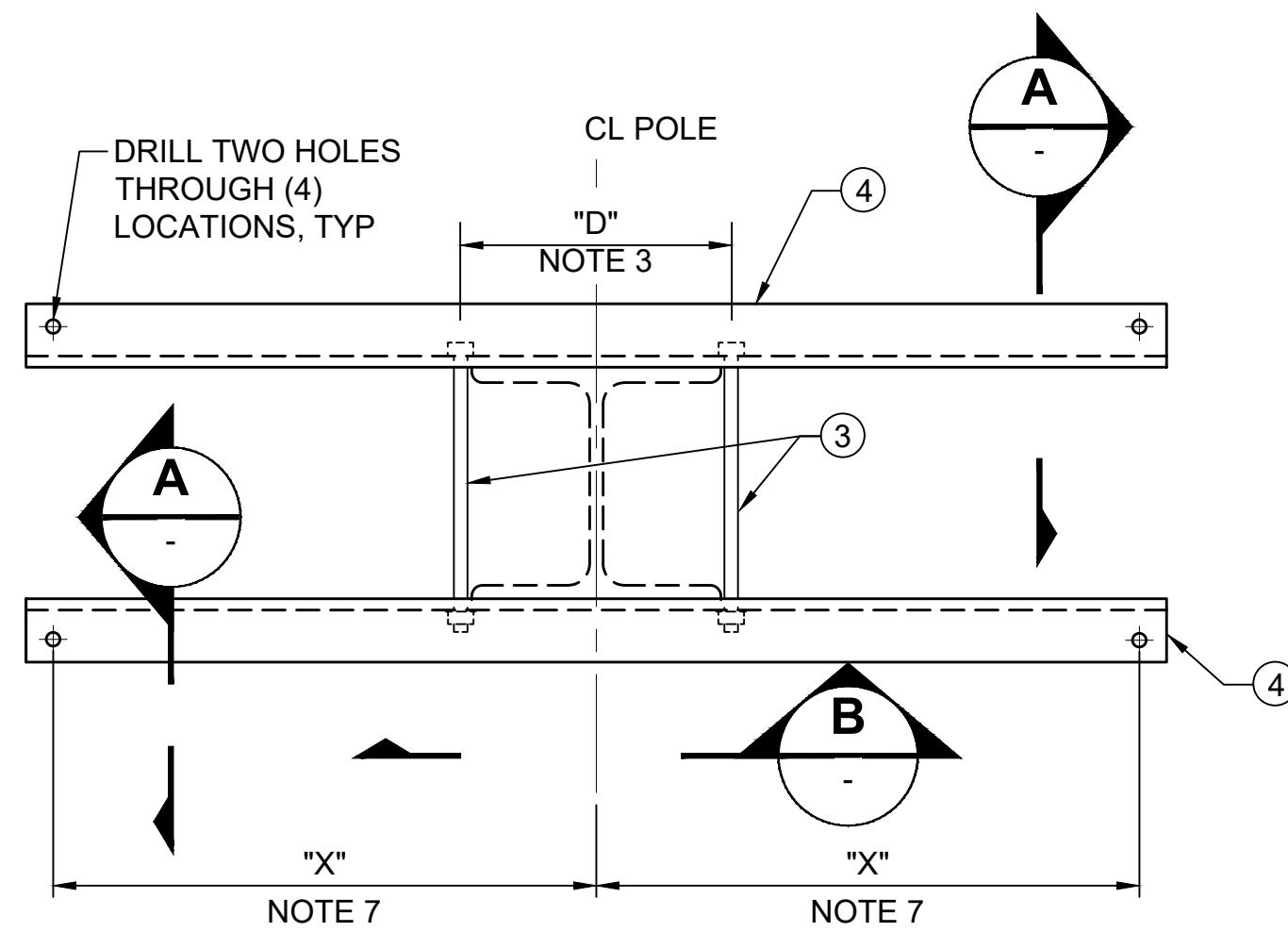
POLE BRACKET ASSEMBLY FOR BACK TO BACK CANTILEVERS BTB-XX, OR SINGLE SIDE CANTILEVER BTS-XX
NTS



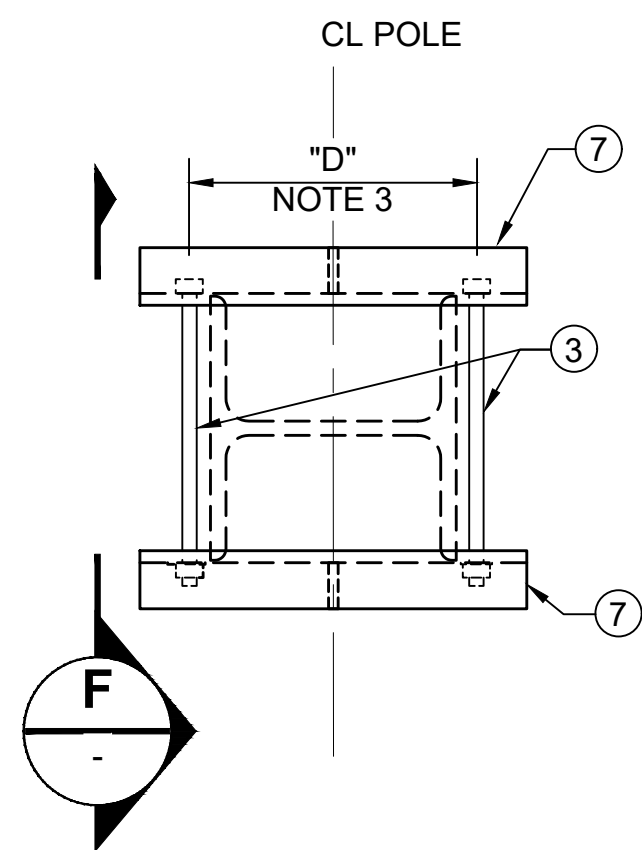
POLE BRACKET ASSEMBLY FOR TWO OR THREE CANTILEVERS BT2-XX, BT3-XX
NTS

GENERAL NOTES:

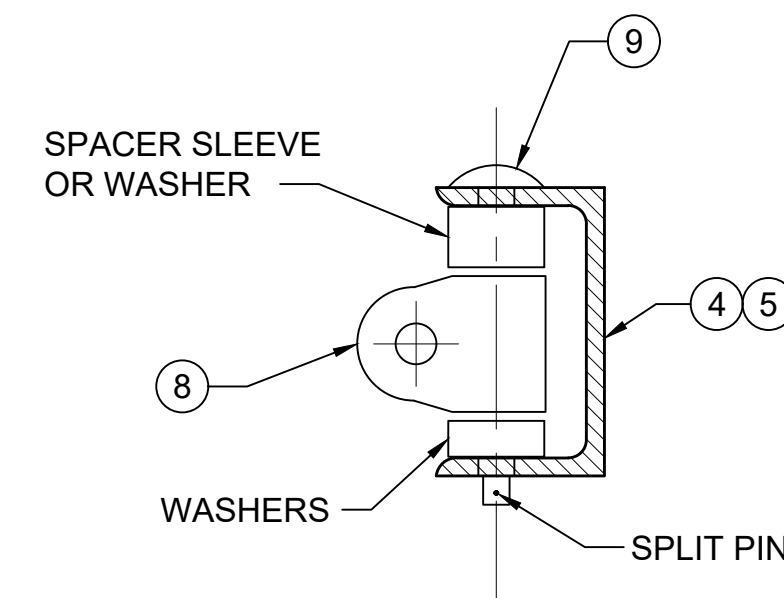
- THE BILL OF MATERIALS DETAILS ARE TYPICAL FOR THE ASSEMBLY STYLES SHOWN. THE CONTRACTOR SHALL ITEMIZE THE TABLE WITH DESCRIPTIONS AND PART NUMBERS OF COMPONENTS REQUIRED TO COMPLETE EACH ASSEMBLY.
- ALL DIMENSIONS AND BOLT SIZES SHALL BE DETERMINED BY CONTRACTOR BASED ON FURNISHED CATENARY COMPONENTS.
- CONTRACTOR TO COORDINATE POLE SIZE WITH DESIGN OF BRACKET.
- BOLT LENGTHS "XX":
"XX" IS 08 FOR WF08 SECTION, POLE TYPE WF-08XX SEE DWG JOD300.
"XX" IS 10 FOR WF10 SECTION, POLE TYPES WF-10XX, WF-10XXF AND WF-20XX SEE DWGS JOD300 AND JOD301.
"XX" IS 12 FOR WF12 SECTION, POLE TYPES WF-21XX, WF-21XXF, WF-22XX, WF-22XXF, WF-32XX AND WF-32XXF SEE DWGS JOD300 AND JOD301.
- SPREADER AND CHANNELS MAY BE SLOTTED OR MULTIPLE DRILLED BY CONTRACTOR FOR UNIVERSAL APPLICATION.
- BOLT THREAD PROJECTION THROUGH NUTS SHALL NOT EXCEED 2" IN LENGTH.
- "X" = 2'-6" NOMINAL OR AS SPECIFIED IN OCS LAYOUT PLANS.
- ALL BRACKETS TO BE SUPPLIED WITH BOLTS TO SUIT THE POLE SIZE.
- SWIVEL SHALL BE DESIGNED BY THE CONTRACTOR TO SUIT MATING CANTILEVER ASSEMBLY COMPONENTS.



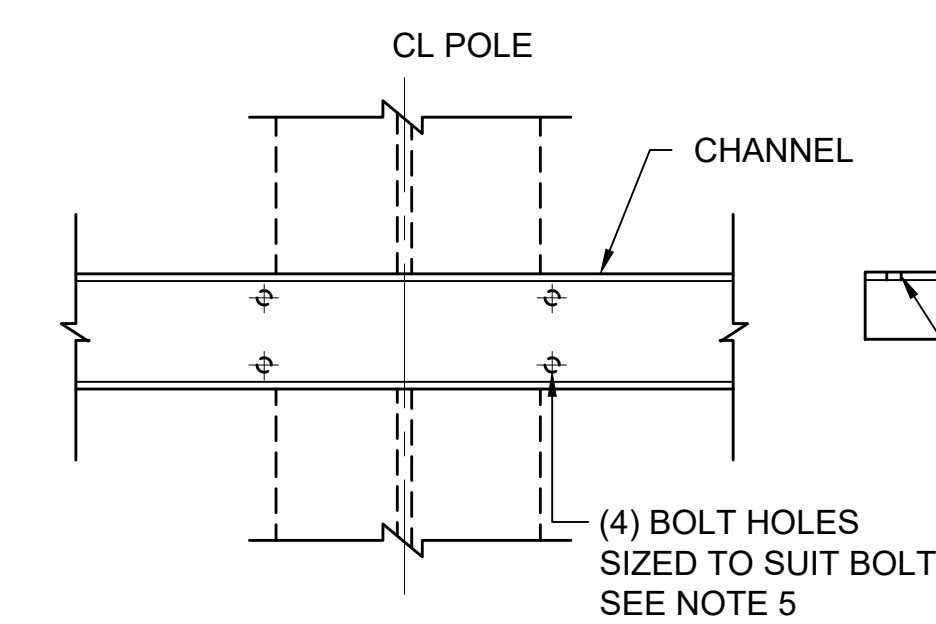
POLE BRACKET ASSEMBLY FOR FOUR CANTILEVERS BT4-XX
NTS



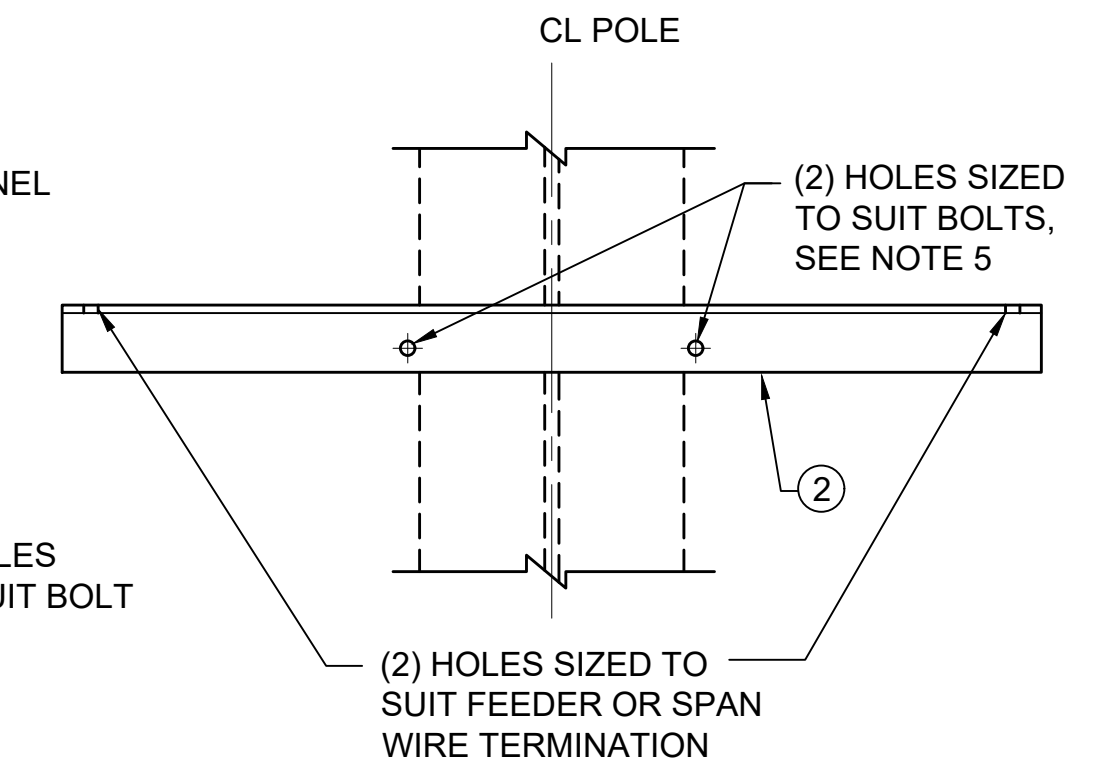
POLE ANCHOR BRACKET ASSEMBLY BTA-XX
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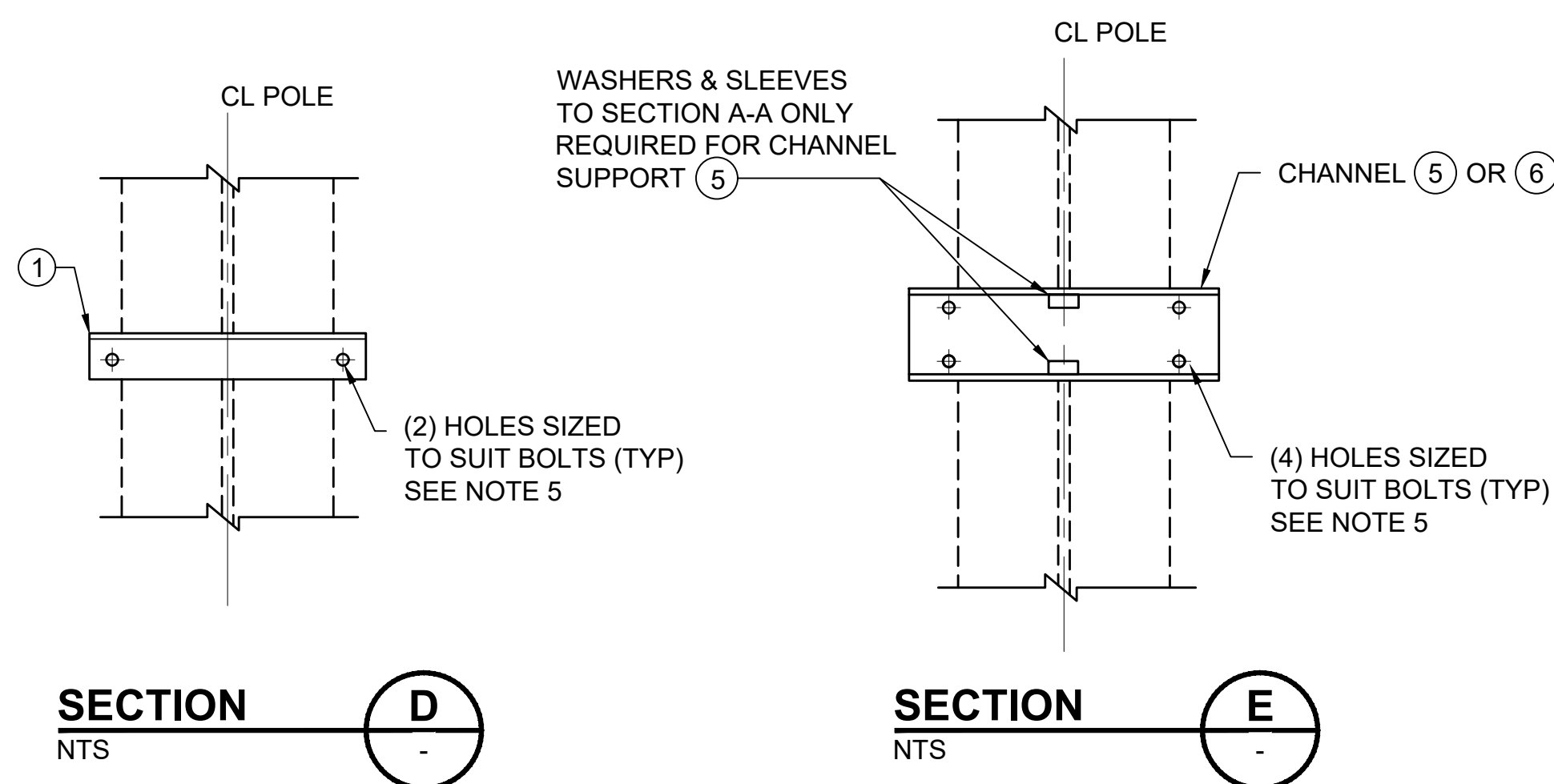
SECTION A
NTS
ITEMS 4 & 5 ONLY



SECTION B
NTS
(BOLTS OMITTED)

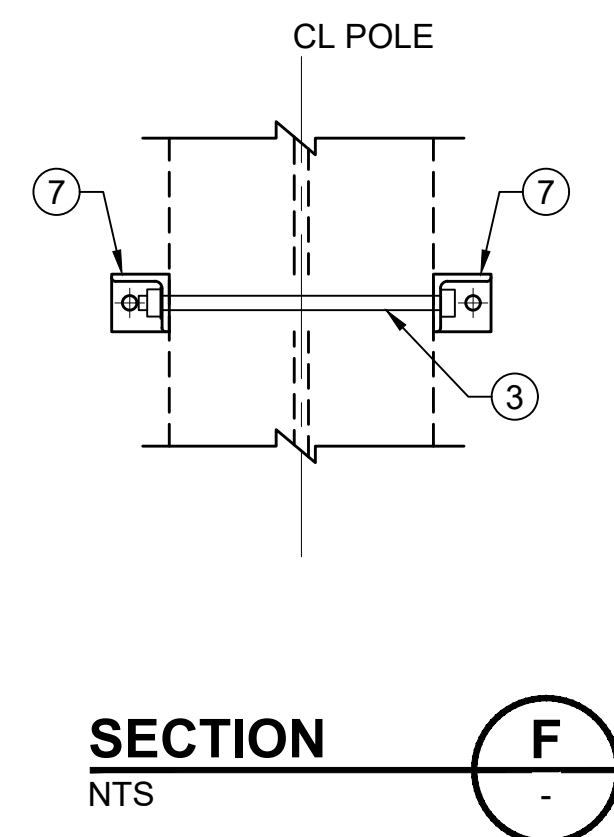


SECTION C
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SECTION D
NTS

SECTION E
NTS



SECTION F
NTS

| QUANTITIES EACH TYPE | | | | | | | | BILL OF MATERIALS | | |
|----------------------|--------|--------|--------|--------|--------|--------|-------|------------------------------|----------|------------------|
| BT4-XX | BT3-XX | BT2-XX | BTS-XX | BTB-XX | BTA-XX | BTF-XX | UNITS | DESCRIPTION | ITEM NO. | PART NO./REMARKS |
| - | - | - | - | - | - | 1 | EA | BACKING ANGLE | 1 | |
| - | - | - | - | - | - | 1 | EA | FEEDER SPREADER | 2 | |
| 4 | 4 | 4 | 4 | 4 | 2 | 2 | EA | BOLT WITH NUT & FLAT WASHERS | 3 | NOTE 4, 8 |
| 2 | 1 | 1 | - | - | - | - | EA | CHANNEL SPREADER | 4 | |
| - | 1 | - | 1 | 2 | - | - | EA | CHANNEL SUPPORT | 5 | |
| - | - | 1 | 1 | - | - | - | EA | BACKING CHANNEL | 6 | |
| - | - | - | - | - | 2 | - | EA | ANCHOR SUPPORT | 7 | |
| 4 | 3 | 2 | 1 | 2 | - | - | EA | SWIVEL WITH PIN | 8 | NOTE 9 |
| 4 | 3 | 2 | 1 | 2 | - | - | EA | HINGE PIN | 9 | |

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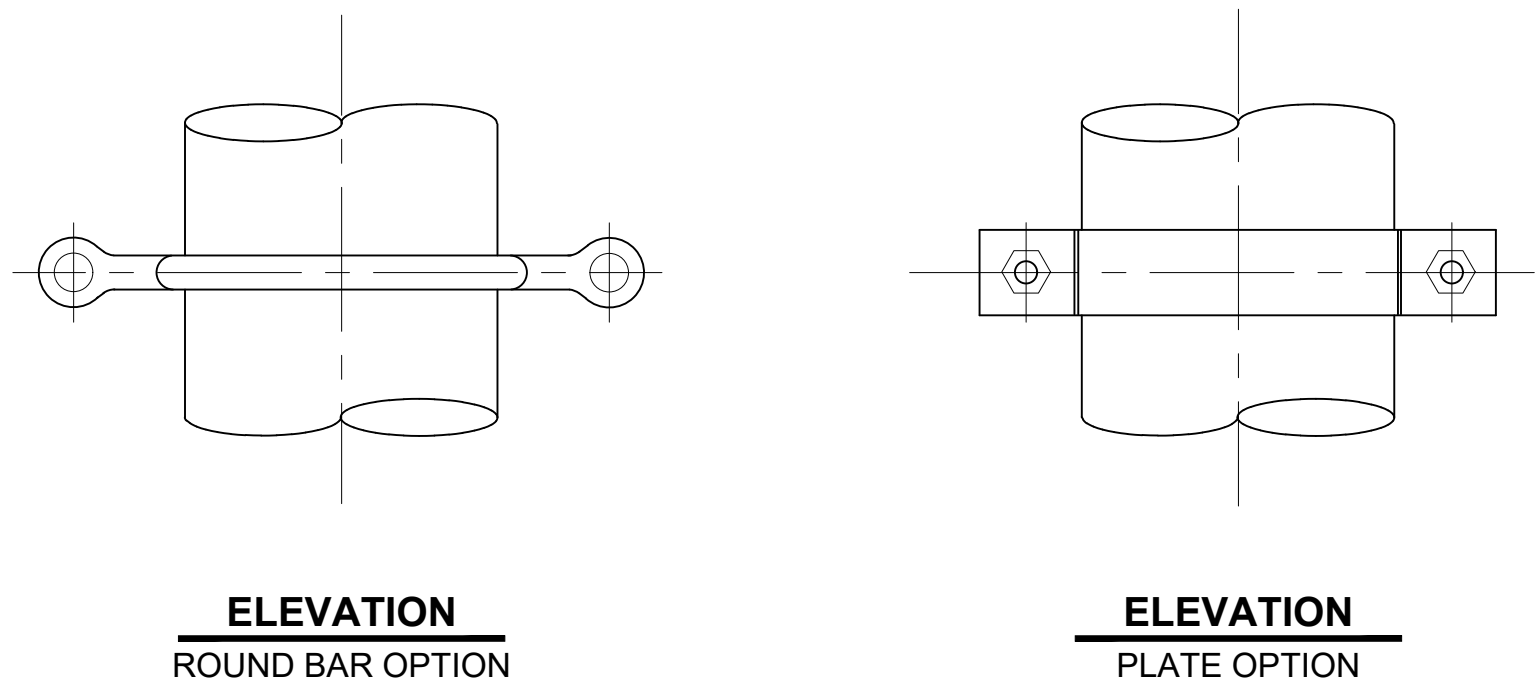
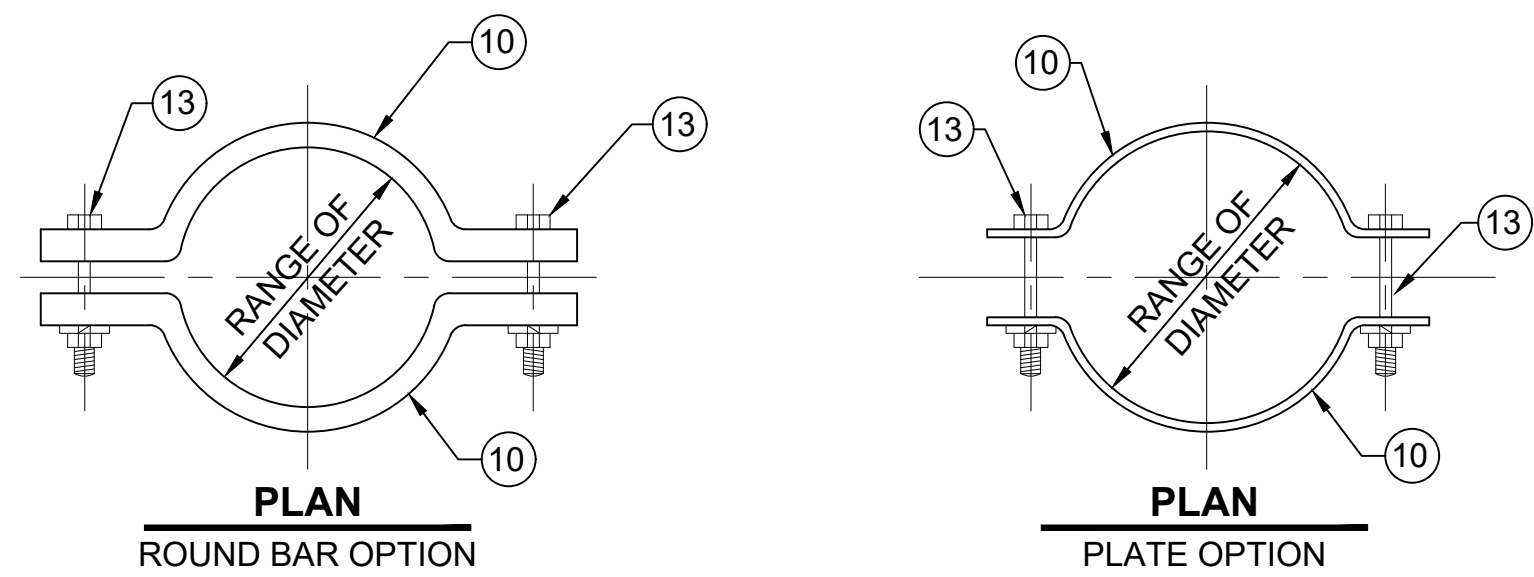
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| DATE: | 2/2024 |

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| SOUND TRANSIT STANDARD DRAWINGS SYSTEMS | |
| OVERHEAD CATENARY SYSTEM BRACKET ASSEMBLIES BTF, BTA, BTB, BTS, BT2, BT3 & BT4 | |

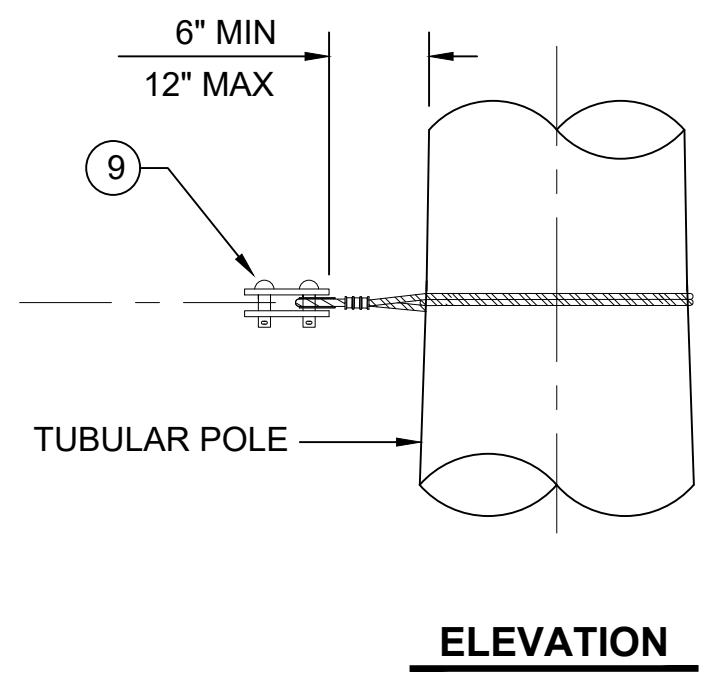
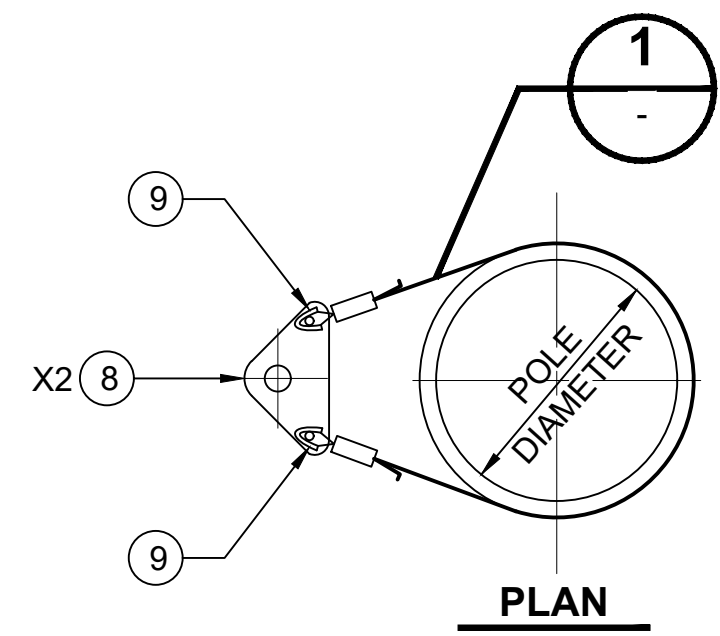
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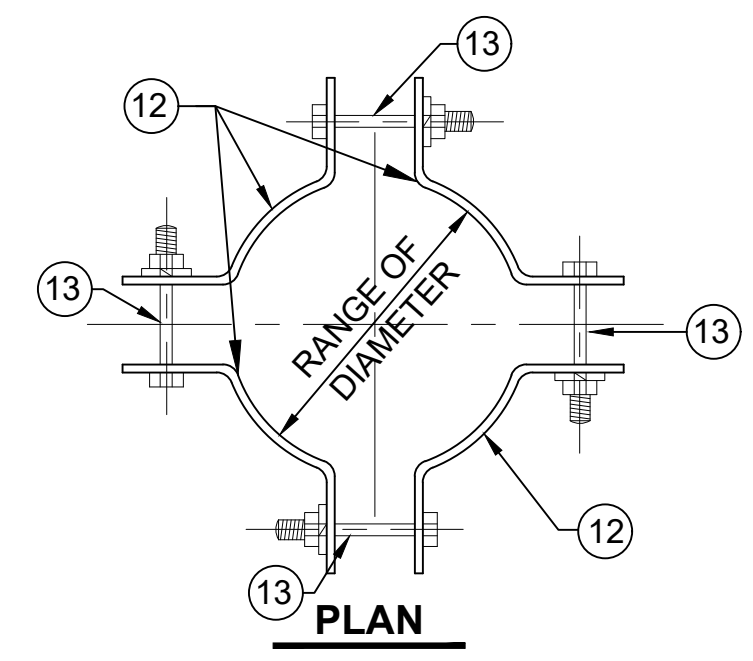
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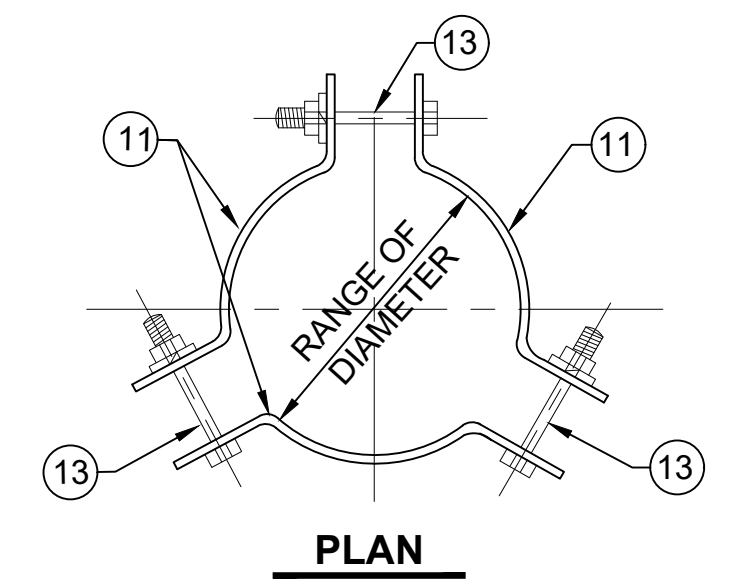
TWO PIECE POLE BRACKET ASSEMBLY BA-XX
NTS



STEEL GUY STRAND ASSEMBLY FOR CROSS-SPANS & TERMINATIONS BE-XX
NTS

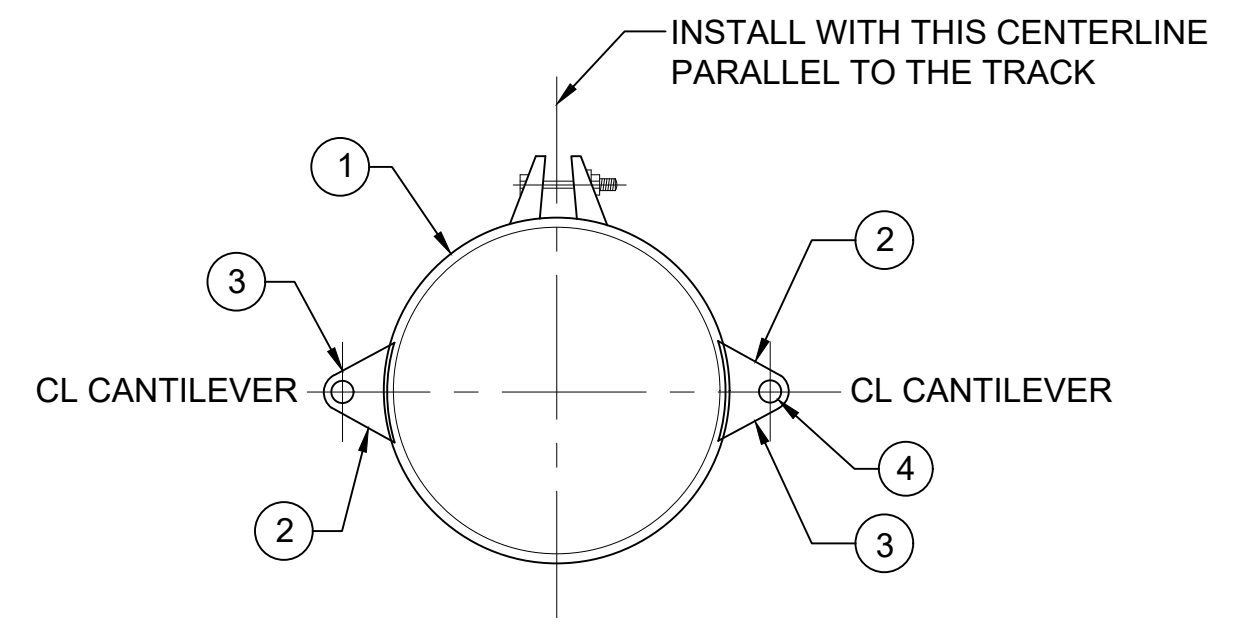
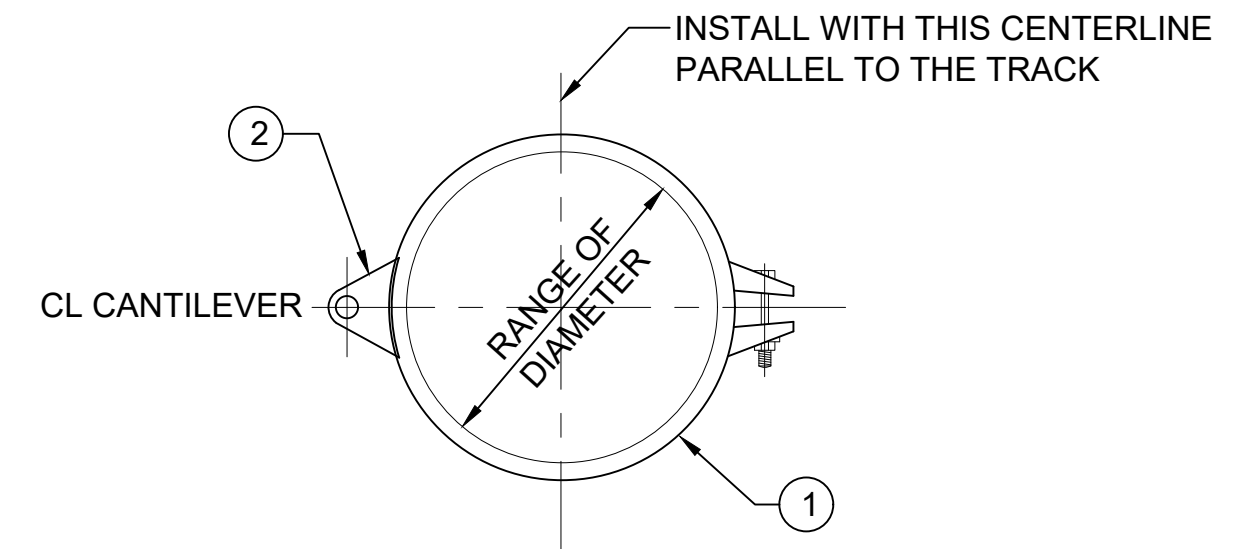


FOUR PIECE POLE BRACKET ASSEMBLY FOR GUY WIRES BD-XX
NTS

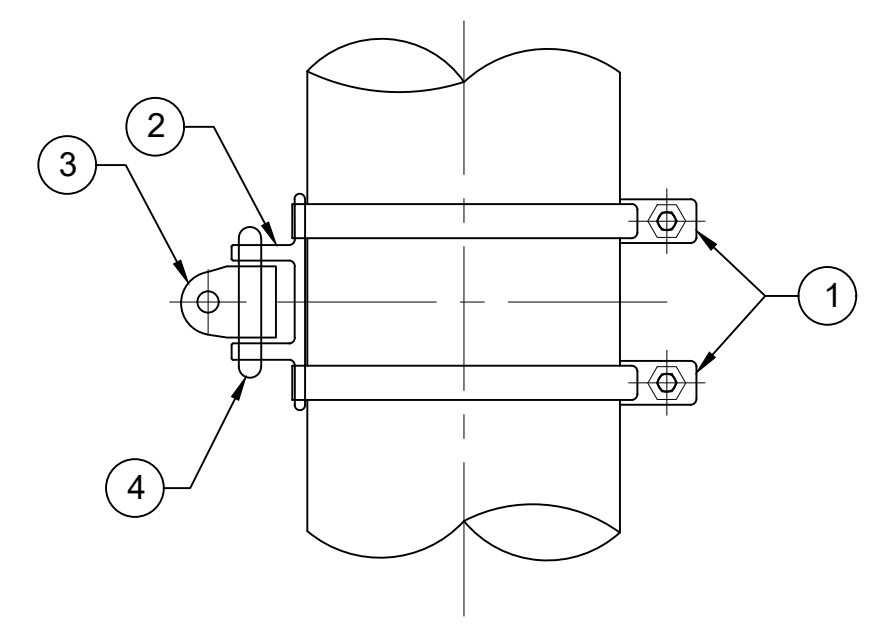


THREE PIECE POLE BRACKET ASSEMBLY FOR GUY WIRES BC-XX
NTS

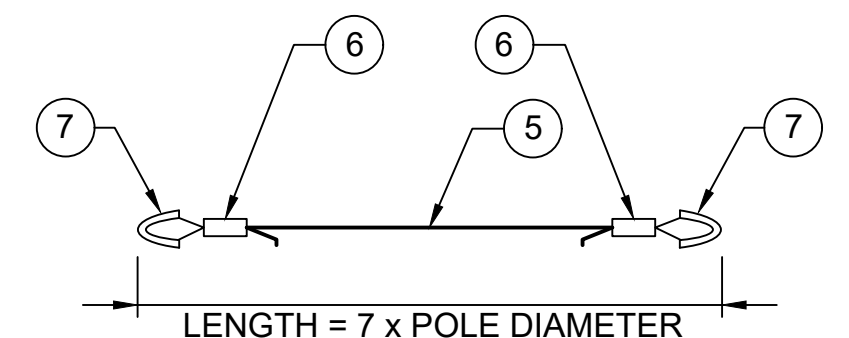
- GENERAL NOTES:**
- ALL DIMENSIONS AND BOLT SIZES SHALL BE DETERMINED BY CONTRACTOR BASED ON FURNISHED CATENARY COMPONENTS PRIOR TO FABRICATION.
 - CONTRACTOR TO DETERMINE POLE DIAMETER AT ATTACHMENT HEIGHT PRIOR TO FABRICATION OF BRACKET ASSEMBLIES.
 - IN ASSEMBLY REFERENCE, "XX" INDICATES POLE BASE DIAMETER TO THE NEAREST INCH.
 - BOLT THREAD PROJECTION THROUGH NUTS SHALL NOT EXCEED 2 INCHES IN LENGTH.
 - SWIVEL SHALL BE DESIGNED BY THE CONTRACTOR TO SUIT MATING CANTILEVER ASSEMBLY COMPONENTS.
 - THE BILL OF MATERIALS DETAILS ARE TYPICAL FOR THE ASSEMBLY STYLES SHOWN. THE CONTRACTOR SHALL ITEMIZE THE TABLE WITH DESCRIPTIONS AND PART NUMBERS OF COMPONENTS REQUIRED TO COMPLETE EACH ASSEMBLY.
 - THE CONTRACTOR IS RESPONSIBLE FOR THE DESIGN OF EACH ASSEMBLY AS A WHOLE.



HINGE BRACKET ASSEMBLY FOR BACK-TO-BACK CANTILEVER BB-XX
NTS



HINGE BRACKET ASSEMBLY FOR SINGLE CANTILEVER BH-XX
NTS



TYPICAL POLE SLING SUB-ASSEMBLY
NTS

| QUANTITIES EACH TYPE | | | | | | UNITS | DESCRIPTION | ITEM NO. | PART NO./REMARKS |
|----------------------|----------|-------|-------|-------|-------|-------|--------------------|----------|------------------|
| BH-XX | BE-XX | BD-XX | BC-XX | BB-XX | BA-XX | | | | |
| 2 | - | - | - | 2 | - | EA | POLE CLAMP ASSY | 1 | |
| 1 | - | - | - | 2 | - | EA | POLE CLEVIS | 2 | |
| 1 | - | - | - | 2 | - | EA | SWIVEL WITH PIN | 3 | NOTE 5 |
| 1 | - | - | - | 2 | - | EA | HINGE PIN | 4 | |
| - | AS REQ'D | - | - | - | - | LF | WIRE ROPE | 5 | STAINLESS STEEL |
| - | 2 | - | - | - | - | EA | COMPRESSION SLEEVE | 6 | |
| - | 2 | - | - | - | - | EA | THIMBLE | 7 | |
| - | 2 | - | - | - | - | EA | PLATE, 3 PIN | 8 | |
| - | 3 | - | - | - | - | EA | PIN, WITH SLIT PIN | 9 | |
| - | - | - | - | - | 2 | EA | HALF BRACKET | 10 | |
| - | - | - | 3 | - | - | EA | THIRD BRACKET | 11 | |
| - | - | 4 | - | - | - | EA | QUARTER BRACKET | 12 | |
| - | - | 4 | 3 | - | 2 | EA | BOLT | 13 | |

| No. | DATE | DSN | CHK | APP | REVISION |
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| 0 | 8/2019 | | | | REVISED SYSTEMS DIRECTIVE DRAWINGS |

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APPROVED BY:

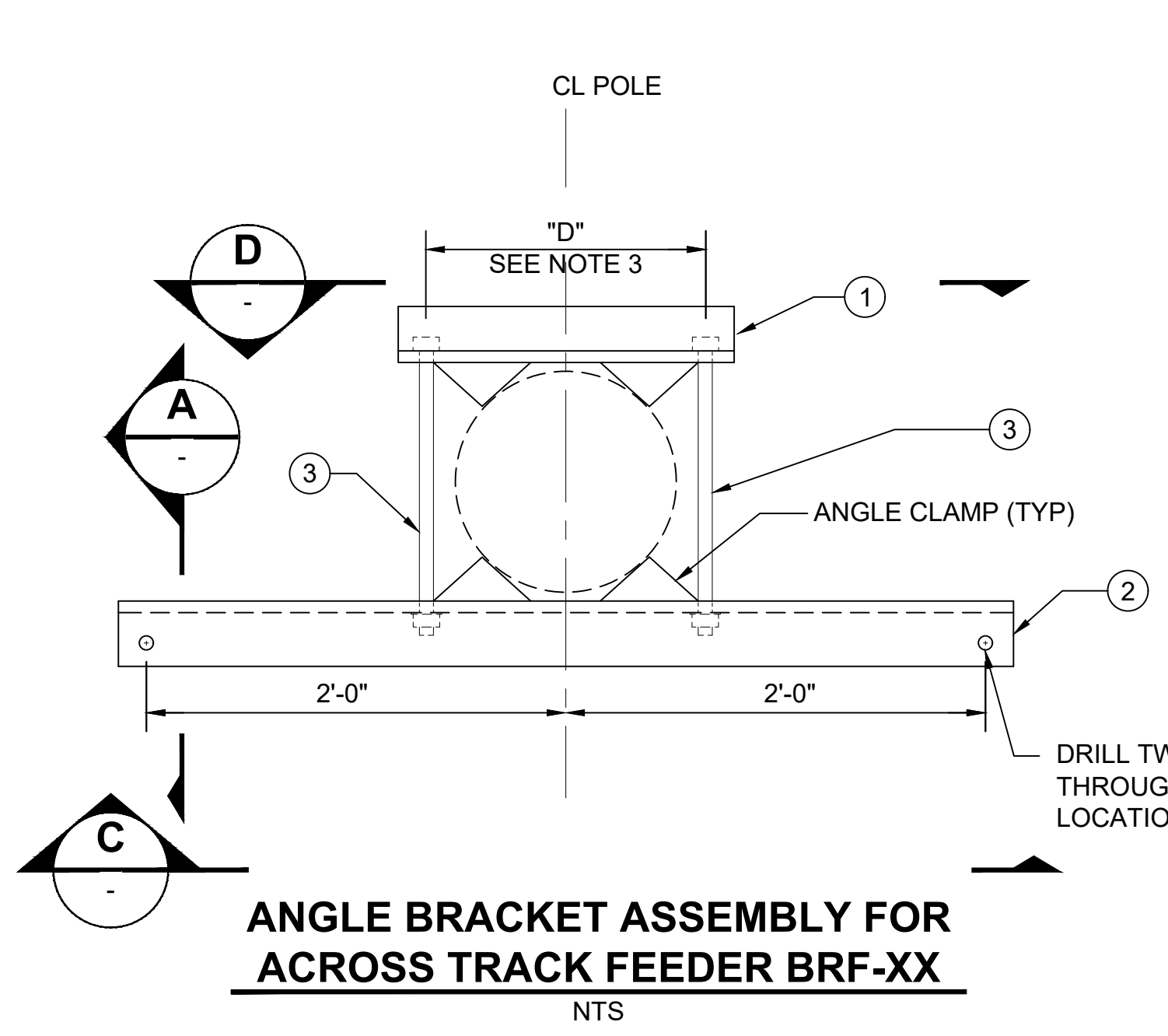
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DATE: 2/2024

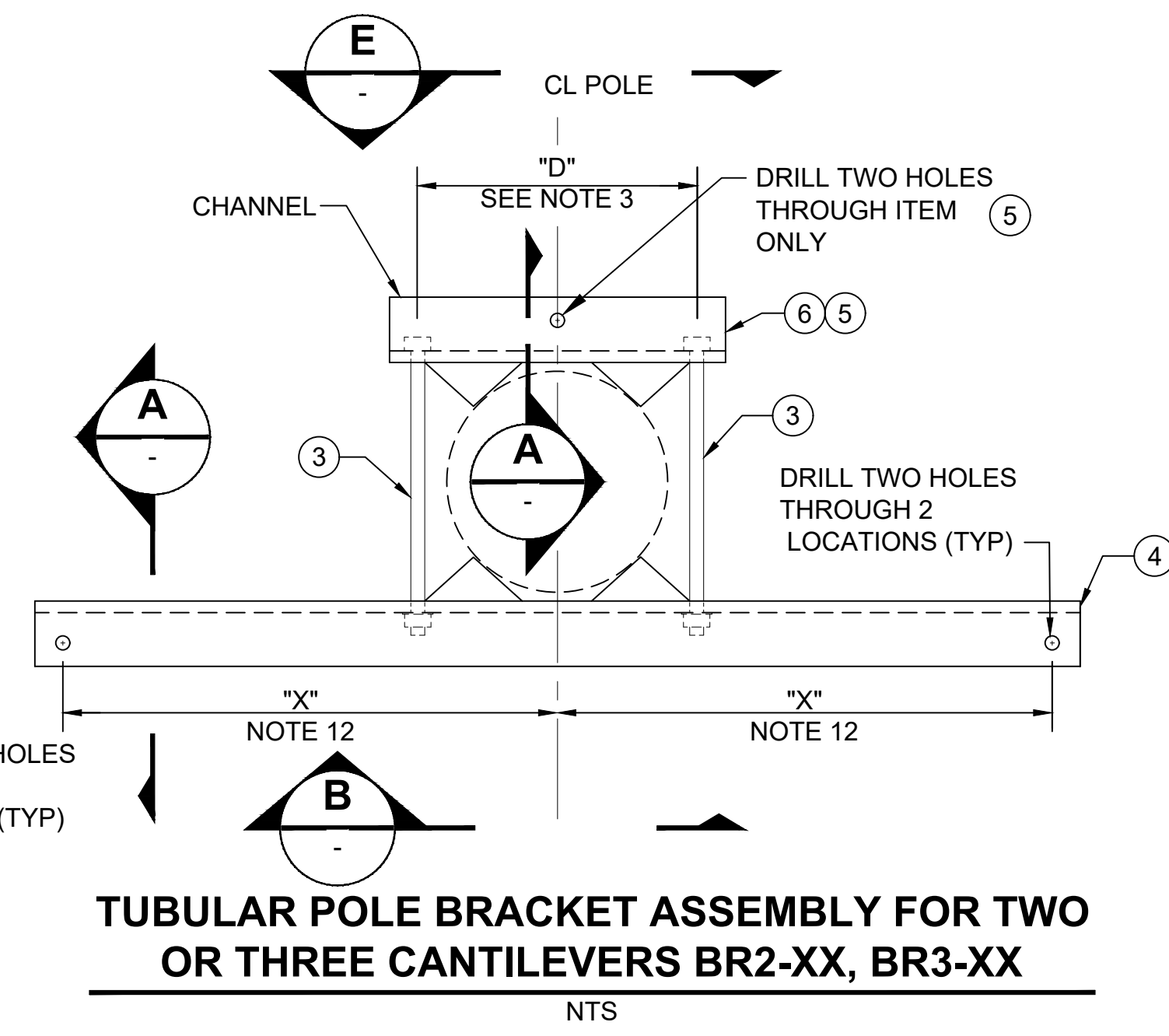
SOUND TRANSIT STANDARD DRAWINGS SYSTEMS
OVERHEAD CATENARY SYSTEM BRACKET ASSEMBLIES
BA, BB, BC, BD, BE & BH

DRAWING No.: **STD-JOD331**
FACILITY ID:
SHEET No.: REV: 1

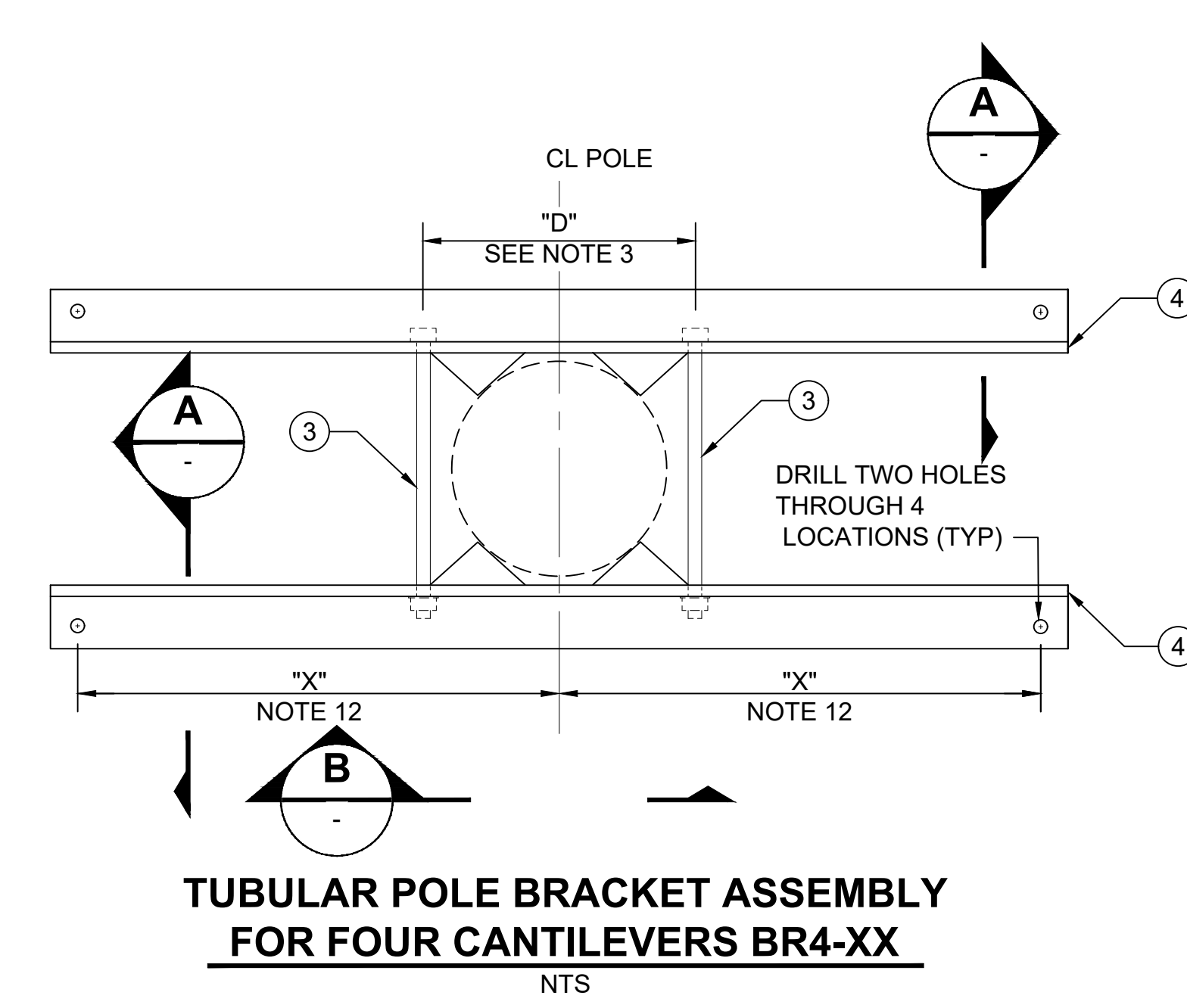
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ANGLE BRACKET ASSEMBLY FOR ACROSS TRACK FEEDER BRF-XX
NTS

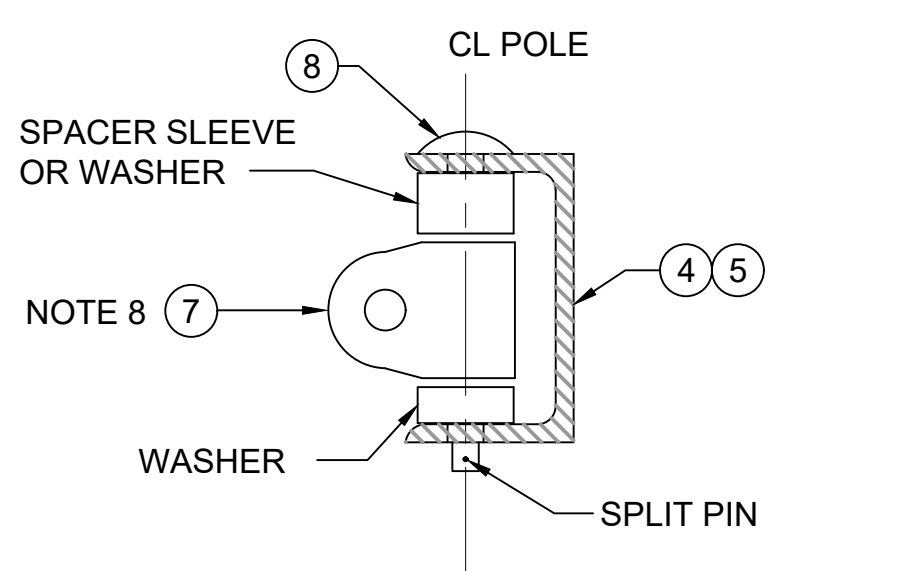


TUBULAR POLE BRACKET ASSEMBLY FOR TWO OR THREE CANTILEVERS BR2-XX, BR3-XX
NTS

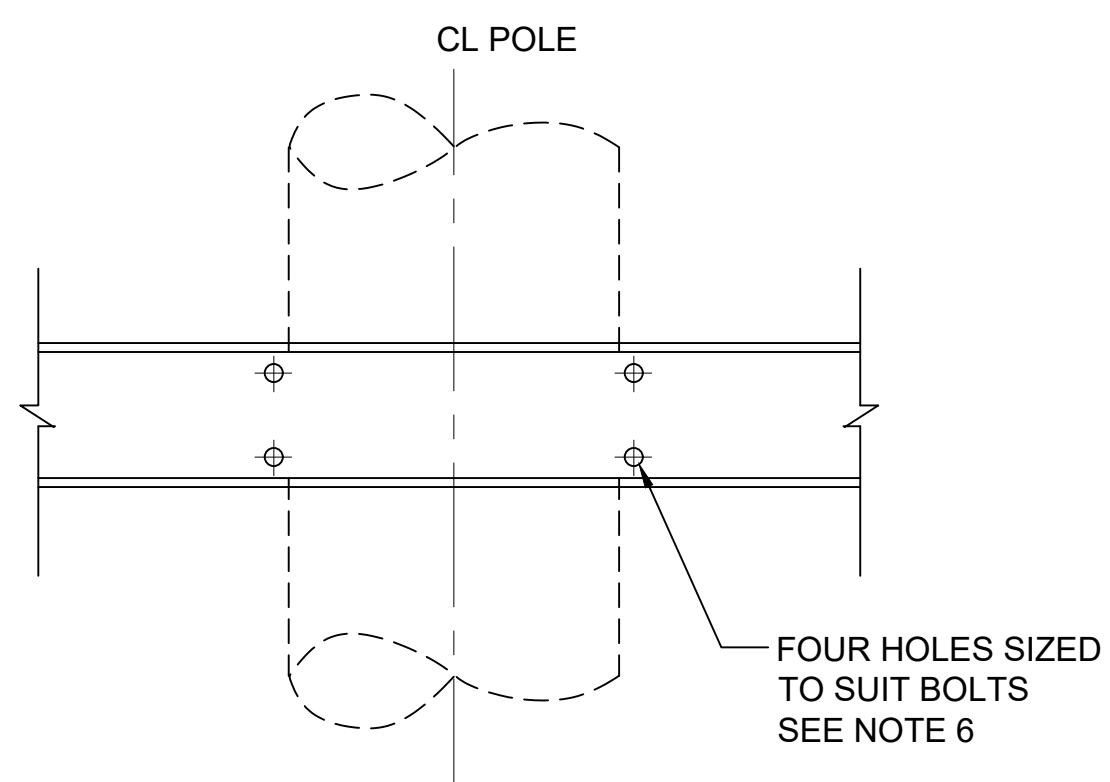


TUBULAR POLE BRACKET ASSEMBLY FOR FOUR CANTILEVERS BR4-XX
NTS

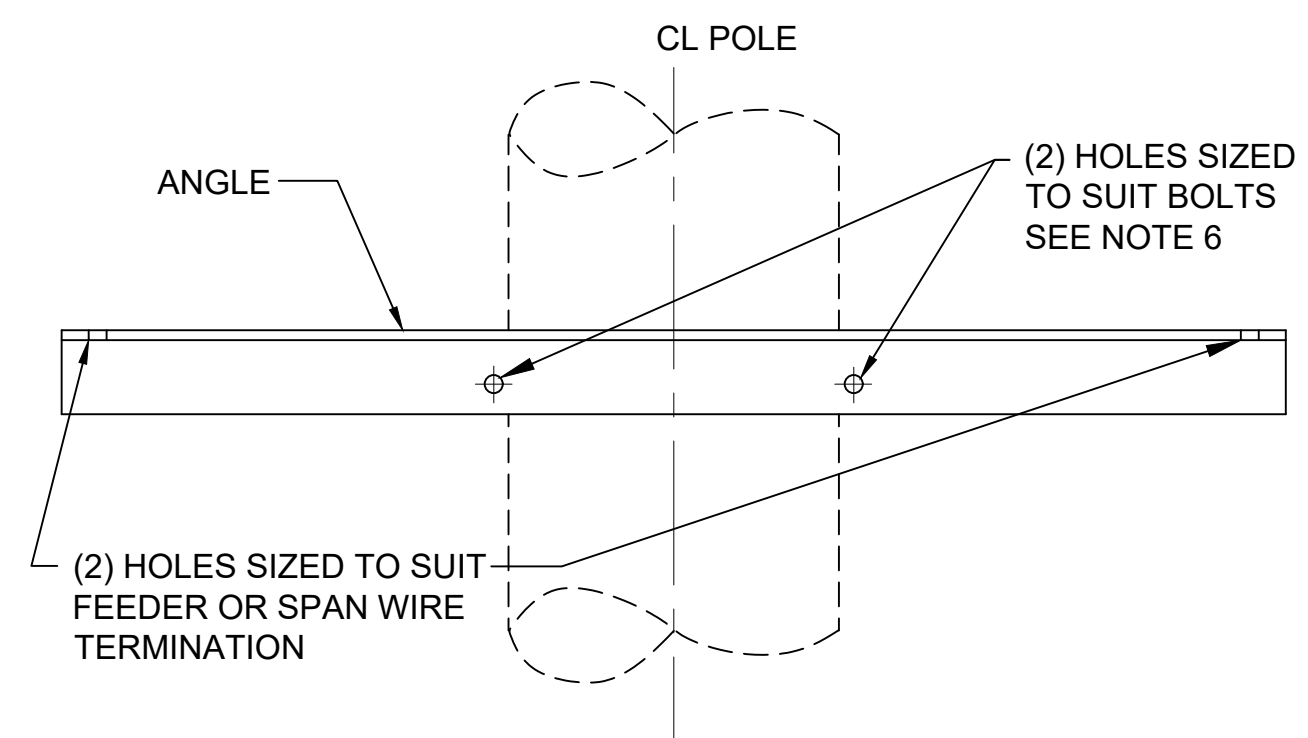
- GENERAL NOTES:**
- ROUGHEN THE SURFACE OF ANGLE CLAMP IN CONTACT WITH STEEL POLE.
 - ALL DIMENSIONS AND BOLT SIZES SHALL BE VERIFIED BY CONTRACTOR BASED ON FURNISHED CATENARY COMPONENTS PRIOR TO FABRICATION.
 - CONTRACTOR SHALL DETERMINE POLE DIAMETER AT ATTACHMENT HEIGHT PRIOR TO FABRICATION OF POLE BASE BRACKET.
 - IN ASSEMBLY REFERENCE, "XX" INDICATES POLE BASE DIAMETER TO NEAREST INCH.
 - TYPICALLY CANTILEVER ASSEMBLIES REQUIRE TWO CHANNEL BRACKETS EACH.
 - SPREADER AND CHANNELS MAY BE SLOTTED OR MULTIPLE DRILLED BY CONTRACTOR FOR UNIVERSAL APPLICATION.
 - BOLT THREAD PROJECTION THROUGH NUTS SHALL NOT EXCEED 2" IN LENGTH.
 - SWIVEL SHALL BE DESIGNED BY THE CONTRACTOR TO SUIT MATING CANTILEVER ASSEMBLY COMPONENTS.
 - THE BILL OF MATERIALS DETAILS ARE TYPICAL FOR THE ASSEMBLY STYLES SHOWN. THE CONTRACTOR SHALL ITEMIZE THE TABLE WITH DESCRIPTIONS AND PART NUMBERS OF COMPONENTS REQUIRED TO COMPLETE EACH ASSEMBLY.
 - IF ASSEMBLY BEGINS TO ROTATE AFTER CANTILEVERS ARE INSTALLED AND WIRE PULLED AND REGISTERED, THE CONTRACTOR MUST TACK WELD THE ASSEMBLY TO THE POLE ALONG WITH COLD GALVANIZING AND PAINT OR UTILIZE ANOTHER APPROVED METHOD TO KEEP ASSEMBLY FROM ROTATING.
 - THE CONTRACTOR IS RESPONSIBLE FOR THE DESIGN OF EACH ASSEMBLY AS A WHOLE.
 - "X" = 2'-6" NOMINAL OR AS SPECIFIED IN OCS LAYOUT PLANS.



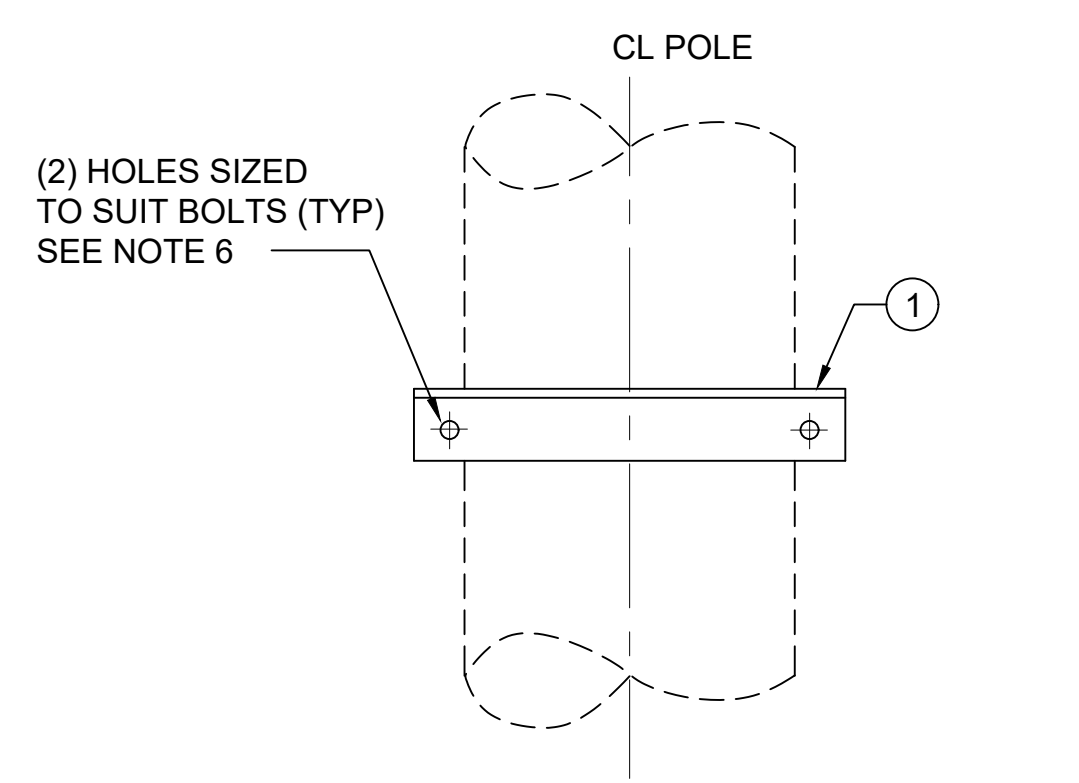
SECTION A
NTS
ITEMS 4 & 5 ONLY
(DETAIL BEYOND SWIVEL OMITTED)



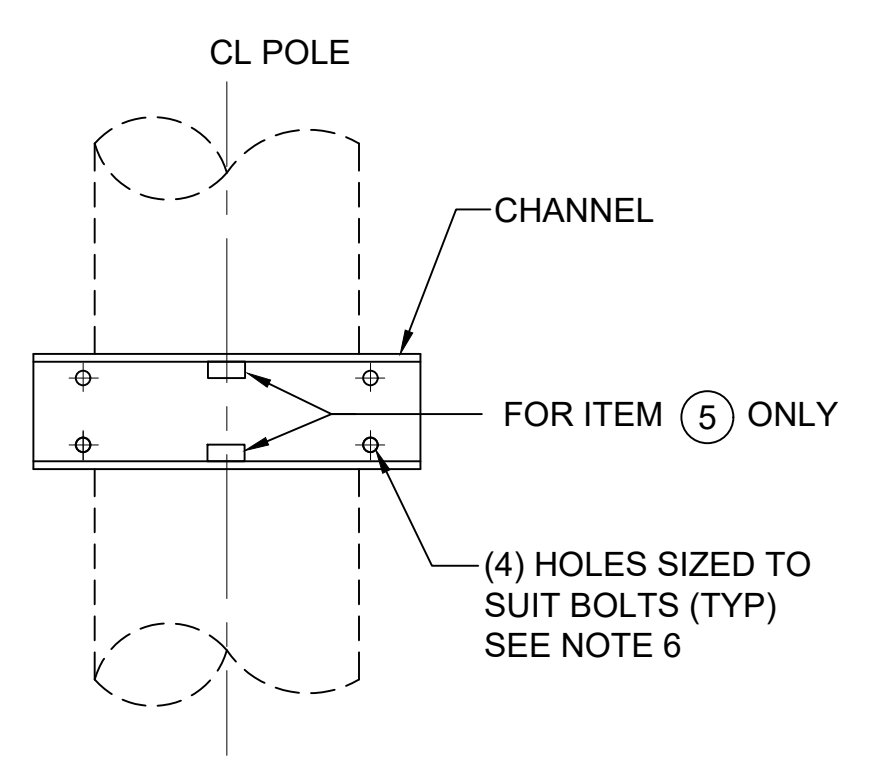
SECTION B
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(BOLTS OMITTED)



SECTION C
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(BOLTS OMITTED)



SECTION D
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(BOLTS OMITTED)



SECTION E
NTS
(BOLTS OMITTED)

| QUANTITIES EACH TYPE | | | | UNITS | DESCRIPTION | ITEM NO. | PART NO./REMARKS |
|----------------------|--------|--------|--------|-------|--|----------|------------------|
| BR4-XX | BR3-XX | BR2-XX | BRF-XX | | | | |
| - | - | - | 1 | EA | BACKING ANGLE | 1 | W/ CLAMP ANGLES |
| - | - | - | 1 | EA | FEEDER SPREADER | 2 | W/ CLAMP ANGLES |
| 4 | 4 | 4 | 2 | EA | BOLT FOR "XX" DIA POLE W/ NUT AND WASHER | 3 | LENGTH AS REQ'D |
| 2 | 1 | 1 | - | EA | CHANNEL SPREADER | 4 | W/ CLAMP ANGLES |
| - | 1 | - | - | EA | CHANNEL SUPPORT | 5 | W/ CLAMP ANGLES |
| - | - | 1 | - | EA | BACKING CHANNEL | 6 | W/ CLAMP ANGLES |
| 4 | 3 | 2 | - | EA | SWIVEL WITH PIN | 7 | NOTE 8 |
| 4 | 3 | 2 | - | EA | HINGE PIN | 8 | |

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| 1 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |
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DRAWN BY:
CHECKED BY:
APPROVED BY:

SUBMITTED BY: DATE: REVIEWED BY: DATE:

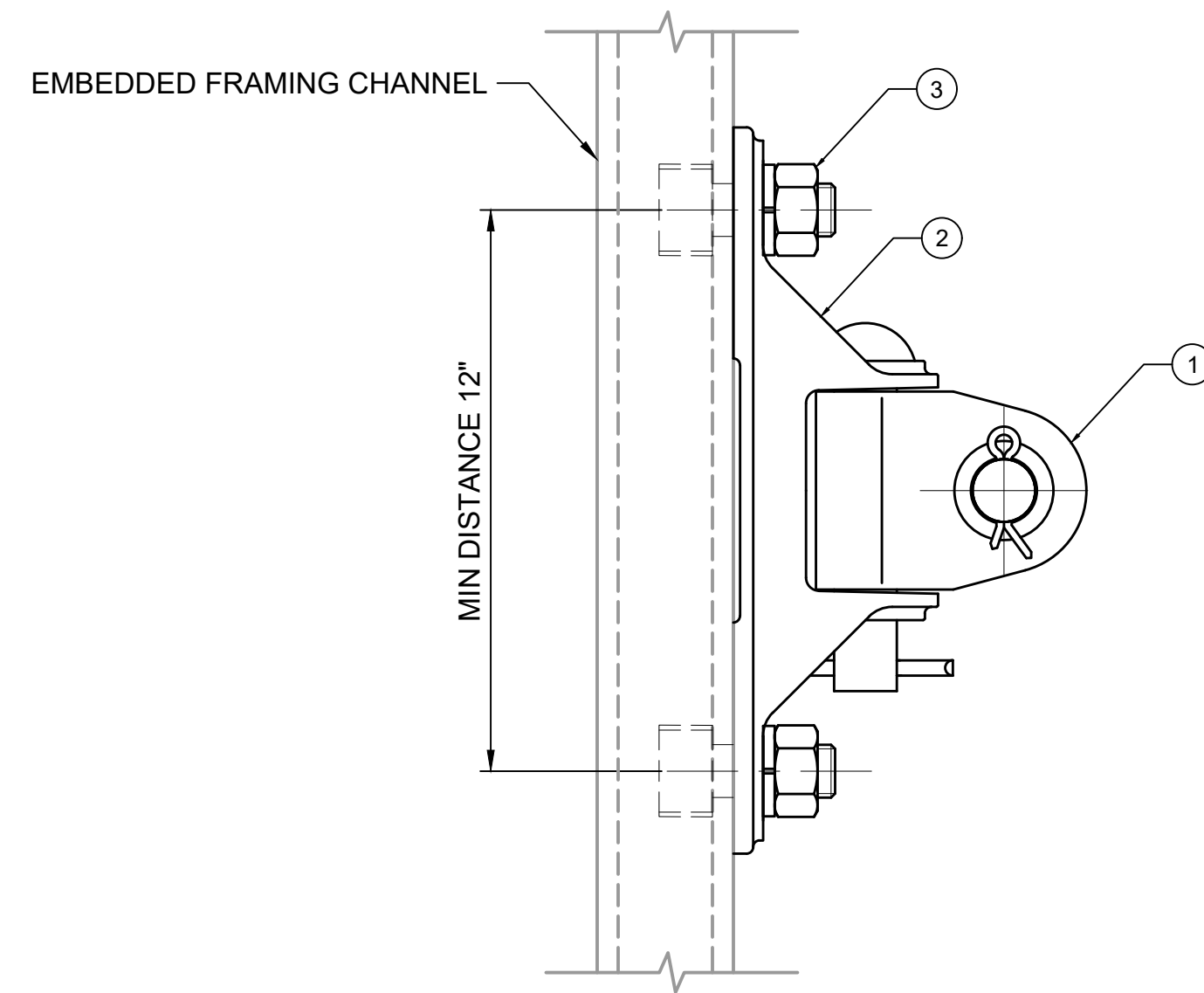
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CONTRACT No.: RTA/LR
DATE: 2/2024

SOUND TRANSIT STANDARD DRAWINGS SYSTEMS
OVERHEAD CATENARY SYSTEM BRACKET ASSEMBLIES BRF, BR2, BR3 & BR4

DRAWING No.: **STD-JOD332**
FACILITY ID:
SHEET No.: REV: 1

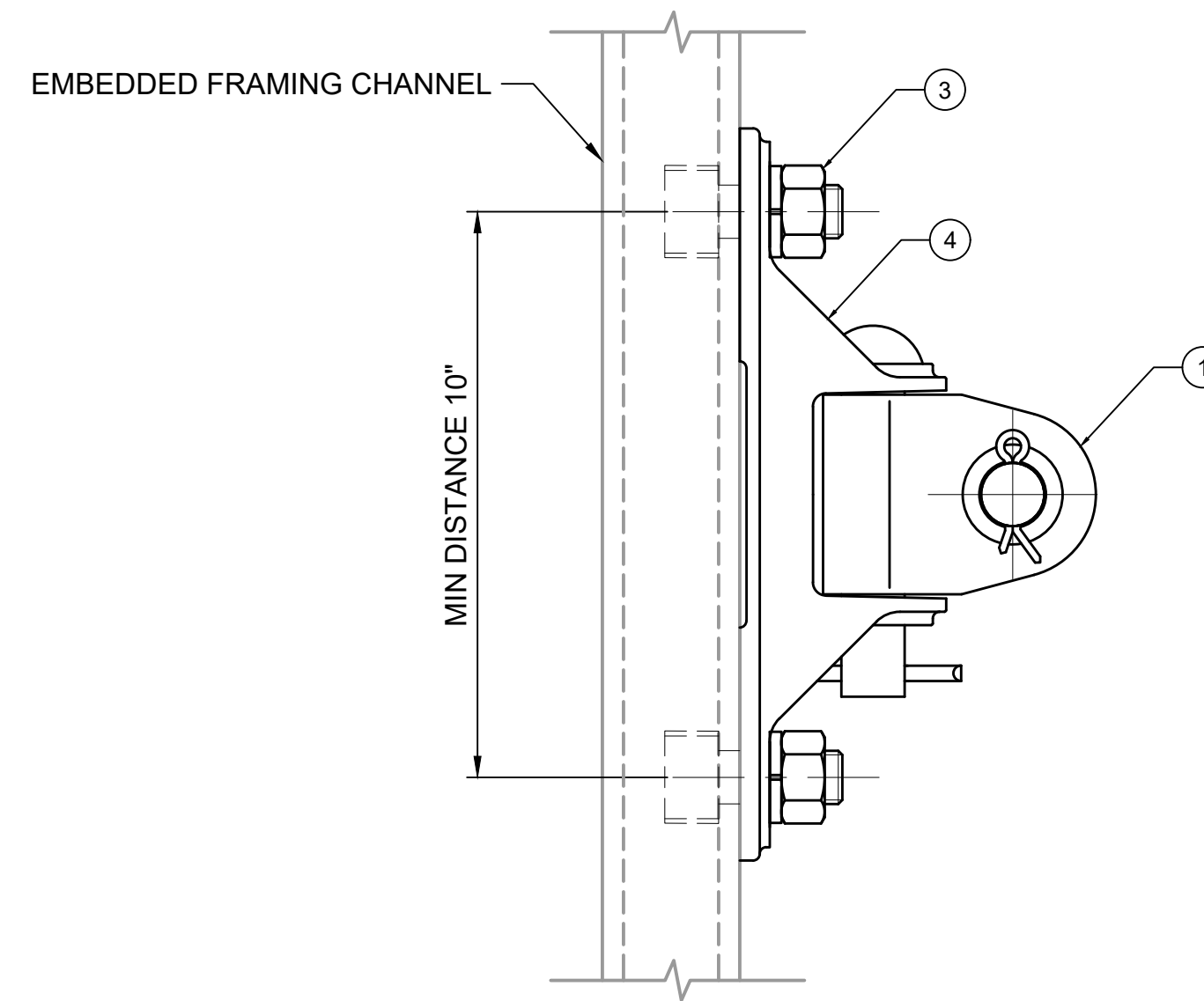
GENERAL NOTES:

1. THE BILL OF MATERIALS ARE TYPICAL FOR THE ASSEMBLY STYLES SHOWN. THE CONTRACTOR SHALL ITEMIZE THE TABLE WITH DESCRIPTIONS AND PART NUMBERS OF COMPONENTS REQUIRED TO COMPLETE EACH ASSEMBLY.
2. CONTRACTOR TO VERIFY ALL QUANTITIES ON THE BILL OF MATERIALS.
3. THE CONTRACTOR IS RESPONSIBLE FOR THE DESIGN OF EACH ASSEMBLY AS A WHOLE.
4. SWIVEL SHALL BE DESIGNED BY THE CONTRACTOR TO SUIT MATING CANTILEVER ASSEMBLY COMPONENTS.



**BRACKET ASSEMBLY FOR CANTILEVER
TO VERTICAL EMBEDDED UNISTRUT BFI-1**

NTS



**BRACKET ASSEMBLY FOR CANTILEVER
TO VERTICAL EMBEDDED UNISTRUT BFI-2**

NTS

| BILL OF MATERIALS | | | | | |
|----------------------|----------|-------|-------------------------------|----------|------------------|
| QUANTITIES EACH TYPE | | UNITS | DESCRIPTION | ITEM NO. | PART NO./REMARKS |
| BFI-2 | BFI-1 | | | | |
| 1 | 1 | EA | SWIVEL CLEVIS W/ PIN | 1 | |
| - | 1 | EA | CANTILEVER SWIVEL BRACKET 12" | 2 | |
| AS REQ'D | AS REQ'D | EA | HARDWARE FOR FRAMING CHANNEL | 3 | |
| 1 | - | EA | CANTILEVER SWIVEL BRACKET 10" | 4 | |


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LINE IS 1" AT FULL SCALE



SCALE:
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FILENAME:
STD-JOD333
CONTRACT No.:
RTA/LR
DATE:
2/2024

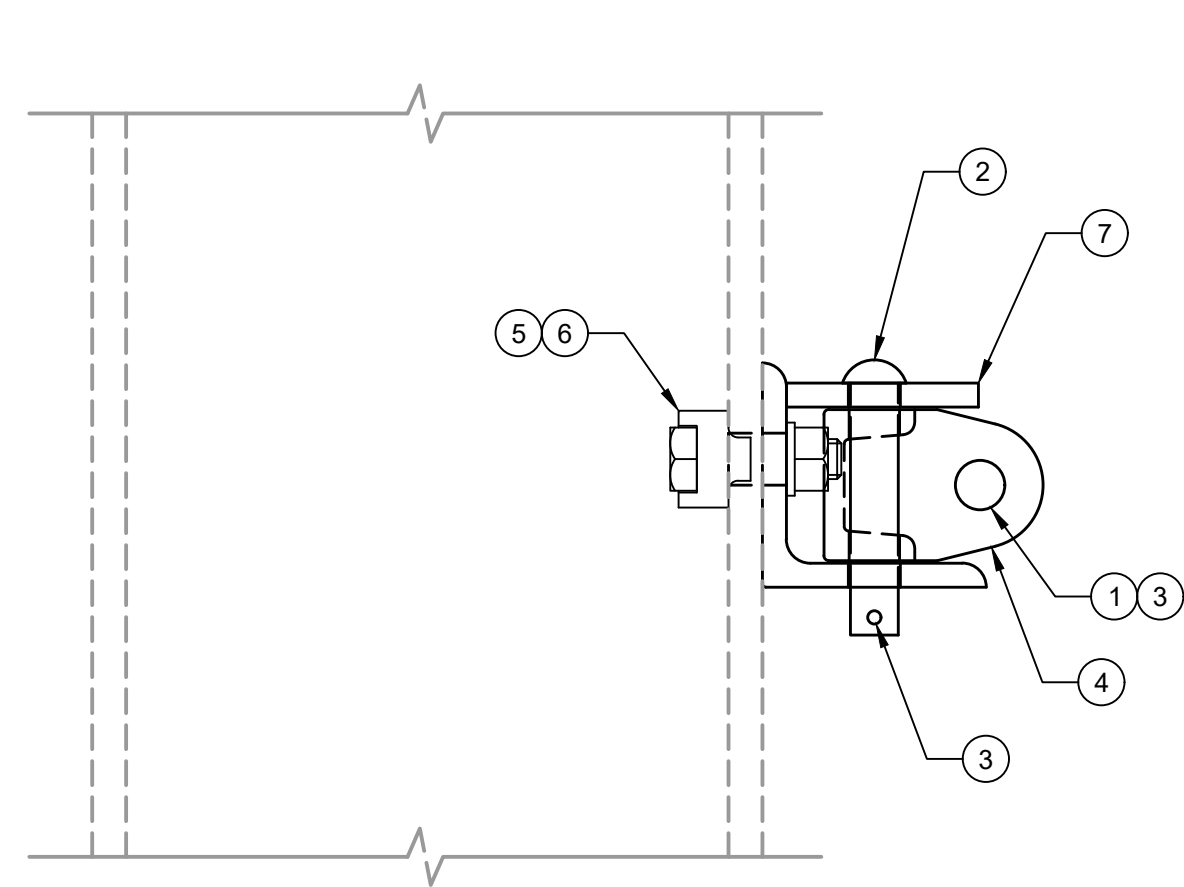
**SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS**

OVERHEAD CATENARY SYSTEM
FRAMING INSERT BRACKET ASSEMBLIES
BFI-1 & BFI-2

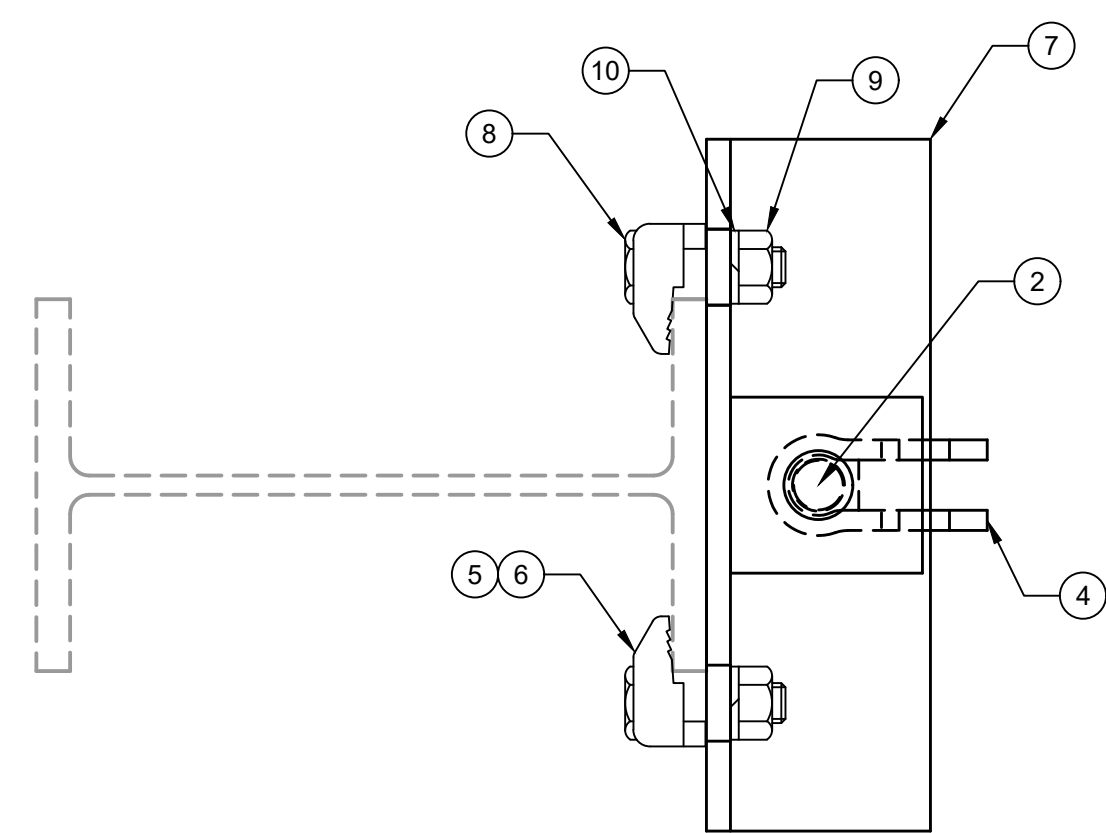
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| DRAWING No.: | STD-JOD333 |
| FACILITY ID: | |
| SHEET No.: | REV: |
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GENERAL NOTES:

1. BILL OF MATERIALS DETAILS ARE TYPICAL FOR THE ASSEMBLY STYLES SHOWN. THE CONTRACTOR SHALL ITEMIZE THE TABLE WITH DESCRIPTIONS AND PART NUMBERS OF COMPONENTS REQUIRED TO COMPLETE EACH ASSEMBLY.
2. CONTRACTOR TO DETERMINE POLE SIZE AT ATTACHMENT HEIGHT AND COORDINATE DESIGN OF POLE BRACKET PRIOR TO FABRICATION.
3. ALL DIMENSIONS AND BOLT SIZES SHALL BE DETERMINED BY CONTRACTOR BASED ON FURNISHED CATENARY COMPONENTS PRIOR TO FABRICATION.
4. BOLT THREAD PROJECTION THROUGH NUTS SHALL NOT EXCEED 2 INCHES IN LENGTH.
5. SWIVEL SHALL BE DESIGNED BY THE CONTRACTOR TO SUIT MATING CANTILEVER ASSEMBLY COMPONENTS.
6. FOR SQUARE TUBE POLES REPLACE LINDAPTERS WITH THREADED RODS (HDG) AND A BACK PLATE.



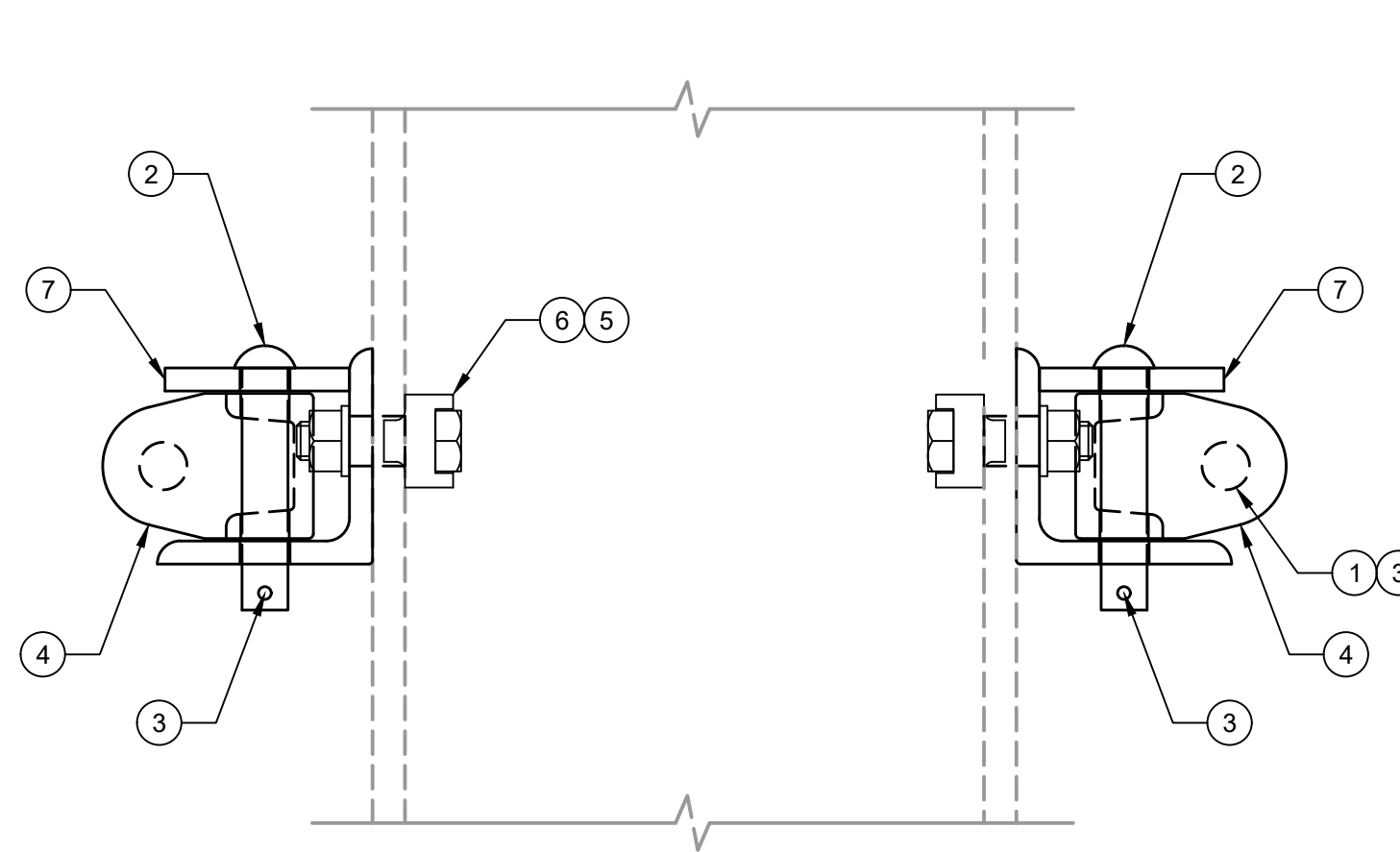
ELEVATION



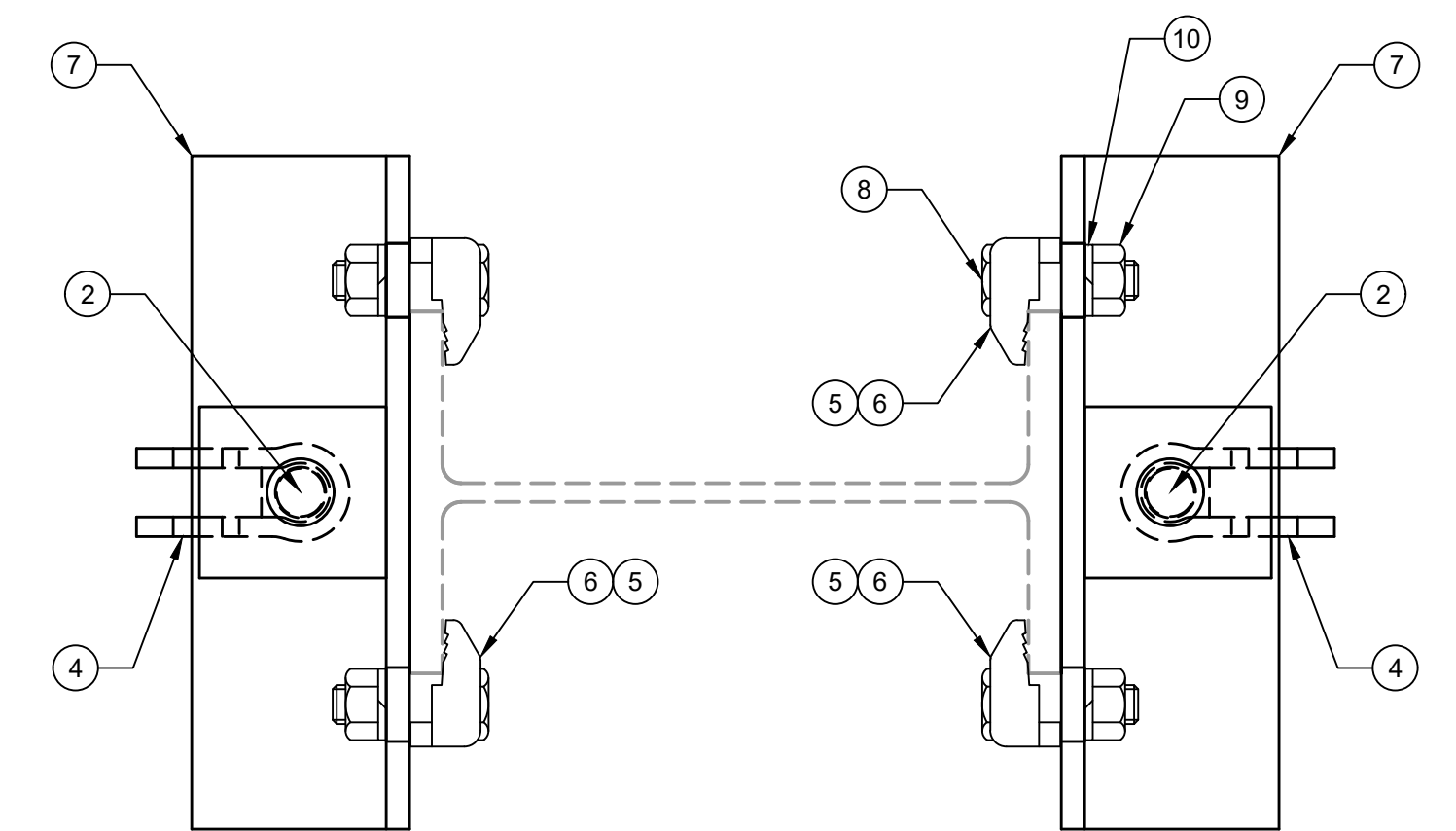
PLAN

SINGLE CANTILEVER BRACKET FOR WIDE FLANGE POLE BR-1

NTS



ELEVATION



PLAN

BACK TO BACK CANTILEVER BRACKET FOR WIDE FLANGE POLE BR-2

NTS

| BILL OF MATERIALS | | | | | |
|----------------------|------|-------|---|----------|------------------|
| QUANTITIES EACH TYPE | | UNITS | DESCRIPTION | ITEM NO. | PART NO./REMARKS |
| BR-2 | BR-1 | | | | |
| 2 | 1 | EA | PIN WITH ROUND HEAD | 1 | |
| 2 | 1 | EA | PIN WITH ROUND HEAD | 2 | |
| 4 | 2 | EA | SPLIT PIN | 3 | |
| 2 | 1 | EA | SWIVEL WITH CLEVIS | 4 | NOTE 5 |
| 4 | 2 | EA | BEAM CLAMP, LINDAPTER OR EQUAL | 5 | |
| 4 | 2 | EA | SHIM, FOR LINDAPTER BEAM CLAMP OR EQUAL | 6 | |
| 2 | 1 | EA | BRACKET FOR CANTILEVER - WIDE FLANGE POLE - ACROSS FLANGE | 7 | |
| 4 | 2 | EA | HEX BOLT | 8 | |
| 4 | 2 | EA | HEX NUT | 9 | |
| 4 | 2 | EA | SPRING LOCK WASHER | 10 | |

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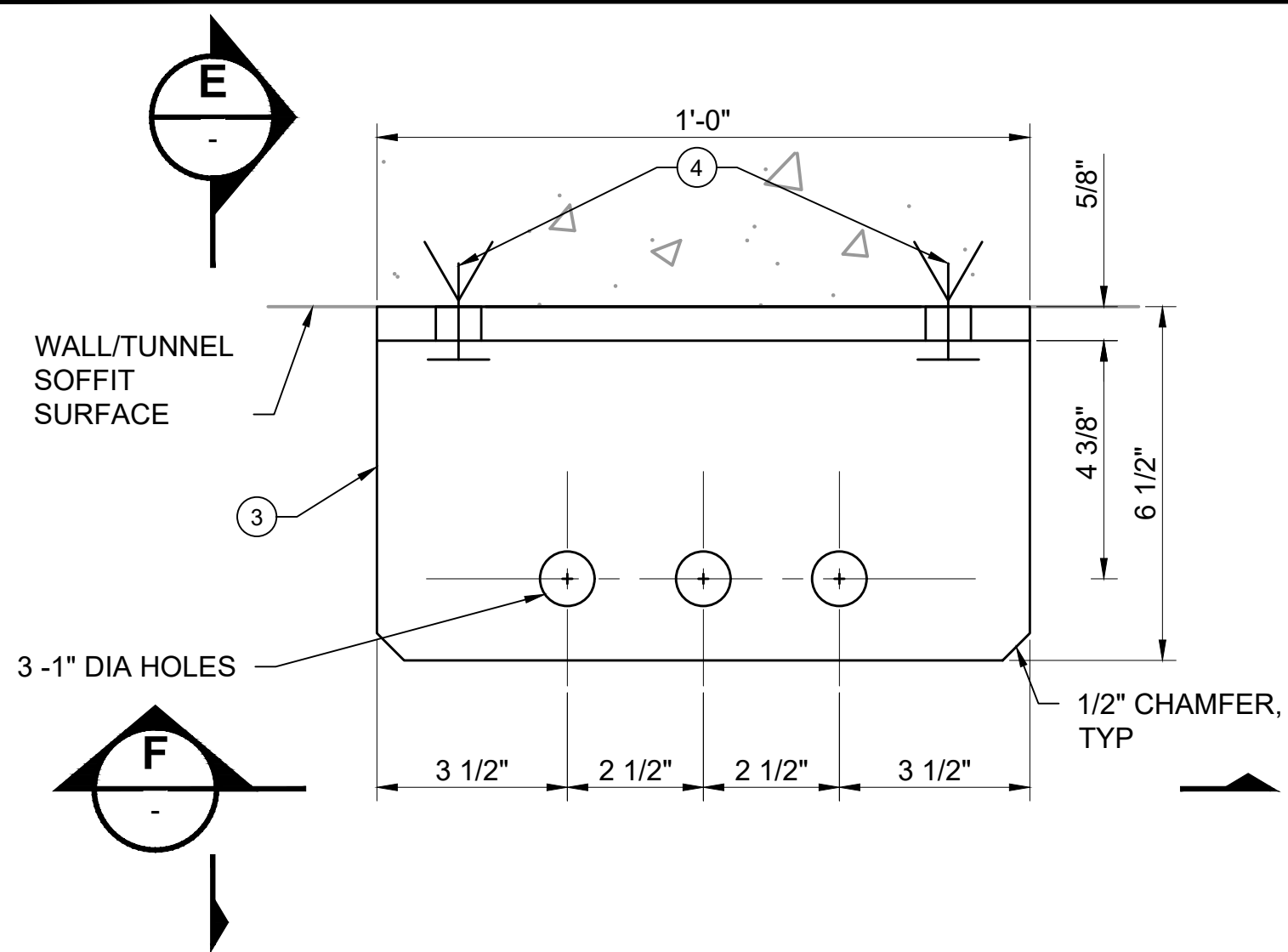
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LINE IS 1" AT FULL SCALE

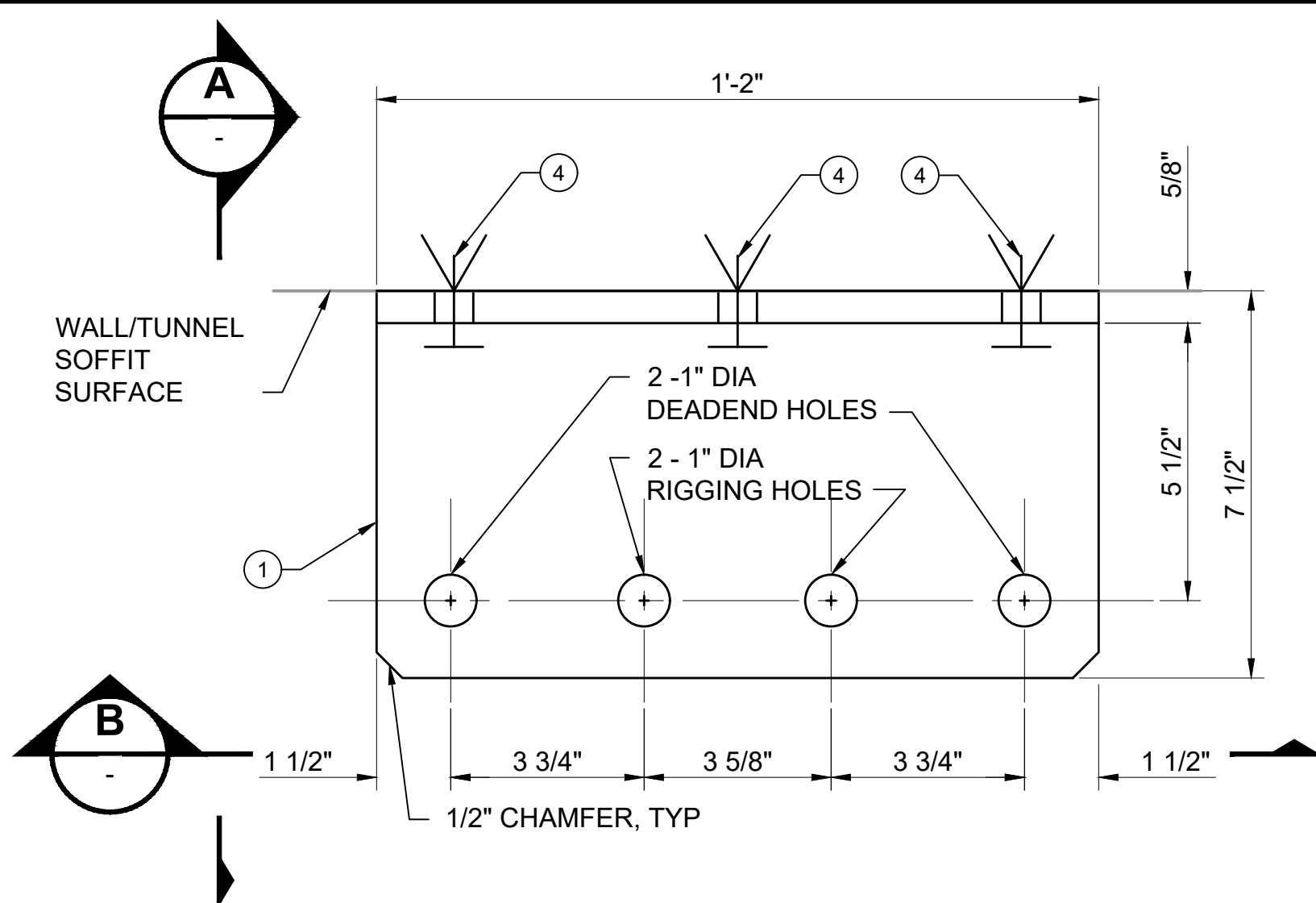
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| CONTRACT No.: RTA/LR |
| DATE: 2/2024 |

SOUND TRANSIT
STANDARD DRAWINGS
 SYSTEMS
 OVERHEAD CATENARY SYSTEM
 WIDE FLANGE POLE BRACKET ASSEMBLIES
 BR-1 & BR-2

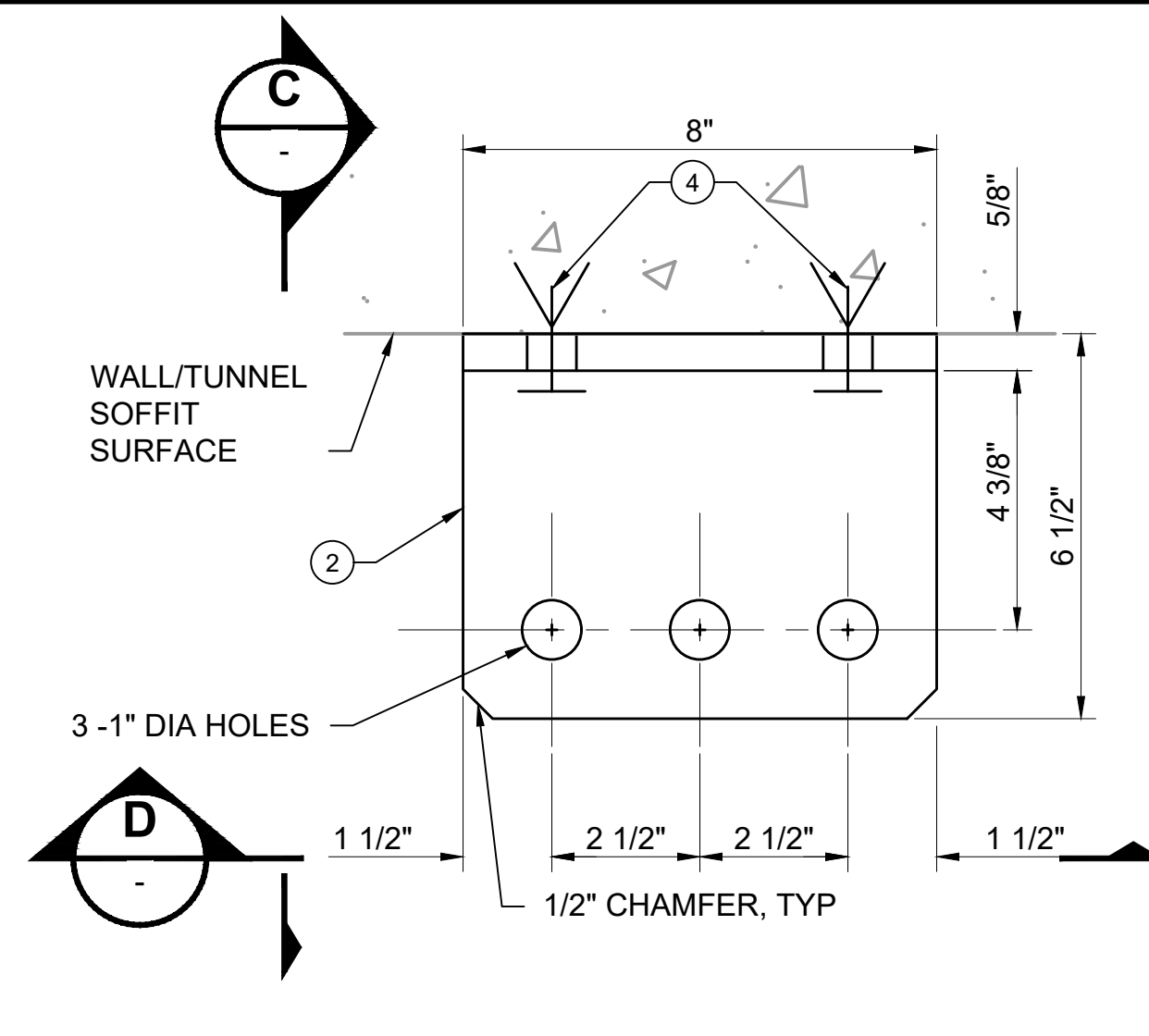
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| FACILITY ID: |
| SHEET No.: 1 |



**TERMINATION BRACKET
IN TUNNELS ASSEMBLY AB-4**
NTS



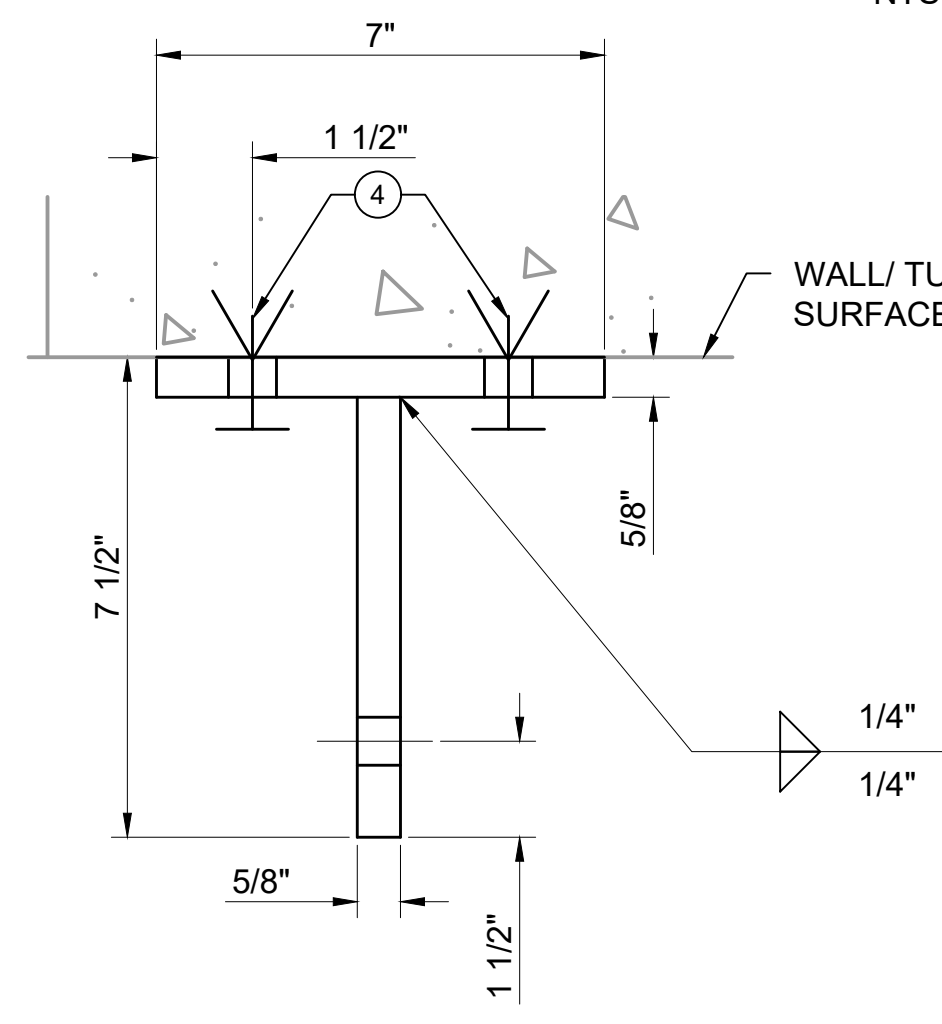
**MESSENGER WIRE TERMINATION BRACKET
IN TUNNELS ASSEMBLY AB-5**
NTS



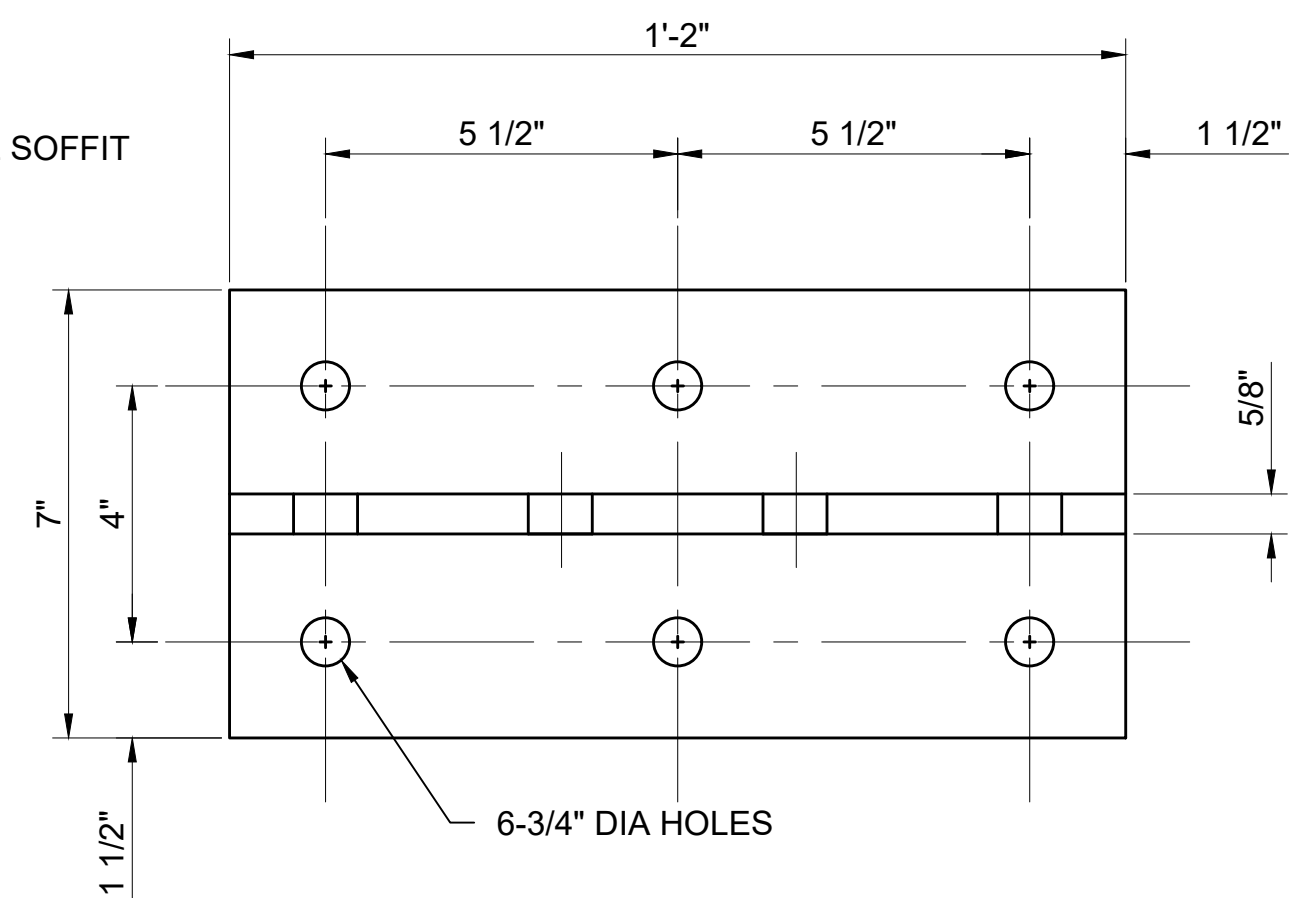
**CONTACT WIRE TERMINATION BRACKET
IN TUNNELS ASSEMBLY AB-6**
NTS

GENERAL NOTES:

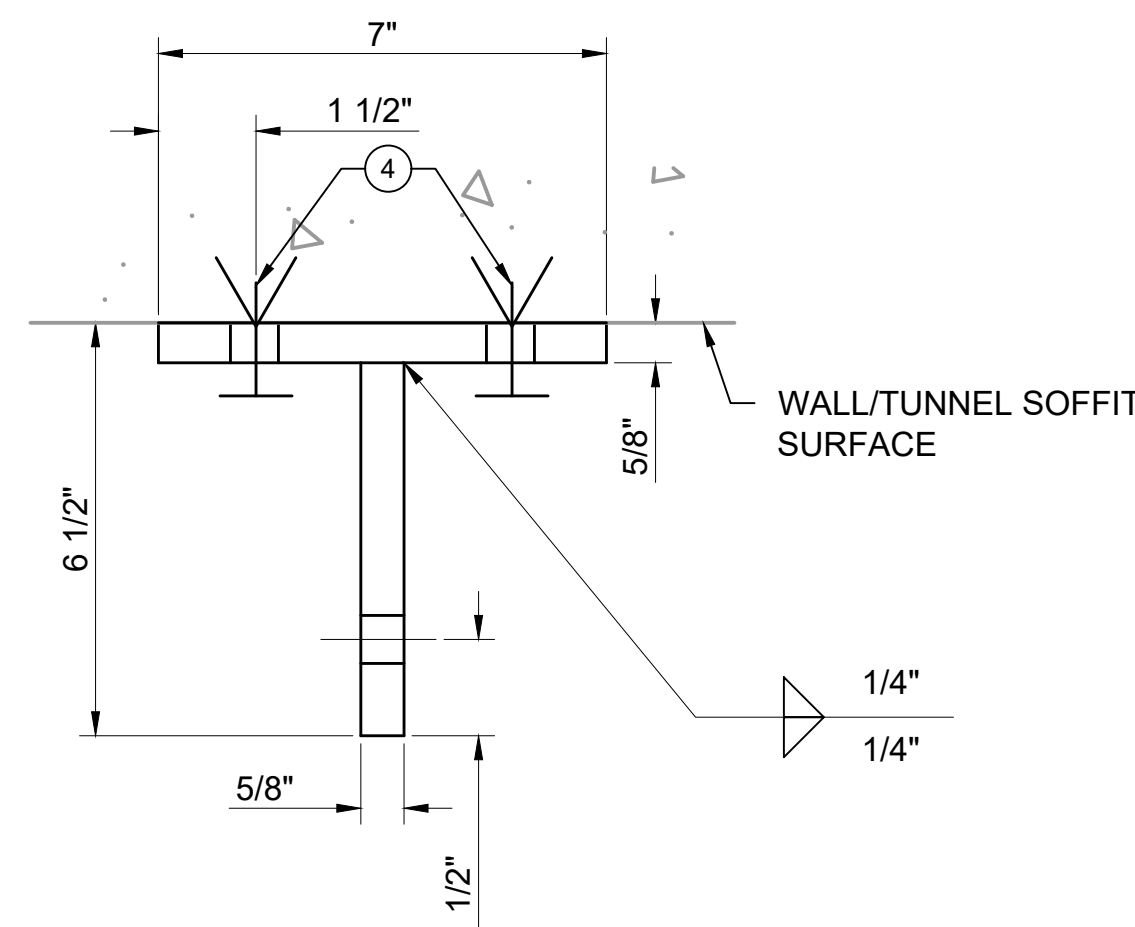
- FOR ABBREVIATIONS, LEGENDS AND SYMBOLS, SEE DWGS JZN001 AND JZN002.
- ANCHOR BOLT REQUIREMENTS TO BE PROVIDED IN OVERHEAD CONTACT SYSTEM ANCHORAGE TO CONCRETE SPECIFICATIONS.
- CONTRACTOR TO VERIFY ALL QUANTITIES ON THE BILL OF MATERIALS.
- THE CONTRACTOR IS RESPONSIBLE FOR THE DESIGN OF EACH ASSEMBLY AS A WHOLE.
- ANCHOR BRACKET STEEL SHALL CONFORM TO ASTM A53 GRADE B.
- CONNECTION PLATE STEEL SHALL CONFORM TO ASTM A572 GRADE 50 WITH A MINIMUM YIELD STRESS $F_y = 50$ KSI.
- ANCHOR BRACKET SHALL BE HOT DIPPED GALVANIZED IN ACCORDANCE WITH ASTM A123.
- THE BILL OF MATERIALS ARE TYPICAL FOR THE ASSEMBLY STYLES SHOWN. THE CONTRACTOR SHALL ITEMIZE THE TABLE WITH DESCRIPTIONS AND PART NUMBERS OF COMPONENTS REQUIRED TO COMPLETE EACH ASSEMBLY.
- CONTRACTOR SHALL VERIFY STEEL REINFORCEMENT LOCATIONS IN CONCRETE STRUCTURES PRIOR TO DRILLING AT OCS SUPPORT LOCATIONS. DETAILED REQUIREMENTS TO BE PROVIDED IN SPECIFICATIONS.



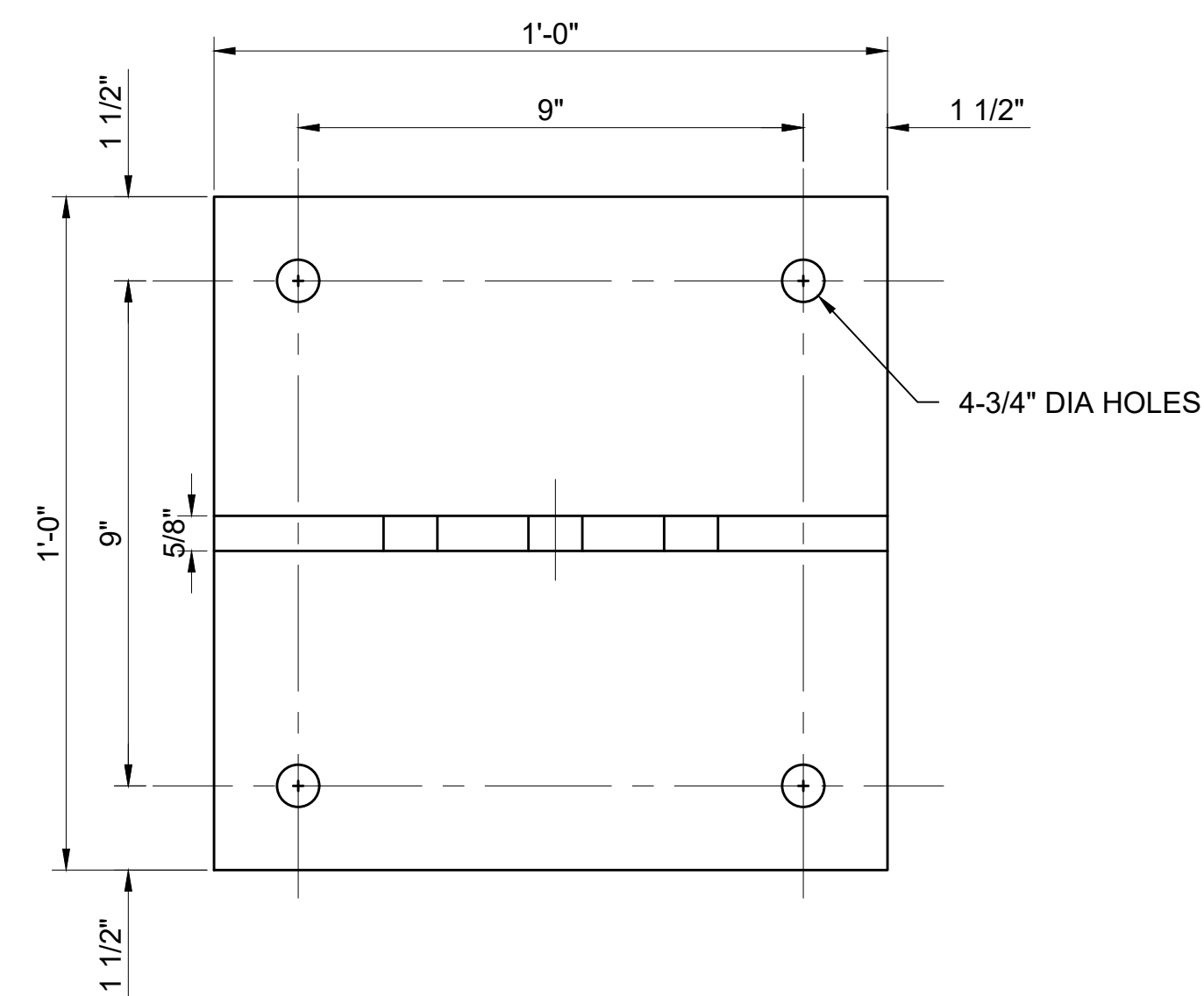
SECTION A
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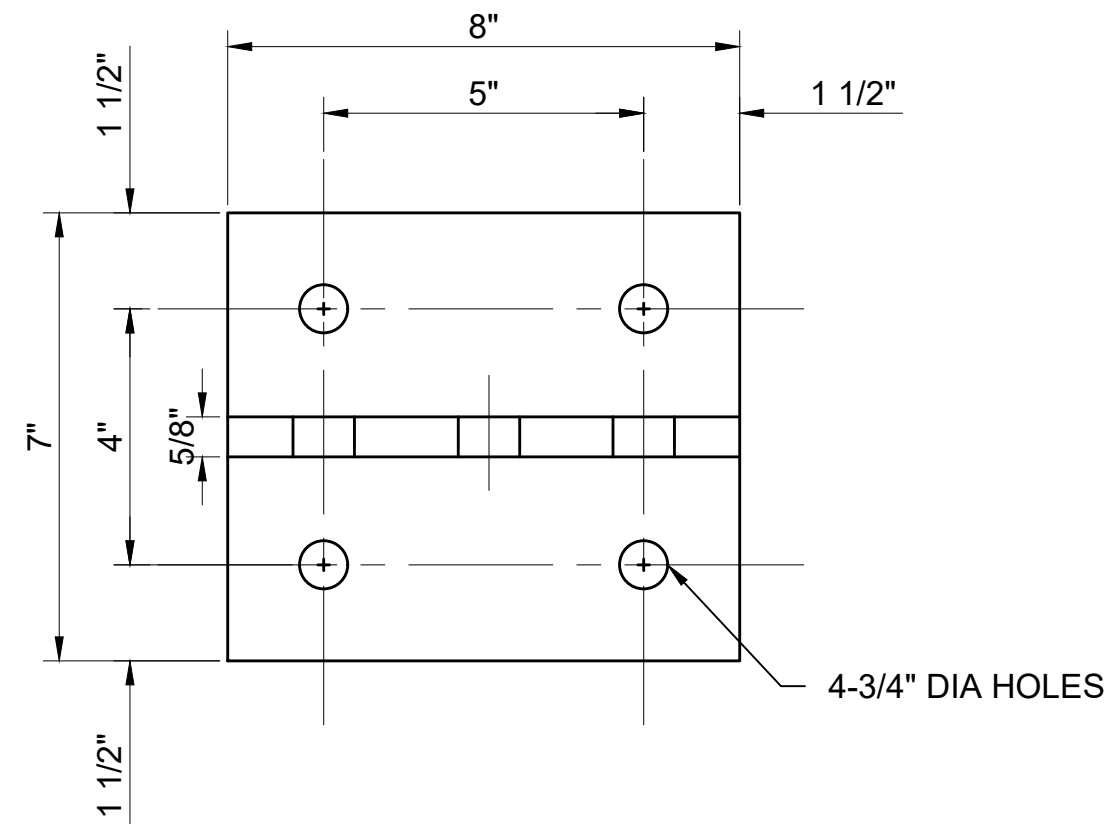
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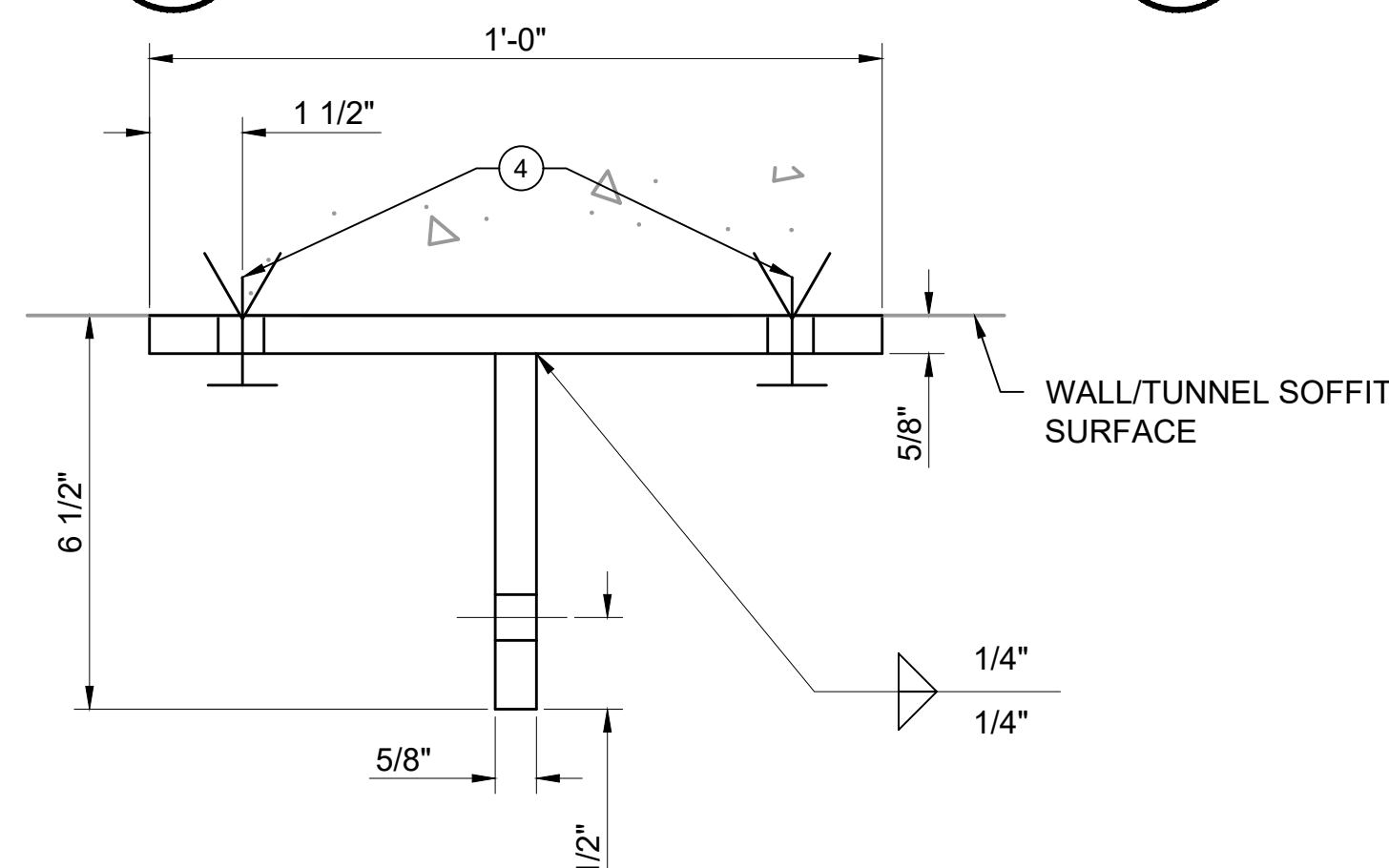
SECTION C
NTS



SECTION D
NTS



SECTION E
NTS



SECTION F
NTS

| BILL OF MATERIALS | | | | | | |
|----------------------|------|------|-------|-----------------------------|----------|------------------|
| QUANTITIES EACH TYPE | | | UNITS | DESCRIPTION | ITEM NO. | PART NO./REMARKS |
| AB-6 | AB-5 | AB-4 | | | | |
| - | 1 | - | EA | MESSENGER WIRE TERM BRACKET | 1 | |
| 1 | - | - | EA | CONTACT WIRE TERM BRACKET | 2 | |
| - | - | 1 | EA | TERM BRACKET | 3 | |
| 4 | 6 | 4 | EA | ANCHOR BOLT | 4 | SEE NOTE 2 |


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SCALE: NTS
FILENAME: STD-JOD335
CONTRACT No.: RTA/LR
DATE: 2/2024

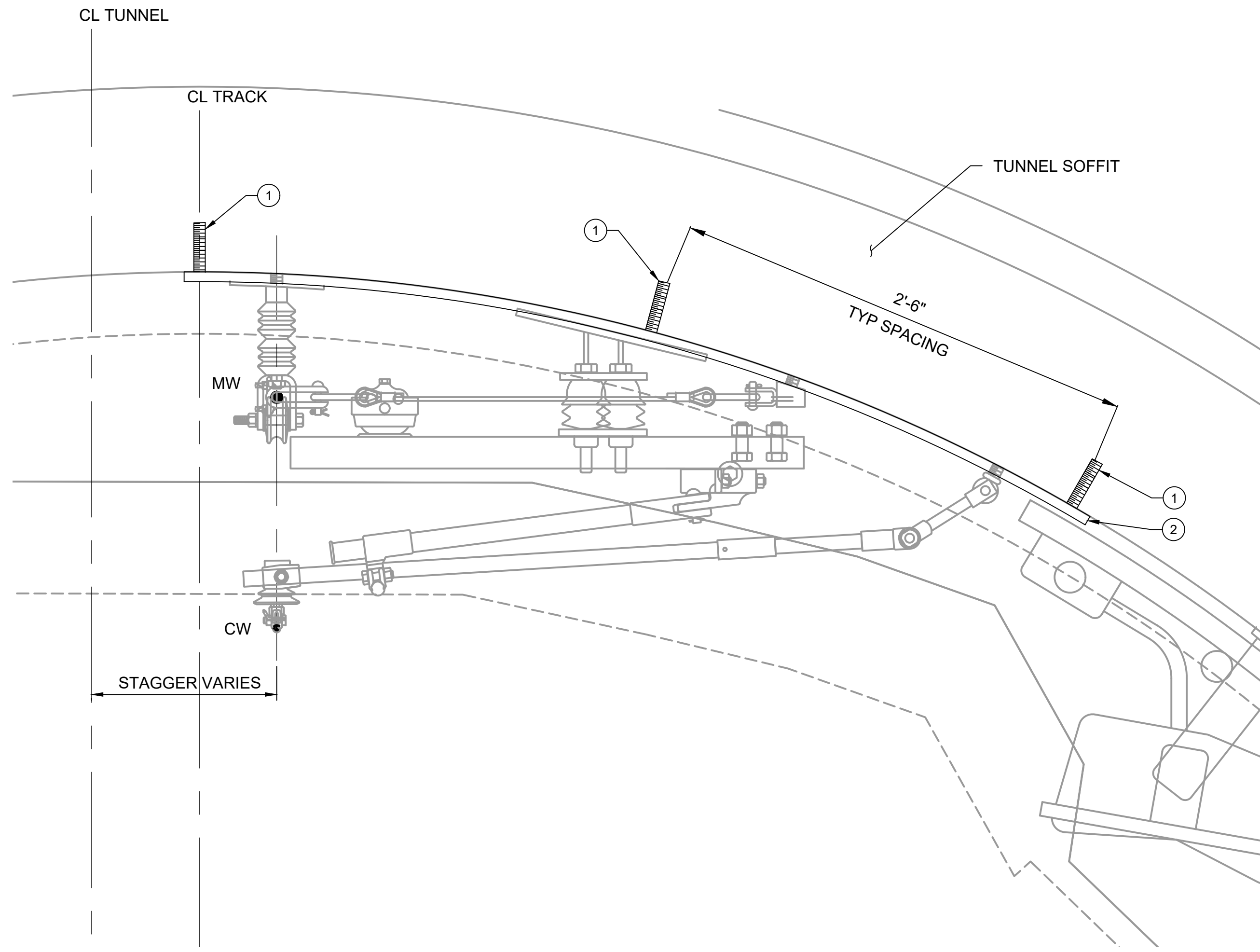
**SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS**

OVERHEAD CATENARY SYSTEM
ANCHOR BRACKET ASSEMBLIES
AB-5 & AB-6

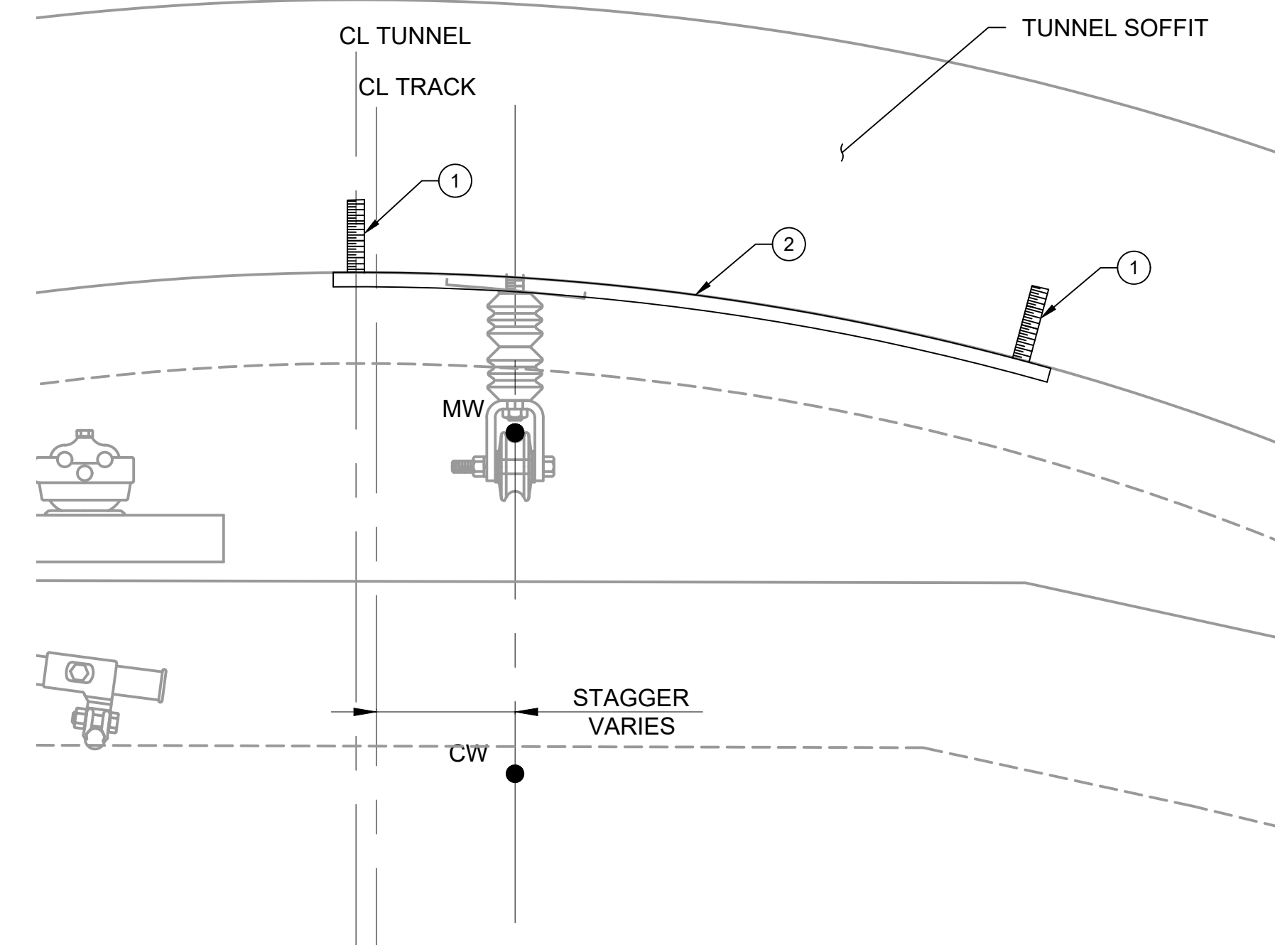
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| DRAWING No.: | STD-JOD335 |
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GENERAL NOTES:

1. FOR ABBREVIATIONS, LEGENDS AND SYMBOLS, SEE DWGS JZN001 AND JZN002.
2. VALUE AND DIRECTION OF STAGGERS TO BE SHOWN ON OCS LAYOUT PLANS.
3. ACTUAL CATENARY SYSTEM HEIGHT AND INDIVIDUAL WIRE HEIGHTS TO BE SHOWN ON OCS LAYOUT PLANS AND SCHEDULES.
4. FOR TS-9 ASSEMBLY, STAGGER IS NOT GIVEN. INSTALL SUPPORT DIRECTLY IN-LINE FROM CW REGISTRATION TO CW REGISTRATION. DETAILS TO BE SHOWN ON OCS LAYOUT PLANS.
5. CURVE FRAMING CHANNEL TO FIT SHAPE OF TUNNEL.
6. USE 5/8" HILTI KWIK II AISI 304/316 WITH 4" EMBED OR EQUIVALENT
ALLOWABLE TENSION = 2400 LB IN 3000 PSI CONCRETE
ALLOWABLE SHEAR = 3300 LB
7. USE 1/2" HILTI KWIK II AISI 304/316 SS BOLT WITH 3 1/2" EMBED OR EQUIVALENT
ALLOWABLE TENSION = 1730 LB IN 3000 PSI CONCRETE
ALLOWABLE SHEAR = 2200 LB
8. INSTALL ANCHOR BOLTS AT PREDETERMINED DIMPLES PROVIDED BY CIVIL CONTRACTOR IN PRECAST TUNNEL LINING. WHERE NO DIMPLES ARE AVAILABLE, XRAY ACCEPTABLE DRILLING LOCATIONS TO PREVENT DAMAGE TO INTERNAL STRUCTURAL REBAR.
9. CONTRACTOR TO VERIFY ALL QUANTITIES ON THE BILL OF MATERIALS.
10. THE CONTRACTOR IS RESPONSIBLE FOR THE DESIGN OF EACH ASSEMBLY AS A WHOLE.
11. CONTRACTOR SHALL VERIFY STEEL REINFORCEMENT LOCATIONS IN CONCRETE STRUCTURES PRIOR TO DRILLING AT OCS SUPPORT LOCATIONS. DETAILED REQUIREMENTS TO BE PROVIDED IN SPECIFICATIONS.



FRAMING CHANNEL IN TUNNELS ASSEMBLY AB-7
NTS



FRAMING CHANNEL FOR MESSENGER WIRE VERTICAL SUPPORT ASSEMBLY AB-8
NTS

| BILL OF MATERIALS | | | | | |
|----------------------|------|-------|---------------------------------|----------|-------------------------------|
| QUANTITIES EACH TYPE | | UNITS | DESCRIPTION | ITEM NO. | PART NO./ REMARKS |
| AB-8 | AB-7 | | | | |
| 2 | 3 | EA | ANCHOR BOLT | 1 | SEE NOTES 6, 7, 11 |
| 3 | 5.25 | LF | FRAMING CHANNEL STAINLESS STEEL | 2 | P3300T SS x 2' UNISTRUT OR EQ |


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| 0 | 8/2019 | | | | REVISED SYSTEMS DIRECTIVE DRAWINGS |

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LINE IS 1" AT FULL SCALE



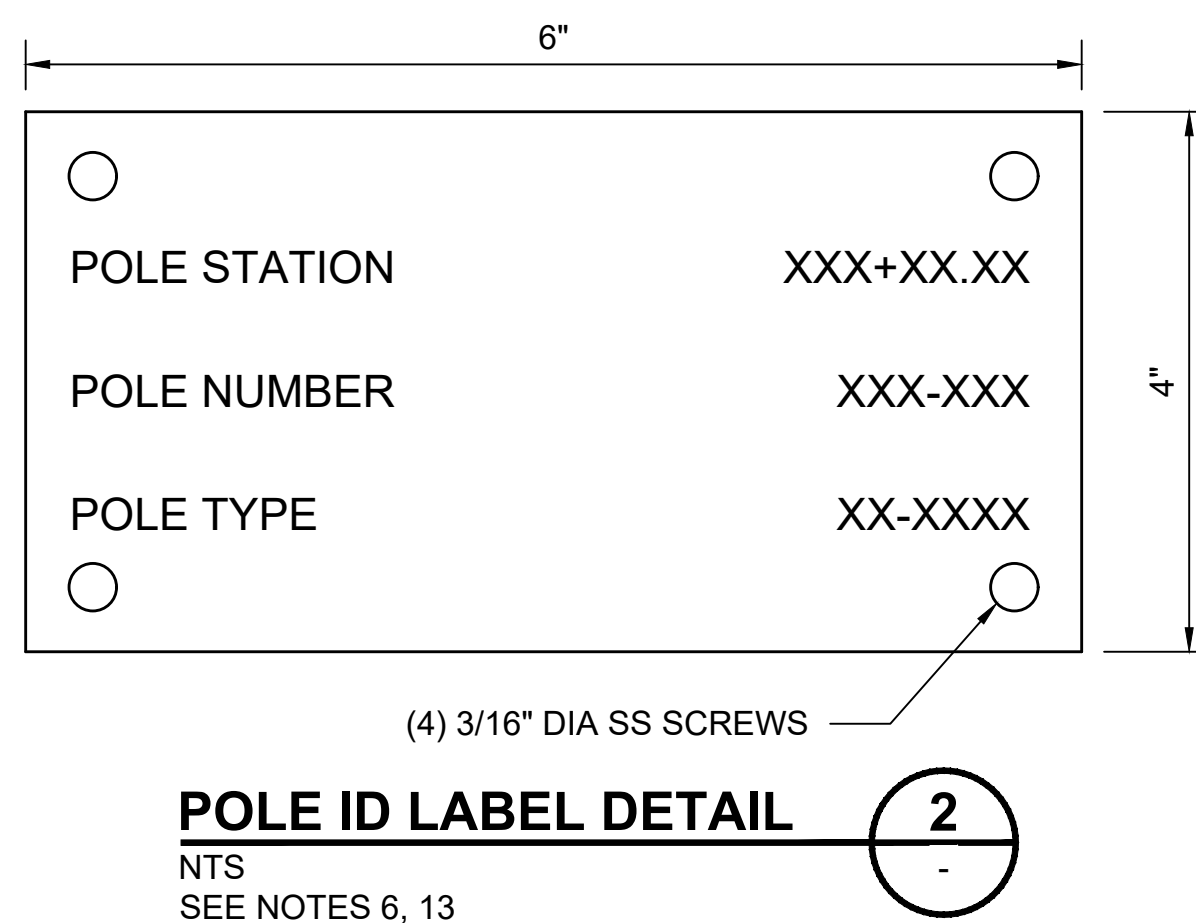
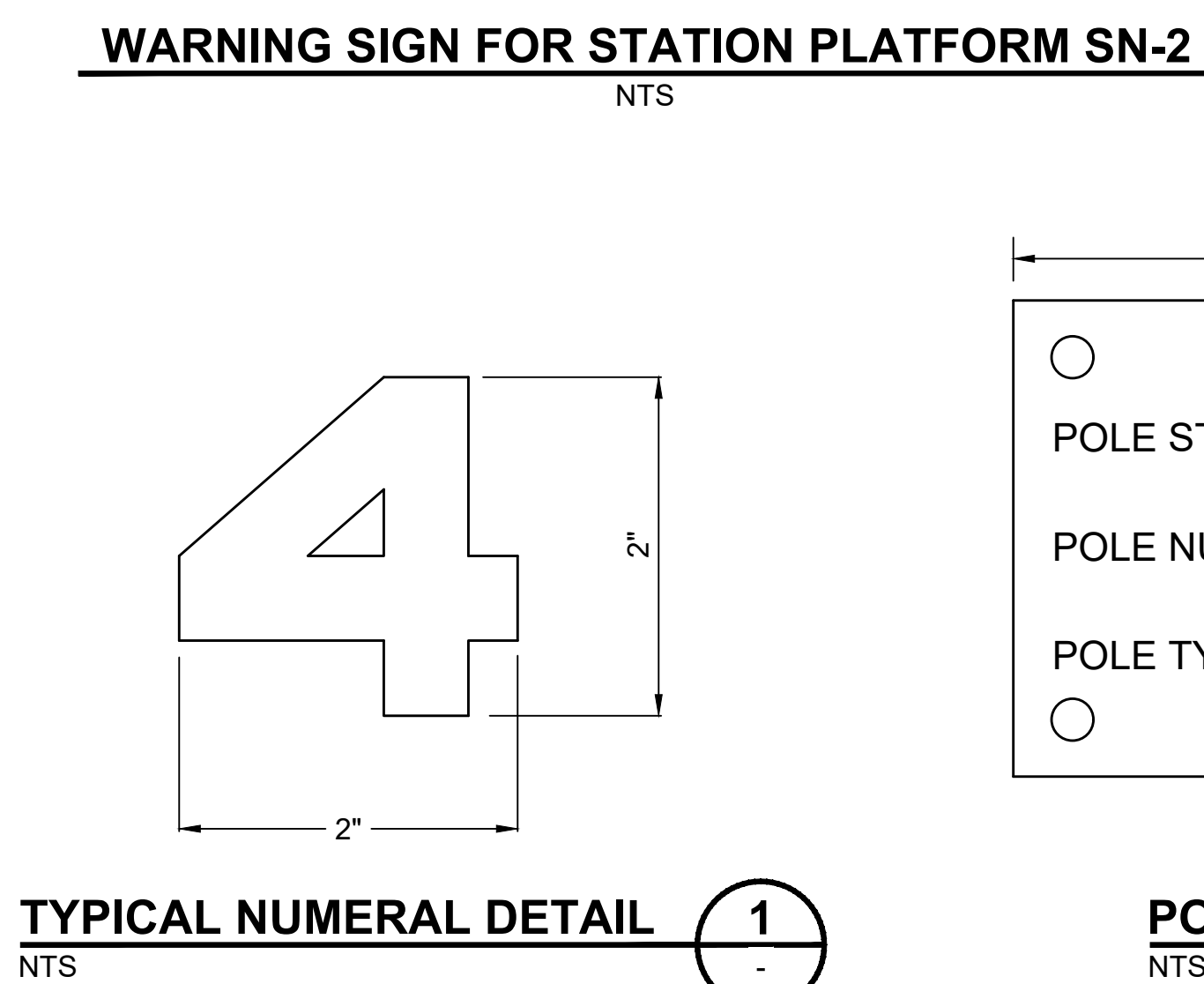
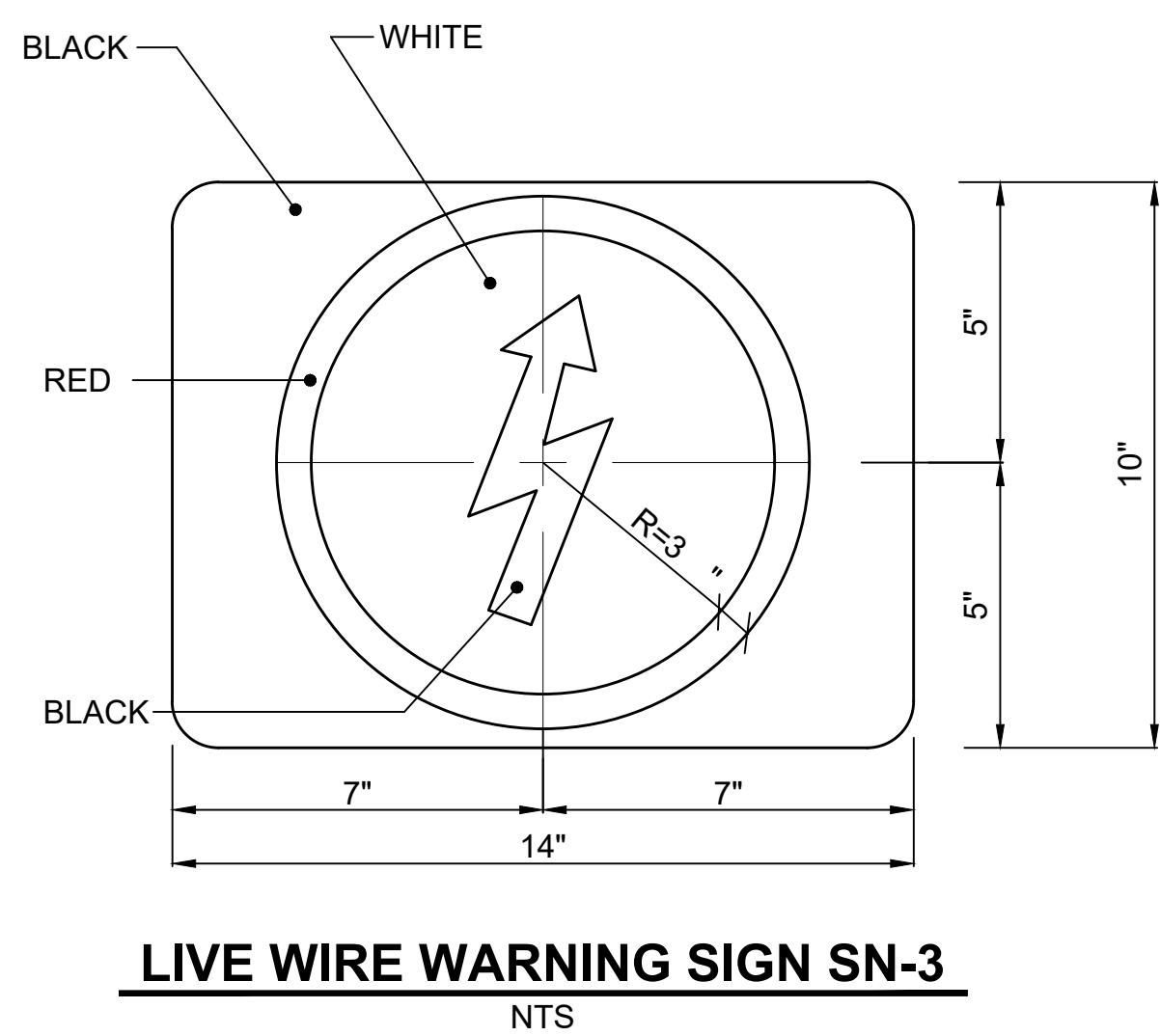
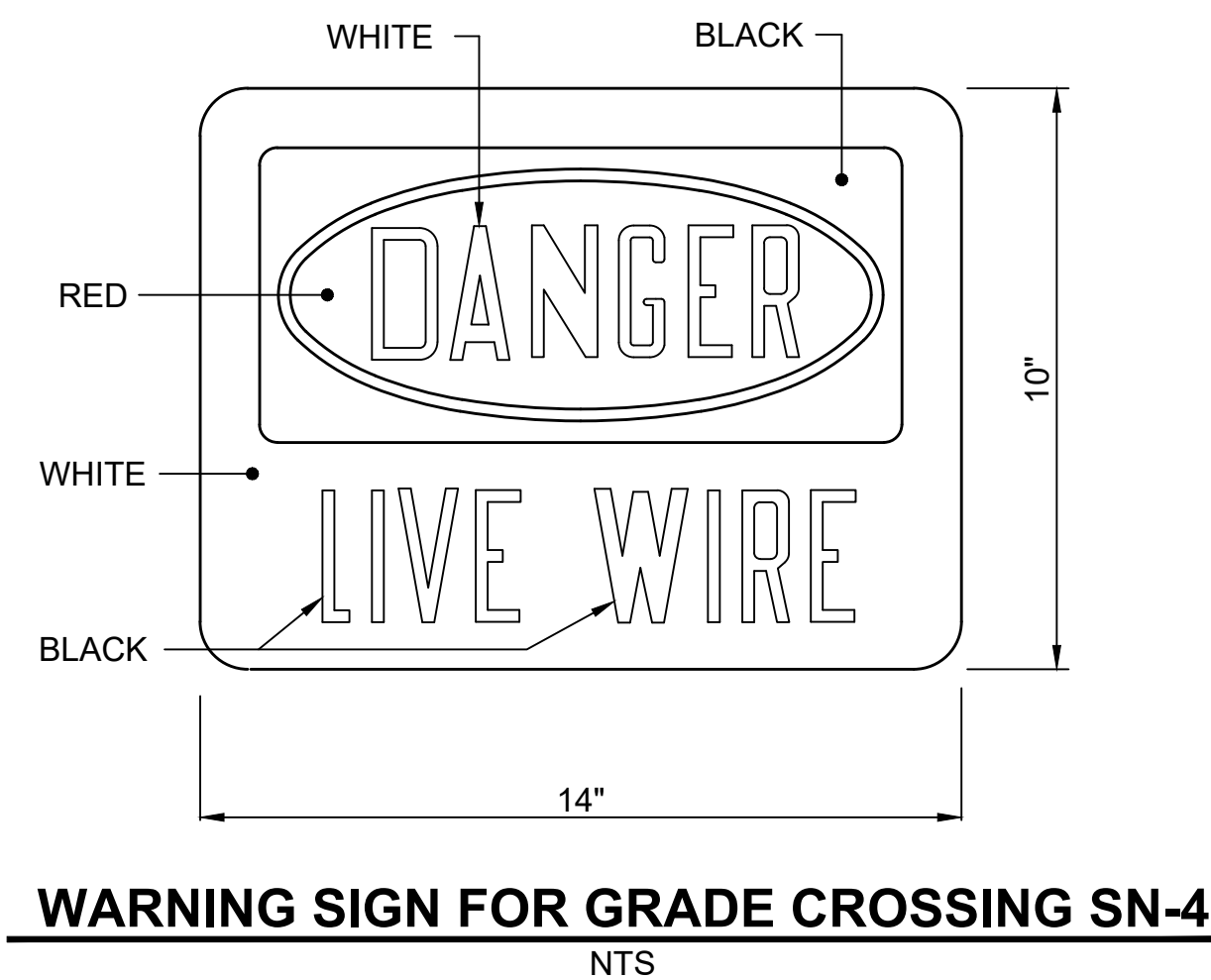
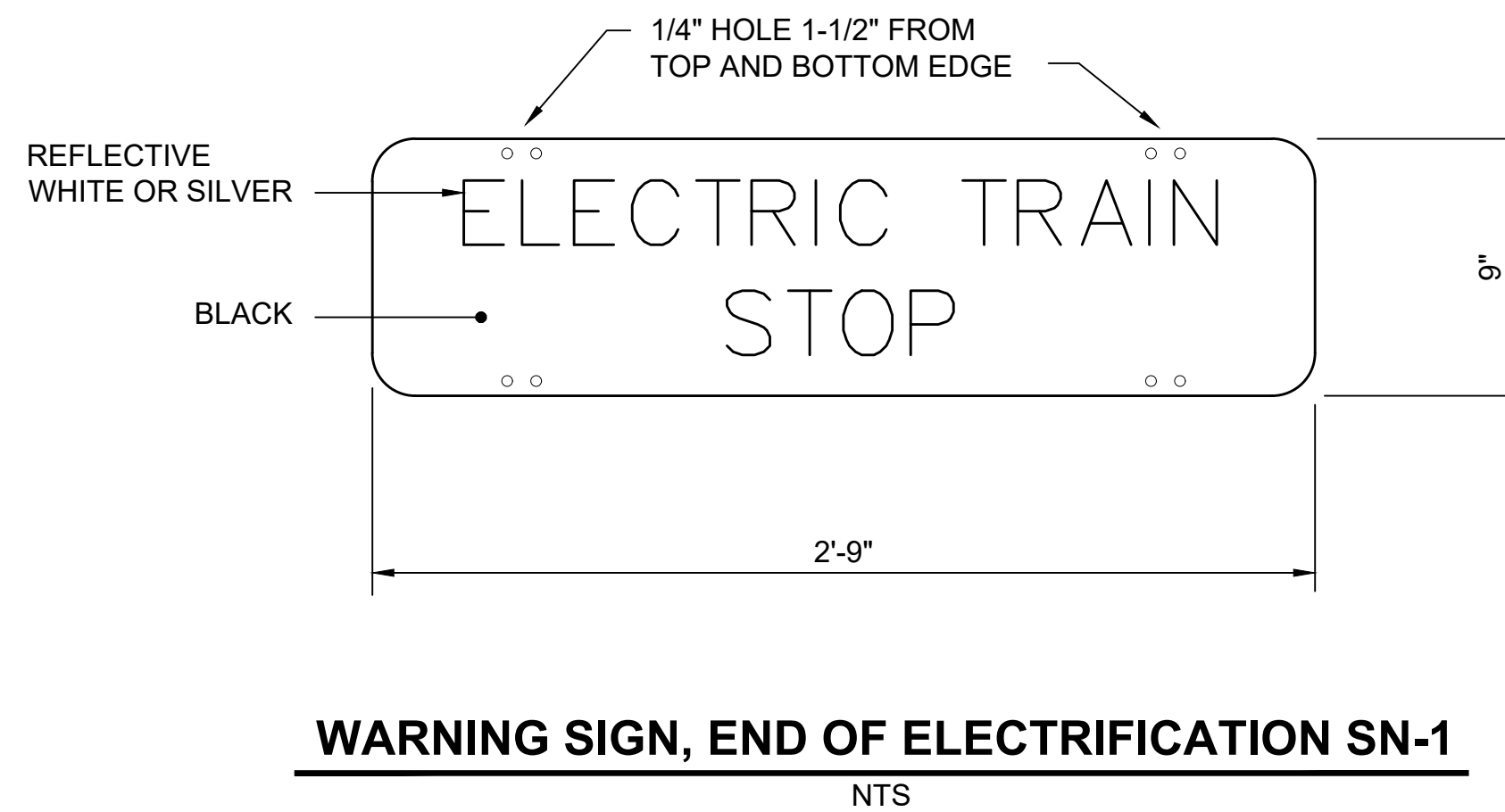
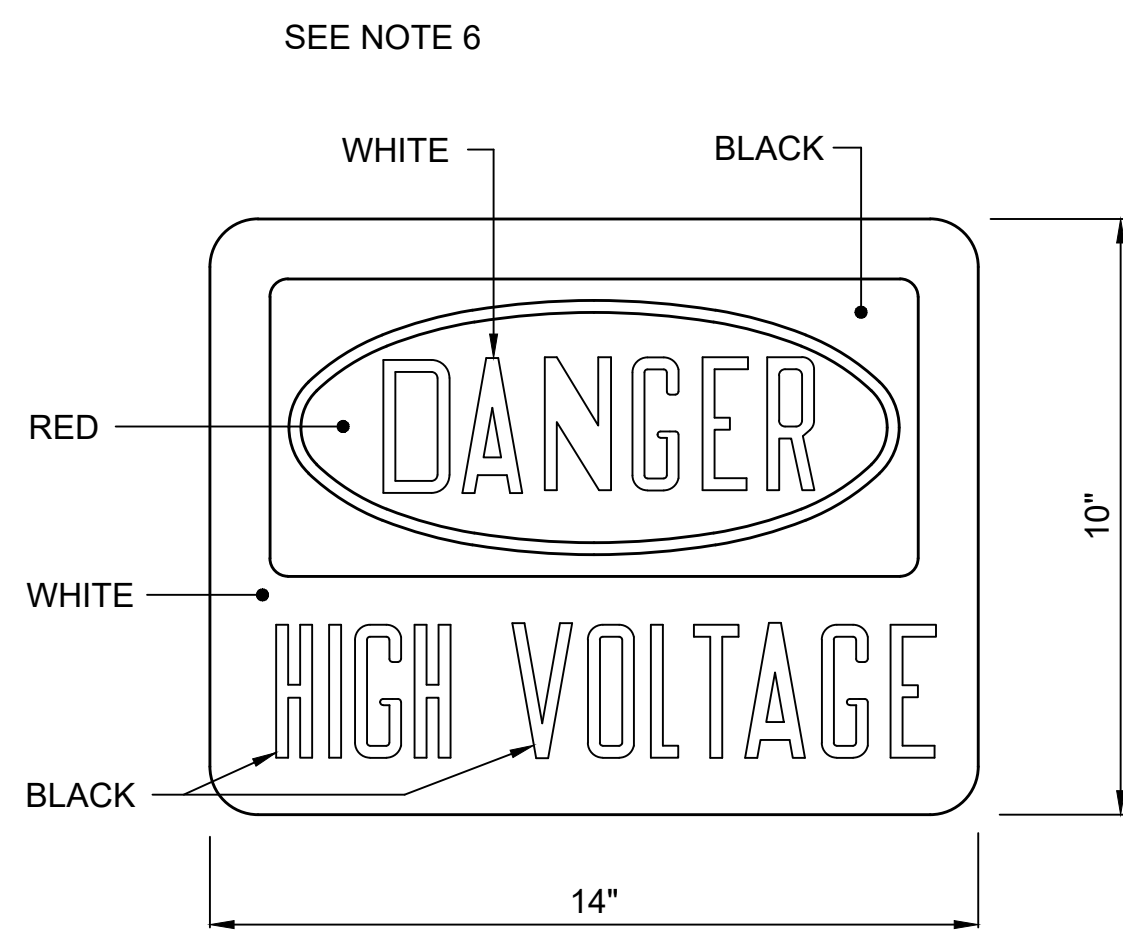
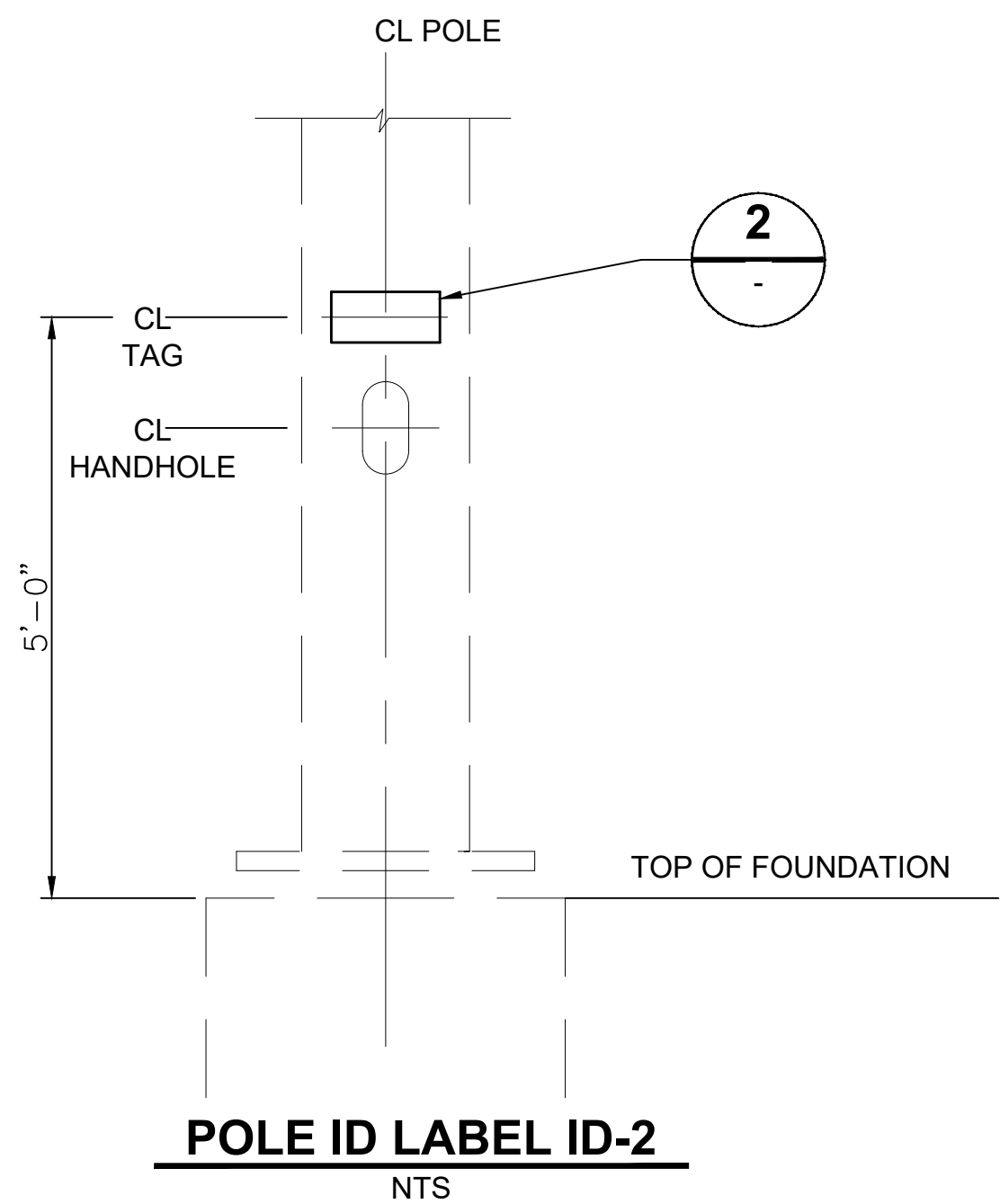
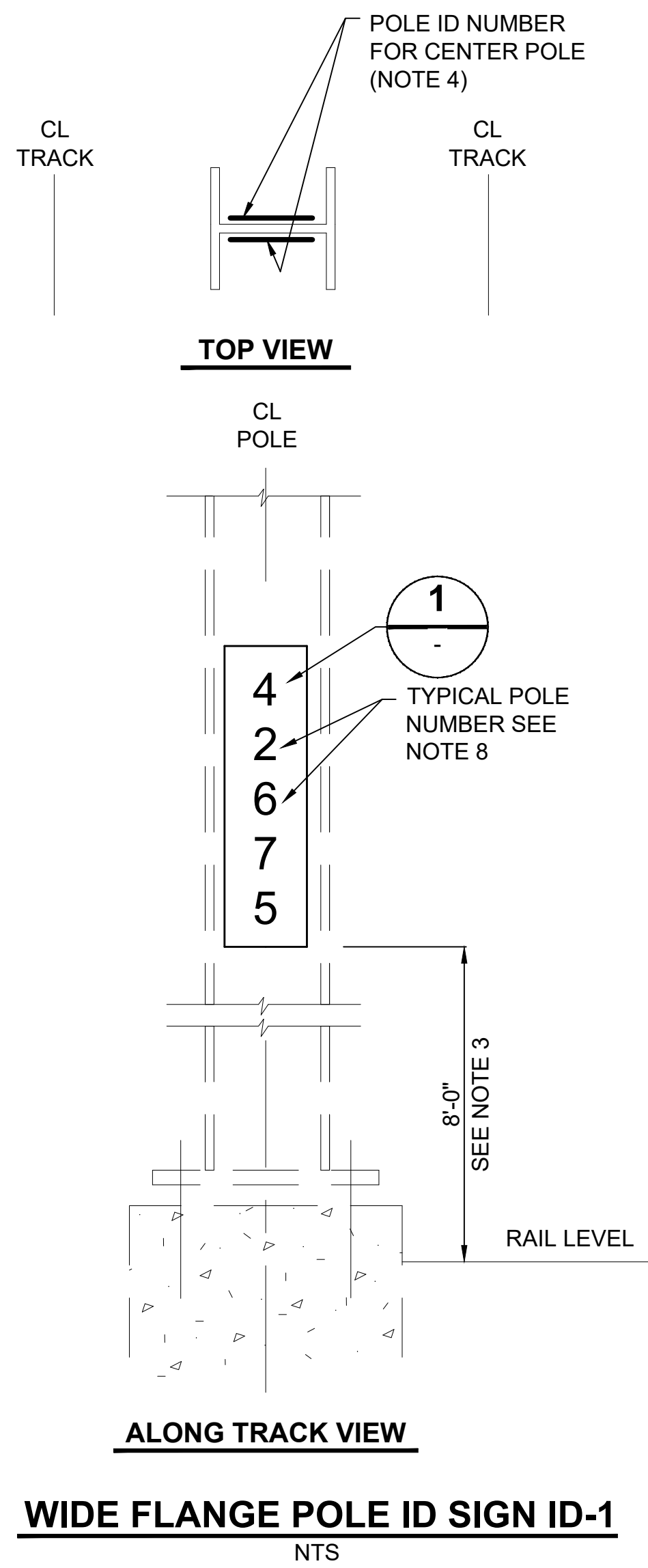
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CONTRACT No.: RTA/LR
DATE: 2/2024

SOUND TRANSIT STANDARD DRAWINGS SYSTEMS

OVERHEAD CATENARY SYSTEM ANCHOR BRACKET ASSEMBLIES AB-7 & AB-8

| | |
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| DRAWING No.: | STD-JOD336 |
| FACILITY ID: | |
| SHEET No.: | REV: 1 |

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GENERAL NOTES:

- SIGNS SHALL BE MADE WITH 0.04" THICK RIGID ALUMINUM BACKING PLATE, WITH BAKED ENAMEL FINISH. ALL EDGES SHALL BE ROUNDED.
- LETTERS SHALL BE ON FRONT OF SIGN ONLY. REAR OF SIGNS SHALL BE BLACK COLOR.
- THE 8'-0" NOMINAL VERTICAL DISTANCE FROM RAIL LEVEL TO THE LOWER EDGE OF THE POLE ID NUMBER MAY REQUIRE ADJUSTMENT TO IMPROVE VISIBILITY FROM AN APPROACHING TRAIN.
- ON CENTER POLES, A POLE ID SIGN IS REQUIRED ON EACH SIDE OF POLE. ON SIDE POLES, POLE ID SIGN SHOULD BE INSTALLED ON SIDE OF POLE FACING NORMAL DIRECTION OF ONCOMING TRAFFIC.
- LOCATION OF WARNING SIGNS TO BE SHOWN ON OCS LAYOUT PLANS OR PRESCRIBED IN SPECIFICATIONS. WHERE MULTIPLE SIGNS ARE REQUIRED ON THE SAME POLE FACE "DANGER" SIGNS SHALL BE THE HIGHEST.
- STAINLESS STEEL TAG TO BE INSTALLED ON ALL POLES AT POSITION INDICATED.
- ALL NUMBERS AND LETTERS TO BE 1/2" HIGH AND TO BE HARD MARKED ON STAINLESS STEEL TAG.
- POLE STATIONING, POLE NUMBER AND POLE TYPE ARE SITE SPECIFIC AND SHALL BE SHOWN ON OCS LAYOUT PLANS AND POLE SCHEDULE.
- I.D. TAGS AND WARNING SIGNS SHALL BE PERMANENTLY ATTACHED TO OCS POLES BY CONTRACTOR USING POWER DRIVEN NAILS, DRIVE PINS OR SS SET SCREWS. NAILS SHALL BE CAPABLE OF HOLDING SIGNS AND ANCHORING INTO BASE MATERIAL.
- THE CONTRACTOR SHALL COMPLETE THE BILL OF MATERIALS TABLE. EACH ASSEMBLY SHALL BE ITEMIZED TO INCLUDE PART NUMBERS, AND MISCELLANEOUS ITEMS REQUIRED FOR FIXING EACH SIGN TYPE.
- ADDITIONAL DETAILS TO BE SHOWN IN SPECIFICATIONS.
- SOUND TRANSIT TO APPROVE SIGN WORDING AND LETTER STYLE PRIOR TO MANUFACTURE.
- CATENARY DETAILS INCLUDING POLE STATION AND POLE/STRUCTURE ID NUMBERS TO BE SHOWN ON OCS LAYOUT PLANS AND SCHEDULES.

| BILL OF MATERIALS | | | | | | | | | | |
|----------------------|------|------|------|------|------|-------|------------------------------|---------|----------------|--|
| QUANTITIES EACH TYPE | | | | | | UNITS | DESCRIPTION | ITEM NO | PART NO/REMARK | |
| ID-1 | ID-2 | SN-1 | SN-2 | SN-3 | SN-4 | | | | | |
| 2 | - | - | - | - | - | EACH | WIDE FLANGE POLE ID SIGN | 1 | | |
| - | 2 | - | - | - | - | EACH | TAPERED TUBULAR POLE ID SIGN | 2 | | |
| - | - | 1 | - | - | - | EACH | END OF ELECTRIFICATION SIGN | 3 | | |
| - | - | - | - | - | 2 | EACH | GRADE CROSSING SIGN | 4 | | |
| - | - | - | 1 | - | - | EACH | STATION PLATFORM SIGN | 5 | | |
| - | - | - | - | 1 | - | EACH | LIVE WIRE SIGN | 6 | | |

| No. | DATE | DSN | CHK | APP | REVISION |
|-----|--------|-----|-----|-----|------------------------------------|
| 1 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |
| 0 | 8/2019 | | | | REVISED SYSTEMS DIRECTIVE DRAWINGS |

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| DESIGNED BY: | |
| DRAWN BY: | |
| CHECKED BY: | |
| APPROVED BY: | |

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| SUBMITTED BY: | DATE: | REVIEWED BY: | DATE: |
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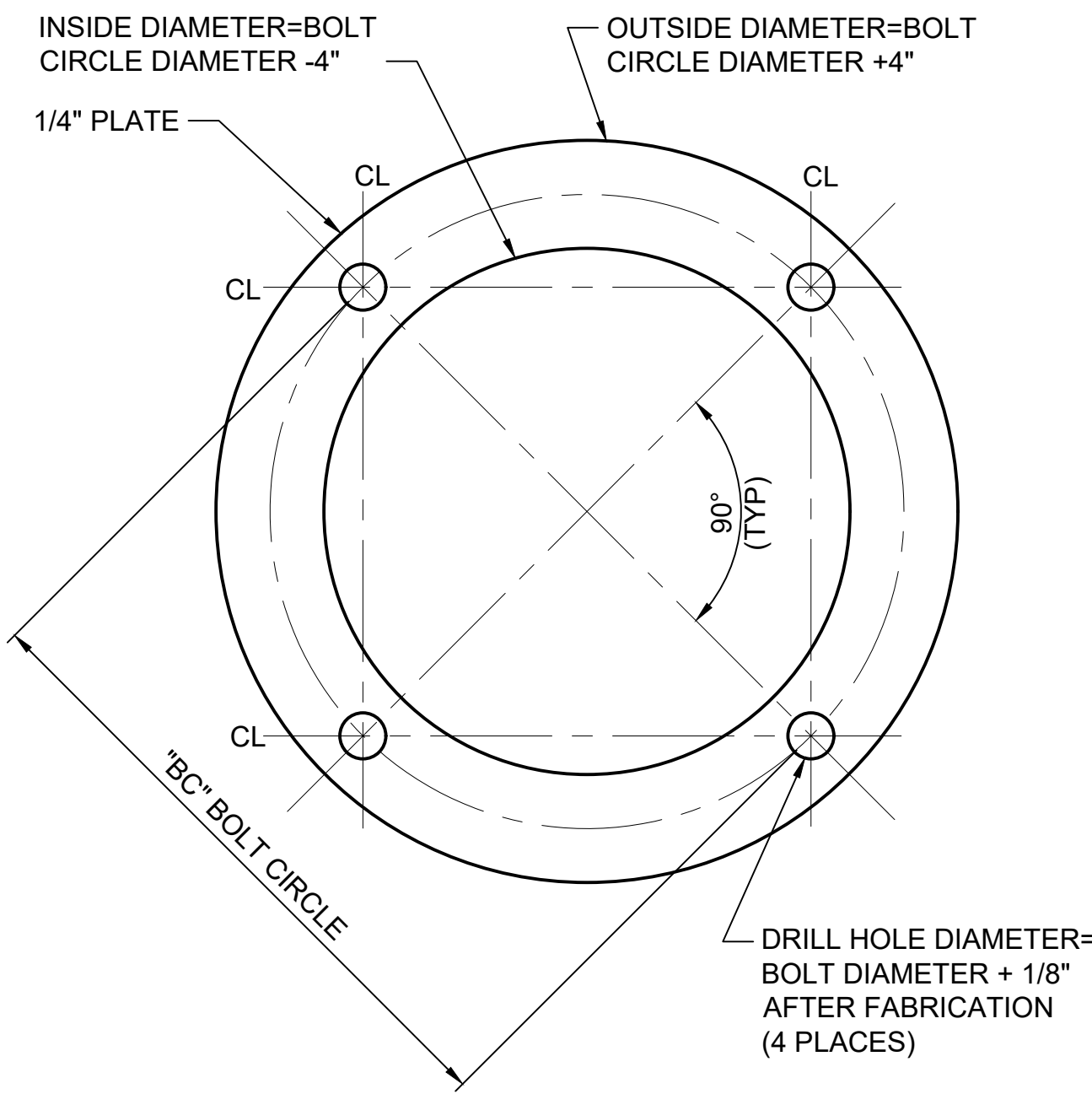
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| FILENAME: STD-JOD340 | DATE: 2/2024 |

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| SOUND TRANSIT STANDARD DRAWINGS SYSTEMS | |
| OVERHEAD CATENARY SYSTEM POLE AND WARNING SIGN ASSEMBLIES ID-1, ID-2, SN-1, SN-2, SN-3 & SN4 | |

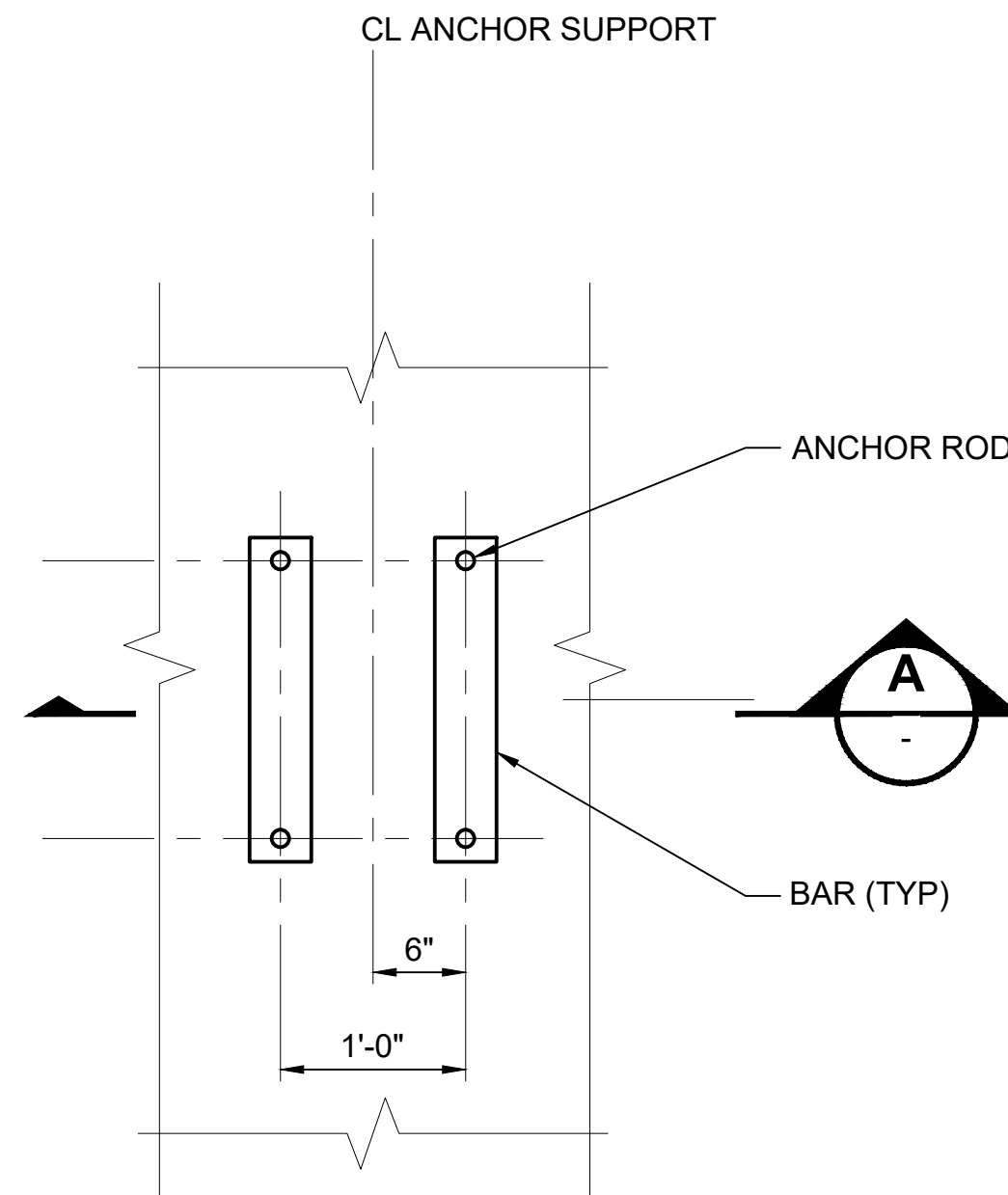
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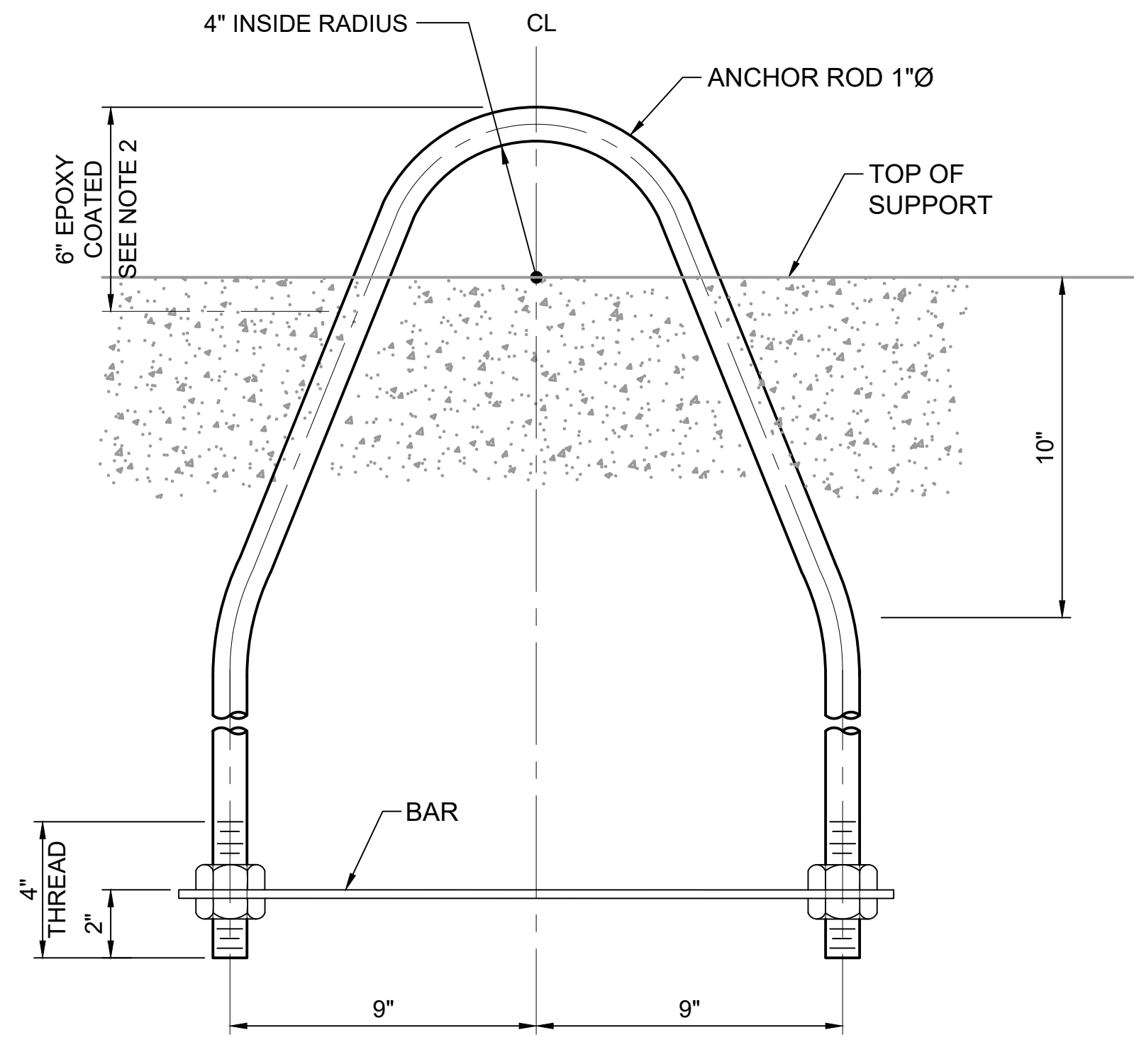
OCS POLE ANCHOR PLATE DETAIL
NTS



DOWNGUY ANCHOR SUPPORT PLAN
SCALE: 1" = 1'-0"

| OCS POLE SUPPORT SCHEDULE TUBULAR POLES ON AERIAL GUIDEWAY | | | | | |
|---|--------------|--------|--------|-----|---|
| FOUNDATION | ANCHOR BOLTS | | | | |
| | TYPE | BC | DIA | L | P |
| FG-1T | 1'-4" | 1 1/2" | 2'-5" | 9" | |
| FG-2T | 1'-6" | 1 3/4" | 2'-6" | 10" | |
| FG-3T | 1'-8" | 2" | 2'-8" | 12" | |
| FG-4T | 1'-10" | 2 1/2" | 2'-10" | 14" | |
| FG-5T | 2'-0" | 2 1/2" | 2'-10" | 14" | |

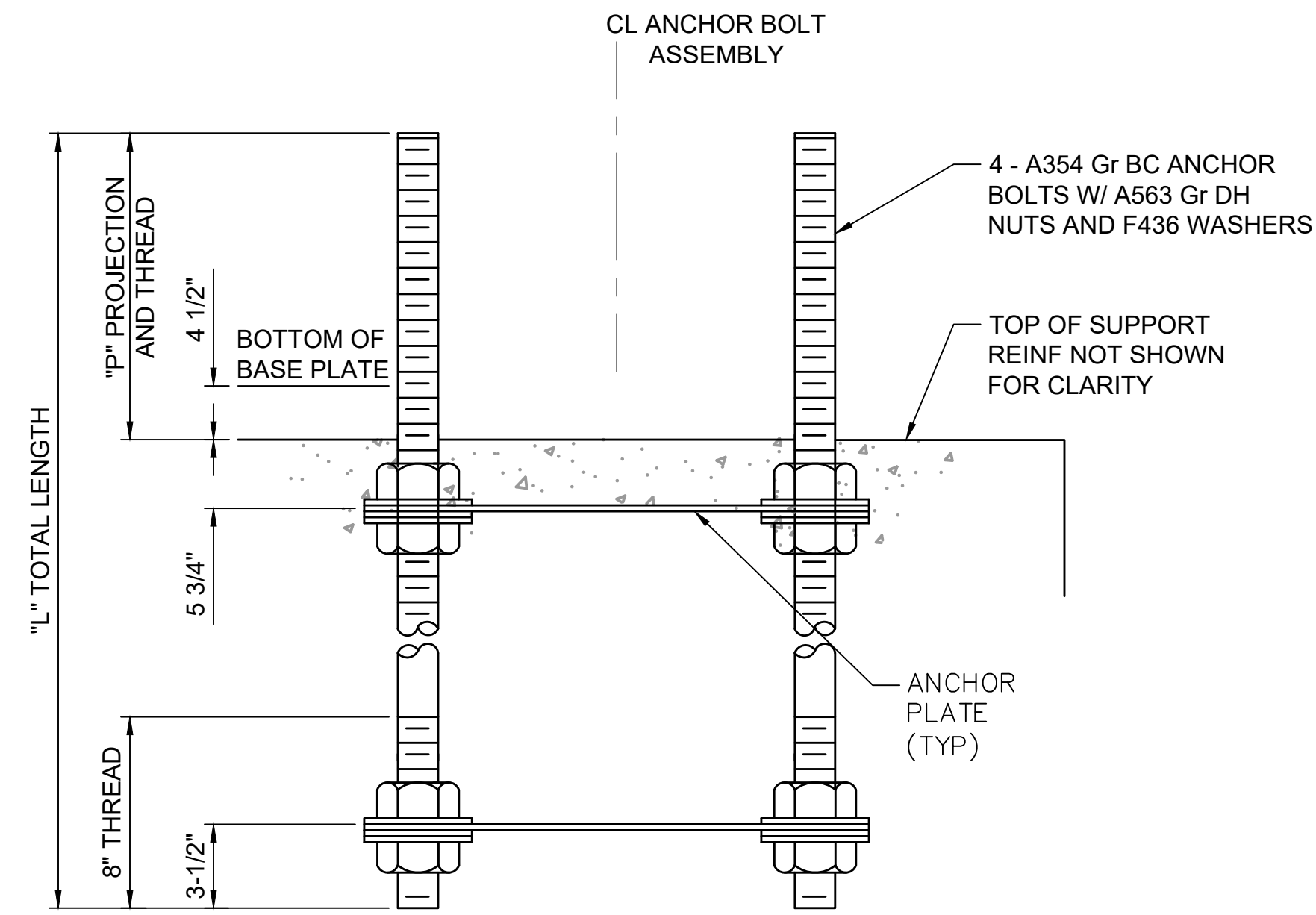
- GENERAL NOTES:**
- DOWNGUY ANCHOR MATERIAL SPECIFICATIONS
ANCHOR BOLTS/ROD: M314/GRADE 55
HEAVY HEXNUTS: M291/GRADE A
FLAT WASHERS: M293
 - THE DOWNGUY ANCHOR ROD SHALL BE COATED WITH EPOXY AS INDICATED. EPOXY MATERIAL SHALL BE APPLIED UNIFORMLY TO ALL REQUIRED SURFACES.
 - OCS POLE ANCHOR BOLTS TO BE GALVANIZED PER ASTM A153/A153M WITH OVERTAPPED THREADS PER AISC REQUIREMENTS FOR UNC SERIES.
 - OCS POLE ANCHOR BOLT ASSEMBLY NUTS TO BE HOT-DIP GALVANIZED WITH OVERTAPPED THREADS.



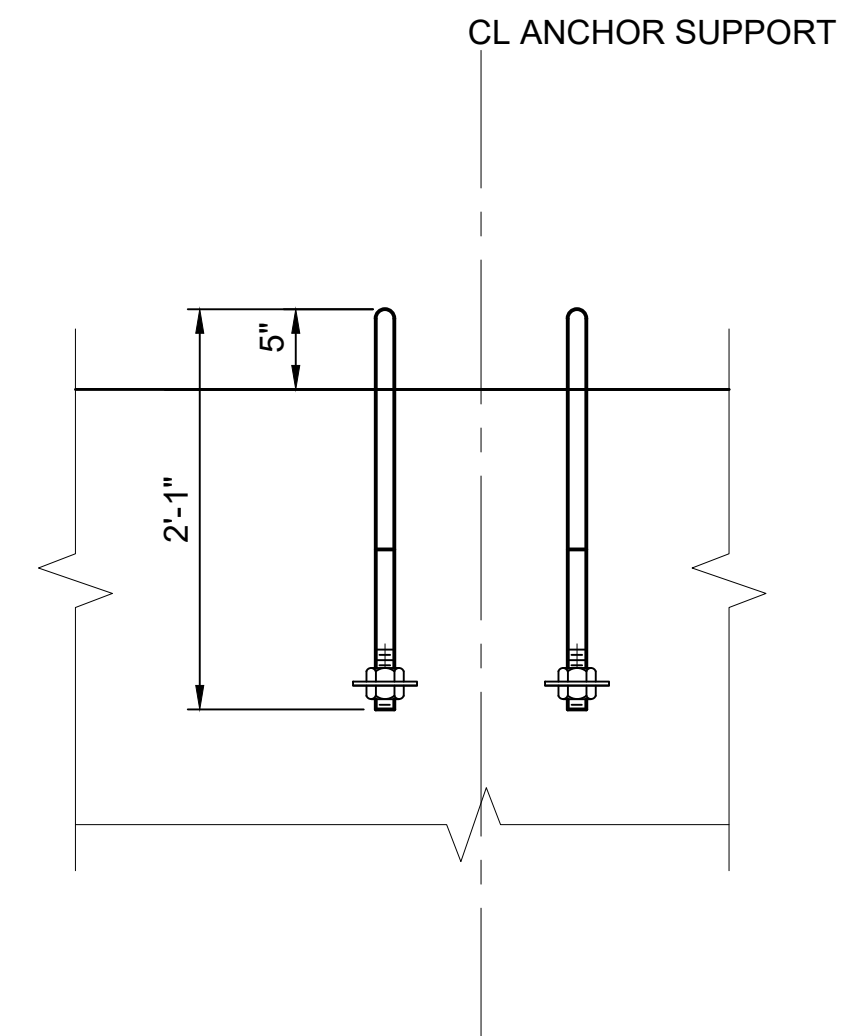
DOWNGUY ANCHOR DETAIL
SCALE: 3" = 1'-0"

| OCS POLE SUPPORT SCHEDULE TUBULAR POLES ON SLAB-ON-GRADE | | | | | |
|---|--------------|--------|-------|-----|---|
| FOUNDATION | ANCHOR BOLTS | | | | |
| | TYPE | BC | DIA | L | P |
| FS-1T | 1'-4" | 1 1/2" | 5'-0" | 9" | |
| FS-2T | 1'-6" | 1 3/4" | 5'-0" | 10" | |
| FS-3T | 1'-8" | 2" | 5'-0" | 12" | |
| FS-4T | 1'-10" | 2 1/2" | 5'-0" | 14" | |
| FS-5T | 2'-0" | 2 1/2" | 5'-0" | 14" | |

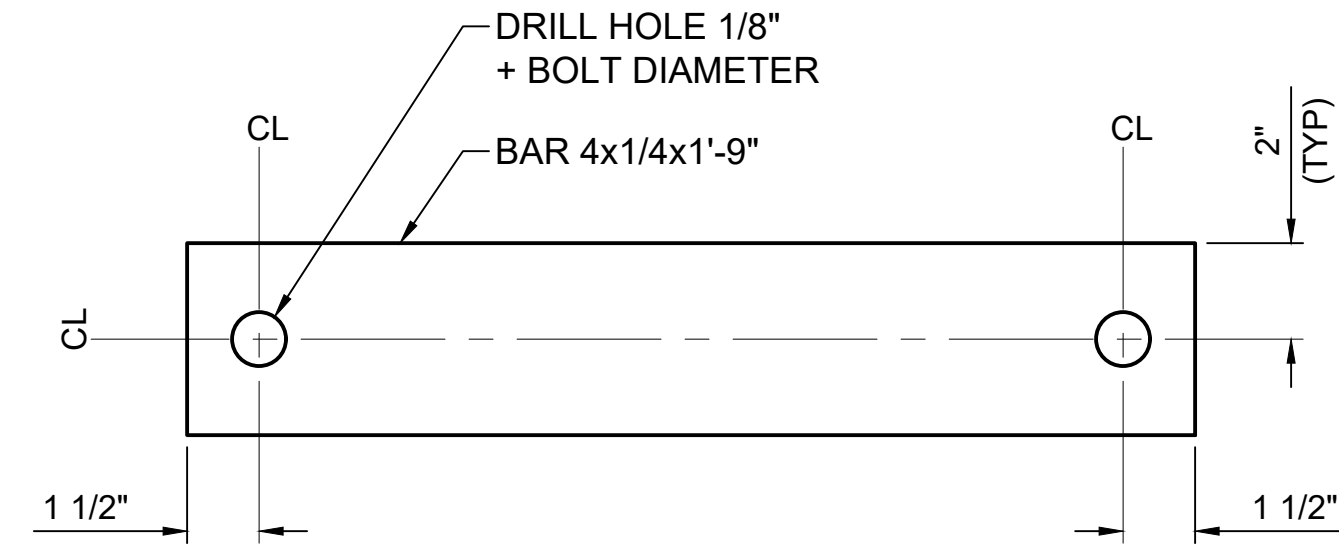
| OCS POLE SUPPORT SCHEDULE WIDE FLANGE POLES ON AERIAL GUIDEWAY | | | | | |
|---|--------------|--------|--------|-----|---|
| FOUNDATION | ANCHOR BOLTS | | | | |
| | TYPE | BC | DIA | L | P |
| FG-08W | 1'-4" | 1 1/2" | 2'-5" | 9" | |
| FG-10W | 1'-6" | 1 3/4" | 2'-6" | 10" | |
| FG-20W | 1'-8" | 2" | 2'-8" | 12" | |
| FG-21W | 1'-8" | 2" | 2'-8" | 12" | |
| FG-22W | 2'-0" | 2 1/2" | 2'-10" | 14" | |
| FG-32W | 2'-0" | 2 1/2" | 2'-10" | 14" | |



OCS POLE ANCHOR PLATE DETAIL
NTS



TYPE FD-3AG DOWNGUY ANCHOR SUPPORT - SECTION
SCALE: 1" = 1'-0"



DOWNGUY ANCHOR BAR DETAIL
SCALE: 3" = 1'-0"

| OCS POLE SUPPORT SCHEDULE WIDE FLANGE ON SLAB-ON-GRADE | | | | | |
|---|--------------|--------|-------|-----|---|
| FOUNDATION | ANCHOR BOLTS | | | | |
| | TYPE | BC | DIA | L | P |
| FS-08W | 1'-4" | 1 1/2" | 5'-0" | 9" | |
| FS-10W | 1'-6" | 1 3/4" | 5'-0" | 10" | |
| FS-20W | 1'-8" | 2" | 5'-0" | 12" | |
| FS-21W | 1'-8" | 2" | 5'-0" | 12" | |
| FS-22W | 2'-0" | 2 1/2" | 5'-0" | 14" | |
| FS-32W | 2'-0" | 2 1/2" | 5'-0" | 14" | |

| No. | DATE | DSN | CHK | APP | REVISION |
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| 1 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |
| 0 | 8/2019 | | | | REVISED SYSTEMS DIRECTIVE DRAWINGS |

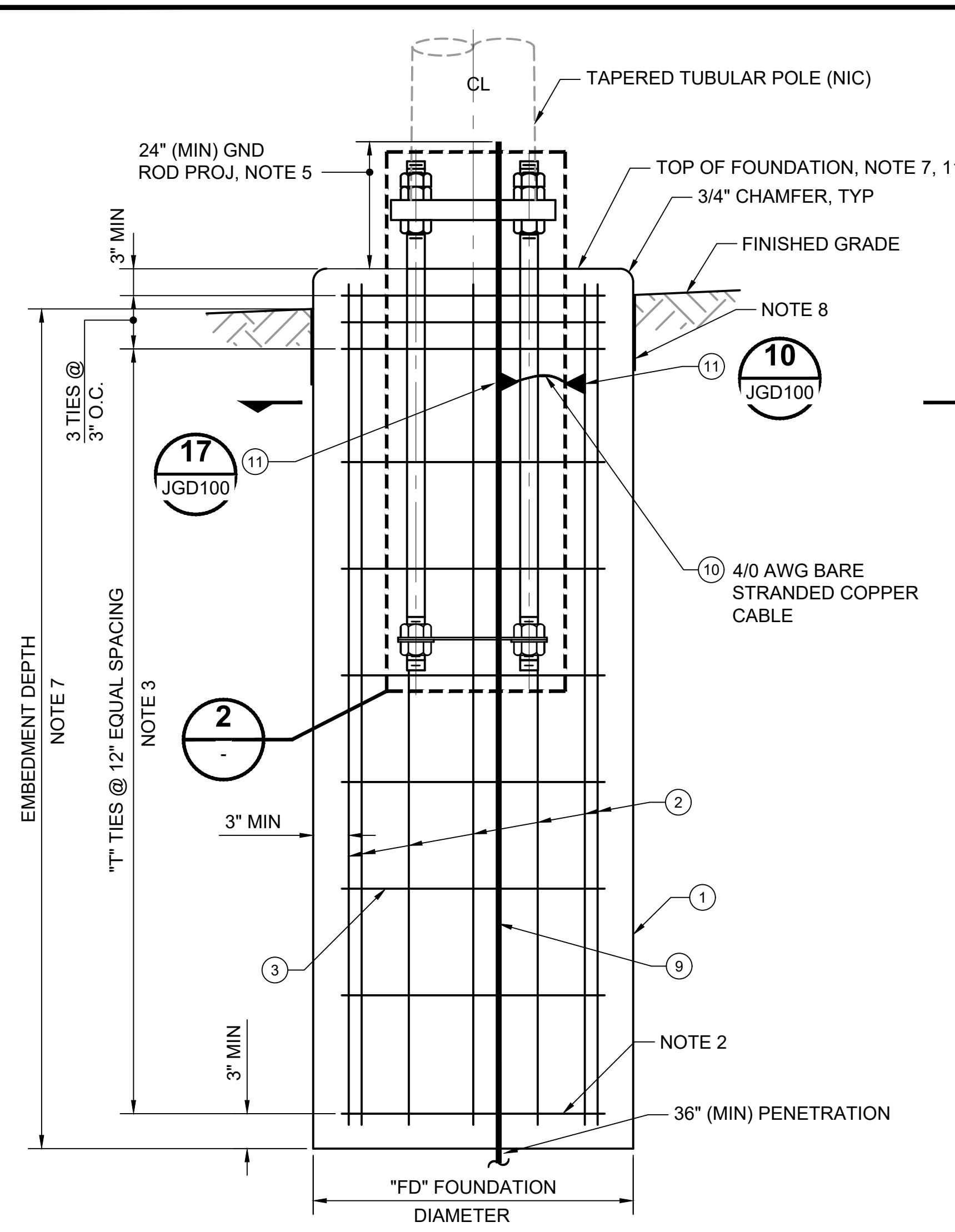
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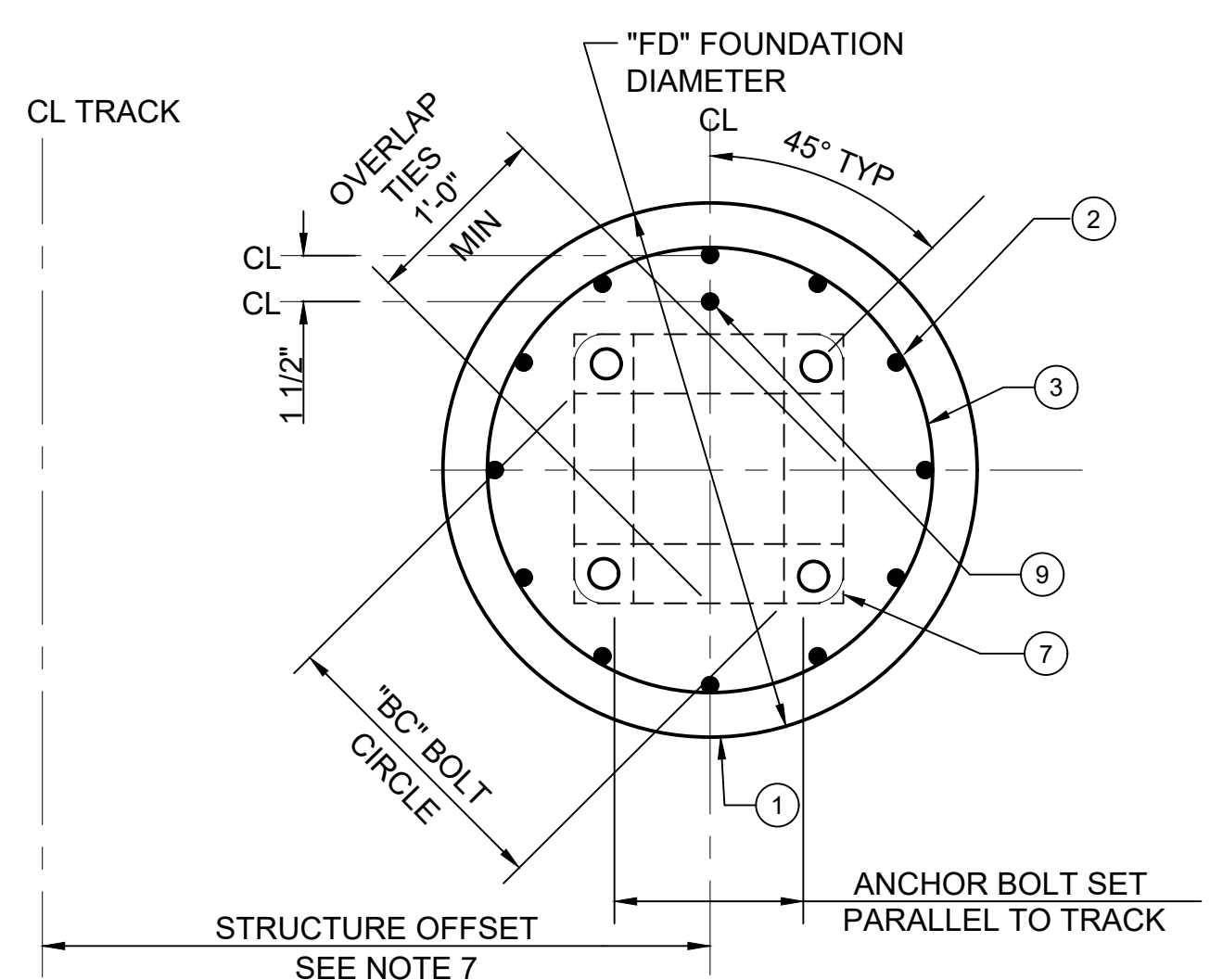
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| CONTRACT No.: | |
| RTA/LR | |
| DATE: | 2/2024 |

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| SOUND TRANSIT STANDARD DRAWINGS SYSTEMS | |
| OVERHEAD CATENARY SYSTEM SLAB ON GRADE - OCS POLE AND DOWN GUY ANCHOR SUPPORT DETAILS | |

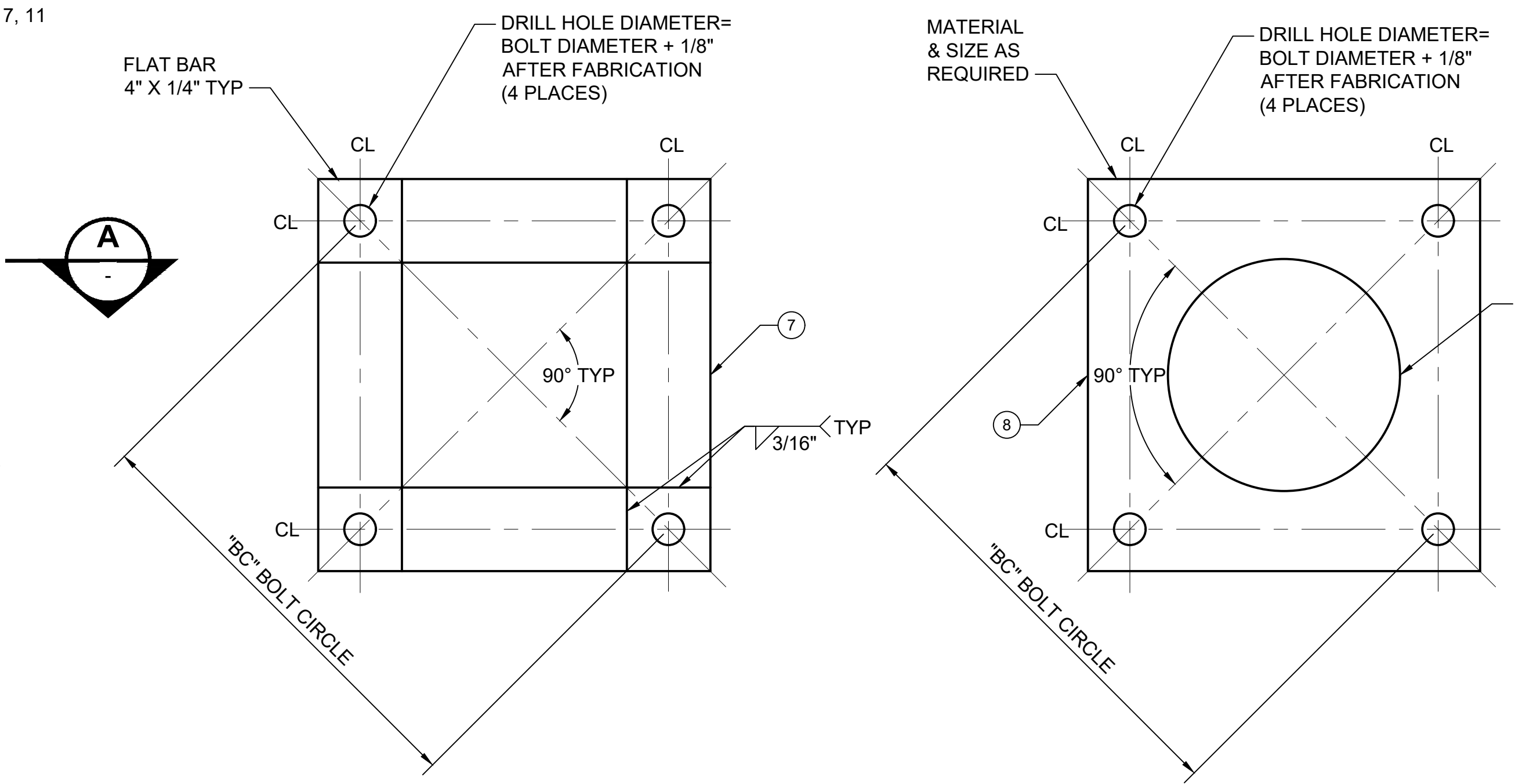
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| DRAWING No.: | STD-JOD351 |
| FACILITY ID: | |
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TYPE FD-XT POLE FOUNDATION ELEVATION (1)
NTS

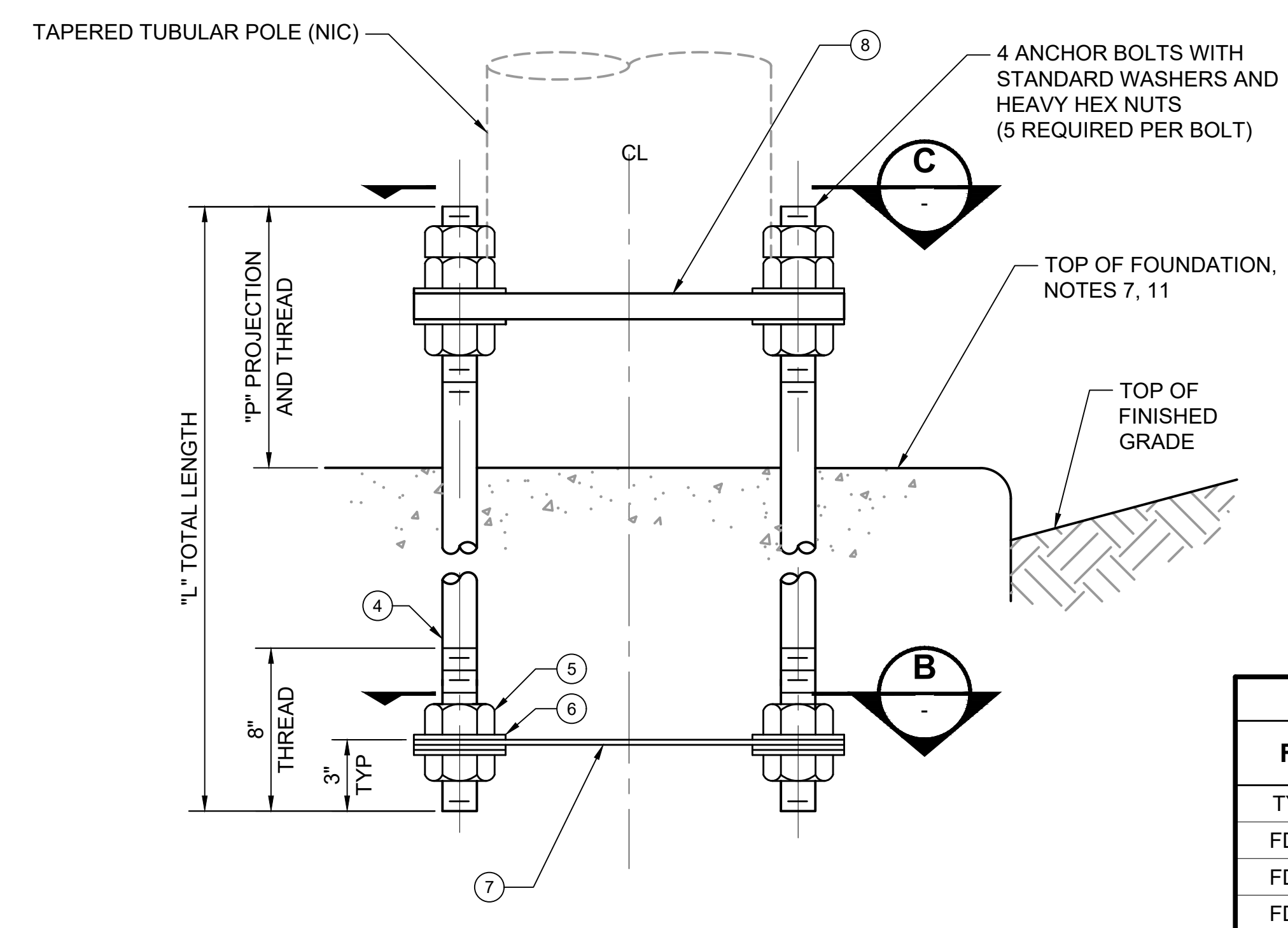


SECTION (A)
NTS



ANCHOR PLATE DETAIL (B)
NTS

BOLT PATTERN TEMPLATE DETAIL (C)
NTS



ANCHOR BOLT DETAIL (2)
NTS

- GENERAL NOTES:**
1. PROVIDE UNGALVANIZED ANCHOR PLATE (LOWER) AND UNGALVANIZED BOLT PATTERN TEMPLATE (UPPER) FOR ANCHOR BOLT INSTALLATION.
 2. REFER TO CRSI MANUAL OF STANDARD PRACTICE FOR REINFORCEMENT ASSEMBLY REQUIREMENTS.
 3. #4 SPIRALS AT 4" (MAXIMUM) PITCH MAY BE SUBSTITUTED FOR REBAR TIES. SPACE AT 2" FOR TOP 8".
 4. FOUNDATION DEPTH MAY BE INCREASED 2'-0" WITHOUT CHANGING REINFORCEMENT LENGTH. THE REINFORCING SHALL THEN BE INSTALLED 3" FROM THE TOP OF THE FOUNDATION. ANY INCREASE OVER 2'-0" SHALL REQUIRE A CORRESPONDING INCREASE IN REINFORCEMENT LENGTH.
 5. EXTEND GROUND ROD A MINIMUM OF 24" ABOVE TOP OF FOUNDATION WITHIN THE CENTER AREA. BOND GROUND ROD TO VERTICAL REBAR USING EXOTHERMIC WELD. PLACE GROUND ROD PARALLEL TO TRACK CENTERLINE IN THE INCREASING TRACK STATIONING DIRECTION.
 6. REBAR AND EMBEDDED ANCHOR BOLT STEEL SHALL HAVE 3" MINIMUM COVERAGE.
 7. FOR FOUNDATION ELEVATION ABOVE TOR, EMBEDMENT DEPTH AND STRUCTURE OFFSET INFORMATION, SEE OCS FOUNDATION PLANS DRAWINGS.
 8. PROVIDE FIBER EXPANSION BOARD WITH FLEXIBLE SEALANT BETWEEN FOUNDATION AND CONCRETE PAVING.
 9. ANCHOR BOLTS (INCLUDING ALL EXPOSED NUTS AND WASHERS) AND ALL EXPOSED STEEL SHALL BE GALVANIZED PER SPECIFICATIONS.
 10. SEE SPECIFICATIONS FOR GROUND REQUIREMENTS.
 11. PROVIDE 1" WATERSHED.
 12. VERTICAL AND HORIZONTAL REBAR SHALL BE ELECTRICALLY CONTINUOUS.

| BILL OF MATERIALS | | | | | | | | | |
|----------------------|-------|-------|-------|-------|-------|-----------------------|---------|----------------|--|
| QUANTITIES EACH TYPE | | | | | UNITS | DESCRIPTION | ITEM NO | PART NO/REMARK | |
| FD-1T | FD-2T | FD-3T | FD-4T | FD-5T | | | | | |
| AS REQUIRED | | | | | CU YD | CONCRETE | 1 | | |
| AS REQUIRED | | | | | LB | VERTICAL REBAR | 2 | | |
| AS REQUIRED | | | | | LB | HORIZONTAL REBAR | 3 | | |
| 4 | 4 | 4 | 4 | 4 | EACH | ANCHOR BOLT | 4 | | |
| 20 | 20 | 20 | 20 | 20 | EACH | ANCHOR BOLT NUT | 5 | | |
| 16 | 16 | 16 | 16 | 16 | EACH | ANCHOR BOLT WASHER | 6 | | |
| 1 | 1 | 1 | 1 | 1 | EACH | ANCHOR PLATE | 7 | NOTE 1 | |
| 1 | 1 | 1 | 1 | 1 | EACH | BOLT PATTERN TEMPLATE | 8 | NOTE 1 | |
| AS REQUIRED | | | | | EACH | GROUND ROD | 9 | NOTES 5,10 | |
| AS REQUIRED | | | | | FT | COPPER CABLE | 10 | | |
| AS REQUIRED | | | | | EACH | GROUND CONNECTOR | 11 | | |

(X) X DENOTES ITEM NO IN BILL OF MATERIALS

| OCS FOUNDATION SCHEDULES - TYPE FD-XT | | | | | | | | |
|---------------------------------------|---------------|--------------|------|-----|--------------|----------|-----|--------------------------------|
| FOUNDATION | REINFORCEMENT | ANCHOR BOLTS | | | ANCHOR BOLTS | | | MAX ALLOWABLE MOMENT KIP-FT |
| | | "FD" (DIA) | "VR" | "T" | "BC" | BOLT DIA | "L" | |
| FD-1T | 2'-6" | 12 - #6 | #3 | 16" | 1-1/2" | 60" | 9" | 40.0 |
| FD-2T | 3'-0" | 12 - #8 | #4 | 18" | 1-3/4" | 60" | 10" | 75.0 |
| FD-3T | 3'-0" | 12 - #8 | #4 | 20" | 2" | 60" | 12" | 103.0 |
| FD-4T | 3'-0" | 12 - #8 | #4 | 22" | 2-1/2" | 60" | 14" | 166.5 |
| FD-5T | 3'-0" | 12 - #8 | #4 | 24" | 2-1/2" | 60" | 14" | 243.5 |

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| No. | DATE | DSN | CHK | APP | REVISION |
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| 2 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |
| 1 | 8/2019 | | | | REVISED SYSTEMS DIRECTIVE DRAWINGS |
| 0 | 1/2019 | | | | 2019 GUIDANCE DWG REVISIONS - GENERAL UPDATE |

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| CHECKED BY: | |
| APPROVED BY: | |

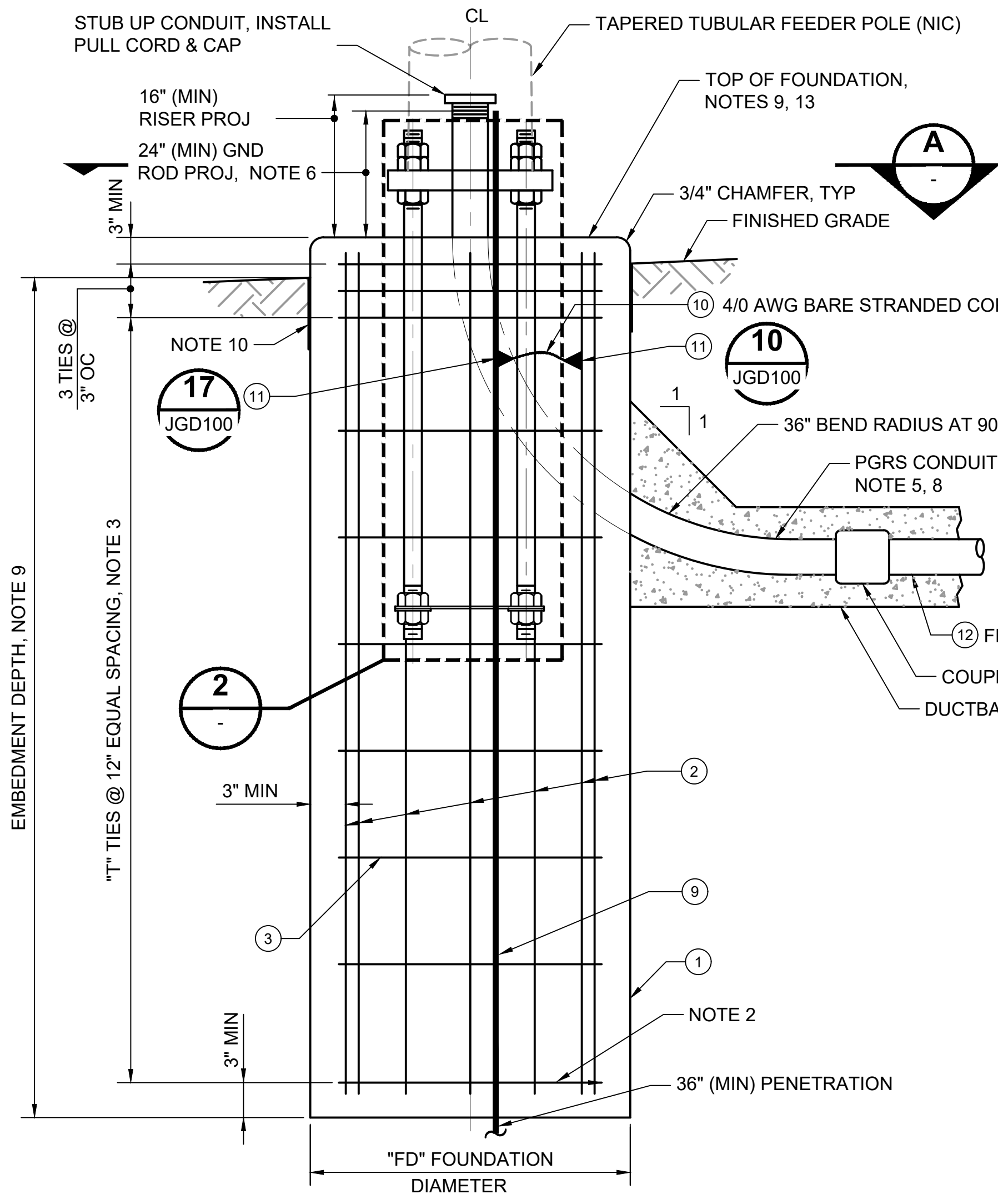
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| RTA/LR | |
| DATE: 2/2024 | |

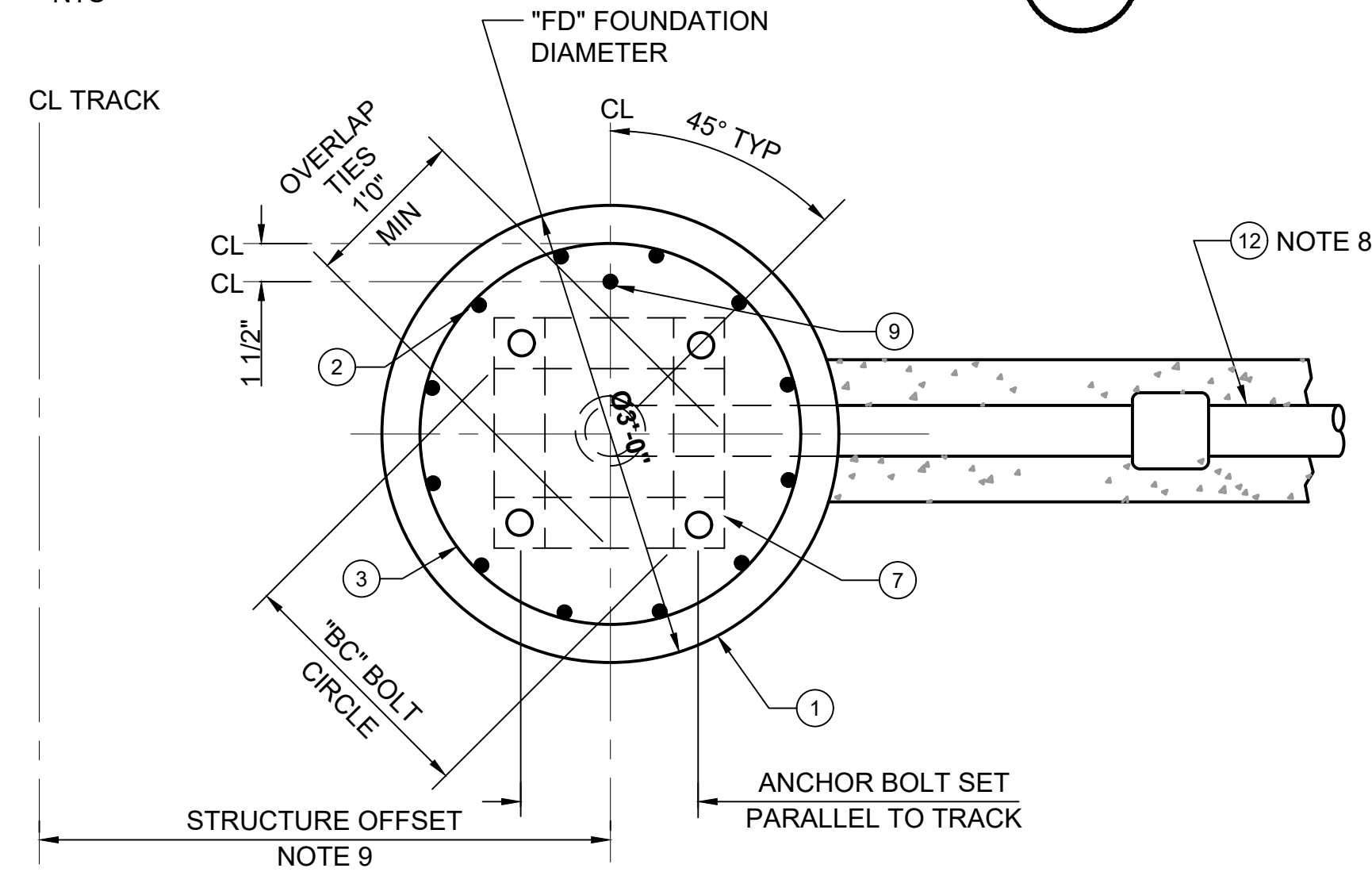
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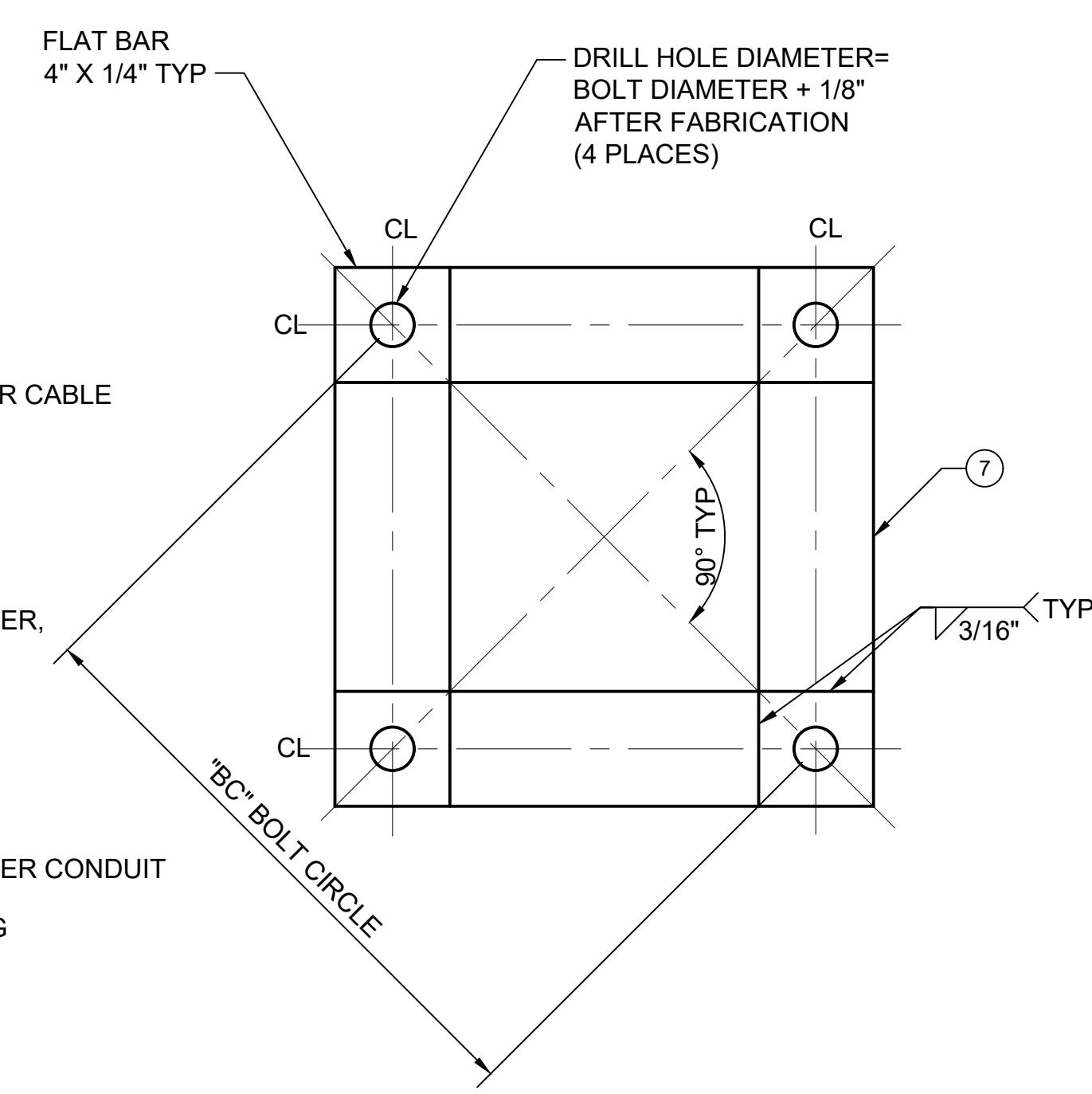
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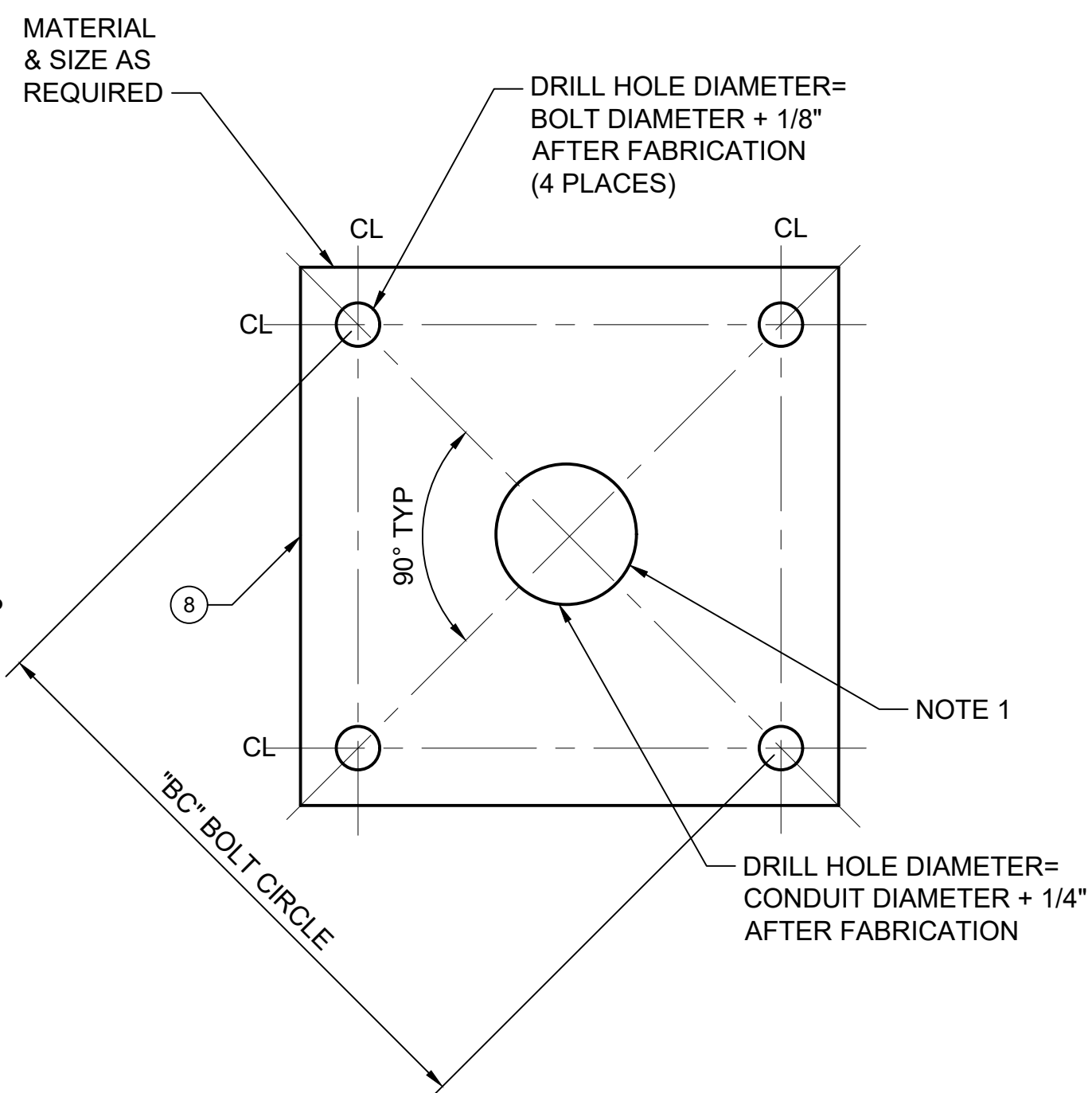
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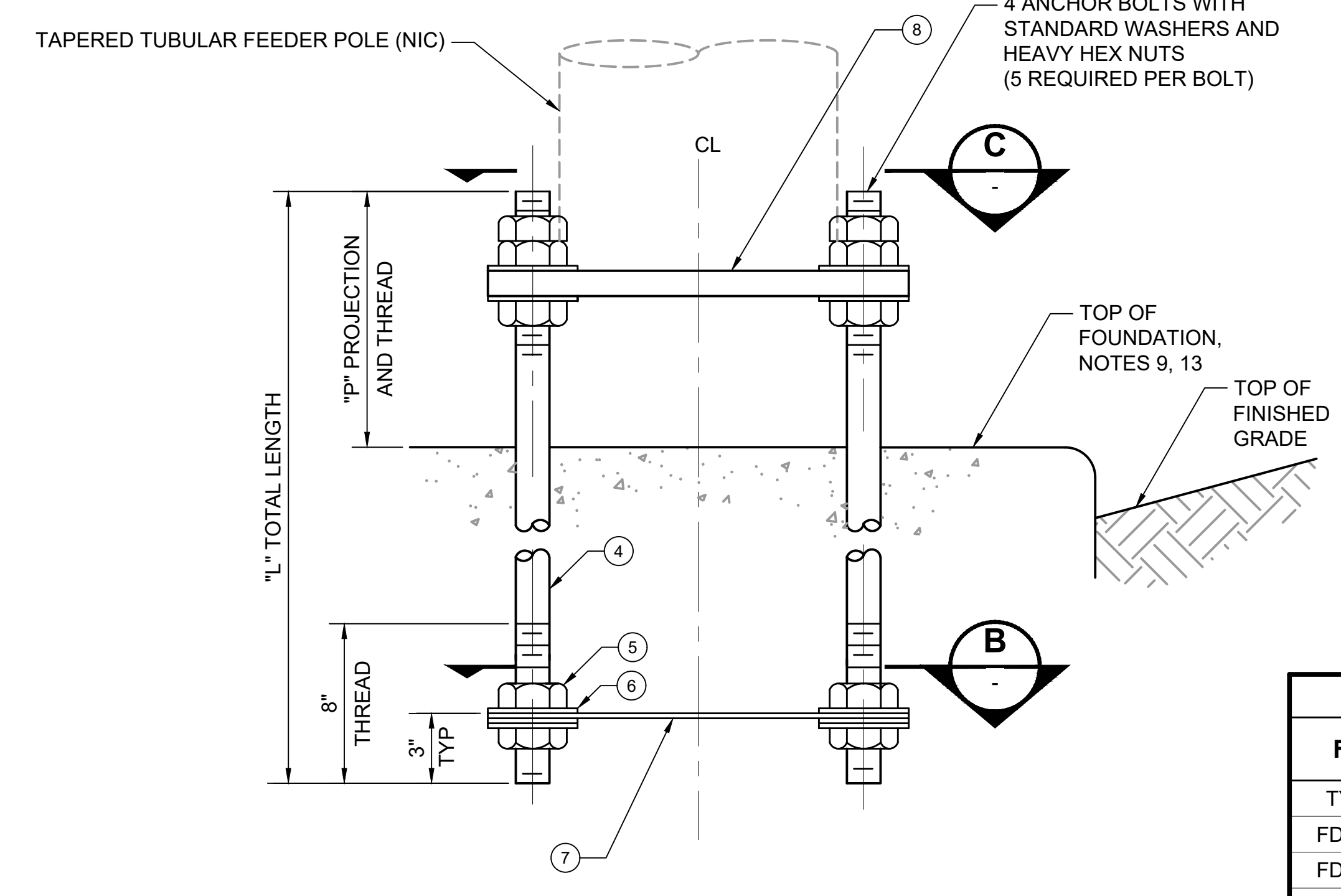
SECTION A
NTS



ANCHOR PLATE DETAIL B
NTS



BOLT PATTERN TEMPLATE DETAIL C
NTS



ANCHOR BOLT DETAIL 2
NTS

- GENERAL NOTES:**
1. PROVIDE UNGALVANIZED ANCHOR PLATE (LOWER) AND UNGALVANIZED BOLT PATTERN TEMPLATE (UPPER) FOR ANCHOR BOLT INSTALLATION.
 2. REFER TO CRSI MANUAL OF STANDARD PRACTICE FOR REINFORCEMENT ASSEMBLY REQUIREMENTS.
 3. #4 SPIRALS AT 4" (MAXIMUM) PITCH MAY BE SUBSTITUTED FOR REBAR TIES. SPACE AT 2" FOR TOP 8".
 4. FOUNDATION DEPTH MAY BE INCREASED 2'-0" WITHOUT CHANGING REINFORCEMENT LENGTH. THE REINFORCING SHALL THEN BE INSTALLED 3" FROM THE TOP OF THE FOUNDATION. ANY INCREASE OVER 2'-0" SHALL REQUIRE A CORRESPONDING INCREASE IN REINFORCEMENT LENGTH.
 5. INSTALL CONDUIT RISERS IN FOUNDATION WHERE SHOWN. DURING CONSTRUCTION ROTATE REBAR CAGE TO AVOID INTERFERENCE WITH CONDUIT IF NECESSARY. FOR DUCTBANK LAYOUT, REFER TO TRACTION ELECTRIFICATION SYSTEM DRAWINGS.
 6. EXTEND GROUND ROD A MINIMUM OF 24" ABOVE TOP OF FOUNDATION WITHIN THE CENTER AREA. BOND GROUND ROD TO VERTICAL REBAR USING EXOTHERMIC WELD. PLACE GROUND ROD PARALLEL TO TRACK CENTERLINE IN THE INCREASING TRACK STATIONING DIRECTION.
 7. REBAR AND EMBEDDED ANCHOR BOLT STEEL SHALL HAVE 3" MINIMUM COVERAGE.
 8. INSTALL CENTERLINE OF FEEDER CONDUIT AT THE CENTERLINE OF ANCHOR BOLT CIRCLE "BC". FOR CONDUIT SIZES, SEE OCS FOUNDATION SCHEDULE DR
 9. FOR FOUNDATION ELEVATION ABOVE TOR, EMBEDMENT DEPTH AND STRUCTURE OFFSET INFORMATION, SEE OCS FOUNDATION PLANS DRAWINGS.
 10. PROVIDE FIBER EXPANSION BOARD WITH FLEXIBLE SEALANT BETWEEN FOUNDATION AND CONCRETE PAVING.
 11. ANCHOR BOLTS (INCLUDING ALL EXPOSED NUTS AND WASHERS) AND ALL EXPOSED STEEL SHALL BE GALVANIZED PER SPECIFICATIONS..
 12. SEE SPECIFICATION FOR GROUNDING REQUIREMENTS.
 13. PROVIDE 1" WATERSHED.
 14. VERTICAL AND HORIZONTAL REBAR SHALL BE ELECTRICALLY CONTINUOUS.

| BILL OF MATERIALS | | | | | | | | | |
|----------------------|--------|--------|--------|--------|-------|-----------------------|---------|----------------|--|
| QUANTITIES EACH TYPE | | | | | UNITS | DESCRIPTION | ITEM NO | PART NO/REMARK | |
| FD-1FT | FD-2FT | FD-3FT | FD-4FT | FD-5FT | | | | | |
| AS REQUIRED | | | | | CU YD | CONCRETE | 1 | | |
| AS REQUIRED | | | | | LB | VERTICAL REBAR | 2 | | |
| AS REQUIRED | | | | | LB | HORIZONTAL REBAR | 3 | | |
| 4 | 4 | 4 | 4 | 4 | EACH | ANCHOR BOLT | 4 | | |
| 20 | 20 | 20 | 20 | 20 | EACH | ANCHOR BOLT NUT | 5 | | |
| 16 | 16 | 16 | 16 | 16 | EACH | ANCHOR BOLT WASHER | 6 | | |
| 1 | 1 | 1 | 1 | 1 | EACH | ANCHOR PLATE | 7 | NOTE 1 | |
| 1 | 1 | 1 | 1 | 1 | EACH | BOLT PATTERN TEMPLATE | 8 | NOTE 1 | |
| AS REQUIRED | | | | | EACH | GROUND ROD | 9 | NOTES 6, 12 | |
| AS REQUIRED | | | | | FT | COPPER CABLE | 10 | | |
| AS REQUIRED | | | | | EACH | GROUND CONNECTOR | 11 | | |
| AS REQUIRED | | | | | LF | 4" FEEDER CONDUIT | 12 | NOTE 8 | |

(X) X DENOTES ITEM NO IN BILL OF MATERIALS

| OCS FOUNDATION SCHEDULES - TYPE FD-XFT | | | | | | | | |
|--|---------------|--------------|-----|-----|--------|----------------------|-----|-------|
| FOUNDATION | REINFORCEMENT | ANCHOR BOLTS | | | | MAX ALLOWABLE MOMENT | | |
| | | BOLT DIA | "L" | "P" | KIP-FT | | | |
| FD-1FT | 2'-6" | 12 - #6 | #3 | 16" | 1-1/2" | 60" | 9" | 40.0 |
| FD-2FT | 3'-0" | 12 - #8 | #4 | 18" | 1-3/4" | 60" | 10" | 75.0 |
| FD-3FT | 3'-0" | 12 - #8 | #4 | 20" | 2" | 60" | 12" | 103.0 |
| FD-4FT | 3'-0" | 12 - #8 | #4 | 22" | 2-1/2" | 60" | 14" | 166.5 |
| FD-5FT | 3'-0" | 12 - #8 | #4 | 24" | 2-1/2" | 60" | 14" | 243.5 |

| No. | DATE | DSN | CHK | APP | REVISION |
|-----|--------|-----|-----|-----|--|
| 2 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |
| 1 | 8/2019 | | | | REVISED SYSTEMS DIRECTIVE DRAWINGS |
| 0 | 1/2019 | | | | 2019 GUIDANCE DWG REVISIONS - GENERAL UPDATE |

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DRAWN BY:
CHECKED BY:
APPROVED BY:

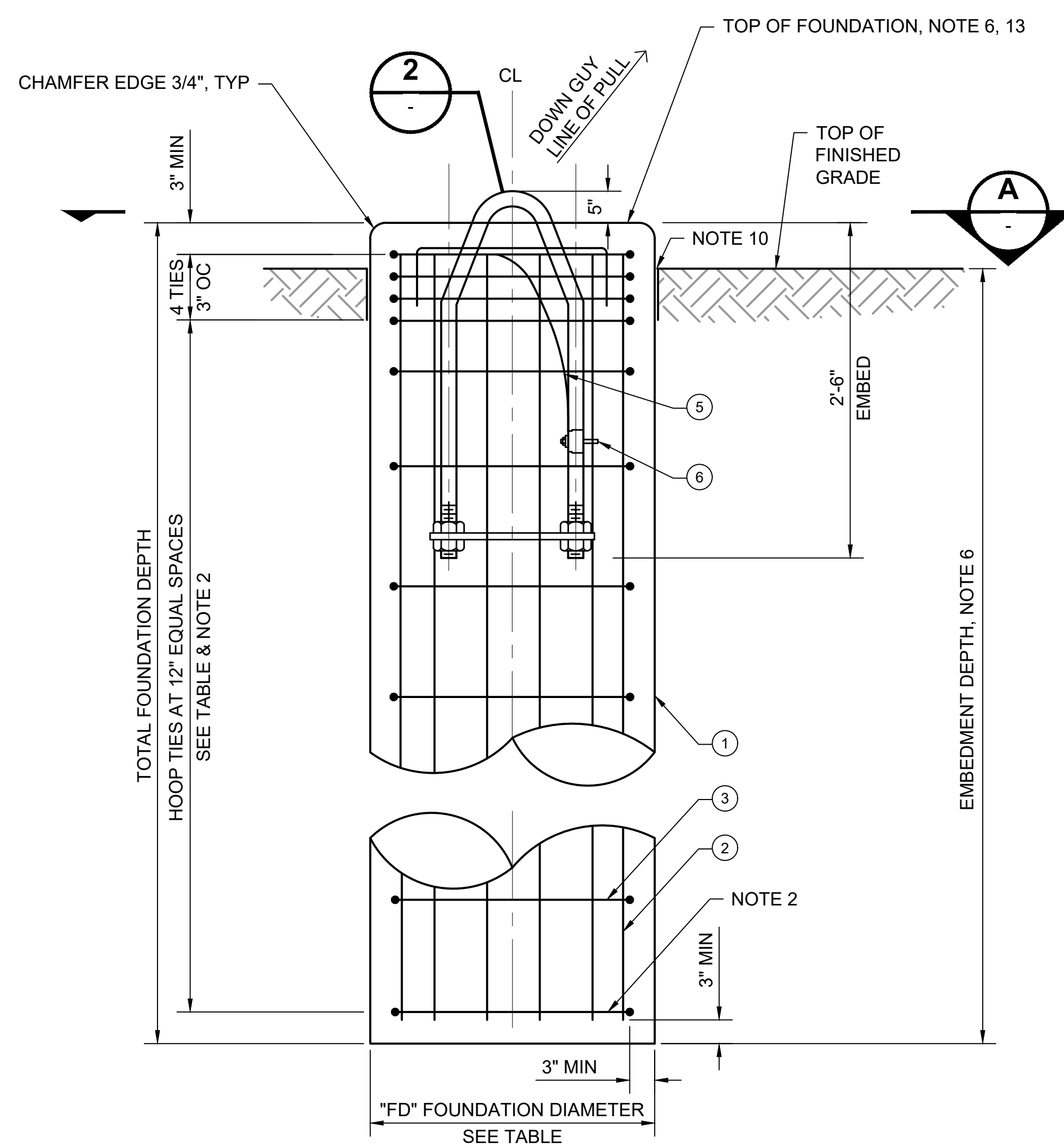
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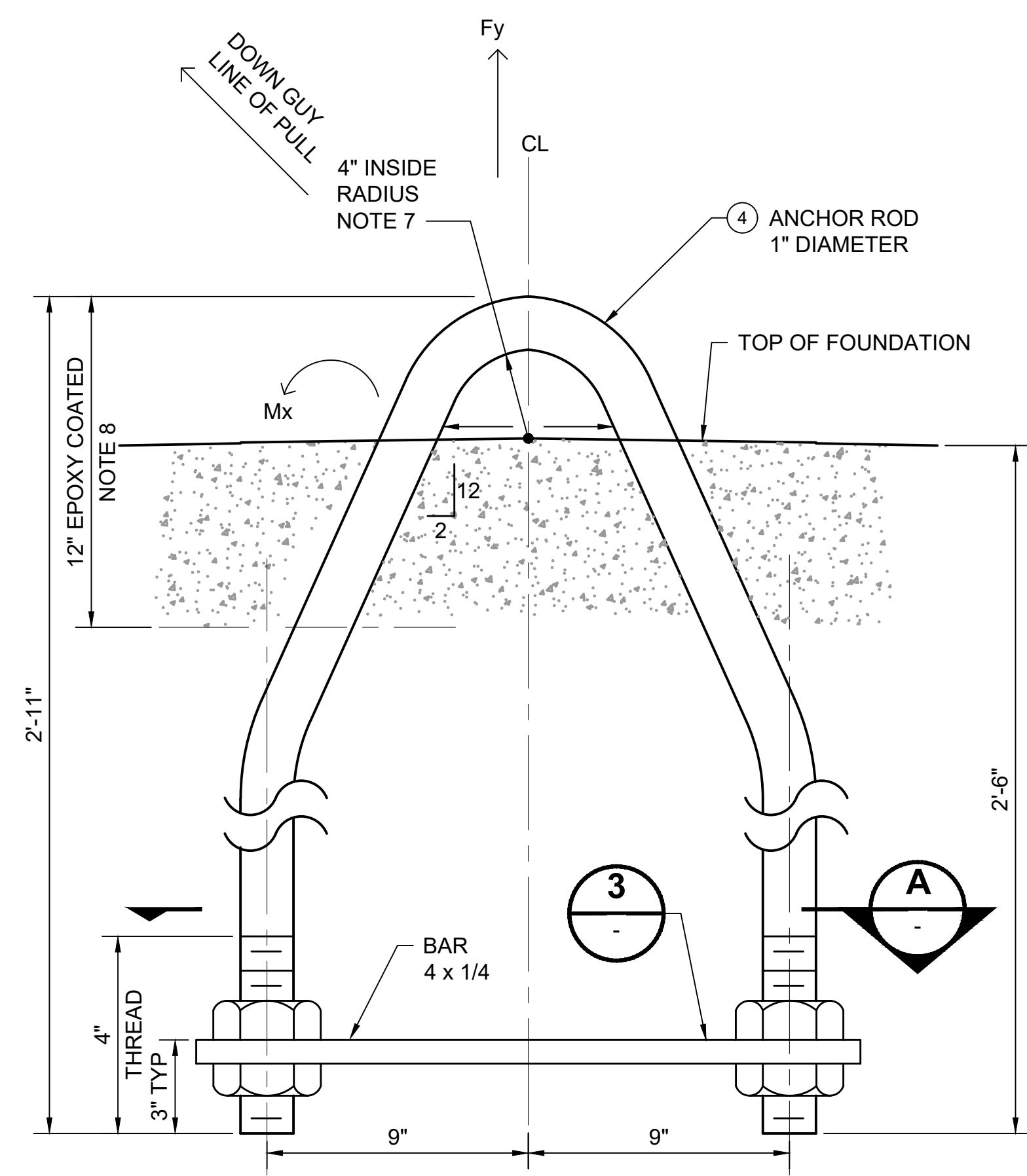
SOUND TRANSIT STANDARD DRAWINGS SYSTEMS
OVERHEAD CATENARY SYSTEM
OCS TYPICAL TAPERED TUBULAR FEEDER POLE FOUNDATION ASSEMBLY DETAILS

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SHEET No.: REV: 2

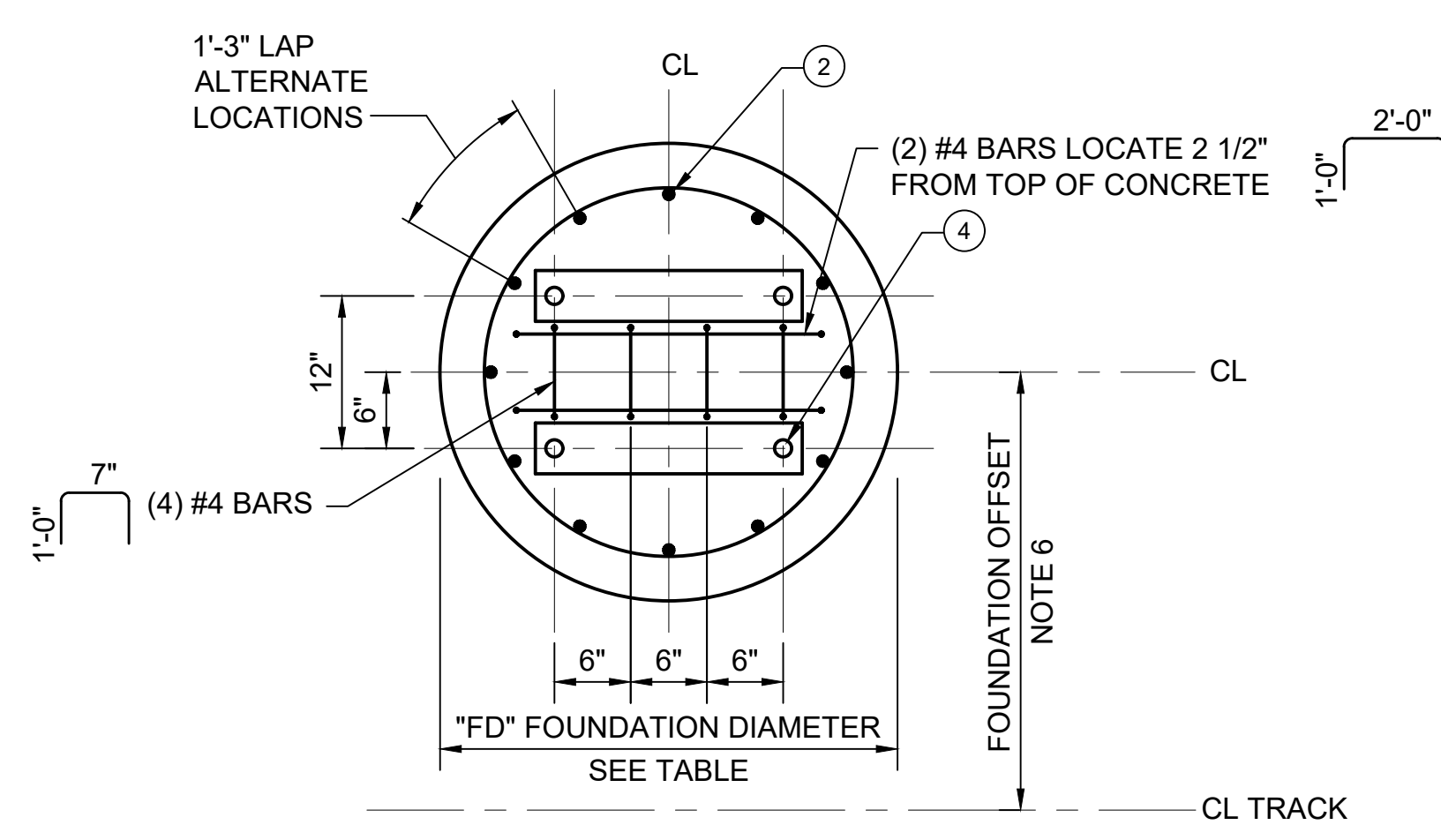
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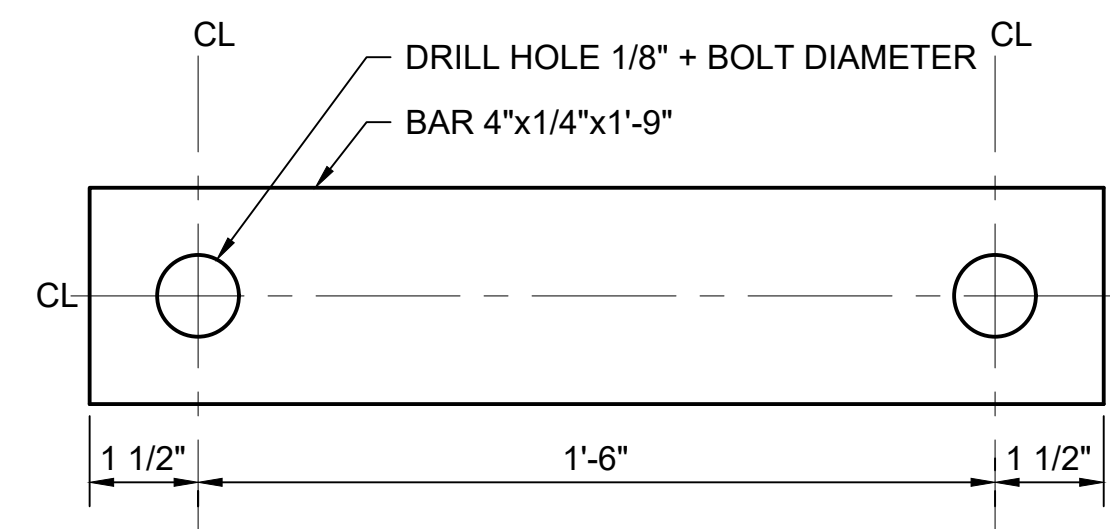
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JOD354



ANCHOR ROD DETAIL (2) NTS



SECTION (A) NTS



BAR SECTION DETAIL (3) NTS

GENERAL NOTES:

- REFER TO CRSI MANUAL OF STANDARD PRACTICE FOR REINFORCEMENT ASSEMBLY REQUIREMENTS.
- NO.4 SPIRALS AT 4" (MAXIMUM) PITCH MAY BE SUBSTITUTED FOR REBAR TIES. SPACE AT 2" PITCH FOR TOP 8".
- FOUNDATION DEPTH MAY BE INCREASED 2'-0" WITHOUT CHANGING REINFORCEMENT LENGTH. THE REINFORCING SHALL THEN BE INSTALLED 3" FROM THE TOP OF THE FOUNDATION. ANY INCREASE OVER 2'-0" SHALL REQUIRE A CORRESPONDING INCREASE IN REINFORCEMENT LENGTH.
- MATERIAL SPECIFICATIONS TO BE INCLUDED IN OCS POLE AND FOUNDATION SPECIFICATIONS.
- REBAR AND EMBEDDED ANCHOR BOLT STEEL SHALL HAVE 3" MINIMUM COVER.
- FOUNDATION ELEVATIONS ABOVE TOR, EMBEDMENT DEPTH AND STRUCTURE OFFSET INFORMATION TO BE SHOWN ON OCS FOUNDATION PLAN DRAWINGS.
- CENTER OF BEND RADIUS ELEVATIONS AT TOP OF LOW RAIL.
- THE ANCHOR ROD SHALL BE COATED WITH EPOXY AS INDICATED. EPOXY MATERIAL SHALL BE APPLIED UNIFORMLY TO ALL REQUIRED SURFACES.
- CASE TOP HALF OF POLE FOUNDATIONS AS REQUIRED.
- PROVIDE FIBER EXPANSION BOARD WITH FLEXIBLE SEALANT BETWEEN FOUNDATION AND CONCRETE PAVING.
- EACH ANCHOR ROD SHALL BE ELECTRICALLY CONNECTED TO THE REINFORCEMENT WITH A 2/0 COPPER WIRE.
- 2/0 COPPER WIRE SHALL BE CLAMPED TO THE ANCHOR ROD WITH A BURGUNDY GAR GROUND CONNECTOR OR APPROVED EQUAL AND EXOTHERMICALLY WELDED TO THE VERTICAL REINFORCEMENT.
- PROVIDE 1" WATERSHED.

| BILL OF MATERIALS | | | | |
|-------------------|-------|------------------|---------|-----------------|
| QUANTITIES | UNITS | DESCRIPTION | ITEM NO | PART NO/ REMARK |
| AS REQUIRED | CU YD | CONCRETE | 1 | |
| AS REQUIRED | LB | VERTICAL REBAR | 2 | |
| AS REQUIRED | LB | HORIZONTAL REBAR | 3 | |
| 2 | EACH | ANCHOR ROD | 4 | |
| AS REQUIRED | FT | COPPER CABLE | 5 | NOTE 11 |
| 2 | EACH | GROUND CONNECTOR | 6 | NOTE 12 |

(X) X DENOTES ITEM NO IN BILL OF MATERIALS


| OCS FOUNDATION SCHEDULES - TYPE A | | | | | | | |
|-----------------------------------|------------|---------------|-----|-----------------|------------|-----------------|------------|
| FOUNDATION | | REINFORCEMENT | | 25' DGA SPACING | | 17' DGA SPACING | |
| TYPE | "FD" (DIA) | "VR" | "T" | Mx | Fy | Mx | Fy |
| FD-3A | 3'-0" | 12 - #8 | #4 | 13.6 KF | 12,500 LBS | 13.6 KF | 18,500 LBS |

| No. | DATE | DSN | CHK | APP | REVISION |
|-----|--------|-----|-----|-----|------------------------------------|
| 1 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |
| 0 | 8/2019 | | | | REVISED SYSTEMS DIRECTIVE DRAWINGS |

DESIGNED BY:
DRAWN BY:
CHECKED BY:
APPROVED BY:

SUBMITTED BY: DATE: REVIEWED BY: DATE:

SCALE: NTS
FILENAME: STD-JOD354
CONTRACT No.: RTA/LR
DATE: 2/2024

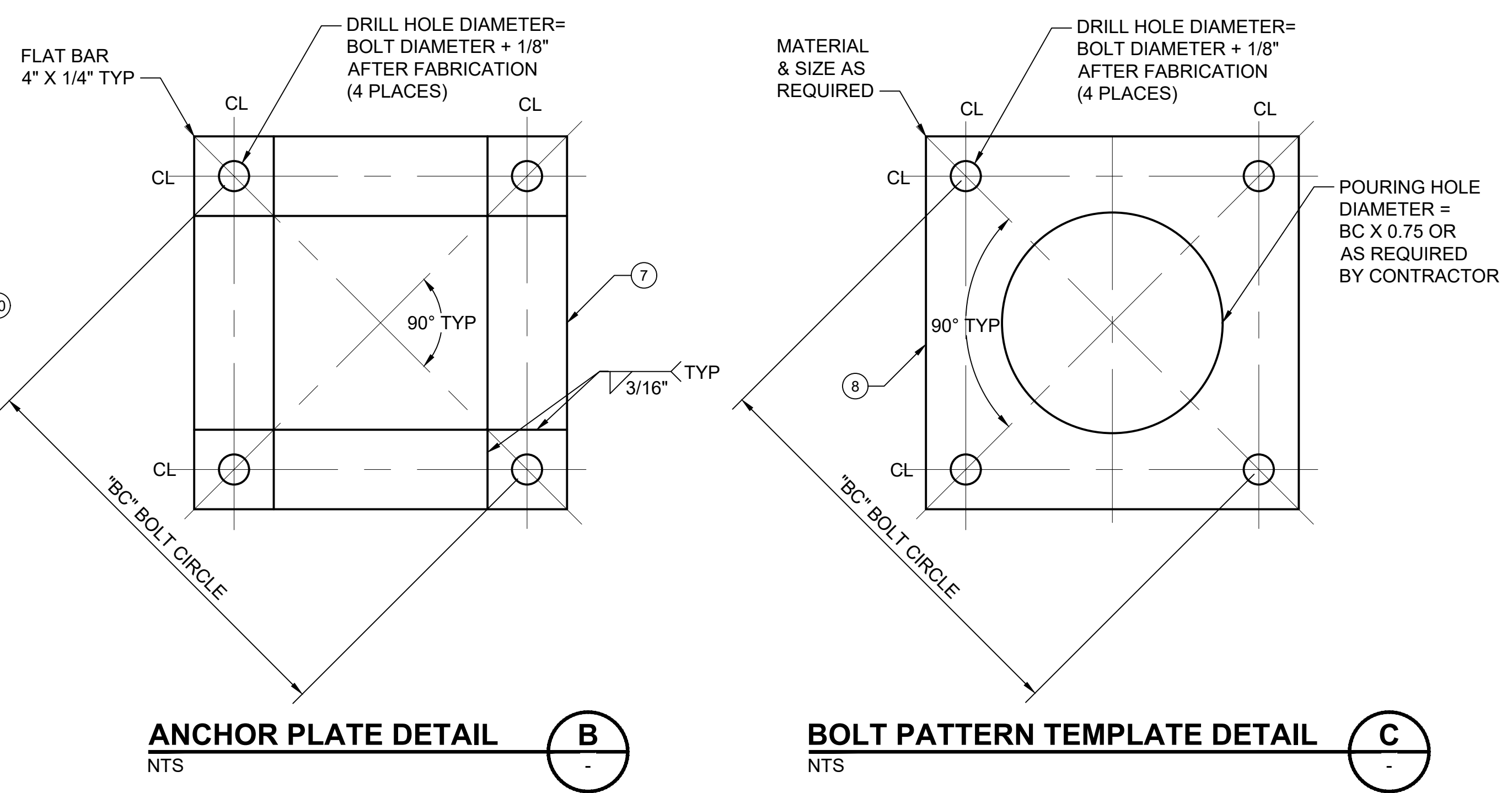
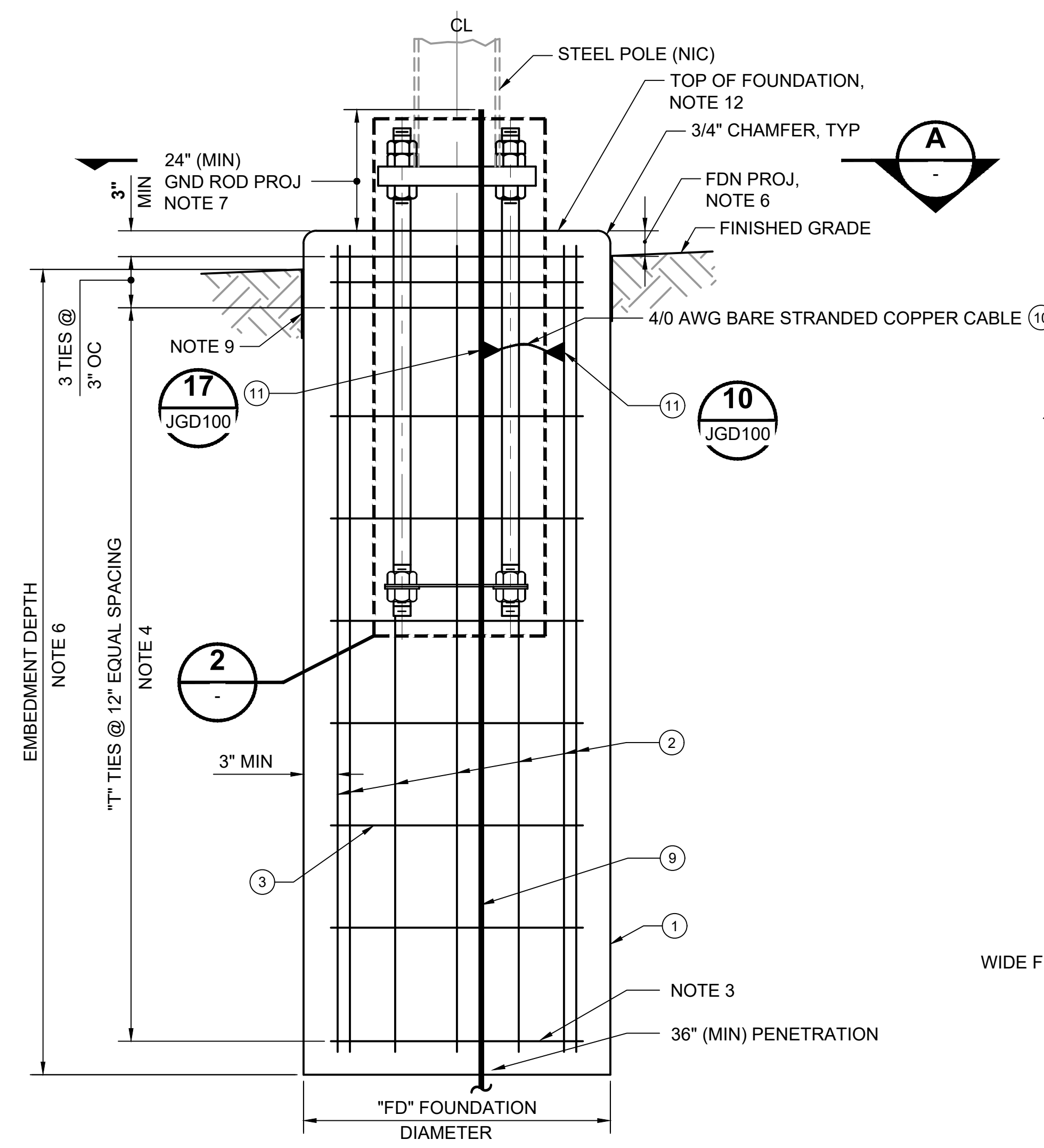


**SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS**

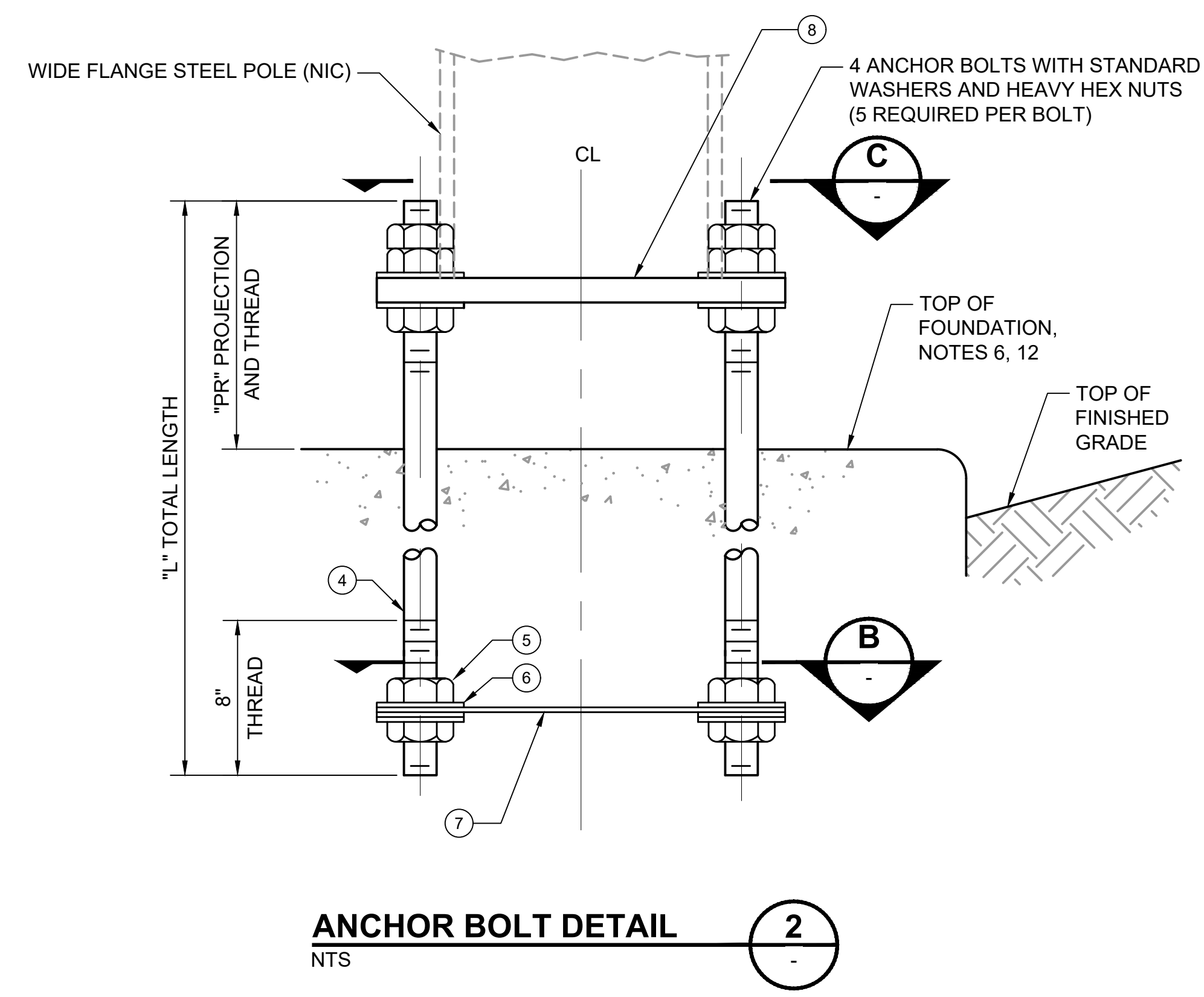
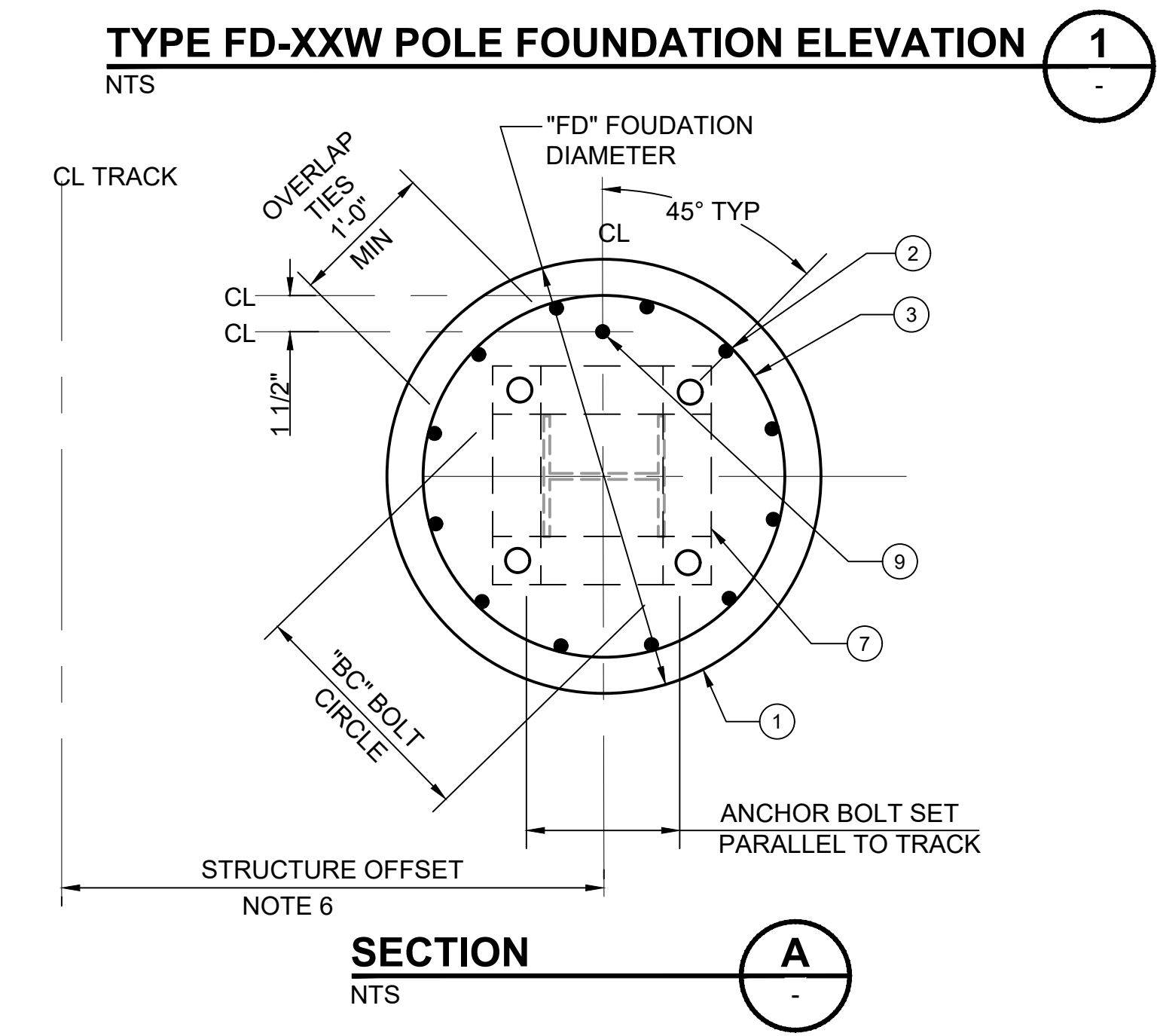
OVERHEAD CATENARY SYSTEM
OCS TYPICAL DOWN GUY ANCHOR
FOUNDATION ASSEMBLY DETAILS

DRAWING No.: **STD-JOD354**
FACILITY ID:
SHEET No.: REV: 1

03/21/24 | 1:52 PM | HARRISBK | C:\USERS\HARRISBK\DRAWINGS\STANDARD DRAWINGS\SYSTEMS\STD-JOD355.DWG



- GENERAL NOTES:**
- ANCHOR BOLTS (INCLUDING ALL EXPOSED NUTS AND WASHERS) AND ALL EXPOSED STEEL, SHALL BE GALVANIZED PER SPECIFICATIONS.
 - PROVIDE UNGALVANIZED ANCHOR PLATE (LOWER) AND UNGALVANIZED BOLT PATTERN TEMPLATE (UPPER) FOR ANCHOR BOLT INSTALLATION.
 - REFER TO CRSI MANUAL OF STANDARD PRACTICE FOR REINFORCEMENT ASSEMBLY REQUIREMENTS.
 - #4 SPIRALS AT 4" (MAXIMUM) PITCH MAY BE SUBSTITUTED FOR REBAR TIES. SPACE AT 2" FOR TOP 8"
 - FOUNDATION DEPTH MAY BE INCREASED 2'-0" WITHOUT CHANGING REINFORCEMENT LENGTH. THE REINFORCING SHALL THEN BE INSTALLED 3" FROM THE TOP OF THE FOUNDATION. AN INCREASE OVER 2'-0" SHALL REQUIRE A CORRESPONDING INCREASE IN REINFORCEMENT LENGTH.
 - FOR FOUNDATION ELEVATION ABOVE TOR, EMBEDMENT DEPTH AND STRUCTURE OFFSET INFORMATION, SEE OCS FOUNDATION PLANS DRAWINGS.
 - EXTEND GROUND ROD A MINIMUM OF 24" ABOVE TOP OF FOUNDATION WITHIN THE CENTER AREA. BOND GROUND ROD TO VERTICAL REBAR USING EXOTHERMIC WELD. PLACE GROUND ROD PARALLEL TO TRACK CENTERLINE IN THE INCREASING TRACK STATIONING DIRECTION.
 - REBAR AND EMBEDDED ANCHOR BOLT STEEL SHALL HAVE 3" MINIMUM COVERAGE.
 - PROVIDE FIBER EXPANSION BOARD WITH FLEXIBLE SEALANT BETWEEN FOUNDATION AND CONCRETE PAVING.
 - SEE SPECIFICATIONS FOR CASING REQUIREMENTS.
 - SEE SPECIFICATIONS FOR GROUND REQUIREMENTS.
 - PROVIDE 1" WATERSHED.
 - VERTICAL AND HORIZONTAL REBAR SHALL BE ELECTRICALLY CONTINUOUS.



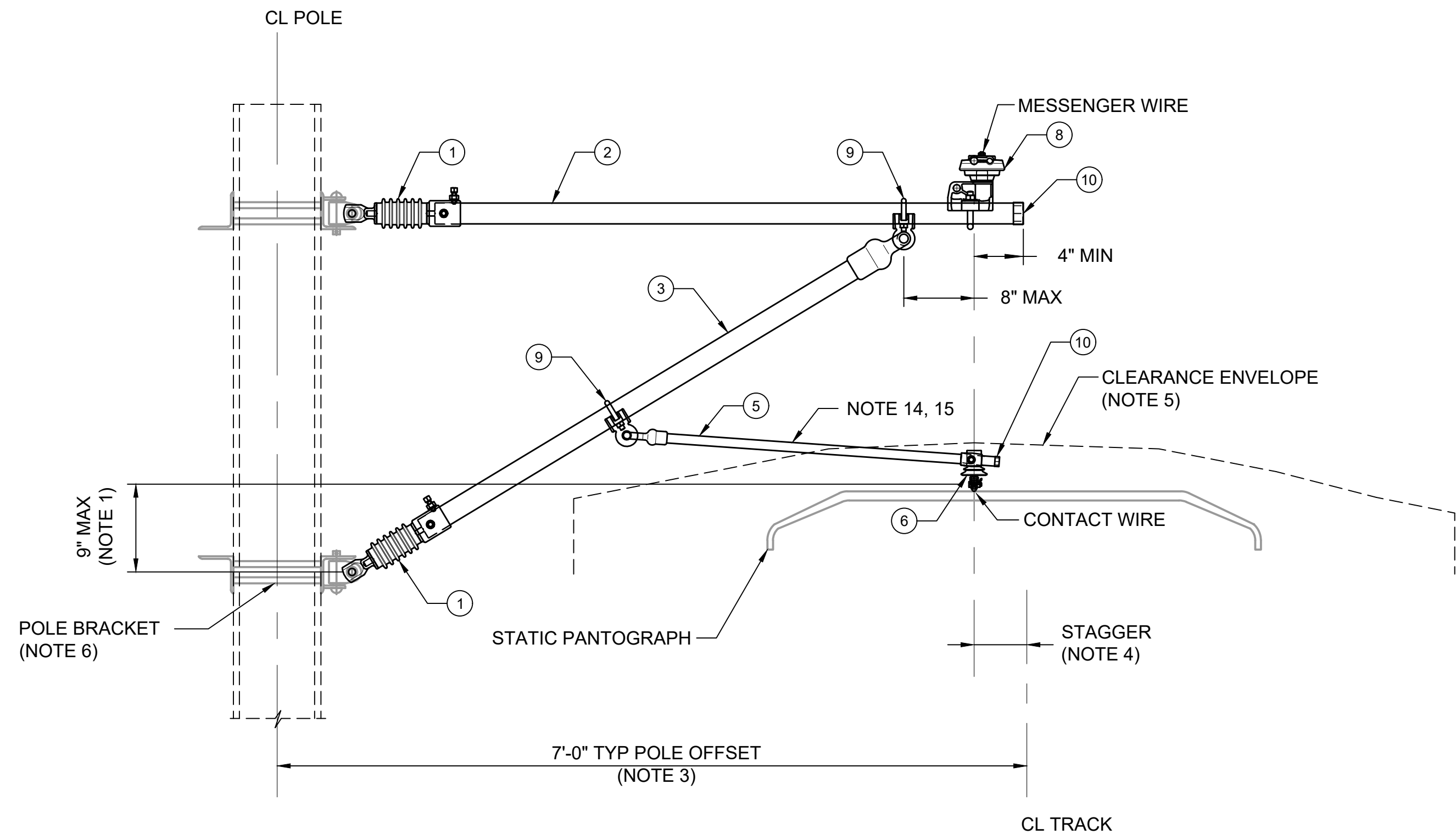
| QUANTITIES EACH TYPE | | | | | | UNITS | DESCRIPTION | ITEM NO | PART NO/REMARK |
|----------------------|--------|--------|--------|--------|--------|-------|-----------------------|---------|----------------|
| FD-08W | FD-10W | FD-20W | FD-21W | FD-22W | FD-32W | | | | |
| | | | | | | CU YD | CONCRETE | 1 | |
| | | | | | | LB | VERTICAL REBAR | 2 | |
| | | | | | | LB | HORIZONTAL REBAR | 3 | |
| 4 | 4 | 4 | 4 | 4 | 4 | EACH | ANCHOR BOLT | 4 | |
| 20 | 20 | 20 | 20 | 20 | 20 | EACH | ANCHOR BOLT NUT | 5 | |
| 16 | 16 | 16 | 16 | 16 | 16 | EACH | ANCHOR BOLT WASHER | 6 | |
| 1 | 1 | 1 | 1 | 1 | 1 | EACH | ANCHOR PLATE | 7 | NOTE 2 |
| 1 | 1 | 1 | 1 | 1 | 1 | EACH | BOLT PATTERN TEMPLATE | 8 | NOTE 2 |
| | | | | | | EACH | GROUND ROD | 9 | NOTE 7, 11 |
| | | | | | | FT | COPPER CABLE | 10 | |
| | | | | | | EACH | GROUND CONNECTOR | 11 | |

(X) X DENOTES ITEM NO IN BILL OF MATERIALS

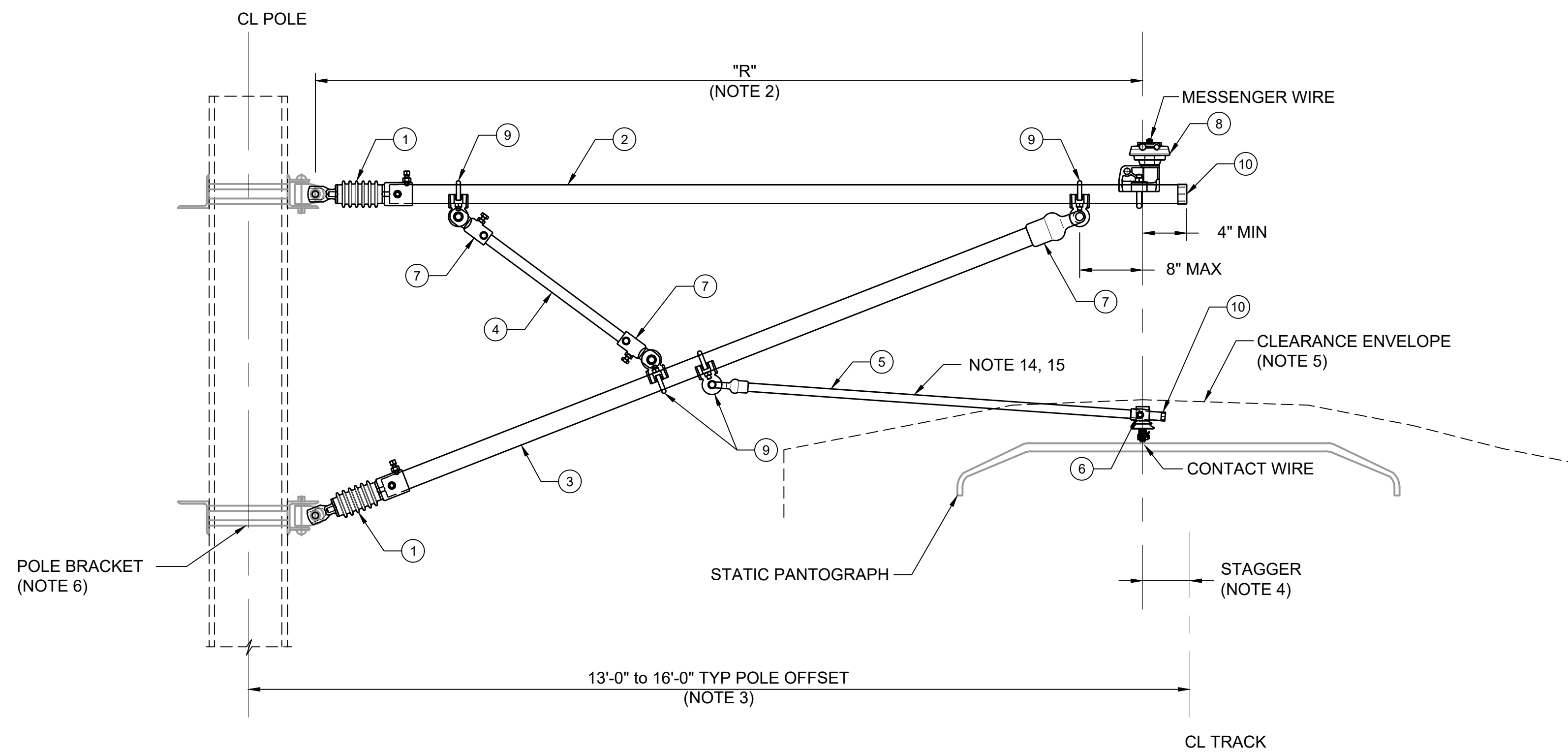
| FOUNDATION TYPE | REINFORCEMENT | | | ANCHOR BOLTS | | | | MAX ALLOWABLE MOMENT KIP-FT |
|-----------------|---------------|---------|-----|--------------|----------|-----|-----|-----------------------------|
| | "FD" (DIA) | "VR" | "T" | "BC" | BOLT DIA | "L" | "P" | |
| FD-08W | 2'-6" | 12 - #6 | #3 | 16" | 1-1/2" | 60" | 9" | 29.1 |
| FD-10W | 3'-0" | 12 - #8 | #4 | 18" | 1-3/4" | 60" | 10" | 44.7 |
| FD-20W | 3'-0" | 12 - #8 | #4 | 20" | 2" | 60" | 12" | 61.9 |
| FD-21W | 3'-0" | 12 - #8 | #4 | 20" | 2" | 60" | 12" | 73.2 |
| FD-22W | 3'-0" | 12 - #8 | #4 | 24" | 2-1/2" | 60" | 14" | 113.7 |
| FD-32W | 3'-0" | 12 - #8 | #4 | 24" | 2-1/2" | 60" | 14" | 156.2 |

| No. | DATE | DSN | CHK | APP | REVISION |
|-----|--------|-----|-----|-----|--|
| 1 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |
| 0 | 8/2019 | | | | 2019 GUIDANCE DWG REVISIONS - GENERAL UPDATE |

| | | | | | |
|--------------|--|----------------------|-------|--|--------------------------------|
| DESIGNED BY: | | SCALE: NTS | | SOUND TRANSIT STANDARD DRAWINGS SYSTEMS OVERHEAD CATENARY SYSTEM OCS TYPICAL WIDE FLANGE POLE FOUNDATION ASSEMBLY DETAILS | DRAWING No.: STD-JOD355 |
| DRAWN BY: | | FILENAME: STD-JOD355 | | | FACILITY ID: |
| CHECKED BY: | | CONTRACT No.: RTA/LR | | | SHEET No.: REV: |
| APPROVED BY: | | SUBMITTED BY: | DATE: | REVIEWED BY: | DATE: |



PULL-OFF CANTILEVER ASSEMBLY CA-01L LIGHT LOAD
NTS



LONG REACH PULL-OFF CANTILEVER ASSEMBLY CL-01L LIGHT LOAD
NTS

GENERAL NOTES:

- LOWER BRACKET TO CONTACT WIRE DIMENSION OF 9" IS FOR 7'-0" POLE TO CENTERLINE OF TRACK OFFSET. THIS DIMENSION MAY BE INCREASED 1" FOR EACH 6" INCREASE IN POLE OFFSET DIMENSION.
- FOR LONG REACH CANTILEVERS USE THIS FORMULA TO CALCULATE "H" (THE DISTANCE BETWEEN THE LOWER POLE BRACKET AND THE CONTACT WIRE).

$$"R" = \text{LENGTH OF TOP PIPE}$$

$$H = 6" + \frac{R - 6"}{6}$$

EXAMPLE FOR 13'-0" TOP PIPE:
 $H = 6" + \frac{13' - 6"}{6}$ H = 6" + 1.16' H = 1.66' OR 1'-8"
- CONTRACTOR SHALL FIELD VERIFY THIS DIMENSION PRIOR TO FABRICATION OF CANTILEVER PIPES.
- CATENARY DETAILS INCLUDING STAGGERS, POLE OFFSETS AND WIRE HEIGHTS AT EACH LOCATION TO BE SHOWN ON OCS LAYOUT PLANS AND JOD112 AND JOD114.
- FOR DETAILS OF PANTOGRAPH CLEARANCE, SEE DWG JOD112 AND JOD114.
- POLE BRACKET ASSEMBLY TO BE CALLED OFF SEPARATELY.
- CONTRACTOR TO DETERMINE COMPONENT DETAIL AND SAFE WORKING LIMITS.
- FOR SYMBOLS, LEGEND AND ABBREVIATIONS SEE DRAWINGS JZN001 AND JZN002.
- CONTRACTOR TO VERIFY ALL QUANTITIES ON THE BILL OF MATERIALS.
- CONTRACTOR TO DETERMINE POLE BRACKET ATTACHMENT HEIGHTS.
- THE CONTRACTOR IS RESPONSIBLE FOR THE DESIGN OF EACH ASSEMBLY AS A WHOLE AND EACH COMPONENT MEETING OR EXCEEDING THE LOADING TABLES WHERE PROVIDED. WHERE THE WORKING LOAD CAPABILITIES OF THE CONTRACTOR'S ASSEMBLIES EXCEED THOSE SHOWN IN THE LOADING TABLE, THE CONTRACTOR SHALL UPDATE THE TABLE IN THEIR SUBMISSION OF ASSEMBLY.
- THE BILL OF MATERIALS ARE TYPICAL FOR THE ASSEMBLY STYLES SHOWN. THE CONTRACTOR SHALL ITEMIZE THE TABLE WITH DESCRIPTIONS AND PART NUMBERS OF COMPONENTS REQUIRED TO COMPLETE EACH ASSEMBLY.
- CANTILEVER BRACKET SEPARATION SHALL BE DETERMINED USING THE TYPICAL 1:3 PIPE SLOPE AS A BASIS. IN SOME LOCATIONS A LARGER SLOPE MAY BE USED TO AVOID CONFLICTS WITH OTHER HARDWARE MOUNTED ON THE POLES.
- STEADY ARM LENGTH AND HEEL SETTING TO BE DETERMINED BY THE CONTRACTOR.
- CONTRACTOR TO ENSURE THAT THE STEADY ARM DESIGN ALLOWS FOR PANTOGRAPH CLEARANCE ENVELOPE.
- THE MAXIMUM LOADS IN THE TABLE ARE THE WORST CASE LOADS THAT INCLUDE WIND AND ICE WHERE APPLICABLE.

| MAXIMUM ASSEMBLY LOADING | | |
|----------------------------|----------|----------|
| | CL-01L | CA-01L |
| MESSENGER WIRE RADIAL LOAD | 350 LBS | 350 LBS |
| CONTACT WIRE RADIAL LOAD | 200 LBS | 200 LBS |
| VERTICAL LOAD | 1000 LBS | 1000 LBS |

| BILL OF MATERIALS | | | | | |
|----------------------|--------|-------|---------------------------|----------|------------------|
| QUANTITIES EACH TYPE | | UNITS | DESCRIPTION | ITEM NO. | PART NO./REMARKS |
| CL-01L | CA-01L | | | | |
| 2 | 2 | EA | INSULATOR | 1 | |
| 1 | 1 | EA | TOP PIPE | 2 | LENGTH AS REQ'D |
| 1 | 1 | EA | STRUT PIPE | 3 | LENGTH AS REQ'D |
| 1 | - | EA | BRACE | 4 | LENGTH AS REQ'D |
| 1 | 1 | EA | STEADY ARM | 5 | LENGTH AS REQ'D |
| 1 | 1 | EA | CONTACT WIRE SWIVEL CLAMP | 6 | INSULATED |
| 3 | 1 | EA | CLEVIS FITTING | 7 | |
| 1 | 1 | EA | INSULATED MESSENGER CLAMP | 8 | |
| 4 | 2 | EA | EYE CLAMP | 9 | |
| 2 | 2 | EA | PIPE CAP | 10 | |

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| No. | DATE | DSN | CHK | APP | REVISION |
|-----|--------|-----|-----|-----|------------------------------------|
| 1 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |
| 0 | 8/2019 | | | | REVISED SYSTEMS DIRECTIVE DRAWINGS |

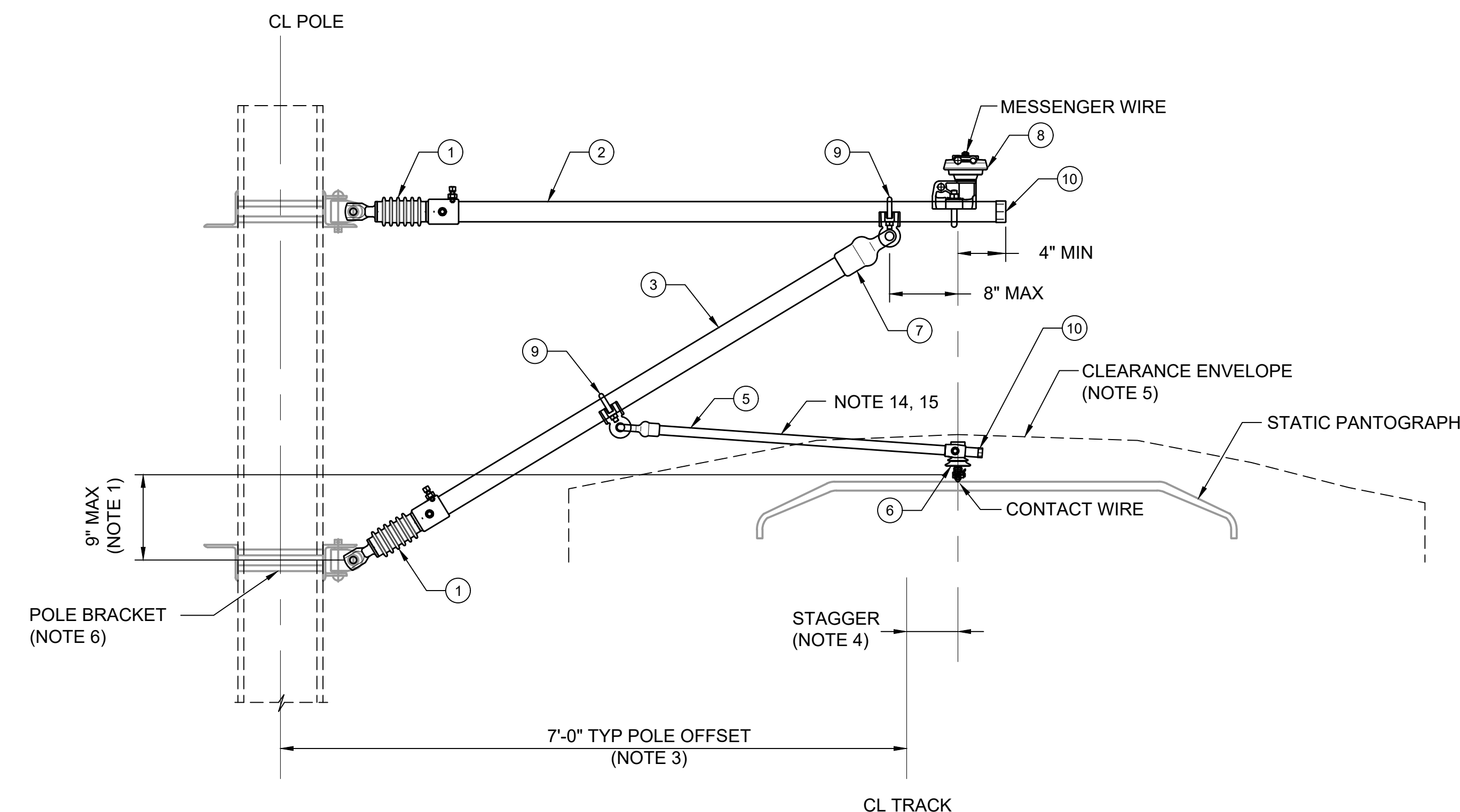
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CHECKED BY:
APPROVED BY:

SUBMITTED BY: _____ DATE: _____
REVIEWED BY: _____ DATE: _____

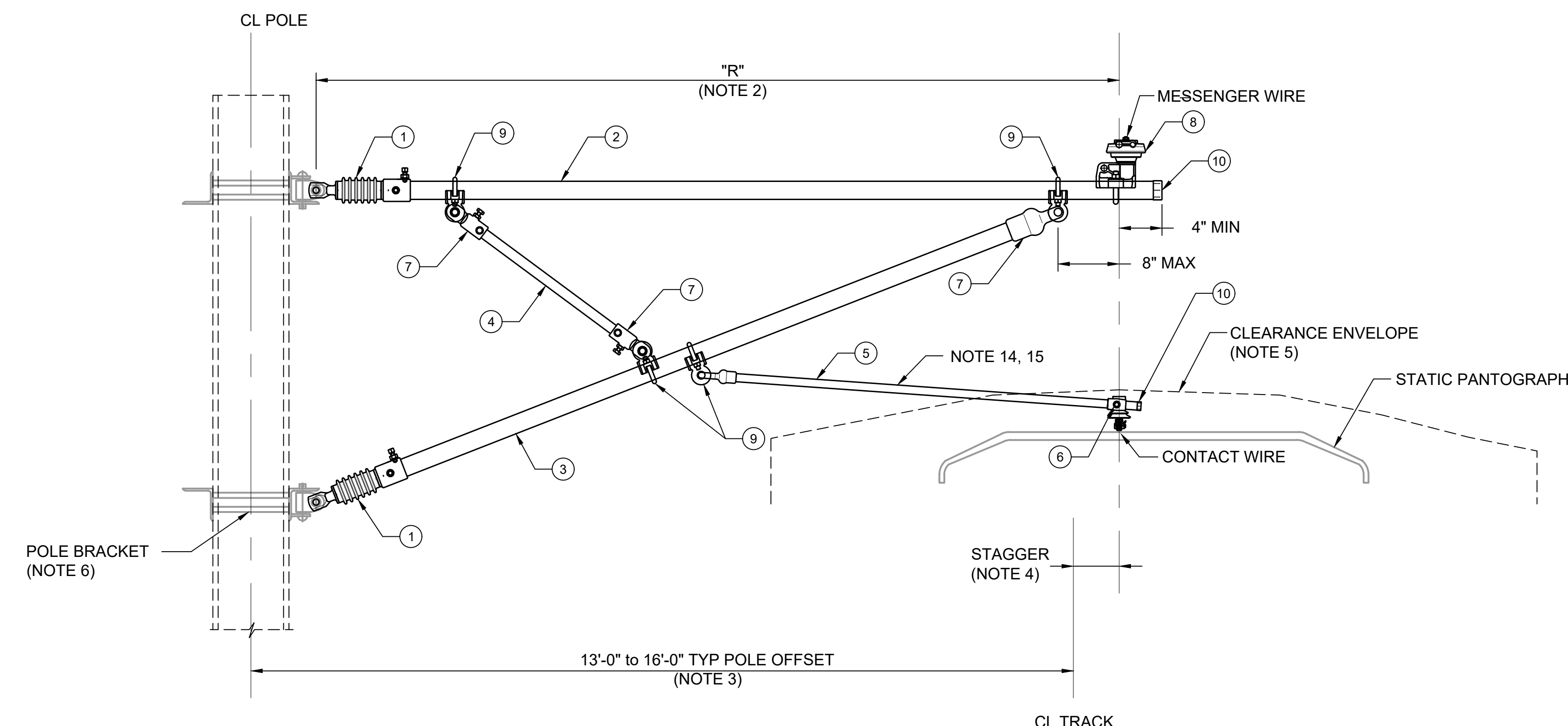
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CONTRACT No.: RTA/LR
DATE: 2/2024

SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS
OVERHEAD CATENARY SYSTEM
CANTILEVER PULL-OFF ASSEMBLIES
CA-01L & CL-01L

DRAWING No.: **STD-JOD400**
FACILITY ID:
SHEET No.: REV: 1



PUSH-OFF CANTILEVER ASSEMBLY CA-02L LIGHT LOAD
NTS



LONG REACH PUSH-OFF CANTILEVER ASSEMBLY CL-02L LIGHT LOAD
NTS

GENERAL NOTES:

- LOWER BRACKET TO CONTACT WIRE DIMENSION OF 9" IS FOR 7'-0" POLE TO CENTERLINE OF TRACK OFFSET. THIS DIMENSION MAY BE INCREASED 1" FOR EACH 6" INCREASE IN POLE OFFSET DIMENSION.
- FOR LONG REACH CANTILEVERS USE THIS FORMULA TO CALCULATE "H" (THE DISTANCE BETWEEN THE LOWER POLE BRACKET AND THE CONTACT WIRE).
"R" = LENGTH OF TOP PIPE
 $H = 6" + \frac{R - 6"}{6}$
EXAMPLE FOR 13'-0" TOP PIPE:
 $H = 6" + \frac{13' - 6'}{6}$ H = 6" + 1.16' H = 1.66' OR 1'-8"
- CONTRACTOR SHALL FIELD VERIFY THIS DIMENSION PRIOR TO FABRICATION OF CANTILEVER PIPES.
- CATENARY DETAILS INCLUDING STAGGERS, POLE OFFSETS AND WIRE HEIGHTS AT EACH LOCATION TO BE SHOWN ON OCS LAYOUT PLANS AND SCHEDULES.
- FOR DETAILS OF PANTOGRAPH CLEARANCE, SEE DWG JOD112 AND JOD114.
- POLE BRACKET ASSEMBLY TO BE CALLED OFF SEPARATELY.
- CONTRACTOR TO DETERMINE COMPONENT DETAIL AND SAFE WORKING LIMITS.
- FOR SYMBOLS, LEGEND AND ABBREVIATIONS SEE DRAWINGS JZN001 AND JZN002.
- CONTRACTOR TO VERIFY ALL QUANTITIES ON THE BILL OF MATERIALS.
- CONTRACTOR TO DETERMINE POLE BRACKET ATTACHMENT HEIGHTS.
- THE CONTRACTOR IS RESPONSIBLE FOR THE DESIGN OF EACH ASSEMBLY AS A WHOLE AND EACH COMPONENT MEETING OR EXCEEDING THE LOADING TABLES WHERE PROVIDED. WHERE THE WORKING LOAD CAPABILITIES OF THE CONTRACTOR'S ASSEMBLIES EXCEED THOSE SHOWN IN THE LOADING TABLE, THE CONTRACTOR SHALL UPDATE THE TABLE IN THEIR SUBMISSION OF ASSEMBLY.
- THE BILL OF MATERIALS ARE TYPICAL FOR THE ASSEMBLY STYLES SHOWN. THE CONTRACTOR SHALL ITEMIZE THE TABLE WITH DESCRIPTIONS AND PART NUMBERS OF COMPONENTS REQUIRED TO COMPLETE EACH ASSEMBLY.
- CANTILEVER BRACKET SEPARATION SHALL BE DETERMINED USING THE TYPICAL 1:3 PIPE SLOPE AS A BASIS. IN SOME LOCATIONS A LARGER SLOPE MAY BE USED TO AVOID CONFLICTS WITH OTHER HARDWARE MOUNTED ON THE POLES.
- STEADY ARM LENGTH AND HEEL SETTING TO BE DETERMINED BY THE CONTRACTOR.
- CONTRACTOR TO ENSURE THAT THE STEADY ARM DESIGN ALLOWS FOR PANTOGRAPH CLEARANCE ENVELOPE.
- THE MAXIMUM LOADS IN THE TABLE ARE THE WORST CASE LOADS THAT INCLUDE WIND AND ICE WHERE APPLICABLE.

| MAXIMUM ASSEMBLY LOADING | | |
|----------------------------|----------|----------|
| | CL-02L | CA-02L |
| MESSENGER WIRE RADIAL LOAD | 350 LBS | 350 LBS |
| CONTACT WIRE RADIAL LOAD | 80 LBS | 80 LBS |
| VERTICAL LOAD | 1000 LBS | 1000 LBS |

| BILL OF MATERIALS | | | | | |
|----------------------|--------|-------|---------------------------|----------|------------------|
| QUANTITIES EACH TYPE | | UNITS | DESCRIPTION | ITEM NO. | PART NO./REMARKS |
| CL-02L | CA-02L | | | | |
| 2 | 2 | EA | INSULATOR | 1 | |
| 1 | 1 | EA | TOP PIPE | 2 | LENGTH AS REQ'D |
| 1 | 1 | EA | STRUT PIPE | 3 | LENGTH AS REQ'D |
| 1 | - | EA | BRACE | 4 | LENGTH AS REQ'D |
| 1 | 1 | EA | STEADY ARM | 5 | LENGTH AS REQ'D |
| 1 | 1 | EA | CONTACT WIRE SWIVEL CLAMP | 6 | INSULATED |
| 3 | 1 | EA | CLEVIS FITTING | 7 | |
| 1 | 1 | EA | INSULATED MESSENGER CLAMP | 8 | |
| 4 | 2 | EA | EYE CLAMP | 9 | |
| 2 | 2 | EA | PIPE CAP | 10 | |

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| No. | DATE | DSN | CHK | APP | REVISION |
|-----|--------|-----|-----|-----|------------------------------------|
| 1 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |
| 0 | 8/2019 | | | | REVISED SYSTEMS DIRECTIVE DRAWINGS |

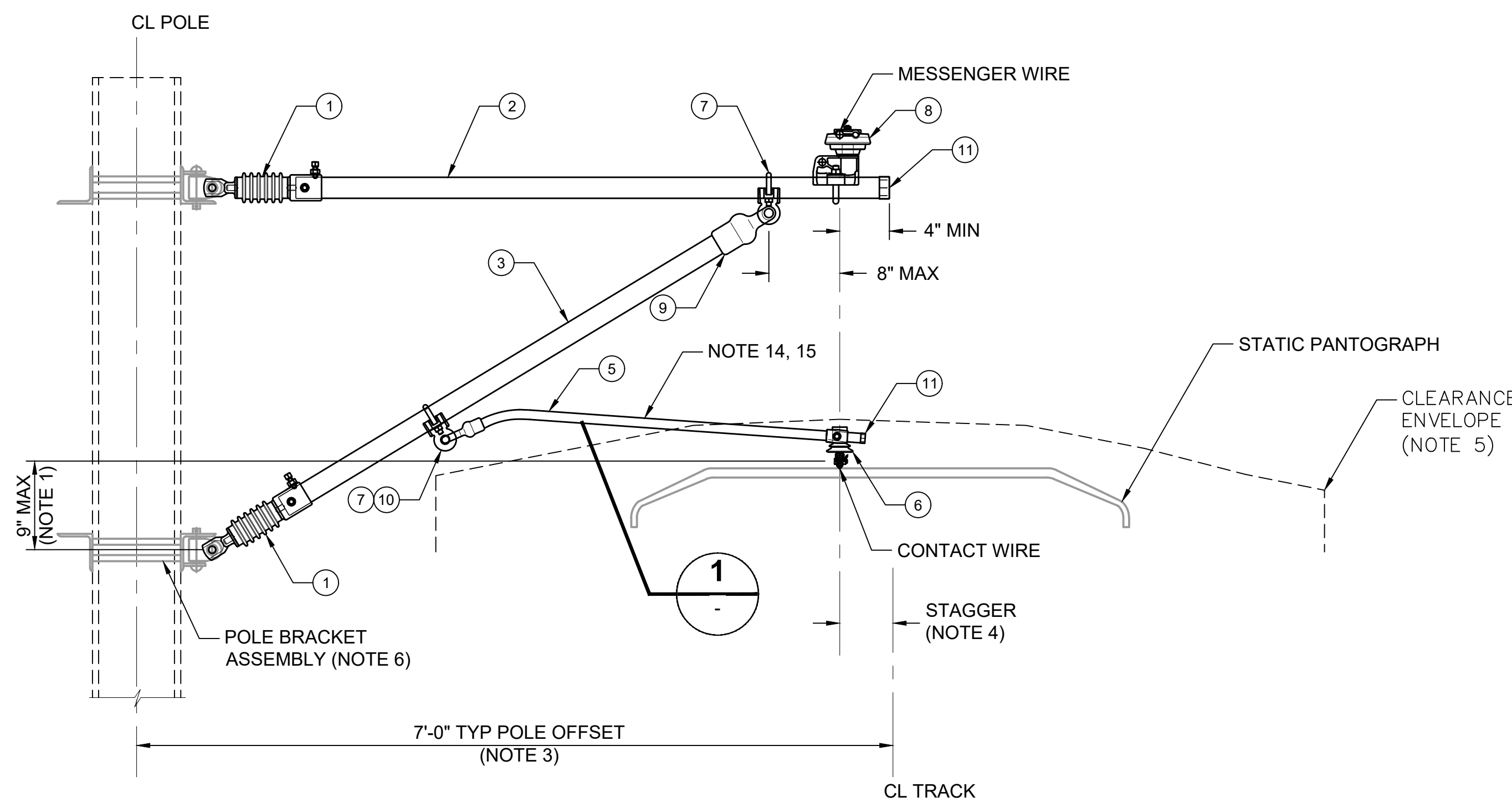
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| CONTRACT No.: | |
| DATE: 2/2024 | |

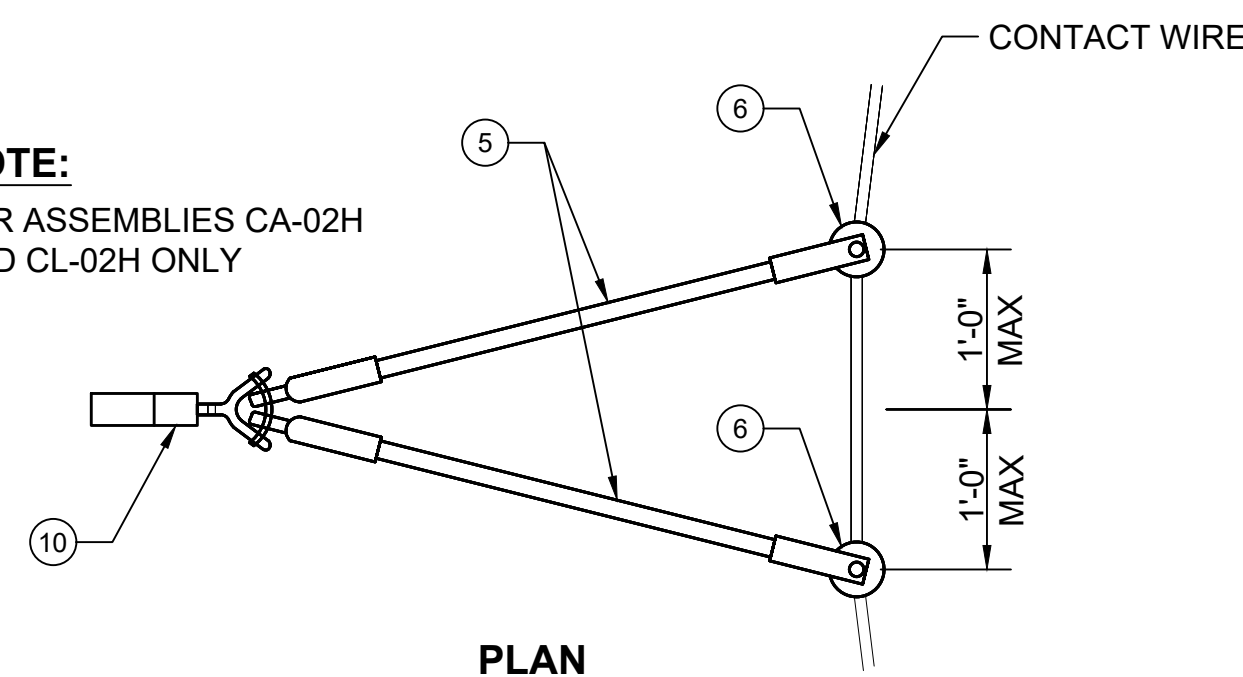
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| SOUND TRANSIT STANDARD DRAWINGS SYSTEMS | |
| OVERHEAD CATENARY SYSTEM CANTILEVER PULL-OFF ASSEMBLIES CA-02L & CL-02L | |

| | |
|--------------|-------------------|
| DRAWING No.: | STD-JOD401 |
| FACILITY ID: | |
| SHEET No.: | REV: 1 |



**PULL-OFF CANTILEVER ASSEMBLY
CA-01 M OR H MEDIUM OR HEAVY LOAD**
NTS

NOTE:
FOR ASSEMBLIES CA-02H
AND CL-02H ONLY



DETAIL OF TWIN STEADY ARMS
NTS

GENERAL NOTES:

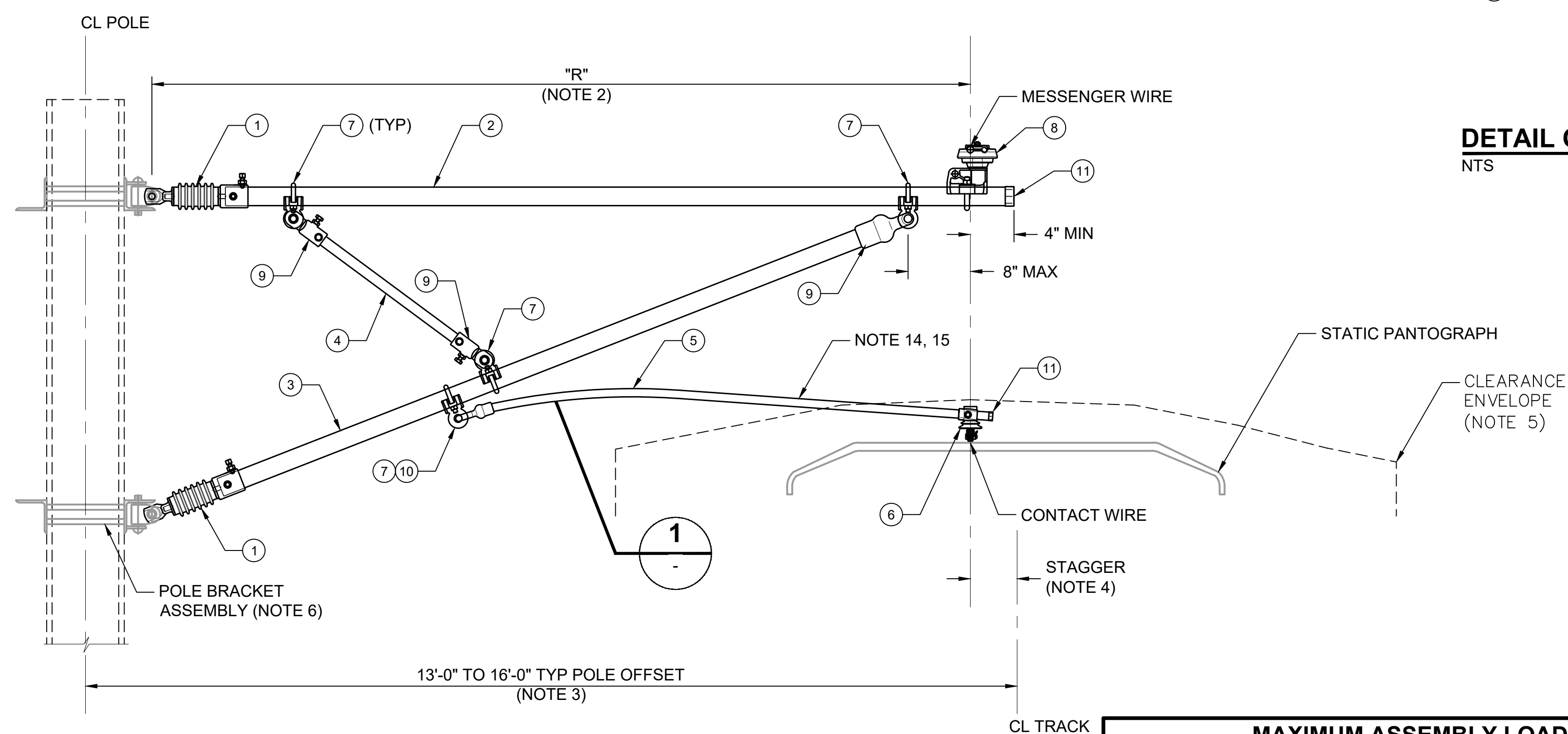
- LOWER BRACKET TO CONTACT WIRE DIMENSION OF 9" IS FOR 7'-0" POLE TO CENTERLINE OF TRACK OFFSET. THIS DIMENSION MAY BE INCREASED 1" FOR EACH 6" INCREASE IN POLE OFFSET DIMENSION.
- FOR LONG REACH CANTILEVERS USE THIS FORMULA TO CALCULATE "H" (THE DISTANCE BETWEEN THE LOWER POLE BRACKET AND THE CONTACT WIRE).

$$R = \text{LENGTH OF TOP PIPE}$$

$$H = 6" + \frac{R - 6"}{6}$$
 EXAMPLE FOR 13'-0" TOP PIPE:

$$H = 6" + \frac{13' - 6'}{6}$$

$$H = 6" + 1.16' H = 1.66' \text{ OR } 1'-8"$$
- CONTRACTOR SHALL FIELD VERIFY THIS DIMENSION PRIOR TO FABRICATION OF CANTILEVER PIPES.
- CATENARY DETAILS INCLUDING STAGGERS, POLE OFFSETS AND WIRE HEIGHTS AT EACH LOCATION TO BE SHOWN ON OCS LAYOUT SCHEDULE.
- FOR DETAILS OF PANTOGRAPH CLEARANCE, SEE DWG JOD112 AND JOD114.
- POLE BRACKET ASSEMBLY TO BE CALLED OFF SEPARATELY.
- CONTRACTOR TO DETERMINE COMPONENT DETAIL AND SAFE WORKING LIMITS.
- FOR SYMBOLS, LEGEND AND ABBREVIATIONS SEE DRAWINGS JZN001 AND JZN002.
- CONTRACTOR TO VERIFY ALL QUANTITIES ON THE BILL OF MATERIALS.
- CONTRACTOR TO DETERMINE POLE BRACKET ATTACHMENT HEIGHTS.
- THE CONTRACTOR IS RESPONSIBLE FOR THE DESIGN OF EACH ASSEMBLY AS A WHOLE AND EACH COMPONENT MEETING OR EXCEEDING THE LOADING TABLES WHERE PROVIDED. WHERE THE WORKING LOAD CAPABILITIES OF THE CONTRACTOR'S ASSEMBLIES EXCEED THOSE SHOWN IN THE LOADING TABLE, THE CONTRACTOR SHALL UPDATE THE TABLE IN THEIR SUBMISSION OF ASSEMBLY.
- THE BILL OF MATERIALS ARE TYPICAL FOR THE ASSEMBLY STYLES SHOWN. THE CONTRACTOR SHALL ITEMIZE THE TABLE WITH DESCRIPTIONS AND PART NUMBERS OF COMPONENTS REQUIRED TO COMPLETE EACH ASSEMBLY.
- CANTILEVER BRACKET SEPARATION SHALL BE DETERMINED USING THE TYPICAL 1:3 PIPE SLOPE AS A BASIS. IN SOME LOCATIONS A LARGER SLOPE MAY BE USED TO AVOID CONFLICTS WITH OTHER HARDWARE MOUNTED ON THE POLES.
- STEADY ARM LENGTH AND HEEL SETTING TO BE DETERMINED BY THE CONTRACTOR.
- CONTRACTOR TO ENSURE THAT THE STEADY ARM DESIGN ALLOWS FOR PANTOGRAPH CLEARANCE ENVELOPE.
- THE CONTRACTOR SHALL ENSURE THAT TWIN STEADY ARMS EQUALLY SHARE THE CONTACT WIRE RADIAL LOAD.
- THE MAXIMUM LOADS IN THE TABLE ARE THE WORST CASE LOADS THAT INCLUDE WIND AND ICE WHERE APPLICABLE.



**LONG REACH PULL-OFF ASSEMBLY
CL-01 M OR H MEDIUM OR HEAVY LOAD**
NTS

| MAXIMUM ASSEMBLY LOADING | | | | |
|----------------------------|----------|----------|---------|---------|
| | CL-01H | CA-01H | CL-01M | CA-01M |
| MESSENGER WIRE RADIAL LOAD | 1450 LBS | 1450 LBS | 750 LBS | 750 LBS |
| CONTACT WIRE RADIAL LOAD | 1000 LBS | 1000 LBS | 500 LBS | 500 LBS |
| VERTICAL LOAD | 350 LBS | 350 LBS | 650 LBS | 650 LBS |

| BILL OF MATERIALS | | | | | | | |
|----------------------|--------|--------|--------|-------|---------------------------|----------|------------------|
| QUANTITIES EACH TYPE | | | | UNITS | DESCRIPTION | ITEM NO. | PART NO./REMARKS |
| CL-01H | CA-01H | CL-01M | CA-01M | | | | |
| 2 | 2 | 2 | 2 | EA | INSULATOR | 1 | |
| 1 | 1 | 1 | 1 | EA | TOP PIPE | 2 | LENGTH AS REQ'D |
| 1 | 1 | 1 | 1 | EA | STRUT PIPE | 3 | LENGTH AS REQ'D |
| 1 | - | 1 | - | EA | BRACE | 4 | LENGTH AS REQ'D |
| 2 | 2 | 1 | 1 | EA | STEADY ARM, CURVED | 5 | LENGTH AS REQ'D |
| 2 | 2 | 1 | 1 | EA | CONTACT WIRE SWIVEL CLAMP | 6 | INSULATED |
| 4 | 2 | 4 | 2 | EA | EYE CLAMP | 7 | |
| 1 | 1 | 1 | 1 | EA | INSULATED MESSENGER CLAMP | 8 | |
| 3 | 1 | 3 | 1 | EA | CLEVIS FITTING | 9 | |
| 1 | 1 | - | - | EA | Y-CLEVIS CLAMP OR EQUAL | 10 | |
| 3 | 3 | 2 | 2 | EA | PIPE CAP | 11 | |

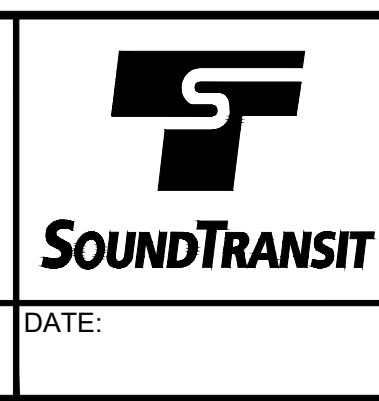
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| No. | DATE | DSN | CHK | APP | REVISION |
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| 1 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |
| 0 | 8/2019 | | | | REVISED SYSTEMS DIRECTIVE DRAWINGS |

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| DRAWN BY: | |
| CHECKED BY: | |
| APPROVED BY: | |

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LINE IS 1" AT FULL SCALE



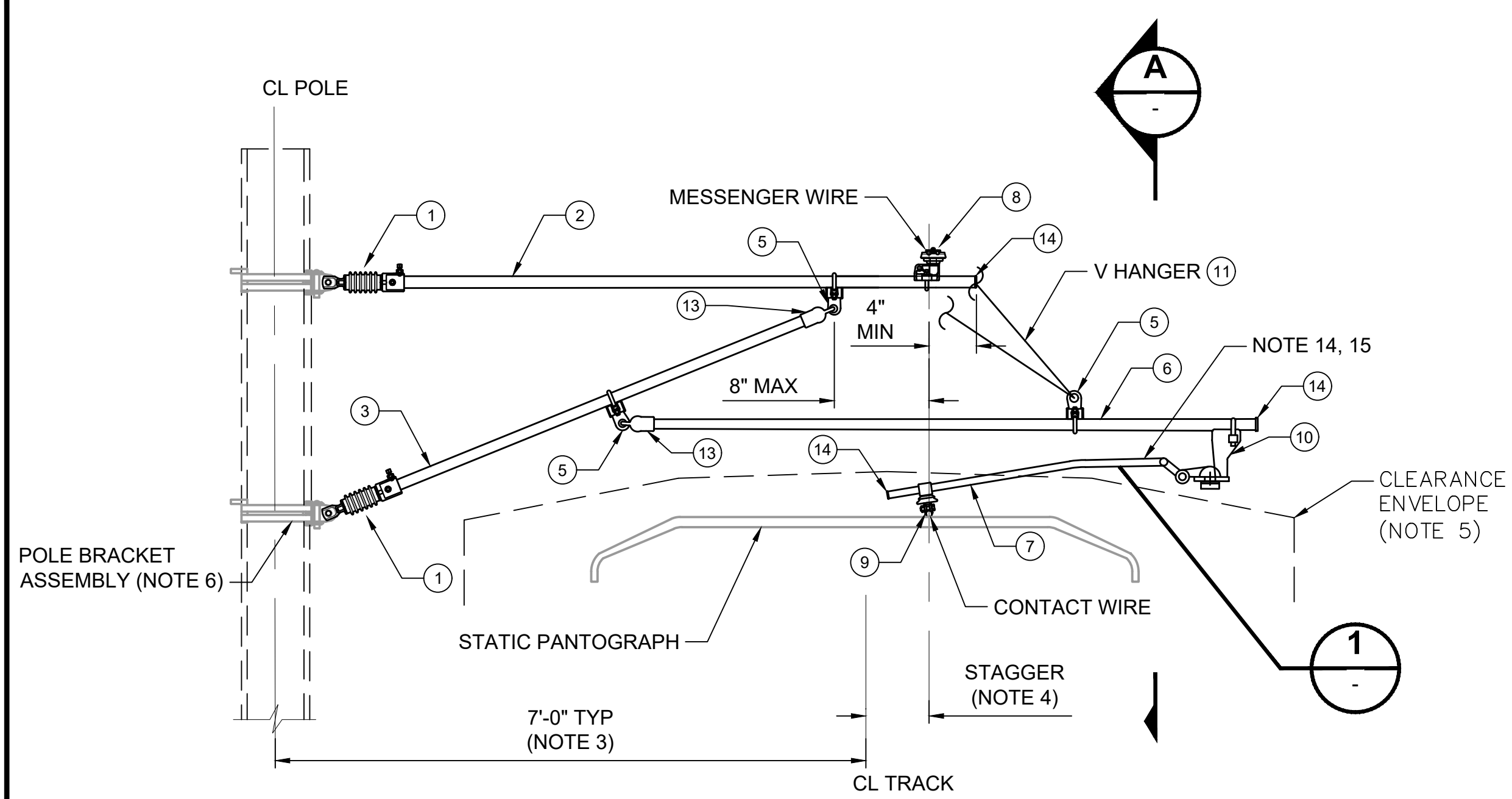
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| SCALE: | NTS |
| FILENAME: | STD-JOD402 |
| CONTRACT No.: | RTA/LR |
| DATE: | 2/2024 |

**SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS**

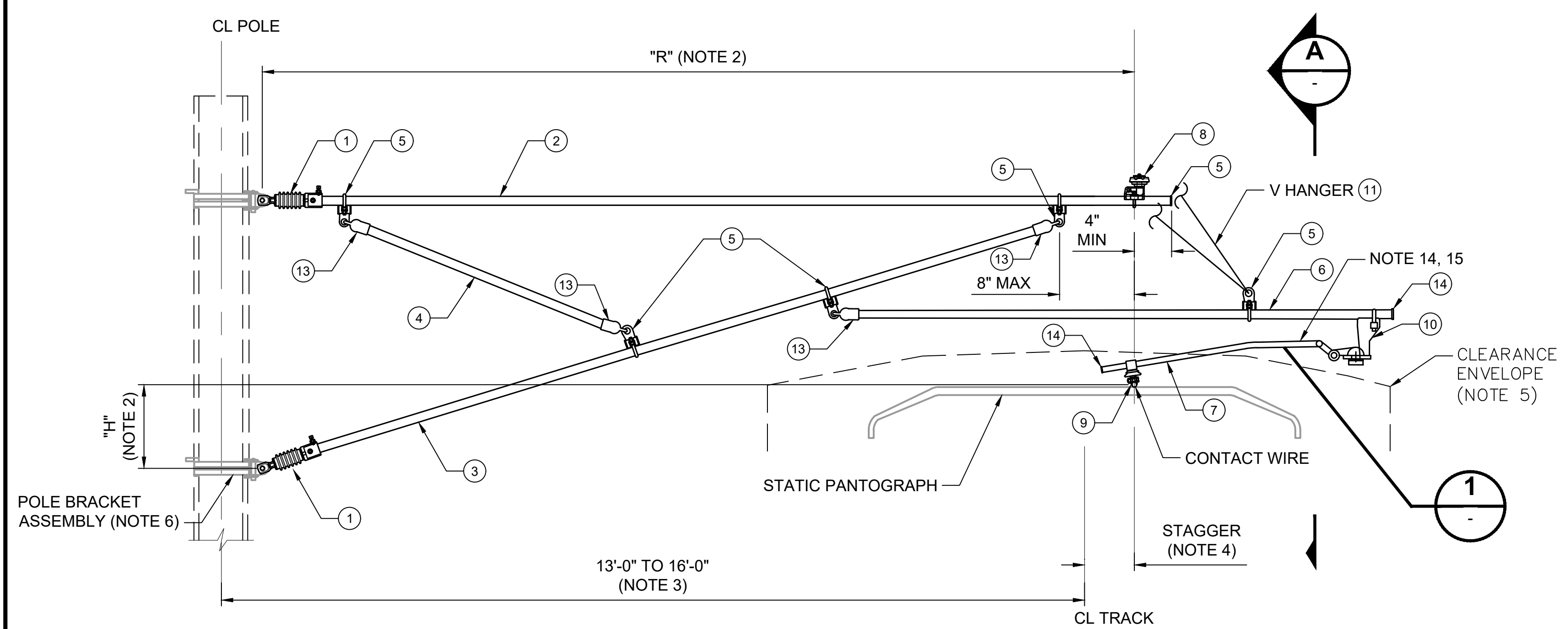
OVERHEAD CATENARY SYSTEM
CANTILEVER PULL-OFF ASSEMBLIES
CA-01M, CA-01H, CL-01M, CA-01H, CL-01M & CL-01H

| | |
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| DRAWING No.: | STD-JOD402 |
| FACILITY ID: | |
| SHEET No.: | REV: |
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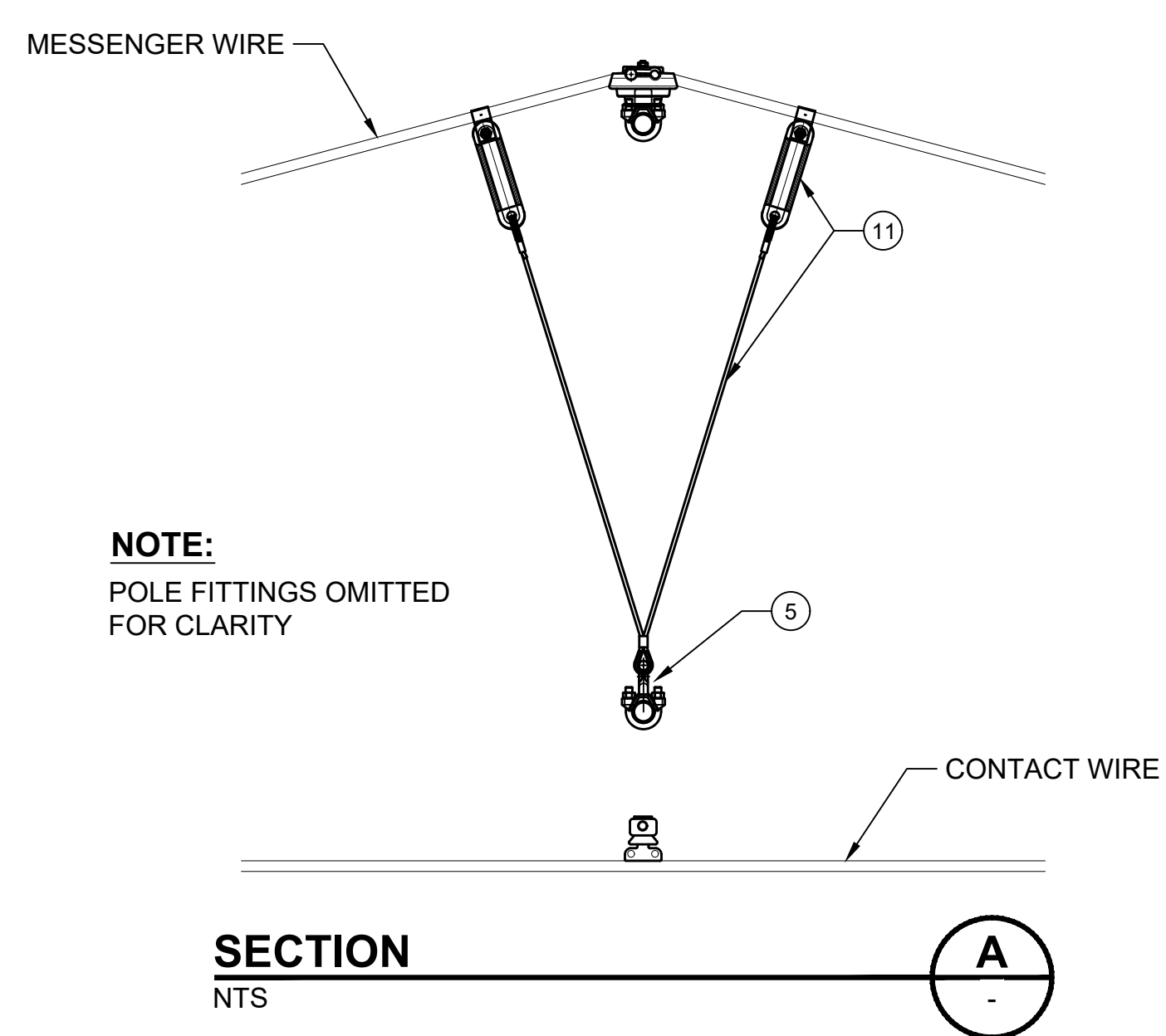


**PUSH-OFF CANTILEVER ASSEMBLY
CA-02 M OR H MEDIUM OR HEAVY LOAD**
NTS

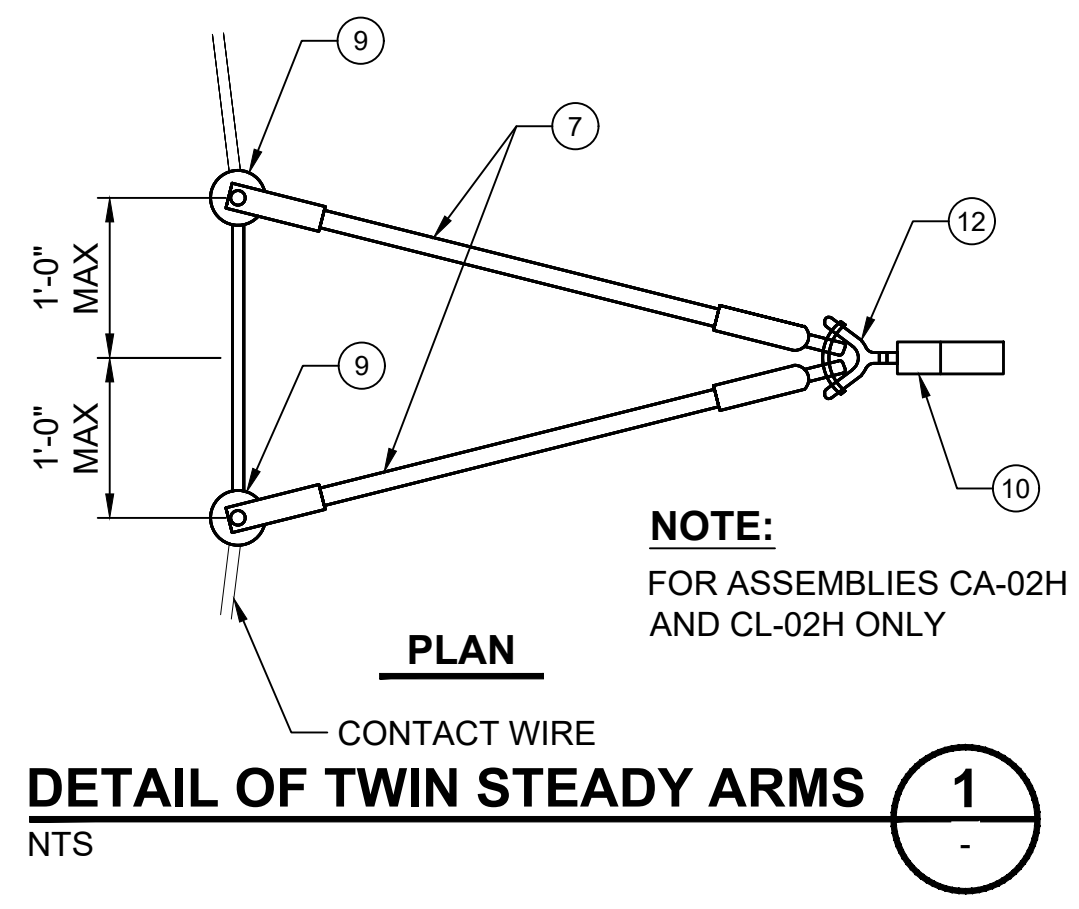


**LONG REACH PUSH-OFF CANTILEVER ASSEMBLY
CL-02 M OR H MEDIUM OR HEAVY LOAD**
NTS

| MAXIMUM ASSEMBLY LOADING | | | | |
|----------------------------|----------|----------|---------|---------|
| | CL-02H | CA-02H | CL-02M | CA-02M |
| MESSENGER WIRE RADIAL LOAD | 1450 LBS | 1450 LBS | 750 LBS | 750 LBS |
| CONTACT WIRE RADIAL LOAD | 1000 LBS | 1000 LBS | 500 LBS | 500 LBS |
| VERTICAL LOAD | 350 LBS | 350 LBS | 650 LBS | 650 LBS |



**SECTION
A-A**
NTS



DETAIL OF TWIN STEADY ARMS
NTS

GENERAL NOTES:

- LOWER BRACKET TO CONTACT WIRE DIMENSION OF 9" IS FOR 7'-0" POLE TO CENTERLINE OF TRACK OFFSET. THIS DIMENSION MAY BE INCREASED 1" FOR EACH 6" INCREASE IN POLE OFFSET DIMENSION.
- FOR LONG REACH CANTILEVERS USE THIS FORMULA TO CALCULATE "H" (THE DISTANCE BETWEEN THE LOWER POLE BRACKET AND THE CONTACT WIRE).

$$R = \text{LENGTH OF TOP PIPE}$$

$$H = 6" + \frac{R - 6"}{6}$$
 EXAMPLE FOR 13'-0" TOP PIPE:

$$H = 6" + \frac{13' - 6' - 6"}{6} = 6" + 1.16' = 1.66' \text{ OR } 1'-8"$$
- CONTRACTOR SHALL FIELD VERIFY THIS DIMENSION PRIOR TO FABRICATION OF CANTILEVER PIPES.
- CATENARY DETAILS INCLUDING STAGGERS, POLE OFFSETS AND WIRE HEIGHTS AT EACH LOCATION TO BE SHOWN ON OCS LAYOUT PLANS AND SCHEDULES.
- FOR DETAILS OF PANTOGRAPH CLEARANCE, SEE DWG JOD112 AND JOD114.
- POLE BRACKET ASSEMBLY TO BE CALLED OFF SEPARATELY.
- CONTRACTOR TO DETERMINE COMPONENT DETAIL AND SAFE WORKING LIMITS.
- FOR SYMBOLS, LEGEND AND ABBREVIATIONS SEE DRAWINGS JZN001 AND JZN002.
- CONTRACTOR TO VERIFY ALL QUANTITIES ON THE BILL OF MATERIALS.
- CONTRACTOR TO DETERMINE POLE BRACKET ATTACHMENT HEIGHTS.
- THE CONTRACTOR IS RESPONSIBLE FOR THE DESIGN OF EACH ASSEMBLY AS A WHOLE AND EACH COMPONENT MEETING OR EXCEEDING THE LOADING TABLES WHERE PROVIDED. WHERE THE WORKING LOAD CAPABILITIES OF THE CONTRACTOR'S ASSEMBLIES EXCEED THOSE SHOWN IN THE LOADING TABLE, THE CONTRACTOR SHALL UPDATE THE TABLE IN THEIR SUBMISSION OF ASSEMBLY.
- THE BILL OF MATERIALS ARE TYPICAL FOR THE ASSEMBLY STYLES SHOWN. THE CONTRACTOR SHALL ITEMIZE THE TABLE WITH DESCRIPTIONS AND PART NUMBERS OF COMPONENTS REQUIRED TO COMPLETE EACH ASSEMBLY.
- CANTILEVER BRACKET SEPARATION SHALL BE DETERMINED USING THE TYPICAL 1:3 PIPE SLOPE AS A BASIS. IN SOME LOCATIONS A LARGER SLOPE MAY BE USED TO AVOID CONFLICTS WITH OTHER HARDWARE MOUNTED ON THE POLES.
- STEADY ARM LENGTH AND HEEL SETTING TO BE DETERMINED BY THE CONTRACTOR.
- CONTRACTOR TO ENSURE THAT THE STEADY ARM DESIGN ALLOWS FOR PANTOGRAPH CLEARANCE ENVELOPE.
- THE CONTRACTOR SHALL ENSURE THAT TWIN STEADY ARMS EQUALLY SHARE THE CONTACT WIRE RADIAL LOAD.
- THE MAXIMUM LOADS IN THIS TABLE ARE THE WORST CASE LOADS THAT INCLUDE WIND AND ICE WHERE APPLICABLE.

| BILL OF MATERIALS | | | | | | | | | |
|----------------------|--------|--------|--------|-------|---------------------------|----------|------------------|--|--|
| QUANTITIES EACH TYPE | | | | UNITS | DESCRIPTION | ITEM NO. | PART NO./REMARKS | | |
| CL-02H | CA-02H | CL-02M | CA-02M | | | | | | |
| 2 | 2 | 2 | 2 | EA | INSULATOR | 1 | | | |
| 1 | 1 | 1 | 1 | EA | TOP PIPE | 2 | LENGTH AS REQ'D | | |
| 1 | 1 | 1 | 1 | EA | STRUT PIPE | 3 | LENGTH AS REQ'D | | |
| 1 | - | 1 | - | EA | BRACE | 4 | LENGTH AS REQ'D | | |
| 5 | 3 | 5 | 3 | EA | EYE CLAMP | 5 | | | |
| 1 | 1 | 1 | 1 | EA | REGISTRATION PIPE | 6 | LENGTH AS REQ'D | | |
| 2 | 2 | 1 | 1 | EA | STEADY ARM, CURVED | 7 | LENGTH AS REQ'D | | |
| 1 | 1 | 1 | 1 | EA | INSULATED MESSENGER CLAMP | 8 | | | |
| 2 | 2 | 1 | 1 | EA | C/W SWIVEL CLAMP | 9 | INSULATED | | |
| 1 | 1 | 1 | 1 | EA | DROP BRACKET | 10 | | | |
| 1 | 1 | 1 | 1 | EA | V-HANGER W/LOOP INSULATOR | 11 | | | |
| 1 | 1 | - | - | EA | "Y" CLEVIS CLAMP OR EQUAL | 12 | | | |
| 4 | 2 | 4 | 2 | EA | CLEVIS FITTING | 13 | | | |
| 3 | 3 | 3 | 3 | EA | PIPE CAP | 14 | | | |

| No. | DATE | DSN | CHK | APP | REVISION |
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| 1 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |
| 0 | 8/2019 | | | | REVISED SYSTEMS DIRECTIVE DRAWINGS |

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| DESIGNED BY: | |
| DRAWN BY: | |
| CHECKED BY: | |
| APPROVED BY: | |

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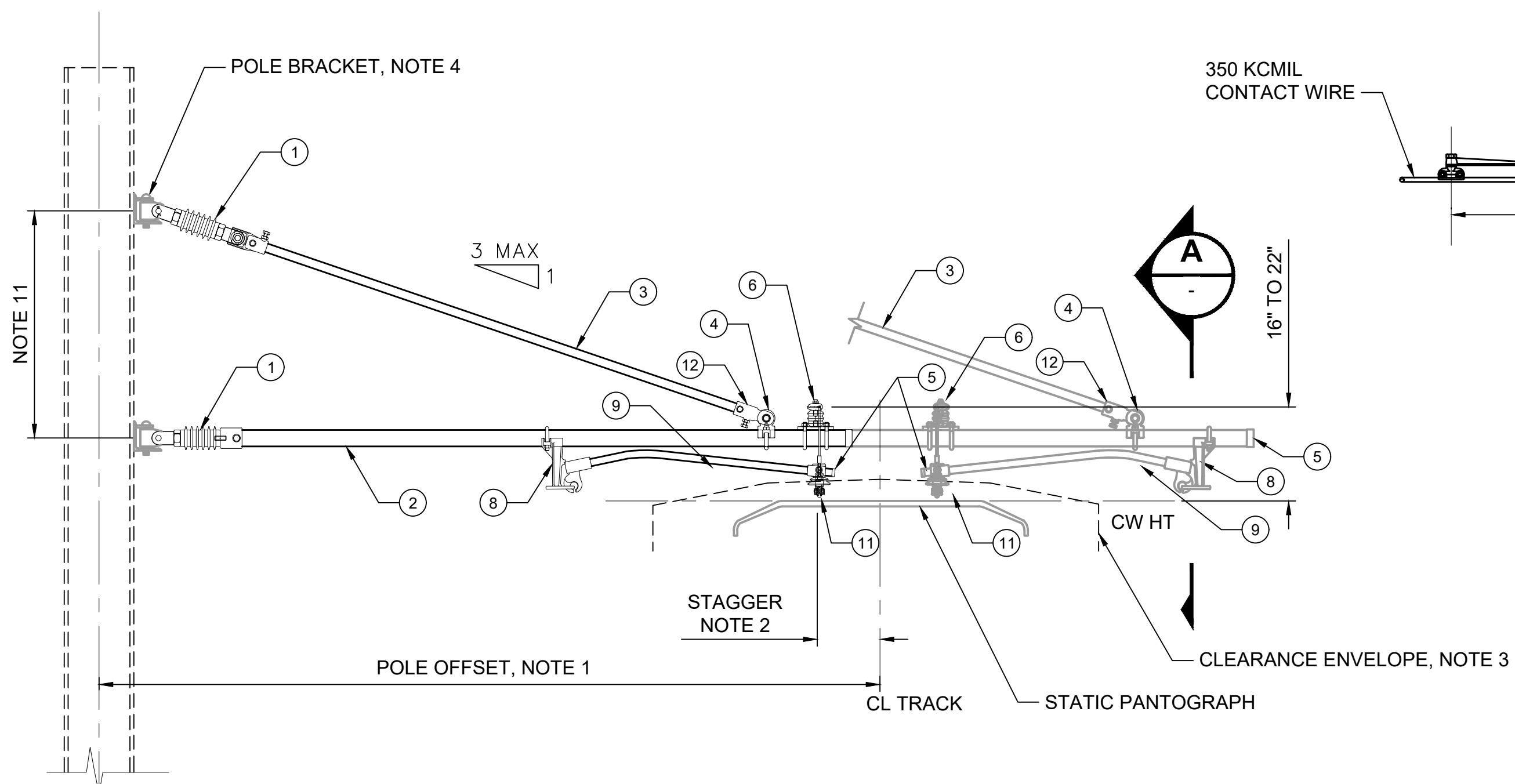
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| SCALE: NTS | FILENAME: STD-JOD403 |
| CONTRACT No.: | |
| RTA/LR | DATE: 2/2024 |

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| SOUND TRANSIT STANDARD DRAWINGS SYSTEMS | |
| OVERHEAD CATENARY SYSTEM CANTILEVER PULL-OFF ASSEMBLIES CA02M, CA-02H, CL-02M & CL-02H | |

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| DRAWING No.: | STD-JOD403 |
| FACILITY ID: | |
| SHEET No.: | REV: 1 |

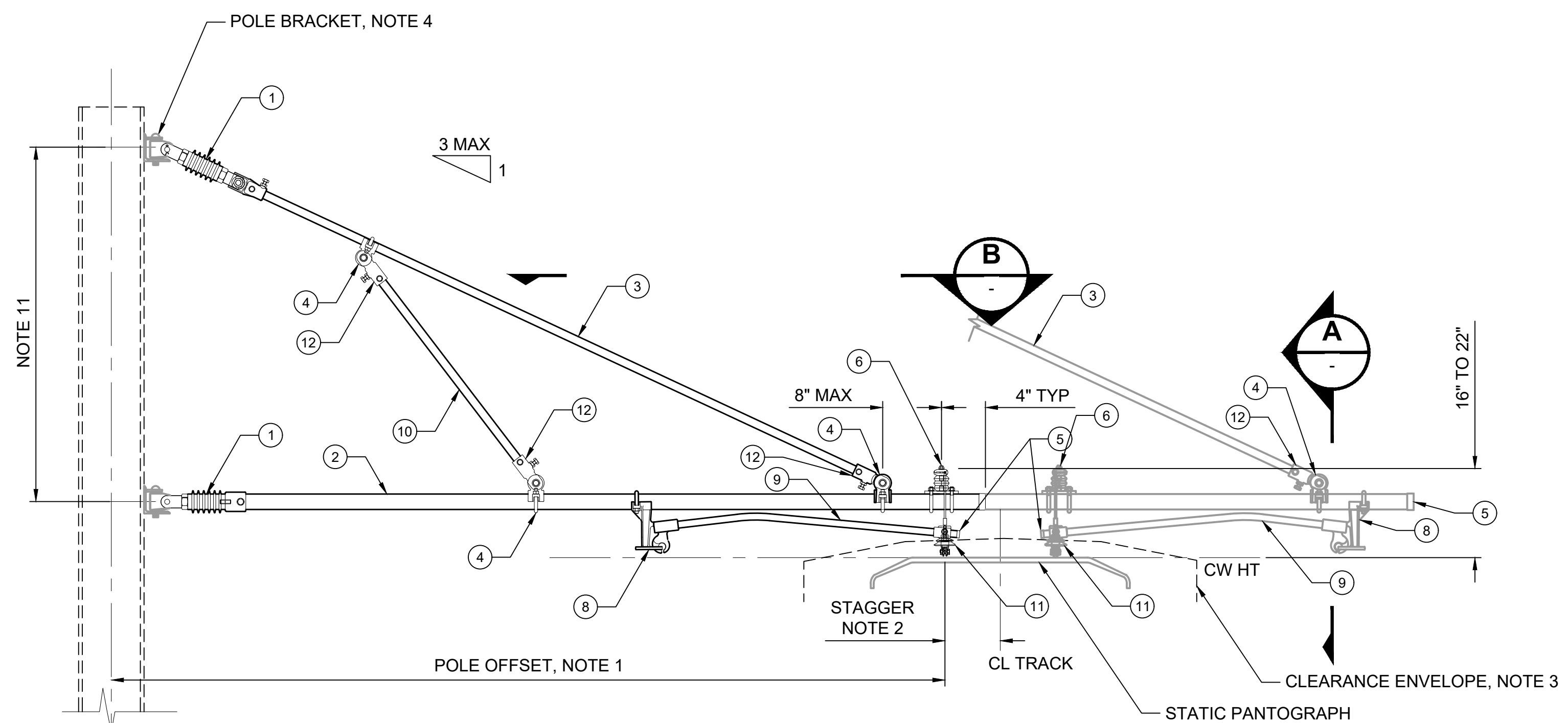
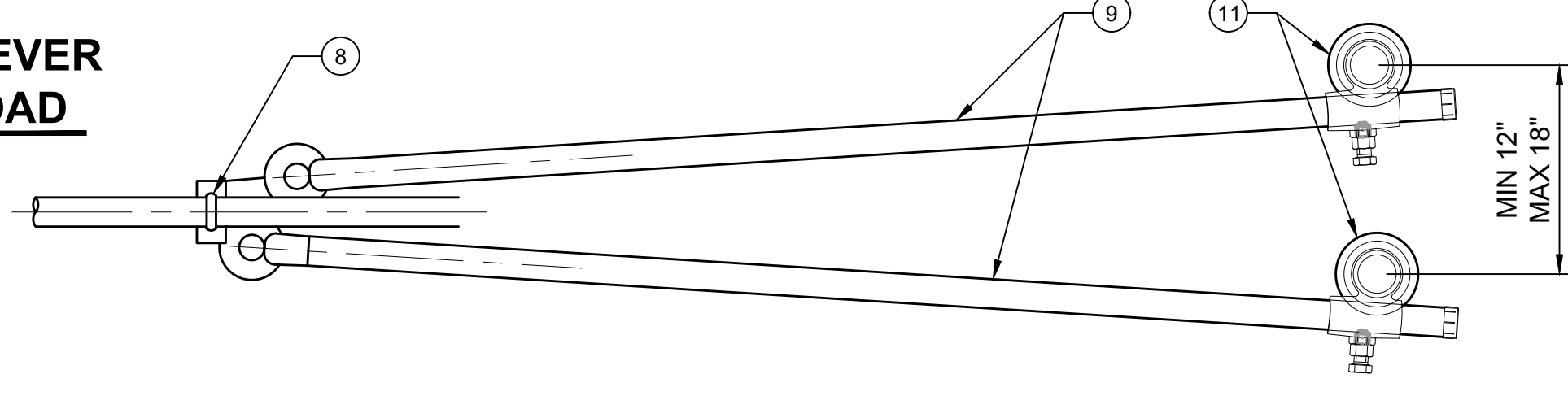
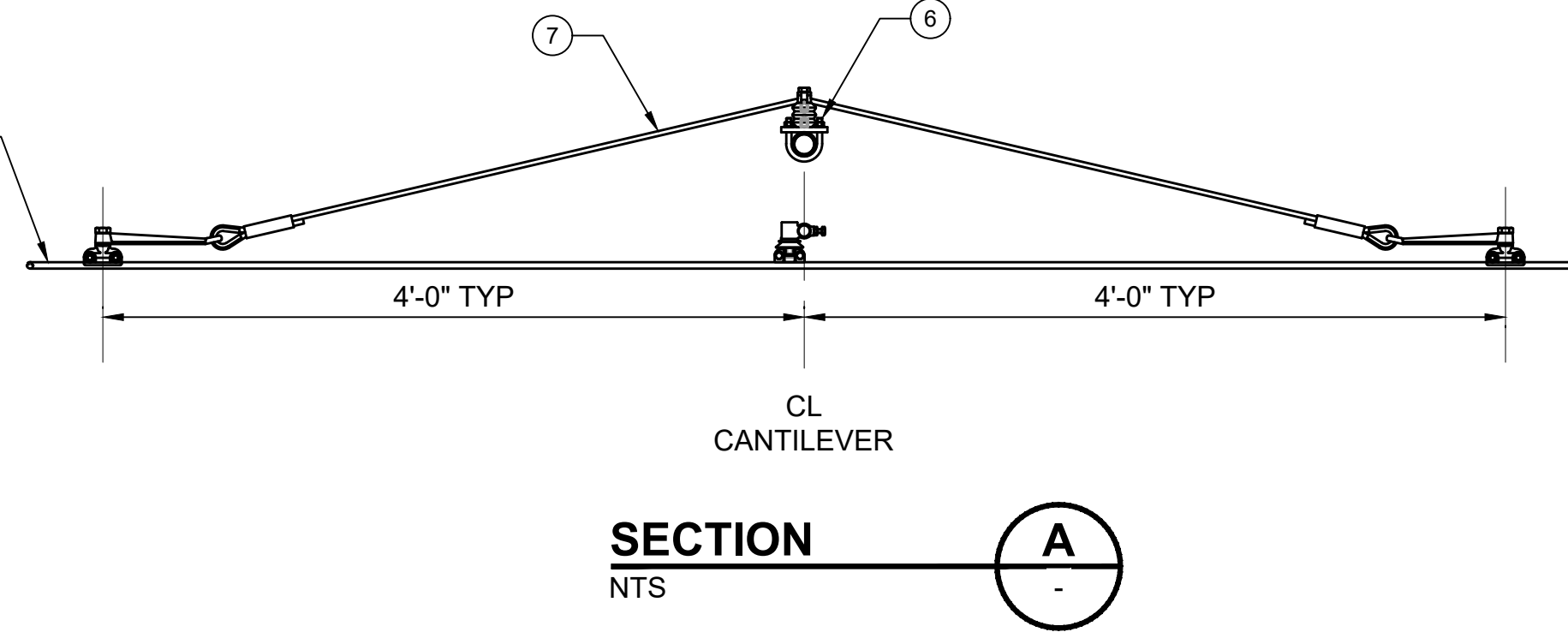
GENERAL NOTES:

1. CONTRACTOR SHALL FIELD VERIFY THIS DIMENSION PRIOR TO FABRICATION OF CANTILEVER PIPES.
2. CATENARY DETAILS INCLUDING STAGGERS, POLE OFFSETS AND WIRE HEIGHTS AT EACH LOCATION TO BE SHOWN ON OCS LAYOUT PLANS AND SCHEDULES.
3. FOR DETAILS OF PANTOGRAPH CLEARANCE, SEE DWG JOD112 AND JOD114.
4. POLE BRACKET ASSEMBLY TO BE CALLED OFF SEPARATELY.
5. CONTRACTOR TO DETERMINE COMPONENT DETAIL AND SAFE WORKING LIMITS.
6. FOR SYMBOLS, LEGEND AND ABBREVIATIONS SEE DRAWINGS JZN001 AND JZN002.
7. CONTRACTOR TO VERIFY ALL QUANTITIES ON THE BILL OF MATERIALS.
8. CONTRACTOR TO DETERMINE POLE BRACKET ATTACHMENT HEIGHTS.
9. THE CONTRACTOR IS RESPONSIBLE FOR THE DESIGN OF EACH ASSEMBLY AS A WHOLE AND EACH COMPONENT MEETING OR EXCEEDING THE LOADING TABLES WHERE PROVIDED. WHERE THE WORKING LOAD CAPABILITIES OF THE CONTRACTOR'S ASSEMBLIES EXCEED THOSE SHOWN IN THE LOADING TABLE, THE CONTRACTOR SHALL UPDATE THE TABLE IN THEIR SUBMISSION OF ASSEMBLY.
10. THE BILL OF MATERIALS ARE TYPICAL FOR THE ASSEMBLY STYLES SHOWN. THE CONTRACTOR SHALL ITEMIZE THE TABLE WITH DESCRIPTIONS AND PART NUMBERS OF COMPONENTS REQUIRED TO COMPLETE EACH ASSEMBLY.
11. CANTILEVER BRACKET SEPARATION SHALL BE DETERMINED USING THE TYPICAL 1:3 PIPE SLOPE AS A BASIS. IN SOME LOCATIONS A LARGER SLOPE MAY BE USED TO AVOID CONFLICTS WITH OTHER HARDWARE MOUNTED ON THE POLES.
12. STEADY ARM LENGTH AND HEEL SETTING TO BE DETERMINED BY THE CONTRACTOR.
13. CONTRACTOR TO ENSURE THAT THE STEADY ARM DESIGN ALLOWS FOR PANTOGRAPH CLEARANCE ENVELOPE.
14. THE MAXIMUM LOADS IN THE TABLE ARE THE WORST CASE LOADS THAT INCLUDE WIND AND ICE WHERE APPLICABLE.
15. CONTRACTOR SHALL ENSURE THAT TWIN STEADY ARMS EQUALLY SHARE THE CONTACT WIRE RADIAL LOAD.



SINGLE WIRE PULL-OFF CANTILEVER ASSEMBLY CA-03M MEDIUM LOAD
NTS

SINGLE WIRE PUSH-OFF CANTILEVER ASSEMBLY CA-04M MEDIUM LOAD
NTS



SINGLE WIRE PULL-OFF CANTILEVER ASSEMBLY CA-03H HEAVY LOAD
NTS

SINGLE WIRE PUSH-OFF CANTILEVER ASSEMBLY CA-04H HEAVY LOAD
NTS

| MAXIMUM ASSEMBLY LOADING | | | | |
|--------------------------|----------|---------|----------|---------|
| | CA-03H | CA-03M | CA-04H | CA-04M |
| CONTACT WIRE RADIAL LOAD | 1000 LBS | 500 LBS | 1000 LBS | 500 LBS |
| VERTICAL LOAD | 150 LBS | 275 LBS | 150 LBS | 275 LBS |

| BILL OF MATERIALS | | | | | | | |
|----------------------|--------|--------|--------|-------|-----------------------------|----------|------------------|
| QUANTITIES EACH TYPE | | | | UNITS | DESCRIPTION | ITEM NO. | PART NO./REMARKS |
| CA-04H | CA-04M | CA-03H | CA-03M | | | | |
| 2 | 2 | 2 | 2 | EA | INSULATOR | 1 | |
| 1 | 1 | 1 | 1 | EA | REGISTRATION PIPE | 2 | LENGTH AS REQ'D |
| 1 | 1 | 1 | 1 | EA | TOP PIPE | 3 | LENGTH AS REQ'D |
| 3 | 1 | 3 | 1 | EA | EYE CLAMP | 4 | |
| 3 | 2 | 3 | 2 | EA | PIPE CAP | 5 | |
| 1 | 1 | 1 | 1 | EA | BRIDLE SUPPORT INSULATOR | 6 | |
| 1 | 1 | 1 | 1 | EA | SUPPORT BRIDLE SUB ASSEMBLY | 7 | |
| 1 | 1 | 1 | 1 | EA | DROP BRACKET | 8 | |
| 2 | 1 | 2 | 1 | EA | STEADY ARM, CURVED | 9 | LENGTH AS REQ'D |
| 1 | - | 1 | - | EA | BRACE | 10 | LENGTH AS REQ'D |
| 2 | 1 | 2 | 1 | EA | CONTACT WIRE SWIVEL CLAMP | 11 | INSULATED |
| 2 | 1 | 2 | 1 | EA | CLEVIS FITTING | 12 | |

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| No. | DATE | DSN | CHK | APP | REVISION |
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| 1 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |
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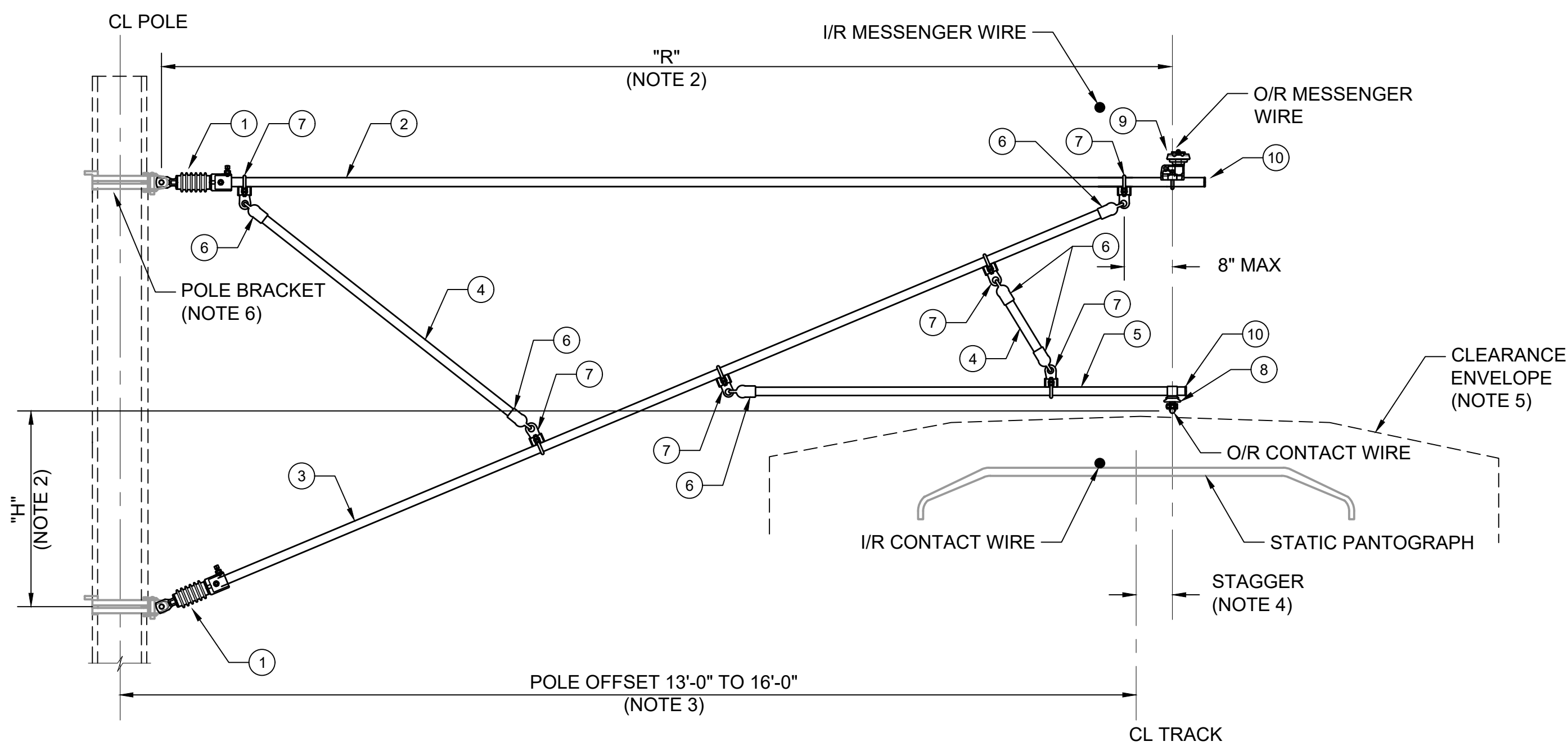
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CHECKED BY:
APPROVED BY:

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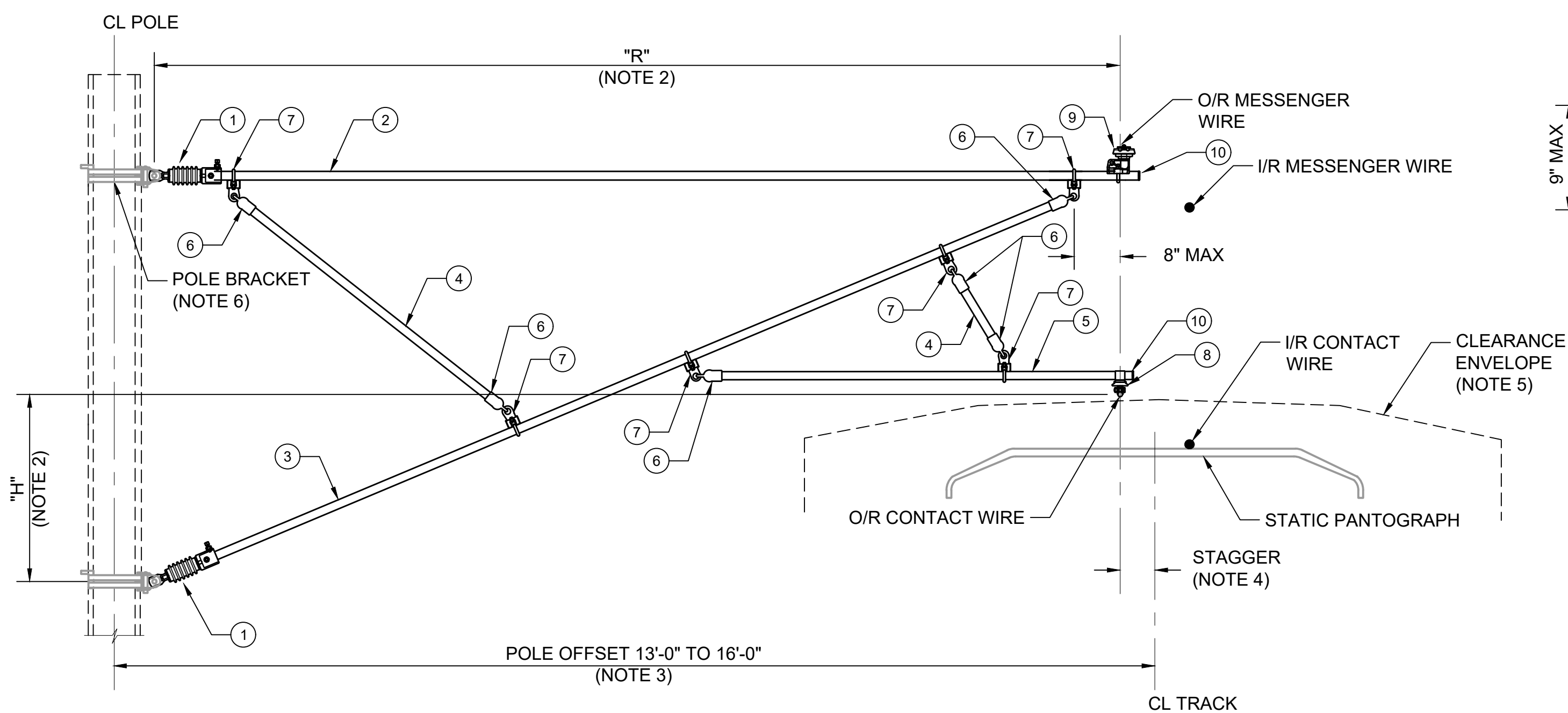
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CONTRACT No.: RTA/LR
DATE: 2/2024

SOUND TRANSIT STANDARD DRAWINGS SYSTEMS
OVERHEAD CATENARY SYSTEM
SINGLE WIRE CANTILEVER ASSEMBLIES
CA-03M, CA-02H, CL-02M & CL-02H

DRAWING No.: **STD-JOD404**
FACILITY ID:
SHEET No.: REV: 1

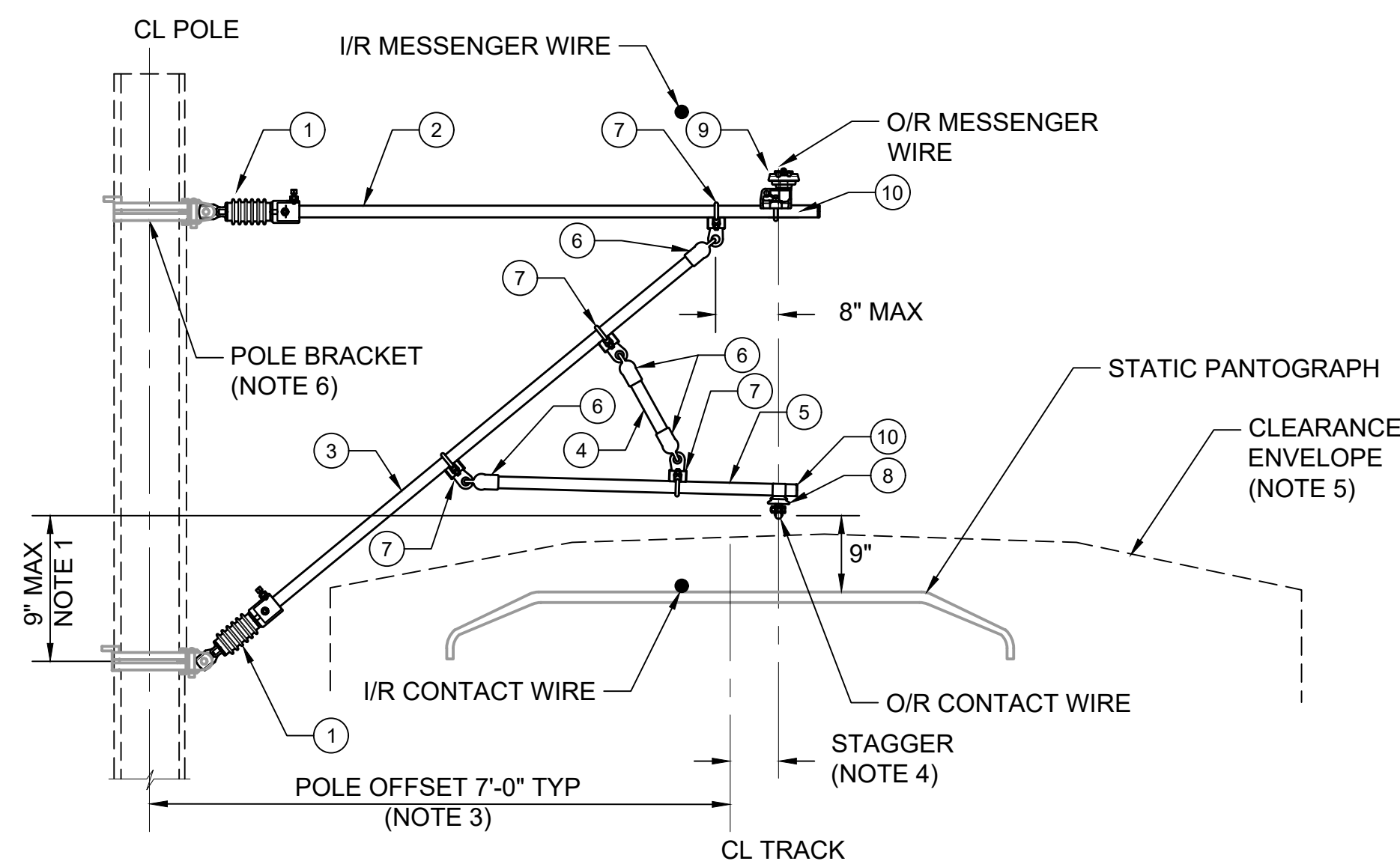


**LONG REACH OUT-OF-RUNNING
OUTSIDE CANTILEVER ASSEMBLY CL-06**
NTS

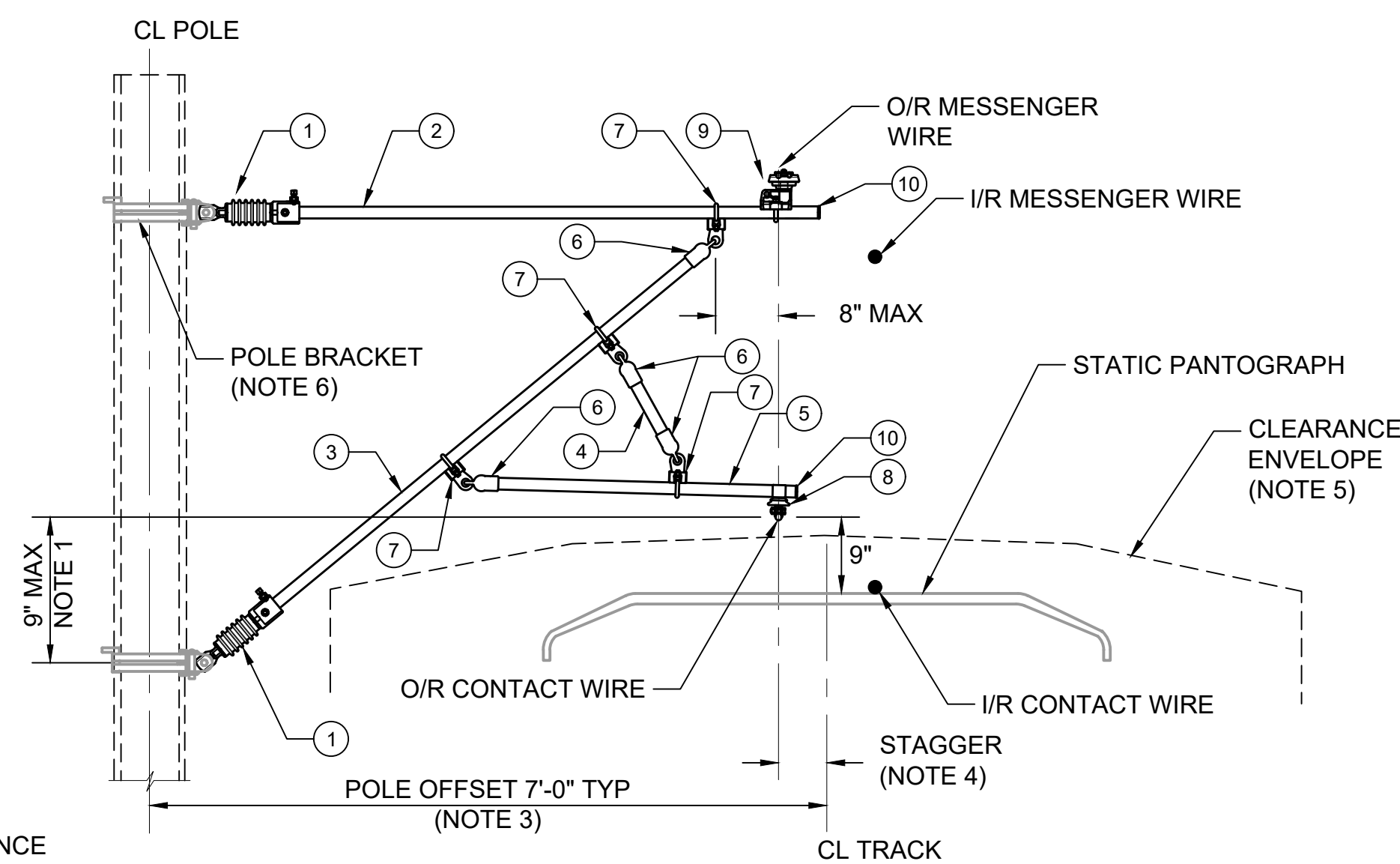


**LONG REACH OUT-OF-RUNNING
INSIDE CANTILEVER ASSEMBLY CL-07**
NTS

| MAXIMUM ASSEMBLY LOADING | | | | |
|----------------------------|----------|----------|----------|----------|
| | CA-06 | CA-07 | CL-06 | CL-07 |
| MESSANGER WIRE RADIAL LOAD | 1450 LBS | 1450 LBS | 1450 LBS | 1450 LBS |
| CONTACT WIRE RADIAL LOAD | 1000 LBS | 1000 LBS | 1000 LBS | 1000 LBS |
| VERTICAL LOAD | 650 LBS | 650 LBS | 650 LBS | 650 LBS |



OUT-OF-RUNNING OUTSIDE CANTILEVER ASSEMBLY CA-06
NTS



OUT-OF-RUNNING INSIDE CANTILEVER ASSEMBLY CA-07
NTS

GENERAL NOTES:

- LOWER BRACKET TO CONTACT WIRE DIMENSION OF 9" IS FOR 7'-0" POLE TO CENTERLINE OF TRACK OFFSET. THIS DIMENSION MAY BE INCREASED 1" FOR EACH 6" INCREASE IN POLE OFFSET DIMENSION.
- FOR LONG REACH CANTILEVERS USE THIS FORMULA TO CALCULATE "H" (THE DISTANCE BETWEEN THE LOWER POLE BRACKET AND THE CONTACT WIRE).
$$"R" = \text{LENGTH OF TOP PIPE } H = 9" + \frac{R-6"}{6}$$

EXAMPLE FOR 13'-0" TOP PIPE:
$$H = 9" + \frac{13'-0" - 6"}{6} \quad H = 9" + 1.16' \quad H = 1'-11"$$
- CONTRACTOR SHALL FIELD VERIFY THIS DIMENSION PRIOR TO FABRICATION OF CANTILEVER PIPES.
- CATENARY DETAILS INCLUDING STAGGERS, POLE OFFSETS AND WIRE HEIGHTS AT EACH LOCATION TO BE SHOWN ON OCS LAYOUT PLANS AND SCHEDULES.
- FOR DETAILS OF PANTOGRAPH CLEARANCE, SEE DWG JOD112 AND JOD114.
- POLE BRACKET ASSEMBLY TO BE CALLED OFF SEPARATELY.
- CONTRACTOR TO DETERMINE COMPONENT DETAIL AND SAFE WORKING LIMITS.
- FOR SYMBOLS, LEGEND AND ABBREVIATIONS SEE DRAWINGS JZN001 AND JZN002.
- CONTRACTOR TO VERIFY ALL QUANTITIES ON THE BILL OF MATERIALS.
- CONTRACTOR TO DETERMINE POLE BRACKET ATTACHMENT HEIGHTS.
- THE CONTRACTOR IS RESPONSIBLE FOR THE DESIGN OF EACH ASSEMBLY AS A WHOLE AND EACH COMPONENT MEETING OR EXCEEDING THE LOADING TABLES WHERE PROVIDED. WHERE THE WORKING LOAD CAPABILITIES OF THE CONTRACTOR'S ASSEMBLIES EXCEED THOSE SHOWN IN THE LOADING TABLE, THE CONTRACTOR SHALL UPDATE THE TABLE IN THEIR SUBMISSION OF ASSEMBLY.
- THE BILL OF MATERIALS ARE TYPICAL FOR THE ASSEMBLY STYLES SHOWN. THE CONTRACTOR SHALL ITEMIZE THE TABLE WITH DESCRIPTIONS AND PART NUMBERS OF COMPONENTS REQUIRED TO COMPLETE EACH ASSEMBLY.
- CANTILEVER BRACKET SEPARATION SHALL BE DETERMINED USING THE TYPICAL 1:3 PIPE SLOPE AS A BASIS. IN SOME LOCATIONS A LARGER SLOPE MAY BE USED TO AVOID CONFLICTS WITH OTHER HARDWARE MOUNTED ON THE POLES.
- STEADY ARM LENGTH AND HEEL SETTING TO BE DETERMINED BY THE CONTRACTOR.
- CONTRACTOR TO ENSURE THAT THE STEADY ARM DESIGN ALLOWS FOR PANTOGRAPH CLEARANCE ENVELOPE.
- THE MAXIMUM LOADS IN THE TABLE ARE THE WORST CASE LOADS THAT INCLUDE WIND AND ICE WHERE APPLICABLE.

| BILL OF MATERIALS | | | | | | | | | |
|----------------------|-------|-------|-------|-------|---------------------------|----------|------------------|--|--|
| QUANTITIES EACH TYPE | | | | UNITS | DESCRIPTION | ITEM NO. | PART NO./REMARKS | | |
| CA-06 | CA-07 | CL-06 | CL-07 | | | | | | |
| 2 | 2 | 2 | 2 | EA | INSULATOR | 1 | | | |
| 1 | 1 | 1 | 1 | EA | TOP PIPE | 2 | LENGTH AS REQ'D | | |
| 1 | 1 | 1 | 1 | EA | STRUT PIPE | 3 | LENGTH AS REQ'D | | |
| 1 | 1 | 2 | 2 | EA | BRACE | 4 | LENGTH AS REQ'D | | |
| 1 | 1 | 1 | 1 | EA | REGISTRATION PIPE | 5 | LENGTH AS REQ'D | | |
| 4 | 4 | 6 | 6 | EA | CLEVIS FITTING | 6 | | | |
| 4 | 4 | 6 | 6 | EA | EYE CLAMP | 7 | | | |
| 1 | 1 | 1 | 1 | EA | CONTACT WIRE SWIVEL CLAMP | 8 | INSULATED | | |
| 1 | 1 | 1 | 1 | EA | INSULATED MESSANGER CLAMP | 9 | | | |
| 2 | 2 | 2 | 2 | EA | PIPE CAP | 10 | | | |

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| No. | DATE | DSN | CHK | APP | REVISION |
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| 1 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |
| 0 | 8/2019 | | | | REVISED SYSTEMS DIRECTIVE DRAWINGS |

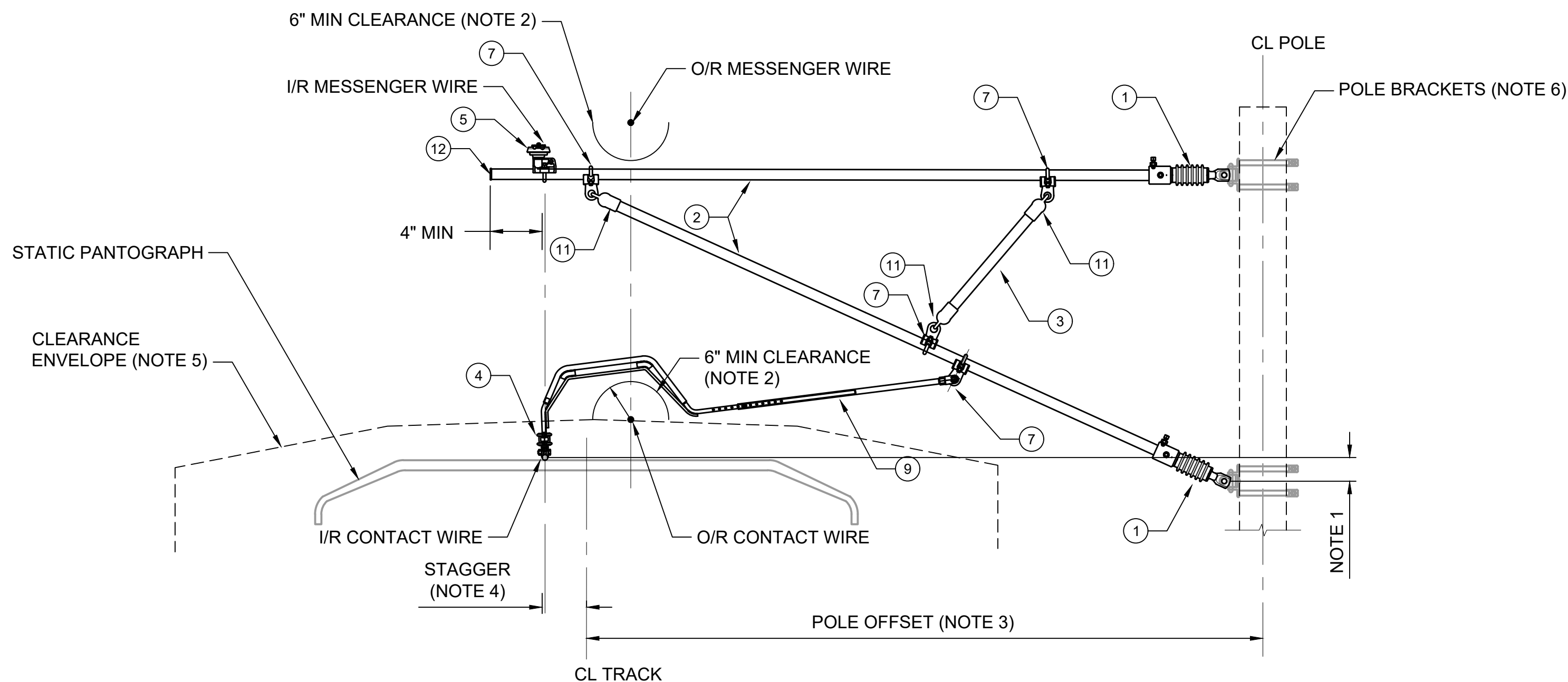
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| CHECKED BY: | |
| APPROVED BY: | |

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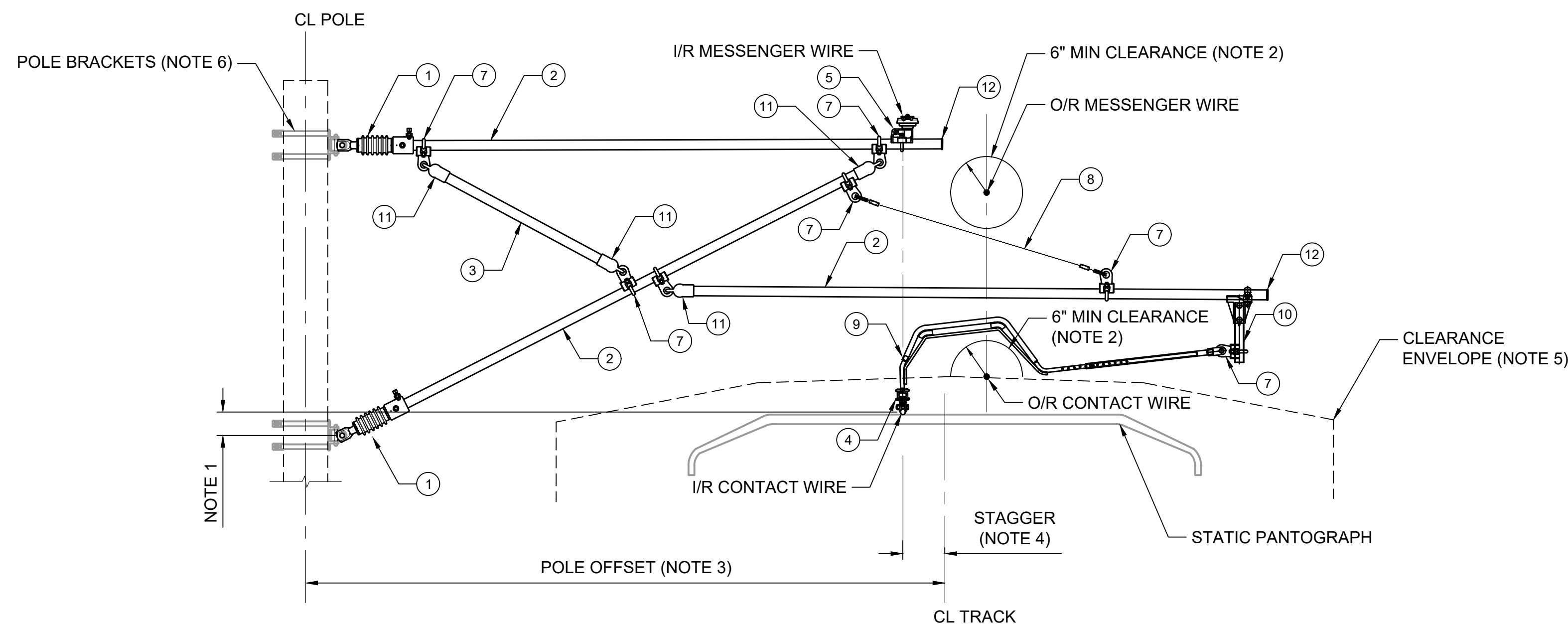
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| SCALE: NTS | STANDARD DRAWINGS SYSTEMS |
| FILENAME: STD-JOD405 | |
| CONTRACT No.: | |
| RTA/LR | |
| DATE: | 2/2024 |

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| SOUND TRANSIT STANDARD DRAWINGS SYSTEMS | |
| OVERHEAD CATENARY SYSTEM OUT-OF-RUNNING CANTILEVER ASSEMBLIES CA-06, CA-07, CL-06 & CL-07 | |

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| DRAWING No.: | STD-JOD405 |
| FACILITY ID: | |
| SHEET No.: | REV: 1 |



OVER-REACH PULL-OFF CANTILEVER ASSEMBLY CA-10M OR CA-10H
NTS



OVER-REACH PUSH-OFF CANTILEVER ASSEMBLY CA-11M OR CA-11H
NTS

GENERAL NOTES:

1. LOWER BRACKET TO CONTACT WIRE DIMENSION OF 9" IS FOR 7'-0" POLE TO CENTERLINE OF TRACK OFFSET. THIS DIMENSION MAY BE INCREASED 1" FOR EACH 6" INCREASE IN POLE OFFSET DIMENSION.
2. CONTRACTOR SHALL ENSURE THAT THE PANTOGRAPH AND ELECTRICAL CLEARANCE REQUIREMENTS ARE MET.
3. CONTRACTOR SHALL FIELD VERIFY THIS DIMENSION PRIOR TO FABRICATION OF CANTILEVER PIPES.
4. CATENARY DETAILS INCLUDING STAGGERS, POLE OFFSETS AND WIRE HEIGHTS AT EACH LOCATION TO BE SHOWN ON OCS LAYOUT PLANS AND SCHEDULES.
5. FOR DETAILS OF PANTOGRAPH CLEARANCE, SEE DWG JOD112 AND JOD114.
6. POLE BRACKET ASSEMBLY TO BE CALLED OFF SEPARATELY.
7. CONTRACTOR TO DETERMINE COMPONENT DETAIL AND SAFE WORKING LIMITS.
8. FOR SYMBOLS, LEGEND AND ABBREVIATIONS SEE DRAWINGS JZN001 AND JZN002.
9. CONTRACTOR TO VERIFY ALL QUANTITIES ON THE BILL OF MATERIALS.
10. CONTRACTOR TO DETERMINE POLE BRACKET ATTACHMENT HEIGHTS.
11. THE CONTRACTOR IS RESPONSIBLE FOR THE DESIGN OF EACH ASSEMBLY AS A WHOLE AND EACH COMPONENT MEETING OR EXCEEDING THE LOADING TABLES WHERE PROVIDED. WHERE THE WORKING LOAD CAPABILITIES OF THE CONTRACTOR'S ASSEMBLIES EXCEED THOSE SHOWN IN THE LOADING TABLE, THE CONTRACTOR SHALL UPDATE THE TABLE IN THEIR SUBMISSION OF ASSEMBLY.
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13. CANTILEVER BRACKET SEPARATION SHALL BE DETERMINED USING THE TYPICAL 1:3 PIPE SLOPE AS A BASIS. IN SOME LOCATIONS A LARGER SLOPE MAY BE USED TO AVOID CONFLICTS WITH OTHER HARDWARE MOUNTED ON THE POLES.
14. STEADY ARM LENGTH AND HEEL SETTING TO BE DETERMINED BY THE CONTRACTOR.
15. CONTRACTOR TO ENSURE THAT THE STEADY ARM DESIGN ALLOWS FOR PANTOGRAPH CLEARANCE ENVELOPE.
16. THE MAXIMUM LOADS IN THE TABLE ARE THE WORST CASE LOADS THAT INCLUDE WIND AND ICE WHERE APPLICABLE.

| MAXIMUM ASSEMBLY LOADING | | | | |
|----------------------------|----------|---------|----------|---------|
| | CA-11H | CA-11M | CA-10H | CA-10M |
| MESSENGER WIRE RADIAL LOAD | 1450 LBS | 750 LBS | 1450 LBS | 750 LBS |
| CONTACT WIRE RADIAL LOAD | 1000 LBS | 500 LBS | 1000 LBS | 500 LBS |
| VERTICAL LOAD | 350 LBS | 650 LBS | 350 LBS | 650 LBS |

| BILL OF MATERIALS | | | | | | |
|-------------------|----------------------|----------|-------|---------------------------|----------|-------------------|
| | QUANTITIES EACH TYPE | | UNITS | DESCRIPTION | ITEM NO. | PART NO./REMARKS |
| | CA-11M/H | CA-10M/H | | | | |
| | 2 | 2 | EA | INSULATOR | 1 | |
| | 3 | 2 | EA | PIPE | 2 | LENGTH AS REQ'D |
| | 1 | 1 | EA | BRACE | 3 | LENGTH AS REQ'D |
| | 1 | 1 | EA | C/W SWIVEL CLAMP | 4 | INSULATED |
| | 1 | 1 | EA | INSULATED MESSENGER CLAMP | 5 | |
| | - | - | EA | NOT USED | 6 | |
| | 7 | 4 | EA | EYE CLAMP | 7 | |
| | 1 | - | EA | HANGER ASSEMBLY | 8 | |
| | 1 | 1 | EA | OVERLAP STEADY ARM | 9 | ADJUSTABLE LENGTH |
| | 1 | - | EA | DROP BRACKET | 10 | |
| | 4 | 3 | EA | CLEVIS FITTING | 11 | |
| | 2 | 1 | EA | PIPE CAP | 12 | |


03/21/24 | 1:53 PM | HARRISBK | DRAWINGS UPDATE 2023 STANDARD DRAWINGS SYSTEMS STD-JOD406.DWG

| No. | DATE | DSN | CHK | APP | REVISION |
|-----|--------|-----|-----|-----|------------------------------------|
| 1 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |
| 0 | 8/2019 | | | | REVISED SYSTEMS DIRECTIVE DRAWINGS |

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| DESIGNED BY: | |
| DRAWN BY: | |
| CHECKED BY: | |
| APPROVED BY: | |

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| SUBMITTED BY: | DATE: | REVIEWED BY: | DATE: |
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LINE IS 1" AT FULL SCALE

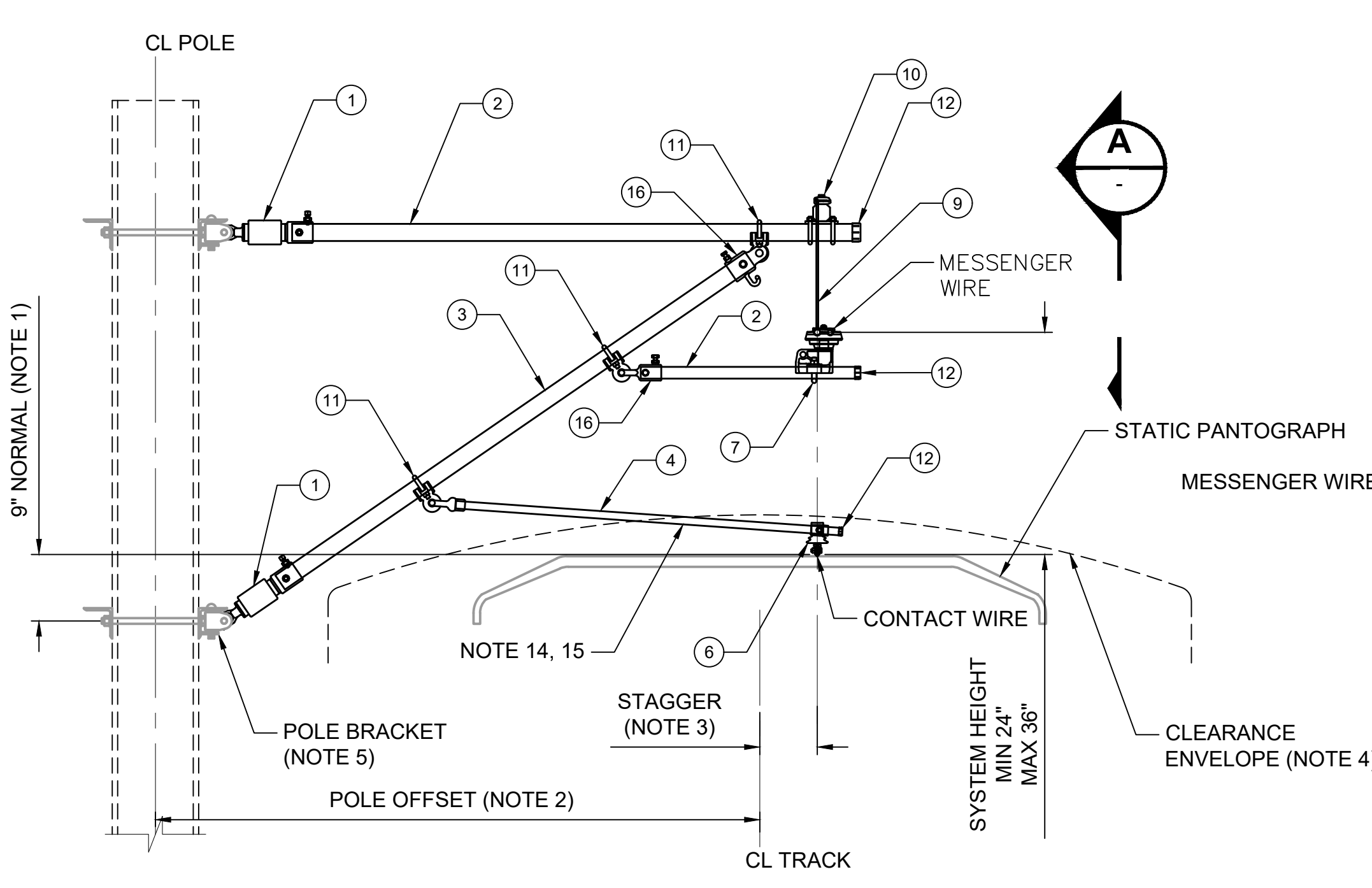


SCALE: NTS
FILENAME: STD-JOD406
CONTRACT No.: RTA/LR
DATE: 2/2024

**SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS**

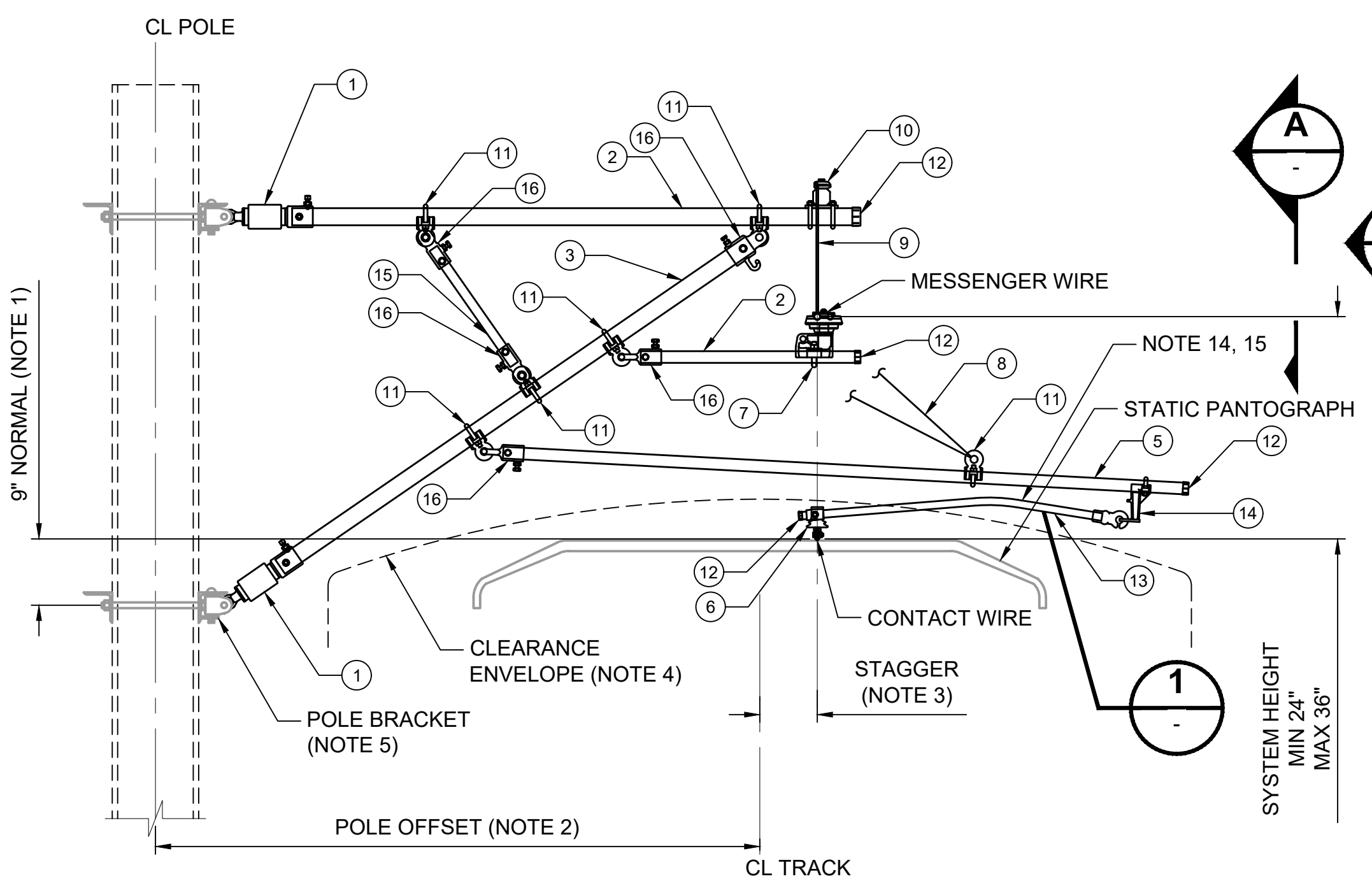
OVERHEAD CATENARY SYSTEM
OVER-REACH CANTILEVER ASSEMBLIES
CA-10M, CA-10H, CA-11M & CA-11H

| | |
|--------------|-------------------|
| DRAWING No.: | STD-JOD406 |
| FACILITY ID: | |
| SHEET No.: | REV: 1 |



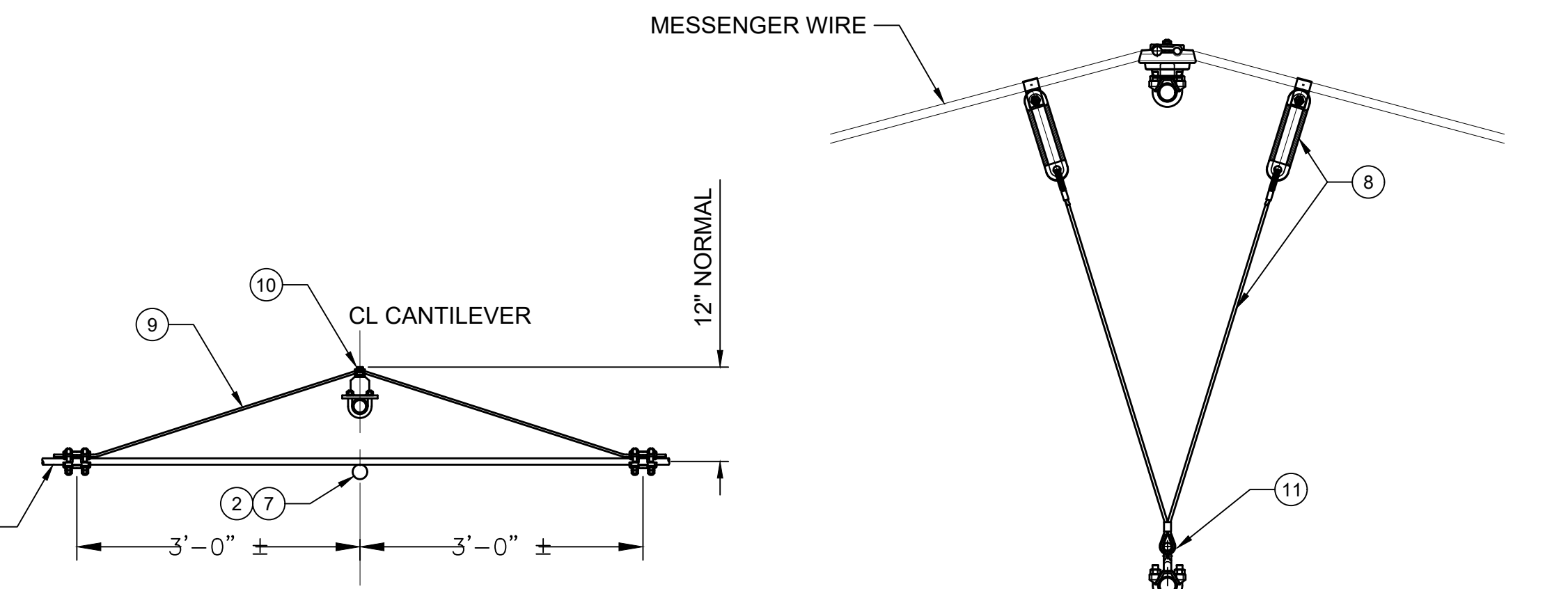
**REDUCED SYSTEM HEIGHT PUSH/PULL CANTILEVER ASSEMBLY
CA-12L OR CA-14L LIGHT LOAD**

NTS
SHOWN IN DIRECT PUSH MODE

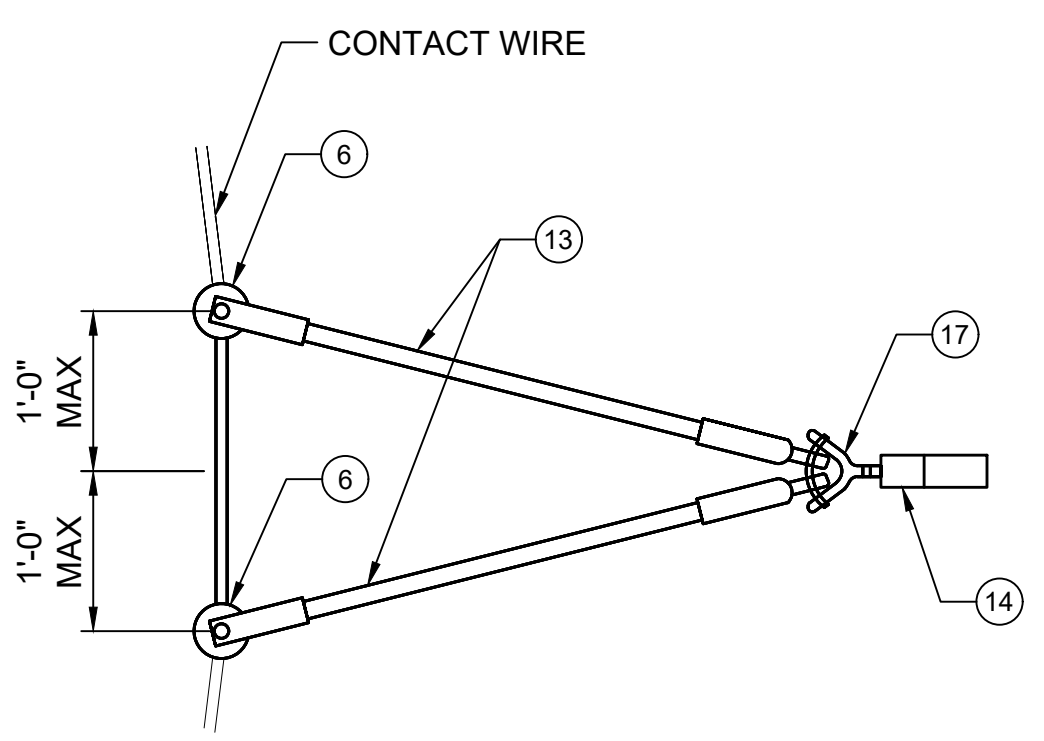


**REDUCED SYSTEM HEIGHT PUSH/PULL CANTILEVER ASSEMBLY
CA-12M, CA-14M, CA-12H OR CA-14H MEDIUM OR HEAVY LOAD**

NTS
SHOWN IN DIRECT PUSH MODE



SECTION A
NTS



DETAIL OF TWIN STEADY ARMS

| ASSEMBLY | APPLICATION |
|----------|-------------|
| CA-12L | PULL-OFF |
| CA-14L | DIRECT-PUSH |
| CA-12M | PULL-OFF |
| CA-14M | PUSH-OFF |
| CA-12H | PULL-OFF |
| CA-14H | PUSH-OFF |

| MAXIMUM ASSEMBLY LOADING | | | | | | |
|----------------------------|----------|---------|----------|----------|---------|----------|
| | CA-14H | CA-14M | CA-14L | CA-12H | CA-12M | CA-12L |
| MESSENGER WIRE RADIAL LOAD | 1450 LBS | 750 LBS | 350 LBS | 1450 LBS | 750 LBS | 350 LBS |
| CONTACT WIRE RADIAL LOAD | 1000 LBS | 500 LBS | 200 LBS | 1000 LBS | 500 LBS | 200 LBS |
| VERTICAL LOAD | 350 LBS | 650 LBS | 1000 LBS | 350 LBS | 650 LBS | 1000 LBS |

| BILL OF MATERIALS | | | | | | | | | |
|----------------------|--------|--------|--------|--------|--------|-------|-----------------------------------|----------|------------------|
| QUANTITIES EACH TYPE | | | | | | UNITS | DESCRIPTION | ITEM NO. | PART NO./REMARKS |
| CA-14H | CA-14M | CA-14L | CA-12H | CA-12M | CA-12L | | | | |
| 2 | 2 | 2 | 2 | 2 | 2 | EA | INSULATOR | 1 | |
| 2 | 2 | 2 | 2 | 2 | 2 | EA | TOP PIPE | 2 | LENGTH AS REQ'D |
| 1 | 1 | 1 | 1 | 1 | 1 | EA | STRUT PIPE | 3 | LENGTH AS REQ'D |
| - | - | 1 | - | - | 1 | EA | STEADY ARM, STRAIGHT | 4 | LENGTH AS REQ'D |
| 1 | 1 | - | - | - | - | EA | REGISTRATION PIPE | 5 | LENGTH AS REQ'D |
| 2 | 1 | 1 | 2 | 1 | 1 | EA | CONTACT WIRE SWIVEL CLAMP | 6 | INSULATED |
| 1 | 1 | 1 | 1 | 1 | 1 | EA | MESSENGER WIRE CLAMP | 7 | INSULATED |
| 1 | 1 | - | - | - | - | EA | V-HANGER ASSEMBLY | 8 | INSULATED |
| 1 | 1 | 1 | 1 | 1 | 1 | EA | M/W BRIDLE ASSEMBLY W/ M/W CLAMPS | 9 | |
| 1 | 1 | 1 | 1 | 1 | 1 | EA | BRIDLE INSULATOR | 10 | |
| 6 | 4 | 3 | 5 | 3 | 3 | EA | EYE CLAMP | 11 | |
| 4 | 3 | 3 | 4 | 3 | 3 | EA | PIPE CAP | 12 | |
| 2 | 1 | - | 2 | 1 | - | EA | STEADY ARM, CURVED | 13 | LENGTH AS REQ'D |
| 1 | 1 | - | - | - | - | EA | DROP BRACKET | 14 | |
| 1 | - | - | 1 | - | - | EA | BRACE | 15 | LENGTH AS REQ'D |
| 5 | 5 | 2 | 5 | 5 | 2 | EA | CLEVIS FITTING | 16 | |
| 1 | - | - | 1 | - | - | EA | "Y" CLEVIS CLAMP OR EQUAL | 17 | |

- GENERAL NOTES:**
- LOWER BRACKET TO CONTACT WIRE DIMENSION OF 9" IS FOR 7'-0" POLE TO CENTERLINE OF TRACK OFFSET. THIS DIMENSION MAY BE INCREASED 1" FOR EACH 6" INCREASE IN POLE OFFSET DIMENSION.
 - CONTRACTOR SHALL FIELD VERIFY THIS DIMENSION PRIOR TO FABRICATION OF CANTILEVER PIPES.
 - CATENARY DETAILS INCLUDING STAGGERS, POLE OFFSETS AND WIRE HEIGHTS AT EACH LOCATION TO BE SHOWN ON OCS LAYOUT PLANS AND SCHEDULES.
 - FOR DETAILS OF PANTOGRAPH CLEARANCE, SEE DWG JOD112 AND JOD114.
 - POLE BRACKET ASSEMBLY TO BE CALLED OFF SEPARATELY.
 - CONTRACTOR TO DETERMINE COMPONENT DETAIL AND SAFE WORKING LIMITS.
 - FOR SYMBOLS, LEGEND AND ABBREVIATIONS SEE DRAWINGS JZN001 AND JZN002.
 - CONTRACTOR TO VERIFY ALL QUANTITIES ON THE BILL OF MATERIALS.
 - CONTRACTOR TO DETERMINE POLE BRACKET ATTACHMENT HEIGHTS.
 - THE CONTRACTOR IS RESPONSIBLE FOR THE DESIGN OF EACH ASSEMBLY AS A WHOLE AND EACH COMPONENT MEETING OR EXCEEDING THE LOADING TABLES WHERE PROVIDED. WHERE THE WORKING LOAD CAPABILITIES OF THE CONTRACTOR'S ASSEMBLIES EXCEED THOSE SHOWN IN THE LOADING TABLE, THE CONTRACTOR SHALL UPDATE THE TABLE IN THEIR SUBMISSION OF ASSEMBLY.
 - THE BILL OF MATERIALS ARE TYPICAL FOR THE ASSEMBLY STYLES SHOWN. THE CONTRACTOR SHALL ITEMIZE THE TABLE WITH DESCRIPTIONS AND PART NUMBERS OF COMPONENTS REQUIRED TO COMPLETE EACH ASSEMBLY.
 - CANTILEVER BRACKET SEPARATION SHALL BE DETERMINED USING THE TYPICAL 1:3 PIPE SLOPE AS A BASIS. IN SOME LOCATIONS A LARGER SLOPE MAY BE USED TO AVOID CONFLICTS WITH OTHER HARDWARE MOUNTED ON THE POLES.
 - STEADY ARM LENGTH AND HEEL SETTING TO BE DETERMINED BY THE CONTRACTOR.
 - CONTRACTOR TO ENSURE THAT THE STEADY ARM DESIGN ALLOWS FOR PANTOGRAPH CLEARANCE ENVELOPE.
 - THE MAXIMUM LOADS IN THE TABLE ARE THE WORST CASE LOADS THAT INCLUDE WIND AND ICE WHERE APPLICABLE.
 - THE CONTRACTOR SHALL ENSURE THAT TWIN STEADY ARMS EQUALLY SHARE THE CONTACT WIRE RADIAL LOAD.

03/21/24 | 1:53 PM | HARRISBK | DRAWINGS UPDATE 2023 STANDARD DRAWINGS SYSTEMS STD-JOD407.DWG

| No. | DATE | DSN | CHK | APP | REVISION |
|-----|--------|-----|-----|-----|------------------------------------|
| 1 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |
| 0 | 8/2019 | | | | REVISED SYSTEMS DIRECTIVE DRAWINGS |

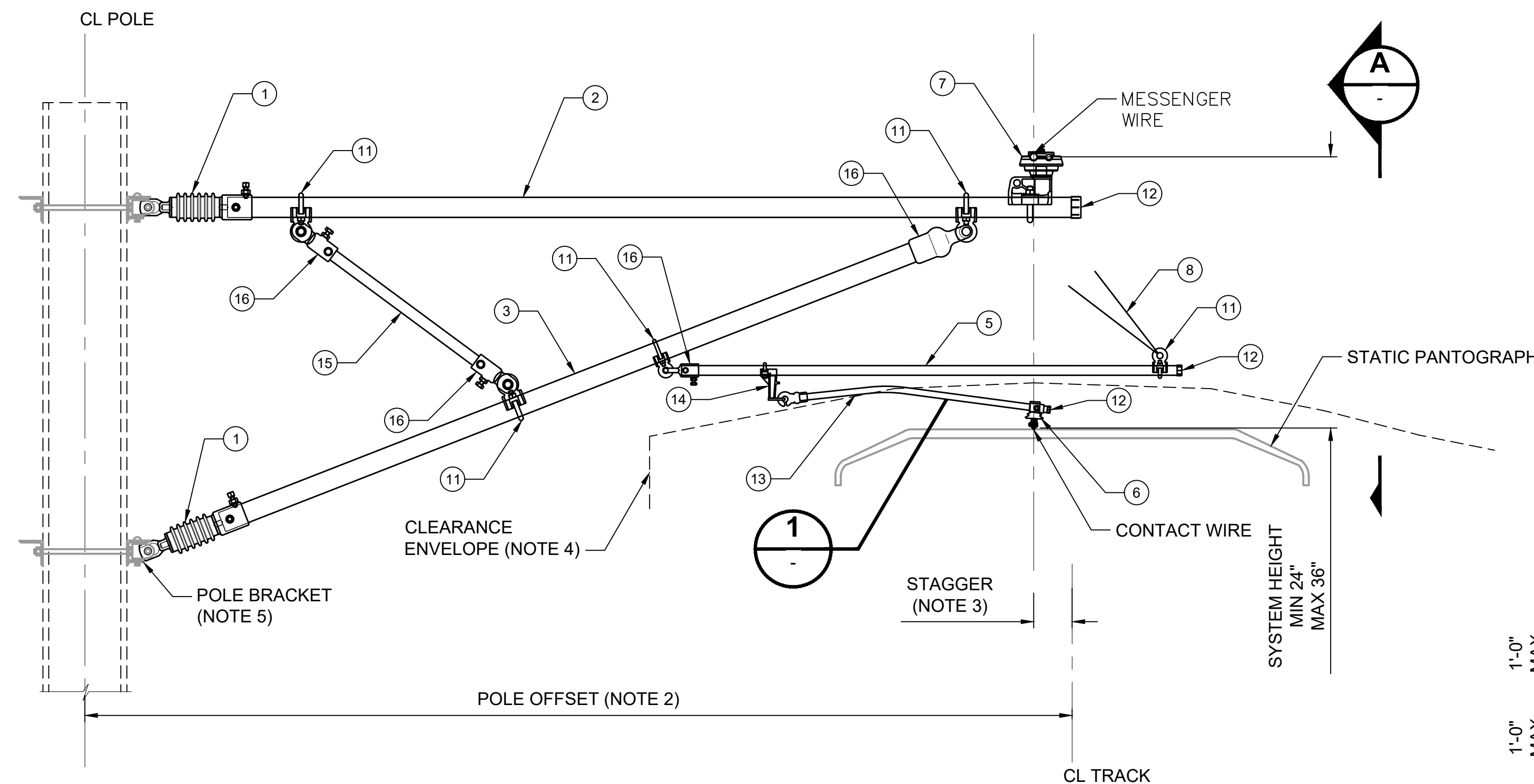
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| DESIGNED BY: | |
| DRAWN BY: | |
| CHECKED BY: | |
| APPROVED BY: | |

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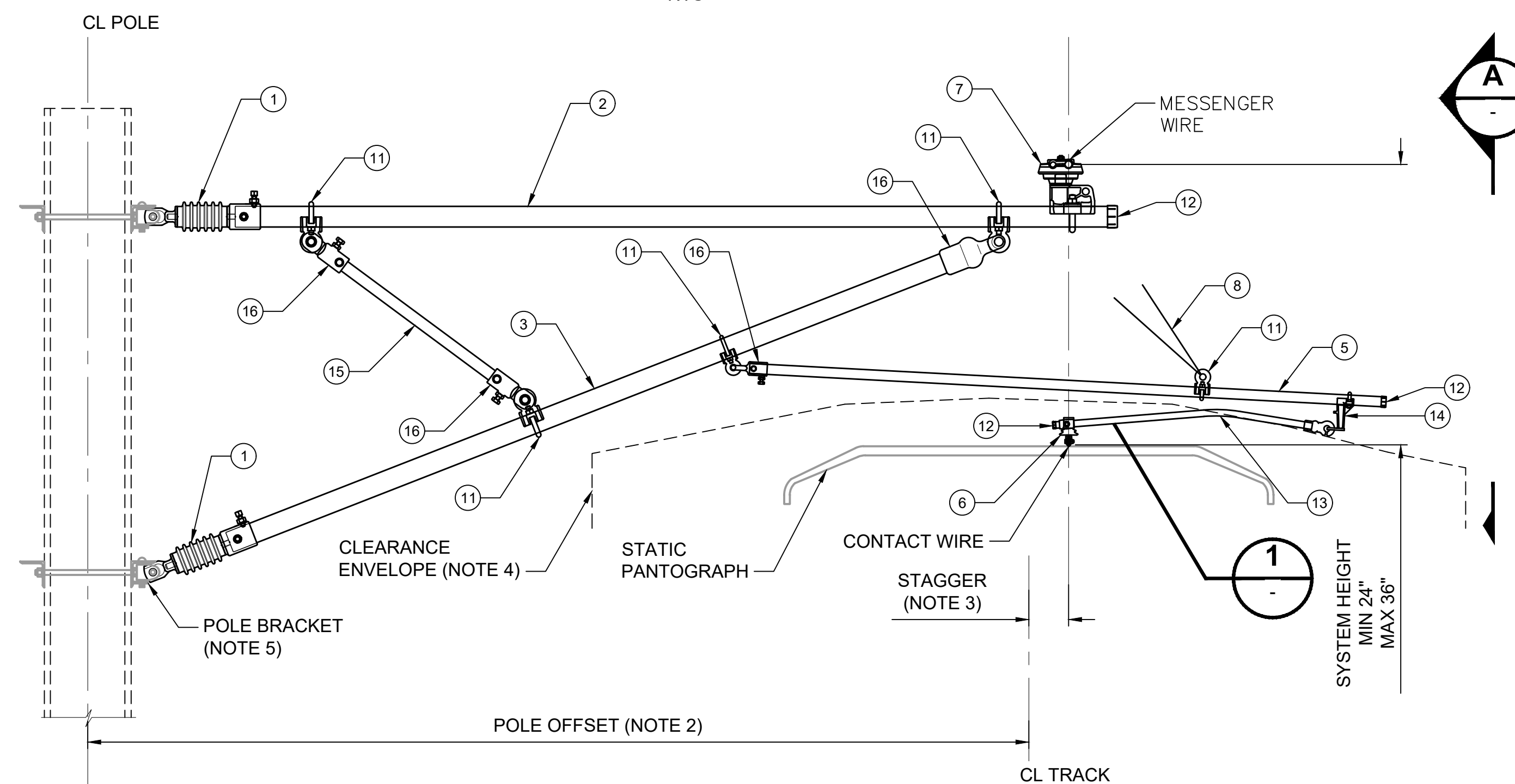
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| SCALE: NTS | FILENAME: STD-JOD407 |
| CONTRACT No.: | RTA/LR |
| DATE: | 2/2024 |

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| SOUND TRANSIT STANDARD DRAWINGS SYSTEMS | |
| OVERHEAD CATENARY SYSTEM REDUCED SYS HT CANT ASSEMBLIES CA-12L, CA-12M,, CA-12H, CA-14L, CA14M & CA-14H | |

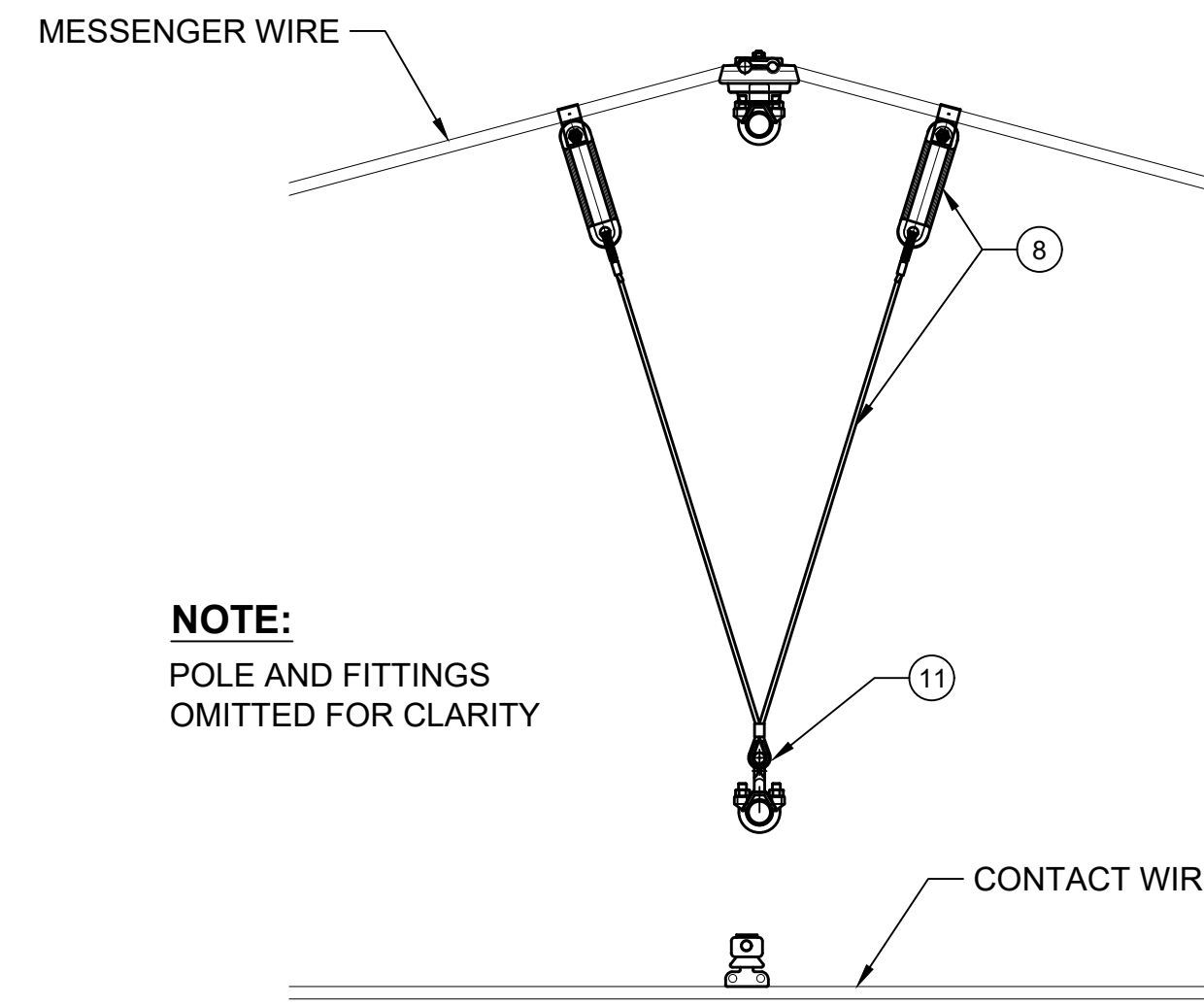
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| DRAWING No.: | STD-JOD407 |
| FACILITY ID: | |
| SHEET No.: | REV: |
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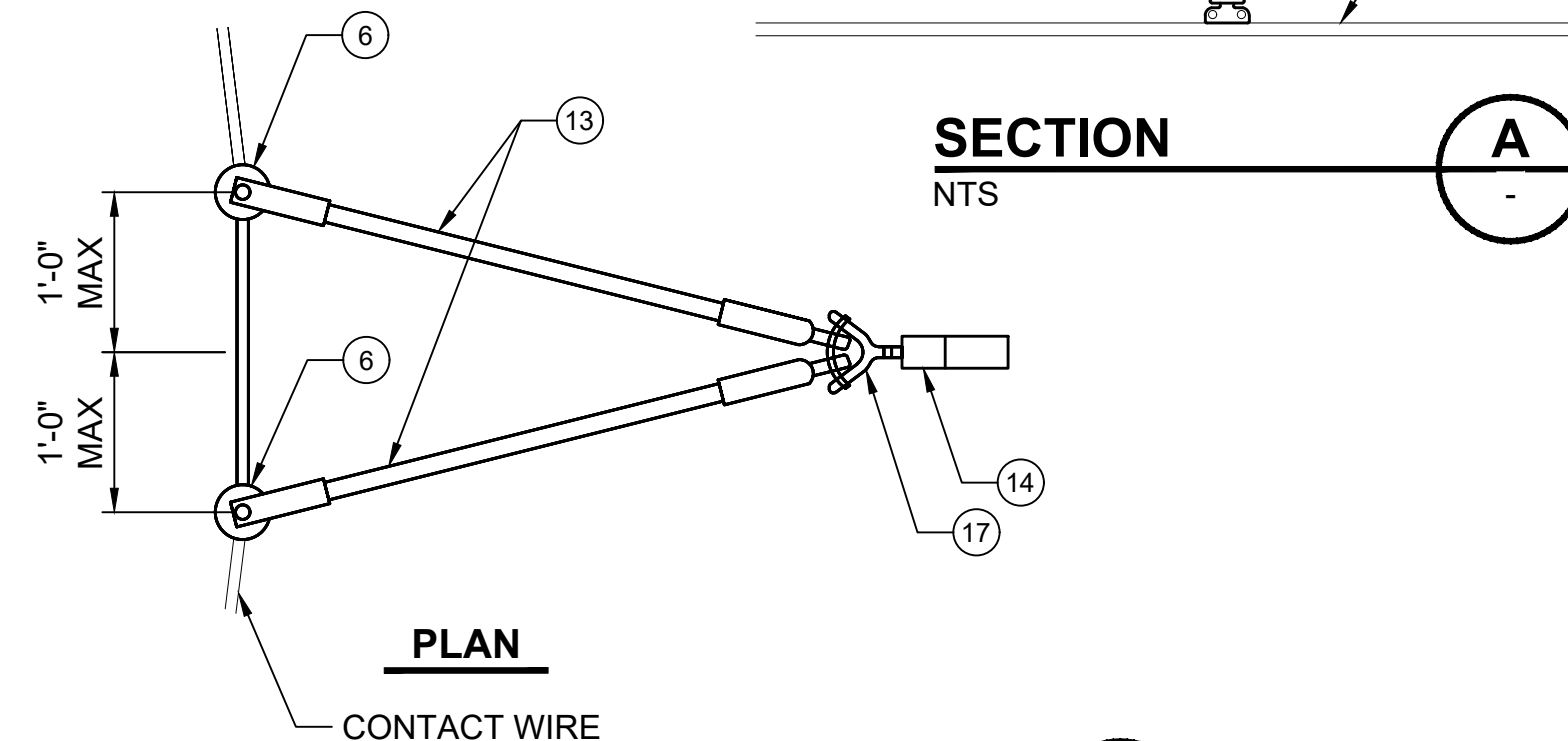
**REDUCED SYSTEM HEIGHT LONG REACH PULL-OFF CANTILEVER ASSEMBLY
CL-12L, CL-12M OR CL-12H LIGHT MEDIUM OR HEAVY LOAD**



**REDUCED SYSTEM HEIGHT LONG REACH PUSH-OFF CANTILEVER ASSEMBLY
CL-14L, CL-14M, OR CL-14H LIGHT MEDIUM OR HEAVY LOAD**



NOTE:
POLE AND FITTINGS
OMITTED FOR CLARITY



DETAIL OF TWIN STEADY ARMS

GENERAL NOTES:

- LOWER BRACKET TO CONTACT WIRE DIMENSION OF 9" IS FOR 7'-0" POLE TO CENTERLINE OF TRACK OFFSET. THIS DIMENSION MAY BE INCREASED 1" FOR EACH 6" INCREASE IN POLE OFFSET DIMENSION.
- CONTRACTOR SHALL FIELD VERIFY THIS DIMENSION PRIOR TO FABRICATION OF CANTILEVER PIPES.
- CATENARY DETAILS INCLUDING STAGGERS, POLE OFFSETS AND WIRE HEIGHTS AT EACH LOCATION TO BE SHOWN ON OCS LAYOUT PLANS AND SCHEDULES.
- FOR DETAILS OF PANTOGRAPH CLEARANCE, SEE DWG JOD112 AND JOD114.
- POLE BRACKET ASSEMBLY TO BE CALLED OFF SEPARATELY.
- CONTRACTOR TO DETERMINE COMPONENT DETAIL AND SAFE WORKING LIMITS.
- FOR SYMBOLS, LEGEND AND ABBREVIATIONS SEE DRAWINGS JZN001 AND JZN002.
- CONTRACTOR TO VERIFY ALL QUANTITIES ON THE BILL OF MATERIALS.
- CONTRACTOR TO DETERMINE POLE BRACKET ATTACHMENT HEIGHTS.
- THE CONTRACTOR IS RESPONSIBLE FOR THE DESIGN OF EACH ASSEMBLY AS A WHOLE AND EACH COMPONENT MEETING OR EXCEEDING THE LOADING TABLES WHERE PROVIDED. WHERE THE WORKING LOAD CAPABILITIES OF THE CONTRACTOR'S ASSEMBLIES EXCEED THOSE SHOWN IN THE LOADING TABLE, THE CONTRACTOR SHALL UPDATE THE TABLE IN THEIR SUBMISSION OF ASSEMBLY.
- THE BILL OF MATERIALS ARE TYPICAL FOR THE ASSEMBLY STYLES SHOWN. THE CONTRACTOR SHALL ITEMIZE THE TABLE WITH DESCRIPTIONS AND PART NUMBERS OF COMPONENTS REQUIRED TO COMPLETE EACH ASSEMBLY.
- CANTILEVER BRACKET SEPARATION SHALL BE DETERMINED USING THE TYPICAL 1:3 PIPE SLOPE AS A BASIS. IN SOME LOCATIONS A LARGER SLOPE MAY BE USED TO AVOID CONFLICTS WITH OTHER HARDWARE MOUNTED ON THE POLES.
- STEADY ARM LENGTH AND HEEL SETTING TO BE DETERMINED BY THE CONTRACTOR.
- CONTRACTOR TO ENSURE THAT THE STEADY ARM DESIGN ALLOWS FOR PANTOGRAPH CLEARANCE ENVELOPE.
- THE MAXIMUM LOADS IN THE TABLE ARE THE WORST CASE LOADS THAT INCLUDE WIND AND ICE WHERE APPLICABLE.
- THE CONTRACTOR SHALL ENSURE THAT TWIN STEADY ARMS EQUALLY SHARE THE CONTACT WIRE RADIAL LOAD.

| MAXIMUM ASSEMBLY LOADING | | | | | | |
|----------------------------|----------|---------|----------|----------|---------|----------|
| | CL-14H | CL-14M | CL-14L | CL-12H | CL-12M | CL-12L |
| MESSENGER WIRE RADIAL LOAD | 1450 LBS | 750 LBS | 350 LBS | 1450 LBS | 750 LBS | 350 LBS |
| CONTACT WIRE RADIAL LOAD | 1000 LBS | 500 LBS | 200 LBS | 1000 LBS | 500 LBS | 200 LBS |
| VERTICAL LOAD | 350 LBS | 650 LBS | 1000 LBS | 350 LBS | 650 LBS | 1000 LBS |

| BILL OF MATERIALS | | | | | | | | | |
|----------------------|--------|--------|--------|--------|--------|-------|---------------------------|----------|------------------|
| QUANTITIES EACH TYPE | | | | | | UNITS | DESCRIPTION | ITEM NO. | PART NO./REMARKS |
| CL-14H | CL-14M | CL-14L | CL-12H | CL-12M | CL-12L | | | | |
| 2 | 2 | 2 | 2 | 2 | 2 | EA | INSULATOR | 1 | |
| 1 | 1 | 1 | 1 | 1 | 1 | EA | TOP PIPE | 2 | LENGTH AS REQ'D |
| 1 | 1 | 1 | 1 | 1 | 1 | EA | STRUT PIPE | 3 | LENGTH AS REQ'D |
| - | - | 1 | - | - | 1 | EA | STEADY ARM, STRAIGHT | 4 | LENGTH AS REQ'D |
| 1 | 1 | 1 | 1 | 1 | 1 | EA | REGISTRATION PIPE | 5 | LENGTH AS REQ'D |
| 2 | 1 | 1 | 2 | 1 | 1 | EA | CONTACT WIRE SWIVEL CLAMP | 6 | INSULATED |
| 1 | 1 | 1 | 1 | 1 | 1 | EA | INSULATED MESSENGER CLAMP | 7 | INSULATED |
| 1 | 1 | 1 | 1 | 1 | 1 | EA | V-HANGER ASSEMBLY | 8 | INSULATED |
| - | - | - | - | - | - | EA | NOT USED | 9 | |
| - | - | - | - | - | - | EA | NOT USED | 10 | |
| 5 | 3 | 3 | 5 | 3 | 3 | EA | EYE CLAMPS | 11 | |
| 4 | 3 | 3 | 4 | 3 | 3 | EA | PIPE CAP | 12 | |
| 2 | 1 | - | 2 | 1 | - | EA | STEADY ARM, CURVED | 13 | LENGTH AS REQ'D |
| 1 | 1 | 1 | 1 | 1 | 1 | EA | DROP BRACKET | 14 | |
| 1 | - | - | 1 | - | - | EA | BRACE | 15 | LENGTH AS REQ'D |
| 4 | 2 | 2 | 4 | 2 | 2 | EA | CLEVIS FITTING | 16 | |
| 1 | - | - | 1 | - | - | EA | "Y" CLEVIS CLAMP OR EQUAL | 17 | |

03/21/24 | 1:53 PM | HARRISBK | DRAWINGS UPDATE 2023 STANDARD DRAWINGS SYSTEMS STD-JOD408.DWG

| No. | DATE | DSN | CHK | APP | REVISION |
|-----|--------|-----|-----|-----|------------------------------------|
| 1 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |
| 0 | 8/2019 | | | | REVISED SYSTEMS DIRECTIVE DRAWINGS |

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| DESIGNED BY: | |
| DRAWN BY: | |
| CHECKED BY: | |
| APPROVED BY: | |

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| SCALE: NTS | FILENAME: STD-JOD408 |
| CONTRACT No.: | RTA/LR |
| DATE: | 2/2024 |

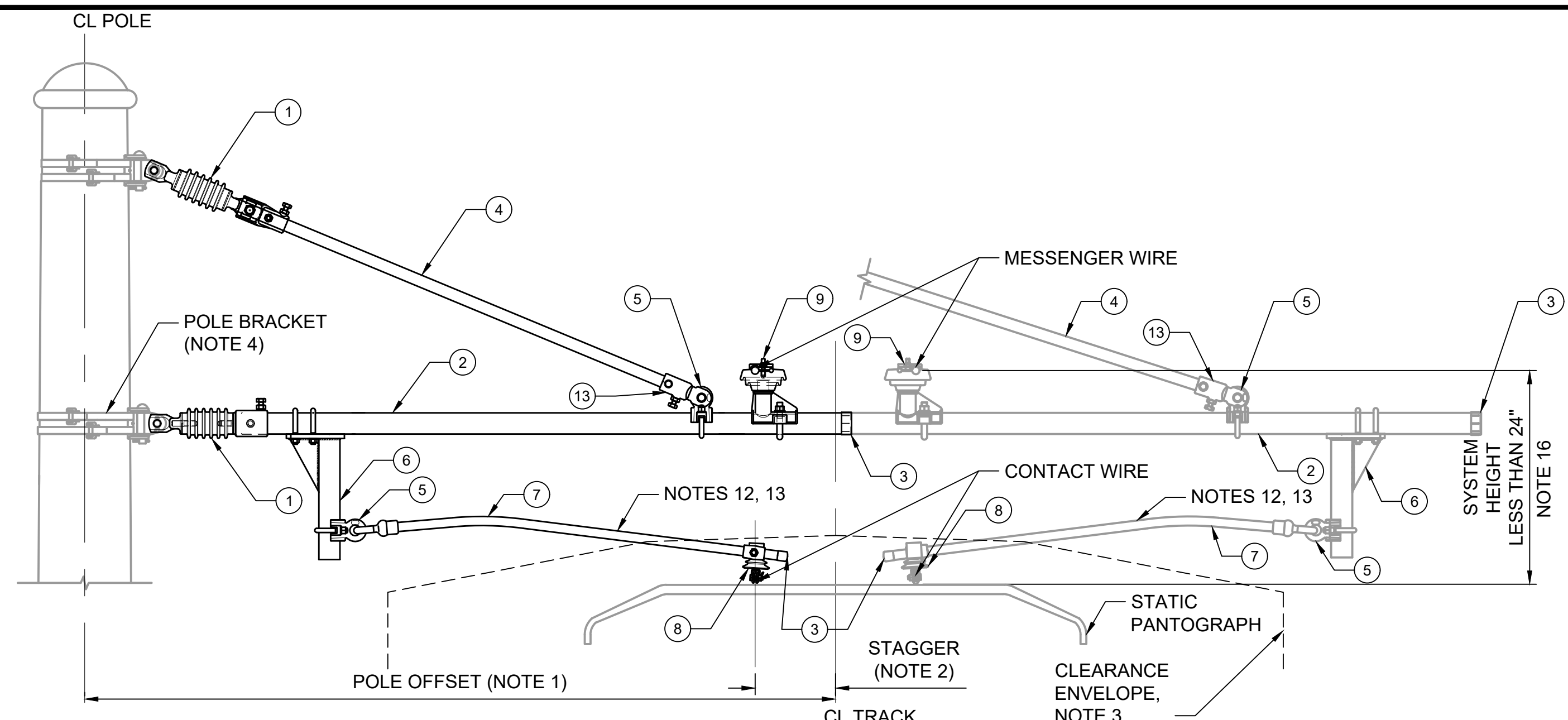
**SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS**

OVERHEAD CATENARY SYSTEM
REDUCED SYS HT LONG-REACH CANT ASSYS
CL-12L, CL-12M, CL-12H, CL-14L, CL-14M & CL-14H

| | |
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| DRAWING No.: | STD-JOD408 |
| FACILITY ID: | |
| SHEET No.: | REV: |
| | 1 |

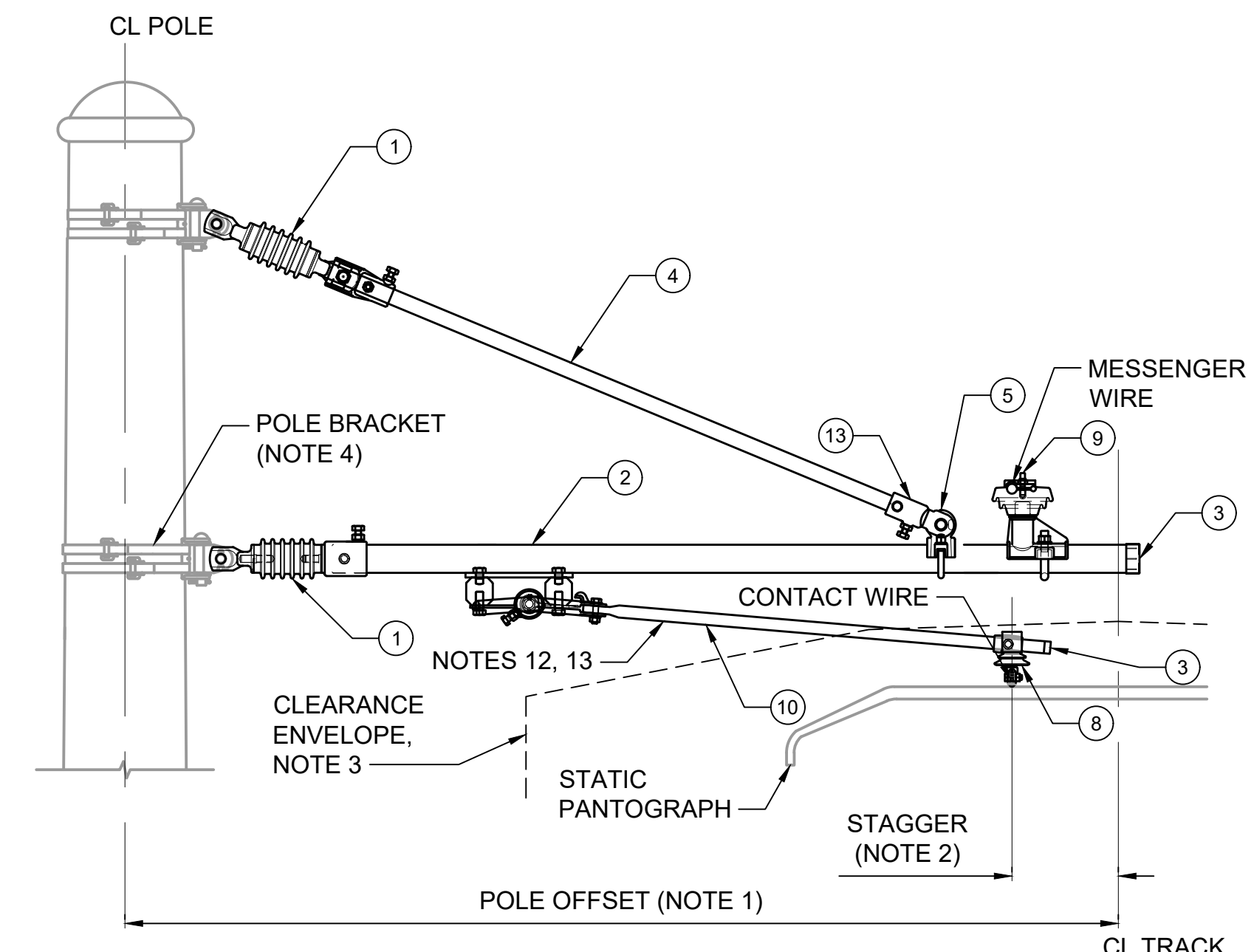
GENERAL NOTES:

- CONTRACTOR SHALL FIELD VERIFY THIS DIMENSION PRIOR TO FABRICATION OF CANTILEVER PIPES.
- CATENARY DETAILS INCLUDING STAGGERS, POLE OFFSETS AND WIRE HEIGHTS AT EACH LOCATION TO BE SHOWN ON OCS LAYOUT PLANS AND SCHEDULES.
- FOR DETAILS OF PANTOGRAPH CLEARANCE, SEE DWG JOD112 AND JOD114.
- POLE BRACKET ASSEMBLY TO BE CALLED OFF SEPARATELY.
- CONTRACTOR TO DETERMINE COMPONENT DETAIL AND SAFE WORKING LIMITS.
- FOR SYMBOLS, LEGEND AND ABBREVIATIONS SEE DRAWINGS JZN001 AND JZN002.
- CONTRACTOR TO VERIFY ALL QUANTITIES ON THE BILL OF M
- CONTRACTOR TO DETERMINE POLE BRACKET ATTACHMENT HEIGHTS.
- THE CONTRACTOR IS RESPONSIBLE FOR THE DESIGN OF EACH ASSEMBLY AS A WHOLE AND EACH COMPONENT MEETING OR EXCEEDING THE LOADING TABLES WHERE PROVIDED. WHERE THE WORKING LOAD CAPABILITIES OF THE CONTRACTOR'S ASSEMBLIES EXCEED THOSE SHOWN IN THE LOADING TABLE, THE CONTRACTOR SHALL UPDATE THE TABLE IN THEIR SUBMISSION OF ASSEMBLY.
- THE BILL OF MATERIALS ARE TYPICAL FOR THE ASSEMBLY STYLES SHOWN. THE CONTRACTOR SHALL ITEMIZE THE TABLE WITH DESCRIPTIONS AND PART NUMBERS OF COMPONENTS REQUIRED TO COMPLETE EACH ASSEMBLY.
- CANTILEVER BRACKET SEPARATION SHALL BE DETERMINED USING THE TYPICAL 1:3 PIPE SLOPE AS A BASIS. IN SOME LOCATIONS A LARGER SLOPE MAY BE USED TO AVOID CONFLICTS WITH OTHER HARDWARE MOUNTED ON THE POLES.
- STEADY ARM LENGTH AND HEEL SETTING TO BE DETERMINED BY THE CONTRACTOR.
- CONTRACTOR TO ENSURE THAT THE STEADY ARM DESIGN ALLOWS FOR PANTOGRAPH CLEARANCE ENVELOPE.
- THE CONTRACTOR SHALL ENSURE THAT TWIN STEADY ARMS EQUALLY SHARE THE CONTACT WIRE RADIAL LOAD.
- THE MAXIMUM LOADS IN THE TABLE ARE WORST CASE LOADS THAT INCLUDE WIND AND ICE WHERE APPLICABLE.
- RECONFIGURE ASSEMBLY FOR SYSTEM HEIGHTS LESS THAN 15".

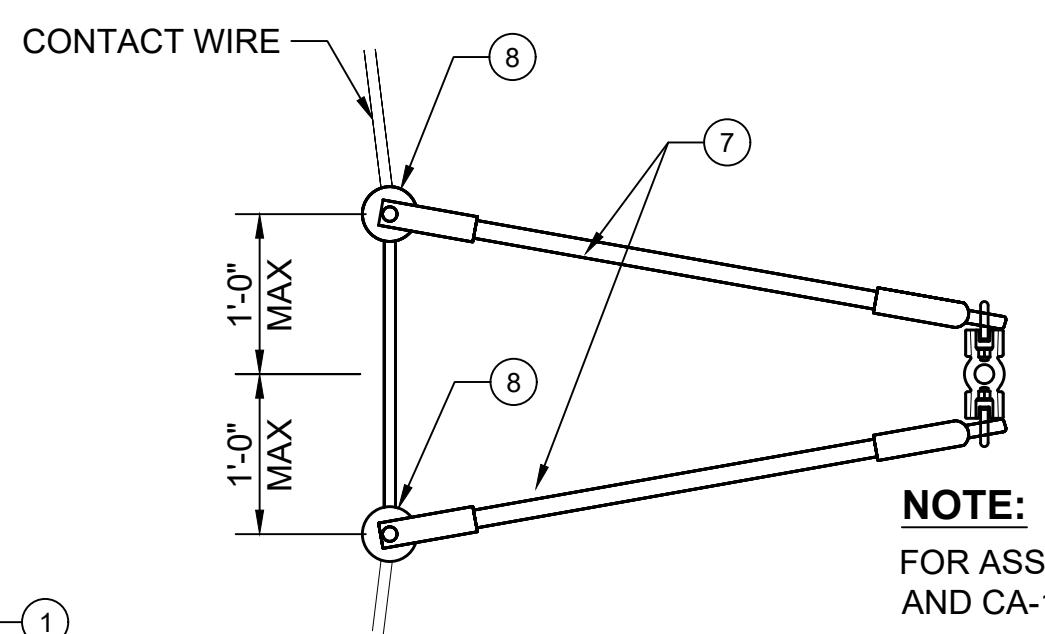


REDUCED SYSTEM HEIGHT PULL-OFF CANTILEVER ASSEMBLY CA-15L OR CA-15M
NTS

REDUCED SYSTEM HEIGHT PUSH-OFF CANTILEVER ASSEMBLY CA-16L OR CA-16M
NTS

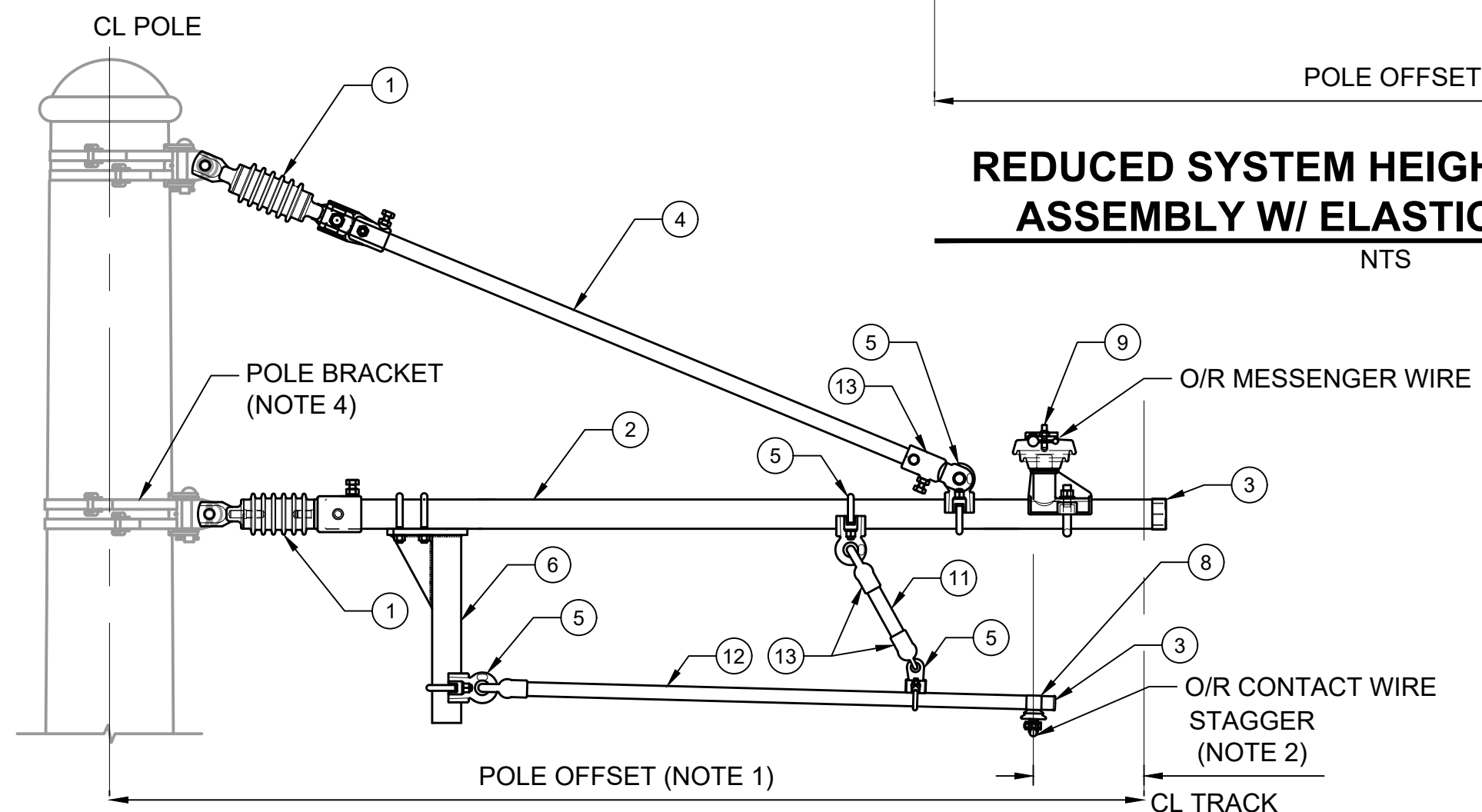


REDUCED SYSTEM HEIGHT CANTILEVER ASSEMBLY W/ ELASTIC ARM CA-15E
NTS

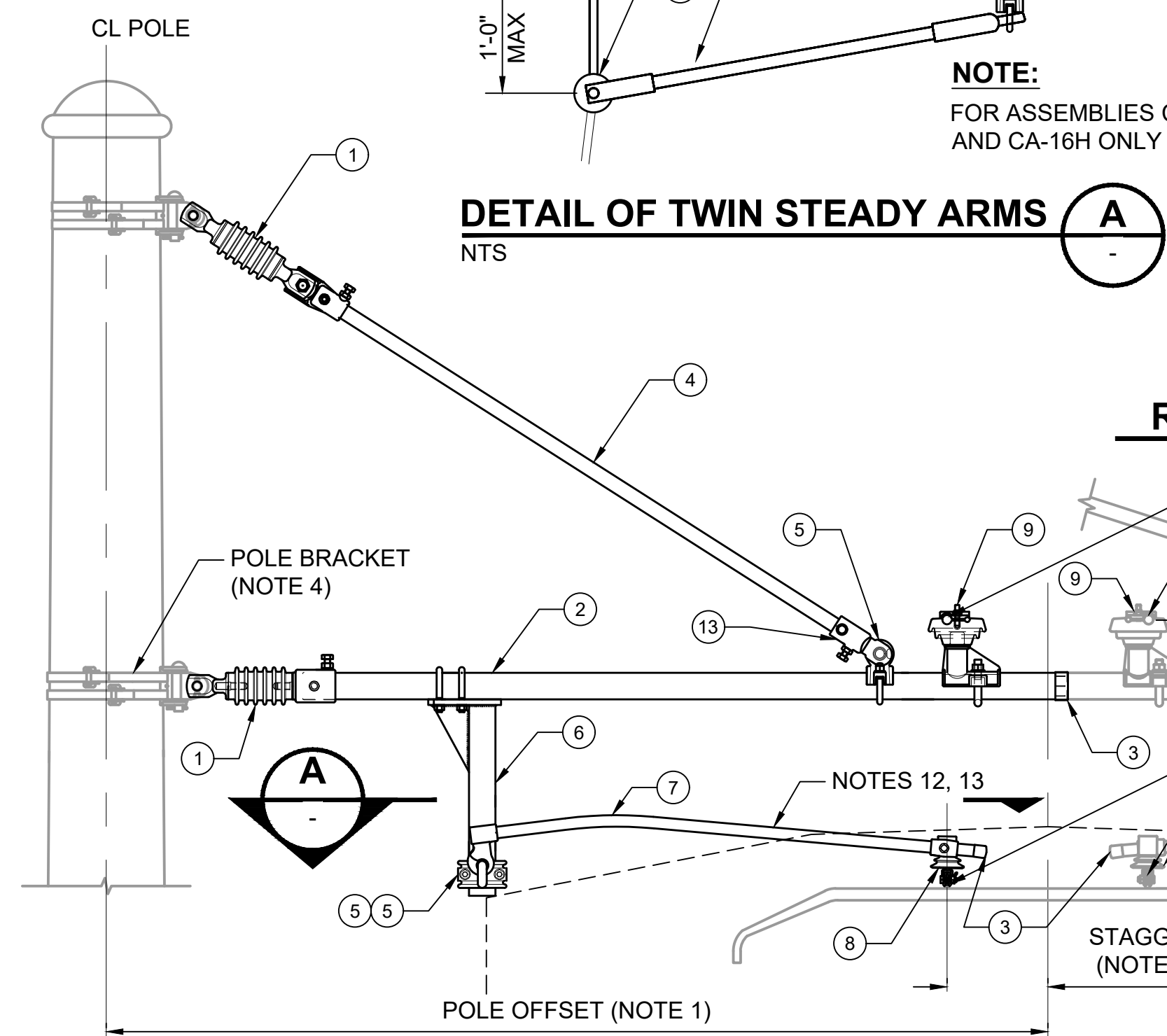


DETAIL OF TWIN STEADY ARMS
NTS

NOTE:
FOR ASSEMBLIES CA-15H AND CA-16H ONLY



REDUCED SYSTEM HEIGHT OUT-OF-RUNNING CANTILEVER ASSEMBLY CA-15X
NTS



REDUCED SYSTEM HEIGHT PULL-OFF CANTILEVER ASSEMBLY CA-15H
NTS

REDUCED SYSTEM HEIGHT PUSH-OFF CANTILEVER ASSEMBLY CA-16H
NTS

| MAXIMUM ASSEMBLY LOADING | | | | | | | | |
|----------------------------|----------|---------|----------|---------|----------|----------|---------|----------|
| | CA-15L | CA-15M | CA-15H | CA-15E | CA-15X | CA-16L | CA-16M | CA-16H |
| MESSENGER WIRE RADIAL LOAD | 350 LBS | 750 LBS | 1450 LBS | 250 LBS | 1450 LBS | 350 LBS | 750 LBS | 1450 LBS |
| CONTACT WIRE RADIAL LOAD | 200 LBS | 500 LBS | 1000 LBS | 150 LBS | 1000 LBS | 200 LBS | 500 LBS | 1000 LBS |
| VERTICAL LOAD | 1000 LBS | 650 LBS | 350 LBS | 450 LBS | 350 LBS | 1000 LBS | 650 LBS | 350 LBS |

| BILL OF MATERIALS | | | | | | | | | | | | |
|----------------------|--------|--------|--------|--------|--------|--------|--------|-------|---------------------------|----------|------------------|--|
| QUANTITIES EACH TYPE | | | | | | | | UNITS | DESCRIPTION | ITEM NO. | PART NO./REMARKS | |
| CA-15X | CA-15L | CA-15M | CA-15H | CA-15E | CA-16L | CA-16M | CA-16H | | | | | |
| 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | EA | INSULATOR | 1 | | |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | EA | REGISTRATION PIPE | 2 | LENGTH AS REQ'D | |
| 2 | 2 | 2 | 3 | 2 | 2 | 2 | 3 | EA | PIPE CAP | 3 | | |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | EA | TOP PIPE | 4 | LENGTH AS REQ'D | |
| 4 | 2 | 2 | 3 | 1 | 2 | 2 | 3 | EA | EYE CLAMP | 5 | | |
| 1 | 1 | 1 | 1 | - | 1 | 1 | 1 | EA | DROP BRACKET | 6 | LENGTH AS REQ'D | |
| - | - | 1 | 2 | - | - | 1 | 2 | EA | STEADY ARM, CURVED | 7 | LENGTH AS REQ'D | |
| 1 | 1 | 1 | 2 | 1 | 1 | 1 | 2 | EA | C/W SWIVEL CLAMP | 8 | INSULATED | |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | EA | INSULATED MESSENGER CLAMP | 9 | | |
| - | - | - | - | 1 | - | - | - | EA | ELASTIC ARM | 10 | | |
| 1 | - | - | 1 | - | - | - | 1 | EA | BRACE | 11 | LENGTH AS REQ'D | |
| 1 | 1 | - | - | - | 1 | - | - | EA | STEADY ARM, STRAIGHT | 12 | LENGTH AS REQ'D | |
| 3 | 1 | 1 | 3 | 1 | 1 | 1 | 3 | EA | CLEVIS FITTING | 13 | | |

03/21/24 | 1:54 PM | HARRISBK | C:\USERS\HARRISBK\DRAWINGS\SYSTEMS\STANDARD DRAWINGS\SYSTEMS\STD-JOD409.DWG

| No. | DATE | DSN | CHK | APP | REVISION |
|-----|--------|-----|-----|-----|------------------------------------|
| 1 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |
| 0 | 8/2019 | | | | REVISED SYSTEMS DIRECTIVE DRAWINGS |

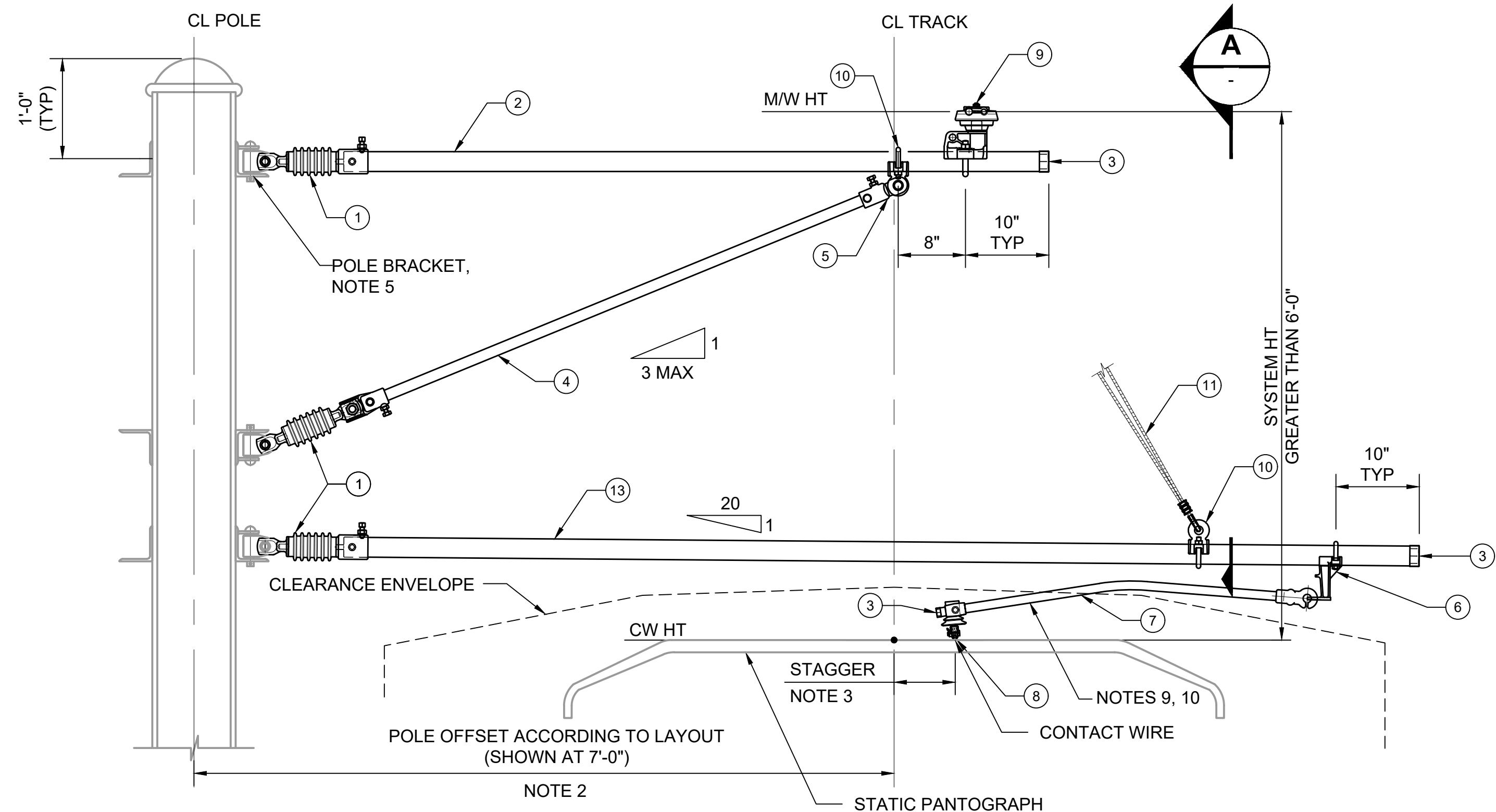
DESIGNED BY:
DRAWN BY:
CHECKED BY:
APPROVED BY:

SUBMITTED BY: DATE: REVIEWED BY: DATE:

SCALE: NTS
FILENAME: STD-JOD409
CONTRACT No.: RTA/LR
DATE: 2/2024

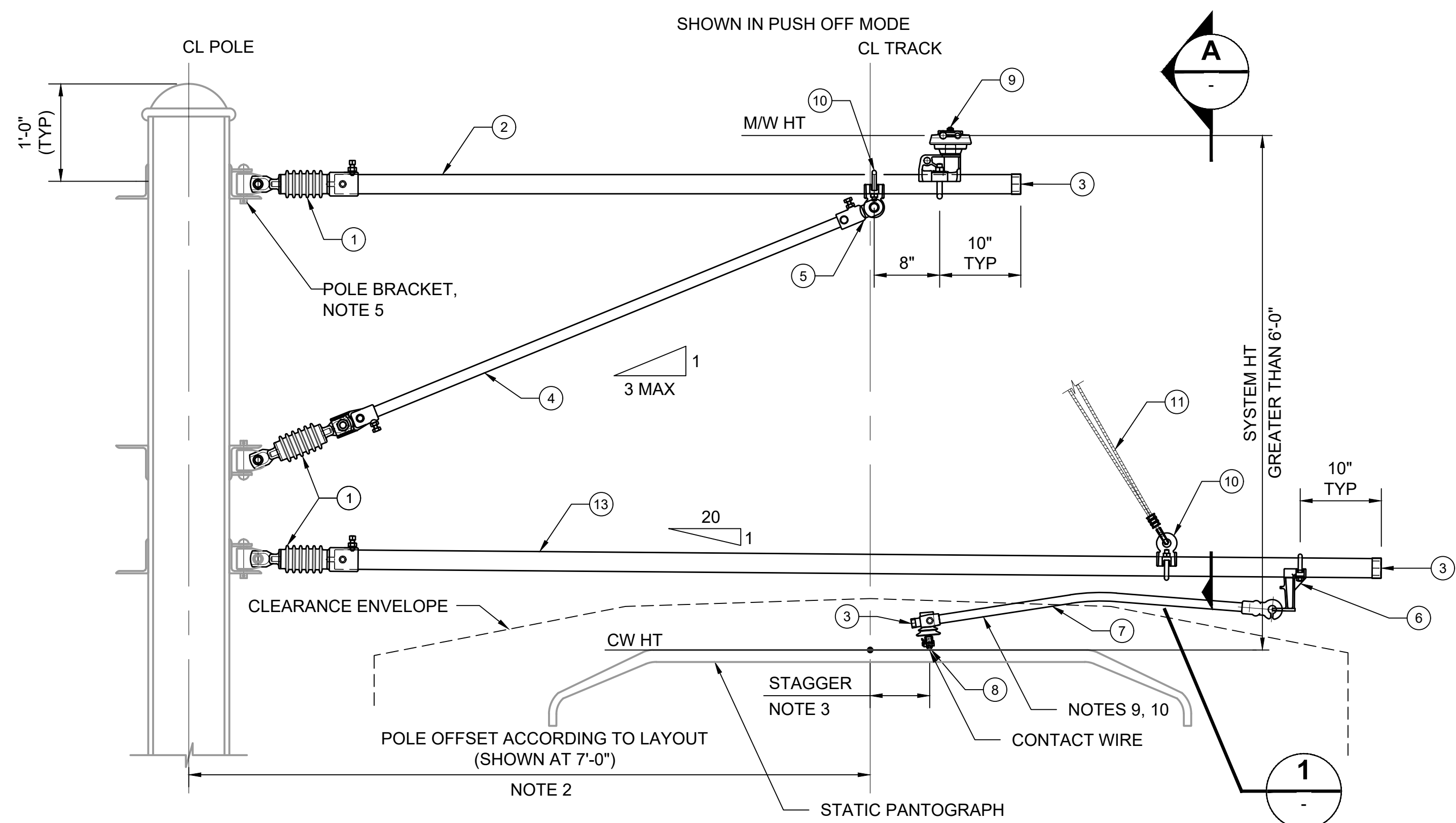
SOUND TRANSIT STANDARD DRAWINGS SYSTEMS
OVERHEAD CATENARY SYSTEM
REDUCED SYS HT CANT ASSYS CA15L, CA-15M, CA-15H, CA-15E, CA-15X, CA-16L, CA-16M, CA-16H

DRAWING No.: **STD-JOD409**
FACILITY ID:
SHEET No.: REV: 1



INCREASED SYSTEM HEIGHT PUSH/PULL CANTILEVER ASSEMBLY CA-17M OR CA-18M MEDIUM LOAD

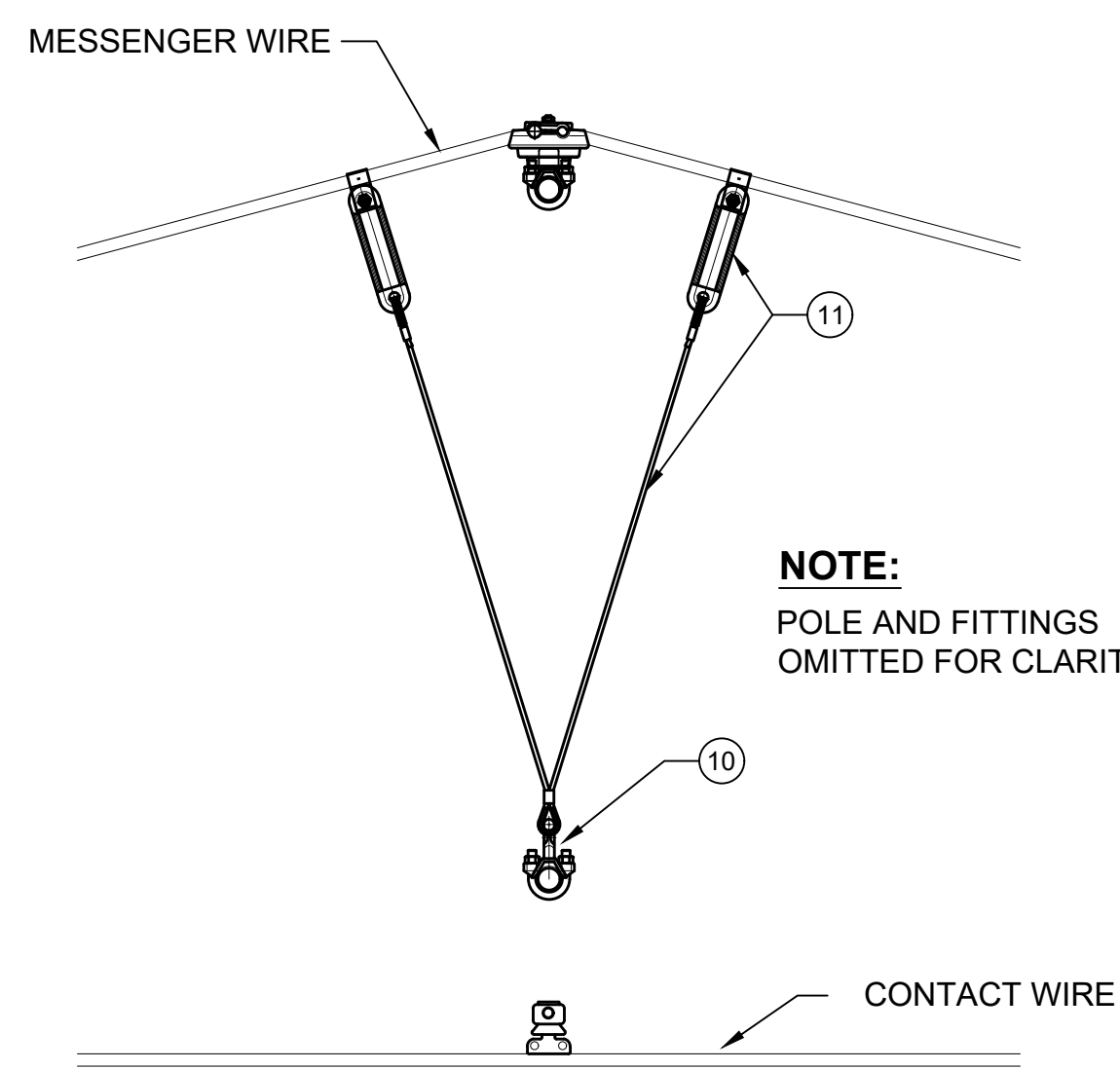
NTS



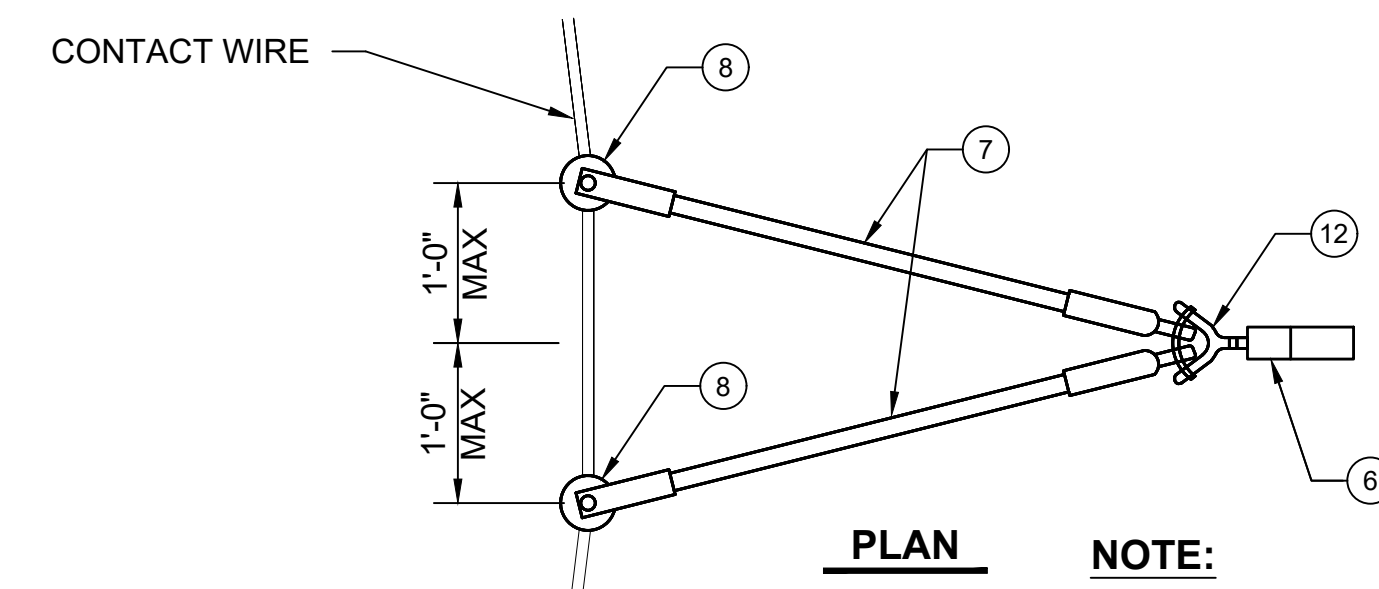
INCREASED SYSTEM HEIGHT PUSH/PULL CANTILEVER ASSEMBLY CA-17H OR CA-18H HEAVY LOAD

NTS

SHOWN IN PUSH OFF MODE



SECTION
NTS



DETAIL OF TWIN STEADY ARMS

NTS

1

| MAXIMUM ASSEMBLY LOADING | | | | |
|----------------------------|----------|---------|----------|---------|
| | CA-18H | CA-18M | CA-17H | CA-17M |
| MESSENGER WIRE RADIAL LOAD | 1450 LBS | 750 LBS | 1450 LBS | 750 LBS |
| CONTACT WIRE RADIAL LOAD | 1000 LBS | 500 LBS | 1000 LBS | 500 LBS |
| VERTICAL LOAD | 350 LBS | 650 LBS | 350 LBS | 650 LBS |

| BILL OF MATERIALS | | | | | | | | | | | | |
|----------------------|--------|--------|--------|-------|---------------------------|----------|------------------|--|--|--|--|--|
| QUANTITIES EACH TYPE | | | | UNITS | DESCRIPTION | ITEM NO. | PART NO./REMARKS | | | | | |
| CA-18H | CA-18M | CA-17H | CA-17M | | | | | | | | | |
| 3 | 3 | 3 | 3 | EA | INSULATOR | 1 | | | | | | |
| 1 | 1 | 1 | 1 | EA | TOP PIPE | 2 | LENGTH AS REQ'D | | | | | |
| 3 | 3 | 3 | 3 | EA | PIPE CAP | 3 | | | | | | |
| 1 | 1 | 1 | 1 | EA | STRUT PIPE | 4 | LENGTH AS REQ'D | | | | | |
| 1 | 1 | 1 | 1 | EA | CLEVIS FITTING | 5 | | | | | | |
| 1 | 1 | 1 | 1 | EA | DROP BRACKET | 6 | | | | | | |
| 2 | 1 | 2 | 1 | EA | STEADY ARM, CURVED | 7 | LENGTH AS REQ'D | | | | | |
| 2 | 1 | 2 | 1 | EA | C/W SWIVEL CLAMP | 8 | INSULATED | | | | | |
| 1 | 1 | 1 | 1 | EA | INSULATED MESSENGER CLAMP | 9 | | | | | | |
| 2 | 2 | 2 | 2 | EA | EYE CLAMP | 10 | | | | | | |
| 1 | 1 | 1 | 1 | EA | "V" HANGER W/LOOP INSUL | 11 | | | | | | |
| 1 | - | 1 | - | EA | "Y" CLEVIS CLAMP OR EQUAL | 12 | | | | | | |
| 1 | 1 | 1 | 1 | EA | REGISTRATION PIPE | 13 | LENGTH AS REQ'D | | | | | |

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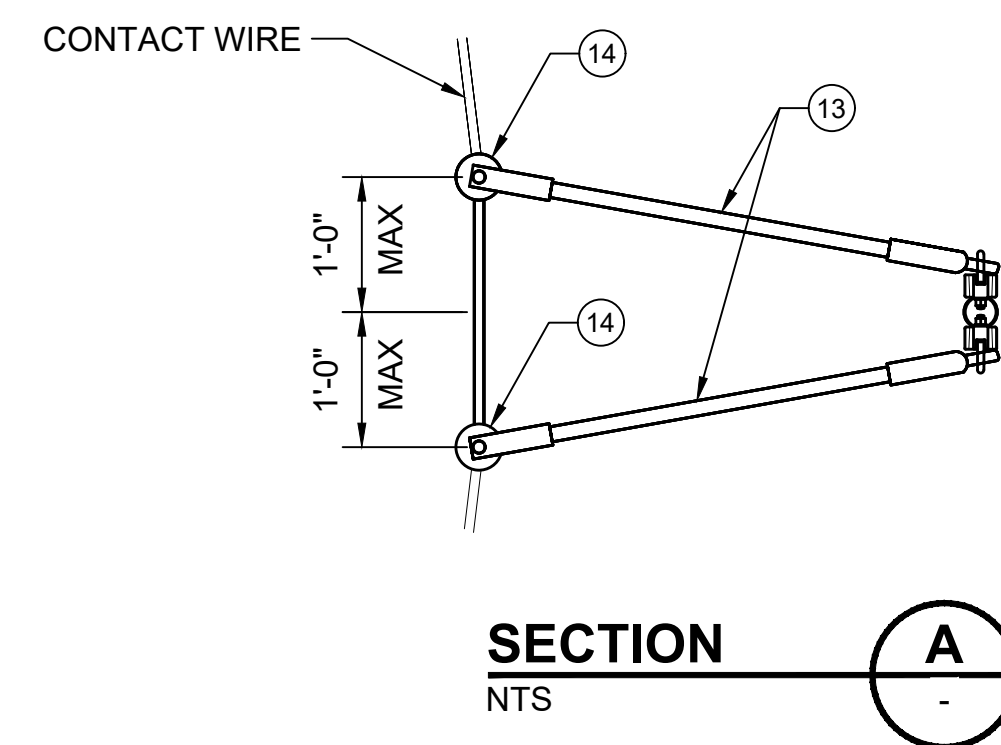
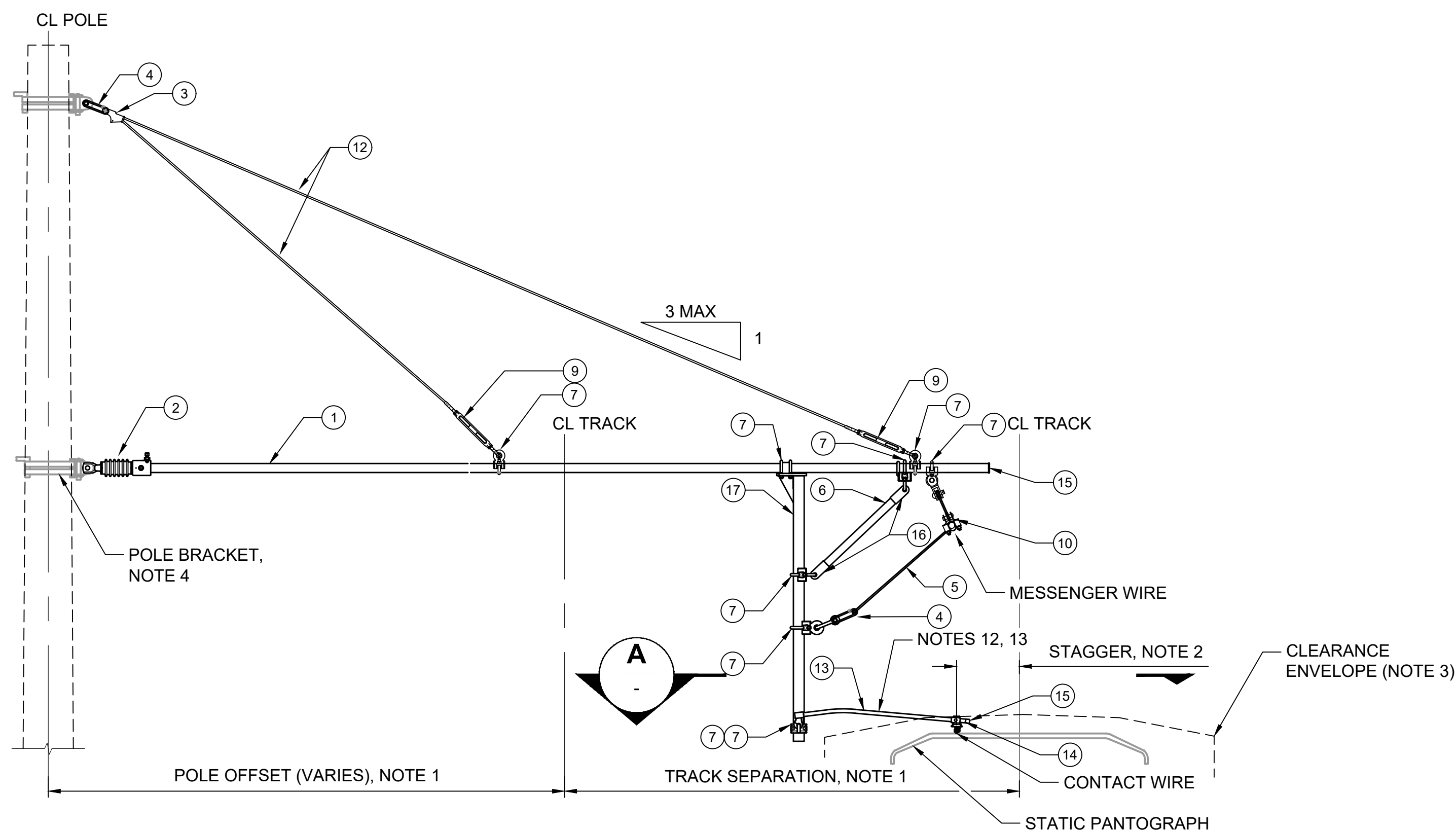
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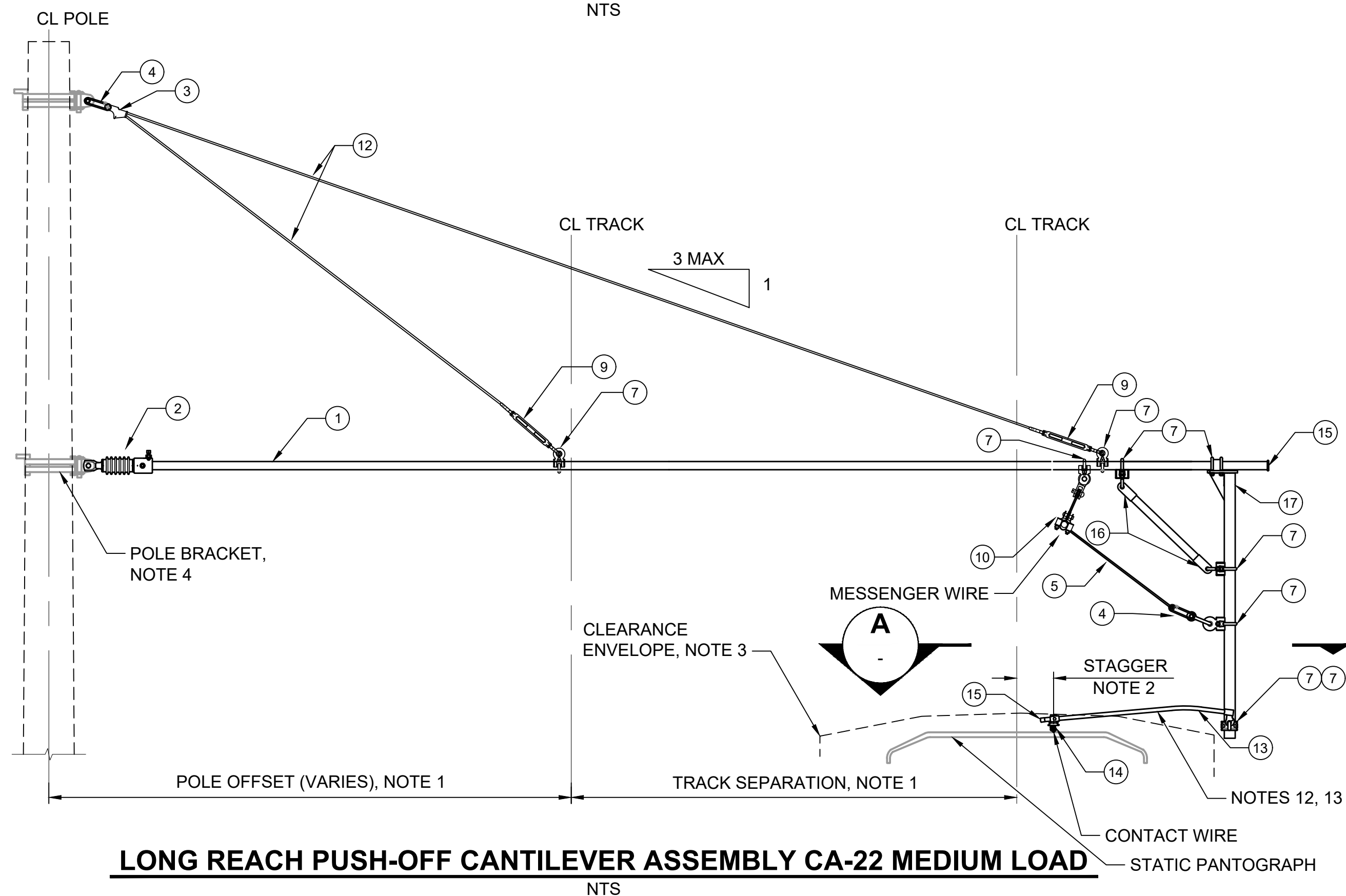
**SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS**

OVERHEAD CATENARY SYSTEM
INCREASED SYSTEM HEIGHT CANTILEVER ASSEMBLIES
CA-17M, CA-17H, CA-18M & CA-18H

| | |
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| DRAWING No.: | STD-JOD410 |
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LONG REACH PULL-OFF CANTILEVER ASSEMBLY CA-21 MEDIUM LOAD



LONG REACH PUSH-OFF CANTILEVER ASSEMBLY CA-22 MEDIUM LOAD

GENERAL NOTES:

1. CONTRACTOR SHALL FIELD VERIFY THIS DIMENSION PRIOR TO FABRICATION OF CANTILEVER PIPES.
2. CATENARY DETAILS INCLUDING STAGGERS, POLE OFFSETS AND WIRE HEIGHTS AT EACH LOCATION TO BE SHOWN ON OCS LAYOUT PLANS AND SCHEDULES.
3. FOR DETAILS OF PANTOGRAPH CLEARANCE, SEE DWG JOD112 AND JOD114.
4. POLE BRACKET ASSEMBLY TO BE CALLED OFF SEPARATELY.
5. CONTRACTOR TO DETERMINE COMPONENT DETAIL AND SAFE WORKING LIMITS.
6. FOR SYMBOLS, LEGEND AND ABBREVIATIONS SEE DRAWINGS JZN001 AND JZN002.
7. CONTRACTOR TO VERIFY ALL QUANTITIES ON THE BILL OF MATERIALS.
8. CONTRACTOR TO DETERMINE POLE BRACKET ATTACHMENT HEIGHTS.
9. THE CONTRACTOR IS RESPONSIBLE FOR THE DESIGN OF EACH ASSEMBLY AS A WHOLE AND EACH COMPONENT MEETING OR EXCEEDING THE LOADING TABLES WHERE PROVIDED. WHERE THE WORKING LOAD CAPABILITIES OF THE CONTRACTOR'S ASSEMBLIES EXCEED THOSE SHOWN IN THE LOADING TABLE, THE CONTRACTOR SHALL UPDATE THE TABLE IN THEIR SUBMISSION OF ASSEMBLY.
10. THE BILL OF MATERIALS ARE TYPICAL FOR THE ASSEMBLY STYLES SHOWN. THE CONTRACTOR SHALL ITEMIZE THE TABLE WITH DESCRIPTIONS AND PART NUMBERS OF COMPONENTS REQUIRED TO COMPLETE EACH ASSEMBLY.
11. CANTILEVER BRACKET SEPARATION SHALL BE DETERMINED USING THE TYPICAL 1:3 PIPE SLOPE AS A BASIS. IN SOME LOCATIONS A LARGER SLOPE MAY BE USED TO AVOID CONFLICTS WITH OTHER HARDWARE MOUNTED ON THE POLES.
12. STEADY ARM LENGTH AND HEEL SETTING TO BE DETERMINED BY THE CONTRACTOR.
13. CONTRACTOR TO ENSURE THAT THE STEADY ARM DESIGN ALLOWS FOR PANTOGRAPH CLEARANCE ENVELOPE.
14. THE MAXIMUM LOADS IN THE TABLE ARE THE WORST CASE LOADS THAT INCLUDE WIND AND ICE WHERE APPLICABLE.

| MAXIMUM ASSEMBLY LOADING | | | | |
|----------------------------|---------|---------|----------|----------|
| | CA-22M | CA-21M | CA-22H | CA-21H |
| MESSENGER WIRE RADIAL LOAD | 750 LBS | 750 LBS | 1500 LBS | 1500 LBS |
| CONTACT WIRE RADIAL LOAD | 500 LBS | 500 LBS | 1000 LBS | 1000 LBS |
| VERTICAL LOAD | 650 LBS | 650 LBS | 1300 LBS | 1300 LBS |

| BILL OF MATERIALS | | | | | | | |
|----------------------|--------|--------|--------|-------|---------------------------|----------|------------------|
| QUANTITIES EACH TYPE | | | | UNITS | DESCRIPTION | ITEM NO. | PART NO./REMARKS |
| CA-22M | CA-21M | CA-22H | CA-21H | | | | |
| 1 | 1 | 1 | 1 | EA | PIPE | 1 | LENGTH AS REQ'D |
| 1 | 1 | 1 | 1 | EA | INSULATOR | 2 | |
| 1 | 1 | 1 | 1 | EA | WEDGE TYPE DEAD END CLAMP | 3 | |
| 2 | 2 | 2 | 2 | EA | STRAIN INSULATOR | 4 | |
| 1 | 1 | 1 | 1 | EA | GUY WIRE | 5 | LENGTH AS REQ'D |
| 1 | 1 | 1 | 1 | EA | BRACE | 6 | LENGTH AS REQ'D |
| 3 | 9 | 3 | 9 | EA | EYE CLAMP | 7 | |
| | | | | EA | NOT USED | 8 | |
| 2 | 2 | 2 | 2 | EA | TURNBUCKLE | 9 | |
| 1 | 1 | 1 | 1 | EA | MESSENGER SUSPENSION | 10 | INSULATED |
| 1 | 1 | 1 | 1 | EA | DROP PIPE | 11 | LENGTH AS REQ'D |
| 1 | 1 | 1 | 1 | EA | STAINLESS STEEL WIRE ROPE | 12 | LENGTH AS REQ'D |
| 1 | 1 | 2 | 2 | EA | STEADY ARM, CURVED | 13 | |
| 1 | 1 | 2 | 2 | EA | C/W SWIVEL CLAMP | 14 | INSULATED |
| 2 | 2 | 2 | 2 | EA | PIPE CAP | 15 | |
| 2 | 2 | 2 | 2 | EA | CLEVIS FITTING | 16 | |
| 1 | 1 | 1 | 1 | EA | DROP BRACKET | 17 | |

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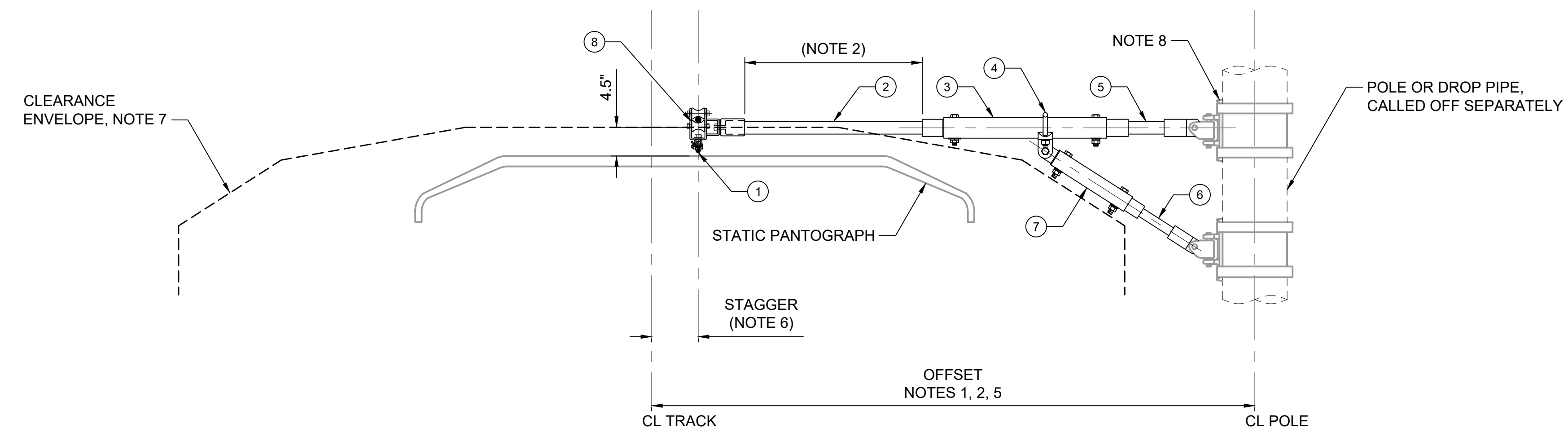
**SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS**

OVERHEAD CATENARY SYSTEM
LONG REACH CANTILEVER ASSEMBLIES
CA-21 & CA-22

| | |
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| DRAWING No.: | STD-JOD411 |
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GENERAL NOTES:

1. SHOP DRAWINGS SHALL CATER TO OFFSETS FROM 6'-6" TO 9'-3".
2. FOR SITE SPECIFIC APPLICATION INSULATED ARM ASSEMBLY SHALL HAVE INSULATION LENGTH (XX) AVAILABLE IN INCREMENTS OF 2 INCHES OR BE ADJUSTABLE TO CATER TO ALL STAGGERS FROM +12" TO -12".
3. ENSURE ALL PARTS OF THIS ASSEMBLY EXCEPT INSULATED ARM, ARE OUTSIDE THE PANTOGRAPH CLEARANCE ENVELOPE UNDER ALL OPERATING CONDITIONS.
4. INSULATED ARM TO BE CLEAR OF CLEARANCE ENVELOPE BY 1" MINIMUM FOR THE FULL RANGE OF VEHICLE MOVEMENT.
5. CONTRACTOR SHALL FIELD VERIFY THIS DIMENSION PRIOR TO FABRICATION OF CANTILEVER PIPES.
6. CATENARY DETAILS INCLUDING STAGGERS, POLE OFFSETS AND WIRE HEIGHTS AT EACH LOCATION TO BE SHOWN ON OCS LAYOUT PLANS AND SCHEDULES.
7. FOR DETAILS OF PANTOGRAPH CLEARANCE, SEE DWG JOD112 AND JOD114.
8. POLE BRACKET ASSEMBLY TO BE CALLED OFF SEPARATELY.
9. CONTRACTOR TO DETERMINE COMPONENT DETAIL AND SAFE WORKING LIMITS.
10. FOR SYMBOLS, LEGEND AND ABBREVIATIONS SEE DRAWINGS JZN001 AND JZN002.
11. CONTRACTOR TO VERIFY ALL QUANTITIES ON THE BILL OF MATERIALS.
12. CONTRACTOR TO DETERMINE POLE BRACKET ATTACHMENT HEIGHTS.
13. THE CONTRACTOR IS RESPONSIBLE FOR THE DESIGN OF EACH ASSEMBLY AS A WHOLE AND EACH COMPONENT MEETING OR EXCEEDING THE LOADING TABLES WHERE PROVIDED. WHERE THE WORKING LOAD CAPABILITIES OF THE CONTRACTOR'S ASSEMBLIES EXCEED THOSE SHOWN IN THE LOADING TABLE, THE CONTRACTOR SHALL UPDATE THE TABLE IN THEIR SUBMISSION OF ASSEMBLY.
14. THE BILL OF MATERIALS ARE TYPICAL FOR THE ASSEMBLY STYLES SHOWN. THE CONTRACTOR SHALL ITEMIZE THE TABLE WITH DESCRIPTIONS AND PART NUMBERS OF COMPONENTS REQUIRED TO COMPLETE EACH ASSEMBLY.
15. THE MAXIMUM LOADS IN THE TABLE ARE THE WORST CASE LOADS THAT INCLUDE WIND AND ICE WHERE APPLICABLE.



UNDER BRIDGE/TUNNEL SUPPORT ASSEMBLY CA-30E
NTS

| MAXIMUM ASSEMBLY LOADING | |
|--------------------------------|---------|
| | CA-30E |
| COMBINED MW & CW RADIAL LOAD | 250 LBS |
| COMBINED MW & CW VERTICAL LOAD | 250 LBS |

| BILL OF MATERIALS | | | | |
|----------------------|-------|------------------------|----------|------------------|
| QUANTITIES EACH TYPE | UNITS | DESCRIPTION | ITEM NO. | PART NO./REMARKS |
| CA-30E | | | | |
| 1 | EA | CW SWIVEL CLAMP | 1 | |
| 1 | EA | INSULATED ARM ASSEMBLY | 2 | NOTE 2 |
| 1 | EA | TOP PIPE | 3 | LENGTH AS REQ'D |
| 1 | EA | CLEVIS FITTING | 4 | |
| 1 | EA | STRUT INSULATOR | 5 | |
| 1 | EA | STRUT INSULATOR | 6 | |
| 1 | EA | STRUT PIPE | 7 | LENGTH AS REQ'D |
| 1 | EA | MW CLAMP | 8 | |

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LINE IS 1" AT FULL SCALE

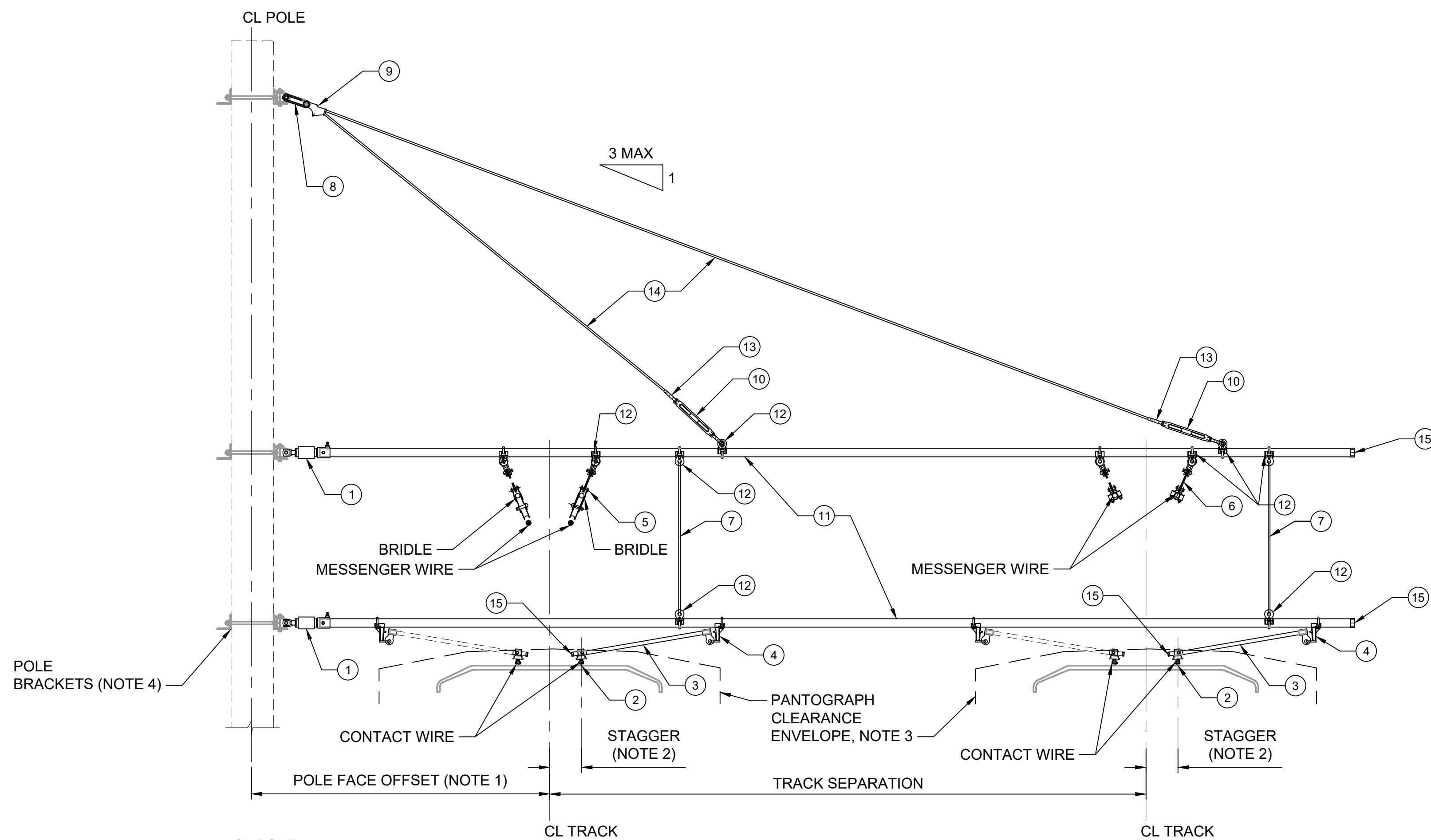


**SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS**

OVERHEAD CATENARY SYSTEM
UNDER BRIDGE/TUNNEL SUPPORT ASSEMBLY
CA-30E

| | | |
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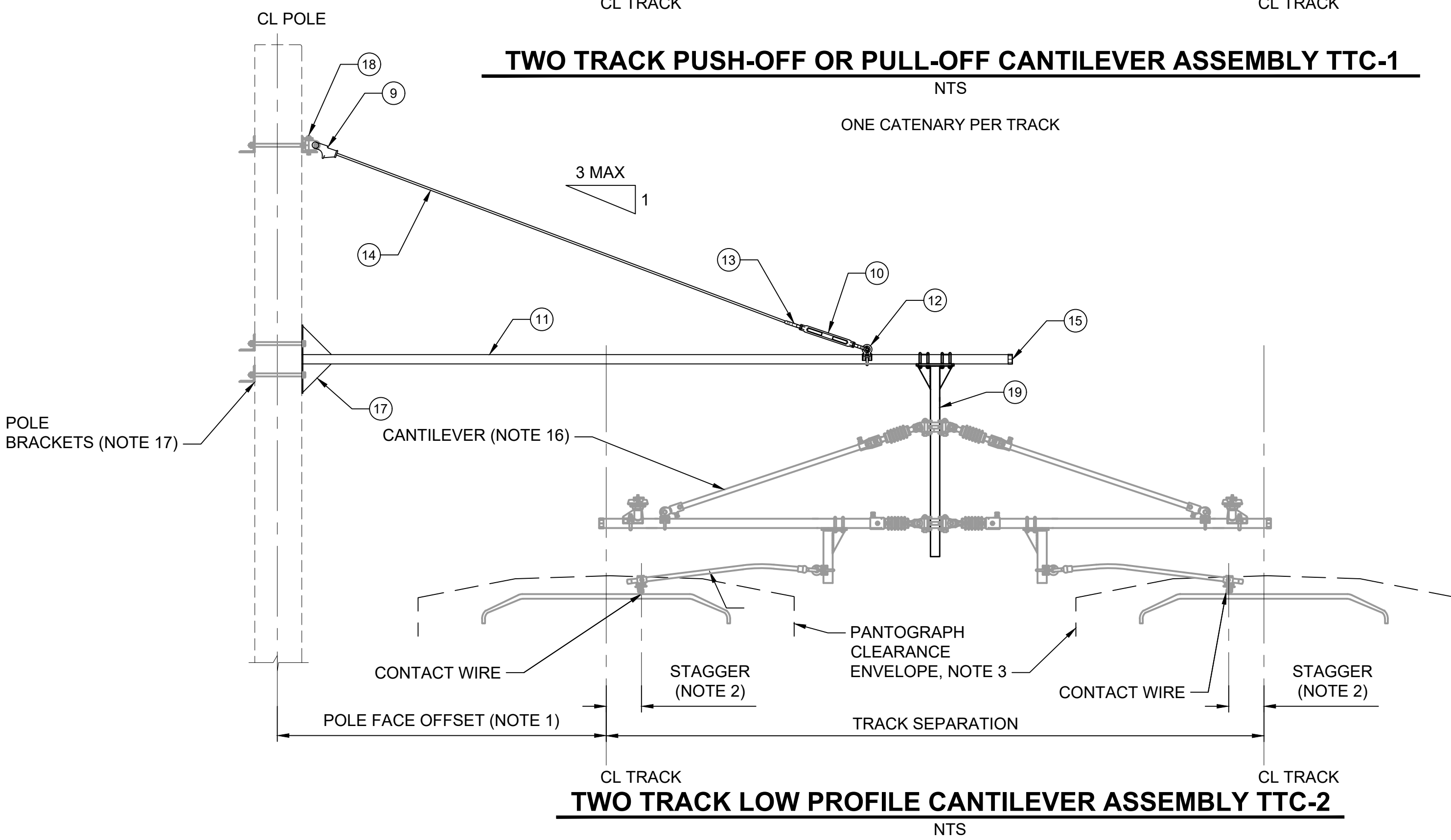
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TWO TRACK PUSH-OFF OR PULL-OFF CANTILEVER ASSEMBLY TTC-1

NTS

ONE CATENARY PER TRACK



TWO TRACK LOW PROFILE CANTILEVER ASSEMBLY TTC-2

NTS

GENERAL NOTES:

1. CONTRACTOR SHALL FIELD VERIFY THIS DIMENSION PRIOR TO FABRICATION OF CANTILEVER PIPES.
2. CATENARY DETAILS INCLUDING STAGGERS, POLE OFFSETS AND WIRE HEIGHTS AT EACH LOCATION TO BE SHOWN ON OCS LAYOUT PLANS AND SCHEDULES.
3. FOR DETAILS OF PANTOGRAPH CLEARANCE, SEE DWG JOD112 AND JOD114.
4. POLE BRACKET ASSEMBLY TO BE CALLED OFF SEPARATELY.
5. CONTRACTOR TO DETERMINE COMPONENT DETAIL AND SAFE WORKING LIMITS.
6. FOR SYMBOLS, LEGEND AND ABBREVIATIONS SEE DRAWINGS JZN001 AND JZN002.
7. CONTRACTOR TO VERIFY ALL QUANTITIES ON THE BILL OF MATERIALS.
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11. CANTILEVER BRACKET SEPARATION SHALL BE DETERMINED USING THE TYPICAL 1:3 PIPE SLOPE AS A BASIS. IN SOME LOCATIONS A LARGER SLOPE MAY BE USED TO AVOID CONFLICTS WITH OTHER HARDWARE MOUNTED ON THE POLES.
12. STEADY ARM LENGTH AND HEEL SETTING TO BE DETERMINED BY THE CONTRACTOR.
13. CONTRACTOR TO ENSURE THAT THE STEADY ARM DESIGN ALLOWS FOR PANTOGRAPH CLEARANCE ENVELOPE.
14. THE CONTRACTOR SHALL ENSURE THAT TWIN STEADY ARMS EQUALLY SHARE THE CONTACT WIRE RADIAL LOAD.
15. SUSPEND MESSENGER USING SS BRIDLE WIRE THROUGH PULLEY.
16. CANTILEVER ASSEMBLY TO BE CALLED OFF SEPARATELY.
17. THE TTC-2 BRACKETS ARE RIGID AND SHALL RESTRICT ROTATIONAL MOVEMENT.
18. THE MAXIMUM LOADS IN THE TABLE ARE THE WORST CASE LOADS THAT INCLUDE WIND AND ICE WHERE APPLICABLE.
19. LOADS ARE PER CATENARY.

| MAXIMUM ASSEMBLY LOADING | | | | |
|----------------------------|----------------|----------|----------------|----------|
| | TTC-1, NOTE 20 | | TTC-2, NOTE 20 | |
| MESSENGER WIRE RADIAL LOAD | 1450 LBS | 1450 LBS | 1450 LBS | 1450 LBS |
| CONTACT WIRE RADIAL LOAD | 1000 LBS | 1000 LBS | 1000 LBS | 1000 LBS |
| VERTICAL LOAD | 1000 LBS | 1000 LBS | 1000 LBS | 1000 LBS |

| BILL OF MATERIALS | | | | | |
|----------------------|-------|-------|--|----------|------------------|
| QUANTITIES EACH TYPE | | UNITS | DESCRIPTION | NO. ITEM | PART NO./REMARKS |
| TTC-1 | TTC-2 | | | | |
| 2 | - | EA | INSULATOR | 1 | |
| 2 | - | EA | CONTACT WIRE SWIVEL CLAMP | 2 | INSULATED |
| 2 | - | EA | STEADY ARM | 3 | LENGTH AS REQ'D |
| 2 | - | EA | DROP BRACKET | 4 | |
| 1 | - | EA | MESSENGER SUSP. W/ PULLEY & LOOP INSULATOR | 5 | |
| 1 | - | EA | MESSENGER SUSP. CLAMP W/ LOOP INSULATOR | 6 | |
| 2 | - | EA | SS HANGER | 7 | |
| 1 | - | EA | STRAIN INSULATOR | 8 | |
| 1 | 1 | EA | WEDGE TYPE DEAD END | 9 | |
| 2 | 1 | EA | TURNBUCKLE | 10 | |
| 2 | 1 | EA | PIPE | 11 | LENGTH AS REQ'D |
| 8 | 1 | EA | EYE CLAMP | 12 | |
| 2 | 1 | EA | THIMBLE & OVAL COMPRESSION SLEEVE | 13 | |
| 2 | 1 | EA | SS WIRE ROPE | 14 | LENGTH AS REQ'D |
| 4 | 1 | EA | PIPE CAP | 15 | |
| - | - | - | NOT USED | 16 | |
| - | 1 | EA | RIGID POLE BRACKET | 17 | |
| - | 1 | EA | POLE BRACKET | 18 | |
| - | 1 | EA | DROP PIPE | 19 | LENGTH AS REQ'D |

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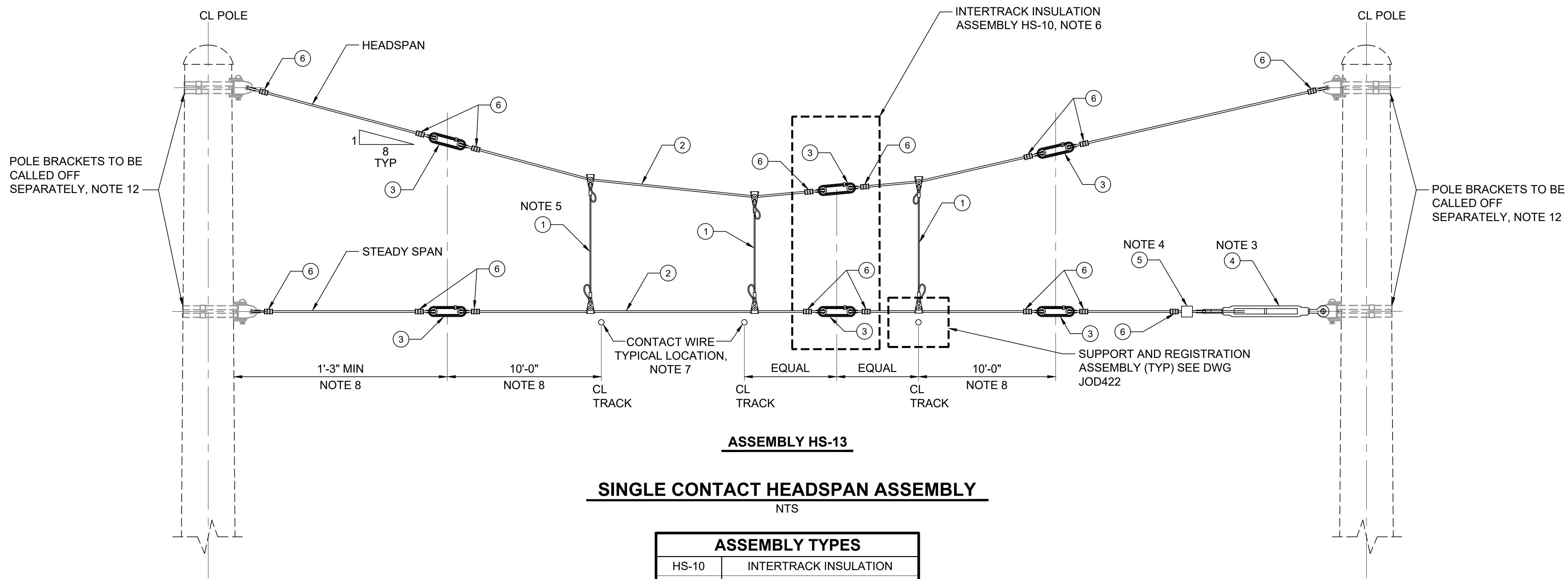
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CONTRACT No.: RTA/LR
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SOUND TRANSIT
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SYSTEMS

OVERHEAD CATENARY SYSTEM
TWO TRACK CANTILEVER ASSEMBLY
TTC-1 & TTC-2

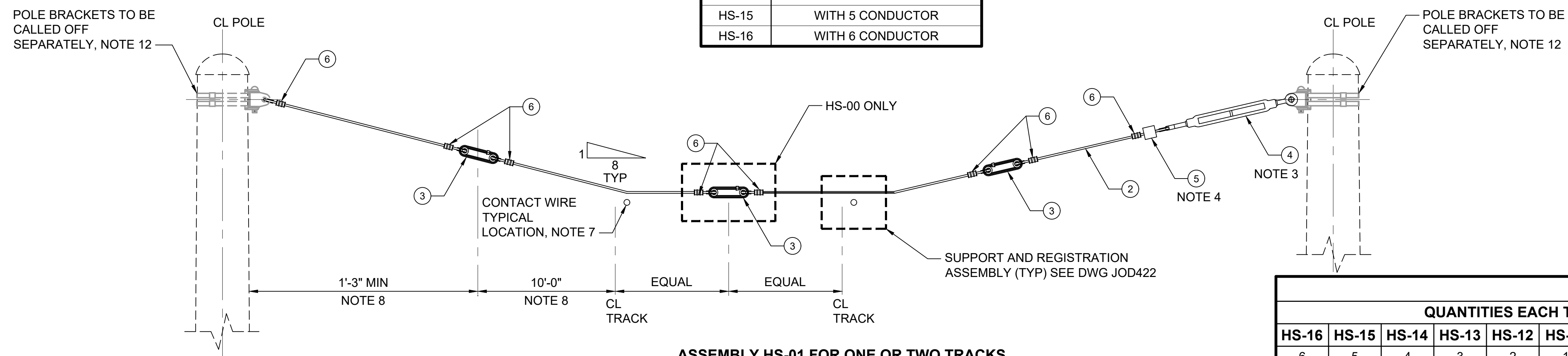
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ASSEMBLY HS-13
SINGLE CONTACT HEADSPAN ASSEMBLY
 NTS

| ASSEMBLY TYPES | |
|----------------|-----------------------|
| HS-10 | INTERTRACK INSULATION |
| HS-11 | WITH 1 CONDUCTOR |
| HS-12 | WITH 2 CONDUCTOR |
| HS-13 | WITH 3 CONDUCTOR |
| HS-14 | WITH 4 CONDUCTOR |
| HS-15 | WITH 5 CONDUCTOR |
| HS-16 | WITH 6 CONDUCTOR |

- GENERAL NOTES:**
1. THE BILL OF MATERIALS DETAILS ARE TYPICAL FOR THE ASSEMBLY STYLES SHOWN. THE CONTRACTOR SHALL ITEMIZE THE TABLE WITH DESCRIPTIONS AND PART NUMBERS OF COMPONENTS REQUIRED TO COMPLETE EACH ASSEMBLY.
 2. VALUE AND DIRECTION OF STAGGER TO BE AS SHOWN ON OCS LAYOUT PLANS.
 3. LOCATE TURNBUCKLE ON THE SLACK SIDE OF THE SPAN WIRES, THIS IS TYPICALLY INSIDE OF CURVES.
 4. A VIBRATION DAMPER IS REQUIRED ONLY IF ONE OR BOTH ENDS OF THE SPAN WIRE ARE ATTACHED TO A BUILDING, CONCRETE POLE, OR OTHER RIGID SUPPORT. THE SPRING IS TO BE LOCATED ADJACENT TO THE TURNBUCKLE.
 5. TYPICALLY LOCATE A SPAN WIRE HANGER ABOVE OR NEAR EACH ATTACHED CONTACT WIRE SUPPORT.
 6. INTERTRACK INSULATION ASSEMBLIES ARE REQUIRED TO BE INSTALLED BETWEEN TRACKS WHERE CONTACT WIRES ARE FED ELECTRICALLY THROUGH DIFFERENT SWITCHES, OR HAVE UNINSULATED WIRE SUPPORT ASSEMBLIES. DETAILS TO BE SHOWN ON SECTIONALIZING DIAGRAMS AND OCS LAYOUT PLANS.
 7. THE CONTACT WIRE SHALL BE ATTACHED TO THESE SPAN WIRES USING INSULATED CONTACT WIRE SUPPORT AND REGISTRATION ASSEMBLIES. SEE DWG JOD422.
 8. SECOND LEVEL INSULATION TO BE LOCATED 10'-0" FROM TRACK CENTERLINE EXCEPT IN CASES WHEN THE POLE FACE IS LESS THAN 11'-3" FROM TRACK CENTERLINE, A MINIMUM OF 1'-3" FROM FACE OF POLE IS REQUIRED.
 9. FOR SYMBOLS, LEGEND AND ABBREVIATIONS SEE DRAWINGS JZN001 AND JZN002.
 10. CONTRACTOR TO VERIFY ALL QUANTITIES ON THE BILL OF MATERIALS.
 11. THE CONTRACTOR IS RESPONSIBLE FOR THE DESIGN OF EACH ASSEMBLY AS A WHOLE AND EACH COMPONENT MEETING OR EXCEEDING THE LOADING TABLES WHERE PROVIDED. WHERE THE WORKING LOAD CAPABILITIES OF THE CONTRACTOR'S ASSEMBLIES EXCEED THOSE SHOWN IN THE LOADING TABLE, THE CONTRACTOR SHALL UPDATE THE TABLE IN THEIR SUBMISSION OF ASSEMBLY.
 12. CONTRACTOR TO DETERMINE POLE BRACKET ATTACHMENT HEIGHTS.



ASSEMBLY HS-01 FOR ONE OR TWO TRACKS
ASSEMBLY HS-00 FOR INTERTRACK INSULATION
SPAN WIRE SUPPORT ASSEMBLY
 NTS

| BILL OF MATERIALS | | | | | | | | | | UNITS | DESCRIPTION | ITEM NO. | PART NO./REMARKS |
|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|----------|-----------------------|-------------|-----------------|------------------|
| QUANTITIES EACH TYPE | | | | | | | | | | | | | |
| HS-16 | HS-15 | HS-14 | HS-13 | HS-12 | HS-11 | HS-10 | HS-01 | HS-00 | | | | | |
| 6 | 5 | 4 | 3 | 2 | 1 | - | - | - | EA | HANGER ASSEMBLY | 1 | | |
| 2 | 2 | 2 | 2 | 2 | 2 | - | 1 | - | AS REQ'D | STAINLESS STEEL WIRE | 2 | LENGTH AS REQ'D | |
| 4 | 4 | 4 | 4 | 4 | 4 | 2 | 2 | 1 | EA | STRAIN INSULATOR | 3 | | |
| 1 | 1 | 1 | 1 | 1 | 1 | - | 1 | - | EA | TURNBUCKLE | 4 | NOTE 3 | |
| - | - | - | - | - | - | - | - | - | EA | VIBRATION DAMPER | 5 | NOTE 4 | |
| 12 | 12 | 12 | 12 | 12 | 12 | 4 | 6 | 2 | EA | COMPRESSION CONNECTOR | 6 | | |

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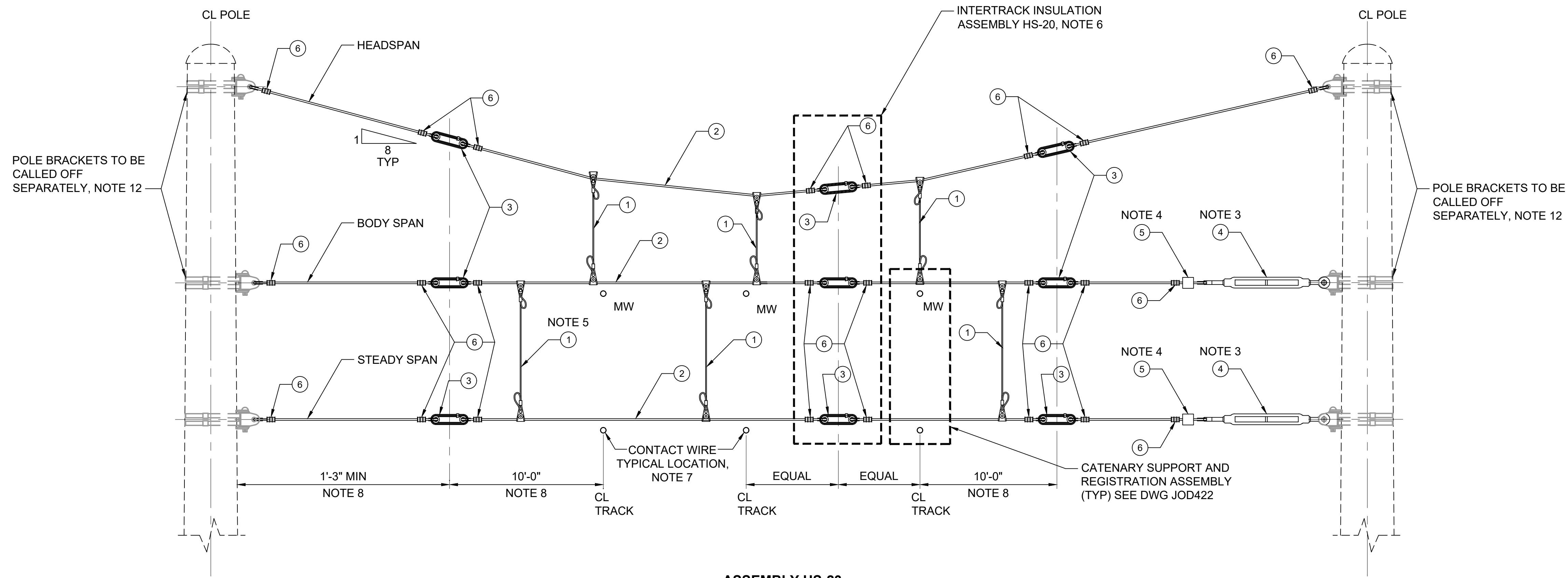
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 FILENAME: STD-JOD420
 CONTRACT No.: RTA/LR
 DATE: 2/2024

**SOUND TRANSIT
 STANDARD DRAWINGS
 SYSTEMS**

OVERHEAD CATENARY SYSTEM
 SPAN WIRE ASSEMBLIES
 HS-00, HS-01 & HS-10 THRU HS-16

DRAWING No.: **STD-JOD420**
 FACILITY ID: _____
 SHEET No.: _____ REV: 1

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ASSEMBLY HS-23
CATENARY HEADSPAN ASSEMBLY
 NTS

| ASSEMBLY TYPES | |
|----------------|-----------------------|
| HS-20 | INTERTRACK INSULATION |
| HS-21 | WITH 1 CATENARY |
| HS-22 | WITH 2 CATENARY |
| HS-23 | WITH 3 CATENARY |
| HS-24 | WITH 4 CATENARY |
| HS-25 | WITH 5 CATENARY |
| HS-26 | WITH 6 CATENARY |

GENERAL NOTES:

1. THE BILL OF MATERIALS DETAILS ARE TYPICAL FOR THE ASSEMBLY STYLES SHOWN. THE CONTRACTOR SHALL ITEMIZE THE TABLE WITH DESCRIPTIONS AND PART NUMBERS OF COMPONENTS REQUIRED TO COMPLETE EACH ASSEMBLY.
2. VALUE AND DIRECTION OF STAGGER TO BE SHOWN ON OCS LAYOUT PLANS.
3. LOCATE TURNBUCKLE ON THE SLACK SIDE OF THE SPAN WIRES, THIS IS TYPICALLY INSIDE OF CURVES.
4. A VIBRATION DAMPER IS REQUIRED ONLY IF ONE OR BOTH ENDS OF THE SPAN WIRE ARE ATTACHED TO A BUILDING, CONCRETE POLE, OR OTHER RIGID SUPPORT. THE SPRING IS TO BE LOCATED ADJACENT TO THE TURNBUCKLE.
5. TYPICALLY LOCATE A SPAN WIRE HANGER ABOVE OR NEAR EACH ATTACHED CONTACT WIRE SUPPORT.
6. INTERTRACK INSULATION ASSEMBLIES ARE REQUIRED TO BE INSTALLED BETWEEN TRACKS WHERE CONTACT WIRES ARE FED ELECTRICALLY THROUGH DIFFERENT SWITCHES, OR HAVE UNINSULATED WIRE SUPPORT ASSEMBLIES. DETAILS TO BE SHOWN ON SECTIONALIZING DIAGRAMS AND OCS LAYOUT PLANS.
7. THE CONTACT WIRE SHALL BE ATTACHED TO THESE SPAN WIRES USING INSULATED CONTACT WIRE SUPPORT AND REGISTRATION ASSEMBLIES. SEE DWG JOD423.
8. SECOND LEVEL INSULATION TO BE LOCATED 10'-0" FROM TRACK CENTERLINE EXCEPT IN CASES WHEN THE POLE FACE IS LESS THAN 11'-3" FROM TRACK CENTERLINE, A MINIMUM OF 1'-3" FROM FACE OF POLE IS REQUIRED.
9. FOR SYMBOLS, LEGEND AND ABBREVIATIONS SEE DRAWINGS JZN001 AND JZN002.
10. CONTRACTOR TO VERIFY ALL QUANTITIES ON THE BILL OF MATERIALS.
11. THE CONTRACTOR IS RESPONSIBLE FOR THE DESIGN OF EACH ASSEMBLY AS A WHOLE AND EACH COMPONENT MEETING OR EXCEEDING THE LOADING TABLES WHERE PROVIDED. WHERE THE WORKING LOAD CAPABILITIES OF THE CONTRACTOR'S ASSEMBLIES EXCEED THOSE SHOWN IN THE LOADING TABLE, THE CONTRACTOR SHALL UPDATE THE TABLE IN THEIR SUBMISSION OF ASSEMBLY.
12. CONTRACTOR TO DETERMINE POLE BRACKET ATTACHMENT HEIGHTS.


| BILL OF MATERIALS | | | | | | | | | | |
|----------------------|-------|-------|-------|-------|-------|-------|----------|-----------------------|----------|------------------|
| QUANTITIES EACH TYPE | | | | | | | UNITS | DESCRIPTION | ITEM NO. | PART NO./REMARKS |
| HS-26 | HS-25 | HS-24 | HS-23 | HS-22 | HS-21 | HS-20 | | | | |
| 12 | 10 | 8 | 6 | 4 | 2 | - | EA | HANGER ASSEMBLY | 1 | |
| 3 | 3 | 3 | 3 | 3 | 3 | - | AS REQ'D | STAINLESS STEEL WIRE | 2 | LENGTH AS REQD |
| 6 | 6 | 6 | 6 | 6 | 6 | 3 | EA | STRAIN INSULATOR | 3 | |
| 2 | 2 | 2 | 2 | 2 | 2 | - | EA | TURNBUCKLE | 4 | NOTE 3 |
| - | - | - | - | - | - | - | EA | VIBRATION DAMPER | 5 | NOTE 4 |
| 18 | 18 | 18 | 18 | 18 | 18 | 6 | EA | COMPRESSION CONNECTOR | 6 | |

| No. | DATE | DSN | CHK | APP | REVISION |
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| 1 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |
| 0 | 8/2019 | | | | REVISED SYSTEMS DIRECTIVE DRAWINGS |

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| DRAWN BY: | |
| CHECKED BY: | |
| APPROVED BY: | |

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LINE IS 1" AT FULL SCALE



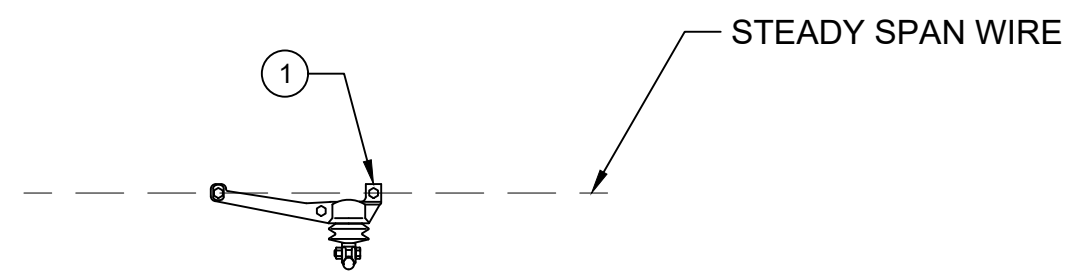
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 CONTRACT No.: RTA/LR
 DATE: 2/2024

**SOUND TRANSIT
 STANDARD DRAWINGS
 SYSTEMS**

OVERHEAD CATENARY SYSTEM
 SPAN WIRE ASSEMBLIES
 HS-20, THRU HS-26

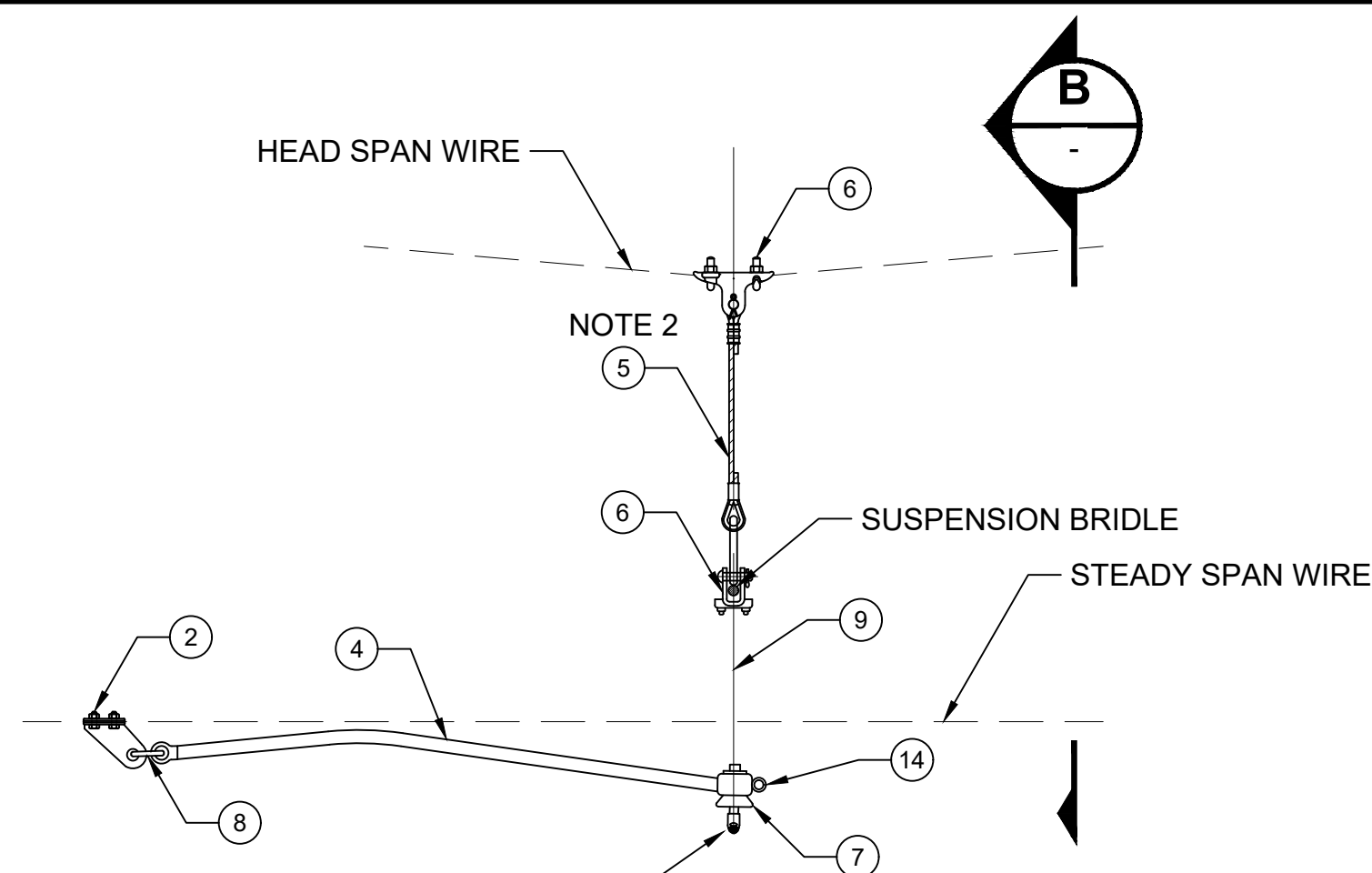
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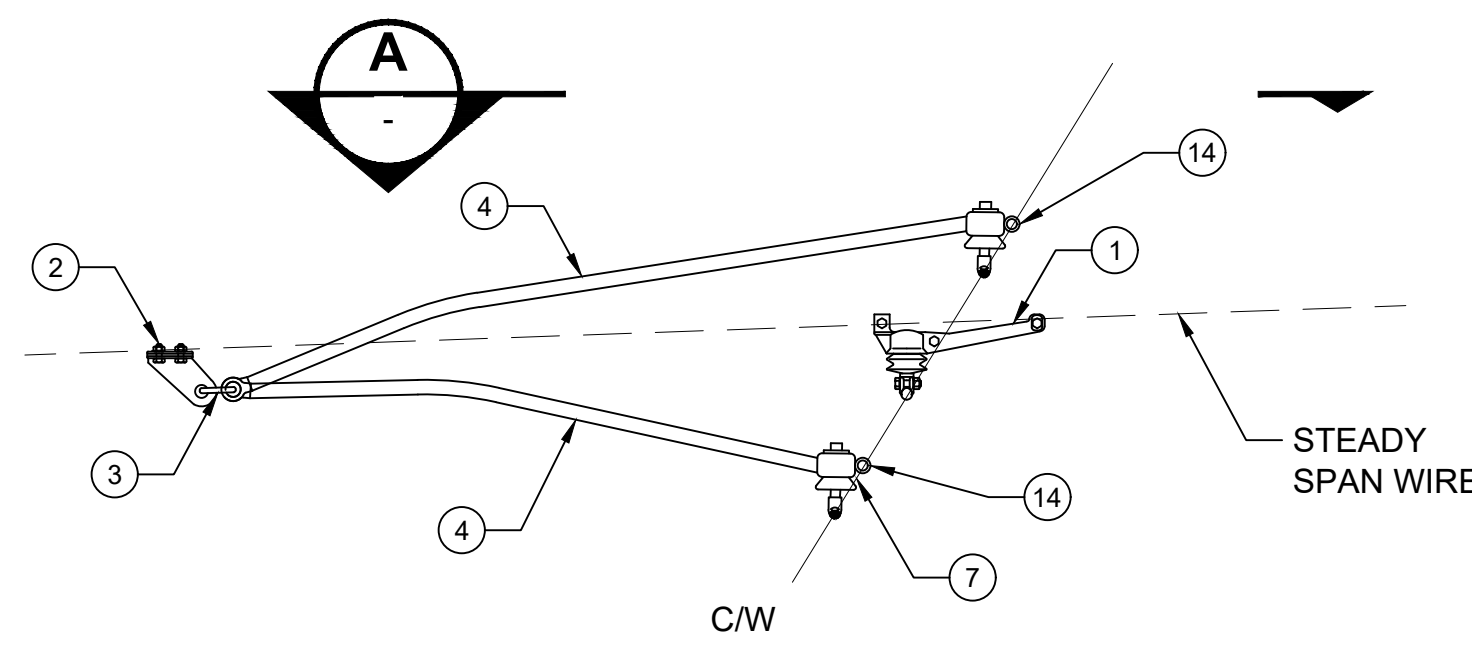
LIGHT LOAD C/W SUPPORT & REGISTRATION HR-1L

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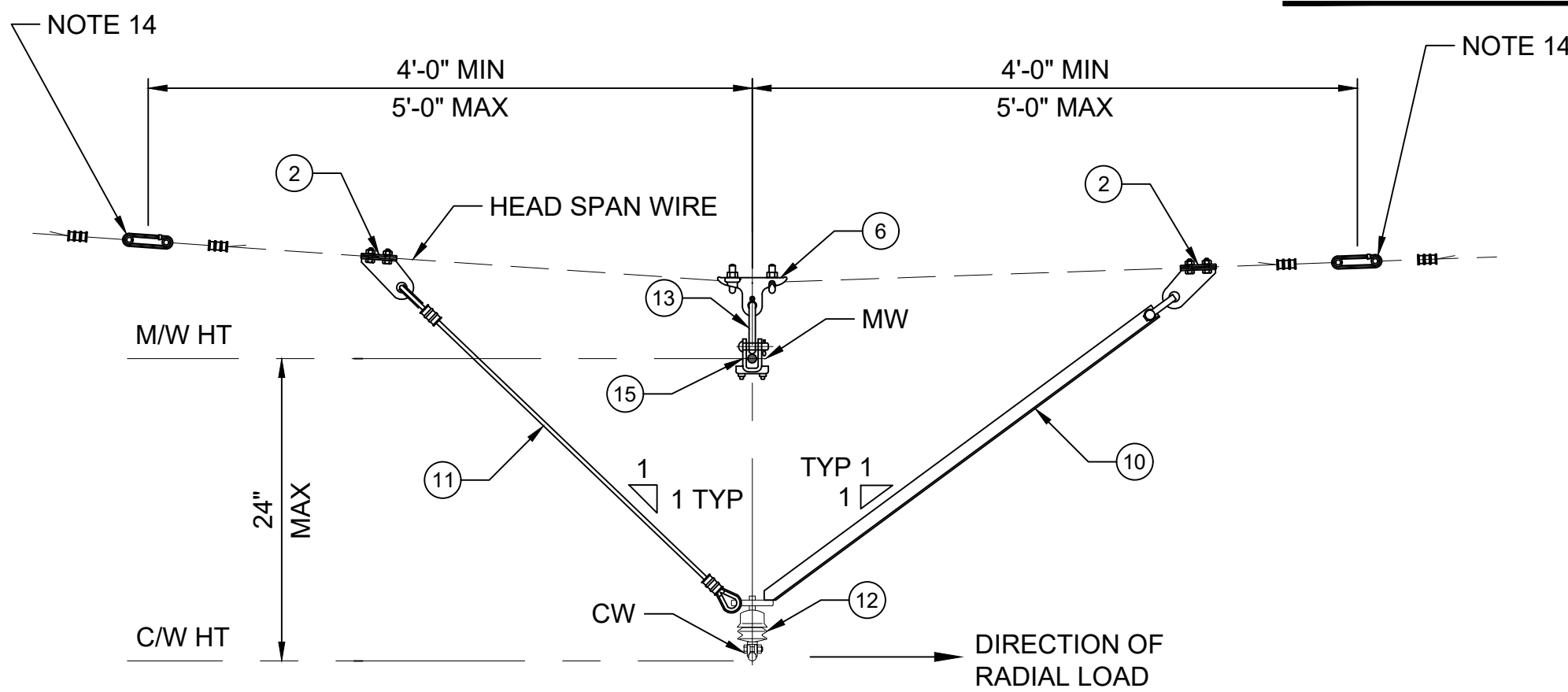
MEDIUM LOAD C/W SUPPORT & REGISTRATION HR-1M

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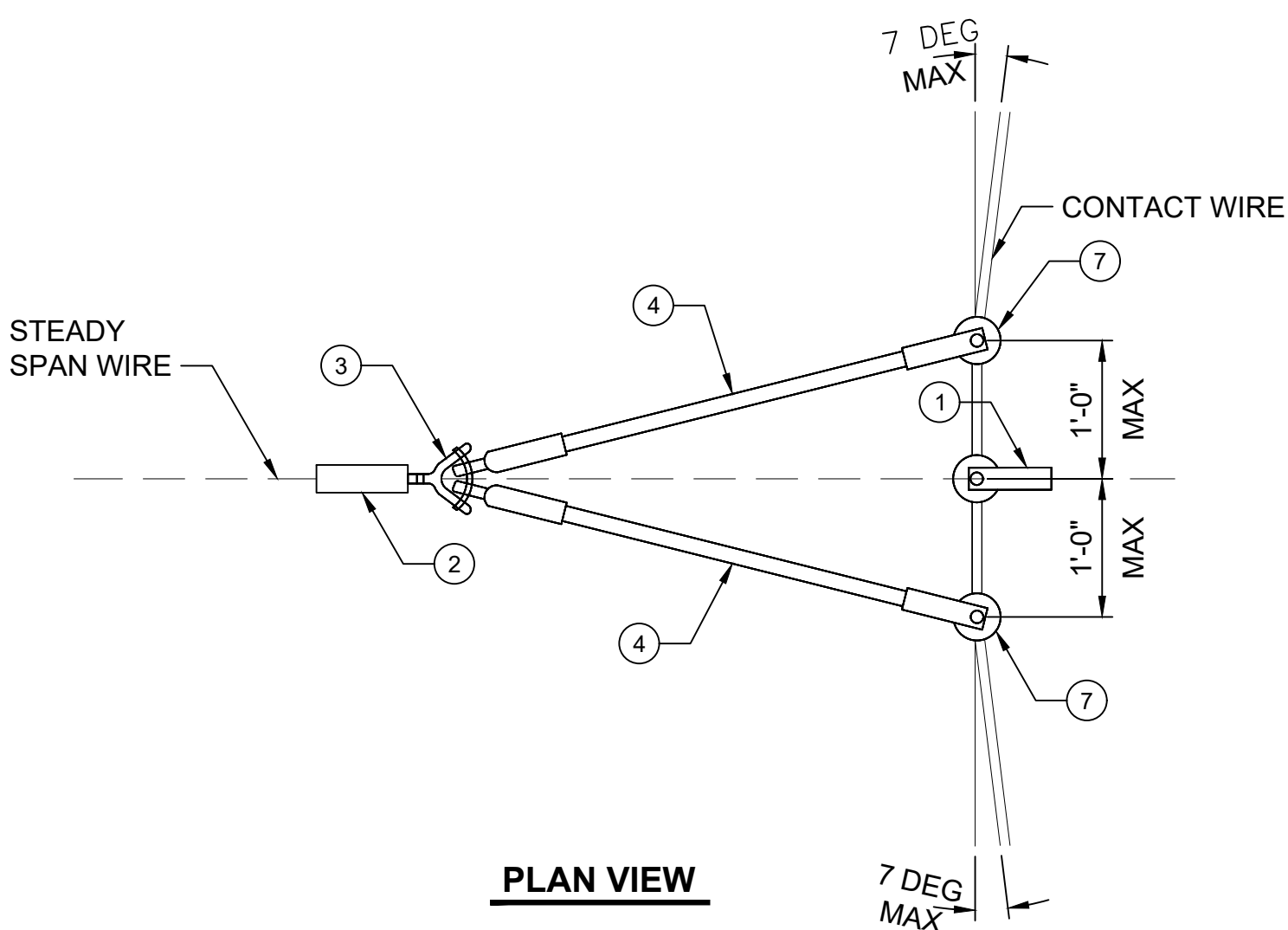
HEAVY LOAD C/W SUPPORT & REGISTRATION HR-1H

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LOW PROFILE SUPPORT AND REGISTRATION, LIGHT LOAD HR-2

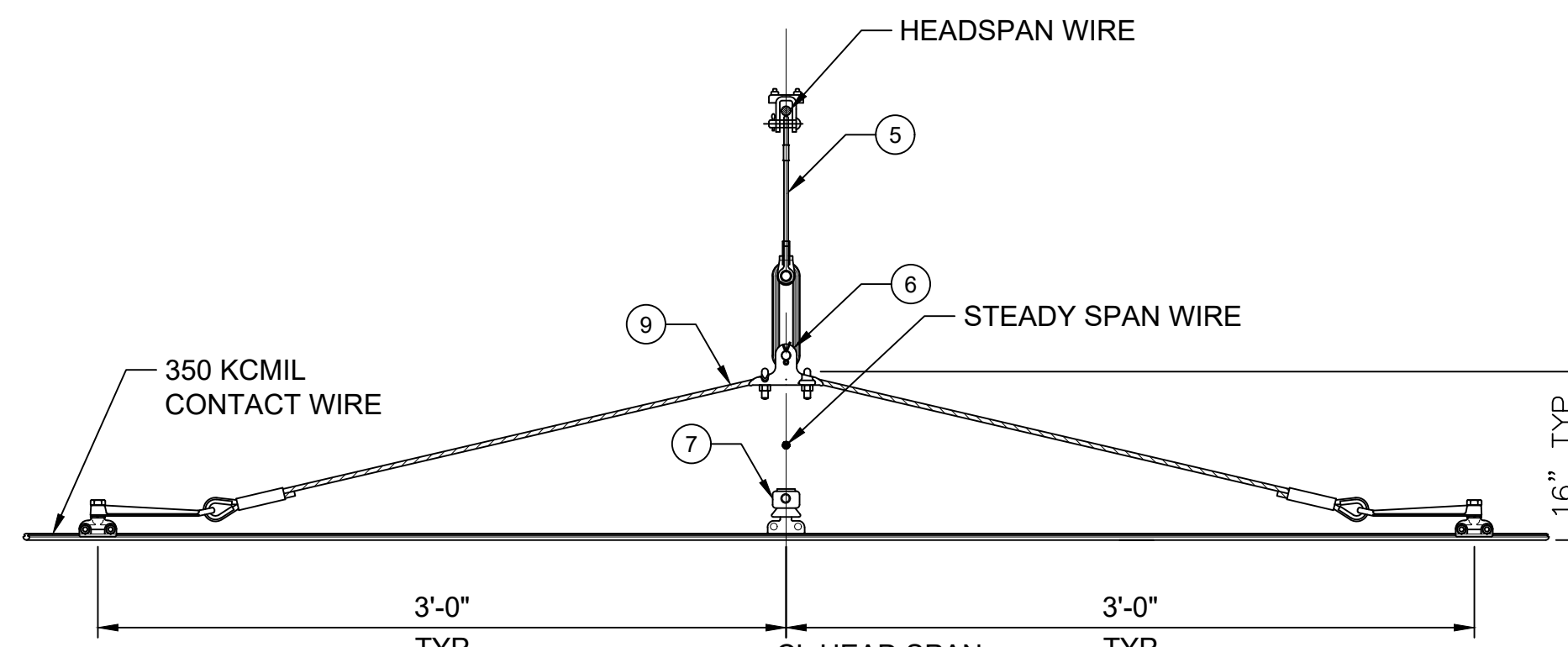
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PLAN VIEW

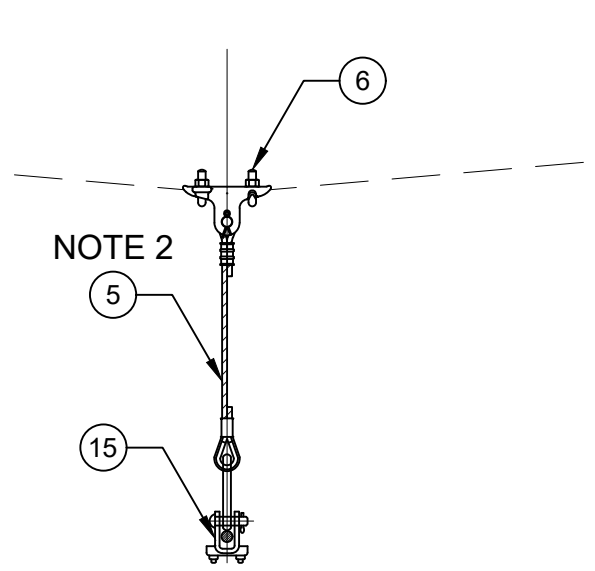
SECTION A

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SECTION B

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LIGHT LOAD M/W SUPPORT HR-MW

NTS

GENERAL NOTES:

1. THE BILL OF MATERIALS DETAILS ARE TYPICAL FOR THE ASSEMBLY STYLES SHOWN. THE CONTRACTOR SHALL ITEMIZE THE TABLE WITH DESCRIPTIONS AND PART NUMBERS OF COMPONENTS REQUIRED TO COMPLETE EACH ASSEMBLY.
2. HANGER SUB-ASSEMBLIES SHALL BE FIELD ADJUSTED TO ACHIEVE SPECIFIED CONTACT WIRE HEIGHT.
3. SUPPORTING HANGERS FOR STEADY SPAN WIRE OR HEAD SPAN WIRE TO BE CALLED OUT SEPARATELY FROM HEADSPAN SUPPORT ASSEMBLIES SHOWN ON DWG JOD420.
4. CATENARY DETAILS INCLUDING STAGGERS, POLE OFFSETS AND WIRE HEIGHTS AT EACH LOCATION TO BE SHOWN ON OCS LAYOUT PLANS AND SCHEDULES.
5. FOR DETAILS OF PANTOGRAPH CLEARANCES, SEE DWG JOD112 AND JOD114.
6. CONTRACTOR TO DETERMINE COMPONENT DETAIL AND SAFE WORKING LOADS.
7. FOR SYMBOLS, LEGEND AND ABBREVIATIONS SEE DRAWINGS JZN001 AND JZN002.
8. CONTRACTOR TO VERIFY ALL QUANTITIES ON THE BILL OF MATERIALS.
9. THE CONTRACTOR IS RESPONSIBLE FOR THE DESIGN OF EACH ASSEMBLY AS A WHOLE AND EACH COMPONENT MEETING OR EXCEEDING THE LOADING TABLES WHERE PROVIDED. WHERE THE WORKING LOAD CAPABILITIES OF THE CONTRACTOR'S ASSEMBLIES EXCEED THOSE SHOWN IN THE LOADING TABLE, THE CONTRACTOR SHALL UPDATE THE TABLE IN THEIR SUBMISSION OF ASSEMBLY.
10. STEADY ARM LENGTH AND HEEL SETTING TO BE DETERMINED BY THE CONTRACTOR.
11. CONTRACTOR TO ENSURE THAT THE STEADY ARM DESIGN ALLOWS FOR PANTOGRAPH CLEARANCE ENVELOPE.
12. THE CONTRACTOR SHALL ENSURE THAT TWIN STEADY ARMS EQUALLY SHARE THE CONTACT WIRE RADIAL LOAD.
13. THE MAXIMUM LOADS IN THE TABLE ARE THE WORST CASE LOADS THAT INCLUDE WIND AND ICE WHERE APPLICABLE.
14. ASSEMBLY INSULATION REFERENCED.

| MAXIMUM ASSEMBLY LOADING | | | | | |
|----------------------------|----------|----------|----------|---------|---------|
| | HR-MW | HR-2 | HR-1H | HR-1M | HR-1L |
| MESSENGER WIRE RADIAL LOAD | 200 LBS | 150 LBS | - | 750 LBS | - |
| CONTACT WIRE RADIAL LOAD | - | 80 LBS | 1000 LBS | 500 LBS | 200 LBS |
| VERTICAL LOAD | 1000 LBS | 1000 LBS | 350 LBS | 650 LBS | 425 LBS |

| BILL OF MATERIALS | | | | | | | | | | |
|----------------------|------|-------|-------|-------|-------|-----------------------------|----------|------------------|--|--|
| QUANTITIES EACH TYPE | | | | | UNITS | DESCRIPTION | ITEM NO. | PART NO./REMARKS | | |
| HR-MW | HR-2 | HR-1H | HR-1M | HR-1L | | | | | | |
| - | - | 1 | - | 1 | EA | INSULATED C/W LINE HANGER | 1 | | | |
| - | 2 | 1 | 1 | - | EA | WIRE CLAMP | 2 | | | |
| - | - | 1 | - | - | EA | "Y" CLEVIS OR SHACKLE | 3 | | | |
| - | - | 2 | 1 | - | EA | STEADY ARM, CURVED | 4 | LENGTH AS REQ'D | | |
| 1 | - | - | 1 | - | EA | INSULATED HANGER SUB-A ASSY | 5 | | | |
| 1 | 1 | - | 2 | - | EA | SUSPENSION CLAMP | 6 | | | |
| - | - | 2 | 1 | - | EA | C/W SWIVEL CLAMP | 7 | INSULATED | | |
| - | - | - | 1 | - | EA | SHACKLE | 8 | | | |
| - | - | - | 1 | - | EA | SUPPORT BRIDLE | 9 | LENGTH AS REQ'D | | |
| - | 1 | - | - | - | EA | ARM | 10 | | | |
| - | 1 | - | - | - | EA | HANGER SUB ASSEMBLY | 11 | LENGTH AS REQ'D | | |
| - | 1 | - | - | - | EA | BOLT C/W SWIVEL & INSULATOR | 12 | | | |
| - | 1 | - | - | - | EA | TWISTED LINK | 13 | | | |
| - | - | 2 | 1 | - | EA | PIPE CAP | 14 | | | |
| 1 | 1 | - | - | - | EA | MW CLAMP | 15 | | | |

| No. | DATE | DSN | CHK | APP | REVISION |
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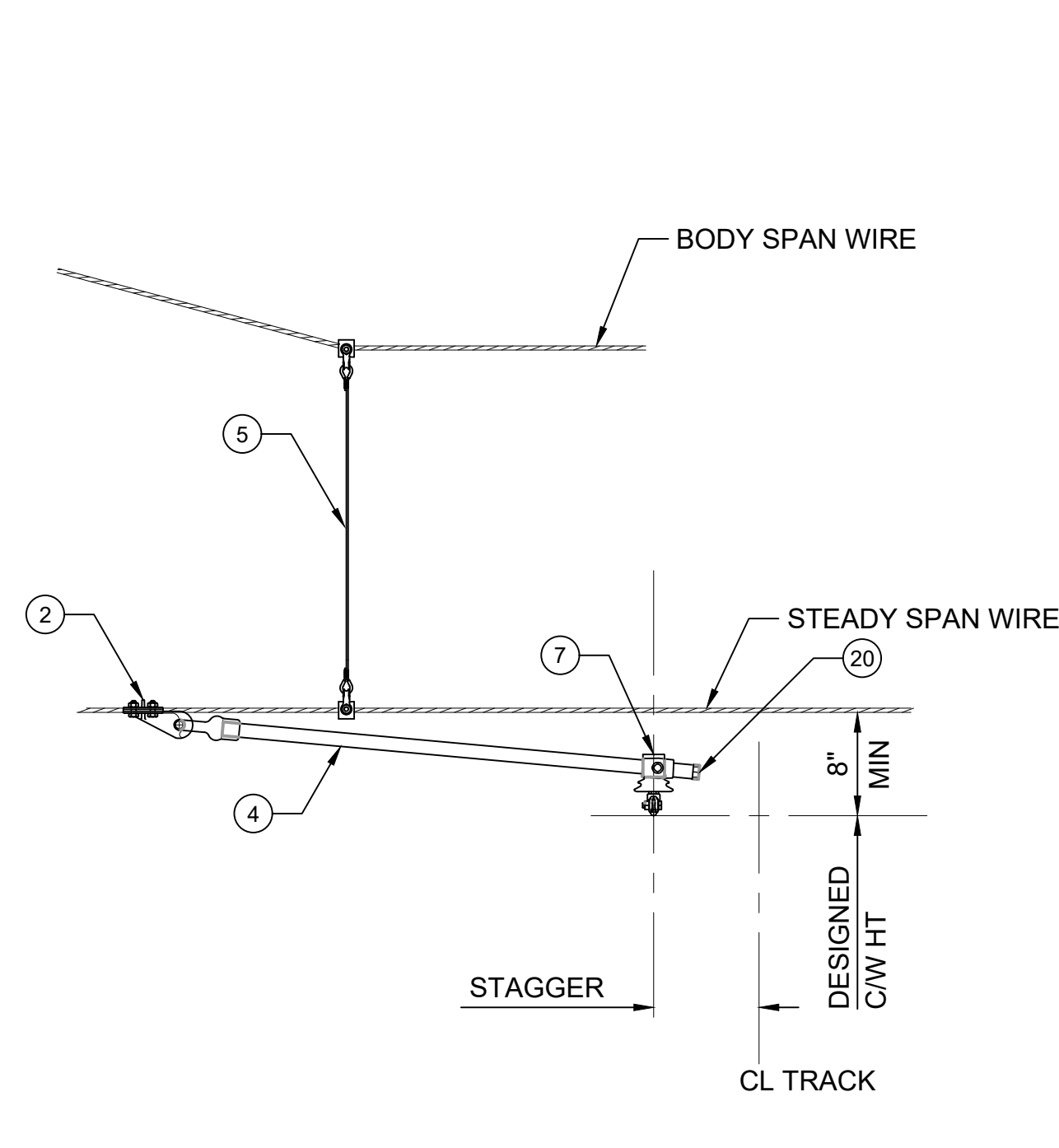
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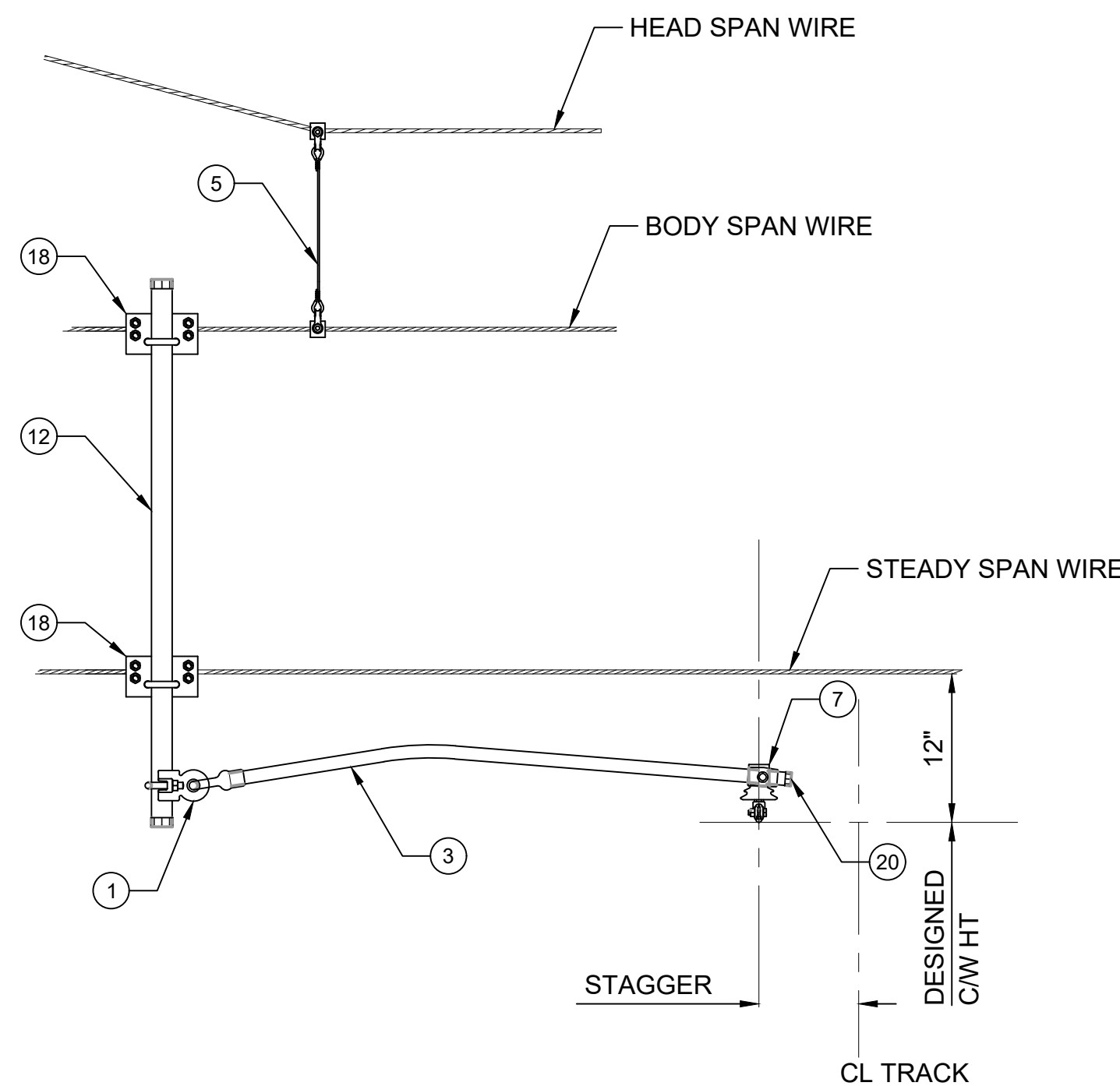
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| SOUND TRANSIT STANDARD DRAWINGS SYSTEMS | |
| OVERHEAD CATENARY SYSTEM CROSS SPAN REGISTRATION ASSEMBLIES HR-1L, HR-1M, HR-1H, HR-2 & HR-MW | |

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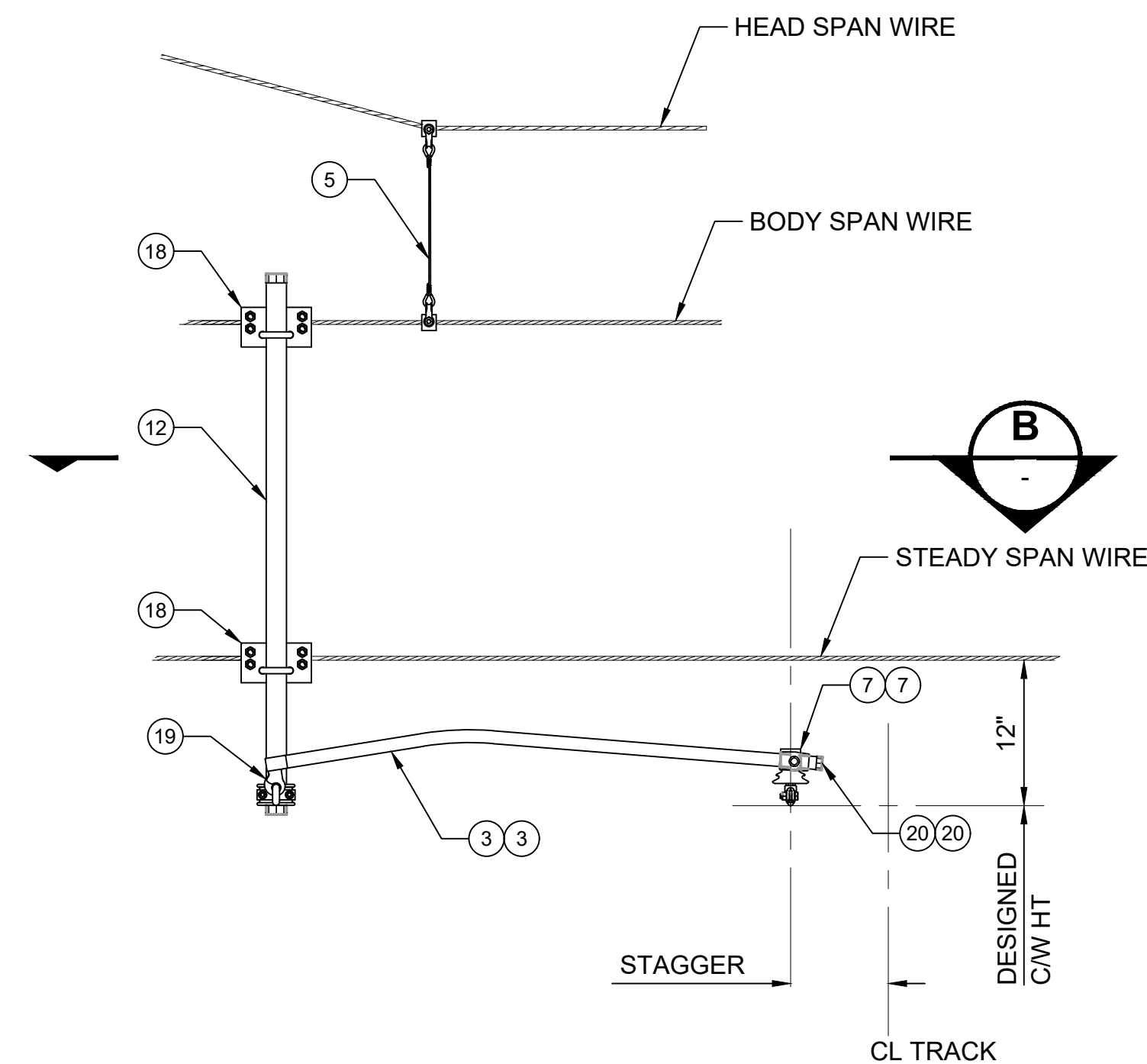
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LIGHT LOAD REGISTRATION HR-3L
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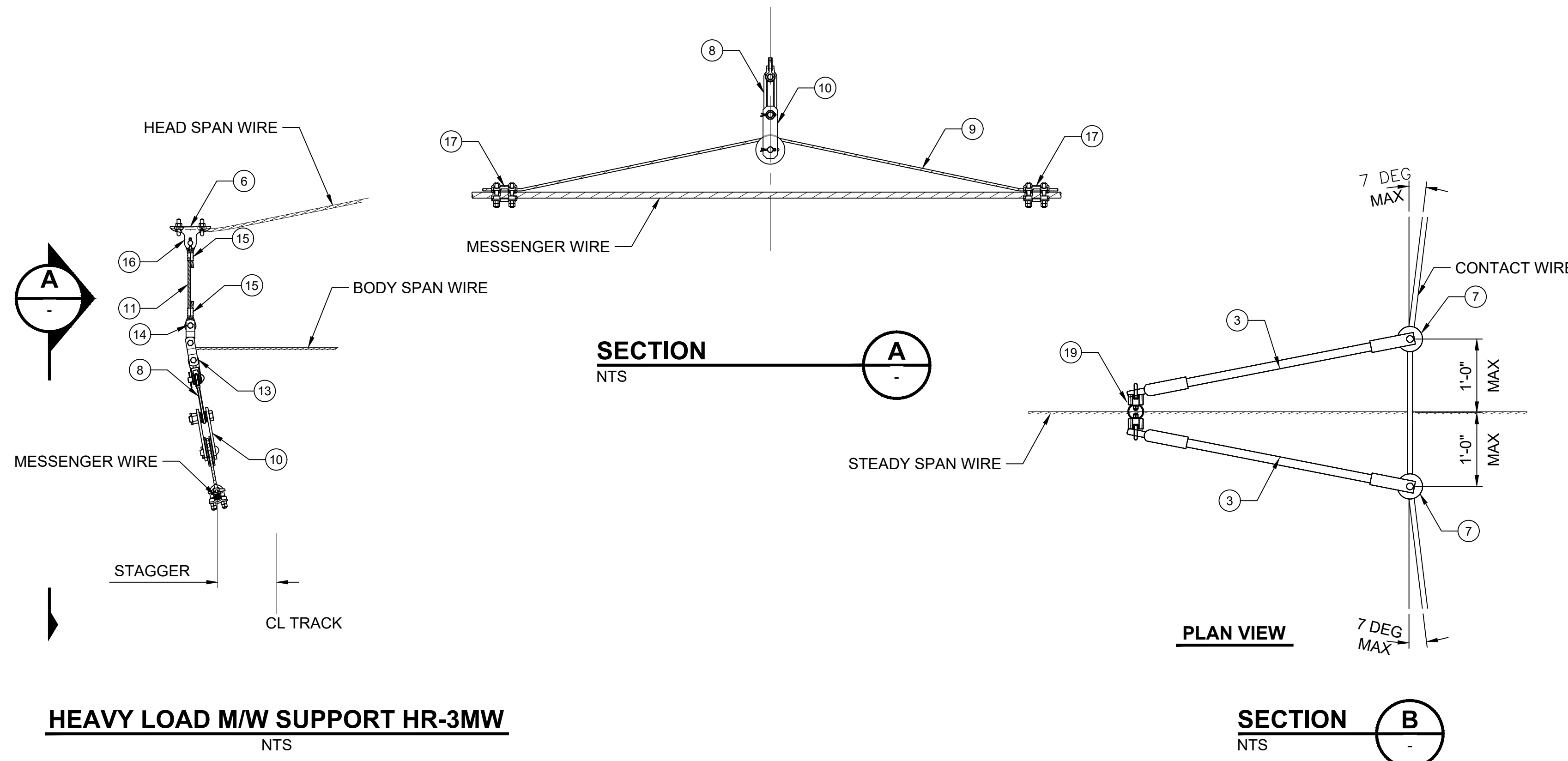


MEDIUM LOAD REGISTRATION HR-3M
NTS



HEAVY LOAD REGISTRATION HR-3H
NTS

- GENERAL NOTES:**
1. THE BILL OF MATERIALS DETAILS ARE TYPICAL FOR THE ASSEMBLY STYLES SHOWN. THE CONTRACTOR SHALL ITEMIZE THE TABLE WITH DESCRIPTIONS AND PART NUMBERS OF COMPONENTS REQUIRED TO COMPLETE EACH ASSEMBLY.
 2. HANGER SUB-ASSEMBLIES SHALL BE FIELD ADJUSTED TO ACHIEVE SPECIFIED CONTACT WIRE HEIGHT.
 3. SUPPORTING HANGERS FOR STEADY SPAN WIRE OR HEAD SPAN WIRE TO BE CALLED OUT SEPARATELY FROM HEADSPAN SUPPORT ASSEMBLIES SHOWN ON DWG JOD421.
 4. CATENARY DETAILS INCLUDING STAGGERS, POLE OFFSETS AND WIRE HEIGHTS AT EACH LOCATION TO BE SHOWN ON OCS LAYOUT PLANS AND SCHEDULES.
 5. FOR DETAILS OF PANTOGRAPH CLEARANCES, SEE DWG JOD112 AND JOD114.
 6. CONTRACTOR TO DETERMINE COMPONENT DETAIL AND SAFE WORKING LOADS.
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 12. THE CONTRACTOR SHALL ENSURE THAT TWIN STEADY ARMS EQUALLY SHARE THE CONTACT WIRE RADIAL LOAD.
 13. THE MAXIMUM LOADS IN THE TABLE ARE THE WORST CASE LOADS THAT INCLUDE WIND AND ICE WHERE APPLICABLE.



HEAVY LOAD M/W SUPPORT HR-3MW
NTS

| MAXIMUM ASSEMBLY LOADING | | | | |
|----------------------------|----------|----------|---------|----------|
| | HR-3MW | HR-3H | HR-3M | HR-3L |
| MESSANGER WIRE RADIAL LOAD | 1450 LBS | - | - | - |
| CONTACT WIRE RADIAL LOAD | - | 1000 LBS | 500 LBS | 200 LBS |
| VERTICAL LOAD | 350 LBS | 350 LBS | 650 LBS | 1000 LBS |

| QUANTITIES EACH TYPE | | | | UNITS | DESCRIPTION | ITEM NO. | PART NO./REMARKS |
|----------------------|-------|-------|-------|----------|------------------------------|----------|------------------|
| HR-3MW | HR-3H | HR-3M | HR-3L | | | | |
| - | - | 1 | - | EA | EYE CLAMP | 1 | |
| - | - | - | 1 | EA | WIRE CLAMP | 2 | |
| - | 2 | 1 | - | EA | CURVED STEADY ARM | 3 | NOTE 6 |
| - | - | - | 1 | EA | STEADY ARM | 4 | NOTE 6 |
| - | 1 | 1 | 1 | EA | HANGER SUB-ASSEMBLY | 5 | LENGTH AS REQ'D |
| 1 | - | - | - | EA | SUSPENSION CLAMP | 6 | |
| - | 2 | 1 | 1 | EA | C/W SWIVEL CLAMP | 7 | INSULATED |
| 1 | - | - | - | EA | INSULATOR | 8 | |
| 1 | - | - | - | EA | SUPPORT BRIDLE WIRE | 9 | |
| 1 | - | - | - | EA | BRIDLE PULLEY | 10 | |
| 1 | - | - | - | AS REQ'D | STAINLESS STEEL WIRE ROPE | 11 | LENGTH AS REQ'D |
| - | 1 | 1 | - | EA | DROP PIPE | 12 | LENGTH AS REQ'D |
| 1 | - | - | - | EA | CLEVIS-CLEVIS LINK | 13 | |
| 1 | - | - | - | EA | WIRE CLIP | 14 | |
| 2 | - | - | - | EA | COMPRESSION SLEEVE | 15 | |
| 2 | - | - | - | EA | THIMBLE | 16 | |
| 2 | - | - | - | EA | MESSANGER CLAMP | 17 | |
| - | 2 | 2 | - | EA | SPAN-PIPE CLAMP | 18 | |
| - | 1 | - | - | EA | DOUBLE STEADY ARM PIPE CLAMP | 19 | |
| - | 2 | 1 | 1 | EA | PIPE CAP | 20 | |

| No. | DATE | DSN | CHK | APP | REVISION |
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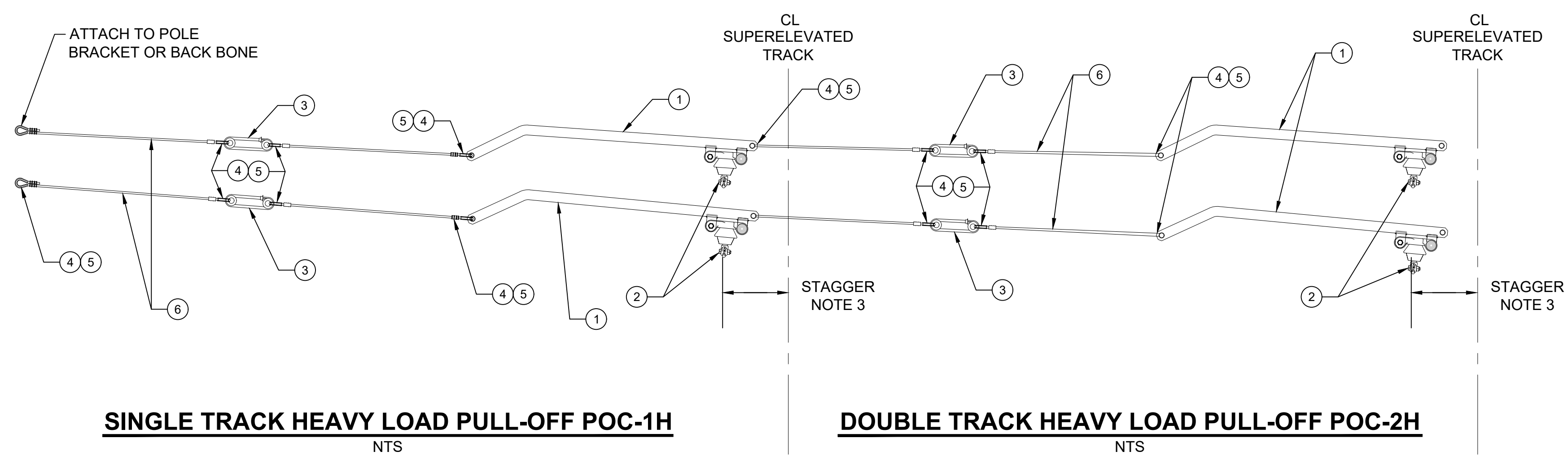
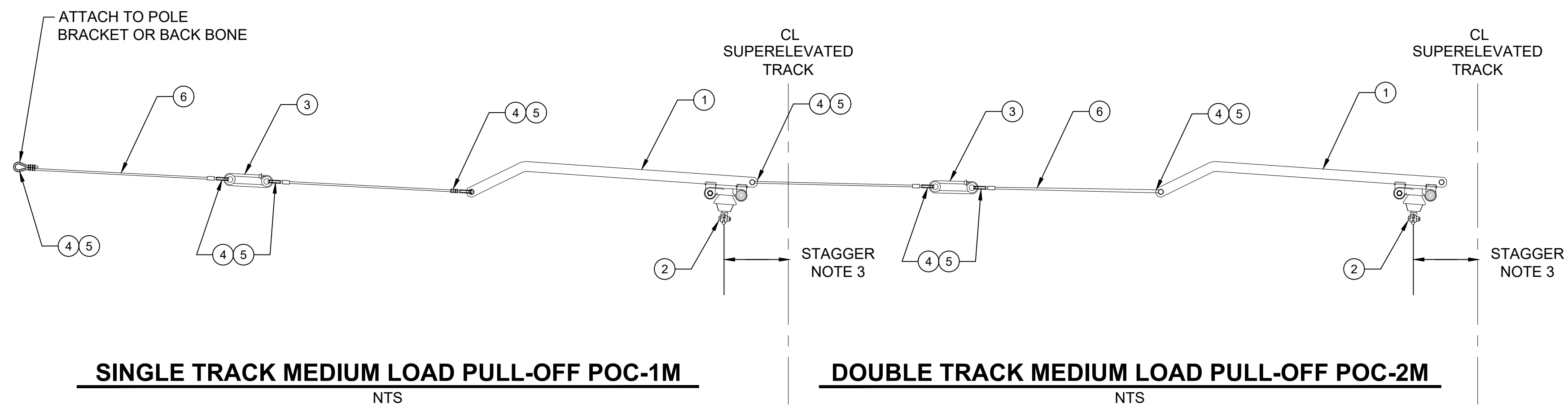
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FILENAME: STD-JOD423
CONTRACT No.: RTA/LR
DATE: 2/2024

SOUND TRANSIT STANDARD DRAWINGS SYSTEMS
OVERHEAD CATENARY SYSTEM HEADSPAN REGISTRATION ASSEMBLIES HR-3L, HR-3M, HR-3H & HR-3MW

DRAWING No.: **STD-JOD423**
FACILITY ID:
SHEET No.: REV: 1



- GENERAL NOTES:**
1. THE BILL OF MATERIALS DETAILS ARE TYPICAL FOR THE ASSEMBLY STYLES SHOWN. CONTRACTOR SHALL ITEMIZE THE TABLE WITH DESCRIPTIONS AND PART NUMBERS OF THE COMPONENTS REQUIRED TO COMPLETE EACH ASSEMBLY.
 2. CONTRACTOR SHALL FIELD VERIFY POLE SETOUT DIMENSION PRIOR TO FABRICATION OF ASSEMBLY.
 3. CATENARY DETAILS INCLUDING STAGGERS, POLE OFFSETS AND WIRE HEIGHTS AT EACH LOCATION TO BE SHOWN ON OCS LAYOUT PLANS AND SCHEDULES.
 4. FOR DETAILS OF PANTOGRAPH CLEARANCES, SEE DWGS JOD112 AND JOD114.
 5. CONTRACTOR TO DETERMINE COMPONENT DETAIL AND SAFE WORKING LOADS.
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 11. THE CONTRACTOR SHALL ENSURE THAT TWIN STEADY ARMS EQUALLY SHARE THE CONTACT WIRE RADIAL LOAD.
 12. FOR A DOUBLE TRACK PULL-OFF, IF PROPER CLEARANCE CANNOT BE MET FOR THE INSIDE STEADY ARM, THE ASSEMBLY SHALL SPLIT INTO TWO SEPERATE SINGLE TRACK PULL-OFFS. ANY EXTRA MATERIAL REQUIRED FOR THE CHANGE WILL BE CONTRACTORS EXPENSE.
 13. THE MAXIMUM LOADS IN THE TABLE ARE THE WORST CASE LOADS THAT INCLUDE WIND AND ICE WHERE APPLICABLE.

| MAXIMUM ASSEMBLY LOADING | | | | |
|--------------------------|----------|----------|---------|---------|
| | POC-2H | POC-1H | POC-2M | POC-1M |
| CONTACT WIRE RADIAL LOAD | 1000 LBS | 1000 LBS | 500 LBS | 500 LBS |

| BILL OF MATERIALS | | | | | | | |
|--------------------|--------|--------|--------|-------|--------------------------|----------|------------------|
| QUANTITIES EA TYPE | | | | UNITS | DESCRIPTION | ITEM NO. | PART NO./REMARKS |
| POC-2H | POC-1H | POC-2M | POC-1M | | | | |
| 4 | 2 | 2 | 1 | EA | CURVED STEADY ARM | 1 | |
| 4 | 2 | 2 | 1 | EA | CONTACT WIRE SWIVELCLAMP | 2 | INSULATED |
| 4 | 2 | 2 | 1 | EA | LOOP INSULATOR | 3 | |
| 16 | 8 | 8 | 4 | EA | THIMBLE | 4 | |
| 16 | 8 | 8 | 4 | EA | COMPRESSION CONNECTOR | 5 | |
| 2 | 2 | 1 | 1 | LF | STAINLESS STEEL WIRE | 6 | LENGTH AS REQ'D |

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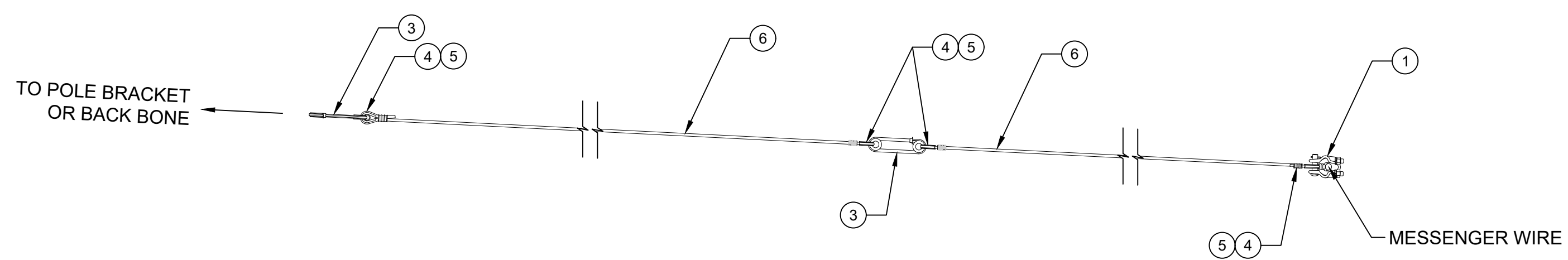
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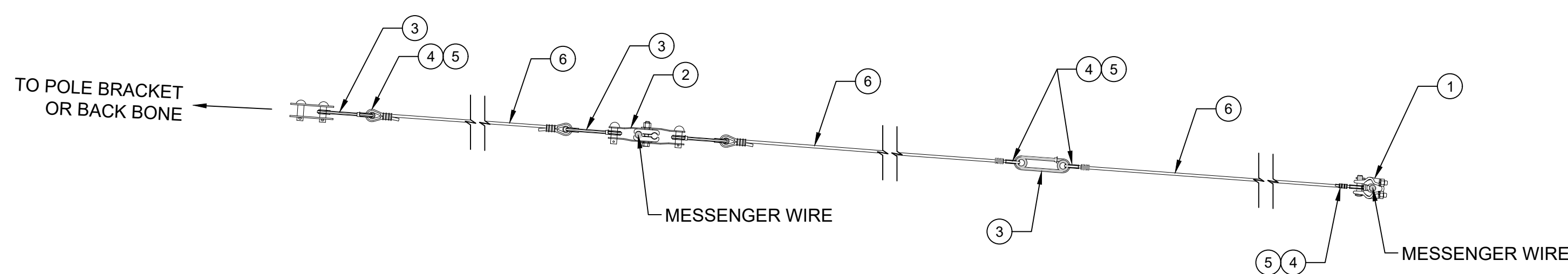
SOUND TRANSIT
STANDARD DRAWINGS
 SYSTEMS

OVERHEAD CATENARY SYSTEM
 CONTACT WIRE PULL-OFF ASSEMBLIES
 POC-1M, POC-1H, POC-2M & POC-2H

| | |
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| DRAWING No.: | STD-JOD430 |
| FACILITY ID: | |
| SHEET No.: | REV: |
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SINGLE TRACK PULL-OFF POM-1M AND POM-1H
NTS



DOUBLE TRACK PULL-OFF POM-2M AND POM-2H
NTS

GENERAL NOTES:

1. THE BILL OF MATERIALS DETAILS ARE TYPICAL FOR THE ASSEMBLY STYLES SHOWN. CONTRACTOR SHALL ITEMIZE THE TABLE WITH DESCRIPTIONS AND PART NUMBERS OF THE COMPONENTS REQUIRED TO COMPLETE EACH ASSEMBLY.
2. CONTRACTOR SHALL FIELD VERIFY POLE SETOUT DIMENSION PRIOR TO FABRICATION OF ASSEMBLY.
3. CATENARY DETAILS INCLUDING STAGGERS, POLE OFFSETS AND WIRE HEIGHTS AT EACH LOCATION TO BE SHOWN ON OCS LAYOUT PLANS AND SCHEDULES.
4. FOR DETAILS OF PANTOGRAPH CLEARANCES, SEE DWGS JOD112 AND JOD114.
5. CONTRACTOR TO DETERMINE COMPONENT DETAIL AND SAFE WORKING LOADS.
6. FOR SYMBOLS, LEGEND AND ABBREVIATIONS SEE DWGS JZN001 AND JZN002.
7. CONTRACTOR TO VERIFY ALL QUANTITIES ON THE BILL OF MATERIALS.
8. THE CONTRACTOR IS RESPONSIBLE FOR THE DESIGN OF EACH ASSEMBLY AS A WHOLE AND EACH COMPONENT MEETING OR EXCEEDING THE LOAD TABLES WHERE PROVIDED. WHERE THE WORKING LOAD CAPABILITIES OF THE CONTRACTOR'S ASSEMBLIES EXCEED THOSE SHOWN IN THE LOADING TABLE, THE CONTRACTOR SHALL UPDATE THE TABLE IN THEIR SUBMISSION OF ASSEMBLY.
9. STEADY ARM LENGTH AND HEEL SETTING TO BE DETERMINED BY THE CONTRACTOR.
10. CONTRACTOR TO ENSURE THAT THE STEADY ARM DESIGN ALLOWS FOR PANTOGRAPH CLEARANCE ENVELOPE.
11. THE CONTRACTOR SHALL ENSURE THAT TWIN STEADY ARMS EQUALLY SHARE THE CONTACT WIRE RADIAL LOAD.
12. THE MAXIMUM LOADS IN THE TABLE ARE THE WORST CASE LOADS THAT INCLUDE WIND AND ICE WHERE APPLICABLE.

| MAXIMUM ASSEMBLY LOADING | | | | |
|----------------------------|----------|---------|----------|---------|
| | POM-2H | POM-1H | POM-2M | POM-1M |
| MESSENGER WIRE RADIAL LOAD | 1450 LBS | 750 LBS | 1450 LBS | 750 LBS |

| BILL OF MATERIALS | | | | | | | |
|--------------------|--------|--------|--------|-------|---------------------------------|----------|------------------|
| QUANTITIES EA TYPE | | | | UNITS | DESCRIPTION | ITEM NO. | PART NO./REMARKS |
| POM-2H | POM-1H | POM-2M | POM-1M | | | | |
| 1 | 1 | 1 | 1 | EA | MESSENGER WIRE SUSPENSION CLAMP | 1 | |
| 1 | - | 1 | - | EA | MESSENGER WIRE PULL-OFF CLAMP | 2 | |
| 3 | 2 | 3 | 2 | EA | LOOP INSULATOR | 3 | |
| 6 | 4 | 6 | 4 | EA | THIMBLE | 4 | |
| 6 | 4 | 6 | 4 | EA | COMPRESSION OVAL CONNECTOR | 5 | |
| 1 | 1 | 1 | 1 | LF | STAINLESS STEEL WIRE | 6 | LENGTH AS REQ'D |

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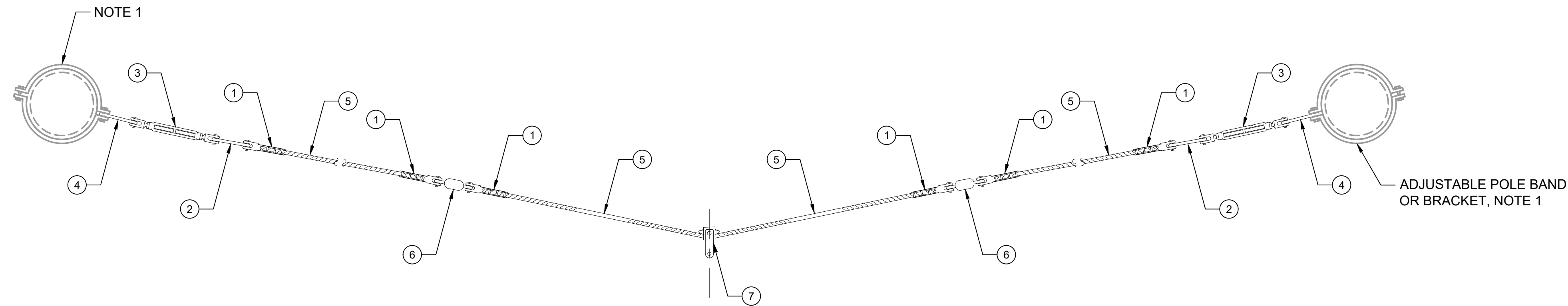
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| | | | | | | | | DATE: | 2/2024 |

SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS

OVERHEAD CATENARY SYSTEM
MESSENGER WIRE PULL-OFF ASSEMBLIES FOR
POM-1M, POM-1H, POM-2M & POM 2H

| | |
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| FACILITY ID: | |
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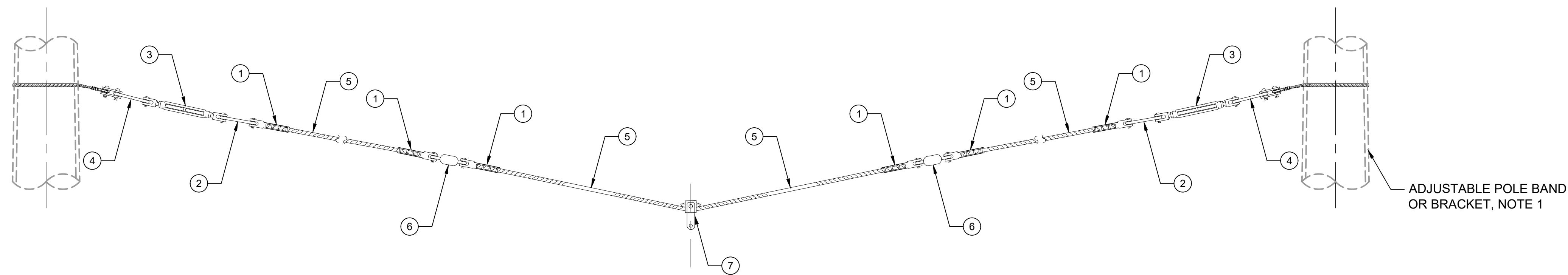
GENERAL NOTES:

1. POLE BANDS AND POLE BRACKETS SHALL BE CALLED OFF SEPARATELY.
2. CONTRACTOR SHALL PROVIDE WORKING LOAD CAPACITIES FOR THESE ASSEMBLIES.
3. FOR SYMBOLS, LEGEND AND ABBREVIATIONS SEE DRAWINGS JZN001 AND JZN002.
4. CONTRACTOR TO VERIFY ALL QUANTITIES ON THE BILL OF MATERIALS.
5. THE CONTRACTOR IS RESPONSIBLE FOR THE DESIGN OF EACH ASSEMBLY AS A WHOLE.
6. THE BILL OF MATERIALS ARE TYPICAL FOR THE ASSEMBLY STYLES SHOWN. THE CONTRACTOR SHALL ITEMIZE THE TABLE WITH DESCRIPTIONS AND PART NUMBERS OF COMPONENTS REQUIRED TO COMPLETE EACH ASSEMBLY.

BDL-1 - ONE WIRE CLAMP FOR SINGLE PULL-OFF (AS SHOWN)
 BDL-2 - TWO WIRE CLAMPS FOR TWO PULL-OFFS

BRIDLE WIRE ASSEMBLY BDL-1 OR BDL-2

NTS



FOR SUPPORTING SINGLE CONTACT SYSTEM SECTION INSULATOR, IN SPAN INSULATION, TO BE DETERMINED TO SUIT ADJACENT WIRING AND FITTINGS.

BRIDLE WIRE SUPPORT ASSEMBLY BDL-3

NTS

| BILL OF MATERIALS | | | | | | |
|----------------------|-------|-------|-------|----------------------|----------|------------------|
| QUANTITIES EACH TYPE | | | UNITS | DESCRIPTION | ITEM NO. | PART NO./REMARKS |
| BDL-3 | BDL-2 | BDL-1 | | | | |
| 6 | 6 | 6 | EA | STRAIN CLAMP | 1 | |
| 2 | 2 | 2 | EA | LINK | 2 | |
| 2 | 2 | 2 | EA | TURNBUCKLE | 3 | |
| 2 | 2 | 2 | EA | LINK | 4 | |
| 3 | 3 | 3 | EA | STAINLESS STEEL WIRE | 5 | LENGTH AS REQ'D |
| 2 | 2 | 2 | EA | INSULATOR | 6 | |
| 1 | 2 | 1 | EA | WIRE CLAMP | 7 | |

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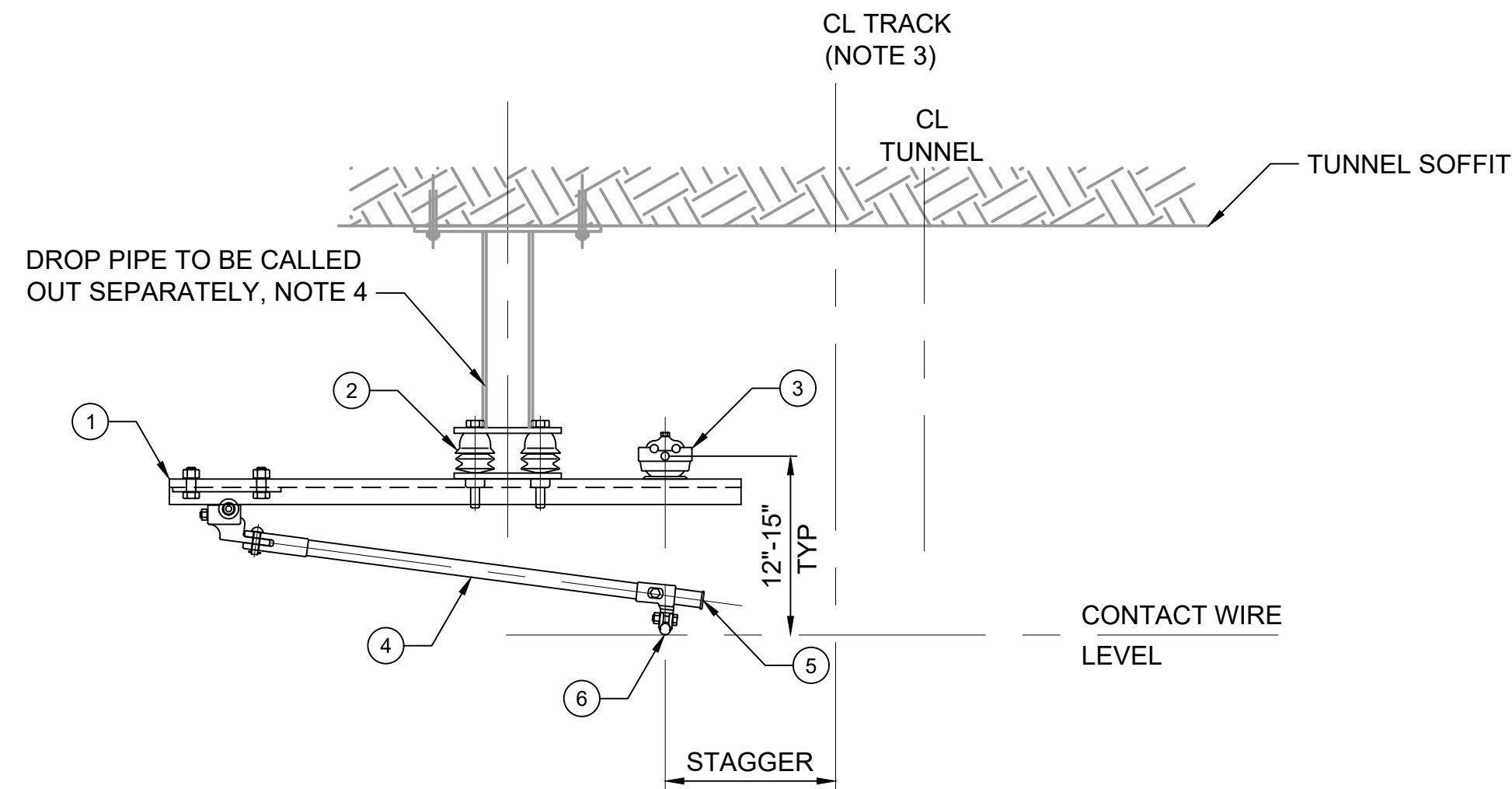
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 CONTRACT No.: RTA/LR
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**SOUND TRANSIT
 STANDARD DRAWINGS
 SYSTEMS**

OVERHEAD CATENARY SYSTEM
 BRIDLE WIRE ASSEMBLIES FOR SWFT
 BDL-1, BDL-2 & BDL-3

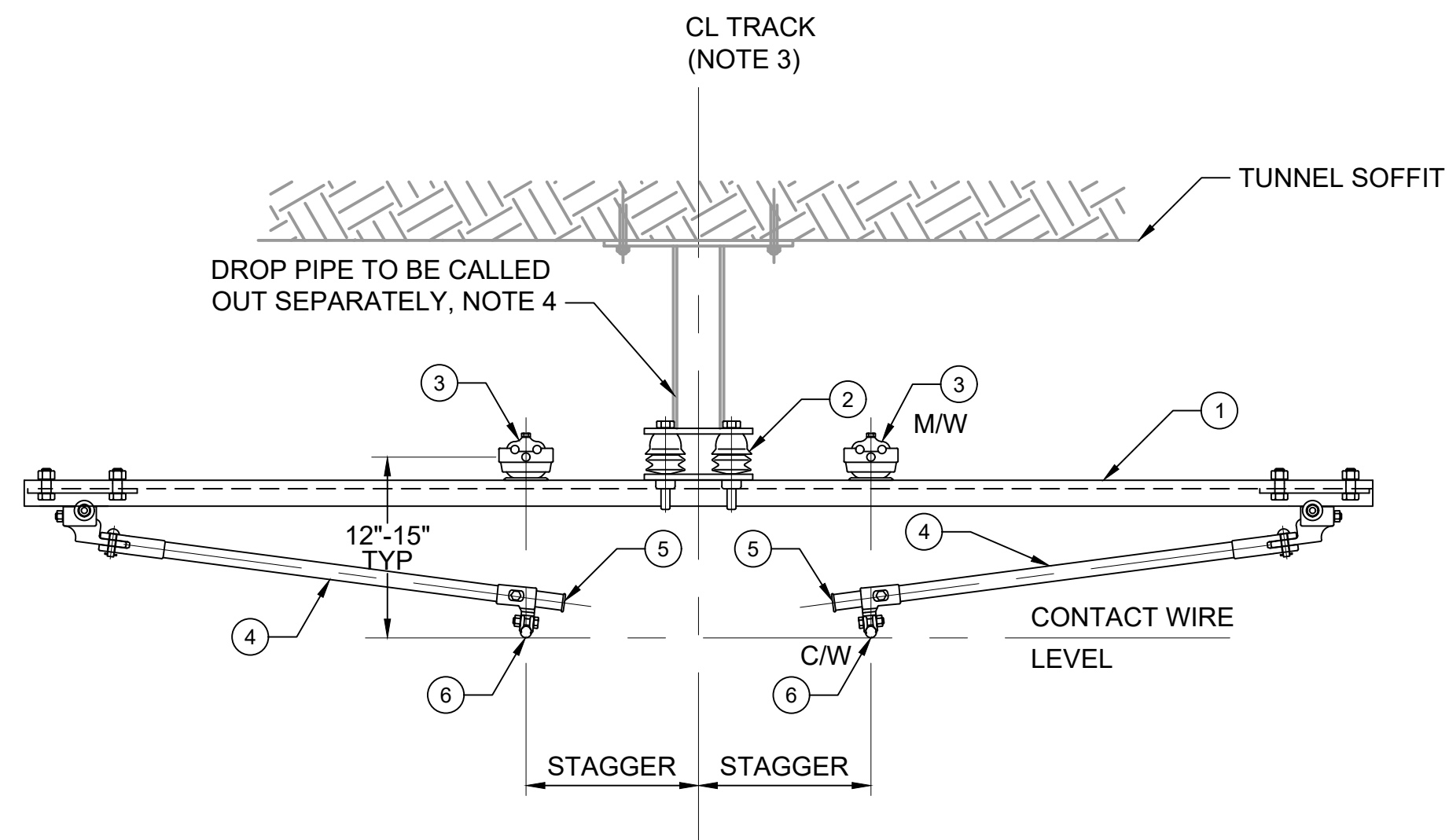
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TUNNEL SUPPORT AND REGISTRATION ASSEMBLY TS-1

NTS

SEE NOTE 4



TUNNEL SUPPORT AND REGISTRATION FOR OVERLAP ASSEMBLY TS-3

NTS

SEE NOTE 4

GENERAL NOTES:

- FOR SYMBOLS, LEGENDS AND ABBREVIATIONS SEE DWGS JZN001 AND JZN002.
- CATENARY DETAILS INCLUDING STAGGERS, POLE OFFSETS AND WIRE HEIGHTS AT EACH LOCATION TO BE SHOWN ON OCS LAYOUT PLANS AND SCHEDULES.
- CONTRACTOR TO COORDINATE THE LOCATION OF THE ASSEMBLIES WITH THE CATENARY STAGGERS AND TRACK CENTERLINE TO ENSURE THAT ELECTRICAL CLEARANCES ARE MAINTAINED.
- CONTRACTOR TO MEASURE THE DISTANCE BETWEEN THE RAIL LEVEL AND THE SOFFIT AT EACH LOCATION AND MANUFACTURE THE DROP PIPE TO SUIT THE CATENARY HEIGHTS.
- FOR DETAILS OF PANTOGRAPH CLEARANCES, SEE DWG JOD112 AND JOD114.
- CONTRACTOR TO DETERMINE COMPONENT DETAIL AND SAFE WORKING LOADS.
- CONTRACTOR TO VERIFY ALL QUANTITIES ON THE BILL OF MATERIALS.
- THE CONTRACTOR IS RESPONSIBLE FOR THE DESIGN OF EACH ASSEMBLY AS A WHOLE AND EACH COMPONENT MEETING OR EXCEEDING THE LOADING TABLES WHERE PROVIDED. WHERE THE WORKING LOAD CAPABILITIES OF THE CONTRACTOR'S ASSEMBLIES EXCEED THOSE SHOWN IN THE LOADING TABLE, THE CONTRACTOR SHALL UPDATE THE TABLE IN THEIR SUBMISSION OF ASSEMBLY.
- THE BILL OF MATERIALS ARE TYPICAL FOR THE ASSEMBLY STYLES SHOWN. THE CONTRACTOR SHALL ITEMIZE THE TABLE WITH DESCRIPTIONS AND PART NUMBERS OF COMPONENTS REQUIRED TO COMPLETE EACH ASSEMBLY.
- THE MAXIMUM LOADS IN THE TABLE ARE WORST CASE LOADS THAT INCLUDE WIND AND ICE WHERE APPLICABLE
- STEADY ARM LENGTH AND HEEL SETTING TO BE DETERMINED BY THE CONTRACTOR.

| MAXIMUM ASSEMBLY LOADING | | |
|----------------------------|---------|---------|
| | TS-3 | TS-1 |
| MESSENGER WIRE RADIAL LOAD | 550 LBS | 650 LBS |
| CONTACT WIRE RADIAL LOAD | 350 LBS | 450 LBS |
| VERTICAL LOAD | 250 LBS | 300 LBS |


| BILL OF MATERIALS | | | | | |
|----------------------|------|-------|-----------------------|----------|------------------|
| QUANTITIES EACH TYPE | | UNITS | DESCRIPTION | ITEM NO. | PART NO./REMARKS |
| TS-3 | TS-1 | | | | |
| 1 | 1 | EA | SUPPORT BRACKET | 1 | |
| 4 | 4 | EA | INSULATOR | 2 | |
| 2 | 1 | EA | M/W SUPPORT INSULATOR | 3 | |
| 2 | 1 | EA | STEADY ARM | 4 | INSULATED |
| 2 | 1 | EA | PIPE CAP | 5 | |
| 2 | 1 | EA | C/W SUPPORT CLAMP | 6 | |

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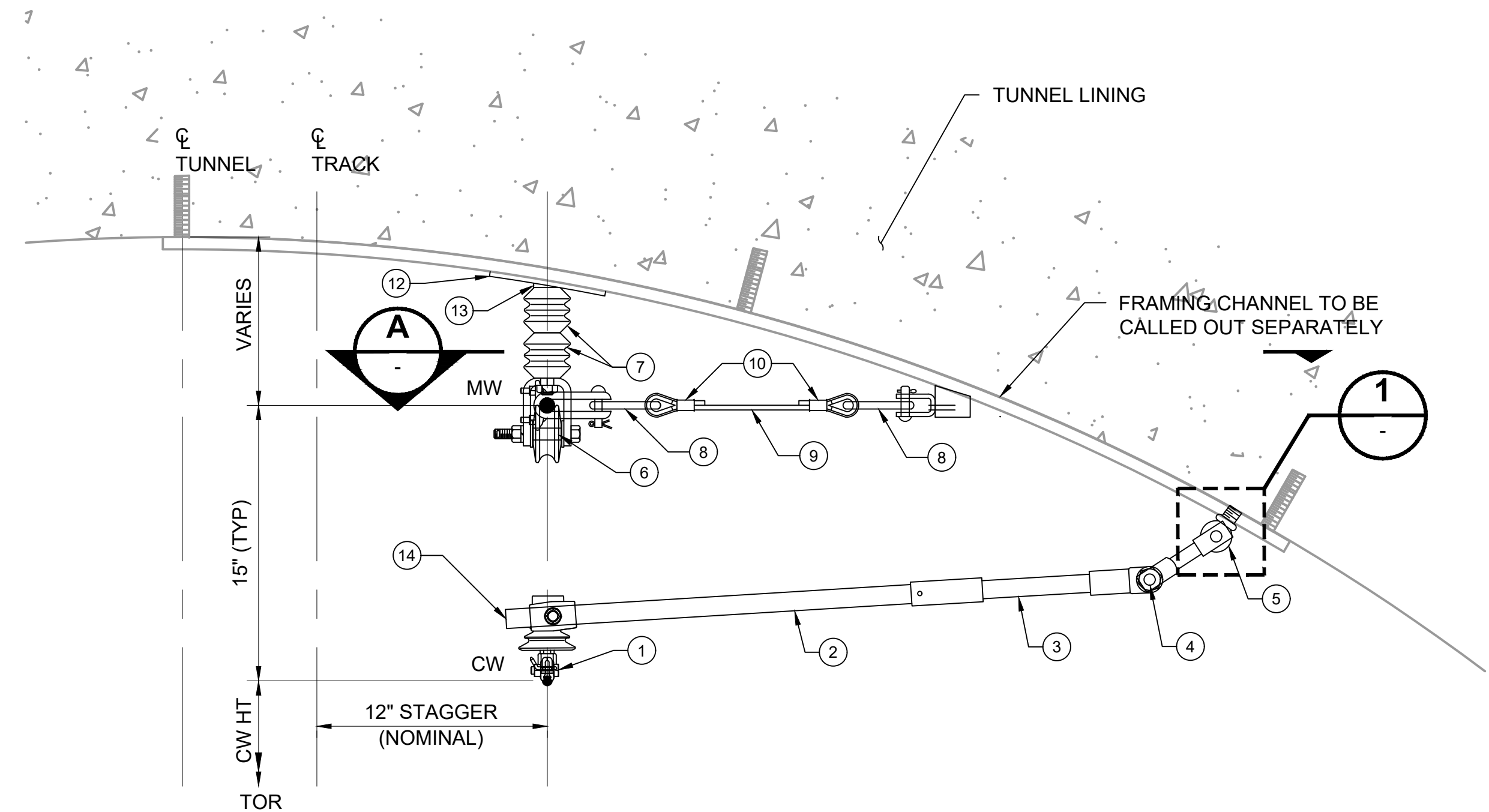
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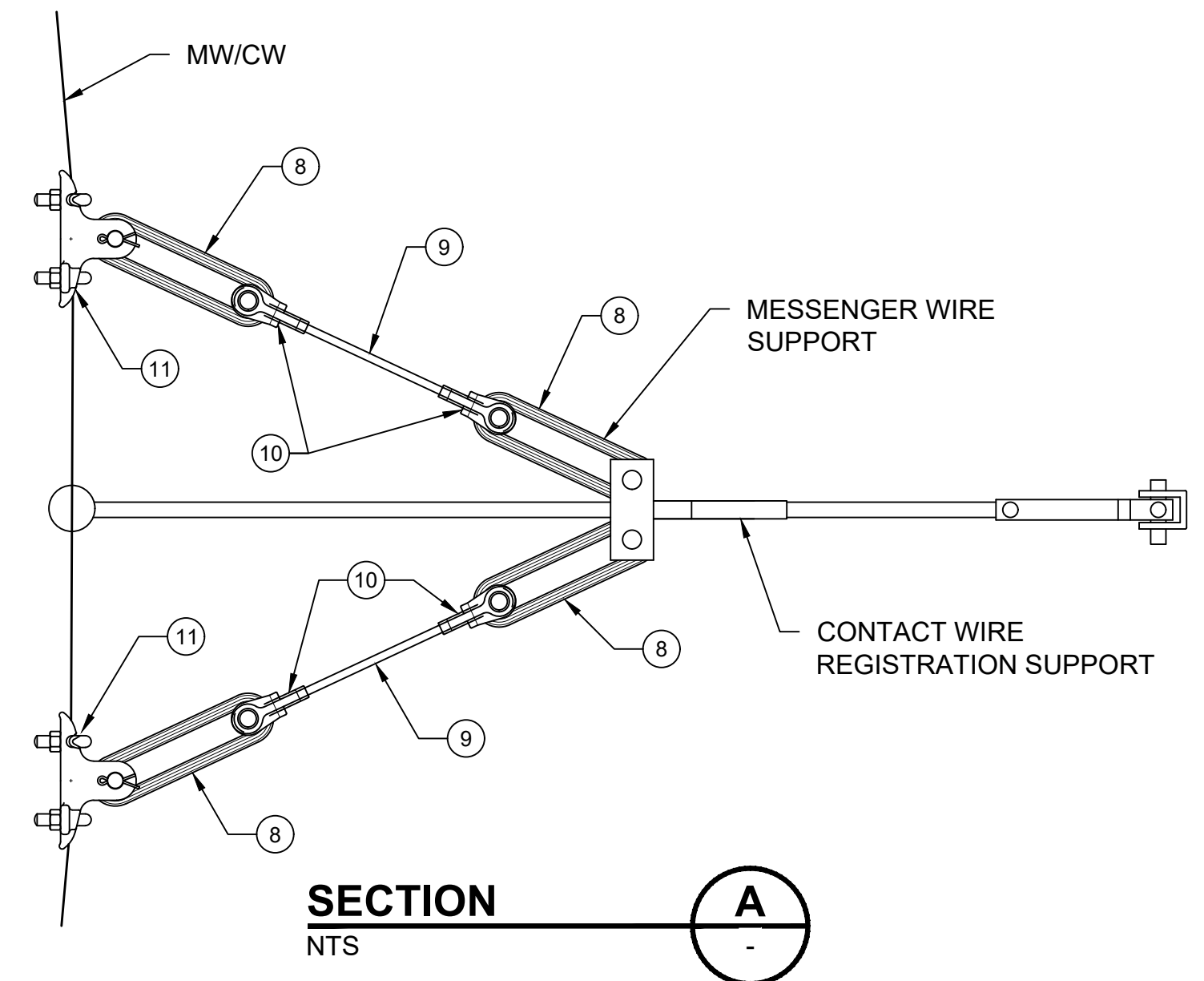
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| SOUND TRANSIT STANDARD DRAWINGS SYSTEMS OVERHEAD CATENARY SYSTEM TUNNEL SUPPORT ASSEMBLIES SCFT TS-1 & TS-3 | DRAWING No.: | STD-JOD440 |
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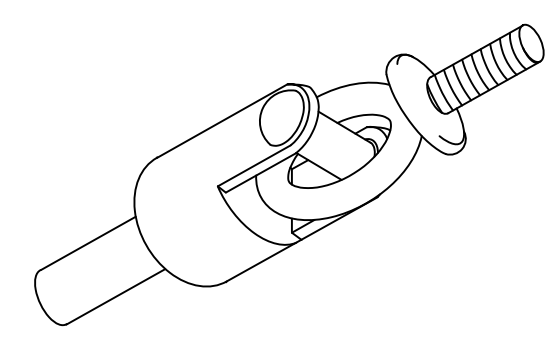
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TUNNEL SUPPORT ASSEMBLY TS-6
NTS
SEE NOTE 10



SECTION A-A
NTS
SEE NOTE 3



DETAIL - CLEVIS TO EYE 1
NTS

- GENERAL NOTES:**
- FOR ABBREVIATIONS, LEGENDS AND SYMBOLS, SEE DWGS JZN001 AND JZN002.
 - CATENARY DETAILS INCLUDING STAGGER, POLE OFFSETS AND WIRE HEIGHTS AT EACH LOCATION TO BE SHOWN ON OCS LAYOUT PLANS AND SCHEDULES.
 - FOR DETAILS OF PANTOGRAPH CLEARANCES, SEE DWG JOD112 AND JOD114.
 - CONTRACTOR TO DETERMINE COMPONENT DETAIL AND SAFE WORKING LOADS.
 - CONTRACTOR TO VERIFY ALL QUANTITIES ON THE BILL OF MATERIALS
 - THE CONTRACTOR IS RESPONSIBLE FOR THE DESIGN OF EACH ASSEMBLY AS A WHOLE AND EACH COMPONENT MEETING OR EXCEEDING THE LOADING TABLES WHERE PROVIDED. WHERE THE WORKING LOAD CAPABILITIES OF THE CONTRACTOR'S ASSEMBLIES EXCEED THOSE SHOWN IN THE LOADING TABLE, THE CONTRACTOR SHALL UPDATE THE TABLE IN THEIR SUBMISSION OF ASSEMBLY.
 - THE BILL OF MATERIALS ARE TYPICAL FOR THE ASSEMBLY STYLES SHOWN. THE CONTRACTOR SHALL ITEMIZE THE TABLE WITH DESCRIPTIONS AND PART NUMBERS OF COMPONENTS REQUIRED TO COMPLETE EACH ASSEMBLY.
 - THE MAXIMUM LOADS IN THE TABLE ARE THE WORST CASE LOADS THAT INCLUDE WIND AND ICE WHERE APPLICABLE.
 - STEADY ARM LENGTH AND HEEL SETTING TO BE DETERMINED BY THE CONTRACTOR.
 - CONTRACTOR TO MEASURE THE DISTANCE BETWEEN THE RAIL LEVEL AND THE SOFFIT AT EACH LOCATION AND MANUFACTURE THE DROP PIPE TO SUIT THE CATENARY HEIGHTS.

| MAXIMUM ASSEMBLY LOADING | |
|----------------------------|---------|
| | TS-6 |
| MESSENGER WIRE RADIAL LOAD | 450 LBS |
| CONTACT WIRE RADIAL LOAD | 300 LBS |
| VERTICAL LOAD | 250 LBS |

| BILL OF MATERIALS | | | | |
|----------------------|-------|---------------------------------|----------|------------------|
| QUANTITIES EACH TYPE | UNITS | DESCRIPTION | ITEM NO. | PART NO./REMARKS |
| TS-6 | | | | |
| 1 | EA | CW SWIVEL CLAMP | 1 | INSULATED |
| 1 | LF | PIPE | 2 | LENGTH AS REQ'D |
| 1 | EA | INSULATOR, EPOXY FIBERGLASS ROD | 3 | LENGTH AS REQ'D |
| 1 | EA | ADJUSTABLE ARM | 4 | |
| 1 | EA | CLEVIS FITTING | 5 | |
| 1 | EA | MW ROLLER | 6 | |
| 2 | EA | SPOOL INSULATOR | 7 | |
| 4 | EA | LOOP INSULATOR | 8 | |
| 2 | LF | STAINLESS STEEL WIRE | 9 | LENGTH AS REQ'D |
| 4 | EA | WIRE THIMBLE AND CRIMP | 10 | |
| 2 | EA | MW CONDUCTOR CLAMP | 11 | |
| 1 | EA | GLASTIC WASHER | 12 | |
| AS REQ'D | EA | BEVELED WASHER | 13 | |
| 1 | EA | PIPE CAP | 14 | |

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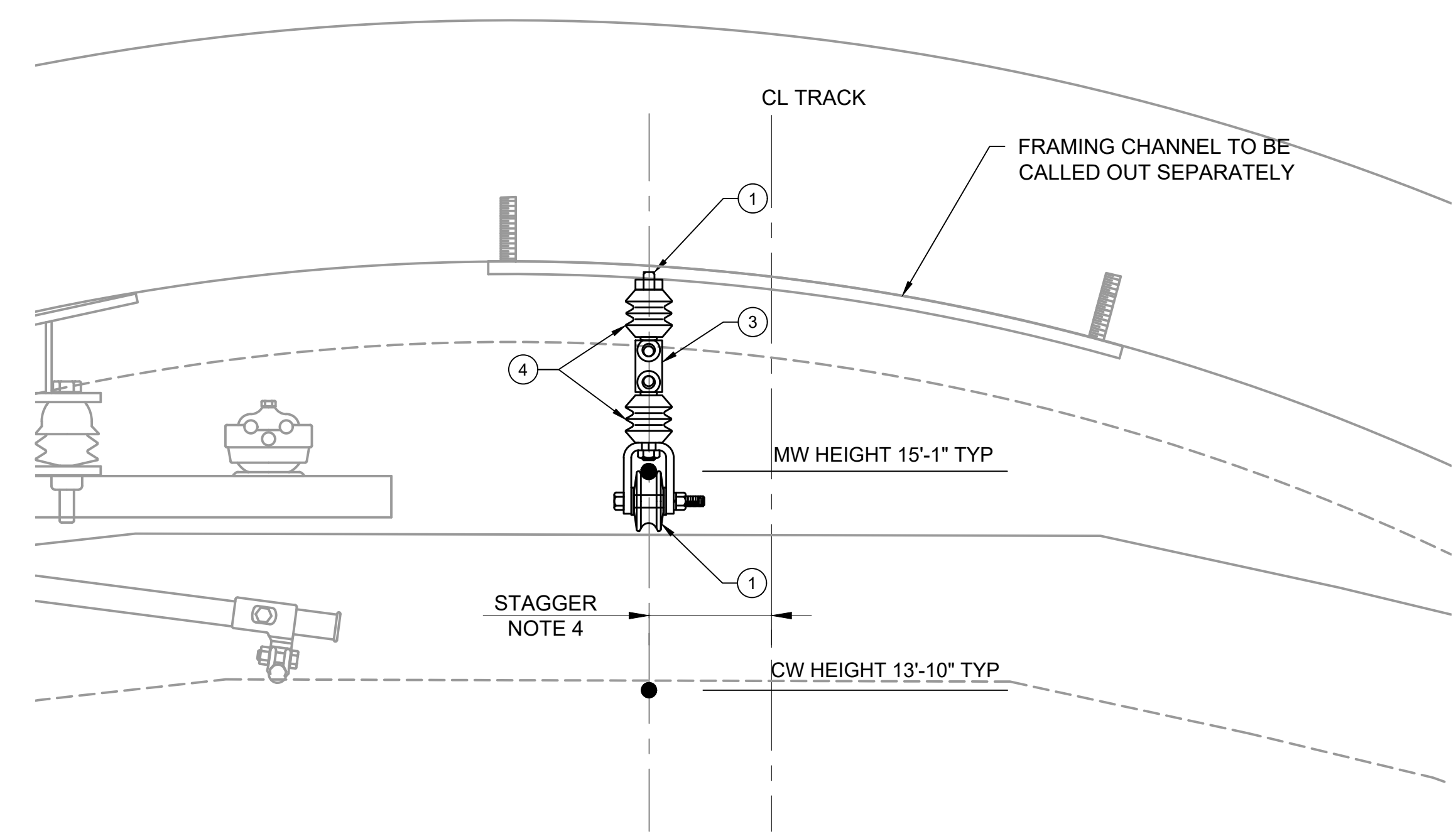
SOUND TRANSIT STANDARD DRAWINGS SYSTEMS
OVERHEAD CATENARY SYSTEM
TUNNEL SUPPORT ASSEMBLIES
SCFT TS-6

DRAWING No.: **STD-JOD441**
FACILITY ID:
SHEET No.: REV: 1

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GENERAL NOTES:

1. FOR ABBREVIATIONS, LEGENDS AND SYMBOLS, SEE DWGS JZN001 AND JZN002.
2. CATENARY DETAILS INCLUDING STAGGER, POLE OFFSETS AND WIRE HEIGHTS AT EACH LOCATION TO BE SHOWN ON OCS LAYOUT PLANS AND SCHEDULES.
3. MINIMUM ELECTRICAL CLEARANCE IS 6 INCHES FROM THE OCS WIRE.
4. INTERMEDIATE STAGGERS NOT GIVEN. INSTALL SUPPORT ASSEMBLIES DIRECTLY IN LINE FROM ADJACENT CW REGISTRATION POINTS. THERE ARE NO CONTACT WIRE RADIAL LOADS AT THESE LOCATIONS.
5. FOR DETAILS OF PANTOGRAPH CLEARANCES, SEE DWGS JOD112 AND JOD114.
6. CONTRACTOR TO DETERMINE COMPONENT DETAIL AND SAFE WORKING LOADS.
7. CONTRACTOR TO VERIFY ALL QUANTITIES ON THE BILL OF MATERIALS.
8. THE CONTRACTOR IS RESPONSIBLE FOR THE DESIGN OF EACH ASSEMBLY AS A WHOLE AND EACH COMPONENT MEETING OR EXCEEDING THE LOADING TABLES WHERE PROVIDED. WHERE THE WORKING LOAD CAPABILITIES OF THE CONTRACTOR'S ASSEMBLIES EXCEED THOSE SHOWN IN THE LOADING TABLE, THE CONTRACTOR SHALL UPDATE THE TABLE IN THEIR SUBMISSION OF ASSEMBLY.
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10. THE MAXIMUM LOADS IN THE TABLE ARE THE WORST CASE LOADS THAT INCLUDE WIND AND ICE WHERE APPLICABLE.
11. STEADY ARM LENGTH AND HEEL SETTING TO BE DETERMINED BY THE CONTRACTOR.
12. CONTRACTOR TO MEASURE THE DISTANCE BETWEEN THE RAIL LEVEL AND THE SOFFIT AT EACH LOCATION AND MANUFACTURE THE DROP PIPE TO SUIT THE CATENARY HEIGHTS.



TUNNEL SUPPORT FOR MESSENGER WIRE ASSEMBLY TS-9
NTS

SEE NOTE 12

| MAXIMUM ASSEMBLY LOADING | |
|----------------------------|---------|
| | TS-9 |
| MESSENGER WIRE RADIAL LOAD | 50 LBS |
| CONTACT WIRE RADIAL LOAD | - |
| VERTICAL LOAD | 250 LBS |

| BILL OF MATERIALS | | | | |
|----------------------|-------|--------------------------|----------|------------------|
| QUANTITIES EACH TYPE | | DESCRIPTION | ITEM NO. | PART NO./REMARKS |
| TS-9 | UNITS | | | |
| 1 | EA | FRAMING CHANNEL HARDWARE | 1 | |
| 1 | EA | MW ROLLER | 2 | |
| 1 | EA | TWO PIN STRAP W/PINS | 3 | |
| 2 | EA | SPOOL INSULATOR | 4 | |

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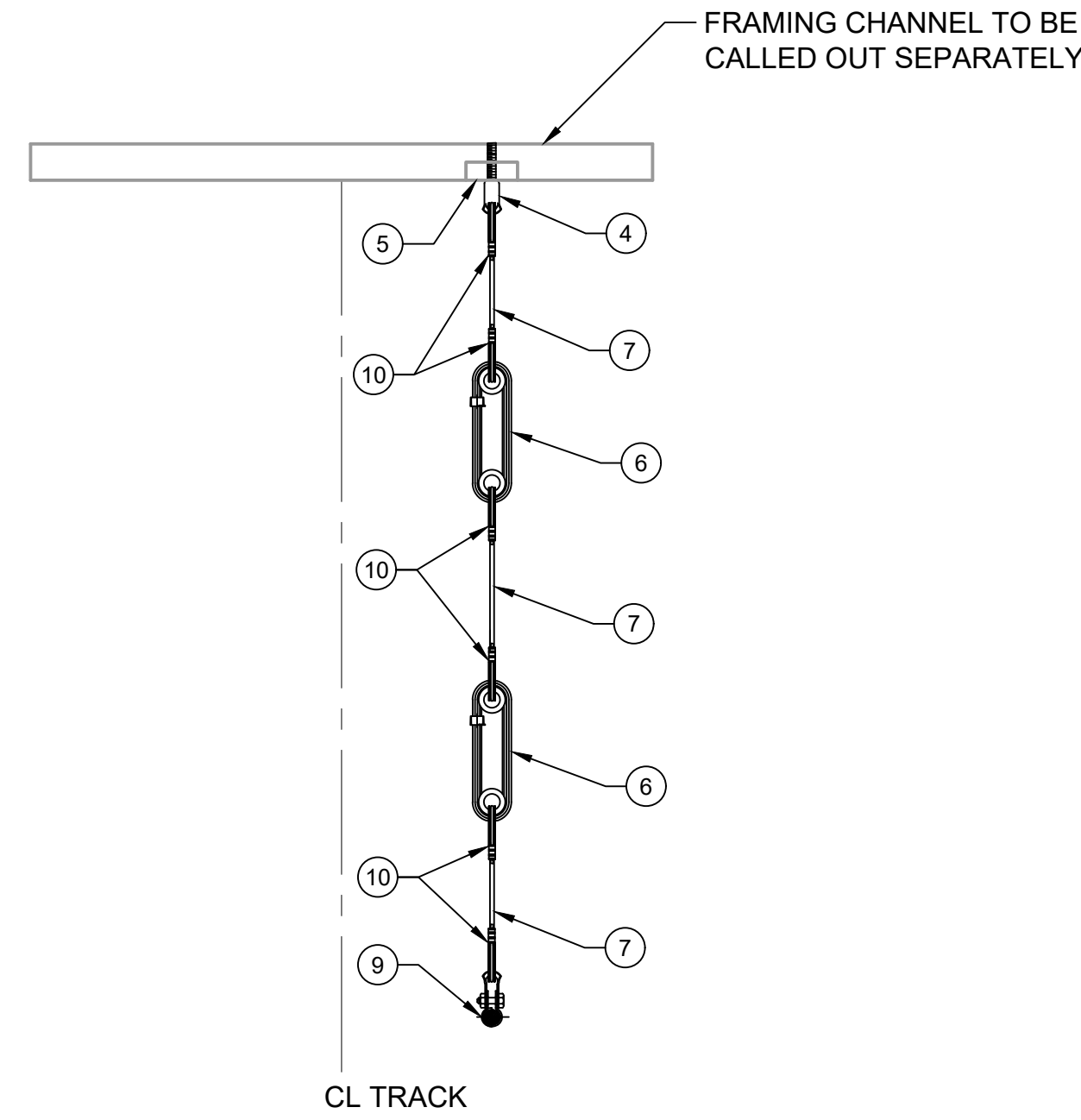
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SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS

OVERHEAD CATENARY SYSTEM
TUNNEL SUPPORT ASSEMBLIES
SCFT TS-9

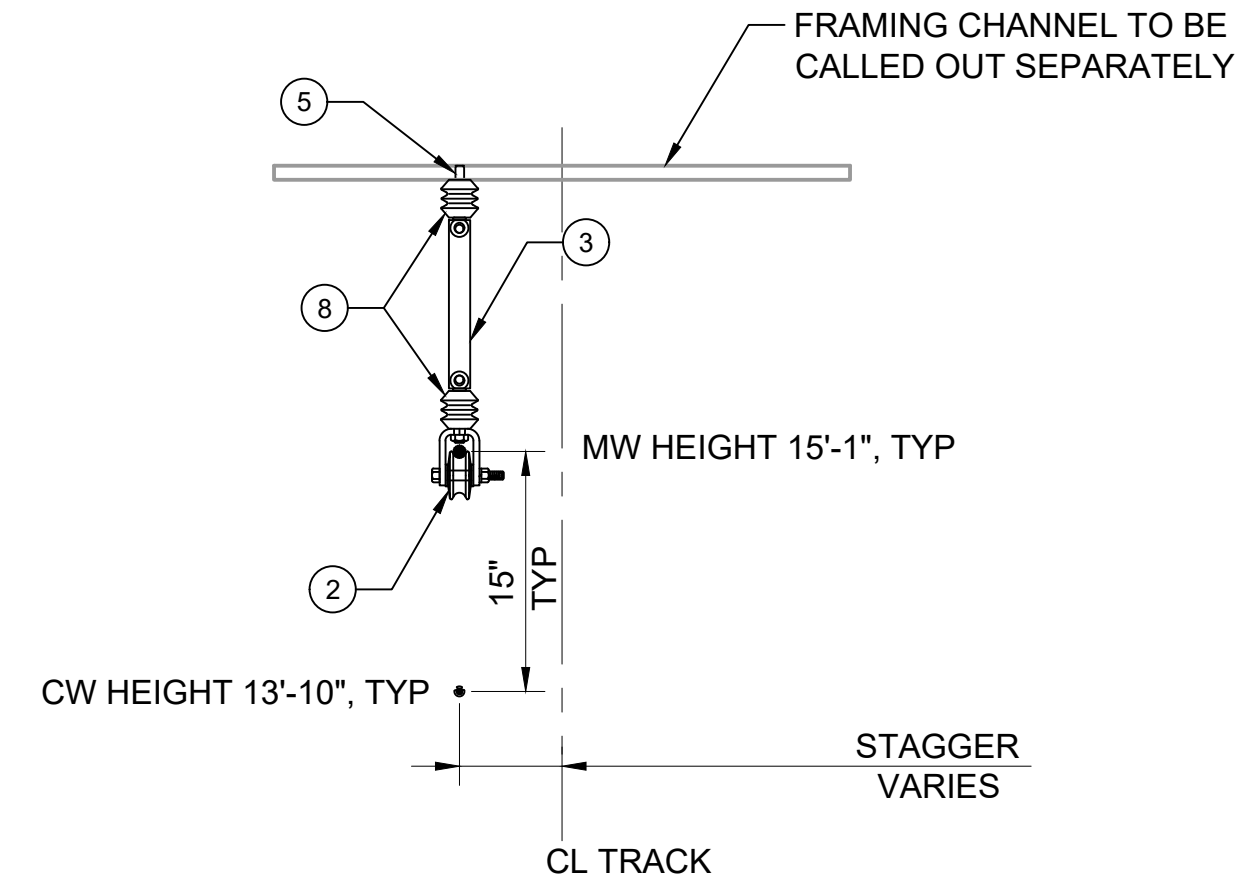
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TUNNEL SUPPORT FOR MESSENGER WIRE ASSEMBLY TS-11

NTS

SEE NOTE 3



TUNNEL SUPPORT FOR MESSENGER WIRE ASSEMBLY TS-12

NTS

SEE NOTE 3

GENERAL NOTES:

- FOR ABBREVIATIONS, LEGENDS AND SYMBOLS, SEE DWGS JZN001 AND JZN002.
- CATENARY DETAILS INCLUDING STAGGERS, POLE OFFSETS AND WIRE HEIGHTS AT EACH LOCATION TO BE SHOWN ON OCS LAYOUT PLANS AND SCHEDULES.
- INTERMEDIATE STAGGERS NOT GIVEN. INSTALL SUPPORT ASSEMBLIES DIRECTLY IN LINE FROM ADJACENT CW REGISTRATION POINTS. THERE ARE NO CONTACT WIRE RADIAL LOADS AT THESE LOCATIONS.
- MINIMUM ELECTRICAL CLEARANCE IS 6 INCHES FROM THE OCS WIRE.
- CONTRACTOR TO DETERMINE COMPONENT DETAIL AND SAFE WORKING LOADS.
- CONTRACTOR TO VERIFY ALL QUANTITIES ON THE BILL OF MATERIALS.
- THE CONTRACTOR IS RESPONSIBLE FOR THE DESIGN OF EACH ASSEMBLY AS A WHOLE AND EACH COMPONENT MEETING OR EXCEEDING THE LOADING TABLES WHERE PROVIDED. WHERE THE WORKING LOAD CAPABILITIES OF THE CONTRACTOR'S ASSEMBLIES EXCEED THOSE SHOWN IN THE LOADING TABLE, THE CONTRACTOR SHALL UPDATE THE TABLE IN THEIR SUBMISSION OF ASSEMBLY.
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- CONTRACTOR TO MEASURE THE DISTANCE BETWEEN THE RAIL LEVEL AND THE SOFFIT AT EACH LOCATION AND MANUFACTURE THE DROP PIPE TO SUIT THE CATENARY HEIGHTS.

| MAXIMUM ASSEMBLY LOADING | | |
|----------------------------|---------|---------|
| | TS-11 | TS-12 |
| MESSENGER WIRE RADIAL LOAD | 50 LBS | 50 LBS |
| CONTACT WIRE RADIAL LOAD | - | - |
| VERTICAL LOAD | 175 LBS | 175 LBS |

| BILL OF MATERIALS | | | | | |
|----------------------|-------|-------|--------------------------|----------|------------------|
| QUANTITIES EACH TYPE | | UNITS | DESCRIPTION | ITEM NO. | PART NO./REMARKS |
| TS-11 | TS-12 | | | | |
| - | - | EA | NOT USED | 1 | |
| - | 1 | EA | MW ROLLER | 2 | |
| - | 2 | EA | TWO HOLE STRAP W / PINS | 3 | |
| 1 | - | EA | EYEBOLT | 4 | |
| 1 | 1 | EA | FRAMING CHANNEL HARDWARE | 5 | |
| 2 | - | EA | LOOP INSULATOR | 6 | |
| 3 | - | EA | STAINLESS STEEL WIRE | 7 | LENGTH AS REQ'D |
| - | 2 | EA | SPOOL INSULATOR | 8 | |
| 1 | - | EA | MW SUPPORT CLAMP | 9 | |
| 6 | 2 | EA | WIRE THIMBLE AND CRIMP | 10 | |

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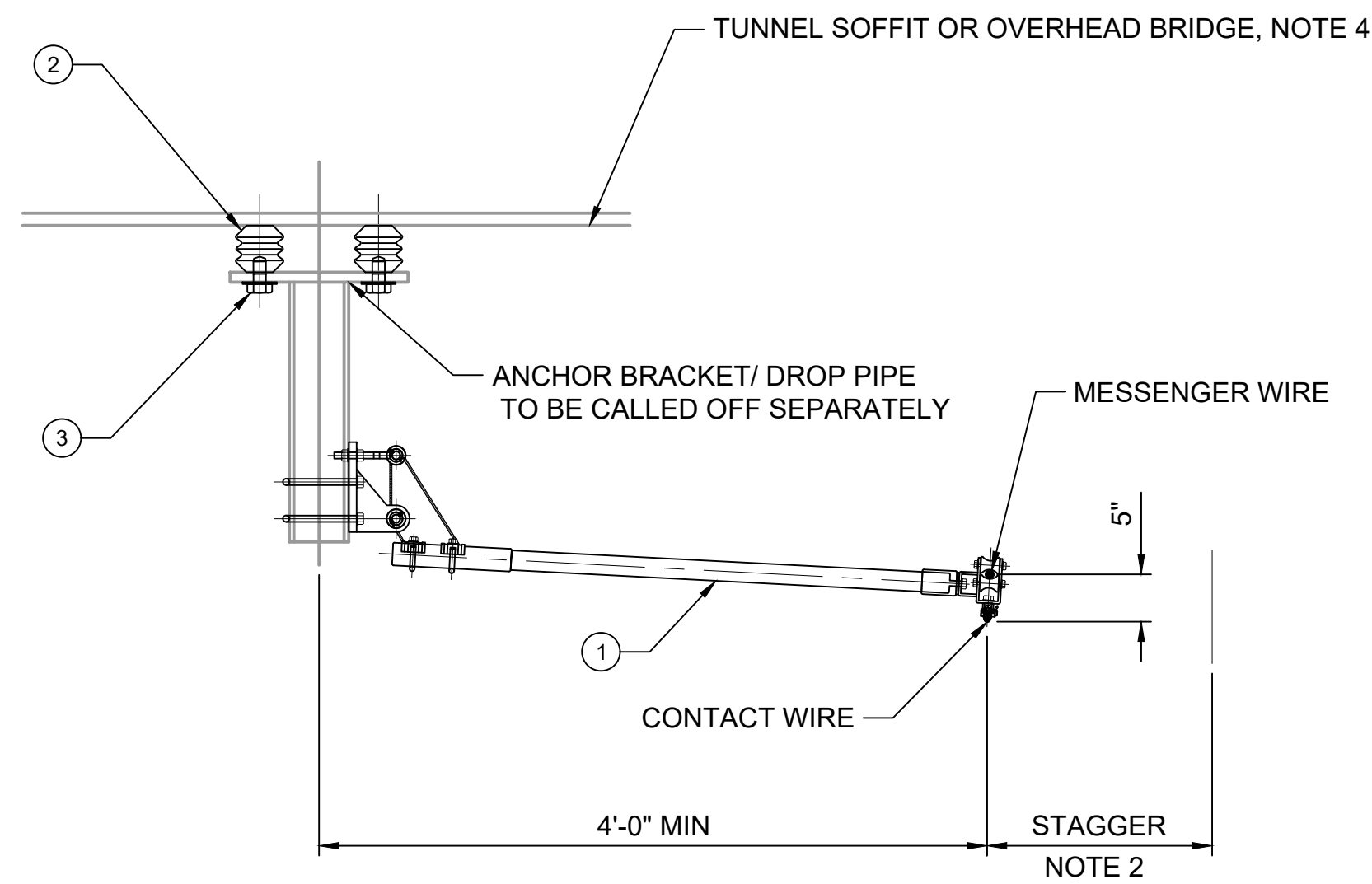
SOUND TRANSIT STANDARD DRAWINGS SYSTEMS

OVERHEAD CATENARY SYSTEM
 TUNNEL SUPPORT ASSEMBLIES
 SCFT TS-11 & TS12

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| DRAWING No.: STD-JOD443 |
| FACILITY ID: |
| SHEET No.: REV: 1 |

GENERAL NOTES:

1. FOR ABBREVIATIONS, LEGENDS AND SYMBOLS, SEE DWGS JZN001 AND JZN002.
2. CATENARY DETAILS INCLUDING STAGGERS, POLE OFFSETS AND WIRE HEIGHTS AT EACH LOCATION TO BE SHOWN ON OCS LAYOUT PLANS AND SCHEDULES.
3. CONTRACTOR TO COORDINATE THE LOCATION OF THE ASSEMBLY WITH THE CATENARY STAGGERS AND TRACK CENTERLINE TO ENSURE THAT ELECTRICAL CLEARANCES ARE MAINTAINED.
4. CONTRACTOR TO DETERMINE DETAILS OF ANCHORING ASSEMBLY TO THE TUNNEL ROOF OR OVERHEAD BRIDGE. ADDITIONAL REQUIREMENTS WHEN ANCHORING TO WSDOT STRUCTURES TO BE INCLUDED IN SPECIFICATIONS.
5. FOR DETAILS OF PANTOGRAPH CLEARANCES, SEE DWG JOD112 AND JOD114.
6. CONTRACTOR TO DETERMINE COMPONENT DETAIL AND SAFE WORKING LOADS.
7. CONTRACTOR TO VERIFY ALL QUANTITIES ON THE BILL OF MATERIALS.
8. THE CONTRACTOR IS RESPONSIBLE FOR THE DESIGN OF EACH ASSEMBLY AS A WHOLE AND EACH COMPONENT MEETING OR EXCEEDING THE LOADING TABLES WHERE PROVIDED. WHERE THE WORKING LOAD CAPABILITIES OF THE CONTRACTOR'S ASSEMBLIES EXCEED THOSE SHOWN IN THE LOADING TABLE, THE CONTRACTOR SHALL UPDATE THE TABLE IN THEIR SUBMISSION OF ASSEMBLY.
9. THE BILL OF MATERIALS ARE TYPICAL FOR THE ASSEMBLY STYLES SHOWN. THE CONTRACTOR SHALL ITEMIZE THE TABLE WITH DESCRIPTIONS AND PART NUMBERS OF COMPONENTS REQUIRED TO COMPLETE EACH ASSEMBLY.
10. CONTRACTOR SHALL VERIFY STEEL REINFORCEMENT LOCATIONS IN CONCRETE STRUCTURES, PRIOR TO DRILLING AT OCS SUPPORT LOCATIONS. DETAILED REQUIREMENTS TO BE PROVIDED IN SPECIFICATIONS.
11. STEADY ARM LENGTH AND HEEL SETTING TO BE DETERMINED BY THE CONTRACTOR.
12. CONTRACTOR TO MEASURE THE DISTANCE BETWEEN THE RAIL LEVEL AND THE SOFFIT AT EACH LOCATION AND MANUFACTURE THE DROP PIPE TO SUIT THE CATENARY HEIGHTS.



CONTACT WIRE ELASTIC ARM SUPPORT ASSEMBLY TYPE TS-16

NTS

| MAXIMUM ASSEMBLY LOADING | |
|----------------------------|---------|
| | TS-16 |
| MESSENGER WIRE RADIAL LOAD | 100 LBS |
| CONTACT WIRE RADIAL LOAD | 50 LBS |
| VERTICAL LOAD | 200 LBS |

| BILL OF MATERIALS | | | | |
|----------------------|-------|-------------------------------------|----------|------------------|
| QUANTITIES EACH TYPE | UNITS | DESCRIPTION | ITEM NO. | PART NO./REMARKS |
| TS-16 | | | | |
| 1 | EA | ELASTIC SUPPORT W/ CW AND MW CLAMPS | 1 | INSULATED |
| 4 | EA | SPOOL INSULATORS | 2 | |
| 4 | EA | BOLT AND WASHER | 3 | |


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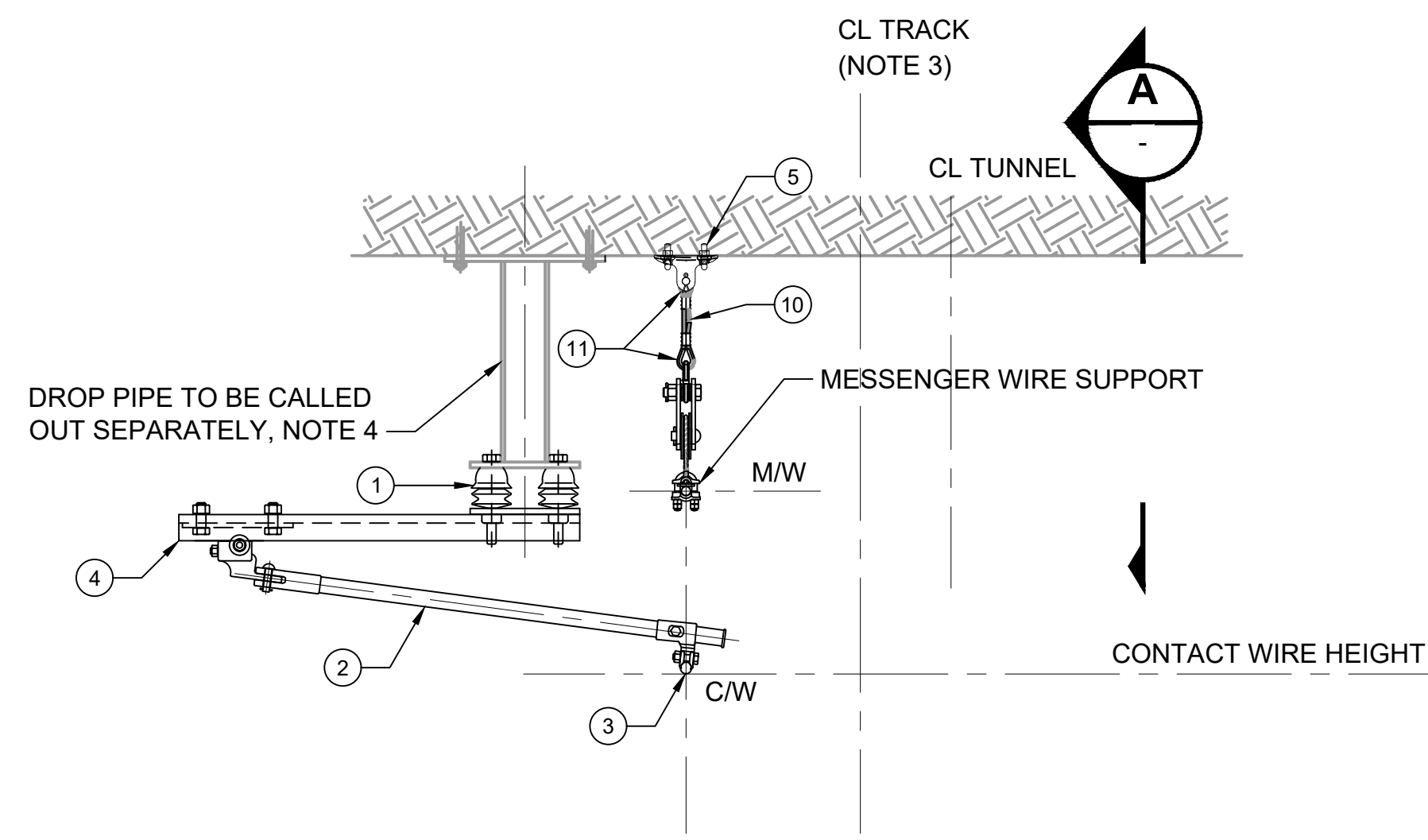
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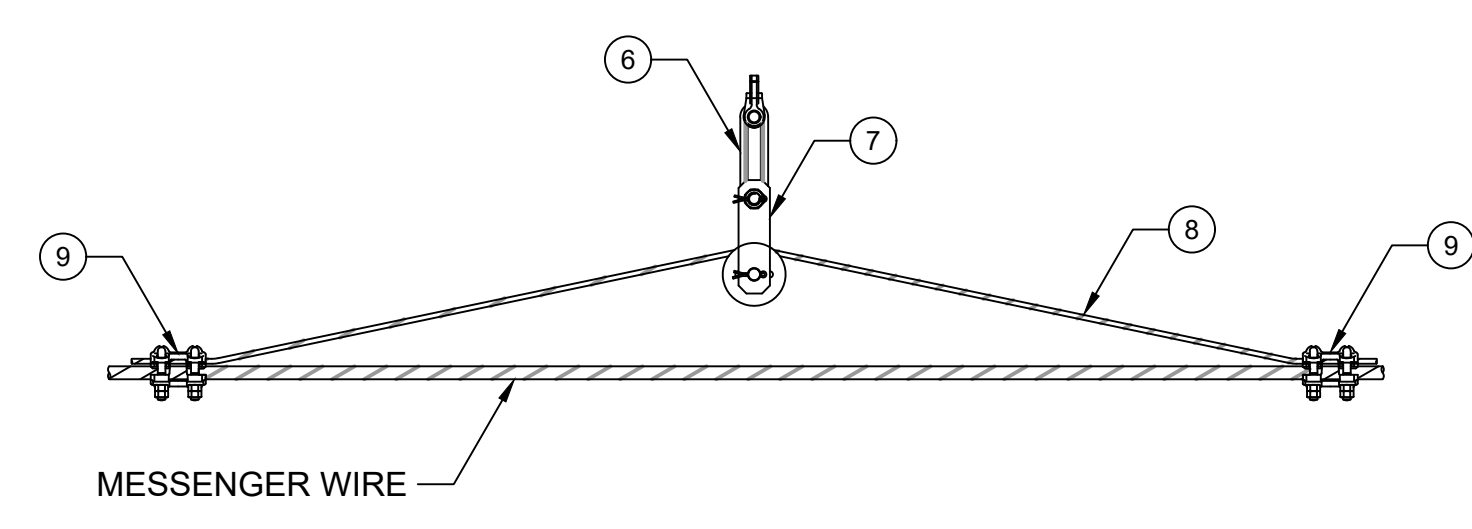
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| SOUND TRANSIT STANDARD DRAWINGS SYSTEMS OVERHEAD CATENARY SYSTEM TUNNEL SUPPORT ASSEMBLY SCFT TS-16 | DRAWING No.: | STD-JOD444 |
| | FACILITY ID: | |
| | SHEET No.: | REV: |
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TUNNEL SUPPORT AND REGISTRATION ASSEMBLY TS-17
NTS



SECTION A-A
NTS
DROP PIPE AND SUPPORT BRACKET OMITTED FOR CLARITY

GENERAL NOTES:

1. FOR ABBREVIATIONS, LEGENDS AND SYMBOLS, SEE DWGS JZN001 AND JZN002.
2. CATENARY DETAILS INCLUDING STAGGERS, POLE OFFSETS AND WIRE HEIGHTS AT EACH LOCATION TO BE SHOWN ON OCS LAYOUT PLANS AND SCHEDULES.
3. CONTRACTOR TO COORDINATE THE LOCATION OF THE ASSEMBLIES WITH THE CATENARY STAGGERS AND TRACK CENTERLINE TO ENSURE THAT ELECTRICAL CLEARANCES ARE MAINTAINED.
4. CONTRACTOR TO MEASURE THE DISTANCE BETWEEN THE RAIL LEVEL AND THE SOFFIT AT EACH LOCATION AND MANUFACTURE THE PIPE STANCHION TO SUIT THE CATENARY HEIGHTS.
5. FOR DETAILS OF PANTOGRAPH CLEARANCES, SEE DWGS JOD112 AND JOD114.
6. CONTRACTOR TO DETERMINE COMPONENT DETAIL AND SAFE WORKING LOADS.
7. CONTRACTOR TO VERIFY ALL QUANTITIES ON THE BILL OF MATERIALS.
8. THE CONTRACTOR IS RESPONSIBLE FOR THE DESIGN OF EACH ASSEMBLY AS A WHOLE AND EACH COMPONENT MEETING OR EXCEEDING THE LOADING TABLES WHERE PROVIDED WHERE THE WORKING LOAD CAPABILITIES OF THE CONTRACTOR'S ASSEMBLIES EXCEED THOSE SHOWN IN THE LOADING TABLE. THE CONTRACTOR SHALL UPDATE THE TABLE IN THEIR SUBMISSION OF ASSEMBLY.
9. THE BILL OF MATERIALS ARE TYPICAL FOR THE ASSEMBLY STYLES SHOWN. THE CONTRACTOR SHALL ITEMIZE THE TABLE WITH DESCRIPTIONS AND PART NUMBERS OF COMPONENTS REQUIRED TO COMPLETE EACH ASSEMBLY.
10. THE MAXIMUM LOADS IN THE TABLE ARE THE WORST CASE LOADS THAT INCLUDE WIND AND ICE WHERE APPLICABLE.
11. STEADY ARM LENGTH AND HEELS SETTING TO BE DETERMINED BY THE CONTRACTOR.
12. SIZE AND EMBEDMENT DEPTH OF CONCRETE ANCHORS TO BE DETERMINED BY CONTRACTOR.
13. CONTRACTOR SHALL VERIFY STEEL REINFORCEMENT LOCATIONS IN CONCRETE STRUCTURES, PER SPECIFICATION SECTION 34 23 25 PRIOR TO DRILLING AT OCS SUPPORT LOCATIONS

| MAXIMUM ASSEMBLY LOADING | |
|----------------------------|----------|
| | TS-17 |
| MESSENGER WIRE RADIAL LOAD | 1200 LBS |
| CONTACT WIRE RADIAL LOAD | 750 LBS |
| VERTICAL LOAD | 300 LBS |


| QUANTITIES EACH TYPE | UNITS | DESCRIPTION | ITEM NO. | PART NO./REMARKS |
|----------------------|-------|-----------------------------|----------|------------------|
| TS-17 | | | | |
| 4 | EA | INSULATOR | 1 | |
| 1 | EA | STEADY ARM | 2 | INSULATED |
| 1 | EA | C/W SWIVEL CLAMP | 3 | |
| 1 | EA | SUPPORT BRACKET | 4 | |
| 1 | EA | BRACKET W/ CONCRETE ANCHORS | 5 | NOTE 12 |
| 1 | EA | LOOP INSULATOR | 6 | |
| 1 | EA | BRIDLE PULLEY | 7 | |
| 1 | EA | INSULATED BRIDLE WIRE | 8 | LENGTH AS REQ'D |
| 2 | EA | MESSENGER CLAMP | 9 | |
| 1 | EA | STAINLESS STEEL WIRE | 10 | LENGTH AS REQ'D |
| 2 | EA | THIMBLE AND WIRE CLIPS | 11 | |

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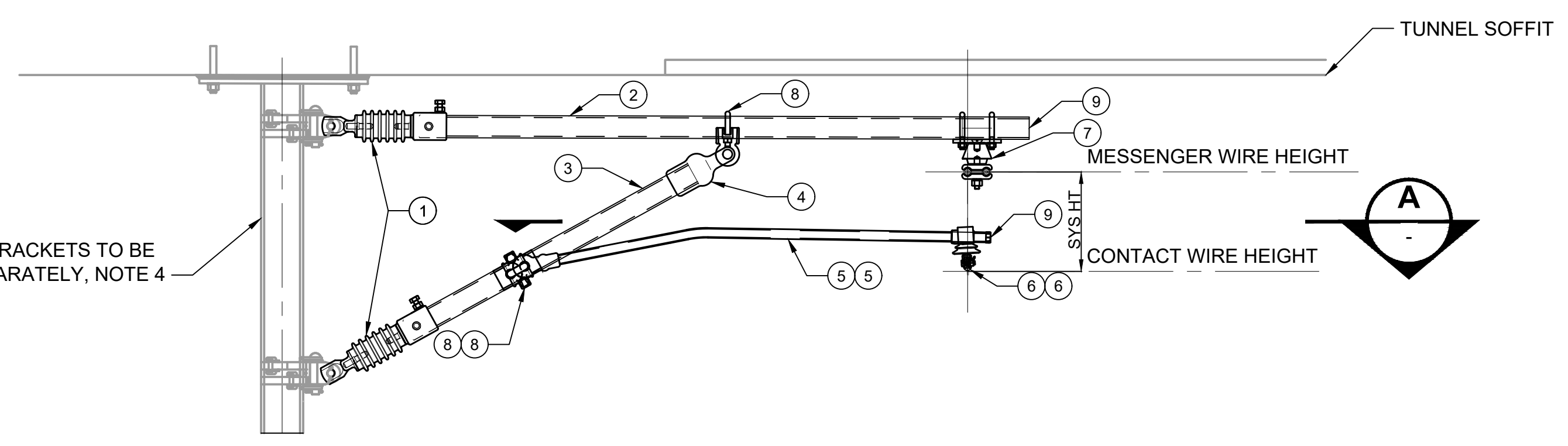
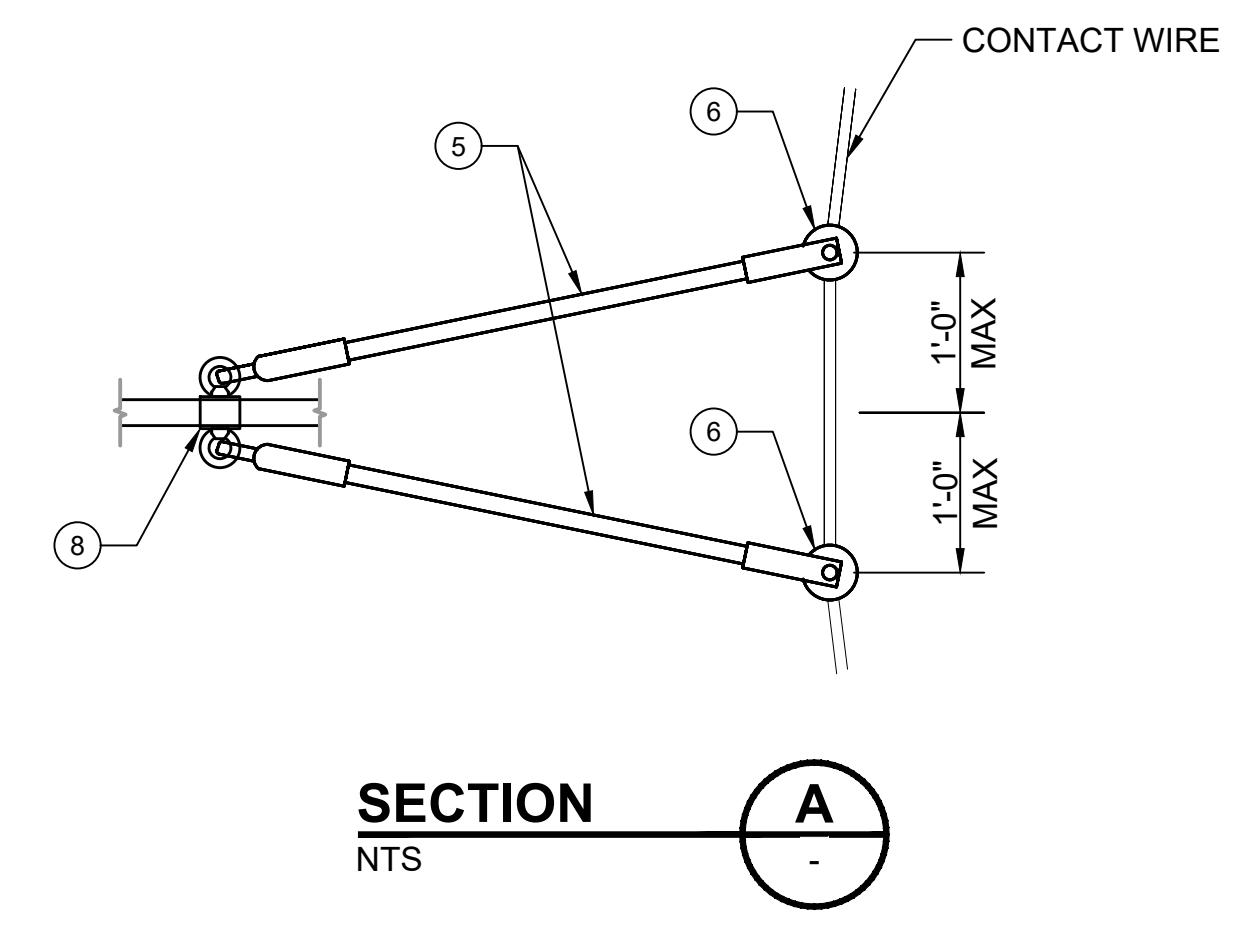
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| SOUND TRANSIT STANDARD DRAWINGS SYSTEMS | |
| OVERHEAD CATENARY SYSTEM TUNNEL SUPPORT ASSEMBLIES SCAT TS-17 | |

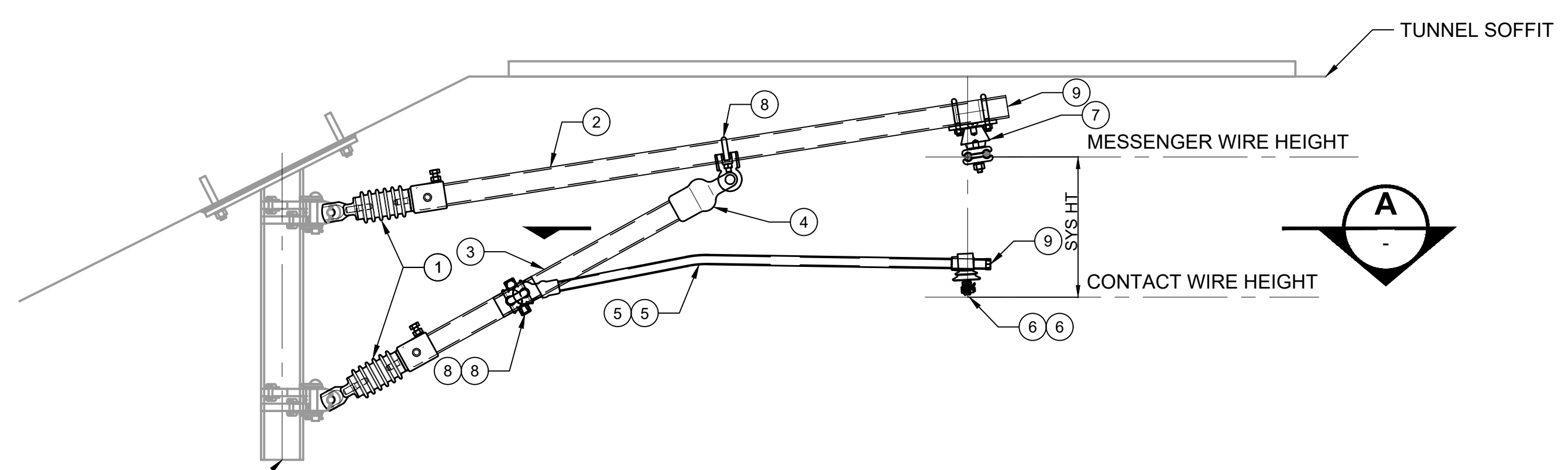
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GENERAL NOTES:

- FOR ABBREVIATIONS, LEGENDS AND SYMBOLS, SEE DWG JZN001 AND JZN002.
- CATENARY DETAILS INCLUDING STAGGERS, POLE OFFSETS AND WIRE HEIGHTS AT EACH LOCATION TO BE SHOWN ON OCS LAYOUT PLANS AND SCHEDULES.
- CONTRACTOR TO COORDINATE THE LOCATION OF THE ASSEMBLIES WITH THE CATENARY STAGGERS AND TRACK CENTERLINE TO ENSURE THAT ELECTRICAL CLEARANCES ARE MAINTAINED.
- CONTRACTOR TO MEASURE THE DISTANCES BETWEEN THE RAIL LEVEL AND THE SOFFIT AT EACH LOCATION AND MANUFACTURE THE DROP PIPE TO SUIT THE CATENARY HEIGHTS.
- FOR DETAILS OF PANTOGRAPH CLEARANCES, SEE DWG JOD112 AND JOD114.
- CONTRACTOR TO DETERMINE COMPONENT DETAIL AND SAFE WORKING LOADS.
- CONTRACTOR TO VERIFY ALL QUANTITIES ON THE BILL OF MATERIALS.
- THE CONTRACTOR IS RESPONSIBLE FOR THE DESIGN OF EACH ASSEMBLY AS A WHOLE AND EACH COMPONENT MEETING OR EXCEEDING THE LOADING TABLES WHERE PROVIDED. WHERE THE WORKING LOAD CAPABILITIES OF THE CONTRACTOR'S ASSEMBLIES EXCEED THOSE SHOWN IN THE LOADING TABLE, THE CONTRACTOR SHALL UPDATE THE TABLE IN THEIR SUBMISSION OF ASSEMBLY.
- THE BILL OF MATERIALS ARE TYPICAL FOR THE ASSEMBLY STYLES SHOWN. THE CONTRACTOR SHALL ITEMIZE THE TABLE WITH DESCRIPTIONS AND PART NUMBERS OF COMPONENTS REQUIRED TO COMPLETE EACH ASSEMBLY.
- THE MAXIMUM LOADS IN THE TABLE ARE THE WORST CASE LOADS THAT INCLUDE WIND AND ICE WHERE APPLICABLE.
- UNDER HUNG MESSENGER CLAMP SHALL BE DESIGNED FOR UNDER HUNG OPERATIONS AT THE LOADING SPECIFIED. LOADING DIRECTION MAY BE UP TO 20 DEGREES OFF OF HORIZONTAL.
- STEADY ARM LENGTH AND HEEL SETTING TO BE DETERMINED BY THE CONTRACTOR.



LOW PROFILE TUNNEL SUPPORT ASSEMBLY TS-20 HEAVY LOAD
NTS



INCLINED LOW PROFILE TUNNEL SUPPORT ASSEMBLY TS-21 HEAVY LOAD
NTS
SEE NOTE 11

| MAXIMUM ASSEMBLY LOADING | | |
|----------------------------|----------|----------|
| | TS-21 | TS-20 |
| MESSENGER WIRE RADIAL LOAD | 1500 LBS | 1500 LBS |
| CONTACT WIRE RADIAL LOAD | 1000 LBS | 1000 LBS |
| VERTICAL LOAD | 300 LBS | 300 LBS |

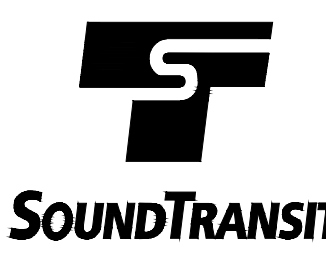
| BILL OF MATERIALS | | | | | |
|----------------------|-------|-------|--------------------------------------|----------|------------------|
| QUANTITIES EACH TYPE | | UNITS | DESCRIPTION | ITEM NO. | PART NO./REMARKS |
| TS-21 | TS-20 | | | | |
| 2 | 2 | EA | INSULATOR | 1 | |
| 1 | 1 | EA | TOP PIPE | 2 | LENGTH AS REQ'D |
| 1 | 1 | EA | STRUT PIPE | 3 | LENGTH AS REQ'D |
| 1 | 1 | EA | CLEVIS FITTING | 4 | |
| 2 | 2 | EA | STEADY ARM, CURVED | 5 | LENGTH AS REQ'D |
| 2 | 2 | EA | CONTACT WIRE SWIVEL CLAMP | 6 | |
| 1 | 1 | EA | UNDER HUNG INSULATED MESSENGER CLAMP | 7 | NOTE 11 |
| 3 | 3 | EA | EYE CLAMP | 8 | |
| 2 | 2 | EA | PIPE CAP | 9 | |

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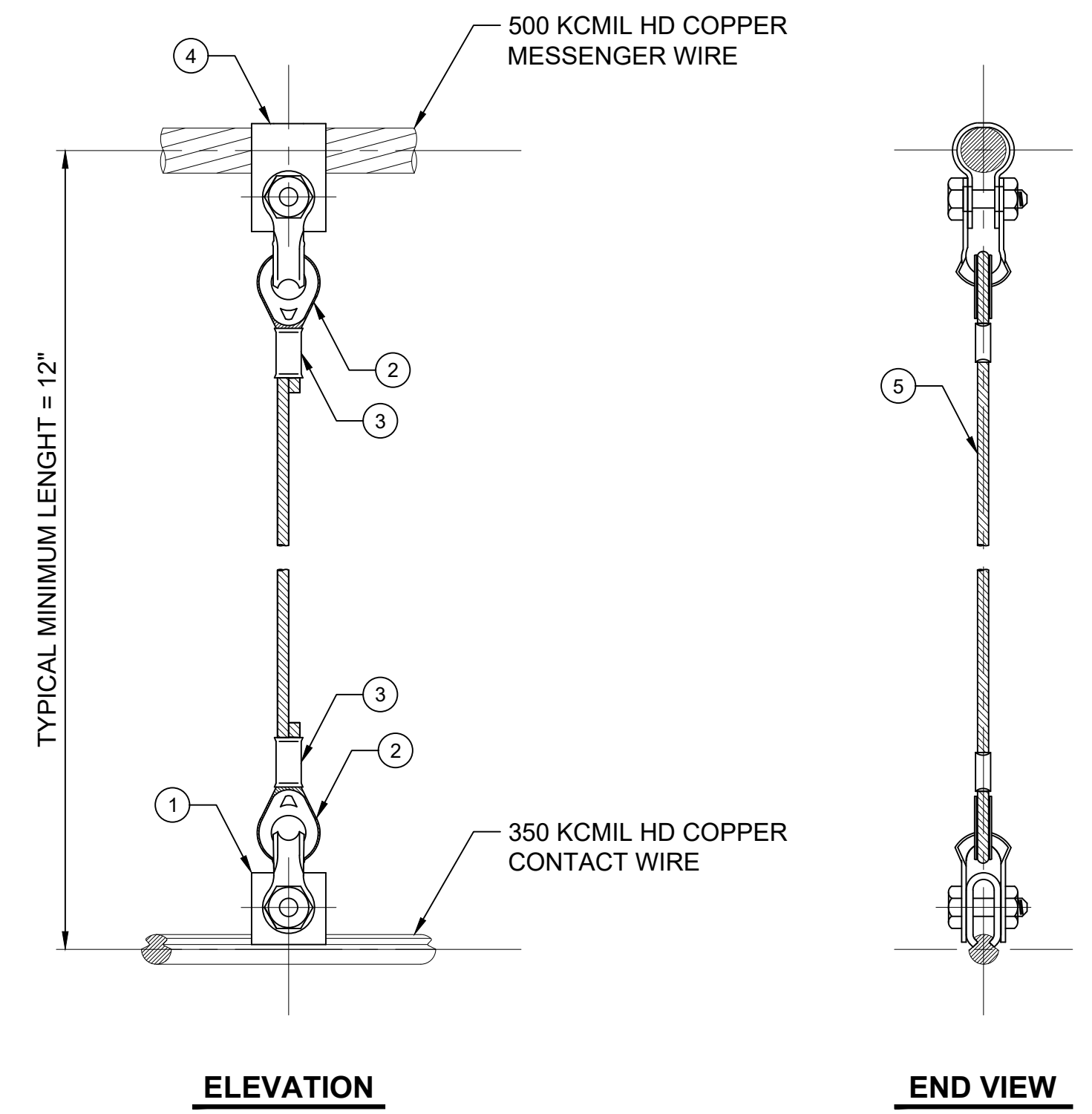
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DATE: 2/2024

SOUND TRANSIT STANDARD DRAWINGS SYSTEMS

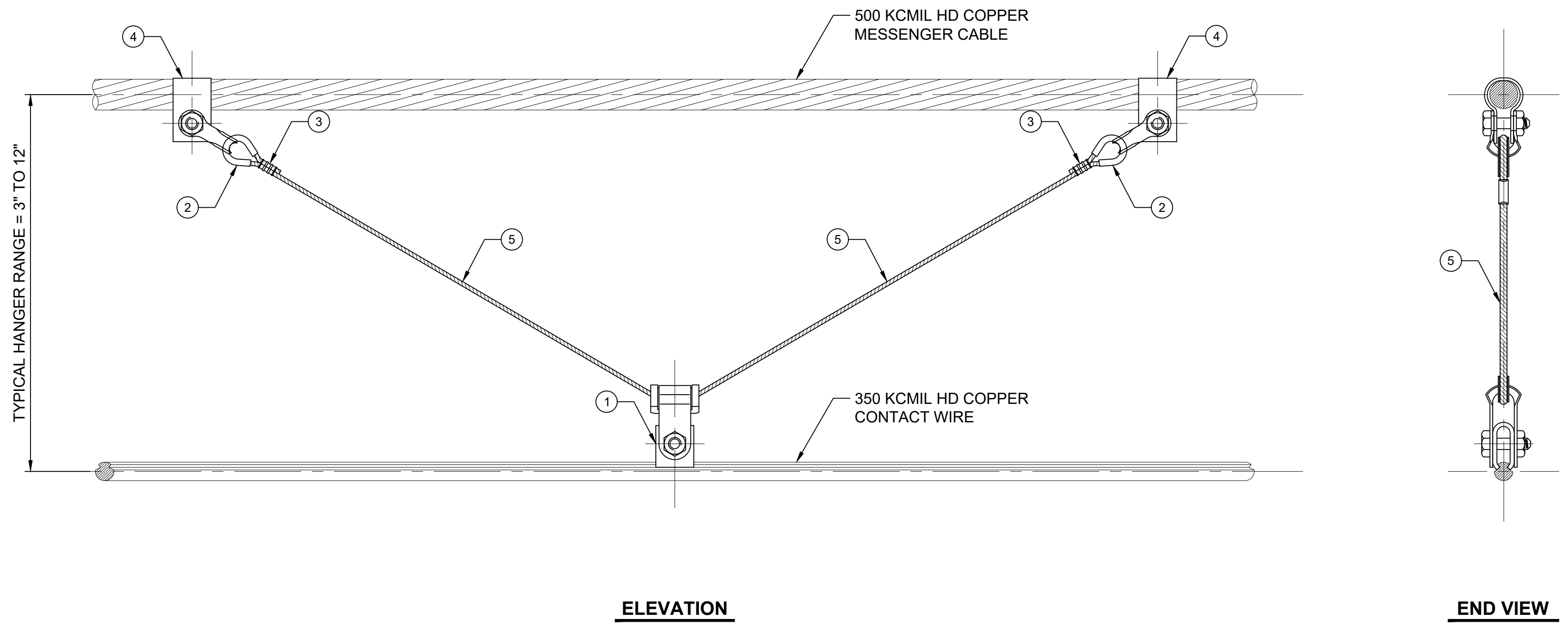
OVERHEAD CATENARY SYSTEM
LOW PROFILE TUNNEL SUPPORT ASSEMBLIES
SCAT TS-20 & TS-21

| | |
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| DRAWING No.: | STD-JOD446 |
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- GENERAL NOTES:**
- HANGER LENGTHS TO BE DETERMINED BY CONTRACTOR.
 - HANGERS SHALL BE FLEXIBLE STAINLESS STEEL WIRE ROPE.
 - FOR SYMBOLS, LEGEND AND ABBREVIATIONS SEE DRAWINGS JZN001 AND JZN002.
 - CONTRACTOR TO VERIFY ALL QUANTITIES AND SIZES ON THE BILL OF MATERIALS.
 - THE CONTRACTOR IS RESPONSIBLE FOR THE DESIGN OF EACH ASSEMBLY AS A WHOLE.
 - THE BILL OF MATERIALS ARE TYPICAL FOR THE ASSEMBLY STYLES SHOWN.



HANGER ASSEMBLY HA-1
NTS



SHORT HANGER ASSEMBLY HA-2
NTS

| BILL OF MATERIALS | | | | | |
|----------------------|------|-------|----------------------------|----------|------------------|
| QUANTITIES EACH TYPE | | UNITS | DESCRIPTION | ITEM NO. | PART NO./REMARKS |
| HA-2 | HA-1 | | | | |
| 1 | 1 | EA | CONTACT WIRE CLIP | 1 | |
| 2 | 2 | EA | INSULATED THIMBLE | 2 | |
| 2 | 2 | EA | COMPRESSION SLEEVE | 3 | |
| 2 | 1 | EA | MESSENGER CLIP | 4 | |
| 1 | 1 | LF | FLEXIBLE S/STL HANGER WIRE | 5 | LENGTH AS REQ'D |

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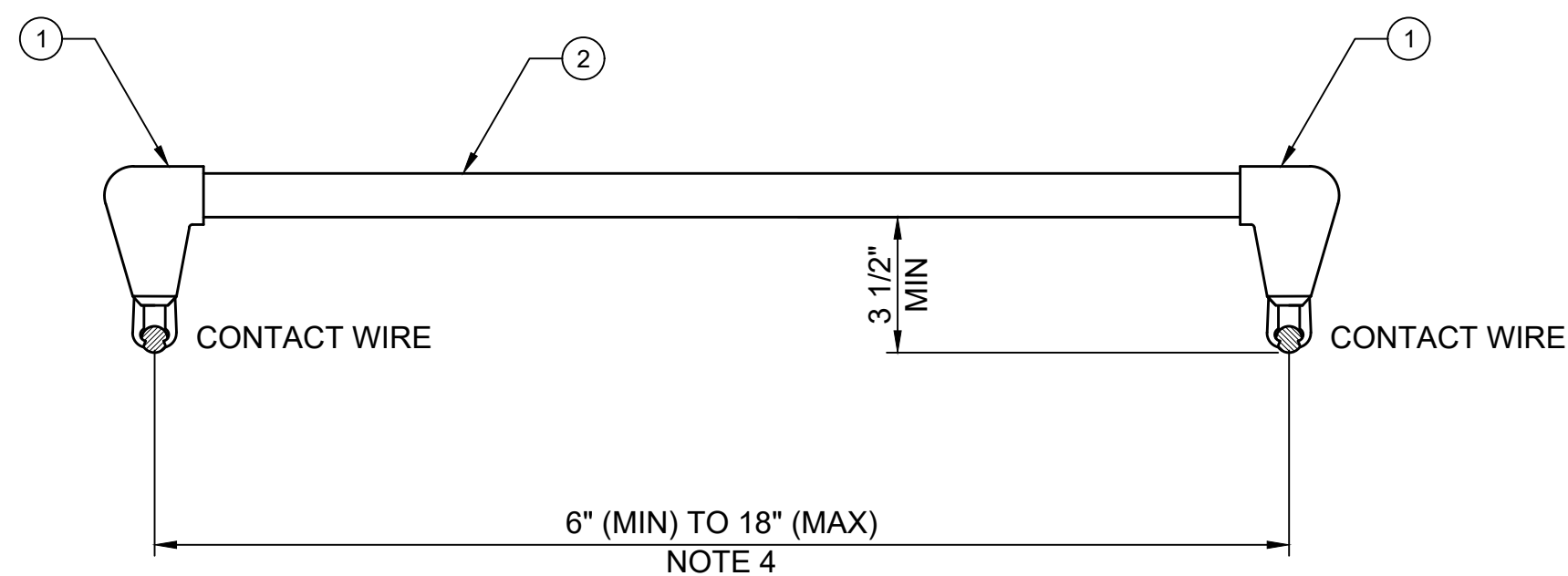
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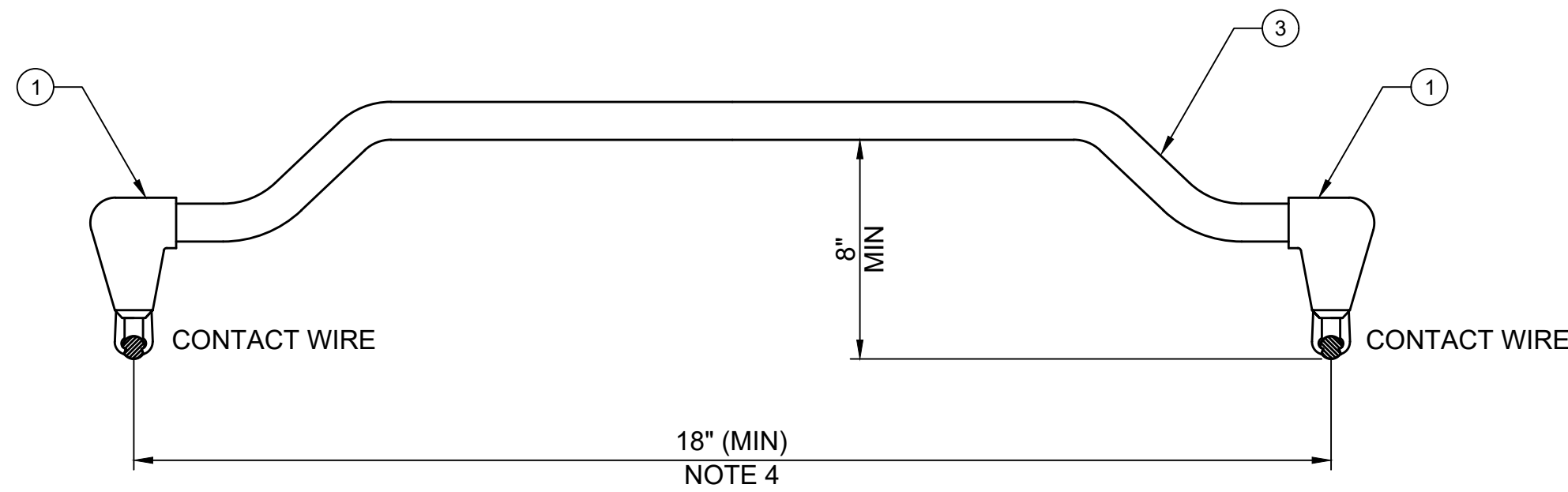


**SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS**
OVERHEAD CATENARY SYSTEM
HANGER ASSEMBLIES
HA-1 & HA-2

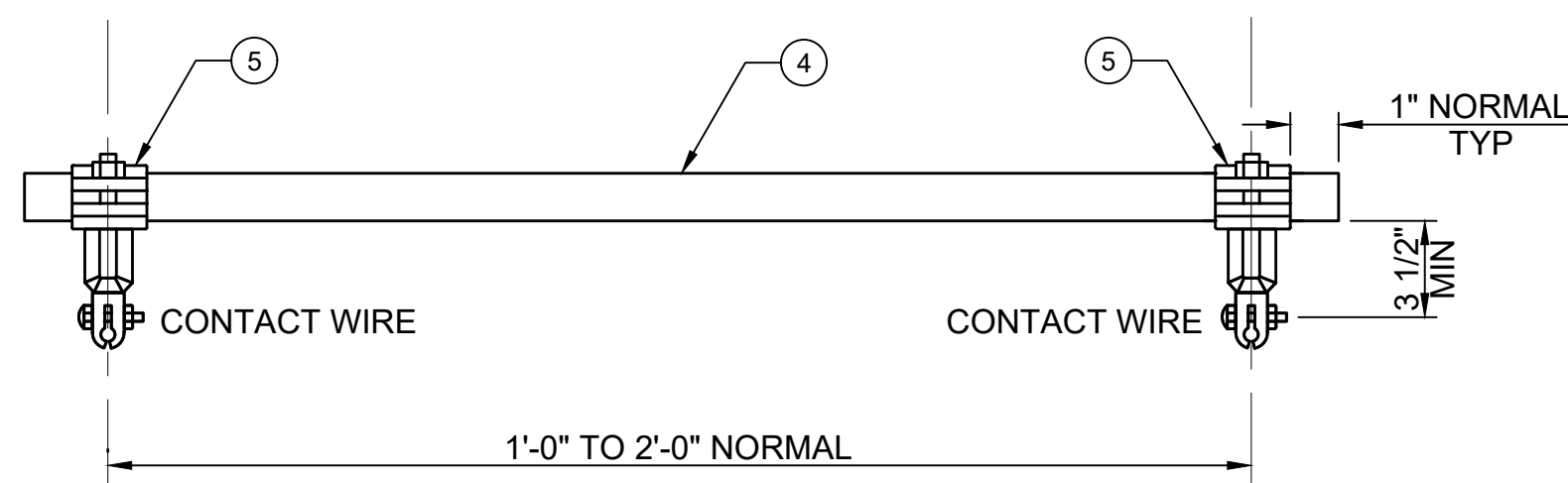
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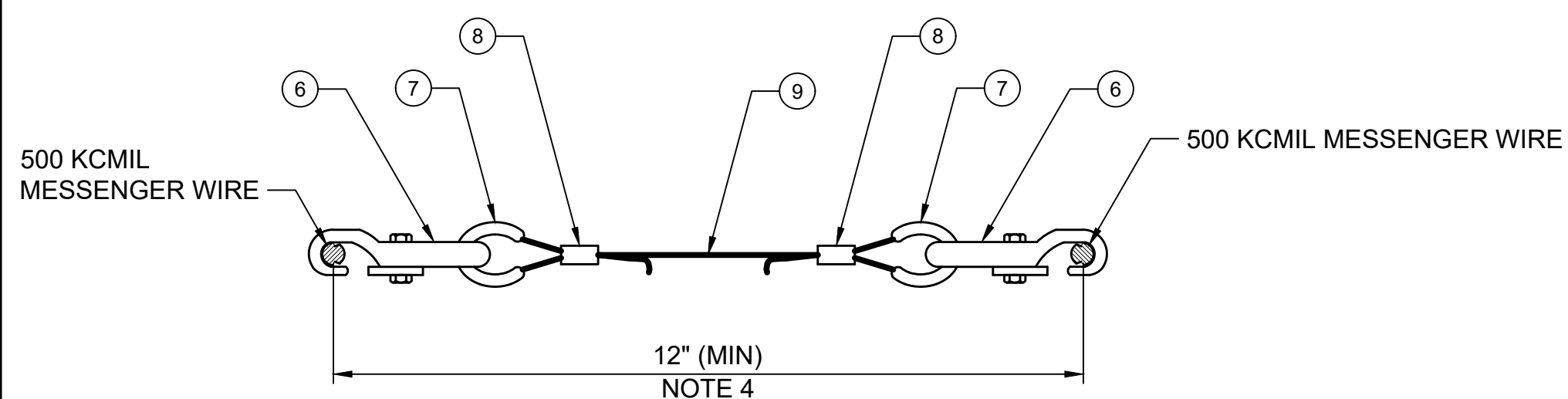
SHORT CONTACT WIRE KNUCKLE ASSEMBLY KN-1
NTS



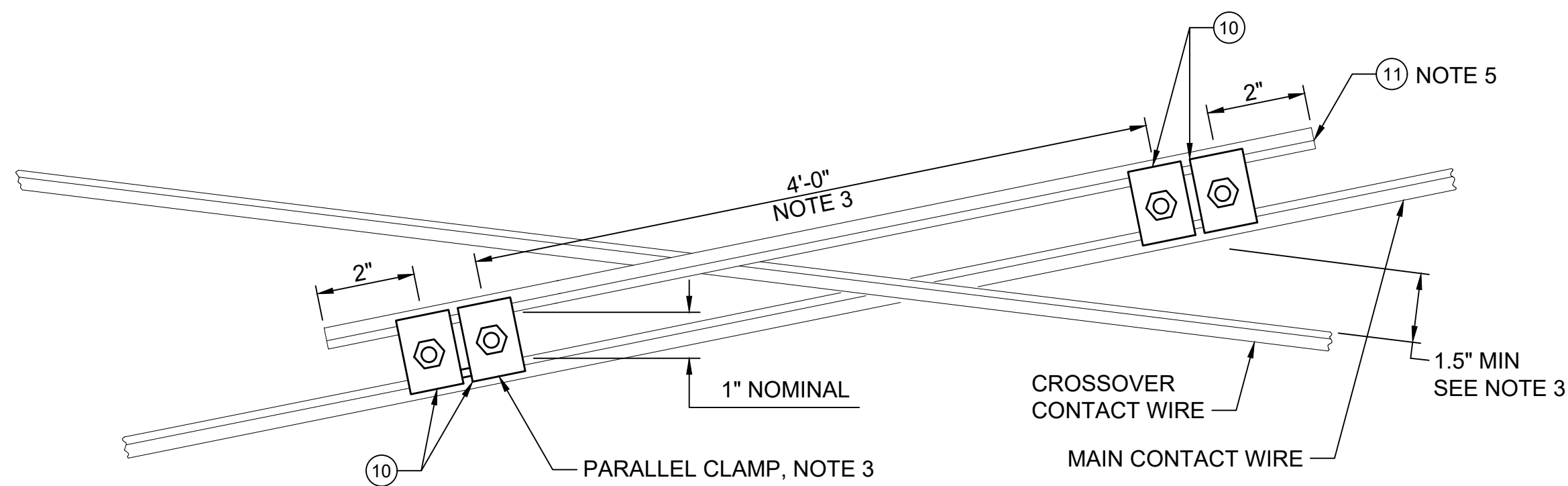
LONG CONTACT WIRE KNUCKLE ASSEMBLY KN-2
NTS



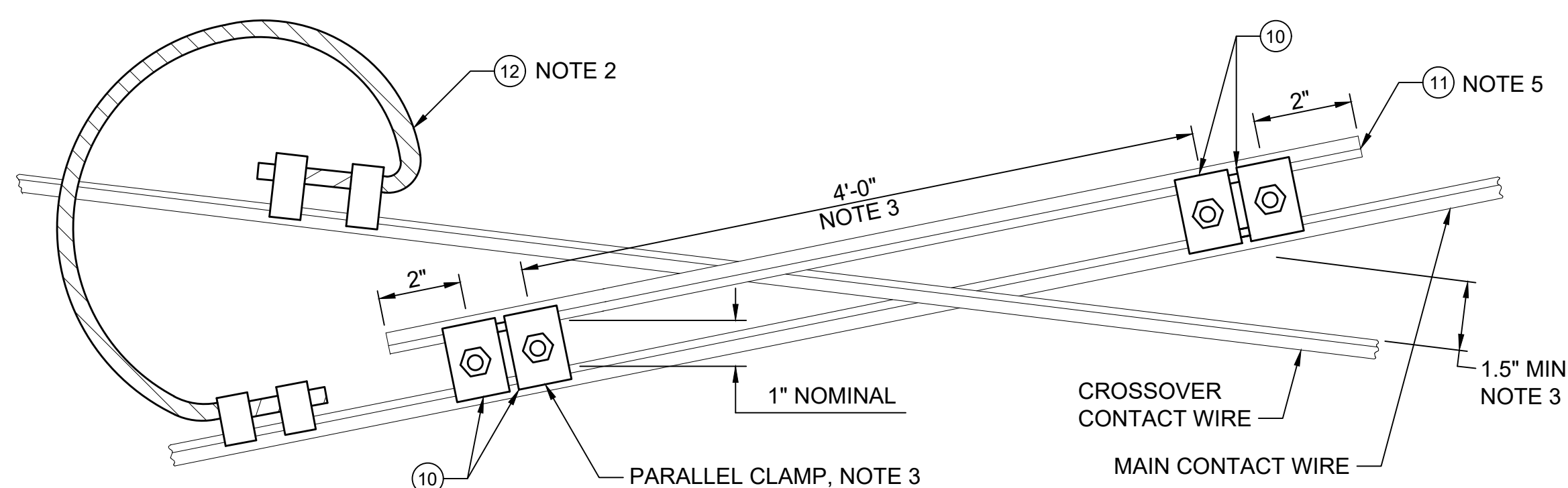
INSULATED KNUCKLE ASSEMBLY KN-3
NTS



MESSENGER WIRE KNUCKLE ASSEMBLY KN-4
NTS



CROSS CONTACT FOR SIMPLE CATENARY ASSEMBLY CC-1
NTS



SINGLE CONTACT SYSTEM CROSS CONTACT AND JUMPER ASSEMBLY CC-2
NTS

GENERAL NOTES:

- A FULL CURRENT JUMPER (TYPE JC-2) WILL TYPICALLY BE ALLOCATED IN ASSOCIATION WITH SIMPLE CATENARY CROSS CONTACT ASSEMBLIES AND KNUCKLE ASSEMBLIES ON OCS LAYOUT PLANS.
- POSITION THE JUMPER BETWEEN THE SINGLE CONTACT WIRES SO IT WILL BE CLEAR OF THE PANTOGRAPH UNDER ALL CONDITIONS.
- THE LENGTH OF THE BRIDGE ROD OR WIRE SHALL BE INCREASED AS NECESSARY WHEN THE CROSSING ANGLE PRODUCES LESS THAN 1.5" CLEARANCE AT EACH CLAMP.
- KNUCKLE LENGTH:
 - FOR FIXED TERMINATION CATENARY 6" MINIMUM MAY BE USED.
 - FOR AUTO-TENSIONED CATENARY A 6" MINIMUM KNUCKLE CAN BE USED ONLY WHERE ALONG TRACK MOVEMENTS ARE IDENTICAL. WHERE THE ALONG TRACK MOVEMENTS OF THE KNUCKLED WIRES ARE NOT IDENTICAL, THE KNUCKLE SHALL BE OF SUFFICIENT LENGTH TO ACCOMMODATE THE DIFFERENTIAL MOVEMENT WITHOUT CAUSING EXCESSIVE LOADINGS ON THE COMPONENTS OR RESTRICTING MOVEMENT. KNUCKLES SHALL BE USED ONLY IN TENSION.
- IF CONTACT WIRE IS USED FOR THE CROSS CONTACT BRIDGING ROD IT SHALL BE STRAIGHTENED IN THE SHOP. FIELD STRAIGHTENED WIRE SHALL NOT BE USED.
- CONTRACTOR TO DETERMINE COMPONENT DETAIL AND SAFE WORKING LOADS.
- FOR SYMBOLS, LEGEND AND ABBREVIATIONS SEE DRAWINGS JZN001 AND JZN002.
- CONTRACTOR TO VERIFY ALL QUANTITIES ON THE BILL OF MATERIALS.
- THE CONTRACTOR IS RESPONSIBLE FOR THE DESIGN OF EACH ASSEMBLY AS A WHOLE.
- THE BILL OF MATERIALS ARE TYPICAL FOR THE ASSEMBLY STYLES SHOWN. THE CONTRACTOR SHALL ITEMIZE THE TABLE WITH DESCRIPTIONS AND PART NUMBERS OF COMPONENTS REQUIRED TO COMPLETE EACH ASSEMBLY.

| BILL OF MATERIALS | | | | | | | | | | | |
|----------------------|------|------|------|-----|------|-------|-------------------------|----------|--------------------|--|--|
| QUANTITIES EACH TYPE | | | | | | UNITS | DESCRIPTION | ITEM NO. | PART NO./REMARKS | | |
| CC-2 | CC-1 | KN-4 | KN-3 | KN2 | KN-1 | | | | | | |
| - | - | - | - | 2 | 2 | EA | CONTACT WIRE CLAMP | 1 | | | |
| - | - | - | - | - | 1 | EA | STRAIGHT PIPE | 2 | LENGTH AS REQ'D | | |
| - | - | - | - | 1 | - | EA | CURVED PIPE | 3 | LENGTH AS REQ'D | | |
| - | - | - | 1 | - | - | EA | INSULATED ROD | 4 | LENGTH AS REQ'D | | |
| - | - | - | 2 | - | - | EA | CONTACT WIRE CLAMP | 5 | | | |
| - | - | 2 | - | - | - | EA | MESSENGER CLAMP | 6 | | | |
| - | - | 2 | - | - | - | EA | THIMBLE | 7 | | | |
| - | - | 2 | - | - | - | EA | COMPRESSION SLEEVE | 8 | | | |
| - | - | 1 | - | - | - | EA | FLEXIBLE SS WIRE | 9 | LENGTH AS REQ'D | | |
| 4 | 4 | - | - | - | - | EA | PARALLEL GROOVE CLAMP | 10 | | | |
| 1 | 1 | - | - | - | - | EA | CONTACT WIRE, 350 KCMIL | 11 | LENGTH AS REQ'D | | |
| 1 | - | - | - | - | - | EA | FULL FEEDING JUMPER | 12 | ASSEMBLY TYPE JC-1 | | |


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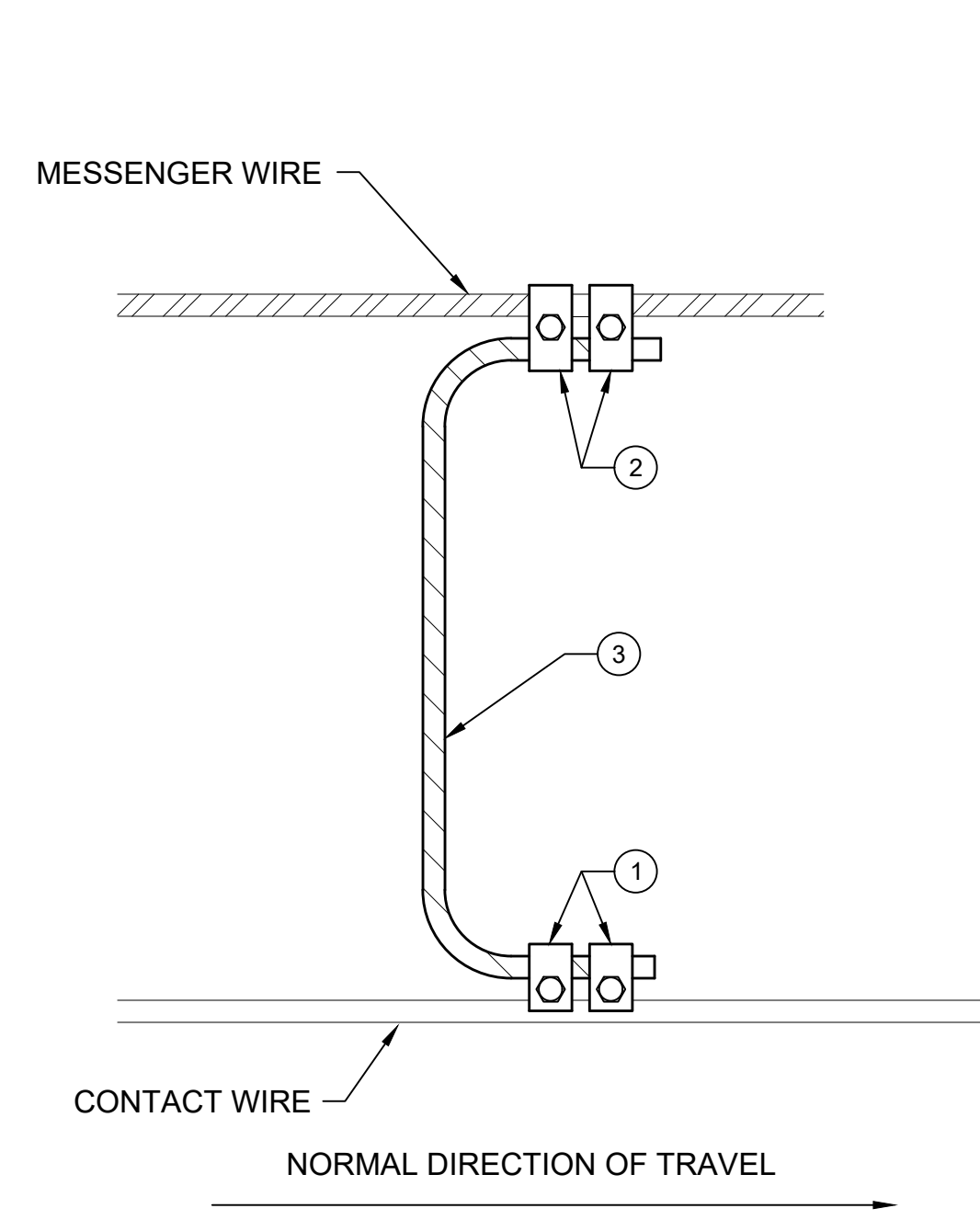


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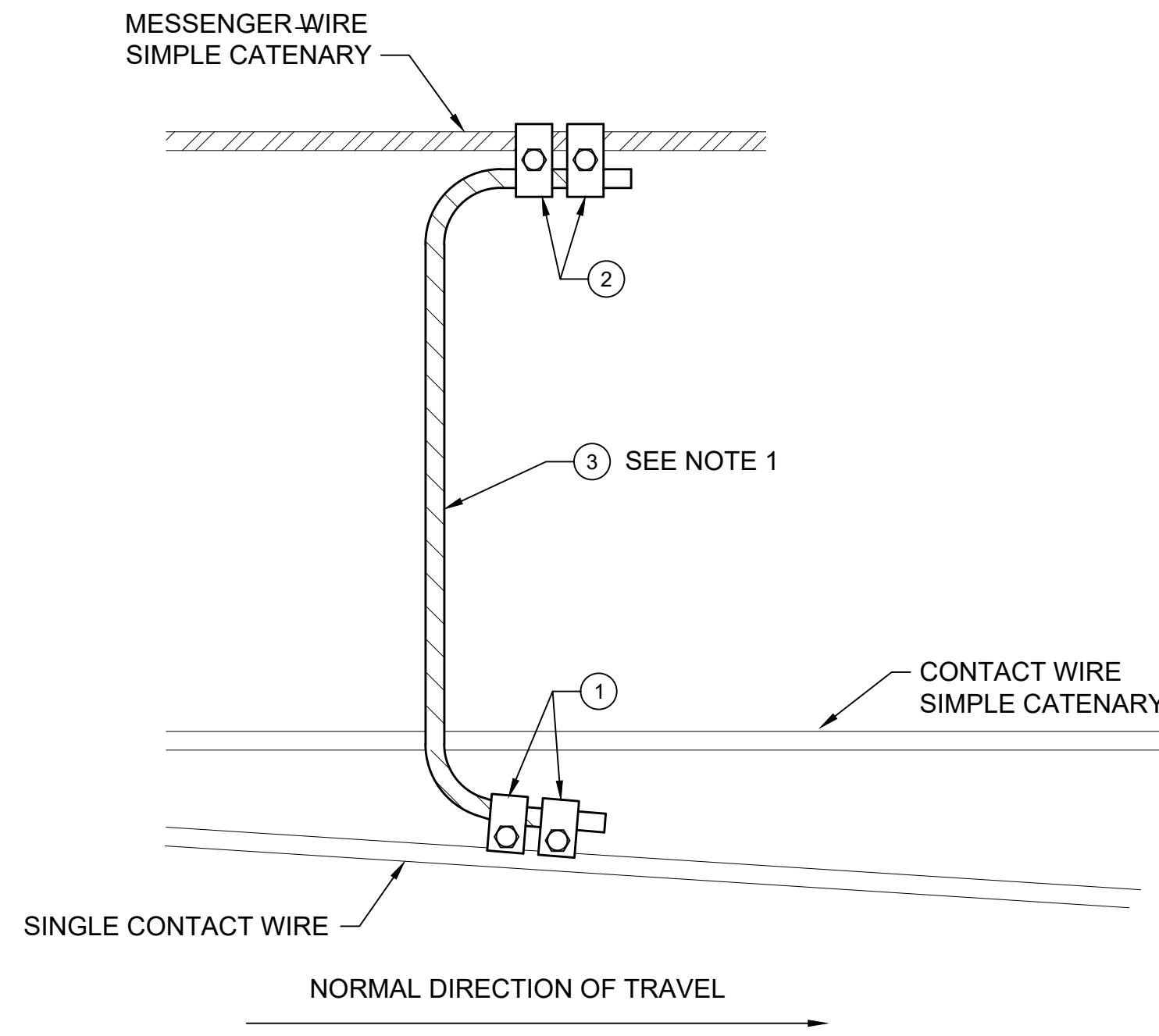
SOUND TRANSIT STANDARD DRAWINGS SYSTEMS

OVERHEAD CATENARY SYSTEM IN-SPAN ASSEMBLIES
CC-1, CC-2, KN-1, KN-2, KN-3 & KN-4

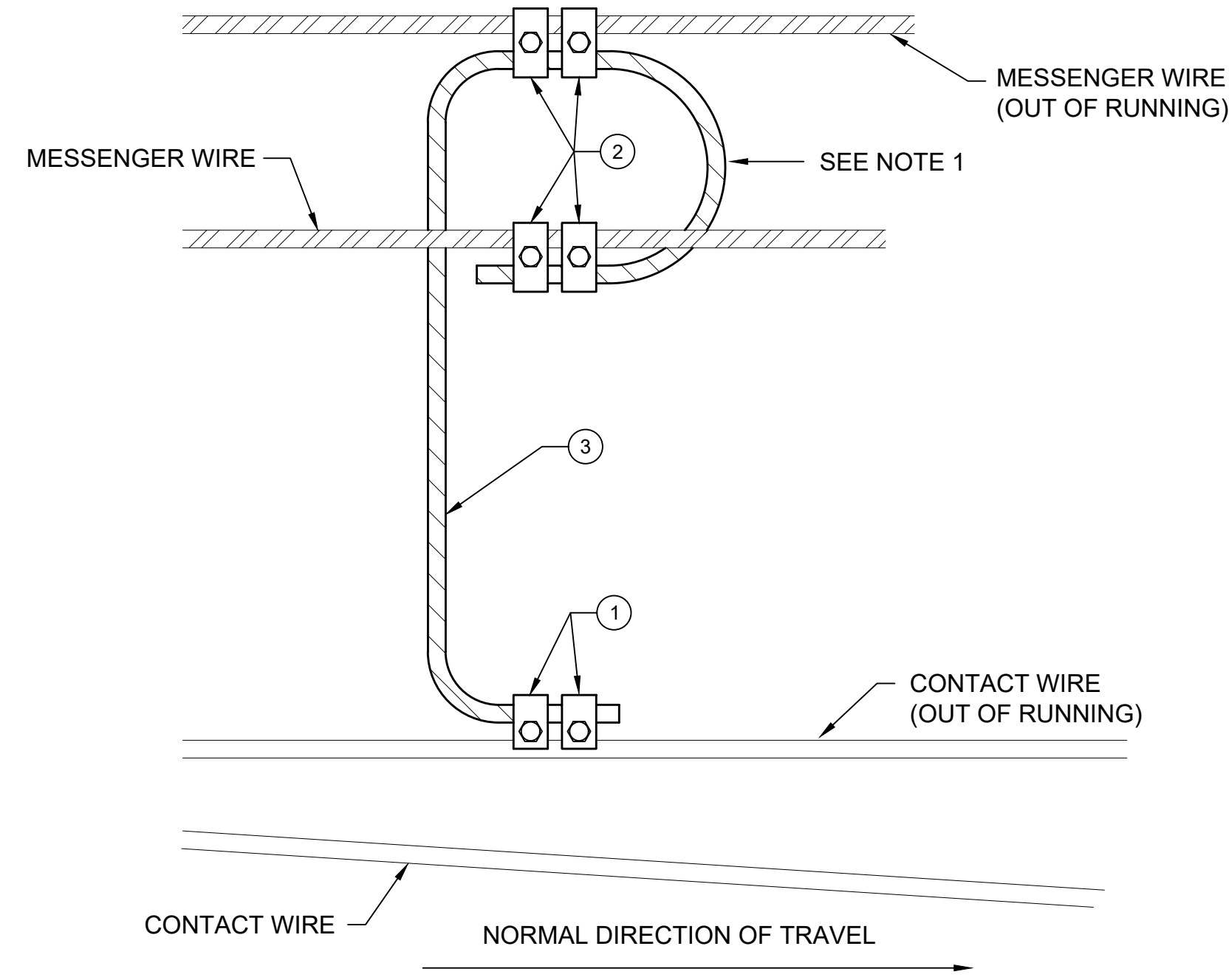
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FOR SIMPLE CATENARY
IN SPAN JUMPER JS-1
NTS

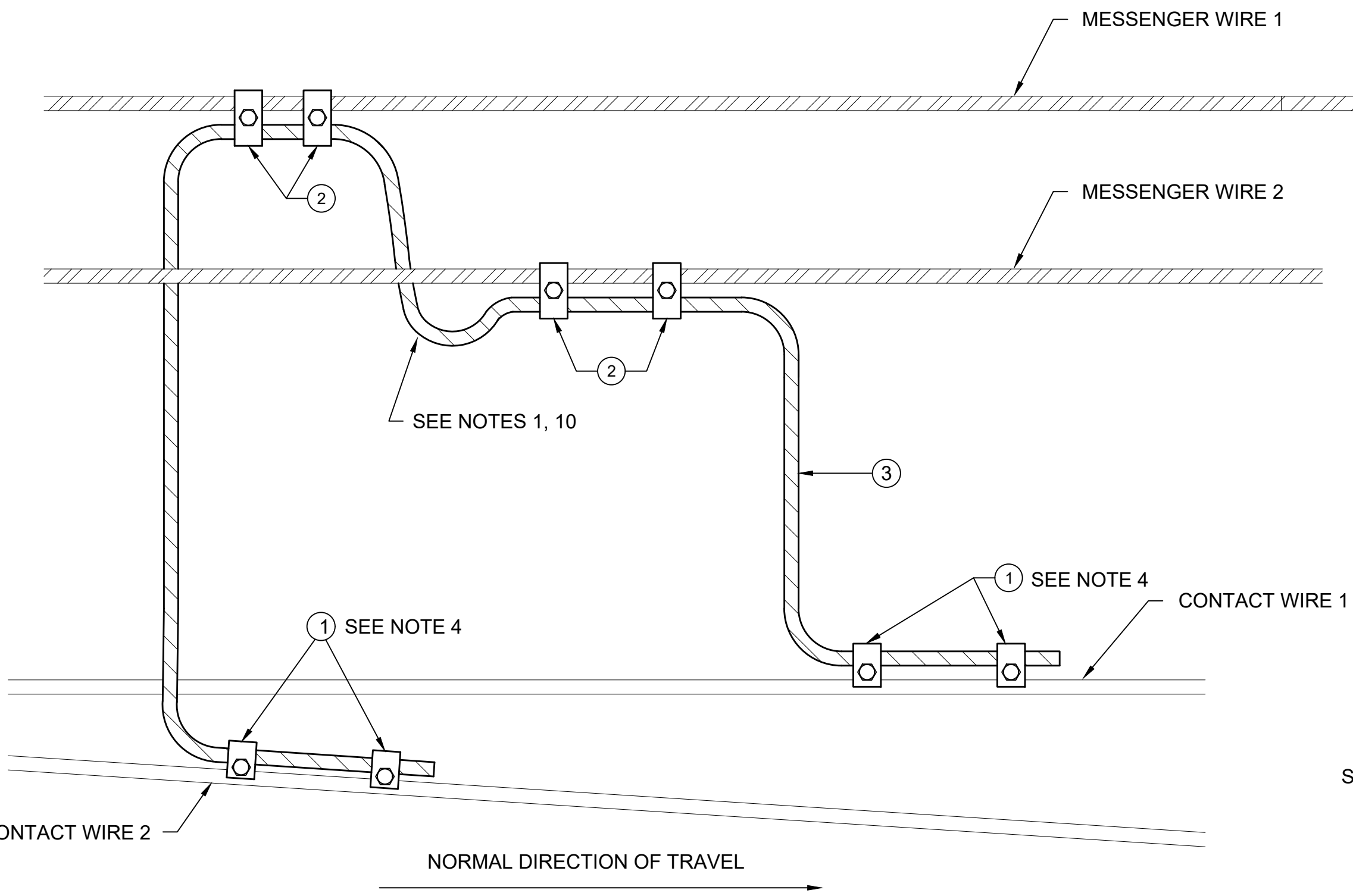


SIMPLE CATENARY TO SINGLE CONTACT SYSTEM
FULL CURRENT JUMPER JP-1
NTS

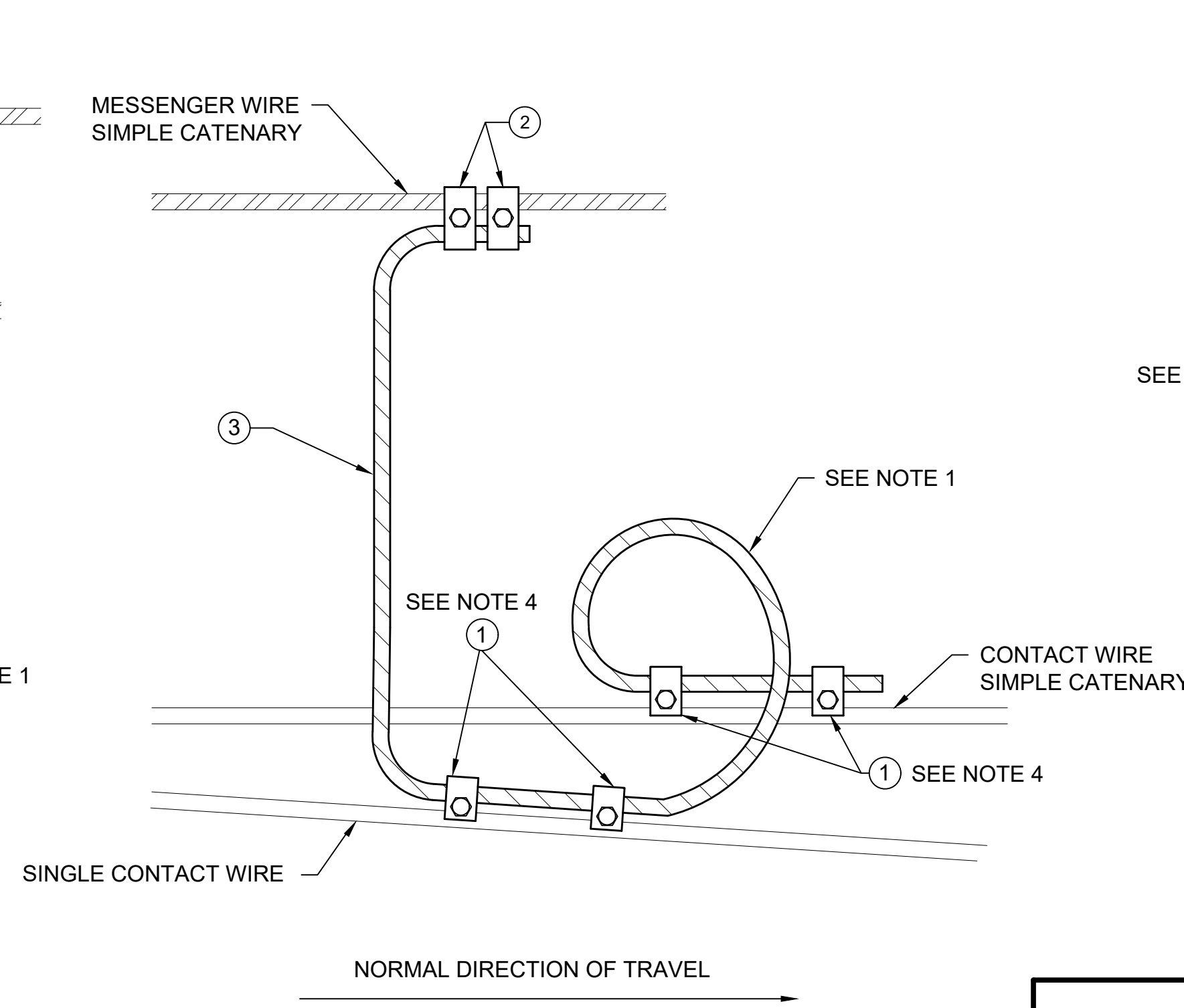


SIMPLE CATENARY TO SINGLE CONTACT SYSTEM
POTENTIAL EQUALIZING JUMPER JP-2
NTS

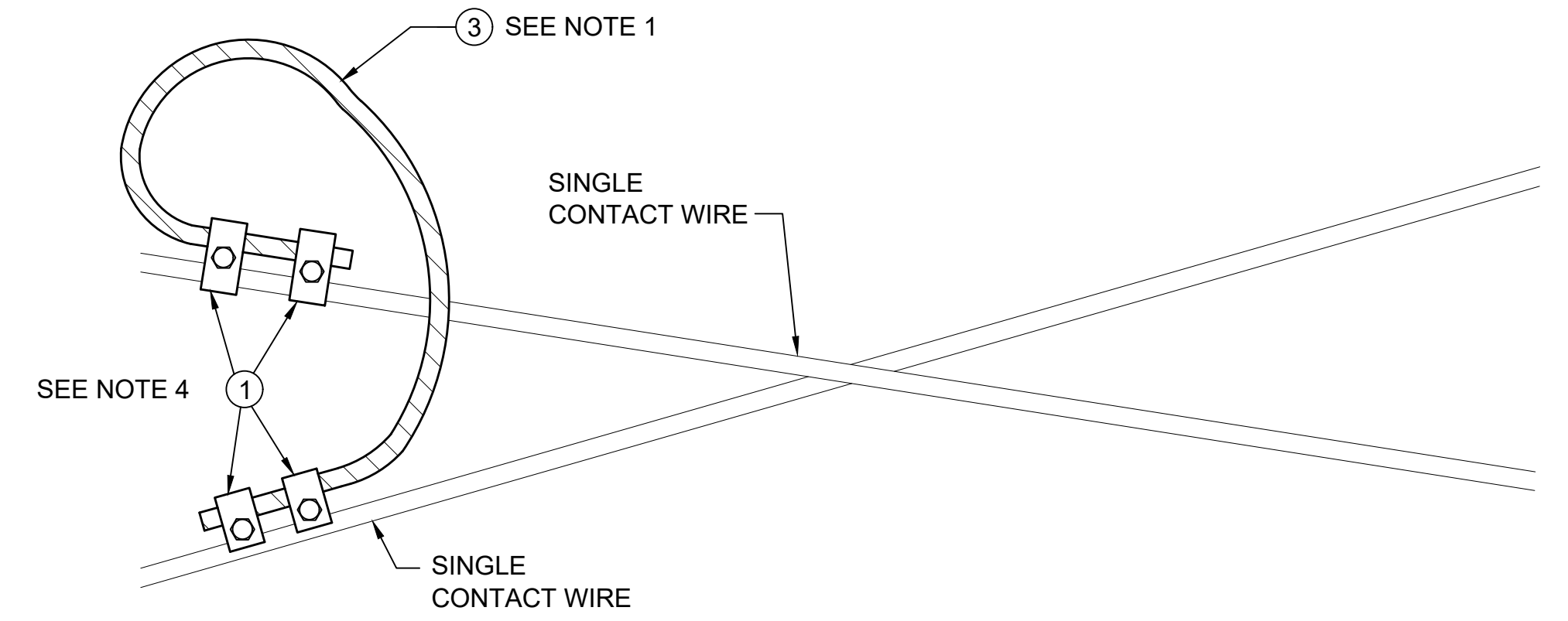
- GENERAL NOTES:**
- WHEN INSTALLING A JUMPER BETWEEN WIRES THE CONTRACTOR SHALL DRAPE THE JUMPER WIRE SUFFICIENTLY TO PROVIDE FOR DIFFERENTIAL ALONG TRACK MOVEMENT OF THE TENSION LENGTHS. ANY BENDS IN JUMPER WIRE SHALL BE NO LESS THAN 6" RADIUS.
 - MESSENGER WIRE IS 500 KCMIL HD COPPER 19 STRAND. CONTACT WIRE IS 350 KCMIL HD COPPER SOLID GROOVED.
 - CUT ENDS OF JUMPER WIRE TO PROTRUDE TYPICALLY 1" BEYOND ADJACENT CLAMP. ENDS TO BE BOUND TO PREVENT FRAYING.
 - THE CONTRACTOR MAY SUBSTITUTE ONE TWO-BOLT CONTACT/JUMPER CLAMP FOR EACH PAIR OF CLAMPS SHOWN.
 - THE BILL OF MATERIALS DETAILS ARE TYPICAL FOR THE ASSEMBLY STYLES SHOWN. THE CONTRACTOR SHALL ITEMIZE THE TABLE WITH DESCRIPTIONS AND PART NUMBERS OF COMPONENTS REQUIRED TO COMPLETE EACH ASSEMBLY.
 - CONTRACTOR TO DETERMINE COMPONENT DETAIL AND SAFE WORKING LOADS.
 - FOR SYMBOLS, LEGEND AND ABBREVIATIONS SEE DRAWINGS JZN001 AND JZN002.
 - CONTRACTOR TO VERIFY ALL QUANTITIES ON THE BILL OF MATERIALS.
 - THE CONTRACTOR IS RESPONSIBLE FOR THE DESIGN OF EACH ASSEMBLY AS A WHOLE.
 - INSTALL AS NOTED:
MESSENGER WIRE 1 TO CONTACT WIRE 2.
MESSENGER WIRE 2 TO CONTACT WIRE 1.



CATENARY SYSTEM TO CATENARY SYSTEM
FULL CURRENT JUMPER JC-2
NTS



SIMPLE CATENARY TO SINGLE CONTACT SYSTEM
FULL CURRENT JUMPER JC-3
NTS



SINGLE CONTACT SYSTEM FULL JUMPER JC-1
NTS

| QUANTITIES EACH TYPE | | | | | | UNITS | DESCRIPTION | ITEM NO. | PART NO./REMARKS |
|----------------------|------|------|------|------|------|-------|-------------------------------------|----------|------------------|
| JS-1 | JP-1 | JP-2 | JC-1 | JC-2 | JC-3 | | | | |
| 2 | 2 | 2 | 4 | 4 | 4 | EA | CLAMP, CONTACT/JUMPER | 1 | NOTE 4 |
| 2 | 2 | 4 | - | 4 | 2 | EA | CLAMP, MESSENGER/JUMPER | 2 | |
| 1 | 1 | 1 | 1 | 1 | 1 | EA | JUMPER WIRE, 350 KCMIL CLASS G OR H | 3 | LENGTH AS REQ'D |

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| No. | DATE | DSN | CHK | APP | REVISION |
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| 1 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |
| 0 | 8/2019 | | | | REVISED SYSTEMS DIRECTIVE DRAWINGS |

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APPROVED BY:

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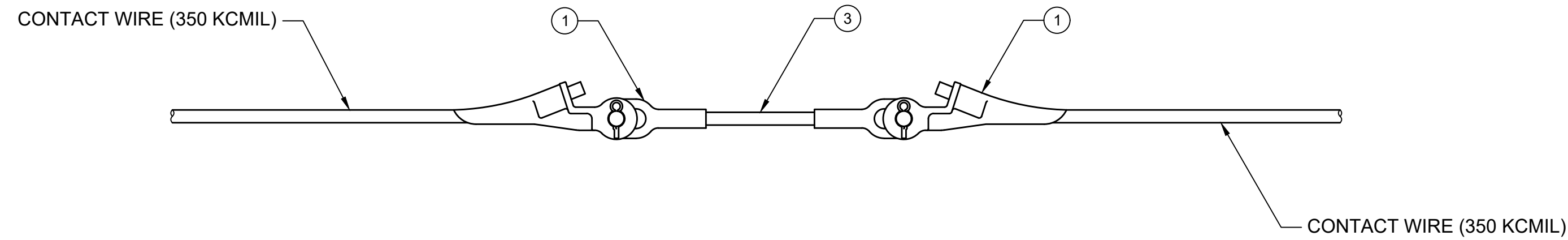
SCALE: NTS
FILENAME: STD-JOD502
CONTRACT No.: RTA/LR
DATE: 2/2024

SOUND TRANSIT STANDARD DRAWINGS SYSTEMS
OVERHEAD CATENARY SYSTEM JUMPER ASSEMBLIES
JC-1, JC-2, JC-3, JP-1, JP-2 & JS-1

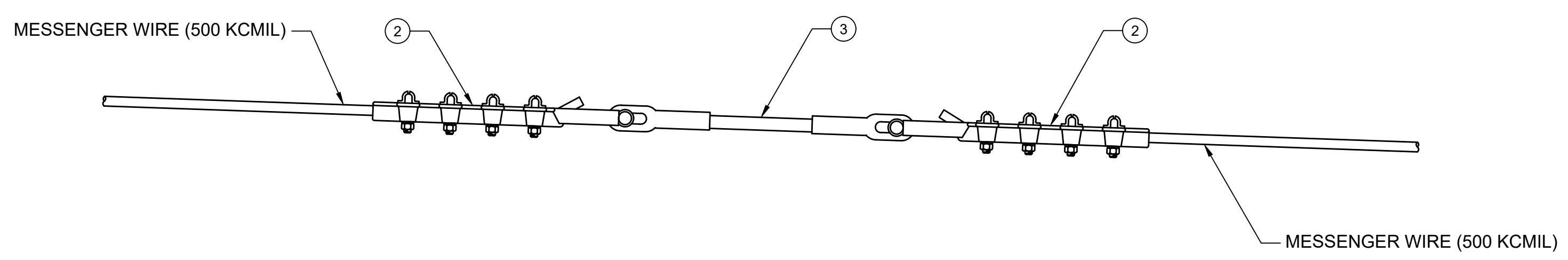
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FACILITY ID:
SHEET No.: 1 REV: 1

GENERAL NOTES:

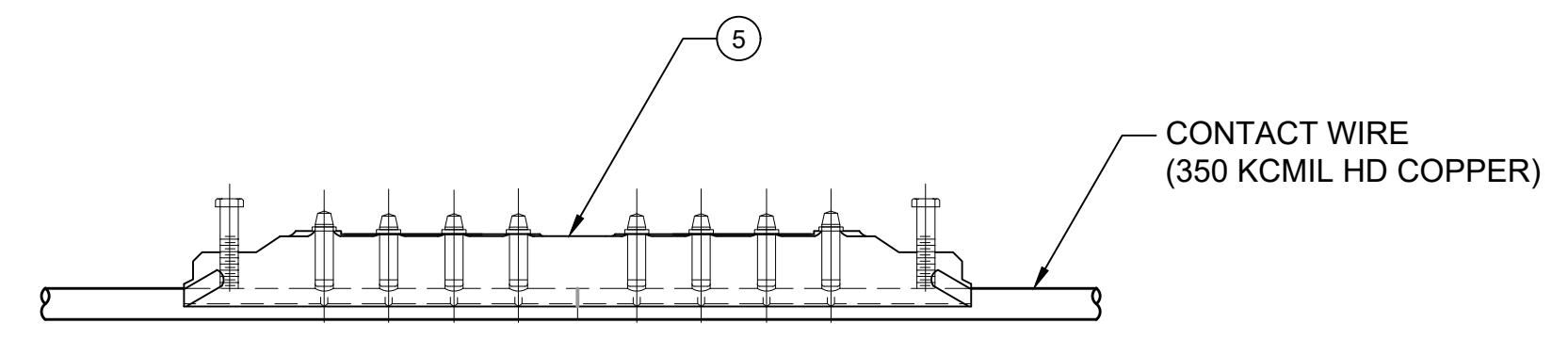
1. ALL INSULATORS, END CLAMPS AND SPLICES SHALL BE DESIGNED TO ACCOMMODATE MESSENGER AND CONTACT WIRE MAXIMUM TENSIONS TOGETHER WITH MINIMUM SPECIFIED SAFETY FACTORS.
2. LOCATION OF IN-SPAN INSULATION TO BE SHOWN ON OCS LAYOUT PLANS.
3. FOR CONDUCTOR TENSIONS AND DETAILS SEE TECHNICAL DWGS JOD100, JOD101.
4. A SWIVEL LINK MAY BE ADDED BETWEEN THE CONTACT WIRE CLAMPS OR MESSENGER WIRE CLAMPS AND THE INSULATORS TO PREVENT THE OUT OF RUNNING CATENARY FROM TWISTING.
5. THE BILL OF MATERIALS DETAILS ARE TYPICAL FOR THE ASSEMBLY STYLES SHOWN. THE CONTRACTOR SHALL ITEMIZE THE TABLE WITH DESCRIPTIONS AND PART NUMBERS OF COMPONENTS REQUIRED TO COMPLETE EACH ASSEMBLY.
6. ASSEMBLY IN-1 SHALL NOT BE INSTALLED WHERE LESS THAN 6" VERTICAL CLEARANCE WILL OCCUR ABOVE A PANTOGRAPH. INSTEAD USE ASSEMBLY IN-3.
7. CONTRACTOR TO DETERMINE COMPONENT DETAIL AND SAFE WORKING LOADS.
8. FOR SYMBOLS, LEGEND AND ABBREVIATIONS SEE DRAWINGS JZN001 AND JZN002.
9. CONTRACTOR TO VERIFY ALL QUANTITIES ON THE BILL OF MATERIALS.
10. THE CONTRACTOR IS RESPONSIBLE FOR THE DESIGN OF EACH ASSEMBLY AS A WHOLE.



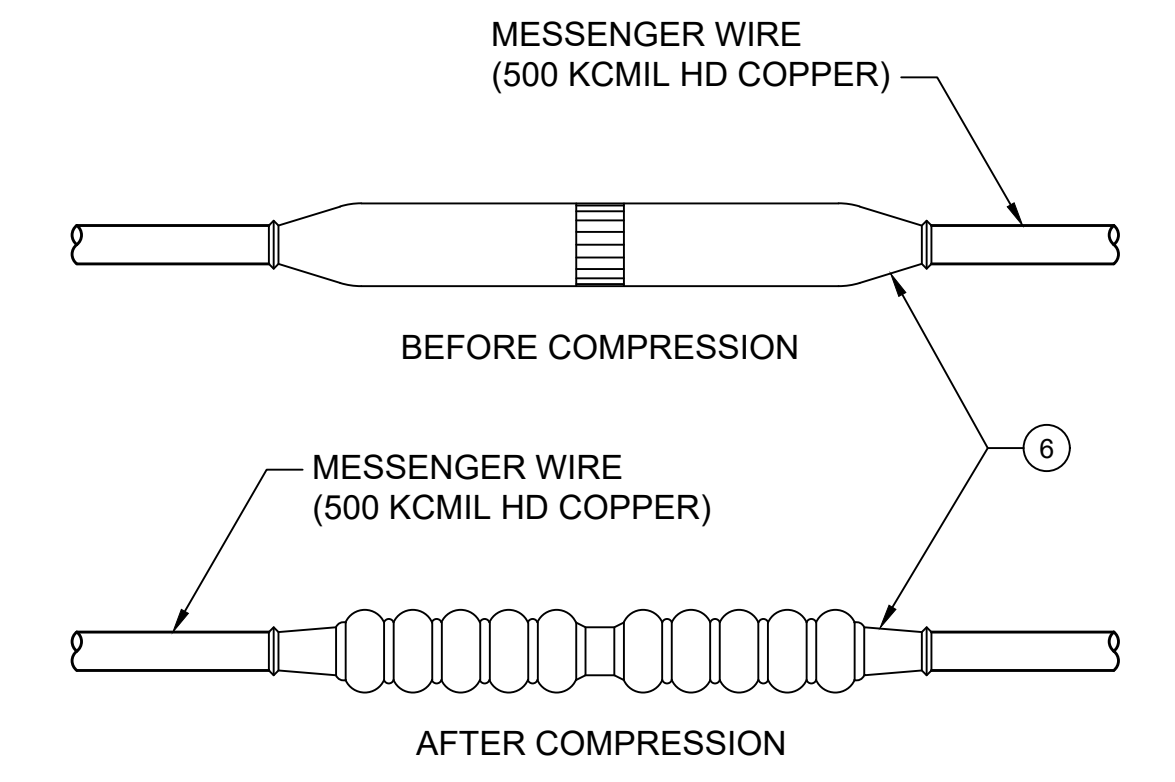
CONTACT WIRE IN-SPAN INSULATION ASSEMBLY IN-1
NTS



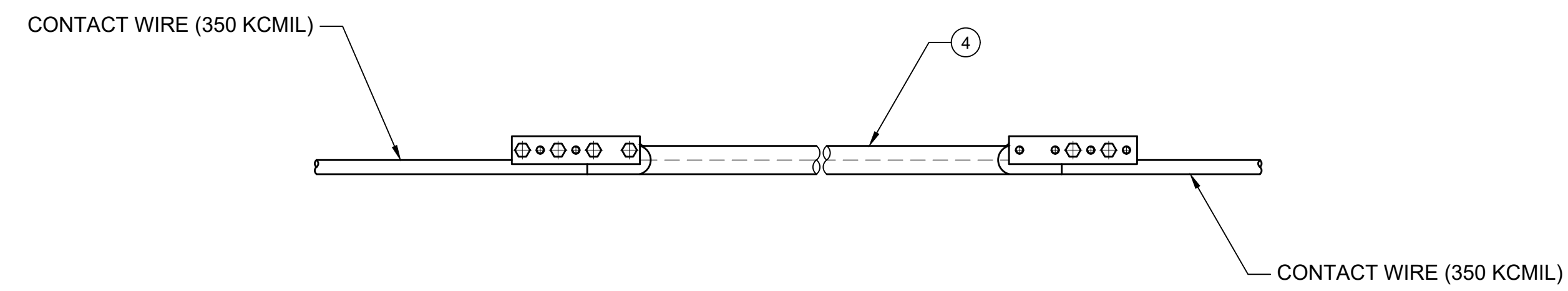
MESSENGER IN-SPAN INSULATION ASSEMBLY IN-2
NTS



CONTACT WIRE SPLICE ASSEMBLY SPL-1
NTS



MESSENGER WIRE SPLICE ASSEMBLY SPL-2
NTS



CONTACT WIRE OVERLAP IN-SPAN INSULATION ASSEMBLY IN-3
NTS

| BILL OF MATERIALS | | | | | | | | |
|----------------------|-------|------|------|------|-------|------------------------|----------|------------------|
| QUANTITIES EACH TYPE | | | | | UNITS | DESCRIPTION | ITEM NO. | PART NO./REMARKS |
| SPL-2 | SPL-1 | IN-3 | IN-2 | IN-1 | | | | |
| - | - | - | - | 2 | EA | CONTACT WIRE DEAD END | 1 | |
| - | - | - | 2 | - | EA | MESSENGER DEAD END | 2 | |
| - | - | - | 1 | 1 | EA | STRAIN INSULATOR | 3 | |
| - | - | 1 | - | - | EA | CONTACT WIRE INSULATOR | 4 | |
| - | 1 | - | - | - | EA | CONTACT WIRE SPLICE | 5 | |
| 1 | - | - | - | - | EA | MESSENGER WIRE SPLICE | 6 | |


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| 1 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |
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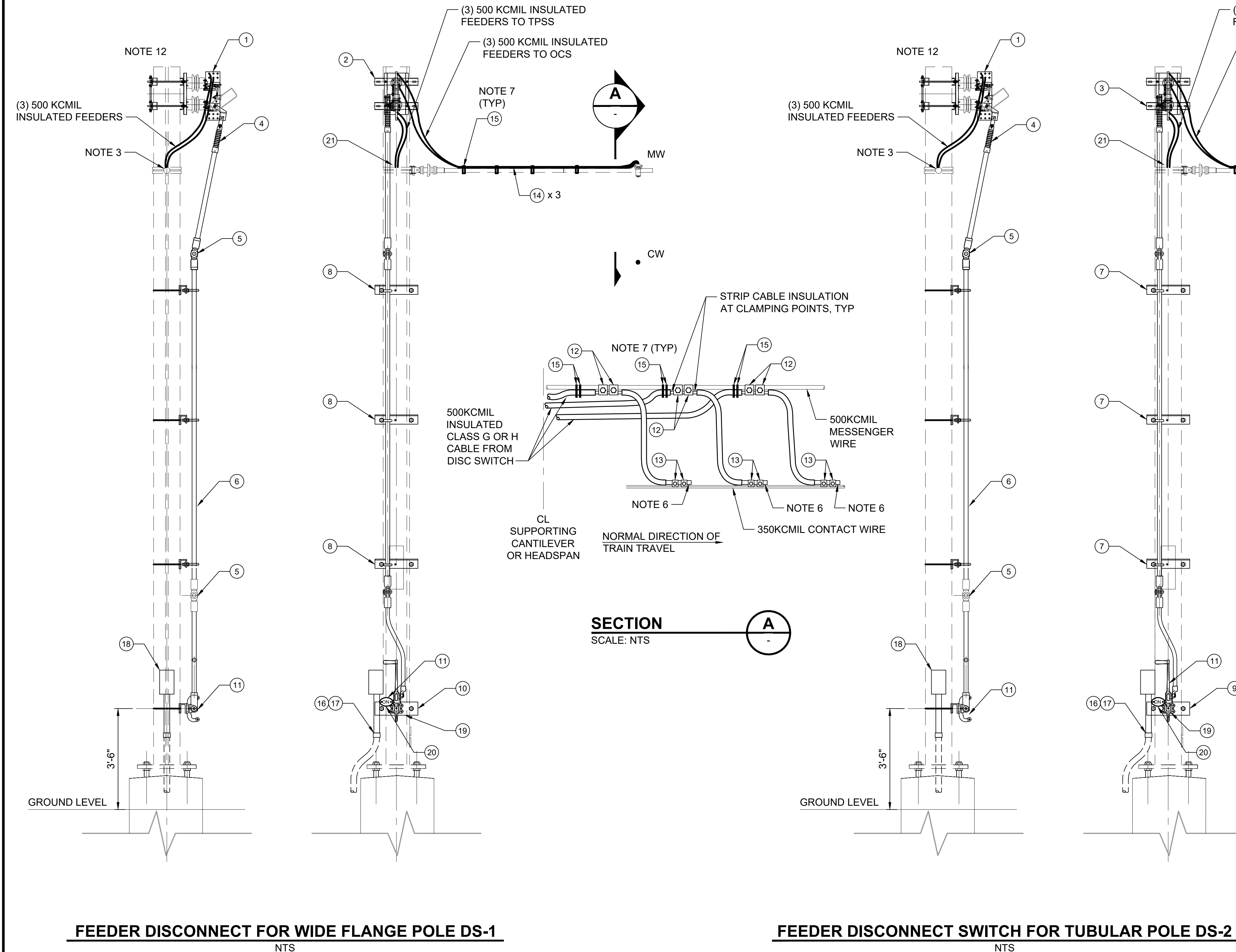
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FILENAME: STD-JOD503
CONTRACT No.: RTA/LR
DATE: 2/2024

SOUND TRANSIT STANDARD DRAWINGS SYSTEMS

OVERHEAD CATENARY SYSTEM
IN-SPAN INSULATORS AND SPLICE ASSEMBLIES
IN-1, IN-2, IN-3, SPL -1, & SPL-2

DRAWING No.: **STD-JOD503**
FACILITY ID:
SHEET No.: 1 REV: 1

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- GENERAL NOTES:**
1. THE BILL OF MATERIALS DETAILS ARE TYPICAL FOR THE ASSEMBLY STYLES SHOWN. THE CONTRACTOR SHALL ITEMIZE THE TABLE WITH DESCRIPTIONS AND PART NUMBERS OF COMPONENTS REQUIRED TO COMPLETE EACH ASSEMBLY.
 2. THE CONTRACTOR SHALL INCLUDE CABLE SUPPORTS WHERE CABLE WEIGHT MAY AFFECT SWITCH OPERATION.
 3. 4" CONDUITS ARE PART OF WIDE FLANGE FEEDER POLE ASSEMBLIES. (FEEDER SPOUTS ARE PART OF TUBULAR FEEDER POLE ASSEMBLIES.)
 4. TERMINATE HANDLE INDICATOR CABLE AT SCADA JUNCTION BOX.
 5. BEFORE ASSEMBLY, CLAMPS ARE TO BE WIRE BRUSH CLEANED, THEN GREASED WITH CONDUCTIVE GREASE ACCORDING TO CLAMP MANUFACTURER.
 6. WIRE ENDS TO BE TIED BEFORE CUTTING AND POSITIONED TO PROTRUDE BEYOND CLAMPS BY 1".
 7. CABLES AND CLAMPS TO BE INSTALLED ALLOWING FOR ALONG TRACK WIRING MOVEMENT, AND SECURED AGAINST DROOPING BELOW THE LEVEL OF THE CONTACT WIRE WHEN UPLIFTED 3". (INSULATED CABLE SUPPORT REQUIREMENTS TO BE PROVIDED IN SPECIFICATIONS.)
 8. JUMPER WIRES CONNECTED TO THE CONTACT WIRE SHALL NOT BE BENT TO LESS THAN 6" RADIUS.
 9. CABLE MUST NOT BE TIED TO ANY ADJACENT INSULATORS.
 10. HANDLE SHALL BE IN THE DOWN POSITION WHEN THE SWITCH IS OPEN.
 11. INSTALL PROVISIONS TO PAD LOCK SWITCH IN OPEN AND CLOSED POSITIONS.
 12. POLE, CANTILEVER/SUPPORT ASSEMBLY AND SURGE ARRESTER TO BE CALLED OFF SEPARATELY.
 13. CONTRACTOR TO COORDINATE CABLE ROUTING WITH THE OCS LAYOUT PLANS AND SECTIONALIZING DIAGRAM.

| BILL OF MATERIALS | | | | | |
|----------------------|----------|-------|------------------------------|----------|------------------|
| QUANTITIES EACH TYPE | | UNITS | DESCRIPTION | ITEM NO. | PART NO./REMARKS |
| DS-2 | DS-1 | | | | |
| 1 | 1 | EA | SWITCH ASSY, 2000 AMP | 1 | |
| - | 1 | EA | SWITCH SUPPORT, WF POLE | 2 | |
| 1 | - | EA | SWITCH SUPPORT, TUBULAR POLE | 3 | |
| 1 | 1 | EA | INSULATED PIPE | 4 | |
| 2 | 2 | EA | PIPE LINKAGE | 5 | |
| AS REQ'D | AS REQ'D | LF | OPERATING PIPE | 6 | |
| 3 | - | EA | PIPE SUPPORT, TUBULAR POLE | 7 | |
| - | 3 | EA | PIPE SUPPORT, WF POLE | 8 | |
| 1 | - | EA | HANDLE SUPPORT, TUBULAR POLE | 9 | |
| - | 1 | EA | HANDLE SUPPORT, WF POLE | 10 | |
| 1 | 1 | EA | OPERATING HANDLE ASSY | 11 | |
| 6 | 6 | EA | CABLE FEEDER/MESSENGER CLAMP | 12 | |
| 6 | 6 | EA | FEEDER/CONTACT CLAMP | 13 | |
| AS REQ'D | AS REQ'D | LF | FEEDER CABLE, 500KCMIL | 14 | 2400V INSULATED |
| AS REQ'D | AS REQ'D | EA | INSULATED CABLE SUPPORT | 15 | |
| AS REQ'D | AS REQ'D | LF | CONDUIT | 16 | |
| AS REQ'D | AS REQ'D | EA | PIPE STRAP FOR CONDUIT | 17 | |
| 1 | 1 | EA | SCADA JUNCTION BOX | 18 | NOTE 4 |
| AS REQ'D | AS REQ'D | EA | INTERLOCK | 19 | |
| 1 | 1 | EA | HANDLE INDICATOR | 20 | |
| 1 | 1 | EA | STRAIN RELIEF BUSHING | 21 | WATERTIGHT |

FEEDER DISCONNECT FOR WIDE FLANGE POLE DS-1
NTS

FEEDER DISCONNECT SWITCH FOR TUBULAR POLE DS-2
NTS

SECTION A
SCALE: NTS

| No. | DATE | DSN | CHK | APP | REVISION |
|-----|--------|-----|-----|-----|------------------------------------|
| 1 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |
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CHECKED BY:
APPROVED BY:

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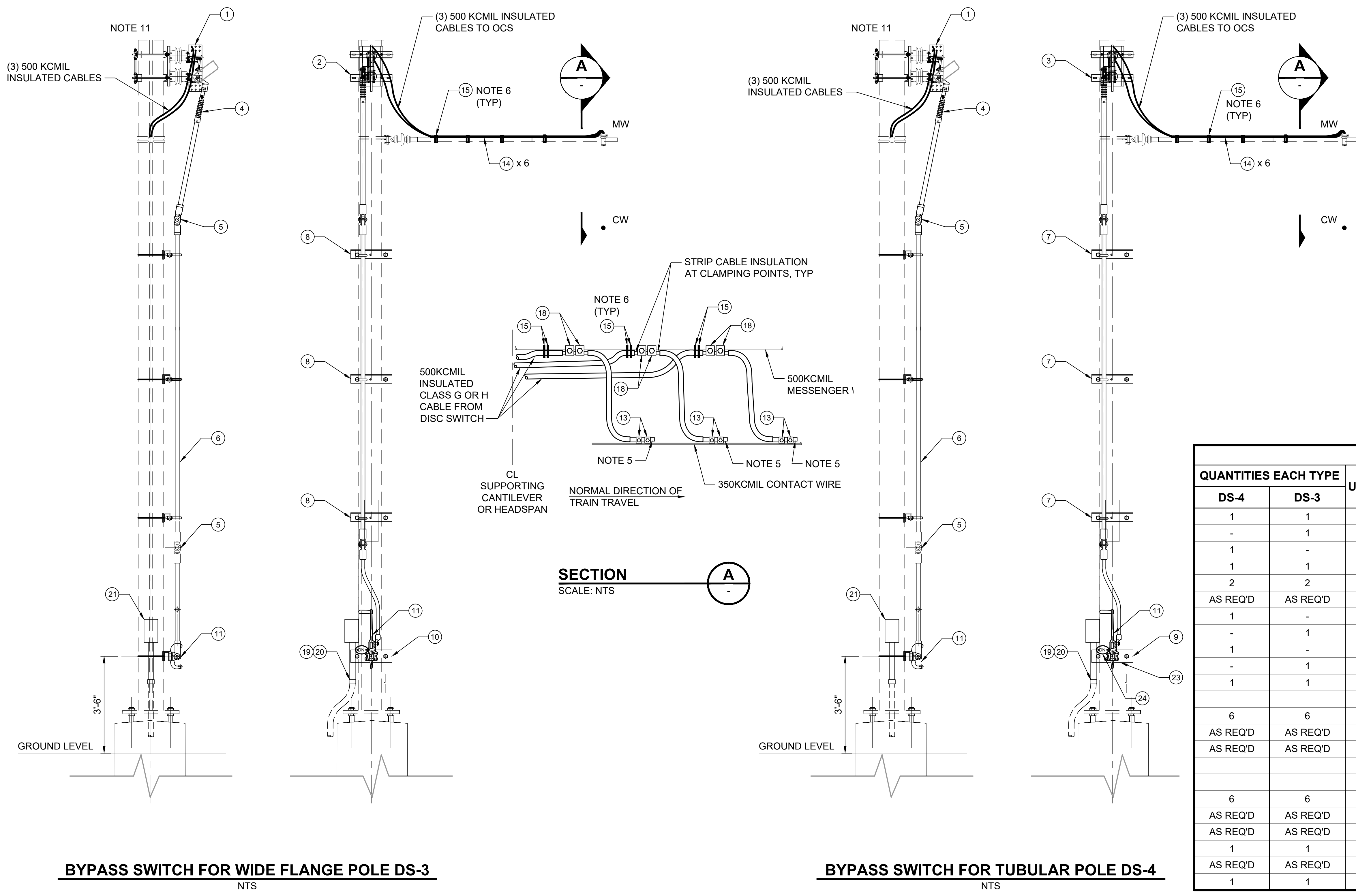
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CONTRACT No.: RTA/LR
DATE: 2/2024

SOUND TRANSIT STANDARD DRAWINGS SYSTEMS

OVERHEAD CATENARY SYSTEM
POLE MOUNTED FEEDER DISCONNECT ASSEMBLIES DS-1 & DS-2

DRAWING No.: **STD-JOD510**
FACILITY ID:
SHEET No.: REV: 1

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- GENERAL NOTES:**
1. THE BILL OF MATERIALS DETAILS ARE TYPICAL FOR THE ASSEMBLY STYLES SHOWN. THE CONTRACTOR SHALL ITEMIZE THE TABLE WITH DESCRIPTIONS AND PART NUMBERS OF COMPONENTS REQUIRED TO COMPLETE EACH ASSEMBLY.
 2. THE CONTRACTOR SHALL INCLUDE CABLE SUPPORTS WHERE CABLE WEIGHT MAY AFFECT SWITCH OPERATION.
 3. TERMINATE HANDLE INDICATOR CABLE AT SCADA JUNCTION BOX.
 4. BEFORE ASSEMBLY, CLAMPS ARE TO BE WIRE BRUSH CLEANED, THEN GREASED WITH CONDUCTIVE GREASE ACCORDING TO CLAMP MANUFACTURER.
 5. WIRE ENDS TO BE TIED BEFORE CUTTING AND POSITIONED TO PROTRUDE BEYOND CLAMPS BY 1".
 6. CABLES AND CLAMPS TO BE INSTALLED ALLOWING FOR ALONG TRACK WIRING MOVEMENT, AND SECURED AGAINST DROOPING BELOW THE LEVEL OF THE CONTACT WIRE WHEN UPLIFTED 3". INSULATED CABLE SUPPORT REQUIREMENTS TO BE PROVIDED IN SPECIFICATIONS.
 7. JUMPER WIRES CONNECTED TO THE CONTACT WIRE SHALL NOT BE BENT TO LESS THAN 6" RADIUS.
 8. CABLE MUST NOT BE TIED TO ANY ADJACENT INSULATORS.
 9. HANDLE SHALL BE IN THE DOWN POSITION WHEN THE SWITCH IS OPEN.
 10. INSTALL PROVISIONS TO PAD LOCK SWITCH IN OPEN AND CLOSED POSITIONS.
 11. POLE CANTILEVER/SUPPORT ASSEMBLY AND SURGE ARRESTERS TO BE CALLED OFF SEPARATELY.
 12. CONTRACTOR TO COORDINATE CABLE ROUTING WITH THE OCS LAYOUT PLANS AND SECTIONALIZING DIAGRAM.

| BILL OF MATERIALS | | | | | |
|----------------------|----------|-------|------------------------------|----------|------------------|
| QUANTITIES EACH TYPE | | UNITS | DESCRIPTION | ITEM NO. | PART NO./REMARKS |
| DS-4 | DS-3 | | | | |
| 1 | 1 | EA | SWITCH ASSY, 2000 AMP | 1 | |
| - | 1 | EA | SWITCH SUPPORT, WF POLE | 2 | |
| 1 | - | EA | SWITCH SUPPORT, TUBULAR POLE | 3 | |
| 1 | 1 | EA | INSULATED PIPE | 4 | |
| 2 | 2 | EA | PIPE LINKAGE | 5 | |
| AS REQ'D | AS REQ'D | LF | OPERATING PIPE | 6 | |
| 1 | - | EA | PIPE SUPPORT, TUBULAR POLE | 7 | |
| - | 1 | EA | PIPE SUPPORT, WF POLE | 8 | |
| 1 | - | EA | HANDLE SUPPORT, TUBULAR POLE | 9 | |
| - | 1 | EA | HANDLE SUPPORT, WF POLE | 10 | |
| 1 | 1 | EA | OPERATING HANDLE ASSY | 11 | |
| | | EA | NOT USED | 12 | |
| 6 | 6 | EA | CLAMP CONTACT | 13 | |
| AS REQ'D | AS REQ'D | LF | FEEDER CABLE, 500KCMIL | 14 | 2400V INSULATED |
| AS REQ'D | AS REQ'D | EA | INSULATED CABLE SUPPORT | 15 | |
| | | | NOT USED | 16 | |
| | | | NOT USED | 17 | |
| 6 | 6 | EA | CLAMP, FEEDER TO MESSENGER | 18 | |
| AS REQ'D | AS REQ'D | LF | CONDUIT | 19 | |
| AS REQ'D | AS REQ'D | EA | PIPE STRAP FOR CONDUIT | 20 | |
| 1 | 1 | EA | SCADA JUNCTION BOX | 21 | NOTE 3 |
| AS REQ'D | AS REQ'D | EA | INTERLOCK | 22 | |
| 1 | 1 | EA | HANDLE INDICATOR | 23 | |

BYPASS SWITCH FOR WIDE FLANGE POLE DS-3
NTS

BYPASS SWITCH FOR TUBULAR POLE DS-4
NTS

SECTION
SCALE: NTS

| No. | DATE | DSN | CHK | APP | REVISION |
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| 1 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |
| 0 | 8/2019 | | | | REVISED SYSTEMS DIRECTIVE DRAWINGS |

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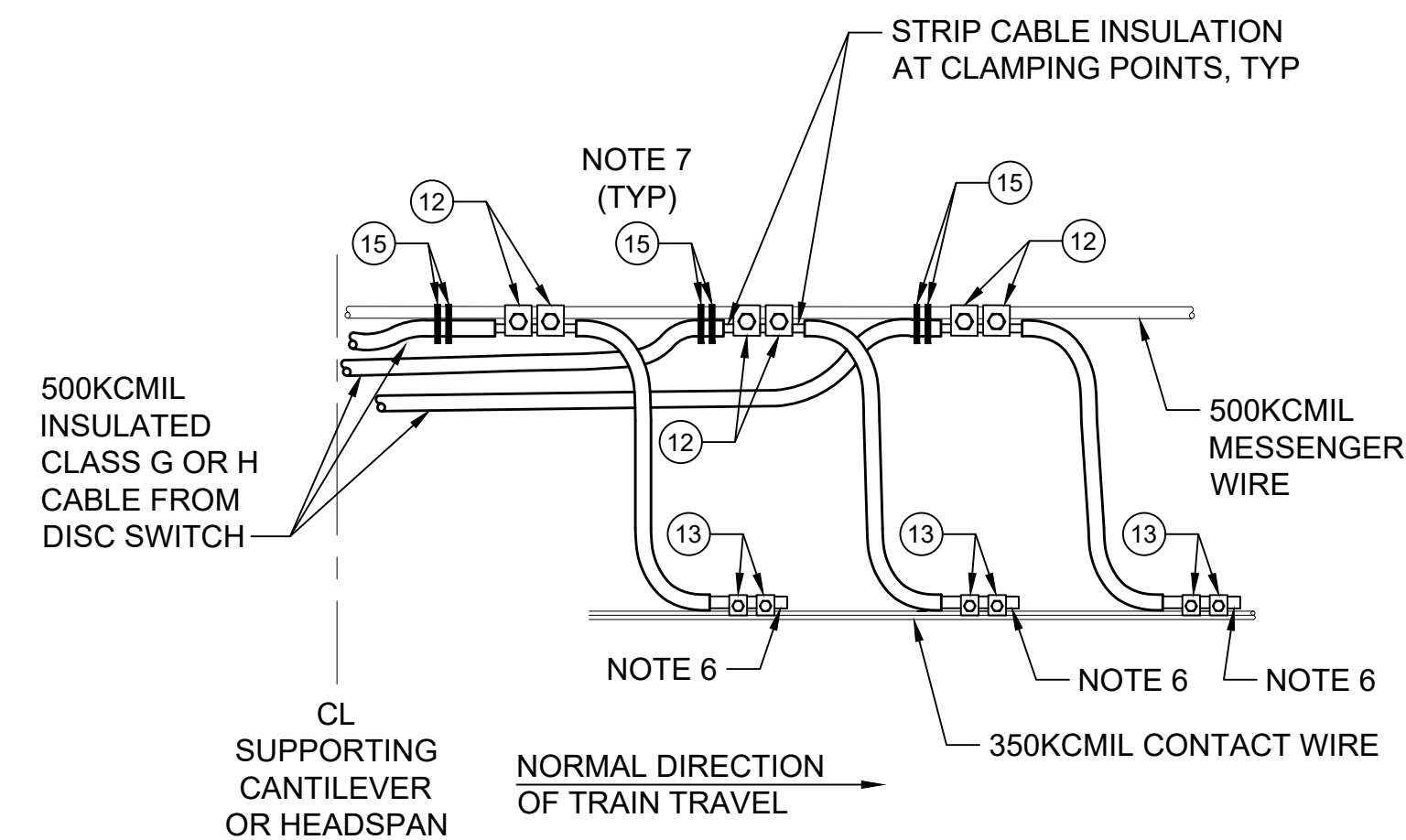
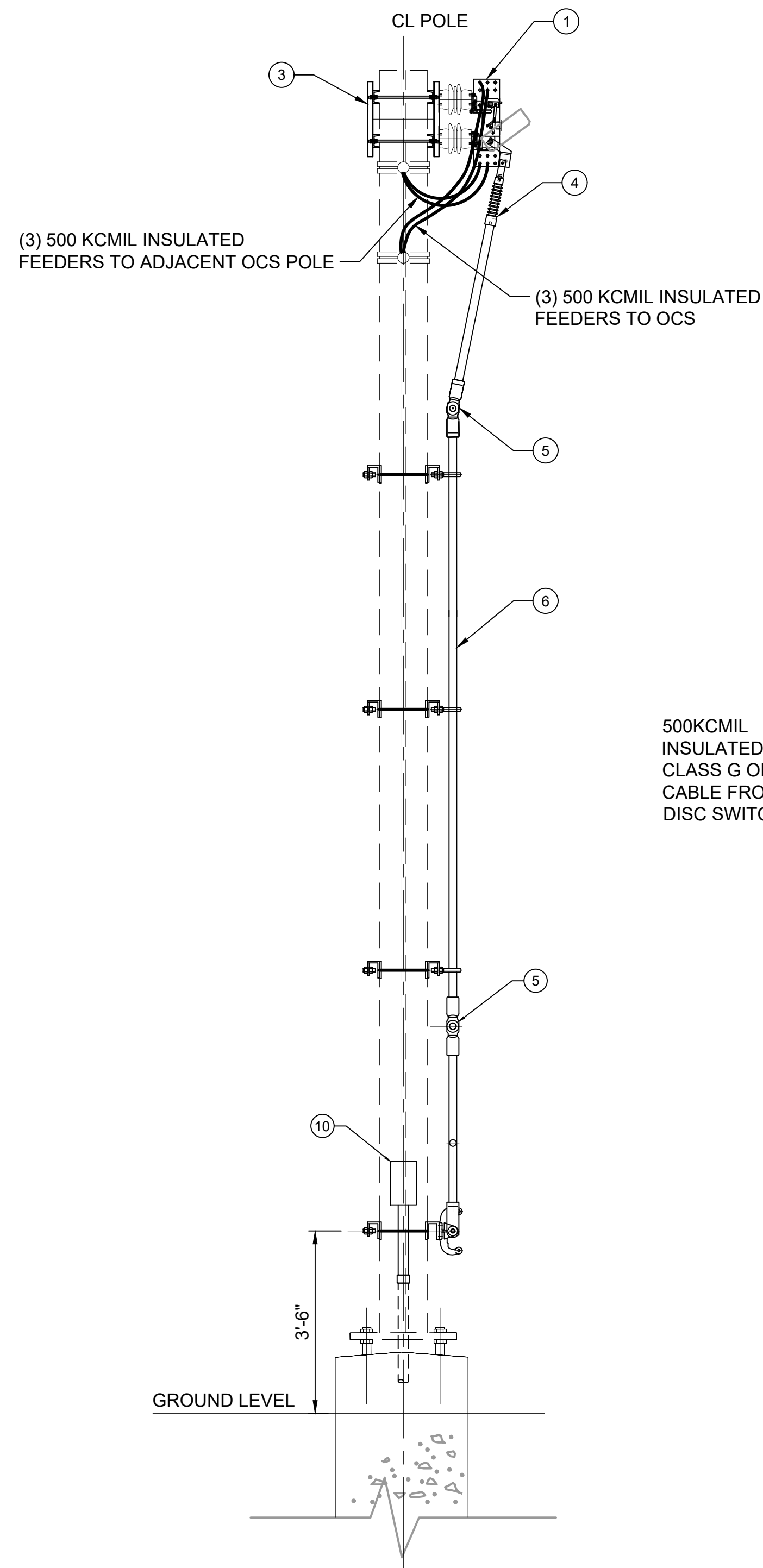
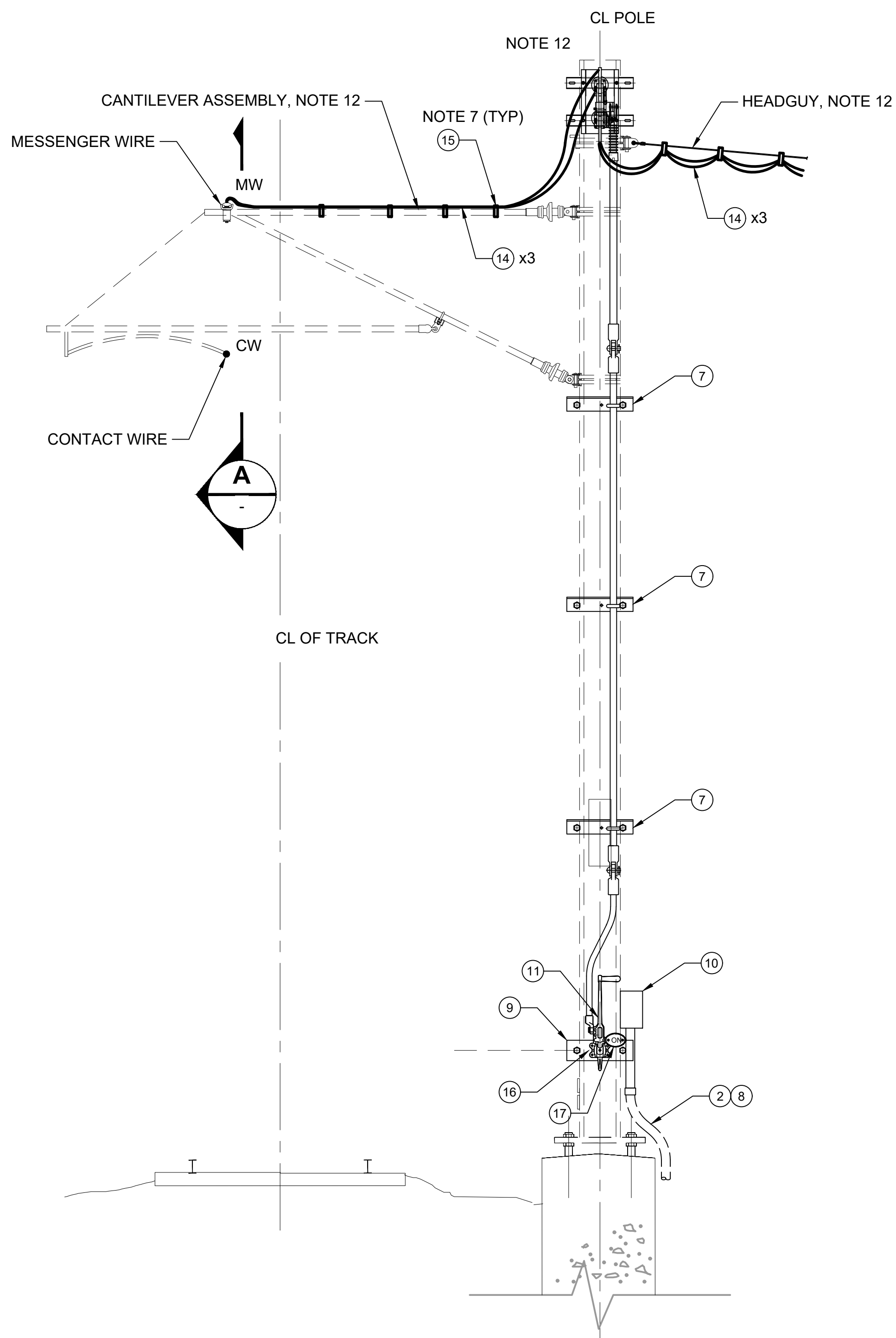
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SCALE: NTS
FILENAME: STD-JOD511
CONTRACT No.: RTA/LR
DATE: 2/2024

**SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS**

OVERHEAD CATENARY SYSTEM
POLE MOUNTED BYPASS DISCONNECT ASSEMBLIES
DS-3 & DS-4

| | |
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| DRAWING No.: | STD-JOD511 |
| FACILITY ID: | |
| SHEET No.: | REV: |
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SECTION A-A
NTS

GENERAL NOTES:

1. THE BILL OF MATERIALS DETAILS ARE TYPICAL FOR THE ASSEMBLY STYLES SHOWN. THE CONTRACTOR SHALL ITEMIZE THE TABLE WITH DESCRIPTIONS AND PART NUMBERS OF COMPONENTS REQUIRED TO COMPLETE EACH ASSEMBLY.
2. THE CONTRACTOR SHALL INCLUDE CABLE SUPPORTS WHERE CABLE WEIGHT MAY AFFECT SWITCH OPERATION.
3. 4" CONDUITS ARE PART OF WIDE FLANGE POLE ASSEMBLIES.
4. TERMINATE HANDLE INDICATOR CABLE AT SCADA JUNCTION BOX.
5. BEFORE ASSEMBLY, CLAMPS ARE TO BE WIRE BRUSH CLEANED, THEN GREASED WITH CONDUCTIVE GREASE ACCORDING TO CLAMP MANUFACTURER.
6. WIRE ENDS TO BE TIED BEFORE CUTTING AND POSITIONED TO PROTRUDE BEYOND CLAMPS BY 1".
7. CABLES AND CLAMPS TO BE INSTALLED ALLOWING FOR A LONG TRACK WIRING MOVEMENT, AND SECURED AGAINST DROOPING BELOW THE LEVEL OF THE CONTACT WIRE WHEN UPLIFTED 3". (INSULATED CABLE SUPPORT REQUIREMENTS TO BE PROVIDED IN SPECIFICATIONS.)
8. JUMPER WIRES CONNECTED TO THE CONTACT WIRE SHALL NOT BE BENT TO LESS THAN 6" RADIUS.
9. CABLE MUST NOT BE TIED TO ANY ADJACENT INSULATORS.
10. HANDLE SHALL BE IN THE DOWN POSITION WHEN THE SWITCH IS OPEN.
11. INSTALL PROVISIONS TO PAD LOCK SWITCH IN OPEN AND CLOSED POSITIONS.
12. POLE CANTILEVER/SUPPORT ASSEMBLY AND SURGE ARRESTERS TO BE CALLED OFF SEPARATELY.
13. CONTRACTOR TO COORDINATE CABLE ROUTING WITH THE OCS LAYOUT PLANS AND SECTIONALIZING DIAGRAM.

BYPASS SWITCH ASSEMBLY DS-5

NTS


| BILL OF MATERIALS | | | | |
|----------------------|-------|---------------------------------|----------|------------------|
| QUANTITIES EACH TYPE | UNITS | DESCRIPTION | ITEM NO. | PART NO./REMARKS |
| 1 | EA | SWITCH ASSY, 2000 AMP, 1500 VOC | 1 | |
| AS REQ'D | LF | CONDUIT | 2 | |
| 1 | EA | SWITCH SUPPORT | 3 | |
| 1 | EA | INSULATED PIPE | 4 | |
| 2 | EA | PIPE LINKAGE | 5 | |
| AS REQ'D | LF | OPERATING PIPE | 6 | |
| 3 | EA | PIPE SUPPORT | 7 | |
| AS REQ'D | EA | PIPE STRAP FOR CONDUIT | 8 | |
| 1 | EA | HANDLE SUPPORT | 9 | |
| 1 | EA | SCADA JUNCTION BOX | 10 | NOTE 4 |
| 1 | EA | OPERATING HANDLE ASSY | 11 | |
| 6 | EA | MW CABLE CLAMPS | 12 | |
| 6 | EA | CLAMP, FEEDER TO CONTACT WIRE | 13 | |
| AS REQ'D | LF | FEEDER CABLE, 500KCMIL | 14 | 2400V INSULATED |
| AS REQ'D | EA | INSULATED CABLE SUPPORT | 15 | |
| 1 | EA | INTERLOCK | 16 | |
| 1 | EA | HANDLE INDICATOR | 17 | |

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| 1 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |
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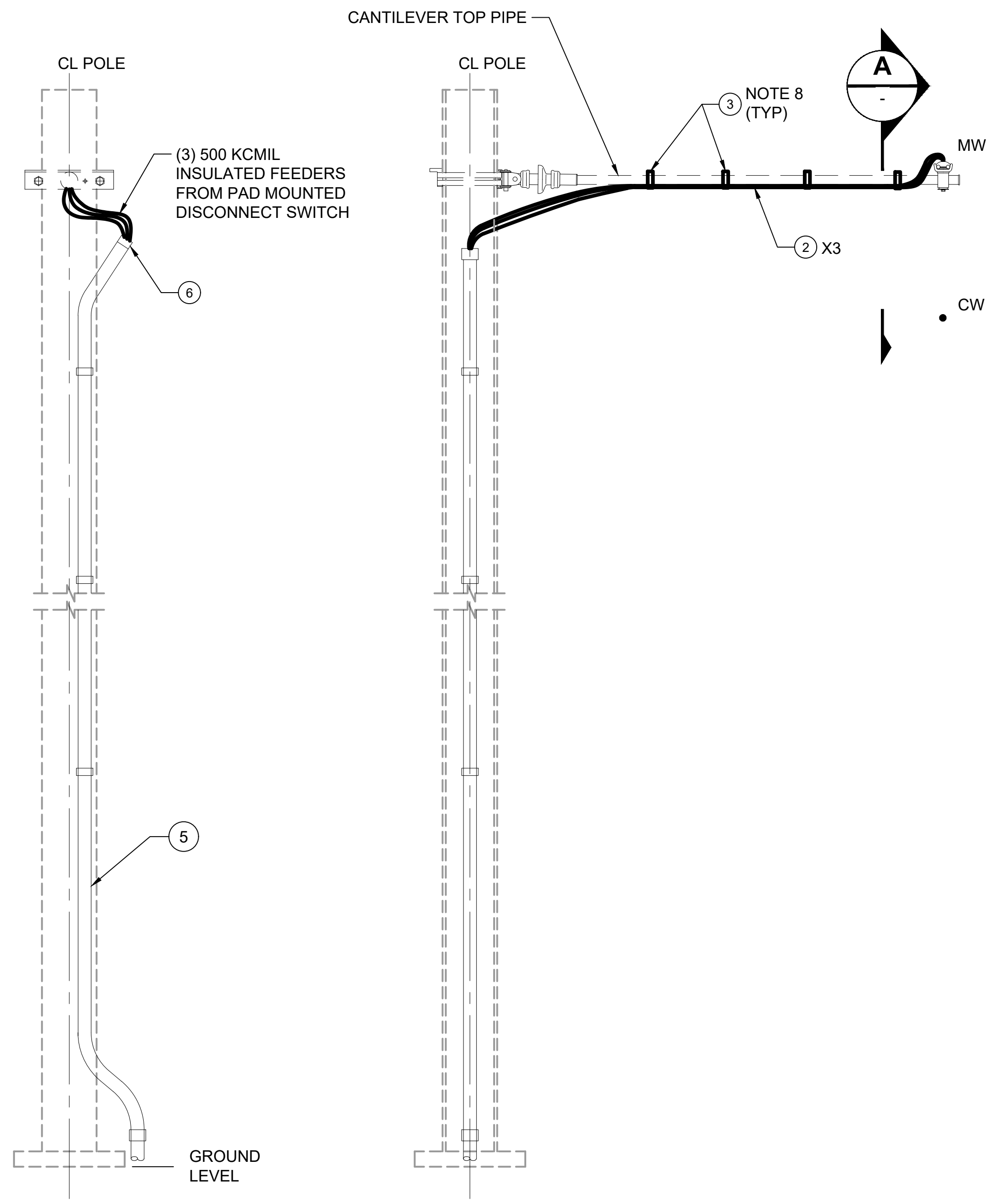
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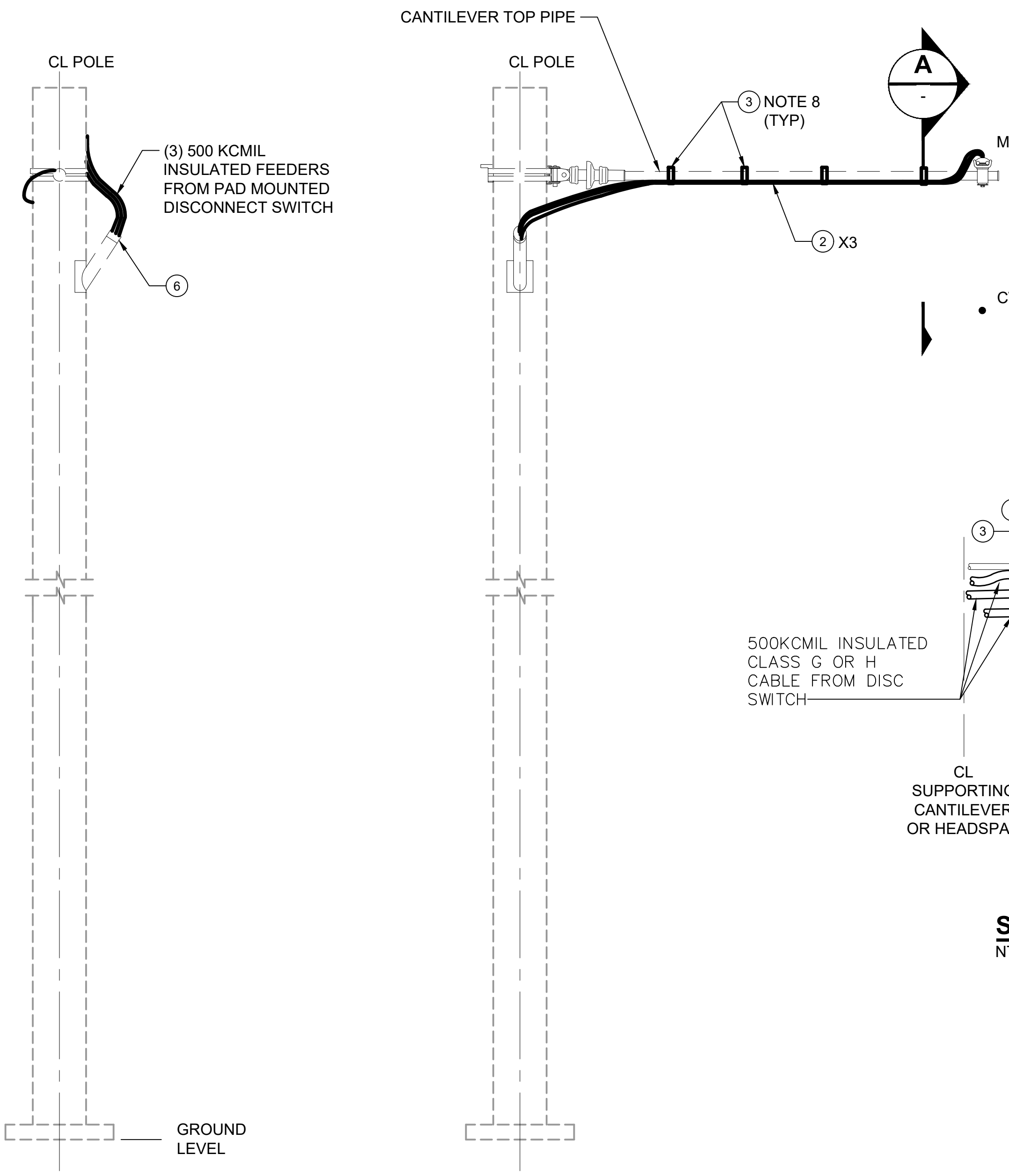
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| SOUND TRANSIT STANDARD DRAWINGS SYSTEMS | |
| OVERHEAD CATENARY SYSTEM POLE MOUNTED BYPASS DISCONNECT ASSEMBLY DS-5 | |

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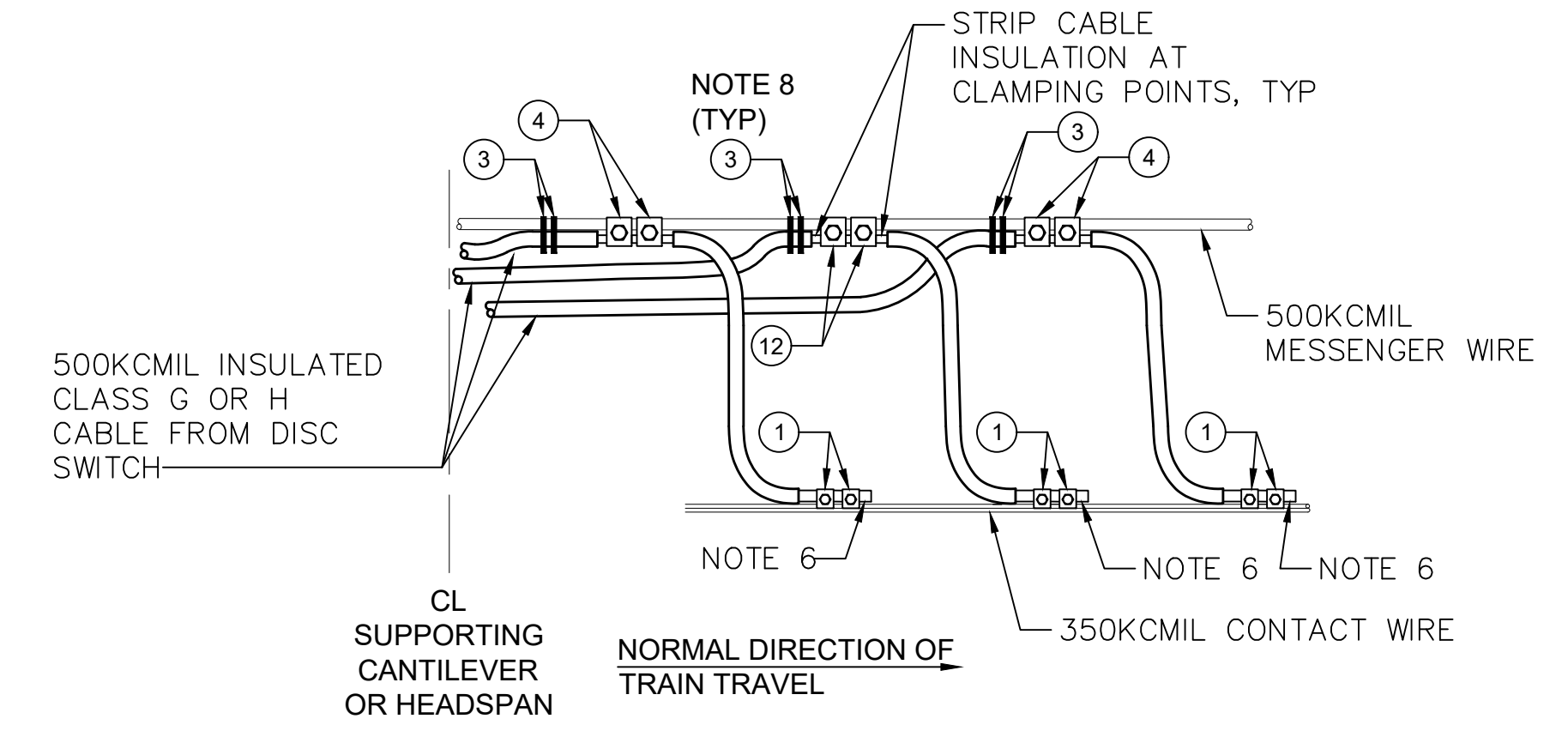
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**FEEDER CABLE ASSEMBLY
FOR WIDE FLANGE POLE AND TUNNEL FC-1**
NTS



FEEDER CABLE ASSEMBLY FOR TUBULAR POLE FC-2
NTS



SECTION
NTS

| BILL OF MATERIALS | | | | | |
|----------------------|----------|-------|----------------------------|----------|------------------|
| QUANTITIES EACH TYPE | | UNITS | DESCRIPTION | ITEM NO. | PART NO./REMARKS |
| FC-1 | FC-2 | | | | |
| 6 | 6 | EA | CLAMP, CONTACT WIRE | 1 | |
| AS REQ'D | AS REQ'D | LF | FEEDER CABLE, 500KCMIL | 2 | 2400V INSULATED |
| AS REQ'D | AS REQ'D | EA | INSULATED CABLE SUPPORT | 3 | |
| 6 | 6 | EA | CLAMP, FEEDER TO MESSENGER | 4 | |
| AS REQ'D | - | LF | 4" GRS CONDUIT | 5 | |
| 1 | 1 | EA | 4" STRAIN RELEASE BUSHING | 6 | WATERPROOF |

| No. | DATE | DSN | CHK | APP | REVISION |
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| 1 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |
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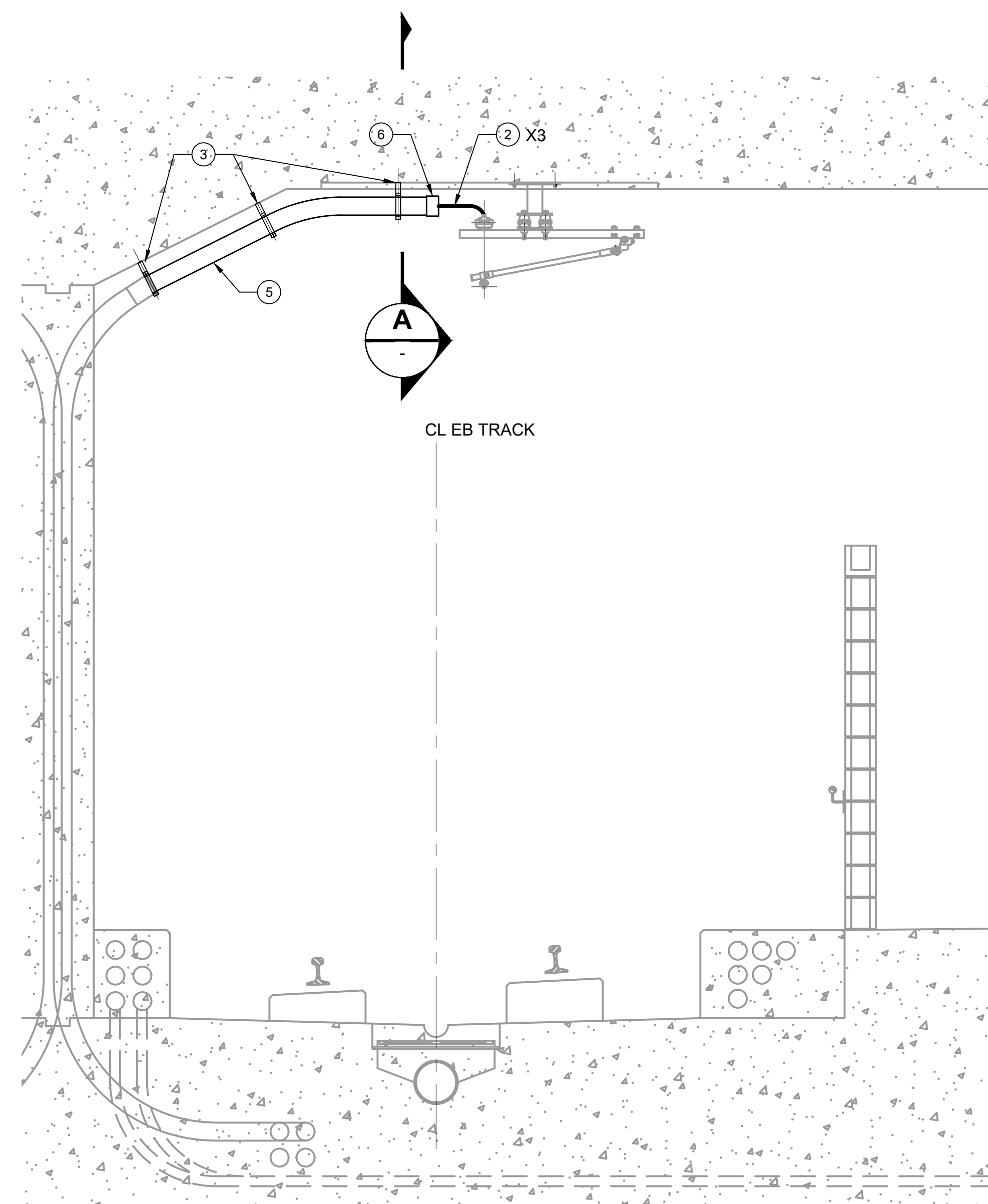
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| | CONTRACT No.: RTA/LR |
| | DATE: 2/2024 |

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| SOUND TRANSIT STANDARD DRAWINGS SYSTEMS | |
| OVERHEAD CATENARY SYSTEM FEEDER CABLE ASSEMBLIES FC-1 & FC-2 | |

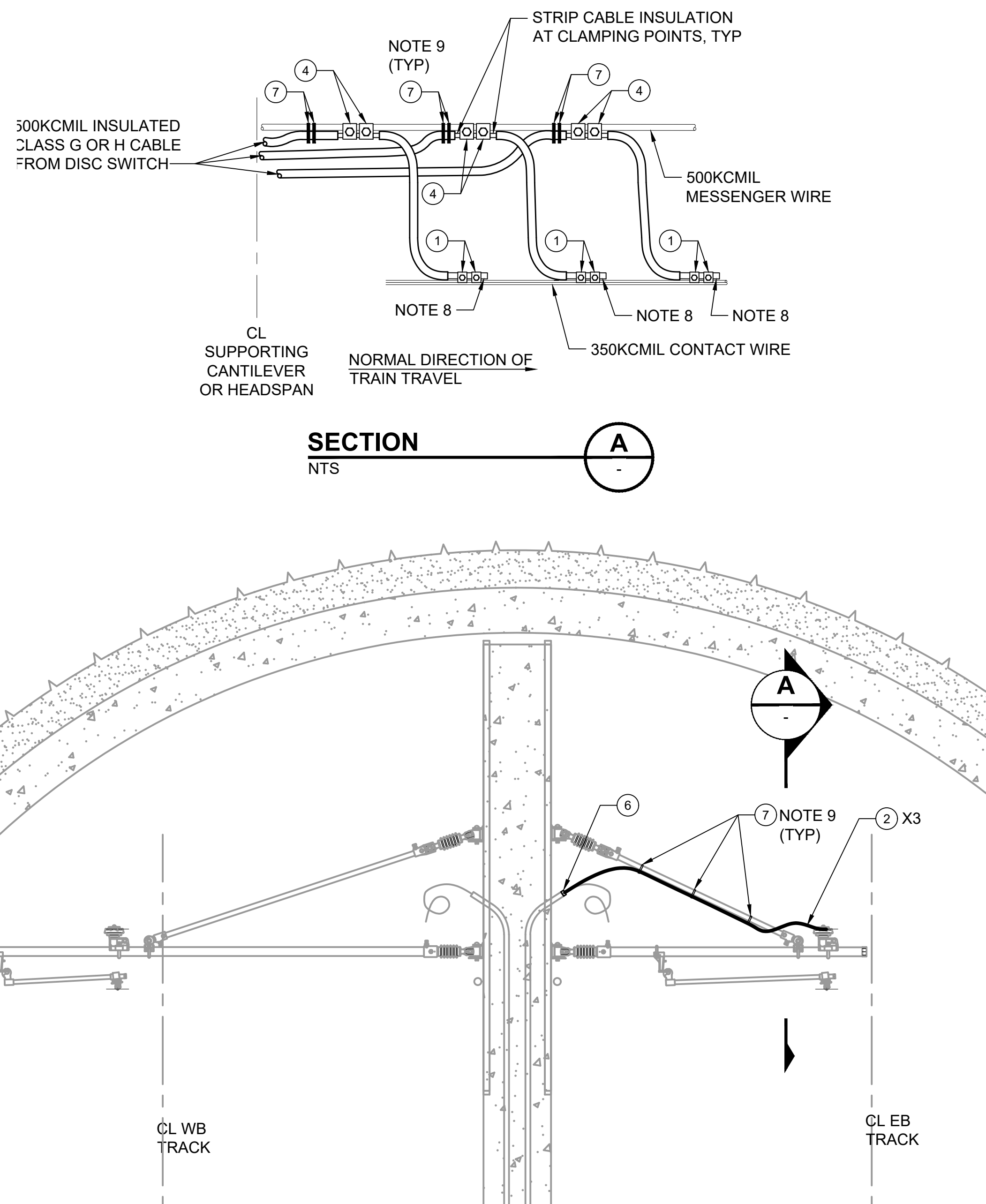
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FEEDER CABLE ASSEMBLY FOR TUNNEL FC-3
NTS



FEEDER CABLE ASSEMBLY FOR TUNNEL ON CENTER WALL FC-4
NTS

GENERAL NOTES:


1. THE BILL OF MATERIALS DETAILS ARE TYPICAL FOR THE ASSEMBLY STYLES SHOWN. THE CONTRACTOR SHALL ITEMIZE THE TABLE WITH DESCRIPTIONS AND PART NUMBERS OF COMPONENTS REQUIRED TO COMPLETE EACH ASSEMBLY.
2. CONTRACTOR TO DETERMINE COMPONENT DETAIL AND SAFE WORKING LOADS.
3. FOR SYMBOLS LEGEND AND ABBREVIATIONS SEE DWGS JZN001 AND JZN002.
4. CONTRACTOR TO VERIFY ALL QUANTITIES ON THE BILL OF MATERIALS.
5. THE CONTRACTOR IS RESPONSIBLE FOR THE DESIGN OF EACH ASSEMBLY AS A WHOLE.
6. OCS SUPPORT TO BE CALLED OFF SEPARATELY.
7. CONTRACTOR SHALL VERIFY STEEL REINFORCEMENT LOCATIONS IN CONCRETE STRUCTURES PRIOR TO DRILLING AT OCS SUPPORT LOCATIONS. DETAILED REQUIREMENTS TO BE PROVIDED IN SPECIFICATIONS.
8. WIRE ENDS TO BE TIED BEFORE CUTTING AND POSITIONED TO PROTRUDE BEYOND CLAMPS BY 1".
9. CABLES AND CLAMPS TO BE SECURED AGAINST DROOPING BELOW THE LEVEL OF THE CONTACT WIRE WHEN UPLIFTED 3". INSULATED CABLE SUPPORT REQUIREMENTS TO BE PROVIDED IN SPECIFICATIONS.

| BILL OF MATERIALS | | | | | |
|----------------------|----------|-------|----------------------------|----------|---------------------|
| QUANTITIES EACH TYPE | | UNITS | DESCRIPTION | ITEM NO. | PART NO./REMARKS |
| FC-3 | FC-4 | | | | |
| 6 | 6 | EA | CLAMP, CONTACT WIRE | 1 | |
| AS REQ'D | AS REQ'D | LF | FEEDER CABLE, 500KCMIL | 2 | 2400V INSULATED |
| AS REQ'D | - | EA | CONDUIT BRACKET | 3 | W/ CONCRETE ANCHORS |
| 6 | 6 | EA | CLAMP, FEEDER TO MESSENGER | 4 | |
| AS REQ'D | - | LF | 4" GRS CONDUIT | 5 | |
| 1 | 1 | EA | 4" STRAIN RELIEF BUSHING | 6 | WATERPROOF |
| AS REQ'D | AS REQ'D | EA | INSULATED CABLE SUPPORT | 7 | |

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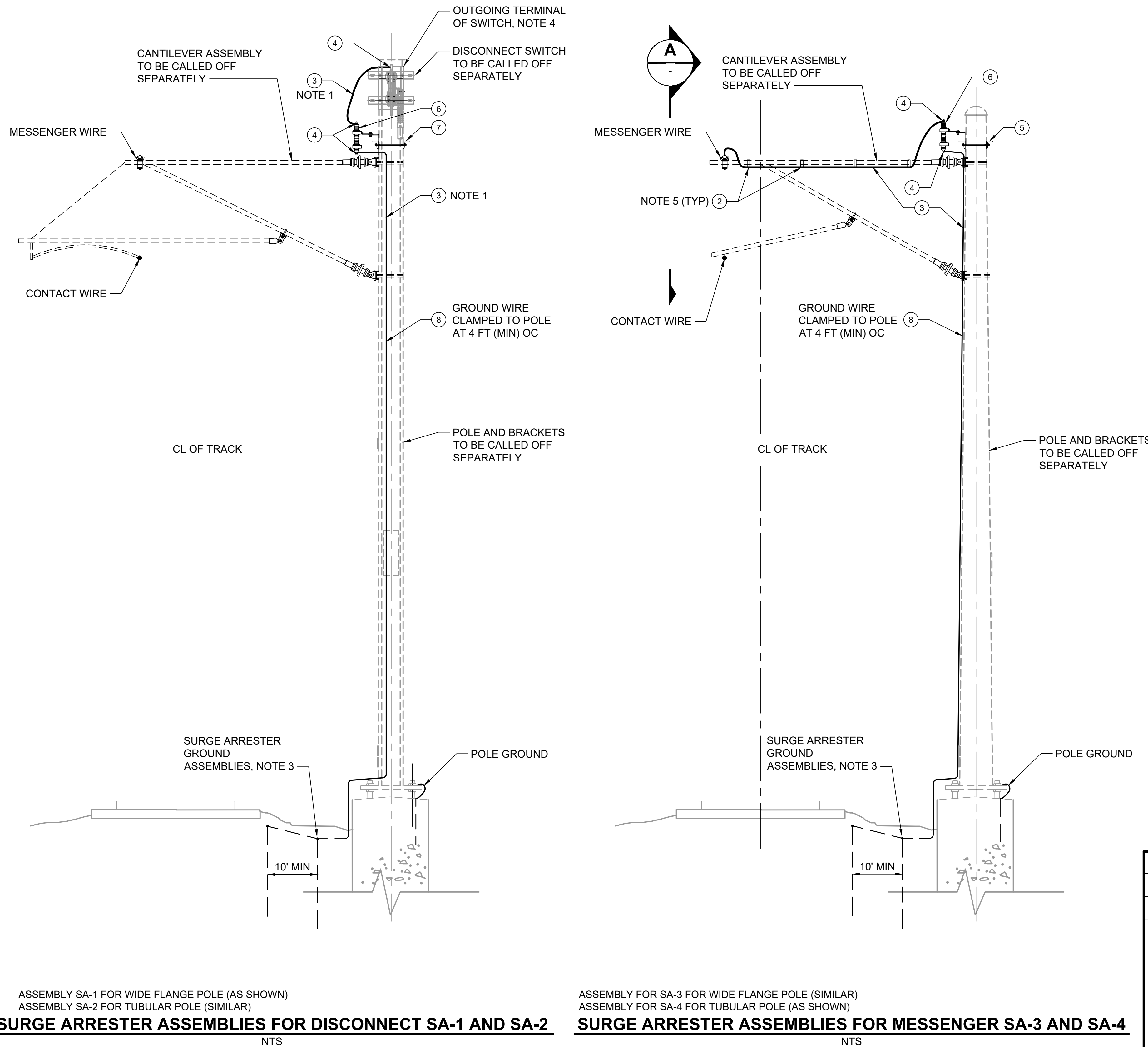
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| FILENAME: STD-JOD514 | |
| CONTRACT No.: | RTA/LR |
| DATE: | 2/2024 |

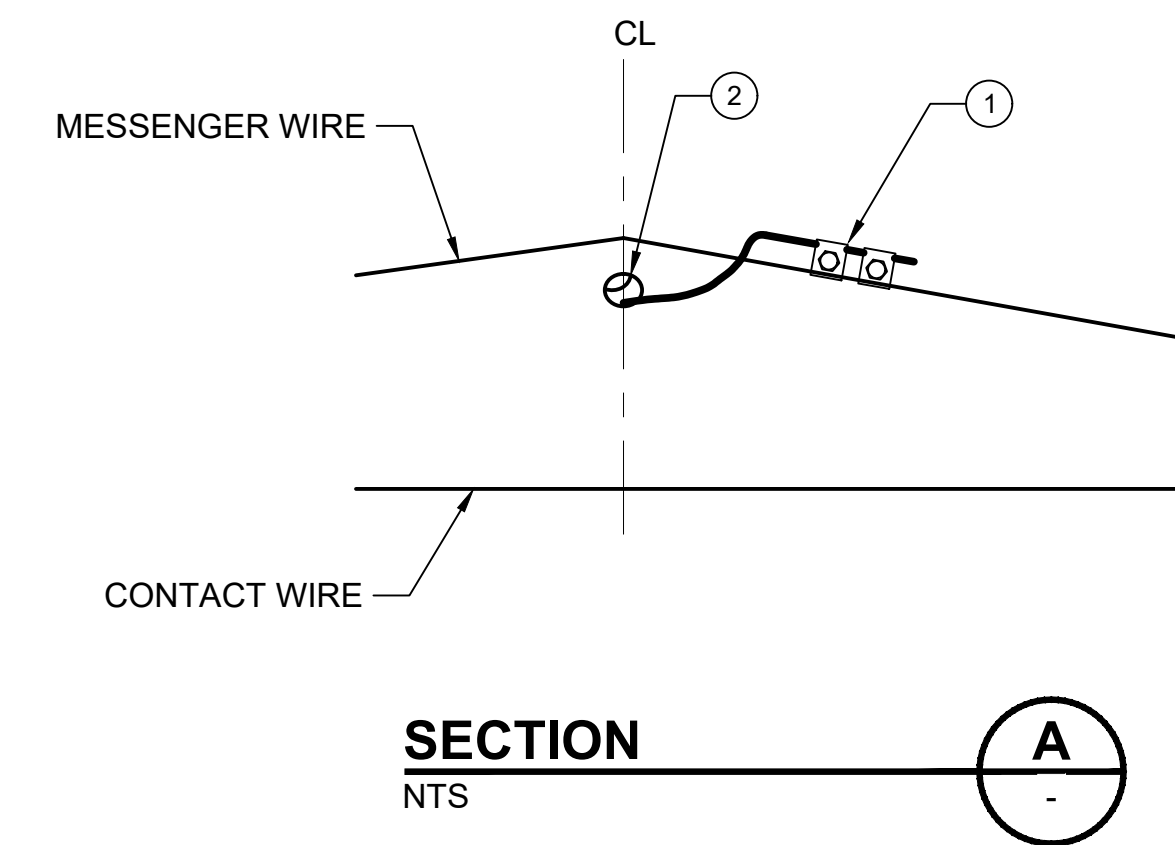
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| SOUND TRANSIT STANDARD DRAWINGS SYSTEMS | |
| OVERHEAD CATENARY SYSTEM FEEDER CABLE ASSEMBLIES FC-3 & FC-3 | |

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| DRAWING No.: | STD-JOD514 |
| FACILITY ID: | |
| SHEET No.: | REV: 1 |



GENERAL NOTES:

1. THE SURGE ARRESTER SHALL BE MOUNTED TO PERMIT THE CABLES TO TAKE THE MOST DIRECT ROUTE TO GROUND ASSEMBLY. SURGE ARRESTER CONNECTIONS TO OCS AND GROUND SHALL BE CONTINUOUS.
2. CABLE BENDS SHALL EXCEED 8" RADIUS.
3. ALL GROUND CONNECTIONS SHALL BE BY EXOTHERMIC WELD. FOR BORED FOUNDATIONS, SURGE ARRESTER GROUND CABLE IS TO BE CONNECTED TO A DEDICATED SURGE ARRESTER GROUND ROD. FOR AERIAL STRUCTURE MOUNTED POLES, SURGE ARRESTER GROUND IS TO BE CONNECTED TO A SEPARATE GROUND SYSTEM. MAXIMUM ALLOWABLE TESTED RESISTANCE TO GROUND TO BE INCLUDED IN SPECIFICATIONS.
4. THE POSITIVE CONNECTION CABLE SHALL BE CONNECTED TO THE SAME SWITCH TERMINAL AS THE OUTGOING FEEDER CABLES.
5. INSULATED CABLE SUPPORT REQUIREMENTS TO BE PROVIDED IN SPECIFICATIONS.
6. THE FEEDER POLE FOUNDATION, WITH INTEGRAL 1 1/2" CONDUIT RISER TO BE CALLED OFF SEPARATELY ON THE OCS FOUNDATION SCHEDULES.
7. THE BILL OF MATERIALS DETAILS ARE TYPICAL FOR THE ASSEMBLY STYLES SHOWN. THE CONTRACTOR SHALL ITEMIZE THE TABLE WITH DESCRIPTIONS AND PART NUMBERS OF COMPONENTS REQUIRED TO COMPLETE EACH ASSEMBLY.
8. CONTRACTOR TO DETERMINE COMPONENT DETAIL AND SAFE WORKING LOADS.
9. FOR SYMBOLS, LEGEND AND ABBREVIATIONS SEE DRAWINGS JZN001 AND JZN002.
10. CONTRACTOR TO VERIFY ALL QUANTITIES ON THE BILL OF MATERIALS.
11. THE CONTRACTOR IS RESPONSIBLE FOR THE DESIGN OF EACH ASSEMBLY AS A WHOLE.
12. DISCONNECT SWITCH ASSEMBLY SHADED FOR CLARITY.



| BILL OF MATERIALS | | | | | | | |
|----------------------|----------|----------|----------|-------|-------------------------|----------|----------------------|
| QUANTITIES EACH TYPE | | | | UNITS | DESCRIPTION | ITEM NO. | PART NO./REMARKS |
| SA-4 | SA-3 | SA-2 | SA-1 | | | | |
| 2 | 2 | - | - | EA | CLAMP, 4/0 TO MESSENGER | 1 | |
| 4 TYP | 4 TYP | - | - | EA | INSULATED CABLE SUPPORT | 2 | |
| AS REQ'D | AS REQ'D | AS REQ'D | AS REQ'D | LF | CABLE, 4/0 AWG | 3 | 2400V INSULATED |
| 2 | 2 | 3 | 3 | EA | CABLE LUG, 4/0 AWG | 4 | |
| 1 | - | 1 | - | EA | SURGE ARRESTER BRACKET | 5 | FOR TUBULAR POLE |
| 1 | 1 | 1 | 1 | EA | SURGE ARRESTER | 6 | |
| - | 1 | - | 1 | EA | SURGE ARRESTER BRACKET | 7 | FOR WIDE FLANGE POLE |
| AS REQ'D | AS REQ'D | AS REQ'D | AS REQ'D | EA | CABLE STRAP | 8 | |

ASSEMBLY SA-1 FOR WIDE FLANGE POLE (AS SHOWN)
ASSEMBLY SA-2 FOR TUBULAR POLE (SIMILAR)
SURGE ARRESTER ASSEMBLIES FOR DISCONNECT SA-1 AND SA-2
NTS

ASSEMBLY FOR SA-3 FOR WIDE FLANGE POLE (SIMILAR)
ASSEMBLY FOR SA-4 FOR TUBULAR POLE (AS SHOWN)
SURGE ARRESTER ASSEMBLIES FOR MESSENGER SA-3 AND SA-4
NTS

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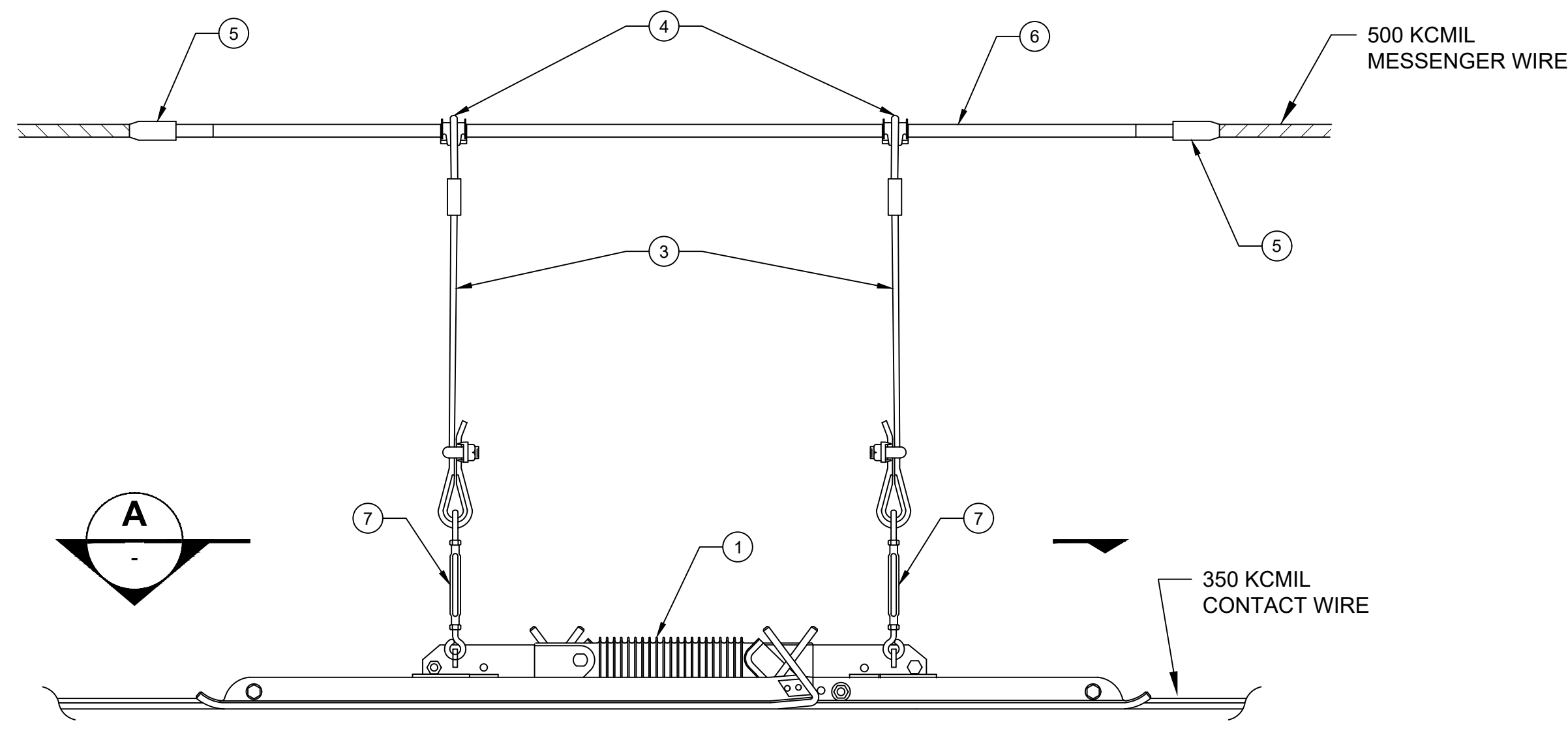
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CONTRACT No.: RTA/LR
DATE: 2/2024

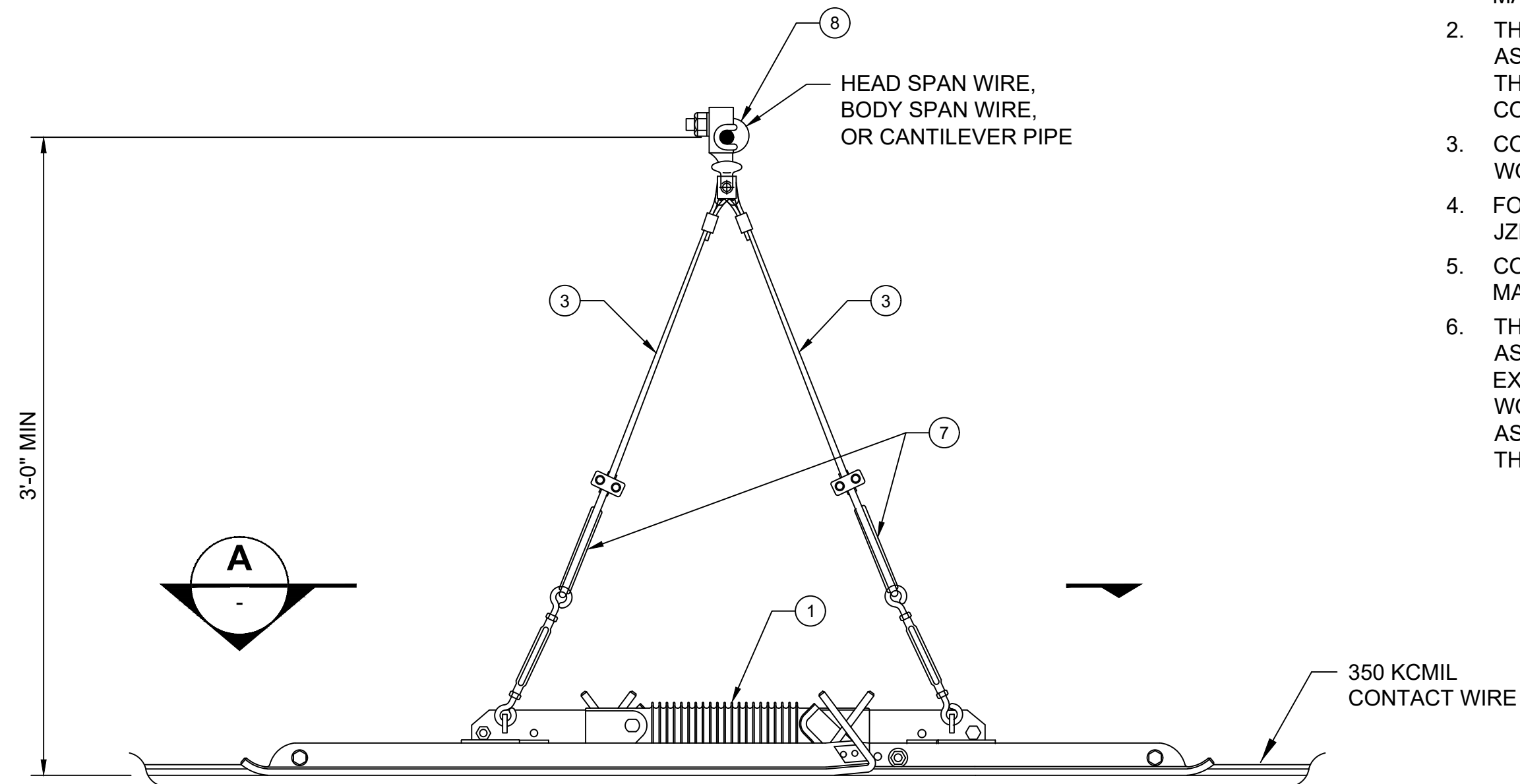
SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS
OVERHEAD CATENARY SYSTEM
SURGE ARRESTER ASSEMBLIES
SA-1, SA-2, SA-3 & SA-4

DRAWING No.: **STD-JOD520**
FACILITY ID: _____
SHEET No.: _____ REV: 1



**SECTION INSULATOR ASSEMBLY
FOR SIMPLE CATENARY AUTO-TENSIONED SYSTEM SI-1**

NTS

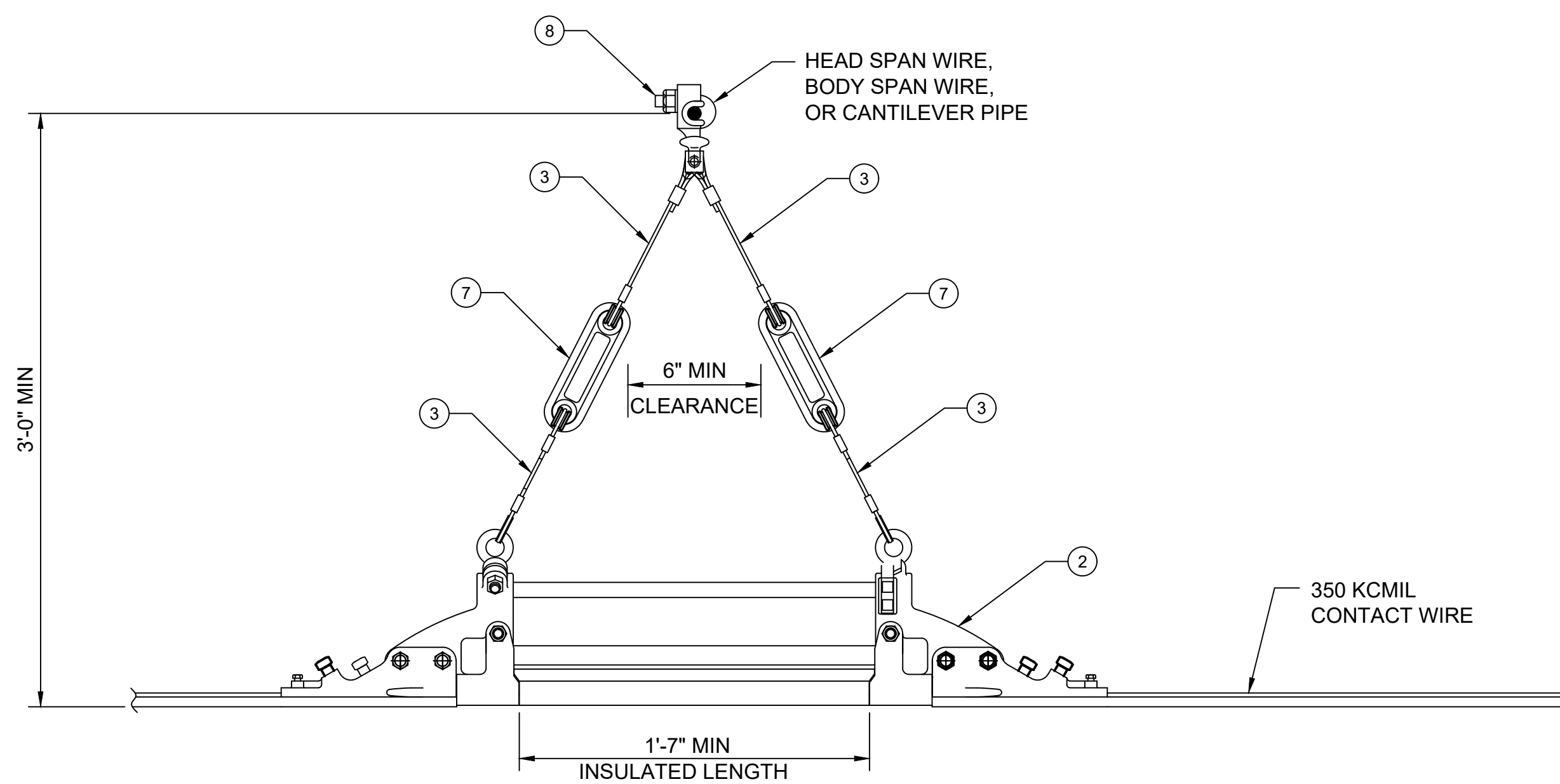


**BRIDGING SECTION INSULATOR ASSEMBLY
FOR SINGLE CONTACT FIXED TERMINATION WIRING SI-2**

NTS

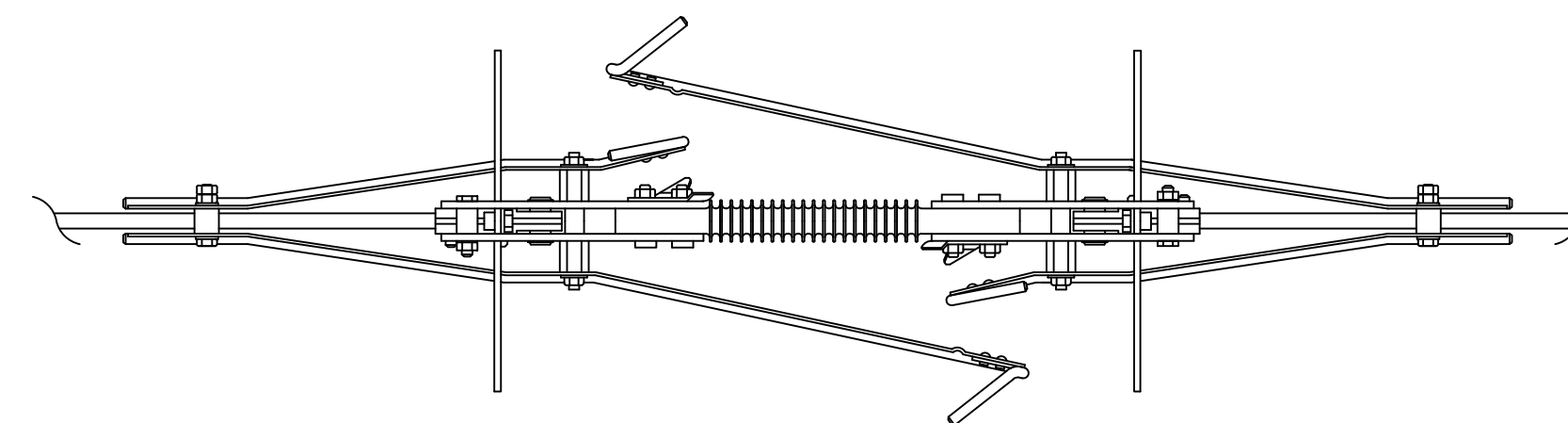
GENERAL NOTES:

- SECTION INSULATORS SHALL BE INSTALLED AS PER MANUFACTURERS INSTRUCTIONS.
- THE BILL OF MATERIALS DETAILS ARE TYPICAL FOR THE ASSEMBLY STYLES SHOWN. THE CONTRACTOR SHALL ITEMIZE THE TABLE WITH DESCRIPTIONS AND PART NUMBERS OF COMPONENTS REQUIRED TO COMPLETE EACH ASSEMBLY.
- CONTRACTOR TO DETERMINE COMPONENT DETAIL AND SAFE WORKING LOADS.
- FOR SYMBOLS AND LEGEND AND ABBREVIATIONS SEE DWGS JZN001 AND JZN002.
- CONTRACTOR TO VERIFY ALL QUANTITIES ON THE BILL OF MATERIALS.
- THE CONTRACTOR IS RESPONSIBLE FOR THE DESIGN OF EACH ASSEMBLY AS A WHOLE AND EACH COMPONENT MEETING OR EXCEEDING THE LOADING TABLES WHERE PROVIDED WHERE THE WORKING LOAD CAPABILITIES OF THE CONTRACTOR'S ASSEMBLIES EXCEED THOSE SHOWN IN THE LOADING TABLE IN THEIR SUBMISSION OF ASSEMBLY.



**NON-BRIDGING SECTION INSULATOR ASSEMBLY
FOR SINGLE CONTACT FIXED TERMINATION WIRING SI-3**

NTS



**SECTION
A**

NTS


| BILL OF MATERIALS | | | | | | |
|----------------------|------|------|-------|---------------------|----------|-------------------------|
| QUANTITIES EACH TYPE | | | UNITS | DESCRIPTION | ITEM NO. | PART NO./REMARKS |
| SI-3 | SI-2 | SI-1 | | | | |
| - | 1 | 1 | EA | SECTION INSULATOR | 1 | WITH TURNBUCKLES |
| 1 | - | - | EA | SECTION INSULATOR | 2 | NON BRIDGING |
| 2 | 4 | 4 | EA | HANGER ASSEMBLY | 3 | FIELD ADJUSTABLE |
| - | - | 2 | EA | SLIDING HANGER CLIP | 4 | |
| - | - | 2 | EA | TERMINATION CLAMP | 5 | FOR 500 KCMIL MESSENGER |
| - | - | 1 | EA | STRAIN INSULATOR | 6 | LONG ROD TYPE |
| 2 | 4 | 4 | EA | HANGER INSULATOR | 7 | |
| 1 | 2 | - | EA | CLEVIS WIRE CLAMP | 8 | |

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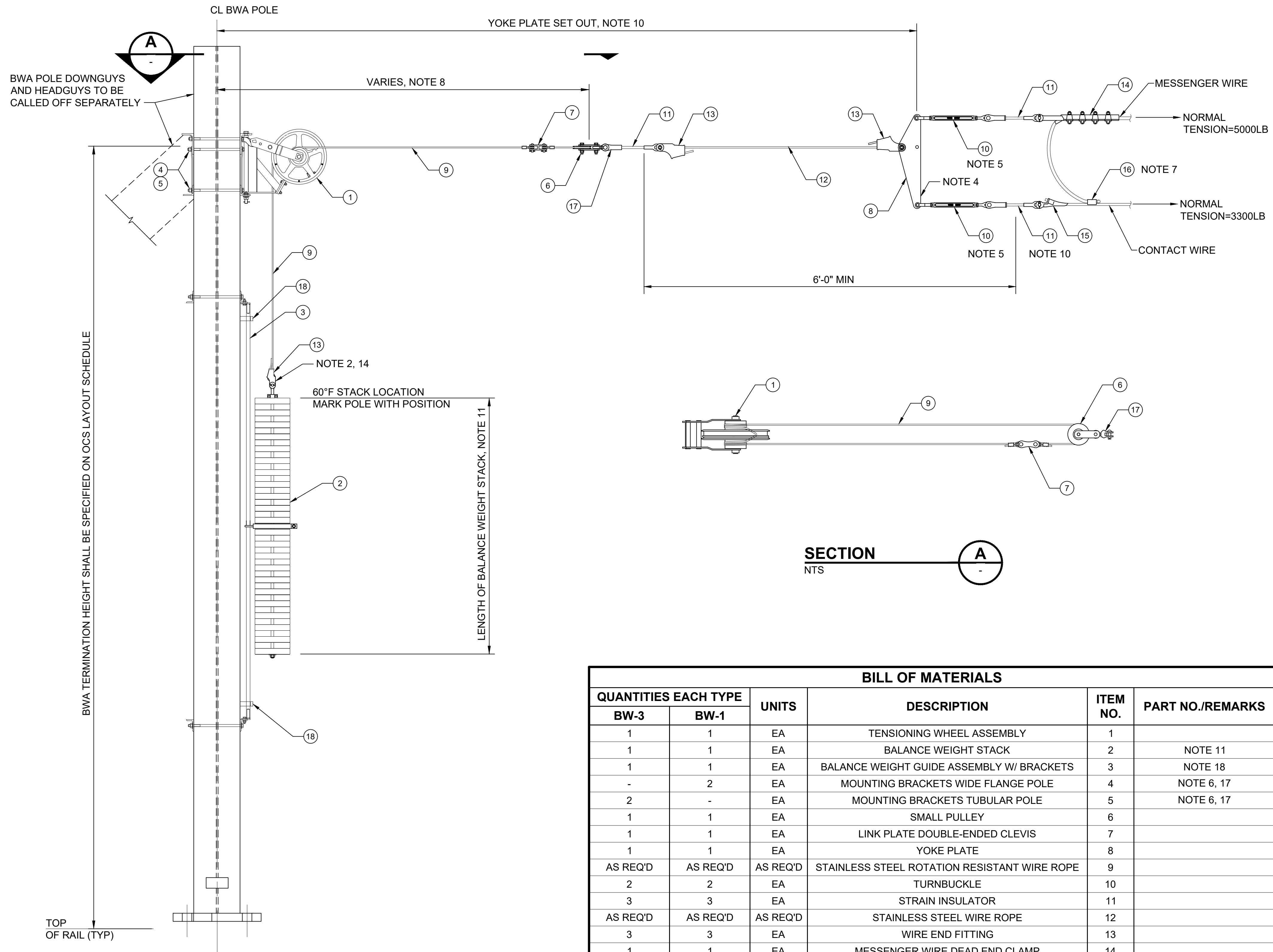
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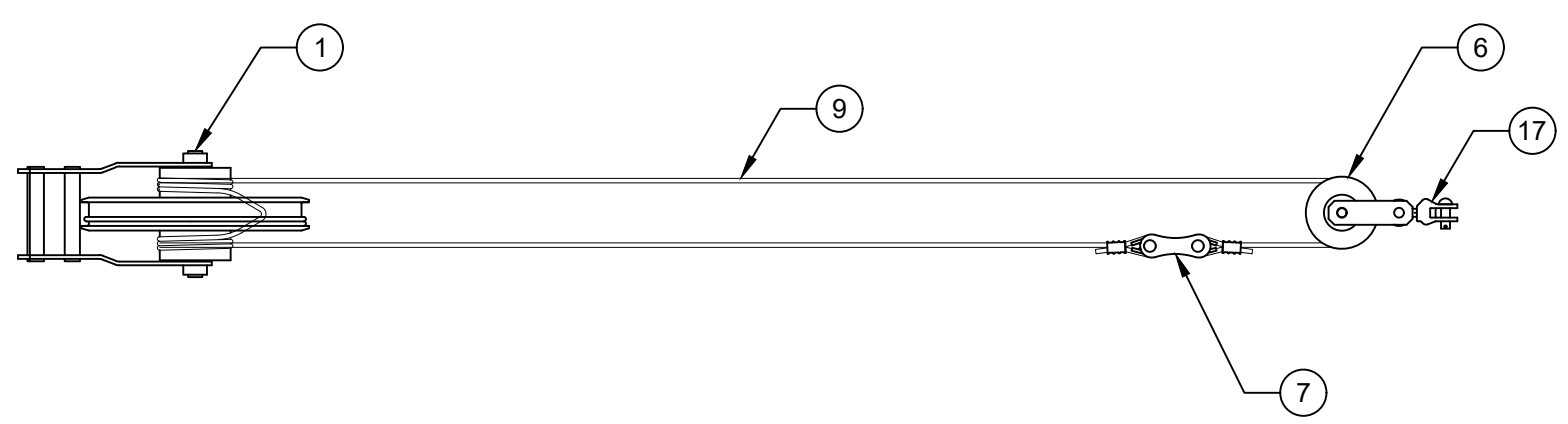
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| SOUND TRANSIT STANDARD DRAWINGS SYSTEMS | |
| OVERHEAD CATENARY SYSTEM SECTION INSULATOR ASSEMBLIES SI-1, SI-2 & SI-3 | |

| | |
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| DRAWING No.: | STD-JOD530 |
| FACILITY ID: | |
| SHEET No.: | REV: 1 |



- GENERAL NOTES:**
1. THE ASSEMBLY SHALL APPLY A COMBINED TENSION TO THE MESSENGER AND CONTACT WIRES.
 2. PROVIDE SUFFICIENT TAIL WIRE FOR FIELD ADJUSTMENT. THE EXCESS TAIL WIRE SHALL BE CUT OFF ONLY AFTER FINAL ADJUSTMENT.
 3. TENSION ASSEMBLY SHALL HAVE A RATIO OF 1:3. TENSION ASSEMBLY SHALL BE DESIGNED SO THAT IT WILL BECOME LOCKED IN CASE OF A TENSION RELIEF FROM THE CATENARY.
 4. THE YOKE PLATE SHALL BE DIMENSIONED TO PRODUCE THE NORMAL TENSION VALUE SHOWN. YOKE PLATE SHALL HAVE AN ADDITIONAL HOLE TO FACILITATE ATTACHMENT OF TENSIONING RIGS.
 5. M/W & C/W TURNBUCKLES SHALL BE FURNISHED TO PERMIT PLUMBING OF YOKE PLATE. AFTER FINAL ADJUSTMENT, TURNBUCKLES SHALL BE EXTENDED 6" MIN FROM MIN LENGTH.
 6. MOUNTING BRACKET SHALL BE FURNISHED TO PERMIT ALONG TRACK AND ACROSS TRACK ADJUSTMENTS FOR PLUMBING OF BALANCE WEIGHT.
 7. A JUMPER/ANTI-TORSION ARRANGEMENT IS TO BE FORMED USING APPROXIMATELY 2.5' (FT) OF MESSENGER WIRE EXTENDING FROM THE REAR OF THE DEAD END ASSEMBLY.
 8. CONTRACTOR SHALL FURNISH THIS DIMENSION, BASED ON PHYSICAL AND MECHANICAL PROPERTIES OF THE BALANCE WEIGHT ASSEMBLY AND THE ALONG TRACK MOVEMENT OF THE CATENARY.
 9. CONTRACTOR SHALL USE MOUNTING BRACKET AND GUIDE ASSEMBLY ADJUSTABILITY TO KEEP THE WEIGHT STACK CLEAR OF THE DYNAMIC CLEARANCE ENVELOPE.
 10. THE C/W TAIL WIRE INSULATOR IS TO BE NO CLOSER THAN 4'-0" TO SUPERELEVATED TRACK CENTERLINE. TYPICAL YOKE PLATE SET OUT DIMENSION IS TO BE SPAN LENGTH TIMES 0.3.
 11. THE DESIGN IS BASED ON AN 18" EYE-TO-EYE YOKE PLATE AND 14" CIRCULAR BALANCE WEIGHT MOUNTED AT A 2" OFFSET FROM THE FACE OF THE POLE. THE CONTRACTOR SHALL DETERMINE THE LENGTH OF THE BALANCE WEIGHT STACK, TRAVEL, POSITION OF TEMPERATURE STOPS AND TERMINATION ATTACHMENT HEIGHT BASED ON THE REQUIRED TENSION, ACTUAL SUPPLIED HARDWARE AND SITE SPECIFIC CONDITIONS.
 12. THE BALANCE WEIGHT SHALL MOVE FREELY WITHIN THE TEMPERATURE RANGE OF 5° F TO 130° F, AND WITHIN THE SPACE GIVEN BETWEEN BWA TERMINATION AND TOP OF BASEPLATE. TEMPERATURE STOP CLAMPS SHALL BE INSTALLED TO PREVENT BALANCE WEIGHT MOVEMENT BEYOND THE SET TEMPERATURE RANGE.
 13. THE MOUNTING ARRANGEMENT OF BALANCE WEIGHT ASSEMBLY AS SHOWN IS TYPICAL. THE CONTRACTOR SHALL DEVELOP THE DESIGN BASED ON THE EQUIPMENT ACTUALLY USED AND THE MANUFACTURER'S RECOMMENDATIONS.
 14. THE CONTRACTOR SHALL ENSURE THAT NO INTERFERENCE OCCURS BETWEEN ALL POLE CLAMPS & BRACKETS AND THE BWA-WIRE ROPE TERMINATIONS FOR THEIR TOTAL VERTICAL TRAVEL. PROVIDE A MINIMUM OF 2" OF FREE SPACE TO ALL MOVING WIRE COMPONENTS.
 15. THE BILL OF MATERIALS DETAILS ARE TYPICAL FOR THE ASSEMBLY STYLES SHOWN. THE CONTRACTOR SHALL ITEMIZE THE TABLE WITH DESCRIPTIONS AND PART NUMBERS OF COMPONENTS REQUIRED TO COMPLETE EACH ASSEMBLY.
 16. SEE DWG JOD602 FOR BALANCE WEIGHT MOVEMENT CHART.
 17. BRACKETS SHALL BE DESIGNED AND FABRICATED FOR USE WITH THE DOWN GUY ASSEMBLIES.
 18. GUIDE ASSEMBLY SHALL RESTRAIN SIDE TO SIDE MOVEMENT UNDER ALL ENVIRONMENTAL CONDITIONS.
 19. CONSTANT TENSION SPRING TERMINATIONS ARE PREFERRED OVER BALANCE WEIGHT ASSEMBLIES.



SECTION A
NTS

| BILL OF MATERIALS | | | | | |
|----------------------|----------|----------|--|----------|------------------|
| QUANTITIES EACH TYPE | | UNITS | DESCRIPTION | ITEM NO. | PART NO./REMARKS |
| BW-3 | BW-1 | | | | |
| 1 | 1 | EA | TENSIONING WHEEL ASSEMBLY | 1 | |
| 1 | 1 | EA | BALANCE WEIGHT STACK | 2 | NOTE 11 |
| 1 | 1 | EA | BALANCE WEIGHT GUIDE ASSEMBLY W/ BRACKETS | 3 | NOTE 18 |
| - | 2 | EA | MOUNTING BRACKETS WIDE FLANGE POLE | 4 | NOTE 6, 17 |
| 2 | - | EA | MOUNTING BRACKETS TUBULAR POLE | 5 | NOTE 6, 17 |
| 1 | 1 | EA | SMALL PULLEY | 6 | |
| 1 | 1 | EA | LINK PLATE DOUBLE-ENDED CLEVIS | 7 | |
| 1 | 1 | EA | YOKE PLATE | 8 | |
| AS REQ'D | AS REQ'D | AS REQ'D | STAINLESS STEEL ROTATION RESISTANT WIRE ROPE | 9 | |
| 2 | 2 | EA | TURNBUCKLE | 10 | |
| 3 | 3 | EA | STRAIN INSULATOR | 11 | |
| AS REQ'D | AS REQ'D | AS REQ'D | STAINLESS STEEL WIRE ROPE | 12 | |
| 3 | 3 | EA | WIRE END FITTING | 13 | |
| 1 | 1 | EA | MESSENGER WIRE DEAD END CLAMP | 14 | |
| 1 | 1 | EA | CONTACT WIRE DEAD END CLAMP | 15 | |
| 1 | 1 | EA | MESSENGER/CONTACT CLAMP | 16 | NOTE 7 |
| 1 | 1 | EA | SHACKLE OR SWIVEL | 17 | |
| 2 | 2 | EA | BALANCE WEIGHT STOP CLAMPS | 18 | |

BALANCE WEIGHT ANCHOR ASSEMBLY ON WIDE FLANGE POLE BW-1
BALANCE WEIGHT ANCHOR ASSEMBLY ON TUBULAR POLE BW-3
NTS

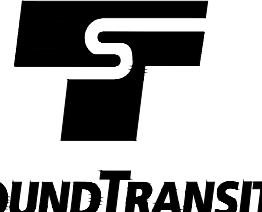
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SCALE: NTS
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CONTRACT No.: RTA/LR
DATE: 2/2024

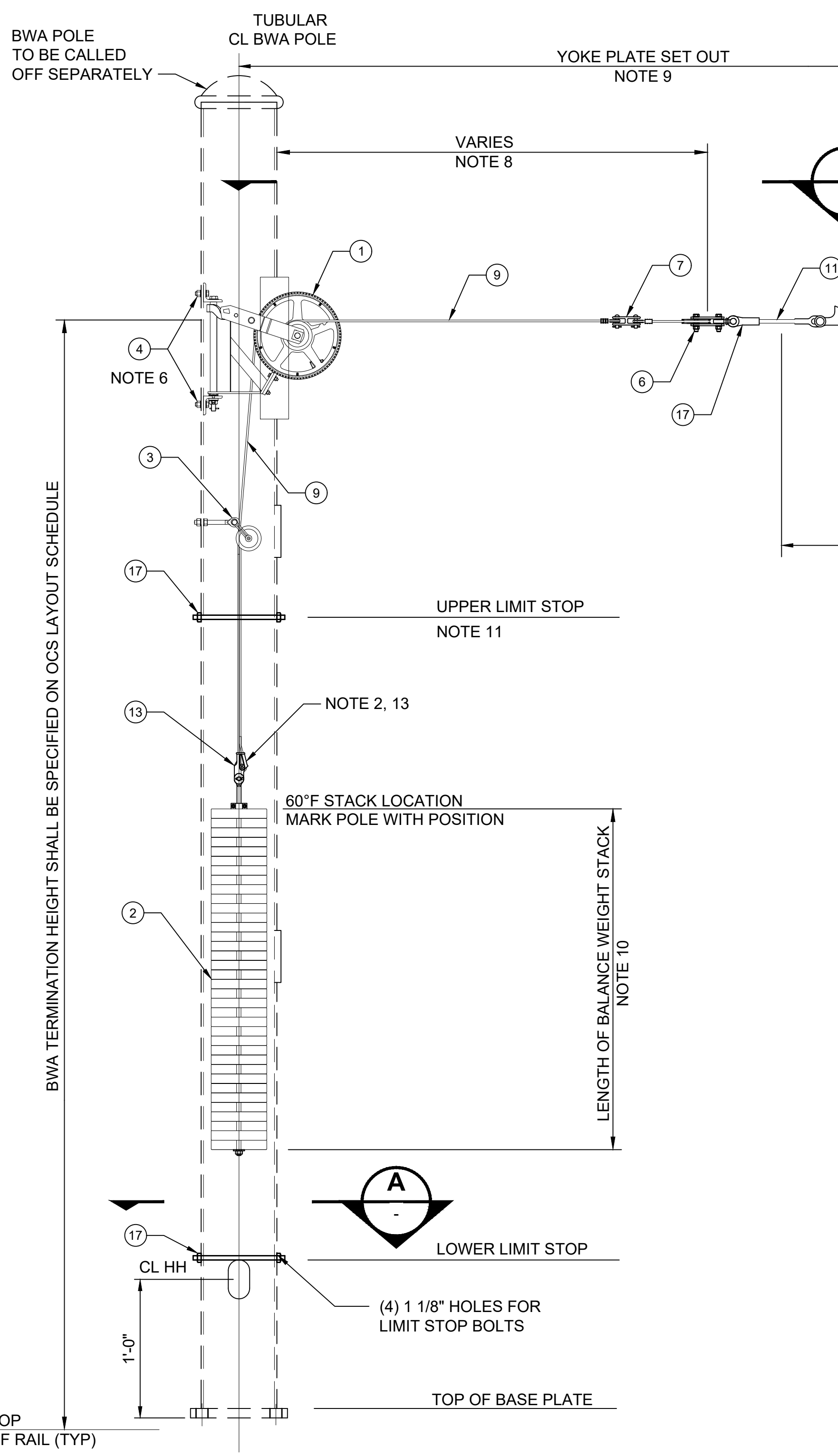


**SOUND TRANSIT
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SYSTEMS**

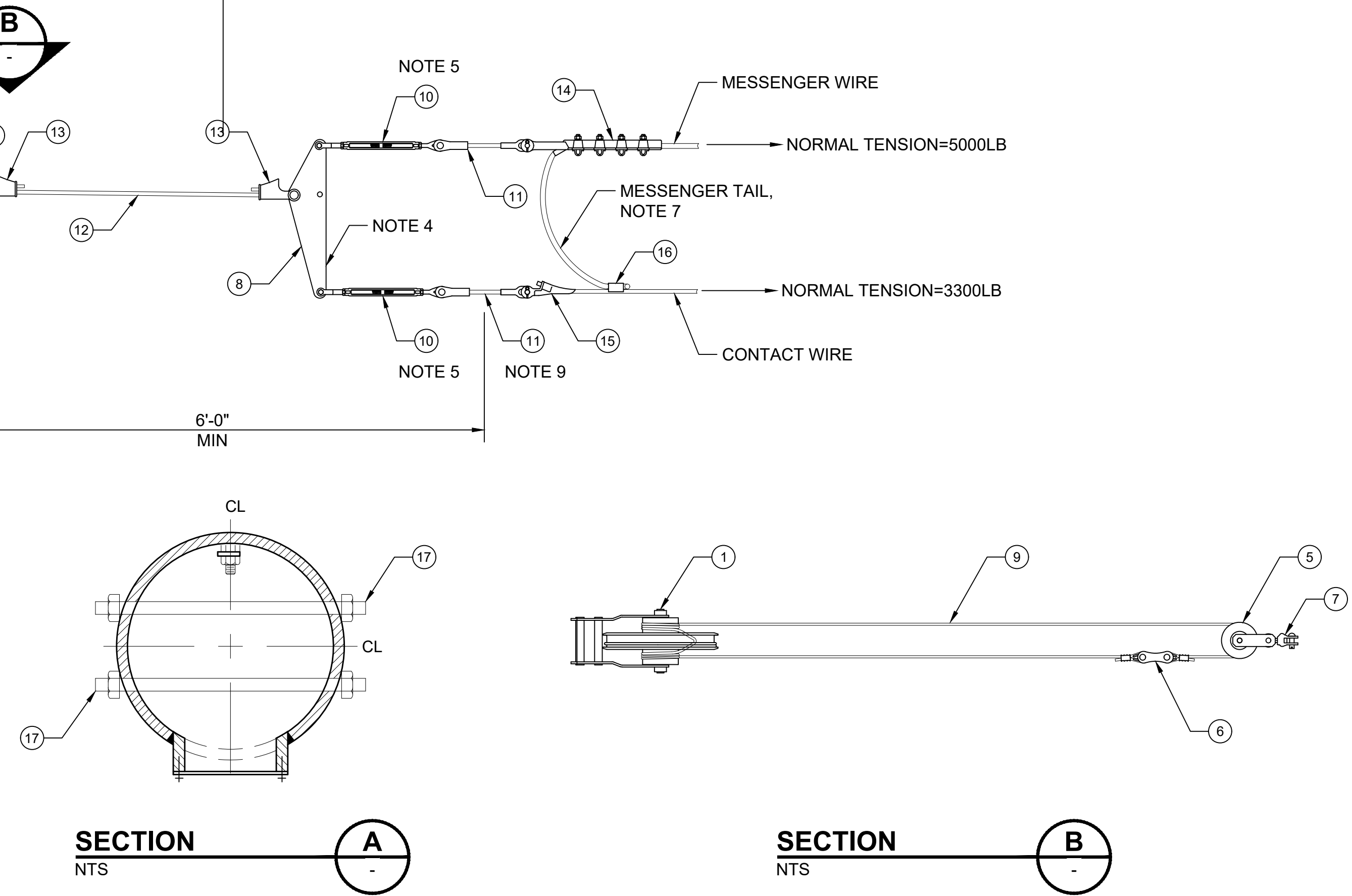
OVERHEAD CATENARY SYSTEM
BALANCE WEIGHT ANCHOR ASSEMBLY
BW-1 & BW-3

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| DRAWING No.: | STD-JOD600 |
| FACILITY ID: | |
| SHEET No.: | REV: 1 |

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BALANCE WEIGHT ANCHOR ASSEMBLY INSIDE TUBULAR POLE BW-2
SCALE: NTS



| BILL OF MATERIALS | | | | | |
|----------------------|-------|--|----------|------------------|------------|
| QUANTITIES EACH TYPE | UNITS | DESCRIPTION | ITEM NO. | PART NO./REMARKS | |
| BW-2 | | | | | |
| 1 | EA | TENSIONING WHEEL ASSEMBLY | 1 | | |
| 1 | EA | BALANCE WEIGHT STACK | 2 | | |
| 1 | EA | BALANCE WEIGHT GUIDE PULLEY ASSEMBLY W/ BRACKETS | 3 | | |
| 2 | EA | MOUNTING BRACKETS | 4 | | NOTE 6, 17 |
| 1 | EA | SMALL PULLEY | 5 | | |
| 1 | EA | LINK PLATE DOUBLE-ENDED CLEVIS | 6 | | |
| 1 | EA | SHACKLE OR SWIVEL | 7 | | |
| 1 | EA | YOKE PLATE | 8 | | |
| AS REQ'D | LF | STAINLESS STEEL ROTATION RESISTANT WIRE CABLE | 9 | | |
| 1 | EA | TURNBUCKLE | 10 | | |
| 3 | EA | STRAIN INSULATOR | 11 | | |
| AS REQ'D | LF | STAINLESS STEEL WIRE ROPE | 12 | | |
| 3 | EA | WIRE END FITTING | 13 | | |
| 1 | EA | MESSENGER WIRE DEAD END CLAMP | 14 | | |
| 1 | EA | CONTACT WIRE DEAD END CLAMP | 15 | | |
| 1 | EA | MESSENGER/CONTACT CLAMP | 16 | | NOTE 7 |
| 4 | EA | 1" DIAMETER STOP BOLTS & NUTS | 17 | | |

- GENERAL NOTES:**
- THE ASSEMBLY SHALL APPLY A COMBINED TENSION TO THE MESSENGER AND CONTACT WIRES.
 - PROVIDE SUFFICIENT TAIL WIRE FOR FIELD ADJUSTMENT. THE EXCESS TAIL WIRE SHALL BE CUT OFF ONLY AFTER FINAL ADJUSTMENT.
 - TENSION ASSEMBLY SHALL HAVE A RATIO OF 1:3. TENSION ASSEMBLY SHALL BE DESIGNED SO THAT IT WILL BECOME LOCKED IN CASE OF A TENSION RELIEF FROM THE CATENARY.
 - THE YOKE PLATE SHALL BE DIMENSIONED TO PRODUCE THE NORMAL TENSION VALUE SHOWN. YOKE PLATE SHALL HAVE AN ADDITIONAL HOLE TO FACILITATE ATTACHMENT OF TENSION RIGS.
 - M/W & C/W TURNBUCKLES SHALL BE FURNISHED TO PERMIT PLUMBING OF YOKE PLATE. AFTER FINAL ADJUSTMENT, TURNBUCKLES SHALL BE EXTENDED 6" MIN FROM MIN LENGTH.
 - MOUNTING BRACKET SHALL BE FURNISHED TO PERMIT ALONG TRACK AND ACROSS TRACK ADJUSTMENTS FOR PLUMBING OF BALANCE WEIGHT.
 - A JUMPER/ANTI-TORSION ARRANGEMENT IS TO BE FORMED USING APPROXIMATELY 2.5 (FT) OF MESSENGER WIRE EXTENDING FROM THE REAR OF THE DEAD END ASSEMBLY.
 - CONTRACTOR SHALL FURNISH THIS DIMENSION, BASED ON PHYSICAL AND MECHANICAL PROPERTIES OF THE BALANCE WEIGHT ASSEMBLY AND THE ALONG TRACK MOVEMENT OF THE CATENARY.
 - THE C/W TAIL WIRE INSULATOR IS TO BE NO CLOSER THAN 4'-0" TO SUPER ELEVATED TRACK CENTERLINE. TYPICAL YOKE PLATE SET OUT DIMENSION IS TO BE SPAN LENGTH TIMES 0.3.
 - THE DESIGN IS BASED ON AN 18" EYE-TO-EYE YOKE PLATE AND 14" CIRCULAR BALANCE WEIGHT. THE CONTRACTOR SHALL DETERMINE THE LENGTH OF THE BALANCE WEIGHT STACK, TRAVEL, POSITION OF LOW TEMPERATURE STOP AND TERMINATION ATTACHMENT HEIGHT BASED ON THE REQUIRED TENSION, ACTUAL SUPPLIED HARDWARE AND SITE SPECIFIC CONDITIONS. MAXIMUM WIDTH OF THE WEIGHT SHALL FIT INSIDE 18" STD TUBULAR POLE.
 - THE BALANCE WEIGHT SHALL MOVE FREELY WITHIN THE TEMPERATURE RANGE OF 5° F TO 130° F, AND WITHIN THE SPACE BETWEEN TEMPERATURE STOPS. TEMPERATURE STOP BOLTS SHALL BE INSTALLED TO PREVENT BALANCE WEIGHT MOVEMENT BEYOND THE SET TEMPERATURE RANGE. TEMPERATURE STOP BOLTS TO BE PLACED ABOVE THE POLE GROUNDING STUD AND SHALL NOT IMPEDE HANDHOLE ACCESS TO THE POLE GROUNDING TERMINATIONS.
 - THE MOUNTING ARRANGEMENT OF BALANCE WEIGHT ASSEMBLY AS SHOWN IS TYPICAL. THE CONTRACTOR SHALL DEVELOP THE DESIGN BASED ON THE EQUIPMENT ACTUALLY USED AND THE MANUFACTURER'S RECOMMENDATIONS AS APPROVED BY THE RESIDENT ENGINEER.
 - THE CONTRACTOR SHALL ENSURE THAT NO INTERFERENCE OCCURS BETWEEN ALL POLE CLAMPS AND BRACKETS AND THE BWA-WIRE ROPE TERMINATIONS FOR THEIR TOTAL VERTICAL TRAVEL. PROVIDE A MINIMUM OF 2" OF FREE SPACE TO ALL MOVING WIRE COMPONENTS.
 - THE BILL OF MATERIALS DETAILS ARE TYPICAL FOR THE ASSEMBLY STYLES SHOWN. THE CONTRACTOR SHALL ITEMIZE THE TABLE WITH DESCRIPTIONS AND PART NUMBERS OF COMPONENTS REQUIRED TO COMPLETE EACH ASSEMBLY.
 - CONTRACTOR TO ROTATE POLE TO ALIGN SHEAVE ASSEMBLY & TERM SPAN PERPENDICULAR TO UPPER POLE FLANGE. SEE DWG JOD304.
 - SEE DWG JOD602 FOR BALANCE WEIGHT MOVEMENT CHART.
 - BRACKETS SHALL BE DESIGNED AND FABRICATED FOR USE WITH THE DOWN GUY ASSEMBLIES.
 - TUBULAR POLES WITH INTERNAL BALANCE WEIGHTS ARE NON-PREFERRED COMPARED TO EXTERNAL BALANCE WEIGHTS. USE OF BW-2 INTERNAL BALANCE WEIGHT ASSEMBLIES MUST BE APPROVED BY SOUND TRANSIT ON A SITE SPECIFIC BASIS.
 - CONSTANT TENSION SPRING TERMINATIONS ARE PREFERRED OVER BALANCE WEIGHT ASSEMBLIES. ST APPROVAL IS REQUIRED IN ORDER TO USE BALANCE WEIGHTS.

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SCALE: NTS
FILENAME: STD-JOD601
CONTRACT No.: RTA/LR
DATE: 2/2024

**SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS**

OVERHEAD CATENARY SYSTEM
BALANCE WEIGHT ANCHOR ASSEMBLY
BW-2

DRAWING No.: **STD-JOD601**
FACILITY ID:
SHEET No.: REV: 1

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GENERAL NOTE:

1. THE INFORMATION FURNISHED IN TABLE 1 IS BASED ON A 1:3 RATIO PULLEY SYSTEM AND IS PROVIDED FOR REFERENCE ONLY. CONTRACTOR SHALL DETERMINE THE ACTUAL BALANCE WEIGHT MOVEMENT, BASED ON ACTUAL PULLEY AND BALANCE WEIGHT ASSEMBLIES PROVIDED.

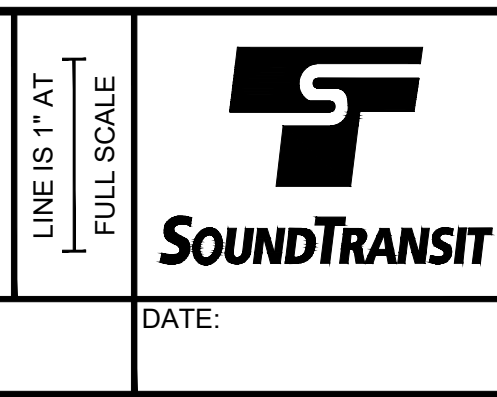
| TABLE 1 - BALANCE WEIGHT MOVEMENT | | | | | | | | | | | | | | | |
|-----------------------------------|-------------------------------------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| TEMP °F | DISTANCE FROM MID-POINT ANCHOR (FT) | | | | | | | | | | | | | | |
| | 200 | 400 | 600 | 800 | 1000 | 1200 | 1400 | 1600 | 1800 | 2000 | 2200 | 2400 | 2600 | 2800 | 3000 |
| 5 | -3.7 | -7.4 | -11.2 | -14.9 | -18.6 | -22.3 | -26.1 | -29.8 | -33.5 | -37.2 | -40.9 | -44.7 | -48.4 | -52.1 | -55.8 |
| 10 | -3.4 | -6.8 | -10.2 | -13.5 | -16.9 | -20.3 | -23.7 | -27.1 | -30.5 | -33.8 | -37.2 | -40.6 | -44.0 | -47.4 | -50.8 |
| 20 | -2.7 | -5.4 | -8.1 | -10.8 | -13.5 | -16.2 | -19.0 | -21.7 | -24.4 | -27.1 | -29.8 | -32.5 | -35.2 | -37.9 | -40.6 |
| 30 | -2.0 | -4.1 | -6.1 | -8.1 | -10.2 | -12.2 | -14.2 | -16.2 | -18.3 | -20.3 | -22.3 | -24.4 | -26.4 | -28.4 | -30.5 |
| 40 | -1.4 | -2.7 | -4.1 | -5.4 | -6.8 | -8.1 | -9.5 | -10.8 | -12.2 | -13.5 | -14.9 | -16.2 | -17.6 | -19.0 | -20.3 |
| 50 | -0.7 | -1.4 | -2.0 | -2.7 | -3.4 | -4.1 | -4.7 | -5.4 | -6.1 | -6.8 | -7.4 | -8.1 | -8.8 | -9.5 | -10.2 |
| 60 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 70 | 0.7 | 1.4 | 2.0 | 2.7 | 3.4 | 4.1 | 4.7 | 5.4 | 6.1 | 6.8 | 7.4 | 8.1 | 8.8 | 9.5 | 10.2 |
| 80 | 1.4 | 2.7 | 4.1 | 5.4 | 6.8 | 8.1 | 9.5 | 10.8 | 12.2 | 13.5 | 14.9 | 16.2 | 17.6 | 19.0 | 20.3 |
| 90 | 2.0 | 4.1 | 6.1 | 8.1 | 10.2 | 12.2 | 14.2 | 16.2 | 18.3 | 20.3 | 22.3 | 24.4 | 26.4 | 28.4 | 30.5 |
| 100 | 2.7 | 5.4 | 8.1 | 10.8 | 13.5 | 16.2 | 19.0 | 21.7 | 24.4 | 27.1 | 29.8 | 32.5 | 35.2 | 37.9 | 40.6 |
| 110 | 3.4 | 6.8 | 10.2 | 13.5 | 16.9 | 20.3 | 23.7 | 27.1 | 30.5 | 33.8 | 37.2 | 40.6 | 44.0 | 47.4 | 50.8 |
| 120 | 4.1 | 8.1 | 12.2 | 16.2 | 20.3 | 24.4 | 28.4 | 32.5 | 36.5 | 40.6 | 44.7 | 48.7 | 52.8 | 56.9 | 60.9 |
| 130 | 4.7 | 9.5 | 14.2 | 19.0 | 23.7 | 28.4 | 33.2 | 37.9 | 42.6 | 47.4 | 52.1 | 56.9 | 61.6 | 66.3 | 71.1 |

DIMENSION GIVEN IN INCHES (SEE NOTE 1)
BALANCE WEIGHT MOVEMENT "-" MOVES UPWARD "+" MOVES DOWNWARD

| No. | DATE | DSN | CHK | APP | REVISION |
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| 1 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |
| 0 | 8/2019 | | | | REVISED SYSTEMS DIRECTIVE DRAWINGS |

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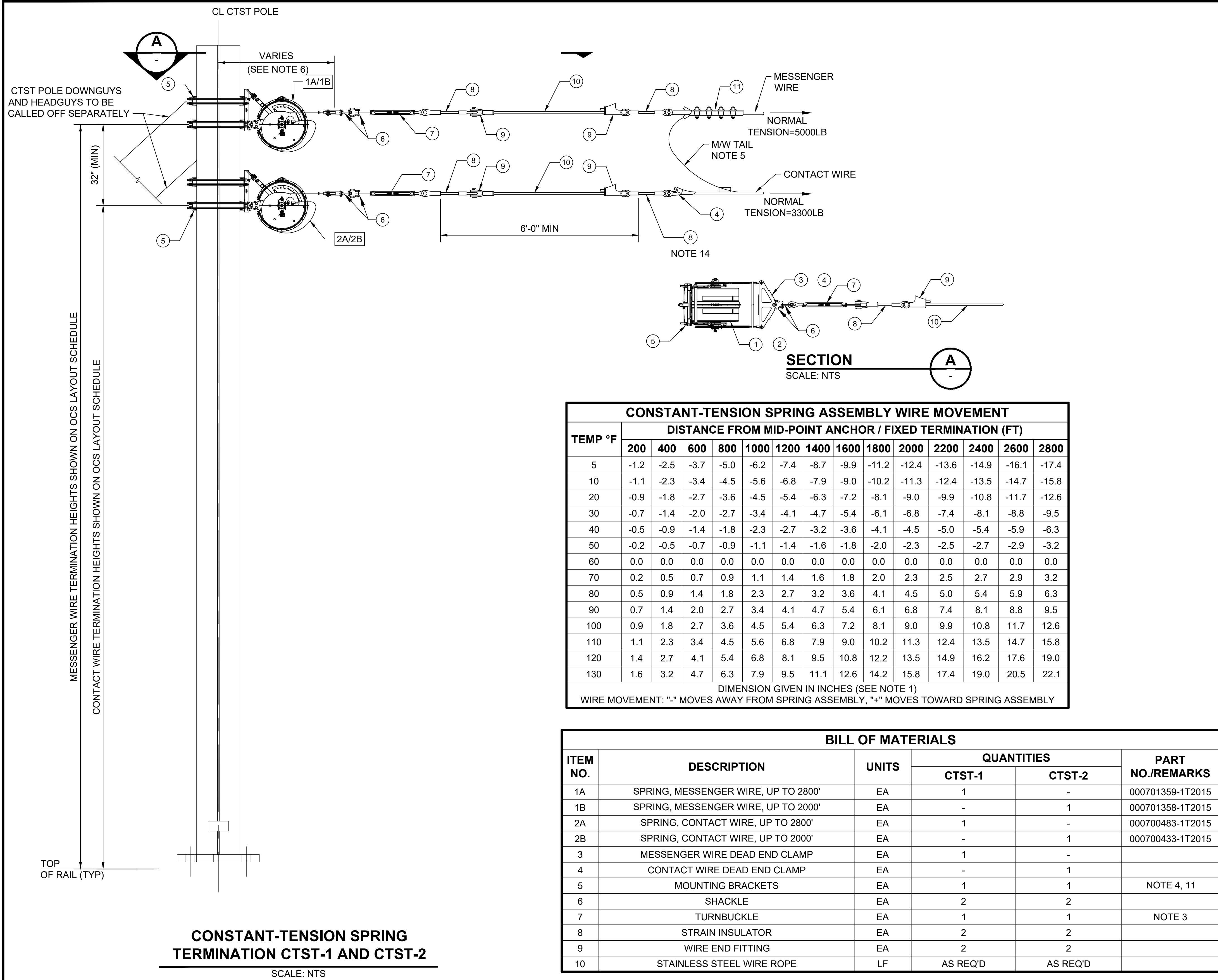
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| SCALE: NTS |
| FILENAME: STD-JOD602 |
| CONTRACT No.: RTA/LR |
| DATE: 2/2024 |

**SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS**

OVERHEAD CATENARY SYSTEM
BALANCE WEIGHT ANCHOR ASSEMBLY
BW-1, BW-2, BW-3, BW-4, BW-5 & BW-6

| |
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| DRAWING No.: STD-JOD602 |
| FACILITY ID: |
| SHEET No.: 1 |

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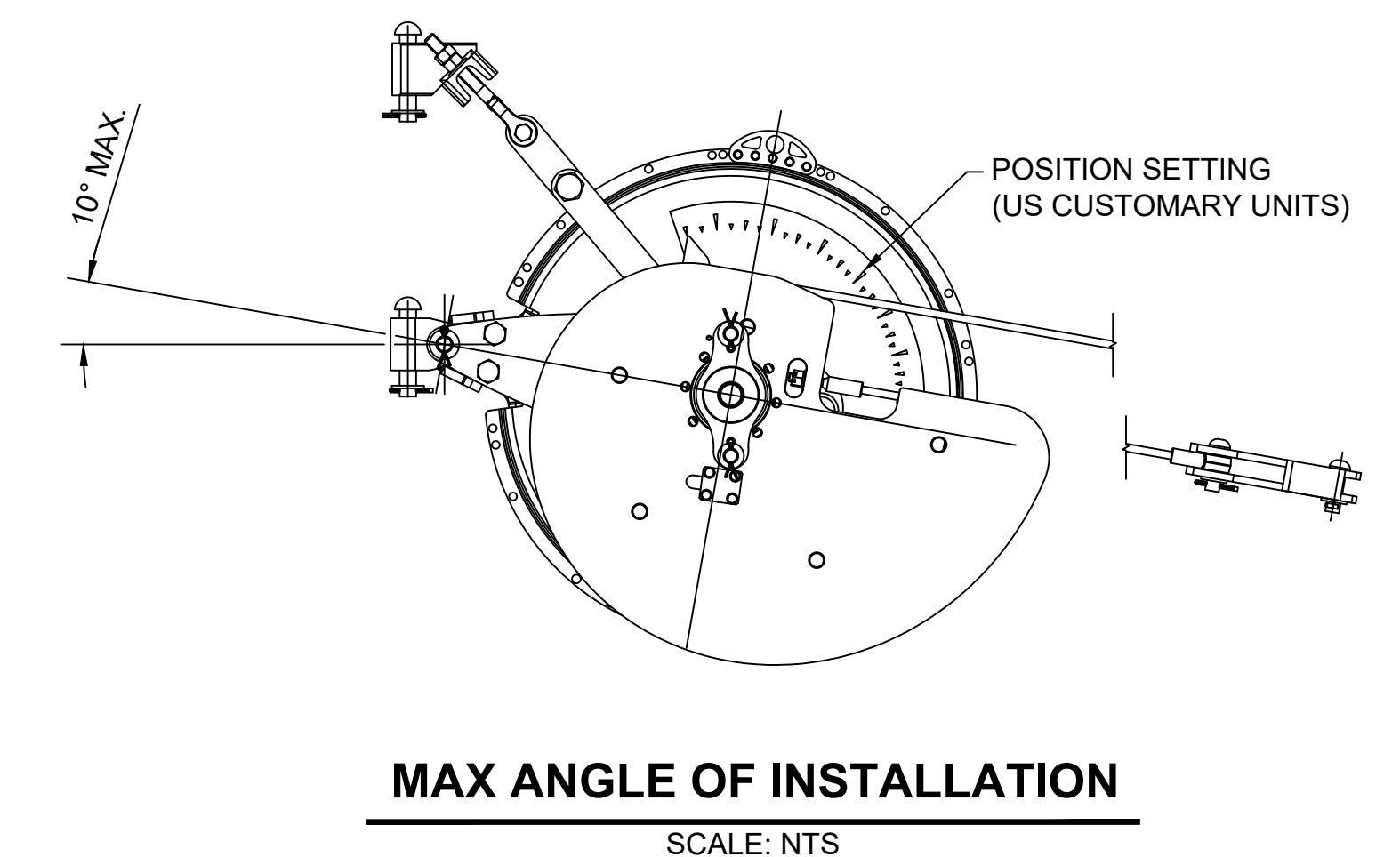
GENERAL NOTES:

1. THE WIRE MOVEMENT VALUES SHOWN IN THE TABLE PROVIDED ARE BASED ON A 1:1 RATIO OF SPRING SYSTEM TO WIRE MOVEMENT. CONTRACTOR SHALL SUBMIT POSITION SETTING TABLES BASED ON WIRE MOVEMENT FOR EACH CONSTANT-TENSION SPRING TERMINATION ASSEMBLY.
2. OCS WIRES SHALL MOVE FREELY WITHIN THE TEMPERATURE RANGE OF 5°F TO 130°F.
3. AFTER FINAL ADJUSTMENT OF WIRING, TURNBUCKLES SHALL BE EXTENDED 6" MINIMUM FROM MINIMUM LENGTH.
4. MOUNTING BRACKET SHALL BE FURNISHED TO PERMIT ALONG TRACK AND ACROSS TRACK ADJUSTMENTS OF SPRING TENSIONING ASSEMBLY.
5. A JUMPER/ANTI-TORSION ARRANGEMENT IS TO BE FORMED USING APPROXIMATELY 2.5' (FT) OF MESSENGER WIRE EXTENDING FROM THE REAR OF THE DEAD END ASSEMBLY.
6. CONTRACTOR SHALL FURNISH THIS DIMENSION, BASED ON PHYSICAL AND MECHANICAL PROPERTIES OF THE AUTOMATIC-TENSIONING ASSEMBLY AND THE ALONG TRACK MOVEMENT OF THE CATENARY.
7. THE MOUNTING ARRANGEMENT OF THE SPRING TENSIONING ASSEMBLY AS SHOWN IS TYPICAL. THE CONTRACTOR SHALL DEVELOP THE ACTUAL CONFIGURATION BASED ON THE EQUIPMENT USED AND THE MANUFACTURER'S RECOMMENDATIONS.
8. THE CONTRACTOR SHALL ENSURE THAT NO INTERFERENCE OCCURS BETWEEN ALL POLE CLAMPS, BRACKETS, AND OTHER MOUNTED EQUIPMENT IN THE VICINITY AND THE WIRE MOVEMENT OF THE SPRING TENSIONING ASSEMBLY.
9. THE BILL OF MATERIALS DETAILS ARE TYPICAL FOR THE ASSEMBLY STYLES SHOWN. THE CONTRACTOR SHALL ITEMIZE THE TABLE WITH DESCRIPTIONS AND PART NUMBERS OF COMPONENTS REQUIRED TO COMPLETE EACH ASSEMBLY.
10. PROVIDE SUFFICIENT TAIL WIRE FOR FIELD ADJUSTMENT. THE EXCESS TAIL WIRE SHALL BE CUT OFF ONLY AFTER FINAL ADJUSTMENT.
11. BRACKETS SHALL BE DESIGNED AND FABRICATED FOR USE WITH THE DOWN GUY ASSEMBLIES.
12. CTST UNITS SHALL INCLUDE WEEP HOLES TO ENSURE PROPER DRAINAGE BASED ON MOUNTING ORIENTATION.
13. THE CONSTANT TENSION SPRINGS SHALL BE SUBMITTED BY CONTRACTOR IN SHOP DRAWINGS, INCLUDING DATA DEMONSTRATING THE MAINTAIN A MECHANICAL PULL FORCE EFFICIENCY WITHIN +/- 3% OF THE REQUIRED TENSIONS OVER THE AUTO-TENSIONED TEMPERATURE RANGE.
14. THE CONTACT WIRE TAIL WIRE INSULATOR IS TO BE NO CLOSER THAN 4'-0" TO SUPERELEVATED TRACK CENTERLINE.
15. A SET OF BLOCKING PINS SHALL BE PROVIDED TO SOUND TRANSIT AS PART OF THE REQUIRED SPARE PARTS DELIVERY FOR THIS ITEM.

| CONSTANT-TENSION SPRING ASSEMBLY WIRE MOVEMENT | | | | | | | | | | | | | | |
|--|---|------|------|------|------|------|------|------|-------|-------|-------|-------|-------|-------|
| TEMP °F | DISTANCE FROM MID-POINT ANCHOR / FIXED TERMINATION (FT) | | | | | | | | | | | | | |
| | 200 | 400 | 600 | 800 | 1000 | 1200 | 1400 | 1600 | 1800 | 2000 | 2200 | 2400 | 2600 | 2800 |
| 5 | -1.2 | -2.5 | -3.7 | -5.0 | -6.2 | -7.4 | -8.7 | -9.9 | -11.2 | -12.4 | -13.6 | -14.9 | -16.1 | -17.4 |
| 10 | -1.1 | -2.3 | -3.4 | -4.5 | -5.6 | -6.8 | -7.9 | -9.0 | -10.2 | -11.3 | -12.4 | -13.5 | -14.7 | -15.8 |
| 20 | -0.9 | -1.8 | -2.7 | -3.6 | -4.5 | -5.4 | -6.3 | -7.2 | -8.1 | -9.0 | -9.9 | -10.8 | -11.7 | -12.6 |
| 30 | -0.7 | -1.4 | -2.0 | -2.7 | -3.4 | -4.1 | -4.7 | -5.4 | -6.1 | -6.8 | -7.4 | -8.1 | -8.8 | -9.5 |
| 40 | -0.5 | -0.9 | -1.4 | -1.8 | -2.3 | -2.7 | -3.2 | -3.6 | -4.1 | -4.5 | -5.0 | -5.4 | -5.9 | -6.3 |
| 50 | -0.2 | -0.5 | -0.7 | -0.9 | -1.1 | -1.4 | -1.6 | -1.8 | -2.0 | -2.3 | -2.5 | -2.7 | -2.9 | -3.2 |
| 60 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 70 | 0.2 | 0.5 | 0.7 | 0.9 | 1.1 | 1.4 | 1.6 | 1.8 | 2.0 | 2.3 | 2.5 | 2.7 | 2.9 | 3.2 |
| 80 | 0.5 | 0.9 | 1.4 | 1.8 | 2.3 | 2.7 | 3.2 | 3.6 | 4.1 | 4.5 | 5.0 | 5.4 | 5.9 | 6.3 |
| 90 | 0.7 | 1.4 | 2.0 | 2.7 | 3.4 | 4.1 | 4.7 | 5.4 | 6.1 | 6.8 | 7.4 | 8.1 | 8.8 | 9.5 |
| 100 | 0.9 | 1.8 | 2.7 | 3.6 | 4.5 | 5.4 | 6.3 | 7.2 | 8.1 | 9.0 | 9.9 | 10.8 | 11.7 | 12.6 |
| 110 | 1.1 | 2.3 | 3.4 | 4.5 | 5.6 | 6.8 | 7.9 | 9.0 | 10.2 | 11.3 | 12.4 | 13.5 | 14.7 | 15.8 |
| 120 | 1.4 | 2.7 | 4.1 | 5.4 | 6.8 | 8.1 | 9.5 | 10.8 | 12.2 | 13.5 | 14.9 | 16.2 | 17.6 | 19.0 |
| 130 | 1.6 | 3.2 | 4.7 | 6.3 | 7.9 | 9.5 | 11.1 | 12.6 | 14.2 | 15.8 | 17.4 | 19.0 | 20.5 | 22.1 |

DIMENSION GIVEN IN INCHES (SEE NOTE 1)
WIRE MOVEMENT: "-" MOVES AWAY FROM SPRING ASSEMBLY, "+" MOVES TOWARD SPRING ASSEMBLY

| BILL OF MATERIALS | | | | | |
|-------------------|-------------------------------------|-------|------------|----------|------------------|
| ITEM NO. | DESCRIPTION | UNITS | QUANTITIES | | PART NO./REMARKS |
| | | | CTST-1 | CTST-2 | |
| 1A | SPRING, MESSENGER WIRE, UP TO 2800' | EA | 1 | - | 000701359-1T2015 |
| 1B | SPRING, MESSENGER WIRE, UP TO 2000' | EA | - | 1 | 000701358-1T2015 |
| 2A | SPRING, CONTACT WIRE, UP TO 2800' | EA | 1 | - | 000700483-1T2015 |
| 2B | SPRING, CONTACT WIRE, UP TO 2000' | EA | - | 1 | 000700433-1T2015 |
| 3 | MESSENGER WIRE DEAD END CLAMP | EA | 1 | - | |
| 4 | CONTACT WIRE DEAD END CLAMP | EA | - | 1 | |
| 5 | MOUNTING BRACKETS | EA | 1 | 1 | NOTE 4, 11 |
| 6 | SHACKLE | EA | 2 | 2 | |
| 7 | TURNBUCKLE | EA | 1 | 1 | NOTE 3 |
| 8 | STRAIN INSULATOR | EA | 2 | 2 | |
| 9 | WIRE END FITTING | EA | 2 | 2 | |
| 10 | STAINLESS STEEL WIRE ROPE | LF | AS REQ'D | AS REQ'D | |



CONSTANT-TENSION SPRING TERMINATION CTST-1 AND CTST-2
SCALE: NTS

MAX ANGLE OF INSTALLATION
SCALE: NTS

| No. | DATE | DSN | CHK | APP | REVISION |
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| 0 | 2/2024 | | | | 2024 NEW STANDARD DRAWINGS |

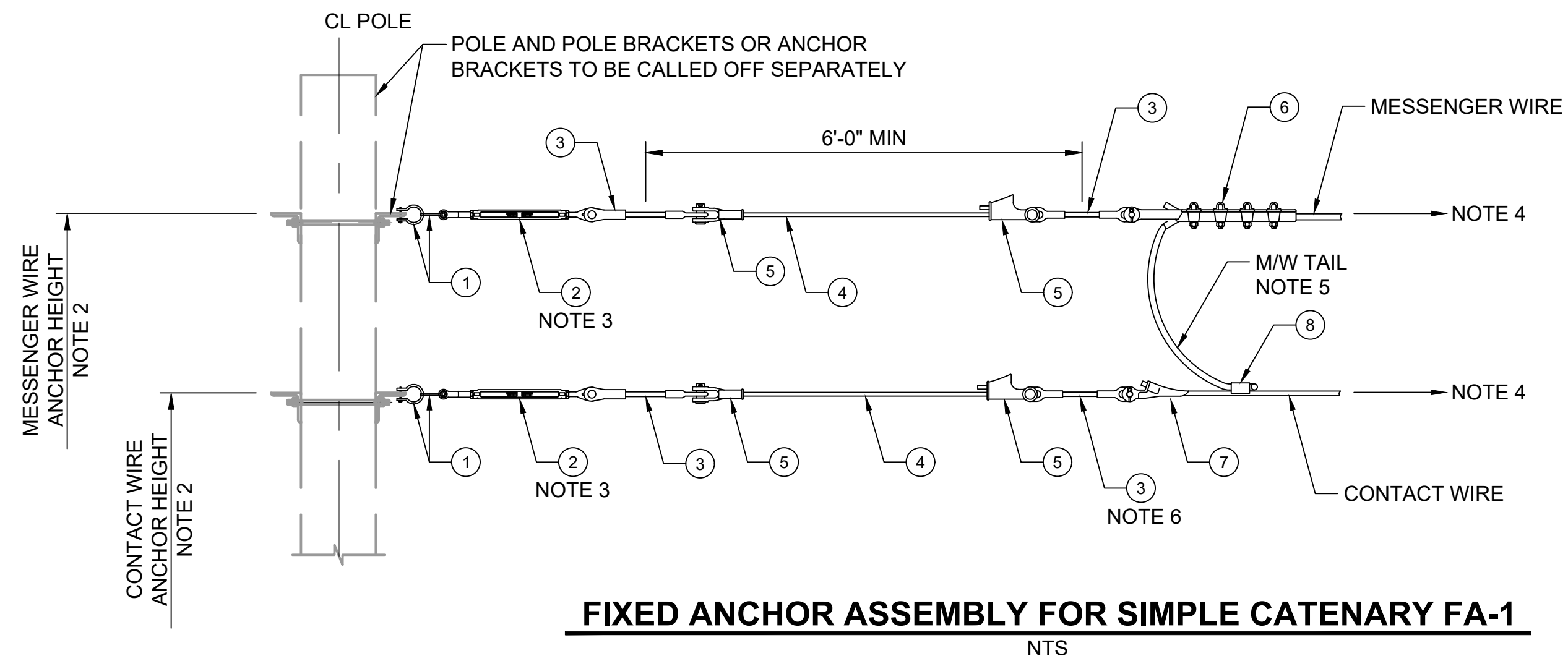
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| FILENAME: STD-JOD603 | |
| CONTRACT No.: RTA/LR | |
| DATE: 2/2024 | |

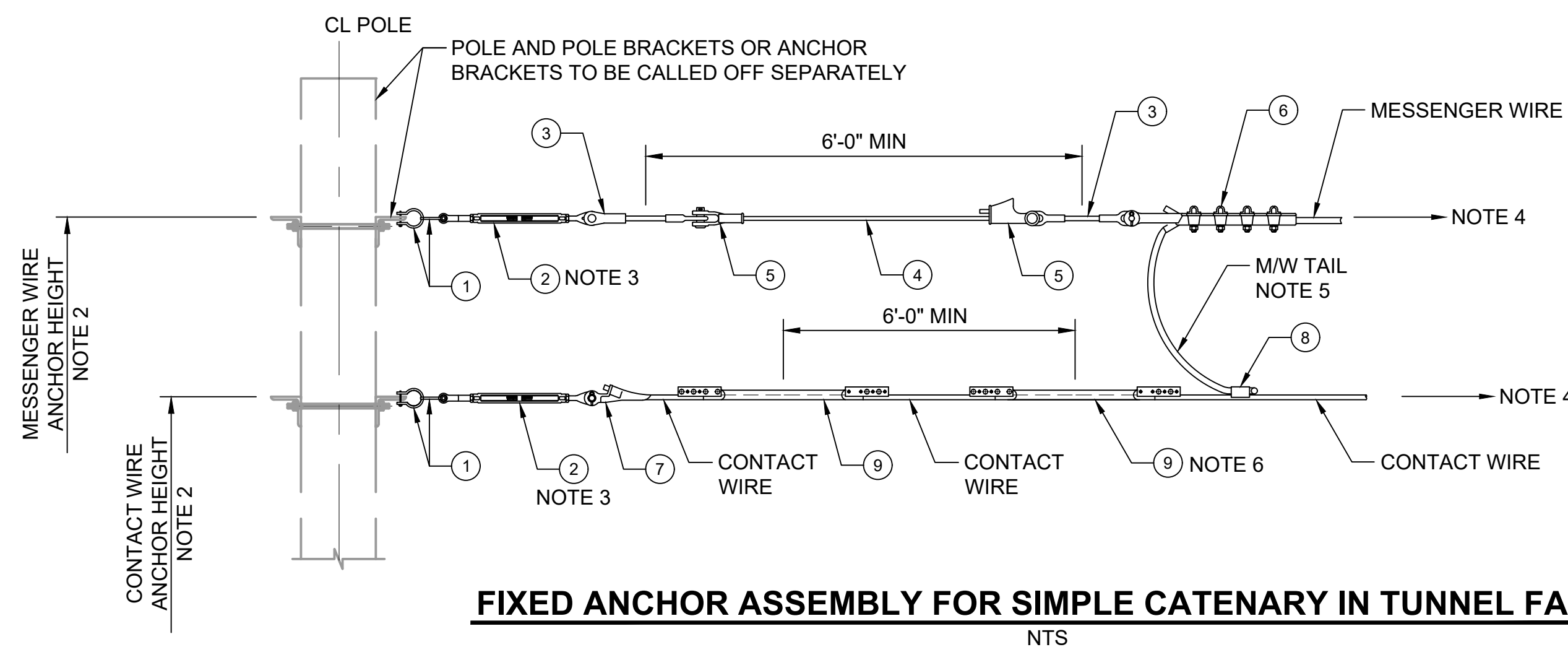
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| SOUND TRANSIT STANDARD DRAWINGS SYSTEMS OVERHEAD CONTACT SYSTEMS CONSTANT TENSION SPRING TERMINATION CTST-1, CTST-2 | |
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| DRAWING No.: STD-JOD603 |
| FACILITY ID: |
| SHEET No.: 0 |



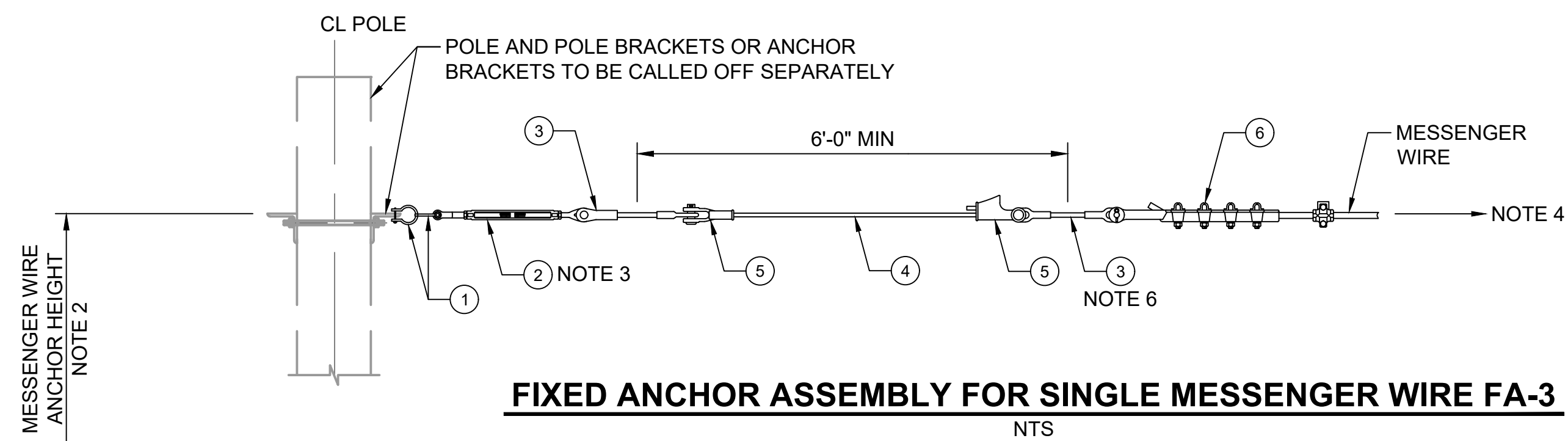
FIXED ANCHOR ASSEMBLY FOR SIMPLE CATENARY FA-1

NTS



FIXED ANCHOR ASSEMBLY FOR SIMPLE CATENARY IN TUNNEL FA-1T

NTS

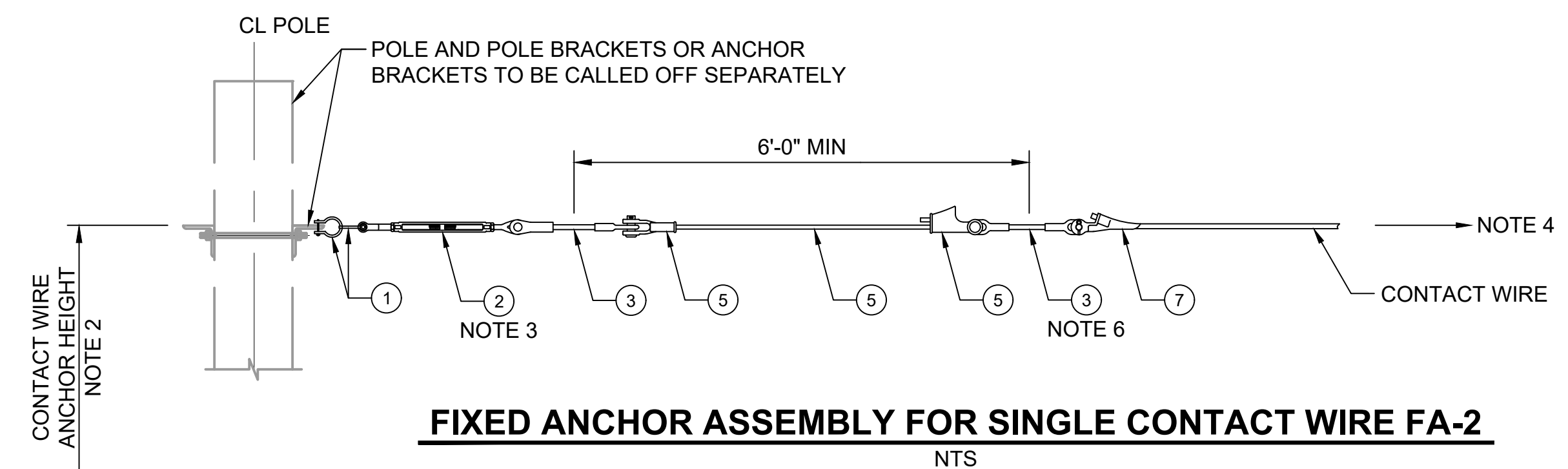


FIXED ANCHOR ASSEMBLY FOR SINGLE MESSENGER WIRE FA-3

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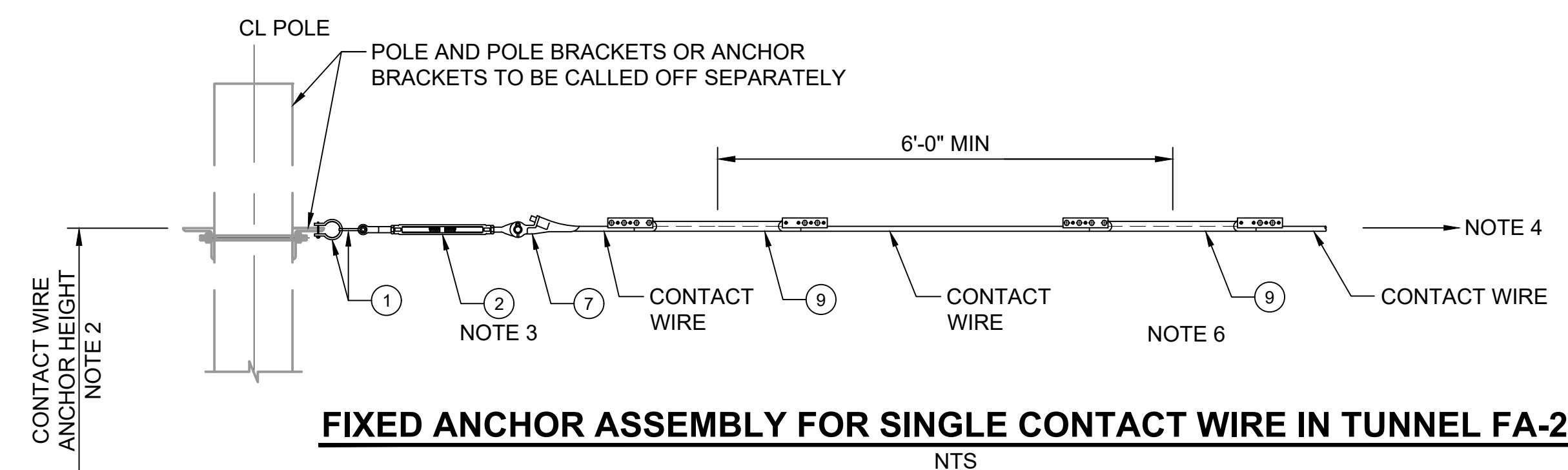
GENERAL NOTES:

1. THE BILL OF MATERIALS DETAILS ARE TYPICAL FOR THE ASSEMBLY STYLES SHOWN. THE CONTRACTOR SHALL ITEMIZE THE TABLE WITH DESCRIPTIONS AND PART NUMBERS OF COMPONENTS REQUIRED TO COMPLETE EACH ASSEMBLY.
2. ANCHOR HEIGHTS TO BE SHOWN ON OCS LAYOUT PLANS.
3. AFTER ADJUSTMENT OF WIRING, TURNBUCKLES SHALL BE EXTENDED 6" MINIMUM FROM MINIMUM LENGTH.
4. FOR CONDUCTOR TENSIONS AND DETAILS, SEE TECHNICAL DWGS JOD100, JOD101.
5. A JUMPER/ANTI-TORSION ARRANGEMENT IS TO BE FORMED USING APPROXIMATELY 2.5' (FT) OF MESSENGER WIRE EXTENDING FROM THE REAR OF THE DEAD END ASSEMBLY.
6. THE M/W AND C/W TAIL WIRE INSULATORS ARE TO BE NO CLOSER THAN 4'-0" TO SUPER-ELEVATED TRACK CENTERLINE.
7. CONTRACTOR TO DETERMINE COMPONENT DETAIL AND SAFE WORKING LOADS.
8. FOR SYMBOLS, LEGEND AND ABBREVIATIONS SEE DRAWINGS JZN001 AND JZN002.
9. CONTRACTOR TO VERIFY ALL QUANTITIES ON THE BILL OF MATERIALS.
10. CONTRACTOR TO DETERMINE POLE BRACKET ATTACHMENT HEIGHTS.
11. THE CONTRACTOR IS RESPONSIBLE FOR THE DESIGN OF EACH ASSEMBLY.



FIXED ANCHOR ASSEMBLY FOR SINGLE CONTACT WIRE FA-2

NTS



FIXED ANCHOR ASSEMBLY FOR SINGLE CONTACT WIRE IN TUNNEL FA-2T

NTS

| QUANTITIES EACH TYPE | | | | | UNITS | DESCRIPTION | ITEM NO. | PART NO./REMARKS |
|----------------------|-------|------|-------|------|-------|---------------------------|----------|------------------|
| FA-3 | FA-2T | FA-2 | FA-1T | FA-1 | | | | |
| 2 | 2 | 2 | 4 | 4 | EA | SHACKLE | 1 | |
| 1 | 1 | 1 | 2 | 2 | EA | TURNBUCKLE | 2 | NOTE 3 |
| 2 | - | 2 | 2 | 4 | EA | STRAIN INSULATOR | 3 | |
| 1 | - | 1 | 1 | 2 | EA | STAINLESS STEEL WIRE ROPE | 4 | LENGTH AS REQ'D |
| 2 | - | 2 | 2 | 4 | EA | WIRE END FITTING | 5 | |
| 1 | - | - | 1 | 1 | EA | MESSENGER DEADEND | 6 | |
| - | 1 | 1 | 1 | 1 | EA | CONTACT WIRE DEADEND | 7 | |
| - | - | - | 1 | 1 | EA | CLAMP, MESSENGER/CONTACT | 8 | NOTE 5 |
| - | 2 | - | 2 | - | EA | RUNNABLE INSULATOR | 9 | |

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| No. | DATE | DSN | CHK | APP | REVISION |
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| 1 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |
| 0 | 8/2019 | | | | REVISED SYSTEMS DIRECTIVE DRAWINGS |

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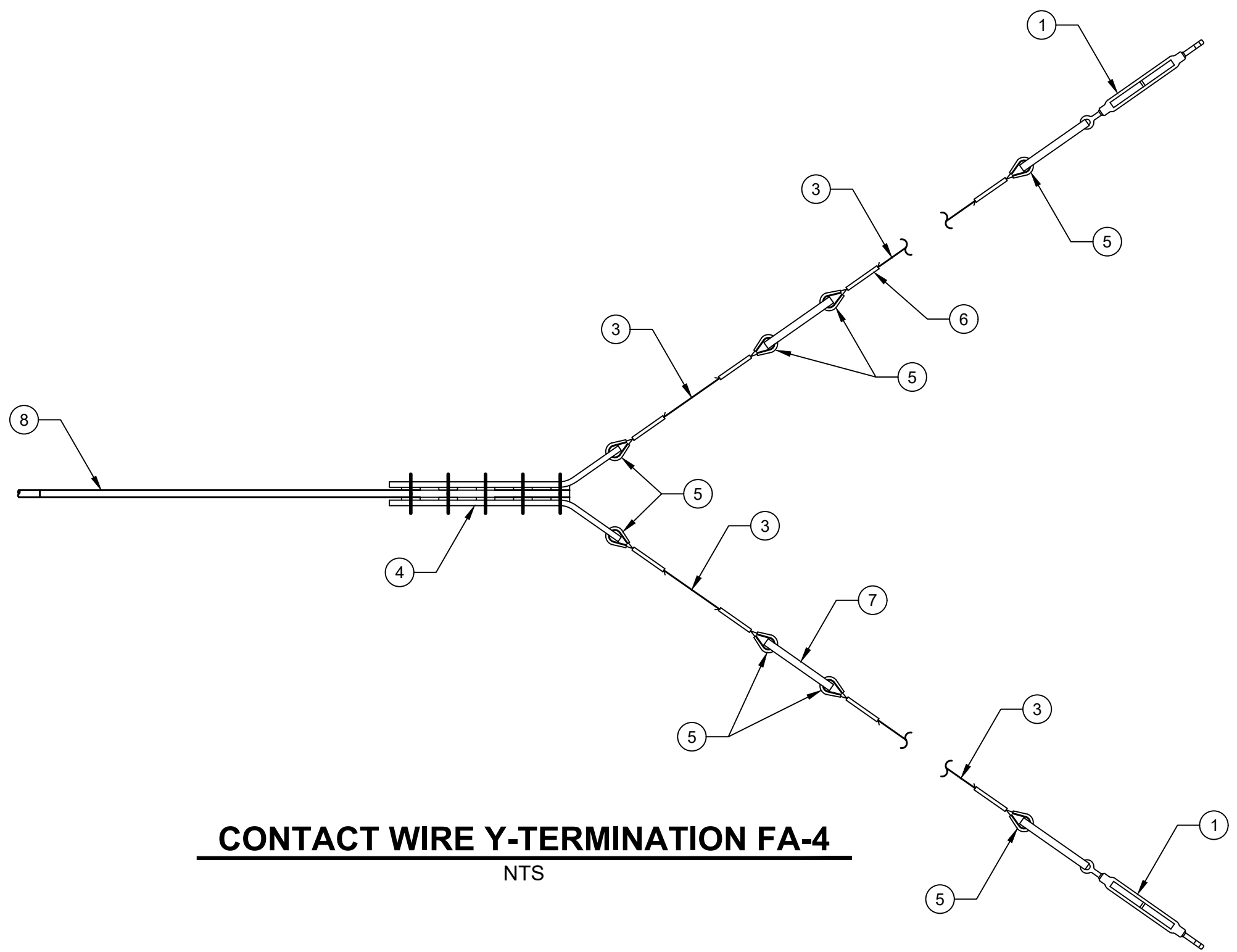
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 CONTRACT No.: RTA/LR
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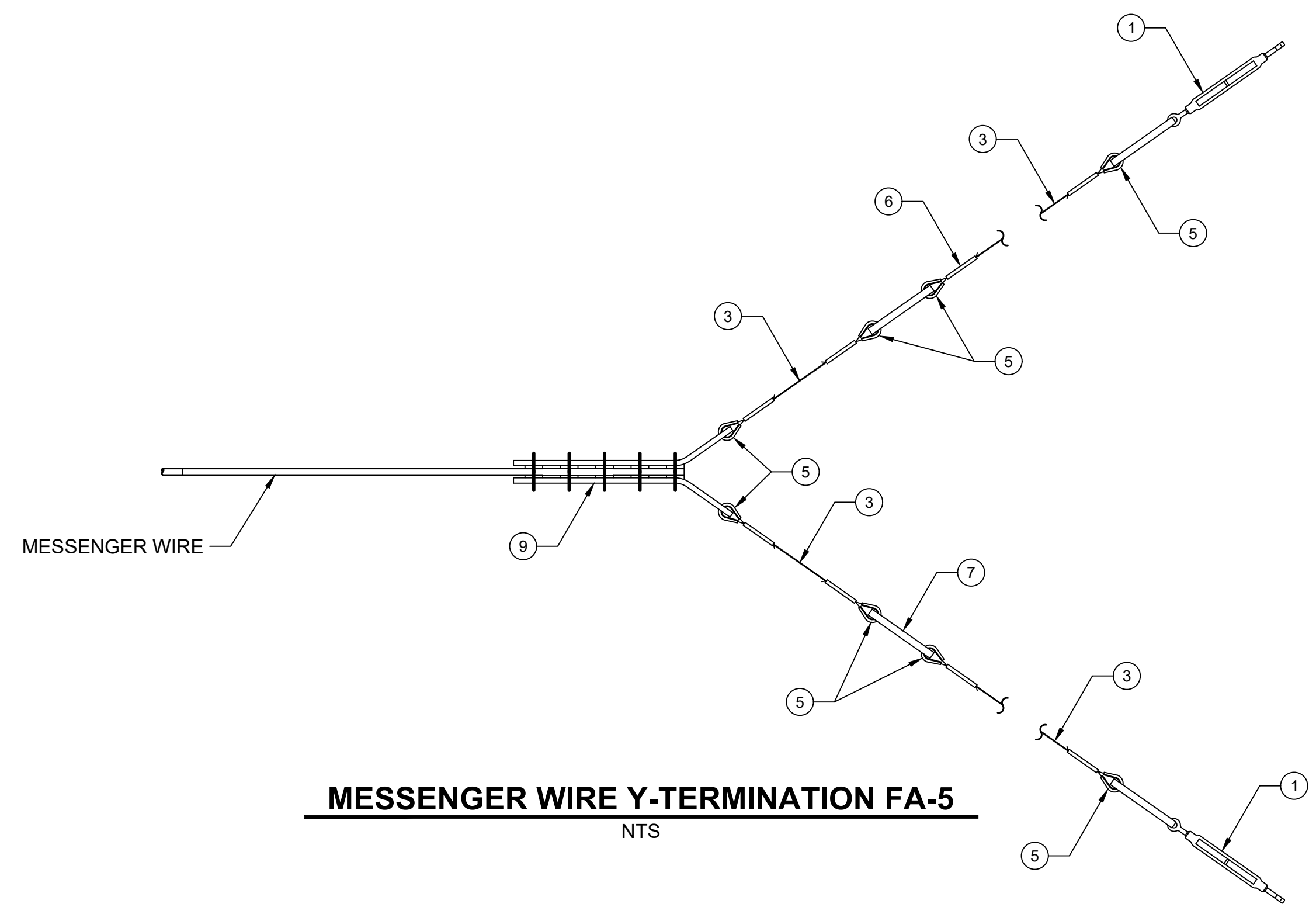
**SOUND TRANSIT
 STANDARD DRAWINGS
 SYSTEMS**

OVERHEAD CATENARY SYSTEM
 FIXED ANCHOR ASSEMBLIES
 FA-1, FA-1T, FA-2, FA-2T & FA-3

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| DRAWING No.: | STD-JOD610 |
| FACILITY ID: | |
| SHEET No.: | REV: 1 |



CONTACT WIRE Y-TERMINATION FA-4
NTS



MESSENGER WIRE Y-TERMINATION FA-5
NTS

GENERAL NOTES:

1. FOR CONDUCTOR TENSIONS AND DETAILS SEE TECHNICAL SHEETS JOD100, JOD101.
2. CONTRACTOR TO DETERMINE COMPONENT DETAIL AND SAFE WORKING LOADS.
3. FOR SYMBOLS, LEGEND AND ABBREVIATIONS SEE DRAWINGS JZN001 AND JZN002.
4. CONTRACTOR TO VERIFY ALL QUANTITIES ON THE BILL OF MATERIALS.
5. CONTRACTOR TO DETERMINE POLE BRACKET ATTACHMENT HEIGHTS.
6. THE CONTRACTOR IS RESPONSIBLE FOR THE DESIGN OF EACH ASSEMBLY AS A WHOLE.
7. ANCHOR HEIGHT TO BE SHOWN ON OCS LAYOUT PLANS.

| BILL OF MATERIALS | | | | | |
|----------------------|----------|----------|------------------------------|----------|------------------|
| QUANTITIES EACH TYPE | | UNITS | DESCRIPTION | ITEM NO. | PART NO./REMARKS |
| FA-5 | FA-4 | | | | |
| 2 | 2 | EA | TURNBUCKLE | 1 | |
| - | 5 | EA | PARALLEL GROOVE CLAMP | 2 | |
| AS REQ'D | AS REQ'D | AS REQ'D | STAINLESS STEEL WIRE | 3 | |
| - | 1 | EA | CONTACT WIRE Y-TERMINATION | 4 | |
| 8 | 8 | EA | THIMBLE/CLAMP | 5 | |
| - | - | EA | NOT USED | 6 | |
| 4 | 4 | EA | INSULATOR | 7 | |
| - | 1 | EA | CONTACT WIRE 10FT LONG | 8 | |
| 1 | - | EA | MESSENGER WIRE Y-TERMINATION | 9 | |


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| 1 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |
| 0 | 8/2019 | | | | REVISED SYSTEMS DIRECTIVE DRAWINGS |

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DRAWN BY:
CHECKED BY:
APPROVED BY:

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REVIEWED BY: _____ DATE: _____

SCALE: NTS
FILENAME: STD-JOD611
CONTRACT No.: RTA/LR
DATE: 2/2024

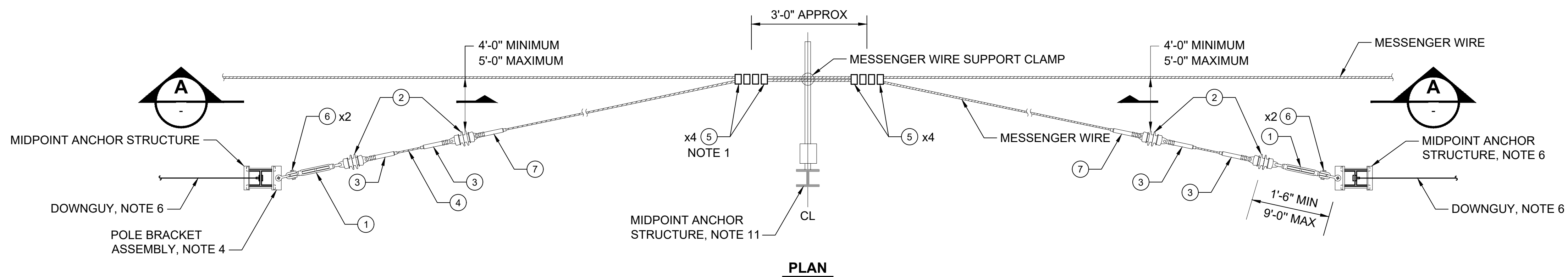


SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS
OVERHEAD CATENARY SYSTEM
FIXED ANCHOR Y-TERMINATIONS
FA-4 & FA-5

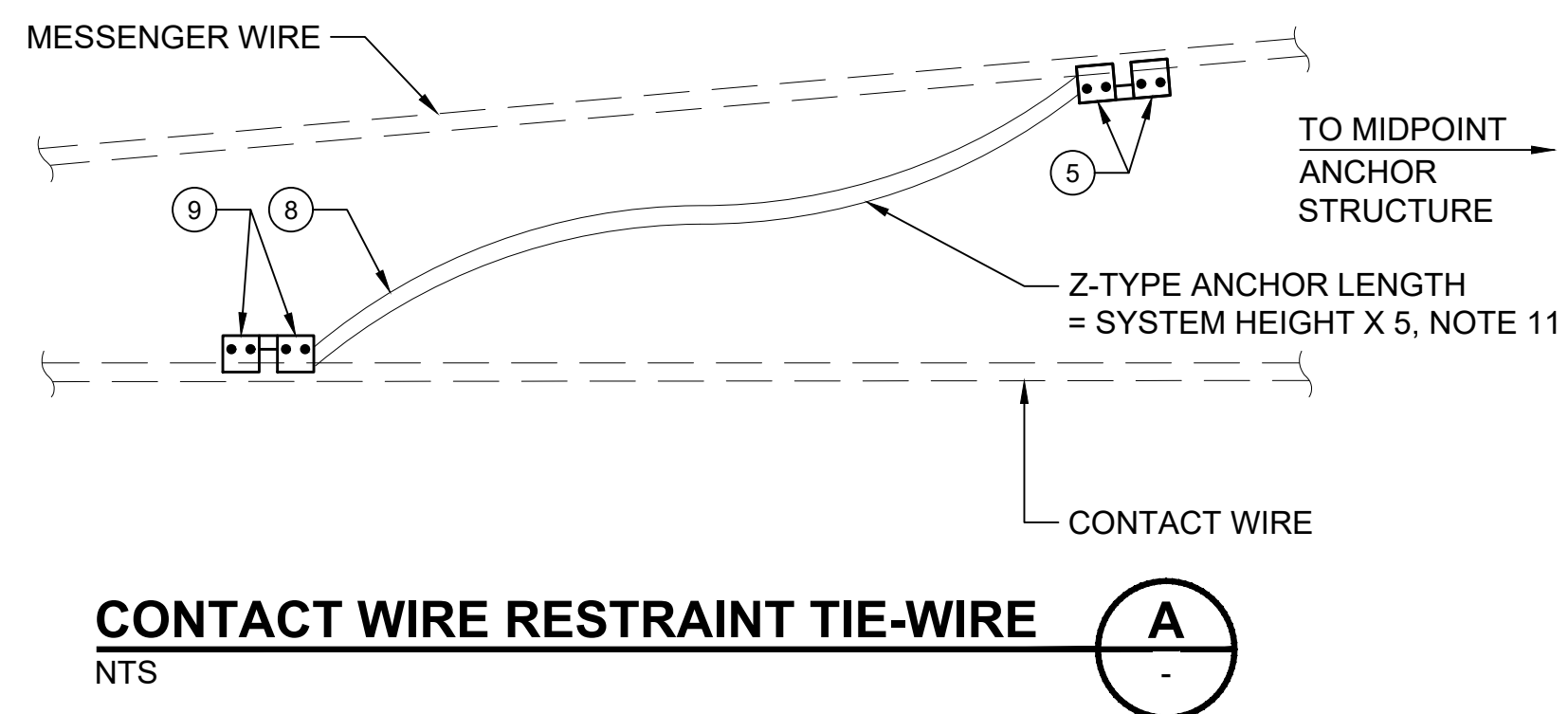
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GENERAL NOTES:

1. THE CLAMPS OR CLIPS SHALL HAVE SUFFICIENT STRENGTH TO RESTRAIN MESSENGER WIRE AND CONTACT WIRE ON ONE SIDE UNDER BROKEN MESSENGER OR CONTACT WIRE CONDITIONS.
2. SPAN GUY MATERIAL TO HAVE HIGHER MINIMUM FAILURE LOAD THAN MESSENGER WIRE.
3. NORMAL GUY WIRE TERMINATION HEIGHT IS 1'-6" BELOW THE MESSENGER WIRE HEIGHT.
4. POLE BRACKETS SHALL BE CALLED OFF SEPARATELY.
5. THE BILL OF MATERIALS DETAILS ARE TYPICAL FOR THE ASSEMBLY STYLES SHOWN. THE CONTRACTOR SHALL ITEMIZE THE TABLE WITH DESCRIPTIONS AND PART NUMBERS OF COMPONENTS REQUIRED TO COMPLETE EACH ASSEMBLY.
6. DOWN GUYS TO BE CALLED OFF SEPARATELY.
7. CONTRACTOR TO DETERMINE COMPONENT DETAIL AND SAFE WORKING LOADS.
8. FOR SYMBOLS, LEGEND AND ABBREVIATIONS SEE DRAWINGS JZN001 AND JZN002.
9. CONTRACTOR TO VERIFY ALL QUANTITIES AND SIZES ON THE BILL OF MATERIALS.
10. THE CONTRACTOR IS RESPONSIBLE FOR THE DESIGN OF EACH ASSEMBLY AS A WHOLE.
11. CANTILEVER TO BE CALLED OFF SEPARATELY.



MID-POINT SPAN GUY MP-1
NTS



| QUANTITIES EACH TYPE | UNITS | DESCRIPTION | ITEM NO. | PART NO./REMARKS |
|----------------------|-------|------------------------------|----------|------------------|
| MP-01 | | | | |
| 2 | EA | TURNBUCKLE | 1 | |
| 4 | EA | STRAIN INSULATOR | 2 | |
| 6 | EA | WIRE DEADEND | 3 | |
| AS REQ'D | LF | STAINLESS STEEL WIRE | 4 | NOTE 2 |
| 12 | EA | PARALLEL GROOVE CLAMPS | 5 | NOTE 1 |
| 4 | EA | SHACKLE | 6 | |
| 2 | EA | MESSENGER DEADEND | 7 | |
| AS REQ'D | LF | STRANDED TIE WIRE, HD COPPER | 8 | |
| 4 | EA | TROLLEY WIRE CLAMP | 9 | NOTE 1 |

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| DESIGNED BY: | | | | | |
| DRAWN BY: | | | | | |
| CHECKED BY: | | | | | |
| APPROVED BY: | | | | | |
| 1 | 2/2024 | 2024 REVISED STANDARD DRAWINGS | | | |
| 0 | 8/2019 | REVISED SYSTEMS DIRECTIVE DRAWINGS | | | |
| No. | DATE | DSN | CHK | APP | REVISION |

| | | | |
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| DESIGNED BY: | | DATE: | |
| DRAWN BY: | | REVIEWED BY: | |
| CHECKED BY: | | DATE: | |
| APPROVED BY: | | DATE: | |
| SUBMITTED BY: | | DATE: | |

LINE IS 1" AT FULL SCALE

SCALE: NTS
FILENAME: STD-JOD615
CONTRACT No.: RTA/LR
DATE: 2/2024

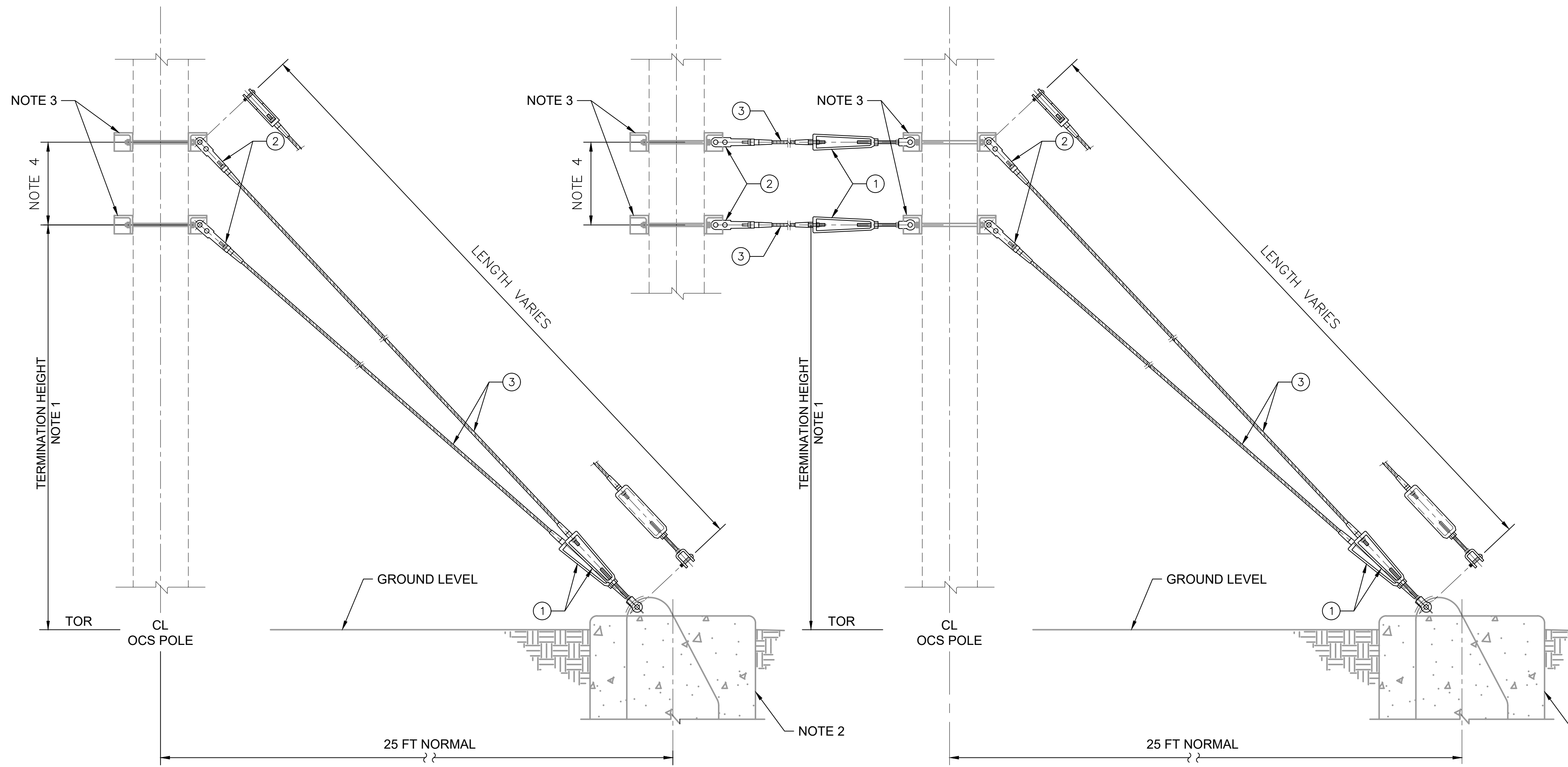
**SOUND TRANSIT
STANDARD DRAWINGS
SYSTEMS**

OVERHEAD CATENARY SYSTEM
MID-POINT SPAN GUY ASSEMBLY
MP-1

| | |
|--------------|------------|
| DRAWING No.: | STD-JOD615 |
| FACILITY ID: | |
| SHEET No.: | REV: |
| | 1 |

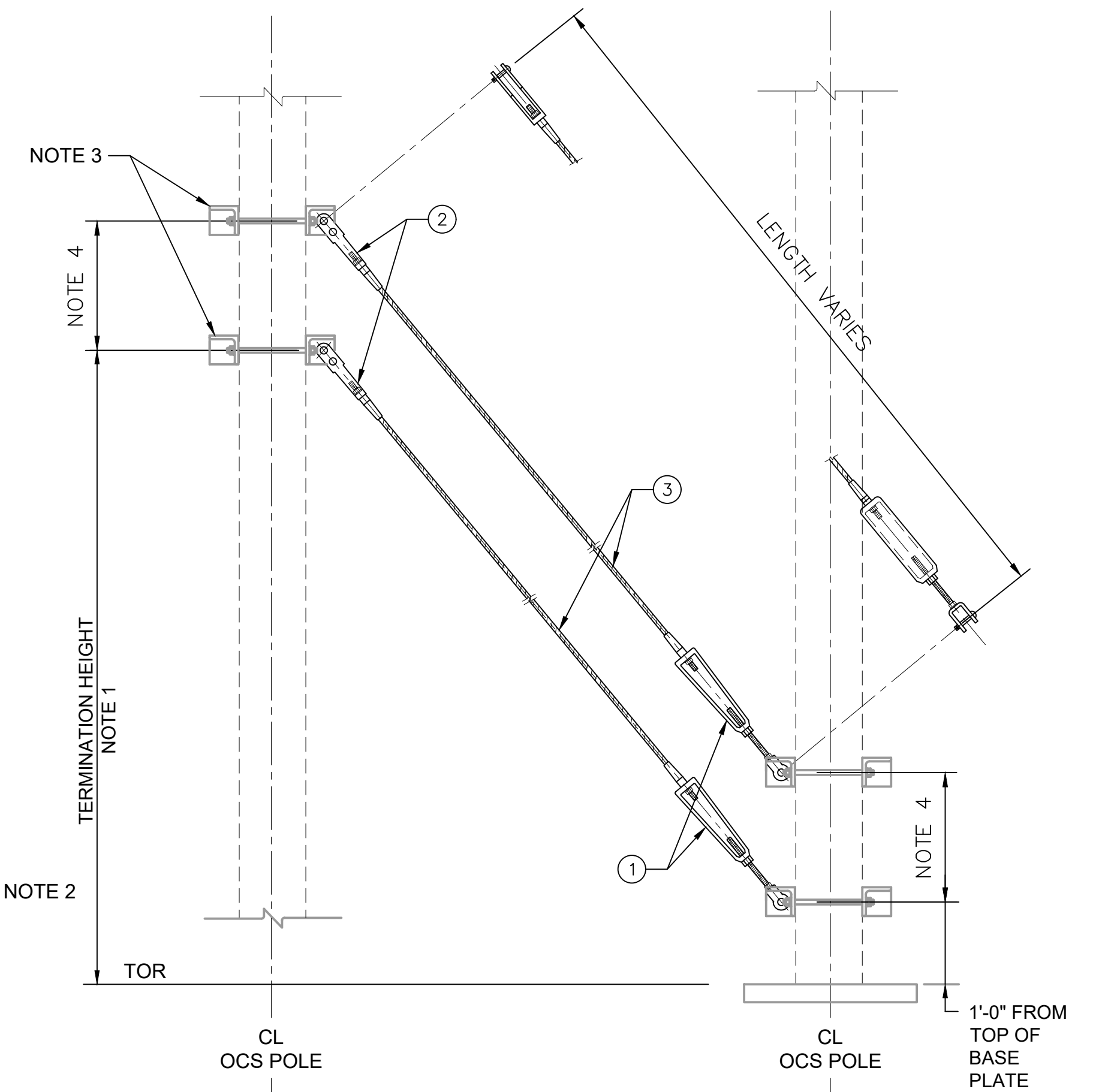
GENERAL NOTES:

1. TERMINATION HEIGHTS TO BE LISTED ON OCS LAYOUT PLANS AND SCHEDULES ON A SITE SPECIFIC BASIS.
2. GUY FOUNDATION TO BE CALLED OFF SEPARATELY.
3. POLE BRACKET TO BE CALLED OUT SEPARATELY.
4. ATTACHMENT HEIGHT AND SEPARATION OF ANCHOR PLATES VARIES WITH SPECIFIED TYPE (CTST, BWA, OR FA). CONTRACTOR TO DESIGN AND SUBMIT ALL ANCHOR CONFIGURATIONS FOR APPROVAL.
5. HEIGHT OF HEAD GUY NEAR TOP OF POLE SHALL BE DETERMINED BY THE CONTRACTOR.

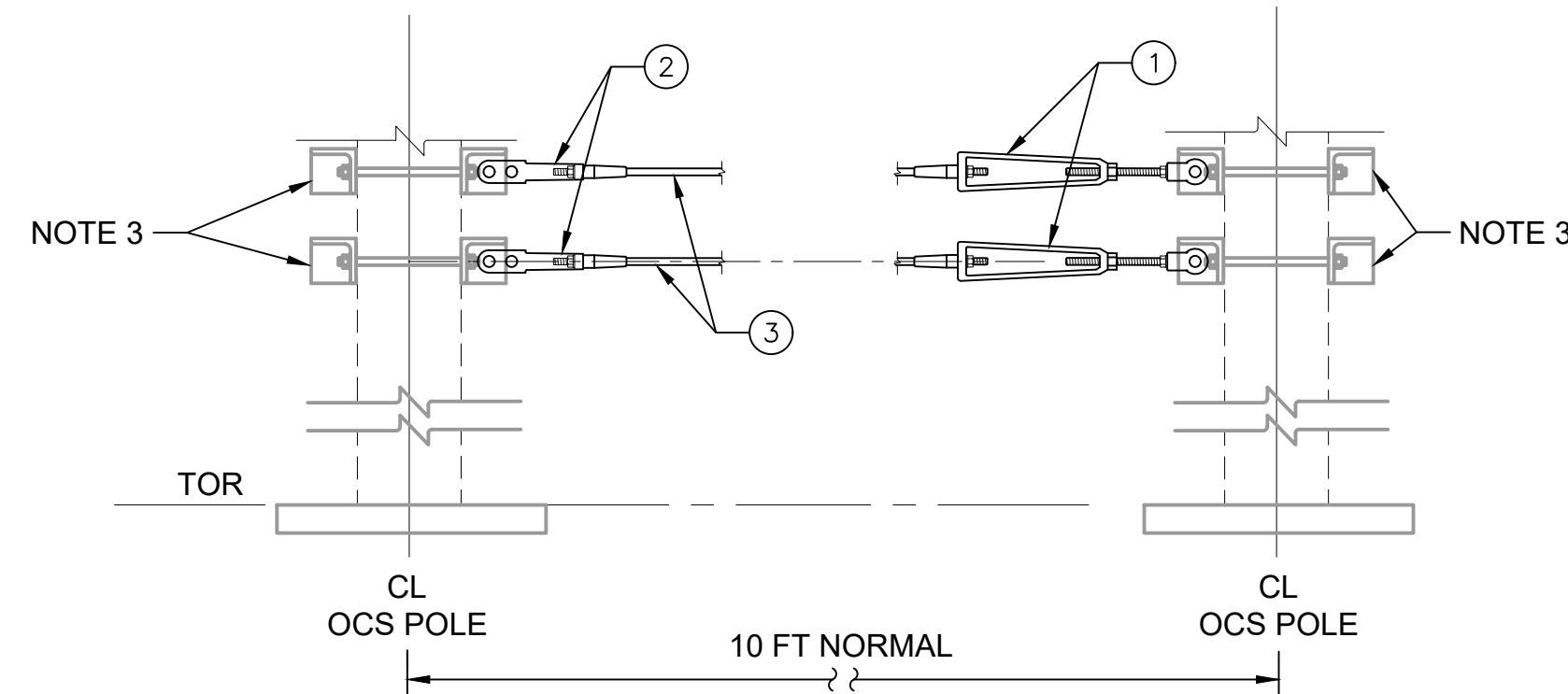


DOWN GUY ASSEMBLY DG-1
NTS

HEAD GUY AND DOWN GUY ASSEMBLY DG-2
NTS



DOWN GUY ASSEMBLY DG-3
NTS



HEAD GUY ASSEMBLY HG-1
NTS

SEE NOTE 5

| BILL OF MATERIALS | | | | | | | |
|----------------------|----------|----------|----------|-------|-------------------------------------|----------|------------------|
| QUANTITIES EACH TYPE | | | | UNITS | DESCRIPTION | ITEM NO. | PART NO./REMARKS |
| HG-1 | DG-3 | DG-2 | DG-1 | | | | |
| 2 | 2 | 4 | 2 | EA | END FITTING WITH TURNBUCKLE AND PIN | 1 | |
| 2 | 2 | 4 | 2 | EA | END FITTING WITH CLEVIS AND PIN | 2 | |
| AS REQ'D | AS REQ'D | AS REQ'D | AS REQ'D | LF | STAINLESS STEEL WIRE | 3 | |

03/21/24 | 1:57 PM | HARRISBK C:\USERS\HARRISBK\Sound Transit\Technical Standards and Requirements Projects - Drawings Update 2023\Standard Drawings\System\STD-JOD620.DWG

| | | | | | |
|--------------|--------|------------------------------------|-----|-----|----------|
| DESIGNED BY: | | | | | |
| DRAWN BY: | | | | | |
| CHECKED BY: | | | | | |
| APPROVED BY: | | | | | |
| 1 | 2/2024 | 2024 REVISED STANDARD DRAWINGS | | | |
| 0 | 8/2019 | REVISED SYSTEMS DIRECTIVE DRAWINGS | | | |
| No. | DATE | DSN | CHK | APP | REVISION |

| | | | |
|---------------|--|--------------|--|
| DESIGNED BY: | | DATE: | |
| DRAWN BY: | | REVIEWED BY: | |
| CHECKED BY: | | DATE: | |
| APPROVED BY: | | DATE: | |
| SUBMITTED BY: | | DATE: | |

LINE IS 1" AT FULL SCALE

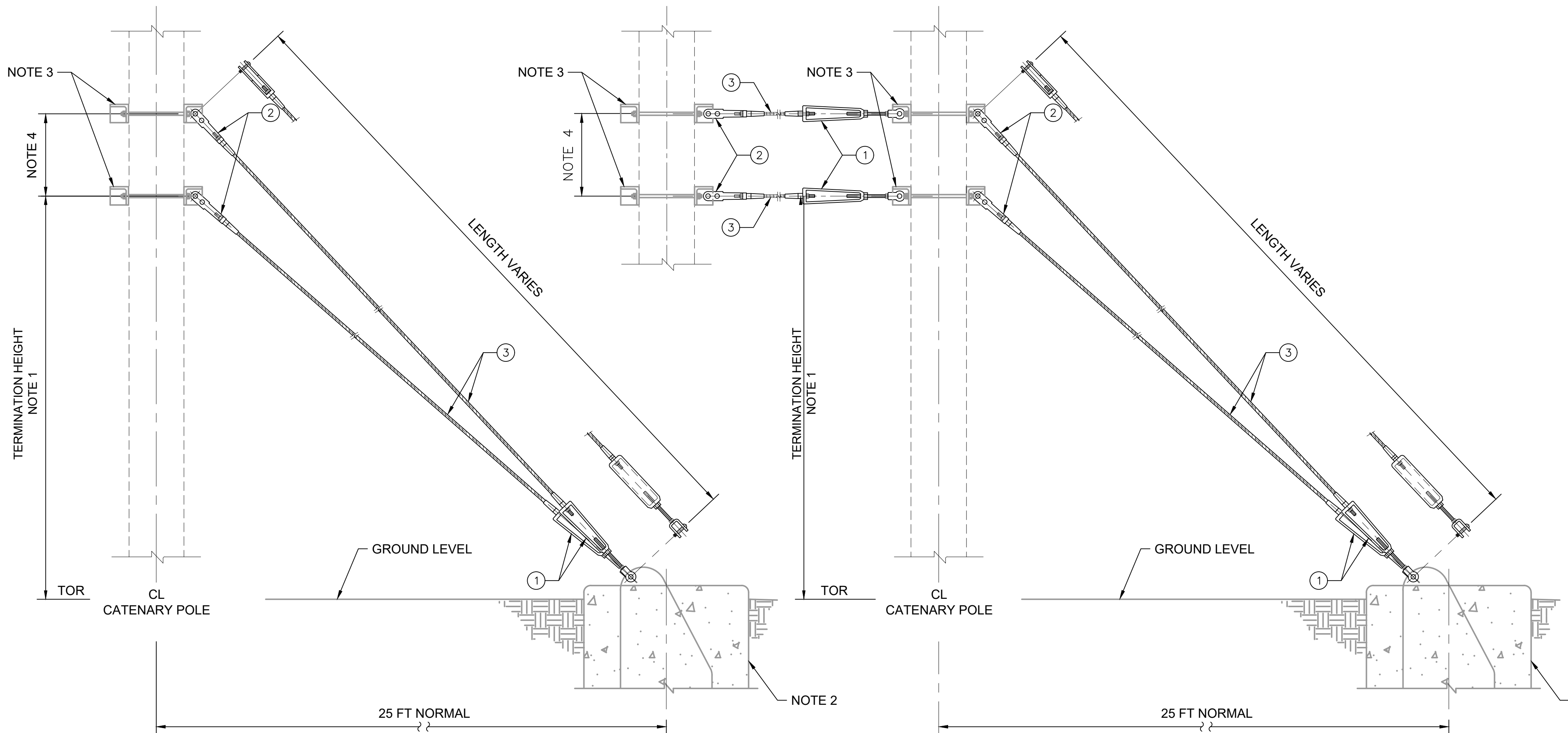
SCALE: NTS
 FILENAME: STD-JOD620
 CONTRACT No.: RTA/LR
 DATE: 2/2024

SOUND TRANSIT
STANDARD DRAWINGS
 SYSTEMS

OVERHEAD CATENARY SYSTEM
 WIDE FLANGE POLE DOWN/HEAD GUY ASSEMBLIES
 DG-1, DG-2, DG-3 & HG1

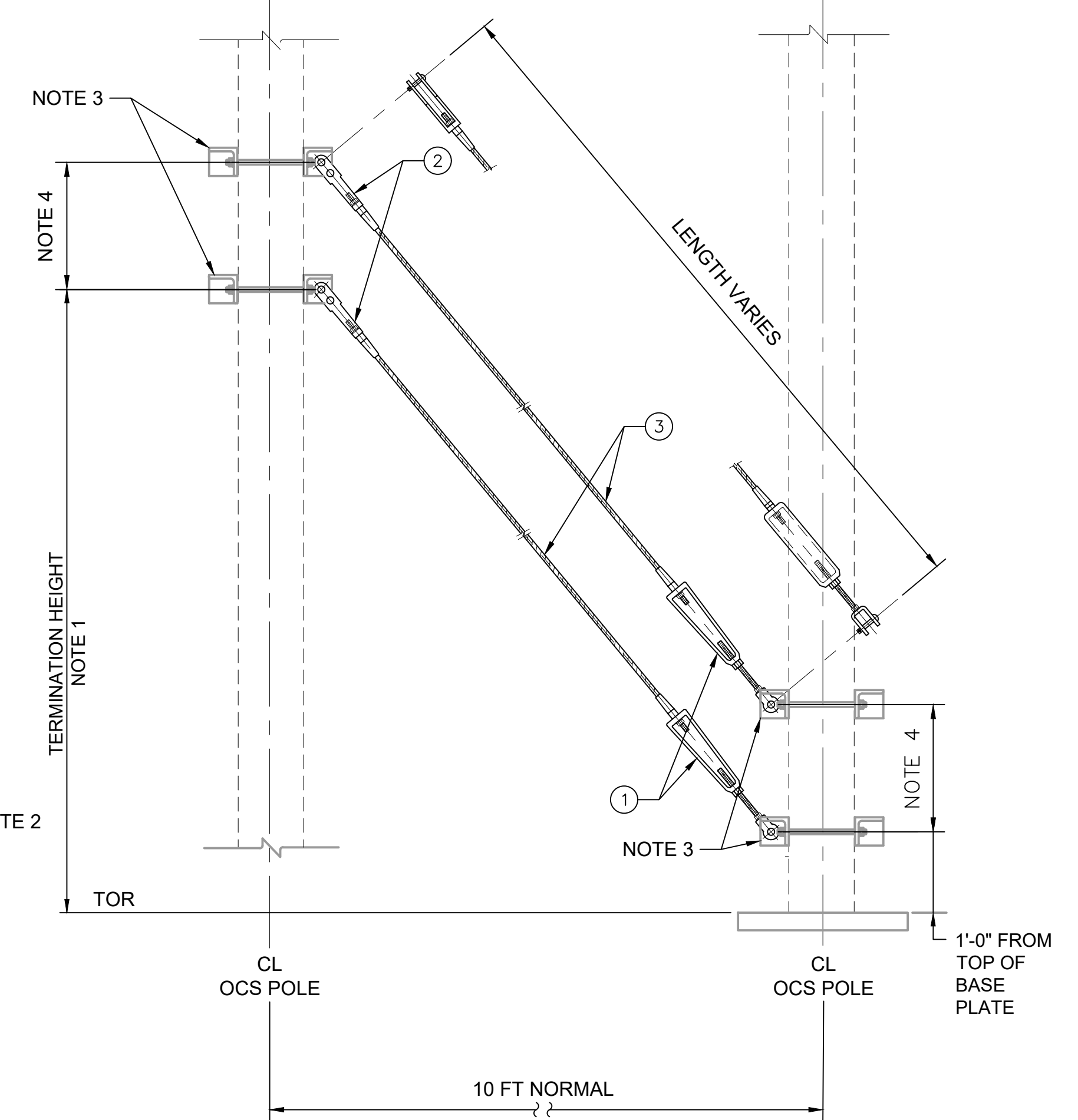
| | |
|--------------|-------------------|
| DRAWING No.: | STD-JOD620 |
| FACILITY ID: | |
| SHEET No.: | REV: |
| | 1 |

- GENERAL NOTES:**
1. TERMINATION HEIGHTS TO BE LISTED ON OCS LAYOUT PLANS AND SCHEDULES ON A SITE SPECIFIC BASIS.
 2. GUY FOUNDATION TO BE CALLED OFF SEPARATELY.
 3. POLE BRACKET TO BE CALLED OUT SEPARATELY.
 4. ATTACHMENT HEIGHT AND SEPARATION OF ANCHOR PLATES VARIES WITH SPECIFIED TYPE (CTST, BWA, OR FA). CONTRACTOR TO DESIGN AND SUBMIT ALL ANCHOR CONFIGURATIONS FOR APPROVAL.
 5. HEIGHT OF HEAD GUY NEAR TOP OF POLE SHALL BE DETERMINED BY THE CONTRACTOR.

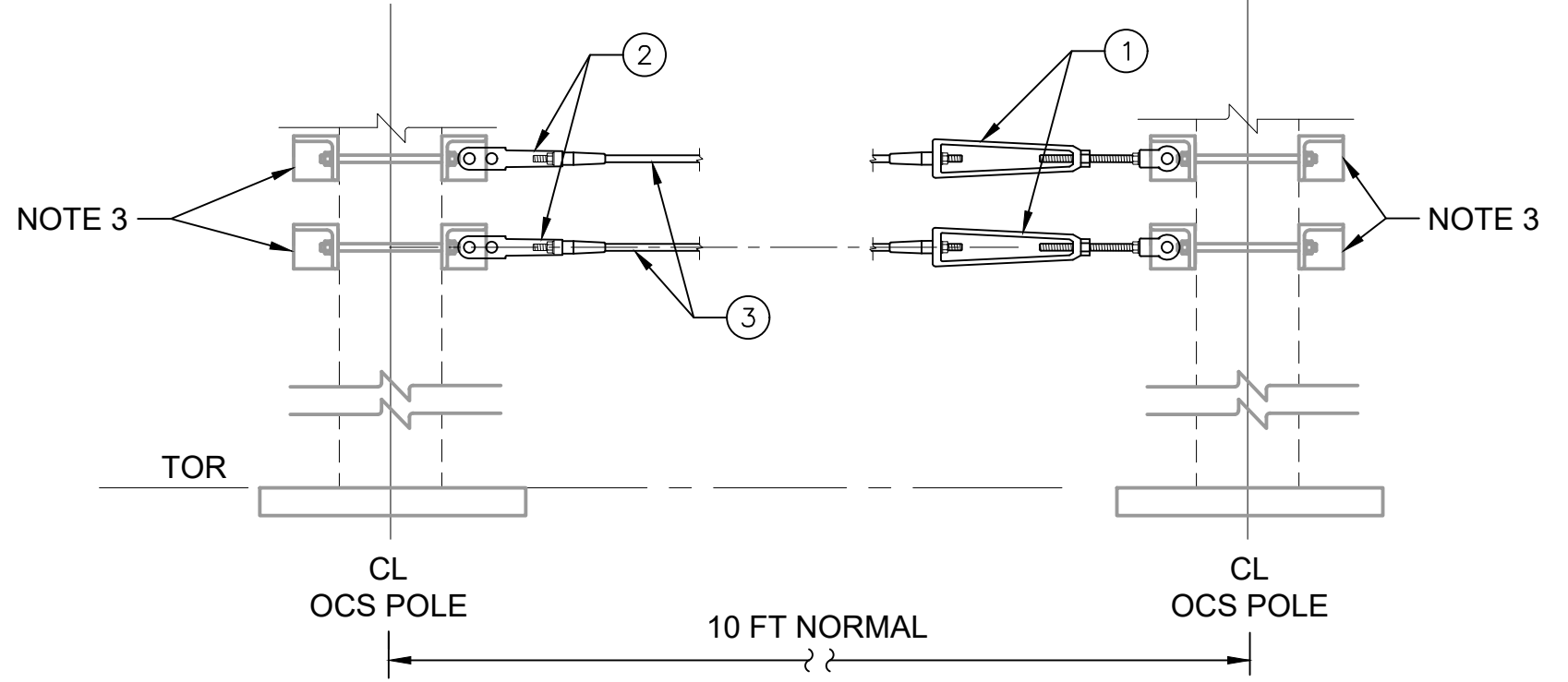


DOWN GUY ASSEMBLY DG-4
NTS

HEAD GUY AND DOWN ASSEMBLY DG-5
NTS



DOWN GUY ASSEMBLY DG-6
NTS



HEAD GUY ASSEMBLY HG-2
NTS

SEE NOTE 5

| QUANTITIES EACH TYPE | | | | | UNITS | DESCRIPTION | ITEM NO. | PART NO./REMARKS |
|----------------------|---------|---------|---------|----|-------------------------------------|-------------|----------|------------------|
| HG-2 | DG-6 | DG-5 | DG-4 | | | | | |
| 2 | 2 | 4 | 2 | EA | END FITTING WITH TURNBUCKLE AND PIN | 1 | | |
| 2 | 2 | 4 | 2 | EA | END FITTING WITH CLEVIS AND PIN | 2 | | |
| AS REQD | AS REQD | AS REQD | AS REQD | LF | STAINLESS STEEL WIRE | 3 | | |

03/21/24 | 1:57 PM | HARRISBK | DRAWINGS UPDATE 2023 STANDARD DRAWINGS SYSTEMS STD-JOD621.DWG

| No. | DATE | DSN | CHK | APP | REVISION |
|-----|--------|-----|-----|-----|------------------------------------|
| 1 | 2/2024 | | | | 2024 REVISED STANDARD DRAWINGS |
| 0 | 8/2019 | | | | REVISED SYSTEMS DIRECTIVE DRAWINGS |

DESIGNED BY:
DRAWN BY:
CHECKED BY:
APPROVED BY:

SUBMITTED BY: DATE: REVIEWED BY: DATE:

LINE IS 1" AT FULL SCALE



SCALE: NTS
FILENAME: STD-JOD621
CONTRACT No.: RTA/LR
DATE: 2/2024

SOUND TRANSIT STANDARD DRAWINGS SYSTEMS
OVERHEAD CATENARY SYSTEM
TAPERED TUBULAR POLE DOWN/HEAD GUY ASSEMBLIES
DG-4, DG-5, DG-6 & HG-2

DRAWING No.: **STD-JOD621**
FACILITY ID:
SHEET No.: REV: 1