

LOSSAN CORRIDOR-SAN DIEGO SUBDIVISION ENGINEERING STANDARD DRAWINGS (ESD)



PHOTO CREDIT: KEITH KRANDA



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1	7/17/18	NEW SHEET	CHECKED B. SMITH 	 SANDAG DIRECTOR OF RAIL		 NCTD CHIEF DEPUTY DEVELOPMENT OFFICER		DRAWING SHEET NO. 1 OF 1		
			RECOMMENDED B. SCHMITH 							
REV.	DATE	DESCRIPTION	DES.	ENG.	DATE	07/17/18			CONTRACT SHEET NO.	

LOSSAN ENGINEERING STANDARD DRAWINGS

Section 1000

GENERAL

ESD NO.	DRAWING TITLE	CURRENT REVISION	CURRENT DATE
GENERAL			
1000	Cover Page, Index, and Title Block		
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2700	(Not Used)		

REV.	DATE	DESCRIPTION	DES.	ENG.
1	9/23/22	CLOUDED SHEETS AS PART OF REVISION PACKAGE #1	SH	DB

DRAWN RAILPROS	
CHECKED A. ANDERSON	<i>[Signature]</i>
RECOMMENDED B. SMITH	<i>[Signature]</i>
DATE	SEPT 2022

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ENGINEERING STANDARD DRAWINGS
ENGINEERING STANDARD INDEX
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ESD-2911-03	NO. 8 STANDARD TURNOUT - CROSSOVER LAYOUT AND BILL OF MATERIALS		2/2/15
ESD-2911-04	NO. 8 STANDARD TURNOUT - SWITCH AND TURNOUT PLATES		2/2/15
ESD-2911-05	NO. 8 STANDARD TURNOUT - GAGE PLATES		2/2/15
ESD-2911-06	NO. 8 STANDARD TURNOUT - FROG GAGE PLATES		2/2/15
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ESD-2921-03	NO. 10 STANDARD TURNOUT - CROSSOVER LAYOUT AND BILL OF MATERIALS		5/27/15
ESD-2921-04	NO. 10 STANDARD TURNOUT - SWITCH AND TURNOUT PLATES		5/27/15
ESD-2921-05	NO. 10 STANDARD TURNOUT - GAGE PLATES		5/27/15
ESD-2921-06	NO. 10 STANDARD TURNOUT - FROG GAGE PLATES		5/27/15
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ESD-2921-08	NO. 10 STANDARD TURNOUT - RAILBOUND MANGANESE STEEL FROG		5/27/15
ESD-2921-09	NO. 10 STANDARD TURNOUT - FROG PLATES		5/27/15
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ESD-2922-03	NO. 10 SPRING FROG TURNOUT - CROSSOVER LAYOUT AND BILL OF MATERIALS		5/27/15
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ESD-2931-03	NO. 14 STANDARD TURNOUT - CROSSOVER LAYOUT AND BILL OF MATERIALS		2/2/15
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ESD-2951-03	NO. 24 TANGENTIAL TURNOUT - TURNOUT DATA AND SWITCH PLATES		11/20/15
ESD-2951-04	NO. 24 TANGENTIAL TURNOUT - CROSSOVER LAYOUT AND BILL OF MATERIALS		5/18/17
ESD-2951-05	NO. 24 TANGENTIAL TURNOUT - TURNOUT AND FROG PLATES		2/2/15
ESD-2951-06	NO. 24 TANGENTIAL TURNOUT - GAGE PLATES		2/2/15
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ESD-2951-13	NO. 24 TANGENTIAL TURNOUT - 61' - 8" STRAIGHT SPLIT SWITCH POINT		2/2/15
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		CHECKED A. ANDERSON		 SANDAG DIRECTOR OF RAIL		 NCTD CHIEF DEPUTY DEVELOPMENT OFFICER		DRAWING SHEET NO. 2 OF 4
		RECOMMENDED B. SMITH		DATE 07/17/18				SCALE: NONE
REV.	DATE	DESCRIPTION	DES.	ENG.				CONTRACT SHEET NO.

ESD NO.	DRAWING TITLE	CURRENT REVISION	CURRENT DATE
RAILWAY SIGNALING			
8100	General Signal Symbols		
ESD-8100	CIRCUIT PLAN SYMBOLS		3/18/2017
ESD-8105	COMPONENT SYMBOLS		FEB 2015
ESD-8110	SHELF & VITAL RELAYS		FEB 2015
ESD-8115	RELAY CONTACT SYMBOLS		FEB 2015
ESD-8120	PLUG-IN RELAY BASE COIL & JUMPER WIRING WITH CONTACT ARRANGEMENT		FEB 2015
ESD-8125	GRADE CROSSING SYMBOLS		FEB 2015
ESD-8130	WAYSIDE SIGNAL SYMBOLS		3/18/2017
ESD-8135	SWITCH AND DERAIL SYMBOLS		FEB 2015
ESD-8140	SWITCH CIRCUIT CONTROLLER CONTACT SYMBOLS		FEB 2015
ESD-8147	SIGNAL ASPECTS AND APPLICABLE RULES		FEB 2015
ESD-8150	INSTRUMENT HOUSE WIRING DETAILS		FEB 2015
ESD-8155	CABLE JUNCTION CASE WIRING DETAILS		FEB 2015
8200	General Signal Installation		
ESD-8210	TYPICAL CABLE TERMINATION		FEB 2015
ESD-8215-01	TYPICAL INTERMEDIATE SIGNAL LOCATION & BERM WITH SECURITY FENCE		3/18/2017
ESD-8215-02	TYPICAL GRADE CROSSING LOCATION & BERM WITH SECURITY FENCE		3/18/2017
ESD-8215-03	TYPICAL CONTROL POINT LOCATION & BERM WITH SECURITY FENCE		3/18/2017
ESD-8220	STANDARD PLACEMENT OF INSULATED JOINTS		FEB 2015
ESD-8230	TRACK WIRE INSTALLATION		FEB 2015
ESD-8235-01	TERMINATION SHUNT INSTALLATION		10/16/2017
ESD-8235-02	TERMINATION SHUNT INSTALLATION		FEB 2015
ESD-8240	RAIL AND FROG BONDING DETAILS		FEB 2015
ESD-8245	STANDARD PLACEMENT OF FOULING WIRES		FEB 2015
ESD-8255	GALVANIZED STEEL SIGNAL AND GATE FOUNDATION		FEB 2015
ESD-8260-01	AUTOMATIC TRAIN STOP (ATS) INDUCTOR LAYOUT		FEB 2015
ESD-8260-02	AUTOMATIC TRAIN STOP (ATS) PLACEMENT REQUIREMENTS		FEB 2015
ESD-8262	TYPICAL LOCATION FLASHING LIGHT SIGNALS WITH GATES		FEB 2015
ESD-8264	TYPICAL LOCATION CANTILEVER FLASHING LIGHT SIGNALS WITH GATES		FEB 2015
ESD-8266	TYPICAL LOCATION CANTILEVER FLASHING LIGHT SIGNALS WITH GATES AND MEDIAN		FEB 2015
ESD-8268	TYPICAL LOCATION EAST END OF SIDING		3/18/2017
ESD-8269	TYPICAL LOCATION UNIVERSAL CROSSOVER		3/18/2017
ESD-8270	EMERGENCY NOTIFICATION SIGN FOR HIGHWAY GRADE CROSSING SHELTER		FEB 2015
ESD-8271	CONTROL POINT SIGN		FEB 2015
ESD-8280-01	TYPICAL GROUNDING FOR SIGNAL LOCATIONS		3/18/2017
ESD-8280-02	TYPICAL GROUNDING FOR SIGNAL LOCATIONS		3/18/2017
ESD-8290	BEGIN CIRCUIT AND END CIRCUIT SIGN		FEB 2015
ESD-8291	CTC & RADIO CHANNEL SIGN		FEB 2015
8300	Grade Crossing Warning Devices - Part 1		
ESD-8300	FLASHING LIGHT SIGNAL ASSEMBLY WITH OR WITHOUT GATE		3/18/2017
ESD-8305	FLASHING LIGHT SIGNAL CONFIGURATIONS (CPUC No. 8)		FEB 2015
ESD-8306	FLASHING LIGHT SIGNAL WITH GATE CONFIGURATIONS (CPUC No. 9, 9-A, AND 9-E)		FEB 2015
ESD-8308	TYPICAL GATE ASSEMBLIES FOR PEDESTRIAN TREATMENTS AT VEHICLE CROSSINGS		3/18/2017
ESD-8309	TYPICAL GATE ASSEMBLIES FOR PEDESTRIAN AND BICYCLE ONLY CROSSINGS		3/18/2017
ESD-8320	SINGLE MAST CROSSING CANTILEVER ASSEMBLY 10' THRU 30' ARM LENGTH		FEB 2015
ESD-8325	DOUBLE MAST CROSSING CANTILEVER ASSEMBLY 30' THRU 40' ARM LENGTH		FEB 2015
ESD-8350	TYPICAL LOCATION PLAN FLASHING LIGHT SIGNALS WITH ENTRANCE GATES		FEB 2015
ESD-8355	TYPICAL LOCATION PLAN FLASHING LIGHT SIGNALS WITH ENTRANCE AND EXIT GATES		FEB 2015
ESD-8360	TYPICAL LOCATION PLAN CANTILEVER FLASHERS WITH ENTRANCE GATES		FEB 2015
ESD-8365	TYPICAL LOCATION PLAN CANTILEVER FLASHERS WITH ENTRANCE AND EXIT GATES		FEB 2015
ESD-8370	TYPICAL LOCATION PLAN FLASHING LIGHT SIGNALS WITH GATES AND MEDIAN		FEB 2015
ESD-8375	TYPICAL LOCATION PLAN FLASHING LIGHT SIGNALS WITH ENTRANCE AND EXIT GATES AND MEDIAN		FEB 2015
ESD-8380	TYPICAL LOCATION PLAN CANTILEVER FLASHERS WITH ENTRANCE GATES AND MEDIAN		FEB 2015
ESD-8385	TYPICAL LOCATION PLAN CANTILEVER FLASHERS WITH ENTRANCE AND EXIT GATES AND MEDIAN		FEB 2015
ESD-8390	TYPICAL LOCATION PLAN PEDESTRIAN PATHWAYS CROSSING CONFIGURATION		FEB 2015
8400	Grade Crossing Warning Devices - Part 2		
ESD-8400	TYPICAL LIGHT UNIT ALIGNMENT FOR FLASHING LIGHT SIGNALS AT GRADE CROSSING		FEB 2015
ESD-8470	HIGH WIND SUPPORT FOR TUBULAR MAST		FEB 2015

ESD NO.	DRAWING TITLE	CURRENT REVISION	CURRENT DATE
RAILWAY SIGNALING (CONT.)			
8500	Wayside Signal		
ESD-8500	TYPICAL WAYSIDE SIGNAL ASSEMBLY - TWO UNIT BI-DIRECTIONAL		FEB 2015
ESD-8505	TYPICAL WAYSIDE SIGNAL ASSEMBLY - FOUR UNIT BI-DIRECTIONAL		FEB 2015
ESD-8510	WAYSIDE SIGNAL CANTILEVER STRUCTURE		FEB 2015
ESD-8515	WAYSIDE SIGNAL BRIDGE STRUCTURE		FEB 2015
ESD-8520	TYPICAL DWARF SIGNAL PLACEMENT		FEB 2015
ESD-8525	TYPICAL L.E.D. COLOR LIGHT SIGNAL UNIT		3/18/2017
ESD-8530	TYPICAL GROUND SIGNAL JUNCTION BOX		FEB 2015
ESD-8540	SIGNAL NUMBER PLATE		FEB 2015
ESD-8545	P SIGN		FEB 2015
ESD-8550	G SIGN		FEB 2015
ESD-8570	TYPICAL GALVANIZED SIGNAL LADDER		FEB 2015
8600	Switch Layouts		
ESD-8605	M23-A DUAL CONTROL SWITCH LAYOUT FOR No. 8, No. 10 & No. 14 RIGHT HAND TURNOUTS		FEB 2015
ESD-8610	M23-A DUAL CONTROL SWITCH LAYOUT FOR No. 8, No. 10 & No. 14 LEFT HAND TURNOUTS		FEB 2015
ESD-8615	M23-A DUAL CONTROL SWITCH LAYOUT FOR No. 20 & No. 24 RIGHT HAND TURNOUTS		FEB 2015
ESD-8620	M23-A DUAL CONTROL SWITCH LAYOUT FOR No. 20 & No. 24 LEFT HAND TURNOUTS		FEB 2015
ESD-8625	PUSH-PULL HELPER ROD ASSEMBLY FOR NO. 20 RIGHT OR LEFT HAND TURNOUTS		FEB 2015
ESD-8630	PUSH-PULL HELPER ROD ASSEMBLY FOR NO. 24 RIGHT OR LEFT HAND TURNOUTS		FEB 2015
ESD-8635-01	PUSH-PULL HELPER ROD ASSEMBLY DETAILS "T" CRANK & PIPE GUIDE AUX CONNECTION		FEB 2015
ESD-8635-02	PUSH-PULL HELPER ROD ASSEMBLY DETAILS SCREW JAW, SOLID JAW, ADJUSTABLE LINK		FEB 2015
ESD-8650	TYPICAL LEFT OR RIGHT HAND RACOR TYPE "MF" INSULATED "FRONT" ROD FOR USE ON TURNOUTS		FEB 2015
ESD-8660	TYPICAL RACOR TYPE "SMJ" NO. 1 INSULATED "BASKET" ROD FOR USE ON TURNOUTS		FEB 2015
8700	Switch Components		
ESD-8705	POINT DETECTOR CONNECTING ROD FOR DUAL CONTROL SWITCH APPLICATIONS		FEB 2015
ESD-8710	INTERNAL LOCK ROD ASSEMBLY		FEB 2015
ESD-8715	LOCK ROD DROP LUG		FEB 2015
ESD-8720	LOCK ROD CONNECTING ROD		FEB 2015
ESD-8725	SWITCH OPERATING LUG (BEAR CLAW)		FEB 2015
ESD-8730	SWITCH OPERATING ROD FOR DUAL CONTROL SWITCH APPLICATIONS		FEB 2015
ESD-8732	BOLTS FOR SWITCH CONNECTIONS		FEB 2015
ESD-8735	M23-A DUAL CONTROL SWITCH MACHINE MOUNTING PLATES AND TIE REQUIREMENTS		FEB 2015
ESD-8755	TYPICAL PEDESTAL JUNCTION BOX		FEB 2015
ESD-8760	CIRCUIT CONTROLLER PLACEMENT AT HAND THROW SWITCHES		FEB 2015
ESD-8761	SWITCH CIRCUIT CONTROLLER ROD & LUG		FEB 2015
ESD-8765	LOW 9B ELECTRIC LOCK SWITCH LAYOUT		FEB 2015

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REV.	DATE	DESCRIPTION	DES.	ENG.

REVISIONS	DRAWN
	RM-PRE
	CHECKED E.ROE <i>EJR</i>
	RECOMMENDED B. SCHMITH <i>BBS</i>
	DATE 07/17/18



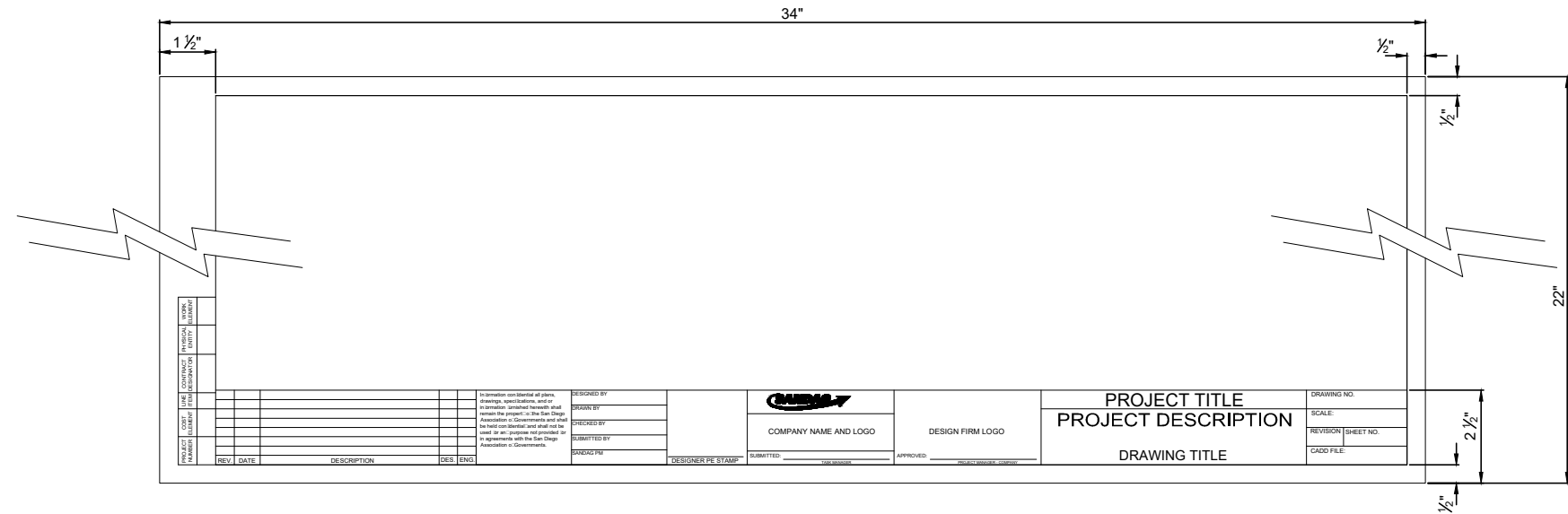
APPROVED: *[Signature]*
SANDAG DIRECTOR OF RAIL



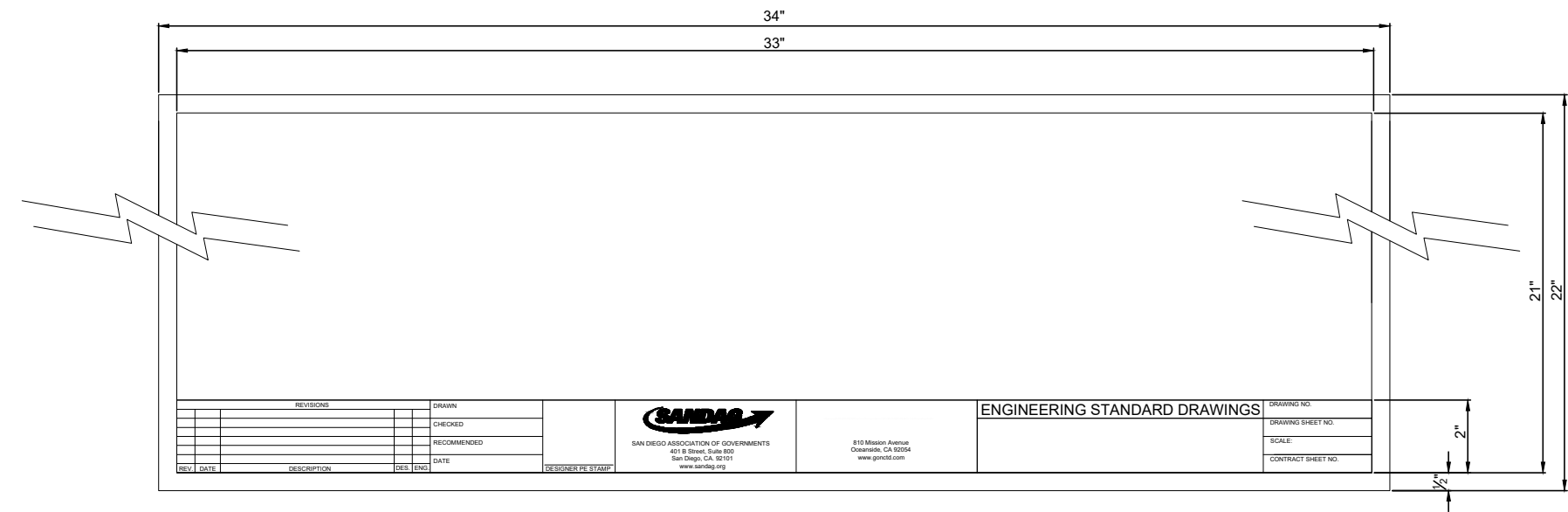
APPROVED: *[Signature]*
NCTD CHIEF OF RAIL OPERATIONS

ENGINEERING STANDARD DRAWINGS
ENGINEERING STANDARD INDEX
(PAGE 4)

DRAWING NO. ESD-1001-04
DRAWING SHEET NO. 4 OF 4
SCALE: NONE
CONTRACT SHEET NO.



CONTRACT DRAWINGS





ENGINEERING STANDARD DRAWINGS

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3. ENGINEERS ARE TO CHECK THE PLAN TO ENSURE COMPLIANCE WITH CURRENT PRACTICES, LAWS, AND REGULATIONS. ENGINEERS ARE TO SEAL THE ENGINEERING STANDARD DRAWING WHEN INSERTING IT IN A PLAN SET OF CONSTRUCTION DRAWINGS BEFORE USING IT FOR CONSTRUCTION.
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REVISIONS				DRAWN RAILPROS		 SAN DIEGO ASSOCIATION OF GOVERNMENTS 401 B Street, Suite 800 San Diego, CA. 92101 www.sandag.org	 NORTH COUNTY TRANSIT DISTRICT 810 Mission Avenue Oceanside, CA 92054 www.gonctd.com	ENGINEERING STANDARD DRAWINGS		DRAWING NO. ESD-1002
				CHECKED B. SMITH <i>BS</i>				STANDARD TITLE BLOCKS		DRAWING SHEET NO. 1 OF 1
				RECOMMENDED B.SCHMITH <i>BS</i>						SCALE: NONE
				DATE 5/19/17						CONTRACT SHEET NO.
REV.	DATE	DESCRIPTION	DES.	ENG.	DESIGNER PE STAMP					

GENERAL ABBREVIATIONS

& □ AB ABM ABN ABUT AC AD ADJ AHD ALIGN ALT ANSI AOBE APPROX ARCH AREMA A/R AS ASCE ASPH ASSY ASTM ATR AVE AVM AWWA BAA BB BBR BCR BEG BK BKF BL BLDG BLLBRD BLST BLVD BM BNSF BOC BOS BOT BOW BR C/W CAB CALP CAP CB CEM CF CG CI CIP CJ CL, † CLK CLR CMP CMPA CMU COMPJT CND CNTR CNTRLR CO COC COL COMM COMM R/W CONC CONN CONST CONT CONTR COORD COS CP CPUC CRV	AND AT AGGREGATE BASE AIR-BLOWN MORTAR ABANDON ABUTMENT ASPHALT CONCRETE AREA DRAIN ADJUSTABLE AHEAD ALIGNMENT ALTERNATE AMERICAN NATIONAL STANDARDS INSTITUTE AS ORDERED BY ENGINEER APPROXIMATE, APPROXIMATELY ARCHITECTURAL AMERICAN RAILWAY ENGINEERING & MAINTENANCE OF WAY ASSOCIATION AS REQUIRED AGGREGATE SUBBASE AMERICAN SOCIETY OF CIVIL ENGINEERS ASPHALT, ASPHALT CONCRETE PAVING ASSEMBLY AMERICAN SOCIETY FOR TESTING & MATERIALS ABOVE TOP OF RAIL AVENUE ADD VALUE MACHINE AMERICAN WATER WORKS ASSOCIATION BOARDING ASSISTANCE AREA BATTERY BOX BEGINNING OF BRIDGE BEGIN CURB RETURN BEGIN, BEGINNING BACK BACKFILL BASELINE BUILDING BILLBOARD BALLAST BOULEVARD BENCHMARK BURLINGTON NORTHERN SANTA FE RAILWAY BOTTOM OF CURB BOTTOM OF SLOPE BOTTOM BOTTOM OF WALL BRIDGE, BLUE ROD COMES WITH CABINET CORRUGATED ALUMINUM PIPE CAPACITY CATCH BASIN CEMENT CUBIC FEET CENTER OF GRAVITY CAST IRON CAST IN PLACE CONSTRUCTION JOINT CENTERLINE CHAIN LINK CLEAR, CLEARANCE CORRUGATED METAL PIPE CORRUGATED METAL PIPE ARCH CONCRETE MASONRY UNIT COMPROMISE JOINT CONDUIT COUNTER, CENTER CONTROLLER CLEANOUT CENTER ON CENTER COLUMN COMMUNICATIONS COMMISSION RIGHT OF WAY CONCRETE CONNECTION CONSTRUCTION CONTINUOUS CONTRACTOR COORDINATE COSINE CONTROL POINT, CLEARANCE POINT CALIFORNIA PUBLIC UTILITIES COMMISSION CURVE	CSP CT CTC CTR CULV CVD CVR CWR CY Dc DEL DEP DET DFX DGAC DI DIA, Ø DIAG DIM DIR DIST DN DR DRWY DTR DWG (E) E EA EB EBR ECR EE EF EIC EJ ELEC EL ELEV EMB EMER ENGR EP EQ EQUIP ES ESMT ET ETW EW EX EXC EXP EXT (F) FC FDN FF FG FH FIN FL FLR FOC FR FT FTG FW FWY GA GALV GCL GM GND GP GR GSP HB HC HD HEX	CORRUGATED STEEL PIPE COURT CENTER TO CENTER, CENTRALIZED TRAFFIC CONTROL CENTER CULVERT CURVED COVER CONTINUOUSLY WELDED RAIL CUBIC YARD DEGREE OF CURVE DELINEATORS DEPTH DETAIL DIRECT FIXATION DENSE GRADED ASPHALT CONCRETE DROP INLET, DRAINAGE INLET DIAMETER DIAGONAL DIMENSION DIRECTION DISTRIBUTION DOWN DRIVE DRIVEWAY DETOUR DRAWING EXISTING EAST EACH EASTBOUND END OF BRIDGE END CURB RETURN EACH END EACH FACE EMPLOYEE IN CHARGE EXPANSION JOINT ELECTRICAL ELEVATION, ELECTRIC LOCK ELEVATOR, ELEVATION EMBANKMENT EMERGENCY ENGINEER, ENGINEERING EDGE OF PAVEMENT EQUAL, EQUATION EQUIPMENT EDGE OF SHOULDER, ENGINEERING STANDARD EASEMENT END OF TRACK EDGE OF TRAVELED WAY END WALL EXISTING EXCAVATION EXPANSION EXTERIOR FUTURE FACE OF CONCRETE, FACE OF CURB FOUNDATION FILTER FABRIC FINISHED GRADE FIRE HYDRANT FINISH, FINISHED FLOW LINE FLOOR FIBER OPTIC CABLE FRAME FOOT, FEET FOOTING FIELD WELD FREEWAY GAUGE GALVANIZED GRADE CONTROL LINE GUIDE MARKER GROUND GRADING PLANE GUARDRAIL/GRADE GALVANIZED STEEL PIPE HOSE BIBB HANDICAP, HANDICAPPED HEAVY DUTY HEXAGONAL	HF HH HI HL HMAC HORI □ HP HR HS HST HT HW HWY H □ ID I.D. IE IJ IN INSUL INT INV IR JB JJ JT LB, LBS LF LG LGT LGTH LH LN LOC LOL LP LPL LT LTG LVL MAINT MANG MAX M/C MECH MED MEM MET MFG MH MIC MIN MISC ML MOD MON MOW MP MPH MSL MTL (N) N N/A NB NEG NEUT NIC NO, □ NOM NTS OA OC OD OHD	HEEL OF FROG, HEAD FREE RAIL HANDHOLE HIGH HEEL LENGTH HOT MIX ASPHALT CONCRETE HORIZONTAL HEEL PLATE, HIGH POINT, HIGH PRESSURE HANDRAIL HEEL OF FROG, HIGH STRENGTH HOLLOW STEEL TIE HEIGHT, HIGH TENSILE, HAND THROW HEADWALL HIGHWAY HERT □ INSIDE DIAMETER IDENTIFICATION INVERT ELEVATION INSULATED JOINT INCH(ES) INSULATION INTERIOR INVERT INSIDE RADIUS JUNCTION BOX JOINTED RAIL JOINT POUND, POUNDS LINEAL FEET LONG LIGHT LENGTH LEFT HAND LANE LOCATION LAYOUT LINE LOW POINT, LOW PRESSURE LIGHT POLE LEFT LIGHTING LEVEL MAINTENANCE MANGANESE MAXIMUM MILL CUT MECHANICAL MEDIAN, MEDIUM MEMBRANE METAL MANUFACTURER MANHOLE MICROPHONE MINIMUM MISCELLANEOUS MAINLINE MODIFIED MONUMENT MAINTENANCE OF WAY MILEPOST MILES PER HOUR MEAN SEA LEVEL MATERIAL NEW NORTH NOT APPLICABLE NORTHBOUND NEGATIVE NEUTRAL NOT IN CONTRACT NUMBER NOMINAL NOT TO SCALE OVERALL ON CENTER OUTSIDE DIAMETER OVERHEAD	OP OPNG OPP OTM O □ PB PED PERF PERM PF PG PGL PH PITO PL P/L PNA PNL POTO PP PPL PPP PR PROP PS PSI PSM PT PTM PVC PVMT QTY R RBM RC RCP RD RDWY RECT REF REINF REL REQ'D REV RH RO RP RR RT RTE R/W S SAE SANDAG SAV SB SCHD SD SDMH SDNG SECT SERV SF SG SHLDR SHT SIM SIN SL SLPA SMC S/N SPEC SQ SS SST ST STA STD STIFF	OVERPASS OPENING OPPOSITE OTHER TRACK MATERIAL OUNCE PULL BOX PEDESTRIAN PERFORMED PERMEABLE, PERMANENT POINT OF FROG PAGE PROFILE GRADE LINE POTHOLE POINT OF INTERSECTION OF TURNOUT PLATE PROPERTY LINE PASSENGER NEEDING ASSISTANCE PANEL POWER-OPERATED TURNOUT POWER POLE PERFORMED PERMEABLE LINE PERFORATED PLASTIC PIPE PAIR PROPOSED POINT OF SWITCH POUNDS PER SQUARE INCH PARK BY SPACE MACHINE POINT PARKING TICKET MACHINE POLYVINYL CHLORIDE PAVEMENT QUANTITY RADIUS RAIL BOUND MANGANESE REINFORCED CONCRETE REINFORCED CONCRETE PIPE ROAD ROADWAY RECTANGULAR REFERENCE REINFORCED RELOCATE(D) REQUIRED REVISION, REVISED RIGHT HAND ROUGH OPENING REFERENCE POINT RAILROAD RIGHT ROUTE RIGHT OF WAY SOUTH SOCIETY OF AUTOMOBILE ENGINEERS SAN DIEGO ASSOCIATION OF GOVERNMENTS STAND ALONE VALIDATOR SOUTHBOUND SCHEDULE STORM DRAIN STORM DRAIN MANHOLE SIDING SECTION SERVICE SQUARE FEET SUBGRADE SHOULDER SHEET SIMILAR SINE SLOPE SIGNAGE/LIGHTING/PUBLIC ADDRESS SWIVEL MOVEABLE JOINT SERIAL NUMBER SPECIFICATION SQUARE SANITARY SEWER STAINLESS STEEL STREET STATION STANDARD STIFFENER	STL STR STRL STRUCT SW SWK, S/W SWL SY SYMM T&B TAN TBD TBR TC TD TDS TEL TF THDS THK TK TL TO TOC TOG TOL TOP TOS TOT TOW T/R TRANS TTB TVM (TYP) UB UD UG UON UP UPRR UR UTIL VAR VERT VMB VMS W W/ W/O WB WI WP WPF WRT WSM WT WWF WWW XING XOVER YD □20POTO RH NUMBER 20 POWER OPERATED TURNOUT - RIGHT HAND □10HOTO LH NUMBER 10 HAND OPERATED TURNOUT - LEFT HAND +/-, ± PLUS OR MINUS, APPROXIMATELY
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REVISIONS		DRAWN RAILPROS		SANDAG	NORTH COUNTY TRANSIT DISTRICT	ENGINEERING STANDARD DRAWINGS	DRAWING NO. ESD-1101
		CHECKED B. SMITH		SAN DIEGO ASSOCIATION OF GOVERNMENTS 401 B Street, Suite 800 San Diego, CA. 92101 www.sandag.org	810 Mission Avenue Oceanside, CA 92054 www.gonctd.com	STANDARD ABBREVIATIONS	DRAWING SHEET NO. 1 OF 1
		RECOMMENDED W. PREY					SCALE: NONE
REV.	DATE	DESCRIPTION	DES. ENG.	DATE 2/2/15	DESIGNER PE STAMP		CONTRACT SHEET NO.

DESCRIPTION

EXISTING

PROPOSED

DESCRIPTION

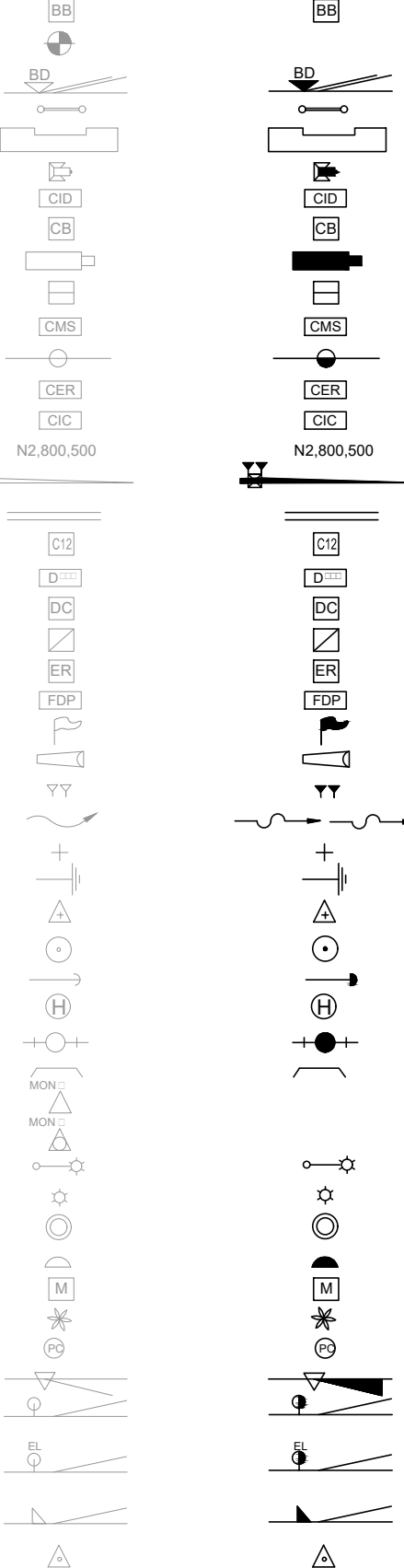
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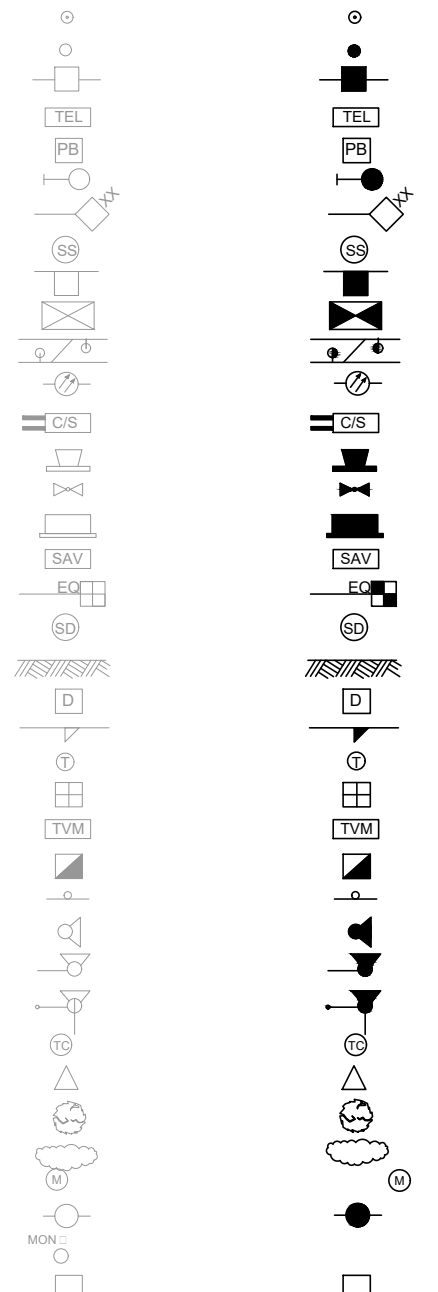
TRACK ALIGNMENT

PATTERNS

- BATTERY BOX
- BENCHMARK
- BI-DIRECTIONAL DERAIL
- BILLBOARD
- BUILDING
- BUMPER
- CARD INTERFACE DEVICE
- CATCH BASIN
- CCTV CAMERA
- CCTV SECURITY MANHOLE
- CHANGEABLE MESSAGE SIGN
- COMMUNICATION LINE TO BE REMOVED
- COMMUNICATIONS EQUIPMENT ROOM
- COMMUNICATIONS INTERFACE CABINET
- COORDINATE
- CROSSING GATE & SIGNAL
- CURB/GUTTER
- CURVE NUMBER
- DISTRIBUTION CABINET (ATTRIBUTED)
- DISTRIBUTION CABINET (INTERMEDIATE CROSS-CONNECT)
- ELECTRIC MANHOLE
- EQUIPMENT ROOM
- FIBER DISTRIBUTION PANEL
- FLAG POLE
- FLARED END SECTION
- FLASHERS
- FLOW
- GRID TICK
- GROUND
- GROUND CONTROL POINT (AERIAL)
- GROUNDING ROD
- GUY WIRE
- HANDHOLE
- HYDRANT
- HEADWALL
- HORIZONTAL CONTROL POINT
- HORIZONTAL & VERTICAL CONTROL POINT
- LIGHT POLE
- LIGHT POST
- MANHOLE
- MICROPHONE
- NOISE SENSING MICROPHONE (SURFACE MOUNTED)
- PALM TREE
- PHOTOELECTRIC CELL
- POINT OF INTERSECTION - TURNOUT
- POINT OF SWITCH (HAND-THROW TURNOUT)
- POINT OF SWITCH (HAND-THROW TURNOUT WITH ELECTRIC LOCK)
- POINT OF SWITCH (POWER-OPERATED TURNOUT)
- POINT OF VERTICAL INTERSECTION



- POLE
- POST
- POWER POLE
- PUBLIC TELEPHONE
- PULL BOX
- RAILROAD SIGNAL
- RAILROAD MILEPOST
- SANITARY SEWER MANHOLE
- SIGN POST
- SIGNAL HOUSE
- SINGLE CROSSOVER
- SINGLE MODE OR MULTIMODE FIBER OPTIC CABLE
- SM FIBER TO COPPER MEDIA CONVERTER/SWITCH DUAL TX/RX
- SPEAKER
- SPEAKER (DUAL)
- STAIRWAY OR RAMP FLOODLIGHT
- STAND ALONE VALIDATOR
- STATION EQUALITY
- STORM DRAIN
- SUBGRADE EARTH
- SUBSYSTEM DEVICE (TVM, VMS, OR CCTV)
- SWITCH POINT DERAIL
- TELEPHONE MANHOLE
- TELEVISION MANHOLE
- TICKET VENDING MACHINE
- TRAFFIC CONTROL BOX
- TRAFFIC SIGN
- TRAFFIC SIGNAL
- TRAFFIC SIGNAL WITH ARM ONLY
- TRAFFIC SIGNAL WITH ARM & POLE
- TIME CLOCK
- TRANSFORMER
- TREE
- TREE LINE, SHRUBBERY
- UTILITY METER
- UTILITY POLE
- VERTICAL CONTROL POINT
- WATER VALVE BOX



UTILITY SYMBOLS

- ELECTRIC POWER
- NATURAL GAS
- SANITARY SEWER
- STORM DRAIN
- SIGNAL
- TELEPHONE
- FIBER OPTIC
- WATER
- UNDER DRAIN

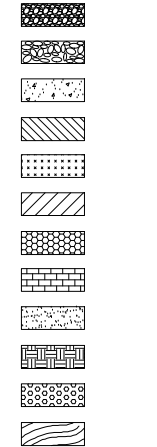
HORIZONTAL

- I TOTAL INTERSECTION ANGLE
- PI POINT OF INTERSECTION OF TWO TANGENTS
- Δ CENTRAL ANGLE OF CIRCULAR CURVE
- R RADIUS OF CIRCULAR CURVE
- Tc TANGENT LENGTH OF CIRCULAR CURVE
- Lc TOTAL LENGTH OF CIRCULAR CURVE
- DC DEGREE OF CURVE
- Os SPIRAL ANGLE
- Ls TOTAL LENGTH OF SPIRAL
- Ts TANGENT TO SPIRAL
- Sc SPIRAL TO CIRCULAR CURVE
- Cs CIRCULAR CURVE TO SPIRAL
- St SPIRAL TO TANGENT
- Pc POINT OF CIRCULAR CURVE
- Pt POINT OF TANGENCY
- Ea SUPERELEVATION
- Eu UNBALANCED SUPERELEVATION
- E TOTAL SUPERELEVATION
- Bc BEGIN CURVE
- Ec END CURVE
- Spi SPIRAL POINT OF INTERSECT

VERTICAL

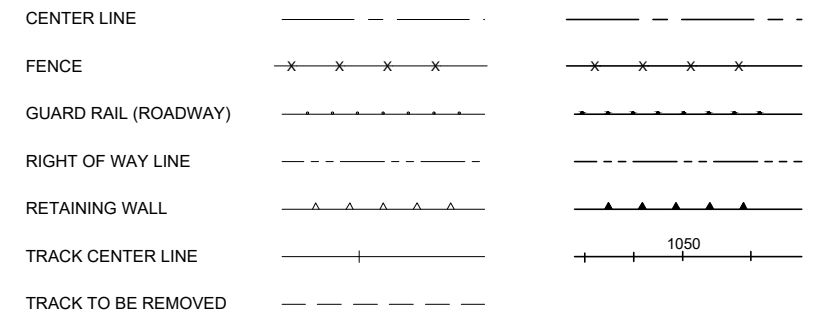
- Vc VERTICAL CURVE
- Bvc BEGIN VERTICAL CURVE
- Evc END VERTICAL CURVE
- Pvi POINT OF VERTICAL INTERSECTION
- Lvc LENGTH OF VERTICAL CURVE

- AGGREGATE BASE
- BALLAST
- CONCRETE
- GRADE CROSSING PANELS
- GRADED/LANDSCAPED AREA
- HOT MIX ASPHALT CONCRETE
- PEDESTRIAN CROSSING PANEL
- STONE/BRICK PAVING
- SUBBALLAST
- SUBGRADE, EARTH
- TACTILE WARNING STRIPS
- TIMBER



EXISTING

PROPOSED



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REV.	DATE	DESCRIPTION	DES.	ENG.

REVISIONS	DRAWN RAILPROS
	CHECKED B. SMITH <i>BS</i>
	RECOMMENDED W. PREY <i>WP</i>
	DATE 2/2/15
DESIGNER PE STAMP	

SAN DIEGO ASSOCIATION OF GOVERNMENTS
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San Diego, CA. 92101
www.sandag.org

810 Mission Avenue
Oceanside, CA 92054
www.gonctd.com

ENGINEERING STANDARD DRAWINGS

STANDARD SYMBOLS

DRAWING NO.	ESD-1201
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	

1 2 3 4 5 6 7 8 9 0

A B C D E F G H I J

K L M N O P Q R S T

U V W X Y Z &

NOTES:

1. "ARIAL BOLD" LETTERS AND NUMERALS TO BE USED ON ALL SIGNS UNLESS OTHERWISE SPECIFIED ON SIGN STANDARD.
2. LETTERS AND NUMERALS MAY BE MADE PROPORTIONALLY NARROWER THAN ILLUSTRATED IF NEEDED TO FIT AVAILABLE SPACE ON THE SIGN. HEIGHT SHALL NOT BE ADJUSTED.
3. ALL LETTERS AND NUMERALS TO BE BLACK 3M 3650-12 "SCOTCHAL PLUS" NON-REFLECTIVE.
4. THE LETTER "I" AND THE NUMERAL "1" ARE IDENTICAL.
5. USE TEXT SPACING PATTERN ON THIS SHEET UNLESS OTHERWISE SPECIFIED ON SIGN STANDARD.

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REV.	DATE	DESCRIPTION	DES.	ENG.	DESIGNER PE STAMP

DRAWN
RAILPROS
CHECKED
B. SMITH *BS*
RECOMMENDED
W. PREY *WP*
DATE 2/2/15



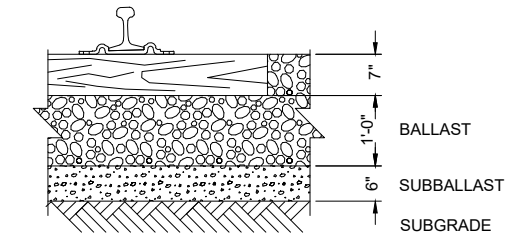
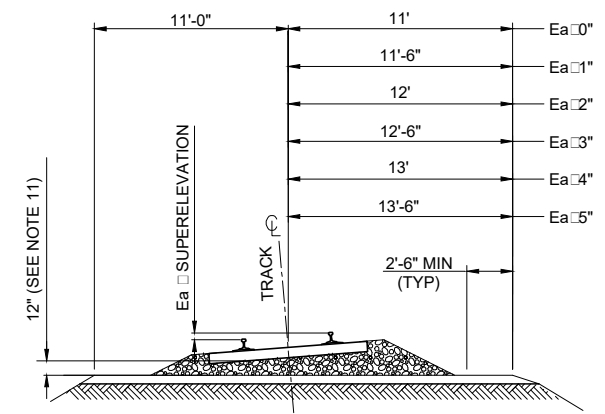
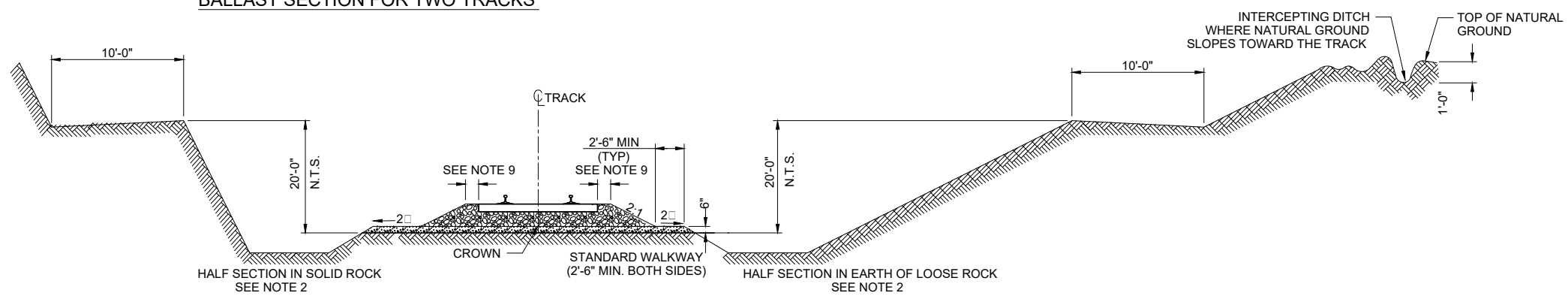
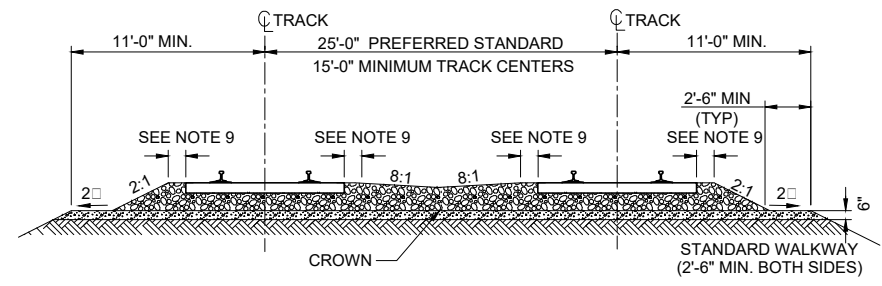
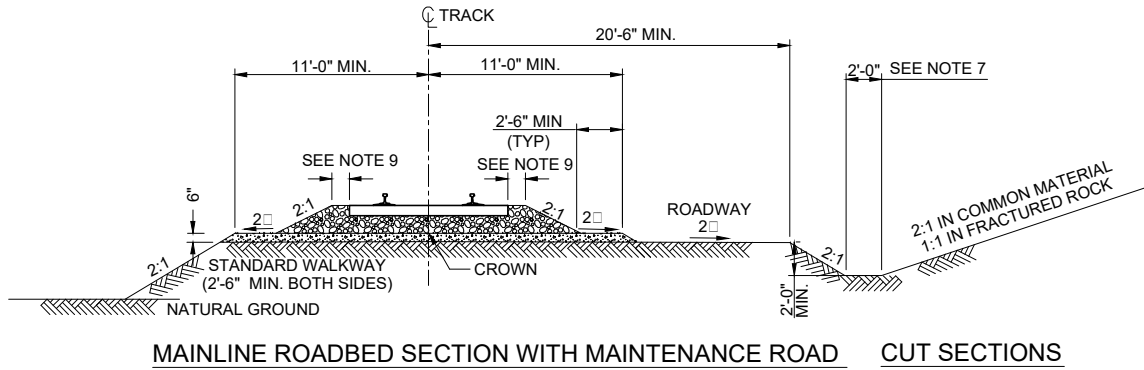
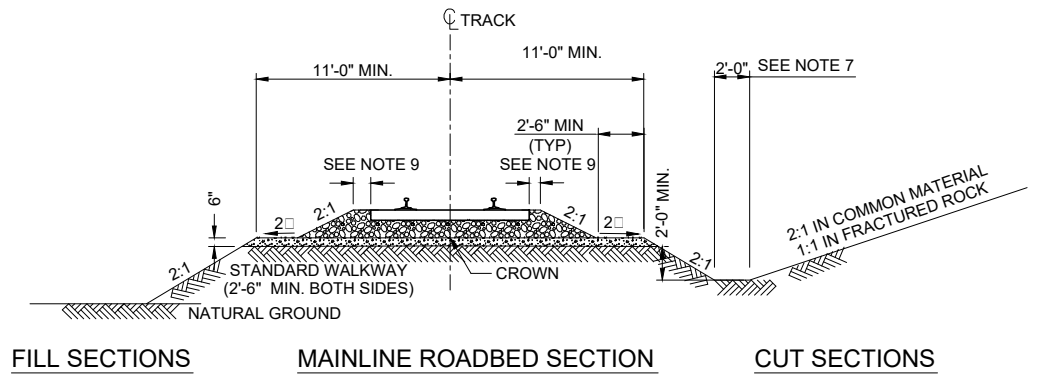
ENGINEERING STANDARD DRAWINGS
SIGN LETTERING

DRAWING NO. ESD-1212
DRAWING SHEET NO. 1 OF 1
SCALE: NONE
CONTRACT SHEET NO.

LOSSAN ENGINEERING STANDARD DRAWINGS

Section 2000

TRACK



NOTES:

1. THE DEPTH OF BALLAST AND SUBBALLAST SHALL BE DECIDED ON THE BASIS OF VOLUME OF TRAFFIC AND ON THE QUALITY OF THE SUBGRADE AS DETERMINED BY THE GEOTECHNICAL ENGINEER AND APPROVED BY SANDAG.
2. SLOPES FOR BANKS IN CUTS AND ON FILLS ARE SHOWN FOR ILLUSTRATIVE PURPOSES ONLY. ACTUAL SLOPES MUST BE DETERMINED BY ENGINEER BASED ON LOCAL CONDITIONS AND CHARACTER OF MATERIAL.
3. BALLAST MUST BE EQUALIZED IN ADVANCE OF DRESSING SO THAT FINAL SECTION WILL CONFORM TO SLOPE REQUIREMENTS AND CHARACTER OF MATERIAL.
4. WHERE OFF-TRACK ROADWAY IS TO BE PROVIDED, ADD 8'-0" MIN ADDITIONAL WIDTH TO THE ROADBED SECTION AT TOP OF SUBGRADE ELEVATION.
5. ALL FILL SLOPES SHALL BE FACED WITH COVER OF MATERIAL SUITABLE FOR GROWING GRASS AND HAVING A THICKNESS OF APPROXIMATELY SIX (6) INCHES. THE OUTER SURFACE OF THIS COVER SHALL COINCIDE WITH THE DESIGN SLOPE OF THE EMBANKMENT. MATERIAL FOR THIS COVER MAY BE OBTAINED FROM SUITABLE CUT MATERIAL.
6. DEPTH OF DITCHES WILL VARY IN ORDER TO PROVIDE FLOW LINE OF 0.2% MINIMUM GRADE IN DITCHES AND IN BENCHES.
7. FLAT BOTTOM DITCHES ARE REQUIRED FOR HIGH DENSITY LINES, HOWEVER A "V" DITCH IS ACCEPTABLE FOR INDUSTRY TRACKS WHEN RIGHT-OF-WAY IS LIMITED AND WHERE LOCAL CONDITIONS AND CHARACTER OF MATERIAL SO REQUIRE.
8. ALL MINIMUM DIMENSIONS SHALL BE MET.
9. BALLAST SHOULDER WIDTH SHALL BE AT LEAST 12".
10. WHERE REQUIRED TO PROVIDE WALKWAYS AT THE HEIGHT PER ESD 2109, USE 3/4" MAX BALLAST IF PRACTICAL FOR TOP 4 INCHES OF BALLAST SECTION.
11. THE GRADE PROFILE ON SUPERELEVATED TRACK IS THE LOW RAIL. MAINTAIN DEPTH OF BALLAST EQUAL TO THAT OF TANGENT TRACK UNDER THE LOW RAIL.
12. CLEARANCES AND WALKWAYS MUST COMPLY WITH CALIFORNIA PUBLIC UTILITIES COMMISSION GENERAL ORDERS.

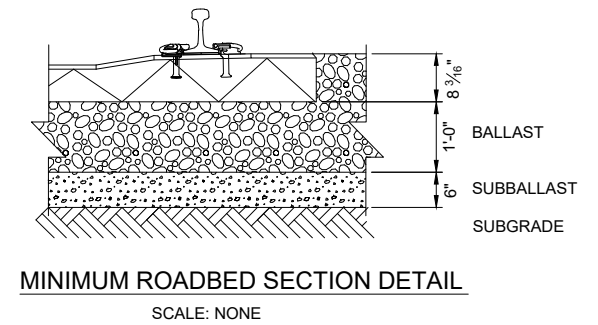
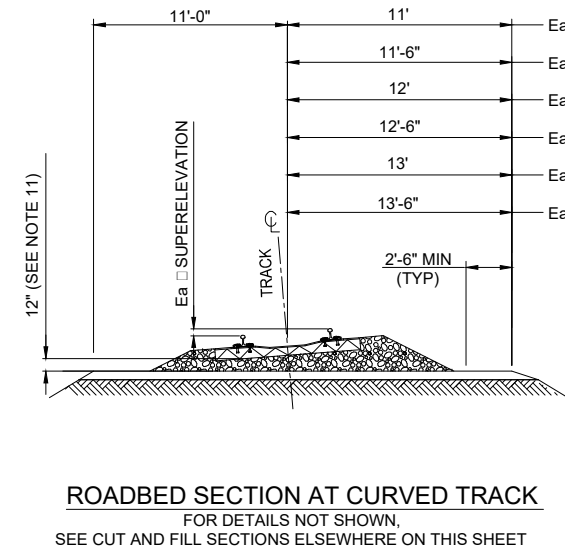
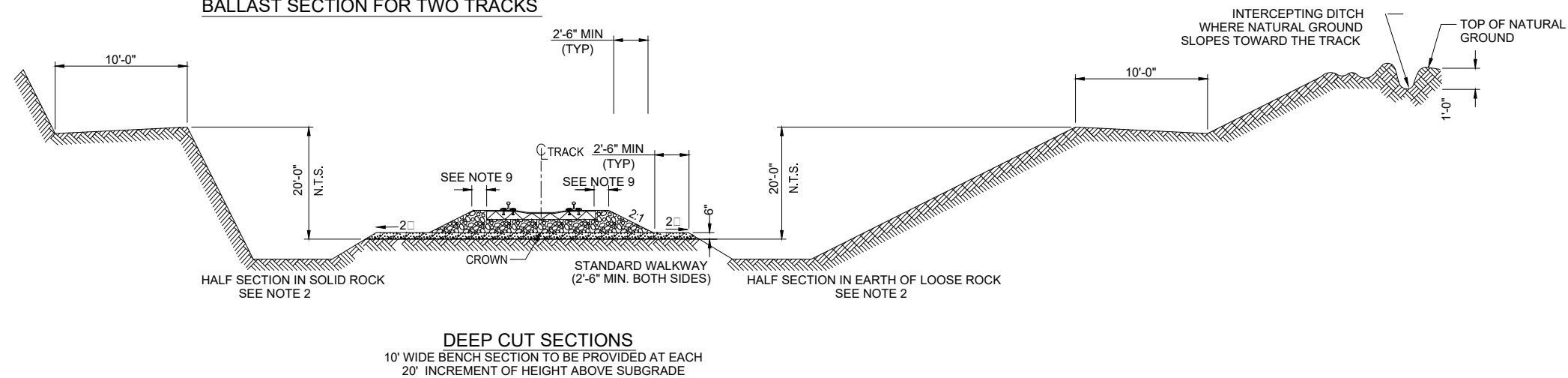
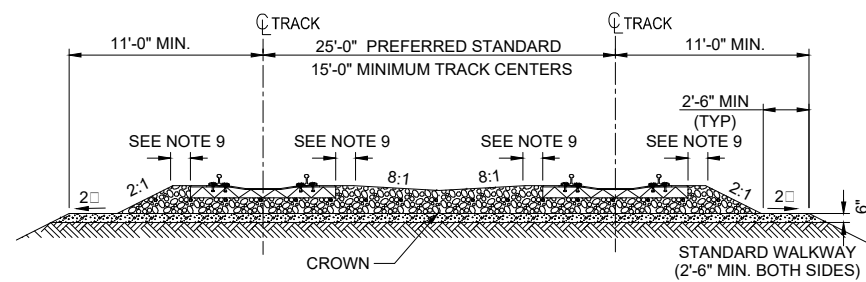
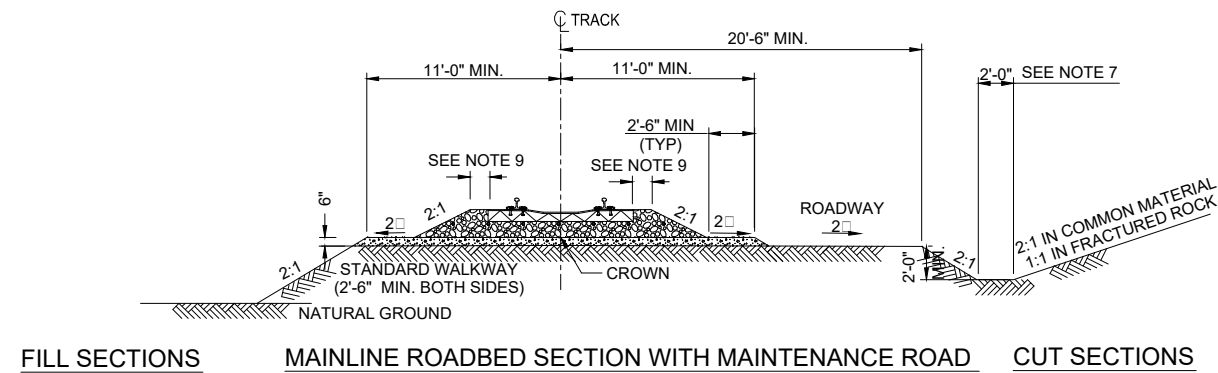
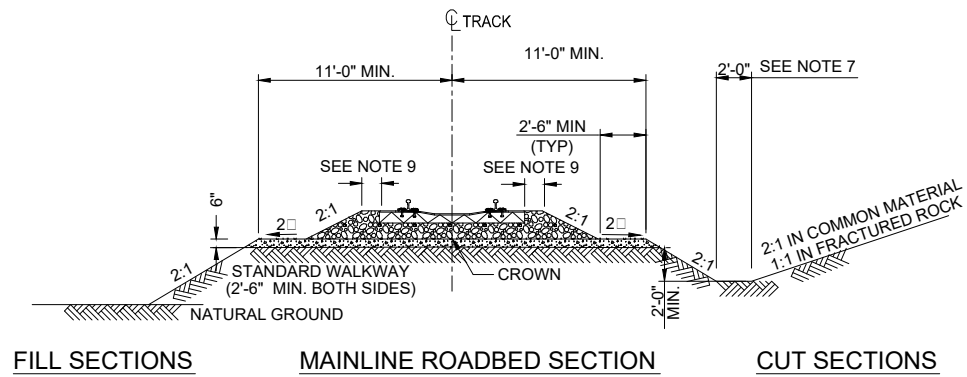
ROADBED SECTION AT CURVED TRACK
FOR DETAILS NOT SHOWN,
SEE CUT AND FILL SECTIONS ELSEWHERE ON THIS SHEET

MINIMUM ROADBED SECTION DETAIL
SCALE: NONE

DEEP CUT SECTIONS
10' WIDE BENCH SECTION TO BE PROVIDED AT EACH
20' INCREMENT OF HEIGHT ABOVE SUBGRADE

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REVISIONS				DRAWN RAILPROS CHECKED B. SMITH RECOMMENDED W. PREY DATE 2/2/15	<p>SAN DIEGO ASSOCIATION OF GOVERNMENTS 401 B Street, Suite 800 San Diego, CA. 92101 www.sandag.org</p>	<p>NORTH COUNTY TRANSIT DISTRICT</p> <p>810 Mission Avenue Oceanside, CA 92054 www.gonctd.com</p>	ENGINEERING STANDARD DRAWINGS ROADBED SECTIONS FOR TRACK CONSTRUCTED USING WOOD TIES	DRAWING NO. ESD-2001	
REV.	DATE	DESCRIPTION	DES. ENG.	DESIGNER PE STAMP				DRAWING SHEET NO. 1 OF 1	
								SCALE: NONE	CONTRACT SHEET NO.



NOTES:

1. THE DEPTH OF BALLAST AND SUBBALLAST SHALL BE DECIDED ON THE BASIS OF VOLUME OF TRAFFIC AND ON THE QUALITY OF THE SUBGRADE AS DETERMINED BY THE GEOTECHNICAL ENGINEER AND APPROVED BY SANDAG.
2. SLOPES FOR BANKS IN CUTS AND ON FILLS ARE SHOWN FOR ILLUSTRATIVE PURPOSES ONLY. ACTUAL SLOPES MUST BE DETERMINED BY ENGINEER BASED ON LOCAL CONDITIONS AND CHARACTER OF MATERIAL.
3. BALLAST MUST BE EQUALIZED IN ADVANCE OF DRESSING SO THAT FINAL SECTION WILL CONFORM TO SLOPE REQUIREMENTS AND CHARACTER OF MATERIAL.
4. WHERE OFF-TRACK ROADWAY IS TO BE PROVIDED, ADD 8'-0" MIN ADDITIONAL WIDTH TO THE ROADBED SECTION AT TOP OF SUBGRADE ELEVATION.
5. ALL FILL SLOPES SHALL BE FACED WITH COVER OF MATERIAL SUITABLE FOR GROWING GRASS AND HAVING A THICKNESS OF APPROXIMATELY SIX (6) INCHES. THE OUTER SURFACE OF THIS COVER SHALL COINCIDE WITH THE DESIGN SLOPE OF THE EMBANKMENT. MATERIAL FOR THIS COVER MAY BE OBTAINED FROM SUITABLE CUT MATERIAL.
6. DEPTH OF DITCHES WILL VARY IN ORDER TO PROVIDE FLOW LINE OF 0.2% MINIMUM GRADE IN DITCHES AND IN BENCHES.
7. FLAT BOTTOM DITCHES ARE REQUIRED FOR HIGH DENSITY LINES, HOWEVER A "V" DITCH IS ACCEPTABLE FOR INDUSTRY TRACKS WHEN RIGHT-OF-WAY IS LIMITED AND WHERE LOCAL CONDITIONS AND CHARACTER OF MATERIAL SO REQUIRE.
8. ALL MINIMUM DIMENSIONS SHALL BE MET.
9. BALLAST SHOULDER WIDTH SHALL BE AT LEAST 12".
10. WHERE REQUIRED TO PROVIDE WALKWAYS AT TIE HEIGHT PER ESD-2109, USE 3/4" MAX BALLAST IF PRACTICAL FOR TOP 4 INCHES OF BALLAST SECTION.
11. THE GRADE PROFILE ON SUPERELEVATED TRACK IS THE LOW RAIL. MAINTAIN DEPTH OF BALLAST EQUAL TO THAT OF TANGENT TRACK UNDER THE LOW RAIL.
12. CLEARANCES AND WALKWAYS MUST COMPLY WITH CALIFORNIA PUBLIC UTILITIES COMMISSION GENERAL ORDERS.

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REV.	DATE	DESCRIPTION	DES.	ENG.

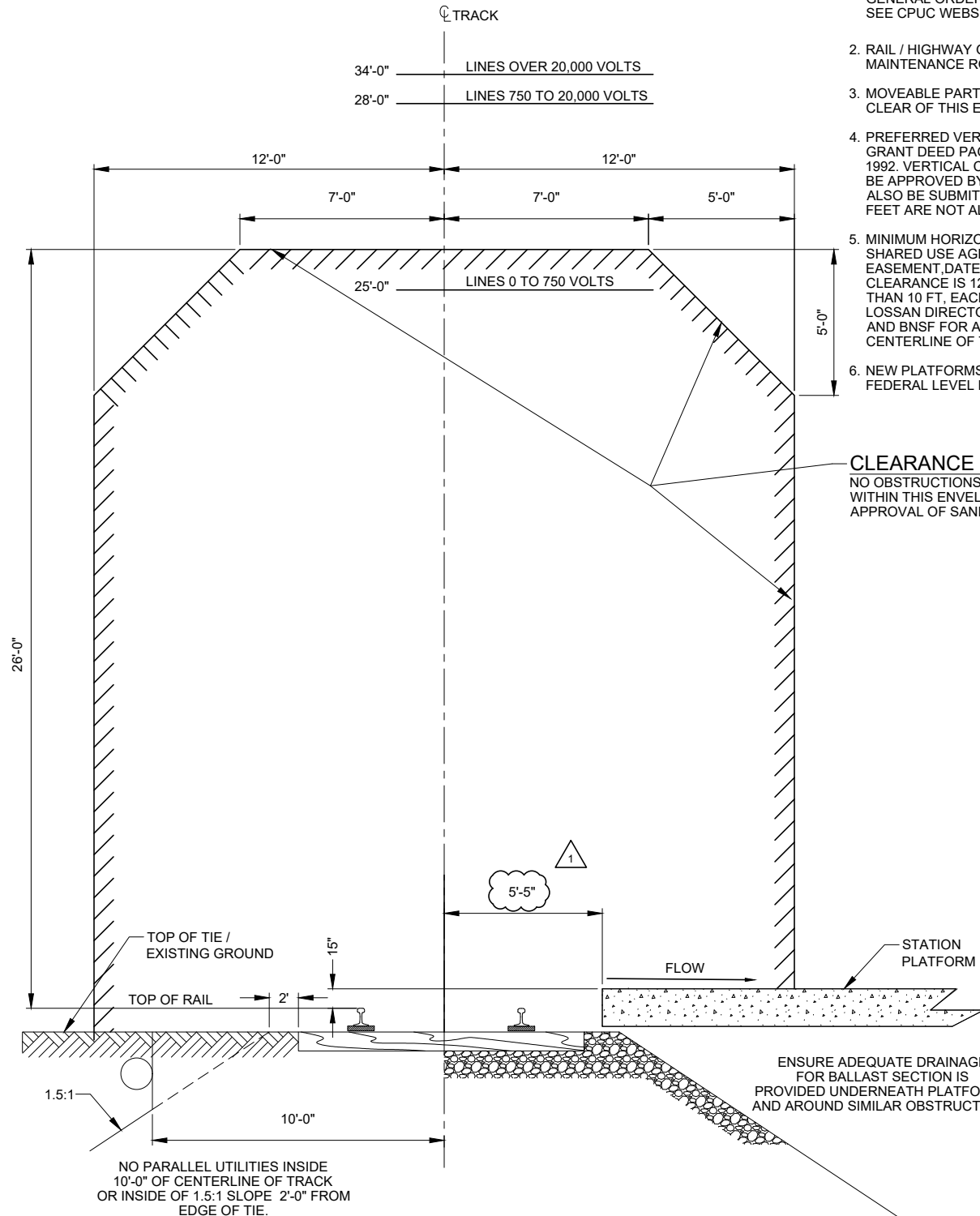
REVISIONS	DRAWN RAILPROS
	CHECKED B. SMITH <i>MSB</i>
	RECOMMENDED W. PREY <i>WP</i>
	DATE 2/2/15
DESIGNER PE STAMP	

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San Diego, CA. 92101
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**NORTH COUNTY
TRANSIT DISTRICT**
810 Mission Avenue
Oceanside, CA 92054
www.gonctd.com

ENGINEERING STANDARD DRAWINGS
ROADBED SECTIONS FOR TRACK CONSTRUCTED USING
CONCRETE TIES

DRAWING NO.	ESD-2002
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	

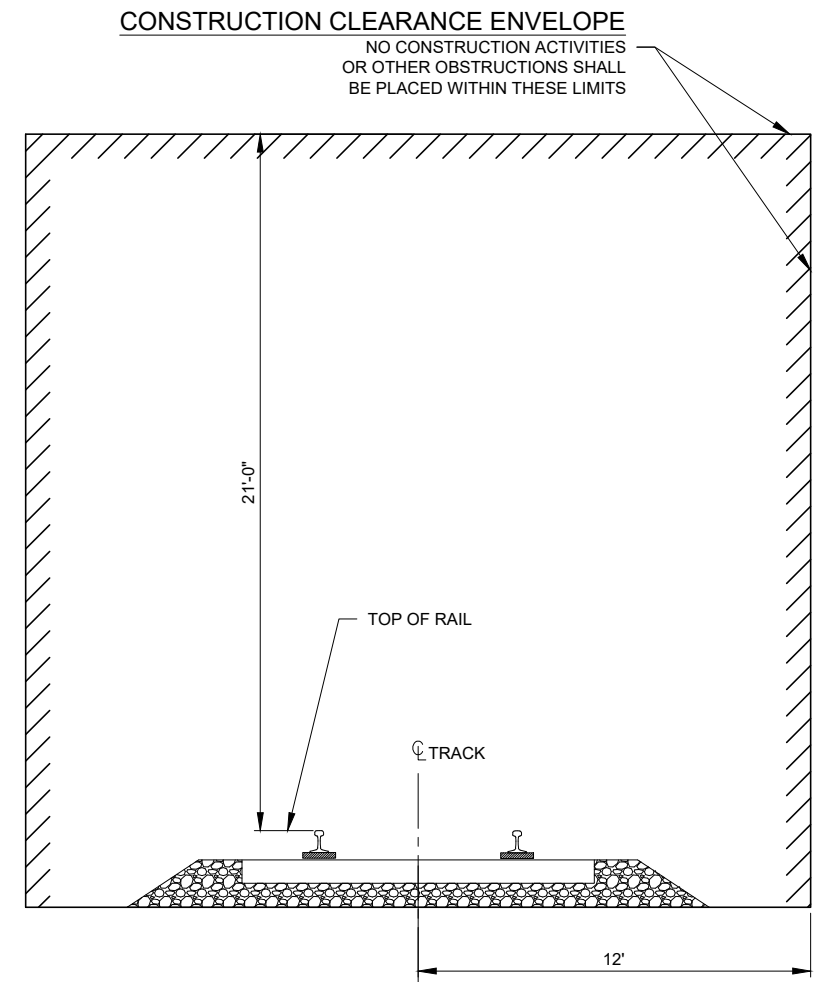


- NOTES:**
- OVERHEAD WIRE CLEARANCES SHALL CONFORM TO CALIFORNIA P.U.C. GENERAL ORDER NO. 95 OR AMENDMENTS THEREOF. SEE CPUC WEBSITE: <http://www.cpuc.ca.gov/puc/documents/go.htm>
 - RAIL / HIGHWAY GRADE SEPARATIONS MAY REQUIRE PROVISIONS FOR MAINTENANCE ROAD AND / OR ADDITIONAL TRACK.
 - MOVEABLE PARTS OF DOORS, GATES, WINDOWS, ETC., MUST REMAIN CLEAR OF THIS ENVELOPE.
 - PREFERRED VERTICAL CLEARANCE IS 26 FEET PER NCTD SHARED USE AGREEMENT, GRANT DEED PAGE 3 AND 4-RESERVED FREIGHT EASEMENT, DATED DECEMBER 15, 1992. VERTICAL CLEARANCES LESS THAN 26 FEET BUT NOT LESS THAN 24 FEET MUST BE APPROVED BY THE SANDAG LOSSAN DIRECTOR OF RAIL ENGINEERING AND MUST ALSO BE SUBMITTED TO BNSF FOR APPROVAL. VERTICAL CLEARANCES LESS THAN 24 FEET ARE NOT ALLOWED.
 - MINIMUM HORIZONTAL CLEARANCE IS 10 FT FROM CENTERLINE OF TRACK PER NCTD SHARED USE AGREEMENT GRANT DEED PAGES 3 AND 4-RESERVED FREIGHT EASEMENT, DATED DECEMBER 15, 1992. PREFERRED MINIMUM HORIZONTAL CLEARANCE IS 12 FT. HORIZONTAL CLEARANCE LESS THAN 12 FT, BUT NOT LESS THAN 10 FT, EACH SIDE OF TRACK CENTERLINE SHALL BE APPROVED BY THE SANDAG LOSSAN DIRECTOR OF RAIL ENGINEERING, AND MUST ALSO BE SUBMITTED TO NCTD AND BNSF FOR APPROVAL. HORIZONTAL CLEARANCE LESS THAN 10 FT FROM CENTERLINE OF TRACK IS NOT ALLOWED FOR NEW CONSTRUCTION.
 - NEW PLATFORMS TO BE CONSTRUCTED 15" ABOVE TOP OF RAIL SHALL COMPLY WITH FEDERAL LEVEL BOARDING REGULATION 76 FR 57924 PER NCTD LETTER 5/8/2014.

CLEARANCE ENVELOPE
NO OBSTRUCTIONS TO BE CONSTRUCTED WITHIN THIS ENVELOPE WITHOUT PRIOR APPROVAL OF SANDAG DIRECTOR OF RAIL

SANDAG CLEARANCE REQUIREMENTS FOR NEW CONSTRUCTION OR DESIGN
ANY EXCEPTION TO THIS REQUIREMENT MUST BE APPROVED BY THE SANDAG DIRECTOR OF RAIL

- NOTES:**
- ANY SHORING SYSTEM THAT IMPACTS THE RAILROAD'S OPERATION AND/OR SUPPORTS THE RAILROAD'S EMBANKMENT SHALL BE DESIGNED AND CONSTRUCTED PER RAILROAD GUIDELINES FOR TEMPORARY SHORING.
 - ALL DEMOLITION WITHIN THE RAILROAD'S RIGHT-OF-WAY AND/OR DEMOLITION THAT MAY IMPACT THE RAILROAD'S TRACKS OR OPERATIONS SHALL COMPLY WITH THE RAILROAD'S DEMOLITION REQUIREMENTS.
 - ERECTION OVER THE RAILROAD'S TRACK SHALL BE PLANNED SUCH THAT IT ENABLES THE TRACK(S) TO REMAIN OPEN TO TRAFFIC PER RAILROAD REQUIREMENTS.
 - THE ELEVATION OF THE EXISTING TOP-OF-RAIL PROFILE, AS SHOWN ON THE PLANS, SHALL BE VERIFIED BEFORE BEGINNING CONSTRUCTION. ALL DISCREPANCIES SHALL BE BROUGHT TO THE ATTENTION OF THE RAILROAD PRIOR TO CONSTRUCTION.
 - THE PROPOSED GRADE SEPARATION PROJECT SHALL NOT CHANGE THE QUANTITY AND/OR CHARACTERISTICS OF THE FLOW IN THE RAILROAD DITCHES AND/OR DRAINAGE STRUCTURES.
 - THE CONTRACTOR MUST SUBMIT A PROPOSED METHOD OF EROSION AND SEDIMENT CONTROL AND HAVE THE METHOD APPROVED BY THE RAILROAD PRIOR TO BEGINNING ANY GRADING ON THE PROJECT SITE.
 - FOR RAILROAD COORDINATION PLEASE REFER TO THE RAILROAD'S COORDINATION REQUIREMENTS AS PART OF THE SPECIFICATIONS OR SPECIAL PROVISIONS OF THE PROJECT.
 - TEMPORARY CONSTRUCTION CLEARANCES, INCLUDING FALSEWORK CLEARANCES, SHALL COMPLY WITH MINIMUM CONSTRUCTION CLEARANCE ENVELOPE DETAIL HEREON.
 - ALL PERMANENT CLEARANCES SHALL BE VERIFIED BEFORE PROJECT CLOSEOUT.



MINIMUM CONSTRUCTION CLEARANCE ENVELOPE
(NORMAL TO RAILROAD)

REV.	DATE	DESCRIPTION	DES.	ENG.
1	9/23/22	INCREASED PLATFORM SIDE CLEARANCE	SH	DB

REVISIONS

DRAWN	RAILPROS
CHECKED	A. ANDERSON
RECOMMENDED	B. SMITH
DATE	SEPT 2022

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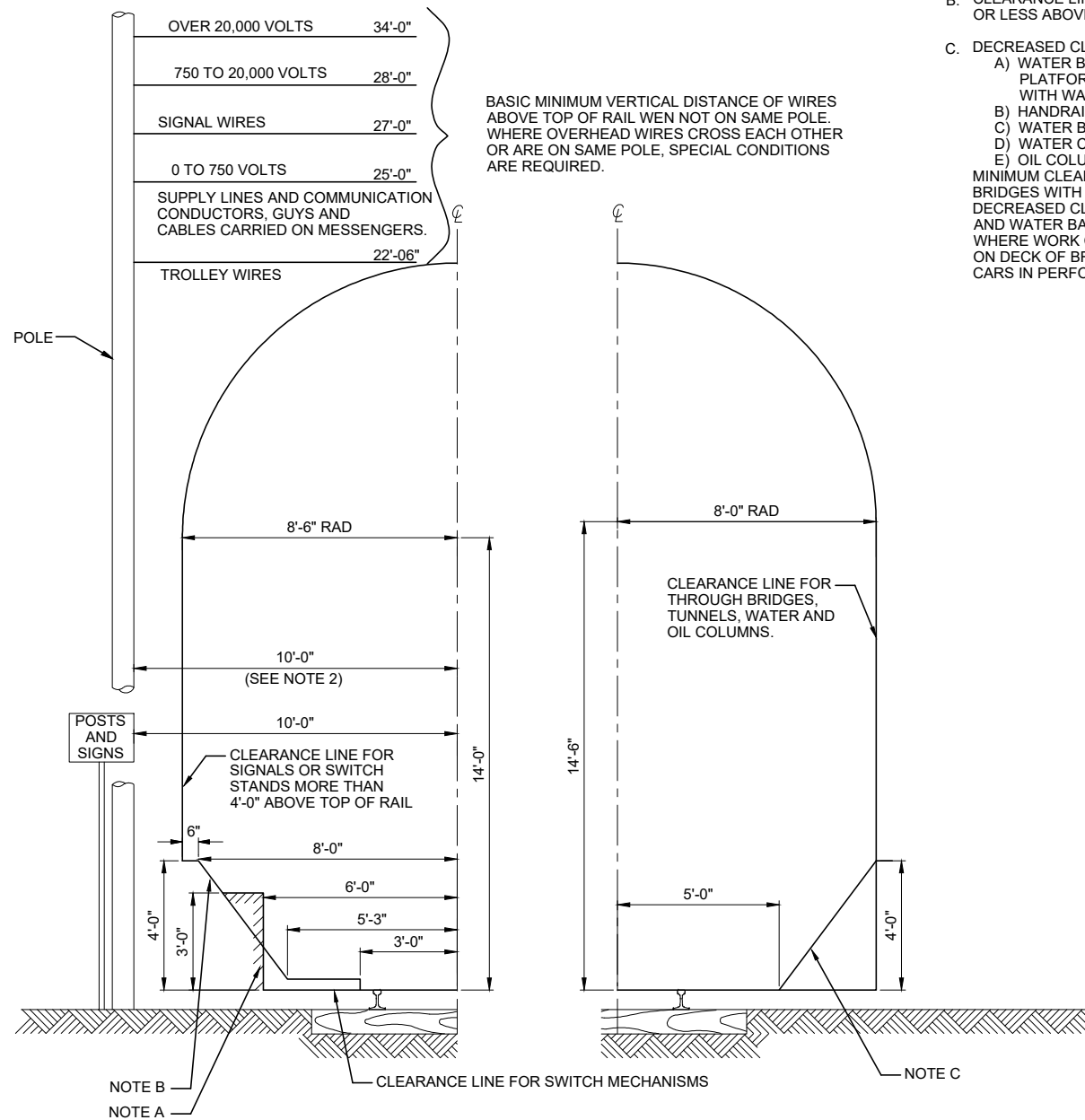
NORTH COUNTY TRANSIT DISTRICT

810 Mission Avenue
Oceanside, CA 92054
www.gonctd.com

ENGINEERING STANDARD DRAWINGS

CLEARANCE REQUIREMENTS FOR CONSTRUCTION OF STRUCTURES

DRAWING NO. ESD-2101
DRAWING SHEET NO. 1 OF 1
SCALE: NONE
CONTRACT SHEET NO.



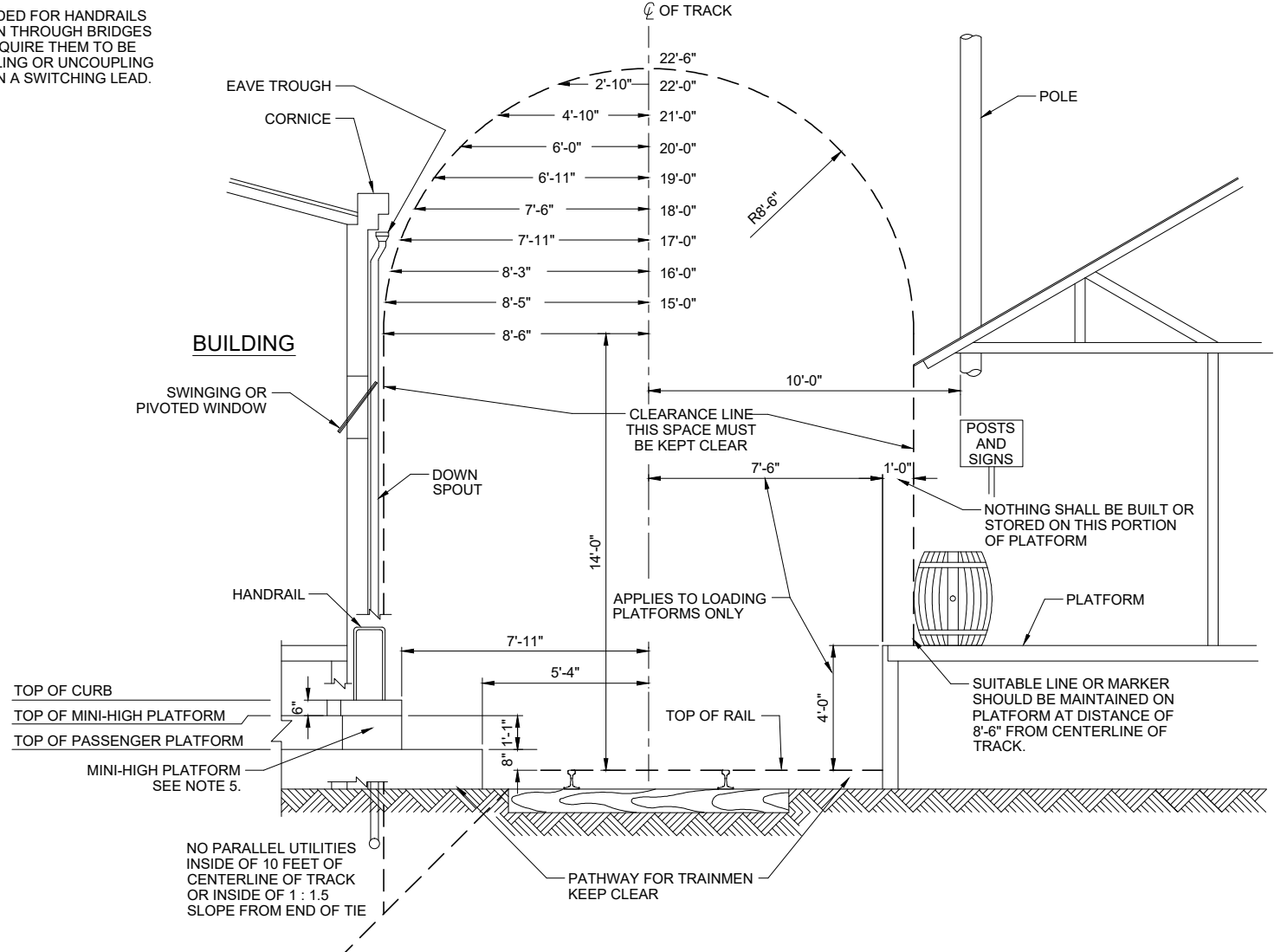
BASIC MINIMUM VERTICAL DISTANCE OF WIRES ABOVE TOP OF RAIL WHEN NOT ON SAME POLE. WHERE OVERHEAD WIRES CROSS EACH OTHER OR ARE ON SAME POLE, SPECIAL CONDITIONS ARE REQUIRED.

NOTES:

- A. CLEARANCE LINE FOR SIGNALS OR SWITCH STANDS 3'-0" OR LESS ABOVE TOP OF RAIL AND LOCATED BETWEEN TRACKS WHERE NOT PRACTICABLE TO MAINTAIN CLEARANCES OTHERWISE PRESCRIBED.
 - B. CLEARANCE LINE FOR PORTIONS OF BLOCK SIGNALS 4'-0" OR LESS ABOVE TOP OF RAIL.
 - C. DECREASED CLEARANCES FOR:
 - A) WATER BARREL PLATFORMS AND REFUGE PLATFORMS PLATFORMS ON BRIDGES AND TRESTLES NOT PROVIDED WITH WALKWAYS
 - B) HANDRAILS
 - C) WATER BARRELS
 - D) WATER COLUMNS
 - E) OIL COLUMNS
- MINIMUM CLEARANCES FOR HANDRAILS AND WATER BARRELS ON BRIDGES WITH WALKWAYS SHALL BE 7'-9". DECREASED CLEARANCES, EXCEPT AS PROVIDED FOR HANDRAILS AND WATER BARRELS ARE NOT PERMITTED ON THROUGH BRIDGES WHERE WORK OF TRAINMEN OR YARDMEN REQUIRE THEM TO BE ON DECK OF BRIDGE FOR PURPOSE OF COUPLING OR UNCOUPLING CARS IN PERFORMING SWITCHING SERVICE ON A SWITCHING LEAD.

NOTES:

- 1. OVERHEAD WIRE CLEARANCES SHALL CONFORM TO COMMISSION'S GENERAL ORDER NO. 95 OR AMENDMENTS THEREOF.
- 2. POSTS, POLES, SIGNS AND SIMILAR FACILITIES MAY HAVE MINIMUM CLEARANCE OF 8'-6", BUT CLEARANCE OF 10'-0" IS RECOMMENDED WHERE PRACTICABLE.
- 3. ALL SIDE CLEARANCE DIMENSIONS ARE FOR TANGENT TRACK. IN GENERAL SIDE CLEARANCE FOR CURVE TRACK TO BE 1'-0" GREATER THAN THAT FOR TANGENT TRACK.
- 4. PLATFORMS 4'-0" OR LESS IN HEIGHT WITH MINIMUM CLEARANCE OF 7'-3" MAY BE EXTENDED AT EXISTING CLEARANCES IF SUCH EXTENSION IS NOT IN CONNECTION WITH RECONSTRUCTION OF ORIGINAL PLATFORM.
- 5. THE STATION PASSENGER PLATFORM AND THE "MINI-HIGH" PLATFORM SHOWN ON THIS DRAWING ARE FOR REFERENCE ONLY, FOR ADDITIONAL INFORMATION AND DETAILS SEE DRAWING ES2103-02.



**TYPICAL
CLEARANCE OF STRUCTURES FROM RAILROAD TRACKS
AS GENERALLY PRESCRIBED BY
PUBLIC UTILITIES COMMISSION - STATE OF CALIFORNIA
GENERAL ORDER NO. 26-D (SUPERSEDES GENERAL ORDER 26-C)**

SEE CPUC WEBSITE: <http://www.cpuc.ca.gov/puc/documents/go.htm>

(EFFECTIVE FEBRUARY 1, 1948)

REGULATIONS GOVERNING CLEARANCES ON RAILROADS AND STREET RAILROADS WITH REFERENCE TO SIDE AND OVERHEAD STRUCTURES, PARALLEL TRACKS, CROSSINGS OF PUBLIC ROADS, HIGHWAYS AND STREETS.

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REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN RAILPROS	
CHECKED B. SMITH	<i>BS</i>
RECOMMENDED W. PREY	<i>WP</i>
DATE	2/2/15
DESIGNER PE STAMP	

SANDAG

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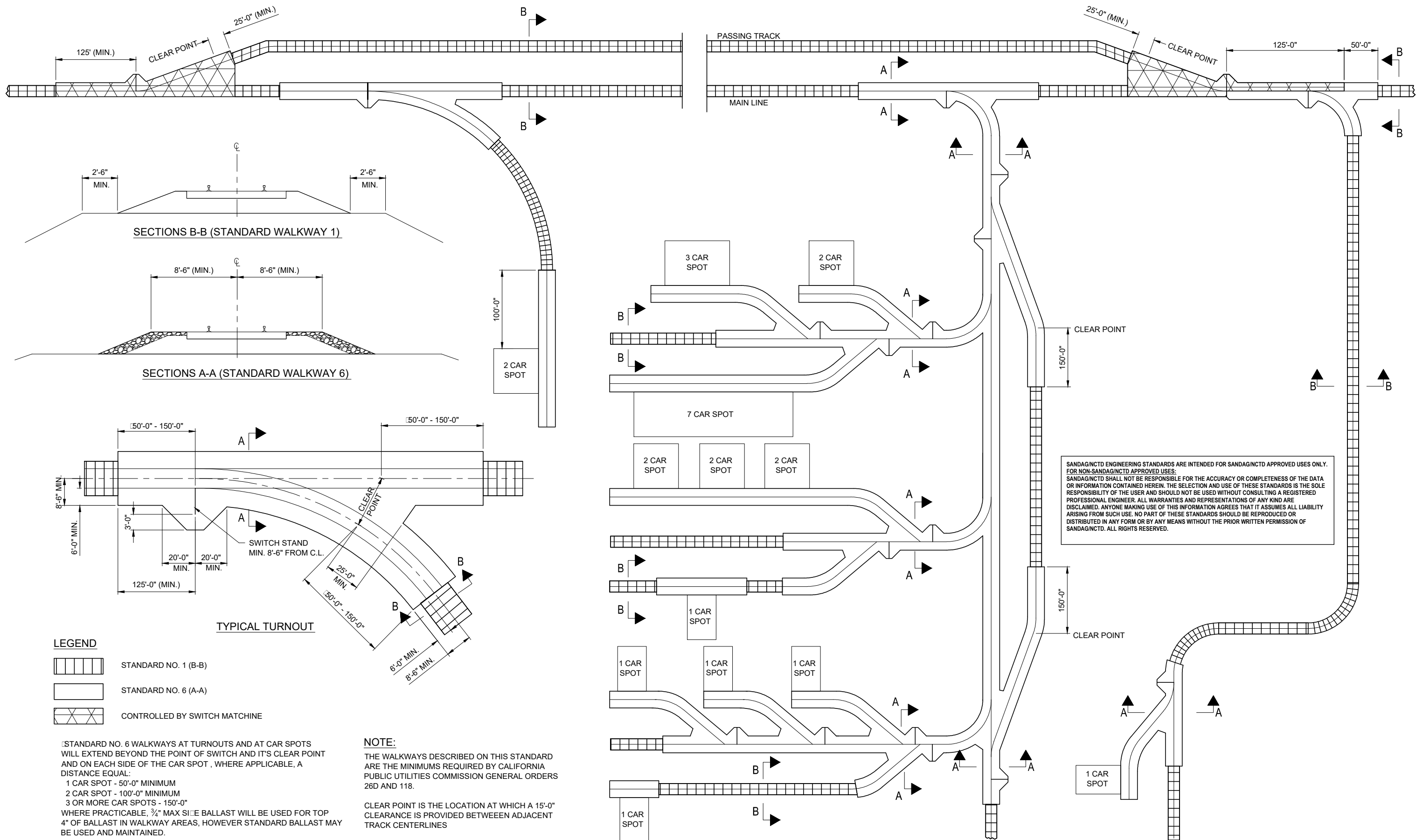
**NORTH COUNTY
TRANSIT DISTRICT**

810 Mission Avenue
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ENGINEERING STANDARD DRAWINGS

CPUC MINIMUM CLEARANCE REQUIREMENTS FOR
STRUCTURES

DRAWING NO.	ESD-2102
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	






SECTIONS B-B (STANDARD WALKWAY 1)

SECTIONS A-A (STANDARD WALKWAY 6)

TYPICAL TURNOUT

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LEGEND

-  STANDARD NO. 1 (B-B)
-  STANDARD NO. 6 (A-A)
-  CONTROLLED BY SWITCH MATCHLINE

STANDARD NO. 6 WALKWAYS AT TURNOUTS AND AT CAR SPOTS WILL EXTEND BEYOND THE POINT OF SWITCH AND ITS CLEAR POINT AND ON EACH SIDE OF THE CAR SPOT, WHERE APPLICABLE, A DISTANCE EQUAL:
 1 CAR SPOT - 50'-0" MINIMUM
 2 CAR SPOT - 100'-0" MINIMUM
 3 OR MORE CAR SPOTS - 150'-0" MINIMUM
 WHERE PRACTICABLE, 3/4" MAX SIZE BALLAST WILL BE USED FOR TOP 4" OF BALLAST IN WALKWAY AREAS, HOWEVER STANDARD BALLAST MAY BE USED AND MAINTAINED.

NOTE:
 THE WALKWAYS DESCRIBED ON THIS STANDARD ARE THE MINIMUMS REQUIRED BY CALIFORNIA PUBLIC UTILITIES COMMISSION GENERAL ORDERS 26D AND 118.
 CLEAR POINT IS THE LOCATION AT WHICH A 15'-0" CLEARANCE IS PROVIDED BETWEEN ADJACENT TRACK CENTERLINES

REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN RAILPROS	
CHECKED B. SMITH	<i>MSB</i>
RECOMMENDED W. PREY	<i>WP</i>
DATE	2/2/15



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ENGINEERING STANDARD DRAWINGS

MINIMUM WALKWAY STANDARDS

DRAWING NO.	ESD-2109
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	

STANDARD VERTICAL CURVES (AREMA SECTION 3.6)

- VERTICAL CURVES AS CALCULATED IN ITEM 6 BELOW SHOULD BE USED TO CONNECT ALL CHANGES IN GRADIENTS.
- THE LENGTH OF VERTICAL CURVE IS DETERMINED BY CHANGES IN GRADIENT, VERTICAL ACCELERATION AND THE SPEED OF THE TRAIN.
- THE PURPOSE OF THE VERTICAL CURVE IS TO EASE THE CHANGE OF THE GRADIENTS IN ORDER TO REDUCE COUPLER AND DIAPHRAGM BINDING AND ELIMINATE THE DANGER OF BREAKING THE TRAIN IN TWO AS A DIRECT RESULT OF TRAIN ACTION. IN ADDITION, THE PROPER VERTICAL CURVE WILL PROVIDE FOR PASSENGER COMFORT ON PASSENGER TRAINS. VERTICAL CURVES SHOULD BE DESIGNED TO BE LONG ENOUGH TO MATCH THE HIGHEST SPEEDS CONTEMPLATED FOR THE RAIL LINES.
- A VERTICAL CURVE WHICH IS CONCAVE UPWARDS SHALL BE DENOTED AS A SAG. A VERTICAL CURVE WHICH IS CONCAVE DOWNWARDS SHALL BE DENOTED AS A SUMMIT.
- VERTICAL CURVE SHALL BE PARABOLIC.
- THE MINIMUM LENGTH OF THE VERTICAL CURVE FOR BOTH SAGS AND SUMMITS IS DETERMINED BY THE FOLLOWING FORMULA .

$$L = \frac{D \times V^2 \times K}{A}$$

WHERE: A=VERTICAL ACCELERATION (FEET/SEC)
 D=ABSOLUTE VALUE OF THE DIFFERENCE IN RATES OF GRADES EXPRESSED AS A DECIMAL
 K=2.15 CONVERSION FACTOR TO GIVE LVC IN FEET
 V=DESIGN SPEED IN MILES PER HOUR

- IT IS RECOMMENDED PRACTICE TO ROUND THE CALCULATED MINIMUM LVC UP TO A CONVENIENT WHOLE NUMBER. ON TRACKS WITH DESIGN SPEEDS GREATER THAN OR EQUAL TO 25 MPH, ANY CALCULATED MINIMUM LVC OF LESS THAN 100 FT SHALL BE ROUNDED UP TO AT LEAST 100 FT.
- THE RECOMMENDED VERTICAL ACCELERATION (A) SHALL BE SELECTED BASED ON THE TYPE OF OPERATIONS AND IS THE SAME FOR BOTH SAGS AND SUMMITS. DEVIATIONS FROM THESE ACCELERATION CRITERIA MAY BE AUTHORIZED BY SANDAG. THE LONGEST VERTICAL CURVE COMPUTED BY THESE METHOD WITH EACH CRITERIA SHALL GOVERN.

FREIGHT OPERATIONS:
 A=0.10 FEET/SEC/SEC

PASSENGER OPERATIONS:
 A=0.60 FEET/SEC/SEC

MIXED PASSENGER WITH FREIGHT TRAFFIC NOT EXCEEDING 4000 TON TRAINS OR 8 MILLION GROSS TONS ANNUAL FREIGHT TRAFFIC
 NOTE: CURRENT SANDAG AND NCTD MAINLINE TRACKS DO NOT MEET THIS CRITERIA

A=0.30 FEET/SEC/SEC FREIGHT SPEED
 A=0.60 FEET/SEC/SEC PASSENGER SPEED

- WHEN DESIGNING VERTICAL CURVES ON MIXED USE FREIGHT AND PASSENGER OPERATIONS, THE DESIGNER SHALL CALCULATE THE MINIMUM LVC USING THE APPLICABLE VALUES OF "A" AND "V" AND SELECT THE LONGEST VALUE YIELDED.
- THE MINIMUM DISTANCE BETWEEN VERTICAL CURVES SHALL BE 3V OR 100 FT, WHICHEVER IS GREATER.
- TURNOUTS SHALL NOT BE PLACED WITHIN THE LIMITS OF A VERTICAL CURVE.
- THE DESIRABLE LENGTH OF VERTICAL CURVES IN YARD TRACKS SHALL BE NOT LESS THAN 100 FT. THE MINIMUM LENGTH OF VERTICAL CURVES IN YARD TRACKS SHALL BE 30 FT.
- THE DESIGN OF VERTICAL ALIGNMENT SHALL AIM TO MINIMIZE THE NUMBER OF VERTICAL CURVES, WHILE CONSISTENT WITH ENGINEERING ECONOMY AND SITE CONSTRAINTS.
- VERTICAL CURVES SHALL BE DESIGNED USING THE FUTURE MAXIMUM DESIGN SPEED FOR PASSENGER AND FREIGHT TRAINS IN EFFECT. DESIGNERS SHALL CONSULT WITH SANDAG FOR THE FUTURE MAXIMUM PASSENGER SPEED AT EACH LOCATION. CURRENTLY THE MAXIMUM SPEEDS ARE 90 MPH PASSENGER AND 80 MPH FREIGHT.
- SPEED RESTRICTIONS DUE TO SIGNAL/STOPPING DISTANCE OR PASSENGER STATIONS WILL NOT BE CONSIDERED.
- PLANS FOR NEW CONSTRUCTION, REHABILITATION, AND TEMPORARY TRACK SHALL CLEARLY SHOW THE PERCENT GRADES, DESIGN SPEED, BEGINNING, END, AND LENGTH OF VERTICAL CURVE.
- VERTICAL PROFILES MUST SHOW CONSTRAINTS TO VERTICAL PROFILE SUCH AS EXISTING OR FUTURE BRIDGES, CROSSINGS, TURNOUTS AND STATION PLATFORMS.
- VERTICAL CURVES WITHIN 100 FEET OF A STATION PLATFORM SHALL BE AVOIDED.

EXAMPLE CALCULATION FOR FREIGHT OPERATIONS

CREST CURVE WITH 0.50% ASCENDING GRADE MEETING A 0.50% DESCENDING GRADE. MAXIMUM DESIGN SPEED IS 50 MPH.

A = 0.10 FEET/SEC/SEC VERTICAL ACCELERATION (FREIGHT)
 D = ABSOLUTE VALUE OF ((+0.005)-(-0.005))=0.01
 K = 2.15 CONVERSION FACTOR TO GIVE L IN FEET
 V = 50 MPH DESIGN SPEED

$$LVC = \frac{D \times V^2 \times K}{A} = \text{MINIMUM LENGTH OF VERTICAL CURVE IN FEET}$$

$$LVC = \frac{(0.01) \times (50\text{MPH})^2 \times 2.15}{0.10 \text{ FEET/SEC/SEC}} = 537.50 \text{ FEET SAY } 540 \text{ FEET}$$

EXAMPLE CALCULATION FOR PASSENGER OPERATIONS

CREST CURVE WITH 0.50% ASCENDING GRADE MEETING A 0.50% DESCENDING GRADE. MAXIMUM DESIGN SPEED IS 75 MPH.

A = 0.60 FEET/SEC/SEC VERTICAL ACCELERATION (PASSENGER AND TRANSIT)
 D = ABSOLUTE VALUE OF ((+0.005)-(-0.005))=0.01
 K = 2.15 CONVERSION FACTOR TO GIVE L IN FEET
 V = 75 MPH DESIGN SPEED

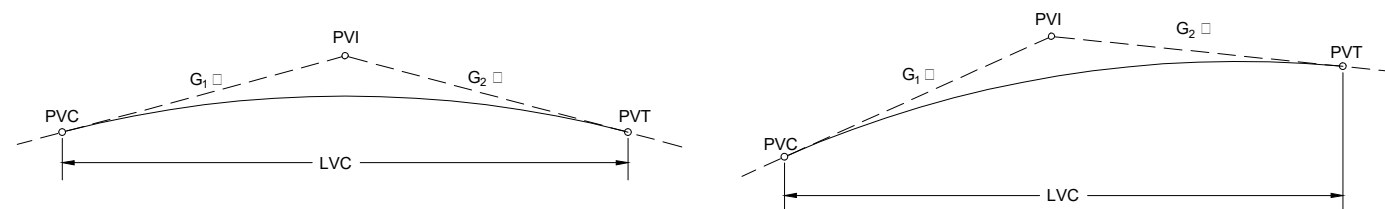
$$LVC = \frac{D \times V^2 \times K}{A} = \text{MINIMUM LENGTH OF VERTICAL CURVE IN FEET}$$

$$LVC = \frac{(0.01) \times (75\text{MPH})^2 \times 2.15}{0.60 \text{ FEET/SEC/SEC}} = 201.56 \text{ FEET SAY } 205 \text{ FEET}$$

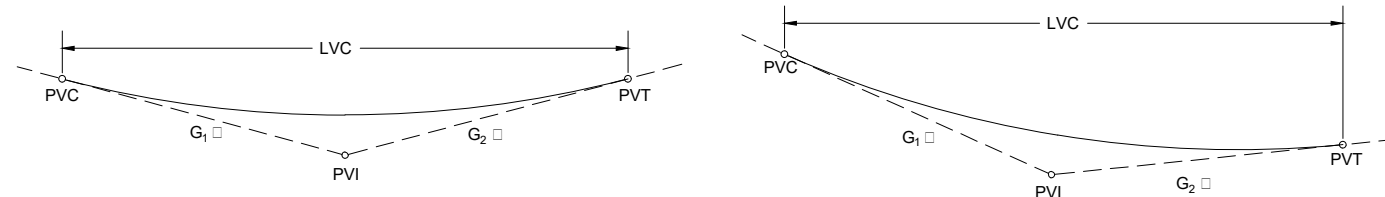
EXAMPLE CALCULATION FOR BOTH OR CONCURRENT OPERATIONS

ASSUMING SAME GRADES AND SPEEDS AS ABOVE EXAMPLES SELECTING LONGEST VALUE YIELDED, LVC WOULD BE 540 FT.

SUMMIT CURVES



SAG CURVES



ABBREVIATIONS

- G1 APPROACHING GRADE
- G2 DEPARTING GRADE
- LVC LENGTH OF VERTICAL CURVE
- PVI POINT OF VERTICAL INTERSECTION
- PVT POINT OF VERTICAL TANGENCY

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REV.	DATE	DESCRIPTION	DES.	ENG.	DESIGNER PE STAMP


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ENGINEERING STANDARD DRAWINGS
 VERTICAL CURVES GEOMETRY

DRAWING NO.	ESD-2201
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	

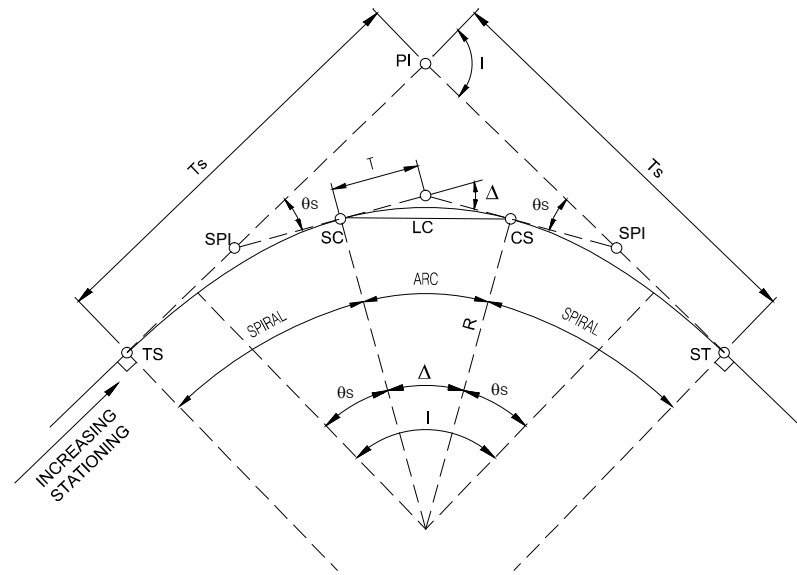


FIGURE A
CIRCULAR CURVES
WITH SPIRAL
TRANSITION

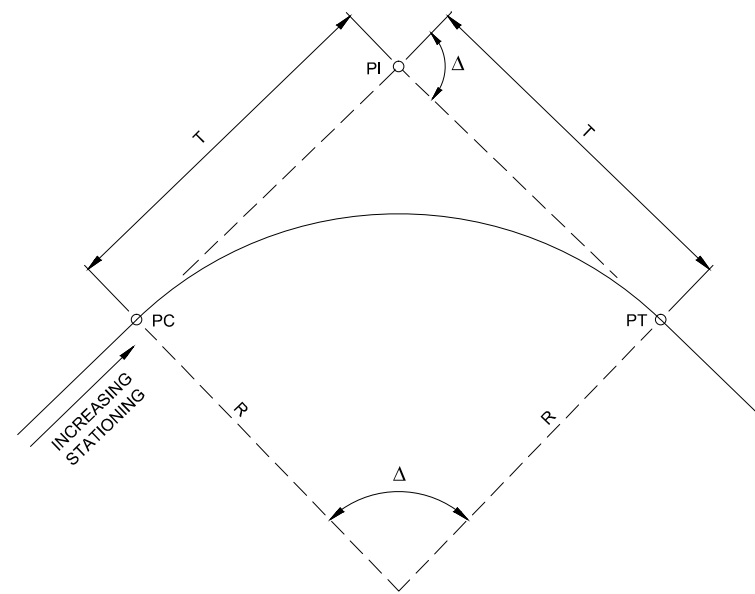


FIGURE B
SIMPLE CIRCULAR
CURVE

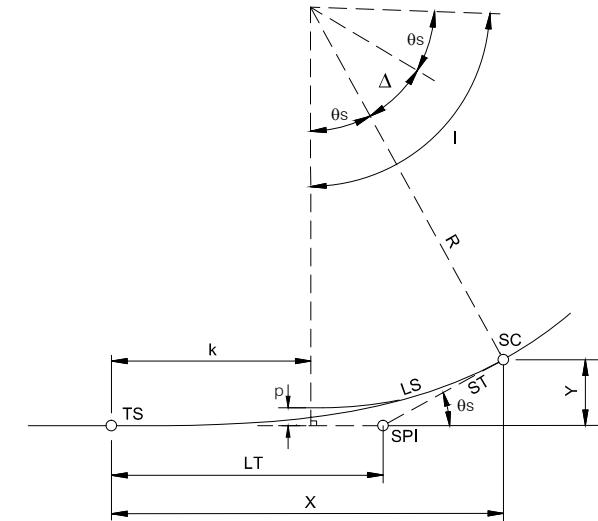


FIGURE C
SPIRAL TRANSITION
CURVE

ABBREVIATIONS AND SYMBOLS

CC	COMPOUND CURVE
CS	CURVE TO SPIRAL
Δ	CENTRAL ANGLE OF CIRCULAR CURVE
Dc	DEGREE OF CURVE (CHORD DEFINITION)
E	EQUILIBRIUM SUPERELEVATION (Ea + Eu)
Ea	ACTUAL SUPERELEVATION
Eu	UNBALANCED SUPERELEVATION (CANT DEFICIENCY)
I	TOTAL CENTRAL ANGLE OR TOTAL INTERSECTION ANGLE
k	TANGENT DISTANCE FROM THE Ts TO THE OFFSETTED PC
L	CHORDED LENGTH OF CIRCULAR CURVE
LC	LONG CHORD
Ls	LENGTH OF SPIRAL
LT	LONG TANGENT (DISTANCE FROM THE Ts TO THE SPI)
p	ORDINATE OF THE OFFSETTED PC
PC	POINT OF CURVATURE
PCC	POINT OF COMPOUND CURVE
PI	POINT OF INTERSECTION
PT	POINT OF TANGENCY
R	RADIUS
S	LENGTH OF SPIRAL (LS) IN 100 FT STATIONS
SC	SPIRAL TO CURVE
SPI	POINT OF INTERSECTION BETWEEN TS AND SC
ST	SPIRAL TO TANGENT
ST	SHORT TANGENT (DISTANCE FROM SPI TO SC)
T	TANGENT LENGTH OF CIRCULAR CURVE
Ts	TANGENT TO SPIRAL
Ts	TOTAL TANGENT DISTANCE OF A SPIRAL CURVE
θs	SPIRAL ANGLE
X	TANGENT DISTANCE FROM TS TO SC
Y	TANGENT OFFSET TO THE SC

KEY FORMULAE

$R \square \frac{50}{\sin(\frac{D_c}{2})}$	$Ts \square (R+p)\tan(\frac{I}{2}) + \square$
$\Delta = I - 2 \theta_s$	$X \square 1 - 0.003048(\theta_s)^2 S$
$L \square \frac{\Delta}{D_c} \times 100$	$Y \square 0.5820sS - 0.00001264(\theta_s)^2 S$
$T \square R \tan(\frac{\Delta}{2})$	$\square \square \frac{LS}{2} - 0.000508\Delta^2 S$
$LC \square 2R \sin(\frac{\Delta}{2})$	$p \square 0.1454\Delta S$
$LS \square \frac{200 \theta_s}{D_c}$	
$S \square \frac{LS}{100}$	
$\theta_s = \frac{LS D_c}{200}$	
$LT \square X - \frac{Y}{\tan \theta_s}$	
$ST \square \frac{Y}{\sin \theta_s}$	

NOTES:

- CIRCULAR CURVES ARE DEFINED BY THE CHORD DEFINITION (CENTRAL ANGLE SUBTENDED BY A CHORD OF 100 FEET) OF CURVATURE AND SPECIFIED BY DEGREE.
- SPIRALS ARE DEFINED BY THE CLOTHOID DEFINITION. AUTHORIZATION FROM SANDAG SHALL BE OBTAINED IF ANY DIFFERENT METHOD OR PARAMETERS ARE UTILIZED FOR SPIRAL TRANSITION CURVES. THE REQUEST SHALL BE FULLY DOCUMENTED WITH DESIGN DATA, CALCULATIONS AND OTHER PERTINENT INFORMATION.
- THE TRACK GEOMETRY DATA TABLE, SHOWN IN ESD 2202-02, SHALL BE COMPLETED AND SUBMITTED TO SANDAG FOR REVIEW, COMMENT AND APPROVAL, FOR ALL CURVES.
- ALL ANGLES ARE IN DEGREES, DISTANCES AND LENGTHS ARE IN FEET, EXCEPT SUPERELEVATIONS ARE IN INCHES AND SPEEDS ARE IN MILES PER HOUR (MPH).

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REVISIONS		DES.	ENG.	DATE	DESCRIPTION
				2/2/15	

DRAWN RAILPROS	
CHECKED B. SMITH	<i>BS</i>
RECOMMENDED W. PREY	<i>WP</i>
DATE	2/2/15

DESIGNER PE STAMP	
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ENGINEERING STANDARD DRAWINGS

HORIZONTAL CURVE GEOMETRY



DRAWING NO.	ESD-2202-01
DRAWING SHEET NO.	1 OF 2
SCALE:	NONE
CONTRACT SHEET NO.	

TRACK GEOMETRY DATA TABLE

CURVE OR TURNOUT NO	DESC	STATIONING DATA					INPUT DATA					CURVE DATA					SPIRAL DATA								
		BEARING	DISTANCE	STATION	NORTHING	EASTING	Dc	Ea	Eu	V (PAS)	V (FRT)	LS	I	R	Δ	L	T	Os	X	Y	Z	p	LT	ST	Ts
							DEGREES	INCHES	INCHES	MPH	MPH	FEET	DEGREES	FEET	DEGREES	FEET	FEET	DEGREES	FEET	FEET	FEET	FEET	FEET	FEET	FEET
CIRCULAR CURVE WITH SPIRAL TRANSITIONS	POB	X	X	X	X	X																			
	TS			X	X	X																			
	SC			X	X	X					X														
	PI			X	X	X	X	X	X	X		X	X	X	X	X									
	CS			X	X	X																			
	ST			X	X	X						X						X	X	X	X	X	X	X	X
TURNOUT	C33	X	X	X	X	X																			
	PITO	X	X	X	X	X																			
COMPOUND CIRCULAR CURVE WITH SPIRAL TRANSITIONS	TS	X	X	X	X	X																			
	SC			X	X	X																			
	PI			X	X	X	X	X	X	X		X	X	X	X	X									
	CS			X	X	X																			
	SC			X	X	X																			
	PI			X	X	X	X	X	X	X		X	X	X	X	X									
SIMPLE CIRCULAR CURVE	M3	X	X	X	X	X																			
	PT			X	X	X	X	X	X	X		X	X	X	X	X									
	PC	X	X	X	X	X																			
COMPOUND CIRCULAR CURVE	M4			X	X	X	X	X	X	X		X	X	X	X	X									
	PI			X	X	X	X	X	X	X		X	X	X	X	X									
	POC			X	X	X																			
	PI			X	X	X	X	X	X	X		X	X	X	X	X									
		X	X	X	X	X																			
		X	X	X	X	X																			
		X	X	X	X	X																			
		X	X	X	X	X																			
		X	X	X	X	X																			

- NOTES:**
1. TRACK GEOMETRY DATA TABLES SHALL BE COMPLETED AND INCLUDED WITH DESIGN DRAWINGS SUBMITTED TO SANDAG FOR REVIEW, COMMENT, AND APPROVAL. EACH PROPOSED OR REALIGNED TRACK SHALL REQUIRE A SEPARATE TABLE.
 2. CELLS MARKED WITH AN "X" WILL NORMALLY CONTAIN DATA.
 3. IN PRACTICE, COMPOUND CURVES WITH MORE THAN TWO CIRCULAR ARCS ARE RARE. IN THEORY, A COMPOUND CURVE CAN HAVE AN INFINITE NUMBER OF CIRCULAR ARCS.
 4. FOR FREIGHT-ONLY OPERATIONS, COLUMN "V (PAS)" WILL REMAIN BLANK. FOR PASSENGER-ONLY OPERATIONS, COLUMN "V (FRT)" WILL REMAIN BLANK.
 5. IN THE EVENT A DESIGNER MUST PROPOSE A CURVE THAT DOES NOT MEET DESIGN REQUIREMENTS PER SANDAG ESD-2201 AND ESD-2202-01, THE DESIGNER SHALL CLEARLY INDICATE IT ON THE GEOMETRY TABLE. THE DESIGNER SHALL, FOR EACH PROPOSED SUBSTANDARD CURVE, SUBMIT TO SANDAG A WRITTEN REQUEST AND JUSTIFICATION FOR A DESIGN WAIVER.
 6. ALL ANGULAR DIMENSIONS SHALL BE SHOWN IN DEGREES, MINUTES AND SECONDS: ROUNDED TO THE NEAREST SECOND.
 7. Ea SHALL BE SELECTED TO THE NEAREST 0.25 INCHES.
 8. Eu SHALL BE THE ACTUAL CALCULATED VALUE SHOWN TO THE NEAREST TWO DECIMAL PLACES.
 9. NORTHING AND EASTING VALUES SHALL BE SHOWN TO THE NEAREST FOUR DECIMAL PLACES.
 10. ALL LENGTH DIMENSIONS SHALL BE TO THE NEAREST TWO DECIMAL PLACES.

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		CHECKED B. SMITH <i>BS</i>				DRAWING SHEET NO. 2 OF 2	
		RECOMMENDED W. PREY <i>WP</i>				SCALE: NONE	
REV.	DATE	DESCRIPTION				DES. ENG.	DATE

CURVE SPEED, SUPERELEVATION AND SPIRAL LENGTH

GENERAL

1. THERE ARE SIX TABLES OF DESIGN AND MAINTENANCE STANDARDS FOR SANDAG TRACK ALIGNMENT:

TABLE P3.5 OPERATIONS.	3.5 - INCH UNBALANCED ELEVATION - STANDARD SPIRAL LENGTH TABLE FOR PASSENGER
TABLE F2.0 OPERATIONS.	2.0 - INCH UNBALANCED ELEVATION - STANDARD SPIRAL LENGTH TABLE FOR FREIGHT
TABLE P3.5M OPERATIONS.	3.5 - INCH UNBALANCED ELEVATION - MINIMUM SPIRAL LENGTH TABLE FOR PASSENGER
TABLE F2.0M OPERATIONS.	2.0 - INCH UNBALANCED ELEVATION - MINIMUM SPIRAL LENGTH TABLE FOR FREIGHT
TABLE PML	4.0 - INCH UNBALANCED ELEVATION - MAINTENANCE LIMIT FOR PASSENGER OPERATIONS
TABLE FML	3.0 - INCH UNBALANCED ELEVATION - MAINTENANCE LIMIT FOR FREIGHT OPERATIONS

2. FOR THE OPERATION OF PASSENGER EQUIPMENT NORMALLY USED IN SANDAG AND AMTRAK TRAINS:

THE DESIGN AND MAINTENANCE OF CURVE GEOMETRY IS CONTROLLED BY FRA TRACK SAFETY STANDARDS (49CFR213.57), WHICH ESTABLISHES THE MAXIMUM SPEED FOR ANY COMBINATION OF CURVATURE AND SUPERELEVATION FOR PASSENGER TRAINS AS RESULTING IN 4 INCHES OF UNDERBALANCE. TO ASSURE THAT NORMAL MAINTENANCE VARIATIONS DO NOT INADVERTENTLY RESULT IN CURVE GEOMETRY THAT CAUSES MORE THAN 4 INCHES OF UNBALANCED ELEVATION, THE DESIGN UNDERBALANCE IS SET AT 3.5 INCHES FOR TABLES P3.5 AND P3.5M. THE FRA TABLES AND FORMULAS DEFINE 4 INCHES OF UNBALANCED ELEVATION AS THE THRESHOLD OF FAILURE. THESE SANDAG TABLES DESIGNATE DESIGN PRACTICE THAT FITS WITHIN THE FRA LIMITS. DESIGNERS AND MAINTENANCE PERSONNEL WILL CONSTRUCT AND MAINTAIN TRACK TO THOSE VALUES EXCEPT AS AUTHORIZED BY SANDAG OR AS EXCEPTED BELOW.

SANDAG PASSENGER EQUIPMENT IS SUBJECT TO LESSENERD STABILITY IN WINDS EXCEEDING 45 MPH AND ARE LIMITED TO AN UNDERBALANCE OF 3 INCHES UNDER THOSE CONDITIONS. TO ACHIEVE THIS REDUCTION, INSTRUCTION TO TRAIN CREWS ARE TO REDUCE SPEED BY 5 MPH UNDER STRONG WIND CONDITIONS WHEN WINDS APPROACH 45 MPH.

FREIGHT TRAIN SPEEDS ARE GOVERNED BY 49CFR213.57 TO NOT RESULT IN MORE THAN 3 INCHES OF UNDERBALANCE. FREIGHT TRAIN SPEEDS FOR NEW CURVES WILL BE DESIGNED PER TABLES F2.0 AND F2.0M ONLY WHERE AUTHORIZED BY SANDAG, WHICH HAVE 2 INCHES UNDERBALANCE IN COMPLIANCE WITH FRA REGULATIONS. EXISTING CURVES MAY BE MAINTAINED WITH UP TO 3 INCHES OF UNDERBALANCE PER TABLE FML AND REMEDIAL ACTION MUST BE TAKEN FOR ANY CURVE FOUND TO EXCEED 3 INCHES OF UNDERBALANCE FOR FREIGHT TRAIN SPEED.

SPIRAL TRANSITION CURVES WILL BE USED TO CONNECT CURVES TO TANGENT TRACK WHENEVER THERE IS SUPERELEVATION IN THE CURVE. THE SUPERELEVATION IS TO BE UNIFORMLY INCREASED FROM THE TANGENT TO THE CURVE THROUGHOUT THE LENGTH OF THE SPIRAL. THE SPIRAL IS ALSO A HORIZONTAL ALIGNMENT ELEMENT OF GRADUALLY DECREASING RADIUS, WHICH MATCHES THE RADIUS OF THE CIRCULAR CURVE ELEMENT AT THE POINT IT MEETS THE CURVE.

THE LENGTH OF THE SPIRALS IN THE TABLES HAS BEEN CALCULATED BASED UPON THE SPEED OF THE TRAIN AND ON THE MAXIMUM TWIST THAT ROLLING STOCK CAN SAFELY NEGOTIATE. LONG CARS THAT TRAVERSE SPIRALS THAT HAVE MORE THAN 1 INCH OF ELEVATION CHANGE IN 62 FEET BEGIN TO UNLOAD SOME OF THE VERTICAL LOAD ON WHEELS IF THEIR SIDE BEARING CLEARANCE IS AT MINIMUMS. THEREFORE STANDARD LENGTH SPIRALS DO NOT EXCEED THIS RATE OF CHANGE. A MAXIMUM CHANGE OF 1 INCH PER 50 FEET IS PERMITTED UNDER THE "MINIMUM" TABLES, BECAUSE SPIRALS WITH THESE PARAMETERS ARE FOUND ON SOME LINES AND CANNOT BE CHANGED DUE TO GEOGRAPHIC LIMITATIONS. THE MINIMUM SPIRAL LENGTHS FOUND IN TABLES P3.5M AND F2.0M MAY ONLY BE USED ON THE PORTIONS OF SUBDIVISION AS AUTHORIZED BY SANDAG.

SPIRALS MAY BE LONGER THAN THE STANDARD LENGTHS SHOWN. LONGER SPIRALS THAT EXIST FROM ORIGINAL CONSTRUCTION WILL NOT BE SHORTENED UNLESS NECESSARY TO OBTAIN GREATER TANGENT LENGTH. SPIRALS FOR CURVES, WHICH MAY BE DESIGNED FOR HIGHER SPEED IN THE FUTURE (E.G. NEAR PRESENT SPEED RESTRICTIONS) SHOULD BE DESIGNED WITH SPIRAL LENGTHS FOR FUTURE HIGHER SPEED AND SUPERELEVATION. CURVES SHOULD BE CONSTRUCTED TO PROPOSED OPERATING SPEED AND NEEDED SUPERELEVATION RUNOFF OVER THE LENGTH OF THE SPIRAL.

NEW CONSTRUCTION WILL BE DESIGNED WITH STANDARD LENGTH SPIRALS PER THE EXAMPLE SHOWN ON THIS SHEET FOR THE MAXIMUM FUTURE DESIGN SPEED FOR THE LOCATION.

DESIGN PROCEDURE

- REFER TO AREMA CHAPTER 5 PART 3 FOR A COMPLETE DISCUSSION OF CURVE DESIGN.
- IN ORDER TO SELECT THE SUPERELEVATION AND SPIRAL LENGTHS FOR CURVES, THE DESIGN SPEEDS FOR FREIGHT AND PASSENGER TRAINS MUST BE DEVELOPED. A SERIES OF TRIAL SOLUTIONS IS USUALLY NECESSARY. EVERY CURVE MUST MEET THE STANDARDS OF SPIRAL LENGTH AND SUPERELEVATION FOR THE SPEED CHOSEN. THE GOAL IS TO OBTAIN THE MAXIMUM SPEED FOR PASSENGER TRAINS CONSISTENT WITH GOOD TRAIN HANDLING, SIGNAL SPACING AND PRACTICAL LIMITS OF EQUIPMENT PERFORMANCE AND TO HAVE THE RESULTING DESIGN PROVIDE AN ACCEPTABLE FREIGHT TRAIN OPERATION AND MAINTENANCE ENVIRONMENT.
- HORIZONTAL CURVES SHALL BE DESIGNED USING THE FUTURE MAXIMUM DESIGN SPEED FOR PASSENGER AND FREIGHT TRAINS EXPECTED ON A GIVEN SUBDIVISION. FUTURE MAXIMUM SPEEDS FOR PASSENGER TRAINS MAY EXCEED SPEEDS CURRENTLY IN EFFECT. THIS MAY RESULT IN SPIRAL LENGTHS THAT ARE LONGER THAN REQUIRED TO PROVIDE FOR PROPOSED SUPERELEVATION RUNOFF FOR NEW CONSTRUCTION. DESIGNERS WILL CONSULT WITH SANDAG/NCTD FOR FUTURE PASSENGER SPEED AT EACH LOCATION. THE SPIRAL LENGTH DESIGN SHALL BE SUFFICIENT TO ALLOW SUPERELEVATION RUNOFF FOR THE FUTURE MAXIMUM DESIGN SPEED EVEN IF THE ACTUAL DESIGN OPERATING SPEED IS LESS THAN THE FUTURE MAXIMUM DESIGN SPEED.
- THE MAXIMUM SPEED FOR FREIGHT TRAINS IS 60 MILES PER HOUR.
- ALL NEW WORK SHOULD USE TABLES P3.5 AND F2.0 TO SPECIFY STANDARD LENGTH SPIRALS. TABLES WITH SUFFIX "M" ARE TO BE USED ONLY ON THE TERRITORY WHERE AUTHORIZED BY SANDAG AND ONLY AT LOCATIONS CONSTRAINED BY EXISTING SITE CONDITIONS. CURVES WHICH DO NOT MEET THE STANDARDS OF TABLES P3.5, F2.0, P3.5M AND F2.0M MUST BE CORRECTED THROUGH REDUCTION OF TRAIN SPEED AND ALTERATION TO THE TRACK CHARACTERISTICS.
- FOR MAXIMUM DESIGN SPEEDS UP TO 35 MPH, CURVES IN OPPOSITE DIRECTIONS SHALL BE SEPARATED BY A REVERSING TANGENT WITH A MINIMUM LENGTH OF 100'. FOR DESIGN SPEEDS GREATER THAN 35 MPH, CURVES IN OPPOSITE DIRECTIONS SHALL BE SEPARATED BY A REVERSING TANGENT WITH A MINIMUM LENGTH EQUAL TO 3 TIMES THE MAXIMUM DESIGN SPEED AS STATED IN MILES PER HOUR. FOR EXAMPLE, A DESIGN SPEED OF 50 MPH WILL REQUIRE A REVERSING TANGENT WITH A MINIMUM LENGTH OF 150' (3 TIMES 50). EXCEPTIONS WILL REQUIRE THE APPROVAL OF SANDAG DIRECTOR OF RAIL ENGINEERING.
- REVERSING TANGENTS MAY BE REDUCED TO HALF OF THE ABOVE WHERE THERE IS LESS THAN 1 INCH OF SUPERELEVATION IN BOTH CURVES.
- ALL DESIGN SPEEDS MUST BE APPROVED BY SANDAG/NCTD.
- SPEEDS SHOULD BE ESTABLISHED IN CONSIDERATION OF PLACEMENT OF SPEED SIGNS PER SANDAG ESD-5213 SUCH THAT THERE IS NO OVERLAP BETWEEN SIGNS FOR REDUCTION AND INCREASE OF SPEED IN THE SAME DIRECTION.
- SPEED AND SUPERELEVATION WILL BE CONSISTENT THROUGH CURVES UNLESS AUTHORIZED BY SANDAG. ALL COMPOUND CURVES WILL BE SEPARATED WITH A SPIRAL OF AT LEAST 31 FEET. IN COMPOUND CURVES WHERE SUPERELEVATION DIFFERS IN EACH CURVE, A SPIRAL OF APPROPRIATE LENGTH WILL BE REQUIRED AT THE POINT OF COMPOUND CURVATURE. THE SPIRAL LENGTH WILL BE DESIGNED TO ACCOMMODATE THE DIFFERENCE OF THE COMPOUND CURVE'S SUPERELEVATIONS. A COMPOUND SPIRAL IS NOT REQUIRED WHERE THE SUPERELEVATION DIFFERENCE IS LESS THAN 0.25"
- ACTUAL ELEVATION GREATER THAN 5 INCHES IS NOT PERMITTED WITHOUT PRIOR APPROVAL OF SANDAG DIRECTOR OF RAIL ENGINEERING.
- SUPERELEVATION THROUGH GRADE CROSSINGS WILL BE DESIGNED WITH CONSIDERATION OF THE STREET PROFILE, WHICH MAY CONSTRAIN THE SUPERELEVATION AND THEREFORE THE CURVE SPEED. CONSIDERATION SHALL BE GIVEN TO CHANGE THE STREET PROFILE IF PRACTICAL TO ACCOMMODATE SUPERELEVATION FOR PROPOSED MAXIMUM SPEED.
- SPEEDS FOR FREIGHT TRAINS SHOULD BE AS UNIFORM AS PRACTICABLE. FREIGHTS TRAINS GENERALLY CANNOT UTILIZE HIGHER SPEEDS THAT ARE LESS THAN 2 MILES IN LENGTH. DUE TO BRAKING DISTANCES AND SIGNAL SPACING, FREIGHT TRAIN SPEEDS MAY BE SET WHICH ARE SUBSTANTIALLY LESS THAN PASSENGER TRAIN SPEEDS. OPERATION OF FREIGHT TRAINS AT SPEEDS LESS THAN EQUILIBRIUM RESULTS IN HEAVY WEAR ON THE LOW RAIL AND LOW VERTICAL LOADS TO THE HIGH WHEELS.
- DESIGNERS SHOULD AVOID SUPERELEVATIONS IN EXCESS OF 4 INCHES WHERE GRADES OR OTHER RESTRICTIONS CAUSE TRAINS TO RUN AT A SPEED LESS THAN 25 MILES PER HOUR.

DESIGN PROCEDURE (CONT)

- FREIGHT TRAIN MAXIMUM AUTHORIZED SPEED SHALL BE BASED ON A STANDARD UNBALANCED ELEVATION BETWEEN 0 AND 2 INCHES. SANDAG MUST APPROVE ANY COMBINATION OF FREIGHT MAXIMUM AUTHORIZED SPEED AND CURVE SUPERELEVATION OUTSIDE THIS LIMITS.
- THE PRIORITIES FOR DESIGNERS ARE:
 - SET MAXIMUM DESIGN SPEED AND DEGREE OF CURVATURE FOR PASSENGER AND FREIGHT TRAINS ON A GIVEN SUBDIVISION AFTER CONSULTATION WITH SANDAG.
 - ASSURE ADEQUATE REVERSING TANGENTS AND SPIRAL LENGTHS.
 - ASSURE ACTUAL ELEVATIONS AND STANDARD SPIRAL LENGTHS FOR HIGHEST PASSENGER AND FREIGHT TRAIN SPEEDS.
 - ASSURE UNIFORM FREIGHT TRAIN SPEED THAT CAN BE SUSTAINED FOR AT LEAST TWO (2) MILES.
 - ASSURE MAXIMUM FREIGHT TRAIN SPEED IS 60 MPH.
 - SET ACTUAL ELEVATION AND SPIRAL LENGTHS FOR FASTEST PRACTICABLE PASSENGER TRAIN OPERATION CONSISTENT WITH SANDAG AND FRA STANDARDS.
- THESE DESIGN STANDARDS DO NOT REPLACE FRA TRACK SAFETY STANDARDS PART 49CFR213.57. IN ADDITION TO COMPLYING WITH THE OVERALL PARAMETERS OF SUPERELEVATION AND SPIRAL LENGTH, CURVES MUST ALSO COMPLY WITH ALL PARTS OF 213.5 THRU 213.63. IN PRACTICE, DESIGNERS SET THE OVERALL PARAMETERS AND MAINTENANCE PERSONNEL PREVENT ANY IRREGULARITIES WHICH COULD BECOME EXEMPTIONS TO THE FRA STANDARDS.
- THE HORIZONTAL ALIGNMENT OF SPIRAL CURVES MAY BE DESIGNED BY:
 - TEN CHORD SPIRAL
 - AREMA CHAPTER 5.3.1.2
 - CLOTHOID SPIRAL GENERATED UNDER CAD DESIGN, WHICH MEETS AREMA CRITERIA
- WHEN THE CURVE CHARACTERISTICS ARE CHANGED IN THE FIELD (CONSTRUCTED) AND APPROVED, THE NEW DATA SHOULD BE ENTERED ONTO THE TRACK CHARTS AND THE FIELD MARKING WILL BE UPDATED.
- RUNOFF OF SUPERELEVATION ON TANGENT TRACK IS NOT PERMITTED.

SAMPLE CURVE DESIGN PROBLEM



A CURRENT RAIL LINE OPERATES PASSENGER SERVICE AT 70 MPH AND FREIGHT AT 50 MPH. A 2° 0' 0" HORIZONTAL CURVE HAS BEEN PROPOSED. WHAT SUPERELEVATION AND SPIRAL LENGTHS DO YOU USE? WILL PASSENGER AND FREIGHT BE ABLE TO MAINTAIN THEIR CURRENT SPEEDS?

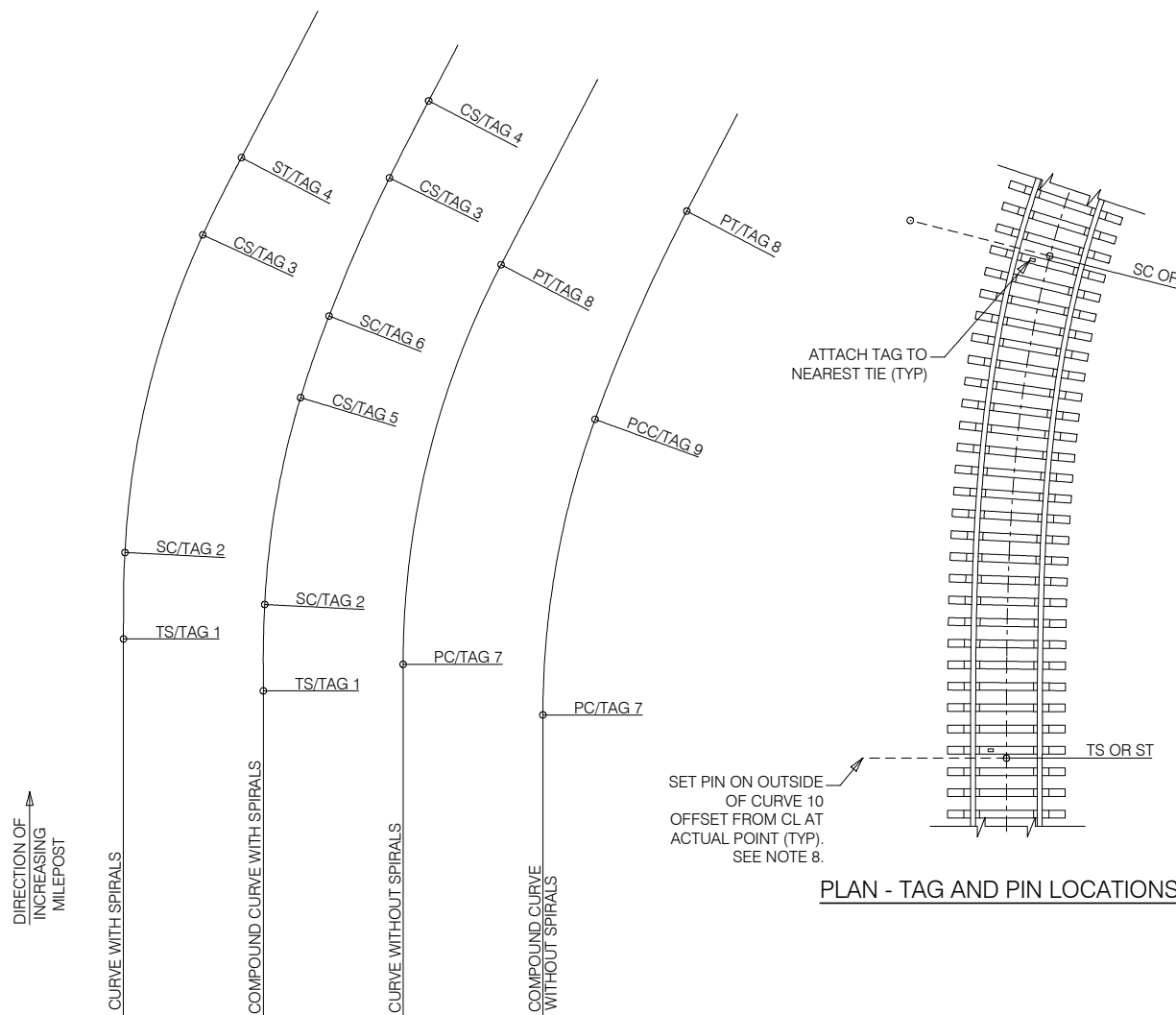
- LOOK UP THE Ea AND Ls FOR A 2° 0' 0" CURVE AT 70 MPH IN THE STANDARD SPIRAL LENGTH TABLE FOR PASSENGER OPERATIONS TABLE P3.5.
 - Ea = 3.5", Ls = 300'
- NOW CHECK CURVE FREIGHT SPEED AND ACTUAL ELEVATION FOR A 2° 0' 0" CURVE AT 70 MPH IN THE STANDARD SPIRAL LENGTH TABLE FOR FREIGHT OPERATIONS, TABLE F2.0.

FOR 65 MPH: Ea = 4.00" AND Ls = 320'
 FOR 60 MPH: Ea = 3.25" AND Ls = 240'
 FOR 50 MPH: Ea = 1.50" AND Ls = 100'

- THE CURVE WILL NEED TO HAVE 3.5 INCHES OF SUPERELEVATION AND THE SPIRALS WILL NEED TO BE 300 FEET BECAUSE THE PASSENGER REQUIREMENT GOVERN IN THIS SITUATION. FREIGHT CAN CONTINUE TO OPERATE AT 50 MPH OR MAY BE INCREASED TO 60 MPH IF THIS CAN BE SUSTAINED FOR AT LEAST 2 MILES (CURVE DESIGN PROCEDURE NO. 13)

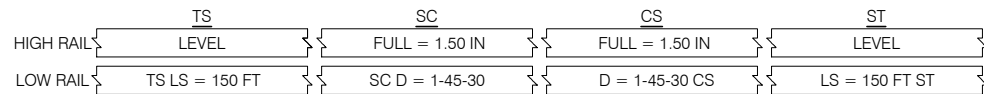
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				CHECKED B. SMITH <i>MSB</i>				DRAWING SHEET NO. 1 OF 1
				RECOMMENDED W. PREY <i>WP</i>				SCALE: NONE
				DATE 2/21/15				DESIGNER PE STAMP
REV.	DATE	DESCRIPTION	DES.	ENG.				



PLAN - TAG AND PIN LOCATIONS

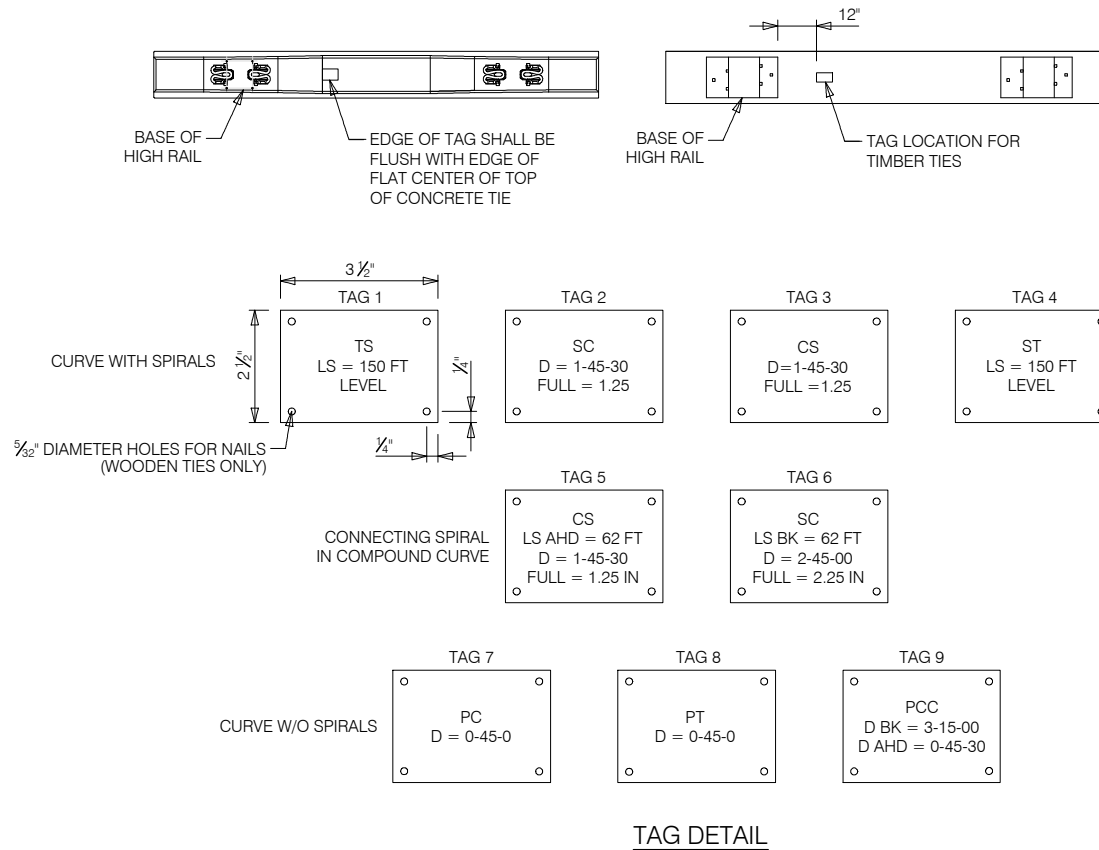
PLAN - LOCATIONS TO BE TAGGED



INFORMATION TO BE PLACED IN WRITING ON GAUGE SIDE WEB OF RAIL WITH PERMANENT METAL MARKER OR PAINT STICK

NOTES: (RH CURVE AS SHOWN, LH OPPOSITE)

- TAGS SHALL BE CLEAR ANODIZED ALUMINUM, 16 GAUGE, WITH EMBOSSED LETTERING, AS SHOWN.
- TAGS SHALL INDICATE NO SUPERELEVATION OF OUTSIDE RAIL AT THE TS AND THE ST, AND FULL SUPERELEVATION OF OUTSIDE RAIL IN INCHES AT ALL SC AND CS POINTS.
- ORIENT TAGS TO BE READ WHILE WALKING IN THE DIRECTION OF INCREASING STATIONING.
- ATTACH TAGS TO CONCRETE TIES WITH MANUS-PRENE 65-A ADHESIVE; TO WOOD TIES WITH GALVANIZED 10 PENNY NAILS OR APPROVED EQUAL.
- TAGS ATTACHED TO ANY TIE BEING REPLACED SHALL BE REMOVED AND ATTACHED TO THE REPLACEMENT TIE BY THE CONTRACTOR.
- CURVE INFORMATION WRITTEN ON RAIL BEING REPLACED SHALL BE WRITTEN IN THE SAME LOCATION ON THE REPLACEMENT RAIL BY THE CONTRACTOR.
- SUPERELEVATED CURVES MUST INCLUDE SPIRALS. CURVES WITHOUT SPIRALS SHALL NOT BE SUPERELEVATED.
- OFFSET PINS SHALL BE #5 REBAR, AT LEAST 24 IN LONG, DRIVEN VERTICALLY INTO THE GROUND WITH 1-2 IN REMAINING EXPOSED. PINS SHALL BE MADE HIGHLY VISIBLE WITH BRIGHT ORANGE PAINT AND ORANGE SURVEYOR TAPE. WITH APPROVAL OF SANDAG, THE DESIRED 10 FT OFFSET MAY VARY BASED ON FIELD CONDITIONS OR TO AVOID HAVING THE PIN BE A TRIPPING OR TIRE-PUNCTURE HAZARD.



TAG DETAIL

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ENGINEERING STANDARD DRAWINGS

SUPERELEVATION TAGS



DRAWING NO.	ESD-2206
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	

SPACING OF TRACKS ON CURVES			
DEGREE OF CURVE	DISTANCE BETWEEN TRACK CENTERS- SUPERELEVATION SAME ON EACH TRACK- SEE NOTE 3		
	MAIN TRACK TO MAIN TRACK	MAIN TRACK TO SIDE TRACK	INDUSTRY AND YARD TRACKS
TANGENT	15'-0"	16'-0"	15'-0"
1°	15'-2"	16'-2"	15'-0"
2°	15'-4"	16'-4"	15'-0"
3°	15'-6"	16'-6"	15'-0"
4°	15'-8"	16'-8"	15'-0"
5°	15'-10"	16'-10"	15'-0"
6°	16'-0"	17'-0"	15'-0"
7°	16'-2"	17'-2"	15'-2"
8°	16'-4"	17'-4"	15'-4"
9°	16'-6"	17'-6"	15'-6"
10°	16'-8"	17'-8"	15'-8"
11°	16'-10"	17'-10"	15'-10"
12°	17'-0"	18'-0"	15'-0"
13°	17'-2"	18'-2"	16'-2"
14°	17'-4"	18'-4"	16'-4"
15°	17'-6"	18'-6"	16'-6"
OVER 15°	INCREASE 2 INCHES PER DEGREE OF CURVE		

NOTES:

- MINIMUM DISTANCE BETWEEN CENTER LINES OF ADJACENT STANDARD GAGE TRACKS ON ALL NEW CONSTRUCTION SHALL BE AS FOLLOWS: THIS MINIMUM DISTANCE WILL ALSO APPLY TO EXISTING TRACKS WHEN RESPACING IS AUTHORIZED BY THE SANDAG DIRECTOR OF RAIL ENGINEERING.
 - MAIN TRACKS _____ 15'-0" MINIMUM, 25'-0" WHERE SPACE PERMITS
 - MAIN SIDING, RUNNING AND DRILL TRACKS AND _____ 15'-0"
ADJACENT TRACK (EXCEPT YARD TRACK)
 - LADDER TRACK AND ADJACENT TRACK _____ 25'-0"
 - INDUSTRY, YARD AND HOUSE TRACKS _____ 15'-0"
 - YARD TRACK AND ADJACENT MAIN OR RUNNING TRACK _____ 25'-0"
 - ON CURVES, TRACK CENTERS AS SHOWN ABOVE SHALL BE INCREASED AS FOLLOWS (SEE TABLE THIS SHEET):
 - TRACKS PER NOTES A, B AND E - INCREASE 1 INCH FOR EACH 30 MINUTES OF CURVE.
 - TRACKS PER NOTE D (YARD TRACKS) - INCREASE 1 INCH FOR EACH 30 MINUTES OF CURVE IN EXCESS OF 6 DEGREES.
- INCREASE DISTANCES BETWEEN TRACK CENTERS SHALL BE APPLIED IN 1/2 INCH INCREMENTS. DEGREES OF CURVATURE THAT ARE NOT EXACT 15 MINUTE INCREMENTS SHALL BE ROUNDED UP TO THE NEXT GREATER 15 MINUTE INCREMENT. FOR EXAMPLE, IF TWO CURVED TRACKS ARE TO BE PARALLEL AND THE INNER TRACK IS D=8°15'10", THEY SHALL BE SEPARATED BASED ON THE ASSUMPTION THAT ITS CURVATURE IS D=8°30'.
- WHERE ADJACENT TRACK IS ON THE OUTSIDE OF A CURVE AND IT'S SUPERELEVATION IS MORE THAN ON THE INSIDE TRACK, DISTANCE BETWEEN THE TRACKS SHALL BE INCREASED THREE INCHES FOR EACH INCH DIFFERENCE IN SUPERELEVATION. THE INCREASE SHALL BE ADDED TO THE AMOUNT SHOWN IN TABLE AT LEFT. WHERE SUCH TRACK HAS THE SAME OR LESS AMOUNT OF SUPERELEVATION, USE SPACING AS SHOWN IN THE TABLE.

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				CHECKED B. SMITH <i>BS</i>	DRAWING SHEET NO. 1 OF 1				
				RECOMMENDED W. PREY <i>WP</i>	SCALE: NONE				
				DATE 2/2/15	CONTRACT SHEET NO.				
REV.	DATE	DESCRIPTION	DES.	ENG.	DESIGNER PE STAMP				

MAXIMUM SPEEDS THROUGH TURNOUTS



NOTES:

1. SUBJECT TO SPEED RESTRICTIONS IMPOSED BY LOCAL CONDITIONS, OTHER THAN THE NUMBER OF THE TURNOUT OR TYPE OF SWITCH, THE FOLLOWING WILL GOVERN THE MAXIMUM SPEEDS PERMITTED ENGINES AND TRAINS THROUGH TURNOUTS.
2. DESIGNER TO VERIFY SAFE SPEED THROUGH TURNOUT

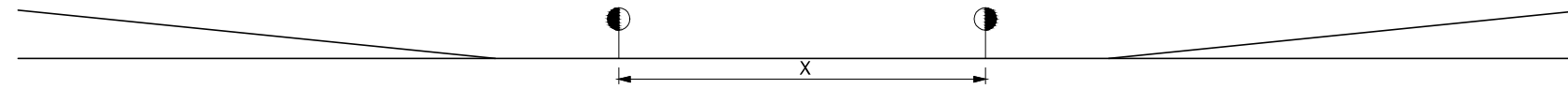
TURNOUT NO.	TANGENTIAL			STANDARD			EQUILATERAL		
	SWITCH POINT LENGTH	PASSENGER MAXIMUM SPEED MPH	FREIGHT MAXIMUM SPEED MPH	SWITCH POINT LENGTH	PASSENGER MAXIMUM SPEED MPH	FREIGHT MAXIMUM SPEED MPH	SWITCH POINT LENGTH	PASSENGER MAXIMUM SPEED MPH	FREIGHT MAXIMUM SPEED MPH
8	-	-	-	16'-6"	12	10	-	-	-
10	-	-	-	16'-6"	20	15	-	-	-
14	-	-	-	26'-0"	30	20	-	-	-
20	-	-	-	39'-0"	45	35	*	70	50
24	61'-8"	60	50	-	-	-	*	85	60

* DESIGNER TO DETERMINE SWITCH POINT LENGTH

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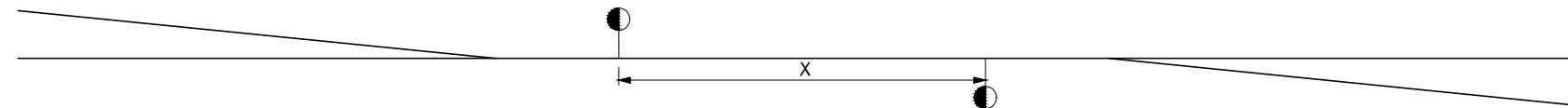
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		CHECKED B. SMITH <i>BSM</i>			DRAWING SHEET NO. 1 OF 1	
		RECOMMENDED B.SCHMITH <i>BAS</i>			SCALE: NONE	
		DATE 5/18/17			CONTRACT SHEET NO.	
REV.	DATE	DESCRIPTION	DES.	ENG.	DESIGNER PE STAMP	

FACING TURNOUTS OF OPPOSITE HAND



FROG NO	DESIRABLE X (FT)	MINIMUM X (FT)
8, 10	82	46
14	122	86
20	N/A	118
24	N/A	150

FACING TURNOUTS OF SAME HAND



FROG NO	DESIRABLE X (FT)	MINIMUM X (FT)
8, 10	82	52
14	125	90
20	N/A	122
24	N/A	150

NOTES:

- DESIGN SPEED, SIGNAL SPACING AND CIRCUITS WILL GOVERN AT LOCATIONS WHERE INSULATED JOINTS ARE REQUIRED.
- ANY DISTANCE BETWEEN FACING POINTS OF SWITCH LESS THAN THE MINIMUMS GIVEN SHALL REQUIRE THE APPROVAL OF SANDAG DIRECTOR OF ENGINEERING.

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RECOMMENDED W. PREY <i>WP</i>	
DATE 2/2/15	



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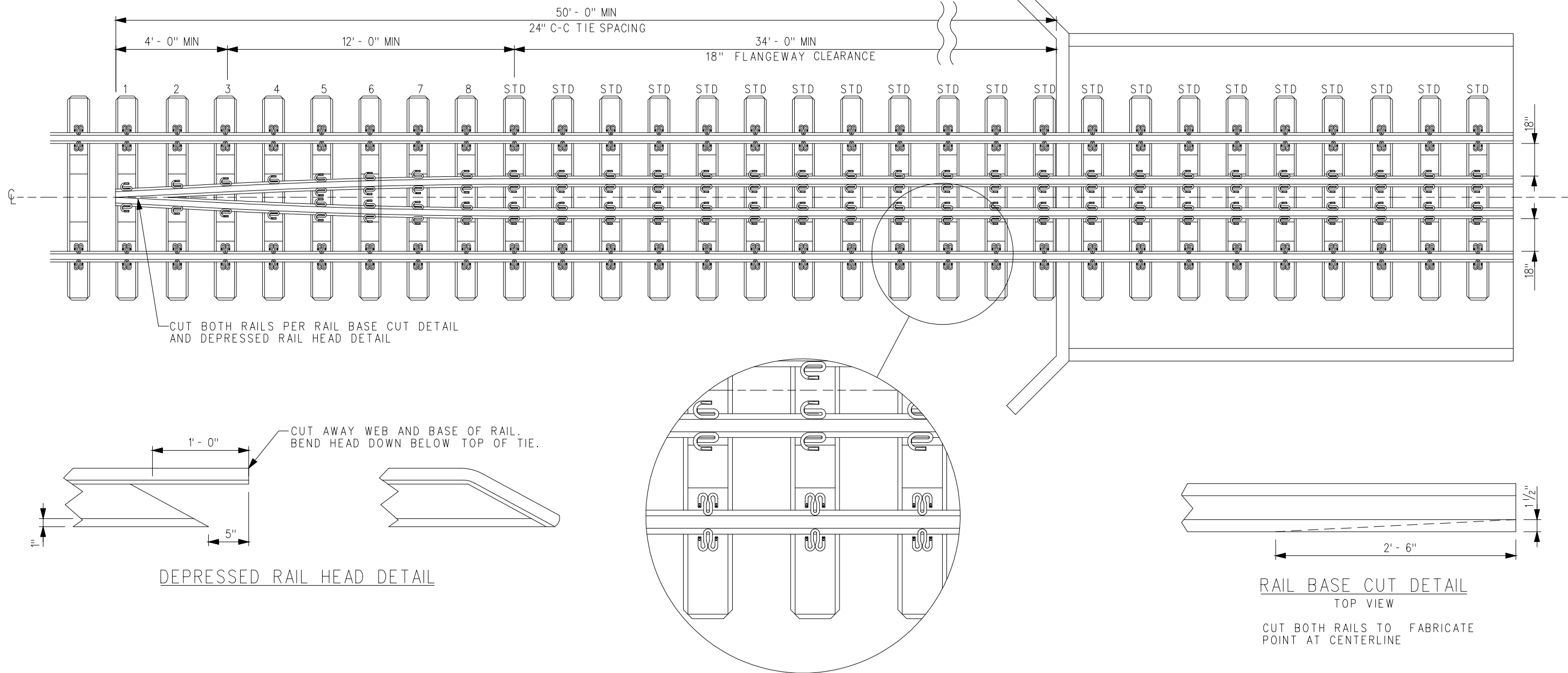


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ENGINEERING STANDARD DRAWINGS

FACING POINT TURNOUT ARRANGEMENT AND SPACING

DRAWING NO. ESD-2209
DRAWING SHEET NO. 1 OF 1
SCALE: NONE
CONTRACT SHEET NO.



NOTES:

1. INNER GUARD RAILS ON BRIDGES SHALL BE REQUIRED IN ACCORDANCE WITH LOSSAN SD DESIGN CRITERIA SECTION 6.6.9.
2. INNER GUARD RAILS MAY BE INSTALLED ON ANY OTHER BRIDGE AS DIRECTED BY THE DIRECTOR OF ENGINEERING.
3. INSIDE GUARDRAILS ARE NOT REQUIRED ON BRIDGES UNTIL BRIDGE OR BRIDGE DECK IS REPLACED OR RUNNING RAIL IS REPLACED ACROSS BRIDGE UNLESS DIRECTED BY DIRECTOR OF ENGINEERING.
4. INSIDE GUARD RAILS MAY BE CONSTRUCTED USING SECOND HAND RAIL NOT LESS THAN 23 LBS LIGHTER OR NO LARGER THAN RUNNING RAILS. IF GUARD RAIL HAS 5 1/2" BASE, USE MODIFIED PLATES FOR 5 1/2" BASE ESD 2371.
5. ON CONCRETE TIES, GUARD RAILS SHALL BE FASTENED TO EACH TIE.
6. GUARD RAIL JOINTS, IF PRESENT, SHALL BE FULLY BOLTED USING SECOND-HAND JOINT BARS.
7. THE QUANTITY OF STD PLATES ON CONCRETE TIES WILL VARY DEPENDING ON THE NUMBER OF TIES. THEY ARE TO BE ORDERED AS NEEDED. PLATES 1 THROUGH 8 COME AS TWO SETS AND ARE TO BE ROTATED 180° ON OPPOSITE ENDS.

REFERENCE DRAWINGS:
 FOR PLATES SEE ESD 2371
 FOR CONCRETE TIE SEE ESD 2406 OR ESD 2407
 FOR SCREW AND WASHER SEE ESD 2356

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REVISIONS	DRAWN RAILPROS
	CHECKED B. SMITH <i>BSM</i>
	RECOMMENDED B. SCHMITH <i>BBS</i>
	DATE 02/10/17
	DESIGNER PE STAMP



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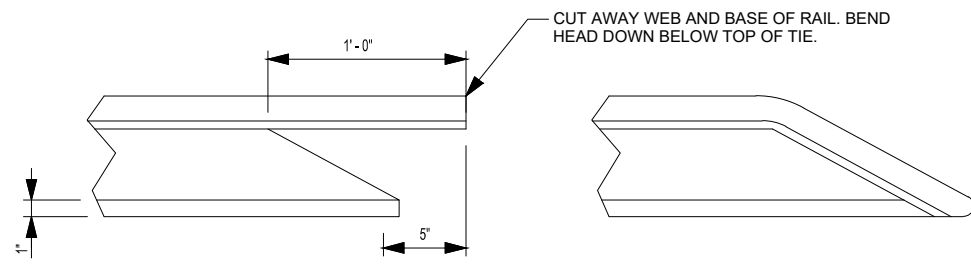
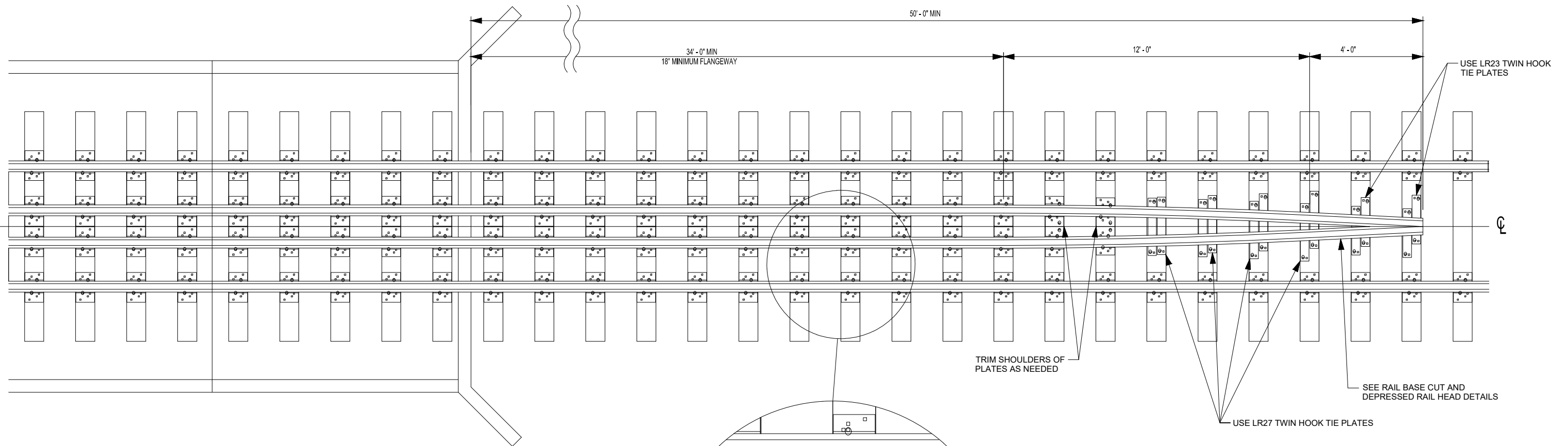


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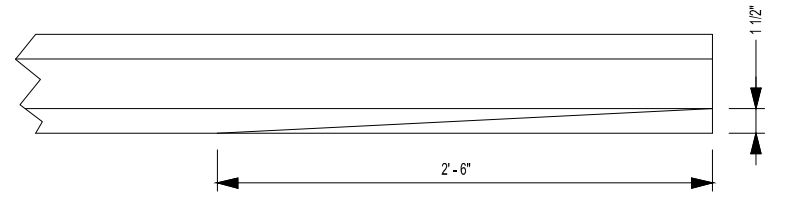
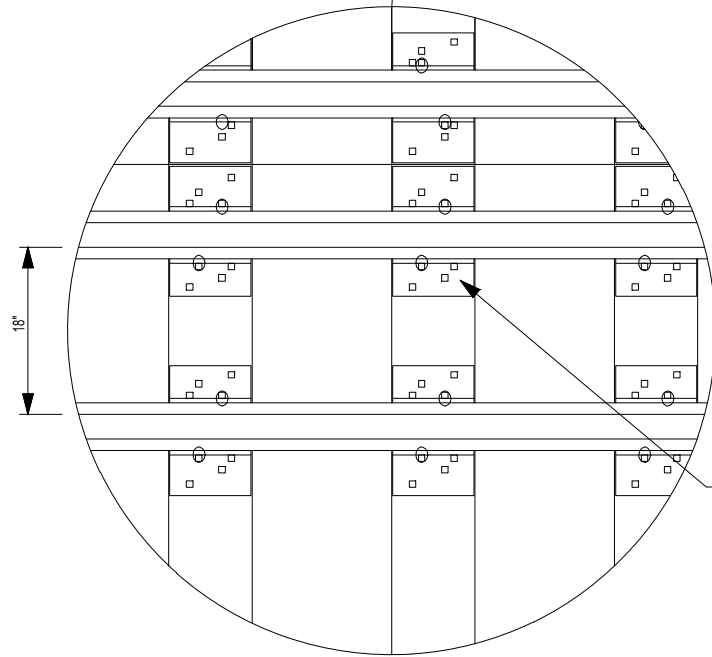
ENGINEERING STANDARD DRAWINGS

18" INSIDE GUARD RAILS FOR CONCRETE TIES

DRAWING NO. ESD-2302
 DRAWING SHEET NO. 1 OF 1
 SCALE: NONE
 CONTRACT SHEET NO.



DEPRESSED RAIL HEAD DETAIL



RAIL BASE CUT DETAIL TOP VIEW

NOTES:

1. INNER GUARD RAILS ON BRIDGES SHALL BE REQUIRED FOR ALL SPANS WHERE EXPOSED STRUCTURAL STEEL IS PRESENT ABOVE T/R AND IS SUBJECTED TO STRUCTURAL DAMAGE BY DERAILED EQUIPMENT. INNER GUARD RAILS SHALL BE INSTALLED ON BRIDGES WHERE INDIVIDUAL SPANS ARE OVER 100 FEET IN LENGTH OR WHERE THE ENTIRE STRUCTURE IS OVER 800 FEET IN LENGTH AND AT LEAST ONE SPAN CROSSES OVER A WATERWAY THAT NORMALLY CONTAINS WATER AT LEAST 15 FEET DEEP. INNER GUARD RAILS SHALL EXTEND 50 FEET BEYOND THE SPAN OR SPANS.
2. INNER GUARD RAILS SHALL BE INSTALLED ON ANY OTHER BRIDGE AS DIRECTED BY THE NCTD CHIEF OF RAIL OPERATIONS.
3. INSIDE GUARD RAILS ARE NOT REQUIRED ON BRIDGES UNTIL BRIDGE OR BRIDGE DECK IS REPLACED OR RUNNING RAIL IS REPLACED ACROSS BRIDGE.
4. INSIDE GUARD RAILS MAY BE CONSTRUCTED USING SECOND HAND RAIL NOT LESS THAN 23 LBS LIGHTER OR NO LARGER THAN RUNNING RAILS. IF GUARD RAIL HAS 5" BASE, USE MODIFIED PLATES FOR 5" BASE PER NCTD ESD-2371.
5. ON WOOD TIES, GUARD RAILS SHALL BE FULLY PLATED AND SPIKED.
6. GUARD RAIL JOINTS, IF PRESENTS, SHALL BE FULLY BOLTED USING SECOND-HAND JOINT BARS.
7. ON TANGENT TRACK, SPIKE THE INSIDE GUARD RAIL WITH TWO SPIKES PER PLATE ON EACH RAIL OF THE TANGENT PORTION AND THREE SPIKES ON EACH RAIL OF THE CURVED PORTION. ON CURVED TRACK, SPIKE THE ENTIRE GUARD RAIL WITH THREE SPIKES PER PLATE ON EACH RAIL.
8. ON WOOD TIES, BOX ANCHOR TWO TIES NEAR THE CENTER OF BRIDGE TO RESTRICT LONGITUDINAL MOVEMENT OF GUARD RAIL.

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REFERENCE DRAWINGS:
FOR PLATES, SEE ESD-2371
FOR SCREW SPIKES, SEE ESD-2355

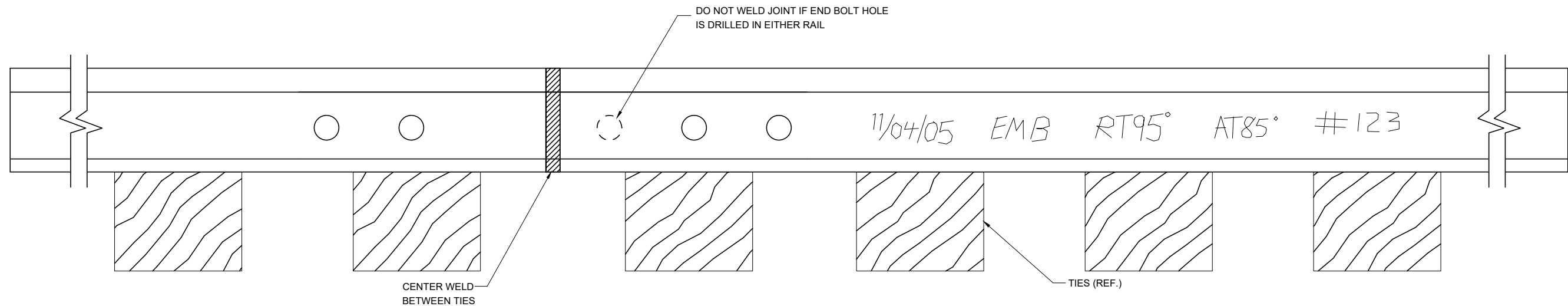
REV.	DATE	DESCRIPTION	DES.	ENG.	DESIGNER PE STAMP

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B. SMITH *MSB*
RECOMMENDED
B. SCHMITH *BAB*
DATE 11/18/16

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ENGINEERING STANDARD DRAWINGS DOUBLE INSIDE GUARDRAIL FOR WOOD TIES	DRAWING NO. ESD-2304
	DRAWING SHEET NO. 1 OF 1
	SCALE: NONE
	CONTRACT SHEET NO.



PROFILE

NOTES:

1. LABEL ALL THERMITE FIELD WELDS ON FIELD SIDE OF RAIL.
2. USE PAINT STICK OR PAINT MARKING PEN TO LABEL RAIL.
3. WRITE MONTH, DAY, AND YEAR, WELDER'S INITIALS, RAIL TEMPERATURE, AIR TEMPERATURE, AND WELD NUMBER IN THE WEB OF THE RAIL ADJACENT TO THE WELD, AS SHOWN. IF THE WELD IS MADE WITH ONE END OF THE RAIL FREE, WRITE THE MONTH, DAY, YEAR, WELDER'S INITIALS, THE WORD "FREE" AND THE WELD NUMBER IN THE WEB OF THE RAIL.

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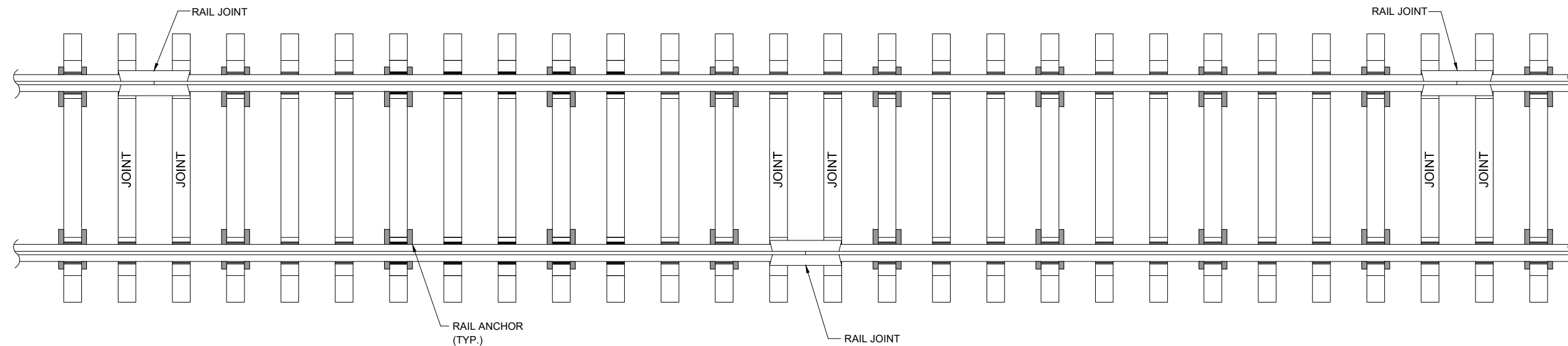
ENGINEERING STANDARD DRAWINGS

STANDARD MARKING FOR THERMITE RAIL WELDS

DRAWING NO.	ESD-2305
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	

NOTES:

1. RAIL ANCHORS SHALL NOT BE PLACED AGAINST JOINT TIES, INCLUDING INSULATED JOINTS. ANCHORS SHALL BE APPLIED TO BOTH ENDS OF TIES, OR NOT AT ALL.
2. WHILE THE NUMBER OF ANCHORS REQUIRED MAY VARY WITH LOCAL CONDITIONS, STANDARD IS 16 ANCHORS PER RAIL LENGTH OF 39 FT OR 24 TIES.
3. AT LOCATIONS WHERE ADDITIONAL ANCHORS ARE REQUIRED, THE ENGINEER WILL DETERMINE THE NUMBER OF ANCHORS REQUIRED.
4. RAIL ANCHOR SHALL BE DRIVEN ON BASE OF RAIL UNTIL LOCKING NOTCH ENGAGES OPPOSITE EDGE OF BASE. ANCHORS MUST NOT BE DRIVEN ALONG THE RAIL. IF ADJUSTMENTS ARE NECESSARY, REMOVE AND RE-APPLY.
5. FOR CONTINUOUS WELDED RAIL, APPLICATION OF ANCHORS SHALL BE IN ACCORDANCE WITH DRAWING ESD-2351-02.
6. FOR ANCHORING OF JOINTED RAIL CONNECTING TO CONTINUOUS WELDED RAIL: APPLY CWR END PATTERN CONCEPT FOR FIVE 39 FOOT RAIL LENGTHS, OR THE EQUIVALENT LENGTH OF 120 TIES, IN ACCORDANCE WITH DRAWING ESD-2351-02.
7. TURNOUTS THAT ARE NOT FASTENED WITH ELASTIC CLIPS ARE TO BE FULLY BOX ANCHORED EXCEPT AT JOINTS OR LOCATIONS WHERE ANCHOR WILL INTERFERE WITH SWITCH OPERATION.
8. ELASTIC FASTENERS WILL SATISFY RAIL ANCHORAGE NEEDS. USE OF ANCHORS IN COMBINATION WITH ELASTIC FASTENERS SHALL BE DONE ONLY AS DIRECTED BY SANDAG ENGINEER.
9. FOR JOINTED RAIL IN LENGTHS IN EXCESS OF 39 FEET, CONTINUE THE PATTERN OF BOX ANCHORS APPLIED TO EACH RAIL ON EVERY 3RD TIE, SKIPPING JOINT TIES.
10. EPOXY BONDED INSULATED JOINTS ARE CONSIDERED CONTINUOUS LENGTHS OF RAIL AND NOT "JOINTS" FOR THE PURPOSES OF SELECTING ANCHOR PATTERNS.



16 ANCHORS PER 39 FT. RAIL

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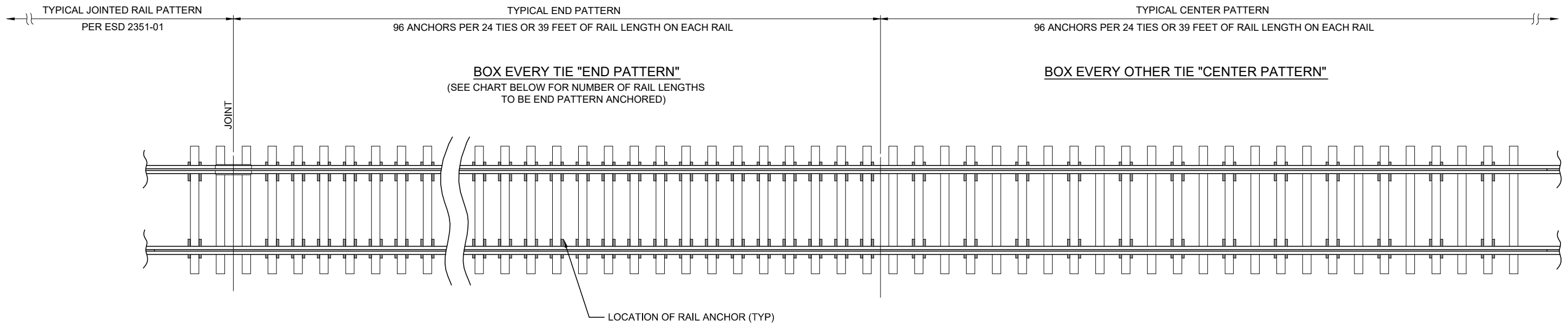
ENGINEERING STANDARD DRAWINGS

APPLICATION OF ANCHORS TO JOINTED RAIL

DRAWING NO.	ESD-2351-01
DRAWING SHEET NO.	1 OF 3
SCALE:	NONE
CONTRACT SHEET NO.	

NOTES:

1. FOR JOINTED RAIL UP TO 80 FT. LENGTHS, CONNECTING TO CONTINUOUS WELDED RAIL, APPLY CWR END PATTERN ANCHORING CONCEPT FOR FIVE 39 FT. RAILS LENGTHS OR THE EQUIVALENT LENGTH OF 120 TIES.
2. END PATTERN IS TO BE APPLIED TO BOTH RAILS WHEN JOINT IS ON ONLY ONE RAIL. ANCHORS SHALL BE APPLIED TO BOTH ENDS OF TIES, OR NOT AT ALL.
3. FOR JOINTED RAIL, APPLICATION OF ANCHORS SHALL BE IN ACCORDANCE WITH DRAWING ESD-2351-01.
4. BOX ANCHOR EVERY TIE FOR A DISTANCE OF 300 FT. AHEAD OF AND BEHIND SWITCH ON MAIN TRACK AND TO THE CLEARANCE POINT OF TURNOUT FOR ALL SWITCHES IN CWR TERRITORY.
5. INSTALL 48 ANCHORS PER EACH 24 TIES 300 FT. ON EACH SIDE OF HOT BOX DETECTORS.
6. EPOXY BONDED INSULATED JOINTS DO NOT REQUIRE END PATTERNS.
7. RAIL ANCHORS MUST NOT BE PLACED AGAINST JOINT TIES, INCLUDING INSULATED JOINTS.
8. AT LOCATIONS WHERE ADDITIONAL ANCHORS ARE REQUIRED, SANDAG ENGINEER WILL DETERMINE THE NUMBER OF ANCHORS REQUIRED.
9. RAIL ANCHOR SHALL BE DRIVEN ON BASE OF RAIL UNTIL LOCKING NOTCH ENGAGES OPPOSITE EDGE OF BASE. ANCHORS MUST NOT BE DRIVEN ALONG THE RAIL. IF ADJUSTMENTS ARE NECESSARY, REMOVE AND RE-APPLY.
10. ELASTIC FASTENERS WILL SATISFY RAIL ANCHORAGE NEEDS, USE OF ANCHORS IN COMBINATION WITH ELASTIC FASTENERS SHALL BE DONE ONLY AS DIRECTED BY THE ENGINEER.



CONTINUOUS WELDED RAIL	END PATTERN ANCHORING REQUIRED AT EACH END OF CWR	
LENGTH OF CWR	DISTANCE OF END PATTERN (FT)	EQUIVALENT NUMBER OF TILES
1000' OR MORE	200	120
800 TO 1000'	150	96
550 TO 800	120	72
400 TO 800	80	48
200 to 400	40	24

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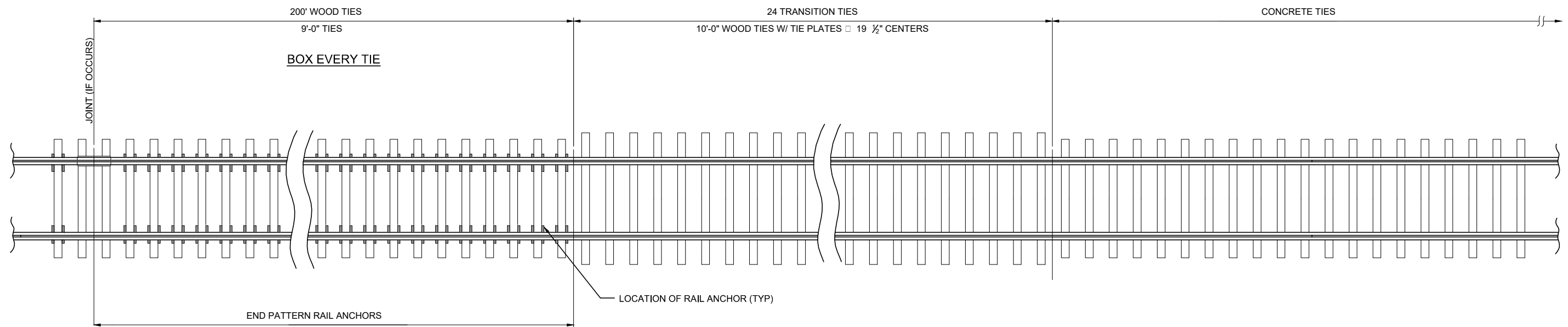
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ENGINEERING STANDARD DRAWINGS
APPLICATION OF ANCHORS TO CONTINUOUS WELDED RAIL

DRAWING NO. ESD-2351-02
DRAWING SHEET NO. 2 OF 3
SCALE: NONE
CONTRACT SHEET NO.

NOTES:

1. TRANSITION TIES TO CONSIST OF TWENTY FOUR, 10'-0" LONG, WOOD TIES WITH TIE PLATES.
2. BOX ANCHORS ARE REQUIRED FOR 200 FEET IN THE WOOD TIES AFTER TRANSITION TIES, EXCEPT OMIT ANCHORS ON BOTH RAILS AT RAIL JOINTS.
3. RAIL ANCHORS MUST NOT BE PLACED AGAINST JOINT TIES, INCLUDING INSULATED JOINTS.
4. AT LOCATIONS WHERE ADDITIONAL ANCHORS ARE REQUIRED, THE ENGINEER WILL DETERMINE THE NUMBER OF ANCHORS REQUIRED.
5. RAIL ANCHOR SHALL BE DRIVEN ON BASE OF RAIL UNTIL LOCKING NOTCH ENGAGES OPPOSITE EDGE OF BASE. ANCHORS MUST NOT BE DRIVEN ALONG THE RAIL. IF ADJUSTMENTS ARE NECESSARY, REMOVE AND RE-APPLY.
6. ELASTIC FASTENERS WILL SATISFY RAIL ANCHORAGE NEEDS, USE OF ANCHORS IN COMBINATION WITH ELASTIC FASTENERS SHALL BE DONE ONLY AS DIRECTED BY THE ENGINEER.
7. ANCHORS SHALL BE APPLIED TO BOTH ENDS OF TIES, OR NOT AT ALL.



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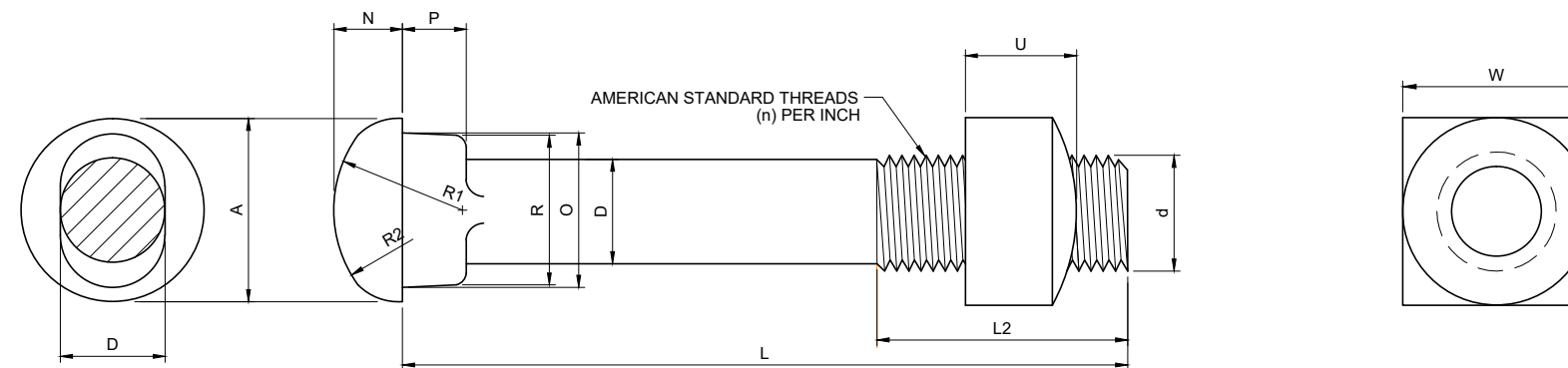
RAIL ANCHOR APPLICATIONS FOR CONTINUOUSLY
WELDED TRANSITION FROM WOOD TO CONCRETE TIES

DRAWING NO.	ESD-2351-03
DRAWING SHEET NO.	3 OF 3
SCALE:	NONE
CONTRACT SHEET NO.	

NOTES:



1. BOLTS AND NUTS TO BE MADE OF GRADE 8 STEEL PER AREMA.
2. NOMINAL SIZE OF BOLT IS THE THREAD DIAMETER (D).
3. FOR MATERIAL SPECIFICATIONS, COMPOSITION, AND TESTING SEE AREMA VOLUME 1, CHAPTER 5, PART 2.

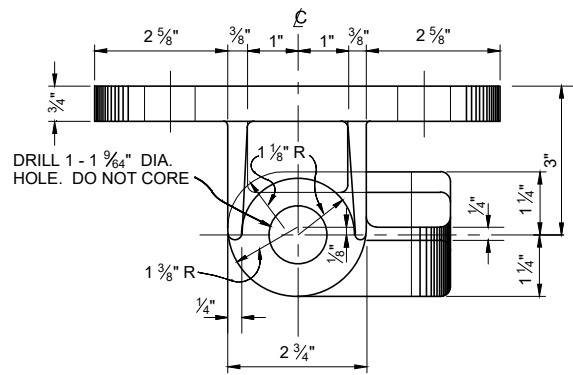
DIMENSION TABLE (INCHES)																
WEIGHT AND SECTION OF RAIL	OVAL NECK TRACK BOLTS												NUT		WEIGHT EACH (BOLT AND NUT)	NUMBER OF BOLTS PER 200-LB KEG
	THREADS			BODY		HEAD			NECK			THICKNESS	WIDTH			
	OUTSIDE DIAMETER	LENGTH	NUMBER PER INCH	SHANK DIAMETER	LENGTH UNDER HEAD	DIAMETER	THICKNESS	LONG RADIUS	SHORT RADIUS	MAXIMUM WIDTH	MINIMUM WIDTH			DEPTH		
	d	L2	n	D	L	A	N	R1	R2	O	R	P	U	W		
80 lb. ASCE	7/8	2	9	7/8	5	1 3/64	35/64	1 25/64	33/64	1 7/32	1 1/16	1/2	1	1 1/16	1.56	128
75 lb. CS & CS Rev.																
85 lb. ASCE																
90 lb. ARA-B	1 1/8	2 1/2	7	1 1/16	6 1/2	1 57/64	45/64	1 55/64	43/64	1 17/32	1 1/2	5/8	1 1/8	1 1/16	2.62	76
110 lb. RE																
112 lb., 115 lb., 131 lb. RE																
119 lb. RE, 136 lb. RE																



TRACK BOLT AND NUT

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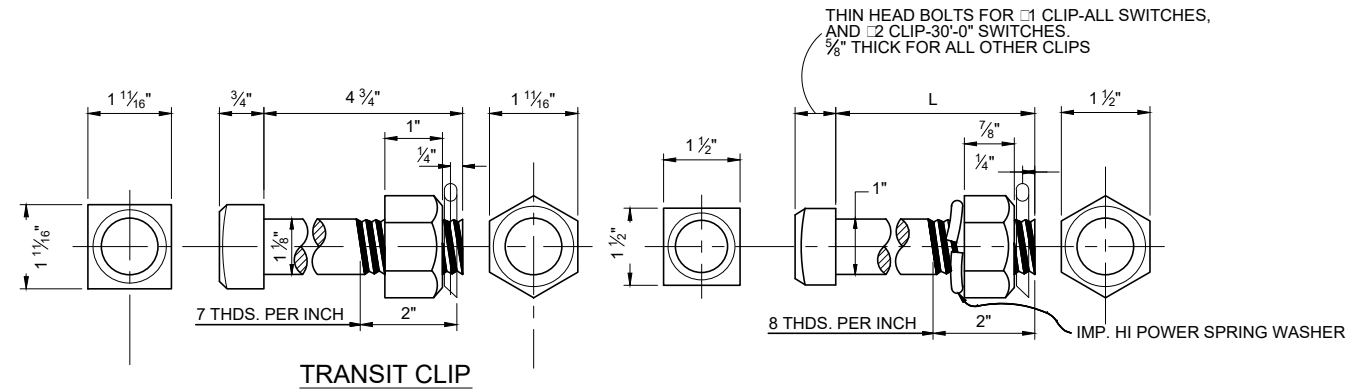
REVISIONS				DRAWN RAILPROS		 SANDAG SAN DIEGO ASSOCIATION OF GOVERNMENTS 401 B Street, Suite 800 San Diego, CA. 92101 www.sandag.org	 NORTH COUNTY TRANSIT DISTRICT 810 Mission Avenue Oceanside, CA 92054 www.gonctd.com	ENGINEERING STANDARD DRAWINGS		DRAWING NO. ESD-2352
				CHECKED B. SMITH <i>BS</i>				TRACK BOLTS AND NUTS - FOR 75 LB. TO 136 LB. RAIL		DRAWING SHEET NO. 1 OF 1
				RECOMMENDED W. PREY <i>WP</i>						SCALE: NONE
				DATE 5/27/15				DESIGNER PE STAMP		CONTRACT SHEET NO.
REV.	DATE	DESCRIPTION	DES.	ENG.						



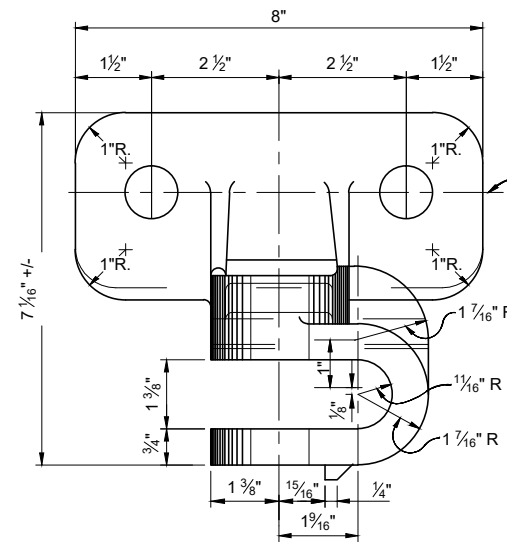
DRILL 1 - 1 3/64" DIA. HOLE. DO NOT CORE

"X" HEIGHT ABOVE BASE	WEIGHT OF RAIL	1/2" REINFORCING	1 1/4" REINFORCING
110 LB. TO 119 LB.		2 7/8"	2 1/16"
130 LB. TO 136 LB.		2 15/16"	2 3/4"

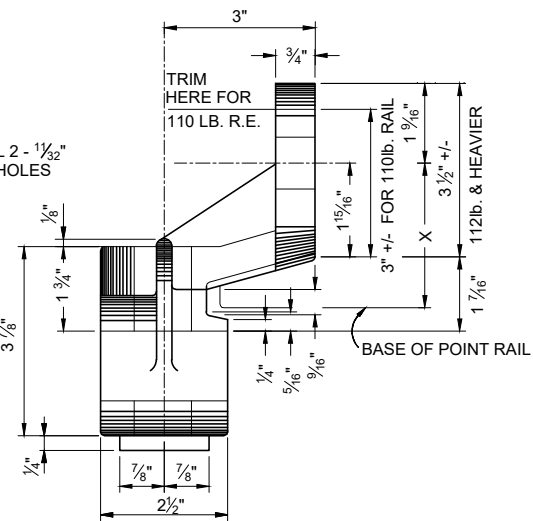
SPECIFICATIONS:
CAST STEEL CLIPS
RIGHT AND LEFT HAND
RIGHT HAND SHOWN



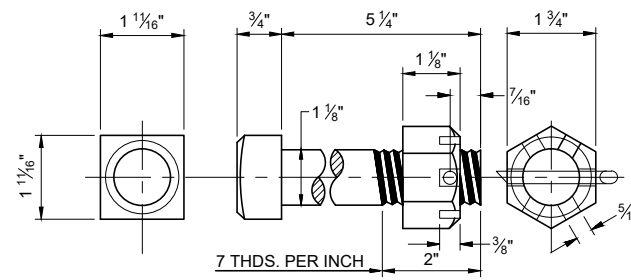
TRANSIT CLIP



DRILL 2 - 1 1/32" DIA. HOLES



OPEN SIDE JAW CLIP



OPEN SIDE JAW CLIP

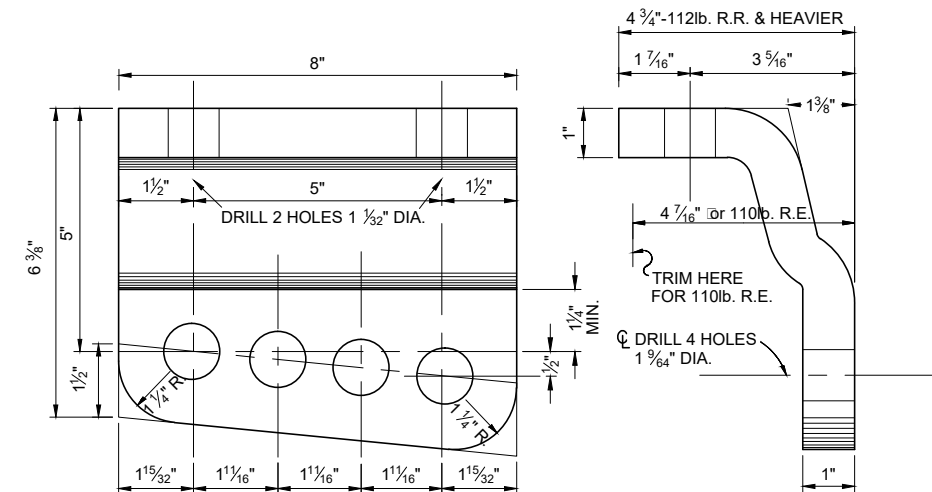
BOLTS FOR SWITCH RODS AND CLIPS

SWITCH LENGTH	ROD NO.	TYPE CLIP	LENGTH OF BOLTS "L"	
			SPLIT SWT.	SPRING SWT.
16'-6"	1	TRANSIT	4"	
		O.S.J.	*4"	4"
	2	TRANSIT	4"	4 1/2"
	3	O.S.J.		+ 4 3/4"
24'-0" AND 30'-0"	1	TRANSIT	4 1/2"	
		O.S.J.	*4"	4 3/4"
	2to5IN. TRANSIT	4 1/2"	5 1/4"	
	4	O.S.J.		+ 5 1/2"

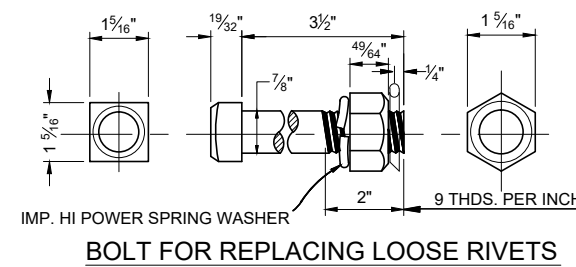
* FOR MACHINE OPERATED SWITCHES
+ FOR FACING POINT LOCK OPERATION

BOLTS FOR SWITCH POINTS AND CLIPS

OPEN SIDE JAW & TRANSIT CLIP



TRANSIT CLIP
RIGHT AND LEFT HAND REQUIRED
RIGHT HAND SHOWN



BOLT FOR REPLACING LOOSE RIVETS

NOTE:
THIS BOLT TO BE USED FOR REPLACING LOOSE RIVETS ON SWITCHES FORMERLY FURNISHED WITH TRANSIT CLIPS RIVETED TO SWITCH POINTS.

NOTES:

- ALL BOLTS TO BE GRADE 8 TURNED BOLTS WITH CUT THREADS.
- DRILL 3/32" DIA. HOLE FOR 1/4" SPRING COTTERS AS SHOWN.
- SLOTTED NUT SHOWN TO BE AMERICAN STANDARD HEAVY SEMI-FINISHED.

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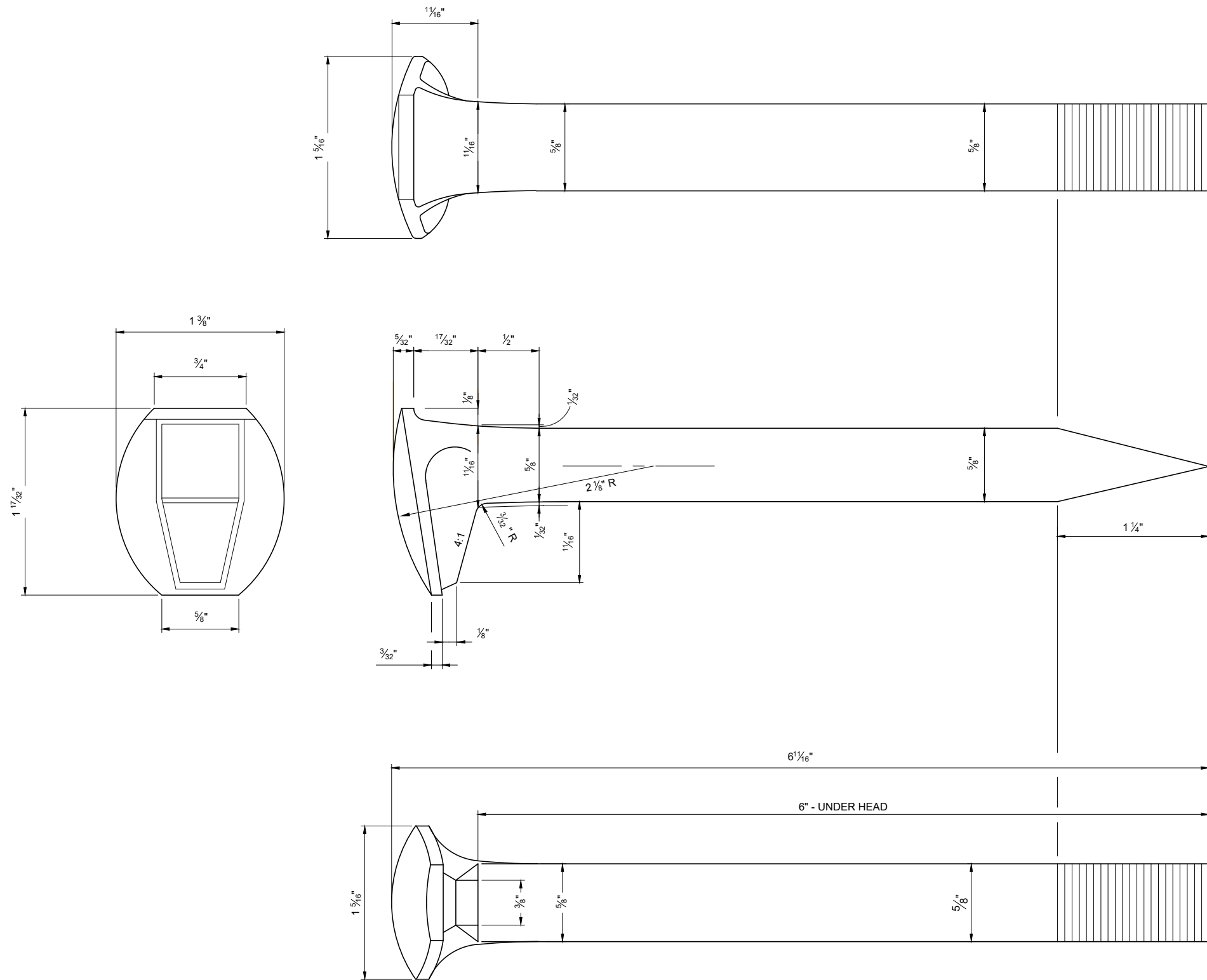
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ENGINEERING STANDARD DRAWINGS
DRAWING NO. ESD-2353
DRAWING SHEET NO. 1 OF 1
SCALE: NONE
CONTRACT SHEET NO.

SWITCH ROD CLIPS AND BOLTS



- NOTES:**
1. TRACK SPIKES TO CONFORM WITH AREMA SPECIFICATIONS
 2. WEIGHT □ 0.85 LBS.
 3. FOR MATERIAL SPECIFICATIONS, COMPOSITION, AND TESTING SEE AREMA VOLUME 1, CHAPTER 5, PART 2.

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REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN
RAILPROS
 CHECKED
B. SMITH *BS*
 RECOMMENDED
W. PREY *WP*
 DATE 5/8/15
 DESIGNER PE STAMP


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 401 B Street, Suite 800
 San Diego, CA. 92101
 www.sandag.org

NORTH COUNTY TRANSIT DISTRICT

 810 Mission Avenue
 Oceanside, CA 92054
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ENGINEERING STANDARD DRAWINGS
 TRACK SPIKE WITH REINFORCED THROAT

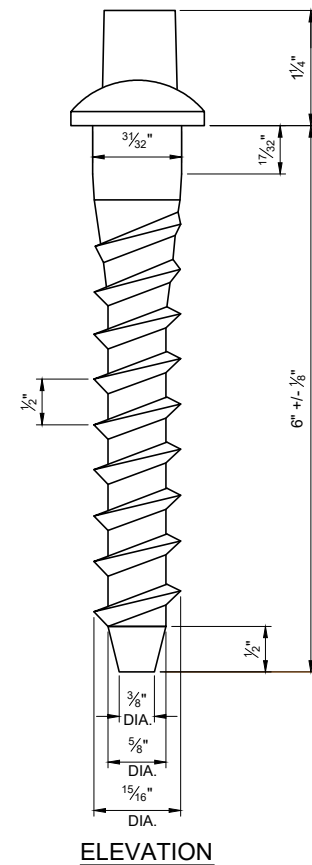
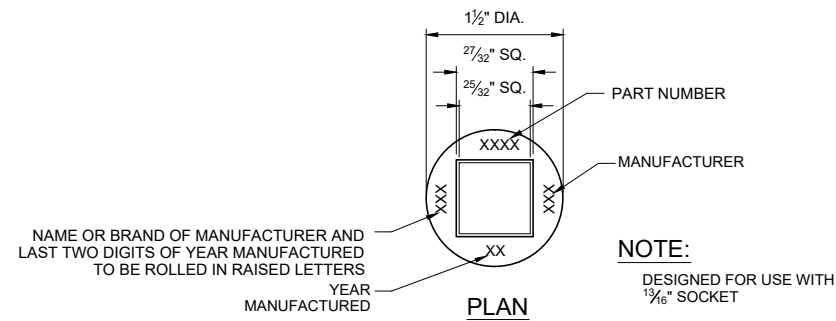
DRAWING NO. ESD-2355-01
 DRAWING SHEET NO. 1 OF 2
 SCALE: NONE
 CONTRACT SHEET NO.

MATERIAL SPECIFICATIONS:



1. ALL SCREW SPIKES TO BE HOT FORGED.
2. SCREW SPIKES TO BE MADE FROM MEDIUM CARBON STEEL TO MEET ASTM A-66 SPECIFICATIONS.
3. SCREW SPIKES TO BE COATED TO RESIST CORROSION.
4. APPROXIMATE SHIPPING WEIGHT OF EACH SCREW SPIKE: 1.1 LBS.
5. SCREW SPIKES TO BE PACKED 100 TO A BAG.

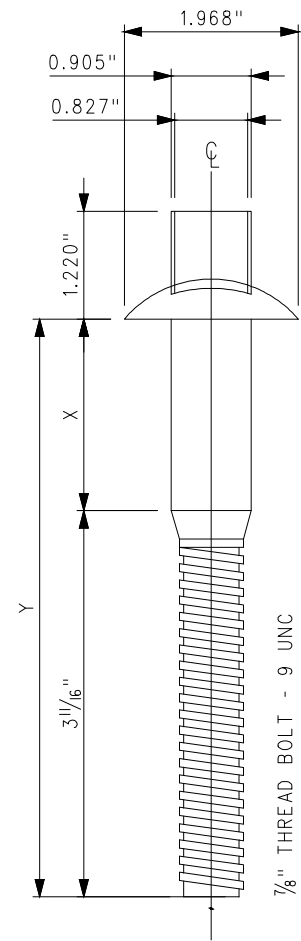
INSTALLATION INSTRUCTIONS:

1. PRE-DRILL WOOD TIES WITH $\frac{5}{16}$ " DIA. DRILL BIT TO DEPTH OF 5 $\frac{1}{2}$ ".
2. PRE-DRILLED HOLES MUST BE PERPENDICULAR WITH BASE PLATE.
3. USING A $\frac{13}{16}$ " SOCKET AND AN IMPACT WRENCH, SCREW IN UNTIL SNUG.

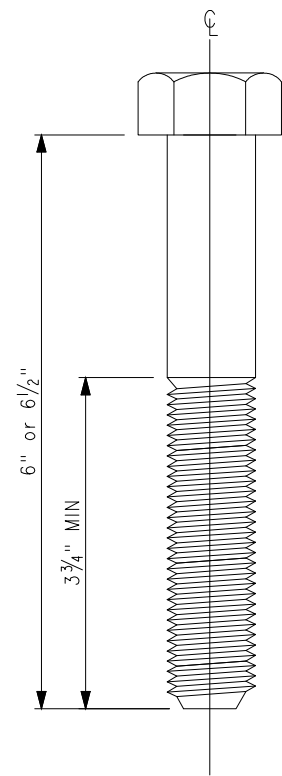


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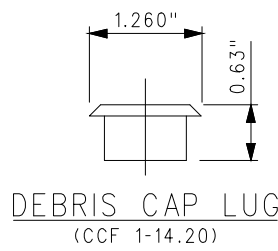
REVISIONS				DRAWN RAILPROS	 SAN DIEGO ASSOCIATION OF GOVERNMENTS 401 B Street, Suite 800 San Diego, CA. 92101 www.sandag.org	 NORTH COUNTY TRANSIT DISTRICT 810 Mission Avenue Oceanside, CA 92054 www.gonctd.com	ENGINEERING STANDARD DRAWINGS 15/16" DIAMETER SCREW SPIKE	DRAWING NO. ESD-2355-02
				CHECKED B. SMITH <i>BS</i>				DRAWING SHEET NO. 2 OF 2
				RECOMMENDED W. PREY <i>WP</i>				SCALE: NONE
				DATE 5/8/15				DESIGNER PE STAMP
REV.	DATE	DESCRIPTION	DES.	ENG.				



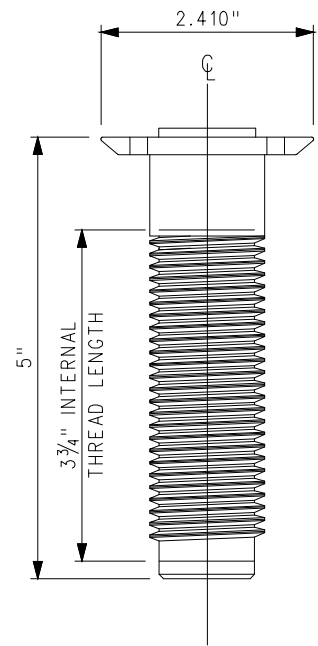
VAPE BOLT



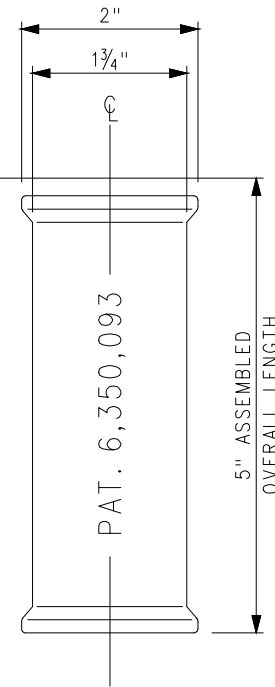
6" OR 6-1/2" LONG
7/8" UNC BOLT
GR A-325
YELLOW ZINC BICHROMATE



DEBRIS CAP LUG
(CCF 1-14.20)



NYLON 66
THREAD INSERT
COLOR-WHITE
REMOVABLE/REPLACEABLE



DUCTILE IRON HOUSING
INTERNALLY THREADED

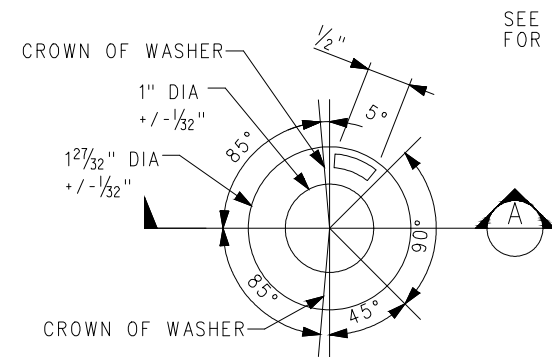
VAPE BOLT DIMENSIONS

X GRIP LENGTH	Y SHANK LENGTH	FOR USE THROUGH
2 3/16"	5 7/8"	3/4" PLATING
2 5/8"	6 3/8"	1" PLATING

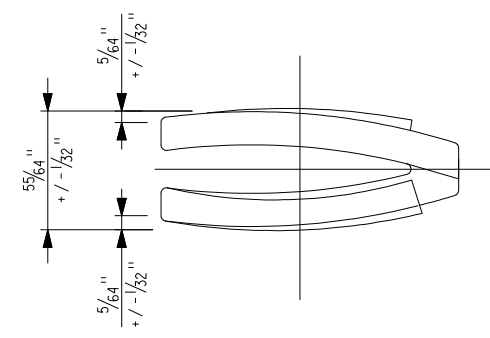
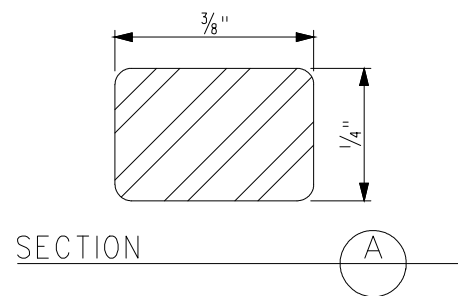
NOTES:

- 6" OR 6-1/2" LONG 7/8" UNC BOLT GR A-325 YELLOW ZINC BICHROMATE.
- TO AVOID DAMAGE TO THE TIE, ENSURE THAT PROPER SCREW SIZE IS USED FOR VARIOUS PLATE THICKNESSES. (SEE TABLE)
- VAPE SCREW TO BE TORQUED TO 150 FT-LBS. THIS TORQUE CORRESPONDS TO A 1mm CLEARANCE BETWEEN COILS ON THE SPRING WASHER.
- FOR CONCRETE GUARD RAIL TIE SEE ESD 2406 OR ESD 2407. FOR CONCRETE SWITCH TIE SEE CORRESPONDING TIE PLAN.
- SPRING WASHERS SHALL CONFORM TO UIC CODE 864-3. DIMENSIONS AS DELIVERED (UNLOADED). STAMPING IS TO BE DONE IN AREA INDICATED ON CURRENT YEAR AND SUPPLIER'S LOGO.

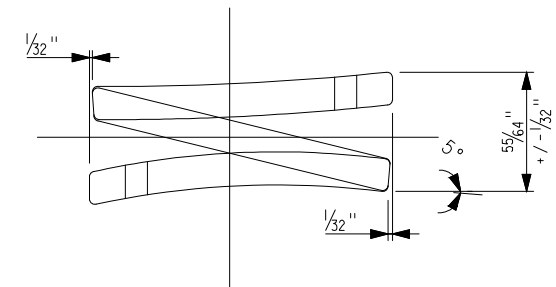
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SEE NOTE FOR STAMPING



HELICAL SPRING WASHER



REV.	DATE	DESCRIPTION	DES.	ENG.

REVISIONS	DRAWN RAILPROS
	CHECKED B. SMITH <i>BSM</i>
	RECOMMENDED B. SCHMITH <i>BAS</i>
	DATE 02/10/17
DESIGNER PE STAMP	

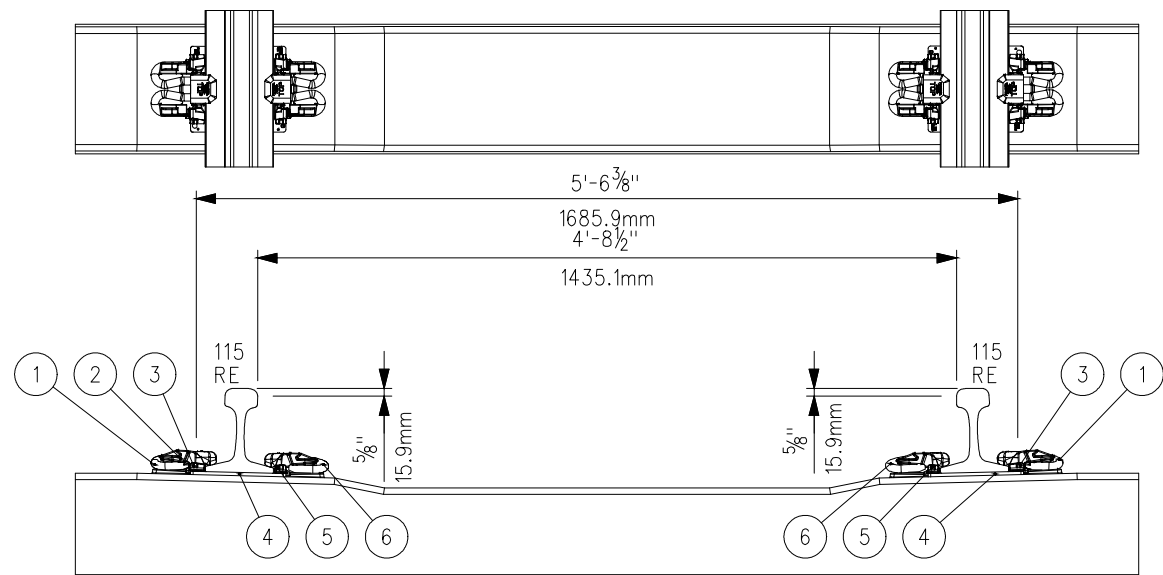
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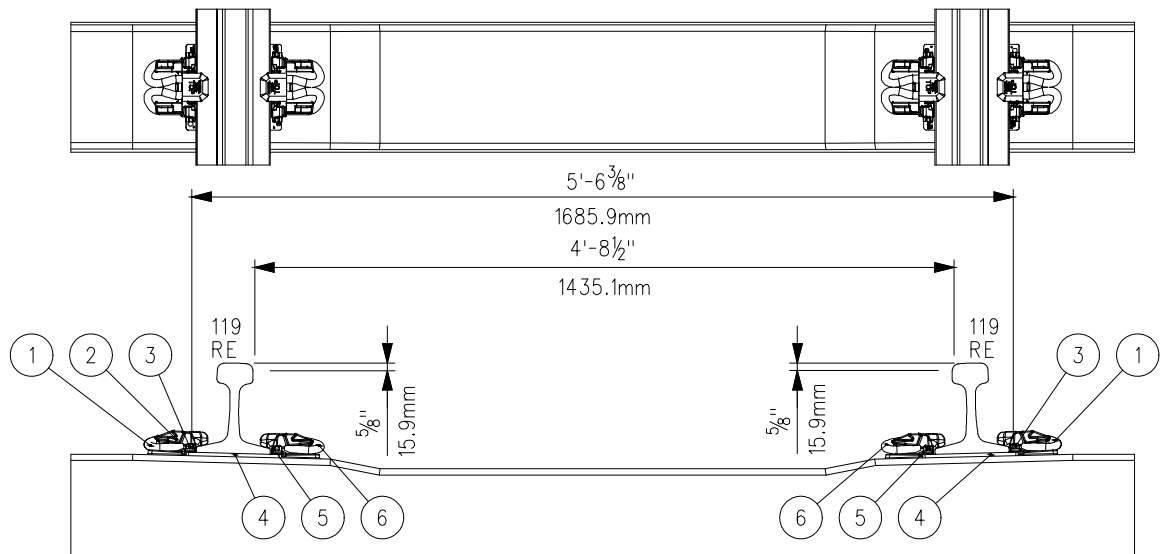
ENGINEERING STANDARD DRAWINGS PIM 532 SCREW, INSERT AND HELICAL WASHER FOR CONCRETE TIES	DRAWING NO. ESD-2356
	DRAWING SHEET NO. 1 OF 1
	SCALE: NONE
	CONTRACT SHEET NO.



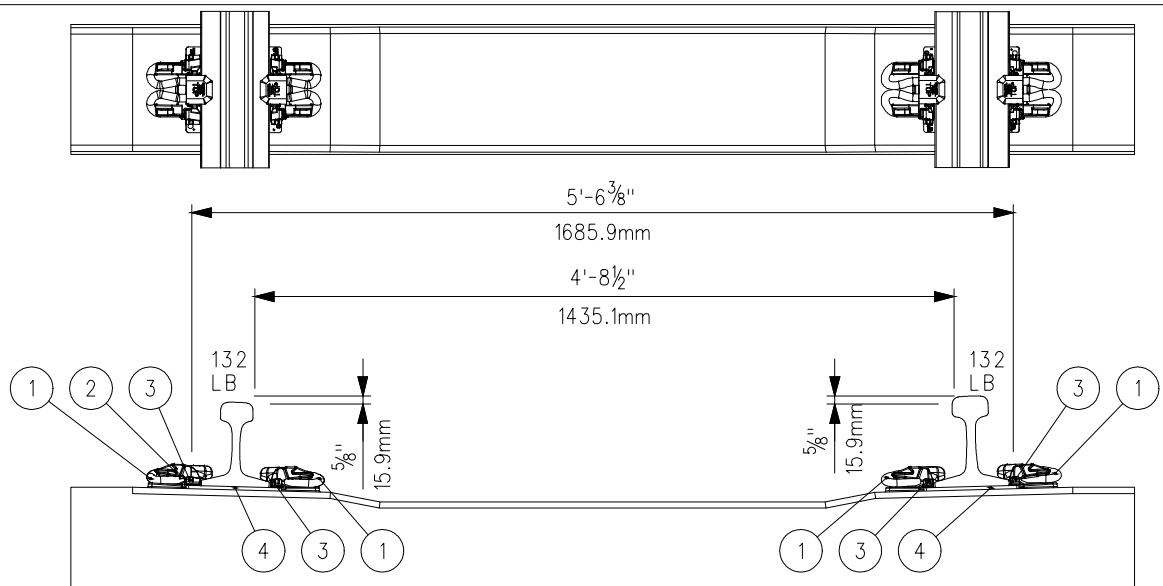
115 RE RAIL AND 136 LB RAIL CONCRETE TIE				
ITEM NO	PART NO	DESCRIPTION	COLOR	QTY
1	10218	RAIL CLIP ASSY - FC1603 CLIP / 7695 TOE INSULATOR	BLUE	2
2	9086	FASTCLIP TWIN-STEM SHOULDER		4
3	11458	SIDE POST INSULATOR - 0.726" THICK POST	BLUE	2
4	11549	RAIL PAD		2
5	11459	SIDE POST INSULATOR - 0.430" THICK POST	GREEN	2
6	10216	RAIL CLIP ASSY - FC1601 CLIP / 7695 TOE INSULATOR	NEUTRAL	2

NOTES:

1. FOR RAIL PAD DETAILS, SEE ESD 2364.
2. FOR SIDE POST INSULATOR DETAILS, SEE ESD 2365.
3. FOR RAIL CLIP DETAILS, SEE ESD 2366.
4. FOR TOE INSULATORS DETAILS, SEE ESD 2367.
5. ALL COMPONENTS FOR TIE ASSEMBLIES TO BE PANDROL TYPE OR EQUIVALENT AS APPROVED BY THE DIRECTOR OF ENGINEERING.
6. ALL PART NUMBERS LISTED ON THIS DRAWING CORRESPOND TO PANDROL BRAND COMPONENTS AND ARE SUBJECT TO CHANGE.
7. FOR CONCRETE TIE DETAILS AND FRICTION PATTERN, SEE ESD 2402.



119 RE RAIL AND 136 LB RAIL CONCRETE TIE				
ITEM NO	PART NO	DESCRIPTION	COLOR	QTY
1	10218	RAIL CLIP ASSY - FC1603 CLIP / 7695 TOE INSULATOR	BLUE	2
2	9086	FASTCLIP TWIN-STEM SHOULDER		4
3	11458	SIDE POST INSULATOR - 0.726" THICK POST	BLUE	2
4	11549	RAIL PAD		2
5	11459	SIDE POST INSULATOR - 0.430" THICK POST	GREEN	2
6	10216	RAIL CLIP ASSY - FC1601 CLIP / 7695 TOE INSULATOR	NEUTRAL	2



132 LB RAIL AND 136 LB RAIL CONCRETE TIE				
ITEM NO	PART NO	DESCRIPTION	COLOR	QTY
1	10216	RAIL CLIP ASSY - FC1601 CLIP / 7695 TOE INSULATOR	NEUTRAL	4
2	9086	FASTCLIP TWIN-STEM SHOULDER		4
3	7692	STANDARD SIDE POST INSULATOR - 0.326" THICK POST	NEUTRAL	4
4	7083	RAIL PAD ASSEMBLY		2

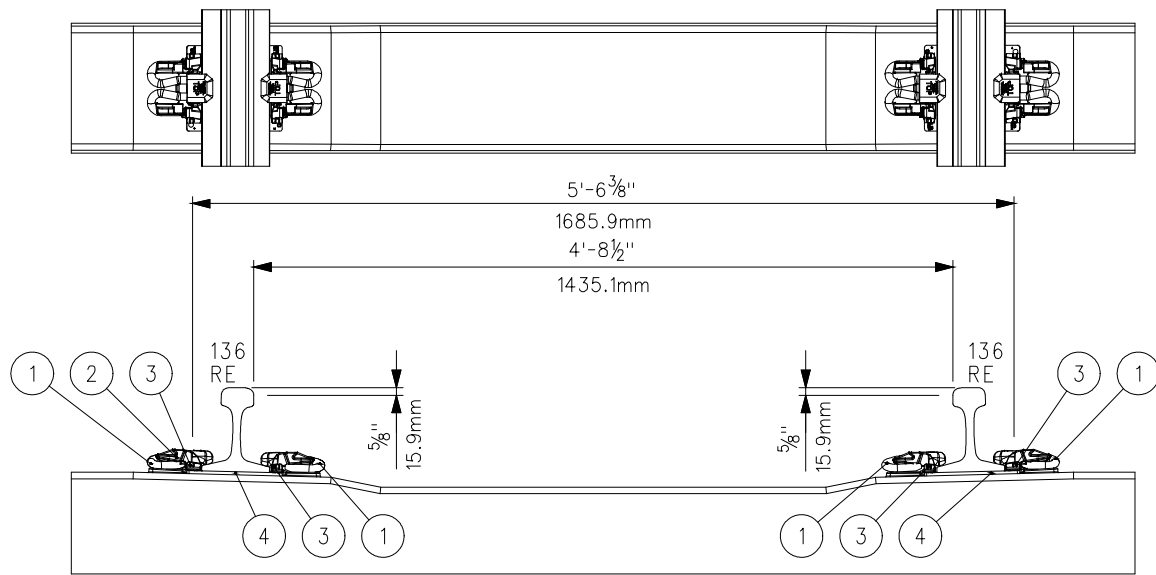
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REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN RAILPROS CHECKED B. SMITH RECOMMENDED B. SCHMITH DATE 02/10/17	 	DESIGNER PE STAMP
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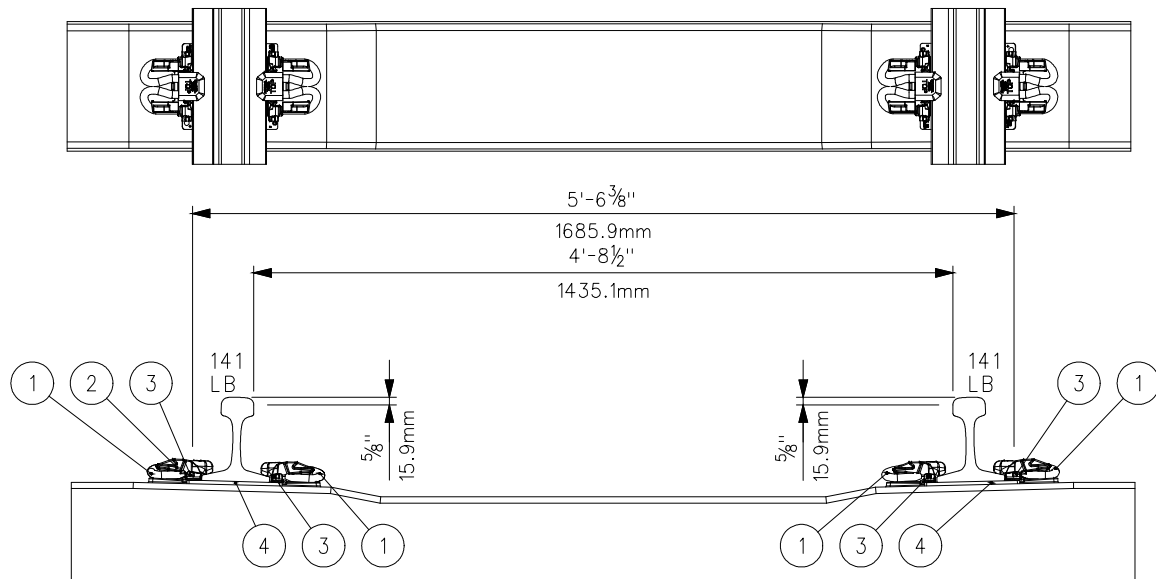
ENGINEERING STANDARD DRAWINGS FASTCLIP FOR CONCRETE TIE ASSEMBLIES FOR VARIOUS RAIL COMBINATIONS	DRAWING NO. ESD-2360-01
	DRAWING SHEET NO. 1 OF 3
	SCALE: NONE
	CONTRACT SHEET NO.



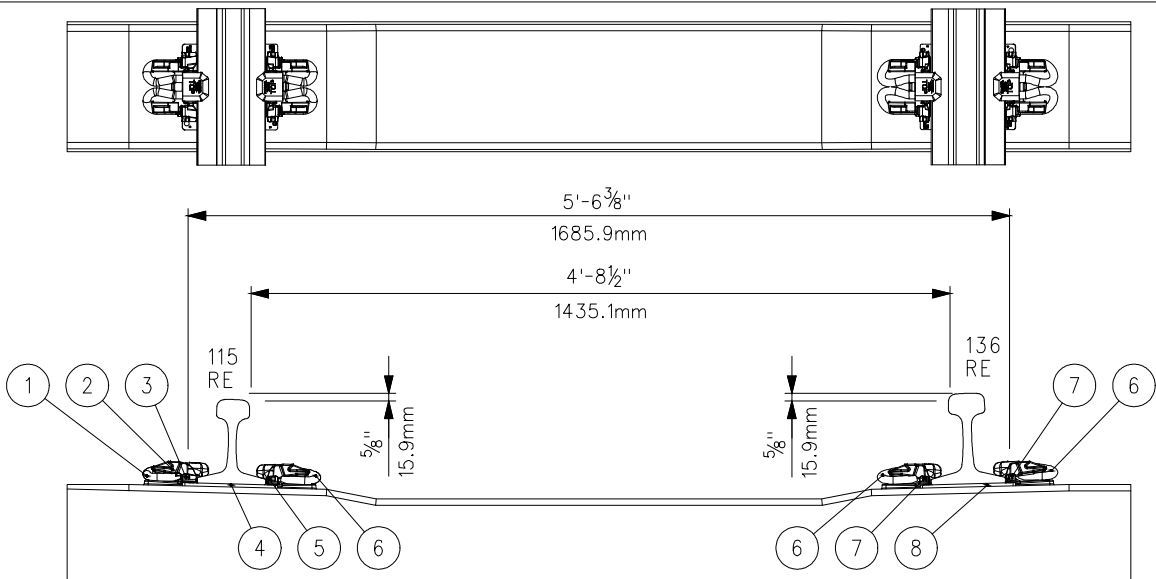
136 RE RAIL AND 136 LB RAIL CONCRETE TIE				
ITEM NO	PART NO	DESCRIPTION	COLOR	QTY
1	10216	RAIL CLIP ASSY - FC1601 CLIP / 7695 TOE INSULATOR	NUETRAL	4
2	9086	FASTCLIP TWIN-STEM SHOULDER		4
3	7692	STANDARD SIDE POST INSULATOR FOR TWIN-STEM SHOULDER	NUETRAL	4
4	7083	RAIL PAD ASSEMBLY		2

NOTES:

1. FOR RAIL PAD DETAILS, SEE ESD2364.
2. FOR SIDE POST INSULATOR DETAILS, SEE ESD2365.
3. FOR RAIL CLIP DETAILS, SEE ESD2366.
4. FOR TOE INSULATORS DETAILS, SEE ESD2367.
5. ALL COMPONENTS FOR TIE ASSEMBLIES TO BE PANDROL TYPE OR EQUIVALENT AS APPROVED BY THE DIRECTOR OF ENGINEERING
6. ALL PART NUMBERS LISTED ON THIS DRAWING CORRESPOND TO PANDROL BRAND COMPONENTS AND ARE SUBJECT TO CHANGE.
7. FOR CONCRETE TIE DETAILS AND FRICTION PATTERN, SEE ESD2402.



141 LB RAIL AND 136 LB RAIL CONCRETE TIE				
ITEM NO	PART NO	DESCRIPTION	COLOR	QTY
1	10216	RAIL CLIP ASSY - FC1601 CLIP / 7695 TOE INSULATOR	NUETRAL	4
2	9086	FASTCLIP TWIN-STEM SHOULDER		4
3	7692	STANDARD SIDE POST INSULATOR FOR TWIN-STEM SHOULDER	NUETRAL	4
4	7083	RAIL PAD ASSEMBLY		2



COMBINATION 115 RE RAIL AND 136 RE RAIL				
ITEM NO	PART NO	DESCRIPTION	COLOR	QTY
1	10218	RAIL CLIP ASSY - FC1603 CLIP / 7695 TOE INSULATOR	BLUE	1
2	9086	FASTCLIP TWIN-STEM SHOULDER		4
3	11458	SIDE POST INSULATOR - 0.726" THICK POST	BLUE	1
4	11549	RAIL PAD		1
5	11459	SIDE POST INSULATOR - 0.430" THICK POST	GREEN	1
6	10216	RAIL CLIP ASSY - FC1601 CLIP / 7695 TOE INSULATOR	NUETRAL	3
7	7692	STANDARD SIDE POST INSULATOR	NUETRAL	2
8	7083	RAIL PAD ASSEMBLY		1

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REV.	DATE	DESCRIPTION	DES.	ENG.

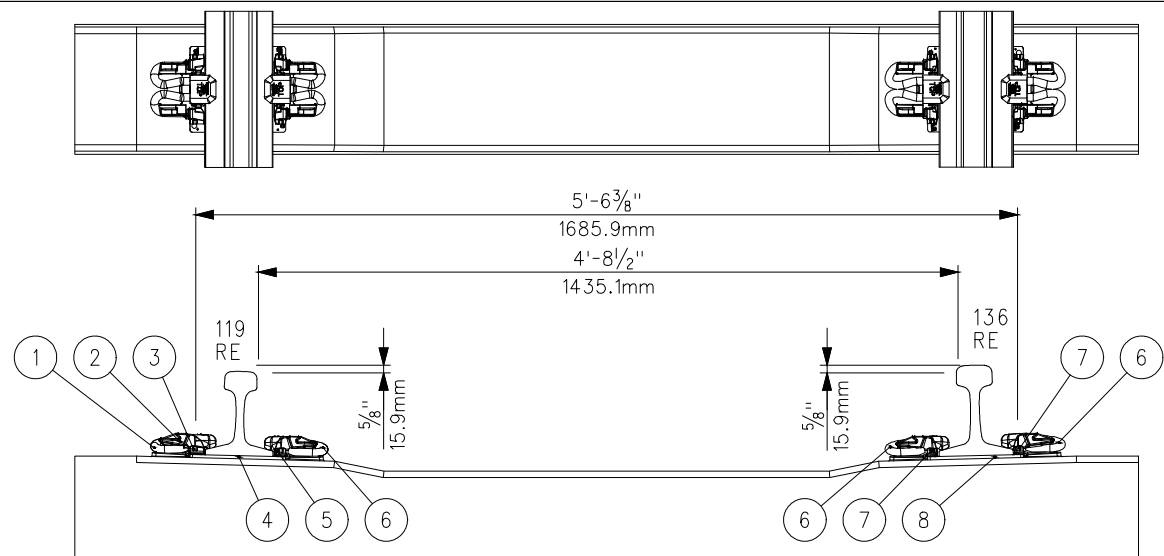
DRAWN RAILPROS CHECKED B. SMITH RECOMMENDED B. SCHMITH DATE 02/10/17	 	DESIGNER PE STAMP
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ENGINEERING STANDARD DRAWINGS
 FASTCLIP FOR CONCRETE TIE ASSEMBLIES FOR
 VARIOUS RAIL COMBINATIONS

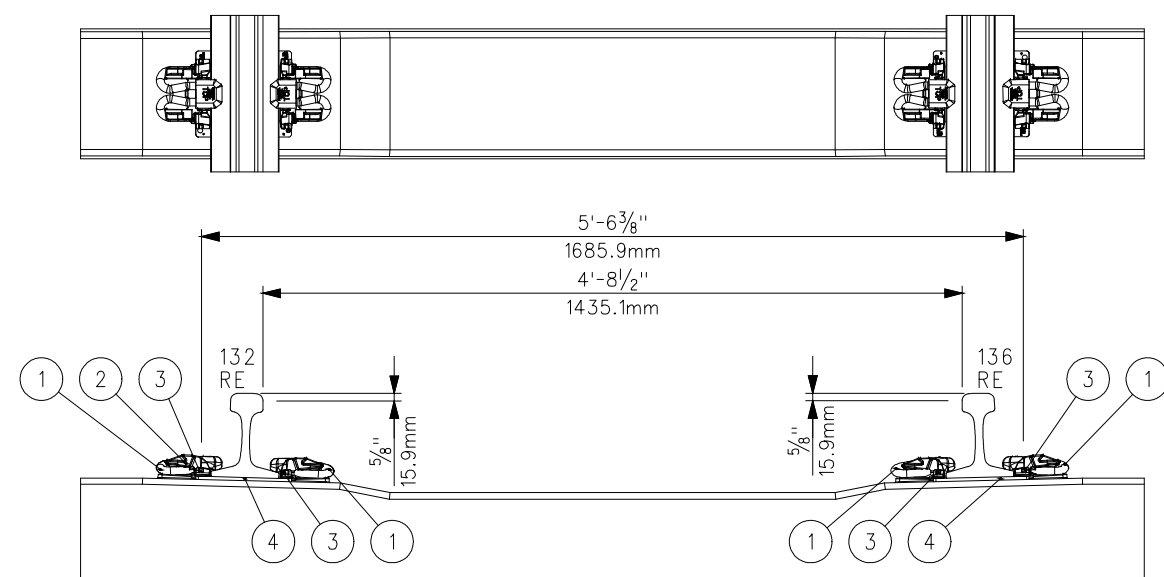
DRAWING NO.	ESD-2360-02
DRAWING SHEET NO.	2 OF 3
SCALE:	NONE
CONTRACT SHEET NO.	



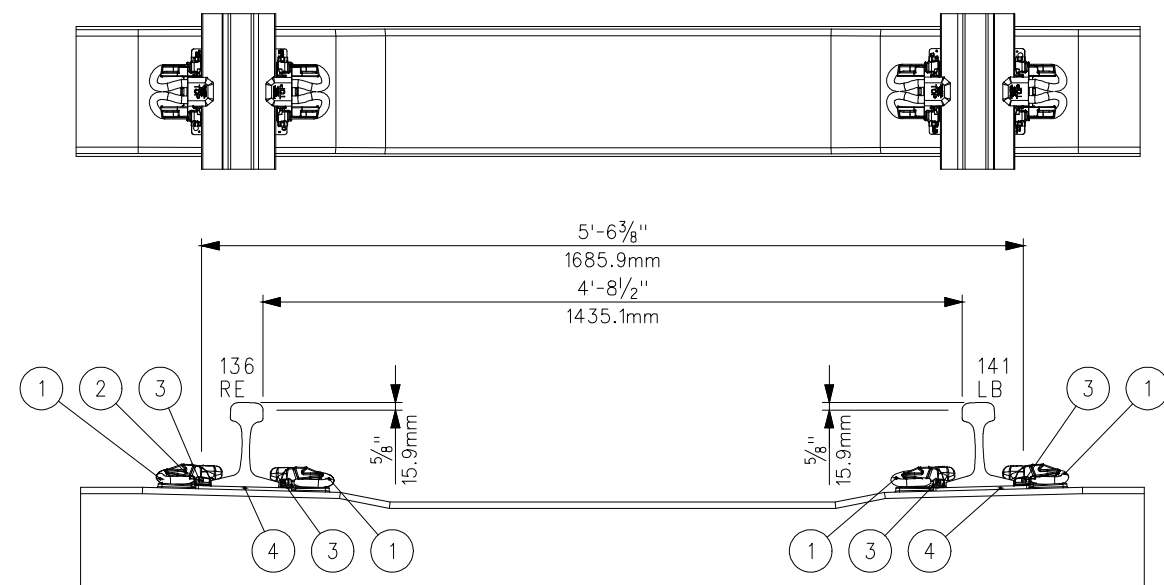
COMBINATION 119 RE RAIL AND 136 LB RAIL				
ITEM NO	PART NO	DESCRIPTION	COLOR	QTY
1	10218	RAIL CLIP ASSY - FC1603 CLIP / 7695 TOE INSULATOR	BLUE	1
2	9086	FASTCLIP TWIN-STEM SHOULDER		4
3	11458	SIDE POST INSULATOR - 0.726" THICK POST	BLUE	1
4	11549	RAIL PAD		1
5	11459	SIDE POST INSULATOR - 0.430" THICK POST	GREEN	1
6	10216	RAIL CLIP ASSY - FC1601 CLIP / 7695 TOE INSULATOR	NUETRAL	3
7	7692	STANDARD SIDE POST INSULATOR	NUETRAL	2
8	7083	RAIL PAD ASSEMBLY		1

NOTES:

1. FOR RAIL PAD DETAILS, SEE ESD2364.
2. FOR SIDE POST INSULATOR DETAILS, SEE ESD 2365.
3. FOR RAIL CLIP DETAILS, SEE ESD2366.
4. FOR TOE INSULATORS DETAILS, SEE ESD 2367.
5. ALL COMPONENTS FOR TIE ASSEMBLIES TO BE PANDROL TYPE OR EQUIVALENT AS APPROVED BY THE DIRECTOR OF ENGINEERING
6. ALL PART NUMBERS LISTED ON THIS DRAWING CORRESPOND TO PANDROL BRAND COMPONENTS AND ARE SUBJECT TO CHANGE.
7. FOR CONCRETE TIE DETAILS AND FRICTION PATTERN, SEE ESD 2402.



136 RE RAIL AND 136 LB RAIL CONCRETE TIE				
ITEM NO	PART NO	DESCRIPTION	COLOR	QTY
1	10216	RAIL CLIP ASSY - FC1601 CLIP / 7695 TOE INSULATOR	NUETRAL	4
2	9086	FASTCLIP TWIN-STEM SHOULDER		4
3	7692	STANDARD SIDE POST INSULATOR FOR TWIN-STEM SHOULDER	NUETRAL	4
4	7083	RAIL PAD ASSEMBLY		2



141 LB RAIL AND 136 LB RAIL CONCRETE TIE				
ITEM NO	PART NO	DESCRIPTION	COLOR	QTY
1	10216	RAIL CLIP ASSY - FC1601 CLIP / 7695 TOE INSULATOR	NUETRAL	4
2	9086	FASTCLIP TWIN-STEM SHOULDER		4
3	7692	STANDARD SIDE POST INSULATOR	NUETRAL	4
4	7083	RAIL PAD ASSEMBLY		2

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REV.	DATE	DESCRIPTION	DES.	ENG.

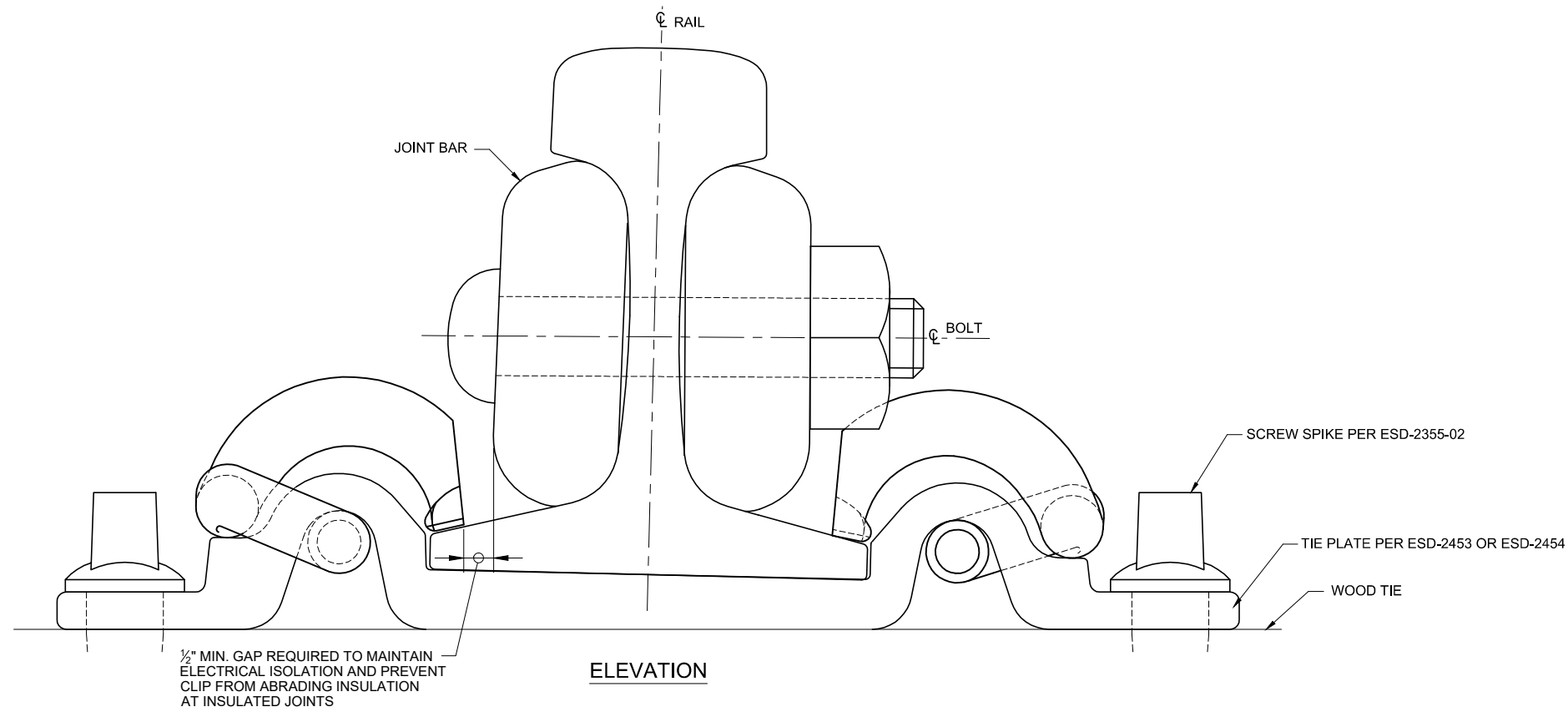
DRAWN RAILPROS	
CHECKED B. SMITH	<i>BS</i>
RECOMMENDED B. SCHMITH	<i>BBS</i>
DATE	02/10/17
DESIGNER PE STAMP	



ENGINEERING STANDARD DRAWINGS

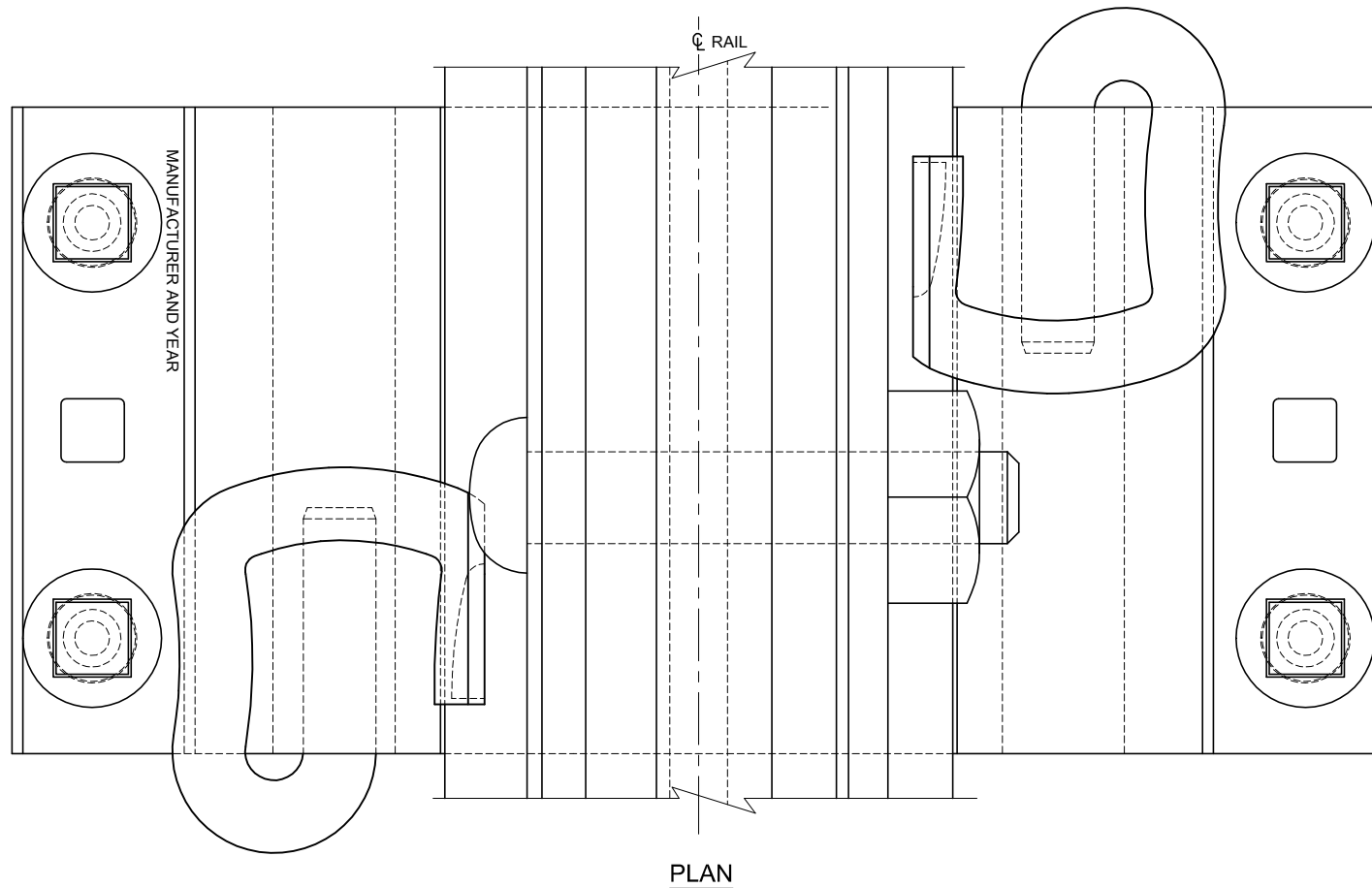
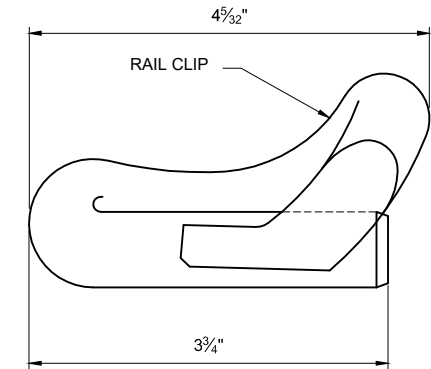
FASTCLIP FOR CONCRETE TIE ASSEMBLIES FOR VARIOUS RAIL COMBINATIONS

DRAWING NO.	ESD-2360-03
DRAWING SHEET NO.	3 OF 3
SCALE:	NONE
CONTRACT SHEET NO.	



NOTES:

1. RAIL CLIP SHALL BE "e" CLIP OR EQUIVALENT. CLIP SHOULD BE MADE FROM HIGH QUALITY SPRING STEEL ALLOY.
2. USE "PANDROL" TYPE ROLLED STEEL BASE PLATE FOR RAIL WITH 5 1/2" OR 6" INSIDE BASE OR EQUIVALENT.
3. TWO CLIPS REQUIRED FOR INSTALLATION OF EACH BASE PLATE.
4. CLIPS SHALL BE DRIVEN TO FULLY INSERT STRAIGHT PART OF ANCHOR INTO PLATE, AND CURVED TO BE FULLY OUTSIDE PLATE.
5. THIS CLIP IS TO BE USED FOR BOLTED OR INSULATED JOINTS.



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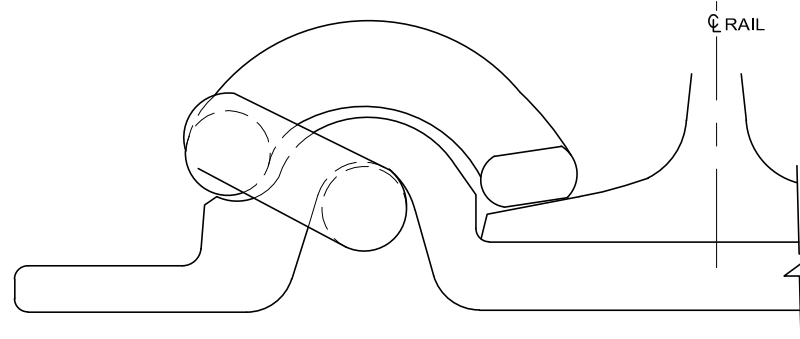
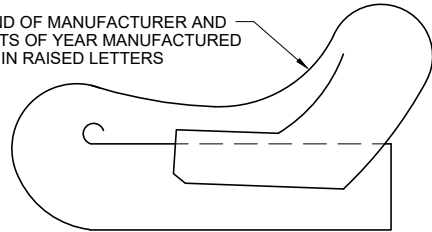
REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN RAILPROS	
CHECKED B. SMITH	<i>BS</i>
RECOMMENDED W. PREY	<i>WP</i>
DATE	5/8/15
DESIGNER PE STAMP	

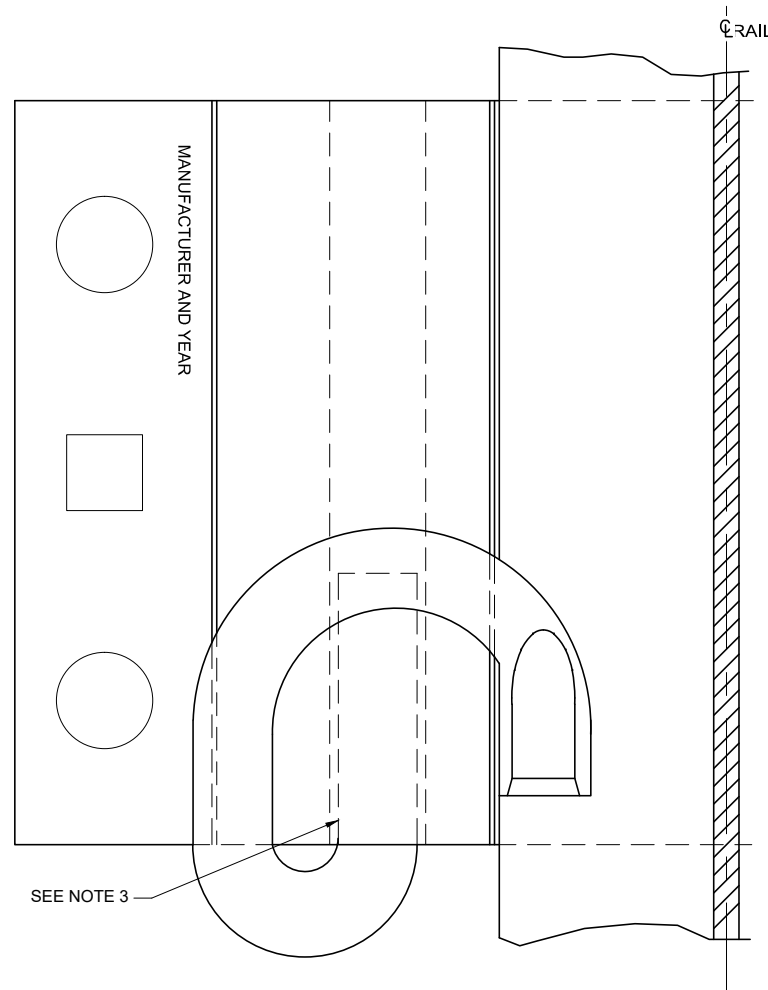


ENGINEERING STANDARD DRAWINGS JOINT "E" CLIP	DRAWING NO. ESD-2361
	DRAWING SHEET NO. 1 OF 1
	SCALE: NONE
	CONTRACT SHEET NO.

NAME OR BRAND OF MANUFACTURER AND
LAST TWO DIGITS OF YEAR MANUFACTURED
TO BE ROLLED IN RAISED LETTERS



ELEVATION



PLAN

NOTES:

1. RAIL CLIP SHALL BE PANDROL TYPE 2055 OR APPROVED EQUAL USED WITH "PANDROL" TYPE OR EQUIVALENT ROLLED STEEL TIE PLATES FOR RAIL WITH 5 1/2" OR 6" BASE..
2. TWO CLIPS REQUIRED FOR INSTALLATION OF EACH TIE PLATE.
3. CLIPS SHALL BE DRIVEN TO FULLY INSERT STRAIGHT PART OF ANCHOR INTO PLATE, AND CURVED TO BE FULLY OUTSIDE PLATE.

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REVISIONS		DES.	ENG.	DATE	DESCRIPTION	DES.	ENG.
REV.	DATE						

DRAWN
RAILPROS
CHECKED
B. SMITH
RECOMMENDED
W. PREY
DATE 5/8/15

DESIGNER PE STAMP



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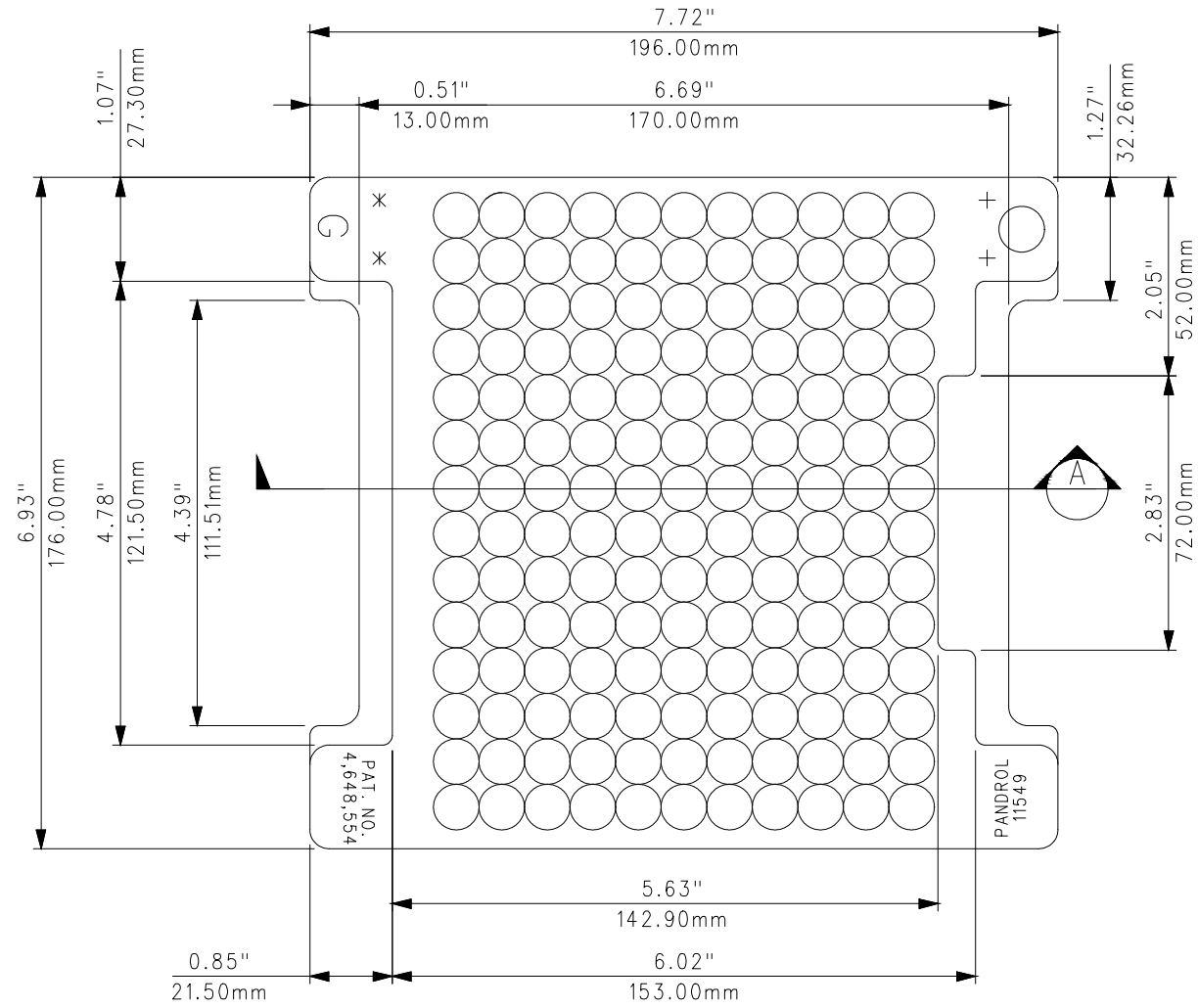


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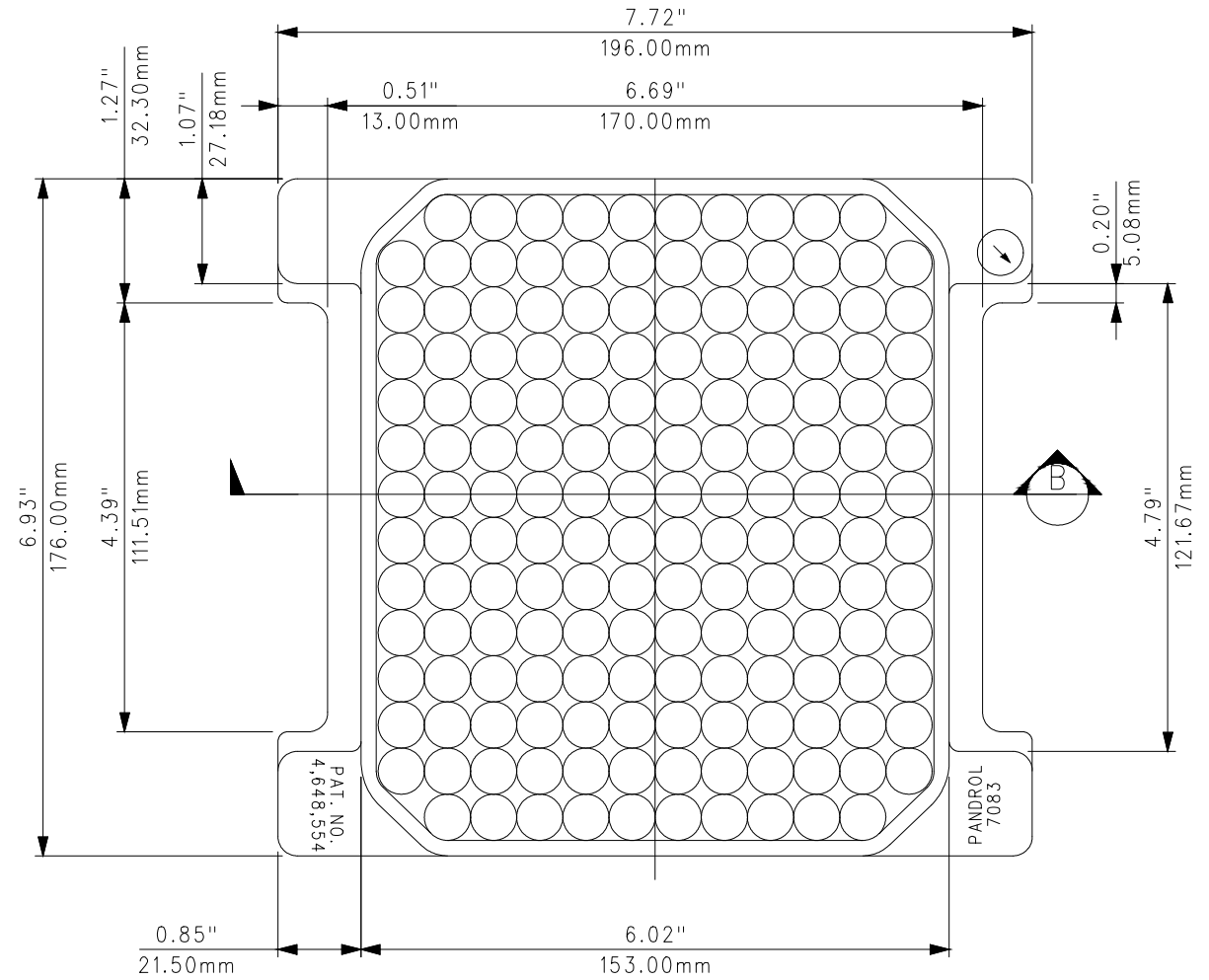
ENGINEERING STANDARD DRAWINGS

RAIL CLIP

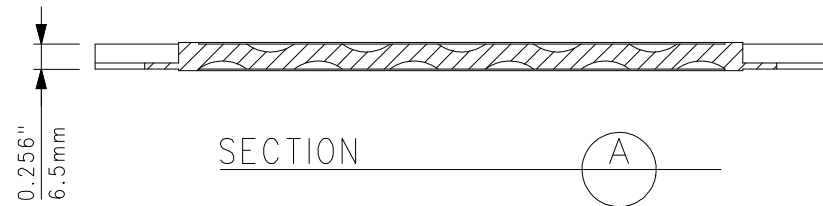
DRAWING NO. ESD-2362
DRAWING SHEET NO. 1 OF 1
SCALE: NONE
CONTRACT SHEET NO.



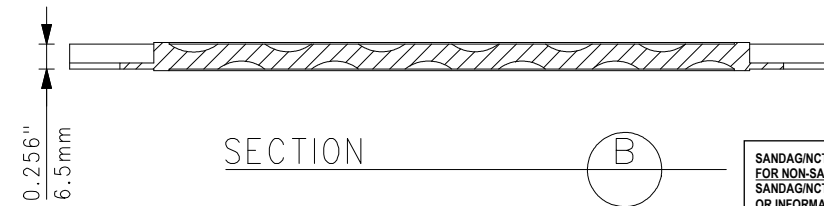
FASTCLIP TIE PAD
FOR 5 1/2" RAIL
USING STANDARD
6" BASE CONCRETE TIE
(PART #11549)



FASTCLIP TIE PAD
FOR 6" RAIL
PANDROL RAIL PAD ASSEMBLY OR EQUAL
(PART #7083)



SECTION A



SECTION B

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				CHECKED B. SMITH	<i>BS</i>
				RECOMMENDED B. SCHMITH	<i>BBS</i>
				DATE	02/10/17
REV.	DATE	DESCRIPTION	DES.	ENG.	DESIGNER PE STAMP



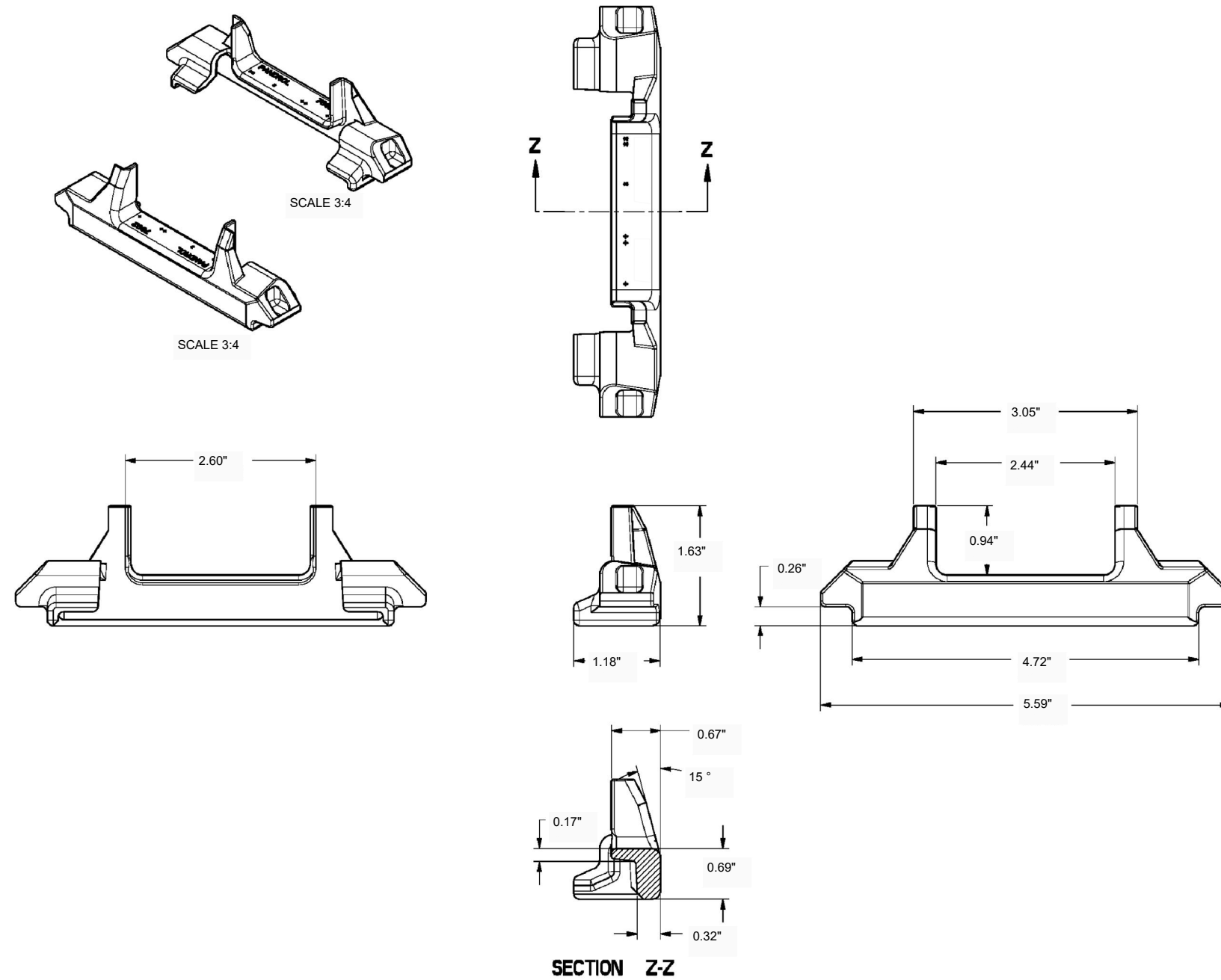
ENGINEERING STANDARD DRAWINGS

CONCRETE TIE PADS FOR 5-1/2" & 6" RAIL BASE

DRAWING NO.	ESD-2364
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	

NOTES:

1. SIDEPOST INSULATOR SHALL BE PANDROL TYPE OR APPROVED EQUAL.
2. APPROX WEIGHT 1.4 OZ



**SIDEPOST INSULATED FOR FASTCLIP
NTS**

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REVISIONS		DES.	ENG.	DATE	DESCRIPTION
				5/8/15	

DRAWN RAILPROS	DESIGNER PE STAMP
CHECKED B. SMITH <i>BS</i>	
RECOMMENDED W. PREY <i>WP</i>	



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ENGINEERING STANDARD DRAWINGS

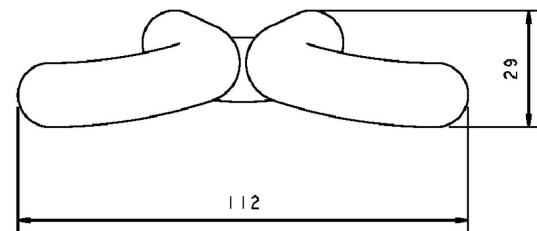
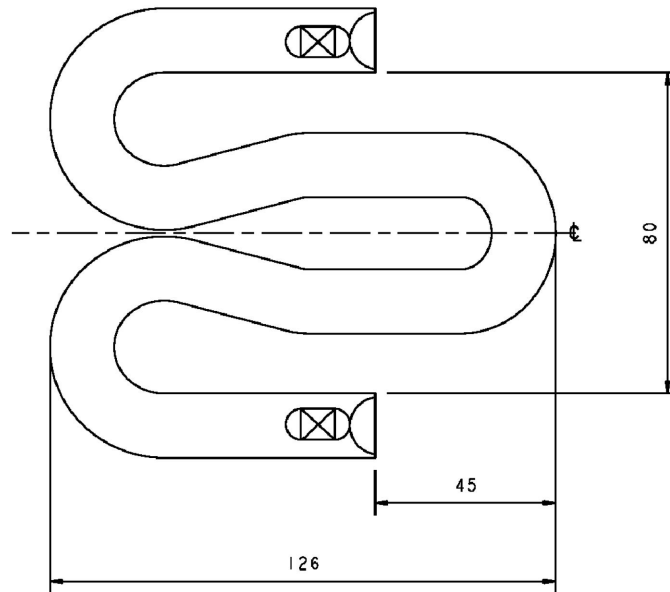
SIDEPOST INSULATOR FOR FASTCLIP

DRAWING NO.	ESD-2365
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	

NOTES:

1. STANDARD RAIL FASTCLIP SHALL BE PANDROL TYPE FC1601 OR APPROVED EQUAL.
2. MODIFIED FASTCLIP FOR INSULATED JOINTS SHALL BE PANDROL TYPE FC1602 OR APPROVED EQUAL.
3. MODIFIED FASTCLIP FITS PANDROL FASTCLIP SINGLE & TWIN-STEM SHOULDERS - TYPES 7835 AND 9086.

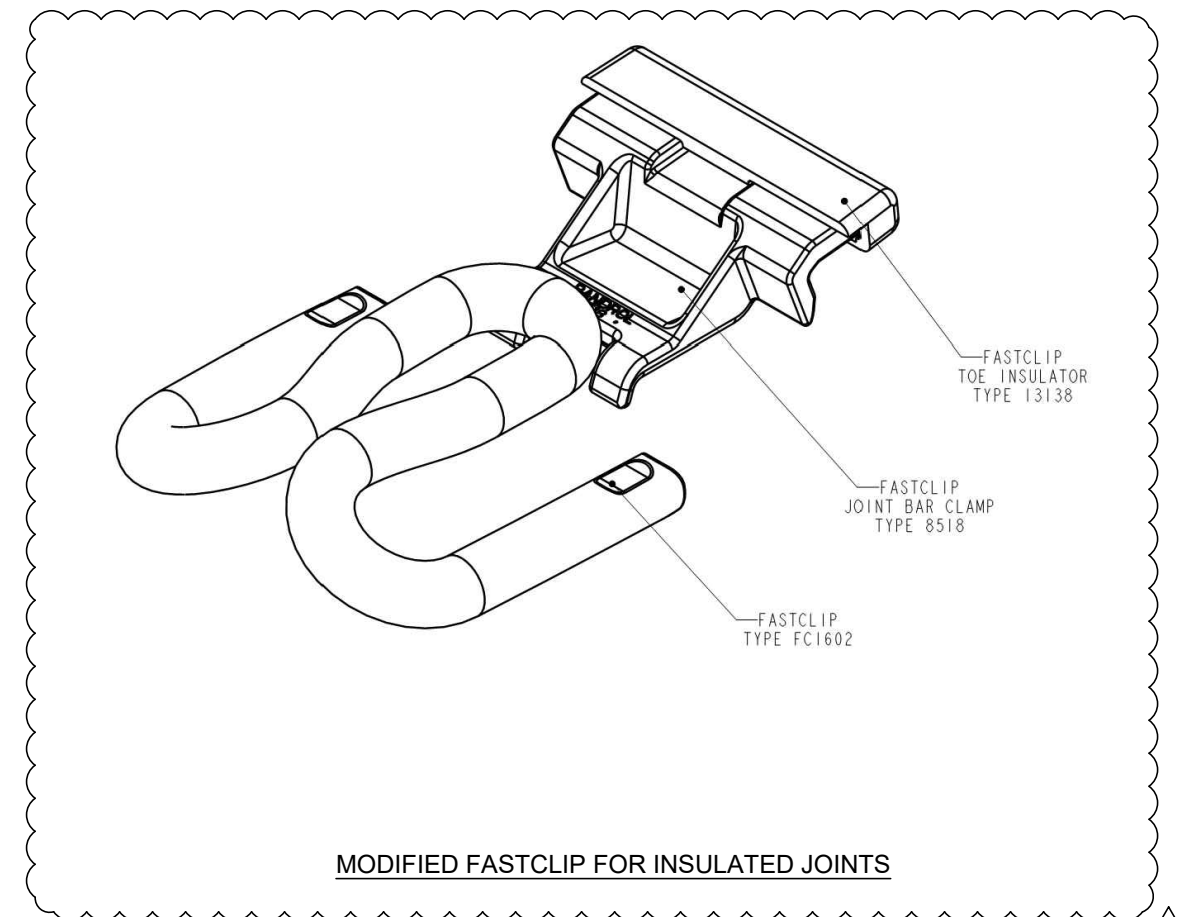
1



NOTE:

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS (mm).

STANDARD RAIL FASTCLIP



MODIFIED FASTCLIP FOR INSULATED JOINTS

1

REVISIONS		SH	DB	DRAWN	DATE
1	9/23/22			RAILPROS	SEPT 2022
				CHECKED	
				A. ANDERSON	
				RECOMMENDED	
				B. SMITH	
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ENGINEERING STANDARD DRAWINGS

RAIL FASTCLIP

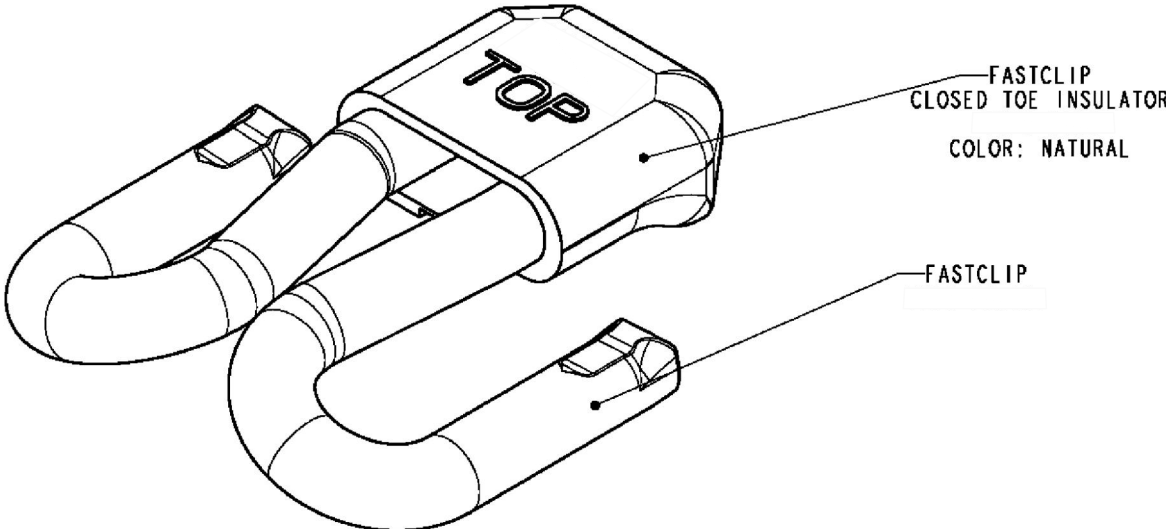
DRAWING NO. ESD-2366
 DRAWING SHEET NO. 1 OF 1
 SCALE: NONE
 CONTRACT SHEET NO.

NOTES:

1. FASTCLIP SHALL BE PANDROL TYPE FC1601 OR APPROVED EQUAL
2. CLOSED TOE INSULATOR SHALL BE COMPATIBLE WITH FASTCLIP AND SUPPLIED BY THE SAME MANUFACTURER.
3. SEE ESD-2367-02 FOR TOE INSULATOR
4. FASTCLIP SHOULD BE MANUFACTURED FROM HIGH QUALITY ALLOY SPRING STEEL

NOTES:

1. APPROX. WEIGHT: 1 Lb 9 Ozs



FASTCLIP WITH TOE INSULATOR
NTS

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RAILPROS

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B. SMITH *BS*

RECOMMENDED
W. PREY *WP*

DATE 5/8/15

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ENGINEERING STANDARD DRAWINGS

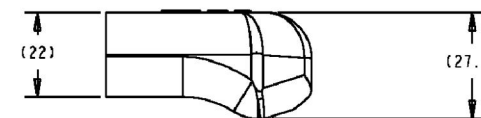
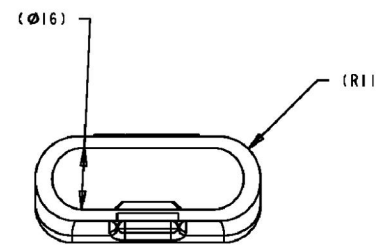
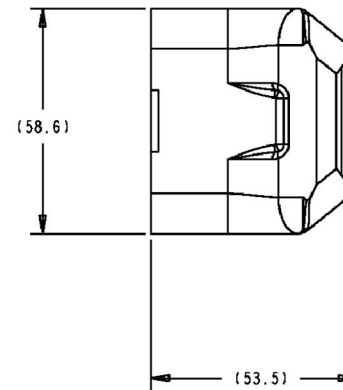
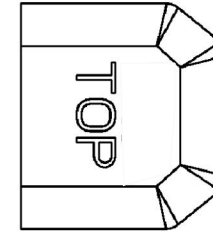
FASTCLIP WITH TOE INSULATOR

DRAWING NO. ESD-2367-01

DRAWING SHEET NO. 1 OF 2

SCALE: NONE

CONTRACT SHEET NO.



VIEW ON TOP

TOE INSULATOR FOR FASTCLIP
NTS

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RECOMMENDED
W. PREY *WP*

DATE 5/8/15

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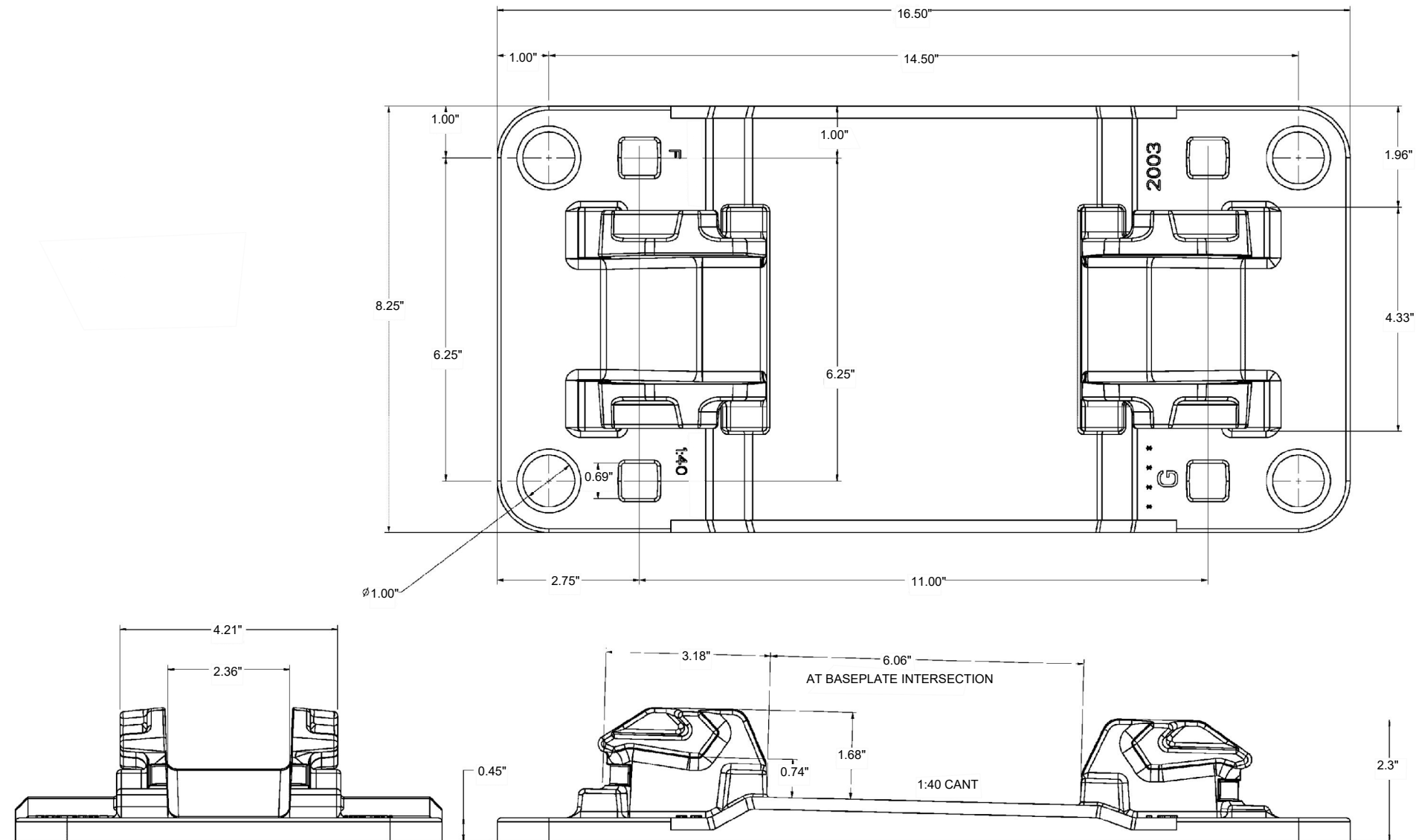
ENGINEERING STANDARD DRAWINGS

TOE INSULATOR FOR FASTCLIP

DRAWING NO. ESD-2367-02
DRAWING SHEET NO. 2 OF 2
SCALE: NONE
CONTRACT SHEET NO.

NOTES:

1. APPROXIMATE WEIGHT IS 24 LBS
2. PLATE SHOULD BE MANUFACTURED FROM DUCTILE IRON



NTS

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ENGINEERING STANDARD DRAWINGS
FASTCLIP CAST BASEPLATE FOR 6" RAIL BASE
(NON-INSULATED)

DRAWING NO. ESD-2368
DRAWING SHEET NO. 1 OF 1
SCALE: NONE
CONTRACT SHEET NO.

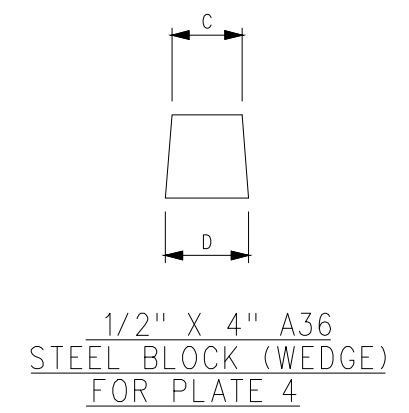
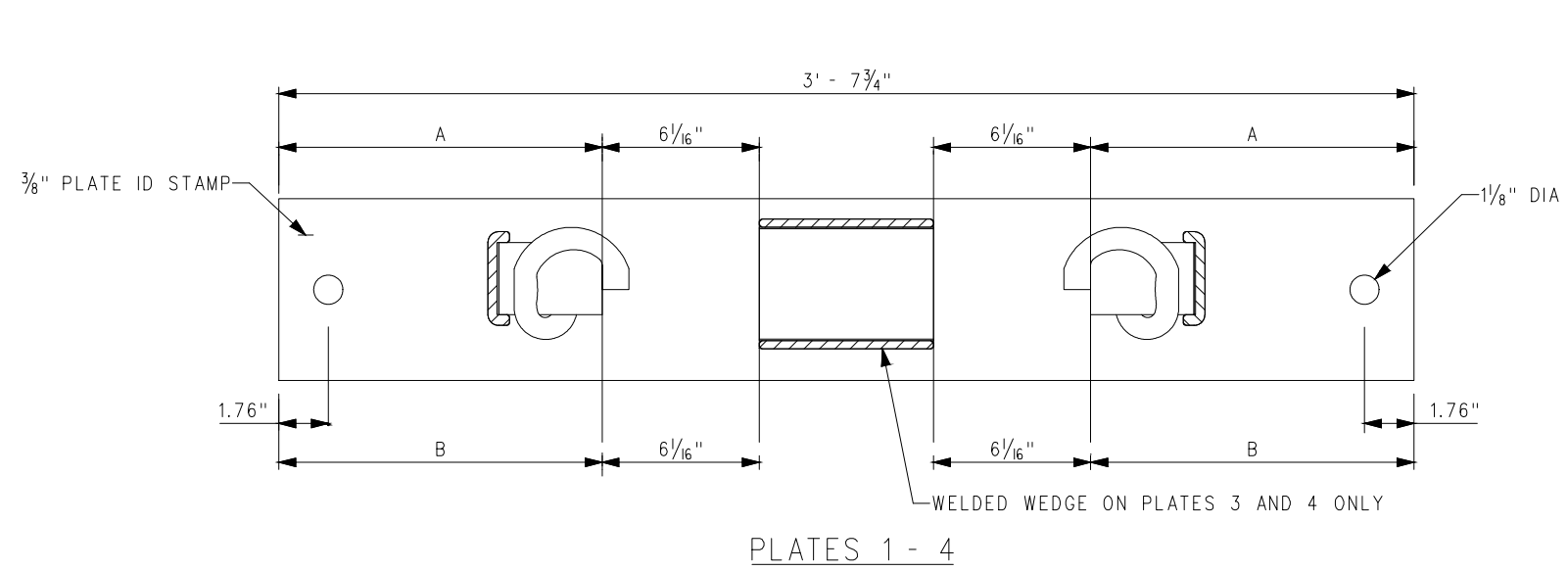
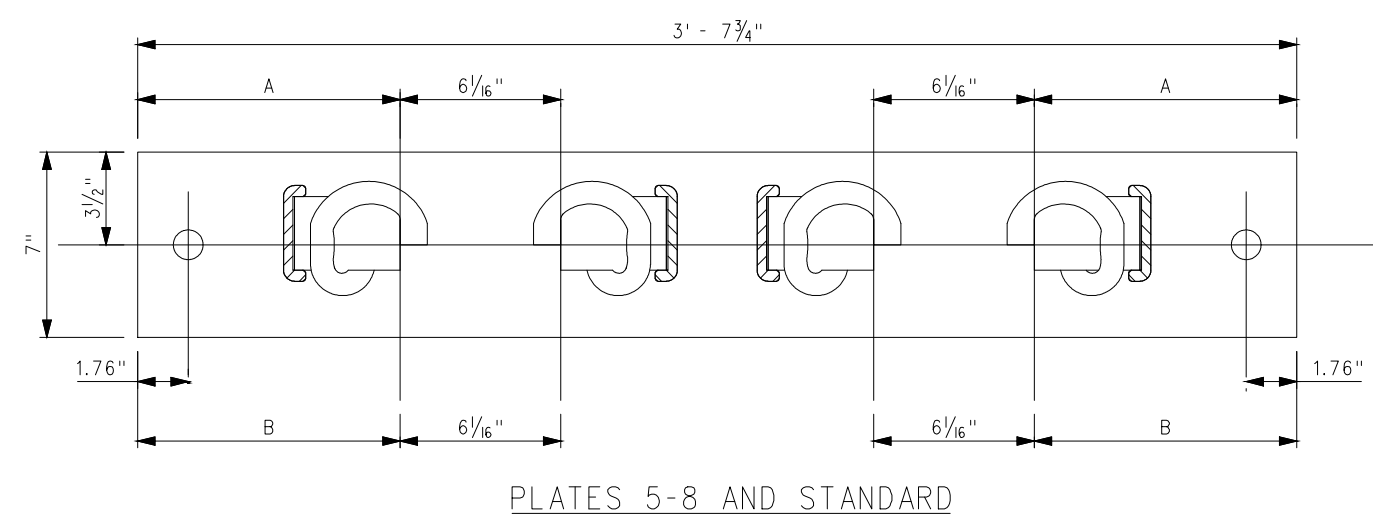


PLATE ID	C (IN)	D (IN)
4	2.56	3.06

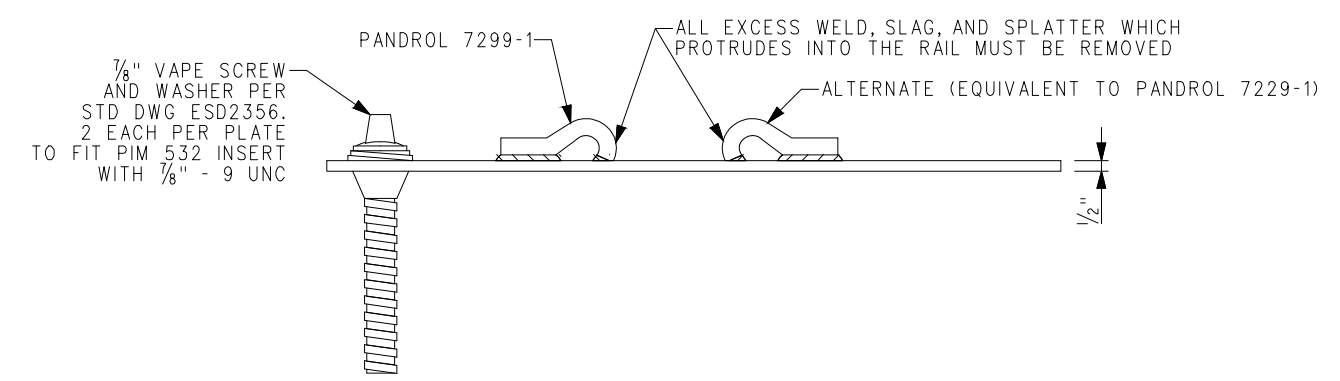


ENTRY PLATES

PLATE ID	A (IN)	B (IN)
1	17.31	17.06
2	16.44	16.19
3	15.50	15.25
4	14.63	14.31
5	13.69	13.44
6	12.75	12.50
7	11.88	11.56
8	10.94	10.69

STANDARD PLATE

PLATE ID	A (IN)	B (IN)
STD	10.05	10.05



DOUBLE INSIDE GUARD RAIL ITEM NUMBERS SET INCLUDES ALL ENTRY PLATES (2 OF EACH)	
STD PLATE (EACH)	ENTRY PLATES 1-8 (SET)

NOTES:

- NO INSIDE CLIPS FOR PLATES 1, 2, 3, & 4. REQUIRES STEEL WEDGE ON PLATES 3 & 4.
- IF 5 1/2" BASE RAIL WILL BE USED FOR GUARD RAIL, THEN DIMENSIONS A & B ARE TO BE INCREASED BY 0.50 (IN), AND THE RAIL SEAT DIMENSION WILL CHANGE FROM 6/16" TO 5/16".

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REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN RAILPROS	
CHECKED B. SMITH	<i>BS</i>
RECOMMENDED B. SCHMITH	<i>BS</i>
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DESIGNER PE STAMP	

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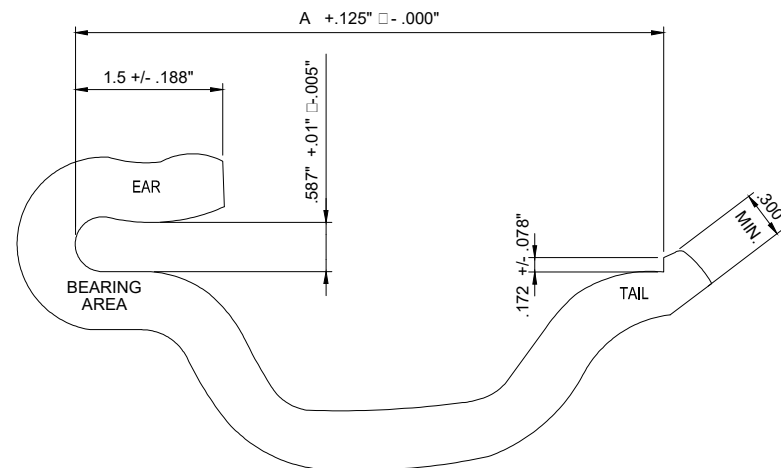
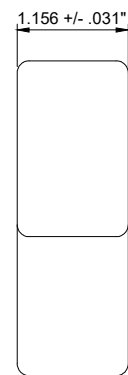
ENGINEERING STANDARD DRAWINGS

18" INSIDE GUARD RAIL PLATES FOR CONCRETE TIES

DRAWING NO.	ESD-2371
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	

NOTES:

1. MATERIAL FOR RAIL ANCHOR TO BE HIGH CARBON SPRING STEEL.
2. MATERIAL FOR RAIL ANCHOR TO BE HEAT TREATED TO RC 34-47, TARGET RANGE RC 39-44.
3. ALL DIMENSIONS ARE MINIMUM UNLESS OTHERWISE SPECIFIED.
4. TYPICAL CHEMISTRY, CARBON .58-90, MANGANESE .7-1.1, SILICON .5 MAXIMUM.



RAIL BASE SIZE	A
5 1/2"	5.625"
6"	6.125"

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REV.	DATE	DESCRIPTION	DES.	ENG.

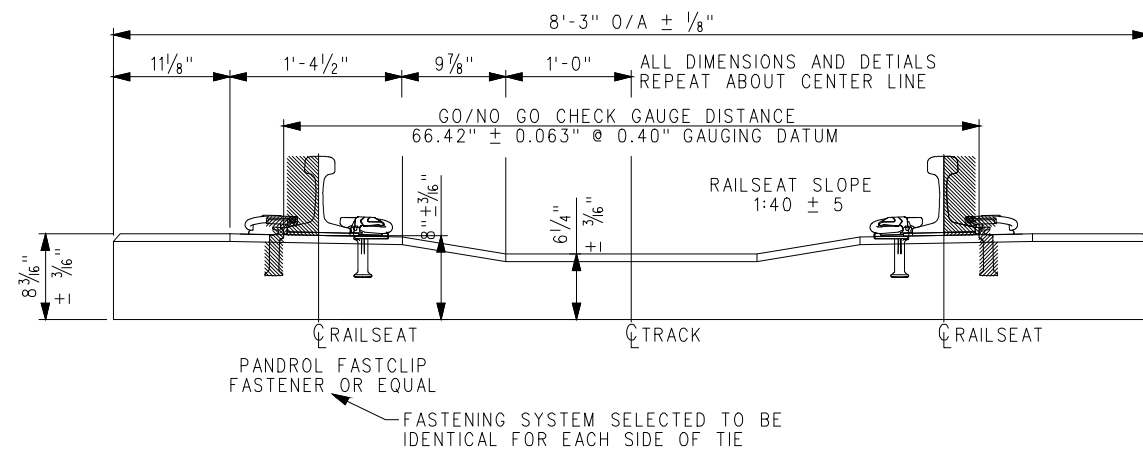
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CHECKED B. SMITH	<i>BS</i>
RECOMMENDED W. PREY	<i>WP</i>
DATE	5/27/15
DESIGNER PE STAMP	



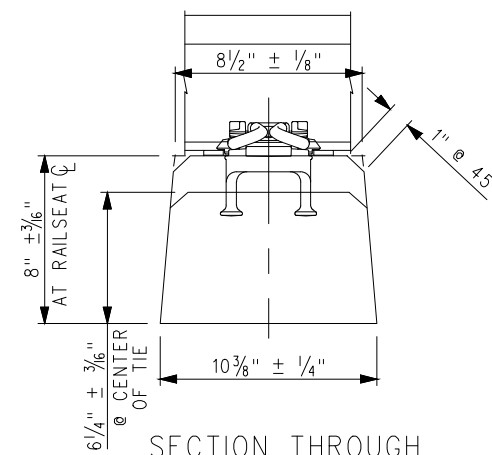
ENGINEERING STANDARD DRAWINGS

BAR STOCK ANCHOR FOR 5-1/2" AND 6" BASE RAIL

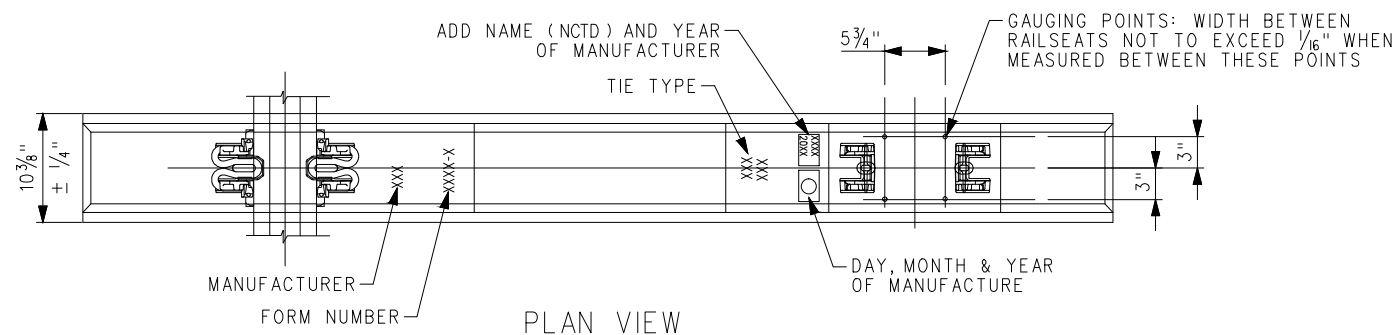
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DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	



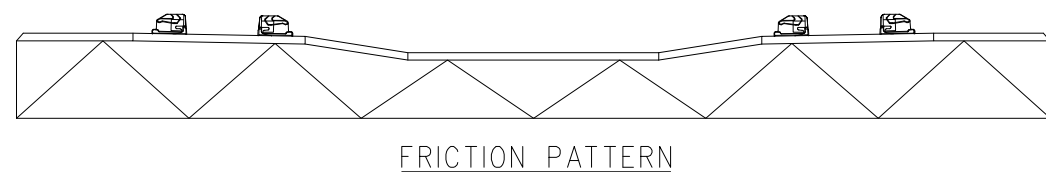
ELEVATION
(FRICTION PATTERN
NOT SHOWN FOR CLARITY)



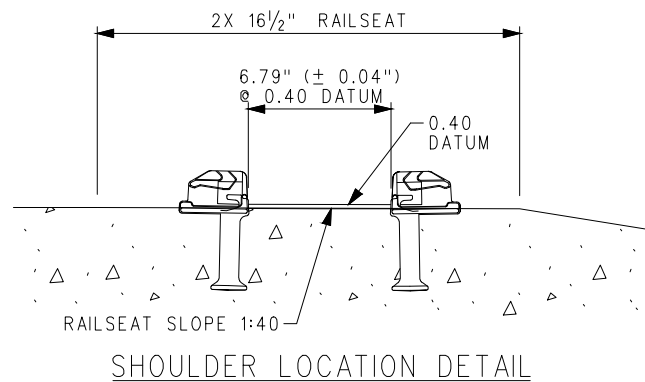
SECTION THROUGH
RAILSEAT CENTERLINE
(PRESTRESSING WIRE NOT SHOWN)



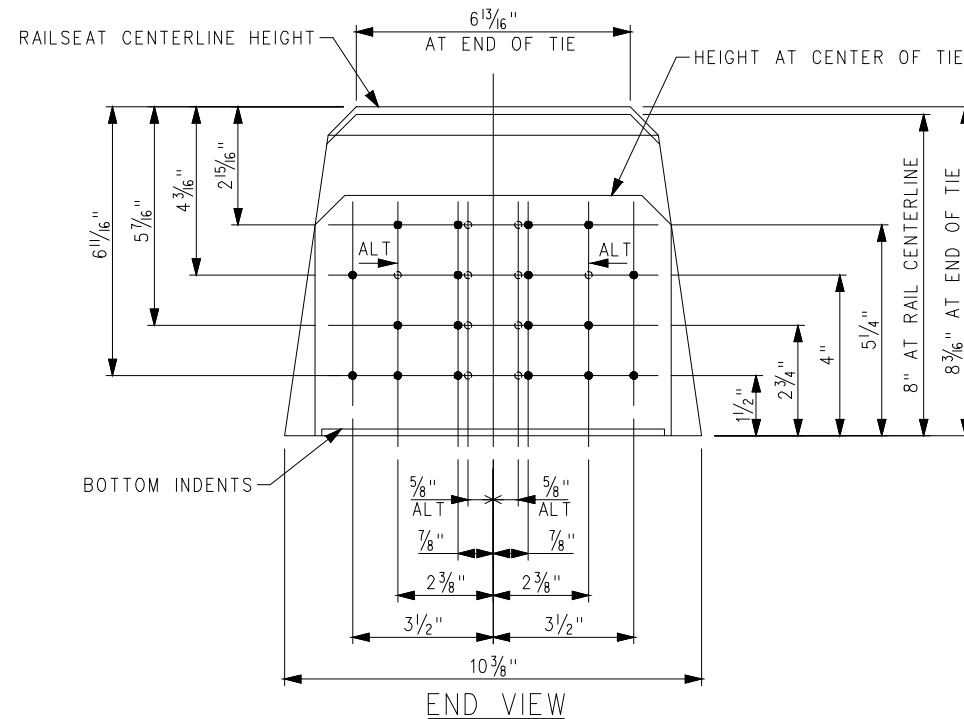
PLAN VIEW



FRICTION PATTERN



SHOULDER LOCATION DETAIL



END VIEW

NOTES:

1. CONCRETE COMPRESSIVE STRENGTH (USING *4" CYLINDER):
28 DAY SPECIFIED = 7000 PSI [48.3 MPa]
TRANSFER MINIMUM = 4500 PSI [31 MPa]
2. AIR ENTRAINED CONCRETE TO BE USED. AIR CONTENT TO BE A MINIMUM OF 3.5% IN THE HARDENED CONCRETE.
3. THE RAILSEAT SHALL BE A FLAT SMOOTH SURFACE ± 0.04" [1.0mm].
4. GAUGING POINTS FOR FLATNESS AND WIND. WIND BETWEEN RAILSEATS NOT TO EXCEED 1/16" [1.6mm] BETWEEN THESE POINTS.
5. ENDS OF PRESTRESSING WIRE TO BE CUT OFF TO WITHIN 1/8" [3.2mm] FROM SURROUNDING CONCRETE AT TIE ENDS.
6. TIES TO BE MANUFACTURED IN ACCORDANCE WITH SPECIFICATIONS AND ACCEPTED PCI PRACTICE FOR PRESTRESSED CONCRETE.
8. FOR DIMENSIONAL ACCEPTANCE PURPOSES, THE GAUGING DIMENSION BETWEEN OUTER SHOULDERS IS CHECKED WITH GO/NO GO GAUGES TO BE WITHIN 1/16" OF CALCULATED DIMENSION, AT A HEIGHT OF 0.4" ABOVE THE RAIL SEAT SURFACE WHICH IS 66.42" ± 0.63".
9. PRESTRESSING WIRE IS 5.32mm DIAMETER CONFORMING WITH ASTM A-881 STEEL WIRE, DEFORMED, STRESS RELIEVED FOR PRESTRESSED CONCRETE RAILROAD TIES. ULTIMATE STRENGTH IS 9200 LB-FORCE MINIMUM.
10. WIRES ARE TENSIONED TO 7000 LB-FORCE/WIRE.
11. THE TOLERANCE ON WIRE SHALL BE ± 1/4". ANY SINGLE WIRE MAY BE OUT OF POSITION BY MORE THAN 1/4" SO LONG AS 3/4" MINIMUM COVER AND ELECTRICAL REQUIREMENTS ARE SATISFIED.
12. ∅ = ALTERNATE WIRE LOCATION
13. FASTENING SYSTEM TO BE FASTCLIP OR AS APPROVED BY THE DIRECTOR OF ENGINEERING.
14. AN APPROVED FRICTION PATTERN SHALL BE CAST INTO SIDES OF TIES AND EMBOSSED INTO BOTTOM OF TIES.
15. RAILSEAT CANT: 1:40 (0.144 @ 5 1/4" GAUGING POINT)
MAX = 0.164" @ 5 3/4" GAUGING POINT
MIN = 0.128" @ 5 1/4" GAUGING POINT
16. APPROXIMATE WEIGHT OF TIE = 610 LBS (USING AIR ENTRAINED CONCRETE)

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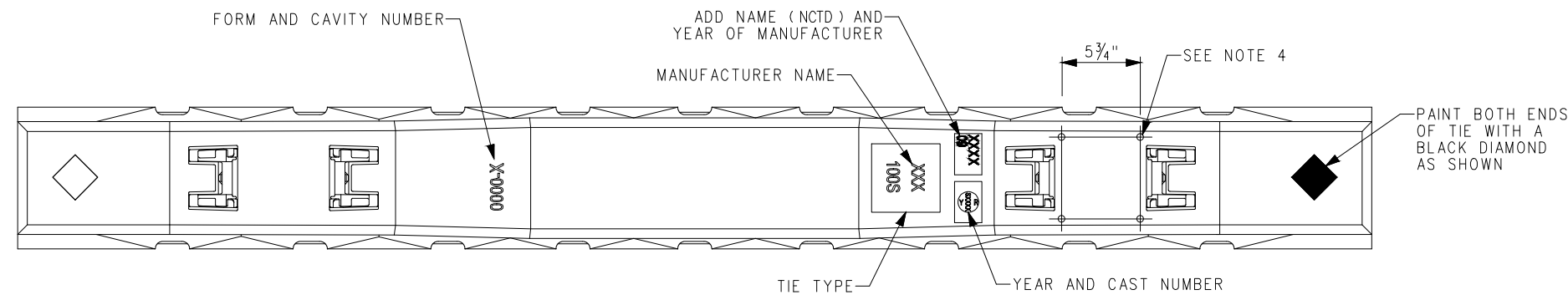
REV.	DATE	DESCRIPTION	DES.	ENG.

REVISIONS	DRAWN RAILPROS
	CHECKED B. SMITH <i>BSM</i>
	RECOMMENDED B. SCHMITH <i>BAS</i>
	DATE 02/10/17
	DESIGNER PE STAMP

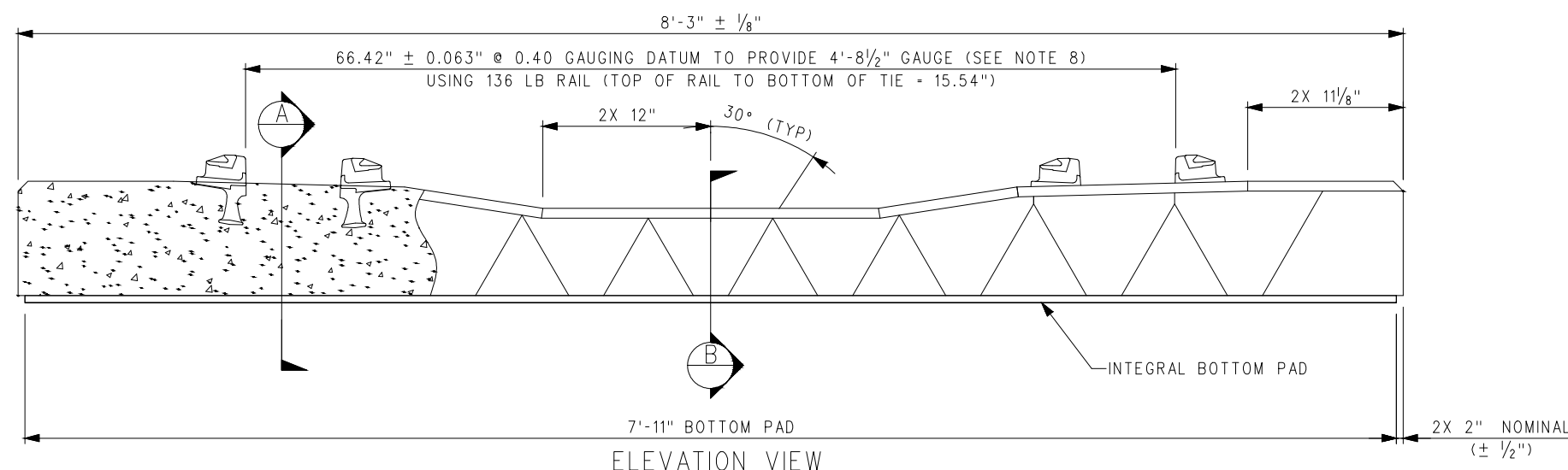
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ENGINEERING STANDARD DRAWINGS CONCRETE TIE AND ELASTIC FASTENING STANDARD	DRAWING NO. ESD-2402
	DRAWING SHEET NO. 1 OF 1
	SCALE: NONE
	CONTRACT SHEET NO.



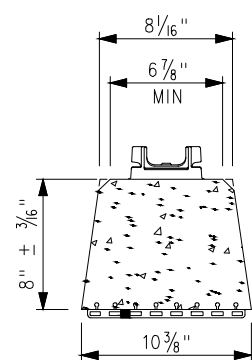
PLAN VIEW



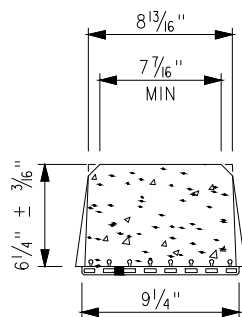
ELEVATION VIEW

NOTES:

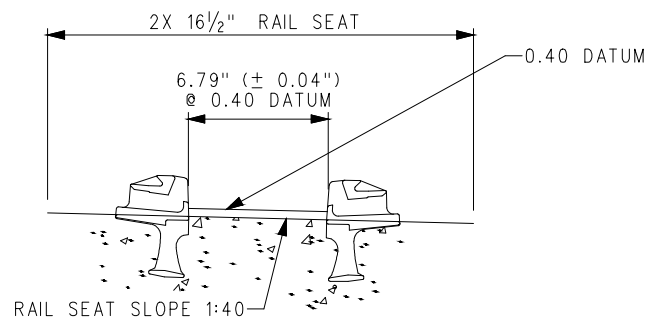
1. CONCRETE COMPRESSIVE STRENGTH (USING 4" CYLINDER):
28 DAY SPECIFIED = 7000 PSI [48.3 MPA]
TRANSFER MINIMUM = 4500 PSI [31 MPA]
2. AIR ENTRAINED CONCRETE TO BE USED. AIR CONTENT TO BE MINIMUM OF 3.5% IN THE HARDENED CONCRETE.
3. THE RAIL SEAT SHALL BE A FLAT SMOOTH SURFACE ± 0.04" [1.0mm].
4. GAUGING POINTS FOR FLATNESS AND WIND. WIND BETWEEN RAIL SEATS NOT TO EXCEED 1/16" [1.6mm] BETWEEN THESE POINTS.
5. SEE APPROPRIATE WIRE PATTERN DRAWING FOR WIRE AND STRESSING DETAILS. (ESD2402)
6. ENDS OF PRESTRESSING WIRE TO BE CUT OFF WITHIN 1/8" [3.2mm] FROM SURROUNDING CONCRETE AT TIE ENDS.
7. TIES TO BE MANUFACTURED IN ACCORDANCE WITH CUSTOMER SUPPLIED SPECIFICATIONS AND/OR ACCEPTED PCI PRACTICE FOR PRESTRESSED CONCRETE.
8. THIS TIE IS DESIGNED TO PROVIDE TRACK GAUGE USING RAIL AND THE FASTENING COMPONENTS LISTED HEREON. THE OUT-TO-OUT SHOULDER DIMENSION IS CALCULATED TO PROVIDE THE GAUGE INDICATED ASSUMING NOMINAL DIMENSIONS FOR RAIL PADS, INSULATORS, AND RAIL TOLERANCE ON SHOULDER POSITION AND RAIL SEAT INCLINATION ARE THOSE FOUND BY EXPERIENCE TO BE ACHIEVABLE AND SATISFACTORY IN PRACTICE.
9. RAIL FASTENING INFORMATION:
CAST IN COMPONENTS:
DUCTILE IRON SHOULDER: PANDROL 9086 OR APPROVED EQUAL 3'
SHOULDER FACE ANGLE
LOOSE COMPONENTS:
INSULATOR:
SIDE POST THICKNESS: AS SPECIFIED
TOE INSULATOR THICKNESS: AS SPECIFIED
CLIP: AS SPECIFIED
PAD THICKNESS: AS SPECIFIED
10. RAIL SEAT CANT: 1:40 (0.144" @ 5 3/4" GAUGING POINT)
MAX = 0.164" @ 5 3/4" GAUGING POINT
MIN = 0.128" @ 5 3/4" GAUGING POINT
11. APPROXIMATE WEIGHT OF TIE = 610 LBS. (USING AIR ENTRAINED CONCRETE).
12. THIS TIE TO ONLY BE USED ON BRIDGE DECKS WITH LESS THAN 12" OF BALLAST UNDER TIES OR AS DIRECTED BY ENGINEER.



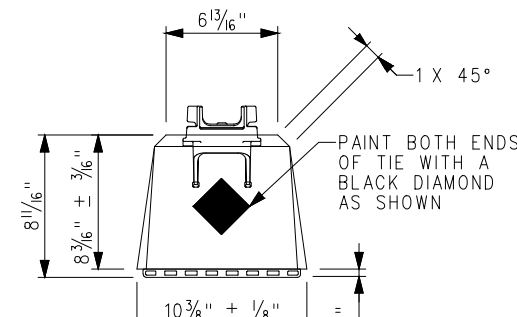
MIDWAY BETWEEN SHOULDERS A



CENTER OF TIE B



SHOULDER LOCATION DETAIL




END VIEW

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REVISIONS	DRAWN RAILPROS
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	RECOMMENDED B. SCHMITH
	DATE 5/5/16
	DESIGNER PE STAMP



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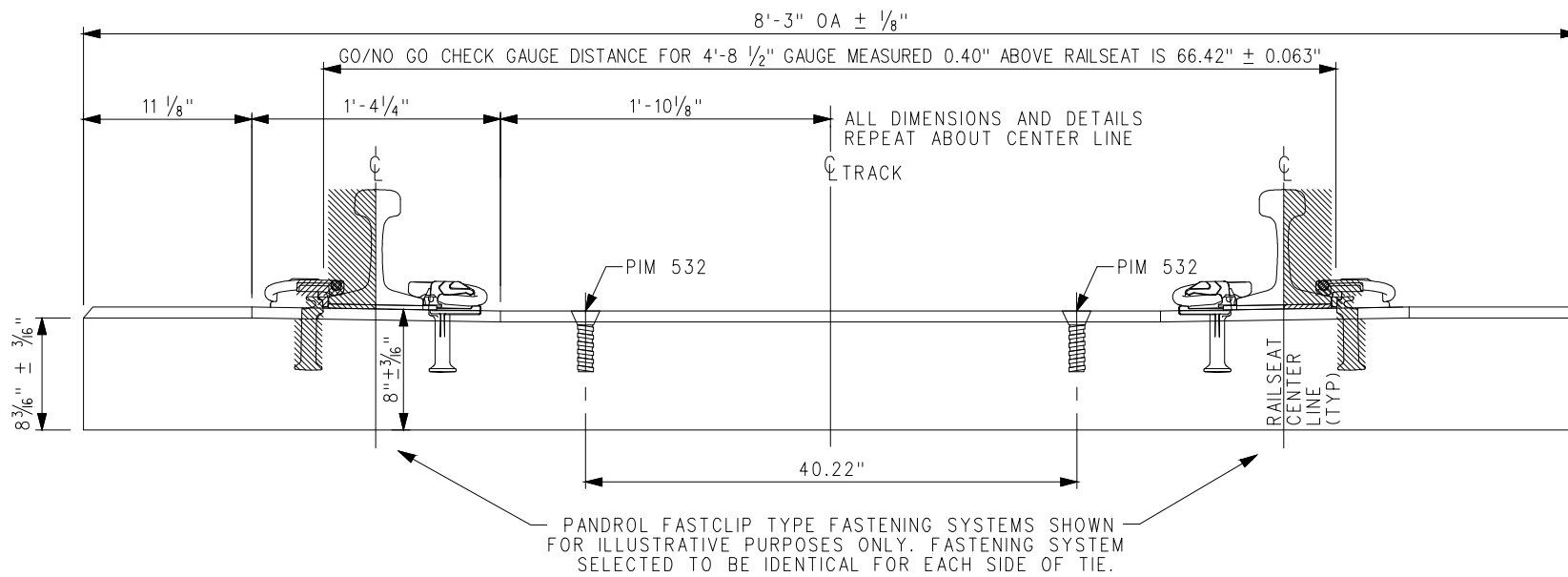
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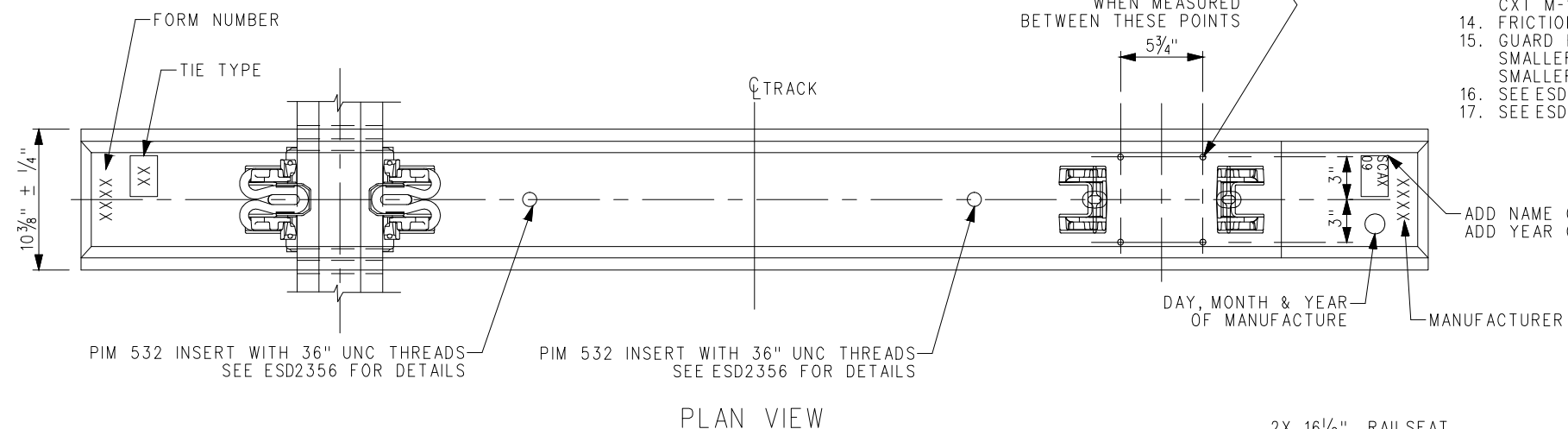
ENGINEERING STANDARD DRAWINGS	DRAWING NO. ESD-2403
8'-3" BOTTOM PAD TIE (FASTCLIP) FOR USE ON BRIDGE DECKS	DRAWING SHEET NO. 1 OF 1
	SCALE: NONE
	CONTRACT SHEET NO.



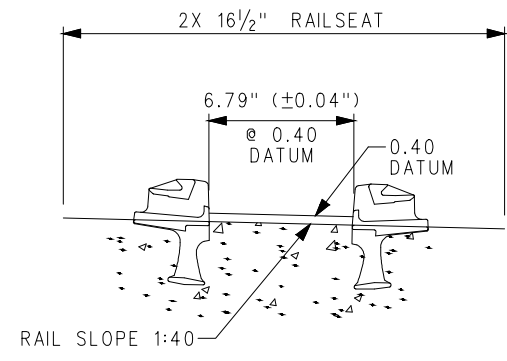
PANDROL FASTCLIP TYPE FASTENING SYSTEMS SHOWN FOR ILLUSTRATIVE PURPOSES ONLY. FASTENING SYSTEM SELECTED TO BE IDENTICAL FOR EACH SIDE OF TIE.

ELEVATION
(FRICTION PATTERN NOT SHOWN FOR CLARITY)

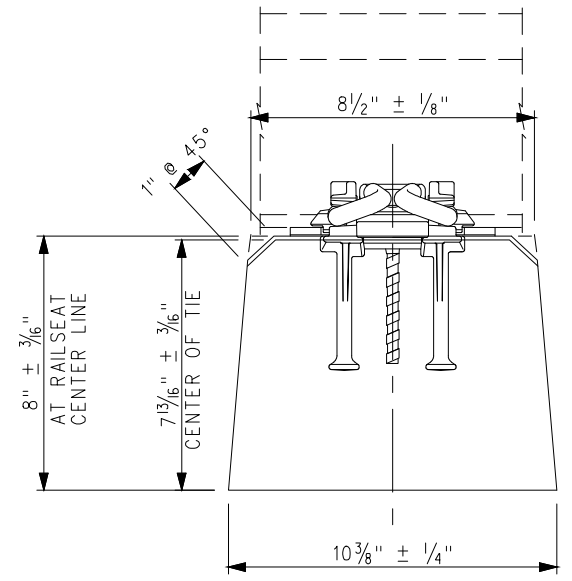
GAUGING POINT: WIDTH BETWEEN RAIL SEATS NOT TO EXCEED 1/16" WHEN MEASURED BETWEEN THESE POINTS



PLAN VIEW



SHOULDER LOCATION DETAIL



SECTION THROUGH RAILSEAT CENTERLINE
(PRESTRESSING WIRE NOT SHOWN)

NOTES:

1. CONCRETE STRENGTH (USING CYLINDER STRENGTHS), 28 DAY SPECIFIED - 7000 PSI. TRANSFER MINIMUM = 4500 PSI.
2. RAILSEAT CANT = 1:40 ± 5.
3. THE RAILSEAT SHALL BE A FLAT, SMOOTH SURFACE ±0.04" (1.0mm).
4. APPROXIMATE WEIGHT OF TIE = 600 LBS (USING AIR ENTRAINED CONCRETE).
5. FOR DIMENSIONAL ACCEPTANCE PURPOSES, THE GAUGING DIMENSION BETWEEN OUTER SHOULDERS IS CHECKED WITH GO/NO GO GAUGES TO BE WITHIN 1/16" OF CALCULATED DIMENSION, AT A HEIGHT OF 0.4" ABOVE THE RAIL SEAT SURFACE. GO/NO GO DIMENSION IS 66.42" ± 0.063".
6. THIS TIE IS DESIGNED FOR USE WITH 136 LB RE RAIL. THIS TIE WILL ALSO ACCOMMODATE 115 LB, 119 LB, 132 LB, AND 141 LB RAIL WITH MINOR CHANGE IN SIDE POST TO ACHIEVE CORRECT GAUGE. SEE ESD2360 FOR DETAILS CONCERNING SIDE POST AND RAIL SIZE.
7. PRESTRESSING WIRE IS 5.32mm DIAMETER DEFORMED WIRE STRESS RELIEVED WITH A MINIMUM BREAKING LOAD OF 9200 LBS AND WITH OTHER REQUIREMENTS CONFORMING WITH ASTM A-881, "STEEL WIRE DEFORMED FOR PRESTRESSED CONCRETE RAILROAD TIES".
8. ENDS OF PRESTRESSING WIRE TO BE CUT OFF TO WITHIN 1/8" OF SURROUNDING CONCRETE AT TIE ENDS.
9. AIR ENTRAINED CONCRETE TO BE USED, AIR CONTENT TO BE 5 1/2% ± 1% IN PLASTIC CONCRETE.
10. THE OUT TO OUT SHOULDER SPACING DIMENSION FOR THIS TIE IS CALCULATED TO PROVIDE THE GAUGE INDICATED ASSUMING NOMINAL DIMENSIONS FOR RAIL PADS, INSULATORS AND RAIL. TOLERANCE ON SHOULDER POSITIONS AND RAILSEAT INCLINATION ARE THOSE FOUND BY EXPERIENCE TO BE ACHIEVABLE AND SATISFACTORY IN PRACTICE.
11. TIES TO BE MANUFACTURED IN ACCORDANCE WITH ACCEPTED PCI CONSTRUCTION PRACTICE FOR PRESTRESSED CONCRETE.
12. FASTENING SYSTEM TO BE APPROVED BY DIRECTOR OF ENGINEERING
13. GUARD RAIL FASTENINGS:
PIM 532 INSERT 7/8" - 9 UNC THREAD
VASSLOH FE6 SPRING WASH
HEAVY HEX 7/8" - 9 UNC BOLT
CXT M-180 CAST IRON CLIP OR EQUIVALENT.
14. FRICTION PATTERN SHALL BE CAST INTO SIDES OF TIES AND EMBOSSED INTO BOTTOM OF TIES.
15. GUARD RAIL MUST BE SMALLER THAN OR EQUAL IN HEIGHT TO RUNNING RAIL. DO NOT USE SMALLER THAN 115 LB GUARD RAIL SECTION WITH 132 LB - 136 LB RUNNING RAIL. DO NOT USE SMALLER THAN 132 LB GUARD RAIL SECTION WITH 141 LB RUNNING RAIL.
16. SEE ESD2356 FOR DETAILS ON COACH SCREW, INSERT, AND WASHER.
17. SEE ESD2371 FOR DETAILS ON INSIDE GUARD RAIL PLATES FOR CONCRETE TIES.

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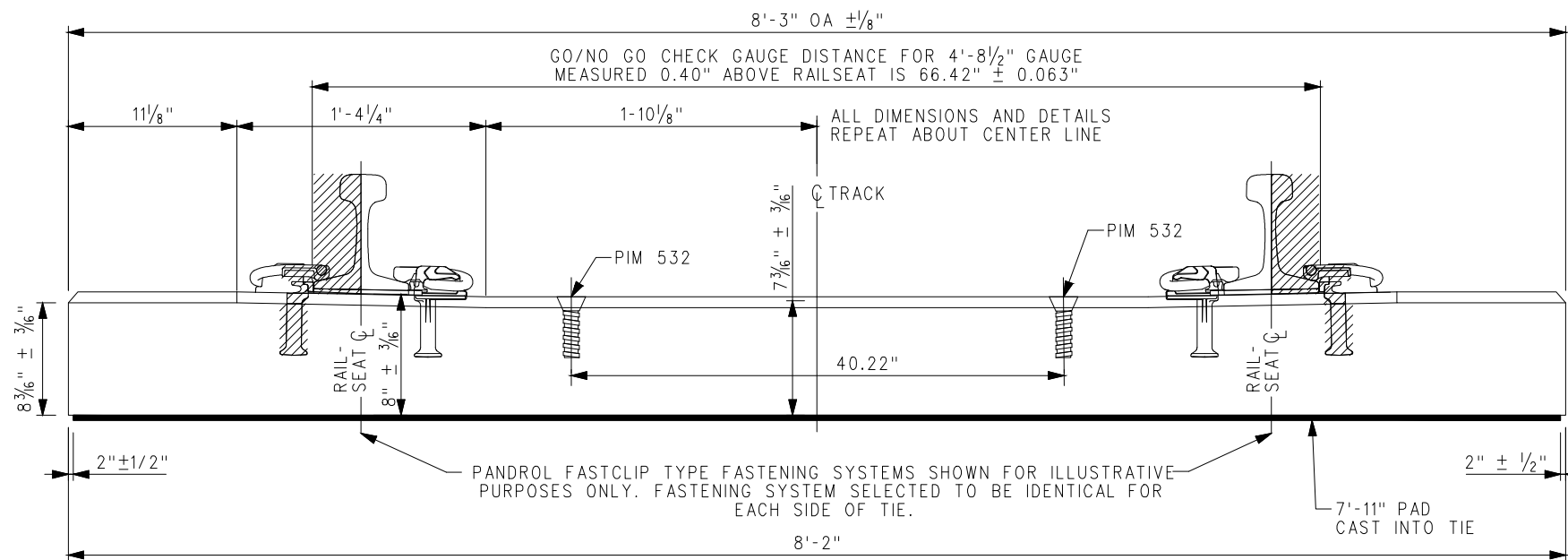
REVISIONS	DRAWN RAILPROS
CHECKED B. SMITH	<i>BS</i>
RECOMMENDED B. SCHMITH	<i>BS</i>
DATE 02/10/17	DESIGNER PE STAMP

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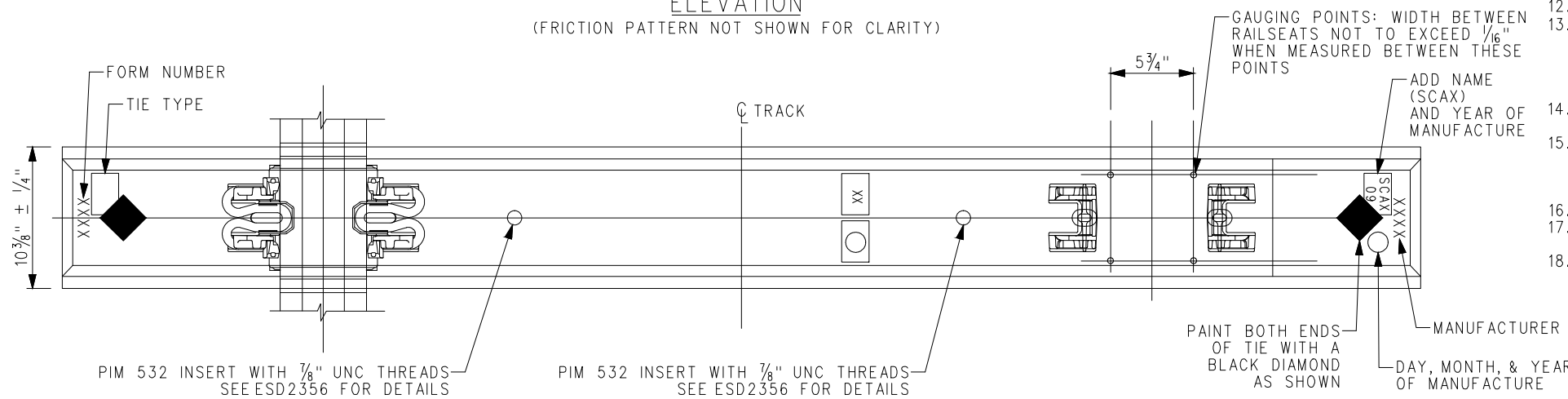
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ENGINEERING STANDARD DRAWINGS
CONCRETE TIE - 18" INNER GUARD RAIL

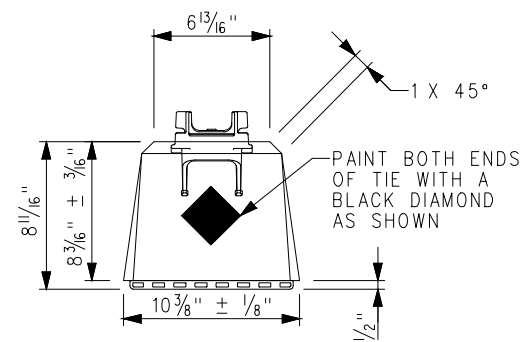
DRAWING NO.	ESD-2406
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	



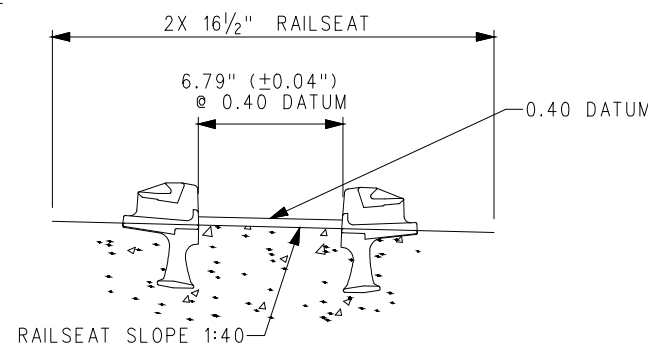
ELEVATION
(FRICTION PATTERN NOT SHOWN FOR CLARITY)



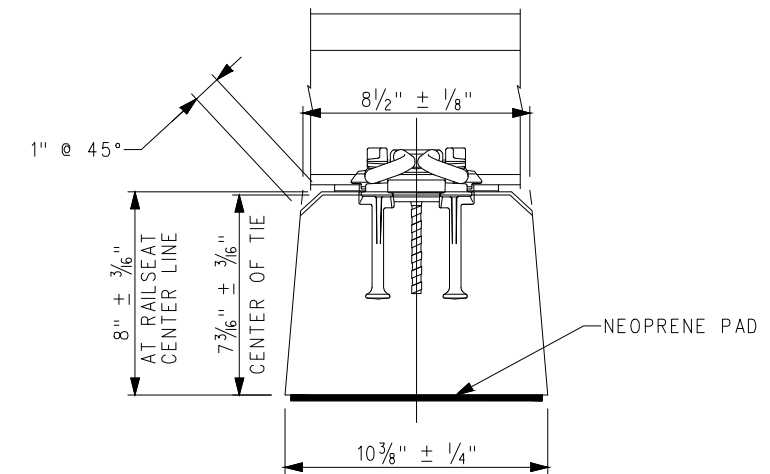
PLAN VIEW



END VIEW



SHOULDER LOCATION DETAIL



SECTION THROUGH RAILSEAT CENTERLINE
(PRESTRESSING WIRE NOT SHOWN)

NOTES:

1. CONCRETE STRENGTH (USING CYLINDER STRENGTHS), 28 DAY SPECIFIED = 7000 PSI
TRANSFER MINIMUM = 4500 PSI.
2. RAIL SEAT CANT = 1:40 ± 5.
3. THE RAIL SEAT SHALL BE A FLAT, SMOOTH SURFACE ±0.04" (1.0mm).
4. APPROXIMATE WEIGHT OF TIE = 600 LBS (USING AIR ENTRAINED CONCRETE).
5. FOR DIMENSIONAL ACCEPTANCE PURPOSES, THE GAUGING DIMENSION BETWEEN OUTER SHOULDERS IS CHECKED WITH GO/NO GO GAUGES TO BE WITHIN 1/16" OF CALCULATED DIMENSION, AT A HEIGHT OF 0.4" ABOVE THE RAIL SEAT SURFACE. GO/NO GO DIMENSION IS 66.42" ± 0.063".
6. THIS TIE IS DESIGNED FOR USE WITH 136 LB RE RAIL. THIS TIE WILL ALSO ACCOMMODATE 115, 119, 132, AND 141 LB RAIL WITH MINOR CHANGE IN SIDE POST TO ACHIEVE CORRECT GAUGE. SEE ESD 2360 FOR DETAILS CONCERNING SIDE POST AND RAIL SIZE.
7. PRESTRESSING WIRE IS 5.32mm DIAMETER DEFORMED WIRE STRESS RELIEVED WITH A MINIMUM BREAKING LOAD OF 9200 LBS AND WITH OTHER REQUIREMENTS CONFORMING WITH ASTM A-881, "STEEL WIRE DEFORMED FOR PRESTRESSED CONCRETE RAILROAD TIES".
8. ENDS OF PRESTRESSING WIRE TO BE CUT OFF WITHIN 1/8" OF SURROUNDING CONCRETE AT TIE ENDS.
9. AIR ENTRAINED CONCRETE TO BE USED, AIR CONTENT TO BE 5 1/2% ± 1% IN PLASTIC CONCRETE.
10. THE OUT TO OUT SHOULDER SPACING DIMENSION FOR THIS TIE IS CALCULATED TO PROVIDE THE GAUGE INDICATED ASSUMING NOMINAL DIMENSIONS FOR RAIL PADS, INSULATORS AND RAIL. TOLERANCE ON SHOULDER POSITIONS AND RAILSEAT INCLINATION ARE THOSE FOUND BY EXPERIENCE TO BE ACHIEVABLE AND SATISFACTORY IN PRACTICE.
11. TIES TO BE MANUFACTURED IN ACCORDANCE WITH ACCEPTED PCI CONSTRUCTION PRACTICE FOR PRESTRESSED CONCRETE.
12. FASTENING SYSTEM TO BE APPROVED BY DIRECTOR OF ENGINEERING
13. GUARD RAIL FASTENINGS:
PIM 532 INSERT 7/8" - 9 UNC THREAD
VASSLOH FE6 SPRING WASHER
HEAVY HEX 7/8" - 9 UNC BOLT
CXT M180 CAST IRON CLIP OR EQUIVALANT
14. FRICTION PATTERN SHALL BE CAST INTO SIDES OF TIES AND EMBOSSED INTO BOTTOM OF TIES.
15. GUARD RAIL MUST BE SMALLER THAN OR EQUAL IN HEIGHT TO RUNNING RAIL. DO NOT USE SMALLER THAN 115 LB GUARD RAIL SECTION WITH 132 - 136 LB RUNNING RAIL. DO NOT USE SMALLER THAN 132 LB GUARD RAIL SECTION WITH 141 LB RUNNING RAIL.
16. SEE ESD 2356 FOR DETAILS ON COACH SCREW, INSERT, AND WASHER.
17. SEE ESD 2371 FOR DETAILS ON INSIDE GUARD RAIL PLATES FOR CONCRETE TIES.
18. THIS TIE TO ONLY BE USED ON BRIDGE DECKS WITH LESS THAN 12" OF BALLAST UNDER TIES OR AS DIRECTED BY ENGINEER.

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DRAWN
RAILPROS

CHECKED
B. SMITH

RECOMMENDED
B. SCHMITH

DATE 02/10/17



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ENGINEERING STANDARD DRAWINGS

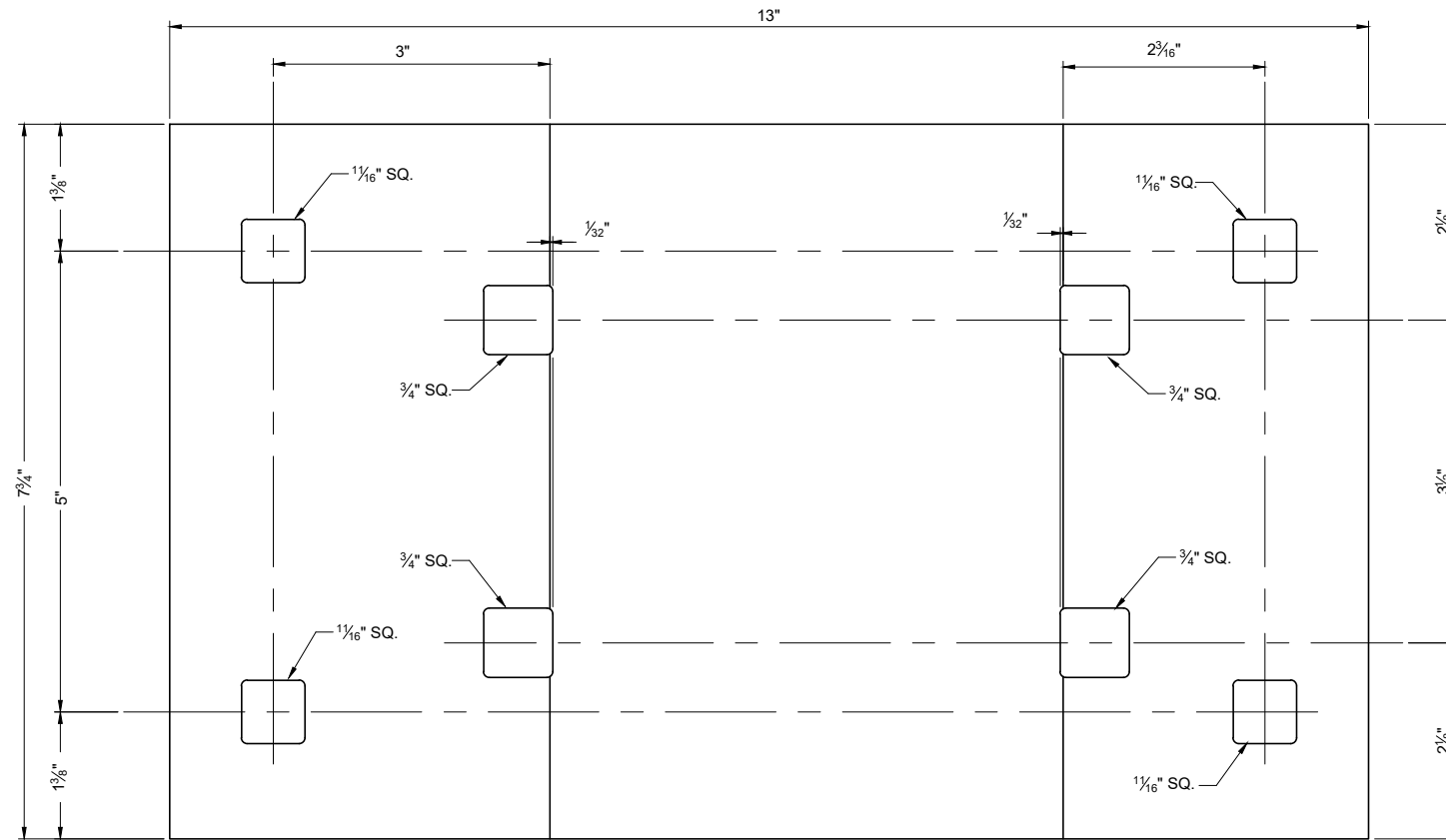
CONCRETE TIE - 18" INNER GUARD RAIL WITH
NEOPRENE PAD

DRAWING NO. ESD-2407

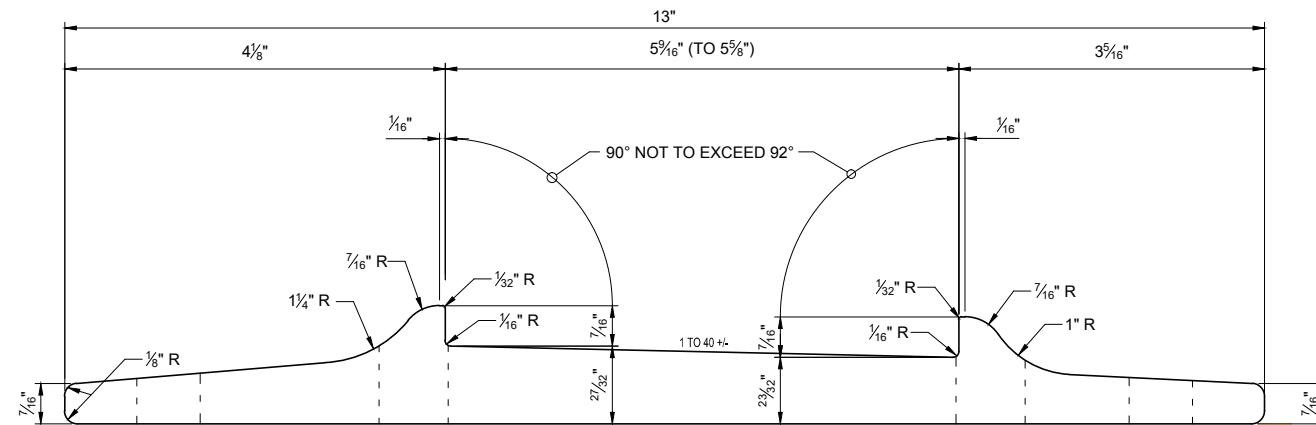
DRAWING SHEET NO. 1 OF 1

SCALE: NONE

CONTRACT SHEET NO.



PLAN



ELEVATION

NOTES:

1. ALL SQUARE SPIKE HOLES SHALL HAVE $\frac{1}{16}$ " FILLETS IN CORNERS.
2. ESTIMATED WEIGHTS:

PER FOOT	31.84 lb.
PER 7 $\frac{3}{4}$ "	20.56 lb.
PUNCHED 8 SPIKE HOLES	19.60 lb.
3. EITHER LOW CARBON OR HIGH CARBON STEEL TIE PLATES MAY BE FURNISHED. ASTM 67 APPLIES.
4. STEEL TIE PLATES ARE TO BE ROLLED TO AREMA MATERIAL SPECIFICATIONS.

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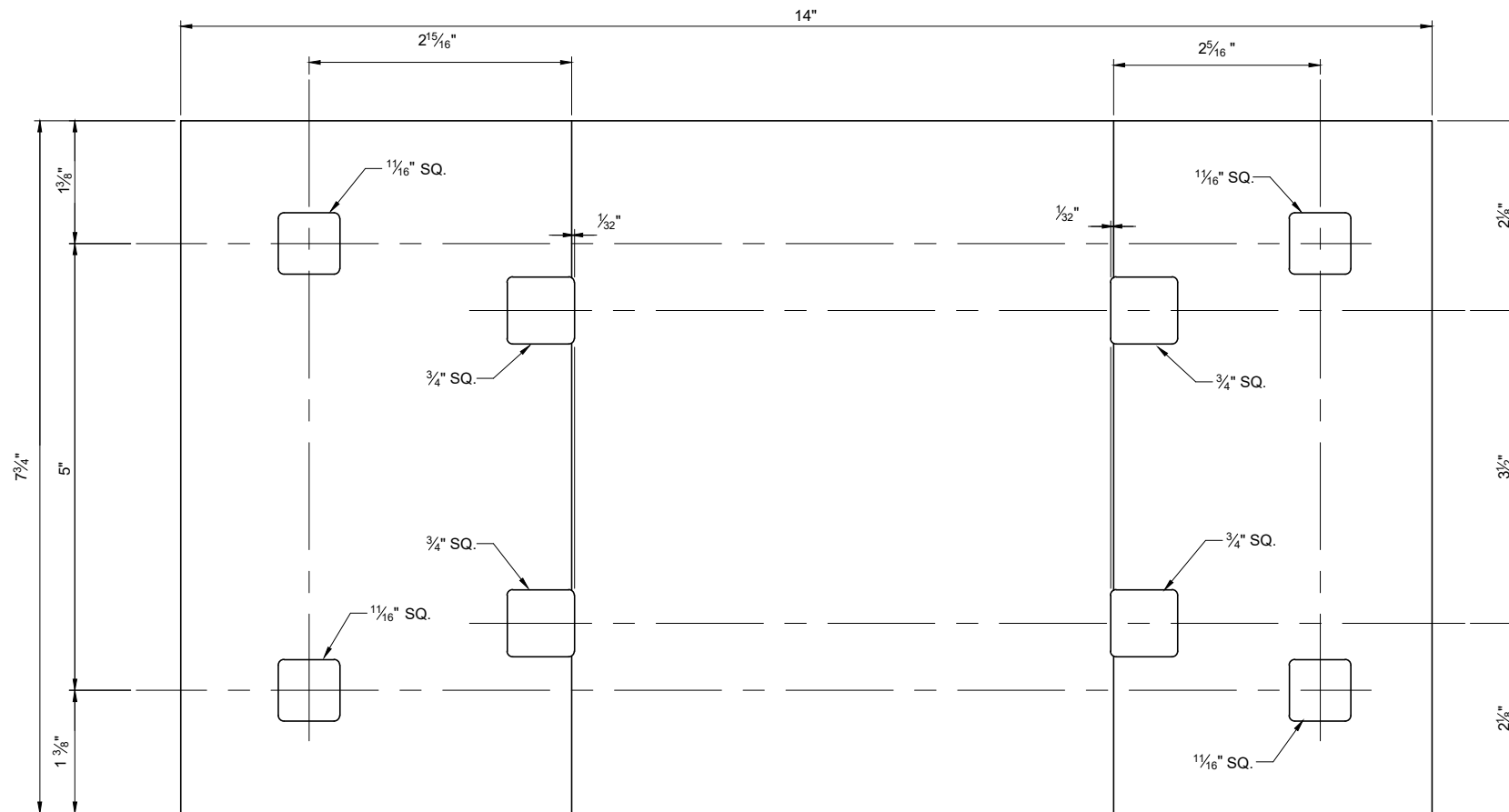
DRAWN RAILPROS		CHECKED B. SMITH <i>BS</i>	RECOMMENDED W. PREY <i>WP</i>	DATE 5/8/15	DESIGNER PE STAMP
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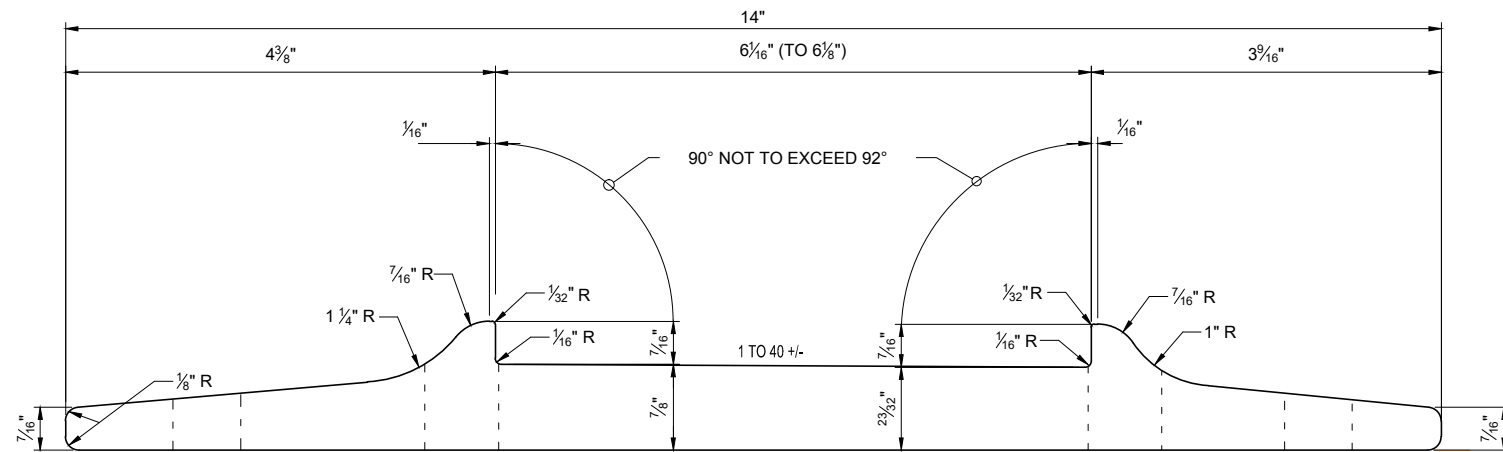
ENGINEERING STANDARD DRAWINGS

STANDARD 13" TIE PLATE FOR 5-1/2" BASE RAIL

DRAWING NO. ESD-2451
DRAWING SHEET NO. 1 OF 1
SCALE: NONE
CONTRACT SHEET NO.



PLAN



ELEVATION

NOTES:

- ALL SQUARE SPIKE HOLES SHALL HAVE $\frac{1}{16}$ " FILLETS IN CORNERS.
- ESTIMATED WEIGHTS:

PER FOOT	34.77 lb.
PER 7 $\frac{3}{4}$ "	22.45 lb.
PUNCHED 8 SPIKE HOLES	21.47 lb.
- EITHER LOW CARBON OR HIGH CARBON STEEL TIE PLATES MAY BE FURNISHED. ASTM 67 APPLIES
- STEEL TIE PLATES ARE TO BE ROLLED TO AREMA MATERIAL SPECIFICATIONS

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DRAWN RAILPROS
CHECKED B. SMITH <i>BS</i>
RECOMMENDED W. PREY <i>WP</i>
DATE 5/8/15
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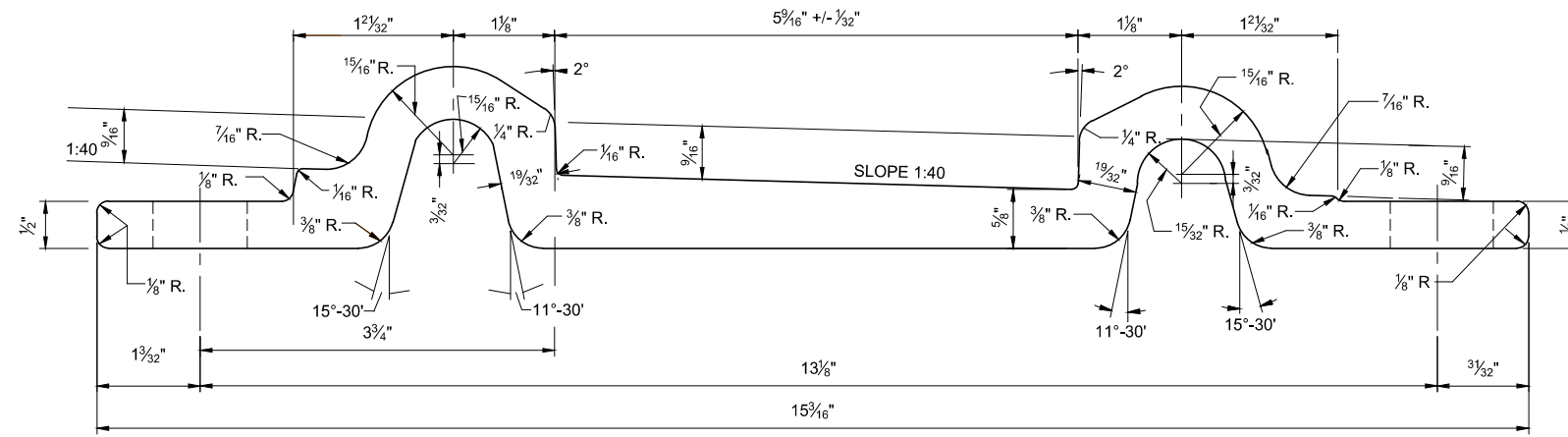
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ENGINEERING STANDARD DRAWINGS

14" TIE PLATE FOR 6" BASE RAIL

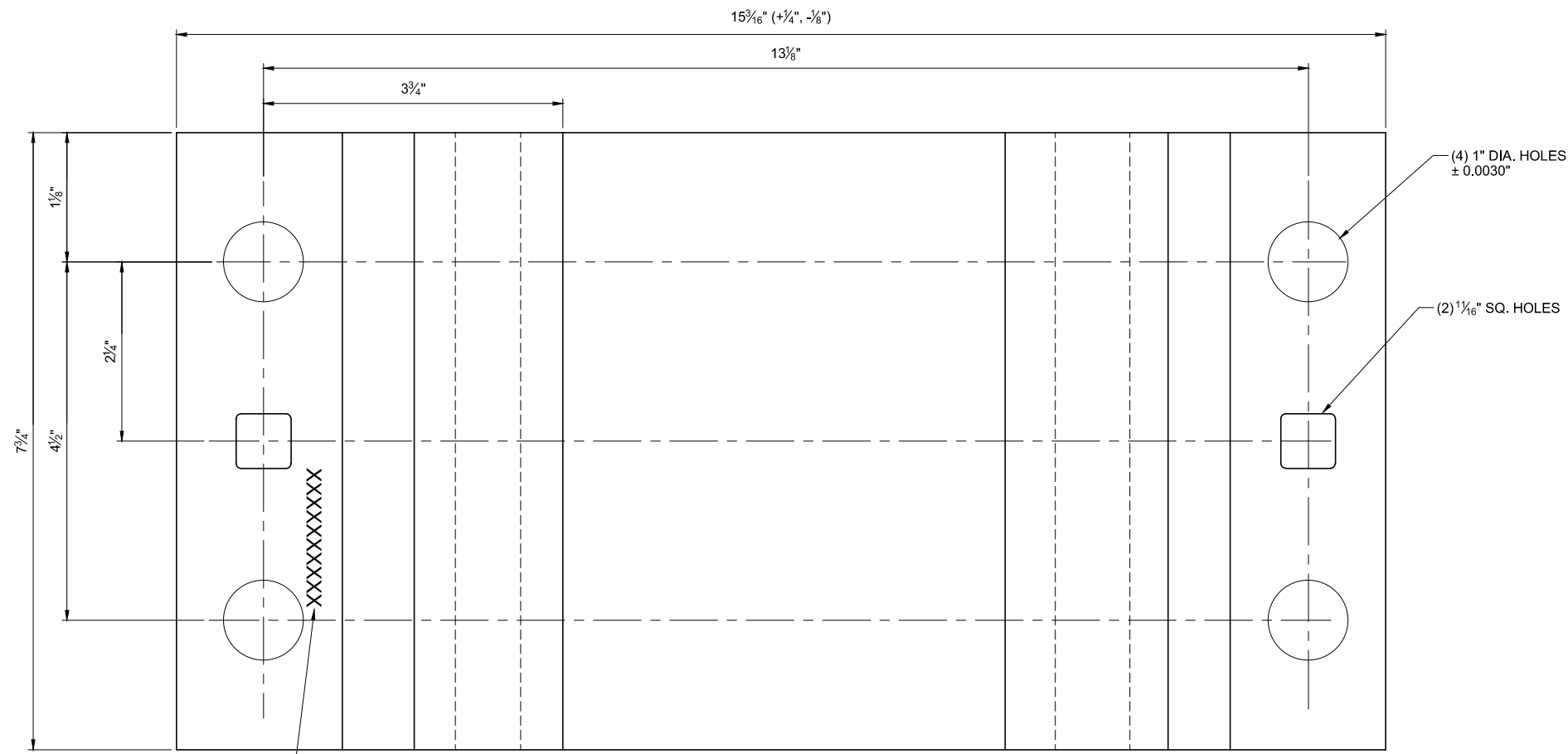
DRAWING NO. ESD-2452
DRAWING SHEET NO. 1 OF 1
SCALE: NONE
CONTRACT SHEET NO.



SECTION

NOTES:

1. PLATE TO BE STANDARD PANDROL TYPE OR APPROVED EQUAL TIE PLATE MODIFIED FOR 1" DIA. HOLES.
2. PLATE TO BE INSTALLED WITH 2 EACH RAIL FASTENING CLIP PER ESD-2362.
3. PLATE TO BE INSTALLED WITH 4 EACH SCREW SPIKES PER PLATE PER ESD-2355-02.



PLAN

NAME OR BRAND OF MANUFACTURER AND LAST TWO DIGITS OF YEAR MANUFACTURED TO BE ROLLED IN RAISED LETTERS

(4) 1" DIA. HOLES ± 0.0030"

(2) 1 1/16" SQ. HOLES

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DRAWN RAILPROS	
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RECOMMENDED W. PREY	WP
DATE	5/27/15
DESIGNER PE STAMP	



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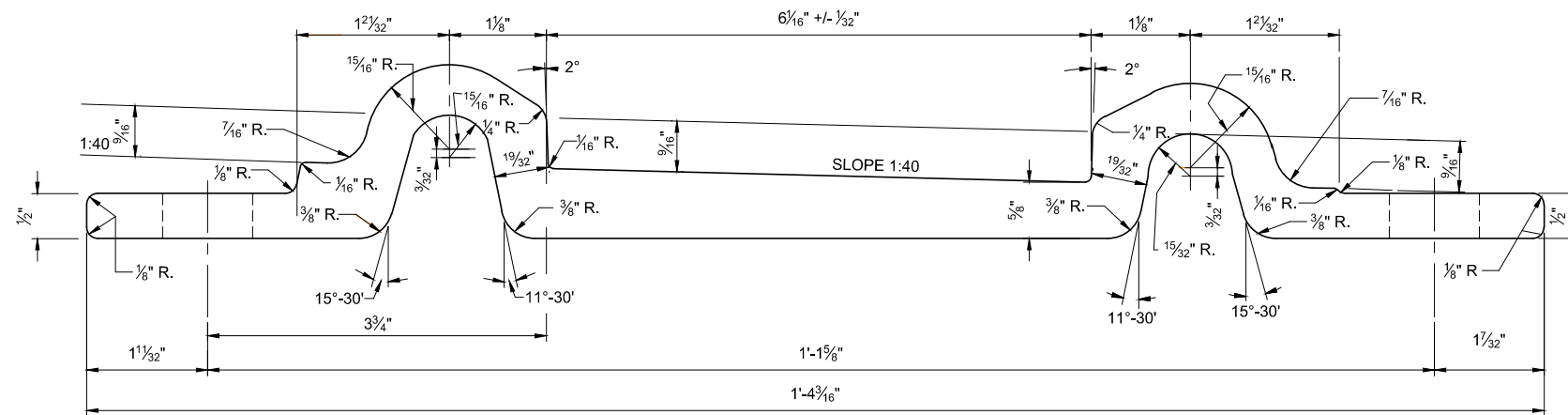


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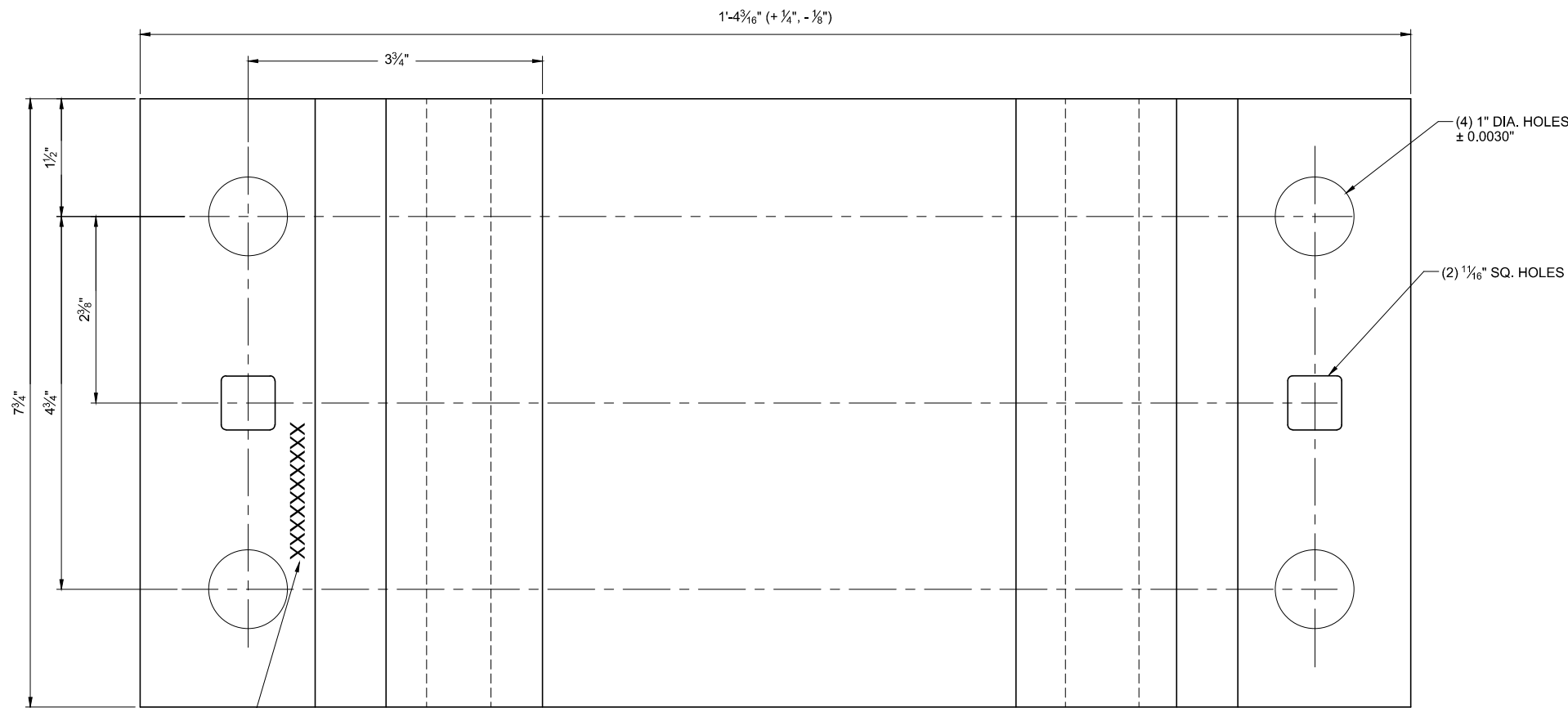
ENGINEERING STANDARD DRAWINGS

STANDARD ROLLED STEEL TIE PLATE FOR 5-1/2" BASE RAIL - FOR USE WITH SCREW SPIKES

DRAWING NO.	ESD-2453
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	



SECTION



PLAN

NOTES:

1. PLATE TO BE STANDARD PANDROL TYPE OR APPROVED EQUAL TIE PLATE MODIFIED FOR 1" DIA. HOLES.
2. PLATE TO BE INSTALLED WITH 2 EACH RAIL FASTENING CLIP PER ESD-2362.
3. PLATE TO BE INSTALLED WITH 4 EACH SCREW SPIKES PER PLATE PER ESD-2355-02.

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REVISIONS	DRAWN RAILPROS
	CHECKED B. SMITH
	RECOMMENDED W. PREY
	DATE 5/27/15
	DESIGNER PE STAMP

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ENGINEERING STANDARD DRAWINGS

STANDARD ROLLED STEEL TIE PLATE FOR 6" BASE RAIL -
FOR USE WITH SCREW SPIKES

DRAWING NO.	ESD-2454
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	

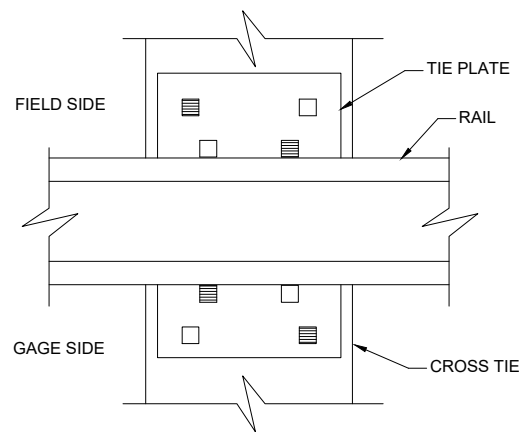


FIG. A

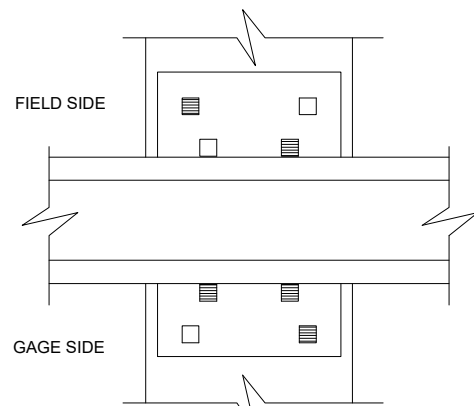


FIG. B

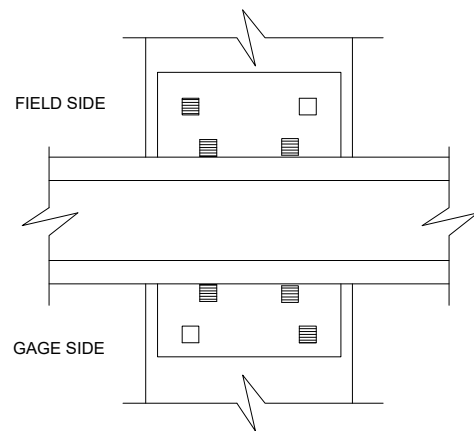


FIG. C

TIE PLATE WITH
HOLD-DOWN SPIKE HOLES

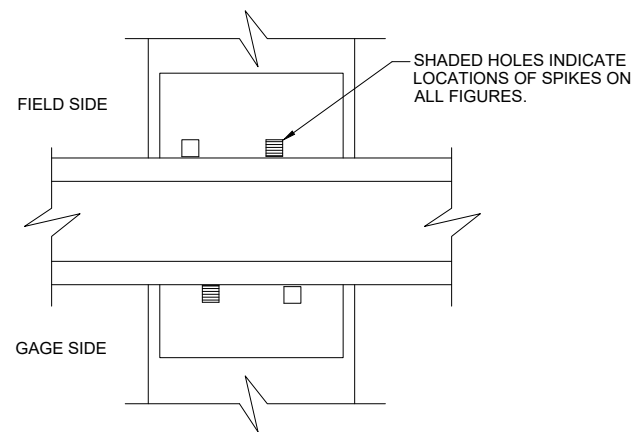


FIG. D

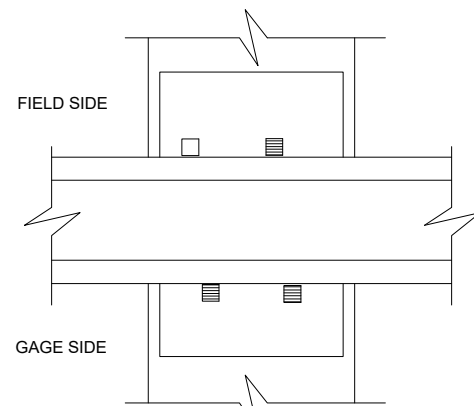


FIG. E

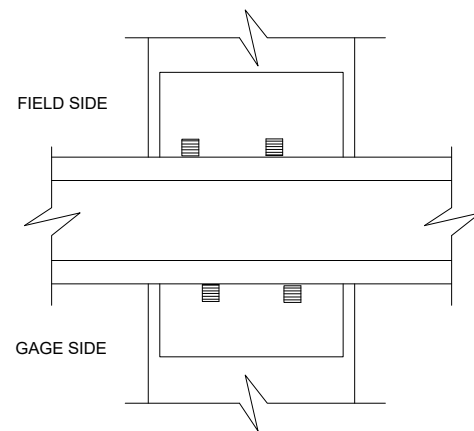


FIG. F

TIE PLATE WITHOUT
HOLD-DOWN SPIKE HOLES

NOTES:

- TIE PLATE SPIKING FOR PLATES WITH HOLD-DOWN SPIKE HOLES.
 - FIGURE A - TANGENT AND CURVES TO 2°00' - 4 SPIKES REQUIRED, 2 LINE AND 2 HOLD-DOWN
 - FIGURE B - CURVES 2°01' TO 4°00' INCLUSIVE - 5 SPIKES REQUIRED, 3 LINE AND 2 HOLD-DOWN
 - FIGURE C - CURVES OVER 4°00' - 6 SPIKES REQUIRED, 4 LINE AND 2 HOLD-DOWN
- TIE PLATE SPIKING FOR PLATES WITHOUT HOLD-DOWN SPIKE HOLES.
 - FIGURE D - TANGENT TRACK WHERE THE MAXIMUM OPERATING SPEED DOES NOT EXCEED 25 M.P.H. FOR FREIGHT AND 30 M.P.H. FOR PASSENGER TRAINS, 2 LINE SPIKES REQUIRED.
 - FIGURE E - TANGENT AND CURVES TO 4°00' INCLUSIVE, 3 LINE SPIKES REQUIRED.
 - FIGURE F - CURVES OVER 4°00' - 4 LINE SPIKES REQUIRED.
- TIE PLATE SPIKING FOR PANDROL TYPE FASTENING SYSTEMS FIGURE G, 4 SCREW SPIKES REQUIRED.
- ANY VARIATIONS IN THE SPIKING PATTERNS ILLUSTRATED IN FIGURES A THRU F MUST BE APPROVED BY THE ENGINEER.
- YARD AND INDUSTRY TRACK TO BE SPIKED WITH NOT LESS THAN TWO SPIKES TO EACH TIE PLATE.
- CUT SPIKES MAY BE USED ON "PANDROL" PLATE SQUARE HOLES FOR TEMPORARY ASSEMBLY OF TRACK. THEY WILL NOT BE REMOVED AFTER INSTALLATION OF SCREW SPIKES.

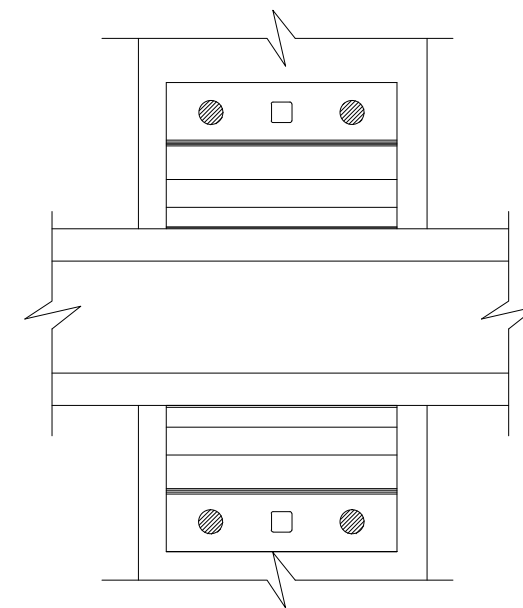


FIGURE G

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REV.	DATE	DESCRIPTION	DES.	ENG.

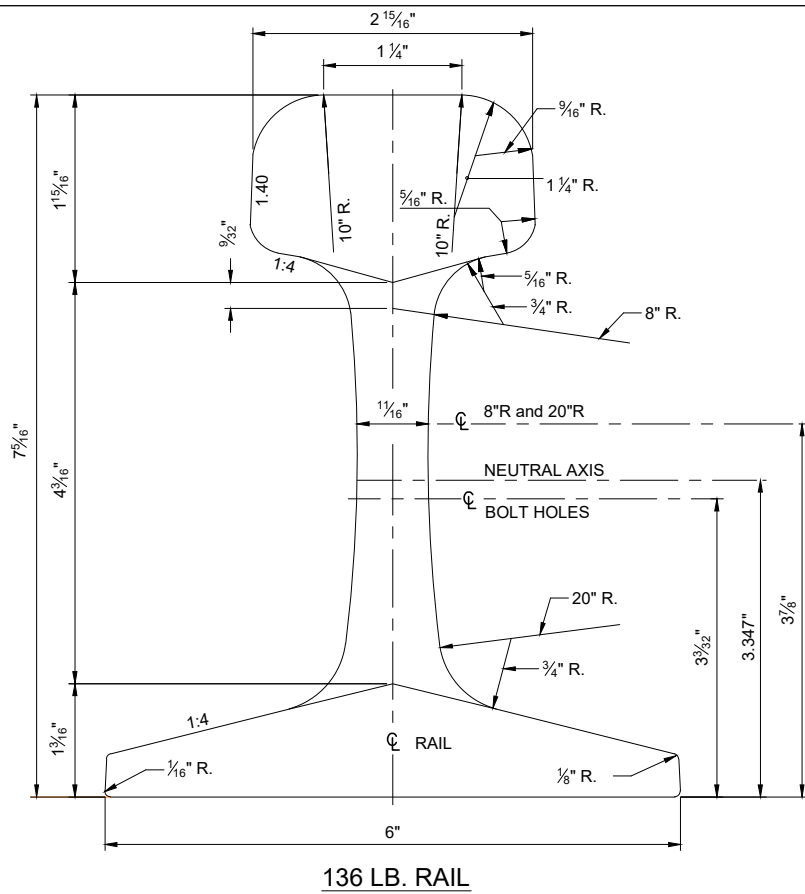
REVISIONS	DRAWN RAILPROS
	CHECKED B. SMITH <i>BS</i>
	RECOMMENDED W. PREY <i>WP</i>
	DATE 5/8/15
DESIGNER PE STAMP	



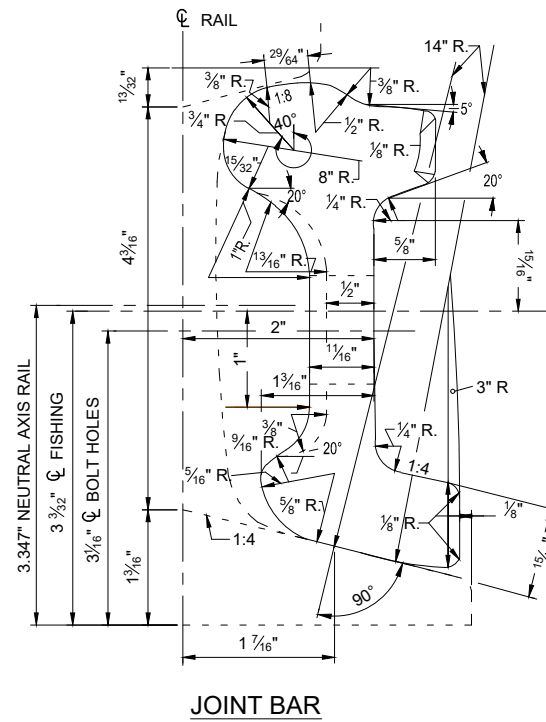
ENGINEERING STANDARD DRAWINGS

TIE PLATE SPIKING PATTERNS

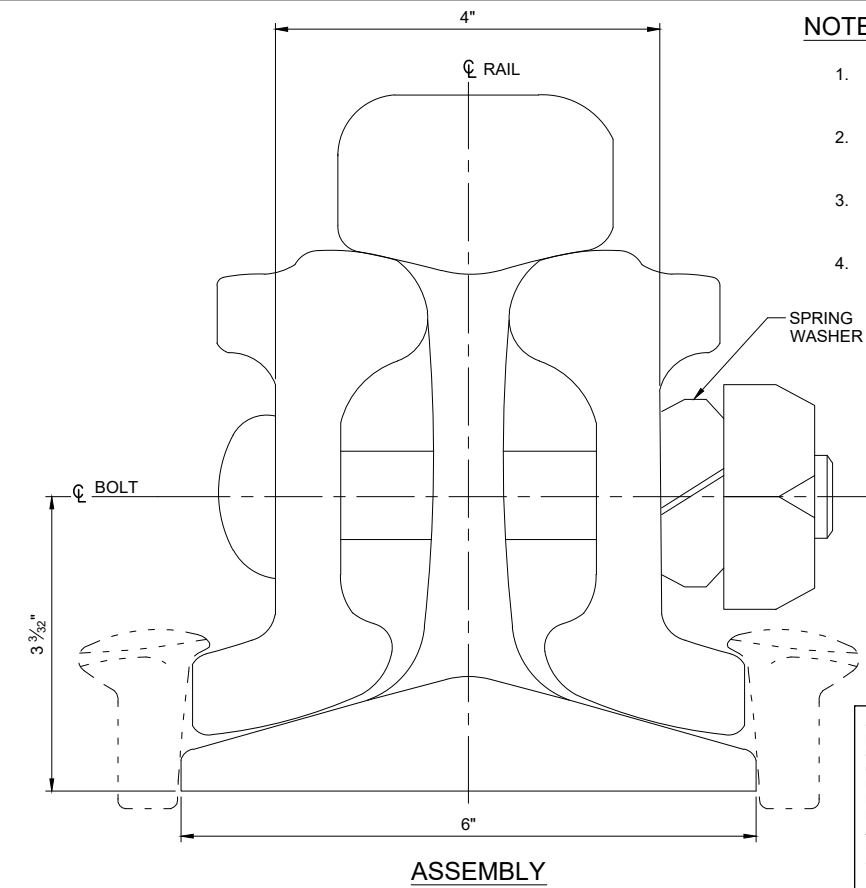
DRAWING NO.	ESD-2460
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	



136 LB. RAIL



JOINT BAR

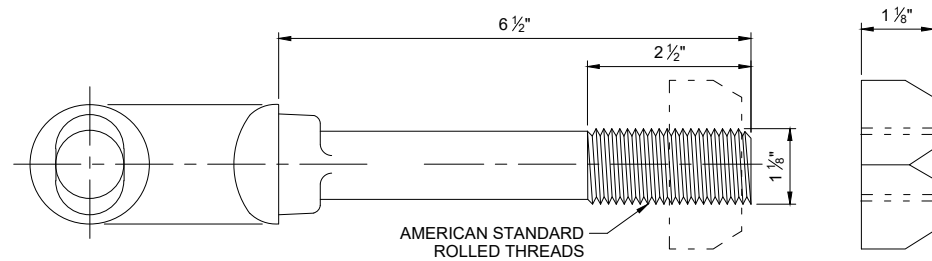


ASSEMBLY

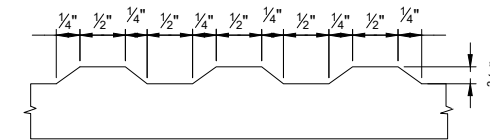
NOTES:

1. RAILS, JOINT BARS AND TRACK BOLTS SHALL CONFORM TO AREMA'S CURRENT SPECIFICATION.
2. REQUISITIONS AND ORDERS FOR TRACK BOLTS SHALL DESIGNATE LENGTH AND DIAMETER OF BOLT.
3. TRACK BOLTS WILL BE OF ADEQUATE LENGTH TO PERMIT USE OF SPRING WASHER UP TO APPROXIMATELY 0.70" THICK.
4. ALL BOLT HOLES SHALL BE CHAMFERED.

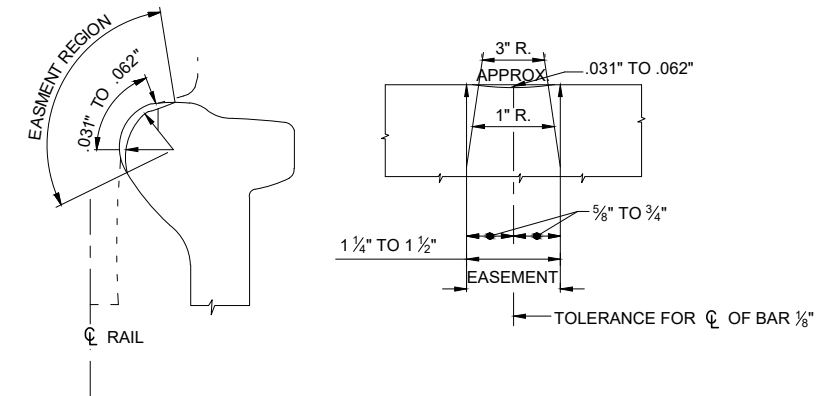
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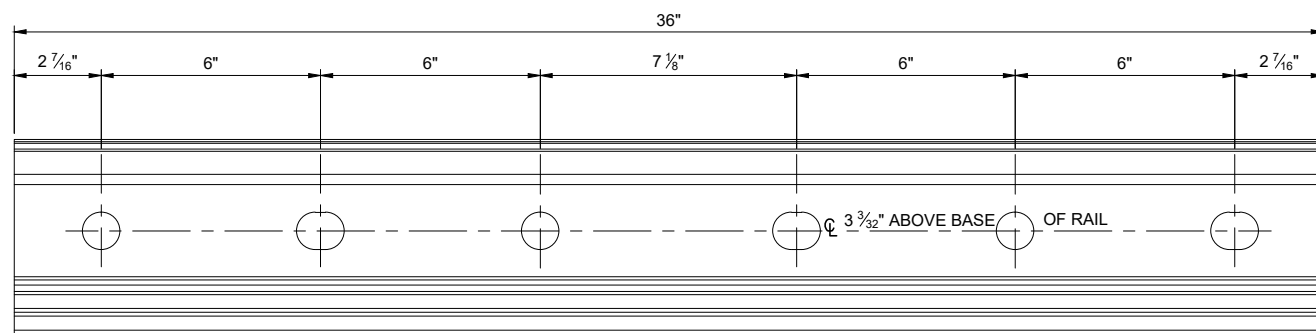
TRACK BOLT & NUT
(SEE ESD 2352 FOR DETAILS NOT SHOWN)



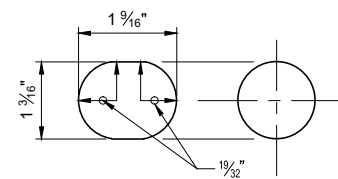
LONGITUDINAL SECTION OF JOINT BAR



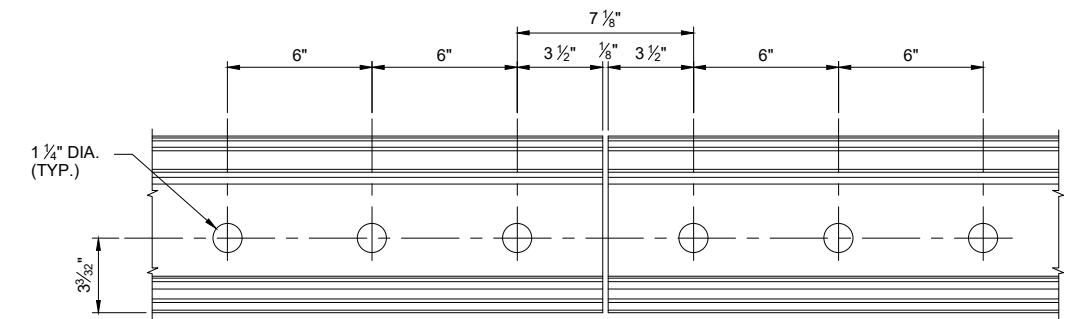
DETAIL OF HEAD EASEMENT



JOINT BAR PUNCHING
(FRONT VIEW)



SIDE OF BOLT HOLES
(JOINT BAR)



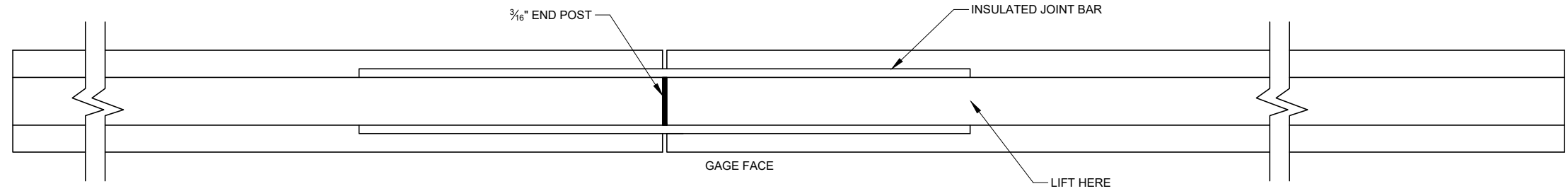
RAIL END DRILLING

REVISIONS			DRAWN RAILPROS		DESIGNER PE STAMP
			CHECKED	B. SMITH	
			RECOMMENDED	W. PREY	
REV.	DATE	DESCRIPTION	DES.	ENG.	

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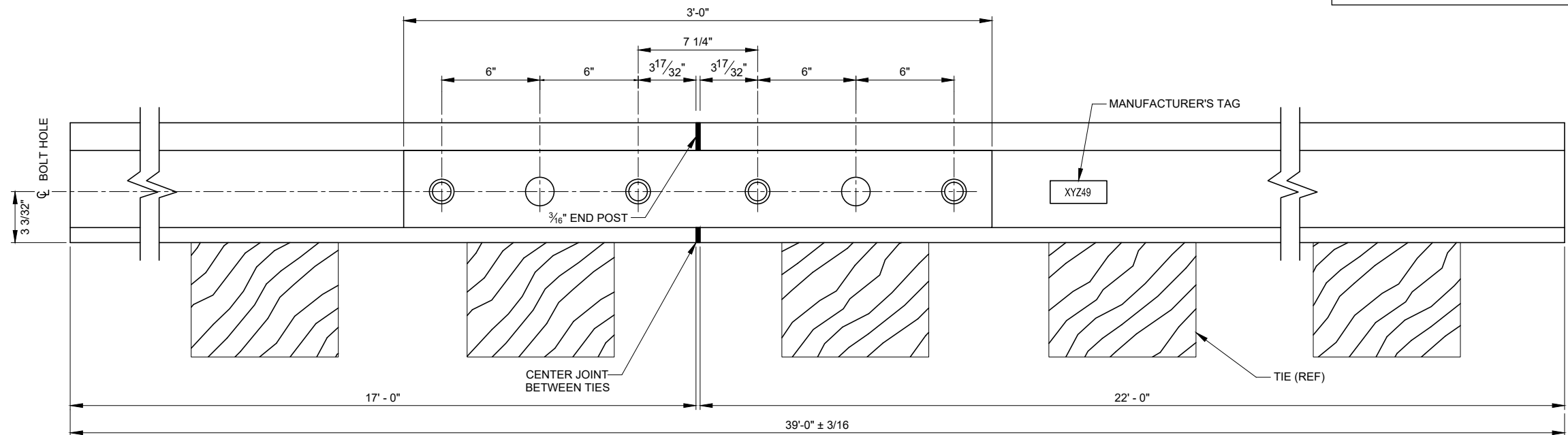
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ENGINEERING STANDARD DRAWINGS		DRAWING NO.
RAIL AND JOINT ASSEMBLY FOR 136 LB. RE		ESD-2502
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		CONTRACT SHEET NO.



PLAN

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PROFILE

NOTES:

- INSULATED JOINT PLUG SHALL MEET OR EXCEED CURRENT AREMA SPECIFICATION CHAPTER 4, PART 3. ONLY ALLEGHENY BONDED INSULATED JOINTS OR APPROVED EQUAL WILL BE ACCEPTED.
- INSULATED JOINT PLUGS SHALL BE MANUFACTURED NEW HEAD HARDENED RAIL. INSULATED JOINTS SHALL BE INSTALLED AS SHOWN IN PLANS OR AS DIRECTED. GOOD USABLE SECOND-HAND HEAD, HARDENED RAIL WITH MAXIMUM 1/4" HEADLOSS MAY BE USED FOR JOINTS MANUFACTURED FOR 1/4" HEADWEAR.
- INSULATED JOINTS SHALL BE INSTALLED AS SHOWN IN PLAN, IN THE DIRECTION OF THE HEAVIEST TONNAGE, OR AS DIRECTED. FOR USE IN TURNOUTS, RAIL WILL BE BENT FOR CLOSURE ON TURNOUT SIDE.
- ALL HOLES SHALL BE CHAMFERED.
- 1" A490 HUCK BOLTS WITH STAGGERED PATTERN SHALL BE FURNISHED.
- WHEN NECESSARY, 1 1/8" GRADE 8 BOLTS WITH SECURITY LOCKNUTS, LUBRICATED AND TORQUED TO 850 FOOT LBS., MAY BE SUBSTITUTED FOR HUCK BOLTS.
- INSULATED JOINT PLUGS TO BE MANUFACTURED AND CURED IN A CONTROLLED ENVIRONMENT AT THE MANUFACTURER'S PLANT. NO FABRICATION OF INSULATED JOINT PLUGS IN THE FIELD WILL BE ACCEPTED. AFTER HUCKING OR BOLTING, MANUFACTURER SHALL REMOVE EXCESS EPOXY FROM RAIL AND JOINT BAR. MANUFACTURER SHALL ADHERE IDENTIFICATION TAG TO THE WEB OF RAIL DEPICTING MANUFACTURER'S NAME, CONTROL NUMBER, LOCATION, MONTH (0X) AND YEAR (20XX) WHERE JOINTS WERE FABRICATED.
- MANUFACTURER SHALL MARK A BALANCE POINT ON THE HEAD OF RAIL FOR HANDLING.
- INSULATED JOINT PLUGS SHALL BE CENTERED BETWEEN TIE CRIBS WHEN INSTALLED.
- SUPPLIERS OF MATERIAL SHOWN ON TRACK STANDARD DRAWINGS SHALL FORMALLY SUBMIT THEIR SHOP DRAWINGS TO THE ENGINEER FOR APPROVAL. MATERIAL SHIPPED WITHOUT WRITTEN APPROVAL FROM THE ENGINEER WILL NOT BE ACCEPTED.
- PREFABRICATED JOINTS OF OTHERS LENGTHS AS SPECIFIED MAY BE REQUIRED IN TURNOUTS.
- ONLY TOELESS JOINT BARS ARE TO BE USED, FASTENED WITH SHAVED E-CLIPS FOR INSULATED JOINTS.

REV.	DATE	DESCRIPTION	DES.	ENG.

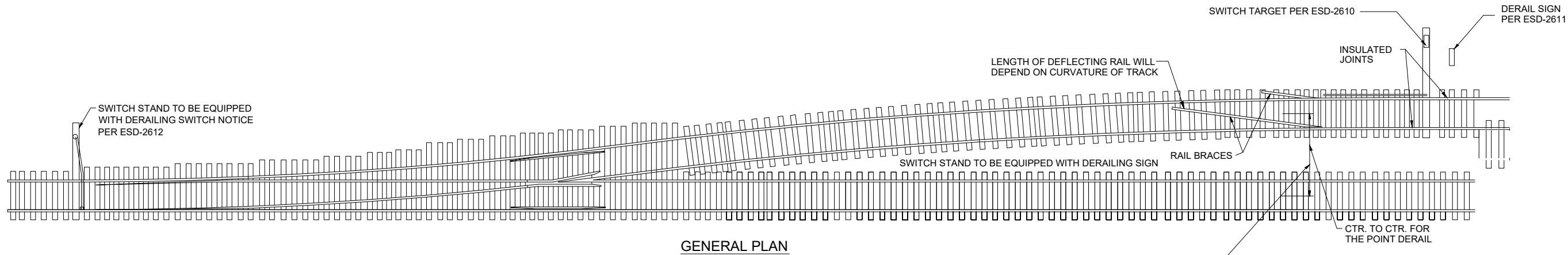
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B. SMITH *BS*
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W. PREY *WP*
 DATE 5/8/15

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ENGINEERING STANDARD DRAWINGS
 PREFABRICATED BONDED INSULATED JOINT

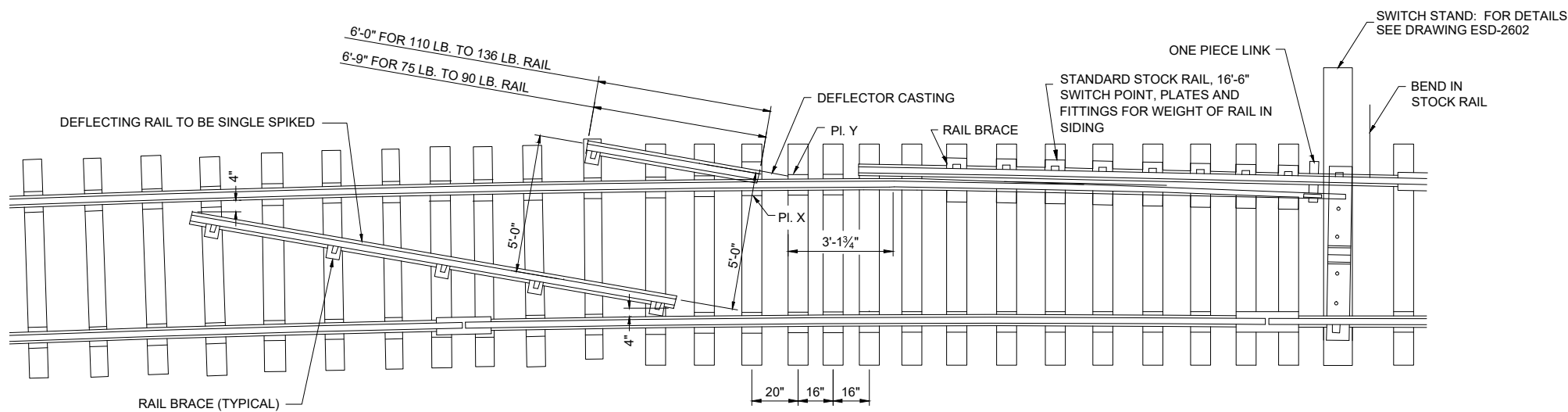
DRAWING NO. ESD-2504
 DRAWING SHEET NO. 1 OF 1
 SCALE: NONE
 CONTRACT SHEET NO.



GENERAL PLAN

NOTE:

1. EXCEPT AT THE INTERLOCKINGS, DERAILS ARE REQUIRED AT THE FOLLOWING LOCATIONS UNLESS OTHERWISE AUTHORIZED.
 - (A) INTERCHANGE TRACKS, REGARDLESS OF GRADE CONDITIONS, WHERE THERE IS HAZARD OF FOREIGN LINE OPERATION CAUSING ENGINES OR CARS TO MOVE FOUL OF MAIN TRACK, SIDING OR OTHER TRACKS.
 - (B) INDUSTRY TRACKS, WHERE AN INDUSTRY CAN MOVE CARS TO CREATE A HAZARD BY FOULING THE MAIN TRACK, SIDING OR OTHER TRACKS.
 - (C) SPURS AND OTHER TRACKS ON WHICH CARS ARE LEFT UNATTENDED AND THE UNAUTHORIZED MOVEMENT OF SUCH CARS MAY FOUL MAIN TRACK OR SIDING, EXCEPT WHERE TRACK GRADE ASCENDS TOWARD MAIN TRACK OR SIDING AT GREATER THAN OR EQUAL TO 1.5% GRADIENT.
 - (D) ANY TRACK, REGARDLESS OF GRADE, THAT IS USED FOR THE STORAGE OF LIVE ENGINES AND WHERE AN UNAUTHORIZED MOVEMENT OF THE ENGINES COULD FOUL MAIN TRACK.
 - (E) OTHER LOCATIONS, REGARDLESS OF GRADE, WHERE SPECIAL CONDITIONS REQUIRE DERAIL PROTECTION AND SUCH PROTECTION IS AUTHORIZED.
 - (F) ANY TRACK, USED FOR LOADING, UNLOADING OR STORAGE OF CARS CONTAINING HAZARDOUS MATERIAL AS LISTED IN THE HAZARDOUS MATERIALS REGULATIONS OF THE DEPARTMENT OF TRANSPORTATION, CODE OF FEDERAL REGULATIONS. SUCH OPERATIONS SHALL BE PROTECTED AGAINST INBOUND MOVEMENTS BY DERAILS, SECURED WITH LOCKS AND LOCATED BEYOND THE CLEARANCE POINT AND NOT LESS THAN 50 FEET FROM NEAR END OF THE CAR(S).
2. ALL NEW INSTALLATIONS OF DERAILS AS OUTLINED ABOVE SHALL BE THE SWITCH POINT TYPE. EXISTING HAYES TYPE DERAILS ARE AUTHORIZED EXCEPT:
 - (A) ON INSIDE OF CURVES OVER 5 DEGREES.
 - (B) ON TRACKS WHERE AN UNCONTROLLED CAR COULD REACH EXCESSIVE SPEED (10 MPH).
 - (C) AT LOCATIONS WHERE A DERAIL IS INSTALLED TO PROTECT AGAINST THE MOVEMENT OF ENGINES OR TRAINS.
 - (D) AT ANY OTHER LOCATION WHERE CONDITIONS ARE SUCH THAT THE SWITCH POINT DERAIL SHOULD BE INSTALLED TO ELIMINATE A POTENTIALLY HAZARDOUS SITUATION.
3. DOUBLE POINT DERAILS PER ESD-2604 ARE REQUIRED FOR:
 - (A) LOCATIONS WHERE UNCONTROLLED MOVEMENTS CAN EXCEED 20 MPH.
 - (B) LOCATIONS PROTECTING TRACKS HOLDING 15 OR MORE CARS.
 - (C) DIVERGING TRACK DESCENDS TOWARDS MAIN TRACK AT GRADE LESS THAN 0.5% OR DESCEND TOWARD THE MAIN TRACK AT ANY GRADIENT.
 - (D) AT OTHER LOCATIONS DESIGNATED BY THE ENGINEER.
4. 2-WAY OR DOUBLE DIRECTION DERAILS ARE NOT AUTHORIZED.
5. DEFLECTOR CASTING AND DEFLECTING RAIL ARE NOT REQUIRED WITH HAYES TYPE DERAILS EXCEPT AT LOCATIONS WHERE GRADE CONDITIONS MAY CAUSE CAR TO CONTINUE MOVEMENT AFTER BEING DERAILED.
6. INSIDE DEFLECTING RAIL AND SHORT RAIL BEHIND DEFLECTOR CASTING WILL BE USED ONLY AT LOCATIONS WHERE THERE IS A POSSIBILITY OF DERAILED CAR CONTINUING ON TOWARD MAIN TRACK AND SIDESWIPING A PASSENGER TRAIN.
7. FOR DETAILS OF DEFLECTOR CASTING, STRAPS AND TIE PLATES X AND Y SEE ESD-2603.
8. FOR DETAILS OF CONNECTING RODS FOR HAYES DERAIL AND ONE PIECE LINK FOR POINT DERAILS SEE ESD-2602.
9. SEE ESD-2612 FOR DERAIL SIGN WHERE REQUIRED.
10. EXPOSED ENDS OF STOCK RAIL AND DEFLECTING RAILS SHALL BE CUT AND WELDED TO END TAPER DETAIL PER ESD-2604.
11. HAND OPERATED DERAILS ARE ILLUSTRATED, HOWEVER POWER OPERATED DERAILS WILL BE INSTALLED AS DIRECTED.



ARRANGEMENT OF POINT DERAIL AND DEFLECTING RAILS

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RAILPROS
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B. SMITH *BBS*
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B. SCHMITH *BBS*
 DATE 03/03/16

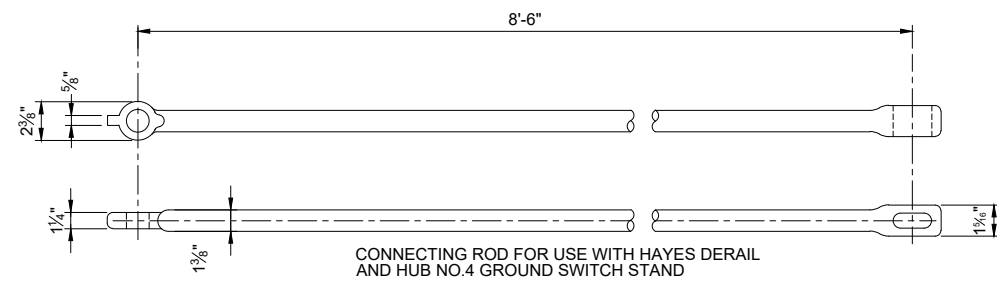
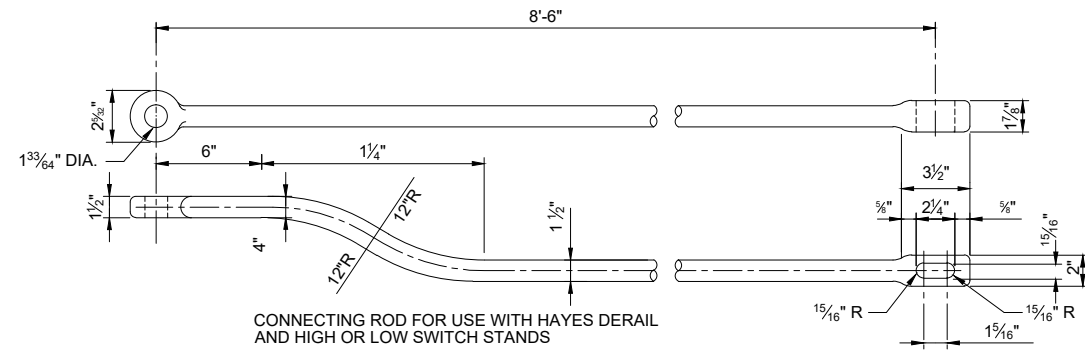
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ENGINEERING STANDARD DRAWINGS
 SINGLE SWITCH POINT DERAIL

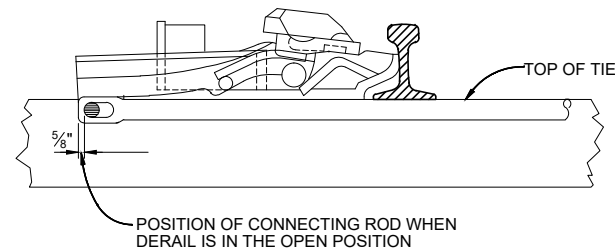
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 CONTRACT SHEET NO.



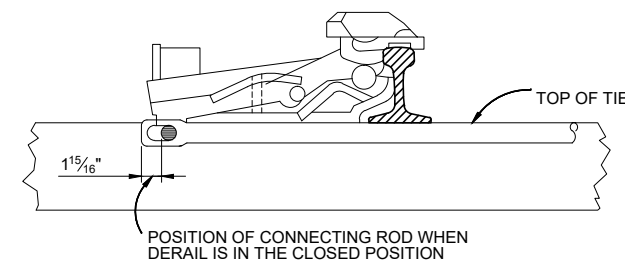
CONNECTING RODS FOR HAYES SLIDING DERAILS

NOTE:

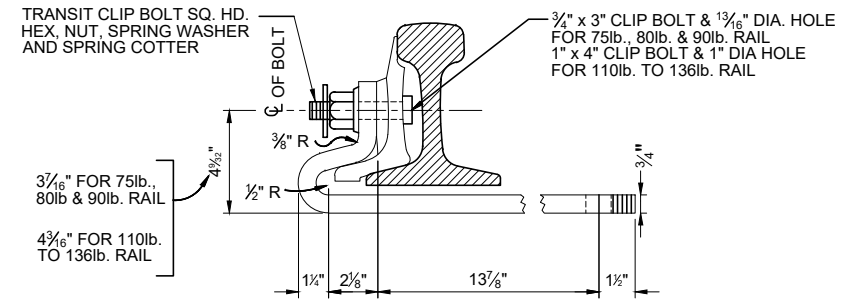
SINCE THE THROW OFF SWITCH STAND IS ONLY 5", THE SLOTTED HOLE IN ROD IS PROVIDED TO PERMIT MOVEMENT OF 6 1/4" REQUIRED FOR PROPER FUNCTIONING OF HAYES SLIDING DERAIL



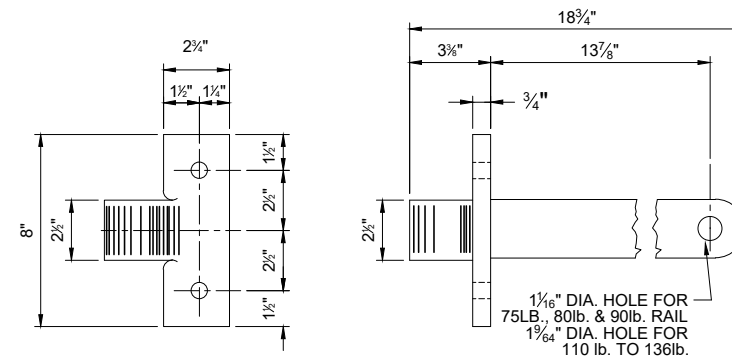
SECTION A-A (OPEN)



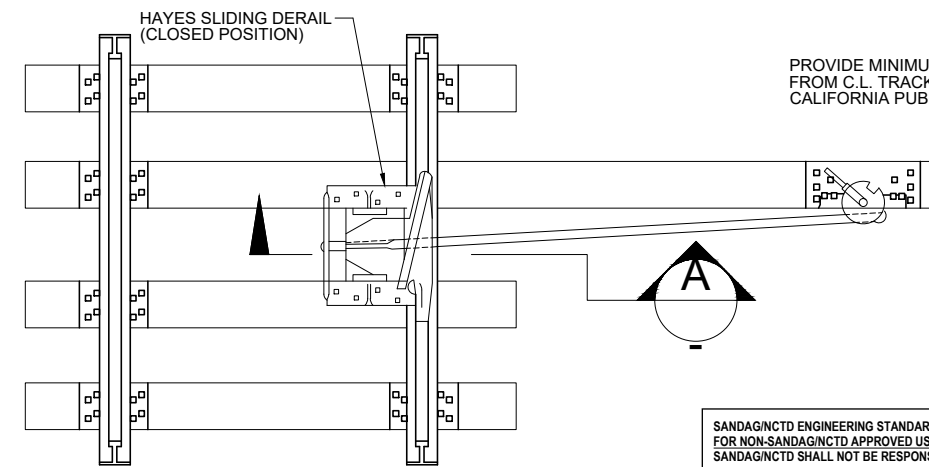
SECTION A-A (CLOSED)



ASSEMBLY



ONE PIECE LINK BETWEEN POINT DERAIL & CONNECTING ROD



GENERAL PLAN FOR CONNECTING ROD WITH HAYES SLIDING DERAIL

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REVISIONS

DRAWN RAILPROS

CHECKED B. SMITH *BS*

RECOMMENDED W. PREY *WP*

DATE 5/27/15

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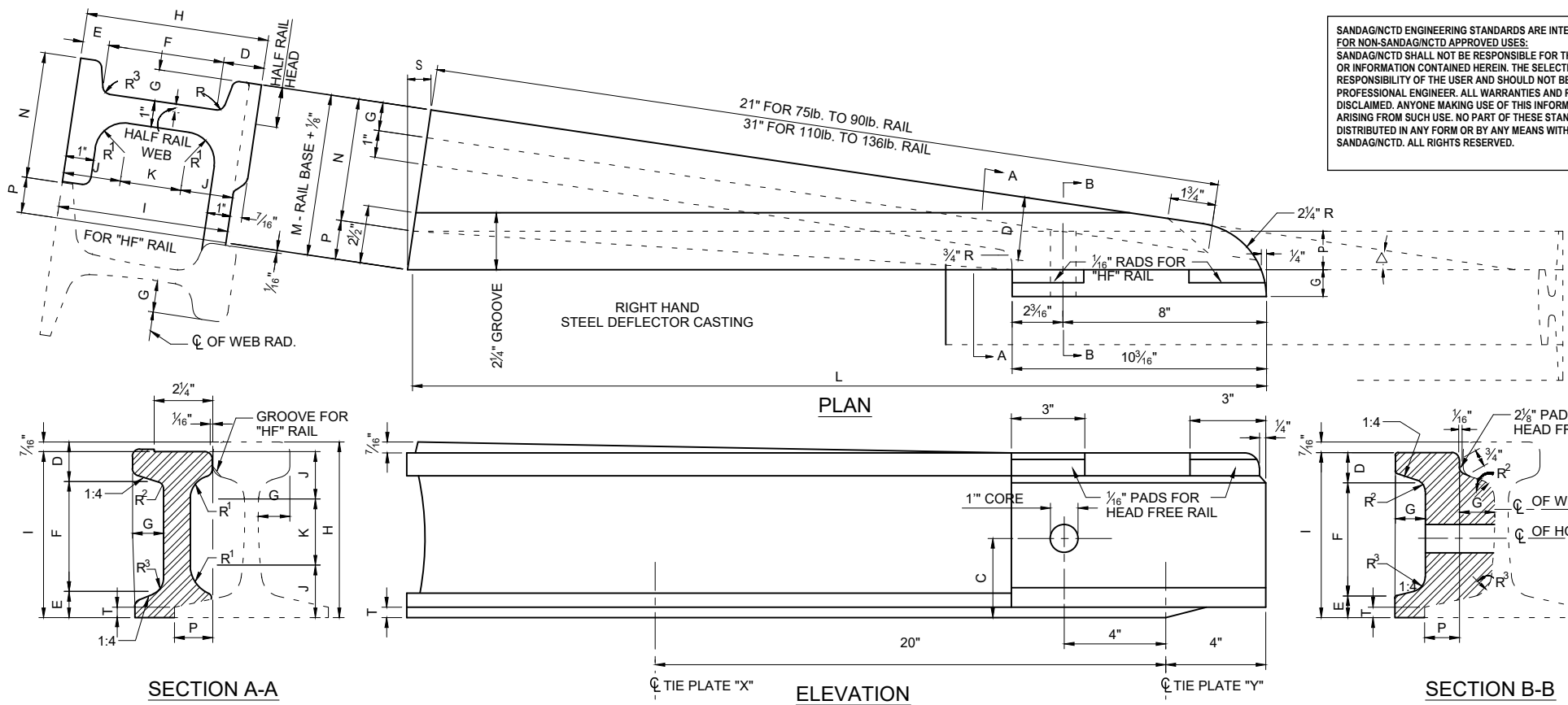
CONNECTING RODS FOR SLIDING DERAILS

DRAWING NO. ESD-2602

DRAWING SHEET NO. 1 OF 1

SCALE: NONE

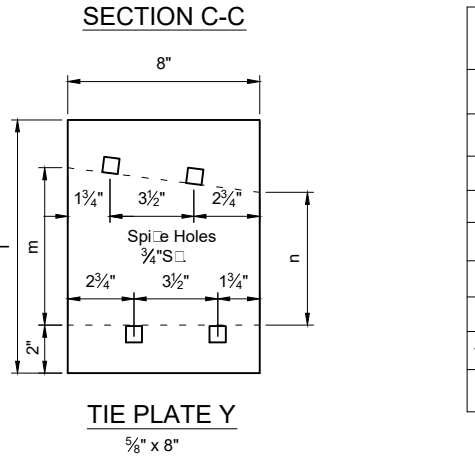
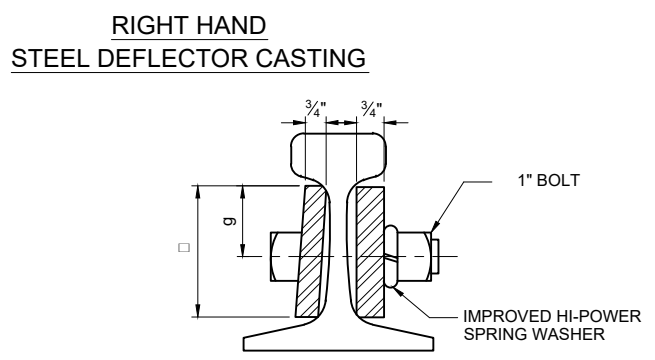
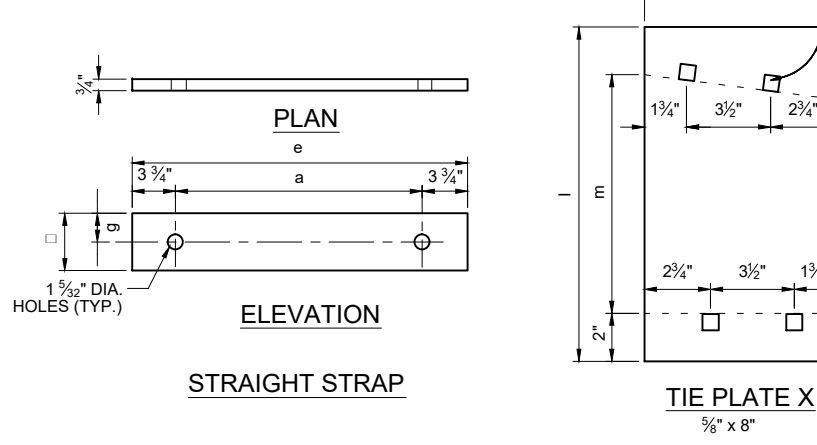
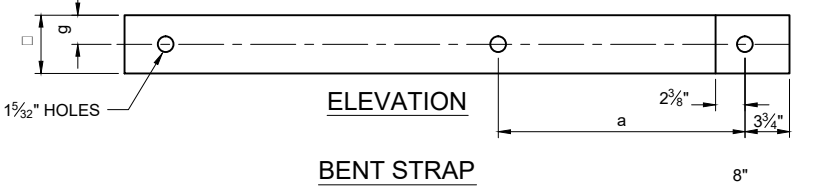
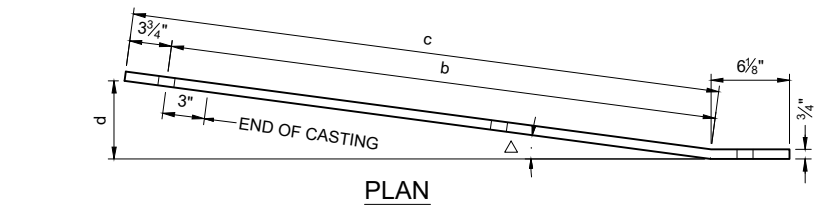
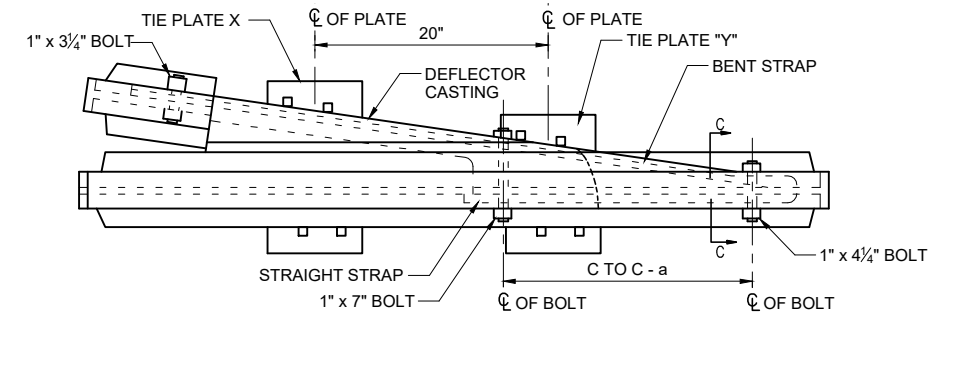
CONTRACT SHEET NO.



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NOTES:

- BOLTS TO BE GRADE 8 WITH STANDARD SQUARE HEADS AND NUTS AND IMPROVED HI-POWER SPRING WASHERS.
- CASTING BOLT TO BE FITTED WITH BEVEL WASHER UNDER HEAD.
- FOR GENERAL ARRANGEMENT OF DERAILS SEE ESD-2601.



RAIL SECTION	STRAPS							TIE PLATE-X			TIE PLATE-Y		
	a	b	c	d	e	□	g	l	m	n	l	m	n
75lb. C.S. and 80lb. A.S.C.E.	18 1/2"	34 1/2"	38 1/4"	6 3/16"	26"	2 5/16"	1 1/4"	15"	10 15/16"	9 5/8"	10 1/2"	6 3/8"	5 1/8"
90lb. A.R. A-A	18 5/8"	34 1/8"	37 7/8"	6 5/16"	25 5/8"	3 3/8"	1 1/8"	15"	11 13/16"	9 7/8"	10 1/2"	6 1/2"	5 3/16"
110lb. R.E.	22"	48"	51 1/4"	6 7/16"	29 1/2"	3 3/8"	1 7/8"	13"	8 7/8"	7 7/8"	10 1/2"	6 3/8"	5 3/8"
112lb. & 115lb. R.E.	21 13/16"	47 13/16"	51 1/2"	6 7/16"	29 3/8"	3 7/8"	2 1/16"	13"	9 9/16"	8 1/16"	10 1/2"	6 1/2"	5 1/2"
113lb. H.F. & 119lb. C.F. & I													
131lb. R.E.	20 5/8"	46 1 1/16"	50 1/2"	7"	28 3/8"	4 1/4"	2 5/16"	14"	9 7/8"	8 3/4"	11"	7 1/16"	5 15/16"
132lb. H.F. & 136lb. C.F. & I													

DEFLECTOR CASTING TABLE (Dimensions in Inches)																				
RAIL SECTION	Angle Δ	C	D	E	F	G	H	I	J	K	L	M	N	P	Q	R ¹	R ²	R ³	S	T
75lb. C.S. and 80lb. A.S.C.E.	9°16'	2 7/32"	1 3/8"	2 5/32"	2 26/32"	1"	5"	4 9/16"	1 3/4"	1 1/16"	2 3/8"	5 1/8"	3 7/8"	1 1/4"	2 23/32"	3/4"	1/4"	1/4"	1 3/16"	5/16"
90lb. A.R. A-A	9°36'	2 13/32"	1 13/32"	1 5/16"	3 3/32"	1"	5 5/8"	5 1/16"	1 3/4"	1 1/16"	2 3/8"	5 1/4"	3 3/32"	1 1/32"	3"	3/4"	3/8"	3/8"	7/8"	3/8"
110lb. R.E.	7°08'	2 5/8"	1 21/32"	1 1/16"	3 17/32"	1 1/32"	6 1/4"	5 13/16"	2"	1 13/16"	3 3/8"	5 5/8"	4 1/4"	1 1/8"	2 23/32"	1"	3/8"	5/8"	1 1/16"	7/16"
112lb. & 115lb. R.E.	7°10'	2 1/8"	1 5/8"	1 1/16"	3 15/16"	1 1/16"	6 5/8"	6 3/16"	2"	2 3/16"	3 3/8"	5 5/8"	4 7/32"	1 13/32"	2 23/32"	1"	3/8"	5/8"	1 1/16"	7/16"
113lb. H.F. & 119lb. C.F. & I							6 13/16"	6 3/8"		2 3/8"										
131lb. R.E.	8°00'	3 3/32"	1 21/32"	1 1/32"	4 3/8"	1 1/32"	7 1/8"	6 1 1/16"	2"	2 1 1/16"	3 3/16"	6 1/8"	4 3/8"	1 1/2"	2 27/32"	1"	1/2"	3/4"	2 7/32"	7/16"
132lb. H.F. & 136lb. C.F. & I							7 7/16"	6 7/8"		2 7/8"										

+ 1" FOR 119lb. C.F. & I.

* 3/4" FOR 115lb. R.E. 119lb. C.F. & I. & 136lb. C.F. & I. RAIL

REV.	DATE	DESCRIPTION	DES.	ENG.

REVISIONS	DRAWN RAILPROS
	CHECKED B. SMITH
	RECOMMENDED W. PREY
	DATE 5/27/15

DESIGNER PE STAMP

SAN DIEGO ASSOCIATION OF GOVERNMENTS
401 B Street, Suite 800
San Diego, CA. 92101
www.sandag.org

810 Mission Avenue
Oceanside, CA 92054
www.gonctd.com

ENGINEERING STANDARD DRAWINGS

DEFLECTOR CASTING FOR SINGLE POINT DERAILS

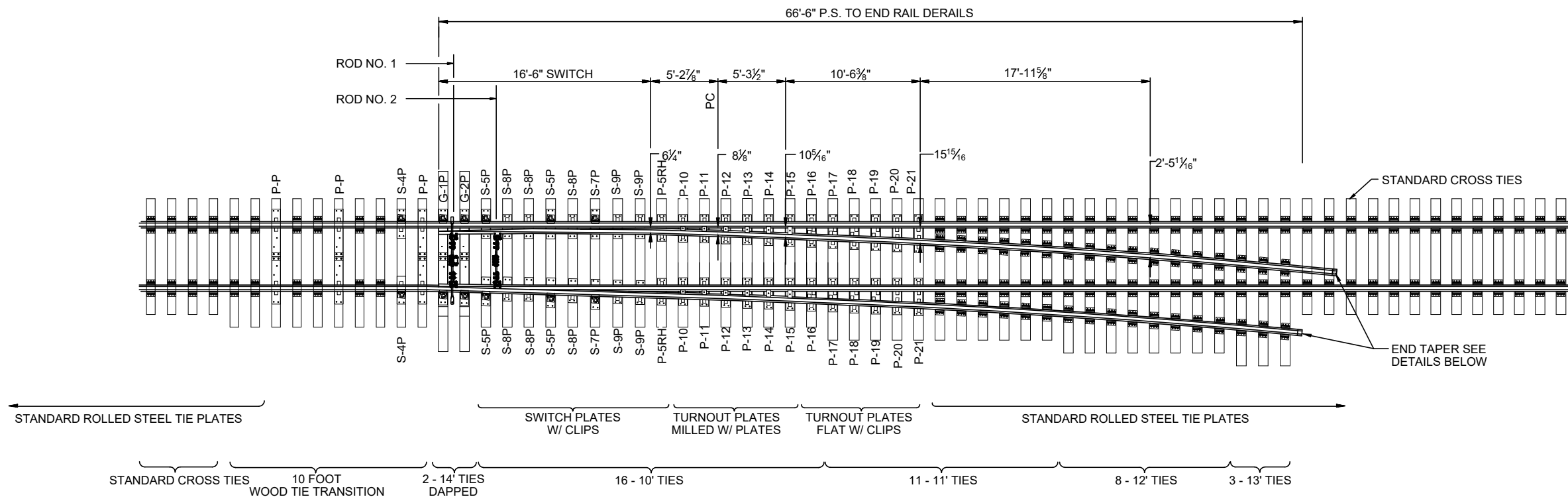
DRAWING NO.	ESD-2603
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	

DERAIL DATA

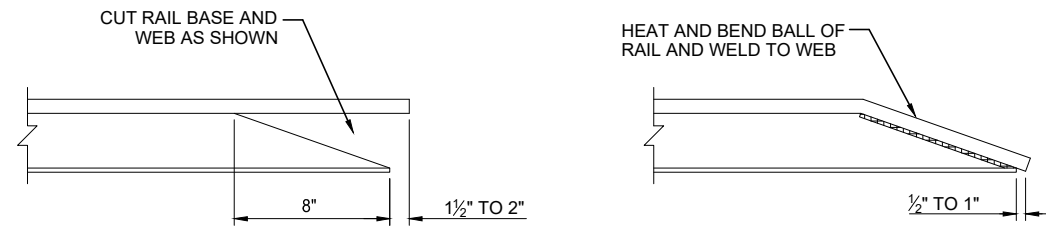
SWITCH GEOMETRY: 16'-6"
 VERTEX DISTANCE: 9 1/2"
 SWITCH ANGLE: 1°44'11"
 SWITCH HEEL SPREAD: 6 1/4"
 RADIUS OF CL CURVE: 736'-5"
 DEGREE OF CL CURVE (CHORD): 7°47'11"

NOTE:

- FOR DETAILS NOT SHOWN, REFER TO ESD-2921.
- DOUBLE POINT DERAILS SHOWN HERE ARE REQUIRED FOR:
 - (A) LOCATIONS WHERE UNCONTROLLED MOVEMENTS CAN EXCEED 20 MPH.
 - (B) LOCATIONS PROTECTING TRACKS HOLDING 15 OR MORE CARS
 - (C) DIVERGING TRACK DESCENDS TOWARDS MAIN TRACK .
 - (D) AT OTHER LOCATIONS DESIGNATED BY THE ENGINEER.



DOUBLE POINT DERAIL LAYOUT



END TAPER FOR DERAILS
(SCALE: NONE)

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REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN
RAILPROS
 CHECKED
B. SMITH
 RECOMMENDED
W. PREY
 DATE 5/27/15
 DESIGNER PE STAMP



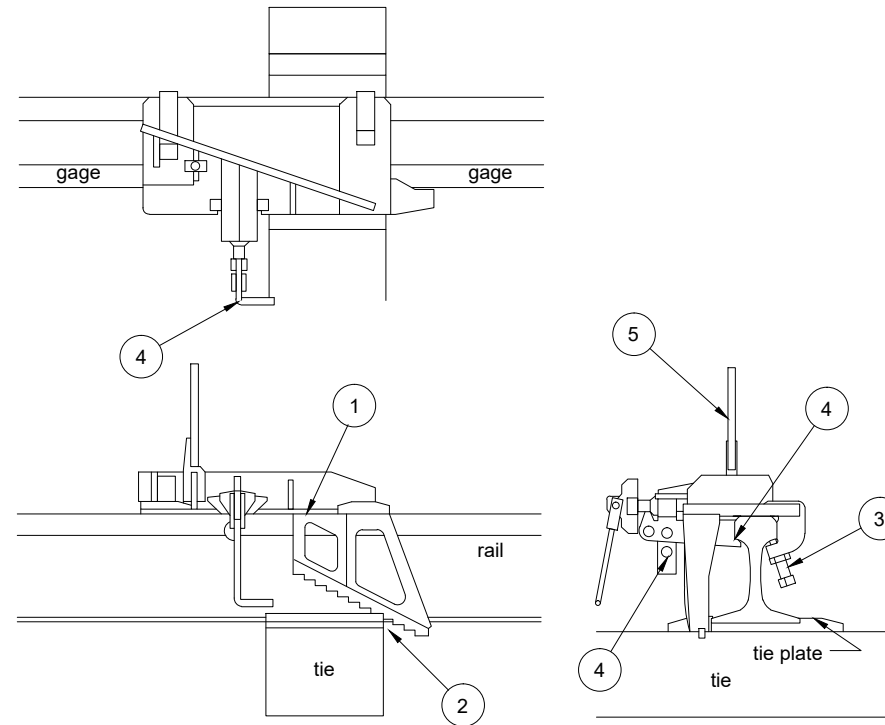
ENGINEERING STANDARD DRAWINGS
 16'-6" DOUBLE POINT DERAIL

DRAWING NO. ESD-2604
 DRAWING SHEET NO. 1 OF 1
 SCALE: NONE
 CONTRACT SHEET NO.

PROPER INSTALLATION OF A PORTABLE DERAIL (HAYES OR EQUAL APPROVED)

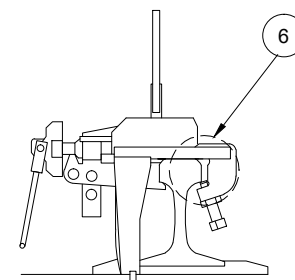
INSTALLATION NOTES:

1. LOOSEN SET SCREWS, AND SCREW HANDLE, PLACE DERAIL ON TOP OF RAIL, MAKE SURE THE DERAIL IS LEVEL, AND PARALLEL TO THE GAGE LINE OF THE RAIL.
2. THE GRADUATED TEETH MUST BE AGAINST THE CORNER OF THE TIE OR TIE PLATE, ON THE GAGE SIDE OF THE RAIL. REMOVE BALLAST AS NEEDED. DO NOT INSTALL DERAIL ON THE INSIDE OF A CURVE.
3. ADJUST SET SCREWS ON THE FIELD SIDE OF THE DERAIL TO A LIGHT BEARING UNDER THE RAIL HEAD, TIGHTEN JAM NUTS.
4. HAND TIGHTEN SCREW HANDLE TO SECURE DERAIL TO RAIL HEAD. ALIGN HOLES FOR APPLYING PADLOCK.
5. POSITION WARNING FLAG, IF USED.
6. THERE SHOULD BE NO GAP BETWEEN RAIL HEAD AND DERAIL CLIP.
7. REFER TO MANUFACTURING INSTRUCTIONS.

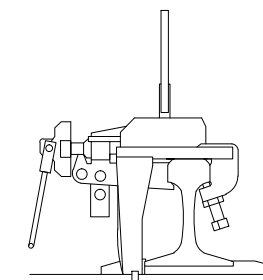


APPLICATION NOTES:

1. MAY BE USED TO SATISFY 49 CFR PART 214 REQUIREMENT.
2. SHALL BE USED AT ALL LOCATIONS WHERE RAIL-MOUNTED CONSTRUCTION AND MAINTENANCE OF WAY EQUIPMENT IS STORED TO PREVENT UNAUTHORIZED MOVEMENT.
3. CONSTRUCTION AND MAINTENANCE OF WAY CONTRACTOR SHALL FURNISH DERAILS.





Incorrect Installation

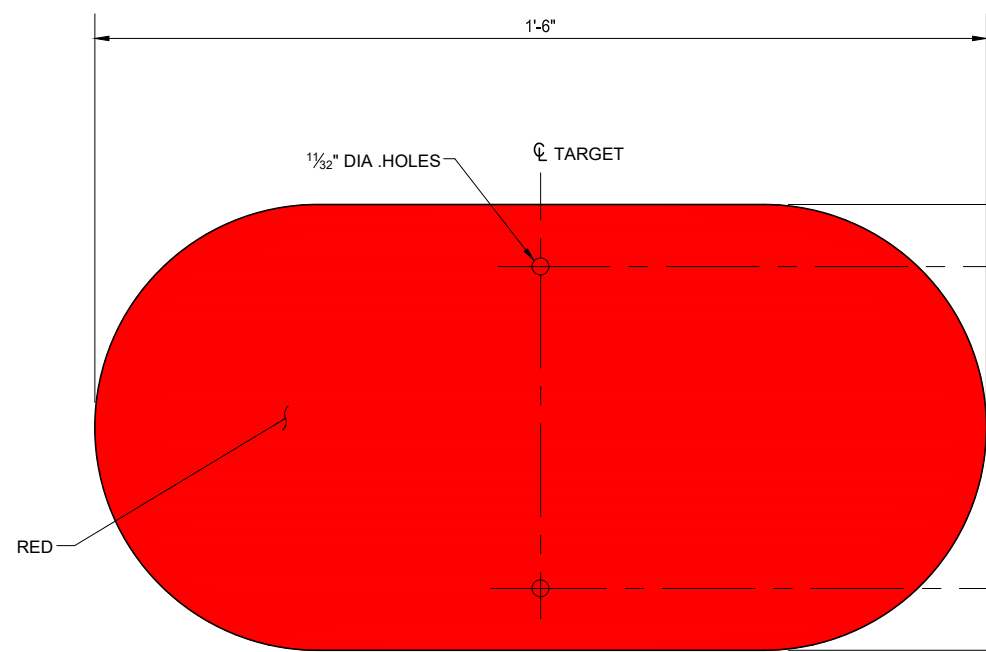


Correct Installation

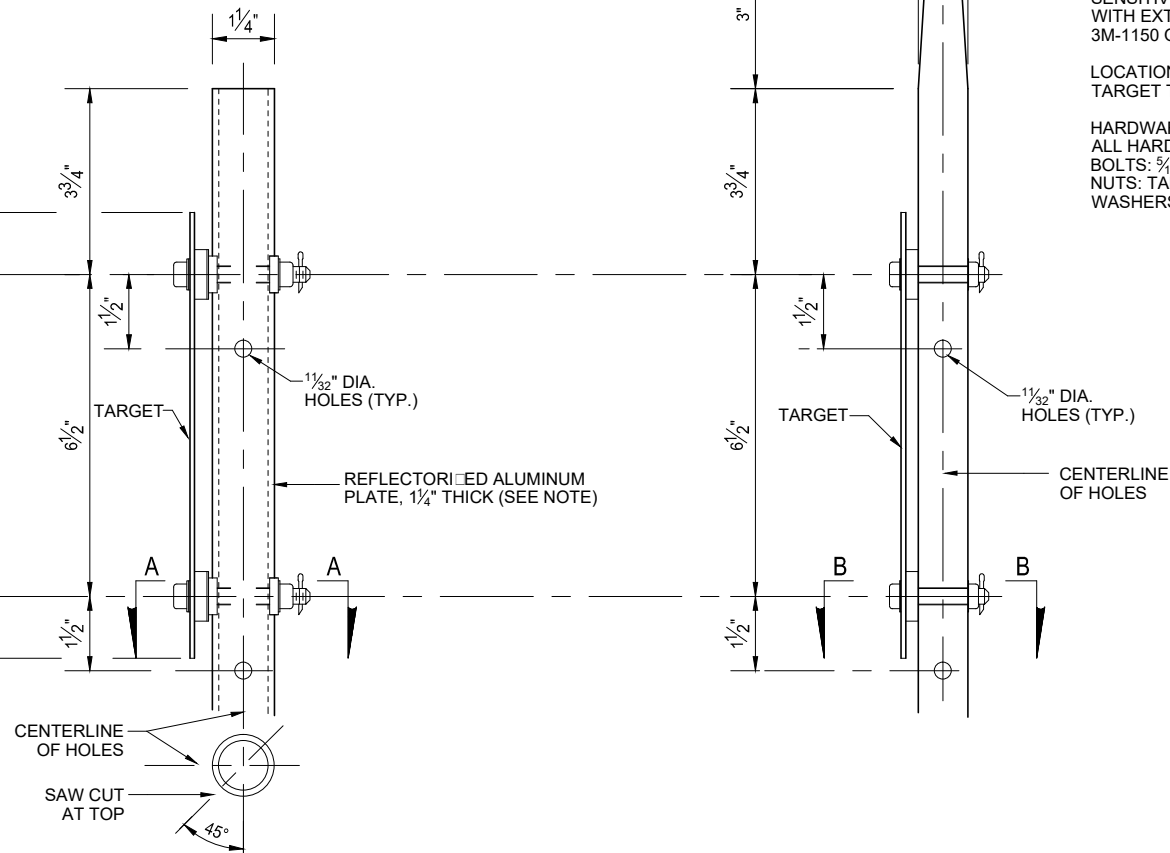
IF THE DERAIL HAS BEEN INVOLVED IN A DERAILMENT, DO NOT USE IT AGAIN.

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REVISIONS				DRAWN RAILPROS		 SAN DIEGO ASSOCIATION OF GOVERNMENTS 401 B Street, Suite 800 San Diego, CA. 92101 www.sandag.org	 NORTH COUNTY TRANSIT DISTRICT 810 Mission Avenue Oceanside, CA 92054 www.gonctd.com	ENGINEERING STANDARD DRAWINGS		DRAWING NO.
				CHECKED B. SMITH	<i>BS</i>			PORTABLE DERAIL		ESD-2605
				RECOMMENDED W. PREY	<i>WP</i>					DRAWING SHEET NO. 1 OF 1
				DATE	5/27/15					SCALE: NONE
REV.	DATE	DESCRIPTION	DES.	ENG.	DESIGNER PE STAMP			CONTRACT SHEET NO.		



DERAILING SWITCH TARGET
(SEE NOTES)



TUBULAR TARGET ROD
(ALTERNATE)

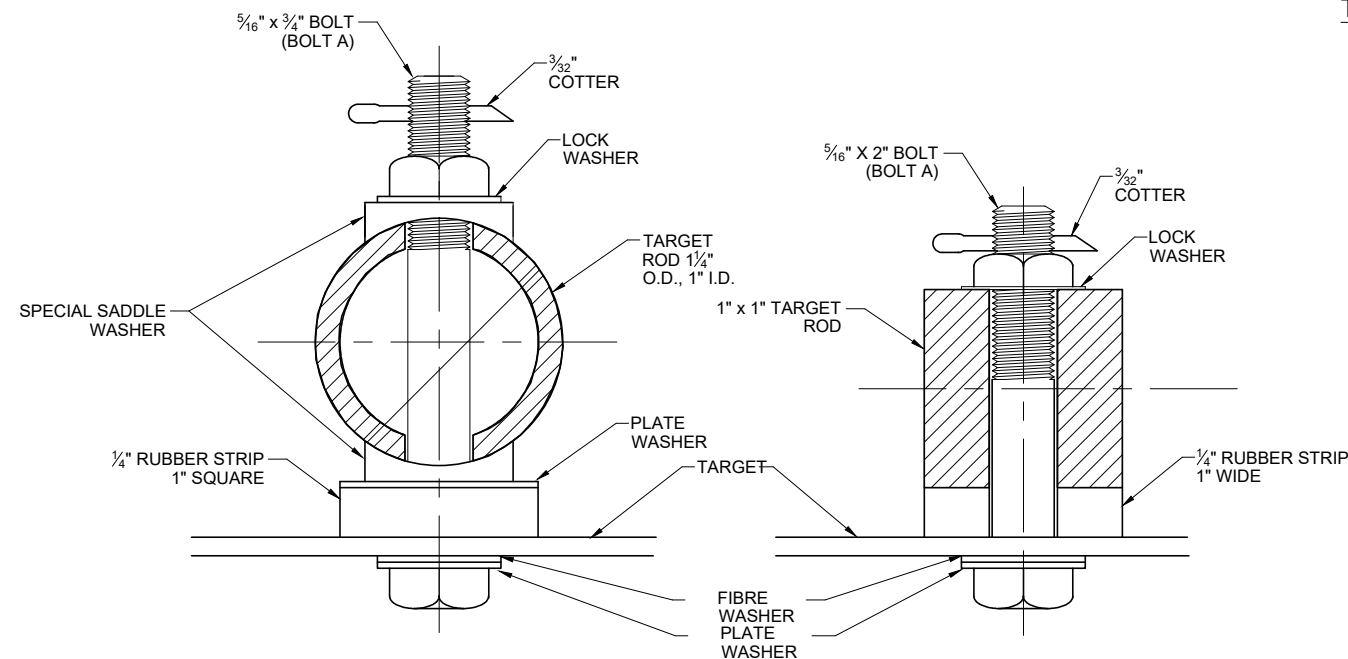
SQUARE TARGET ROD

MATERIAL SPECIFICATIONS:

SIGNS:
 1/8" THICK MILL FINISH ALUMINUM PANEL, ALCOA 6016-T6 OR EQUAL. PAINT ALL SIDES WITH LINEAR POLYURETHANE. COLOR FACE OF PANEL WITH ENGINEERING GRADE, PRESSURE SENSITIVE, RETRO-REFLECTIVE RED VINYL SHEETING. FINISH WITH EXTERIOR GRADE PRESSURE SENSITIVE CLEAR MYLAR, 3M-1150 OR EQUAL.

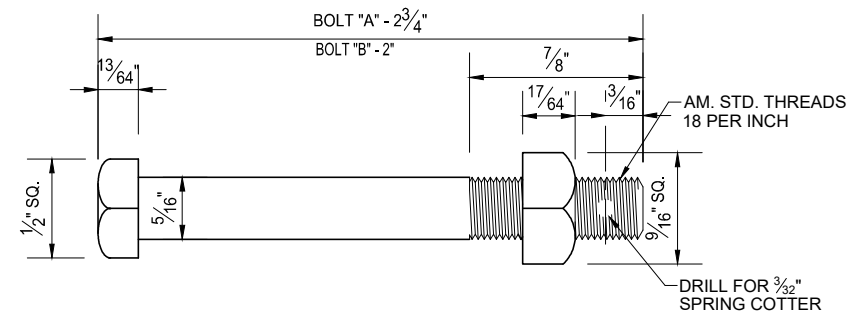
LOCATION:
 TARGET TO BE USED ON ALL DERAILING SWITCH STANDS.

HARDWARE:
 ALL HARDWARE TO BE VANDAL RESISTANT.
 BOLTS: 5/16" DIA. CARRIAGE BOLTS, 2024-T4 ALLOY.
 NUTS: TAMPER RESISTANT, ALCOA OR EQUAL.
 WASHERS: ALUMINUM LOCK WASHERS.



SECTION A-A

SECTION B-B




5/16" TARGET BOLT
(CLASS A STEEL, SEE SPEC. 1003-A)


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REV.	DATE	DESCRIPTION	DES.	ENG.

REVISIONS	DRAWN RAILPROS
CHECKED B. SMITH	RECOMMENDED W. PREY
DATE 5/8/15	DESIGNER PE STAMP

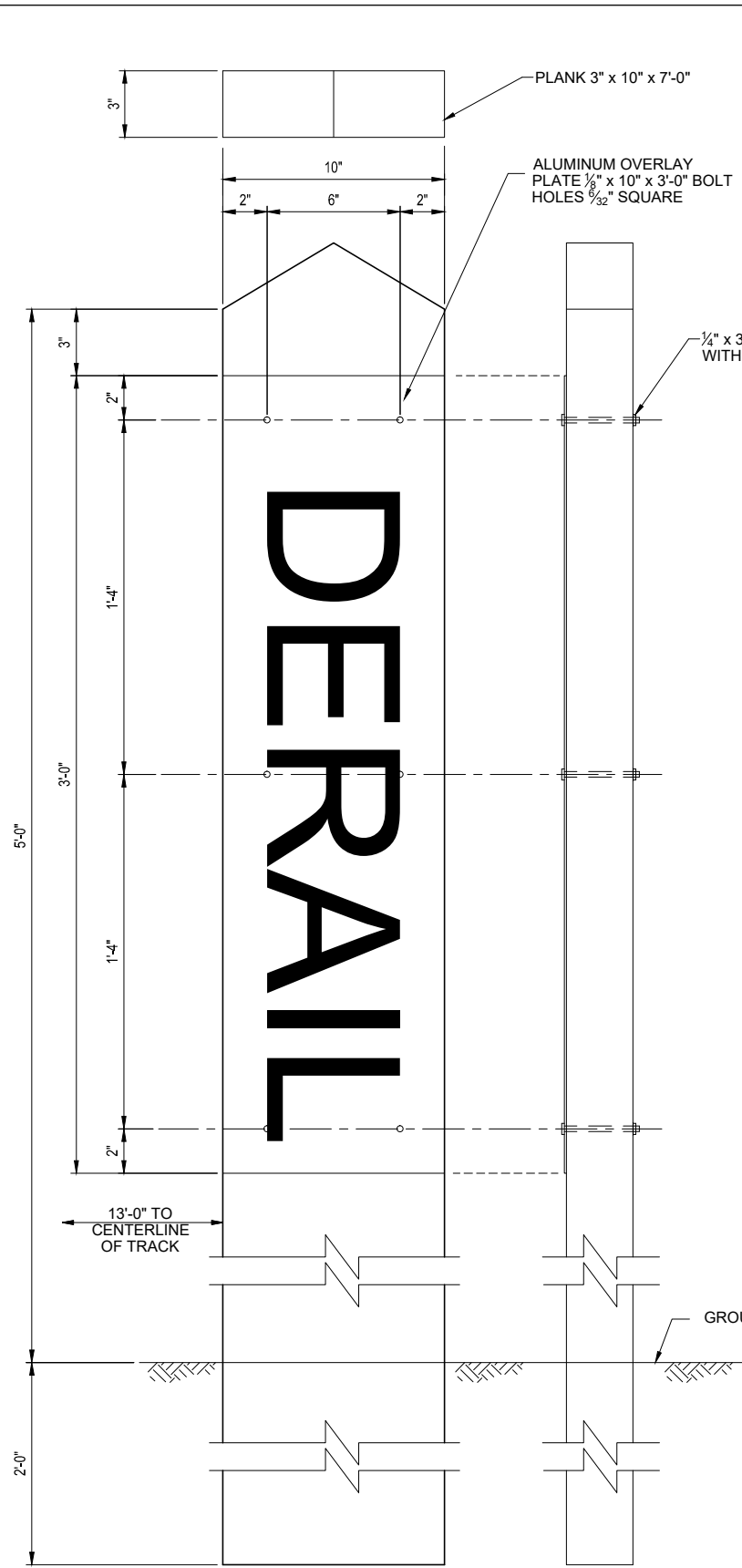


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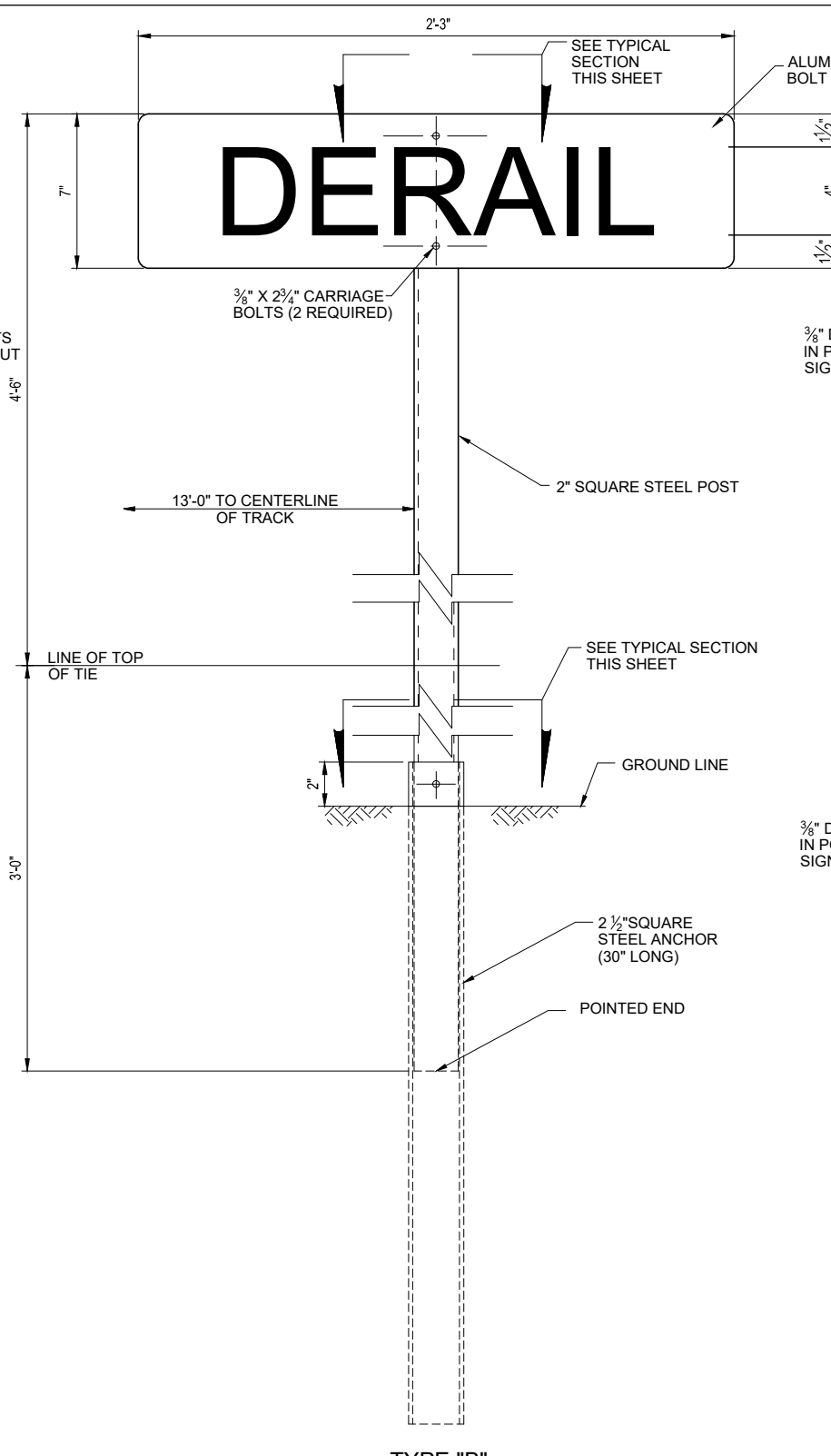


NORTH COUNTY TRANSIT DISTRICT
 810 Mission Avenue
 Oceanside, CA 92054
 www.gonctd.com

ENGINEERING STANDARD DRAWINGS	DRAWING NO. ESD-2610
DERAIL SWITCH TARGET	DRAWING SHEET NO. 1 OF 1
	SCALE: NONE
	CONTRACT SHEET NO.

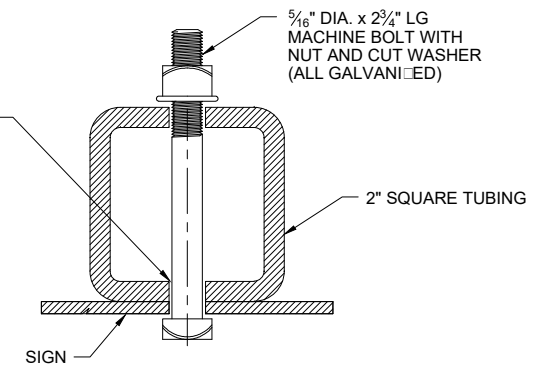


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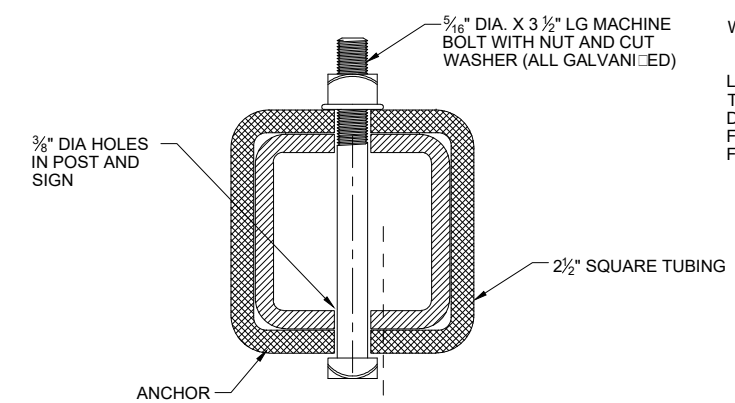


TYPE "B"

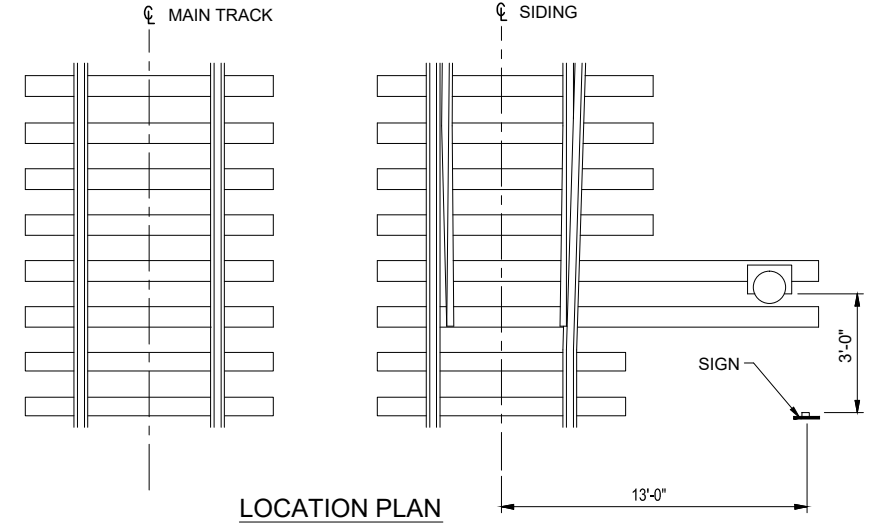
TYPE "A" AND TYPE "B" SIGNS CONFORM TO CALIFORNIA STATE LAW



TYPICAL SECTION THRU SIGN AND POST
NO SCALE



TYPICAL SECTION THRU POST AND ANCHOR
NO SCALE



LOCATION PLAN

MATERIAL SPECIFICATIONS:

SIGNS:
 1/8" THICK MILL FINISH ALUMINUM PANEL, ALCOA 6016-T6 OR EQUAL. PAINT ALL SIDES WITH LINEAR POLYURETHANE. COLOR FACE OF PANEL WITH ENGINEERING GRADE, PRESSURE SENSITIVE, RETRO-REFLECTIVE WHITE VINYL SHEETING. SILK SCREEN LEGEND WITH BLACK INK. FINISH WITH EXTERIOR GRADE PRESSURE SENSITIVE CLEAR MYLAR, 3M-1150 OR EQUAL. EXPOSED PORTIONS OF PLANK (TYPE A) TO BE PAINTED WITH METALLIC AND LAMPBLACK, MAKING A VERY DARK BROWN. BASE OF PLANK TO HAVE A COAT OF COAL TAR APPLIED HOT TO 6" ABOVE GROUND.

STEEL POSTS:
 12 GAGE (.105 THICK) 2.42 LBS. PER LINEAL FOOT SQUARE STEEL TUBE (ASTM A-36) WITH 3/8" DIA. MOUNTING HOLES. ALL GALVANIZED IN ACCORDANCE WITH ASTM A-386.

STEEL ANCHORS:
 12 GAGE (.105 THICK) 2.42 LBS. PER LINEAL FOOT SQUARE STEEL TUBE (ASTM A-36) WITH 3/8" DIA. MOUNTING HOLES. ALL GALVANIZED IN ACCORDANCE WITH ASTM A-386.

TEXT STYLE:
 TEXT TO BE "ARIAL BOLD" PER STANDARD ESD 1212. SIZE AS INDICATED.

HARDWARE:
 ALL HARDWARE TO BE VANDAL RESISTANT.

BOLTS: 5/16" X 2 3/4" LONG ALUMINUM CARRIAGE BOLTS, 2024-T4 ALLOY. (FOR SIGN)

BOLTS: 5/16" X 3 1/2" LONG ALUMINUM CARRIAGE BOLTS, 2024-T4 ALLOY. (FOR ANCHOR)

NUTS: TAMPER RESISTANT, ALCOA OR EQUAL.

WASHERS: PLAIN, FLAT ALUMINUM WASHERS.

LOCATION:
 TO BE USED AT ALL DERAILS PER ESD-2604. SIGN TO BE PLACED DIRECTLY OPPOSITE DERAIL SWITCH ON THE OUTSIDE OF AND 13 FEET FROM THE CENTERLINE OF SIDING, FACING SO AS TO BE READ FROM ENGINE PULLING OUT OF SIDING.

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REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN
RAILPROS

CHECKED
B. SMITH *BS*

RECOMMENDED
W. PREY *WP*

DATE 5/27/15

DESIGNER PE STAMP

SAN DIEGO ASSOCIATION OF GOVERNMENTS
 401 B Street, Suite 800
 San Diego, CA. 92101
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810 Mission Avenue
 Oceanside, CA 92054
 www.gonctd.com

ENGINEERING STANDARD DRAWINGS

DERAIL SIGN

DRAWING NO. ESD-2611

DRAWING SHEET NO. 1 OF 1

SCALE: NONE

CONTRACT SHEET NO.

MATERIAL SPECIFICATIONS:

SIGNS:
 1/8" THICK MILL FINISH ALUMINUM PANEL, ALCOA 6016-T6 OR EQUAL. PAINT ALL SIDES WITH LINEAR POLYURETHANE. COLOR FACE OF PANEL WITH ENGINEERING GRADE, PRESSURE SENSITIVE, RETRO-REFLECTIVE WHITE VINYL SHEETING. SILK SCREEN LEGEND WITH BLACK INK. FINISH WITH EXTERIOR GRADE PRESSURE SENSITIVE CLEAR MYLAR, 3M-1150 OR EQUAL.

TEXT STYLE:
 TEXT TO BE "ARIAL BOLD" PER ESD-1212. SIZE AS INDICATED.

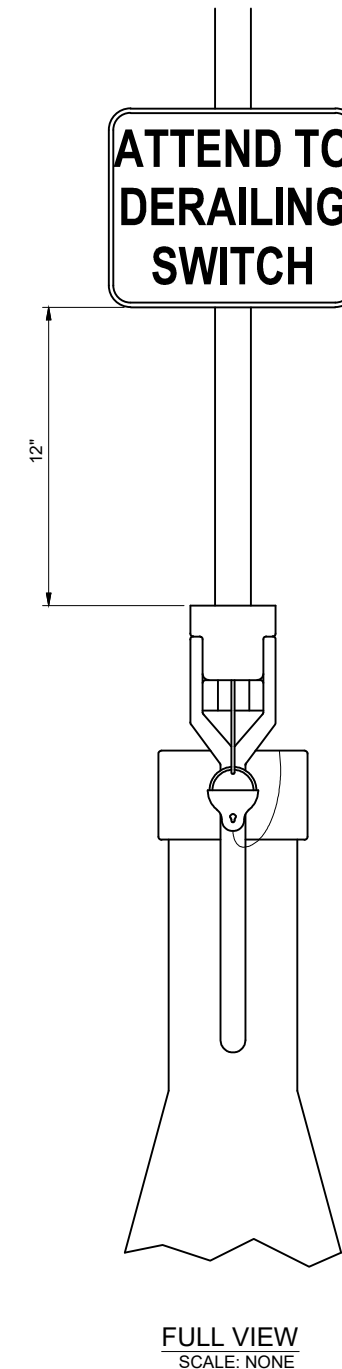
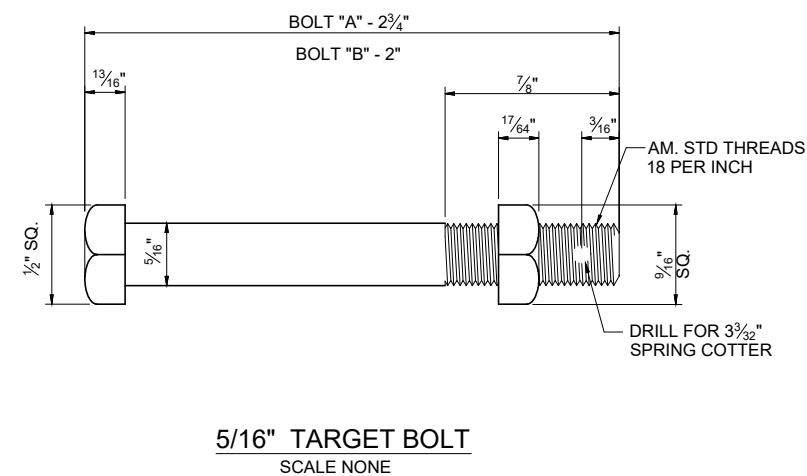
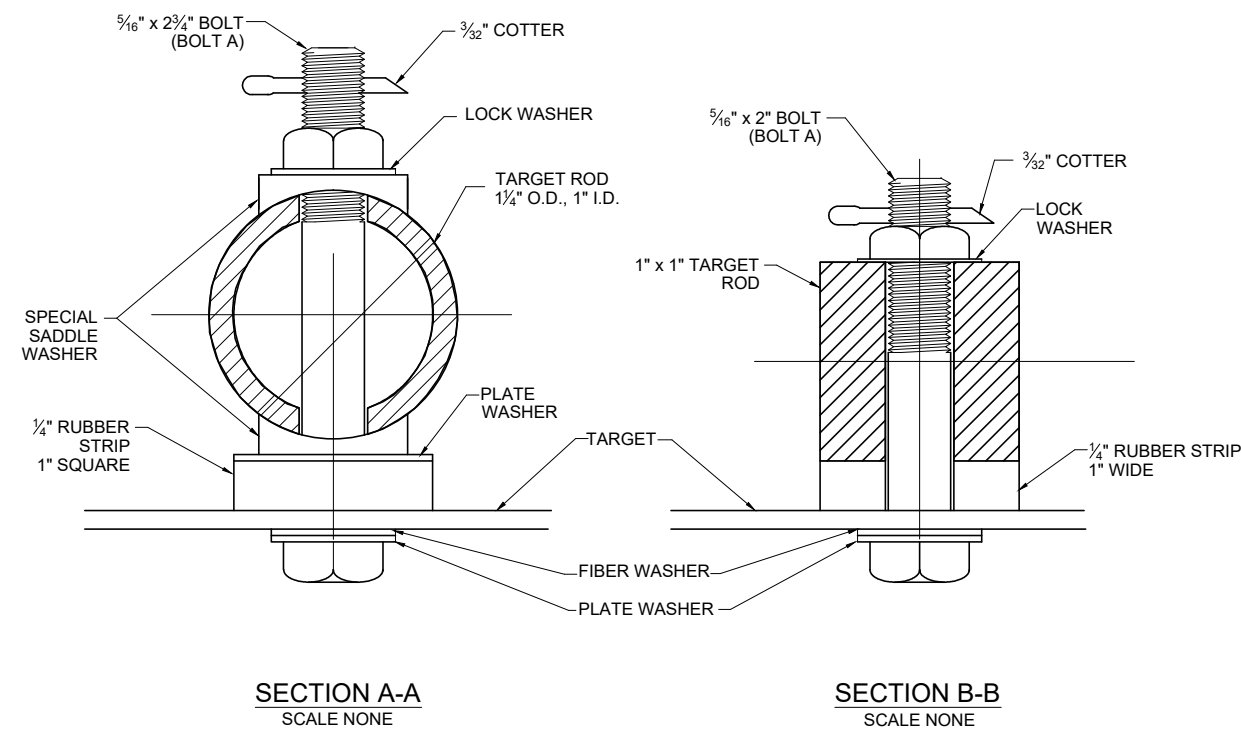
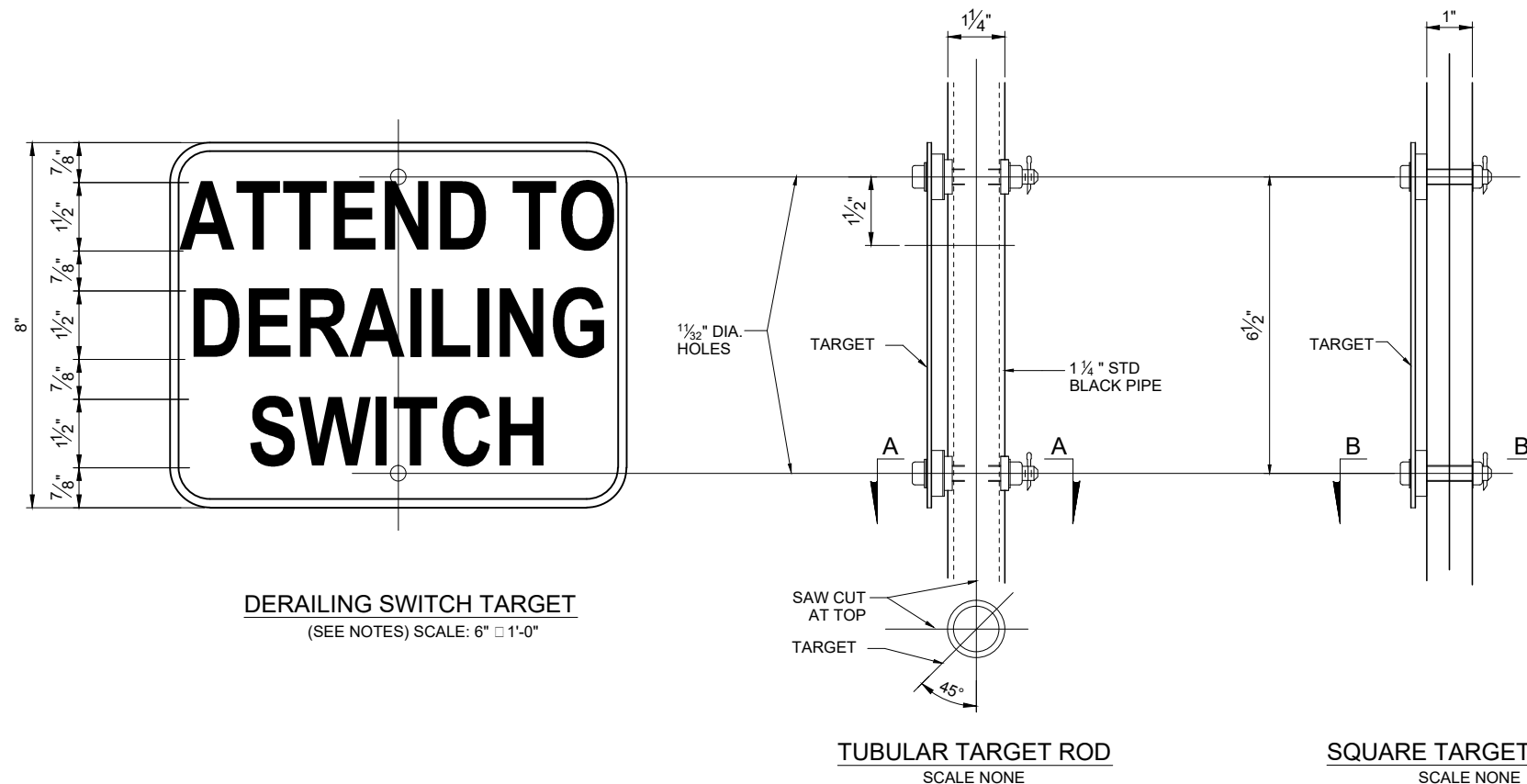
HARDWARE:
 ALL HARDWARE TO BE VANDAL RESISTANT.

BOLTS: 5/16" DIA. CLASS A STEEL.

NUTS: TAMPER RESISTANT, ALCOA OR EQUAL.

WASHERS: ALUMINUM LOCK WASHERS.

LOCATION:
 WHERE DERAIL IS PROVIDED TO PREVENT FOULING OF ANY TRACK, DERAILING SWITCH NOTICE SHALL BE PLACED ON STAND OF THAT PARTICULAR SWITCH THROUGH WHERE THE FOULING MOVEMENT WOULD BE MADE..



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REV.	DATE	DESCRIPTION	DES.	ENG.	DESIGNER PE STAMP

DRAWN
RAILPROS

CHECKED
B. SMITH *BS*

RECOMMENDED
W. PREY *WP*

DATE 5/27/15



ENGINEERING STANDARD DRAWINGS

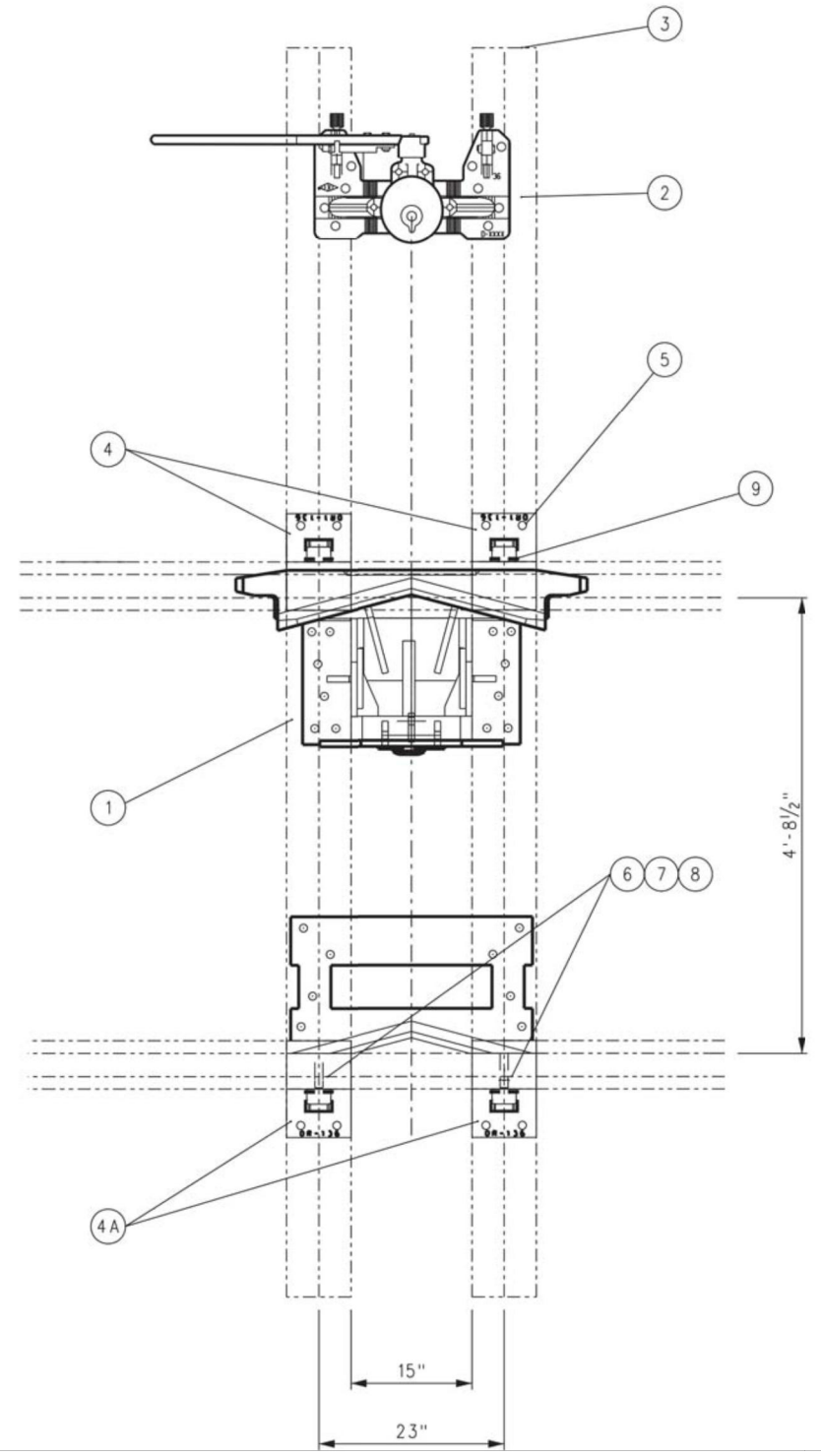
DERAIL SWITCH NOTICE

DRAWING NO. ESD-2612

DRAWING SHEET NO. 1 OF 1

SCALE: NONE

CONTRACT SHEET NO.



BILL OF MATERIAL				
ITEM	QTY	DESCRIPTION	PRODUCT NO	PART NO
1	1	HAYS DERAIL HBXS-8-SS C/W CROWDER	X99-02310	
2	1	36E SWITCH STAND WITH TARGET & BALL HANDLE SCRRA STANDARD TARGET	R36-36094	
3	2	TIE HARDWOOD TREATED, 8" X 12" X 14'-0"	J15-00067	
4	2	TIE PLATE DR1-136		
4A	2	TIE PLATE DR-136		
5	38	SCREW SPIKE 1 5/16" X 6"	V50-00010	
6	2	BOLT HEX 1" X 4" GR 5	V01-61010	
7	2	NUT HEAVY HEX 1" GR 5	V30-60015	
8	2	WASHER SPRING HEAVY 1"	V35-60217	
9	4	CLIP PANDROL E2055G RH GALVANIZED	X25-00016	

INSTALLATION REQUIREMENT NOTES:

1. CROWDER WITH SLIDING DERAIL SHOWN. WHEEL CROWDER STROKE IS 5/4" WITH 7/8" DIAMETER PINS.
2. PAINT: SAFETY YELLOW.
3. FOR PROPER THROW OF SWITCH STAND TO DERAIL/CROWDER, ADJUST SWITCH STAND CRANK EYE FOR 5/4" THROW.
4. MAKE SURE THAT YOUR SWITCH STAND (HEAD BLOCK) TIES THAT HOLD THE DERAIL ARE HIGH QUALITY.
5. READ THE MANUFACTURER'S INSTRUCTIONS.
6. PLACE THE DERAIL TIGHTLY AGAINST THE RAIL.
7. SPIKE BOTH RAILS TO THE TIES AT THE PROPER GAUGE.
8. FASTEN THE DERAIL AND CROWDER THROUGH ALL THE SCREW SPIKE HOLES. PRE-DRILL HOLES TO PREVENT THE TIES FROM SPLITTING.
9. HAVE GOOD DRAINAGE AND BALLAST. THE AREA UNDER THE DERAIL MUST BE POCKETED TO PREVENT BINDING IN ADVERSE WEATHER CONDITIONS.

INSTALLATION OF CROWDER NOTES:

1. PLACE THE WHEEL CROWDER TIGHTLY AGAINST THE WEB OF THE RAIL.
2. RAIL CROWDER MOUNTING BOLT HOLE TO BE MATCH MARKED FROM THE RAIL CROWDER AND DRILLED IN THE FIELD.
3. USE THE WEB SET SCREWS TO ADJUST AND MAINTAIN PROPER WHEEL CROWDER POINT CONTACTS WITH THE RAIL.
4. WITH BOTH RAIL AND WHEEL CROWDER SECURED AND IN DERAILING POSITION, ATTACH THE CONNECTING ROD TO THE LEFT LUG ON THE DERAIL, THEN CONNECT THE OPPOSITE END OF THE CONNECTING ROD WITH THE TURNBUCKLE INTO THE REVERSING CRANK MECHANISM ON THE BASE OF THE WHEEL CROWDER.
5. ATTACH THE SWITCH STAND CONNECTING ROD OF THE MANUAL OR ELECTRIC SWITCH STAND TO THE TURNBUCKLE ON THE SWITCH STAND OR ELECTRIC SWITCH STAND. THE OPPOSITE END OF THE CONNECTING ROD CONNECTS TO THE RIGHT HAND LUG ON THE DERAIL. ADJUST THE THROW ON YOUR SWITCH STAND TO A 5/4" THROW. A SHORTER THROW WILL GIVE YOU PRESSURE ON THE CONNECTING ROD OR SWITCH STAND EYE. PRESSURE ON THE EYE AND CONNECTING ROD CAN RESULT IN A FAILURE OF THAT COMPONENT. ADJUST AS NECESSARY.
6. PLACE COTTER KEYS TO SECURE THE NUTS.
7. INSTALL A SWITCH LOCK.

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REVISIONS		DRAWN RAILPROS	
		CHECKED B. SMITH	
		RECOMMENDED W. PREY	
REV.	DATE	DESCRIPTION	DES. ENG.
			5/27/15
			DESIGNER PE STAMP



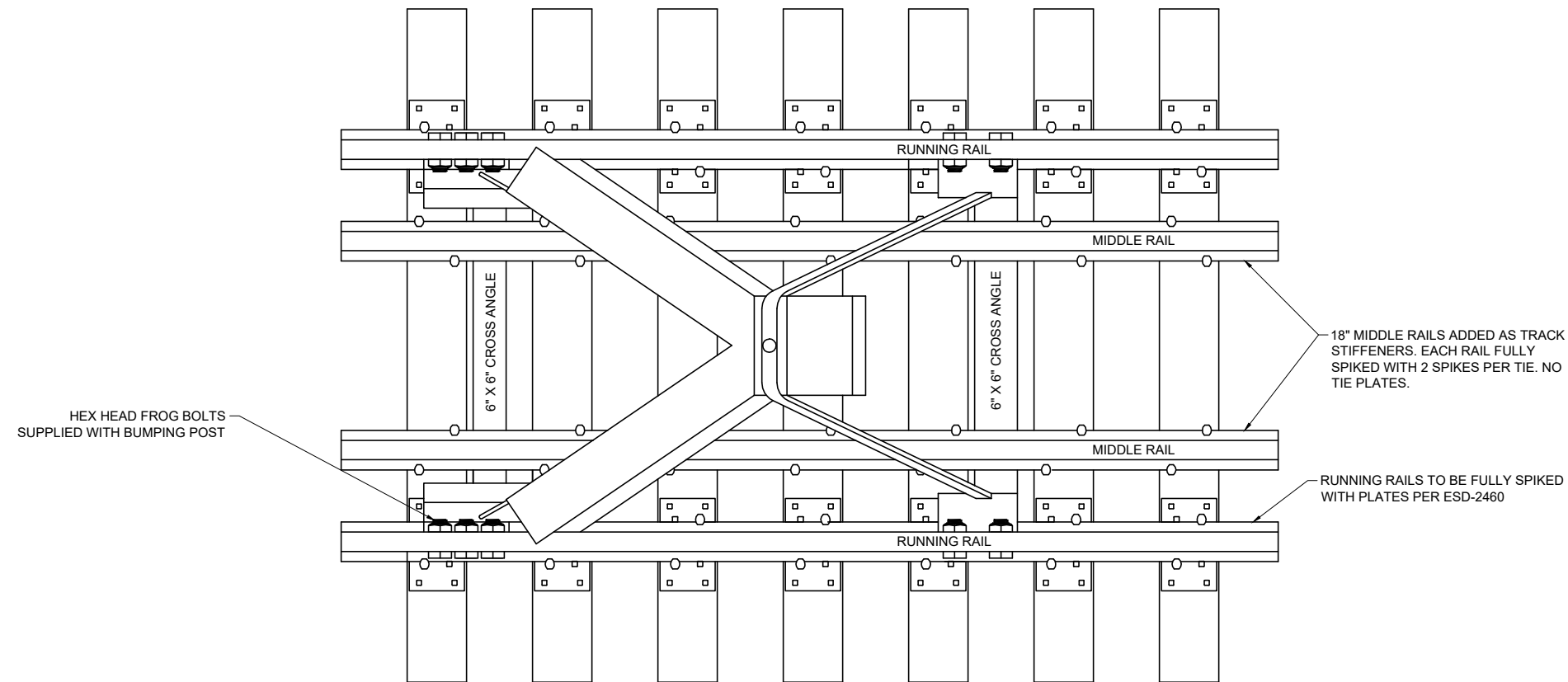
ENGINEERING STANDARD DRAWINGS

BI-DIRECTIONAL DERAIL WITH CROWDER
WITH 36E SWITCH STAND

DRAWING NO.	ESD-2614
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	

NOTES

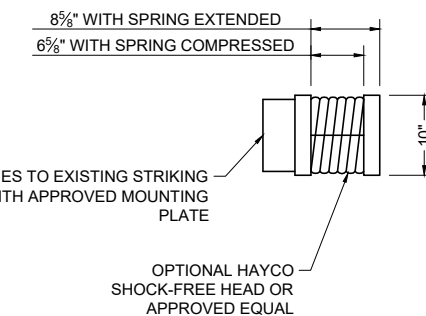
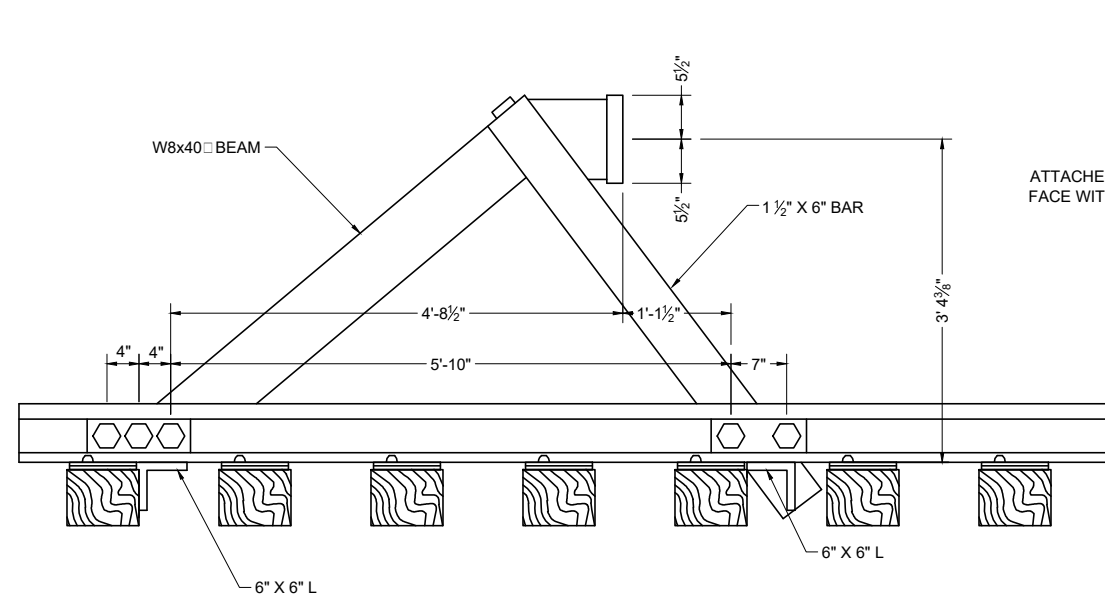
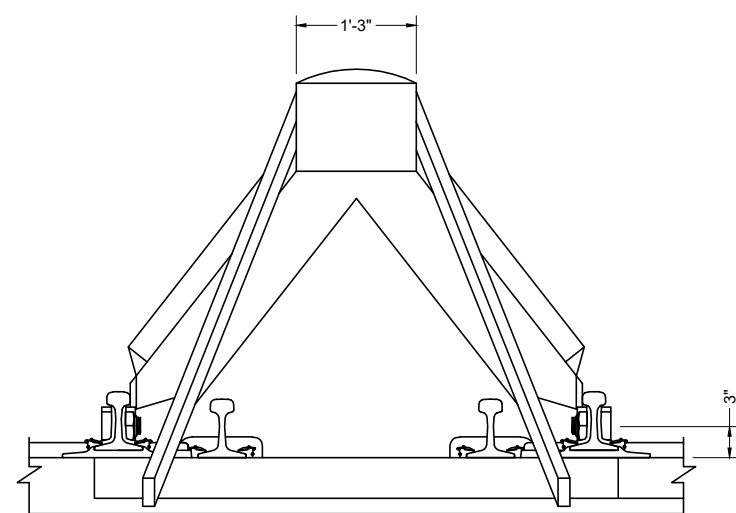
1. STEEL BUMPING POST TO BE WCH MODEL, WAC OR APPROVED EQUAL.
2. OPTIONAL SHOCK FREE HEAD TO BE INSTALLED IF DIRECTED BY THE ENGINEER.



HEX HEAD FROG BOLTS SUPPLIED WITH BUMPING POST

18" MIDDLE RAILS ADDED AS TRACK STIFFENERS. EACH RAIL FULLY SPIKED WITH 2 SPIKES PER TIE. NO TIE PLATES.

RUNNING RAILS TO BE FULLY SPIKED WITH PLATES PER ESD-2460



ATTACHES TO EXISTING STRIKING FACE WITH APPROVED MOUNTING PLATE

OPTIONAL HAYCO SHOCK-FREE HEAD OR APPROVED EQUAL

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REV.	DATE	DESCRIPTION	DES.	ENG.

REVISIONS	DRAWN RAILPROS
	CHECKED B. SMITH <i>BS</i>
	RECOMMENDED W. PREY <i>WP</i>
	DATE 5/27/15
DESIGNER PE STAMP	



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ENGINEERING STANDARD DRAWINGS

STEEL BUMPING POST

DRAWING NO.	ESD-2616
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	

NO. 8 STANDARD TURNOUT ON WOOD TIES

(136LB., RIGHT HAND WITH RAIL BOUND MANGANESE FROG)

BILL OF MATERIAL	
QTY.	DESCRIPTION
1 PAIR	16'-6" EXTENDED FIELD WELDED TYPE SWITCH POINTS (40'-0")
1 EACH	R.H. CURVED SAMSON STOCK RAILS 43'-0"
1 EACH	L.H. STRAIGHT SAMSON STOCK RAILS 42'-0"
1 EACH	21'-0" RAIL (STRAIGHT)
1 EACH	56'-0" RAIL (STRAIGHT)
2 EACH	39'-0" RAIL
1 EACH	30'-6" RAIL (CURVED)
1 EACH	6'-10" RAIL (CURVED)
1 EACH	No. 1 SMJ TYPE SWITCH ROD W/BASKET
1 EACH	VERTICAL SWITCH ROD WITH SMJ CLIPS
3 EACH	GAGE PLATE No. P-P
1 EACH	GAGE PLATE No. G-1P-R AND G-2P-R
6 EACH	SLIDE PLATE S-8P
4 EACH	SLIDE PLATE S-9P
4 EACH	BRACE SLIDE PLATE S-5P
2 EACH	BRACE SLIDE PLATE S-7P
2 EACH	BRACE SLIDE PLATE S-4P
2 EACH	HEEL PLATE PS-RH
2 EACH	TURNOUT PLATES P-10-R THRU P-19-R
1 EACH	PLATES P-20-R THRU P-22-R & P-27-R THRU P-30-R
1 EACH	No.8 R.B.M. FROG ~ 18'-0"
1 EACH	FROG PLATES No. FP-23-R THRU FP-26-R
1 EACH	FROG PLATES No. FCP-1 THRU FCP-3
1 EACH	FROG GAGE PLATES FGP-1 THRU FGP-3
2 EACH	13'-0" U-69 ADJUSTABLE GUARD RAIL W/PLATES
5 EACH	D.I. RAIL HOLD DOWN CLIPS E-3706
2 EACH	D.I. RAIL HOLD DOWN CLIPS E-3707
2 EACH	D.I. RAIL HOLD DOWN CLIPS E-3708
716 PCS.	SCREW SPIKES 1 5/16" DIA. X 6" No. 5760
12 PCS.	BOLTLESS ADJUSTABLE BRACE ASSEMBLY
384 PCS.	RAIL CLIP (GALVANIZED) (ESD-2362)
8 PCS.	E-CLIP (GALVANIZED) (ESD-2361)
102 PCS.	ROLLED STEEL TIE PLATE
2 EA.	EPOXY BONDED PREFABRICATED INSULATED JOINT 21'-2"

DRAWING INDEX

BILL OF MATERIALS AND GENERAL NOTES	ESD-2911-01
LAYOUT	ESD-2911-02
CROSSOVER LAYOUT AND BILL OF MATERIALS	ESD-2911-03
SWITCH AND TURNOUT PLATES	ESD-2911-04
GAGE PLATES	ESD-2911-05
FROG GAGE PLATES	ESD-2911-06
13'-0" GUARD RAIL	ESD-2911-07
RAILBOUND MANGANESE STEEL FROG	ESD-2911-08
FROG PLATES	ESD-2911-09
INSULATED JOINT DIAGRAM	ESD-2911-10
UNDERCUT STOCK RAIL	ESD-2911-11
16'-6" SPLIT SWITCH POINT	ESD-2911-12
SWITCH RODS AND MISC. DETAILS (1 OF 2)	ESD-2911-13
SWITCH RODS AND MISC. DETAILS (2 OF 2)	ESD-2911-14
EXTENSION PLATE AND DAP TIES	ESD-2911-15

TURNOUT DATA	
FROG NUMBER	8
FROG ANGLE	7°-09'-10"
FROG LENGTH	18'-0"
FROG TOE LENGTH	7'-0"
FROG HEEL LENGTH	11'-0"
SWITCH POINT LENGTH 40'-0"	16'-6" AL.
HEEL SPREAD OF SWITCH	6 1/4"
SWITCH ANGLE	1°-44'-11"
LEAD	68'-0"
RADIUS OF TURNOUT CURVE C/L	487.28'
DEGREE OF TURNOUT CURVE C/L	11°-46'-44"
CENTRAL ANGLE OF TURNOUT CURVE	5°-24'-46"
STRAIGHT CLOSURE LENGTH	44'-6"
CURVED CLOSURE LENGTH	44'-8 1/2"

BILL OF WOOD SWITCH TIES			
PIECES	SIZE	LENGTH	BOARD FEET
12	7" x 9"	9'-0"	630.00
8	7" x 9"	10'-0"	420.00
6	7" x 9"	11'-0"	346.50
6	7" x 9"	12'-0"	378.00
4	7" x 9"	13'-0"	273.00
5	7" x 9"	14'-0"	367.50
2	10" x 9"	14'-0" DAP TIES	147.00
5	7" x 9"	15'-0"	393.75
8	7" x 9"	16'-0"	672.00
TOTAL			TOTAL
54			3470.25

NOTES:

1. TURNOUT TO BE FABRICATED FROM 136 LB. HEAD HARDENED RAIL, FROM POINT END TO LAST LONG SWITCH TIE.
2. LOCATION OF INSULATED JOINTS IS DETERMINED BY DRAWING NUMBER ESD-2911-10. IT WILL BE SATISFACTORY TO RELOCATE THE INSULATED JOINT IN THE FIELD UP TO 12" SO AS TO PROVIDE A SUITABLE SUSPENDED JOINT, PROVIDED THE STAGGER OF INSULATED JOINTS DOES NOT EXCEED 4'-6". SUSPENDED INSULATED JOINTS MUST BE LOCATED IN A CRIB AREA BETWEEN TIES, A MINIMUM DISTANCE OF 4" FROM EDGE OF NEAREST TIE PLATE.
3. ALL INSULATED JOINTS ARE TO BE ADHESIVE BONDED PREFABRICATED INSULATED JOINTS PER ESD-2504 UNLESS OTHERWISE SPECIFIED.
4. ALL MATERIALS REQUIRED FOR HAND OR MACHINE OPERATED SWITCH OPERATION WILL BE FURNISHED PER REQUIREMENTS OF THE ENGINEER.
5. MATERIALS AND WORKMANSHIP, ALSO ANY CONSTRUCTION DETAILS NOT SHOWN, SHALL BE PER CURRENT A.R.E.M.A. "MANUAL AND PORTFOLIO" UNLESS OTHERWISE SPECIFIED.
6. WHERE REQUIRED, ALL IDENTIFICATION SYMBOLS TO BE PLAINLY STAMPED.
7. GAGE PLATES WILL BE FURNISHED INSULATED. SWITCH RODS WILL BE FURNISHED INSULATED UNLESS OTHERWISE SPECIFIED.
8. MANUFACTURER SHALL SUBMIT TWO COPIES OF SHOP DRAWINGS TO THE ENGINEER FOR APPROVAL PRIOR TO FABRICATION OF TURNOUT. SHOP DRAWINGS THAT CHANGE DETAILS OF THESE STANDARDS MUST CLEARLY SPECIFY SUCH PROPOSED CHANGES.
9. THE MATERIAL INCLUDED IN A "TURNOUT COMPLETE" IS EVERYTHING LISTED IN THE BILL OF MATERIALS. TO CONSTRUCT A COMPLETE TURNOUT, SWITCH TIES (PER LIST ON THIS SHEET) AND INSULATED JOINTS, FIELD WELDS, RUNNING RAIL, AND CLOSURE RAIL IDENTIFICATION ON SHEET ESD-2911-10 MUST ALSO BE SUPPLIED. THE MATERIAL FOR A "CROSSOVER COMPLETE" IS IDENTIFIED ON SHEET ESD-2911-03.
10. TIE PLATES SHALL CONFORM TO ENGINEERING STANDARD ESD-2454.
11. SCREW SPIKES (5/8" X 6-2 TPI) SHALL CONFORM TO ENGINEERING STANDARD ESD-2355-02. PLATE HOLES SHALL BE 1" DIAMETER. PILOT HOLES IN TIES SHALL BE 5/16" DIAMETER. SCREW SPIKES SHALL BE SCREWED INTO WOOD (NOT DRIVEN).
12. MANUFACTURER SHALL BEVEL RAIL ENDS PER CURRENT A.R.E.M.A. PLAN NO. 1005.
13. THE 16'-6" SWITCH POINT, MADE FROM 40'-0" RAIL PER ESD-2911-12 SHALL BE FURNISHED WITH SWITCH RODS NO. 1 AND 2 PER ESD-2911-13 AND ESD-2911-14.
14. FOR LOCATION OF INSULATED JOINTS FOR NO. 8 TURNOUT AND CROSSOVER, SEE DRAWING NO. ESD-2911-10.
15. GAGE PLATES FOR SWITCH AND FROG, SWITCH HEEL PLATE (FOR BOTH R.H. AND L.H. TURNOUTS) AND PLATES P-10 THRU P-24 ARE DESIGNED TO BE PERPENDICULAR TO THE MAIN LINE THRU RUN RAILS.
16. UPON COMPLETION OF TURNOUT INSTALLATION, RUNNING RAIL MUST BE ADJUSTED TO NCTD NEUTRAL RAIL TEMPERATURE.
17. ALL E-CLIPS SHALL BE GALVANIZED.
18. SWITCH POINTS SHALL BE FABRICATED PER AREMA SPECIFICATION NO. 9-28-92 AND DRAWING ESD-2911-12.
19. THE TOLERANCE FOR SPACING OF SWITCH TIES IS ± 1/2" RELATIVE TO ADJACENT TIES AND ± 1/4" RELATIVE TO CUMULATIVE DIMENSION FROM THE POINT OF SWITCH (PS).
20. FOR SWITCH MACHINE LAYOUT REFER TO ESD-8605 OR ESD-8610.

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REVISIONS		DRAWN RAILPROS
		CHECKED B. SMITH <i>BS</i>
		RECOMMENDED W. PREY <i>WP</i>
		DATE 2/2/15
REV.	DATE	DESCRIPTION
		DES. ENG.

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ENGINEERING STANDARD DRAWINGS NO. 8 STANDARD TURNOUT BILL OF MATERIALS AND GENERAL NOTES	DRAWING NO. ESD-2911-01 DRAWING SHEET NO. 1 OF 15 SCALE: NONE CONTRACT SHEET NO.
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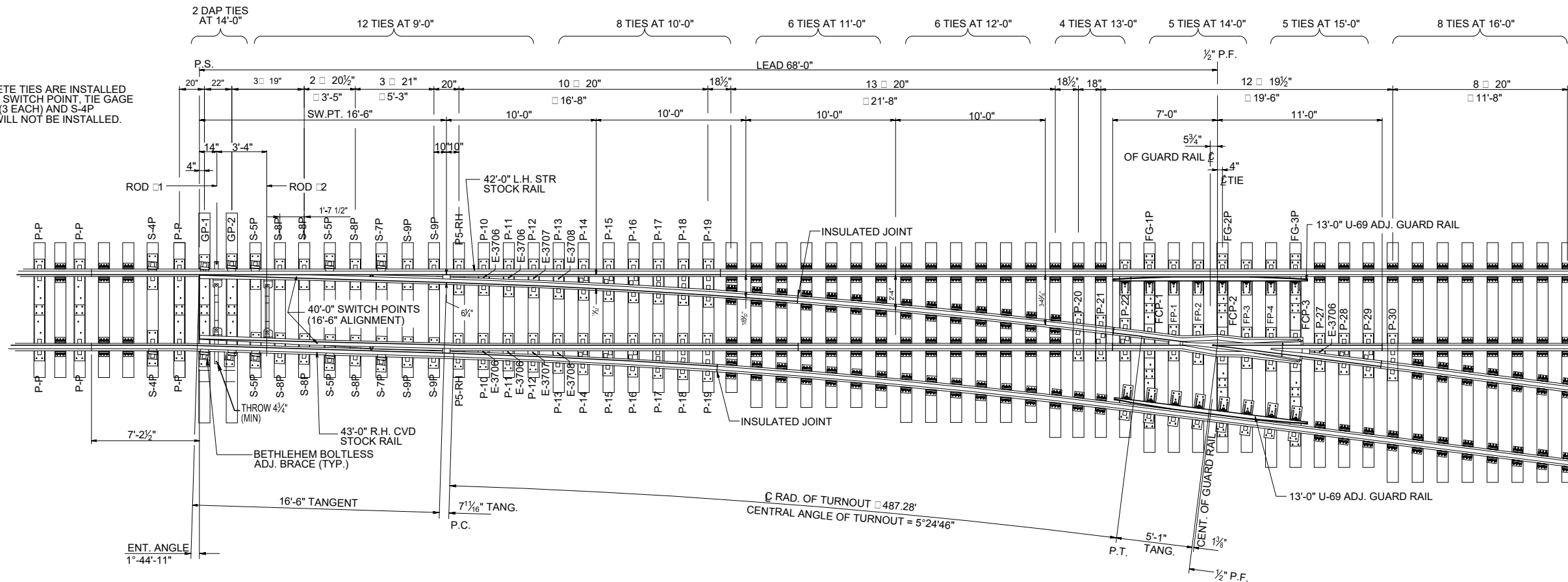
DESIGNER PE STAMP

NOTES:

1. SEE COVER SHEET FOR NOTES, BILL OF MATERIAL AND TURNOUT DATA.
2. SEE SHEET NO. 3 FOR CROSSOVER.
3. SEE ESD-8605 OR ESD-8610 FOR SWITCH MACHINE LAYOUT.

NOTE:

IF CONCRETE TIES ARE INSTALLED AHEAD OF SWITCH POINT, TIE GAGE PLATE PP (3 EACH) AND S-4P (2 EACH) WILL NOT BE INSTALLED.



NO. 8 RIGHT HAND TURNOUT



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REV.	DATE	DESCRIPTION	DES.	ENG.

REVISIONS	DRAWN RAILPROS
	CHECKED B. SMITH
	RECOMMENDED W. PREY
	DATE 2/2/15
	DESIGNER PE STAMP

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ENGINEERING STANDARD DRAWINGS

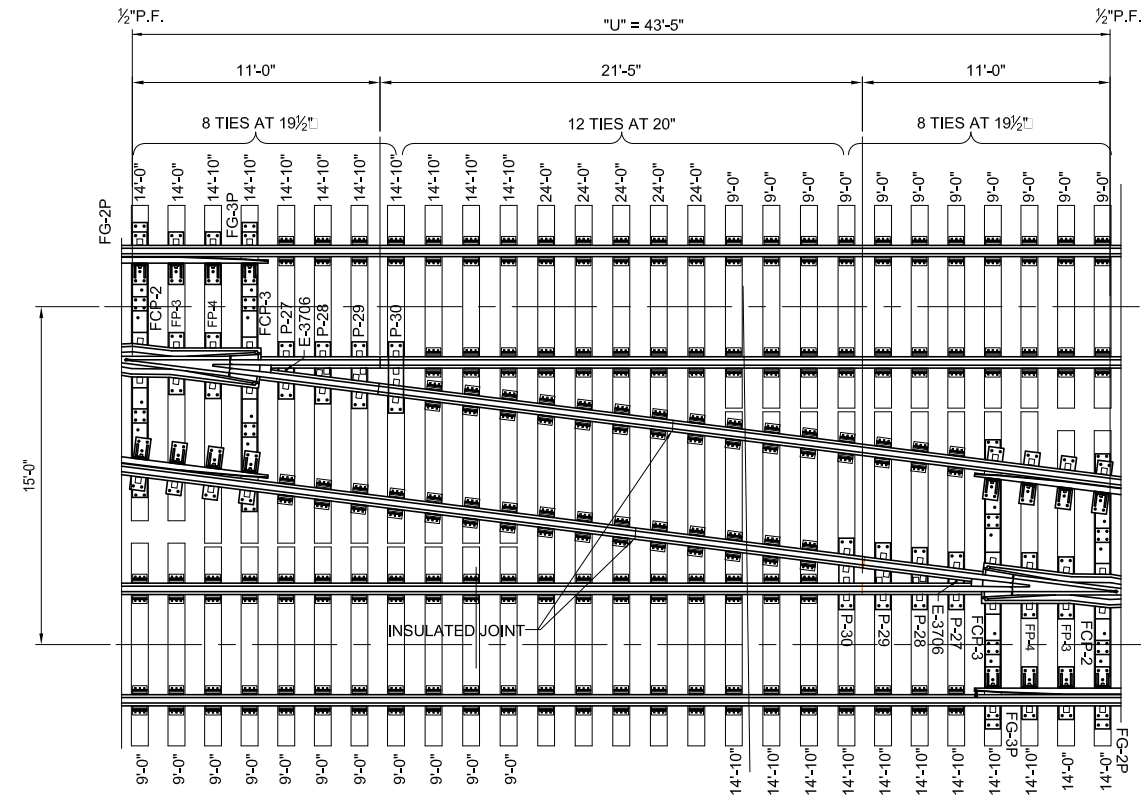
NO. 8 STANDARD TURNOUT -
LAYOUT

DRAWING NO. ESD-2911-02
DRAWING SHEET NO. 2 OF 15
SCALE: NONE
CONTRACT SHEET NO.

NOTES:

- SEE SHEET ESD-2911-01 FOR NOTES.
- SEE SHEET ESD-2911-02 FOR NO. 8 R. H. RAIL BOUND MANGANESE FROG TURNOUT.
- CROSSOVER FOR 15'-0" TRACK CENTERS IS SHOWN. FOR 16'-0" OR GREATER TRACK CENTERS, USE TWO TURNOUTS PER ESD-2911-02. FOR OTHER TRACK CENTER SPACING, MANUFACTURER TO FURNISH SHOP DRAWINGS DETAILING RAIL AND TIE LAYOUT AND DIMENSIONS THAT FOLLOW THESE EXAMPLES.

BILL OF MATERIAL	
QTY.	DESCRIPTION
2 PAIR	16'-6" EXTENDED FIELD WELDED TYPE SWITCH POINTS (40'-0" RAIL)
2 EACH	R.H. CURVED SAMSON STOCK RAILS 43'-0"
2 EACH	L.H. STRAIGHT SAMSON STOCK RAILS 42'-0"
2 EACH	21'-0" RAIL (STRAIGHT)
2 EACH	56'-0" RAIL (STRAIGHT)
2 EACH	6'-10" RAIL (CURVED)
2 EACH	39'-0" RAIL (STRAIGHT)
2 EACH	No. 1 SMJ TYPE SWITCH ROD W/BASKET
2 EACH	VERTICAL SWITCH ROD WITH SMJ CLIPS
6 EACH	GAGE PLATE No. P-P
2 EACH	GAGE PLATE No. GP-1 AND GP-2
12 EACH	SLIDE PLATE S-8P
8 EACH	SLIDE PLATE S-9P
8 EACH	BRACE SLIDE PLATE S-5P
4 EACH	BRACE SLIDE PLATE S-7P
4 EACH	BRACE SLIDE PLATE S-4P
4 EACH	HEEL PLATE P5-RH
4 EACH	TURNOUT PLATES P-10-R THRU P-19-R
2 EACH	PLATES P-20-R THRU P-22-R & P-27-R THRU P-30-R
2 EACH	No.8 R.B.M. FROG ~ 18'-0"
2 EACH	FROG PLATES No. FP-1-R THRU FP-4-R
2 EACH	FROG PLATES No. FCP-1 THRU FCP-3
2 EACH	FROG GAGE PLATES FGP-1 THRU FGP-3
4 EACH	13'-0" U-69 ADJUSTABLE GUARD RAIL W/PLATES
10 EACH	D.I. RAIL HOLD DOWN CLIPS E-3706
4 EACH	D.I. RAIL HOLD DOWN CLIPS E-3707
4 EACH	D.I. RAIL HOLD DOWN CLIPS E-3708
384 PCS.	SCREW SPIKES 15/16" DIA. X 6" No. 5760
12 PCS.	BOLTLESS ADJUSTABLE BRACE ASSEMBLY
192 PCS.	RAIL CLIP (GALVANIZED) (ESD-2362)
24 PCS.	E- CLIP (GALVANIZED) (ESD-2361)
96 PCS.	ROLLED STEEL TIE PLATE
4 EACH	EPOXY BONDED PREFABRICATED INSULATED JOINT (21'-2")
2 EACH	EPOXY BONDED PREFABRICATED INSULATED JOINT (38'-5")



NO. 8 RIGHT HAND CROSSOVER

CROSSOVER DATA	
FROG NUMBER	8
FROG ANGLE	7°-09'-10"
FROG LENGTH	18'-0"
FROG TOE LENGTH	7'-0"
FROG HEEL LENGTH	11'-0"
SWITCH POINT LENGTH 40'-0"	16'-6" AL.
HEEL SPREAD OF SWITCH	6 1/2"
SWITCH ANGLE	1°-44'-11"
LEAD	68'-0"
RADIUS OF TURNOUT CURVE C/L	487.28'
DEGREE OF TURNOUT CURVE C/L	11°-46'-44"
CENTRAL ANGLE OF TURNOUT CURVE	5°-24'-46"
STRAIGHT CLOSURE LENGTH	44'-6"
CURVED CLOSURE LENGTH	44'-8.1"

BILL OF SWITCH TIES			
PIECES	SIZE	LENGTH	BOARD FEET
46	7" x 9"	9'-0"	2173.50
16	7" x 9"	10'-0"	840.00
12	7" x 9"	11'-0"	693.00
12	7" x 9"	12'-0"	756.00
8	7" x 9"	13'-0"	546.00
10	7" x 9"	14'-0"	735.00
4	10" x 9"	14'-0" DAP TIES	294.00
16	7" x 9"	14'-10"	1260.00
5	7" x 9"	24'-0"	630.00
TOTAL			TOTAL
129			7927.50

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REFERENCE DRAWINGS

136 lb. - No.8 - R.H. TURNOUT ESD-2911-02

REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN RAILPROS	
CHECKED B. SMITH	<i>B. SMITH</i>
RECOMMENDED W. PREY	<i>WP</i>
DATE	2/2/15
DESIGNER PE STAMP	



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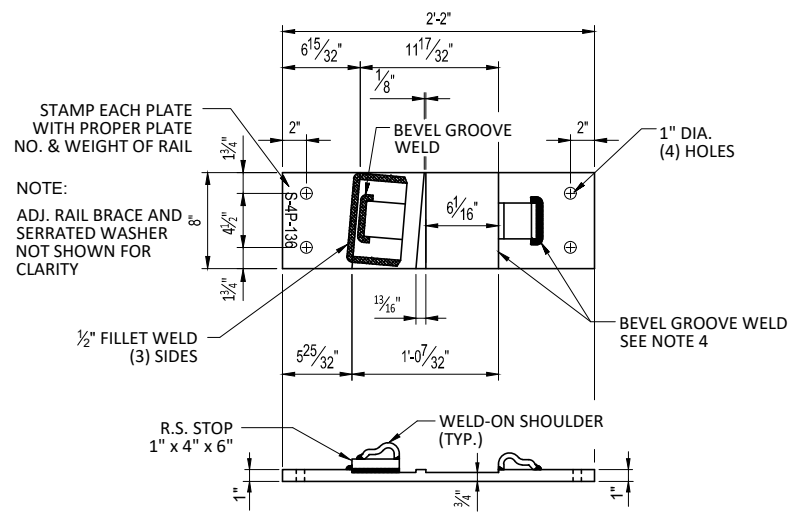


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ENGINEERING STANDARD DRAWINGS

NO. 8 STANDARD TURNOUT -
CROSSOVER LAYOUT AND BILL OF
MATERIALS

DRAWING NO.	ESD-2911-03
DRAWING SHEET NO.	3 OF 15
SCALE:	NONE
CONTRACT SHEET NO.	

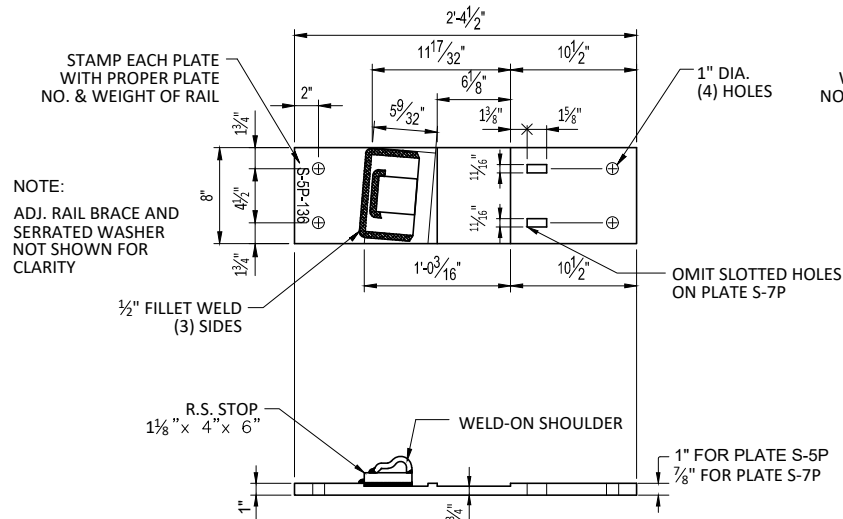


BRACE PLATE S-4P

1" x 8" x 2'-2" LG. ~ MILLED ~ W/ADJ. RAIL BRACE
2 - S-4P PLATES REQUIRED AS SHOWN

REFERENCE DWGS.

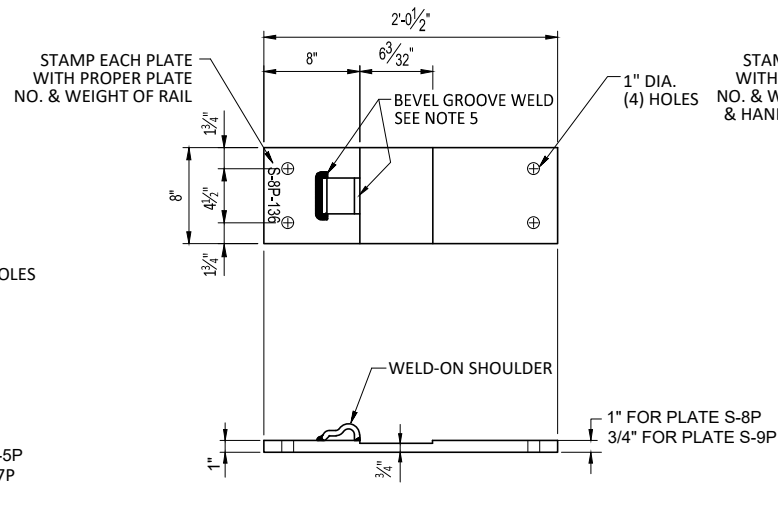
LAYOUT - No.8, R.H., H.O. TURNOUT - 136 lb. SHEET No. 5300-02



BRACE SLIDE PLATE S-5P & S-7P

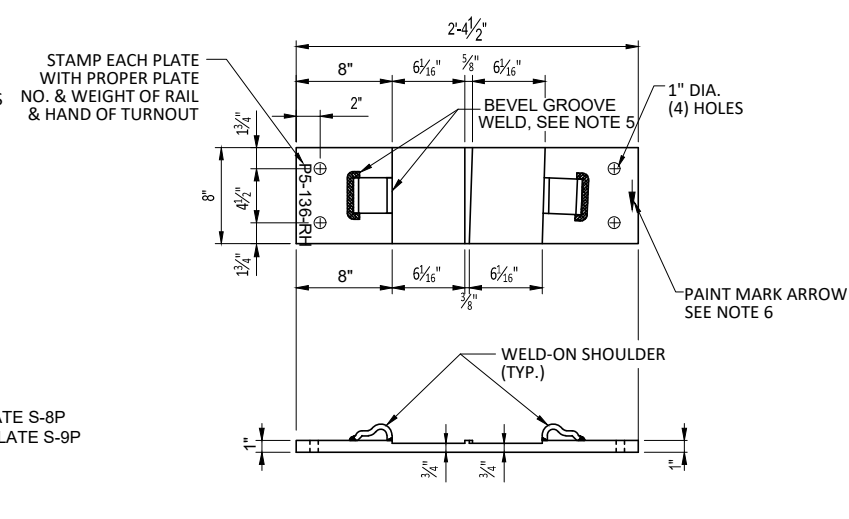
1" X 8" X 2'-4 1/2" LG. - MILLED - W/ADJ. RAIL BRACE
4 - S-5P PLATES REQUIRED AS SHOWN
2 - S-7P PLATES REQUIRED AS SHOWN

SWITCH PLATES



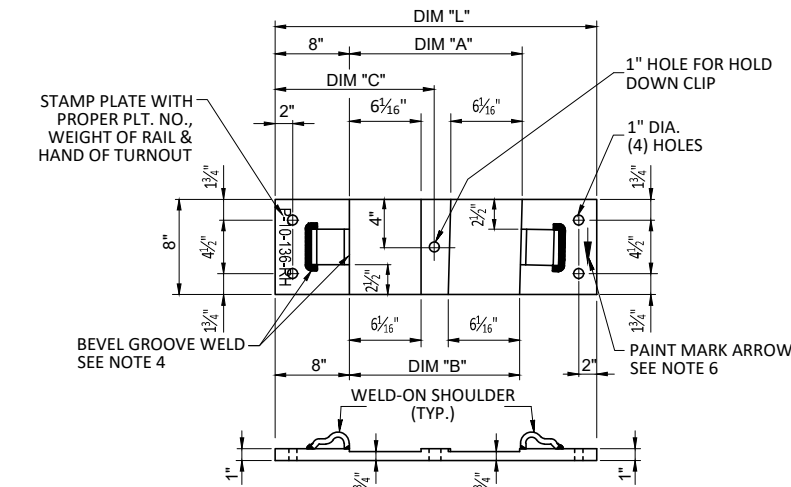
SLIDE PLATE - S-8P & S-9P

1" X 8" X 2'-0 1/2" LG. - MILLED - W/PANDROL CLIP
6 - S-8P PLATES REQUIRED AS SHOWN (1/4" RISER)
4 - S-9P PLATES REQUIRED AS SHOWN (0" RISER)



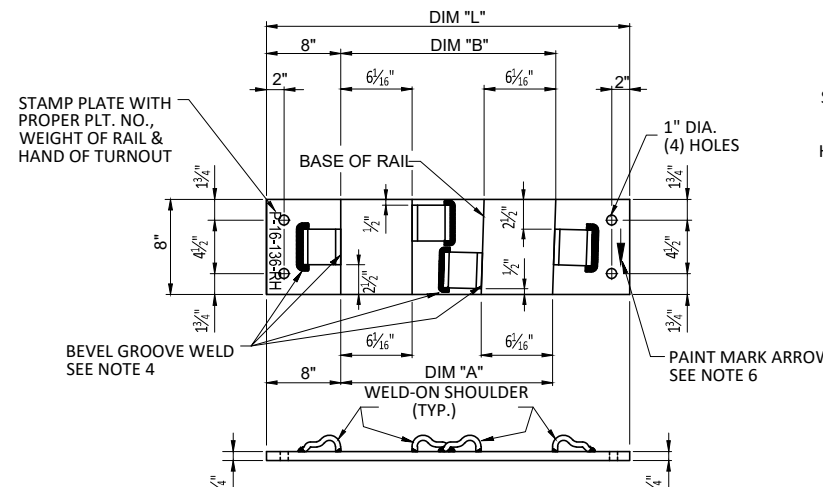
HEEL PLATE - P-5 - RH

1" X 8" X 2'-4 1/2" LG. - MILLED - W/PANDROL CLIPS
2 - P-5-RH PLATES REQUIRED AS SHOWN FOR R.H. T.O.



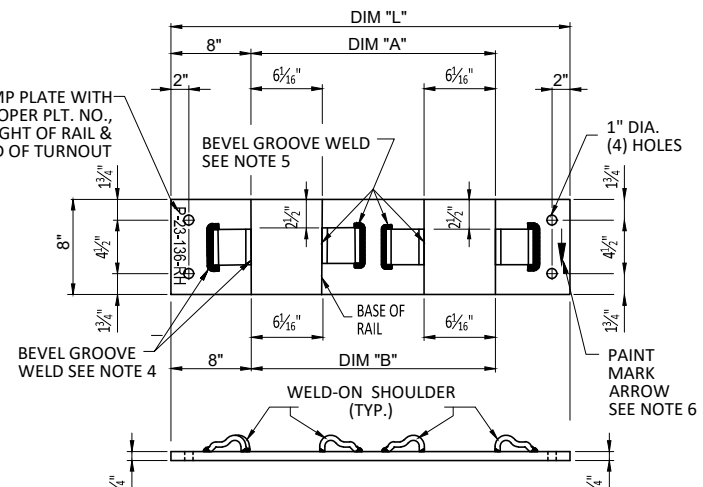
TURNOUT PLATES - P-10 THRU P-13 & P-27

1" x 8" x DIM "L" - MILLED - W/ PANDROLS



TURNOUT PLATES - P-14 THRU P-16

P-21, P-22, P-28 AND P-29
3/4" x 8" x DIM "L" - FLAT - W/ PANDROL CLIPS



TURNOUT PLATES - P-17 THRU P-20 & P-30

3/4" x 8" x DIM "L" - FLAT - W/ PANDROL CLIPS

NOTES:

- PLATES TO BE MADE OF MILD ROLLED STEEL.
- EACH PLATE TO BE PLAINLY STAMPED WITH PLATE NO. AND 136 (WEIGHT OF RAIL) & HAND OF TURNOUT (R.H. OR L.H.)
- THE WELD - ON PRESSED STEEL SHOULDER, MADE FROM MILD STEEL, TO BE PURCHASED FROM PANDROL INTERNATIONAL OR APPROVED ALTERNATE MEETING PANDROL'S DESIGN SPECIFICATIONS.
- THE PRESSED STEEL SHOULDER MUST BE CAREFULLY WELDED TO THE PLATE. ANY WELD PROJECTING BEYOND THE VERTICAL FACE OF SHOULDER IN THE AREA OF THE RAIL SEAT MUST BE MACHINED OUT TO PROVIDE A CLEAR RAIL SEAT DIMENSION AS CALLED FOR.
- THE PLATES AS SHOWN ARE FOR A 136 LB., NO. 8 RIGHT HAND TURNOUT. FOR A LEFT HAND TURNOUT, PLATES P-10 THRU P-29 INCLUSIVE AND FROG PLATES AND GAGE PLATES FG-1P THRU FG-3P ARE TO BE OPPOSITE.
- DIRECTION OF ARROW SHOWN IS AN EXAMPLE ONLY. USING SHEET ESD-2911-02 AS A GUIDE, PAINT MARK EACH PLATE WITH AN ARROW POINTING TOWARD SWITCH POINT.

WELDING SPECIFICATIONS:

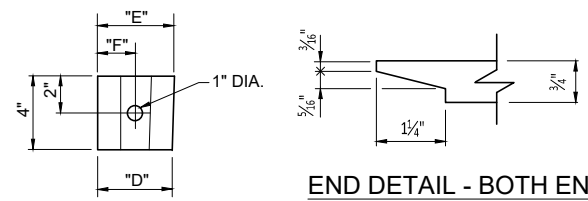
- SET PRESSED STEEL SHOULDER FLUSH AGAINST LINE OF BASE OF RAIL OR SHOULDER OF MILLED PLATE AS SHOWN AND WELD WITH 2 - PASS 3/8" + WELD.
- STOP PLATE FOR ADJUSTABLE RAIL BRACE TO BE SET FLUSH WITH SHOULDER OF MILLED PLATE AS SHOWN AND WELD WITH 3 - PASS 1/2" + FILLET WELD.
- SHOULDERS AND STOPS ARE TO BE CAREFULLY WELDED TO PLATE. NO WELD SHALL PROJECT BEYOND THE VERTICAL EDGE OF THE UNWELDED FOURTH SIDE OF THE STOP PLATE OR VERTICAL FACE OF SHOULDER IN THE AREA OF THE RAIL SEAT. ANY WELD PROJECTING BEYOND THE FACE OF THE STOP OR SHOULDER MUST BE MACHINED OFF TO PROVIDE CLEAR DIMENSION CALLED FOR.
- FOR WELDING PRESSED STEEL SHOULDERS OR PLATE STOPS FOR ADJUSTABLE USE THE FOLLOWING:
 - ELECTRODE 1 5/32 INCH, WELDING SPEC. 7018XLM.
 - ELECTRODE 3/16 INCH, WELDING SPEC. 7018XLM.
 - WIRE, WELDING 3/32 INCH, NR203, 1% NICKEL FLUX CORE.
 OTHER WIRE OR ELECTRODES MEETING SPECIFICATIONS AS CALLED FOR, APPROVED BY THE ENGINEER, MAY BE USED.

DIMENSION TABLE						
PLATE	DIM "A"	DIM "B"	DIM "C"	DIM "L"	Plts REQ'D.	CLIPS REQ'D.
P-10	13 1/16"	13 3/16"	14 3/8"	2'-5"	2 EA.	2 EA.
P-11	14 3/16"	13 3/8"	15"	2'-6"	2 EA.	2 EA.
P-12	15"	14 3/16"	15 3/8"	2'-7"	2 EA.	2 EA.
P-13	15 3/16"	15 3/16"	15 3/16"	2'-8"	2 EA.	2 EA.
P-27	14 1/2"	13 3/4"	14 3/32"	2'-6 1/2"	1 EA.	1 EA.

DIMENSION TABLE						
PLATE	DIM "A"	DIM "B"	DIM "L"	Plts REQ'D.	CLIPS REQ'D.	
P-14	16 1/32"	16 1/32"	2'-9"	2 EA.	2 EA.	
P-15	17 1/32"	17 1/8"	2'-10"	2 EA.	2 EA.	
P-16	18 1/32"	18 1/32"	2'-11"	2 EA.	2 EA.	
P-21	19 3/8"	20 19/32"	3'-0 1/2"	1 EA.	1 EA.	
P-22	17 1/4"	18 1/4"	2'-10"	1 EA.	1 EA.	
P-28	15 3/16"	16 1/16"	2'-9"	1 EA.	1 EA.	
P-29	18 3/8"	19 3/8"	2'-11 1/2"	1 EA.	1 EA.	

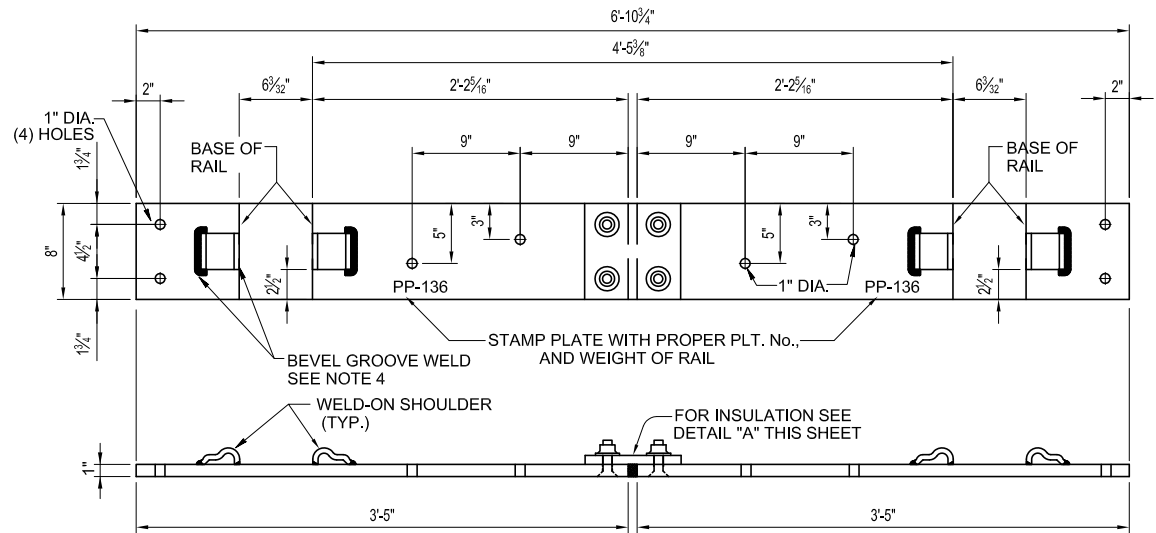
DIMENSION TABLE				
PLATE	DIM "A"	DIM "B"	DIM "L"	Plts REQ'D.
P-17	20 1/8"	19 13/32"	3'-0"	2 EA.
P-18	21 1/8"	20 1/8"	3'-1"	2 EA.
P-19	22 1/32"	20 1/2"	3'-2 1/2"	2 EA.
P-20	22 1/16"	21 19/32"	3'-2 1/2"	1 EA.
P-30	21 1/32"	20 1/32"	3'-2"	1 EA.

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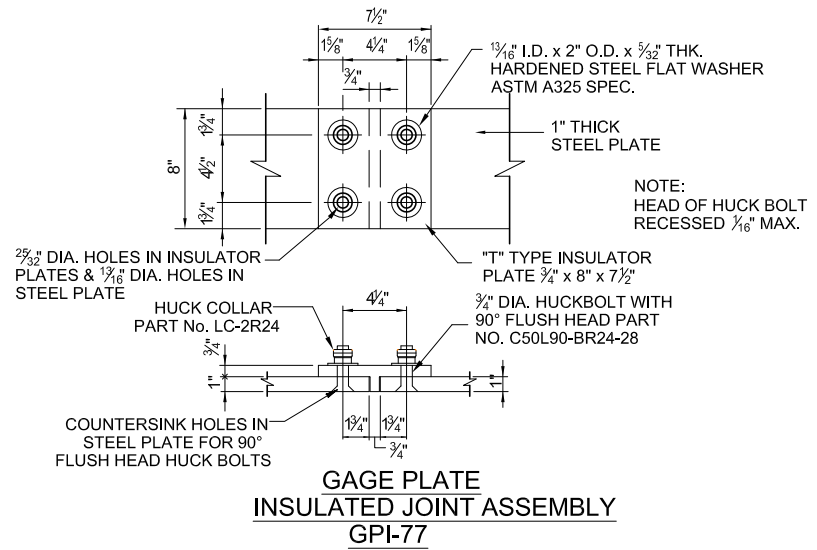
END DETAIL - BOTH ENDS
HOLD DOWN CLIP FOR PLATES P-10 THRU P-15
HOLD DOWN CLIP FOR PLATES P-24 THRU P-26

REVISIONS		DRAWN RAILPROS	<p>SAN DIEGO ASSOCIATION OF GOVERNMENTS 401 B Street, Suite 800 San Diego, CA. 92101 www.sandag.org</p>	<p>810 Mission Avenue Oceanside, CA 92054 www.gonctd.com</p>	<p>ENGINEERING STANDARD DRAWINGS</p> <p>NO.8 STANDARD TURNOUT - SWITCH AND TURNOUT PLATES</p>	DRAWING NO. ESD-2911-04
		CHECKED B. SMITH				DRAWING SHEET NO. 4 OF 15
		RECOMMENDED W. PREY				SCALE: NONE
		DATE 2/21/15				CONTRACT SHEET NO.
REV.	DATE	DESCRIPTION	DES.	ENG.	DESIGNER PE STAMP	



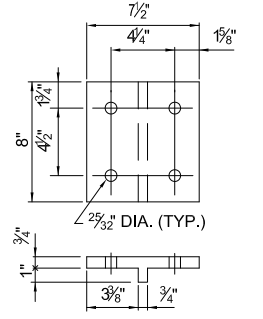
INSULATED GAGE PLATE P-P
1" x 8" - FLAT - W/ INSULATION
(3 PC. REQ'D AS SHOWN)

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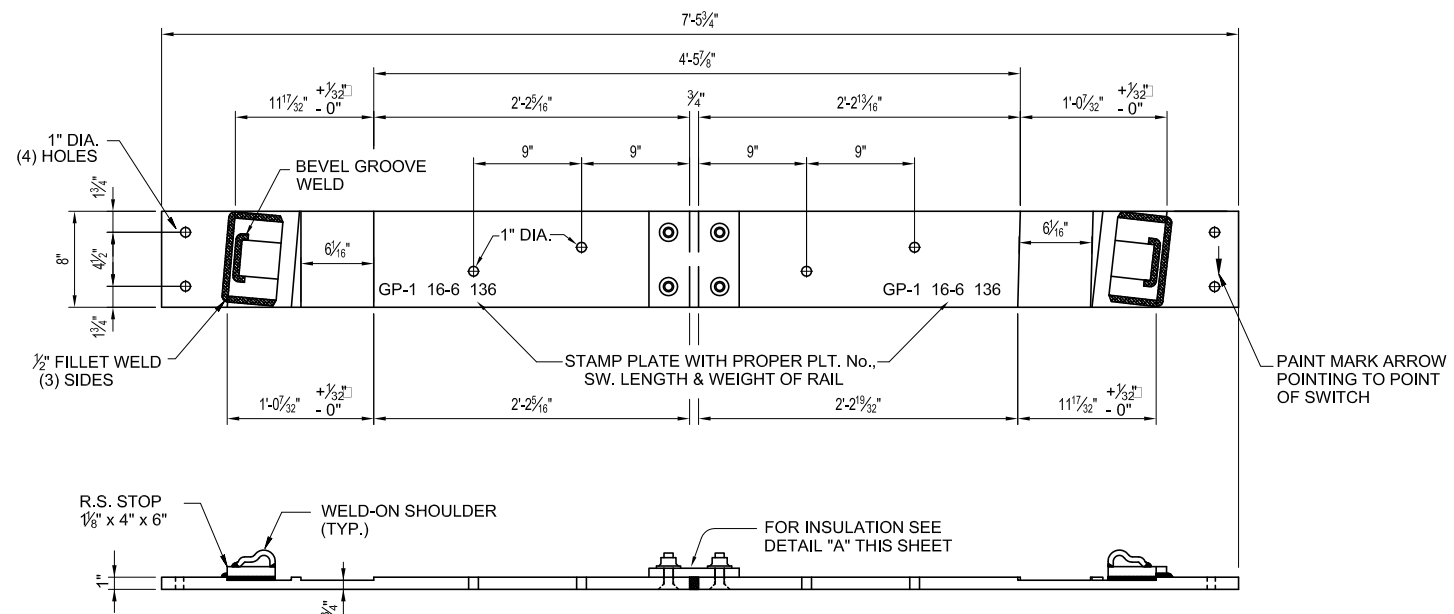
**GAGE PLATE
INSULATED JOINT ASSEMBLY
GPI-77**

- NOTES:
1. PLATES TO BE MADE OF MILD ROLLED STEEL.
 2. THE WELD-ON PRESSED STEEL SHOULDER, MADE OF MILD STEEL AND MEETING "PANDROL'S" DESIGN SPECIFICATIONS SHALL BE USED. THE PRESSED STEEL SHOULDER MUST BE CAREFULLY WELDED TO ALL PLATES WITH A MINIMUM 2 PASS 3/8" + FILLET WELD ALONG THE BEVELED GROOVES OF THE SHOULDER. ANY WELD PROJECTING BEYOND THE VERTICAL FACE OF SHOULDER IN THE AREA OF THE RAIL SEAT MUST BE MACHINED OUT TO PROVIDE A CLEAR RAIL SEAT DIMENSION AS CALLED FOR.
 3. THE PLATES AS SHOWN ARE FOR A 136 LB., NO. 8 RIGHT HAND, HAND OPERATED TURNOUT. FOR A LEFT HAND TURNOUT, PLATES ARE TO BE OPPOSITE.
 4. FOR EXTENSION PLATE AND DAP TIE DETAILS SEE SHEET ESD-2911-15.



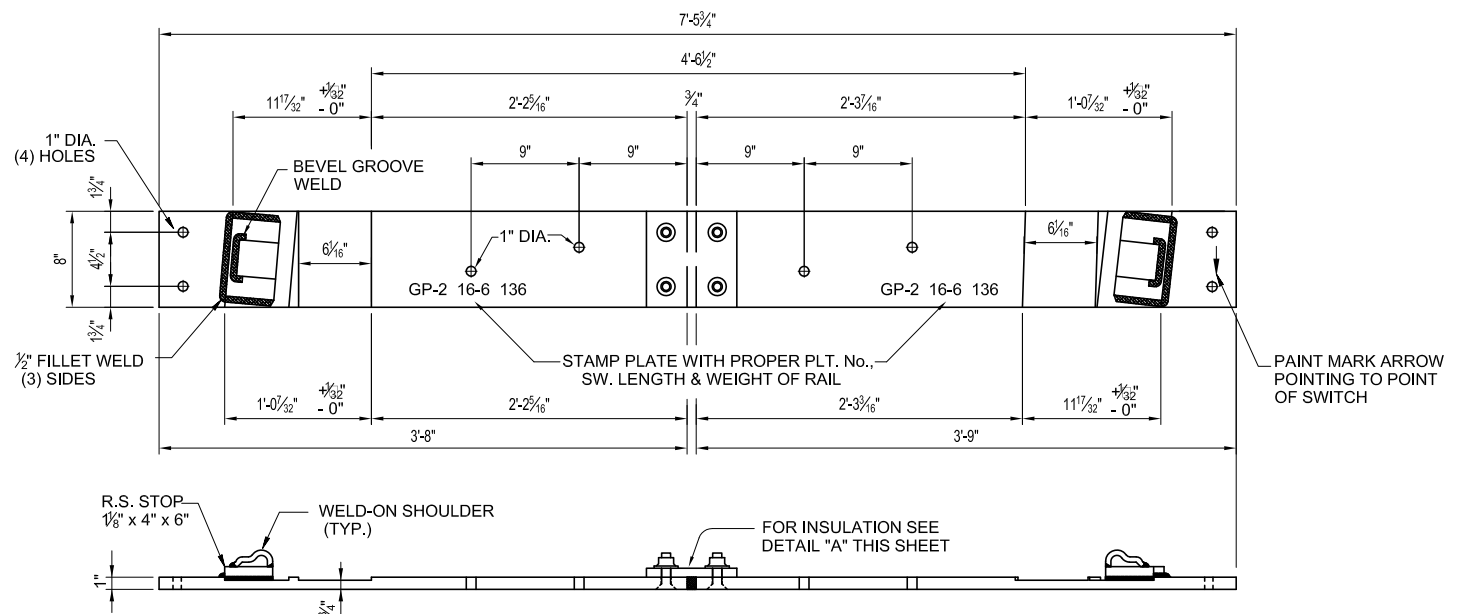
**DETAIL "A"
INSULATION AT GAGE PLATES**
(SCALE: NONE)

DETAIL OF INSULATION BLOCK
POLYESTER COATED STEEL CORE
W/ BUSHINGS, PORTEC #127-07547-01
OR FIBERGLASS REINFORCED THERMOSET RESIN.
PURCHASE PART NO. GP152P05



INSULATED GAGE PLATE GP-1 - USED AT POINT OF SWITCH
1" x 8" - MILLED - W/ INSULATION & ADJ. RAIL BRACES
(1 PC. REQ'D AS SHOWN)

NOTE:
SERRATED WASHER AND BRACE PLATE
NOT SHOWN FOR CLARITY.



INSULATED GAGE PLATE GP-2 - USED AT POINT OF SWITCH
1" x 8" - MILLED - W/ INSULATION & ADJ. RAIL BRACES
(1 PC. REQ'D AS SHOWN)

NOTE:
SERRATED WASHER AND BRACE PLATE
NOT SHOWN FOR CLARITY.

REFERENCE DRAWINGS

LAYOUT - No.8, R.H. TURNOUT - 136 lb. ----- SHEET ESD-2911-02
DETAILS - SWITCH EXTENSION PLATES & DAP TIES lb. ----- SHEET ESD-2911-15

REV.	DATE	DESCRIPTION	DES.	ENG.

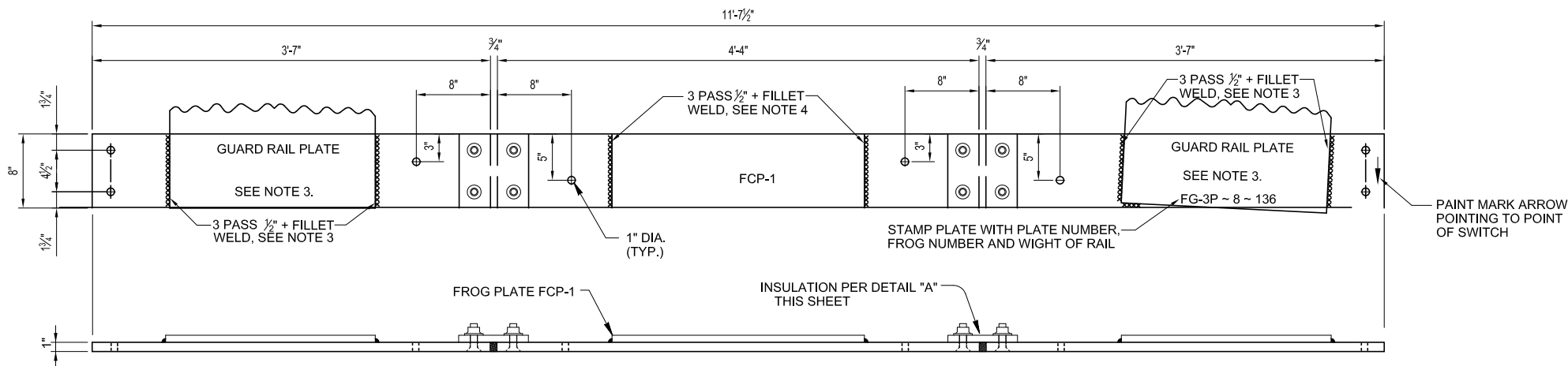
REVISIONS	DRAWN RAILPROS
	CHECKED B. SMITH
	RECOMMENDED W. PREY
	DATE 2/2/15
	DESIGNER PE STAMP

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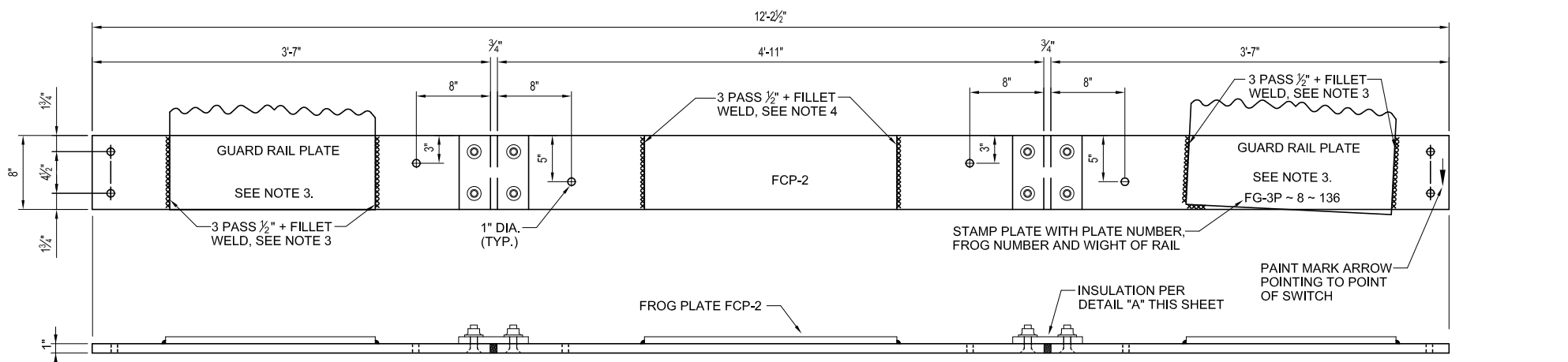
**NORTH COUNTY
TRANSIT DISTRICT**
810 Mission Avenue
Oceanside, CA 92054
www.gonctd.com

ENGINEERING STANDARD DRAWINGS
NO. 8 STANDARD TURNOUT - GAGE
PLATES

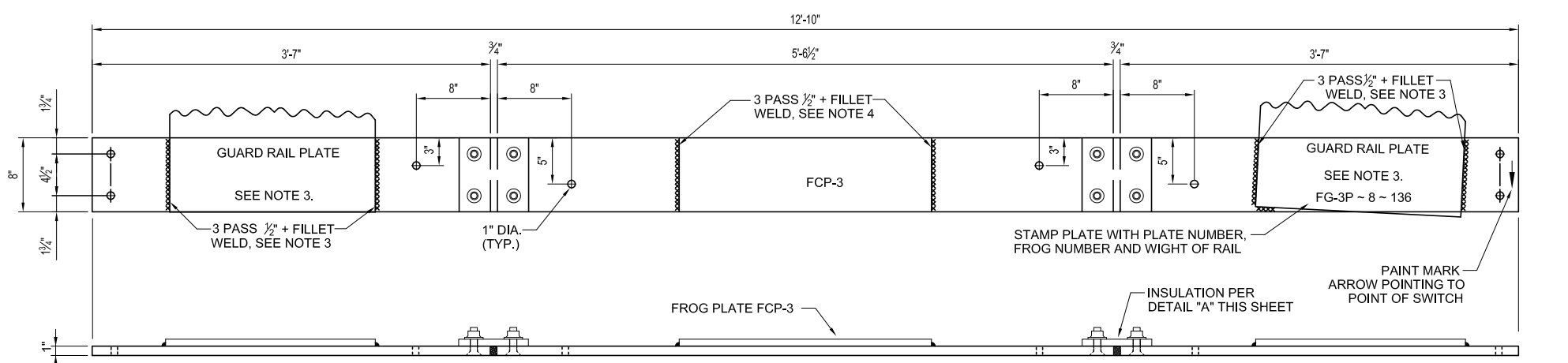
DRAWING NO.	ESD-2911-05
DRAWING SHEET NO.	5 OF 15
SCALE:	NONE
CONTRACT SHEET NO.	



INSULATED FROG GAGE PLATE - FG-1P
 3/4" x 8" - FLAT - W/ INSULATION (1 PC. REQ'D AS SHOWN)



INSULATED FROG GAGE PLATE - FG-2P
 3/4" x 8" - FLAT - W/ INSULATION (1 PC. REQ'D AS SHOWN)
 (THIS DETAIL NOT TO SCALE)

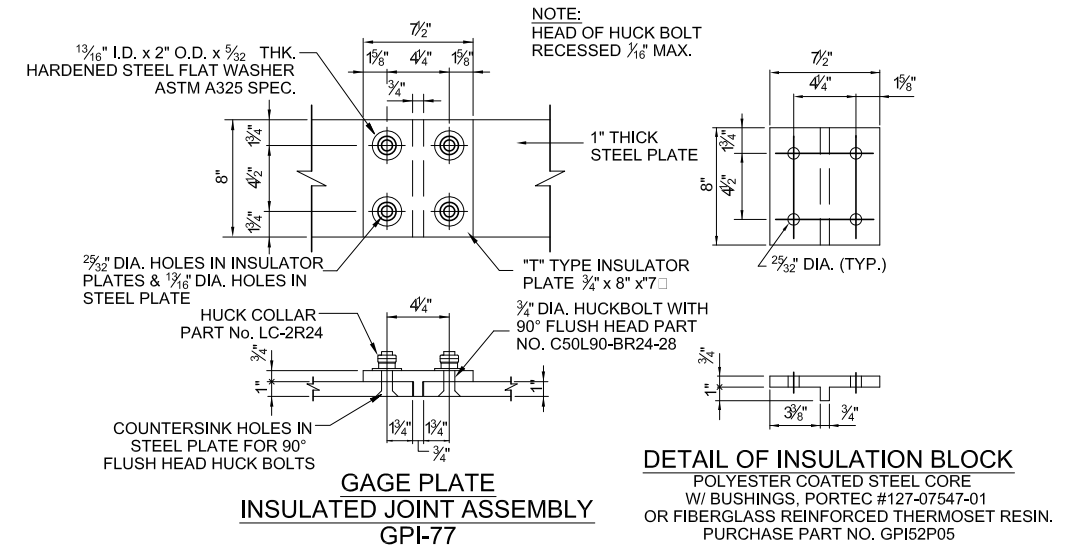


INSULATED FROG GAGE PLATE - FG-3P
 3/4" x 8" - FLAT - W/ INSULATION (1 PC. REQ'D AS SHOWN)
 (THIS DETAIL NOT TO SCALE)

NOTES:

1. PLATES TO BE MADE OF MILD ROLLED STEEL.
2. THE PLATES AS SHOWN ARE FOR A 136 LB., NO. 8, RIGHT HAND, HAND OPERATED TURNOUT. FOR A LEFT HAND TURNOUT PLATES ARE TO BE OPPOSITE.
3. GUARD RAIL PLATES SHALL BE INSTALLED AND WELDED TO THE FROG GAGE PLATES IN THE FIELD WITH A 3 PASS 3/8" + FILLET WELD CONTINUOUS ON BOTH ENDS OF THE PLATE. PLATES ARE TO BE WELDED ONLY AFTER THE GAGE PLATE AND THE FROG IS SECURED IN THE PROPER LOCATION ON THE TIE WITH PROPER ALIGNMENT.
4. FROG BASE PLATES FP-1, FP-4 AND FP-7 ARE TO BE WELDED TO THE FROG GAGE PLATES IN THE FIELD WITH A 3 PASS 3/8" + FILLET WELD CONTINUOUS ON BOTH ENDS OF THE PLATE. PLATES ARE TO BE WELDED ONLY AFTER THE GAGE PLATE AND THE FROG IS SECURED IN THE PROPER LOCATION ON THE TIE WITH PROPER ALIGNMENT.

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DETAIL "A"
INSULATION AT GAGE PLATES
 (SCALE: NONE)

REFERENCE DRAWINGS

LAYOUT - No. 8, R.H. TURNOUT - 136 lb. — SHEET ESD-2911-02

REV.	DATE	DESCRIPTION	DES.	ENG.

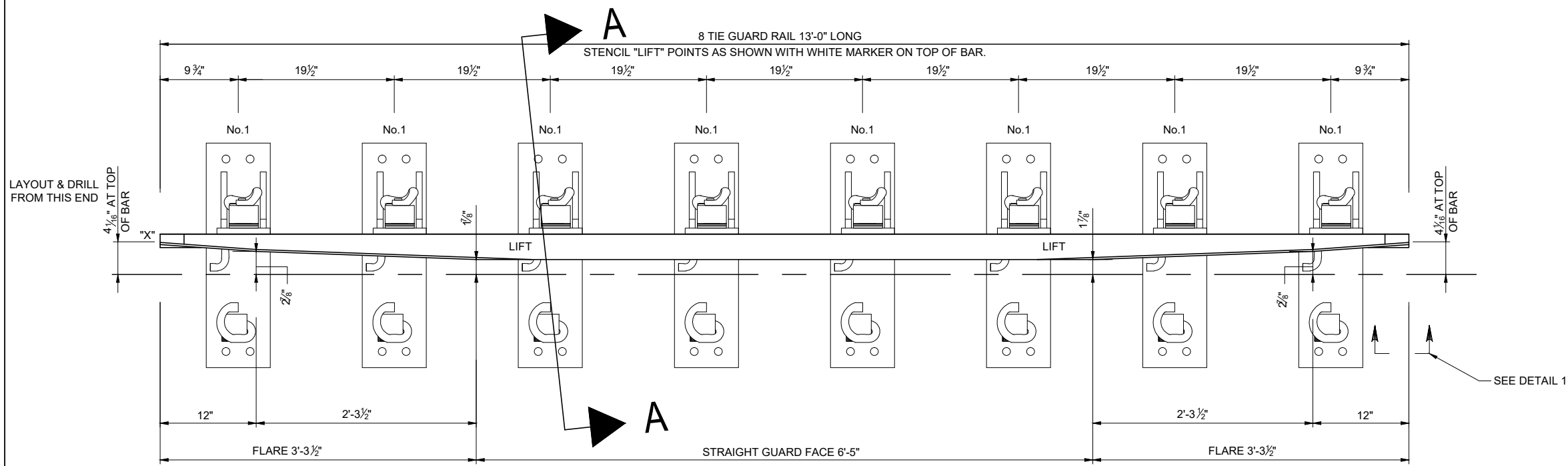
REVISIONS	DRAWN RAILPROS
	CHECKED B. SMITH
	RECOMMENDED W. PREY
	DATE 2/2/15

DESIGNER PE STAMP



ENGINEERING STANDARD DRAWINGS
 NO. 8 STANDARD TURNOUT - FROG
 GAGE PLATES

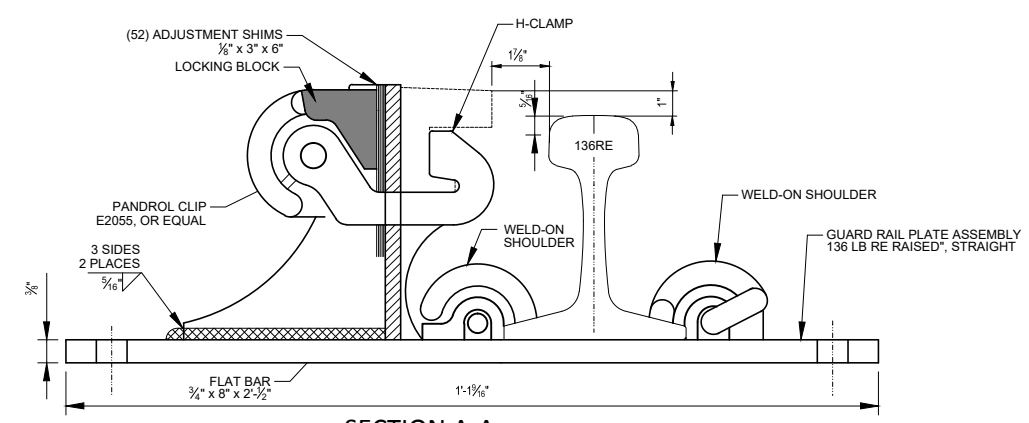
DRAWING NO.	ESD-2911-06
DRAWING SHEET NO.	6 OF 15
SCALE:	NONE
CONTRACT SHEET NO.	



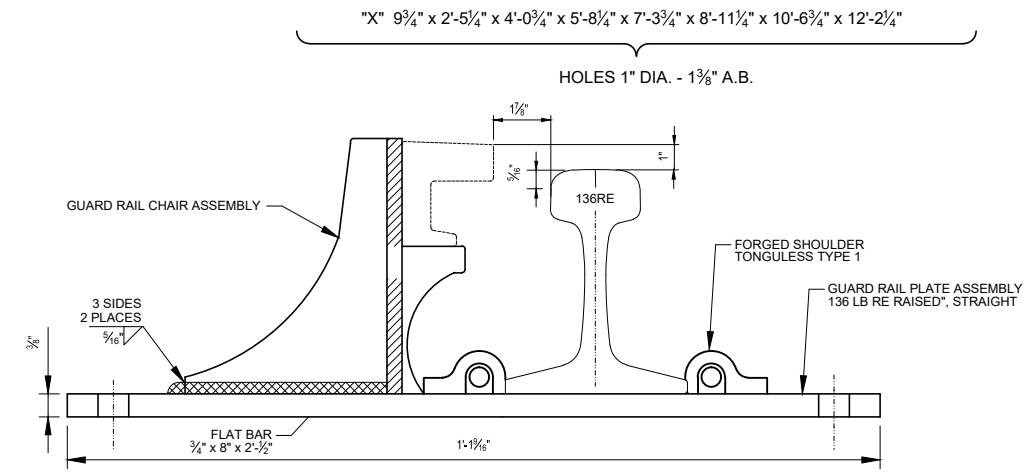
BILL OF MATERIAL	
QTY	DESCRIPTION
1	GUARD BAR, UIC33 1200 SERIES x 26' -0" LONG
8	GUARD RAIL PLATE ASSEMBLY, 136 LB RE RAISED 1", STRAIGHT
8	H-CLAMP
24	CLIP, PANDROL E2055 OR EQUAL
8	LOCKING BLOCK
32	SHIM, 1/8" x 3" x 6"

- NOTES:**
- GUARD RAIL SECTION U.I.C. 33 1200 SERIES (U69) UIC 860.0 GRADE 90A (GUARD FACE BRINELL 319 MIN.)
 - BASE PLATE, BRACKET AND SHIMS MILD STEEL PER A.R.E.M.A. SPECIFICATION M7.
 - PANDROL H-CLAMP OR APPROVED EQUAL.
 - WORKMANSHIP AND TOLERANCES PER A.R.E.M.A. SPECIFICATIONS FOR SPECIAL TRACKWORK.
 - WELDING PER ANSI AWS D1.1-92 OR LATEST REVISION.
 - PLATE SPACING IS SET FOR SHIPPING ONLY. FINAL PLATE SPACING IS TO BE DETERMINED BY TIE SPACING AT TIME OF INSTALLATION.
 - PANDROL SPRING CLIPS TO BE INCLUDED IN ASSEMBLY.
 - LIFT POINTS AND WEIGHT OF ASSEMBLY TO BE MARKED ON HEAD OF WEAR BAR WITH WHITE PAINT.
 - PLATE IS TO BE STAMPED WITH PLATE I.D. WITH 1/2" HIGH CHARACTERS AS SHOWN.
 - GRIND AWAY CORNER OF PANDROL SHOULDER TO CLEAR FOOT OF CHAIR ASSEMBLY.

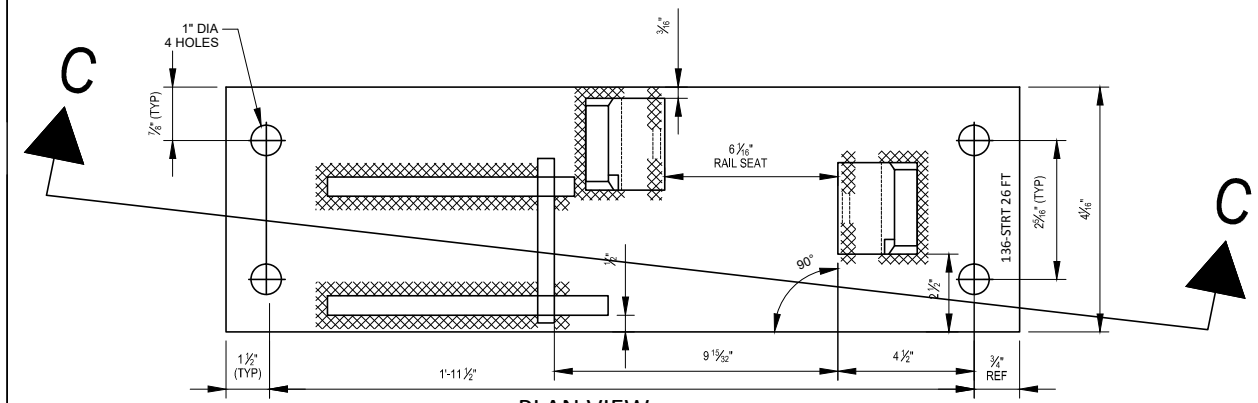
ASSEMBLED 13'-0" GUARD RAIL
 COLLECTIVE DRILLING FROM END OF GUARD BAR MARKED "X"



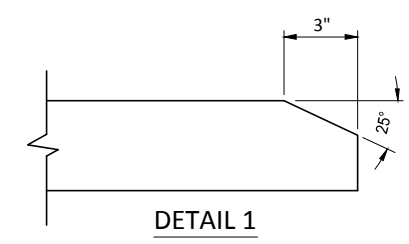
**SECTION A-A:
 GUARD RAIL HARDWARE ASSEMBLY**



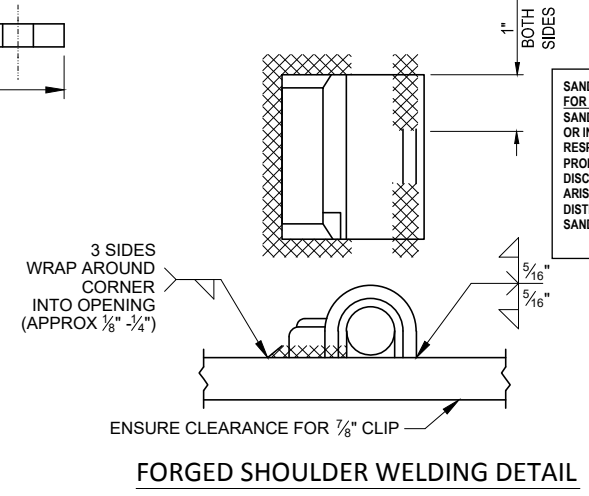
**SECTION C-C:
 GUARD RAIL HARDWARE ASSEMBLY**



**PLAN VIEW:
 GUARD RAIL HARDWARE ASSEMBLY**



DETAIL 1



FORGED SHOULDER WELDING DETAIL

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REV.	DATE	DESCRIPTION	DES.	ENG.

REVISIONS	DRAWN RAILPROS
CHECKED B. SMITH	RECOMMENDED B. SCHMITH
DATE 4/25/17	DESIGNER PE STAMP

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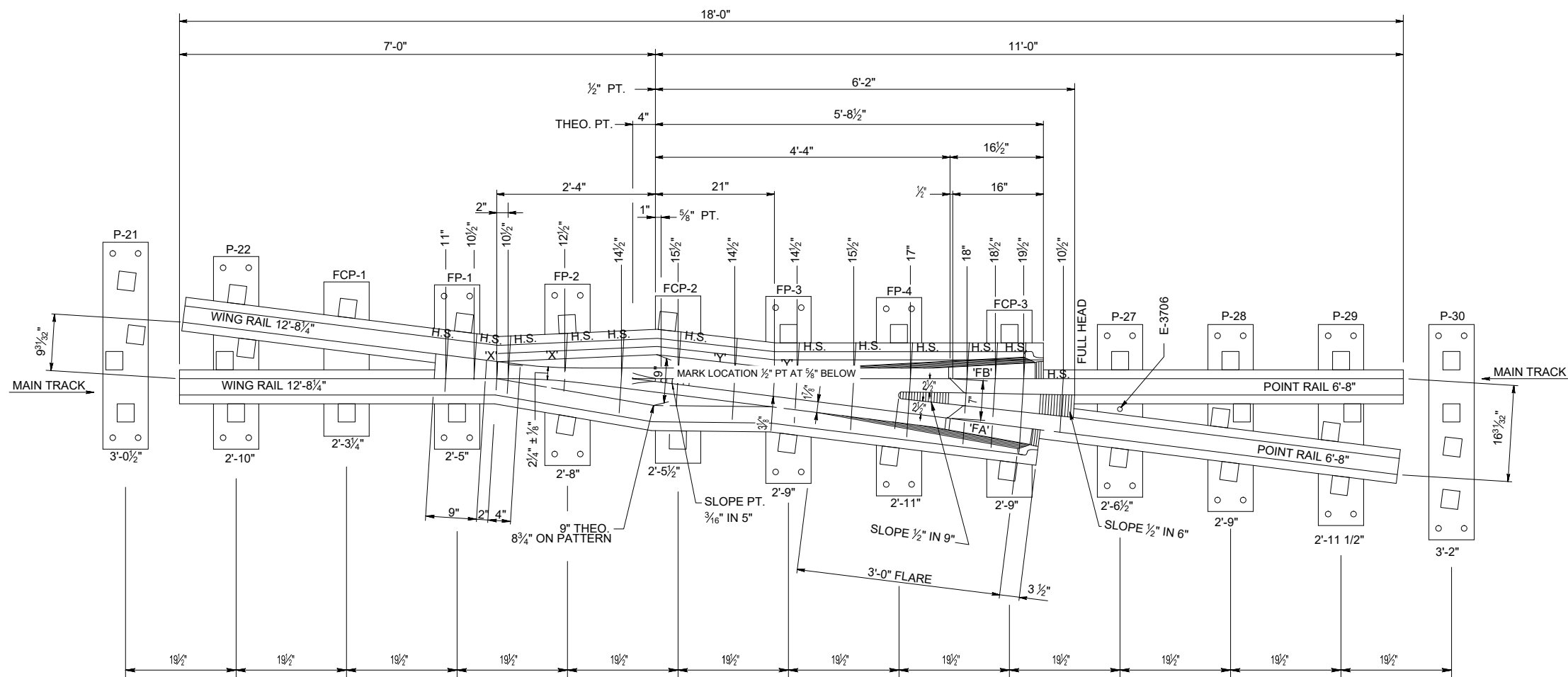
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810 Mission Avenue
 Oceanside, CA 92054
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ENGINEERING STANDARD DRAWINGS

NO. 8 STANDARD TURNOUT -
 13'-0" GUARD RAIL

DRAWING NO. ESD-2911-07
DRAWING SHEET NO. 7 OF 15
SCALE: NONE
CONTRACT SHEET NO.

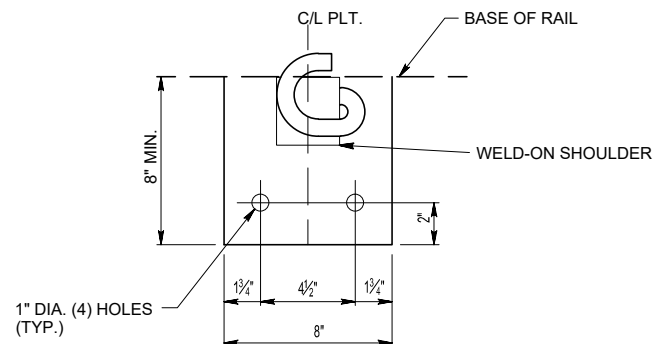


**No. 8 RAILBOUND MANGANESE STEEL FROG
WITH PANDROL-IED PLATES
R.H. TURNOUT SHOWN - LH OPPOSITE PLATE ORIENTATION**

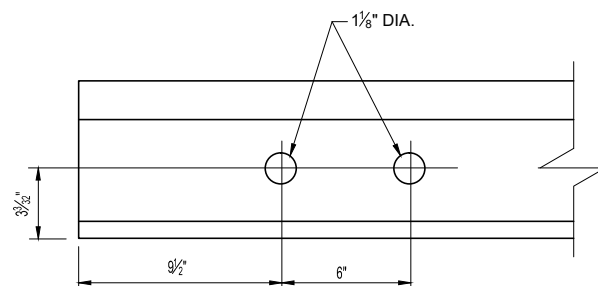
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NOTES:

- FROG ANGLE 7°-09'-10".
- RAIL USED TO FABRICATE FROG IS TO BE 136 LB. HIGH STRENGTH.
- RAIL BOUND MANGANESE STEEL FROG PER CURRENT A.R.E.M.A. PLAN NO. 621 & 625 WITH EXPLOSIVE HARDENED MANGANESE HIGH INTEGRITY CASTING PER CURRENT A.R.E.M.A. SPECIFICATIONS AND MODIFIED FOR ARM LENGTHS AND PLATES WITH "PANDROL" FASTENERS.
- ALL FROG PLATES SHALL BE STAMPED IN 1/2" CHARACTERS TO INDICATE MFG., FROG NO., R.H., RAIL SECTION AND PLATE NUMBER. MARK TO BE STAMPED ON SAME END OF ALL FROG PLATES.
- FOR DETAILS OF FROG PLATES FP-1 THRU FP-4 AND PCP-1 THRU FCP-3 SEE SHEET ESD-2911-09. FOR PLATES P-21, P-22 AND P-27 THRU P-30 SEE SHEET ESD-2911-04.
- WORKMANSHIP AND MATERIALS SHALL BE PER CURRENT A.R.E.M.A. SPECIFICATIONS FOR "SPECIAL TRACKWORK", EXCEPT AS OTHERWISE SPECIFIED.
- ANY CONSTRUCTION DETAILS NOT SHOWN SHALL BE IN ACCORDANCE WITH CURRENT A.R.E.M.A. RECOMMENDED PRACTICES.
- FROG PLATES ARE DESIGNED TO BE INSTALLED PERPENDICULAR TO MAIN TRACK.
- BODY BOLTS 1 3/8" DIA., H.T.C.S. - PER A.R.E.M.A. SPECIFICATIONS.
- TOE AND HEEL BLOCKS AND BOLTS PER A.R.E.M.A. SPECIFICATIONS.
- PLATES TO BE MADE OF MILD ROLLED STEEL.
- THE PLATES AS SHOWN ARE FOR A 136 LB. NO. 8, RIGHT HAND, HAND OPERATED TURNOUT. FOR A LEFT HAND TURNOUT, PLATES ARE TO BE OPPOSITE.
- THE WELD-ON PRESSED STEEL SHOULDER, MADE OF MILD ROLLED STEEL, TO BE PURCHASED FROM PANDROL INTERNATIONAL OR APPROVED ALTERNATE MEETING "PANDROL'S" DESIGN SPECIFICATIONS. THE PRESSED STEEL SHOULDER MUST BE CAREFULLY WELDED TO ALL PLATES WITH A MINIMUM 2 PASS 3/8" + FILLET WELD ALONG THE BEVELED GROOVES OF THE SHOULDER. ANY WELD PROJECTING BEYOND THE VERTICAL FACE OF SHOULDER IN THE AREA OF THE BASE OF RAIL SEAT MUST BE MACHINED OUT TO PROVIDE A CLEAR RAIL SEAT DIMENSION AS CALLED FOR.
- MANUFACTURER OF FROG PLATES SHALL USE COMPLETED FROG TO VERIFY LOCATION OF ADJUSTABLE CLAMPS ON FROG PLATES FCP-1, FCP-2 AND FCP-3 TO INSURE PROPER FIT. FROG PLATES WILL BE WELDED TO THE GAGE PLATES IN THE FIELD WITH A 3 PASS 1/2" + FILLET WELD. PLATES WILL BE WELDED ONLY AFTER THE GAGE PLATES ARE SECURED IN THE PROPER LOCATION ON THE TIE WITH THE FROG IN PLACE AT PROPER ALIGNMENT.
- GUARD RAIL PLATES ARE TO BE INSTALLED AND WELDED TO THE FROG GAGE PLATES IN THE FIELD WITH A 3 PASS 1/2" + FILLET WELD CONTINUOUS ON BOTH ENDS OF THE PLATE. PLATES ARE TO BE WELDED ONLY AFTER THE GAGE PLATE AND THE FROG IS SECURED IN THE PROPER LOCATION ON THE TIE WITH THE FROG IN PLACE AT PROPER ALIGNMENT.
- IDENTIFICATION TAG WITH RAISED METAL CHARACTERS TO BE APPLIED WHICH WILL STATE WEIGHT OF RAIL, FROG NO., MANUFACTURER AND YEAR MANUFACTURED.
- RAIL ENDS TO BE CUT AT 45 DEGREE ANGLE AT JOINT WITH FROG CASTING.

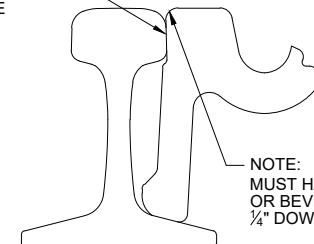


TYPICAL PLATE PUNCHING DETAIL



RAIL END DRILLING

MANG. MUST BE GROUND TO FIT SLOPE OF RAIL HEAD FOR THE ENTIRE LENGTH OF CASTING.



DETAIL OF FROG CASTING / RAIL FIT

SCALE: NONE

WELDING OF GAGE PLATE & GUARD RAIL:

- POSITION GAGE PLATES AT DESIGNATED TIE LOCATIONS AND ANCHOR IN PLACE.
- CHECK TRACK FOR CORRECT GAGE.
- STARTING WITH ONE GAGE PLATE, PLACE FROG PLATES WITH ADJUSTABLE BRACES AND SECURE TO FROG AND GUARD RAIL WITH "PANDROL" CLIPS.
- RECHECK TRACK GAGE AND CORRECT IF NECESSARY.
- CAREFULLY WELD FROG PLATE AND GUARD RAIL PLATE TO FROG GAGE PLATES WITH 3 PASS 1/2" + FILLET WELD. FOR WELDING USE THE FOLLOWING: A. ELECTRODE, 5/32 INCH, WELDING SPEC. 7018XLM. B. ELECTRODE, 3/16 INCH, WELDING SPEC. 7018XLM. C. WIRE, 3/32 INCH, NR203, 1" NICKEL FLUX CORE. OTHER WIRE OR ELECTRODES MEETING SPECIFICATIONS AS CALLED FOR AND APPROVED BY GENERAL MANAGER MAINTENANCE OF WAY MAY BE USED.

REFERENCE DWGS.

LAYOUT - No. 8, R.H. TURNOUT - 136 lb. ----- ESD-2911-02
 FROG GAGE PLATES W/ PANDROLS ----- ESD-2911-06
 RAISED GUARD RAIL PLATES - 136 lb. ----- ESD-2911-07

REV.	DATE	DESCRIPTION	DES.	ENG.

REVISIONS	DRAWN RAILPROS
	CHECKED B. SMITH
	RECOMMENDED W. PREY
	DATE 2/2/15
	DESIGNER PE STAMP

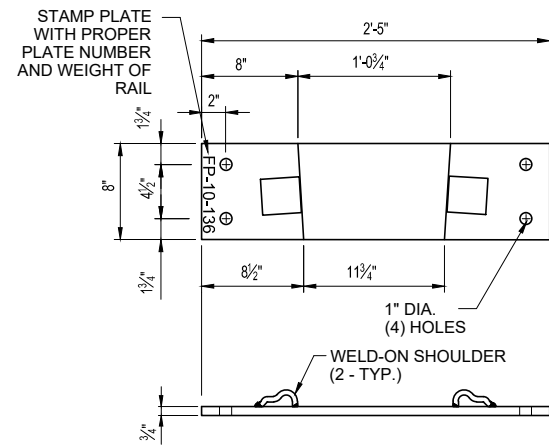

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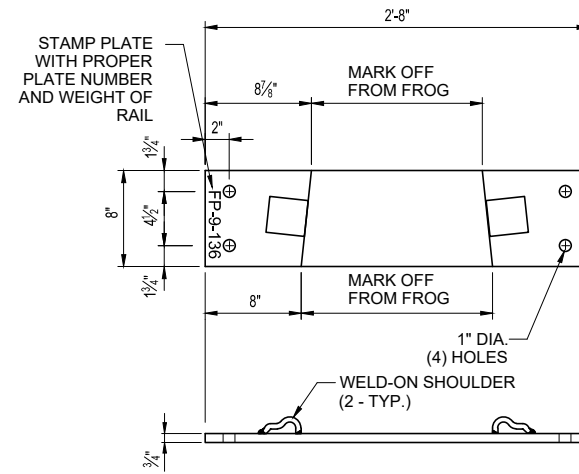
ENGINEERING STANDARD DRAWINGS

**NO. 8 STANDARD TURNOUT -
RAILBOUND MANGANESE STEEL FROG**

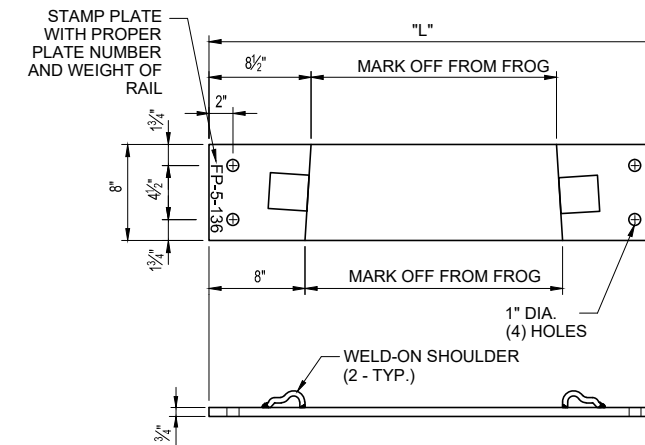
DRAWING NO. ESD-2911-08
DRAWING SHEET NO. 8 OF 15
SCALE: NONE
CONTRACT SHEET NO.



FROG PLATE - FP-1
3/4" x 8" x 2'-5" - FLAT

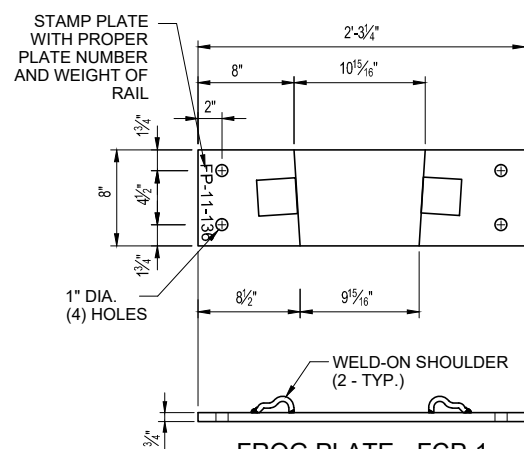


FROG PLATE - FP-2
3/4" x 8" x 2'-8" - FLAT

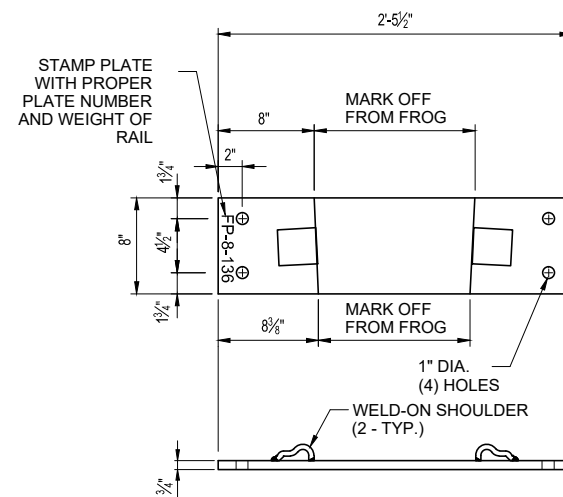


FROG PLATE - FCP-3, FP-3 AND FP-4
3/4" x 8" - FLAT (SEE TABLE FOR LENGTHS)

DIMENSION TABLE		
PLATE	"L"	NO. REQ'D
FCP-3	2'-9"	1
FP-4	2'-11"	1
FP-3	2'-9"	1



FROG PLATE - FCP-1
3/4" x 8" x 2'-3 3/4" - FLAT



FROG PLATE - FCP-2
3/4" x 8" x 2'-5 1/2" - FLAT

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REV.	DATE	DESCRIPTION	DES. ENG.

DRAWN
RAILPROS
CHECKED
B. SMITH
RECOMMENDED
W. PREY
DATE 2/2/15

DESIGNER PE STAMP



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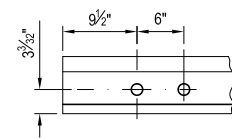
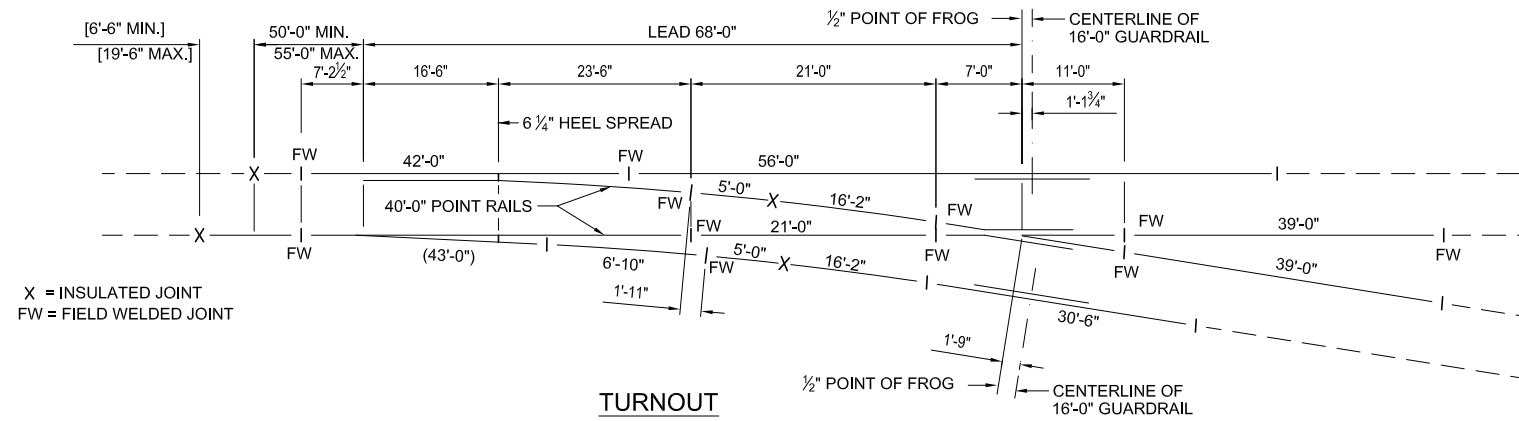
ENGINEERING STANDARD DRAWINGS

NO. 8 STANDARD TURNOUT -
FROG PLATES

DRAWING NO.	ESD-2911-09
DRAWING SHEET NO.	9 OF 15
SCALE:	NONE
CONTRACT SHEET NO.	

NOTES:

1. THE PERMISSIBLE VARIATION IN STANDARD LENGTHS OF RAILS, FROGS AND SWITCH POINTS IS GREATER THAN THE NORMAL EXPANSION GAPS AT RAIL JOINTS AND THICKNESS OF FIBRE END POST IN INSULATED JOINTS. NO ALLOWANCE HAS BEEN MADE FOR EXPANSION GAPS AND FIBRE END POSTS IN COMPUTING LENGTHS OF RAILS SHOWN. DIMENSIONS OF TURNOUT AND ALL COMPONENTS IS FOR A THERMAL, STRESS - FREE CONDITION OF 110° F. ACTUAL EXACT LENGTHS OF RAILS TO BE INSTALLED IS TO BE FIELD ADJUSTED TO FIT OVERALL TURNOUT DIMENSIONS, THERMAL ADJUSTMENTS, THICKNESS OF WELDS AND VARIATIONS IN COMPONENT RAIL LENGTH.
2. RAIL LAYOUT SHOWN FOR TURNOUT IS TO BE USED IN ALL CASES, EXCEPT WHERE COMPROMISE JOINTS ARE REQUIRED BETWEEN THE FROGS IN A CROSSOVER TRACK. WHEN COMPROMISE JOINTS ARE TO BE USED TO JOIN DIFFERENT RAIL WEIGHTS, THE INSULATED JOINTS IN THE CROSSOVER TRACK SHALL ALWAYS BE OF THE HEAVIER RAIL SECTION. THE DESCRIPTIONS OF THE CHANGES IN RAIL LAYOUT WHEN COMPROMISE JOINTS ARE REQUIRED IN THE CROSSOVER TRACK ARE BASED ON AN ASSUMPTION THAT TRACK "H" IS LAID WITH HEAVIER RAIL THAN TRACK "L". CROSSOVER ON 15'-0" TRACK CENTERS; AT LOCATION "A" THE 20'-5" RAIL SHALL BE REPLACED WITH 8'-0" OF THE HEAVIER RAIL AND 12'-5" OF THE LIGHTER RAIL. AT LOCATION "B" THE 18'-0" RAIL SHALL BE REPLACED WITH 7'-0" OF THE HEAVIER RAIL AND 11'-0" OF THE LIGHTER RAIL.
3. IN ADDITION TO NOTE 1, NO ALLOWANCE HAS BEEN MADE IN RAIL LENGTHS TO PROVIDE GAPS NEEDED TO MAKE FIELD WELDS. IN THE FIELD IT MAY BE NECESSARY TO CUT RAIL ENDS TO PROVIDE CORRECT GAPS FOR FIELD WELDS.
4. FURNISH ALL RAIL SHOWN IN SOLID LINES ON THIS DRAWING:
 - (A.) RAILS LONGER THAN 39'-0" SHALL BE CONTINUOUS WELDED RAIL (CWR), TO BE FURNISHED WITH BOTH ENDS LEFT BLANK FOR WELDING IN THE FIELD.
 - (B.) ALL OTHER RAILS SHALL BE 39'-0" AND SHORTER AS SPECIFIED ON THE DRAWING, WITH BOTH ENDS DRILLED PER DETAIL "A".
5. ALL RAIL FURNISHED FOR TURNOUT AND CROSSOVERS SHALL BE "HEAD HARDENED" EXCEPT GUARD RAILS.
6. LOCATIONS OF INSULATED JOINTS ARE SHOWN ON TURNOUT AND CROSSOVER DIAGRAMS WITHOUT TOLERANCES, OR IF TOLERANCES ARE PERMISSIBLE, WITH (+ OR -).
7. ALL INSULATED JOINTS ARE TO BE PROPERLY SUSPENDED IN CRIB AREA BETWEEN TWO TIES LOCATED 4" MINIMUM FROM EDGE OF NEAREST TIE TO EDGE OF INSULATED JOINT.
8. INSULATED JOINT MUST BE INSTALLED TO BE CENTERED BETWEEN TWO (2) TIES.
9. FIELD WELDED JOINTS DESIGNATED "FW" SHOULD BE IN CRIB AREA BETWEEN TWO TIES LOCATED 4" MINIMUM FROM EDGE OF NEAREST TIE AND WELDED JOINT.
10. DIMENSIONS SHOWN IN PARENTHESIS (0'-0") ARE EXACT. RAILS FURNISHED FOR THESE LOCATIONS ARE LONGER AND MUST BE FIELD ADJUSTED (CUT) WITHIN TOLERANCES SHOWN IN BRACKETS [0'-0"].
11. WHEN INSULATED JOINTS WITH TOLERANCES AND FIELD WELDED JOINTS FALL SHORT OF MINIMUM CLEARANCE FROM TIE OR TIE PLATE THE JOINT MAY BE MOVED WITHIN TOLERANCE LIMITS. BONDED INSULATED JOINT ASSEMBLIES AND STOCK RAILS ARE FURNISHED LONGER THAN SHOWN IN PARENTHESIS ON LAYOUT. THESE OR THEIR ADJACENT CONNECTING RAILS MUST BE TRIMMED IN THE FIELD TO FIT.
12. INSULATED JOINTS SHALL BE SAW CUT SQUARE.

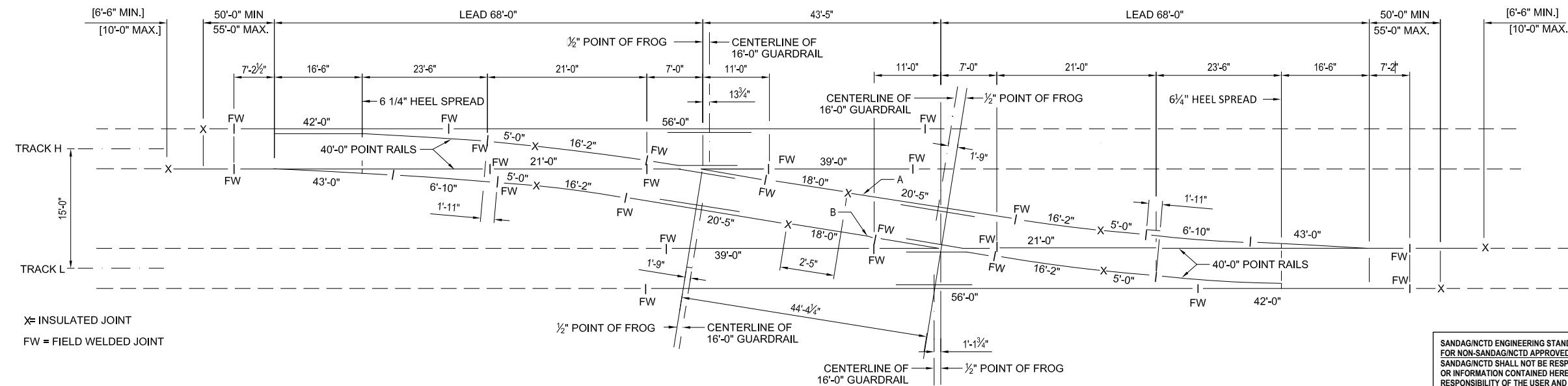


21'-2" LONG ADHESIVE BONDED PREFABRICATED INSULATED RAIL JOINT ASSEMBLY

(SEE NOTE 5) BOTH ENDS SHALL BE LEFT BLANK FOR WELDING IN THE FIELD

38'-5" LONG ADHESIVE BONDED PREFABRICATED INSULATED RAIL JOINT ASSEMBLY

(SEE NOTE 5) BOTH ENDS SHALL BE LEFT BLANK FOR WELDING IN THE FIELD



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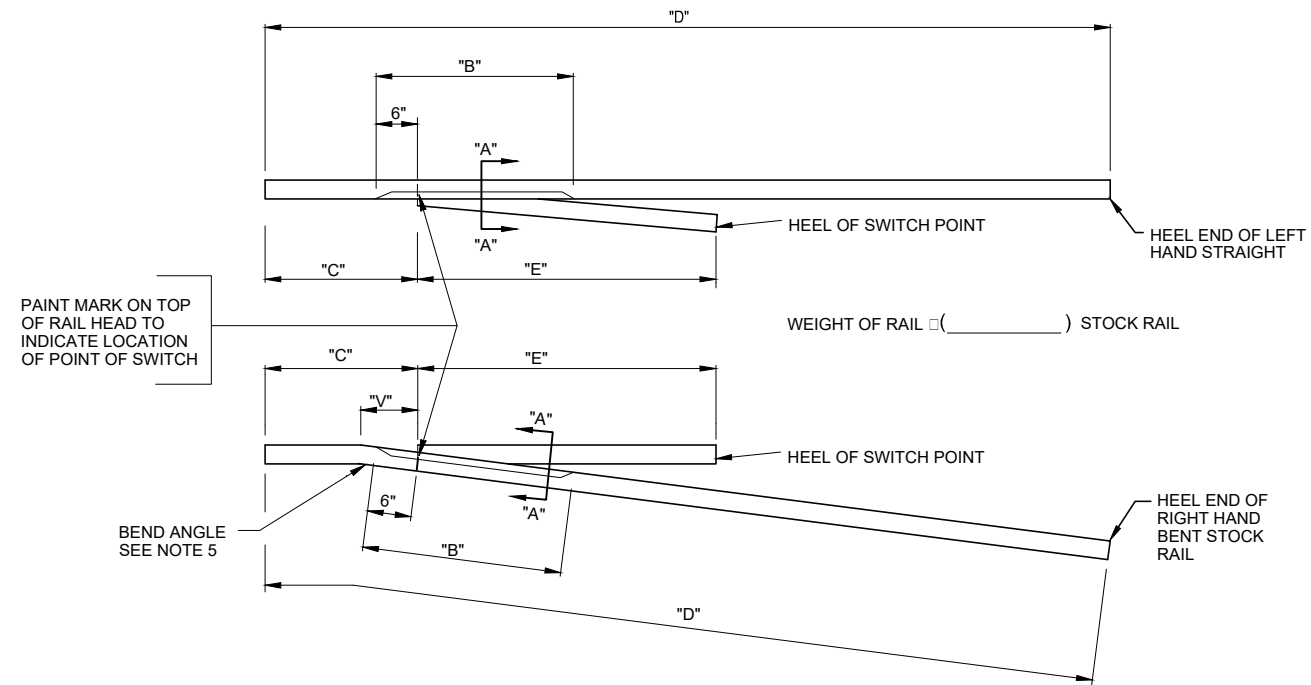
REV.	DATE	DESCRIPTION	DES.	ENG.

REVISIONS	DRAWN RAILPROS
	CHECKED B. SMITH
	RECOMMENDED W. PREY
	DATE 2/2/15
	DESIGNER PE STAMP

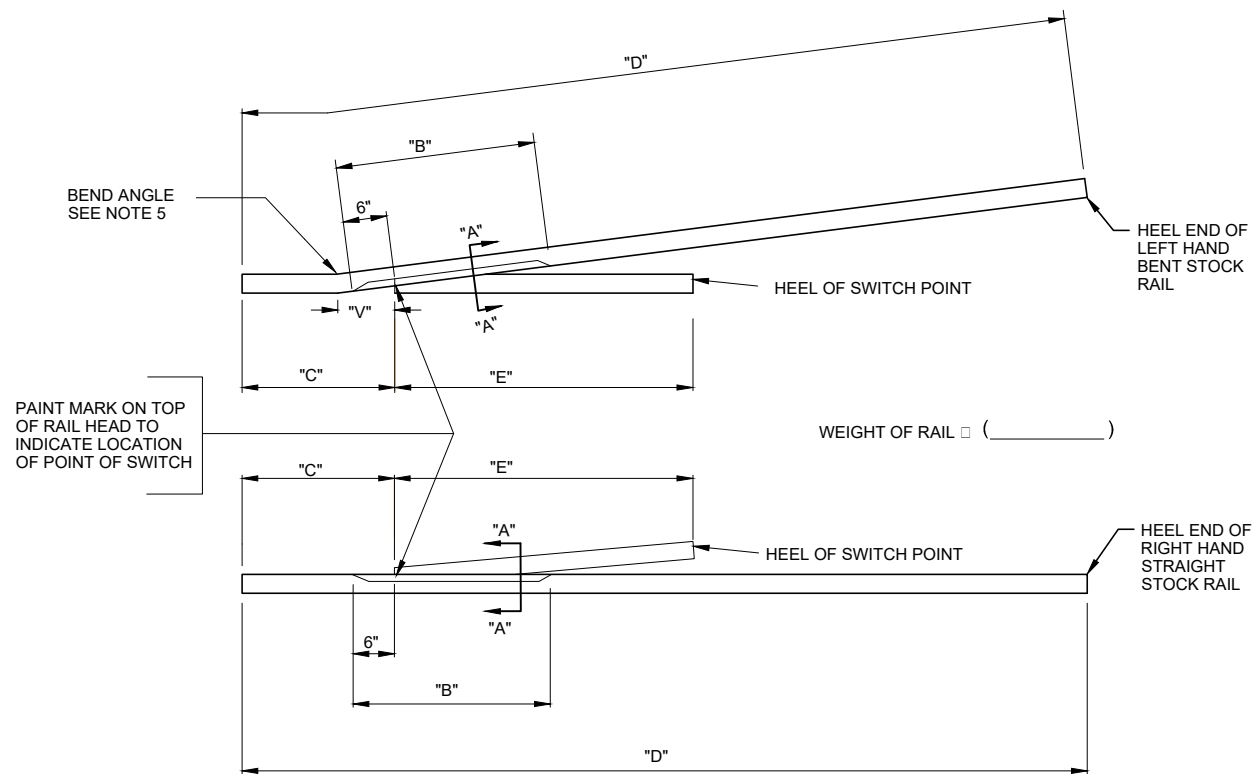
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ENGINEERING STANDARD DRAWINGS NO. 8 STANDARD TURNOUT AND CROSSOVER INSULATED JOINT DIAGRAM	DRAWING NO. ESD-2911-10
	DRAWING SHEET NO. 10 OF 15
	SCALE: NONE
	CONTRACT SHEET NO.



STOCK RAILS ARE SHOWN FOR "RIGHT HAND TURNOUT"



STOCK RAILS ARE SHOWN FOR "LEFT HAND TURNOUT"

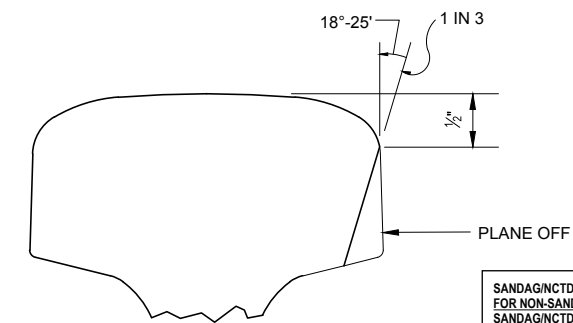
NOTES:

1. INFORMATION OR DIMENSIONS NOTED THUS "E", TO BE FURNISHED BY FIELD FORCES FOR CORRECT ORDERING OF REPLACEMENT STOCK RAILS.
2. "E" □ LENGTH OF SWITCH POINT.
3. UNDERCUT STOCK RAILS TO BE MADE OF HIGH STRENGTH RAIL WITH ENDS BEVELED PER CURRENT A.R.E.M.A. PLAN NO. 1005.
4. FOR STOCK RAIL UNDERCUT LENGTH "B", PER SECTION "A-A", LENGTH "C" AND LENGTH "D" FOR NEW SAMSON SWITCH INSTALLATIONS OR REPLACEMENT ORDERS, SEE TABLE BELOW.

LENGTHS B,C & D FOR 136 LB. RAIL									
Sw. Pt. LENGTH	T.O. No.	STOCK RAIL	B	FOR FIRST (NEW) INSTALL.			FOR REPLACE. ORDERS ONLY		
				C	D	END DRILL SEE NO. 10	C	D	END DRILL SEE NO. 10
16'-6"	8	STR.	9'-6"	7'-2 1/2"	40'-0"	NONE	10'-0"	50'-0"	NONE
16'-6"	8	BENT	9'-6"	7'-2 1/2"	40'-0"	HEEL END ONLY	9'-6"	46'-0"	HEEL END ONLY

5. BEND ANGLE IN BENT STOCK RAIL TO BE AS FOLLOWS:

Sw. Length	BEND ANGLE	V (Vertex Dist.)
16'-6"	1°-44'-11" or 1" in 2'-9"	10 5/16"



SECTION "A - A"

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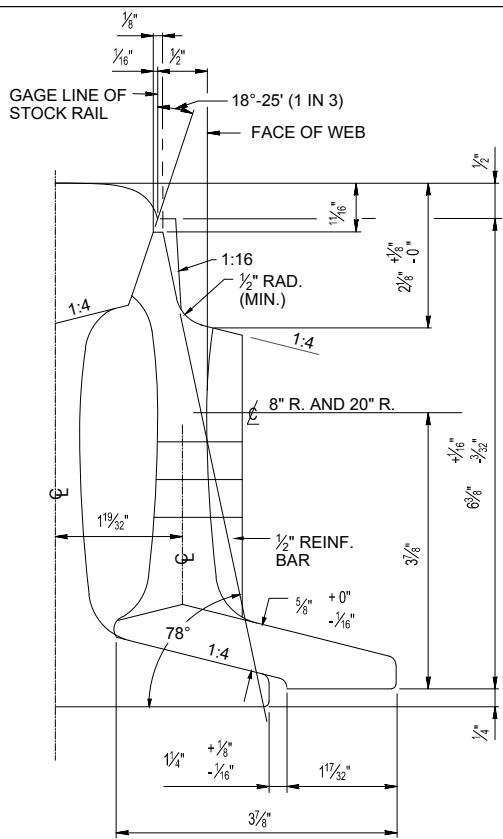
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				2/2/15

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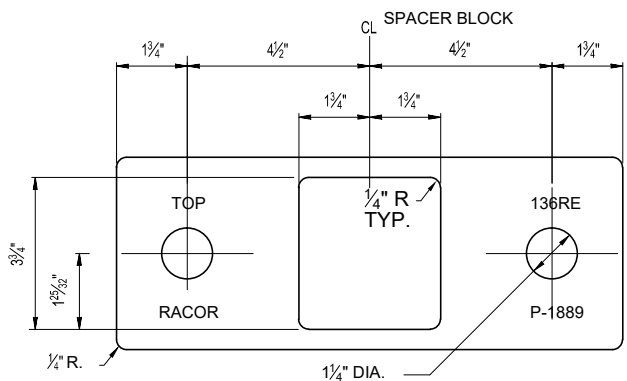
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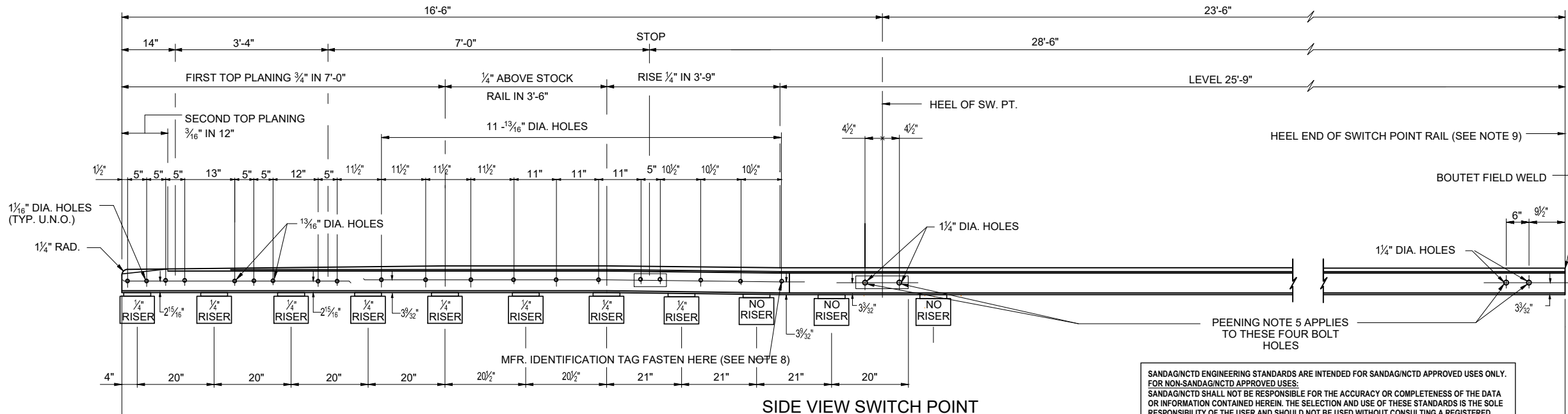
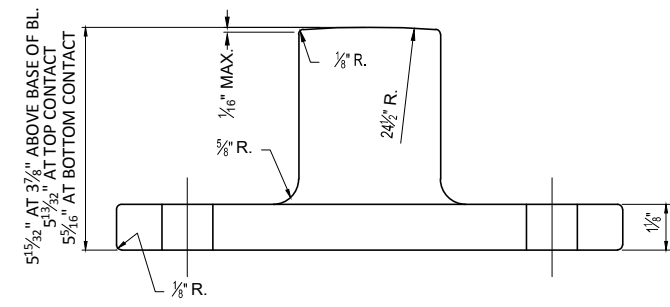
ENGINEERING STANDARD DRAWINGS	
NO. 8 STANDARD TURNOUT - UNDERCUT STOCK RAILS FOR 16'-6" SWITCH POINT	
DRAWING NO.	ESD-2911-11
DRAWING SHEET NO.	11 OF 15
SCALE:	NONE
CONTRACT SHEET NO.	



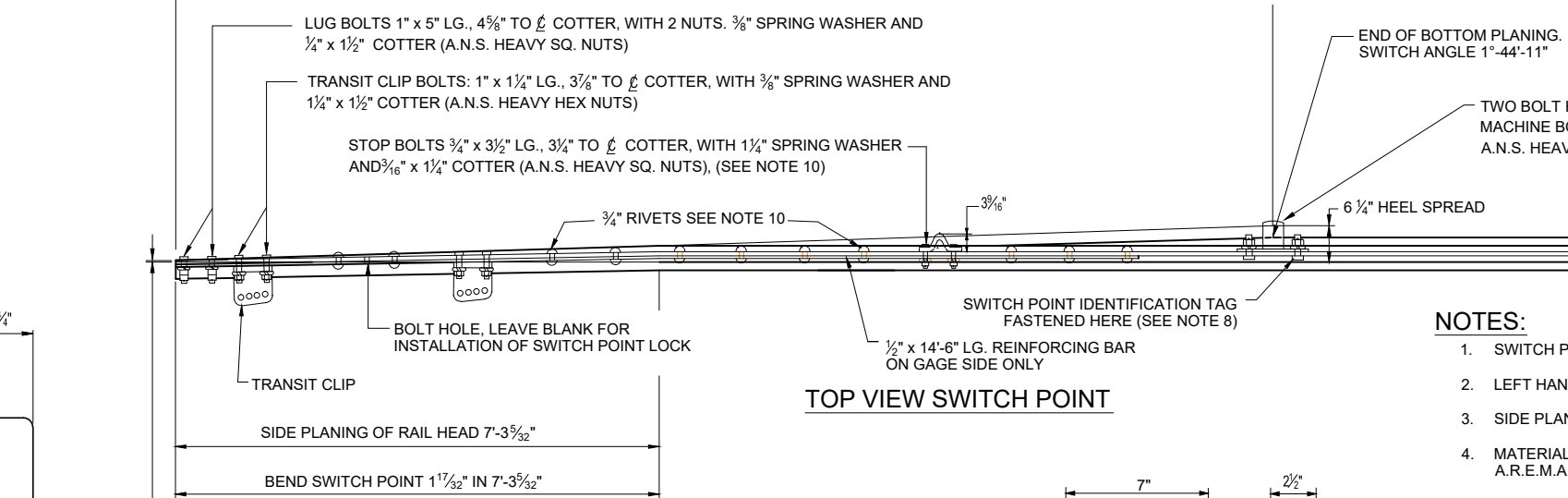
END VIEW OF POINT
SCALE: NONE



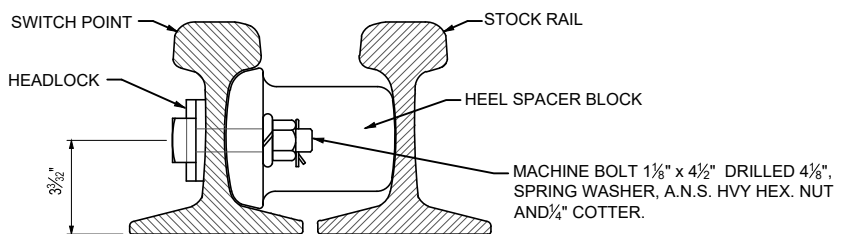
HEEL BLOCK DETAIL



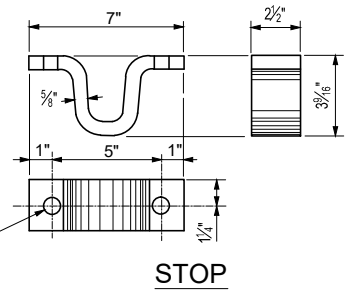
SIDE VIEW SWITCH POINT



TOP VIEW SWITCH POINT



SECTION AT HEEL END OF 16'-6\"/>



STOP

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NOTES:

- SWITCH POINTS TO BE MADE FROM NEW HIGH STRENGTH RAIL.
- LEFT HAND POINT SHOWN. MAKE OPPOSITE HAND FOR RIGHT HAND SWITCH POINTS.
- SIDE PLANING FIGURED ON GAGE LINE 5/16" BELOW TOP OF RAIL.
- MATERIALS AND WORKMANSHIP, ALSO ANY CONSTRUCTION DETAILS NOT SHOW, SHALL BE PER CURRENT A.R.E.M.A. "MANUAL AND PORTFOLIO", UNLESS OTHERWISE SPECIFIED ON THIS PLAN.
- IN ORDER TO ELIMINATE STRESS RAISERS, MANUFACTURER SHALL PEEN THE EDGES OF THE BOLT HOLES AS INDICATED AT THE HEEL OF THE SWITCH POINT AND AT THE HEEL END OF THE SWITCH POINT RAIL. USING AIR HAMMER WITH SUITABLE HEAD AND FINISHING WITH DRIFT PIN. BRAND ON RAIL AT EDGE OF BOLT HOLE TO BE CAREFULLY REMOVED BY GRINDING BEFORE PEENING.
- THE FOLLOWING MATERIAL IS INCLUDED FOR THE TERMS SHOWN. IF ANY PART IS TO BE OMITTED, REQUISITIONS AND ORDERS SHALL STATE DEFINITELY WHAT IS WANTED. "SWITCH POINT": ONE PAIR SWITCH POINTS WITH REINFORCING BARS, TRANSIT CLIPS, STOPS AND FLOATING HEEL SEPARATOR BLOCK FASTENED TO POINT. STATE "RIGHT HAND" OR "LEFT HAND".
- THE CONTOUR PLANING SHALL BE ON THE GAGE SIDE BEGINNING AT A DISTANCE OF 36" FROM THE POINT OF SWITCH AND SHALL BE SHAPED TO THE CONTOUR OF A NEW 136 LB. RAIL AND SHALL RUN OUT AT THE END OF TOP PLANING, WHERE THE SWITCH POINT HAS FULL HEAD CONTOUR.
- METAL IDENTIFICATION TAG SHOWING (1) DESIGN LENGTH OF SWITCH, (2) IN PARENTHESIS, THE ACTUAL LENGTH OF SWITCH POINT RAIL AND (3) THE TURNOUT NUMBER. MARK TAG THUS: 16'-6" (40'-0") NO. 8. TAG TO BE FASTENED TO SWITCH POINT, ON GAGE SIDE OF RAIL
- AT HEEL SPACER BLOCK IN LOCATION SHOWN. AT HEEL END OF SWITCH POINT RAIL, BREAK SHARP CORNER AROUND THE ENTIRE PERIPHERY BY SLIGHTLY GRINDING. ALSO, "DO NOT" END HARDEN RAIL END.
- UNLESS SWITCH POINT ORDER SPECIFICALLY CALLS FOR USE OF 3/4" RIVETS AND 3/4" STOP BOLTS, MANUFACTURER CAN SUBSTITUTE 3/4" HUCK FASTENERS, BOLT PART NO. C-50-LR-BR2416 AND COLLAR PART NO. L3-2-R-24G FOR 3/4" RIVETS. AND FOR 3/4" STOP BOLTS USE HUCK FASTENERS, BOLT PART NO. C-50-LR-BR2424 AND COLLAR PART NO. L3-2-R-24G.
- TURNOUTS ARE TO BE FURNISHED WITH MANGANESE STEEL INSERT ON THE DIVERGING POINT (TURNOUT SIDE) AND A PLAIN SWITCH POINT ON THE NORMAL POINT (STRAIGHT SIDE). REPLACEMENT POINTS MUST SPECIFY WHETHER PLAIN POINT OR MANGANESE STEEL INSERT ARE TO BE FURNISHED.

REV.	DATE	DESCRIPTION	DES.	ENG.

REVISIONS	DRAWN RAILPROS
	CHECKED B. SMITH
	RECOMMENDED W. PREY
	DATE 2/2/15
	DESIGNER PE STAMP

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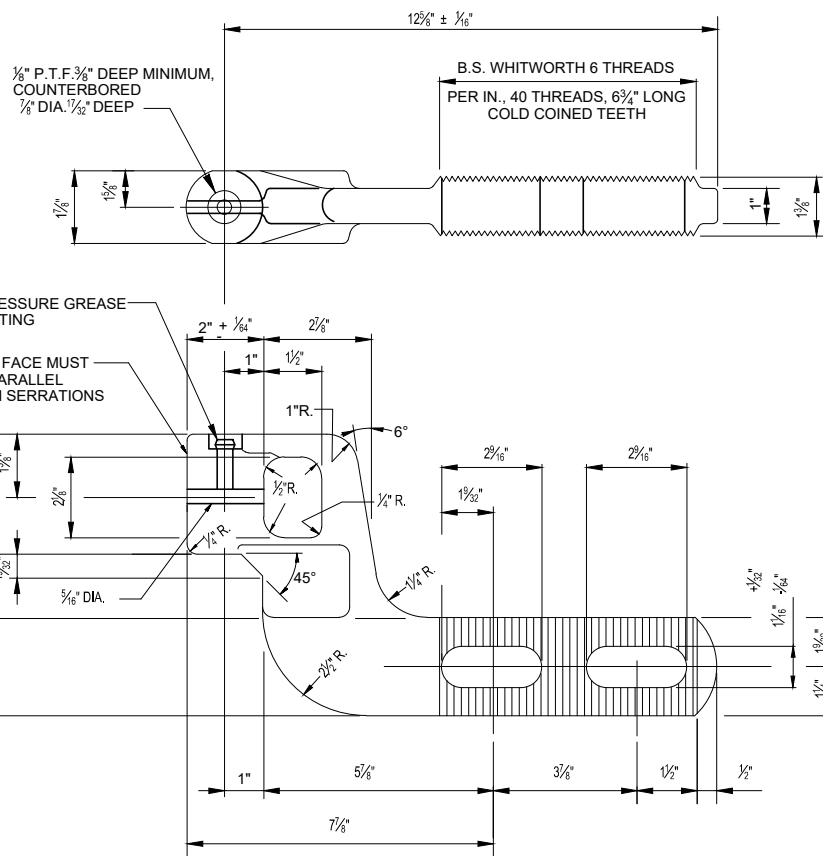
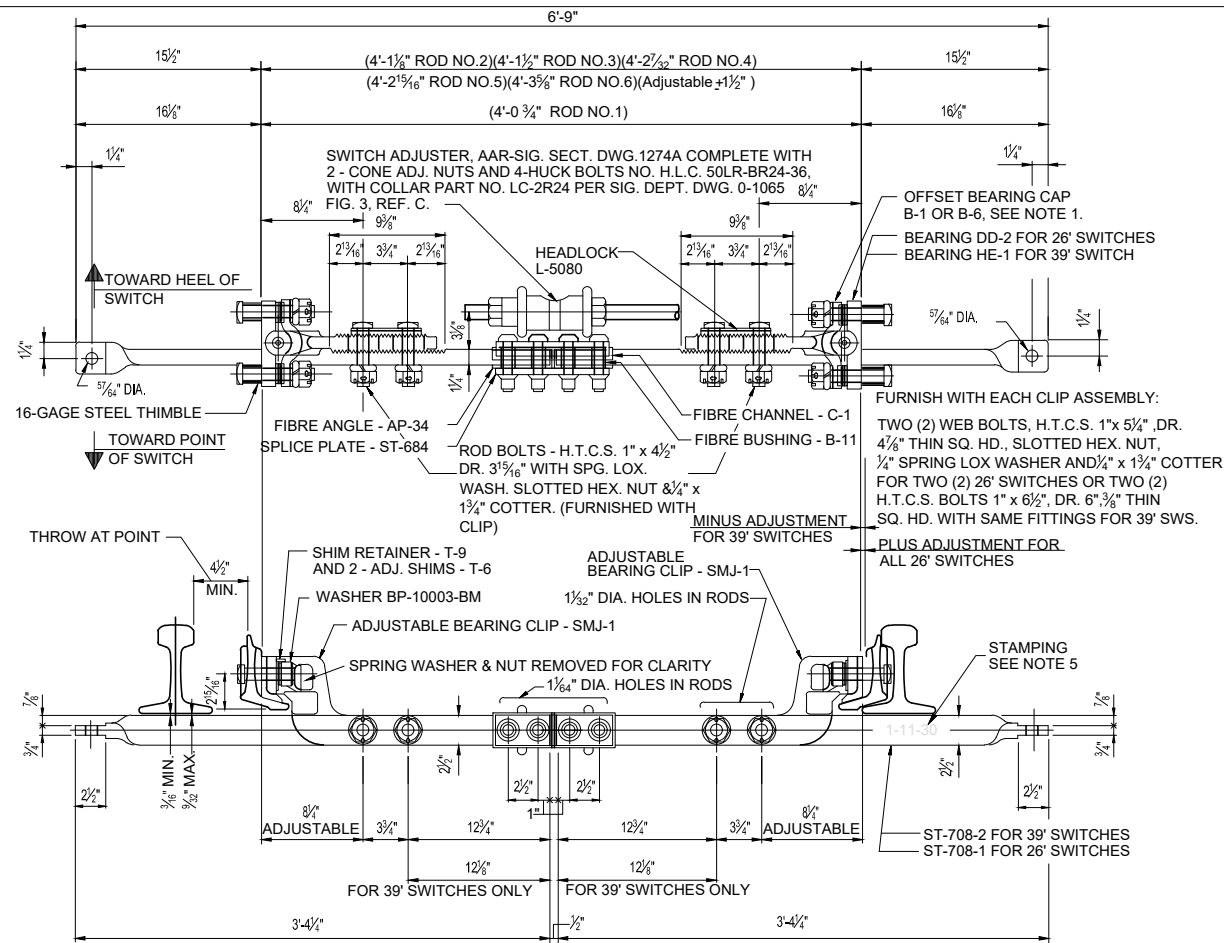
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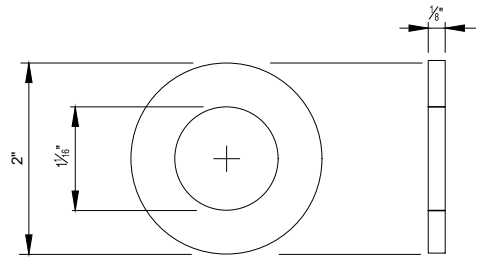
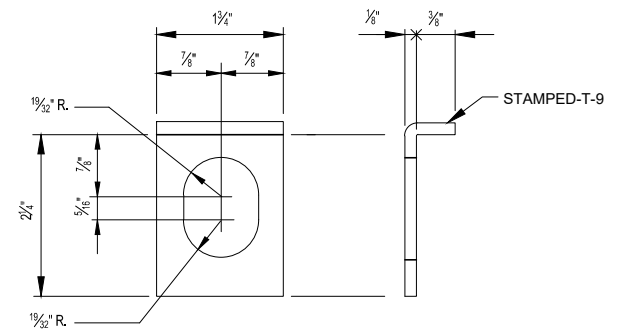
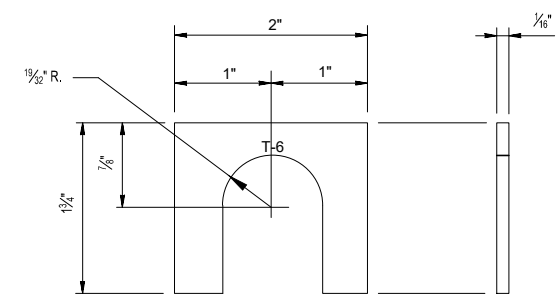
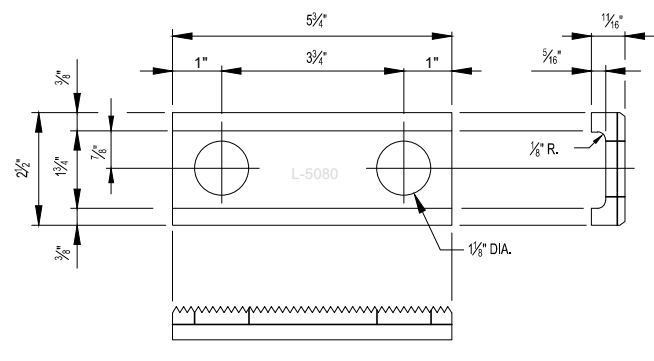
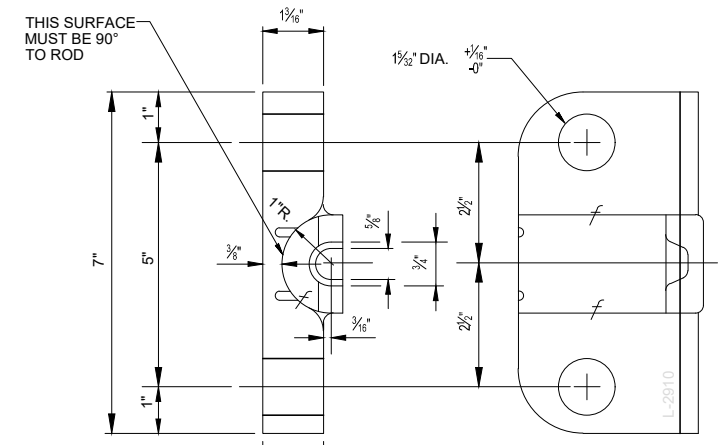
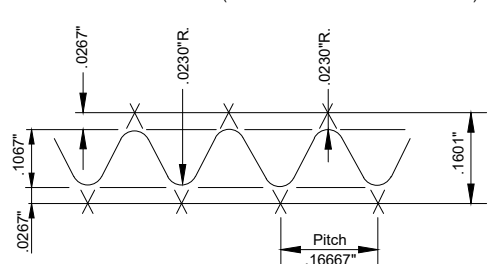
ENGINEERING STANDARD DRAWINGS

NO. 8 STANDARD TURNOUT - 16'-6" SPLIT SWITCH POINT

DRAWING NO. ESD-2911-12
DRAWING SHEET NO. 12 OF 15
SCALE: NONE
CONTRACT SHEET NO.



LENGTH OF SWITCH	BILL OF MATERIAL FOR 1 TYPE "SMJ" SWITCH ROD ASSEMBLY				
	QTY.	PART NUMBER	MATERIAL SPECIF.	DESCRIPTION	DETAIL REMARKS
MATERIAL FOR CLIP ASSEMBLIES					
All	2	SMJ-1	S.A.E. 1020-FOR.STL.	BEARING CLIP	MACHINED PER DETAIL
All	4		H.T.C.S.	WEB BOLT	SEE NOTE
26'	2	DD-2	MALLEABLE IRON	BEARING	PAT. NO. L-2910, MACHINED PER DETAIL
39'	2	HE-1	MALLEABLE IRON	BEARING	PAT. NO. L-2915, MACHINED PER DETAIL
26'	2	B-1	S.A.E. 1045-FOR.STL.	OFFSET BEARING CAP	HEAT TREATED - BRINELL - 225 to 250
39'	2	B-6	S.A.E. 1045-FOR.STL.	OFFSET BEARING CAP	HEAT TREATED - BRINELL - 225 to 250
26'	2	B-6	S.A.E. 1045-FOR.STL.	OFFSET BEARING CAP	HEAT TREATED - BRINELL - 225 to 250
All	4	T-9	S.A.E. 1020	SHIM RETAINER	1/8" x 1 1/4" x 2 1/4"
All	12	T-6	STAINLESS STEEL	ADJUSTMENT SHIM	1/8" x 2" x 1 1/8"
All	4	BP-10003-BM	MALLEABLE IRON	WASHER	1 1/8" I.D. x 2" O.D. x 1/8" THICK
All	4		H.T.C.S.	ROD BOLT	1"x4 1/2" DR. 3 3/16" REG. SQ. HD. SLOTTED HEX NUT
All	4		STEEL	SPG. LOX WASHER	FOR 1" ROD BOLTS
All	4		STEEL	COTTER	1/2" x 1 1/4" FOR ROD BOLTS
All	2		STEEL	GREASE FITTING	PRESSURE - FOR BEARING CLIP
All	2	L-5080	MALLEABLE IRON	HEADLOCK	FOR ROD BOLTS
26'	2		16-GAGE STEEL	THIMBLE	1 1/2" LONG - FOR SHIPPING
39'	2		16-GAGE STEEL	THIMBLE	2 1/2" LONG - FOR SHIPPING
MATERIAL FOR VERTICAL ROD					
16'-6"	1			VERTICAL ROD	USE ONE-ST-708-1 USE ONE-ST-708-1 TWIST, MACHINE AND DRILL END HOLE
39'	1			VERTICAL ROD	USE ONE-ST-708-2 TWIST, MACHINE AND DRILL END HOLE USE ONE-ST-708-2
All	4		HIGH STRENGTH STEEL	CONN. & INSUL. BOLT	HIGH FASTENER NO. HLC-50LR-BR24-36
All	4		LOW CARBON STEEL	COLLAR	HUCK FASTENER NO. LC-2R24
All	1	ST-684	H.R. MILD STEEL	SPLICE PLATE	1/2" x 2 1/2" x 9 1/2" FOR INSULATION
All	2	AP-34	AAR-Sig. Sec. 13-52	ANGLE	1/2" x 2 1/2" x 4 1/2" HARD FIBRE - PARAFIN COATED
All	4	B-11	AAR-Sig. Sec. 13-52	BUSHING	1" O.D. HARD FIBRE - PARAFIN COATED
All	1	C-1	AAR-Sig. Sec. 13-52	CHANNEL	1/8" x 1" x 10" HARD FIBRE - PARAFIN COATED
All	1		MALLEABLE IRON	SWITCH ADJUSTER	
All	2		MALLEABLE IRON	CONE ADJ. NUT	FOR 1 1/4" THROW RODS



- NOTES:**
- WHILE THIS PLAN SHOWS BEARING CLIPS ASSEMBLED TO SWITCH ROD, THIS CLIP ASSEMBLY MAY BE REQUISITIONED AND ORDERED SEPARATELY. WHEN A BEARING CLIP ASSEMBLY ONLY IS WANTED, REQUISITIONS AND ORDERS SHALL SPECIFY, RAIL SECTION AND LENGTH OF SWITCH. ALL PARTS SHOWN IN BILL OF MATERIAL SHALL BE FURNISHED WITH THESE CLIP ASSEMBLIES. WHEN AN INDIVIDUAL PART IS REQUIRED IT SHALL BE ORDERED BY PART NUMBER.
 - WHEN COMPLETED RODS ARE ORDERED THEY SHALL BE ASSEMBLED AND INCLUDE ALL PARTS SHOWN IN THE BILL OF MATERIAL. REQUISITIONS AND ORDERS SHALL SPECIFY RAIL SECTION AND LENGTH OF SWITCH. ON INTERLOCKED SWITCHES WITH AUXILIARY THROW ROD, MACHINE SIDE (RIGHT OR LEFT) SHOULD ALSO BE SPECIFIED.

"NOTES CONTINUED ON SHEET - DWG. ESD-2911-14"

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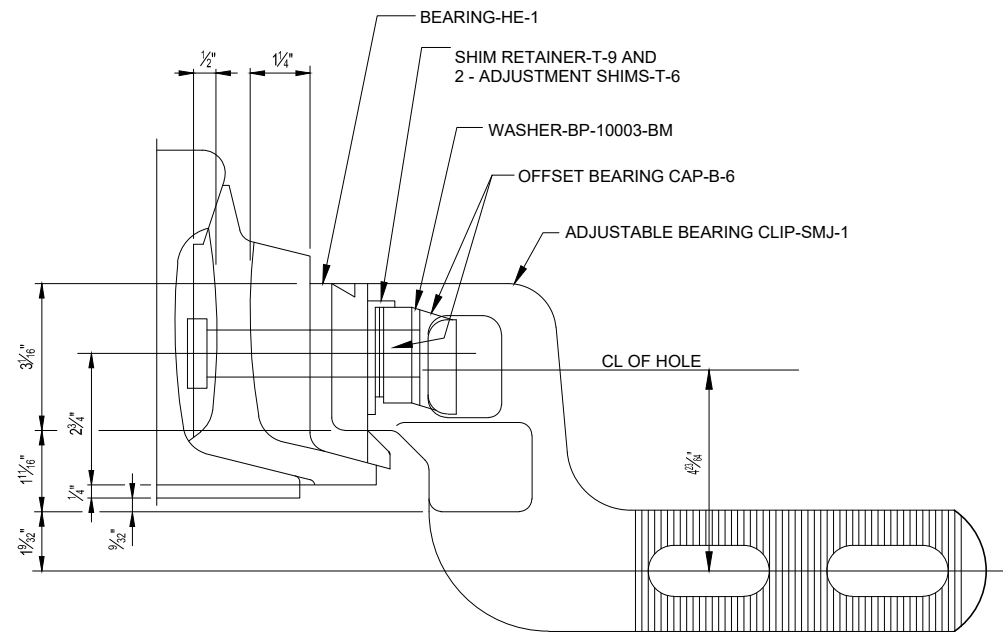
REVISIONS
DRAWN RAILPROS
CHECKED B. SMITH
RECOMMENDED W. PREY
DATE 2/2/15
DESIGNER PE STAMP

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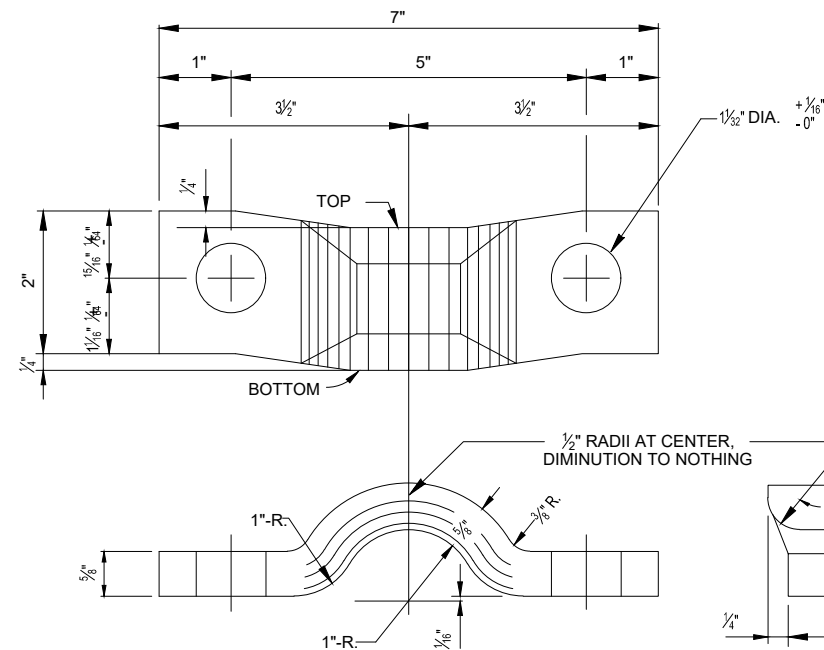
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ENGINEERING STANDARD DRAWINGS
DRAWING NO. ESD-2911-13
DRAWING SHEET NO. 13 OF 15
SCALE: NONE
CONTRACT SHEET NO.

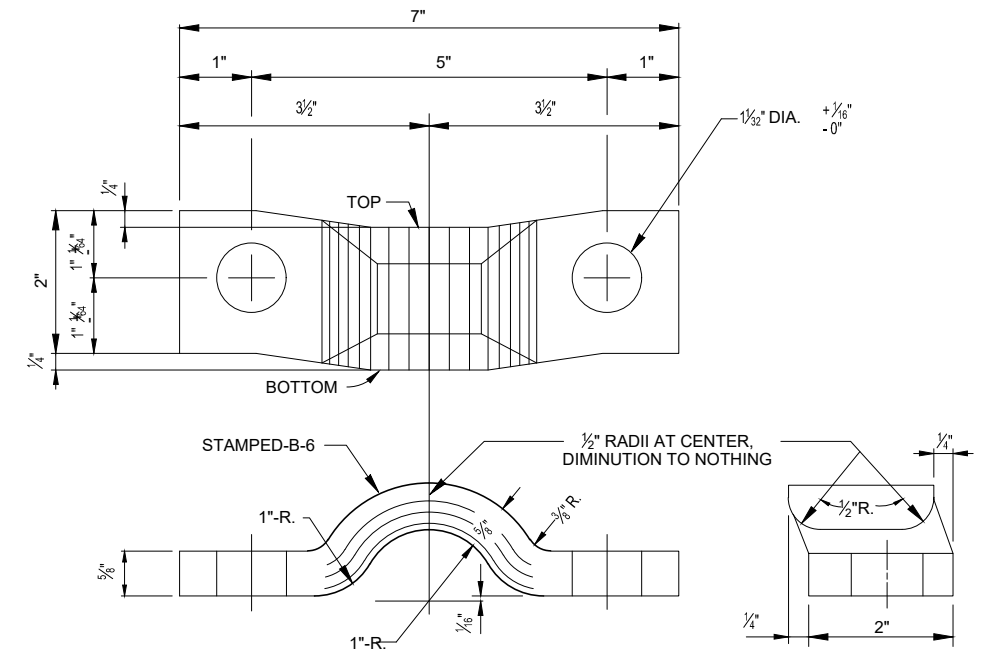
NO. 8 STANDARD TURNOUT - SWITCH RODS AND MISC. DETAILS



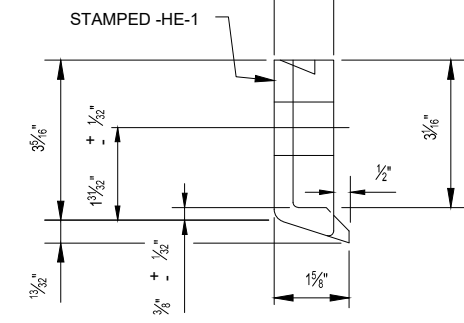
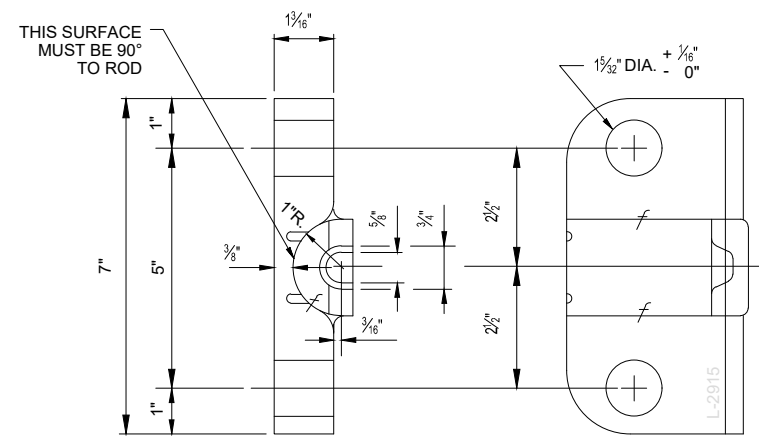
ELEVATION OF "SMJ"CLIP ASSEMBLY FOR 39' SWITCHES
(DRAWN FOR 136 LB. RAIL) SPRING WASHER AND NUT REMOVED



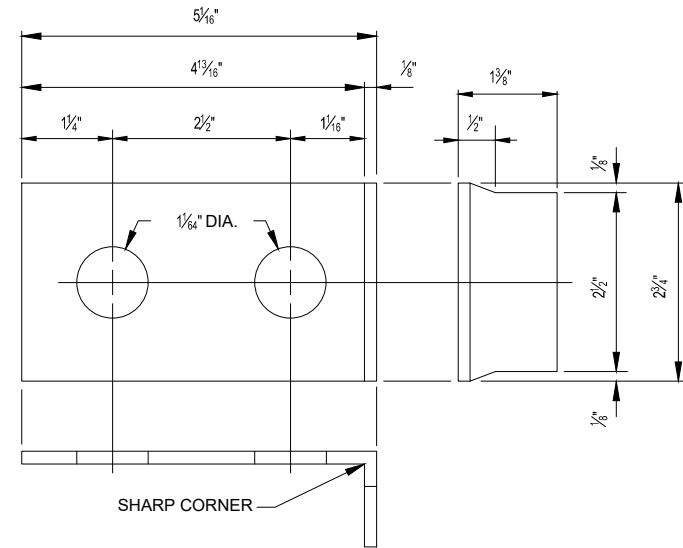
OFFSET BEARING CAP-B-1



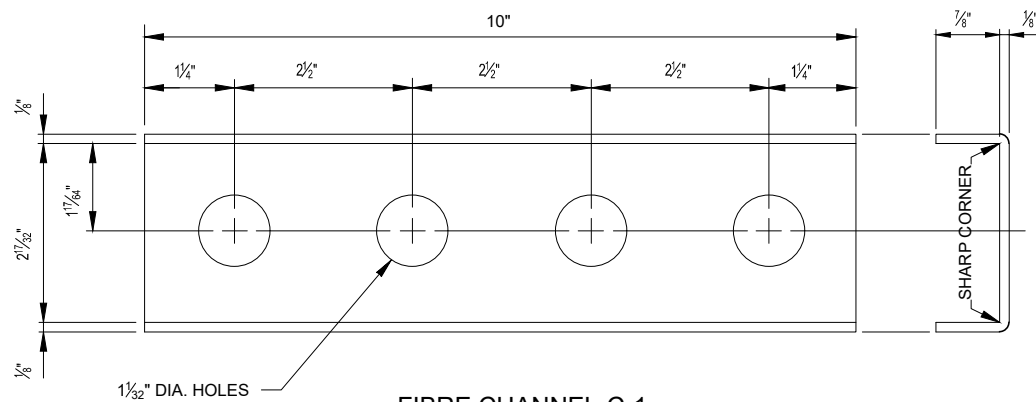
OFFSET BEARING CAP-B-6



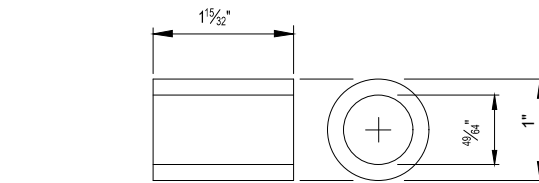
BEARING-HE-1



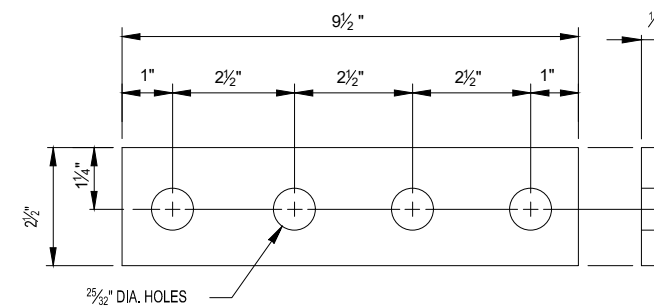
FIBRE ANGLE-AP-34



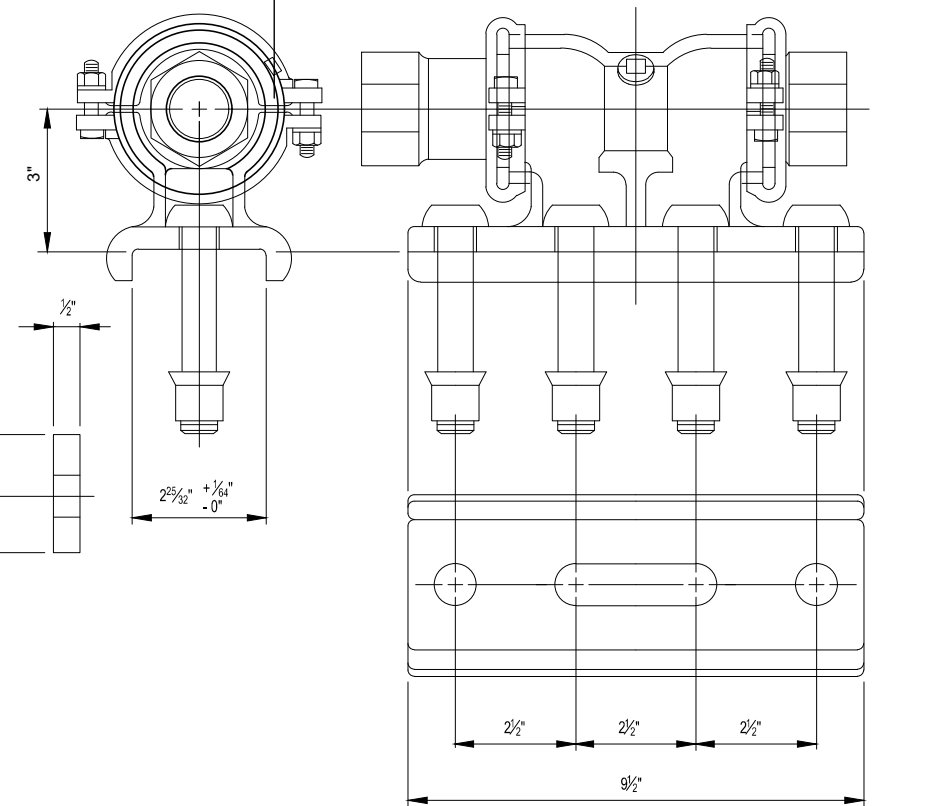
FIBRE CHANNEL-C-1



FIBRE BUSHING-B-11



SPLICE PLATE-ST-684



SWITCH ADJUSTER

NOTES: (CONTINUED FROM ESD-2911-13)

- TWO WEB BOLTS SHALL BE FURNISHED WITH EACH CLIP ASSEMBLY AS CALLED FOR BY NOTE IN TOP VIEW OF ROD ASSEMBLY. WHEN ROD IS USED ON 11'-0" AND 16'-6" SWITCHES THE 1/2" THICK SPRING WASHER SHOULD BE REPLACED WITH A 3/8" THICK SPRING WASHER BY THE STOREKEEPER OR FIELD FORCES, TO BRING COTTER WITHIN THE LIMITS OF SLOT IN WEB BOLT NUTS.
- MATERIALS AND WORKMANSHIP SHALL MEET CURRENT A.R.E.M.A. SPECIFICATIONS FOR "SPECIAL TRACKWORK" UNLESS OTHERWISE SPECIFIED.
- VERTICAL SWITCH ROD SHALL BE PLAINLY STAMPED TO INDICATE SWITCH THAT ROD ASSEMBLY CAN BE USED UPON. IDENTIFICATION MARKING WILL BE AS FOLLOWS:
1-39 FOR USE ON 39'-0" SWITCHES, 132 LB. AND 136 LB. RAIL SECTIONS.
1-11-30 FOR USE ON 11'-0" TO 30'-0" SWITCHES, 115 LB., 119 LB., 131 LB., 132 LB., AND 136 LB. R.E. RAIL SECTIONS.

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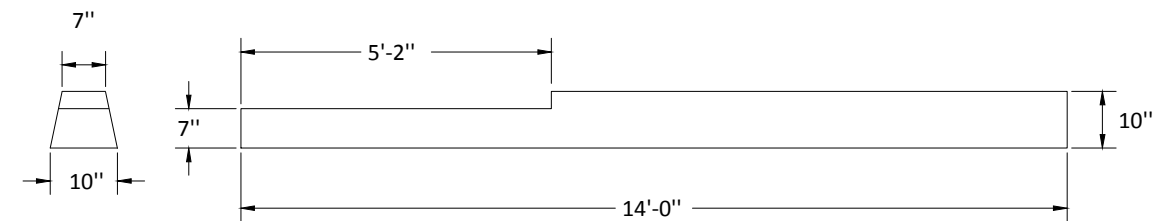
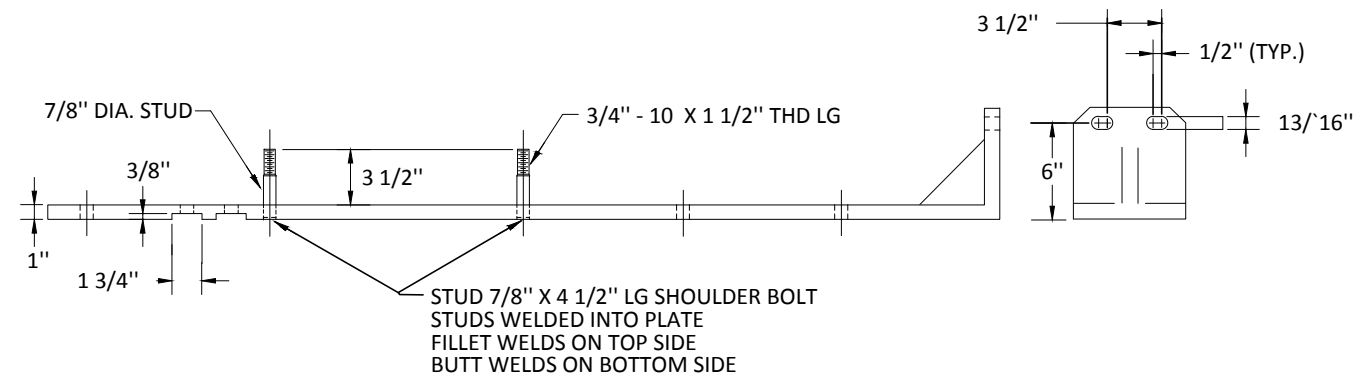
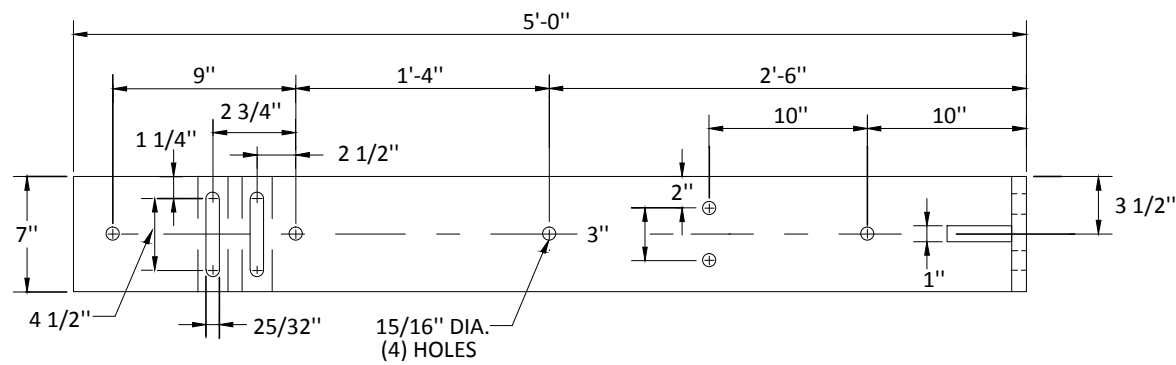
ENGINEERING STANDARD DRAWINGS	DRAWING NO. ESD-2911-14
NO. 8 STANDARD TURNOUT - SWITCH RODS AND MISC. DETAILS (2 OF 2)	DRAWING SHEET NO. 14 OF 15
	SCALE: NONE
	CONTRACT SHEET NO.

NOTE:

SEE SHEET NUMBER 5 FOR NOTES

REFERENCE DRAWINGS:

SWITCH GAGE PLATE DETAILS-ESD-2911-05



MOUNTING PLATE NOTES:

1. EMORY CLOTH SHALL BE INSTALLED TO PROVIDE ABRASIVE MATERIAL BETWEEN SWITCH MACHINE FRAME AND SWITCH PLATE.
2. ALL HOLES SHALL BE DRILLED NOT PUNCHED.
3. ALL CORNERS OF PLATE SHALL BE CHAMFERED 1" X 1".

TRAPEZOID TIE NOTES:

1. TRAPEZOID TIES SHALL BE DOUGLAS FIR OR GUM.
2. TRAPEZOID TIES SHALL BE DAPPED AND TREATED AT THE MILL.
3. TIES SHALL BE STRAIGHT AND FREE OF CRACKS OR OTHER DEFECTS.

ANSALDO SWITCH MACHINE MOUNTING PLATE

DAP TIE

(2 PCS. REQ'D. AS SHOWN)

14 FT. DAPPED TRAPEZOID TIE

US&S SWITCH MACHINE MUST BE FURNISHED WITH FINISHED MOUNTING LUGS

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B. SMITH *BS*

RECOMMENDED
W. PREY *WP*

DATE 2/2/15

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ENGINEERING STANDARD DRAWINGS

NO. 8 STANDARD TURNOUT -
EXTENSION PLATE AND DAP TIE FOR
SWITCH MACHINE

DRAWING NO. ESD-2911-15

DRAWING SHEET NO. 15 OF 15

SCALE: NONE

CONTRACT SHEET NO.

NO. 10 STANDARD TURNOUT ON WOOD TIES

(136LB., RIGHT HAND WITH RAIL BOUND MANGANESE FROG)

DRAWING INDEX

BILL OF MATERIALS AND GENERAL NOTES	ESD-2921-01
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SWITCH AND TURNOUT PLATES	ESD-2921-04
GAGE PLATES	ESD-2921-05
FROG GAGE PLATES	ESD-2921-06
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RAILBOUND MANGANESE STEEL FROG	ESD-2921-08
FROG PLATES	ESD-2921-09
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UNDERCUT STOCK RAIL	ESD-2921-11
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SWITCH RODS AND MISC. DETAILS (1 OF 2)	ESD-2921-13
SWITCH RODS AND MISC. DETAILS (2 OF 2)	ESD-2921-14
EXTENSION PLATE AND DAP TIES FOR SWITCH MACHINE	ESD-2921-15

NOTES:

1. TURNOUT TO BE FABRICATED FROM 136 LB. HEAD HARDENED RAIL, FROM POINT END TO LAST LONG SWITCH TIE.
2. LOCATION OF INSULATED JOINTS IS DETERMINED BY DRAWING NUMBER ESD-2921-10. IT WILL BE SATISFACTORY TO RELOCATE THE INSULATED JOINT IN THE FIELD UP TO 12" SO AS TO PROVIDE A SUITABLE SUSPENDED JOINT, PROVIDED THE STAGGER OF INSULATED JOINTS DOES NOT EXCEED 4'-6". SUSPENDED INSULATED JOINTS MUST BE LOCATED IN A CRIB AREA BETWEEN TIES, A MINIMUM DISTANCE OF 4" FROM EDGE OF NEAREST TIE PLATE.
3. ALL INSULATED JOINTS ARE TO BE ADHESIVE BONDED PREFABRICATED INSULATED JOINTS PER ESD-2504 UNLESS OTHERWISE SPECIFIED.
4. ALL MATERIALS REQUIRED FOR HAND OR MACHINE OPERATED SWITCH OPERATION WILL BE FURNISHED PER REQUIREMENTS OF THE ENGINEER.
5. MATERIALS AND WORKMANSHIP, ALSO ANY CONSTRUCTION DETAILS NOT SHOWN, SHALL BE PER CURRENT A.R.E.M.A. "MANUAL AND PORTFOLIO" UNLESS OTHERWISE SPECIFIED.
6. WHERE REQUIRED, ALL IDENTIFICATION SYMBOLS TO BE PLAINLY STAMPED.
7. GAGE PLATES WILL BE FURNISHED INSULATED. SWITCH RODS WILL BE FURNISHED INSULATED UNLESS OTHERWISE SPECIFIED.
8. MANUFACTURER SHALL SUBMIT TWO COPIES OF SHOP DRAWINGS TO THE ENGINEER FOR APPROVAL PRIOR TO FABRICATION OF TURNOUT. SHOP DRAWINGS THAT CHANGE DETAILS OF THESE STANDARDS MUST CLEARLY SPECIFY SUCH PROPOSED CHANGES.
9. THE MATERIAL INCLUDED IN A "TURNOUT COMPLETE" IS EVERYTHING LISTED IN THE BILL OF MATERIALS. TO CONSTRUCT A COMPLETE TURNOUT, SWITCH TIES (PER LIST ON THIS SHEET) AND INSULATED JOINTS, FIELD WELDS, RUNNING RAIL, AND CLOSURE RAIL IDENTIFICATION ON SHEET ESD-2921-10 MUST ALSO BE SUPPLIED. THE MATERIAL FOR A "CROSSOVER COMPLETE" IS IDENTIFIED ON SHEET ESD-2921-03.
10. TIE PLATES SHALL CONFORM TO ENGINEERING STANDARD ESD-2454.
11. SCREW SPIKES (1/8" X 6-2 TPI) SHALL CONFORM TO ENGINEERING STANDARD ESD-2355-02. PLATE HOLES SHALL BE 1" DIAMETER. PILOT HOLES IN TIES SHALL BE 5/16" DIAMETER. SCREW SPIKES SHALL BE SCREWED INTO WOOD (NOT DRIVEN).
12. MANUFACTURER SHALL BEVEL RAIL ENDS PER CURRENT A.R.E.M.A. PLAN NO. 1005.
13. THE 16'-6" SWITCH POINT, MADE FROM 40'-0" RAIL PER ESD- 2921-12 SHALL BE FURNISHED WITH SWITCH RODS NO. 1 AND 2 PER ESD-2921-13 AND ESD-2921-14.
14. FOR LOCATION OF INSULATED JOINTS FOR NO. 10 TURNOUT AND CROSSOVER, SEE DRAWING NO. ESD-2921-10.
15. GAGE PLATES FOR SWITCH AND FROG, SWITCH HEEL PLATE (FOR BOTH R.H. AND L.H. TURNOUTS) AND PLATES P-10 THRU P-24 ARE DESIGNED TO BE PERPENDICULAR TO THE MAIN LINE THRU RUN RAILS.
16. UPON COMPLETION OF TURNOUT INSTALLATION, RUNNING RAIL MUST BE ADJUSTED TO NCTD NEUTRAL RAIL TEMPERATURE.
17. ALL E-CLIPS SHALL BE GALVANIZED.
18. SWITCH POINTS SHALL BE FABRICATED PER AREMA SPECIFICATION NO. 9-28-92 AND ESD- 2921-12.
19. THE TOLERANCE FOR SPACING OF SWITCH TIES IS $\pm \frac{1}{2}$ " RELATIVE TO ADJACENT TIES AND $1 \frac{1}{4}$ " RELATIVE TO CUMULATIVE DIMENSION FROM THE POINT OF SWITCH (PS).
20. FOR SWITCH MACHINE LAYOUT REFER TO ESD-8605 OR ESD-8610.

BILL OF MATERIAL	
QTY.	DESCRIPTION
1 PAIR	16'-6" EXTENDED FIELD WELDED TYPE SWITCH POINTS (40'-0" RAIL)
1 EACH	R.H. SAMSON STOCK RAILS (30'-0")
1 EACH	L.H. SAMSON STOCK RAILS (40'-0")
1 EACH	NO. 1 SMJ TYPE SWITCH ROD W/BASKET
1 EACH	VERTICAL SWITCH ROD WITH SMJ CLIPS
3 EACH	GAGE PLATE No. P-P
1 EACH	GAGE PLATE No. G-1P
1 EACH	GAGE PLATE No. G-2P
6 EACH	SLIDE PLATE S-8P
4 EACH	SLIDE PLATE S-9P
4 EACH	BRACE SLIDE PLATE S-5P
2 EACH	BRACE SLIDE PLATE S-7P
2 EACH	BRACE SLIDE PLATE S-4P
2 EACH	HEEL PLATE P-5RH
2 EACH	TURNOUT PLATES P-10 THRU P-21
1 EACH	PLATES P-22 THRU P-29
1 EACH	No.10 R.B.M. FROG - 22'-6"
1 EACH	FROG PLATES No. FP-1 THRU FP-9
1 EACH	FROG PLATES No. FCP-1 THRU FCP-3
1 EACH	FROG GAGE PLATES FG-1P THRU FG-3P
2 EACH	16'-0" U-69 ADJUSTABLE GUARD RAIL W/PLATES
5 EACH	D.I. RAIL HOLD DOWN CLIPS E-3706
2 EACH	D.I. RAIL HOLD DOWN CLIPS E-3707
2 EACH	D.I. RAIL HOLD DOWN CLIPS E-3708
138 PCS.	ROLLED STEEL TIE PLATES
552 PCS.	SCREW SPIKES 1/8" DIA. X 6" No. 5760
276 PCS.	RAIL CLIP (GALVANIZED)(ESD-2362)
8 PCS.	"E"-CLIP (GALVANIZED)(ESD-2361)
12 PCS.	BOLTLESS ADJUSTABLE BRACE ASSEMBLY
1 EACH	19'-6" RAIL
1 EACH	23'-6" RAIL
1 EACH	30'-2" RAIL
4 EACH	39'-0" RAIL
1 EACH	EPOXY BONDED PREFABRICATED INSULATED JOINT (30'-4")
1 EACH	EPOXY BONDED PREFABRICATED INSULATED JOINT (46'-6")

TURNOUT DATA	
FROG NO.	10
FROG ANGLE	5°-43'-29"
FROG LENGTH ON MAIN TRACK	22'-6"
FROG LENGTH ON TURNOUT TRACK	22'-6"
LENGTH OF SWITCH POINT	16'-6"
SWITCH ANGLE	1°-44'-11"
HEEL SPREAD OF SWITCH	6 1/4"
LEAD	80'-5"
RADIUS OF TURNOUT CURVE	742.29'
DEGREE OF TURNOUT CURVE	7°-43'-29"
CENTRAL ANGLE OF TURNOUT CURVE	3°-59'-18"
RADIUS OF EQUIVALENT CURVE	941.70'
DEGREE OF EQUIVALENT CURVE	6°-05'-14"
LENGTH OF EQUIVALENT CURVE	94.04'
STRAIGHT CLOSURE	56'-11"
CURVED CLOSURE	57'-1"

BILL OF WOOD SWITCH TIES			
PIECES	SIZE	LENGTH	BOARD FEET
16	7" x 9"	10'-0"	840.00
11	7" x 9"	11'-0"	635.25
8	7" x 9"	12'-0"	504.00
7	7" x 9"	13'-0"	477.75
6	7" x 9"	14'-0"	441.00
2	10" x 9"	14'-0" DAP TIES	147.00
6	7" x 9"	15'-0"	472.50
6	7" x 9"	16'-0"	504.00
9	7" x 9"	17'-0"	803.25
TOTAL			TOTAL
71			4824.75

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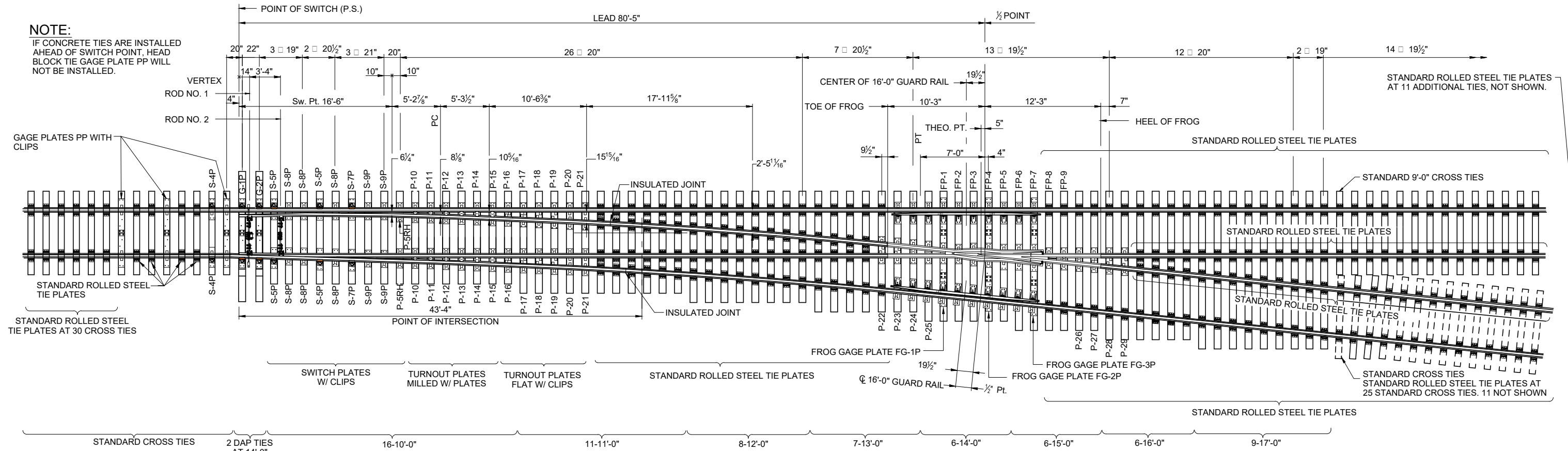
<p style="text-align: center;">REVISIONS</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>REV.</td><td>DATE</td><td>DESCRIPTION</td><td>DES.</td><td>ENG.</td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td></tr> </table>	REV.	DATE	DESCRIPTION	DES.	ENG.																					<p style="text-align: center;">DRAWN RAILPROS</p> <p style="text-align: center;">CHECKED B. SMITH <i>BS</i></p> <p style="text-align: center;">RECOMMENDED W. PREY <i>WP</i></p> <p style="text-align: center;">DATE 5/27/15</p>	<p style="text-align: center;">SANDAG</p> <p style="text-align: center;">SAN DIEGO ASSOCIATION OF GOVERNMENTS 401 B Street, Suite 800 San Diego, CA. 92101 www.sandag.org</p>	<p style="text-align: center;">NORTH COUNTY TRANSIT DISTRICT</p> <p style="text-align: center;">810 Mission Avenue Oceanside, CA 92054 www.gonctd.com</p>	<p style="text-align: center;">ENGINEERING STANDARD DRAWINGS</p> <p style="text-align: center;">NO. 10 STANDARD TURNOUT BILL OF MATERIALS AND GENERAL NOTES</p>	<p style="text-align: center;">DRAWING NO. ESD-2921-01</p> <p style="text-align: center;">DRAWING SHEET NO. 1 OF 15</p> <p style="text-align: center;">SCALE: NONE</p> <p style="text-align: center;">CONTRACT SHEET NO.</p>
REV.	DATE	DESCRIPTION	DES.	ENG.																										

NOTES:

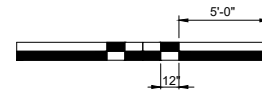
1. SEE COVER SHEET FOR NOTES, BILL OF MATERIAL AND TURNOUT DATA.
2. SEE SHEET NO. 3 FOR CROSSOVER.
3. SEE ESD-8605 OR ESD-8610 FOR SWITCH MACHINE LAYOUT.

NOTE:

IF CONCRETE TIES ARE INSTALLED AHEAD OF SWITCH POINT, HEAD BLOCK TIE GAGE PLATE PP WILL NOT BE INSTALLED.



10 RIGHT HAND TURNOUT



GRAPHIC SCALE

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REVISIONS		DES.	ENG.
REV.	DATE	DESCRIPTION	DES. ENG.

DRAWN
RAILPROS
 CHECKED
B. SMITH
 RECOMMENDED
W. PREY
 DATE 5/27/15

DESIGNER PE STAMP


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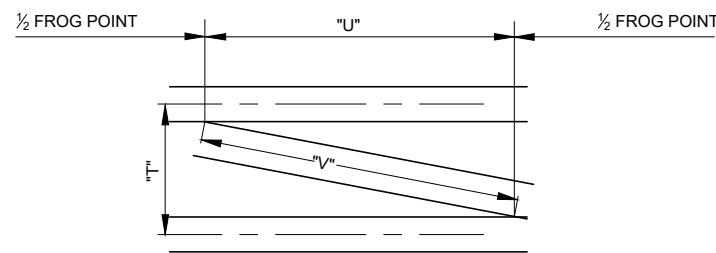
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ENGINEERING STANDARD DRAWINGS
 NO. 10 STANDARD TURNOUT - LAYOUT

DRAWING NO.	ESD-2921-02
DRAWING SHEET NO.	2 OF 15
SCALE:	NONE
CONTRACT SHEET NO.	

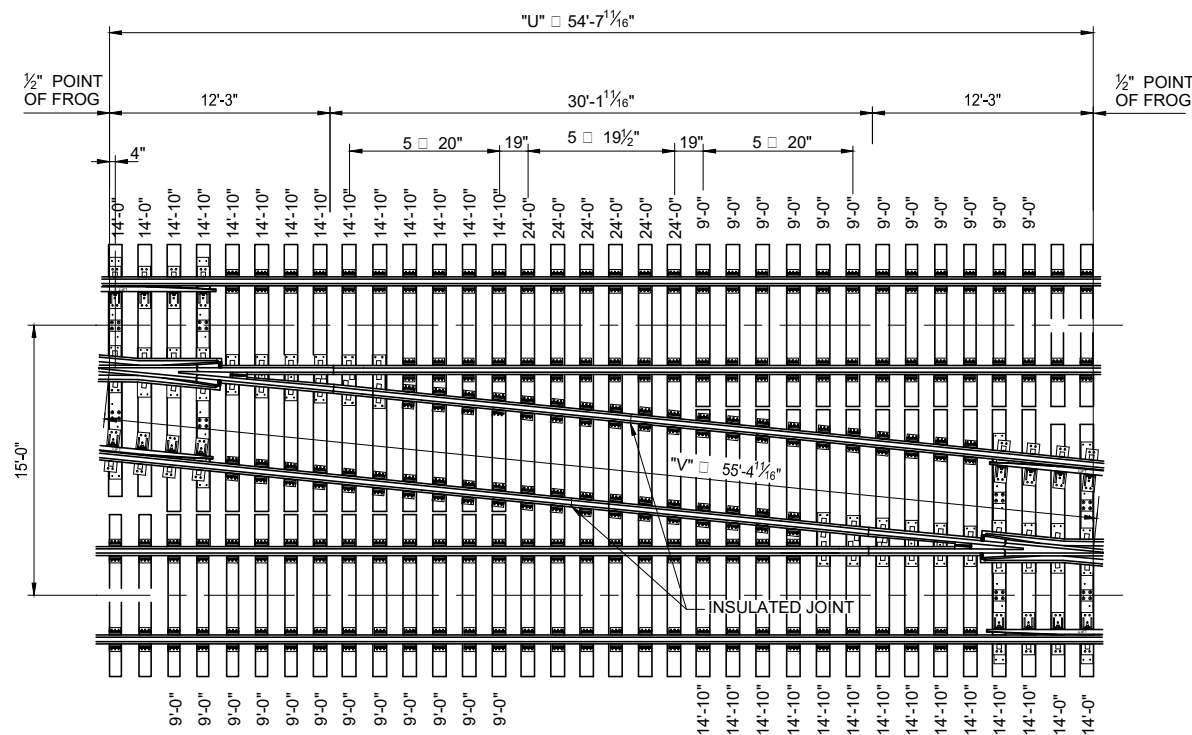
NOTES:

- SEE SHEET 1 FOR NO. 10 TURNOUT DATA, BILL OF MATERIAL AND NOTES.
- SEE SHEET 2 FOR LAYOUT OF NO. 10 TURNOUT.



CROSSOVER DIAGRAM

CROSSOVER DATA		
MAIN TRACKS - TANGENT AND PARALLEL		
CROSSOVER - TANGENT BETWEEN FROGS		
TRACK CENTERS "T"	DISTANCE BETWEEN 1/2" FROG PTS.	
	ON MAIN TRACK "U"	ON CROSSOVER "V"
15'-0"	54'-7 1/16"	55'-4 1/16"
EACH 1"	0.831'	0.835'



NO. 10 CROSSOVER

BILL OF SWITCH TIES			
PIECES	SIZE	LENGTH	BOARD FEET
24	7" x 9"	9'-0"	1134.00
32	7" x 9"	10'-0"	1680.00
22	7" x 9"	11'-0"	1270.50
16	7" x 9"	12'-0"	1008.00
14	7" x 9"	13'-0"	955.50
16	7" x 9"	14'-0"	1176.00
4	10" x 9"	14'-0" DAP TIES	336.00
24	7" x 9"	14'-10"	1890.00
6	7" x 9"	24'-0"	756.00
TOTAL		TOTAL	10206.00
158			

BILL OF MATERIAL	
QTY.	DESCRIPTION
2 PAIR	16'-6" EXTENDED FIELD WELDED TYPE SWITCH POINTS (40'-0" RAIL)
1 PAIR	R.H. SAMSON STOCK RAILS (30'-0")
1 PAIR	L.H. SAMSON STOCK RAILS (40'-0")
2 EACH	NO. 1 SMJ TYPE SWITCH ROD W/BASKET
2 EACH	VERTICAL SWITCH ROD WITH SMJ CLIPS
6 EACH	GAGE PLATE No. P-P
2 EACH	GAGE PLATE No. G-1P
2 EACH	GAGE PLATE No. G-2P
12 EACH	SLIDE PLATE S-8P
8 EACH	SLIDE PLATE S-9P
8 EACH	BRACE SLIDE PLATE S-5P
4 EACH	BRACE SLIDE PLATE S-7P
4 EACH	BRACE SLIDE PLATE S-4P
4 EACH	HEEL PLATE P-5RH
4 EACH	TURNOUT PLATES P-10 THRU P-21
2 EACH	PLATES P-22 THRU P-29
2 EACH	No. 10 R.B.M. FROG - 22'-6"
2 EACH	FROG PLATES No. FP-1 THRU FP-9
2 EACH	FROG PLATES No. FCP-1 THRU FCP-3
2 EACH	FROG GAGE PLATES FG-1P THRU FG-3P
4 EACH	16'-0" U-69 ADJUSTABLE GUARD RAIL W/PLATES
10 EACH	D.I. RAIL HOLD DOWN CLIPS E-3706
4 EACH	D.I. RAIL HOLD DOWN CLIPS E-3707
4 EACH	D.I. RAIL HOLD DOWN CLIPS E-3708
228 PCS.	TIE PLATES
912 PCS.	SCREW SPIKES 15/16" DIA. X 6" No. 5760
456 PCS.	RAIL CLIP (GALVANIZED) (ESD-2362)
24 PCS.	"E"-CLIP (GALVANIZED) (ESD-2361)
12 PCS.	BOLTLESS ADJUSTABLE BRACE ASSEMBLY
2 EACH	23'-6" RAIL
2 EACH	30'-2" RAIL
6 EACH	39'-0" RAIL
2 EACH	EPOXY BONDED PREFABRICATED INSULATED JOINT (30'-4")
2 EACH	EPOXY BONDED PREFABRICATED INSULATED JOINT (40'-9")
2 EACH	EPOXY BONDED PREFABRICATED INSULATED JOINT (46'-6")

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REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN RAILPROS CHECKED B. SMITH RECOMMENDED W. PREY DATE 5/27/15	DESIGNER PE STAMP
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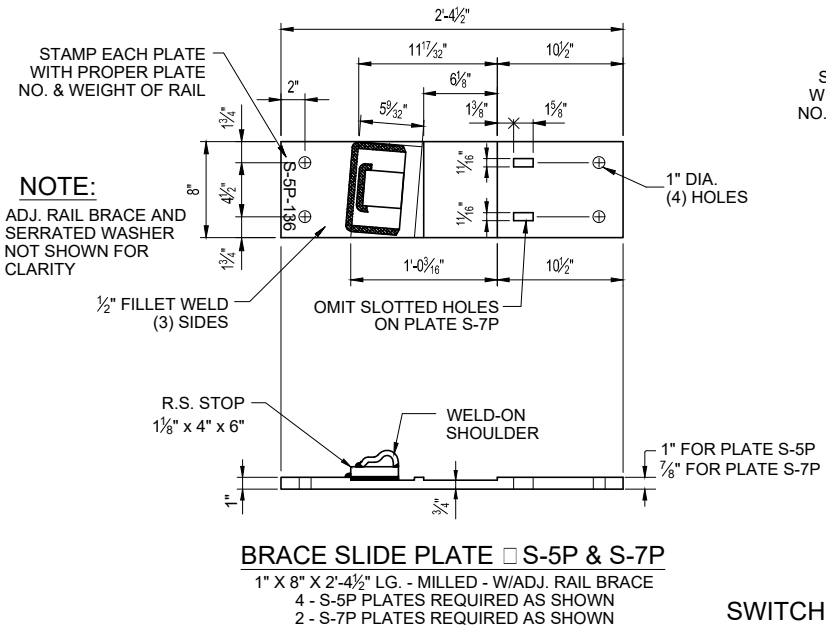
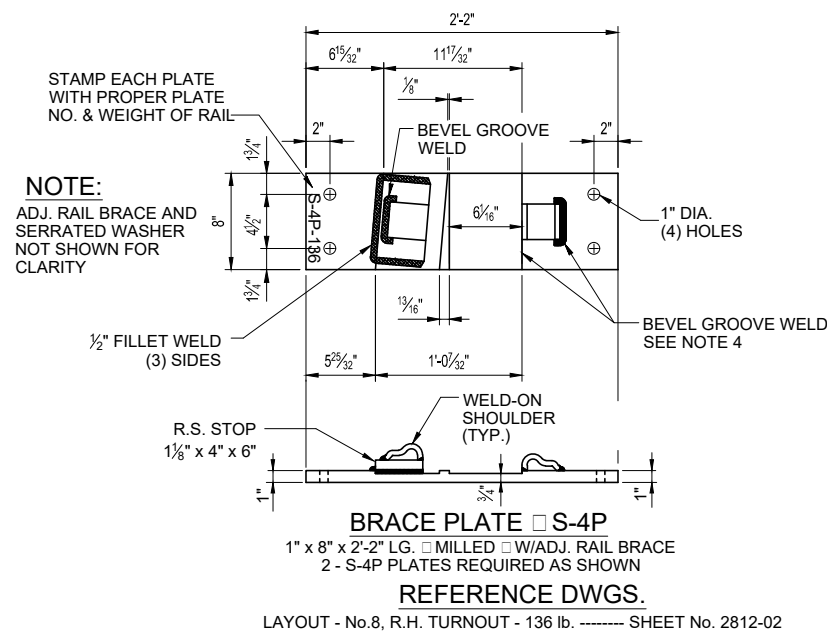
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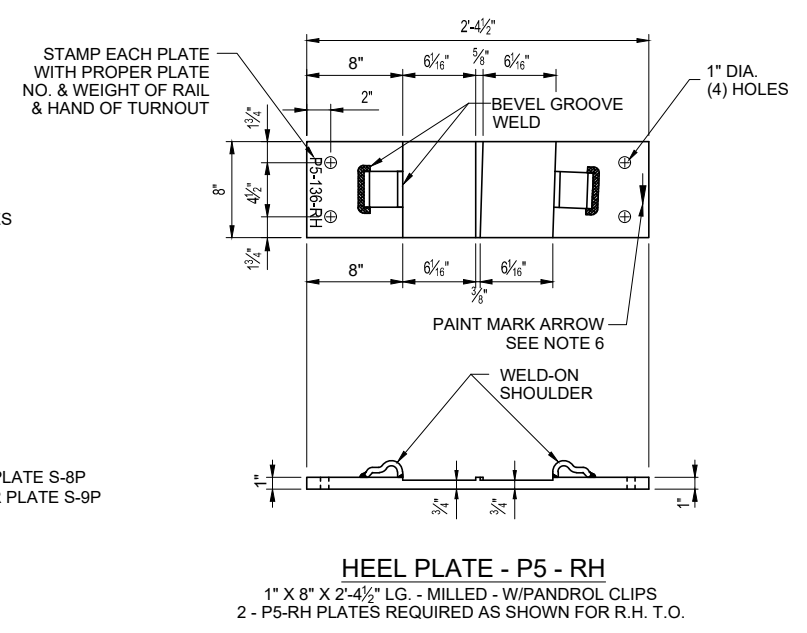
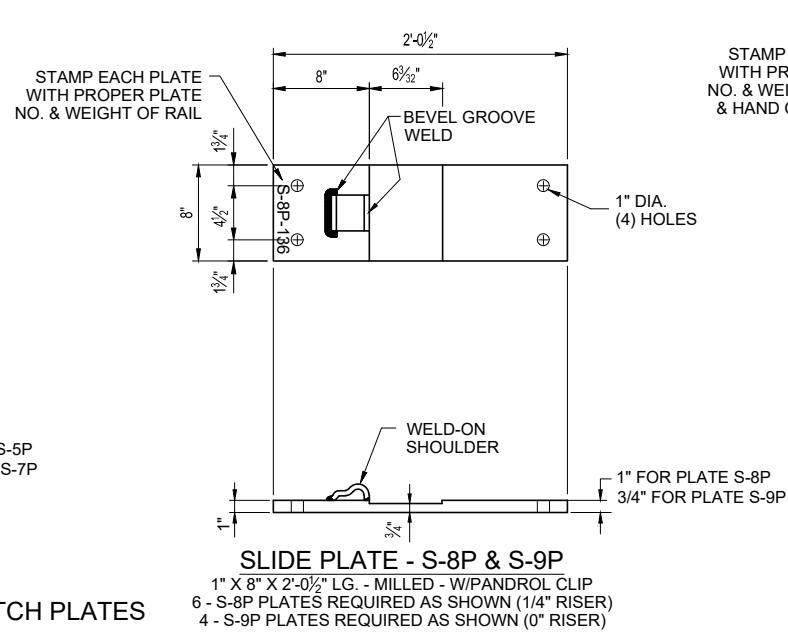
ENGINEERING STANDARD DRAWINGS

 NO. 10 STANDARD TURNOUT -
 CROSSOVER LAYOUT AND BILL OF
 MATERIALS

DRAWING NO.	ESD-2921-03
DRAWING SHEET NO.	3 OF 15
SCALE:	NONE
CONTRACT SHEET NO.	



SWITCH PLATES



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NOTES:

1. PLATES TO BE MADE OF MILD ROLLED STEEL.
2. EACH PLATE TO BE PLAINLY STAMPED WITH PLATE NO. AND 136 (WEIGHT OF RAIL & HAND OF TURNOUT (R.H. OR L.H.)).
3. THE WELD - ON PRESSED STEEL SHOULDER, MADE FROM MILD STEEL, TO BE PURCHASED FROM PANDROL INTERNATIONAL OR APPROVED ALTERNATE MEETING PANDROL'S DESIGN SPECIFICATIONS.
4. THE PRESSED STEEL SHOULDER MUST BE CAREFULLY WELDED TO THE PLATE. ANY WELD PROJECTING BEYOND THE VERTICAL FACE OF SHOULDER IN THE AREA OF THE RAIL SEAT MUST BE MACHINED OFF TO PROVIDE A CLEAR RAIL SEAT DIMENSION AS CALLED FOR.
5. THE PLATES AS SHOWN ARE FOR A 136 LB., NO. 10 RIGHT HAND TURNOUT. FOR A LEFT HAND TURNOUT, PLATES P-10 THRU P-29 INCLUSIVE AND FROG PLATES AND GAGE PLATES FG-1P THRU FG-3P ARE TO BE OPPOSITE.
6. DIRECTION OF ARROW SHOWN IS AN EXAMPLE ONLY. USING SHEET ESD-2921-02 AS A GUIDE, PAINT MARK EACH PLATE WITH AN ARROW POINTING TOWARD SWITCH POINT.

WELDING SPECIFICATIONS

1. SET PRESSED STEEL SHOULDER FLUSH AGAINST LINE OF BASE OF RAIL OR SHOULDER OF MILLED PLATE AS SHOWN AND WELD WITH 2 - PASS 3/8" + WELD.
2. STOP PLATE FOR ADJUSTABLE RAIL BRACE TO BE SET FLUSH WITH SHOULDER OF MILLED PLATE AS SHOWN AND WELD WITH 3 - PASS 1/2" + FILLET WELD.
3. SHOULDERS AND STOPS ARE TO BE CAREFULLY WELDED TO PLATE. NO WELD SHALL PROJECT BEYOND THE VERTICAL EDGE OF THE UNWELDED FOURTH SIDE OF THE STOP PLATE OR VERTICAL FACE OF SHOULDER IN THE AREA OF THE RAIL SEAT. ANY WELD PROJECTING BEYOND THE FACE OF THE STOP OR SHOULDER MUST BE MACHINED OFF TO PROVIDE CLEAR DIMENSION CALLED FOR.
4. FOR WELDING PRESSED STEEL SHOULDERS OR PLATE STOPS USE THE FOLLOWING:
 - A. ELECTRODE 1 5/32 INCH, WELDING SPEC. 7018XLM.
 - B. ELECTRODE 3/16 INCH, WELDING SPEC. 7018XLM.
 - C. WIRE, WELDING 3/32 INCH, NR203, 1 NICKEL FLUX CORE.
 OTHER WIRE OR ELECTRODES MEETING SPECIFICATIONS AS CALLED FOR, APPROVED BY THE ENGINEER, MAY BE USED.

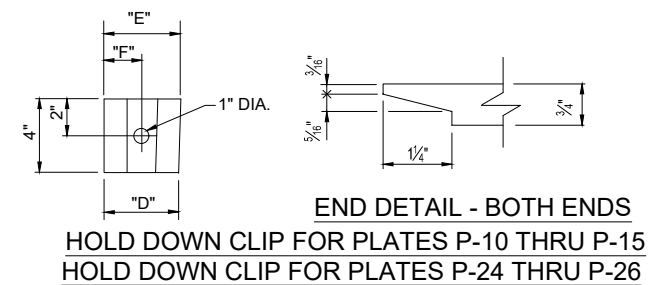
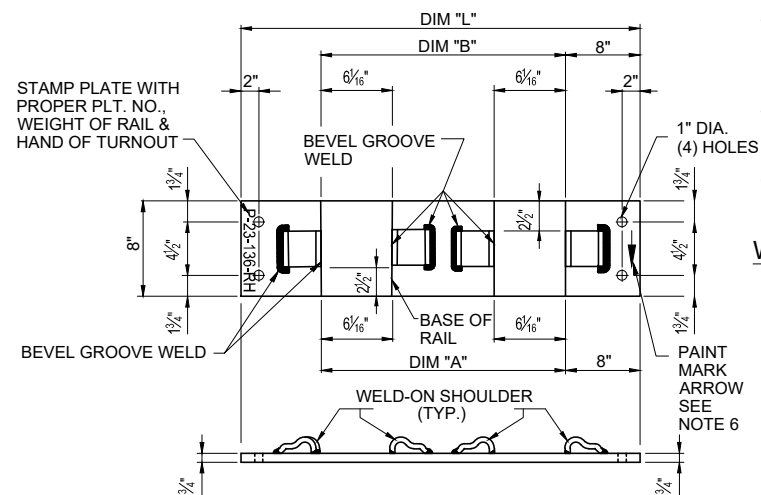
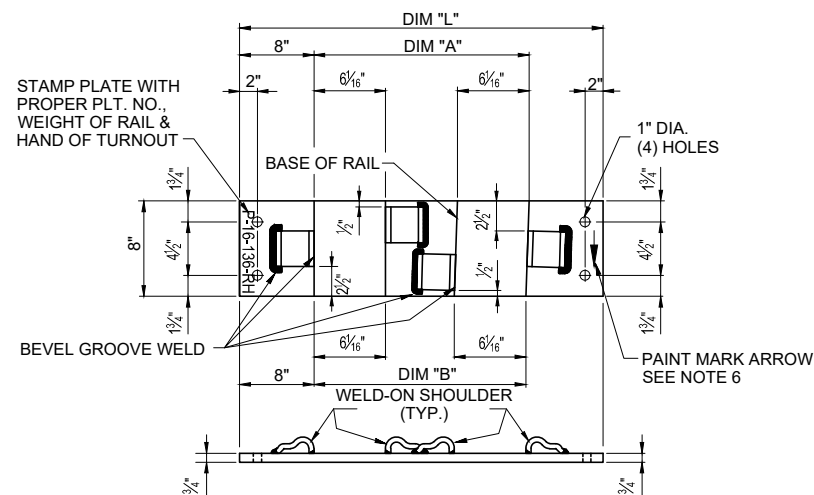
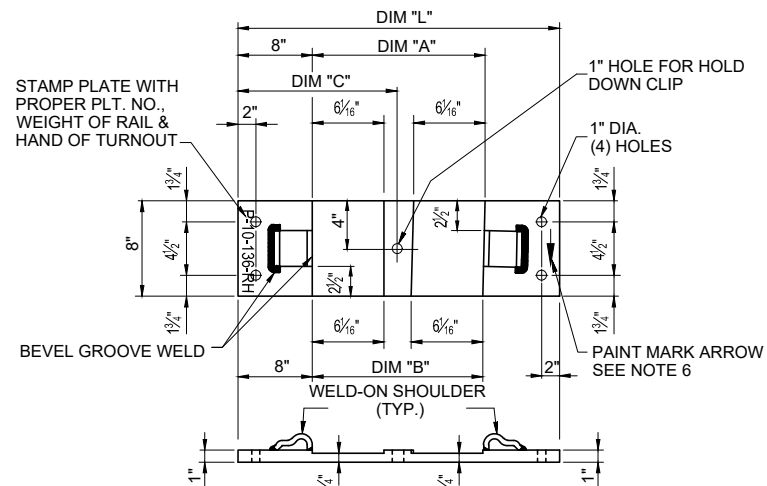


PLATE	DIM "A"	DIM "B"	DIM "C"	DIM "L"	Pits REQ'D.	DIM "D"	DIM "E"	DIM "F"	CLIPS REQ'D
P-10	13 1/8"	13 3/8"	14 1/2"	2'-5"	2 EA.	3 3/8"	3 3/8"	1 5/8"	2 EA.
P-11	13 23/32"	13 1/16"	14 7/8"	2'-6"	2 EA.	3 23/32"	3 3/32"	1 15/16"	2 EA.
P-12	14 1/32"	14 19/32"	15 3/8"	2'-6 1/2"	2 EA.	4 1/32"	4 9/16"	2 3/4"	2 EA.
P-13	15"	15 1/4"	15 1/2"	2'-7 1/2"	2 EA.	4 3/32"	5 7/32"	2 9/16"	2 EA.
P-14	15 1/16"	15 3/32"	15 27/32"	2'-8"	2 EA.	5 7/32"	5 1/16"	2 29/32"	2 EA.
P-15	16 1/32"	16 23/32"	16 1/2"	2'-8 1/2"	2 EA.	6 3/8"	6 1/16"	3 3/32"	2 EA.
P-25	15 15/32"	16 3/32"	15 29/32"	2'-8 1/2"	1 EA.	6 1/32"	5 17/32"	2 3/32"	1 EA.
P-26	15 1/16"	16 7/32"	15 7/8"	2'-8 1/2"	1 EA.	5 1/16"	6 1/4"	2 15/16"	1 EA.

PLATE	DIM "A"	DIM "B"	DIM "L"	Pits REQ'D.
P-16	17 7/8"	17 7/16"	2'-9 1/2"	2 EA.
P-17	17 15/16"	18 1/4"	2'-10"	2 EA.
P-18	18 25/32"	19 5/32"	2'-11"	2 EA.
P-24	17 7/16"	18 1/4"	2'-10 1/2"	1 EA.
P-27	17 3/8"	18 3/16"	2'-10 1/2"	1 EA.
P-28	19 1/32"	20 1/8"	3'-0"	1 EA.

PLATE	DIM "A"	DIM "B"	DIM "L"	Pits REQ'D.
P-19	20 5/32"	19 25/32"	3'-0"	2 EA.
P-20	21 1/8"	20 3/4"	3'-1"	2 EA.
P-21	22 5/32"	21 3/4"	3'-2"	2 EA.
P-22	22 3/16"	21 1/16"	3'-2 1/2"	1 EA.
P-23	20 1/16"	19 5/16"	3'-0 1/2"	1 EA.
P-29	22 5/32"	21 1/32"	3'-2"	1 EA.

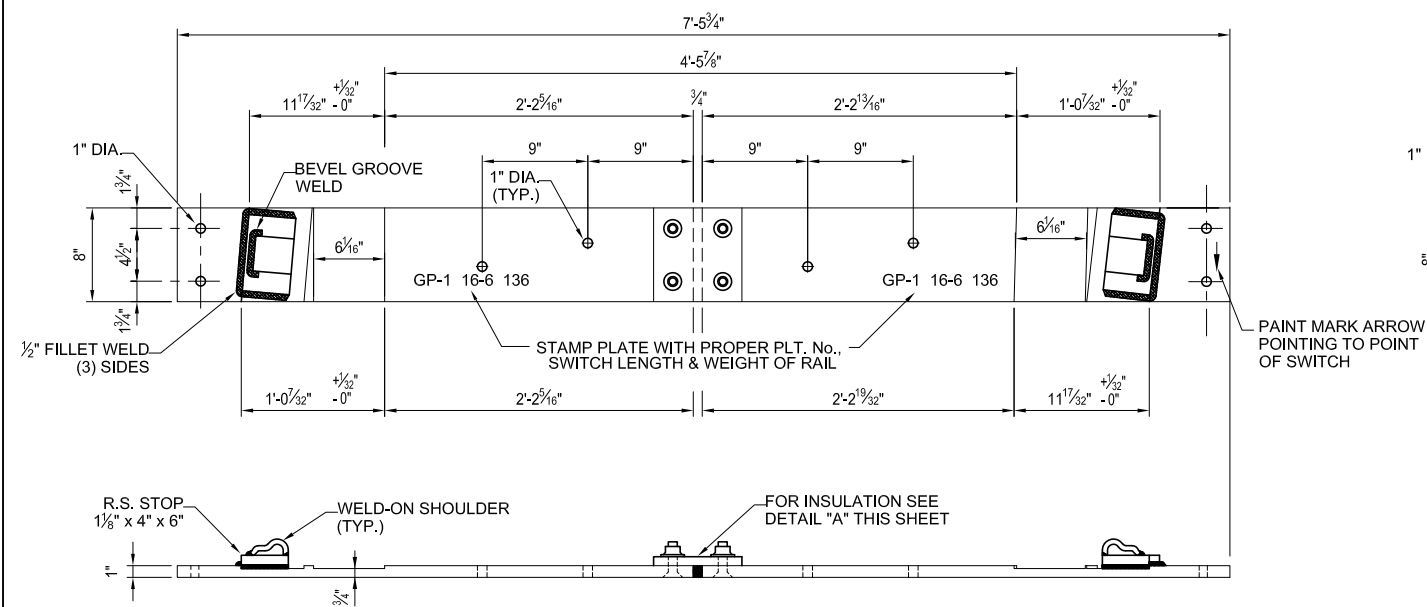
REV.	DATE	DESCRIPTION	DES.	ENG.

REVISIONS	DRAWN RAILPROS
CHECKED B. SMITH	RECOMMENDED W. PREY
DATE 5/27/15	DESIGNER PE STAMP

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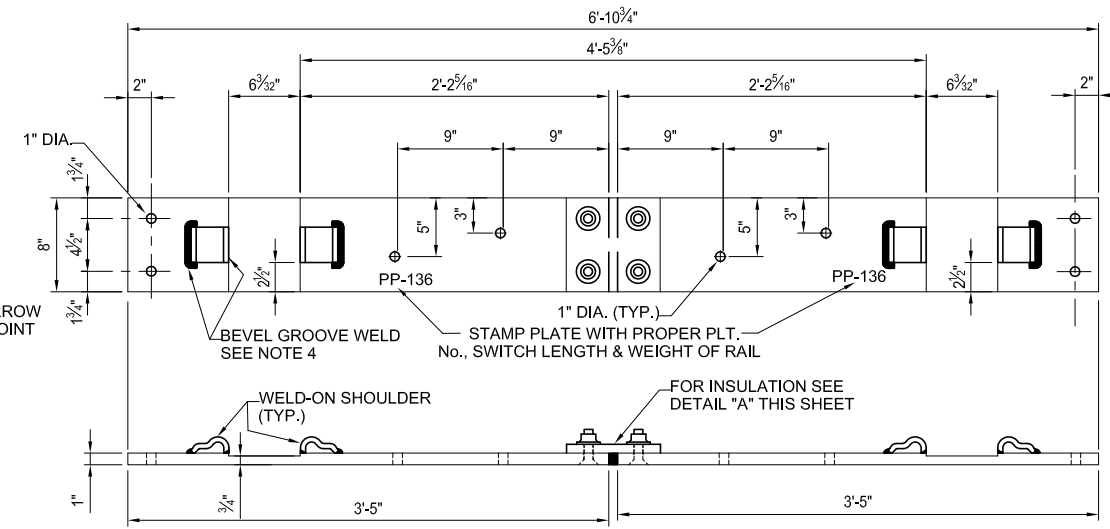
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ENGINEERING STANDARD DRAWINGS	DRAWING NO. ESD-2921-04
NO. 10 STANDARD TURNOUT - SWITCH AND TURN OUT PLATES	DRAWING SHEET NO. 4 OF 15
	SCALE: NONE
	CONTRACT SHEET NO.



INSULATED GAGE PLATE GP-1 - USED AT POINT OF SWITCH
 1" x 8" - MILLED - W/ INSULATION & ADJ. RAIL BRACES
 (1 PC. REQ'D AS SHOWN) (SCALE: NONE)

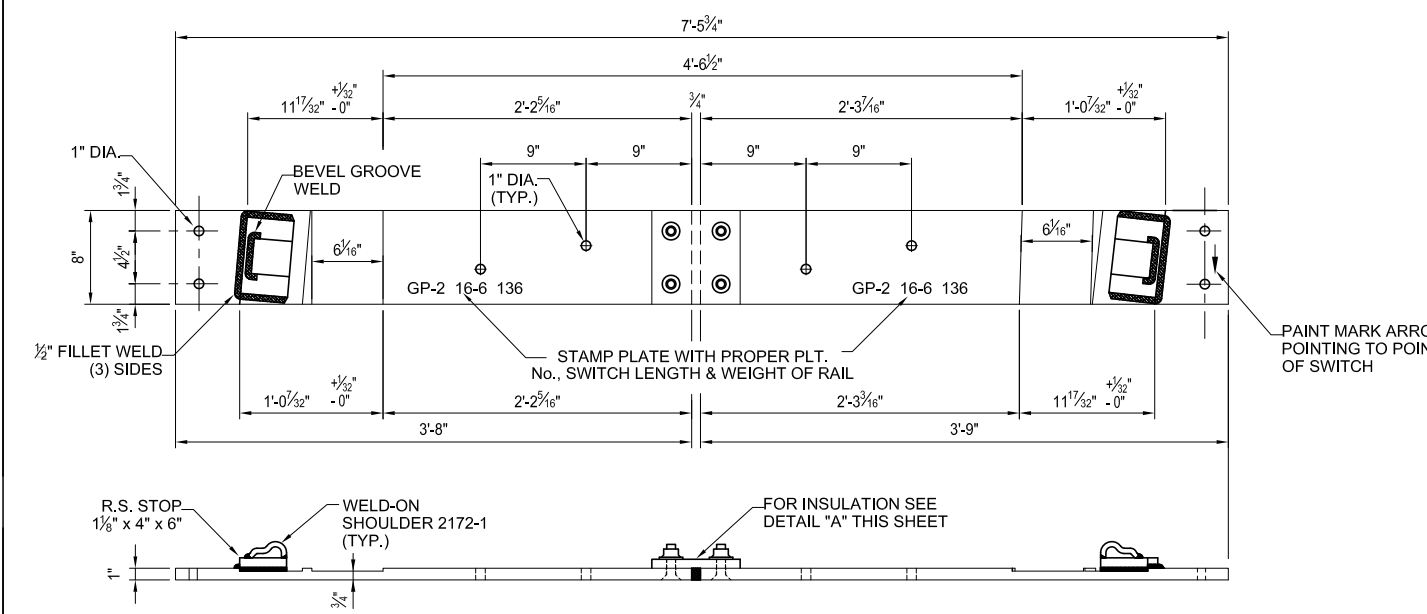
NOTE:
 SERRATED WASHER AND BRACE PLATE
 NOT SHOWN FOR CLARITY.



PANDROLIZED INSULATED GAGE PLATE PP
 1" x 8" - FLAT - W/ INSULATION (3 PC. REQ'D AS SHOWN)
 (SCALE: NONE)

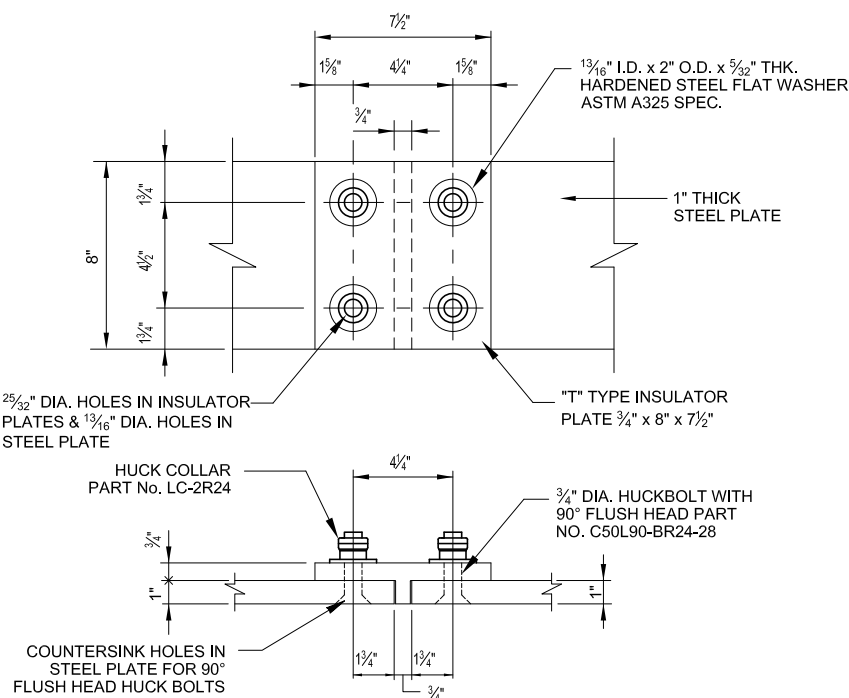
- NOTES:**
1. PLATES TO BE MADE OF MILD ROLLED STEEL.
 2. THE WELD - ON, PRESSED STEEL SHOULDER, MADE OF MILD STEEL TO BE PURCHASED FROM PANDROL INTERNATIONAL OR APPROVED ALTERNATE MEETING PANDROL'S DESIGN SPECIFICATIONS.
 3. THE PRESSED STEEL SHOULDER MUST BE CAREFULLY WELDED TO GAGE PLATES. ANY WELD PROJECTING BEYOND THE VERTICAL FACE OF SHOULDER IN THE AREA OF THE RAIL SEAT MUST BE MACHINED OUT TO PROVIDE A CLEAR RAIL SEAT DIMENSION AS CALLED FOR.
 4. THE PLATES AS SHOWN FOR A 136 LB., NO. 10 RIGHT HAND HAND OPERATED TURNOUT. FOR A LEFT HAND TURNOUT, PLATES ARE TO BE OPPOSITE.
 5. FOR EXTENSION PLATE AND DAP TIE DETAILS SEE SHEET ESD-2921-15.

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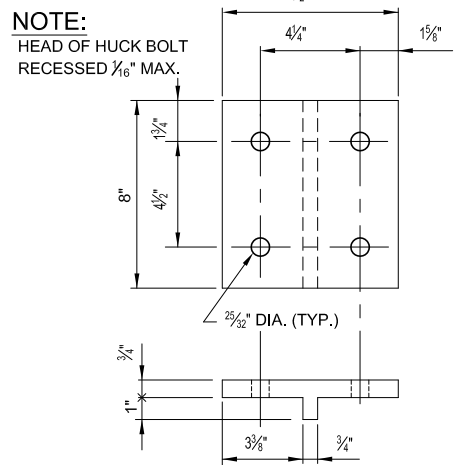


INSULATED GAGE PLATE GP-2 - USED AT POINT OF SWITCH
 1" x 8" - MILLED - W/ INSULATION & ADJ. RAIL BRACES
 (1 PC. REQ'D AS SHOWN) (SCALE: NONE)

NOTE:
 SERRATED WASHER AND BRACE PLATE
 NOT SHOWN FOR CLARITY.



GAGE PLATE INSULATED JOINT ASSEMBLY GPI-77



DETAIL "A" INSULATION AT PLATES
 (SCALE: NONE)

REFERENCE DWGS.

LAYOUT - No. 10, R.H. TURNOUT - 136 lb. SHEET ESD-2921-02
 DETAILS - SWITCH EXTENSION PLATE & DAP TIES SHEET ESD-2921-15

REV.	DATE	DESCRIPTION	DES.	ENG.

DESIGNER PE STAMP

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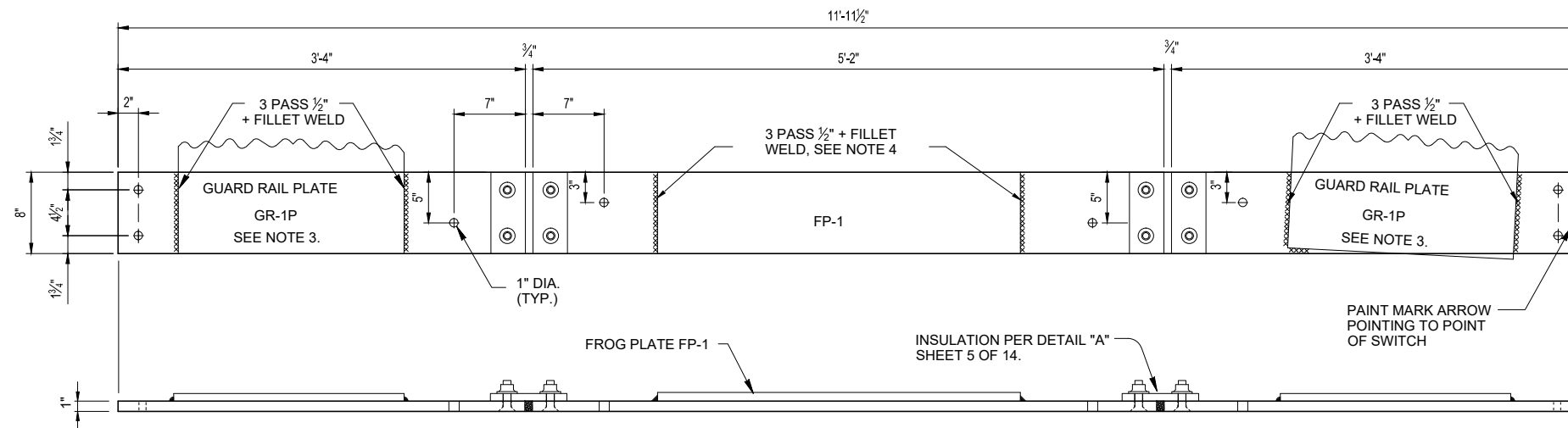
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ENGINEERING STANDARD DRAWINGS
 NO. 10 STANDARD TURNOUT - GAGE PLATES

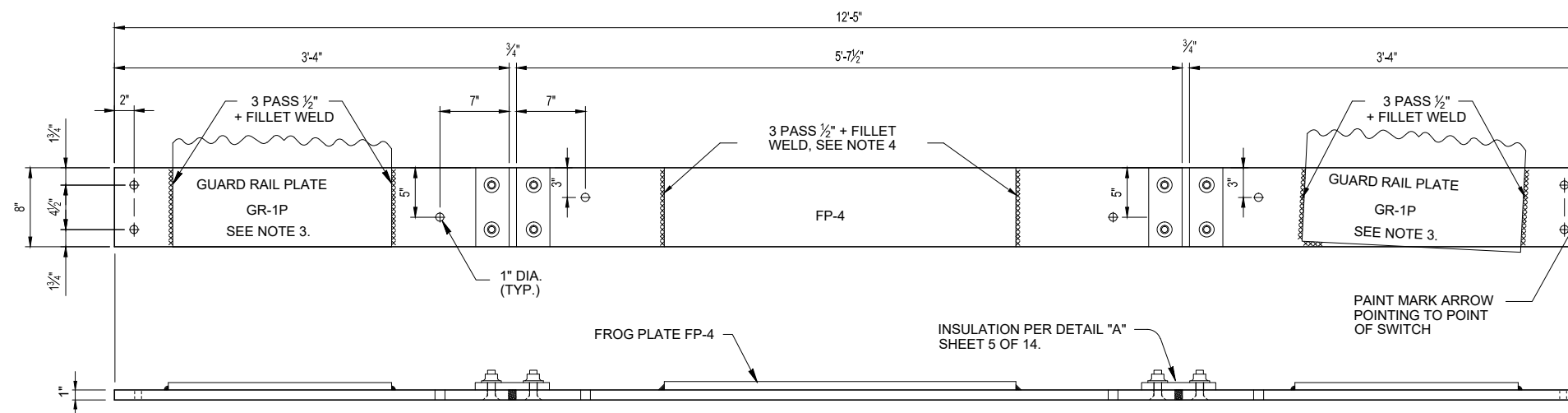
DRAWING NO.	ESD-2921-05
DRAWING SHEET NO.	5 OF 15
SCALE:	NONE
CONTRACT SHEET NO.	

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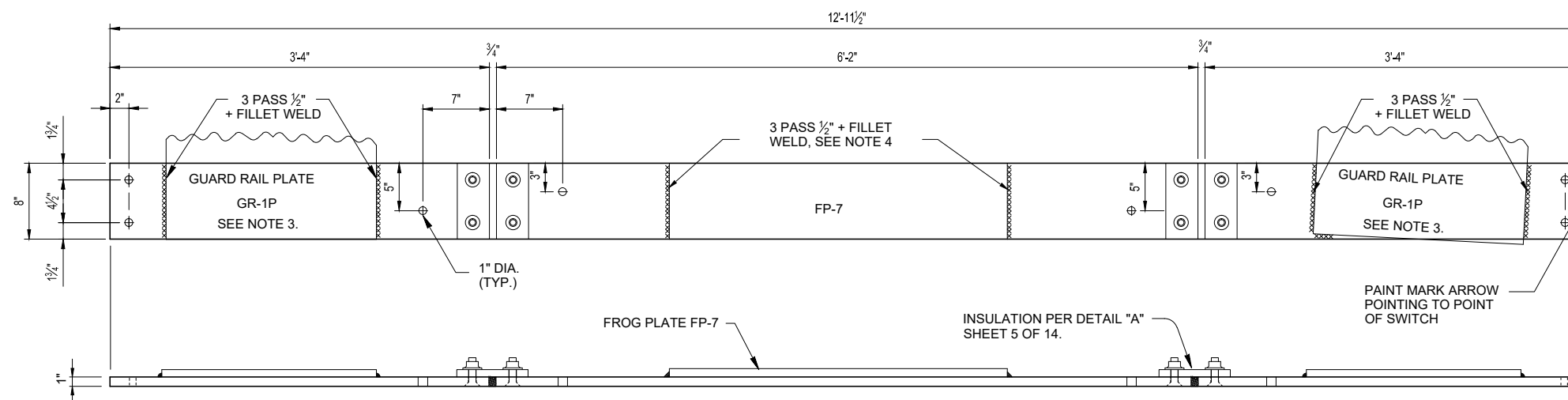
1. PLATES TO BE MADE OF MILD ROLLED STEEL.
2. THE PLATES AS SHOWN ARE FOR A 136 LB., NO. 10, RIGHT HAND, HAND OPERATED TURNOUT. FOR A LEFT HAND TURNOUT, PLATES ARE TO BE OPPOSITE.
3. GUARD RAIL PLATES ARE TO BE INSTALLED AND WELDED TO THE FROG GAGE PLATES IN THE FIELD WITH A 3 PASS 1/2" FILLET WELD CONTINUOUS ON BOTH ENDS OF THE PLATE. PLATES ARE TO BE WELDED ONLY AFTER THE GAGE PLATE AND THE FROG ARE SECURED IN THE PROPER LOCATION ON THE TIE WITH PROPER ALIGNMENT.
4. FROG BASE PLATES FP-1, FP-4 AND FP-7 ARE TO BE WELDED TO THE FROG GAGE PLATES IN THE FIELD WITH A 3 PASS 1/2" FILLET WELD CONTINUOUS ON BOTH ENDS OF THE PLATE. PLATES ARE TO BE WELDED ONLY AFTER THE GAGE PLATE AND THE FROG IS SECURED IN THE PROPER LOCATION ON THE TIE WITH PROPER ALIGNMENT.



INSULATED FROG GAGE PLATE - FG-1P
3/4" x 8" - FLAT - W/ INSULATION (1 PC. REQ'D AS SHOWN)



INSULATED FROG GAGE PLATE - FG-2P
3/4" x 8" - FLAT - W/ INSULATION (1 PC. REQ'D AS SHOWN)



INSULATED FROG GAGE PLATE - FG-3P
3/4" x 8" - FLAT - W/ INSULATION (1 PC. REQ'D AS SHOWN)

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REFERENCE DRAWINGS

LAYOUT - NO.10, R.H. TURNOUT - 136 LB. ----- SHEET ESD-2812-02

REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN RAILPROS
CHECKED B. SMITH <i>BSM</i>
RECOMMENDED W. PREY <i>WP</i>
DATE 5/27/15

DESIGNER PE STAMP

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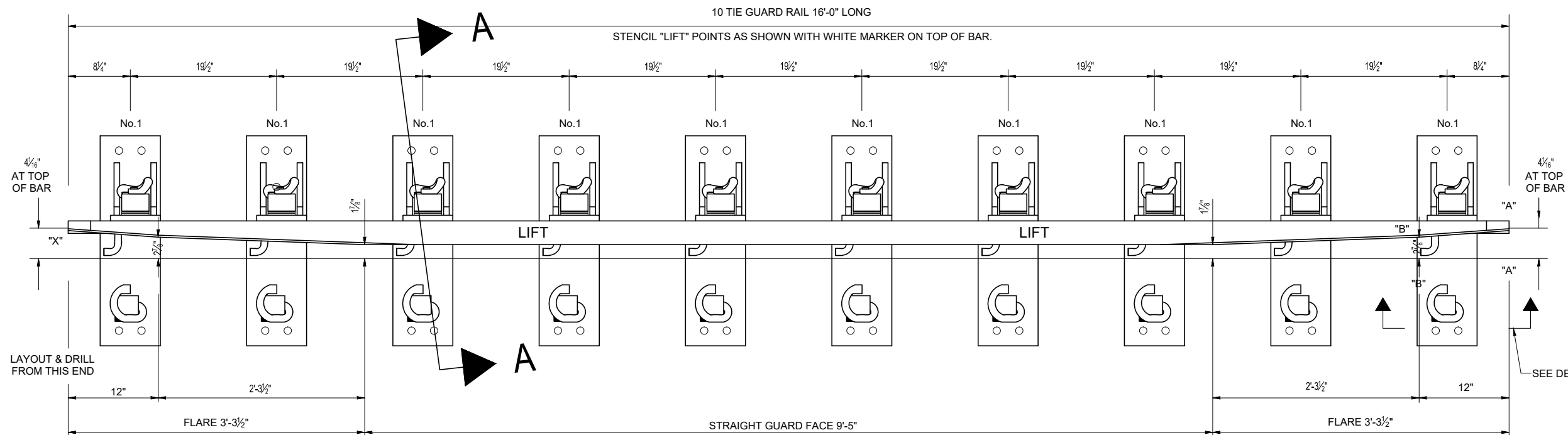
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ENGINEERING STANDARD DRAWINGS

NO. 10 STANDARD TURNOUT - FROG GAGE PLATES

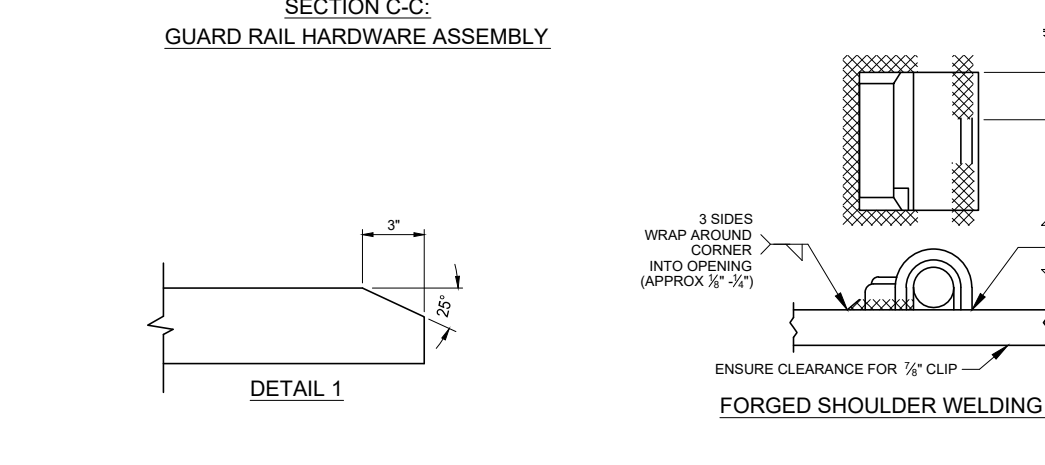
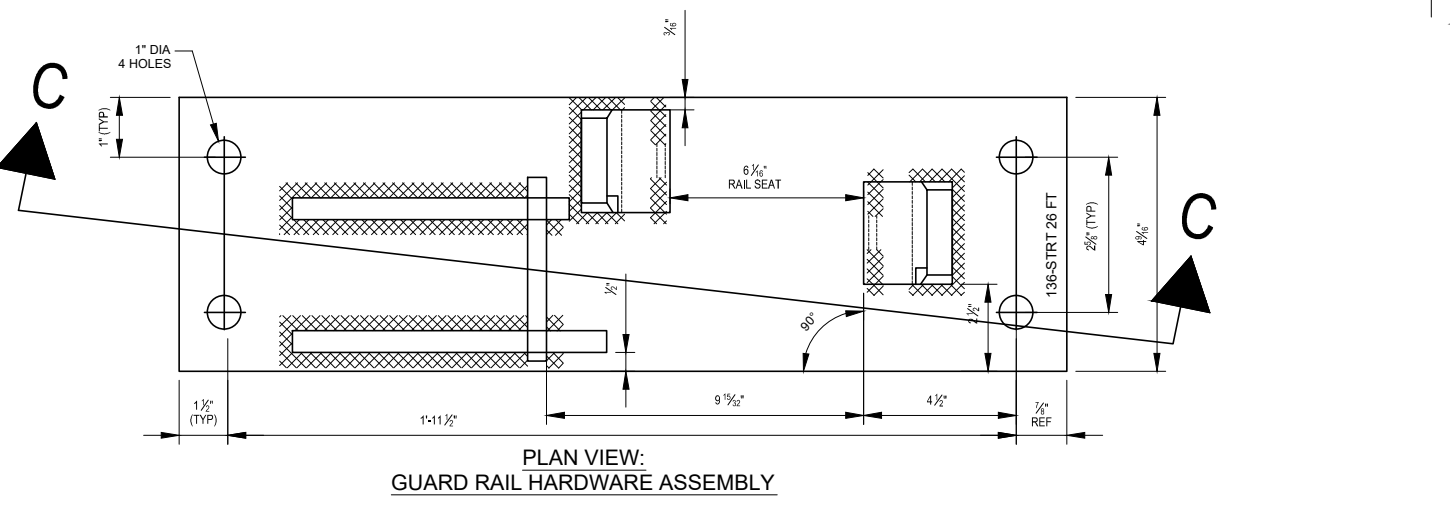
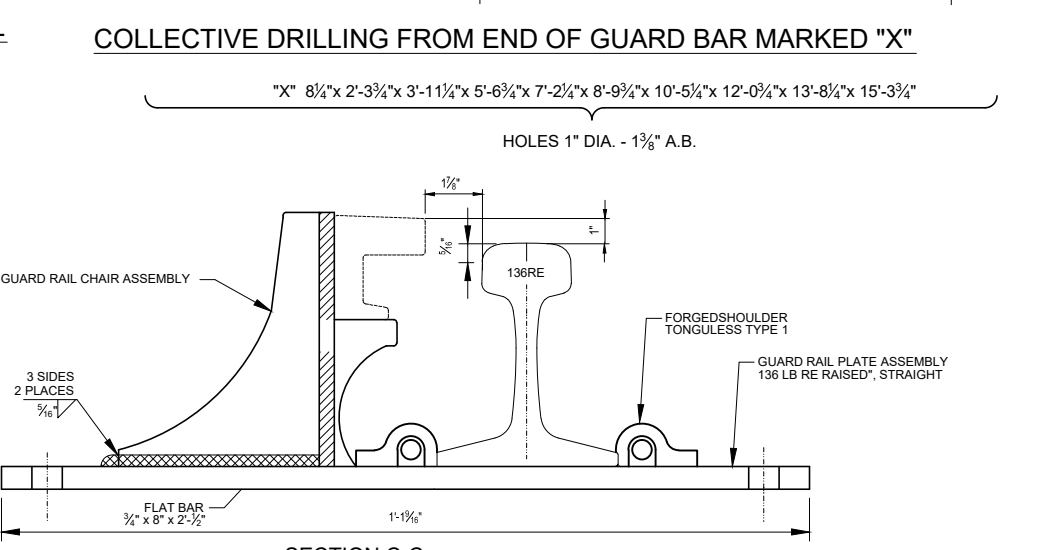
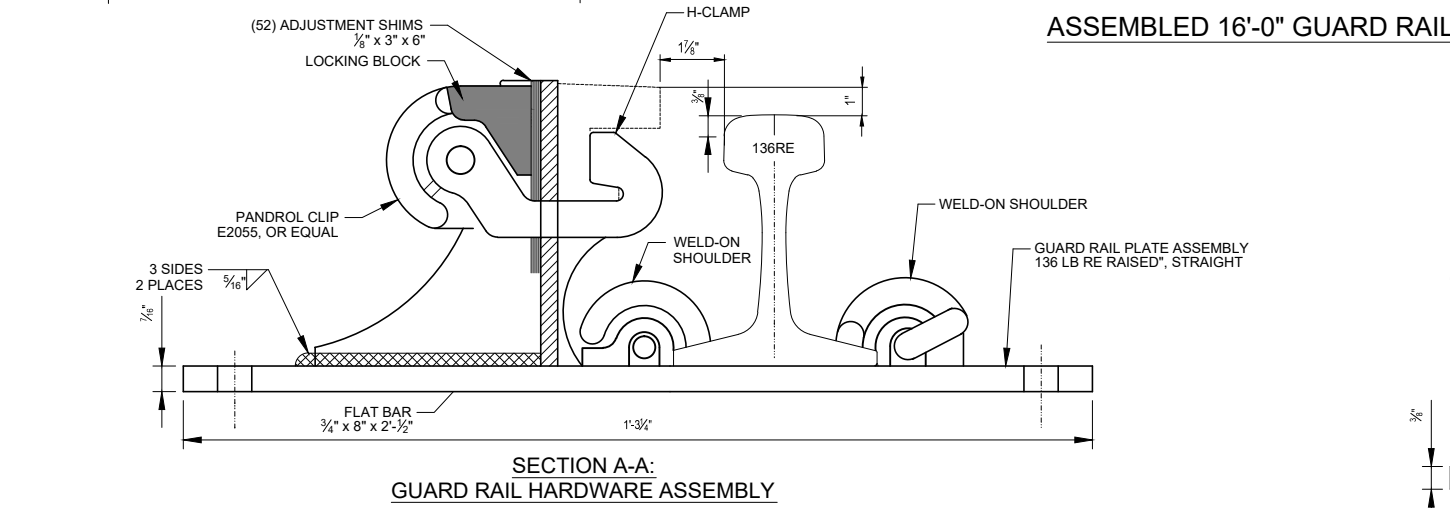
DRAWING NO. ESD-2921-06
DRAWING SHEET NO. 6 OF 15
SCALE: NONE
CONTRACT SHEET NO.



BILL OF MATERIAL	
QTY	DESCRIPTION
1	GUARD BAR, UIC33 1200 SERIES x 26" -0" LONG
10	GUARD RAIL PLATE ASSEMBLY, 136 LB RE RAISED 1", STRAIGHT
10	H-CLAMP
30	CLIP, PANDROL E2055 OR EQUAL
10	LOCKING BLOCK
40	SHIM, 1/2" x 3" x 6"


- NOTES:**
- GUARD RAIL SECTION U.I.C. 33 1200 SERIES (U69) UIC 860.0 GRADE 90A (GUARD FACE BRINELL 319 MIN.)
 - BASE PLATE, BRACKET AND SHIMS MILD STEEL PER A.R.E.M.A. SPECIFICATION M7.
 - PANDROL H-CLAMP OR APPROVED EQUAL.
 - WORKMANSHIP AND TOLERANCES PER A.R.E.M.A. SPECIFICATIONS FOR SPECIAL TRACKWORK.
 - WELDING PER ANSI -AWS D1.1-92 OR LATEST REVISION.
 - PLATE SPACING IS SET FOR SHIPPING ONLY. FINAL PLATE SPACING IS TO BE DETERMINED BY THE SPACING AT TIME OF INSTALLATION.
 - PANDROL SPRING CLIPS TO BE INCLUDED IN ASSEMBLY.
 - LIFT POINTS AND WEIGHT OF ASSEMBLY TO BE MARKED ON HEAD OF WEAR BAR WITH WHITE PAINT.
 - PLATE IS TO BE STAMPED WITH PLATE I.D. WITH 1/2" HIGH CHARACTERS AS SHOWN.
 - GRIND AWAY CORNER OF PANDROL SHOULDER TO CLEAR FOOT OF CHAIR ASSEMBLY.

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REV.	DATE	DESCRIPTION	DES.	ENG.

REVISIONS	DRAWN RAILPROS
CHECKED B. SMITH	RECOMMENDED B. SCHMITH
DATE 4/25/17	DESIGNER PE STAMP



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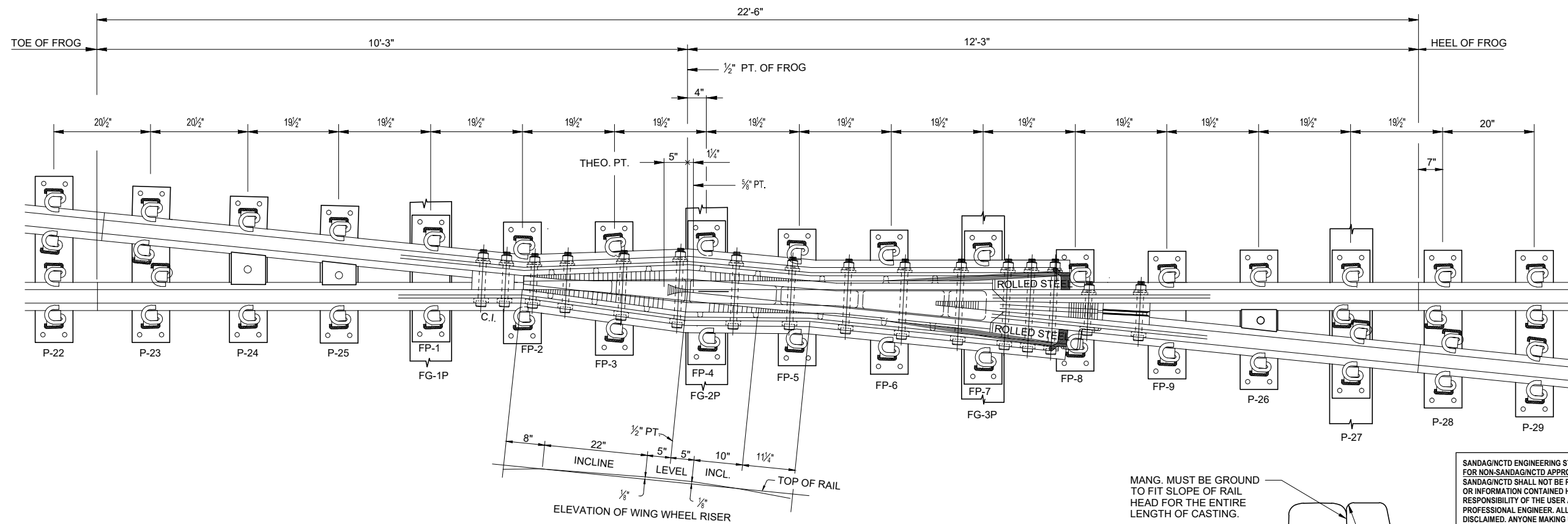
ENGINEERING STANDARD DRAWINGS

NO. 10 STANDARD TURNOUT -
16'-6" GUARD RAIL

DRAWING NO. ESD-2921-07
DRAWING SHEET NO. 7 OF 15
SCALE: NONE
CONTRACT SHEET NO.

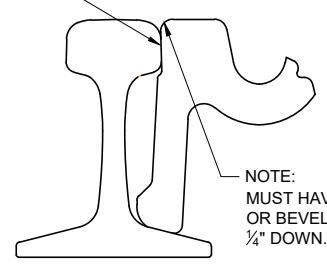
NOTES:

1. FROG ANGLE 5°-43'-29".
2. RAIL USED IN FABRICATION OF FROG TO BE 136 LB. "HIGH STRENGTH".
3. RAILBOUND MANGANESE STEEL FROG PER CURRENT A.R.E.M.A. PLAN NUMBERS 621 AND 623 WITH EXPLOSIVE HARDENED MANGANESE HIGH INTEGRITY CASTING PER CURRENT A.R.E.M.A. SPECIFICATIONS AND MODIFIED FOR ARM LENGTHS AND PLATES WITH PANDROL TYPE FASTENERS.
4. ALL FROG PLATES SHALL BE STAMPED IN 1/2" CHARACTERS TO INDICATE MANUFACTURER, FROG NUMBER, HAND OF TURNOUT, RAIL SECTION AND PLATE NUMBER. MARK TO BE STAMPED ON SAME END OF ALL FROG PLATES.
5. FOR DETAILS OF FROG PLATES SEE ESD-2921-09.
6. WORKMANSHIP AND MATERIALS SHALL BE PER CURRENT A.R.E.M.A. SPECIFICATIONS FOR "SPECIAL TRACKWORK", EXCEPT AS OTHERWISE SPECIFIED.
7. ANY CONSTRUCTION DETAILS NOT SHOWN SHALL BE IN ACCORDANCE WITH CURRENT A.R.E.M.A. RECOMMENDED PRACTICE.
8. FROG PLATES ARE DESIGNED TO BE INSTALLED PERPENDICULAR TO MAIN TRACK.
9. BODY BOLTS TO BE 1 3/8" DIA. H.T.C.S. PER A.R.E.M.A. SPECIFICATIONS.
10. TOE AND HEEL BLOCKS AND BOLTS PER A.R.E.M.A. SPECIFICATIONS.
11. RAIL ENDS TO BE CUT AT 45 DEGREE ANGLE AT JOINT WITH FROG CASTING.



NO. 10 RAILBOUND MANGANESE STEEL FROG
ANGLE 5° 43' 29"

MANG. MUST BE GROUND TO FIT SLOPE OF RAIL HEAD FOR THE ENTIRE LENGTH OF CASTING.



DETAIL OF FROG CASTING / RAIL FIT

SCALE: NONE

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REV.	DATE	DESCRIPTION	DES.	ENG.

REVISIONS	DRAWN RAILPROS
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	RECOMMENDED W. PREY
	DATE 5/27/15
	DESIGNER PE STAMP

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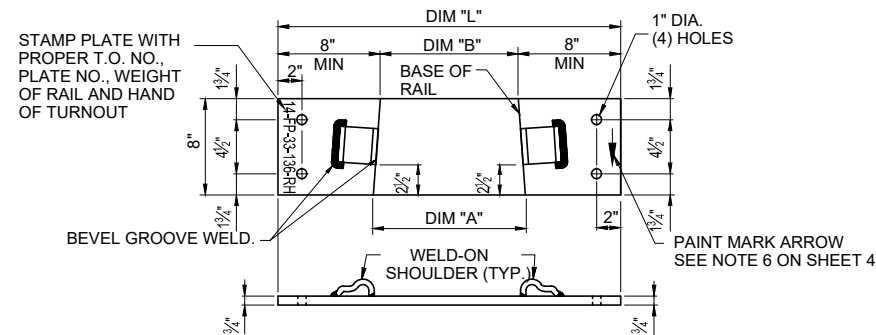
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ENGINEERING STANDARD DRAWINGS

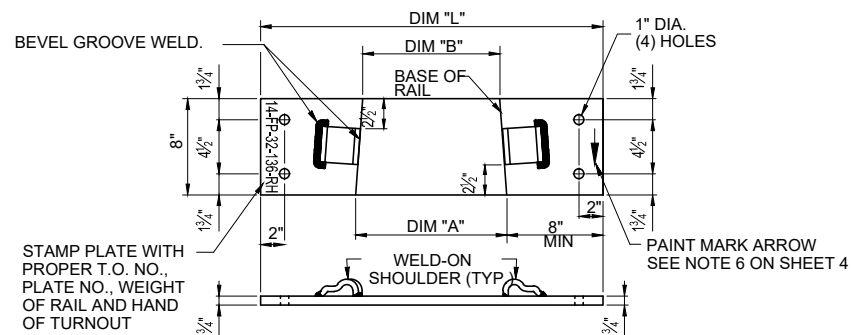
NO. 10 STANDARD TURNOUT -
RAILBOUND MANGANESE STEEL FROG

DRAWING NO.	ESD-2921-08
DRAWING SHEET NO.	8 OF 15
SCALE:	NONE
CONTRACT SHEET NO.	



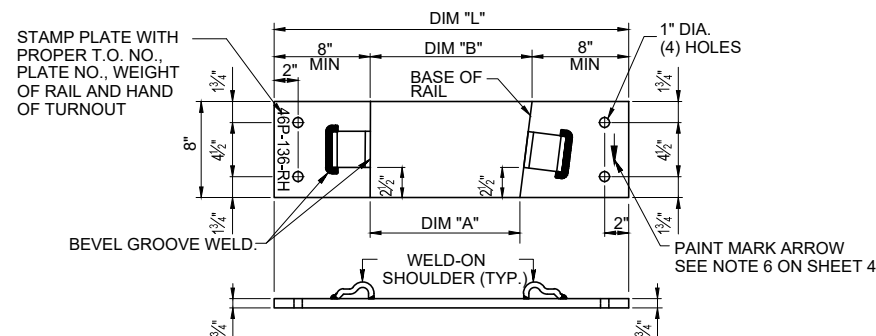
FROG PLATE - FP-1

3/4" x 8" x DIM "L" - FLAT - W/PANDROL CLIPS



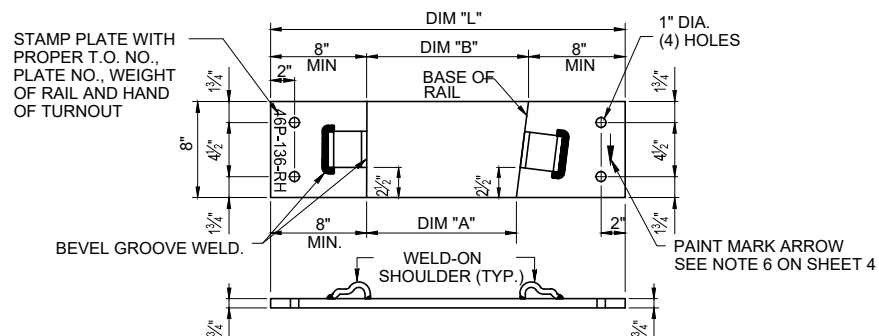
FROG PLATE - FP-4

3/4" x 8" x DIM "L" - FLAT - W/PANDROL CLIPS



FROG PLATE - FP-2 & FP-3

3/4" x 8" x DIM "L" - FLAT - W/PANDROL CLIPS



FROG PLATE - FP-5 THRU FP-9

3/4" x 8" x DIM "L" - FLAT - W/PANDROL CLIPS

NOTE:

- FOR FROG DETAILS AND NOTES SEE SHEET 8.
- THE WELD - ON PRESSED STEEL SHOULDER, MADE FROM MILD STEEL, TO BE PURCHASED FROM PANDROL INTERNATIONAL OR APPROVED ALTERNATE MEETING PANDROL'S DESIGN SPECIFICATIONS.
- PLATES FP-1 THRU FP-9 ARE TO BE LAID OUT AND PROPERLY SPACED AND MARKED OFF FROM UNDER FROG TO INSURE LOCATION OF PANDROL SHOULDERS OR APPROVED EQUAL
- SPECIAL FROG PLATES FP-1, FP-4 AND FP-7 ARE DESIGNED TO BE WELDED TO FROG GAGE PLATES. FOR MANUFACTURING DETAILS AND INSTALLATION PROCEDURES SEE DWG. ESD-2812-06
- SEE SHEET 4 FOR WELDING SPECIFICATIONS

DIMENSION TABLE


PLATE	DIM "A"	DIM "B"	DIM "L"	PITS REQ'D.
FP-1	SEE NOTE 3		2'-6 1/2"	1 EA.
FP-2	SEE NOTE 3		2'-4 1/2"	1 EA.
FP-3	SEE NOTE 3		2'-8"	1 EA.
FP-4	SEE NOTE 3		2'-9 1/2"	1 EA.
FP-5	SEE NOTE 3		2'-8"	1 EA.
FP-6	SEE NOTE 3		2'-10"	1 EA.
FP-7	SEE NOTE 3		3'-0"	1 EA.
FP-8	SEE NOTE 3		2'-4 1/2"	1 EA.
FP-9	SEE NOTE 3		2'-6 1/2"	1 EA.

NOTE: DIMENSIONS FOR LOCATION OF PRESSED STEEL SHOULDERS TO BE VERIFIED USING FINISHED FROG AS A TEMPLATE BEFORE WELDING SHOULDERS IN PLACE.

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REV.	DATE	DESCRIPTION	DES.	ENG.

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DESIGNER PE STAMP	

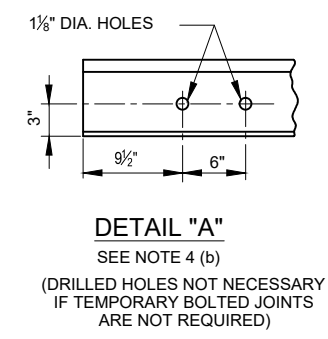
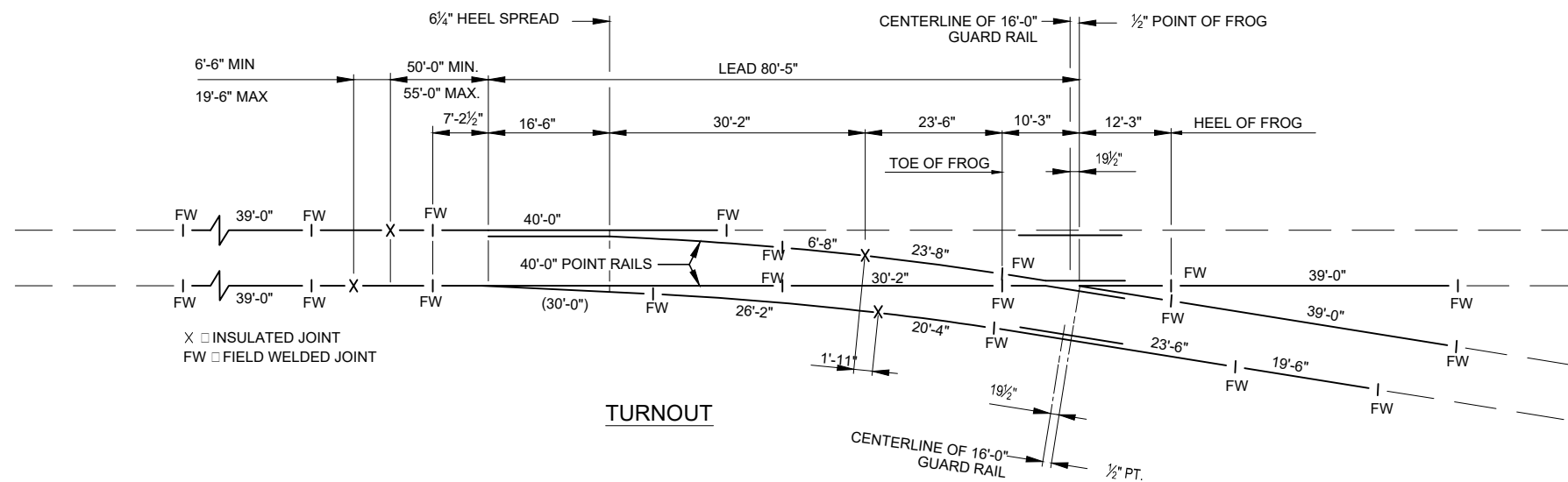


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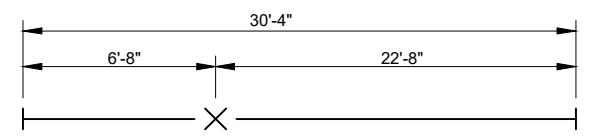
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<p>ENGINEERING STANDARD DRAWINGS</p> <p>NO. 10 STANDARD TURNOUT - FROG PLATES</p>	<p>DRAWING NO. ESD-2921-09</p> <p>DRAWING SHEET NO. 9 OF 15</p> <p>SCALE: NONE</p> <p>CONTRACT SHEET NO.</p>
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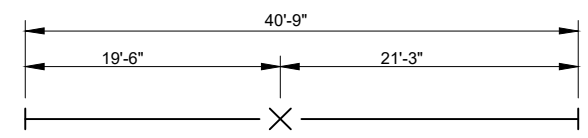


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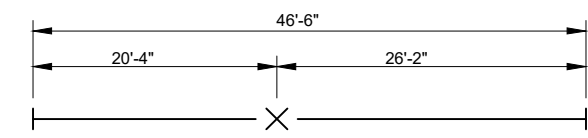
1. THE PERMISSIBLE VARIATION IN STANDARD LENGTHS OF RAILS, FROGS AND SWITCH POINTS IS GREATER THAN THE NORMAL EXPANSION GAPS AT RAIL JOINTS AND THICKNESS OF FIBRE END POST IN INSULATED JOINTS, NO ALLOWANCE HAS BEEN MADE FOR EXPANSION GAPS AND FIBRE END POSTS IN COMPUTING LENGTHS OF RAILS SHOWN. DIMENSIONS OF TURNOUT AND ALL COMPONENTS IS FOR A THERMAL, STRESS - FREE CONDITION OF 105° F. ACTUAL EXACT LENGTHS OF RAILS TO BE INSTALLED IS TO BE FIELD - ADJUSTED TO FIT OVERALL TURNOUT DIMENSIONS, THERMAL ADJUSTMENTS, THICKNESS OF WELDS AND VARIATIONS IN COMPONENT RAIL LENGTH.
2. RAIL LAYOUT SHOWN FOR TURNOUT IS TO BE USED IN ALL CASES, EXCEPT WHERE COMPROMISE JOINTS ARE REQUIRED BETWEEN THE FROGS IN A CROSSOVER TRACK. WHEN COMPROMISE JOINTS ARE TO BE USED TO JOIN DIFFERENT RAIL WEIGHTS, THE INSULATED JOINTS IN THE CROSSOVER TRACK SHALL ALWAYS BE OF THE HEAVIER RAIL SECTION. THE DESCRIPTIONS OF THE CHANGES IN RAIL LAYOUT WHEN COMPROMISE JOINTS ARE REQUIRED IN THE CROSSOVER TRACK ARE BASED ON AN ASSUMPTION THAT TRACK "H" IS LAID WITH HEAVIER RAIL THAN TRACK "L". CROSSOVER ON 15'-0" TRACK CENTERS: AT LOCATION "A" THE 19'-6" RAIL SHALL BE REPLACED WITH 8'-0" OF THE HEAVIER RAIL AND 11'-6" OF THE LIGHTER RAIL. AT LOCATION "B" THE 21'-3" RAIL SHALL BE REPLACED WITH 7'-0" OF THE HEAVIER RAIL AND 14'-3" OF THE LIGHTER RAIL.
3. IN ADDITION TO NOTE 1. NO ALLOWANCE HAS BEEN MADE IN RAIL LENGTHS TO PROVIDE GAPS NEEDED TO MAKE FIELD WELDS. IN THE FIELD IT MAY BE NECESSARY TO CUT RAIL ENDS TO PROVIDE CORRECT GAPS FOR FIELD WELDS.
4. FURNISH ALL RAIL SHOWN IN SOLID LINES ON THIS DRAWING: (A.) RAILS LONGER THAN 39'-0" SHALL BE CONTINUOUS WELDED RAIL (CWR), TO BE FURNISHED WITH BOTH ENDS LEFT BLANK FOR WELDING IN THE FIELD. (B.) ALL OTHER RAILS SHALL BE 39'-0" OF SHORTER AS SPECIFIED ON THE DRAWING, WITH BOTH ENDS DRILLED PER DETAIL "A".
5. ALL RAIL FURNISHED FOR TURNOUT AND CROSSOVERS SHALL BE "HEAD HARDENED" EXCEPT GUARD RAILS.
6. LOCATIONS OF INSULATED JOINTS ARE SHOWN ON TURNOUT AND CROSSOVER DIAGRAMS WITHOUT TOLERANCES, OR IF TOLERANCES ARE PERMISSIBLE, WITH (+ OR -). ALL INSULATED JOINTS ARE TO BE PROPERLY SUSPENDED IN CRIB AREA BETWEEN TWO TIES LOCATED 4" MINIMUM FROM EDGE OF NEAREST TIE TO EDGE OF INSULATED JOINT. INSULATED JOINT MUST BE INSTALLED TO BE CENTERED BETWEEN TWO (2) TIES. FIELD WELDED JOINTS DESIGNATED "FW" SHOULD BE IN CRIB AREA BETWEEN TWO TIES LOCATED 4" MINIMUM FROM EDGE OF NEAREST TIE AND WELDED JOINT. DIMENSIONS SHOWN IN PARENTHESIS (0'-0") ARE EXACT. RAILS FURNISHED FOR THESE LOCATIONS ARE LONGER AND MUST BE FIELD ADJUSTED (CUT) WITHIN TOLERANCES SHOWN IN BRACKETS (0'-0") WHEN INSULATED JOINTS WITH TOLERANCES AND FIELD WELDED JOINTS FALL SHORT OF MINIMUM CLEARANCE FROM TIE OR TIE PLATE THE JOINT MAY BE MOVED WITHIN TOLERANCE LIMITS. BONDED INSULATED JOINT ASSEMBLIES AND STOCK RAILS ARE FURNISHED LONGER THAN SHOWN IN PARENTHESIS ON LAYOUT. THESE OR THEIR ADJACENT CONNECTING RAILS MUST BE TRIMMED IN THE FIELD TO FIT.
7. INSULATED JOINTS SHALL BE SQUARE SAWCUT.



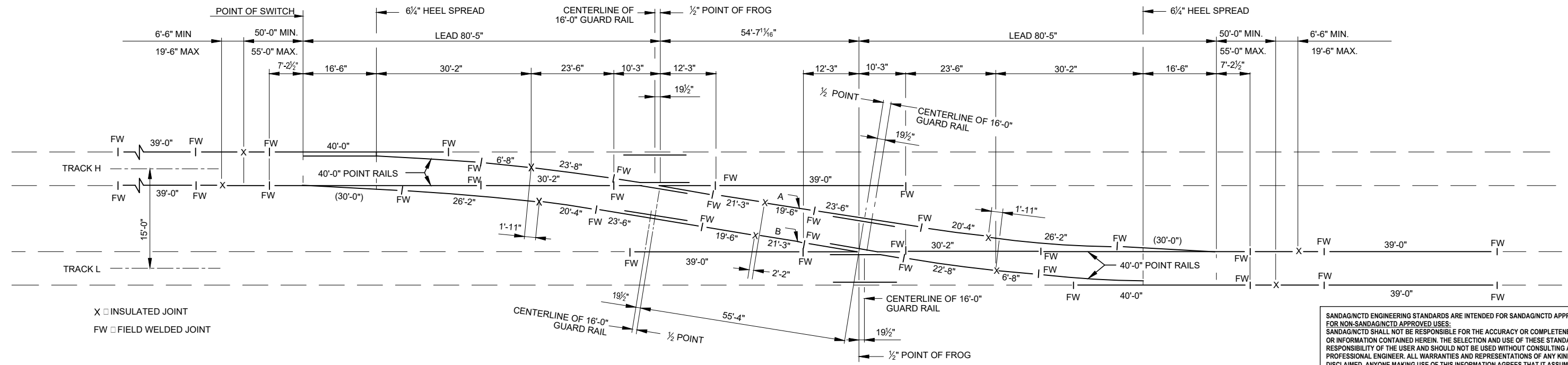
30'-4" LONG ADHESIVE BONDED PREFABRICATED INSULATED RAIL JOINT ASSEMBLY
(SEE NOTE 6) BOTH ENDS SHALL BE LEFT BLANK FOR WELDING IN THE FIELD



40'-9" LONG ADHESIVE BONDED PREFABRICATED INSULATED RAIL JOINT ASSEMBLY
(SEE NOTE 6) BOTH ENDS SHALL BE LEFT BLANK FOR WELDING IN THE FIELD



46'-6" LONG ADHESIVE BONDED PREFABRICATED INSULATED RAIL JOINT ASSEMBLY
(SEE NOTE 6) BOTH ENDS SHALL BE LEFT BLANK FOR WELDING IN THE FIELD



CROSSOVER
15'-0" TRACK CENTERS

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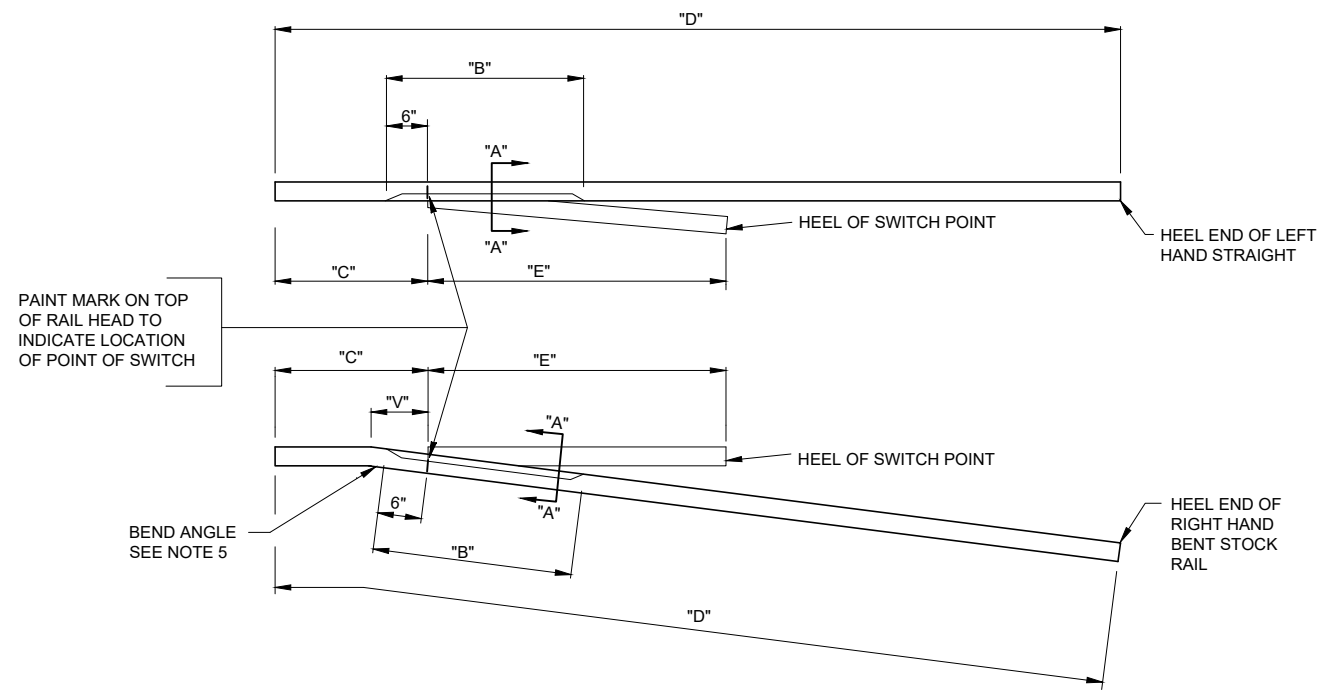
REVISIONS	DRAWN RAILPROS
CHECKED B. SMITH	RECOMMENDED W. PREY
DATE 5/27/15	DESIGNER PE STAMP

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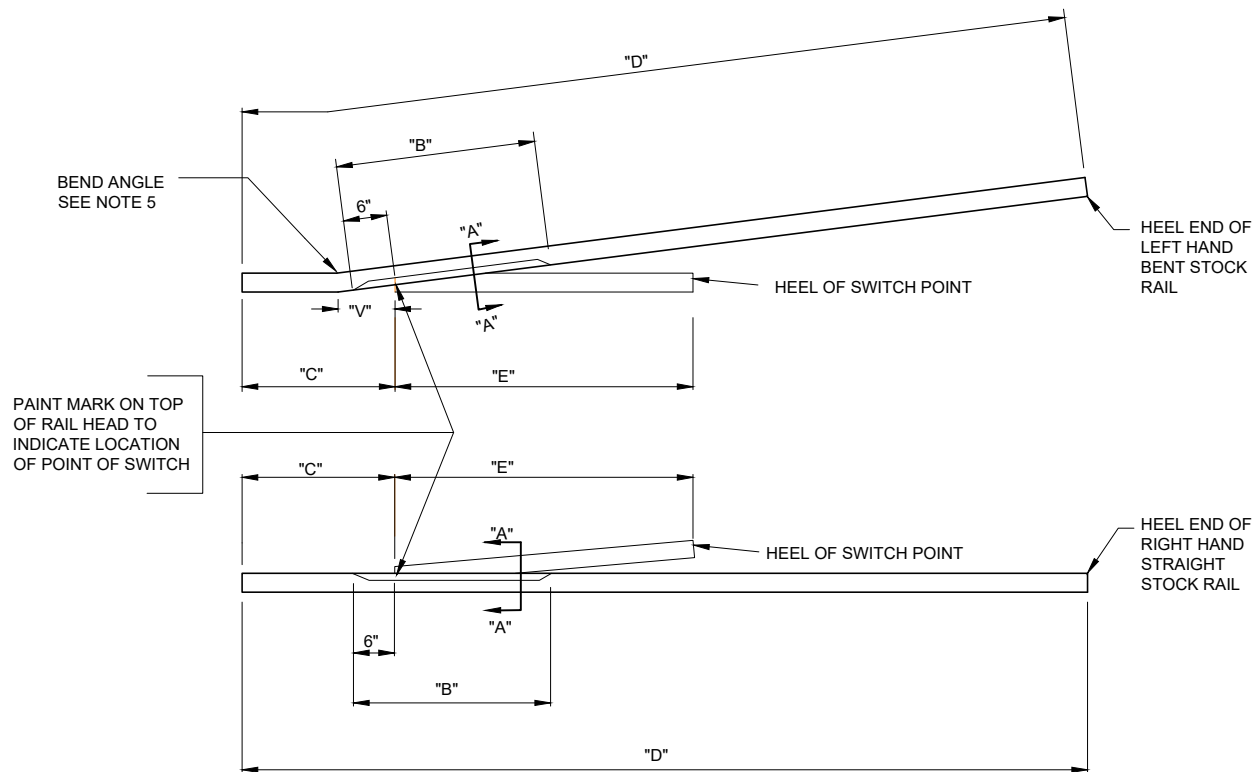
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ENGINEERING STANDARD DRAWINGS
NO. 10 STANDARD TURNOUT AND CROSSOVER - INSULATED JOINT DIAGRAM

DRAWING NO. ESD-2921-10
DRAWING SHEET NO. 10 OF 15
SCALE: NONE
CONTRACT SHEET NO.



STOCK RAILS SHOWN ARE FOR "RIGHT HAND TURNOUT"



STOCK RAILS SHOWN ARE FOR "LEFT HAND TURNOUT"

NOTES:

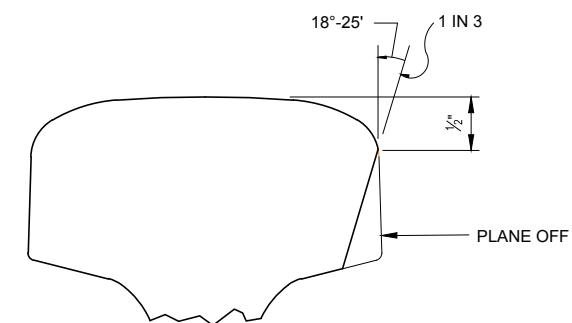
1. INFORMATION OR DIMENSIONS NOTED THUS, "E" TO BE FURNISHED BY FIELD FORCES FOR CORRECT ORDERING OF REPLACEMENT STOCK RAILS.
2. "E" □ LENGTH OF SWITCH POINT.
3. UNDERCUT STOCK RAILS TO BE MADE OF HIGH STRENGTH RAIL WITH ENDS BEVELED PER CURRENT A.R.E.M.A. PLAN NO. 1005.
4. FOR STOCK RAIL UNDERCUT LENGTH "B", PER SECTION "A-A", LENGTH "C" AND LENGTH "D" FOR NEW SAMSON SWITCH INSTALLATIONS OR REPLACEMENT ORDERS SEE TABLE BELOW

LENGTHS B, C, & D FOR 136 LB. RAIL									
SW. PT. LENGTH	T.O. NO.	STOCK RAIL	B	FOR FIRST (NEW) INSTALL.			FOR REPLACE. ORDERS ONLY		
				C	D	END DRILL. SEE NO. 10	C	D	END DRILL. SEE NO. 10
16'-6"	10	STR.	9'-6"	10'-0"	40'-0"	NONE	10'-0"	52'-0"	NONE
16'-6"	10	BENT	9'-6"	10'-0"	40'-0"	HEEL END ONLY	10'-0"	52'-0"	HEEL END ONLY

5. BEND ANGLE IN BENT STOCK RAIL TO BE AS FOLLOWS:

SW. LENGTH	BEND ANGLE	V (VERTEX DIST.)
16'-6"	1°-44'-11" OR 1" IN 2'-9"	10 ⁵ / ₁₆ "

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SECTION "A-A"

REV.	DATE	DESCRIPTION	DES.	ENG.

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	RECOMMENDED W. PREY <i>WP</i>
	DATE 5/27/15
	DESIGNER PE STAMP

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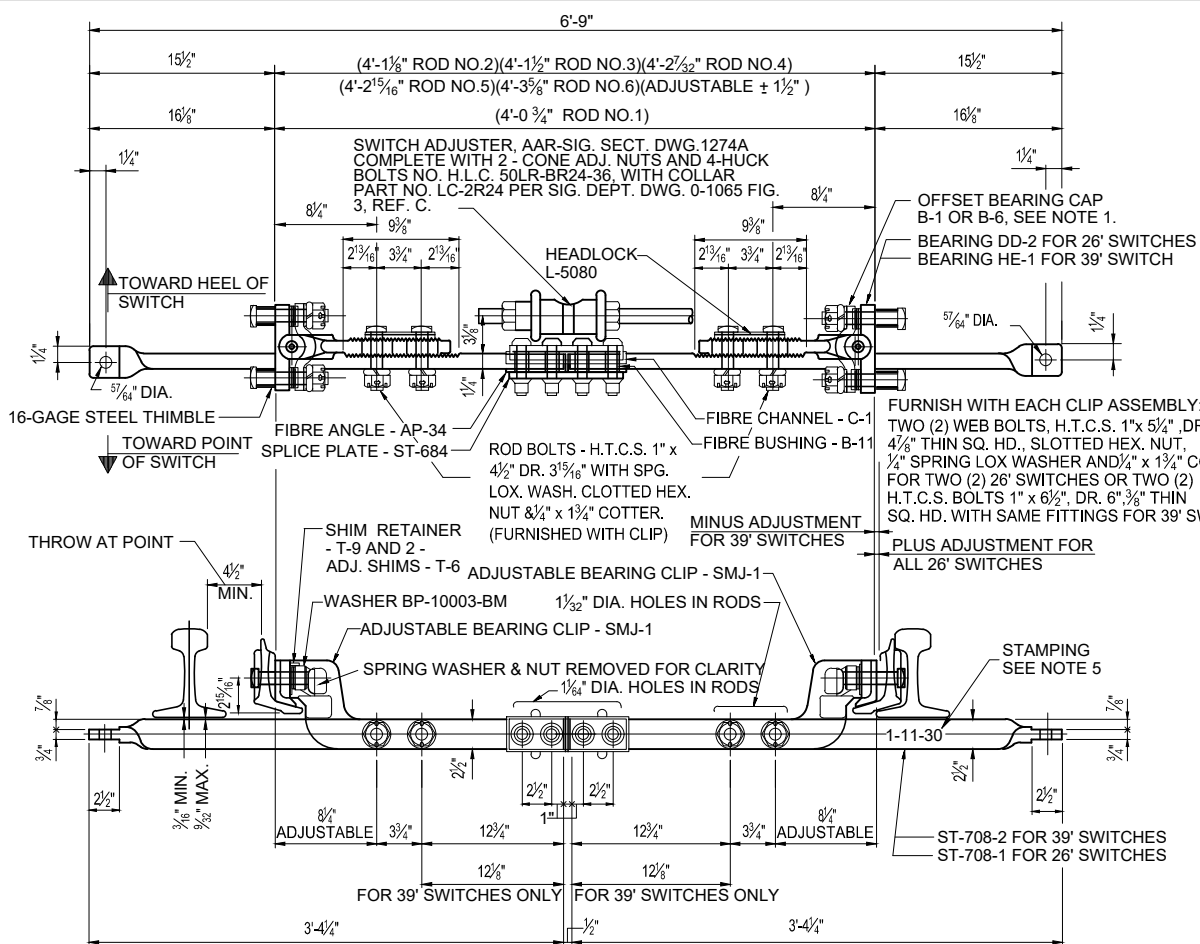
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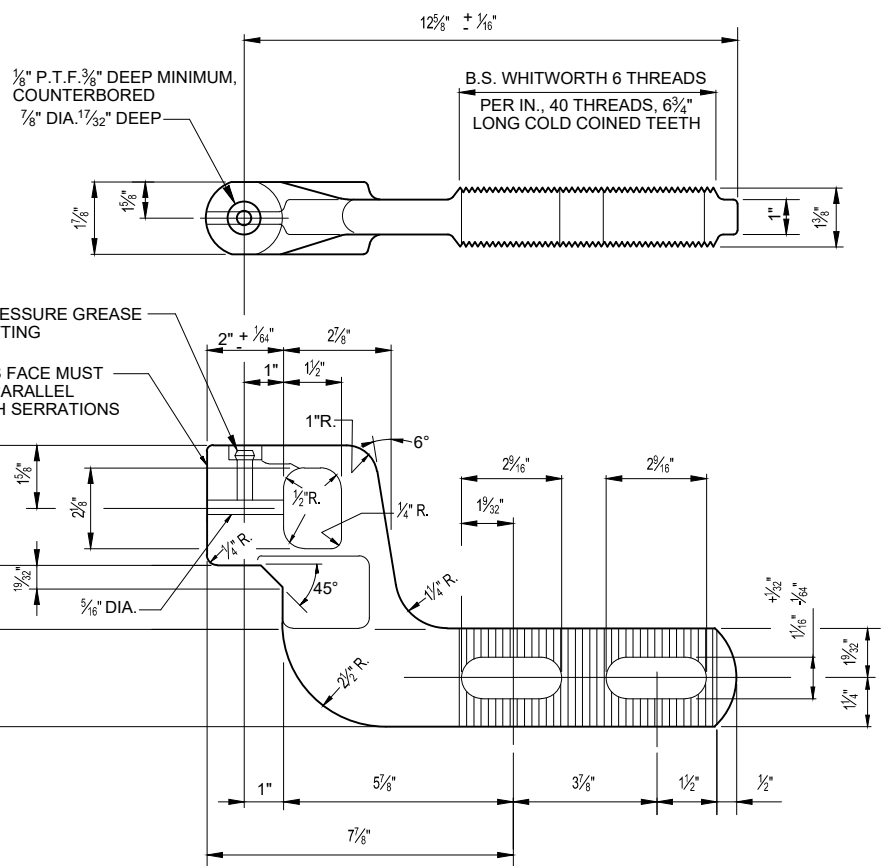
ENGINEERING STANDARD DRAWINGS

NO. 10 STANDARD TURNOUT -
UNDERCUT STOCK RAILS FOR 16'-6"
SWITCH POINT

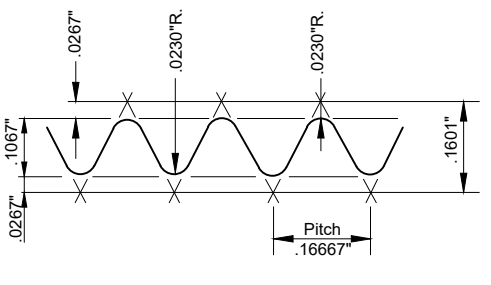
DRAWING NO.	ESD-2921-11
DRAWING SHEET NO.	11 OF 15
SCALE:	NONE
CONTRACT SHEET NO.	



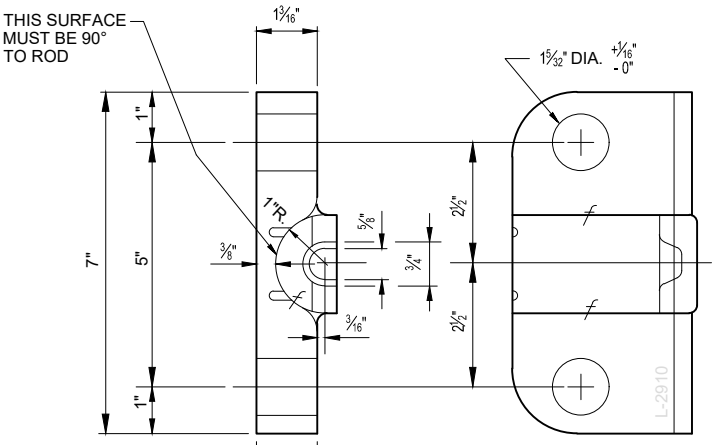
NO. 1 SWITCH ROD ASSEMBLY
(SHOWN FOR MACHINE ON RIGHT) SEE NOTE 2



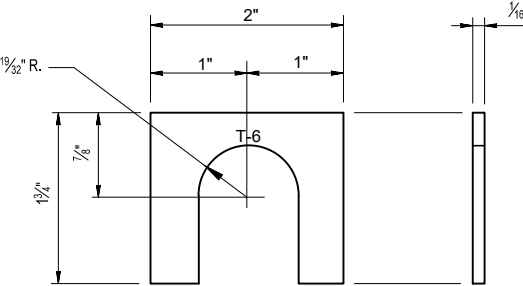
ADJUSTABLE BEARING CLIP - SMJ - 1
SCALE: NONE



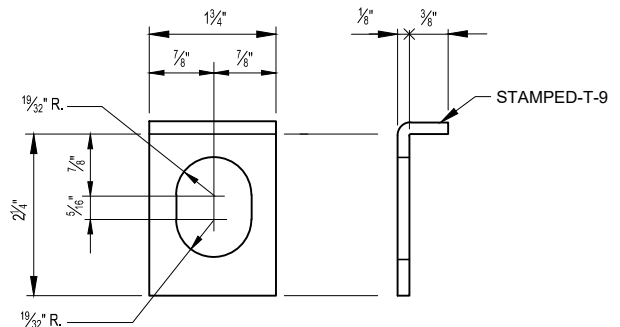
ENLARGED PROFILE OF SERRATIONS
SCALE: NONE



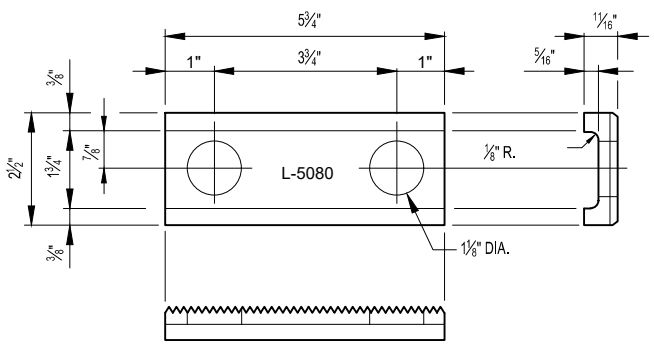
BEARING - DD - 2
SCALE: NONE



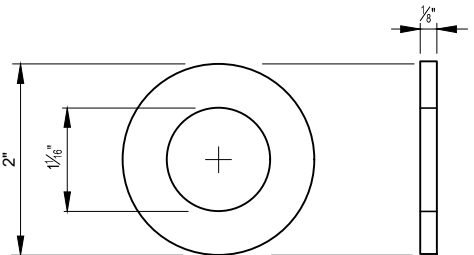
ADJUSTABLE SHIM - T - 6
SCALE: NONE



SHIM RETAINER - T - 9
SCALE: NONE



HEADLOCK L-5080
SCALE: NONE



WASHER - BP - 10003 - BM
SCALE: NONE

LENGTH OF SWITCH	BILL OF MATERIAL FOR 1 TYPE "SMJ" SWITCH ROD ASSEMBLY				
	MATERIAL FOR CLIP ASSEMBLIES				
QTY.	PART NUMBER	MATERIAL SPECIF.	DESCRIPTION	DETAIL REMARKS	
ALL	2	SMJ-1	S.A.E.1020-FOR.STL.	BEARING CLIP	MACHINED PER DETAIL
ALL	4		H.T.C.S.	WEB BOLT	SEE NOTE
26'	2	DD-2	MALLEABLE IRON	BEARING	PAT. NO. L-2910, MACHINED PER DETAIL
39'	2	HE-1	MALLEABLE IRON	BEARING	PAT. NO. L-2915, MACHINED PER DETAIL
26'	2	B-1	S.A.E.1045-FOR.STL.	OFFSET BEARING CAP	HEAT TREATED - BRINELL -.225 TO .250
39'	2	B-6	S.A.E.1045-FOR.STL.	OFFSET BEARING CAP	HEAT TREATED - BRINELL -.225 TO .250
26'	2	B-6	S.A.E.1045-FOR.STL.	OFFSET BEARING CAP	HEAT TREATED - BRINELL -.225 TO .250
ALL	4	T-9	S.A.E.1020	SHIM RETAINER	1/8" X 1 3/4" X 2 1/4"
ALL	12	T-6	STAINLESS STEEL	ADJUSTMENT SHIM	1/16" X 2" X 1 1/2"
ALL	4	BP-10003-BM	MALLEABLE IRON	WASHER	1 1/16" I.D. X 2" O.D. X 1/16" THICK
ALL	4		H.T.C.S.	ROD BOLT	1" X 4 1/2" DR. 3 1/8" REG. SQ. HD. SLOTTED HEX NUT
ALL	4		STEEL	SPG. LOX WASHER	FOR 1" ROD BOLTS
ALL	4		STEEL	COTTER	1/4" X 1 1/4" FOR ROD BOLTS
ALL	2		STEEL	GREASE FITTING	PRESSURE - FOR BEARING CLIP
ALL	2	L-5080	MALLEABLE IRON	HEADLOCK	FOR ROD BOLTS
26'	2		16-GAGE STEEL	THIMBLE	1 1/2" LONG - FOR SHIPPING
39'	2		16-GAGE STEEL	THIMBLE	2 1/2" LONG - FOR SHIPPING
MATERIAL FOR VERTICAL ROD					
16'-6"	1			VERTICAL ROD	USE ONE-ST-708-1 USE ONE-ST-708-1 TWIST, MACHINE AND DRILL END HOLE
39'	1			VERTICAL ROD	USE ONE-ST-708-2 USE ONE-ST-708-2 TWIST, MACHINE AND DRILL END HOLE
ALL	4		HIGH STRENGTH STEEL	CONN. & INSUL. BOLT	HIGH FASTENER NO. HLC-50LR-BR24-36
ALL	4		LOW CARBON STEEL	COLLAR	HUCK FASTENER NO. LC-2R24
ALL	1	ST-684	H.R. MILD STEEL	SPLICE PLATE	1/2" X 2 1/2" X 9 1/2" FOR INSULATION
ALL	2	AP-34	AAR-SIG.SEC.13-52	ANGLE	1/2" X 2 1/2" X 4 1/8" HARD FIBRE - PARAFIN COATED
ALL	4	B-11	AAR-SIG.SEC.13-52	BUSHING	1" O.D. HARD FIBRE - PARAFIN COATED
ALL	1	C-1	AAR-SIG.SEC.13-52	CHANNEL	1/8" X 1" X 10" HARD FIBRE - PARAFIN COATED
ALL	1		MALLEABLE IRON	SWITCH ADJUSTER	
ALL	2		MALLEABLE IRON	CONE ADJ. NUT	FOR 1/4" THROW RODS

NOTES:

- WHILE THIS PLAN SHOWS BEARING CLIPS ASSEMBLED TO SWITCH ROD, THIS CLIP ASSEMBLY MAY BE REQUISITIONED AND ORDERED SEPARATELY. WHEN A BEARING CLIP ASSEMBLY ONLY IS WANTED, REQUISITIONS AND ORDERS SHALL SPECIFY, RAIL SECTION AND LENGTH OF SWITCH. ALL PARTS SHOWN IN BILL OF MATERIAL SHALL BE FURNISHED WITH THESE CLIP ASSEMBLIES. WHEN AN INDIVIDUAL PART IS REQUIRED IT SHALL BE ORDERED BY PART NUMBER.
- WHEN COMPLETED RODS ARE ORDERED THEY SHALL BE ASSEMBLED AND INCLUDE ALL PARTS SHOWN IN BILL OF MATERIAL. REQUISITIONS AND ORDERS SHALL SPECIFY RAIL SECTION AND LENGTH OF SWITCH. ON INTERLOCKED SWITCHES WITH AUXILIARY THROW ROD, MACHINE SIDE (RIGHT OF LEFT) SHOULD ALSO BE SPECIFIED.

NOTES CONTINUED ON SHEET - ESD-2921-14

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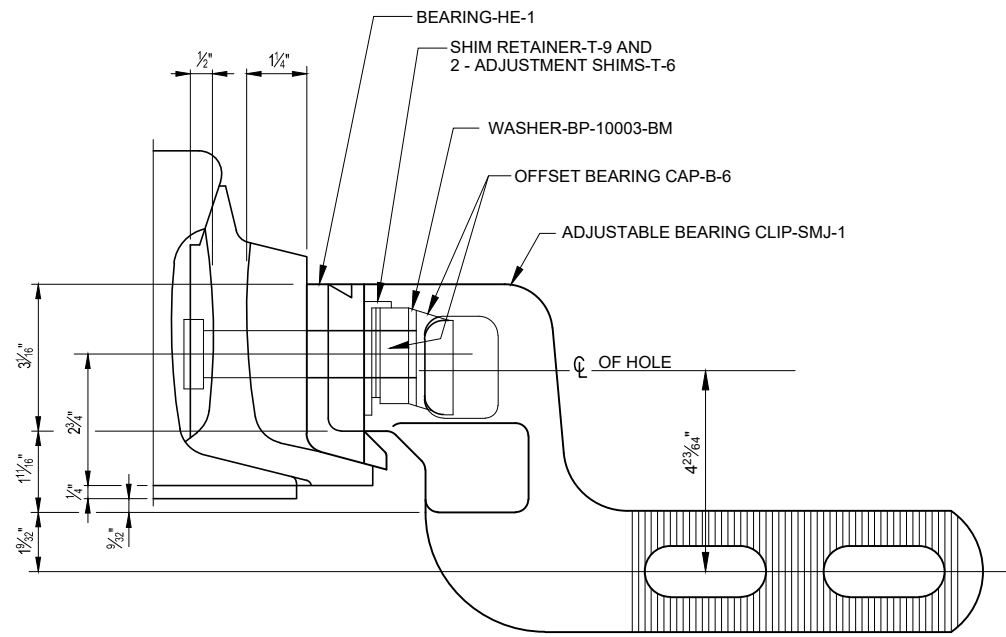
REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN RAILPROS
CHECKED B. SMITH
RECOMMENDED W. PREY
DATE 5/27/15
DESIGNER PE STAMP

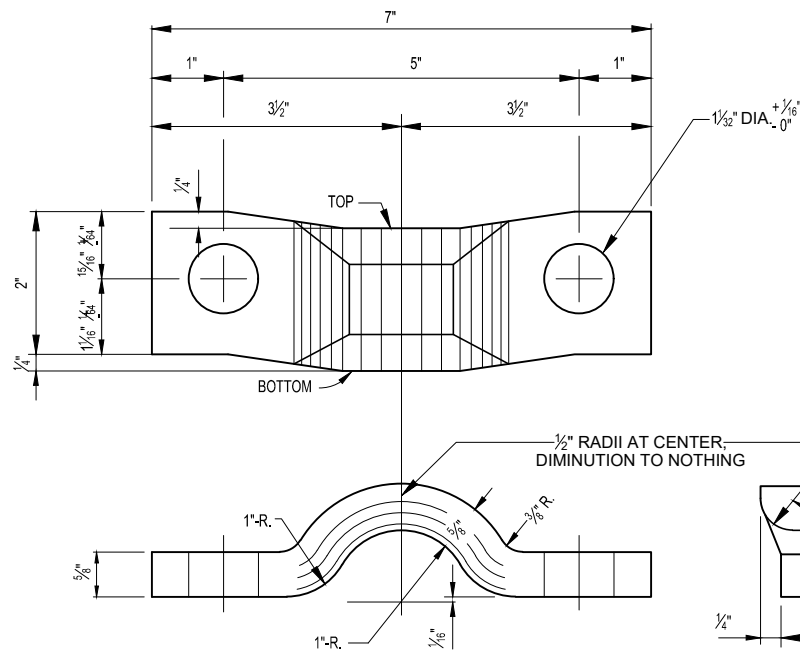
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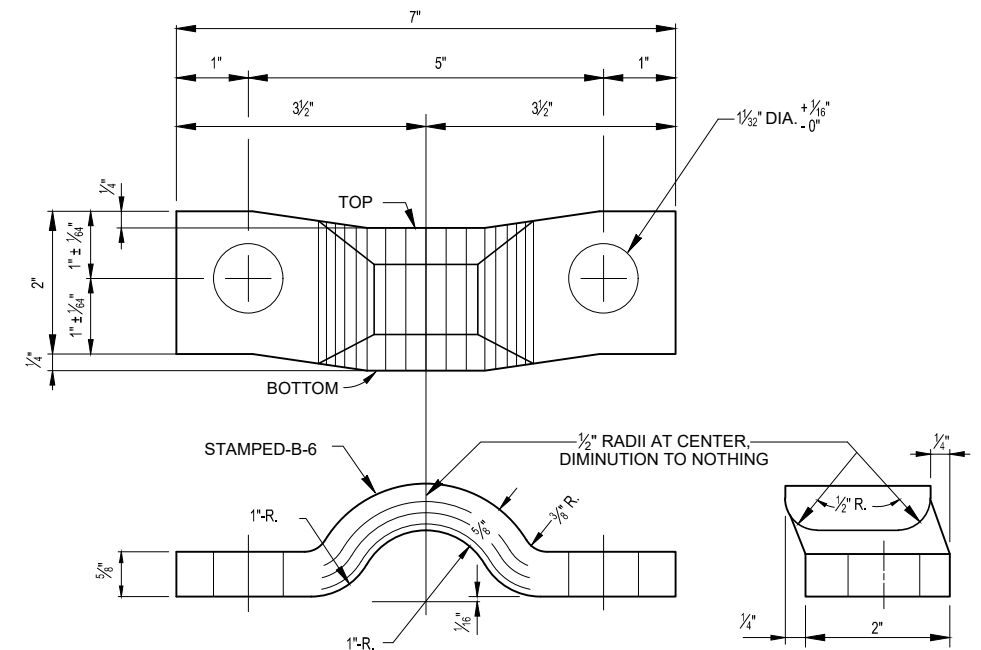
ENGINEERING STANDARD DRAWINGS
DRAWING NO. ESD-2921-13
DRAWING SHEET NO. 13 OF 15
SCALE: NONE
CONTRACT SHEET NO.
NO. 10 STANDARD TURNOUT - SWITCH RODS AND MISC. DETAILS (1 OF 2)



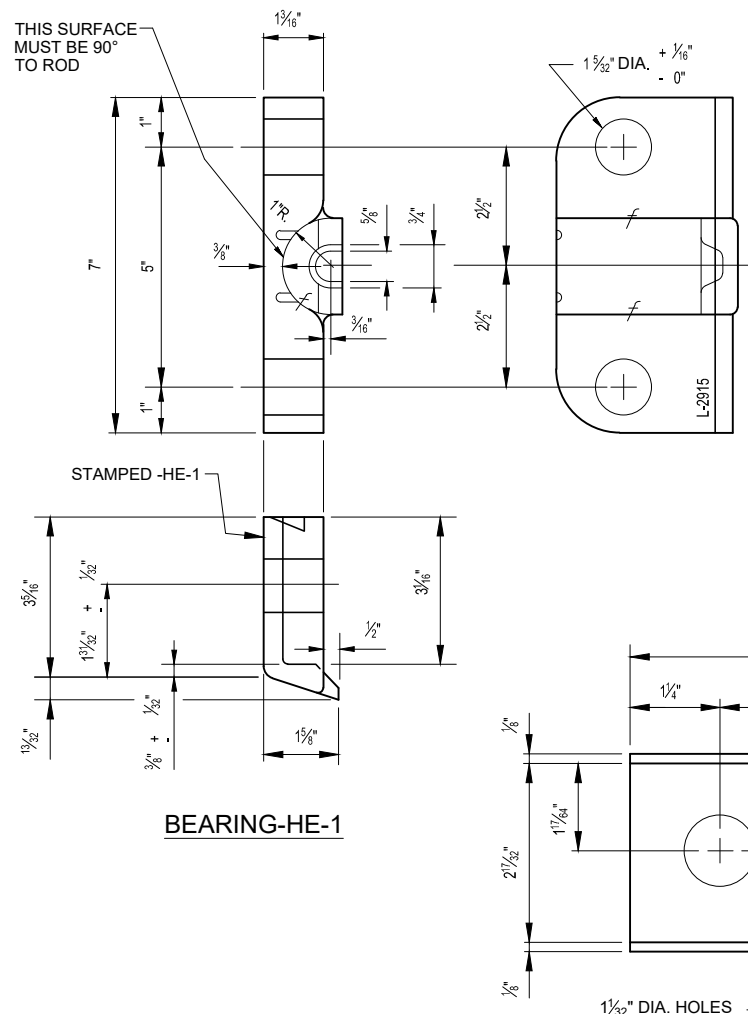
ELEVATION OF "SMJ" CLIP ASSEMBLY FOR 39' SWITCHES
(DRAWN FOR 136 LB. RAIL) SPRING WASHER AND NUT REMOVED



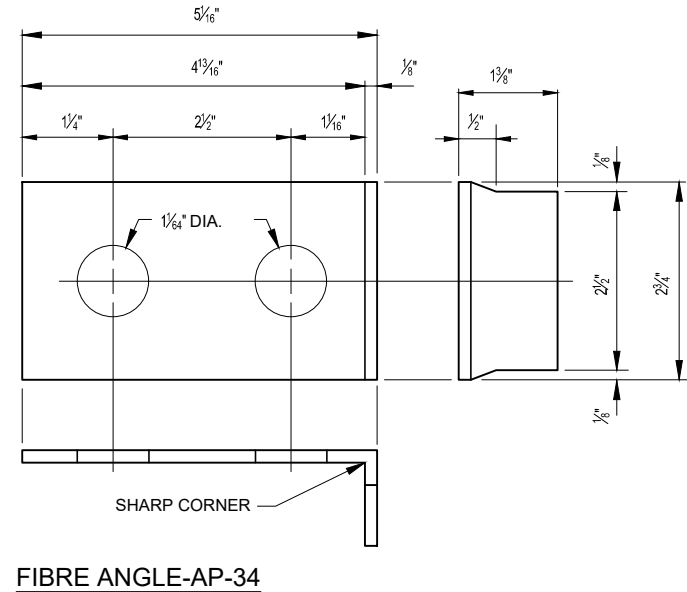
OFFSET BEARING CAP-B-1



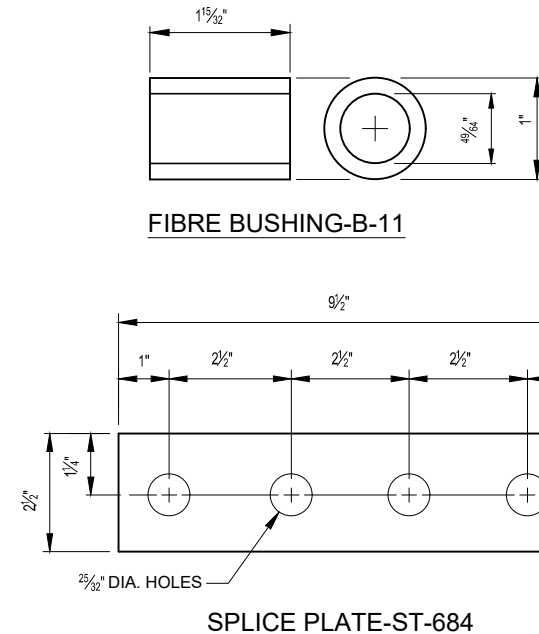
OFFSET BEARING CAP-B-6



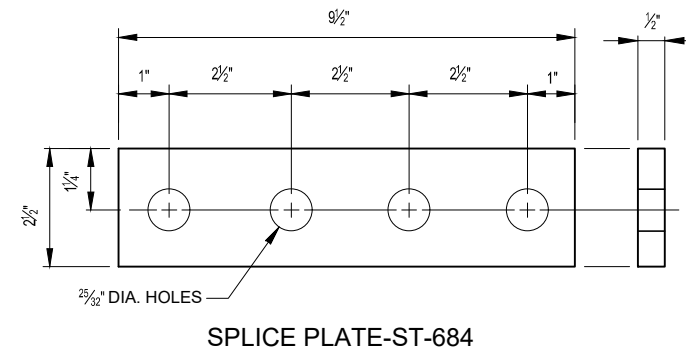
BEARING-HE-1



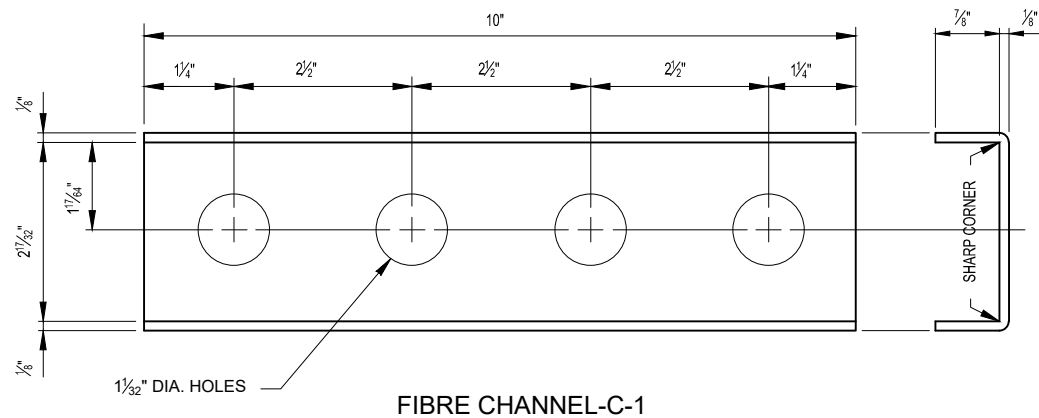
FIBRE ANGLE-AP-34



FIBRE BUSHING-B-11



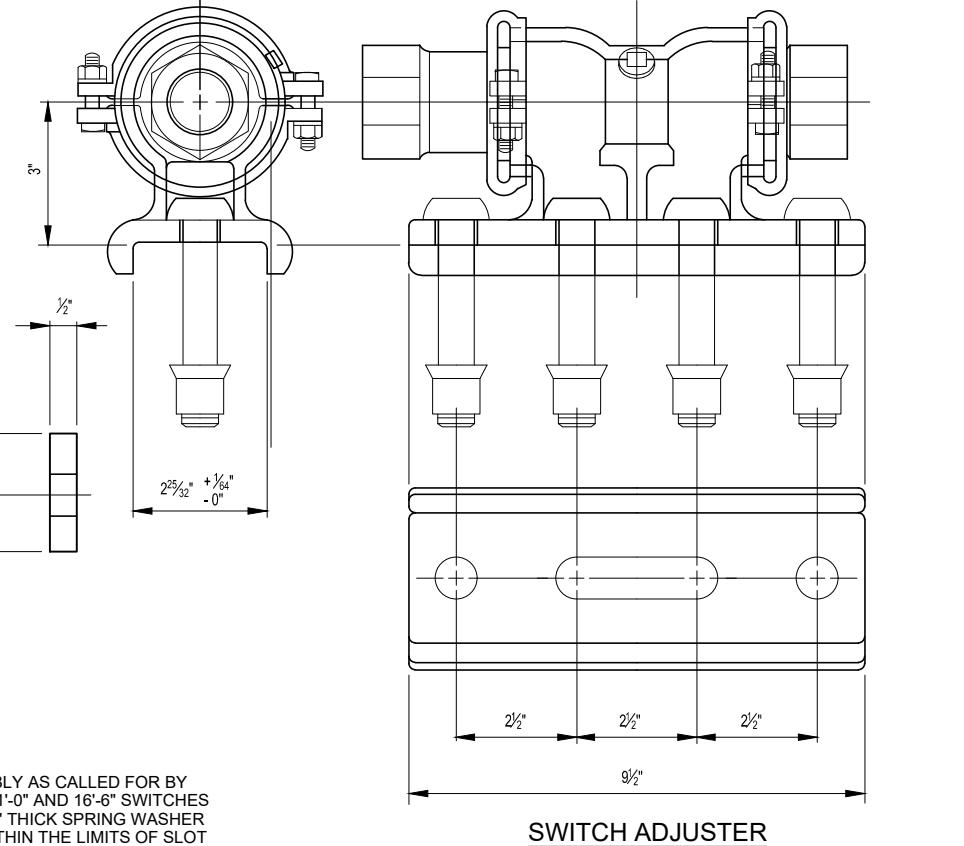
SPLICE PLATE-ST-684



FIBRE CHANNEL-C-1

NOTES: (CONTINUED FROM ESD-2921-13)

- TWO WEB BOLTS SHALL BE FURNISHED WITH EACH CLIP ASSEMBLY AS CALLED FOR BY NOTE IN TOP VIEW OF ROD ASSEMBLY. WHEN ROD IS USED ON 11'-0" AND 16'-6" SWITCHES THE 1/4" THICK SPRING WASHER SHOULD BE REPLACED WITH A 3/8" THICK SPRING WASHER BY THE STOREKEEPER OR FIELD FORCES, TO BRING COTTER WITHIN THE LIMITS OF SLOT IN WEB BOLT NUTS.
- MATERIALS AND WORKMANSHIP SHALL MEET CURRENT A.R.E.M.A. SPECIFICATIONS FOR "SPECIAL TRACKWORK" UNLESS OTHERWISE SPECIFIED.
- VERTICAL SWITCH ROD SHALL BE PLAINLY STAMPED TO INDICATE SWITCH THAT ROD ASSEMBLY CAN BE USED UPON. IDENTIFICATION MARKING WILL BE AS FOLLOWS: 1-39 FOR USE ON 39'-0" SWITCHES, 132 LB. AND 136 LB. RE RAIL SECTIONS. 1-11-30 FOR USE ON 11'-0" TO 30'-0" SWITCHES, 115 LB., 119 LB., 131 LB., 132 LB. AND 136 LB. RE RAIL SECTIONS.



SWITCH ADJUSTER

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REV.	DATE	DESCRIPTION	DES.	ENG.

REVISIONS	DRAWN RAILPROS
	CHECKED B. SMITH
	RECOMMENDED W. PREY
	DATE 5/27/15
DESIGNER PE STAMP	

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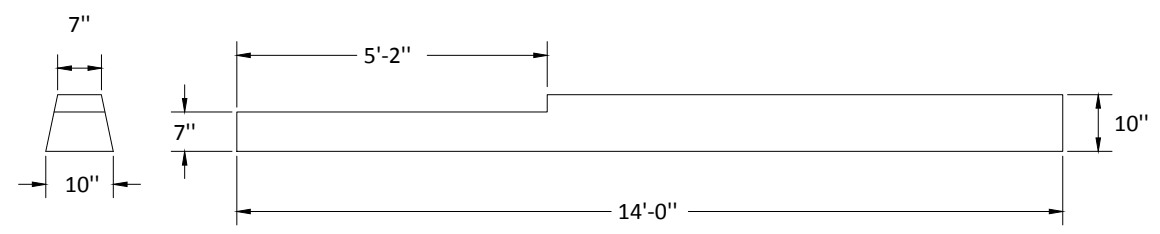
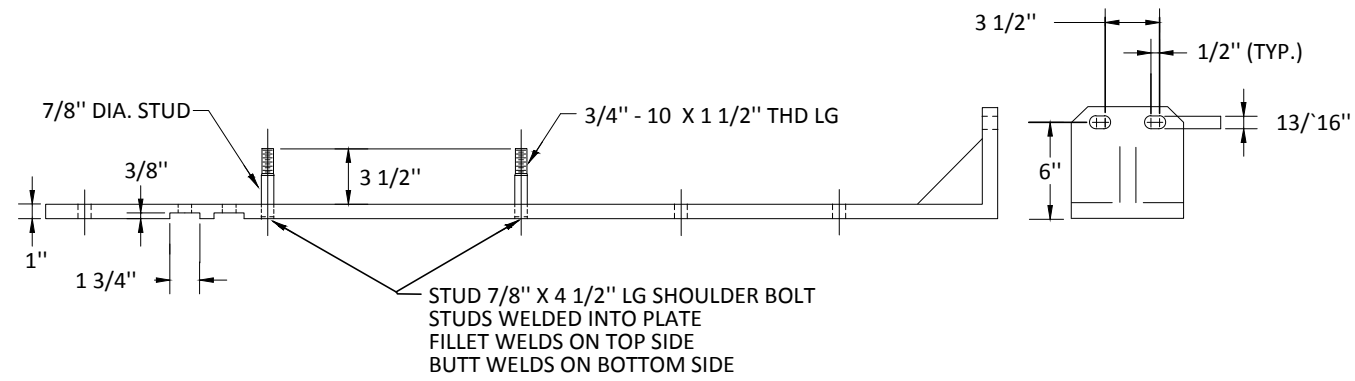
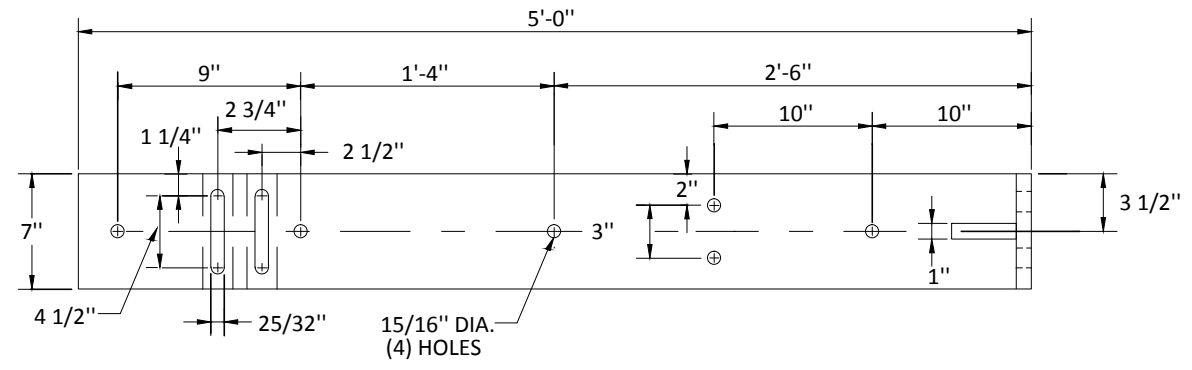
ENGINEERING STANDARD DRAWINGS

NO. 10 STANDARD TURNOUT - SWITCH RODS AND MISC. DETAILS (2 OF 2)

DRAWING NO. ESD-2921-14
DRAWING SHEET NO. 14 OF 15
SCALE: NONE
CONTRACT SHEET NO.

NOTE:
SEE SHEET ESD-2921-05 FOR NOTES

REFERENCE DRAWINGS:
SWITCH GAGE PLATE DETAILS-ESD-2921-05



- MOUNTING PLATE NOTES:**
1. EMORY CLOTH SHALL BE INSTALLED TO PROVIDE ABRASIVE MATERIAL BETWEEN SWITCH MACHINE FRAME AND SWITCH PLATE.
 2. ALL HOLES SHALL BE DRILLED NOT PUNCHED.
 3. ALL CORNERS OF PLATE SHALL BE CHAMFERED 1" X 1".

- TRAPEZOID TIE NOTES:**
1. TRAPEZOID TIES SHALL BE DOUGLAS FIR OR GUM.
 2. TRAPEZOID TIES SHALL BE DAPPED AND TREATED AT THE MILL.
 3. TIES SHALL BE STRAIGHT AND FREE OF CRACKS OR OTHER DEFECTS.

ANSALDO SWITCH MACHINE MOUNTING PLATE

DAP TIE
(2 PCS. REQ'D. AS SHOWN)

14 FT. DAPPED TRAPEZOID TIE

US&S SWITCH MACHINE MUST BE FURNISHED WITH FINISHED MOUNTING LUGS

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REVISIONS		DES.	ENG.	DATE	DESCRIPTION
				5/27/15	

DRAWN RAILPROS	CHECKED B. SMITH	RECOMMENDED W. PREY	DATE 5/27/15	DESIGNER PE STAMP
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ENGINEERING STANDARD DRAWINGS

NO. 10 STANDARD TURNOUT -
EXTENSION PLATE AND DAP TIE FOR
SWITCH MACHINE

DRAWING NO. ESD-2921-15
DRAWING SHEET NO. 15 OF 15
SCALE: NONE
CONTRACT SHEET NO.

NO. 10 SPRING RAIL FROG TURNOUT ON WOOD TIES

(136LB., RIGHT HAND WITH RAIL BOUND MANGANESE FROG)

BILL OF MATERIAL	
QTY.	DESCRIPTION
1 PAIR	16'-6" EXTENDED FIELD WELDED TYPE SWITCH POINTS (40'-0" RAIL)
1 EACH	R.H. SAMSON STOCK RAILS 30'-0"
1 EACH	L.H. SAMSON STOCK RAILS 40'-0"
1 EACH	No. 1 SMJ TYPE SWITCH ROD W/BASKET
1 EACH	VERTICAL SWITCH ROD WITH SMJ CLIPS
3 EACH	GAGE PLATE No. P-P
1 EACH	GAGE PLATE No. G-1P
1 EACH	GAGE PLATE No. G-2P
6 EACH	SLIDE PLATE S-8P
4 EACH	SLIDE PLATE S-9P
4 EACH	BRACE SLIDE PLATE S-5P
2 EACH	BRACE SLIDE PLATE S-7P
2 EACH	BRACE SLIDE PLATE S-4P
2 EACH	HEEL PLATE P-5RH
2 EACH	TURNOUT PLATES P-10 THRU P-21
1 EACH	PLATES P-22 THRU P-29
1 EACH	No.10 SPRING RAIL FROG - 22'-6"
1 EACH	FROG PLATES No. FP-1 THRU FP-9
1 EACH	FROG PLATES No. FCP-1 THRU FCP-3
1 EACH	FROG GAGE PLATES FG-1P THRU FG-3P
2 EACH	16'-0" U-69 ADJUSTABLE GUARD RAIL W/PLATES
5 EACH	D.I. RAIL HOLD DOWN CLIPS E-3706
2 EACH	D.I. RAIL HOLD DOWN CLIPS E-3707
2 EACH	D.I. RAIL HOLD DOWN CLIPS E-3708
138 PCS.	ROLLED STEEL TIE PLATES
552 PCS.	SCREW SPIKES 1 5/16" DIA. X 6" No. 5760
276 PCS.	RAIL CLIP (GALVANIZED) (ESD-2362)
8 PCS.	E-CLIP (GALVANIZED) (ESD- 2361)
12 PCS.	BOLTLESS ADJUSTABLE BRACE ASSEMBLY
1 EACH	19'-6" RAIL
1 EACH	23'-6" RAIL
1 EACH	28'-6" RAIL
1 EACH	23'-0" RAIL
1 EACH	28'-0" RAIL
1 EACH	32'-0" RAIL
4 EACH	39'-0" RAIL
1 EACH	EPOXY BONDED PREFABRICATED INSULATED JOINT (28'-8")
1 EACH	EPOXY BONDED PREFABRICATED INSULATED JOINT (46'-6")

DRAWING INDEX

BILL OF MATERIALS AND GENERAL NOTES	ESD-2922-01
LAYOUT	ESD-2922-02
CROSSOVER LAYOUT AND BILL OF MATERIALS	ESD-2922-03
SWITCH AND TURNOUT PLATES	ESD-2922-04
GAGE PLATES	ESD-2922-05
FROG GAGE PLATES	ESD-2922-06
16'-6" GUARD RAIL	ESD-2922-07
NO. 10 SPRING RAIL FROG	ESD-2922-08
FROG PLATES	ESD-2922-09
INSULATED JOINT DIAGRAM	ESD-2922-10
UNDERCUT STOCK RAIL	ESD-2922-11
16'-6" SPLIT SWITCH POINT	ESD-2922-12
SWITCH RODS AND MISC. DETAILS (1 OF 2)	ESD-2922-13
SWITCH RODS AND MISC. DETAILS (2 OF 2)	ESD-2922-14
EXTENSION PLATE AND DAP TIES	ESD-2922-15

NOTES:

1. TURNOUT TO BE FABRICATED FROM 136 LB. HEAD HARDENED RAIL, FROM POINT END TO LAST LONG SWITCH TIE.
2. LOCATION OF INSULATED JOINTS IS DETERMINED BY DRAWING NUMBER ESD-2922-10. IT WILL BE SATISFACTORY TO RELOCATE THE INSULATED JOINT IN THE FIELD UP TO 12" SO AS TO PROVIDE A SUITABLE SUSPENDED JOINT, PROVIDED THE STAGGER OF INSULATED JOINTS DOES NOT EXCEED 4'-6". SUSPENDED INSULATED JOINTS MUST BE LOCATED IN A CRIB AREA BETWEEN TIES, A MINIMUM DISTANCE OF 4" FROM EDGE OF NEAREST TIE PLATE.
3. ALL INSULATED JOINTS ARE TO BE ADHESIVE BONDED PREFABRICATED INSULATED JOINTS PER ESD-2504 UNLESS OTHERWISE SPECIFIED.
4. ALL MATERIALS REQUIRED FOR HAND OR MACHINE OPERATED SWITCH OPERATION WILL BE FURNISHED PER REQUIREMENTS OF THE ENGINEER.
5. MATERIALS AND WORKMANSHIP, ALSO ANY CONSTRUCTION DETAILS NOT SHOWN, SHALL BE PER CURRENT A.R.E.M.A. "MANUAL AND PORTFOLIO" UNLESS OTHERWISE SPECIFIED.
6. WHERE REQUIRED, ALL IDENTIFICATION SYMBOLS TO BE PLAINLY STAMPED.
7. GAGE PLATES WILL BE FURNISHED INSULATED. SWITCH RODS WILL BE FURNISHED INSULATED UNLESS OTHERWISE SPECIFIED.
8. MANUFACTURER SHALL SUBMIT TWO COPIES OF SHOP DRAWINGS TO THE ENGINEER FOR APPROVAL PRIOR TO FABRICATION OF TURNOUT. SHOP DRAWINGS THAT CHANGE DETAILS OF THESE STANDARDS MUST CLEARLY SPECIFY SUCH PROPOSED CHANGES.
9. THE MATERIAL INCLUDED IN A "TURNOUT COMPLETE" IS EVERYTHING LISTED IN THE BILL OF MATERIALS. TO CONSTRUCT A COMPLETE TURNOUT, SWITCH TIES (PER LIST ON THIS SHEET) AND INSULATED JOINTS, FIELD WELDS, RUNNING RAIL, AND CLOSURE RAIL IDENTIFICATION ON SHEET ESD-2922-10 MUST ALSO BE SUPPLIED. THE MATERIAL FOR A "CROSSOVER COMPLETE" IS IDENTIFIED ON SHEET ESD-2922-03.
10. TIE PLATES SHALL CONFORM TO ENGINEERING STANDARD ESD-2454.
11. SCREW SPIKES (1 5/16" x 6-2 TPI) SHALL CONFORM TO ENGINEERING STANDARD ESD-2355-03. PLATE HOLES SHALL BE 1" DIAMETER. PILOT HOLES IN TIES SHALL BE 5/16" DIAMETER. SCREW SPIKES SHALL BE SCREWED INTO WOOD (NOT DRIVEN).
12. MANUFACTURER SHALL BEVEL RAIL ENDS PER CURRENT A.R.E.M.A. PLAN NO. 1005.
13. THE 16'-6" SWITCH POINT, MADE FROM 40'-0" RAIL PER ESD-2922-12 SHALL BE FURNISHED WITH SWITCH RODS NO. 1 AND 2 PER ESD-2922-13 AND ESD-2922-14.
14. FOR LOCATION OF INSULATED JOINTS FOR NO. 8 TURNOUT AND CROSSOVER, SEE DRAWING NO. ESD-2922-10.
15. GAGE PLATES FOR SWITCH AND FROG, SWITCH HEEL PLATE (FOR BOTH R.H. AND L.H. TURNOUTS) AND PLATES P-10 THRU P-24 ARE DESIGNED TO BE PERPENDICULAR TO THE MAIN LINE THRU RUN RAILS.
16. UPON COMPLETION OF TURNOUT INSTALLATION, RUNNING RAIL MUST BE ADJUSTED TO NCTD NEUTRAL RAIL TEMPERATURE.
17. ALL E-CLIPS SHALL BE GALVANIZED.
18. SWITCH POINTS SHALL BE FABRICATED PER AREMA SPECIFICATION NO. 9-28-92 AND PER ESD-2922-12.
19. THE TOLERANCE FOR SPACING OF SWITCH TIES IS ± 1/2" RELATIVE TO ADJACENT TIES AND 1 1/4" RELATIVE TO CUMULATIVE DIMENSION FROM THE POINT OF SWITCH (PS).
20. FOR SWITCH MACHINE LAYOUT REFER TO ESD-8605 OR ESD-8610

TURNOUT DATA	
FROG NO.	10
FROG ANGLE	5°-43'-29"
FROG LENGTH ON MAIN TRACK	24'-6"
FROG LENGTH ON TURNOUT TRACK	24'-6"
LENGTH OF SWITCH POINT	16'-6"
SWITCH ANGLE	1°-44'-11"
HEEL SPREAD OF SWITCH	6 1/4"
LEAD	80'-6"
RADIUS OF TURNOUT CURVE	736.76'
DEGREE OF TURNOUT CURVE	7°-46'-58"
CENTRAL ANGLE OF TURNOUT CURVE	3°-59'-18"
RADIUS OF EQUIVALENT CURVE	941.70'
DEGREE OF EQUIVALENT CURVE	6°-05'-14"
LENGTH OF EQUIVALENT CURVE	94.04'
STRAIGHT CLOSURE	60'-0"
CURVED CLOSURE	57'-0"

BILL OF WOOD SWITCH TIES			
PIECES	SIZE	LENGTH	BOARD FEET
16	7" x 9"	10'-0"	840.00
11	7" x 9"	11'-0"	635.25
8	7" x 9"	12'-0"	504.00
7	7" x 9"	13'-0"	477.75
6	7" x 9"	14'-0"	441.00
2	10" x 9"	14'-0" DAP TIES	147.00
6	7" x 9"	15'-0"	472.50
6	7" x 9"	16'-0"	504.00
9	7" x 9"	17'-0"	803.25
TOTAL			TOTAL
71			4824.75

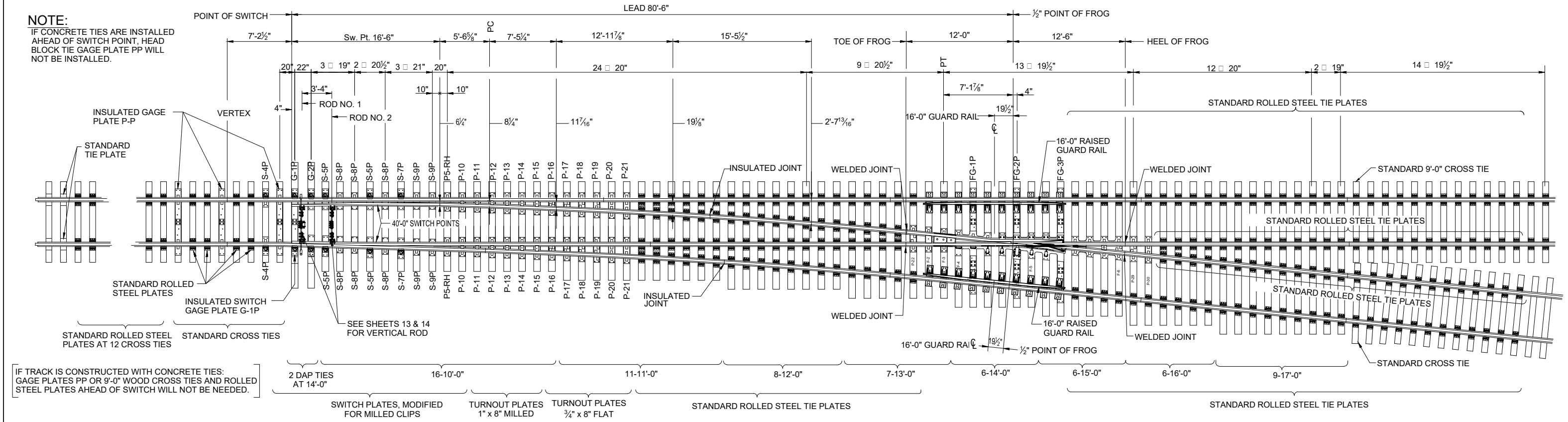
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<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2" style="text-align: center;">REVISIONS</th> </tr> </thead> <tbody> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr> <th style="width: 10%;">REV.</th> <th>DATE</th> <th>DESCRIPTION</th> <th>DES.</th> <th>ENG.</th> </tr> </tbody> </table>	REVISIONS										REV.	DATE	DESCRIPTION	DES.	ENG.	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="text-align: center;">DRAWN RAILPROS</td></tr> <tr><td style="text-align: center;">CHECKED B. SMITH <i>BSM</i></td></tr> <tr><td style="text-align: center;">RECOMMENDED W. PREY <i>WP</i></td></tr> <tr><td style="text-align: center;">DATE 5/27/15</td></tr> <tr><td style="text-align: center;">DESIGNER PE STAMP</td></tr> </table>	DRAWN RAILPROS	CHECKED B. SMITH <i>BSM</i>	RECOMMENDED W. PREY <i>WP</i>	DATE 5/27/15	DESIGNER PE STAMP	<p style="font-size: x-small;"> SAN DIEGO ASSOCIATION OF GOVERNMENTS 401 B Street, Suite 800 San Diego, CA. 92101 www.sandag.org </p>	<p style="font-size: x-small;"> 810 Mission Avenue Oceanside, CA 92054 www.gonctd.com </p>	<h2 style="margin: 0;">ENGINEERING STANDARD DRAWINGS</h2> <p style="margin: 5px 0 0 0;">NO. 10 SPRING RAIL FROG TURNOUT BILL OF MATERIALS AND GENERAL NOTES</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="text-align: center;">DRAWING NO. ESD-2922-01</td></tr> <tr><td style="text-align: center;">DRAWING SHEET NO. 1 OF 15</td></tr> <tr><td style="text-align: center;">SCALE: NONE</td></tr> <tr><td style="text-align: center;">CONTRACT SHEET NO.</td></tr> </table>	DRAWING NO. ESD-2922-01	DRAWING SHEET NO. 1 OF 15	SCALE: NONE	CONTRACT SHEET NO.
REVISIONS																													
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NOTES:

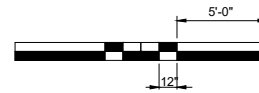
1. SEE COVER SHEET FOR NOTES, BILL OF MATERIAL AND TURNOUT DATA.
2. SEE SHEET NO. 3 FOR CROSSOVER.
3. SEE ESD-8605 OR ESD-8610 FOR SWITCH MACHINE LAYOUT.

NOTE:
IF CONCRETE TIES ARE INSTALLED AHEAD OF SWITCH POINT, HEAD BLOCK TIE GAGE PLATE PP WILL NOT BE INSTALLED.



IF TRACK IS CONSTRUCTED WITH CONCRETE TIES: GAGE PLATES PP OR 9'-0" WOOD CROSS TIES AND ROLLED STEEL PLATES AHEAD OF SWITCH WILL NOT BE NEEDED.

10 RIGHT HAND TURNOUT



GRAPHIC SCALE

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REV.	DATE	DESCRIPTION	DES.	ENG.

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	RECOMMENDED W. PREY
	DATE 5/27/15
	DESIGNER PE STAMP

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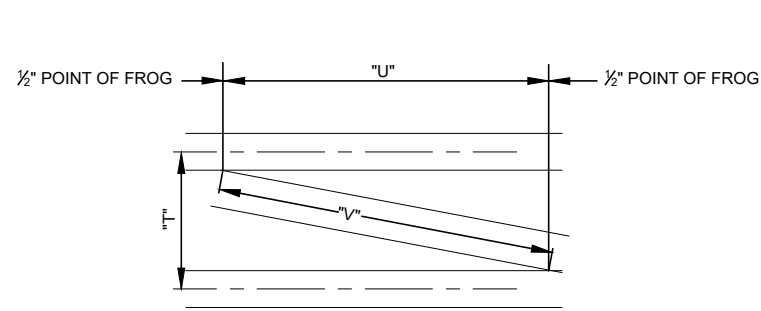
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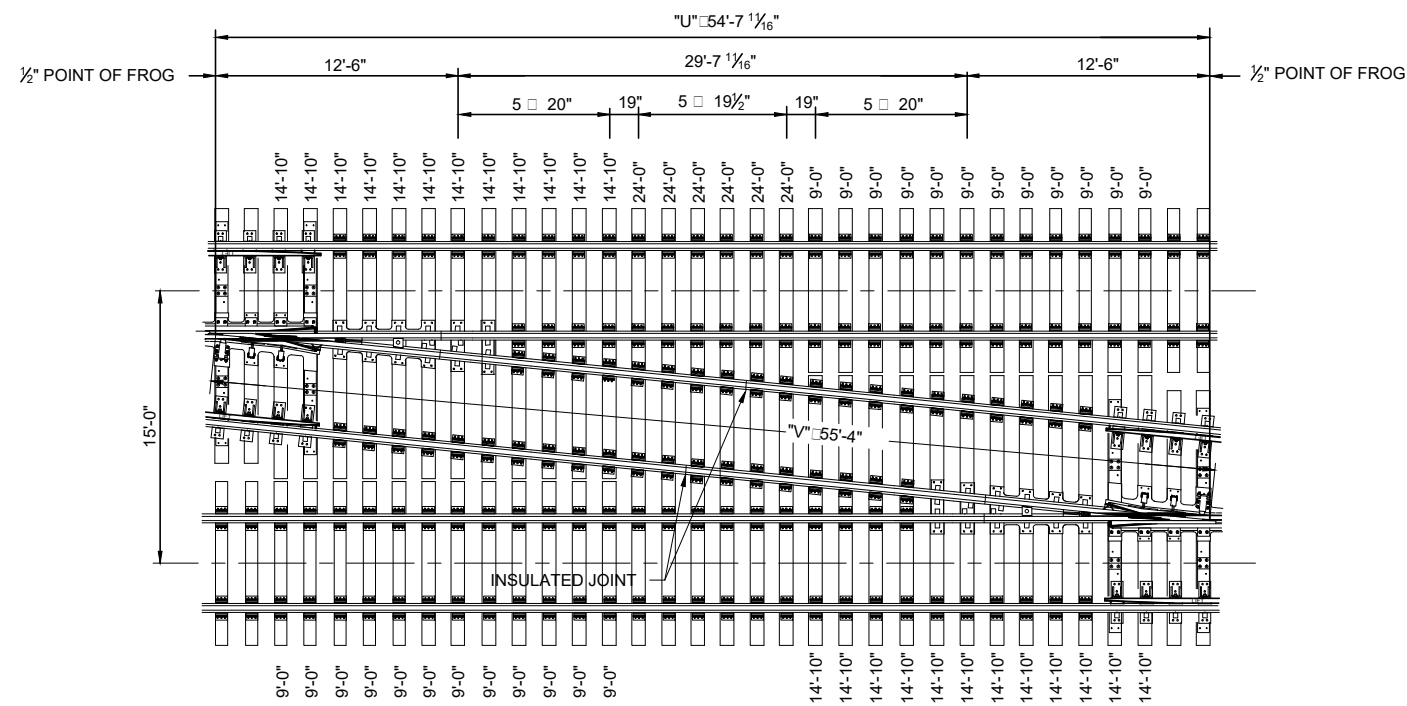
NO. 10 SPRING RAIL FROG TURNOUT - LAYOUT

DRAWING NO.	ESD-2922-02
DRAWING SHEET NO.	2 OF 15
SCALE:	NONE
CONTRACT SHEET NO.	



CROSSOVER DIAGRAM

CROSSOVER DATA		
MAIN TRACKS - TANGENT AND PARALLEL CROSSOVER - TANGENT BETWEEN FROGS		
TRACK CENTERS "T"	DISTANCE BETWEEN FROG 1/2 POINTS	
	ON MAIN TRACK "U"	ON CROSSOVER "V"
15'-0"	54'-7 1/16"	55'-4"
EACH 1"	0.831'	0.835'



RIGHT HAND CROSSOVER

BILL OF SWITCH TIES				
PIECES	SIZE	LENGTH	BOARD FEET	
24	7" x 9"	9'-0"	1134.00	
32	7" x 9"	10'-0"	1680.00	
22	7" x 9"	11'-0"	1270.50	
16	7" x 9"	12'-0"	1008.00	
14	7" x 9"	13'-0"	955.50	
16	7" x 9"	14'-0"	1176.00	
4	10" x 9"	14'-0" DAP TIES	294.00	
24	7" x 9"	14'-10"	1890.00	
6	7" x 9"	24'-0"	756.00	
TOTAL			TOTAL	
158			10164.00	

BILL OF MATERIAL

QTY.	DESCRIPTION
2 PAIR	16'-6" EXTENDED FIELD WELDED TYPE SWITCH POINTS (40'-0" RAIL)
1 PAIR	R.H. SAMSON STOCK RAILS (30'-0")
1 PAIR	L.H. SAMSON STOCK RAILS (40'-0")
2 EACH	No. 1 SMJ TYPE SWITCH ROD W/BASKET
2 EACH	VERTICAL SWITCH ROD WITH SMJ CLIPS
6 EACH	GAGE PLATE No. P-P
2 EACH	GAGE PLATE No. G-1P
2 EACH	GAGE PLATE No. G-2P
12 EACH	SLIDE PLATE S-8P
8 EACH	SLIDE PLATE S-9P
8 EACH	BRACE SLIDE PLATE S-5P
4 EACH	BRACE SLIDE PLATE S-7P
4 EACH	BRACE SLIDE PLATE S-4P
4 EACH	HEEL PLATE P-5RH
4 EACH	TURNOUT PLATES P-10 THRU P-21
2 EACH	PLATES P-22 THRU P-29
2 EACH	No.10 SPRING RAIL FROG - 24'-6"
2 EACH	FROG PLATES No. FP-1 THRU FP-9
2 EACH	FROG PLATES No. FCP-1 THRU FCP-3
2 EACH	FROG GAGE PLATES FG-1P THRU FG-3P
4 EACH	16'-0" U-69 ADJUSTABLE GUARD RAIL W/PLATES
10 EACH	D.I. RAIL HOLD DOWN CLIPS E-3706
4 EACH	D.I. RAIL HOLD DOWN CLIPS E-3707
4 EACH	D.I. RAIL HOLD DOWN CLIPS E-3708
228 PCS.	TIE PLATES
912 PCS.	SCREW SPIKES 1 5/16" DIA. X 6" No. 5760
456 PCS.	RAIL CLIP (GALVANIZED) (ESD-2362)
24 PCS.	E-CLIP (GALVANIZED) (ESD-2361)
12 PCS.	BOLTLESS ADJUSTABLE BRACE ASSEMBLY
2 EACH	23'-6" RAIL
2 EACH	28'-6" RAIL
6 EACH	39'-0" RAIL
2 EACH	EPOXY BONDED PREFABRICATED INSULATED JOINT (28'-6")
2 EACH	EPOXY BONDED PREFABRICATED INSULATED JOINT (40'-6")
2 EACH	EPOXY BONDED PREFABRICATED INSULATED JOINT (46'-6")

NOTES:

- SEE SHEET 1 FOR 10 TURNOUT DATA, BILL OF MATERIAL AND NOTES.
- SEE SHEET 2 FOR LAYOUT OF 10 TURNOUT.

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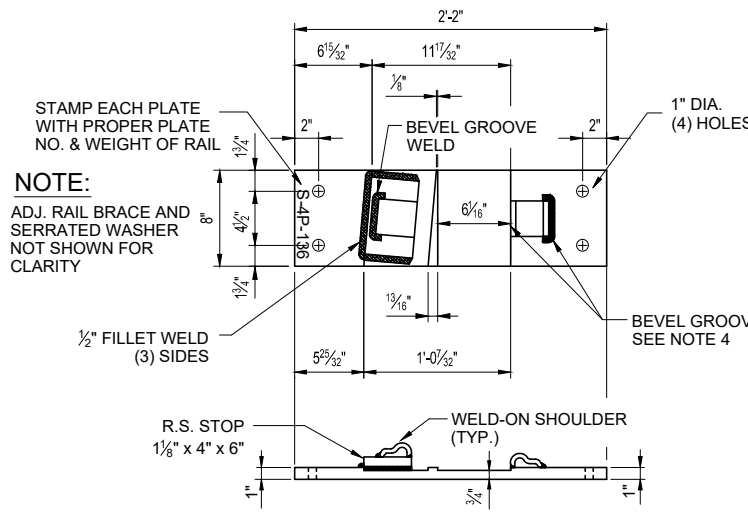
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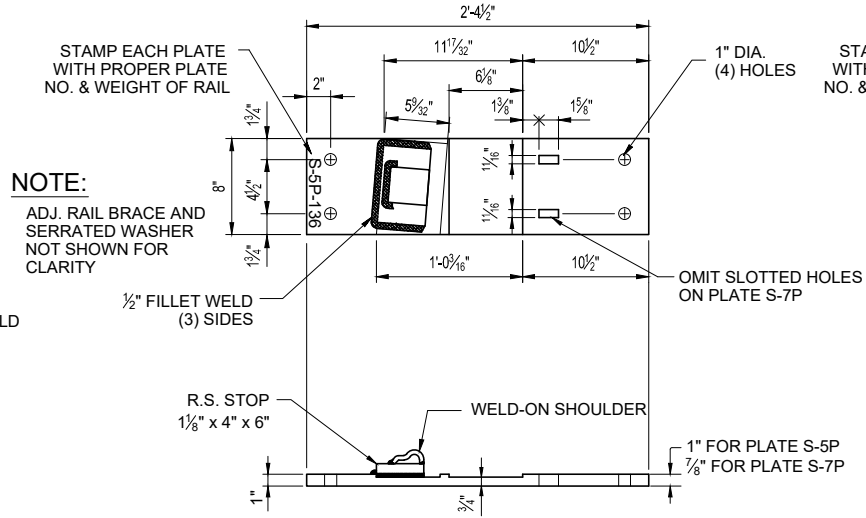
ENGINEERING STANDARD DRAWINGS

NO. 10 SPRING RAIL FROG TURNOUT -
CROSSOVER LAYOUT AND BILL OF MATERIALS

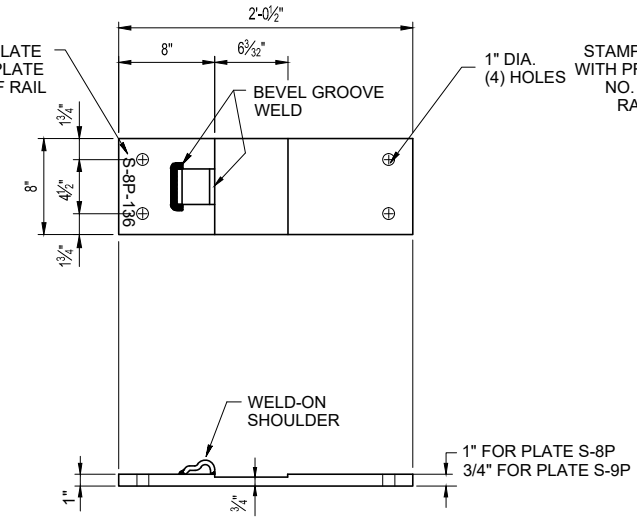
DRAWING NO.	ESD-2922-03
DRAWING SHEET NO.	3 OF 15
SCALE:	NONE
CONTRACT SHEET NO.	



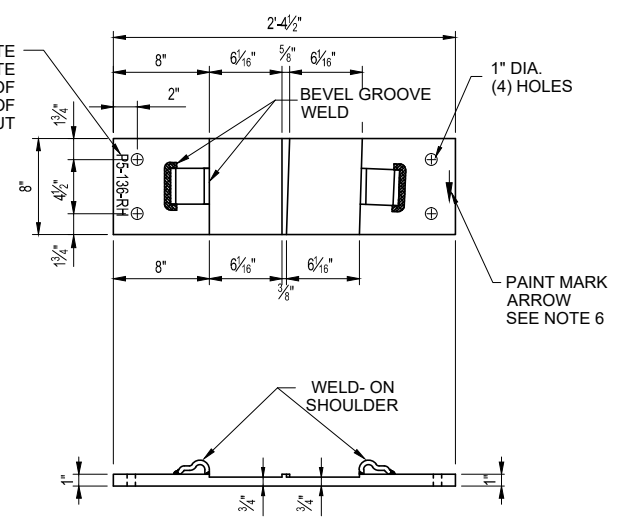
BRACE PLATE S-4P
 1" x 8" x 2'-2" LG. MILLED W/ADJ. RAIL BRACE
 2 - S-4P PLATES REQUIRED AS SHOWN



BRACE SLIDE PLATE S-5P & S-7P
 1" x 8" x 2'-4 1/2" LG. MILLED W/ADJ. RAIL BRACE
 4 - S-5P PLATES REQUIRED AS SHOWN
 2 - S-7P PLATES REQUIRED AS SHOWN



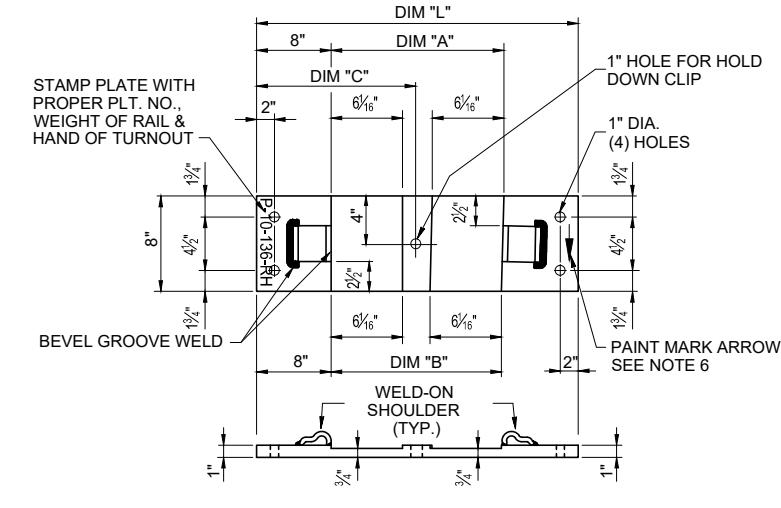
SLIDE PLATE - S-8P & S-9P
 1" x 8" x 2'-0 1/2" LG. - MILLED - W/PANDROL CLIP
 6 - S-8P PLATES REQUIRED AS SHOWN (1/4" RISER)
 4 - S-9P PLATES REQUIRED AS SHOWN (0" RISER)



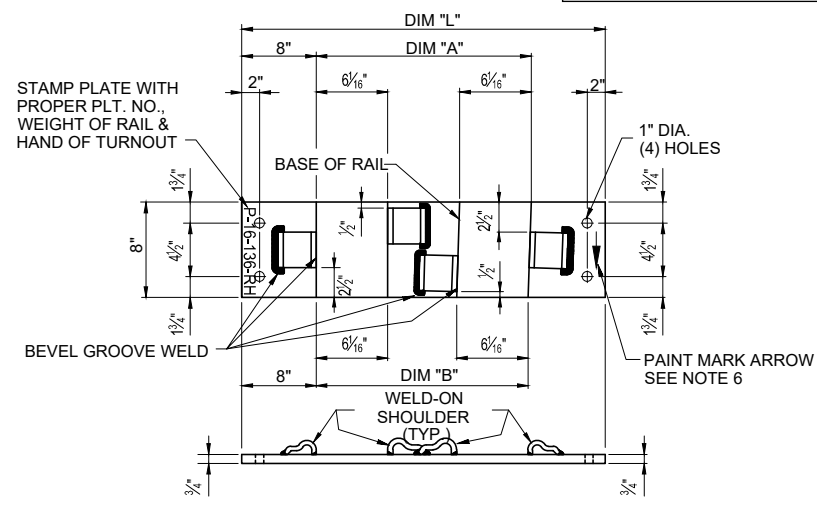
HEEL PLATE - P5 - RH
 1" x 8" x 2'-4 1/2" LG. - MILLED - W/PANDROL CLIPS
 2 - P5-RH PLATES REQUIRED AS SHOWN FOR R.H. T.O.

SWITCH PLATES

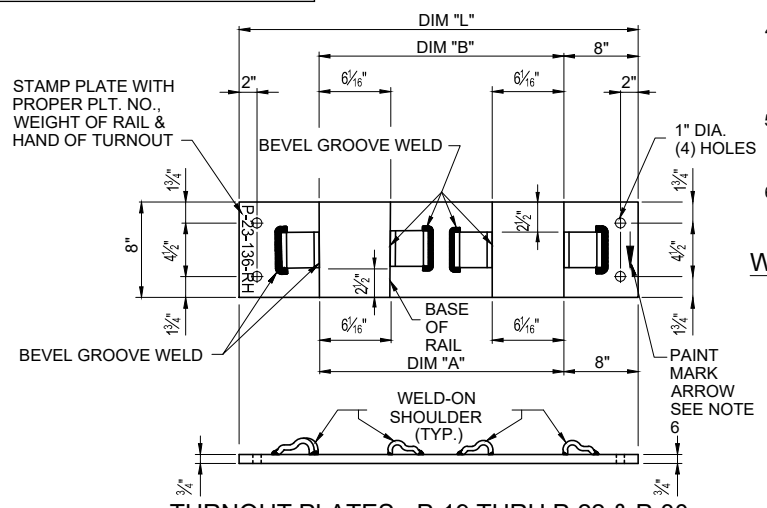
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TURNOUT PLATES - P-10 THRU P-15
 1" x 8" x DIM "L" - MILLED - W/ PANDROLS



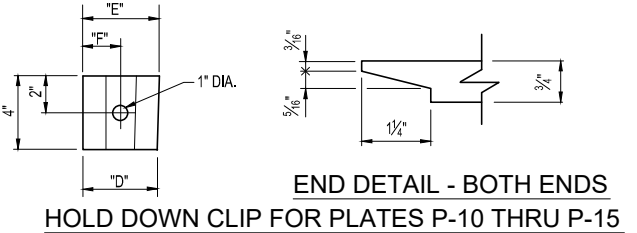
TURNOUT PLATES - P-16 THRU P-18 & P-29
 3/4" x 8" x DIM "L" - FLAT - W/ PANDROL CLIPS



TURNOUT PLATES - P-19 THRU P-22 & P-30
 3/4" x 8" x DIM "L" - FLAT - W/ PANDROL CLIPS

- NOTES:**
- PLATES TO BE MADE OF MILD ROLLED STEEL.
 - EACH PLATE TO BE PLAINLY STAMPED WITH PLATE NO. AND 136 (WEIGHT OF RAIL & HAND OF TURNOUT (R.H. OR L.H.)).
 - THE WELD - ON PRESSED STEEL SHOULDER, MADE FROM MILD STEEL, TO BE PURCHASED FROM PANDROL INTERNATIONAL OR APPROVED ALTERNATE MEETING PANDROL'S DESIGN SPECIFICATIONS.
 - THE PRESSED STEEL SHOULDER MUST BE CAREFULLY WELDED TO THE PLATE. ANY WELD PROJECTING BEYOND THE VERTICAL FACE OF SHOULDER IN THE AREA OF THE RAIL SEAT MUST BE MACHINED OFF TO PROVIDE A CLEAR RAIL SEAT DIMENSION AS CALLED FOR.
 - THE PLATES AS SHOWN ARE FOR A 136 LB., NO. 10 RIGHT HAND TURNOUT. FOR A LEFT HAND TURNOUT, PLATES P-10 THRU P-29 INCLUSIVE AND FROG PLATES AND GAGE PLATES FG-1P THRU FG-3P ARE TO BE OPPOSITE.
 - DIRECTION OF ARROW SHOWN IS AN EXAMPLE ONLY. USING SHEET ESD-2922-02 AS A GUIDE, PAINT MARK EACH PLATE WITH AN ARROW POINTING TOWARD SWITCH POINT.

- WELDING SPECIFICATIONS**
- SET PRESSED STEEL SHOULDER FLUSH AGAINST LINE OF BASE OF RAIL OR SHOULDER OF MILLED PLATE AS SHOWN AND WELD WITH 2 - PASS 3/8" + WELD.
 - STOP PLATE FOR ADJUSTABLE RAIL BRACE TO BE SET FLUSH WITH SHOULDER OF MILLED PLATE AS SHOWN AND WELD WITH 3 - PASS 1/2" + FILLET WELD.
 - SHOULDERS AND STOPS ARE TO BE CAREFULLY WELDED TO PLATE. NO WELD SHALL PROJECT BEYOND THE VERTICAL EDGE OF THE UNWELDED FOURTH SIDE OF THE STOP PLATE OR VERTICAL FACE OF SHOULDER IN THE AREA OF THE RAIL SEAT. ANY WELD PROJECTING BEYOND THE FACE OF THE STOP OR SHOULDER MUST BE MACHINED OFF TO PROVIDE CLEAR DIMENSION CALLED FOR.
 - FOR WELDING PRESSED STEEL SHOULDERS OR PLATE STOPS USE THE FOLLOWING:
 - A. ELECTRODE 1 5/32 INCH, WELDING SPEC. 7018XLM.
 - B. ELECTRODE 3/16 INCH, WELDING SPEC. 7018XLM.
 - C. WIRE, WELDING 3/32 INCH, NR203, 1 □ NICKEL FLUX CORE.
 OTHER WIRE OR ELECTRODES MEETING SPECIFICATIONS AS CALLED FOR APPROVED BY THE ENGINEER, MAY BE USED.



DIMENSION TABLE									
PLATE	DIM "A"	DIM "B"	DIM "C"	DIM "L"	PLTS REQ'D.	DIM "D"	DIM "E"	DIM "F"	CLIPS REQ'D.
P-10	13 1/8"	13 1/8"	14 1/2"	2'-5"	2 EA.	3 3/8"	3 3/8"	1 3/8"	2 EA.
P-11	13 13/32"	13 3/16"	14 1/8"	2'-6"	2 EA.	3 23/32"	3 3/32"	1 13/16"	2 EA.
P-12	14 1/32"	14 19/32"	15 1/16"	2'-6 1/2"	2 EA.	4 1/32"	4 1/16"	2 1/4"	2 EA.
P-13	15"	15 1/2"	15 1/2"	2'-7 1/2"	2 EA.	4 1/32"	5 1/32"	2 1/16"	2 EA.
P-14	15 1/16"	15 3/32"	15 3/32"	2'-8"	2 EA.	5 1/32"	5 1/16"	2 29/32"	2 EA.
P-15	16 1/32"	16 3/32"	16 7/32"	2'-8 1/2"	2 EA.	6 1/8"	6 1/16"	3 3/32"	2 EA.

DIMENSION TABLE				
PLATE	DIM "A"	DIM "B"	DIM "L"	PLTS REQ'D.
P-16	17 7/8"	17 1/8"	2'-9 1/2"	2 EA.
P-17	17 1/16"	18 1/2"	2'-10"	2 EA.
P-18	18 29/32"	19 9/32"	2'-11"	2 EA.
P-29	19 1/32"	20 1/8"	3'-0"	1 EA.

DIMENSION TABLE				
PLATE	DIM "A"	DIM "B"	DIM "L"	PLTS REQ'D.
P-19	20 1/2"	19 25/32"	3'-0"	2 EA.
P-20	21 1/8"	20 3/4"	3'-1"	2 EA.
P-21	22 1/2"	21 1/4"	3'-2"	2 EA.
P-22	22 1/8"	21 1/8"	3'-2 1/2"	1 EA.
P-30	22 1/2"	21 1/32"	3'-2"	1 EA.

REV.	DATE	DESCRIPTION	DES.	ENG.

REVISIONS	DRAWN RAILPROS
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	RECOMMENDED W. PREY
	DATE 5/27/15
	DESIGNER PE STAMP

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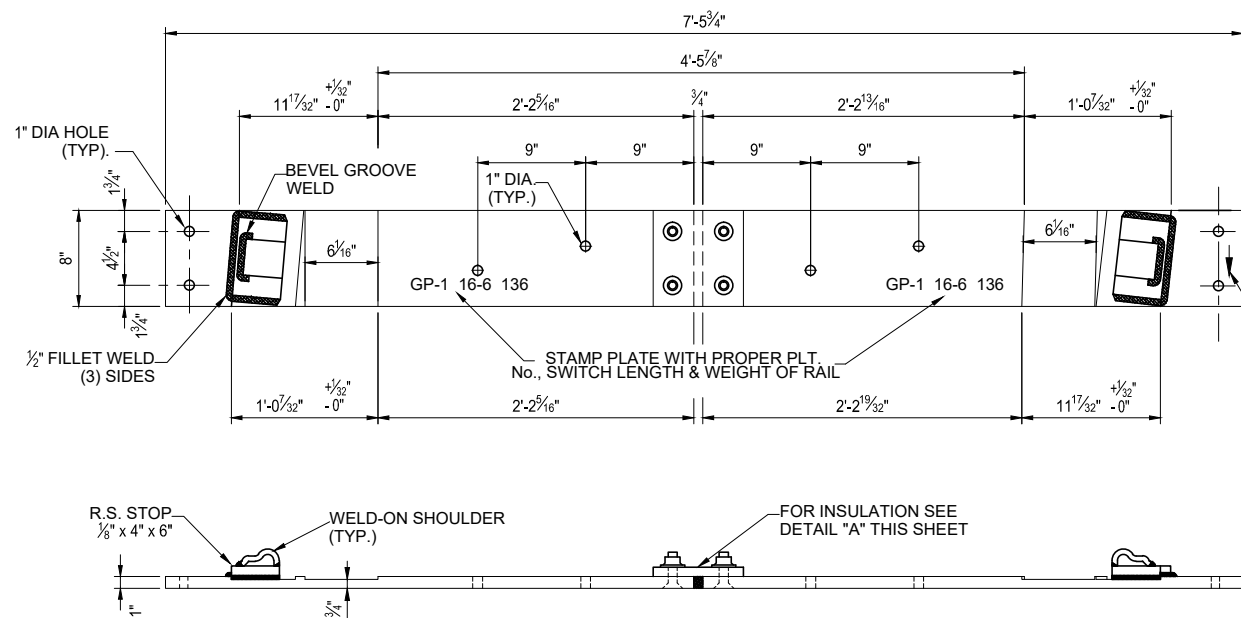
NO. 10 SPRING RAIL FROG TURNOUT - SWITCH AND TURNOUT PLATES

DRAWING NO. ESD-2922-04
DRAWING SHEET NO. 4 OF 15
SCALE: NONE
CONTRACT SHEET NO.

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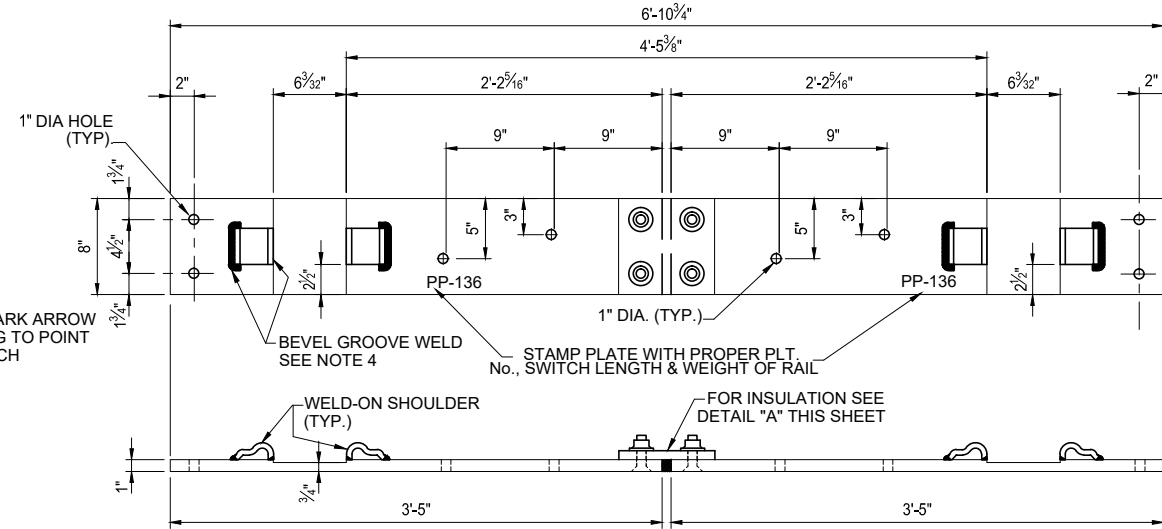
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3. THE PRESSED STEEL SHOULDER MUST BE CAREFULLY WELDED TO GAGE PLATES. ANY WELD PROJECTING BEYOND THE VERTICAL FACE OF SHOULDER IN THE AREA OF THE RAIL SEAT MUST BE MACHINED OUT TO PROVIDE A CLEAR RAIL SEAT DIMENSION AS CALLED FOR.
4. THE PLATES AS SHOWN FOR A 136 LB., NO. 10 RIGHT HAND HAND OPERATED TURNOUT. FOR A LEFT HAND TURNOUT, PLATES ARE TO BE OPPOSITE.
5. FOR EXTENSION PLATE AND DAP TIE DETAILS SEE SHEET ESD-2922-15.

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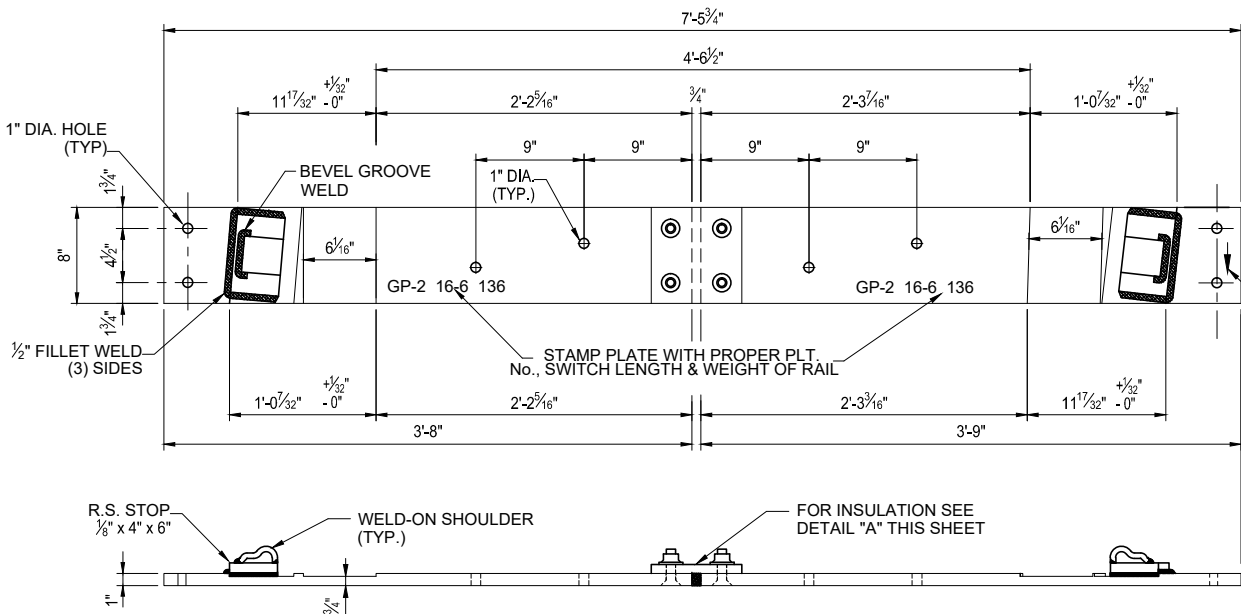


INSULATED GAGE PLATE GP-1 - USED AT POINT OF SWITCH
 1" x 8" - MILLED - W/ INSULATION & ADJ. RAIL BRACES
 (1 PC. REQ'D AS SHOWN) (SCALE: NONE)

NOTE:
 SERRATED WASHER AND BRACE PLATE NOT SHOWN FOR CLARITY.

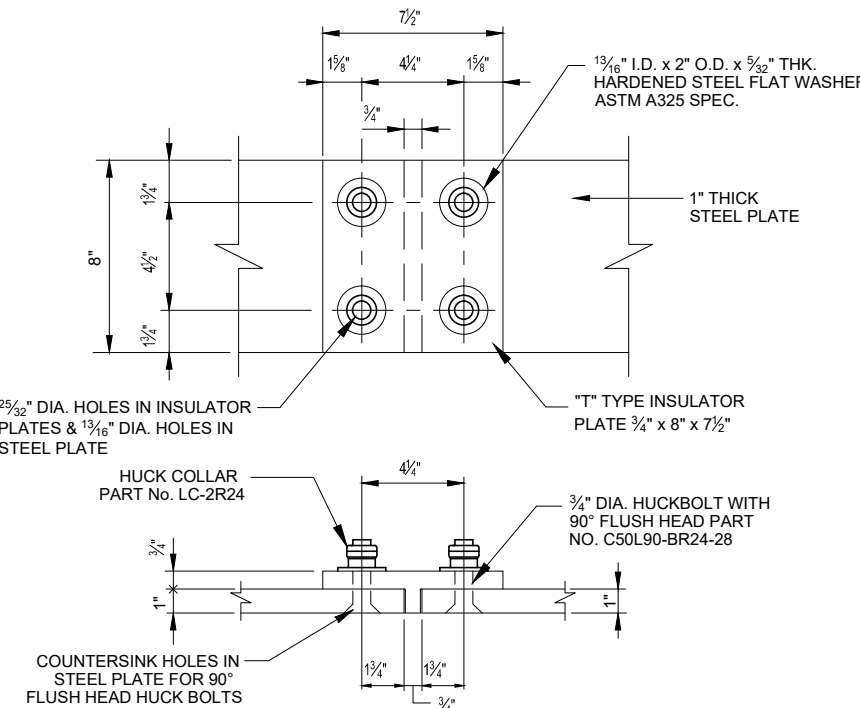


INSULATED GAGE PLATE PP
 1" x 8" - FLAT - W/ INSULATION (3 PC. REQ'D AS SHOWN)
 (SCALE: NONE)

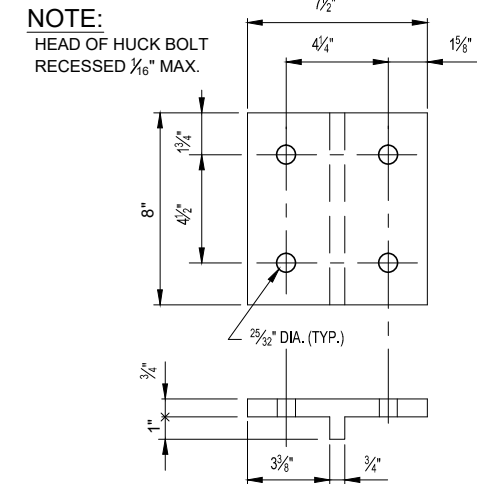


INSULATED GAGE PLATE GP-2 - USED AT POINT OF SWITCH
 1" x 8" - MILLED - W/ INSULATION & ADJ. RAIL BRACES
 (1 PC. REQ'D AS SHOWN) (SCALE: NONE)

NOTE:
 SERRATED WASHER AND BRACE PLATE NOT SHOWN FOR CLARITY.



**GAGE PLATE
 INSULATED JOINT ASSEMBLY GPI-77**



NOTE:
 HEAD OF HUCK BOLT RECESSED 1/16" MAX.


DETAIL OF INSULATION BLOCK
 POLYESTER COATED STEEL CORE
 W/ BUSHINGS, PORTEC 127-07547-01
 OR FIBERGLASS REINFORCED THERMOSET RESIN.
 PURCHASE PART NO. GPI52P05
 OR APPROVED EQUAL

REFERENCE DRAWINGS

LAYOUT - No. 10, R.H. TURNOUT - 136 lb. SHEET ESD-2922-02
 DETAILS - SWITCH EXTENSION PLATE & DAP TIES SHEET ESD-2922-15

REV.	DATE	DESCRIPTION	DES.	ENG.

REVISIONS	DRAWN RAILPROS
	CHECKED B. SMITH
	RECOMMENDED W. PREY
	DATE 5/27/15
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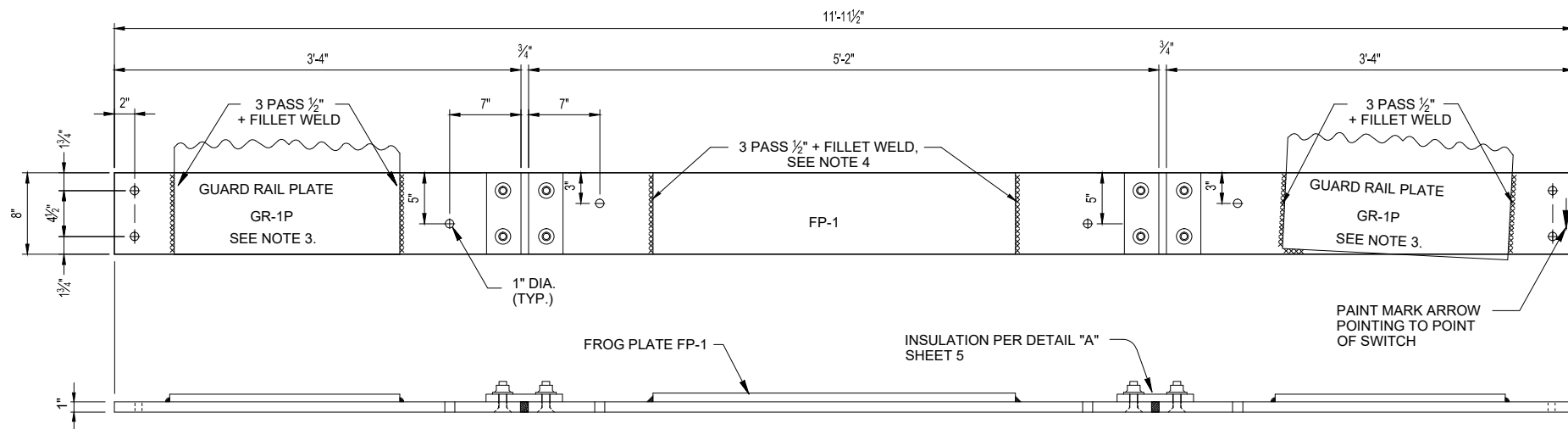


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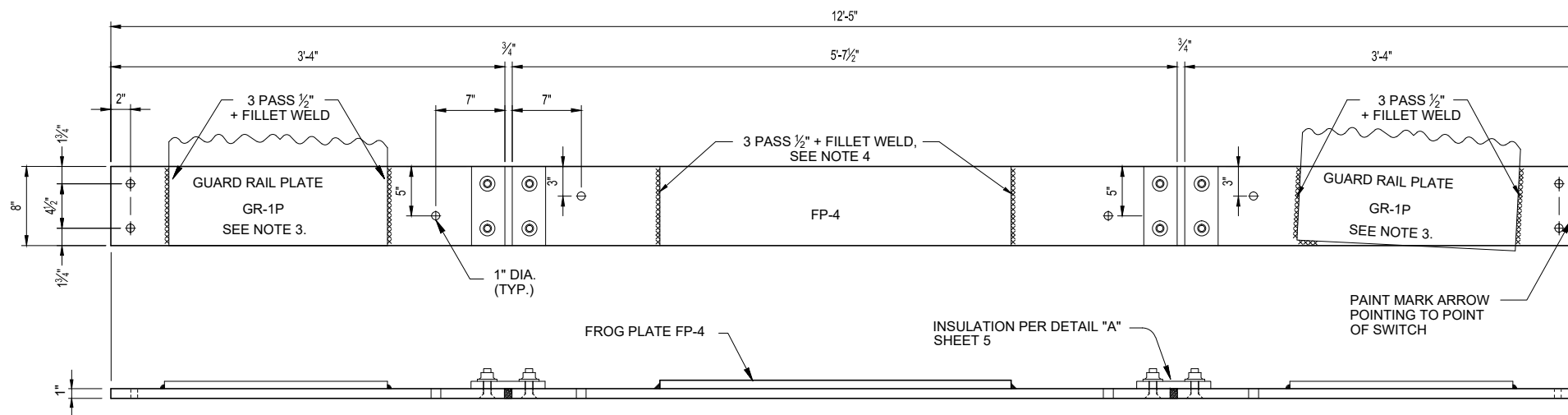
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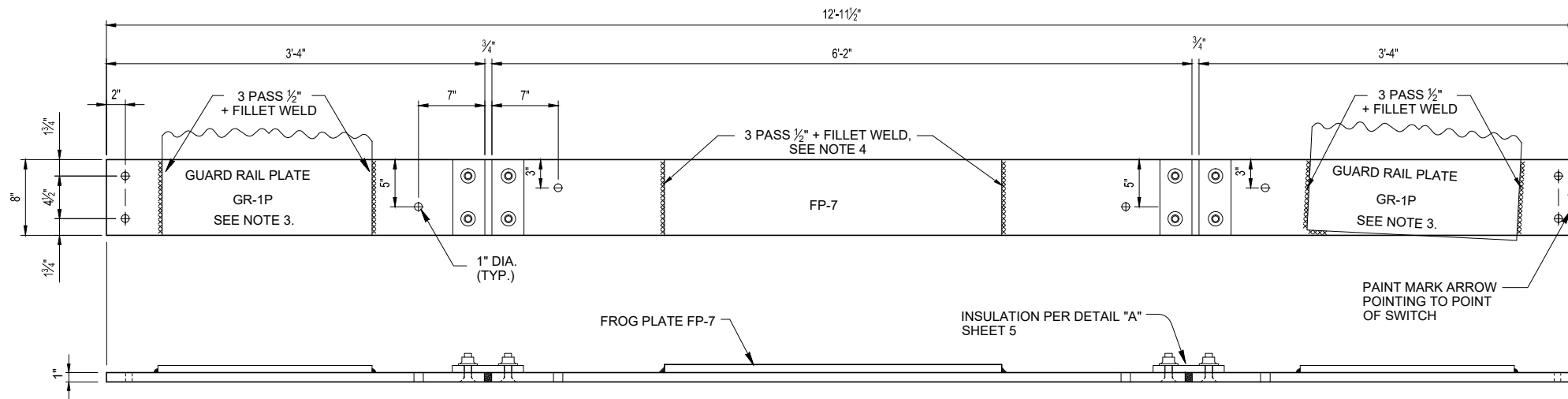
ENGINEERING STANDARD DRAWINGS	DRAWING NO. ESD-2922-05
NO. 10 SPRING RAIL FROG TURNOUT - GAGE PLATES	DRAWING SHEET NO. 5 OF 15
	SCALE: NONE
	CONTRACT SHEET NO.



INSULATED FROG GAGE PLATE - FG-1P
 3/4" x 8" - FLAT - W/ INSULATION (1 PC. REQ'D AS SHOWN)



INSULATED FROG GAGE PLATE - FG-2P
 3/4" x 8" - FLAT - W/ INSULATION (1 PC. REQ'D AS SHOWN)



INSULATED FROG GAGE PLATE - FG-3P
 3/4" x 8" - FLAT - W/ INSULATION (1 PC. REQ'D AS SHOWN)

NOTES:

1. PLATES TO BE MADE OF MILD ROLLED STEEL.
2. THE PLATES AS SHOWN ARE FOR A 136 LB., NO. 10, RIGHT HAND, HAND OPERATED TURNOUT. FOR A LEFT HAND TURNOUT, PLATES ARE TO BE OPPOSITE.
3. GUARD RAIL PLATES ARE TO BE INSTALLED AND WELDED TO THE FROG GAGE PLATES IN THE FIELD WITH A 3 PASS 1/2" + FILLET WELD CONTINUOUS ON BOTH ENDS OF THE PLATE. PLATES ARE TO BE WELDED ONLY AFTER THE GAGE PLATE AND THE FROG PLATE IS SECURED IN THE PROPER LOCATION ON THE TIE WITH PROPER ALIGNMENT.
4. FROG BASE PLATES FP-1, FP-4 AND FP-7 ARE TO BE WELDED TO THE FROG GAGE PLATES IN THE FIELD WITH A 3 PASS 1/2" + FILLET WELD CONTINUOUS ON BOTH ENDS OF THE PLATE. PLATES ARE TO BE WELDED ONLY AFTER THE GAGE PLATE AND THE FROG IS SECURED IN THE PROPER LOCATION ON THE TIE WITH PROPER ALIGNMENT.

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REFERENCE DRAWING

LAYOUT - No.10, R.H. TURNOUT - 136 lb. ----- SHEET ESD-2902-02

REV.	DATE	DESCRIPTION	DES.	ENG.

REVISIONS	DRAWN RAILPROS
CHECKED B. SMITH	
RECOMMENDED W. PREY	
DATE 5/27/15	
DESIGNER PE STAMP	

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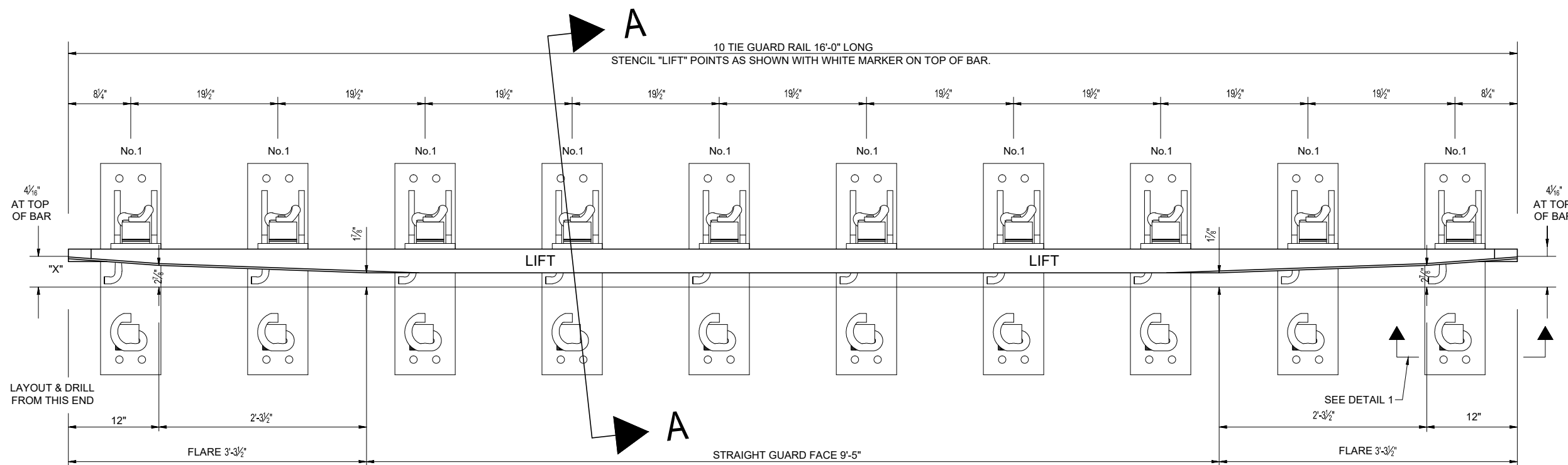
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ENGINEERING STANDARD DRAWINGS

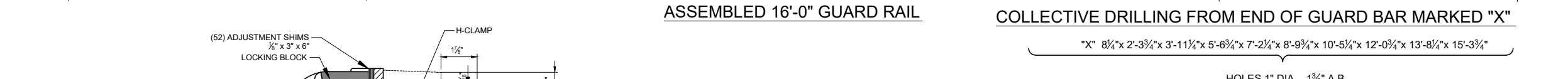
NO. 10 SPRING RAIL FROG TURNOUT - FROG GAGE PLATES

DRAWING NO. ESD-2922-06
DRAWING SHEET NO. 6 OF 15
SCALE: NONE
CONTRACT SHEET NO.

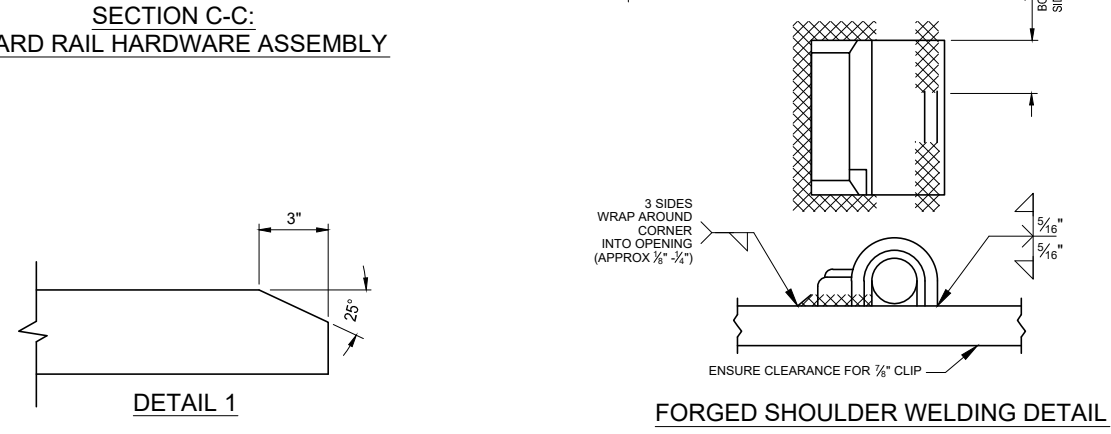
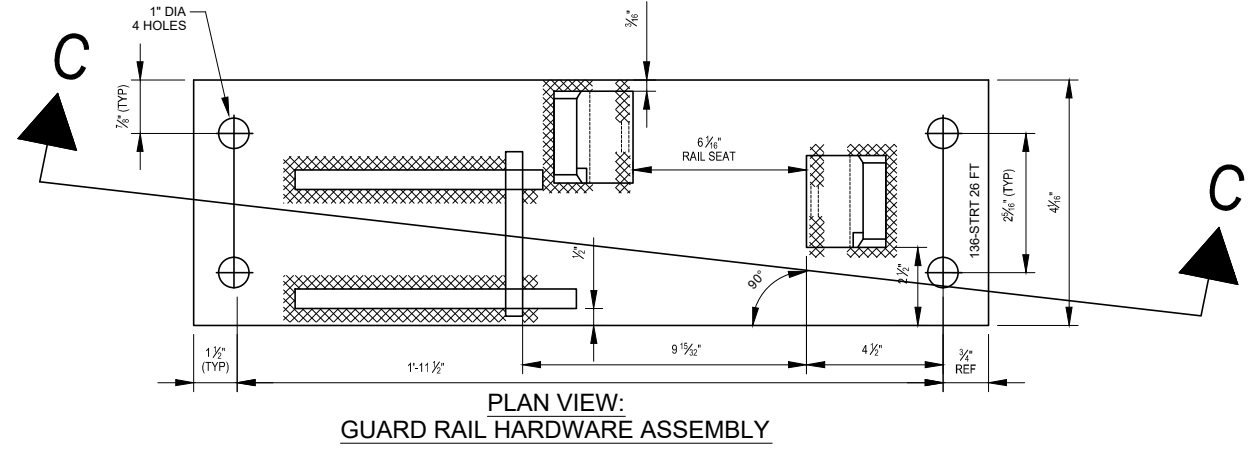
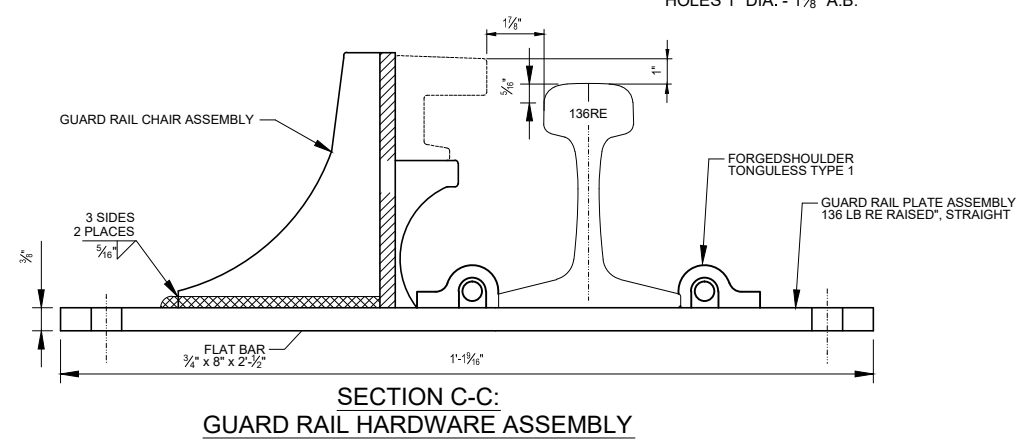
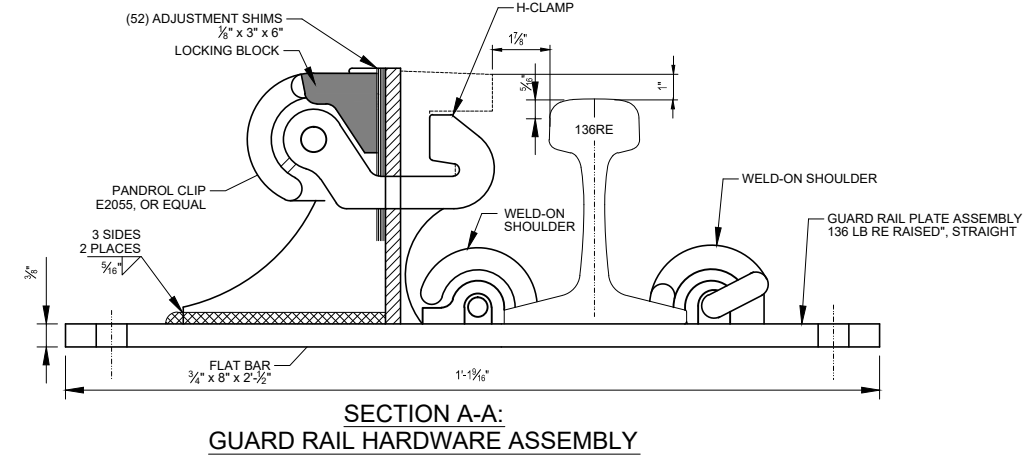


BILL OF MATERIAL	
QTY	DESCRIPTION
1	GUARD BAR, UIC33 1200 SERIES x 26' -0" LONG
10	GUARD RAIL PLATE ASSEMBLY, 136 LB RE RAISED 1", STRAIGHT
10	H-CLAMP
30	CLIP, PANDROL E2055 OR EQUAL
10	LOCKING BLOCK
40	SHIM, 1/2" x 3" x 6"

- NOTES:**
- GUARD RAIL SECTION U.I.C. 33 1200 SERIES (U69) UIC 860.0 GRADE 90A (GUARD FACE BRINELL 319 MIN.)
 - BASE PLATE, BRACKET AND SHIMS MILD STEEL PER A.R.E.M.A. SPECIFICATION M7.
 - PANDROL H-CLAMP OR APPROVED EQUAL.
 - WORKMANSHIP AND TOLERANCES PER A.R.E.M.A. SPECIFICATIONS FOR SPECIAL TRACKWORK.
 - WELDING PER ANSI A5.1 D1.1-92 OR LATEST REVISION.
 - PLATE SPACING IS SET FOR SHIPPING ONLY. FINAL PLATE SPACING IS TO BE DETERMINED BY TIE SPACING AT TIME OF INSTALLATION.
 - PANDROL SPRING CLIPS TO BE INCLUDED IN ASSEMBLY.
 - LIFT POINTS AND WEIGHT OF ASSEMBLY TO BE MARKED ON HEAD OF WEAR BAR WITH WHITE PAINT.
 - PLATE IS TO BE STAMPED WITH PLATE I.D. WITH 1/2" HIGH CHARACTERS AS SHOWN.
 - GRIND AWAY CORNER OF PANDROL SHOULDER TO CLEAR FOOT OF CHAIR ASSEMBLY.



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REVISIONS		DES.	ENG.
REV.	DATE	DESCRIPTION	

DRAWN RAILPROS
CHECKED B. SMITH
RECOMMENDED B. SCHMITH
DATE 4/25/17
DESIGNER PE STAMP

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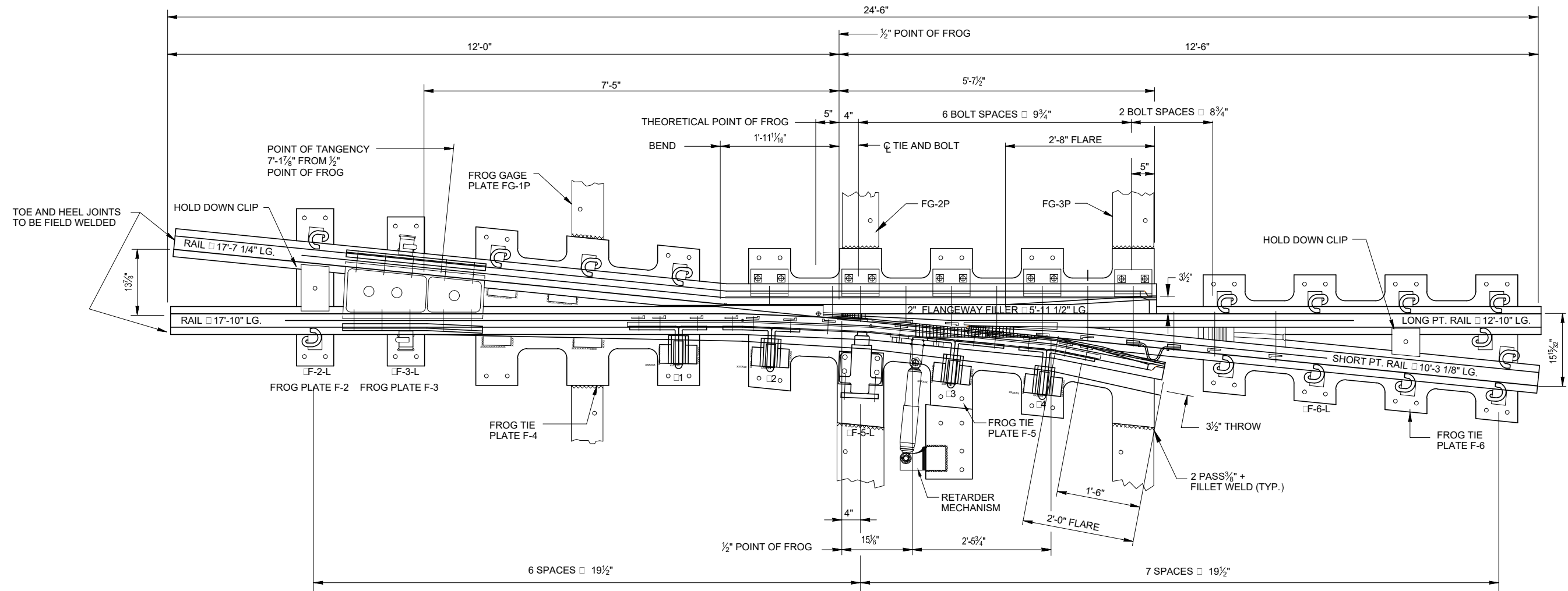
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ENGINEERING STANDARD DRAWINGS

NO. 10 SPRING RAIL FROG TURNOUT -
16'-6" GUARD RAIL

DRAWING NO. ESD-2922-07
DRAWING SHEET NO. 7 OF 15
SCALE: NONE
CONTRACT SHEET NO.



NO. 10 SPRING RAIL STEEL FROG
(SHOWN WITH RETARDER MECHANISM)

NOTES:

1. FROG ANGLE 5°-43'-29".
2. RAIL TO BE 136 LB. HIGH STRENGTH FOR ENTIRE TURNOUT.
3. SPRING RAIL FROG PER A.R.E.M.A. PLAN NO. 401-82 MODIFIED FOR ARM LENGTHS, PLATES WITH CLIP FASTENERS AND BODY BOLT SPACING.
4. ALL FROG PLATES SHALL BE STAMPED IN 1/2" CHARACTERS TO INDICATE MFG., FROG NO., R.H., RAIL SECTION AND PLATE NUMBER. MARK TO BE STAMPED ON SAME END OF ALL FROG PLATES.
5. A MARKER PLATE SHALL BE PLACED ON THE RIGID WING RAIL NEAR THE 1/2 POINT OF FROG IN RAISED OR DEEPLY CUT CHARACTERS TO INDICATE MFG., FROG NO. 10, R.H., SPRING, RAILS SECTION, DATE MADE AND MFG'S SERIAL NO. IF ANY.
6. WORKMANSHIP AND MATERIALS SHALL BE PER CURRENT A.R.E.M.A. SPECIFICATIONS FOR "SPECIAL TRACKWORK", EXCEPT AS OTHERWISE SPECIFIED.
7. ANY CONSTRUCTION DETAILS NOT SHOWN SHALL BE IN ACCORDANCE WITH CURRENT A.R.E.M.A. RECOMMENDED PRACTICE.
8. FROG PLATES ARE DESIGNED TO BE INSTALLED PERPENDICULAR TO MAIN TRACK.
9. WELD-ON SHOULDERS MUST MEET APPROVED DESIGN SPECIFICATIONS.
10. HOLES IN PLATES FOR SCREW SPIKES ARE DRILLED 1" DIA.
11. BODY BOLTS TO BE 1 3/8" DIAMETER, HEAT TREATED CARBON STEEL, GRADE 8, WITH 3/8" SPRING WASHER AND BEVELED HEAD LOCK.
12. HORN AND CAST STEEL TOE BLOCK BOLTS TO BE 1" DIAMETER, HEAT TREATED CARBON STEEL, GRADE 8 WITH SQUARE NUTS, 3/8" SPRING WASHER AND BEVELED HEADLOCK.
13. SPRING BOX BOLTS TO BE 7/8" DIAMETER, HEAT TREATED CARBON STEEL, GRADE 8, COUNTERSUNK, SQUARE NECK WITH SPRING WASHERS.
14. DURING MANUFACTURING OF FROG PLATES, SET STOPS, HOLD DOWN HORNS AND SPRING BOX FOR SPRING WING RAIL TO OPEN 2" AT BEND. LOCATE ITEMS PERPENDICULAR TO FULLY OPENED SPRING WING RAIL. HOLD DOWN HOUSING TO BE CENTERED ON HORN WITH SPRING WING RAIL AT HALF OPEN POSITION. OTHER ITEMS TO BE APPROXIMATELY CENTERED ON CENTERLINE OF SWITCH TIE.
15. SPRING ASSEMBLY WITH BOLT THROUGH RIGID AND SPRING WING RAILS AT THEORETICAL POINT OF FROG MAY BE USED IN PLACE OF A.R.E.M.A. SPRING BOX. SUBSTITUTE HOLD DOWN HORN FOR SPRING BOX.
16. THE NUMBER OF BOLTS AND BOLT SPACING FOR HOLD DOWN HORNS TO BE ADJUSTED AS REQUIRED TO ALLOW CLEARANCE FOR BODY BOLTS AND OTHER FROG COMPONENTS DURING MOVEMENT OF SPRING WING RAIL.
17. THE TOE BLOCK TO BE CAST STEEL PER A.R.E.M.A. PLAN NO. 401-82. JOINT BAR NEXT TO SPRING WING RAIL TO BE BENT TO ALIGNMENT OF FULLY OPEN SPRING WING RAIL (2" OPENING). REGULAR BOLT WITH THIMBLE TO BE USED INSTEAD OF SHOULDER BOLT. MANUFACTURER MAY SUBMIT ALTERNATE DESIGN FOR TOE BLOCK FOR APPROVAL PRIOR TO MANUFACTURING.
18. FROG SHOWN IS PER NOTE 3 ABOVE. IF ANOTHER SPRING RAIL FROG IS USED, SHOP DRAWINGS MUST BE APPROVED BY THE NCTD MANAGER MAINTENANCE OF WAY.
19. RAIL END TO BE DRILLED OUTSIDE TWO HOLES OF JOINT PER ESD-2502.

NOTE:

ON SPRING RAIL FROGS, BONDS TO BE INSTALLED ON RIGID WING RAIL SIDE. DISTANCE BETWEEN TERMINALS IS SHOWN AS 1". THIS DIMENSION MAY DECREASE, WHEN NECESSARY, DUE TO LIMITED DISTANCE FROM BOLT TO END OF RAIL. WHEN A PLATE CLIP ON SPRING RAIL FROGS INTERFERES WITH APPLICATION OF BONDS AS SHOWN HEREON, THE PLATE CLIP SHOULD BE ALTERED TO PERMIT PROPER INSTALLATION OF THE BONDS. USE A 12" BOND OF WELDED OR PLUG - IN TYPE.

INSTALLATION OF FROG FIELD WELDS:

FROG TO BE INSTALLED WITH FIELD WELDS ON MAIN TRACK (STRAIGHT) SIDE IN ALL CASES. FIELD WELDS ARE USED ON TURNOUT (CURVED) SIDE IF USED BY THROUGH TRAFFIC OR MORE THAN ONCE PER DAY. BOLTED JOINTS PER ESD-2502 ARE TO BE USED ON TURNOUT SIDE IF TURNOUT USE DOES NOT EXCEED ABOVE LIMITS.

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REV.	DATE	DESCRIPTION	DES. ENG.

DRAWN RAILPROS
CHECKED B. SMITH
RECOMMENDED W. PREY
DATE 5/27/15
DESIGNER PE STAMP

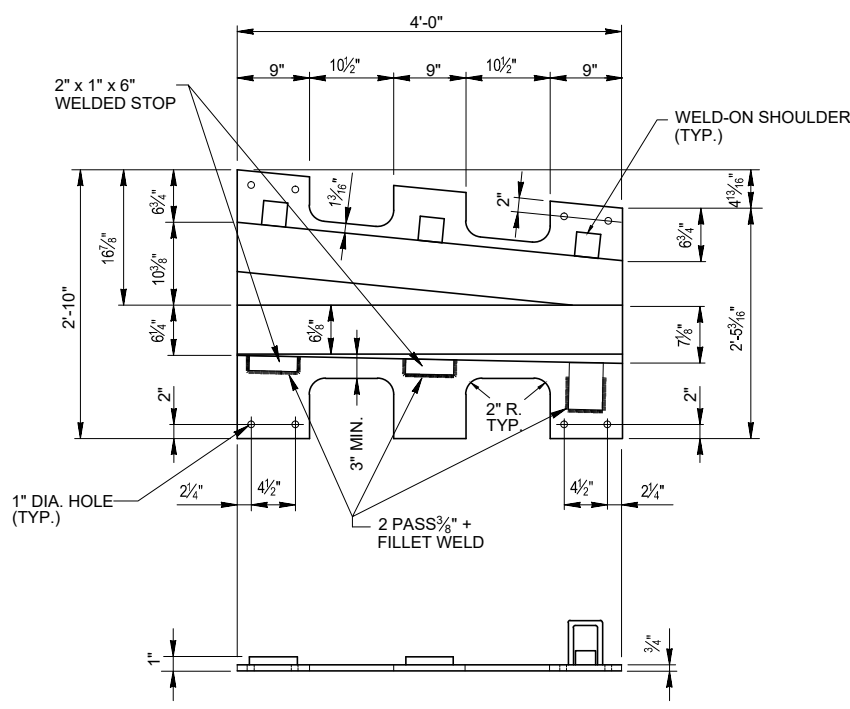
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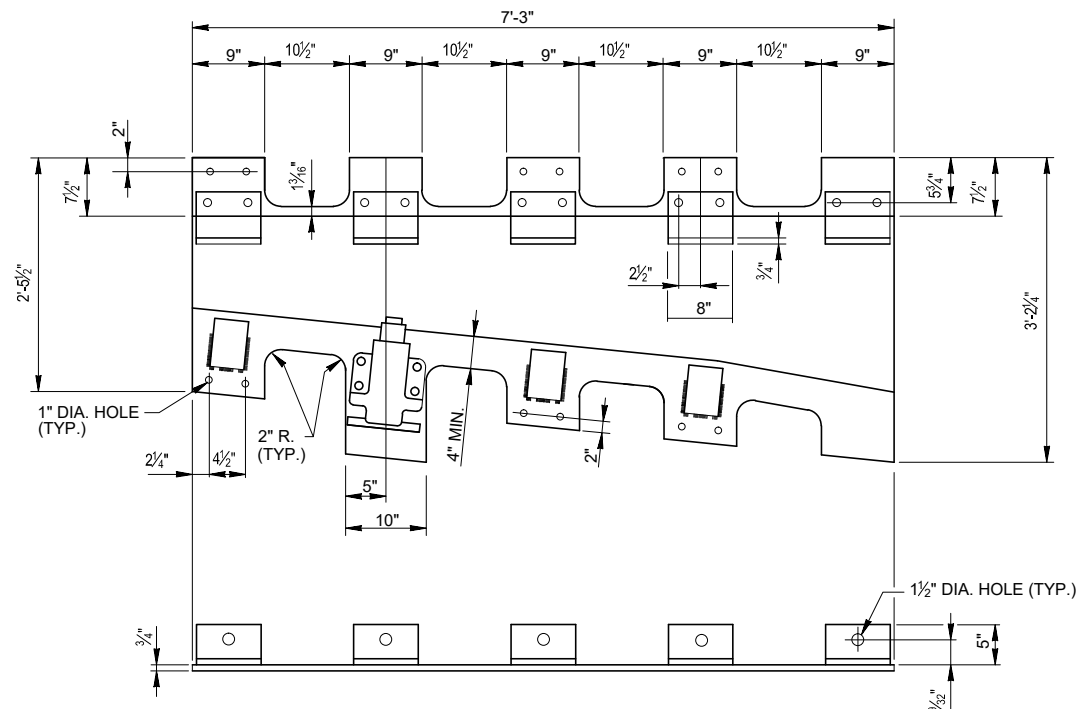
ENGINEERING STANDARD DRAWINGS
NO. 10 SPRING RAIL FROG

DRAWING NO. ESD-2922-08
DRAWING SHEET NO. 8 OF 15
SCALE: NONE
CONTRACT SHEET NO.

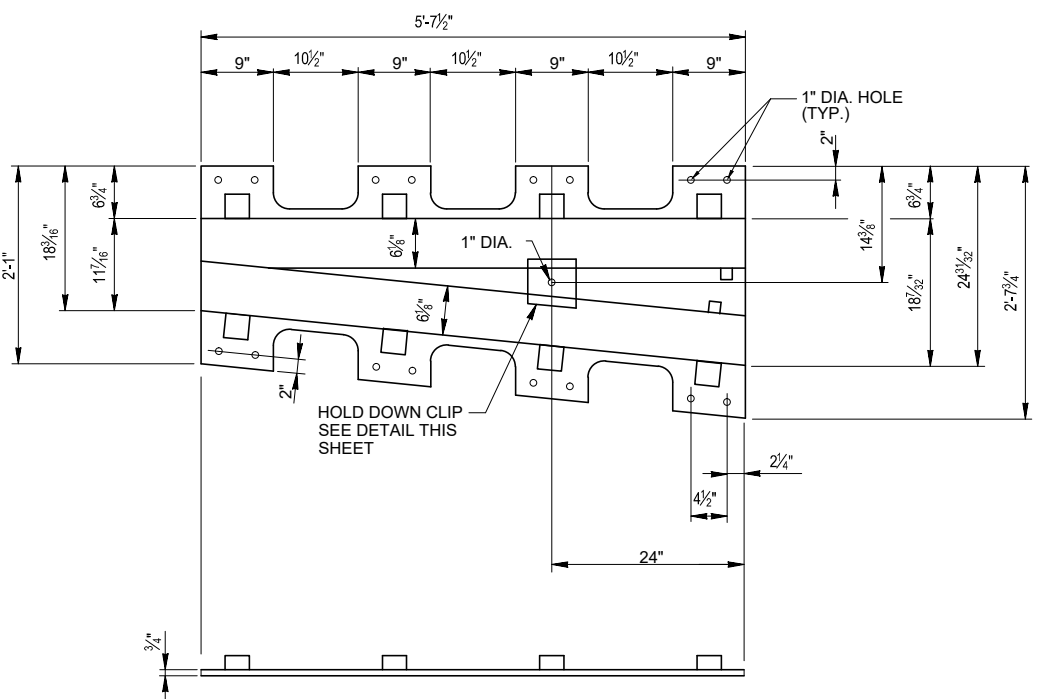
NOTE:
FOR NOTES AND FROG LAYOUT SEE ESD-2922-08.



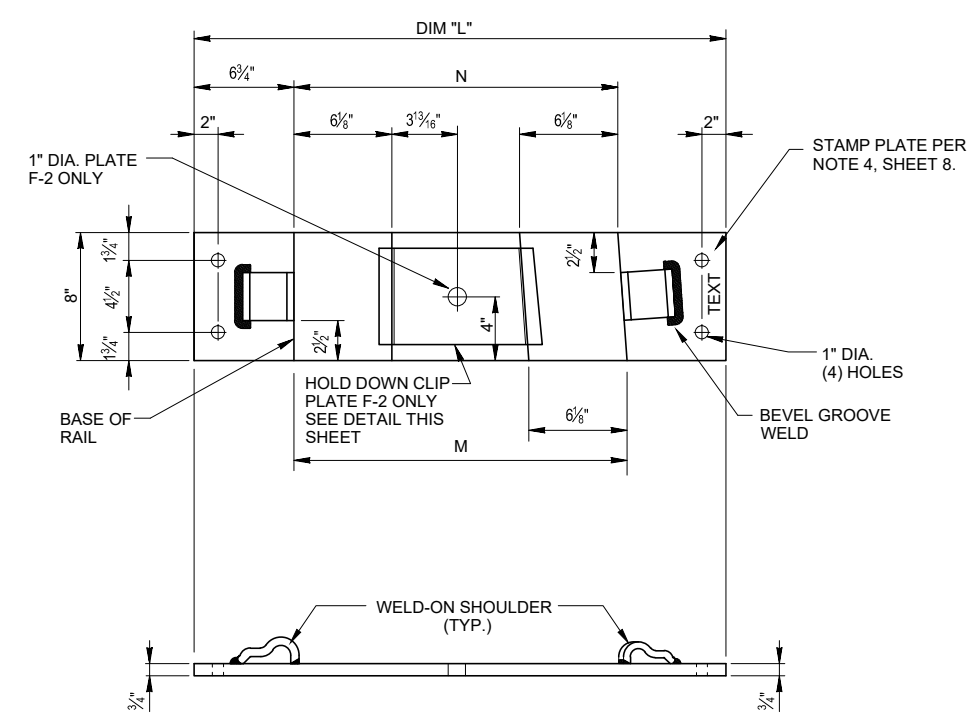
FROG PLATE - F-4



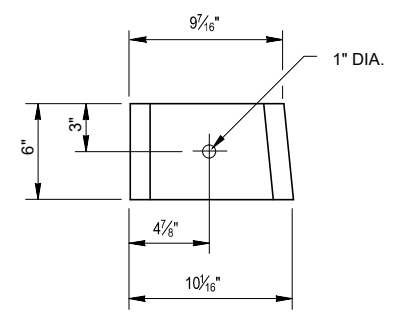
FROG PLATE - F-5



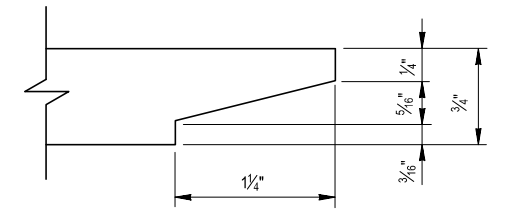
FROG PLATE - F-6



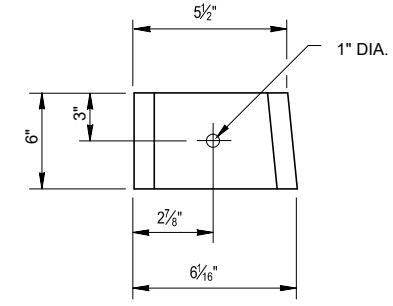
FROG PLATE - F-2 AND F-3
3/4" x 8" x DIM "L" - FLAT - W/ CLIPS
(SCALE: NONE)



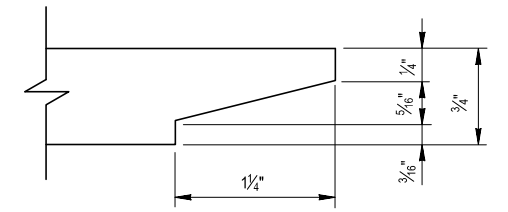
HOLD DOWN CLIP
FOR PLATE - F-2
SCALE: NONE



END DETAIL - BOTH ENDS
SCALE: NONE



HOLD DOWN CLIP
FOR PLATE - F-6
SCALE: NONE



END DETAIL - BOTH ENDS
SCALE: NONE

PLATE	DIM "L"	DIM "M"	DIM "N"	PLTS REQ'D.
F-2	2'-9 3/4"	20 1/4"	19 1/2"	1 EA.
F-3	2'-8"	18 3/8"	17 3/8"	1 EA.

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REV.	DATE	DESCRIPTION	DES.	ENG.

REVISIONS	DRAWN RAILPROS
	CHECKED B. SMITH
	RECOMMENDED W. PREY
	DATE 5/27/15

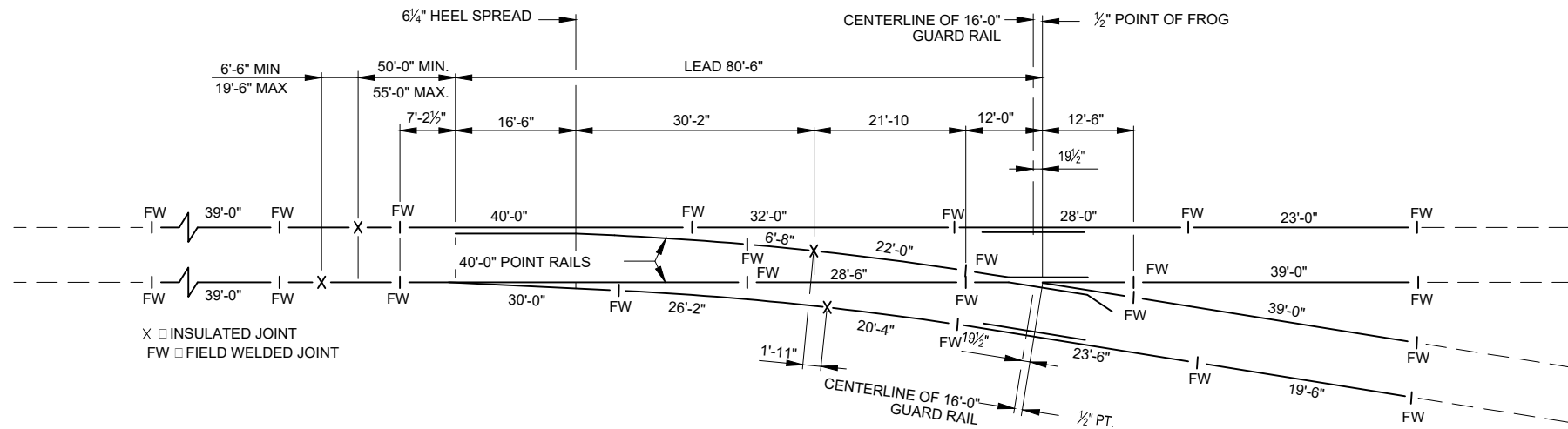
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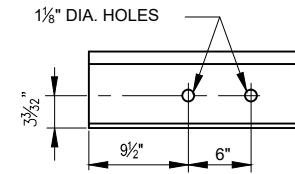
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ENGINEERING STANDARD DRAWINGS
NO. 10 SPRING RAIL FROG TURNOUT - FROG PLATES

DRAWING NO.	ESD-2922-09
DRAWING SHEET NO.	9 OF 15
SCALE:	NONE
CONTRACT SHEET NO.	



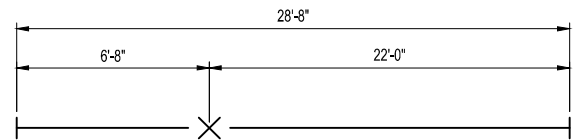
TURNOUT



DETAIL "A"
SEE NOTE (b)
(DRILLED HOLES NOT NECESSARY
IF TEMPORARY BOLTED JOINTS
ARE NOT REQUIRED)

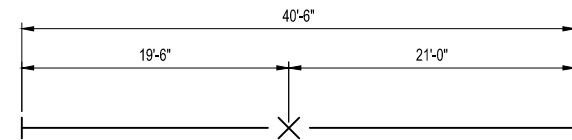
NOTES:

1. THE PERMISSIBLE VARIATION IN STANDARD LENGTHS OF RAILS, FROGS AND SWITCH POINTS IS GREATER THAN THE NORMAL EXPANSION GAPS AT RAIL JOINTS AND THICKNESS OF FIBRE END POST IN INSULATED JOINTS, NO ALLOWANCE HAS BEEN MADE FOR EXPANSION GAPS AND FIBRE END POSTS IN COMPUTING LENGTHS OF RAILS SHOWN. DIMENSIONS OF TURNOUT AND ALL COMPONENTS IS FOR A THERMAL, STRESS - FREE CONDITION OF 105° F. ACTUAL EXACT LENGTHS OF RAILS TO BE INSTALLED IS TO BE FIELD - ADJUSTED TO FIT OVERALL TURNOUT DIMENSIONS, THERMAL ADJUSTMENTS, THICKNESS OF WELDS AND VARIATIONS IN COMPONENT RAIL LENGTH.
2. RAIL LAYOUT SHOWN FOR TURNOUT IS TO BE USED IN ALL CASES, EXCEPT WHERE COMPROMISE JOINTS ARE REQUIRED BETWEEN THE FROGS IN A CROSSOVER TRACK. WHEN COMPROMISE JOINTS ARE TO BE USED TO JOIN DIFFERENT RAIL WEIGHTS, THE INSULATED JOINTS IN THE CROSSOVER TRACK SHALL ALWAYS BE OF THE HEAVIER RAIL SECTION. THE DESCRIPTIONS OF THE CHANGES IN RAIL LAYOUT WHEN COMPROMISE JOINTS ARE REQUIRED IN THE CROSSOVER TRACK ARE BASED ON AN ASSUMPTION THAT TRACK "H" IS LAID WITH HEAVIER RAIL THAN TRACK "L". CROSSOVER ON 15'-0" TRACK CENTERS AT LOCATION "A" THE 19'-6" RAIL SHALL BE REPLACED WITH 8'-0" OF THE HEAVIER RAIL AND 11'-6" OF THE LIGHTER RAIL. AT LOCATION "B" THE 21'-3" RAIL SHALL BE REPLACED WITH 7'-0" OF THE HEAVIER RAIL AND 14'-3" OF THE LIGHTER RAIL.
3. IN ADDITION TO NOTE 1. NO ALLOWANCE HAS BEEN MADE IN RAIL LENGTHS TO PROVIDE GAPS NEEDED TO MAKE FIELD WELDS. IN THE FIELD IT MAY BE NECESSARY TO CUT RAIL ENDS TO PROVIDE CORRECT GAPS FOR FIELD WELDS.
4. FURNISH ALL RAIL SHOWN IN SOLID LINES ON THIS DRAWING:
(A.) RAILS LONGER THAN 39'-0" SHALL BE CONTINUOUS WELDED RAIL (CWR), TO BE FURNISHED WITH BOTH ENDS LEFT BLANK FOR WELDING IN THE FIELD.
(B.) ALL OTHER RAILS SHALL BE 39'-0" OF SHORTER AS SPECIFIED ON THE DRAWING, WITH BOTH ENDS DRILLED PER DETAIL "A".
5. ALL RAIL FURNISHED FOR TURNOUT AND CROSSOVERS SHALL BE "HEAD HARDENED" EXCEPT GUARD RAILS.
6. LOCATIONS OF INSULATED JOINTS ARE SHOWN ON TURNOUT AND CROSSOVER DIAGRAMS WITHOUT TOLERANCES. OR IF TOLERANCES ARE PERMISSIBLE, WITH (+ OR -). ALL INSULATED JOINTS ARE TO BE PROPERLY SUSPENDED IN CRIB AREA BETWEEN TWO TIES LOCATED 4" MINIMUM FROM EDGE OF NEAREST TIE TO EDGE OF INSULATED JOINT. INSULATED JOINT MUST BE INSTALLED TO BE CENTERED BETWEEN TWO (2) TIES. FIELD WELDED JOINTS DESIGNATED "FW" SHOULD BE IN CRIB AREA BETWEEN TWO TIES LOCATED 4" MINIMUM FROM EDGE OF NEAREST TIE AND WELDED JOINT. DIMENSIONS SHOWN IN PARENTHESIS (0'-0") ARE EXACT. RAILS FURNISHED FOR THESE LOCATIONS ARE LONGER AND MUST BE FIELD ADJUSTED (CUT) WITHIN TOLERANCES SHOWN IN BRACKETS (0'-0") WHEN INSULATED JOINTS WITH TOLERANCES AND FIELD WELDED JOINTS FALL SHORT OF MINIMUM CLEARANCE FROM TIE OR TIE PLATE THE JOINT MAY BE MOVED WITHIN TOLERANCE LIMITS. BONDED INSULATED JOINT ASSEMBLIES AND STOCK RAILS ARE FURNISHED LONGER THAN SHOWN IN PARENTHESIS ON LAYOUT. THESE OR THEIR ADJACENT CONNECTING RAILS MUST BE TRIMMED IN THE FIELD TO FIT.
7. ORDER POINT END AND HEEL END OF STOCK RAIL DRILLED AND PEENED.
8. INSULATED JOINTS SHALL BE SAWCUT SQUARE.



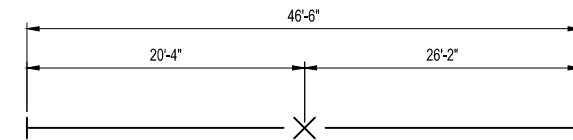
28'-8" LONG ADHESIVE BONDED PREFABRICATED INSULATED RAIL JOINT ASSEMBLY

(SEE NOTE 5) BOTH ENDS SHALL BE LEFT BLANK FOR WELDING IN THE FIELD



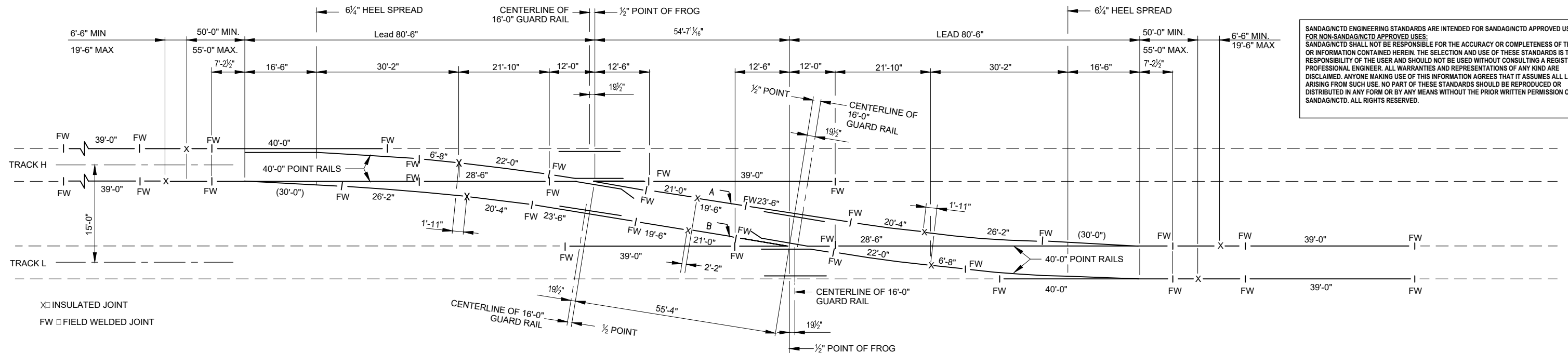
40'-6" LONG ADHESIVE BONDED PREFABRICATED INSULATED RAIL JOINT ASSEMBLY

(SEE NOTE 5) BOTH ENDS SHALL BE LEFT BLANK FOR WELDING IN THE FIELD



46'-6" LONG ADHESIVE BONDED PREFABRICATED INSULATED RAIL JOINT ASSEMBLY

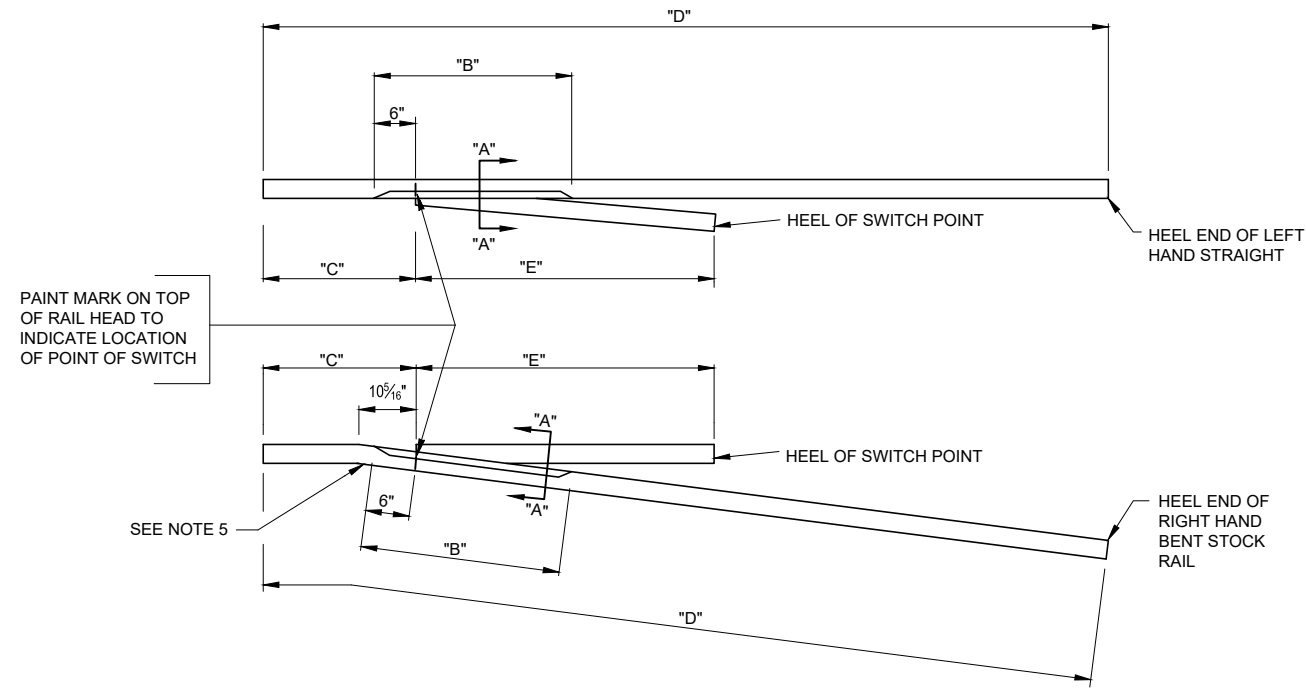
(SEE NOTE 5) BOTH ENDS SHALL BE LEFT BLANK FOR WELDING IN THE FIELD



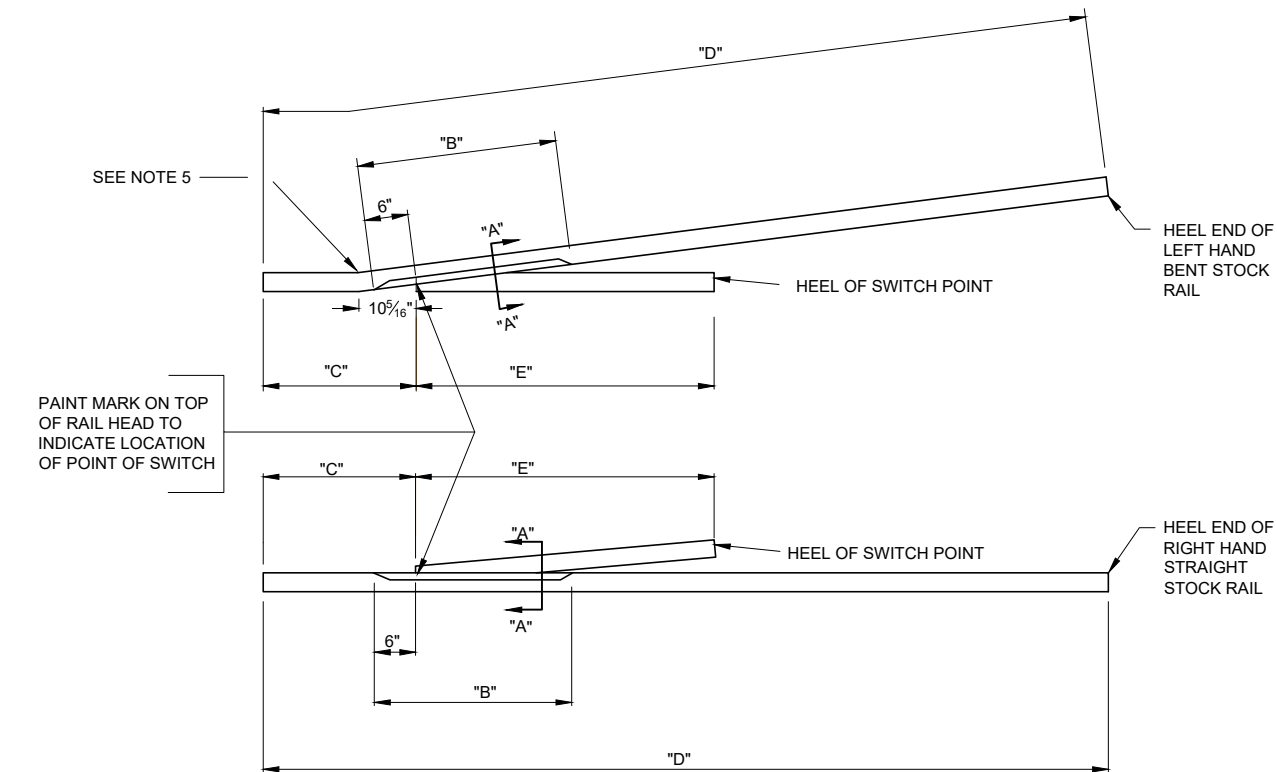
CROSSOVER
15'-0" TRACK CENTERS

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				CHECKED B. SMITH				NO. 10 SPRING RAIL FROG TURNOUT AND CROSSOVER INSULATED JOINT DIAGRAM		DRAWING SHEET NO. 10 OF 15
				RECOMMENDED W. PREY						SCALE: NONE
				DATE 5/27/15						CONTRACT SHEET NO.
REV.	DATE	DESCRIPTION	DES.	ENG.	DESIGNER PE STAMP					



STOCK RAILS SHOWN ARE FOR "RIGHT HAND TURNOUT"



STOCK RAILS SHOWN ARE FOR "LEFT HAND TURNOUT"

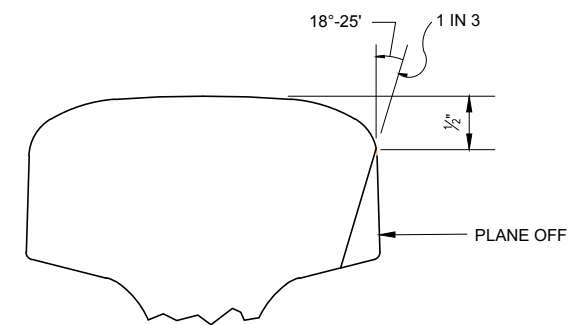
NOTES:

1. INFORMATION OR DIMENSIONS NOTED THUS, "E" TO BE FURNISHED BY FIELD FORCES FOR CORRECT ORDERING OF REPLACEMENT STOCK RAILS.
2. "E" □ LENGTH OF SWITCH POINT.
3. UNDERCUT STOCK RAILS TO BE MADE OF HIGH STRENGTH RAIL WITH ENDS BEVELED PER CURRENT A.R.E.M.A. PLAN NO. 1005.
4. FOR STOCK RAIL UNDERCUT LENGTH "B", PER SECTION "A-A", LENGTH "C" AND "D" FOR NEW SAMSON SWITCH INSTALLATIONS OR REPLACEMENT ORDERS SEE TABLE BELOW.

LENGTHS B, C, & D FOR 136 LB. RAIL									
Sw. Pt. LENGTH	T.O. No.	STOCK RAIL	B	FOR FIRST (NEW) INSTALL.			FOR REPLACE. ORDERS ONLY		
				C	D	END DRILL. SEE NO. 10	C	D	END DRILL. SEE NO. 10
16'-6"	10	STR.	9'-6"	10'-0"	40'-0"	NONE	10'-0"	52'-0"	NONE
16'-6"	10	BENT	9'-6"	10'-0"	30'-0"	HEEL END ONLY	10'-0"	52'-0"	HEEL END ONLY

4. BEND ANGLE IN BENT STOCK RAIL TO BE AS FOLLOWS:

SW. LENGTH	BEND ANGLE	V (VERTEX DIST.)
16'-6"	1°-44'-11" or 1" in 2'-9"	10 ⁵ / ₁₆ "



SECTION "A-A"

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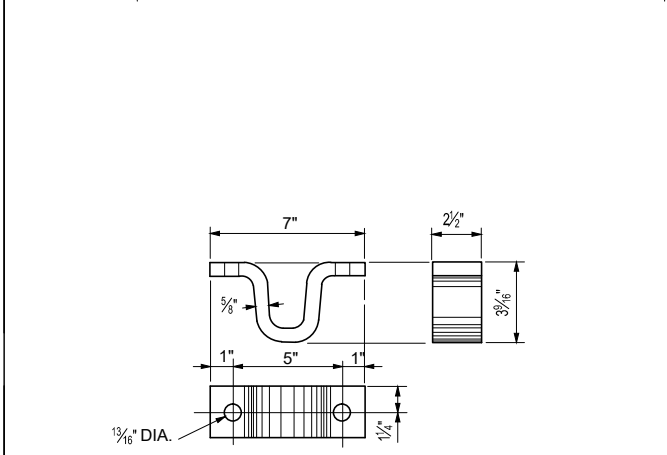
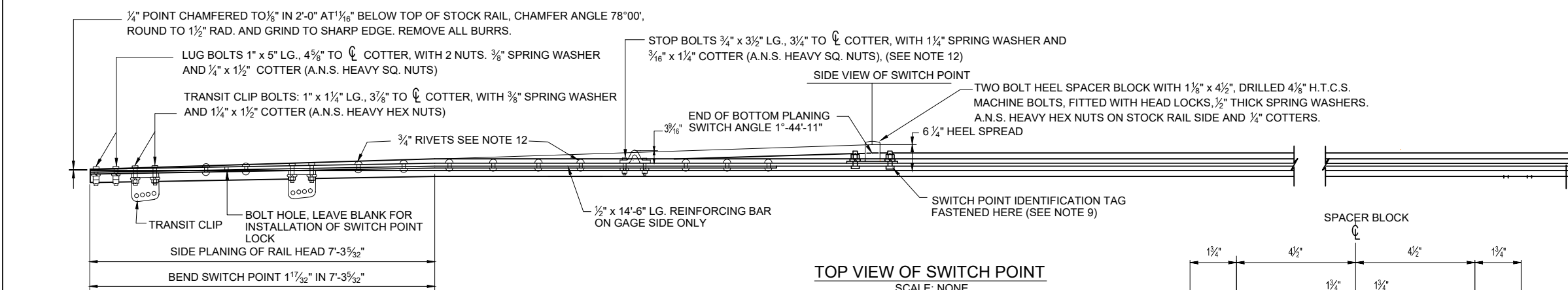
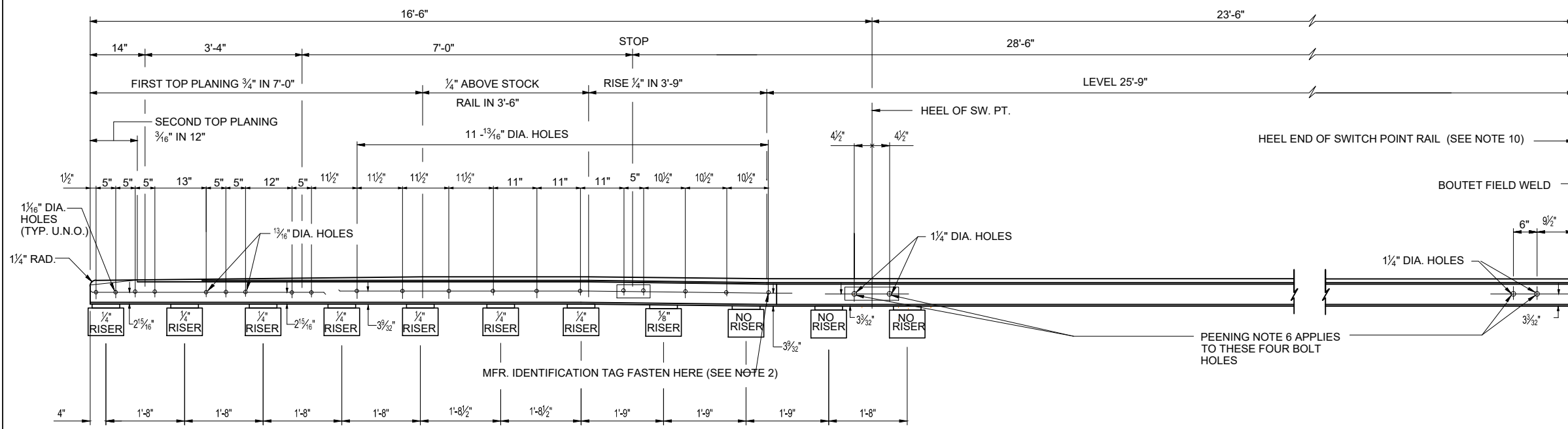
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CHECKED B. SMITH	<i>BS</i>
RECOMMENDED W. PREY	<i>WP</i>
DATE	5/27/15
DESIGNER PE STAMP	

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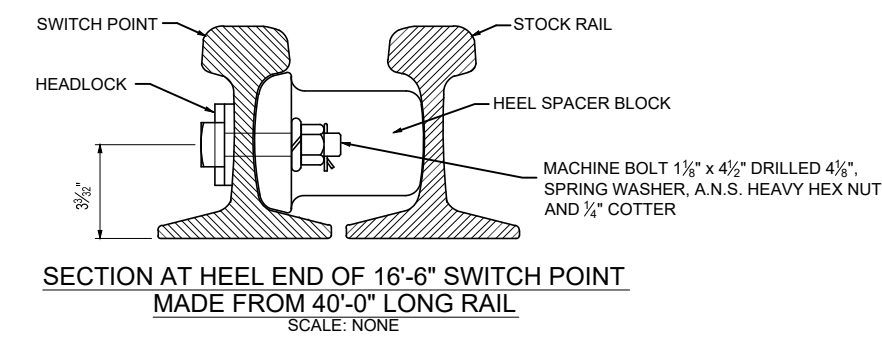
ENGINEERING STANDARD DRAWINGS
 NO. 10 SPRING RAIL FROG TURNOUT -
 UNDERCUT STOCK RAILS FOR 16'-6"
 SWITCH POINT

DRAWING NO.	ESD-2922-11
DRAWING SHEET NO.	11 OF 15
SCALE:	NONE
CONTRACT SHEET NO.	



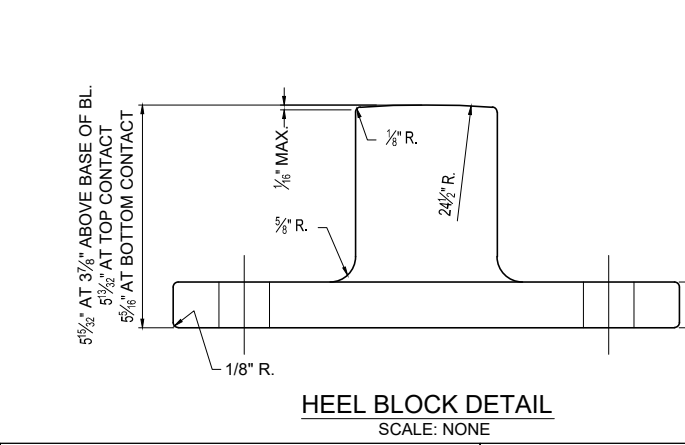
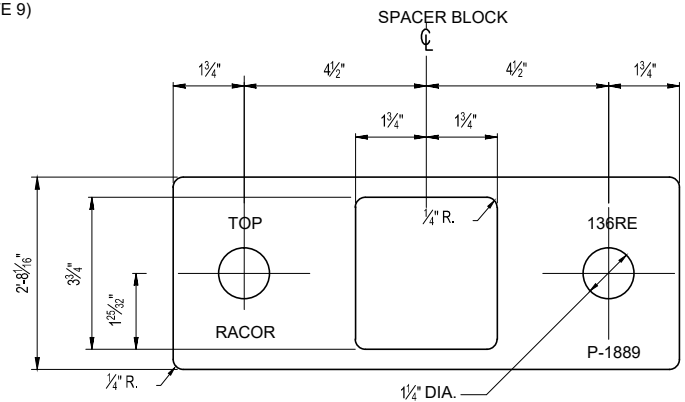
STOP
SCALE: NONE

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SECTION AT HEEL END OF 16'-6" SWITCH POINT MADE FROM 40'-0" LONG RAIL
SCALE: NONE

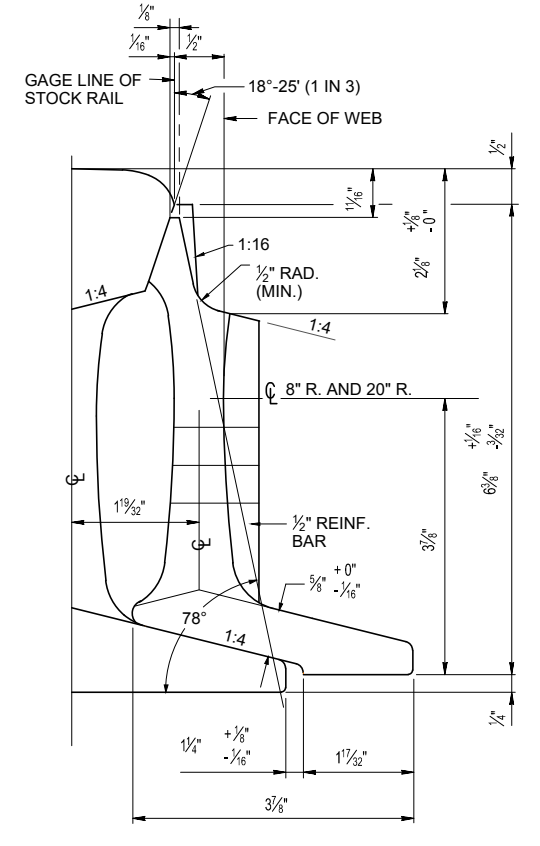
TOP VIEW OF SWITCH POINT
SCALE: NONE



HEEL BLOCK DETAIL
SCALE: NONE

NOTES:

- SWITCH POINTS TO BE MADE FROM 136LB. HIGH STRENGTH RAIL, PAINT MARKED ORANGE.
- METAL IDENTIFICATION TAG SHOWING HAND OF SWITCH POINT, WEIGHT OF RAIL, HS, MANUFACTURER AND WHEN MADE, TO BE FASTENED TO SWITCH POINT AT LOCATION SHOWN.
- RIGHT HAND TURNOUT SHOWN, MAKE OPPOSITE HAND FOR LEFT HAND SWITCH POINTS.
- SIDE PLANING FIGURED ON GAGE LINE 5/8" BELOW TOP OF RAIL.
- MATERIALS AND WORKMANSHIP, ALSO ANY CONSTRUCTION DETAILS NOT SHOWN, SHALL BE PER CURRENT A.R.E.M.A. "TRACKWORK PLANS AND SPECIFICATIONS", UNLESS OTHERWISE SPECIFIED ON THIS PLAN.
- IN ORDER TO ELIMINATE STRESS RAISERS, MANUFACTURER SHALL PEEN THE EDGES OF THE BOLT HOLES AS INDICATED AT THE HEEL OF SWITCH POINT AND AT THE HEEL END OF THE SWITCH POINT RAIL, USING AIR HAMMER WITH SUITABLE HEAD AND FINISHING WITH DRIFT PIN. BRAND ON RAIL AT EDGE OF BOLT HOLE TO BE CAREFULLY REMOVED BY GRINDING BEFORE PEENING.
- ALL SWITCH POINTS WILL BE FURNISHED WITHOUT ALLOY STEEL TIP.
- THE CONTOUR PLANING SHALL BE ON THE GAGE SIDE BEGINNING AT A DISTANCE OF 36" FROM THE POINT OF SWITCH AND SHALL BE SHAPED TO THE CONTOUR OF A NEW 136-LB. RAIL AND SHALL RUN OUT AT THE END OF TOP PLANING, WHERE THE SWITCH POINT HAS FULL HEAD CONTOUR.
- METAL IDENTIFICATION TAG SHOWING (1) DESIGN LENGTH OF SWITCH, (2) IN PARENTHESIS, THE ACTUAL LENGTH OF SWITCH POINT RAIL AND (3) THE TURNOUT NUMBER. MARK TAG THUS: 16'-6" (40'-0") NO. 10. TAG TO BE FASTENED TO SWITCH POINT, ON GAGE SIDE OF RAIL AT HEEL SPACER BLOCK IN LOCATION SHOWN.
- AT HEEL END OF SWITCH POINT RAIL, BREAK SHARP CORNER AROUND THE ENTIRE PERIPHERY BY SLIGHTLY GRINDING. ALSO, "DO NOT" END HARDEN RAIL END.
- NON - INTERLOCKED AND INTERLOCKED SWITCH POINTS ARE MADE THE SAME.
- UNLESS SWITCH POINT ORDER SPECIFICALLY CALLS FOR USE OF 3/4" RIVETS AND 3/4" STOP BOLTS, MANUFACTURER CAN SUBSTITUTE 3/4" HUCK FASTENERS, BOLT PART NO. C-50-LR-BR2416 AND COLLAR PART NO. L3-2-R-24G FOR 3/4" RIVETS, AND FOR 3/4" STOP BOLTS USE HUCK FASTENERS, BOLT PART NO. C-50-LR-BR2424 AND COLLAR PART NO. L3-2-R-24G.



END VIEW OF POINT
SCALE: NONE

REV.	DATE	DESCRIPTION	DES.	ENG.

REVISIONS	DRAWN RAILPROS
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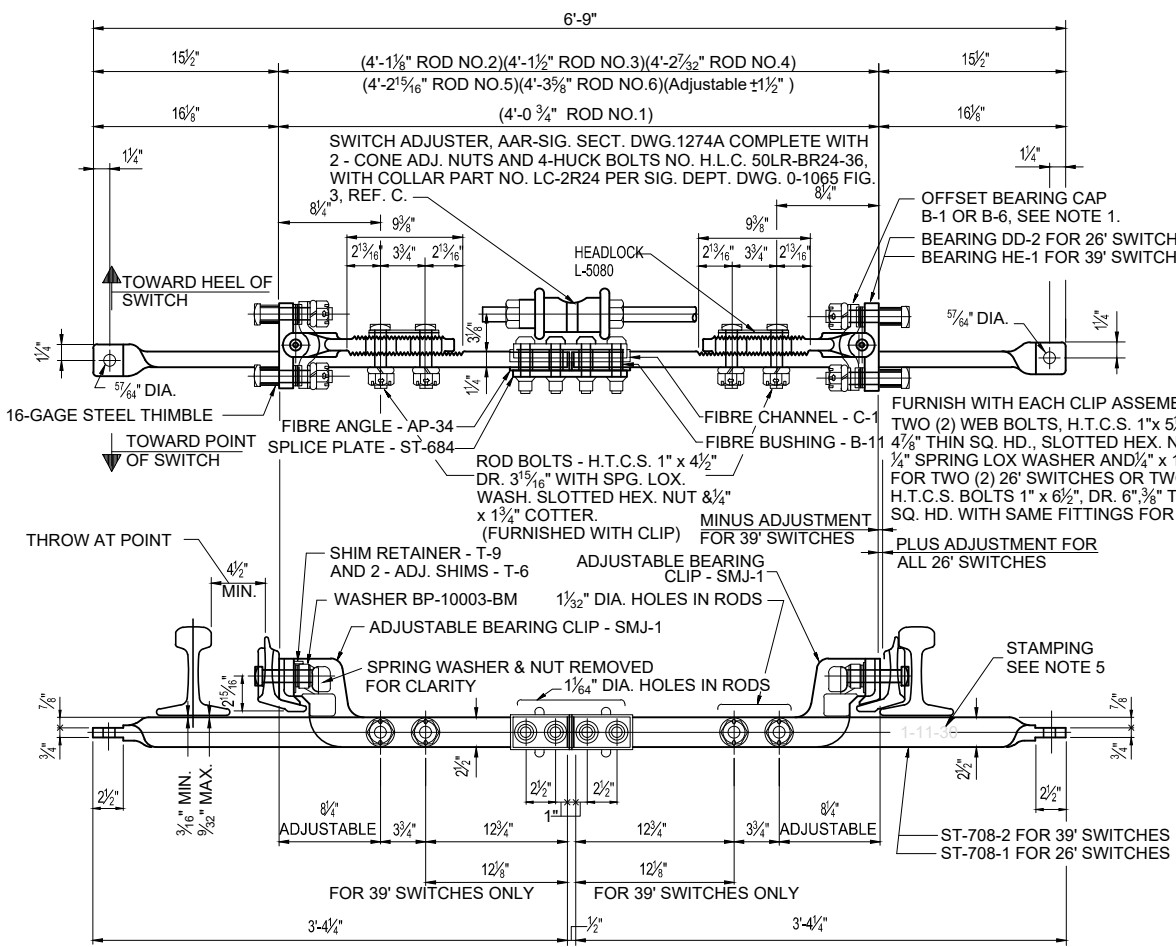
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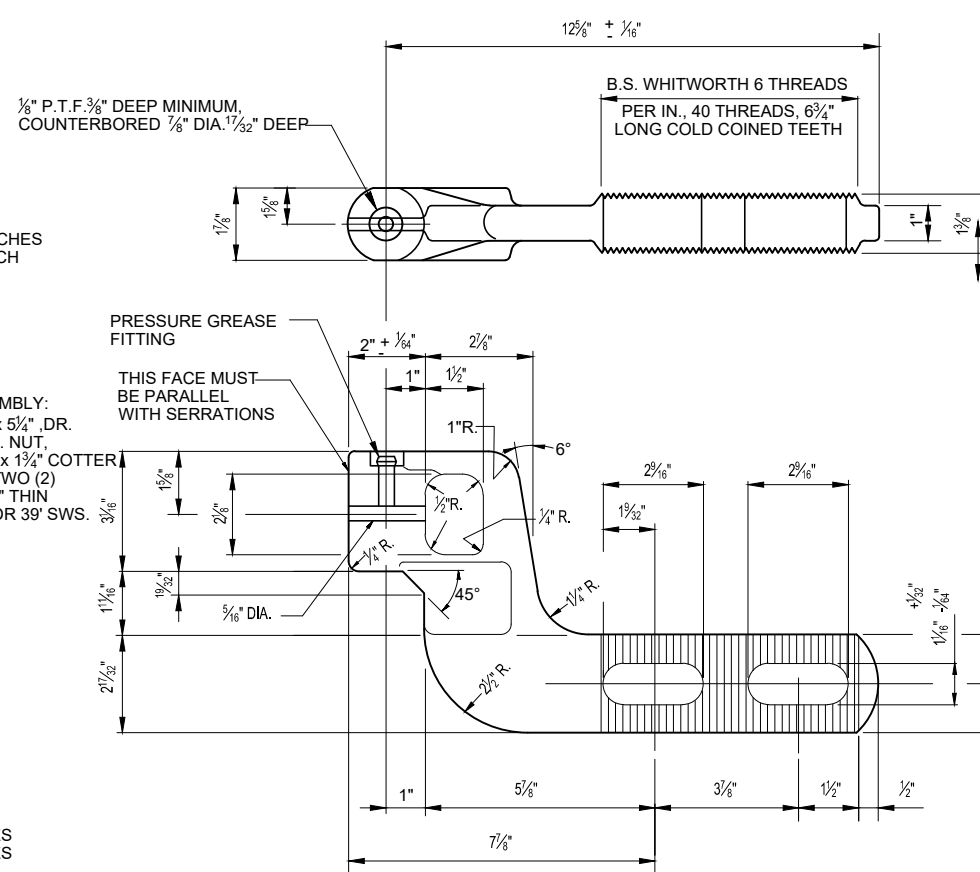
ENGINEERING STANDARD DRAWINGS

NO. 10 SPRING RAIL FROG TURNOUT -
16'-6" SPLIT SWITCH POINT

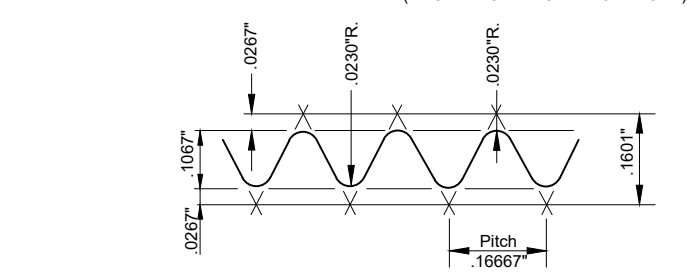
DRAWING NO. ESD-2922-12
DRAWING SHEET NO. 12 OF 15
SCALE: NONE
CONTRACT SHEET NO.



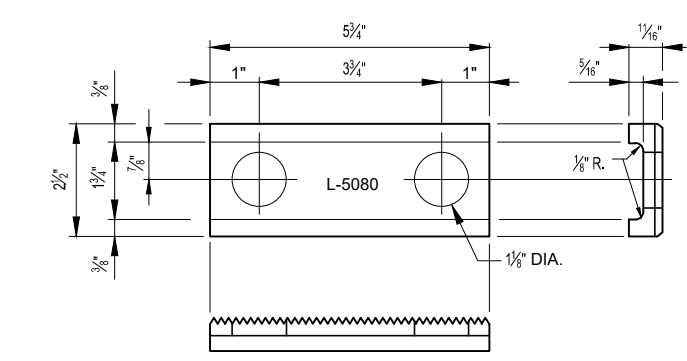
NO. 1 SWITCH ROD ASSEMBLY
(SHOWN FOR MACHINE ON RIGHT) SEE NOTE 2



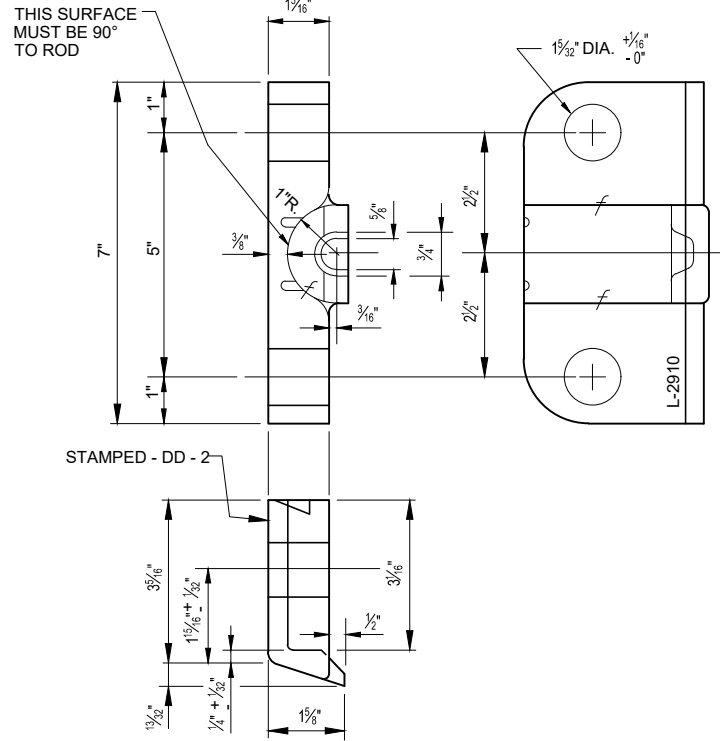
ADJUSTABLE BEARING CLIP - SMJ - 1
SCALE: NONE



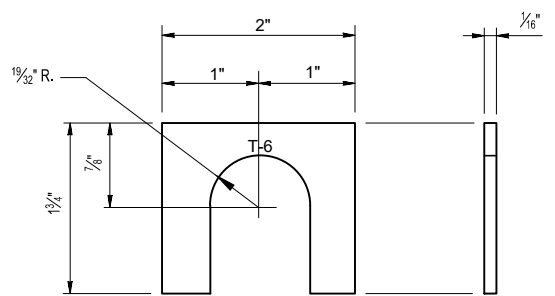
ENLARGED PROFILE OF SERRATIONS
SCALE: NONE



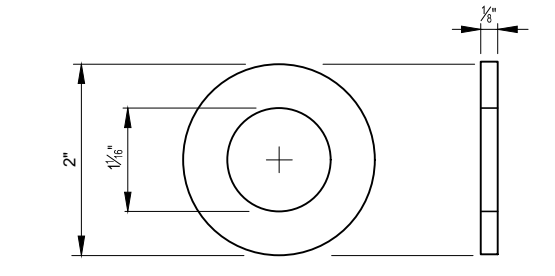
HEADLOCK L-5080
SCALE: NONE



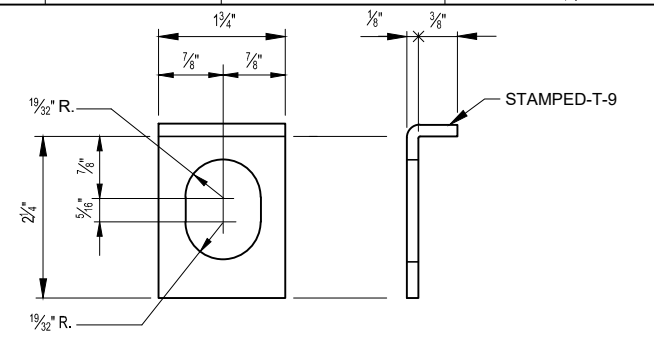
BEARING - DD - 2
SCALE: NONE



ADJUSTABLE SHIM - T - 6
SCALE: NONE



WASHER - BP - 10003 - BM
SCALE: NONE



SHIM RETAINER - T - 9
SCALE: NONE

NOTES:

- WHILE THIS PLAN SHOWS BEARING CLIPS ASSEMBLED TO SWITCH ROD, THIS CLIP ASSEMBLY MAY BE REQUISITIONED AND ORDERED SEPARATELY. WHEN A BEARING CLIP ASSEMBLY ONLY IS WANTED, REQUISITIONS AND ORDERS SHALL SPECIFY, RAIL SECTION AND LENGTH OF SWITCH. ALL PARTS SHOWN IN BILL OF MATERIAL SHALL BE FURNISHED WITH THESE CLIP ASSEMBLIES. WHEN AN INDIVIDUAL PART IS REQUIRED, IT SHALL BE ORDERED BY PART NUMBER.
- WHEN COMPLETED RODS ARE ORDERED THEY SHALL BE ASSEMBLED AND INCLUDE ALL PARTS SHOWN IN BILL OF MATERIAL. REQUISITIONS AND ORDERS SHALL SPECIFY RAIL SECTION AND LENGTH OF SWITCH. ON INTERLOCKED SWITCHES WITH AUXILIARY THROW ROD, MACHINE SIDE (RIGHT OR LEFT) SHOULD ALSO BE SPECIFIED.

*NOTES CONTINUED ON SHEET - DWG. ESD-2922-14

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LENGTH OF SWITCH	BILL OF MATERIAL FOR 1 TYPE "SMJ" SWITCH ROD ASSEMBLY				
	QTY.	PART NUMBER	MATERIAL SPECIF.	DESCRIPTION	DETAIL REMARKS
MATERIAL FOR CLIP ASSEMBLIES					
ALL	2	SMJ-1	S.A.E.1020-FOR.STL.	BEARING CLIP	MACHINED PER DETAIL
ALL	4		H.T.C.S.	WEB BOLT	SEE NOTE
26'	2	DD-2	MALLEABLE IRON	BEARING	PAT. NO. L-2910, MACHINED PER DETAIL
39'	2	HE-1	MALLEABLE IRON	BEARING	PAT. NO. L-2915, MACHINED PER DETAIL
26'	2	B-1	S.A.E.1045-FOR.STL.	OFFSET BEARING CAP	HEAT TREATED - BRINELL -.225 to .250
39'	2	B-6	S.A.E.1045-FOR.STL.	OFFSET BEARING CAP	HEAT TREATED - BRINELL -.225 to .250
26'	2	B-6	S.A.E.1045-FOR.STL.	OFFSET BEARING CAP	HEAT TREATED - BRINELL -.225 to .250
ALL	4	T-9	S.A.E.1020	SHIM RETAINER	1/8" x 1 1/4" x 2 1/4"
ALL	12	T-6	STAINLESS STEEL	ADJUSTMENT SHIM	1/16" x 2" x 1 1/8"
ALL	4	BP-10003-BM	MALLEABLE IRON	WASHER	1 1/16" I.D. x 2" O.D. x 1/16" THICK
ALL	4		H.T.C.S.	ROD BOLT	1" x 4 1/2" DR. 3 1/16"
ALL	4		STEEL	SPG. LOX WASHER	FOR 1" ROD BOLTS
ALL	4		STEEL	COTTER	1/4" x 1 1/4" FOR ROD BOLTS
ALL	2		STEEL	GREASE FITTING	PRESSURE - FOR BEARING CLIP
ALL	2	L-5080	MALLEABLE IRON	HEADLOCK	FOR ROD BOLTS
26'	2		16-GAGE STEEL	THIMBLE	1 1/2" LONG - FOR SHIPPING
39'	2		16-GAGE STEEL	THIMBLE	2 1/2" LONG - FOR SHIPPING
MATERIAL FOR VERTICAL ROD					
16'-6"	1			VERTICAL ROD	USE ONE-ST-708-1 USE ONE-ST-708-1 TWIST, MACHINE AND DRILL END HOLE
39'	1			VERTICAL ROD	USE ONE-ST-708-2 USE ONE-ST-708-2 TWIST, MACHINE AND DRILL END HOLE
ALL	4		HIGH STRENGTH STEEL	CONN. & INSUL. BOLT	HIGH FASTER NO. HLC-50LR-BR24-36
ALL	4		LOW CARBON STEEL	COLLAR	HUCK FASTENER NO. LC-2R24
ALL	1	ST-684	H.R. MILD STEEL	SPLICE PLATE	1/2" x 2 1/2" x 9 1/2" FOR INSULATION
ALL	2	AP-34	AAR-SIG.SEC.13-52	ANGLE	1/2" x 2 1/2" x 4 1/2" HARD FIBRE - PARAFIN COATED
ALL	4	B-11	AAR-SIG.SEC.13-52	BUSHING	1" O.D. HARD FIBRE - PARAFIN COATED
ALL	1	C-1	AAR-SIG.SEC.13-52	CHANNEL	1/8" x 1" x 10" HARD FIBRE - PARAFIN COATED
ALL	1		MALLEABLE IRON	SWITCH ADJUSTER	
ALL	2		MALLEABLE IRON	CONE ADJ. NUT	FOR 1 1/4" THROW RODS

REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN RAILPROS
CHECKED B. SMITH
RECOMMENDED W. PREY
DATE 5/27/15
DESIGNER PE STAMP

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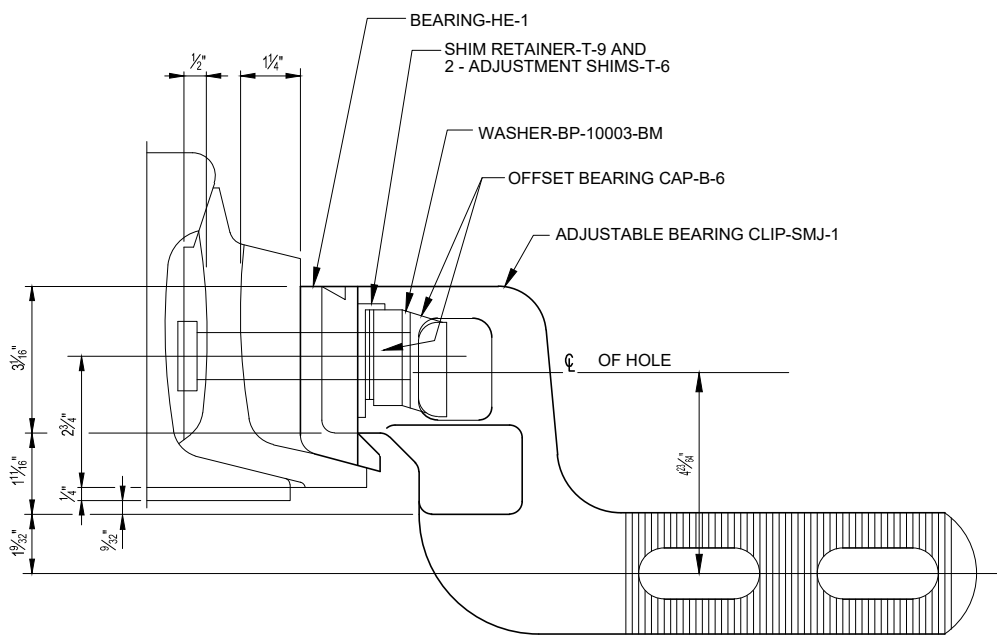
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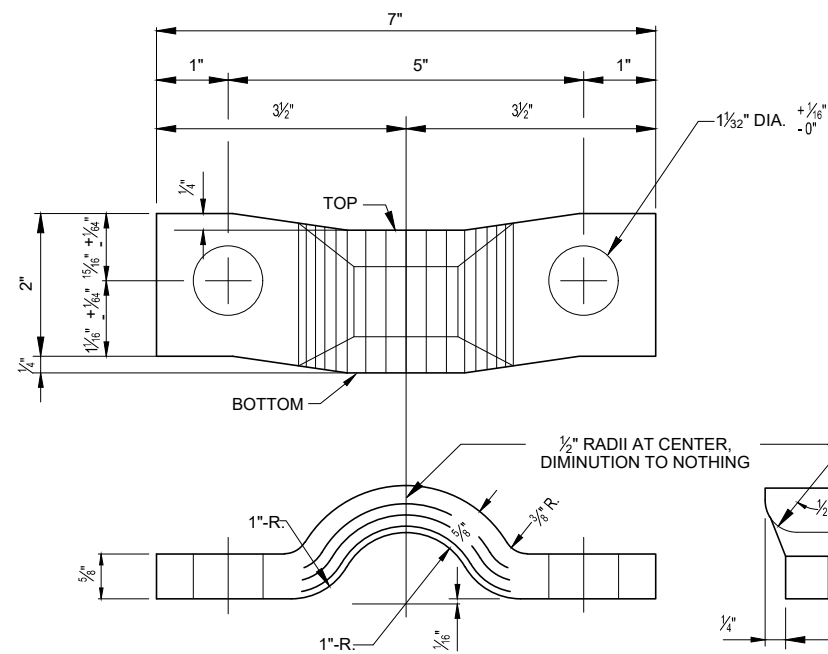
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DRAWING SHEET NO. 13 OF 15
SCALE: NONE
CONTRACT SHEET NO.

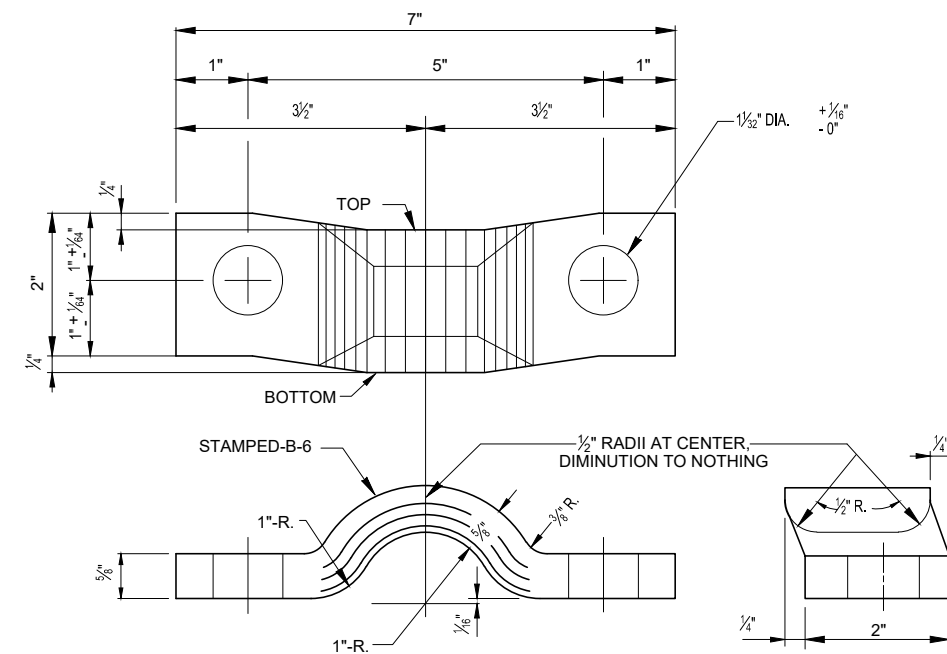
NO. 10 SPRING RAIL FROG TURNOUT - SWITCH RODS AND MISC. DETAILS (1 OF 2)



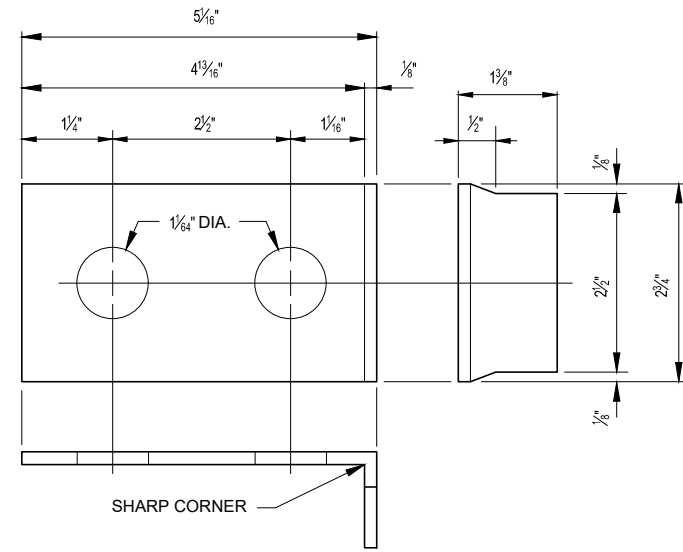
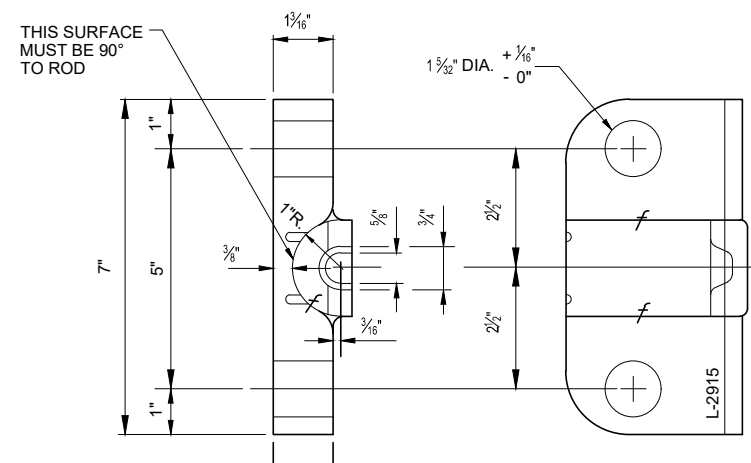
ELEVATION OF "SMJ" CLIP ASSEMBLY FOR 39' SWITCHES
(DRAWN FOR 136 LB. RAIL) SPRING WASHER AND NUT REMOVED



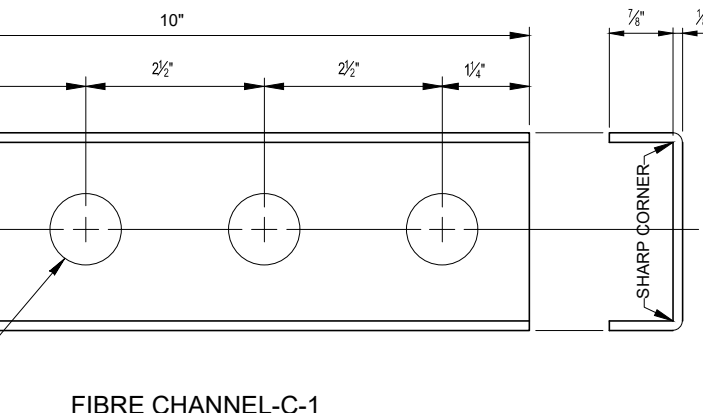
OFFSET BEARING CAP-B-1



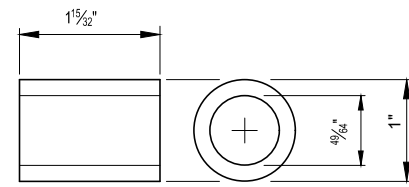
OFFSET BEARING CAP-B-6



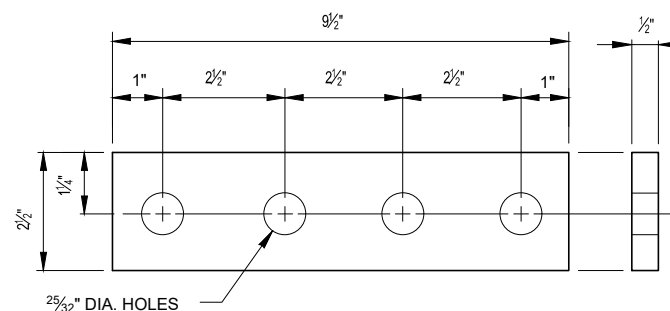
FIBRE ANGLE-AP-34



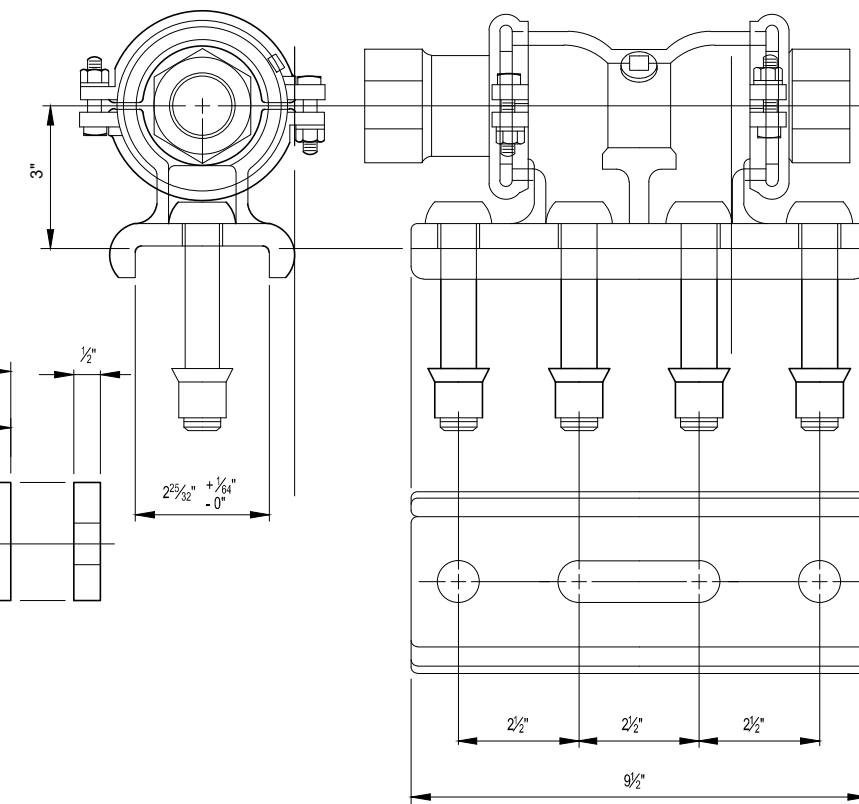
FIBRE CHANNEL-C-1



FIBRE BUSHING-B-11



SPLICE PLATE-ST-684



SWITCH ADJUSTER

NOTES: (CONTINUED FROM ESD-2922-13)

- TWO WEB BOLTS SHALL BE FURNISHED WITH EACH CLIP ASSEMBLY AS CALLED FOR BY NOTE IN TOP VIEW OF ROD ASSEMBLY. WHEN ROD IS USED ON 11'-0" AND 16'-6" SWITCHES THE 1/4" THICK SPRING WASHER SHOULD BE REPLACED WITH A 3/8" THICK SPRING WASHER BY THE STOREKEEPER OR FIELD FORCES, TO BRING COTTER WITHIN THE LIMITS OF SLOT IN WEB BOLT NUTS.
- MATERIALS AND WORKMANSHIP SHALL MEET CURRENT A.R.E.M.A. SPECIFICATIONS FOR "SPECIAL TRACKWORK" UNLESS OTHERWISE SPECIFIED.
- VERTICAL SWITCH ROD SHALL BE PLAINLY STAMPED TO INDICATE SWITCH THAT ROD ASSEMBLY CAN BE USED UPON. IDENTIFICATION MARKING WILL BE AS FOLLOWS: 1-39 FOR USE ON 39'-0" SWITCHES, 132 LB., AND 136 LB. RE RAIL SECTIONS. 1-11-30 FOR USE ON 11'-0" TO 30'-0" SWITCHES, 115 LB., 119 LB., 131 LB., 132 LB. AND 136 LB. RE RAIL SECTIONS.

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REV.	DATE	DESCRIPTION	DES.	ENG.	DESIGNER PE STAMP

DRAWN
RAILPROS

CHECKED
B. SMITH

RECOMMENDED
W. PREY

DATE
5/27/15

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ENGINEERING STANDARD DRAWINGS

NO. 10 SPRING RAIL FROG TURNOUT -
SWITCH RODS AND MISC. DETAILS (2 OF 2)

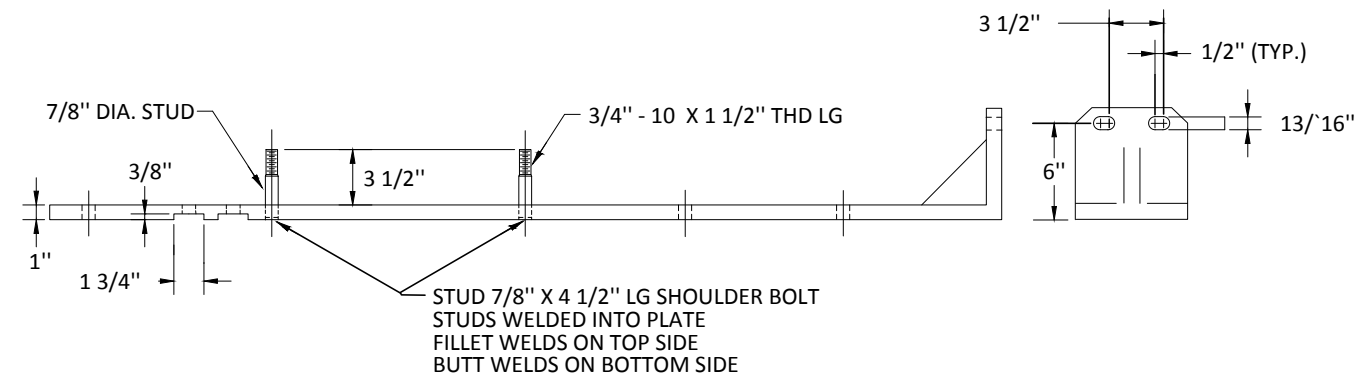
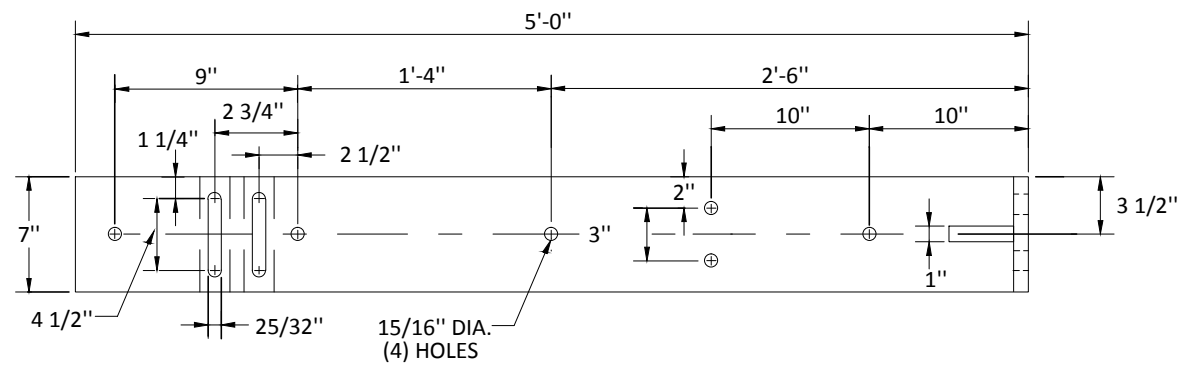
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ESD-2922-14
DRAWING SHEET NO.
14 OF 15
SCALE:
NONE
CONTRACT SHEET NO.

NOTE:

SEE SHEET ESD-2922-05 FOR NOTES

REFERENCE DRAWINGS:

SWITCH GAGE PLATE DETAILS-ESD-2922-05



MOUNTING PLATE NOTES:

1. EMORY CLOTH SHALL BE INSTALLED TO PROVIDE ABRASIVE MATERIAL BETWEEN SWITCH MACHINE FRAME AND SWITCH PLATE.
2. ALL HOLES SHALL BE DRILLED NOT PUNCHED.
3. ALL CORNERS OF PLATE SHALL BE CHAMFERED 1" X 1".

ANSALDO SWITCH MACHINE MOUNTING PLATE

TRAPEZOID TIE NOTES:

1. TRAPEZOID TIES SHALL BE DOUGLAS FIR OR GUM.
2. TRAPEZOID TIES SHALL BE DAPPED AND TREATED AT THE MILL.
3. TIES SHALL BE STRAIGHT AND FREE OF CRACKS OR OTHER DEFECTS.

14 FT. DAPPED TRAPEZOID TIE

DAP TIE
(2 PCS. REQ'D. AS SHOWN)
US&S SWITCH MACHINE MUST BE FURNISHED WITH FINISHED MOUNTING LUGS

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REVISIONS			DES.	ENG.	DATE	DESCRIPTION	DESIGNER PE STAMP
					5/27/15		



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401 B Street, Suite 800
San Diego, CA. 92101
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NORTH COUNTY TRANSIT DISTRICT
810 Mission Avenue
Oceanside, CA 92054
www.gonctd.com

ENGINEERING STANDARD DRAWINGS

NO. 10 SPRING RAIL FROG TURNOUT - EXTENSION PLATE AND DAP TIE FOR SWITCH MACHINE

DRAWING NO.	ESD-2922-15
DRAWING SHEET NO.	15 OF 15
SCALE:	NONE
CONTRACT SHEET NO.	

NO. 14 STANDARD TURNOUT ON WOOD TIES

(136LB., RIGHT HAND WITH RAIL BOUND MANGANESE FROG)

BILL OF MATERIAL	
QTY.	DESCRIPTION
1	NO. 14 RAIL BOUND MANGANESE FROG
2	19'-0" "U-69" ADJUSTABLE GUARD RAIL W/ PLATES
1 PAIR	26'-0" EXTENDED FIELD WELDED TYPE SWITCH POINTS (40'-0" RAIL)
1 EACH	R.H. & L.H. SAMSON STOCK RAILS (40'-0")
1	"MF" TYPE FRONT ROD W/ "MF" CLIPS
1	NO. 1 SMJ TYPE SWITCH ROD W/ BASKET
1 EACH	NO. 2 THRU NO. 4 SMJ TYPE SWITCH ROD W/ BASKET
1	VERTICAL SWITCH ROD ASSEMBLY W/ SMJ CLIPS
2	SWITCH GAGE PLATE P-P
1 EACH	SWITCH GAGE PLATES G-OP THRU G-3P
2 EACH	TURNOUT PLATES P-10 THRU P-24
1 EACH	TURNOUT PLATES P-25 THRU P-30
1 EACH	TURNOUT PLATES P-39 THRU P-45
1 EACH	SINGLE RAIL PLATES P-46 AND P-47
1 EACH	FROG GAGE PLATES FG-1P THRU FG-4P
1 EACH	FROG PLATES FP-31 THRU FP-38
1 EACH	FROG CLAMP PLATES FCP-1 THRU FCP-3
2	SLIDE PLATE S-4P
6	SLIDE PLATE S-5P
2	SLIDE PLATE S-6P
2	SLIDE PLATE S-7P
12	SLIDE PLATE S-8P
2	SLIDE PLATES S-9P
2	HEEL PLATE P5-RH
4	D.I. RAIL HOLD DOWN CLIPS E-3706
6	D.I. RAIL HOLD DOWN CLIPS E-3708
2	D.I. RAIL HOLD DOWN CLIPS E-3709
4	D.I. RAIL HOLD DOWN CLIPS E-3710
16	BOLTLESS ADJUSTABLE BRACE ASSEMBLY
144	ROLLED STEEL PLATES
288	RAIL CLIP (GALVANIZED) (ESD-2362)
8	E-CLIP (GALVANIZED) (ESD-2361)
576	1 5/16" DIA. No. 5760 SCREW SPIKES
1 EACH	16'-0" RAIL
1 EACH	24'-6" RAIL
1 EACH	24'-10" RAIL
4 EACH	39'-0" RAIL
2 EACH	45'-0" RAIL
1 EACH	48'-9" RAIL
1 EACH	56'-10 1/2" RAIL
2 EA.	EPOXY BONDED PREFABRICATED INSULATED JOINT 16'-6"

DRAWING INDEX

BILL OF MATERIALS AND GENERAL NOTES	_____	ESD2931-01
LAYOUT	_____	ESD2931-02
CROSSOVER LAYOUT AND BILL OF MATERIALS	_____	ESD2931-03
SWITCH AND TURNOUT PLATES	_____	ESD2931-04
RAILBOUND MANGANESE FROG DIMENSIONS AND NOTES	_____	ESD2931-05
GAGE PLATES	_____	ESD2931-06
FROG GAGE PLATES	_____	ESD2931-07
19'-0" GUARD RAIL	_____	ESD2931-08
RAILBOUND MANGANESE STEEL FROG	_____	ESD2931-09
INSULATED JOINT DIAGRAM	_____	ESD2931-10
STRAIGHT OR CURVED UNDERCUT STOCK RAIL	_____	ESD2931-11
26'-0" SPLIT SWITCH POINT	_____	ESD2931-12
SWITCH RODS AND MISC. DETAILS (1 OF 2)	_____	ESD2931-13
SWITCH RODS AND MISC. DETAILS (2 OF 2)	_____	ESD2931-14
EXTENSION PLATE AND DAP TIE FOR SWITCH MACHINE	_____	ESD2931-15

TURNOUT DATA	
FROG NUMBER	14
FROG ANGLE	4°-05'-27"
FROG LENGTH	29'-0"
LENGTH OF SWITCH POINT	26'-0"
THICKNESS OF POINT	0"
ANGLE OF POINT	0°-50'-44"
HEEL SPREAD	6 1/4"
ANGLE AT HEEL OF SWITCH	1°-27'-00"
LEAD	108'-7 1/2"
RADIUS OF TURNOUT CURVE C/L	1576.40'
DEGREE OF TURNOUT CURVE C/L	3°-38'-07"
CENTRAL ANGLE - SWITCH	0°-36'-16"
CENTRAL ANGLE - CLOSURE	2°-38'-45"
CENTRAL ANGLE - TURNOUT	3°-14'-7166"
STRAIGHT CLOSURE	56'-9 1/2"
CURVE CLOSURE	56'-11"

BILL OF WOOD SWITCH TIES			
PIECES	SIZE	LENGTH	BOARD FEET
1	7" x 9"	10'-0"	52.50
2	7" x 9"	15'-0"	136.50
18	7" x 9"	10'-0"	945.00
16	7" x 9"	11'-0"	924.00
11	7" x 9"	12'-0"	693.00
11	7" x 9"	13'-0"	750.75
9	7" x 9"	14'-0"	661.50
2	10" x 9"	14'-0" DAP TIES	147.00
7	7" x 9"	15'-0"	551.25
7	7" x 9"	16'-0"	588.00
14	7" x 9"	17'-0"	1249.50
TOTAL			TOTAL
98			6699.00

NOTES:

1. TURNOUT TO BE FABRICATED FROM 136 LB. HEAD HARDENED RAIL, FROM POINT END TO LAST LONG SWITCH TIE.
2. LOCATION OF INSULATED JOINTS IS DETERMINED BY DRAWING NUMBER ESD2931-10. IT WILL BE SATISFACTORY TO RELOCATE THE INSULATED JOINT IN THE FIELD UP TO 12" SO AS TO PROVIDE A SUITABLE SUSPENDED JOINT, PROVIDED THE STAGGER OF INSULATED JOINTS DOES NOT EXCEED 4'-6". SUSPENDED INSULATED JOINTS MUST BE LOCATED IN A CRIB AREA BETWEEN TIES, A MINIMUM DISTANCE OF 4" FROM EDGE OF NEAREST TIE PLATE.
3. ALL INSULATED JOINTS ARE TO BE ADHESIVE BONDED PREFABRICATED INSULATED JOINTS PER ESD-2504 UNLESS OTHERWISE SPECIFIED.
4. ALL MATERIALS REQUIRED FOR HAND OR MACHINE OPERATED SWITCH OPERATION WILL BE FURNISHED PER REQUIREMENTS OF THE ENGINEER.
5. MATERIALS AND WORKMANSHIP, ALSO ANY CONSTRUCTION DETAILS NOT SHOWN, SHALL BE PER CURRENT A.R.E.M.A. "MANUAL AND PORTFOLIO" UNLESS OTHERWISE SPECIFIED.
6. WHERE REQUIRED, ALL IDENTIFICATION SYMBOLS TO BE PLAINLY STAMPED.
7. GAGE PLATES WILL BE FURNISHED INSULATED. SWITCH RODS WILL BE FURNISHED INSULATED UNLESS OTHERWISE SPECIFIED.
8. MANUFACTURER SHALL SUBMIT TWO COPIES OF SHOP DRAWINGS TO THE ENGINEER FOR APPROVAL PRIOR TO FABRICATION OF TURNOUT. SHOP DRAWINGS THAT CHANGE DETAILS OF THESE STANDARDS MUST CLEARLY SPECIFY SUCH PROPOSED CHANGES.
9. THE MATERIAL INCLUDED IN A "TURNOUT COMPLETE" IS EVERYTHING LISTED IN THE BILL OF MATERIALS. TO CONSTRUCT A COMPLETE TURNOUT, SWITCH TIES (PER LIST ON THIS SHEET) AND INSULATED JOINTS, FIELD WELDS, RUNNING RAIL, AND CLOSURE RAIL IDENTIFICATION ON SHEET ESD-2931-10 MUST ALSO BE SUPPLIED. THE MATERIAL FOR A "CROSSOVER COMPLETE" IS IDENTIFIED ON SHEET ESD-2931-03.
10. TIE PLATES SHALL CONFORM TO ENGINEERING STANDARD ESD-2454.
11. SCREW SPIKES (1 5/16" X 6-2 TPI) SHALL CONFORM TO ENGINEERING STANDARD ESD-2355-02. PLATE HOLES SHALL BE 1" DIAMETER. PILOT HOLES IN TIES SHALL BE 5/16" DIAMETER. SCREW SPIKES SHALL BE SCREWED INTO WOOD (NOT DRIVEN).
12. MANUFACTURER SHALL BEVEL RAIL ENDS PER CURRENT A.R.E.M.A. PLAN NO. 1005.
13. THE 26'-0" SWITCH POINT, MADE FROM 40'-0" RAIL PER ESD-2931-12 SHALL BE FURNISHED WITH SWITCH RODS NO. 1 AND 2 PER ESD2931-13 AND ESD2931-14.
14. FOR LOCATION OF INSULATED JOINTS FOR NO. 14 TURNOUT AND CROSSOVER, SEE DRAWING NO. ESD-2931-10.
15. GAGE PLATES FOR SWITCH AND FROG, SWITCH HEEL PLATE (FOR BOTH R.H. AND L.H. TURNOUTS) AND PLATES P-10 THRU P-45 ARE DESIGNED TO BE PERPENDICULAR TO THE MAIN LINE THRU RUN RAILS. UPON COMPLETION OF TURNOUT INSTALLATION, RUNNING RAIL MUST BE ADJUSTED TO NCTD NEUTRAL RAIL TEMPERATURE.
16. UPON COMPLETION OF TURNOUT INSTALLATION, RUNNING RAIL MUST BE ADJUSTED TO NCTD NEUTRAL RAIL TEMPERATURE.
17. ALL E-CLIPS SHALL BE GALVANIZED.
18. SWITCH POINTS SHALL BE FABRICATED PER AREMA SPECIFICATION NO. 9-28-92 AND ESD-2931-12.
19. THE TOLERANCE FOR SPACING OF SWITCH TIES IS +/- 1/2" RELATIVE TO ADJACENT TIES AND 1 1/4" RELATIVE TO CUMULATIVE DIMENSION FROM POINT OF SWITCH (PS).
20. FOR SWITCH MACHINE LAYOUT REFER TO ESD-8605 OR ESD-8610.

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REVISIONS		DRAWN	RAILPROS
REV.	DATE	DESCRIPTION	DES. ENG.

CHECKED B. SMITH <i>BS</i>	
RECOMMENDED W. PREY <i>WP</i>	
DATE	2/2/15
DESIGNER PE STAMP	

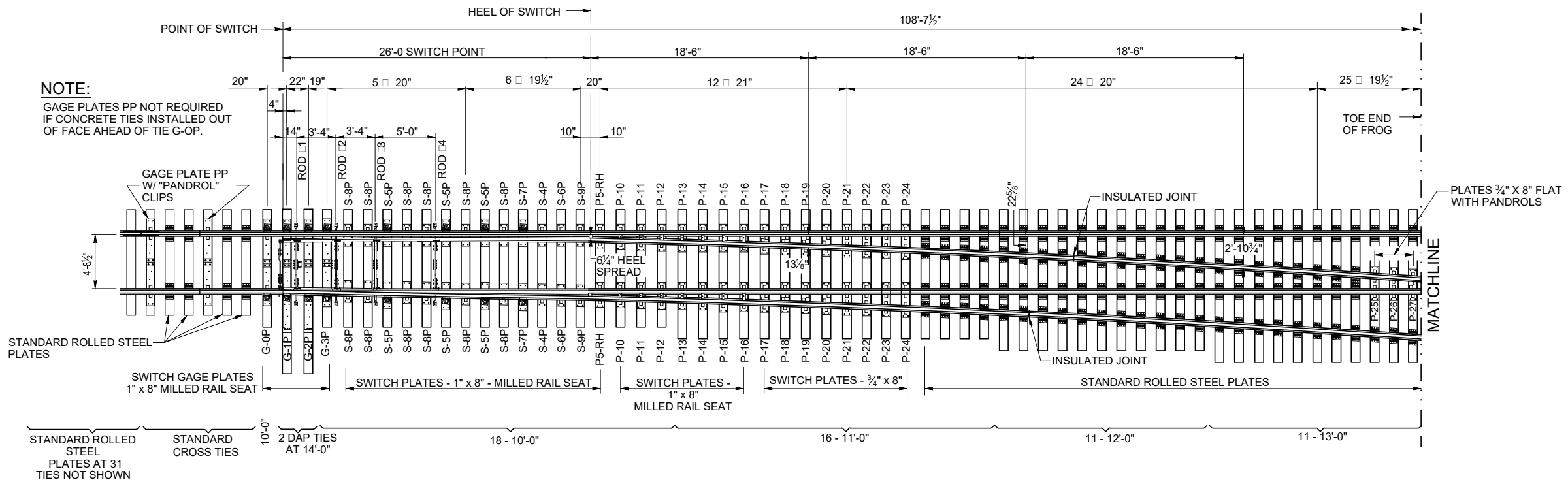
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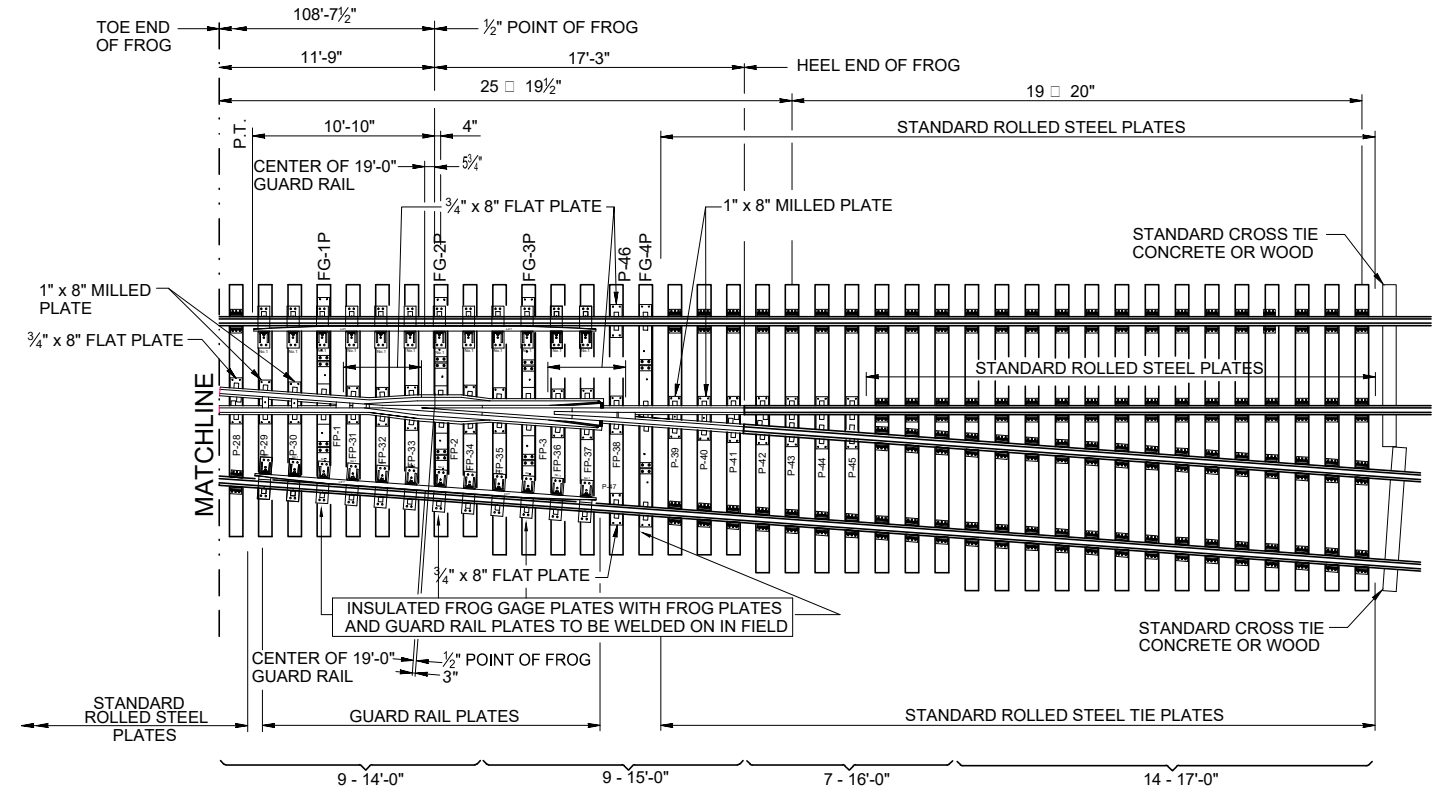
<p>ENGINEERING STANDARD DRAWINGS</p> <p>NO. 14 STANDARD TURNOUT BILL OF MATERIALS AND GENERAL NOTES</p>	<p>DRAWING NO. ESD-2931-01</p> <p>DRAWING SHEET NO. 1 OF 15</p> <p>SCALE: NONE</p> <p>CONTRACT SHEET NO.</p>
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NOTE:
GAGE PLATES PP NOT REQUIRED IF CONCRETE TIES INSTALLED OUT OF FACE AHEAD OF THE TIE G-OP.

- NOTES:**
- SEE COVER SHEET FOR NOTES, BILL OF MATERIAL AND TURNOUT DATA.
 - SEE SHEET NO. 3 FOR CROSSOVER.
 - SEE ESD-8605 OR ESD-8610 FOR SWITCH MACHINE LAYOUTS.



NO. 14 RIGHT HAND TURNOUT



NO. 14 RIGHT HAND TURNOUT (CONT.)

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REV.	DATE	DESCRIPTION	DES.	ENG.

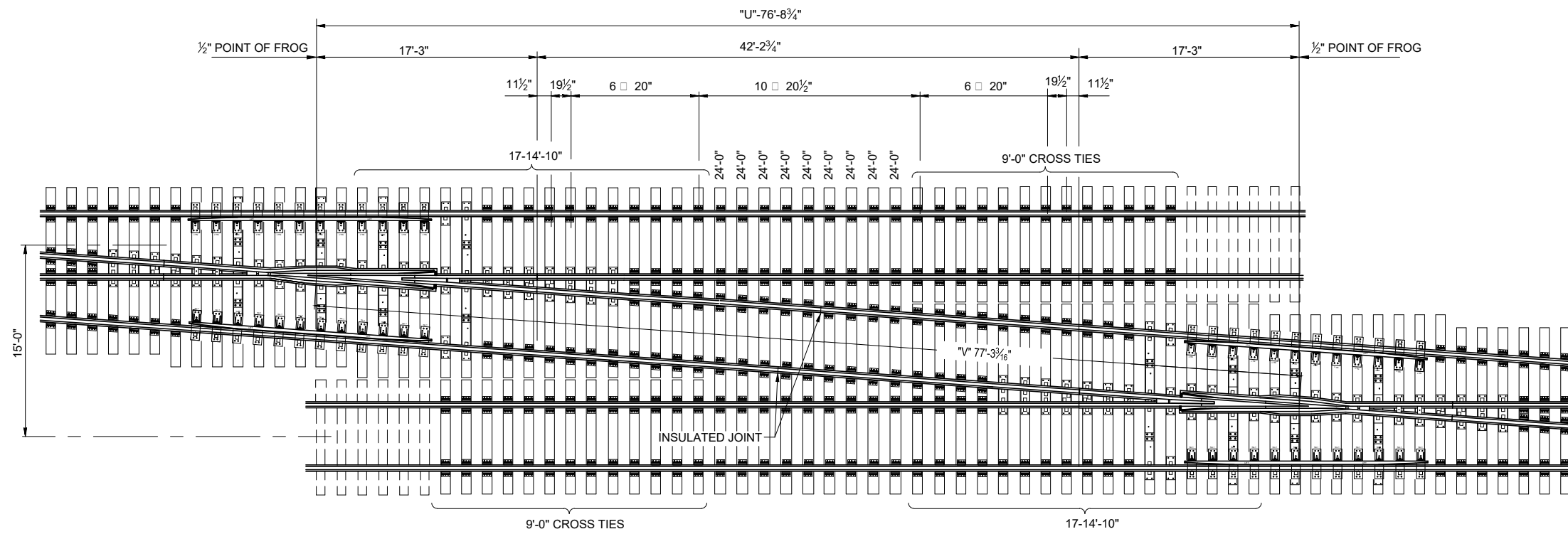
REVISIONS	DRAWN RAILPROS
CHECKED B. SMITH	
RECOMMENDED W. PREY	
DATE 2/2/15	
DESIGNER PE STAMP	


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ENGINEERING STANDARD DRAWINGS
 NO. 14 STANDARD TURNOUT -
LAYOUT

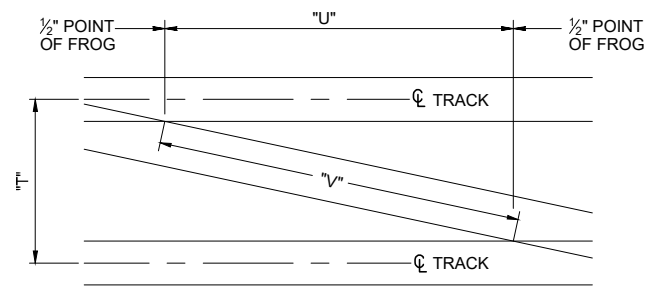
DRAWING NO. ESD-2931-02
DRAWING SHEET NO. 2 OF 15
SCALE: NONE
CONTRACT SHEET NO.



- NOTES:**
- SEE SHEET 1 FOR NO. 14 TURNOUT DATA, BILL OF MATERIAL AND NOTES.
 - SEE SHEET 2 FOR LAYOUT OF NO. 14 TURNOUT.

BILL OF MATERIAL	
QTY.	DESCRIPTION
2	NO. 14 RAIL BOUND MANGANESE FROG
4	19'-0" "U-69" ADJUSTABLE GUARD RAIL W/ PLATES
2	"MF" TYPE FRONT ROD W/ "MF" CLIPS
2	NO. 1 SMJ TYPE SWITCH ROD W/ BASKET
2 EACH	NO. 2 THRU NO. 4 SMJ TYPE SWITCH ROD W/ BASKET
2	VERTICAL SWITCH ROD ASSEMBLY W/ SMJ CLIPS
4	SWITCH GAGE PLATE P-P
2 EACH	SWITCH GAGE PLATES G-0P THRU G-3P
4 EACH	TURNOUT PLATES P-10 THRU P-24
2 EACH	TURNOUT PLATES P-25 THRU P-30
2 EACH	TURNOUT PLATES P-39 THRU P-45
2 EACH	SINGLE RAIL PLATES P-46 AND P-47
2 EACH	FROG GAGE PLATES FG-1P THRU FG-4P
2 EACH	FROG PLATES FP-31 THRU FP-38
2 EACH	FROG CLAMP PLATES FCP-1 THRU FCP-3
4	SLIDE PLATE S-4P
12	SLIDE PLATE S-5P
4	SLIDE PLATE S-6P
4	SLIDE PLATE S-7P
24	SLIDE PLATE S-8P
4	SLIDE PLATES S-9P
4	HEEL PLATE P5-RH
8	D.I. RAIL HOLD DOWN CLIPS E-3706
12	D.I. RAIL HOLD DOWN CLIPS E-3708
4	D.I. RAIL HOLD DOWN CLIPS E-3709
8	D.I. RAIL HOLD DOWN CLIPS E-3710
32	BOLTLESS ADJUSTABLE BRACE ASSEMBLY
186	ROLLED STEEL PLATES
372	RAIL CLIP (GALVANIZED) (ESD-2362)
24	E-CLIP (GALVANIZED) (ESD-2361)
744	1 5/16" DIA. No. 5760 SCREW SPIKES

CROSSOVER



CROSSOVER DATA DETAIL

CROSSOVER DATA		
MAIN TRACKS - TANGENT AND PARALLEL		
CROSSOVER - TANGENT BETWEEN FROGS		
TRACK CENTERS "T"	DISTANCE BETWEEN 1/2" FROG POINTS	
	ON MAIN TRACK TRACK "U"	ON CROSSOVER TRACK "V"
14'-0"	62'-9"	63'-3"
15'-0"	76'-8 3/4"	77'-3 3/16"
16'-0"	90'-8 1/2"	91'-3 3/8"
17'-0"	104'-8 3/8"	105'-3 1/2"
EACH 1"	1.165'	1.168'

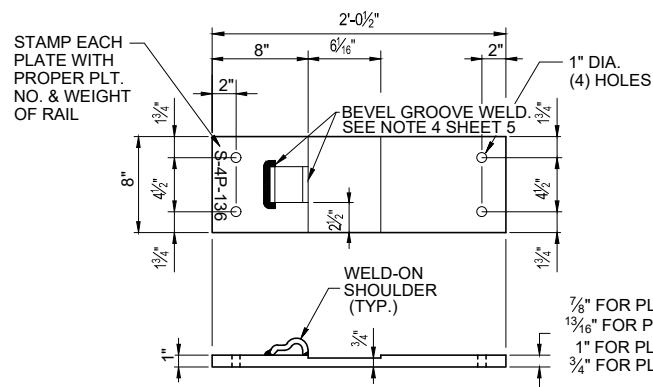
BILL OF MATERIAL (CONT.)	
QTY.	DESCRIPTION
2 EACH	16'-0" RAIL
2 EACH	16'-11 1/4" RAIL
2 EACH	24'-6" RAIL
2 EACH	24'-10" RAIL
2 EACH	39'-0" RAIL
2 EACH	45'-0" RAIL
2 EACH	48'-9" RAIL
2 EACH	56'-10 1/2" RAIL
6 EACH	EPOXY BONDED PREFABRICATED INSULATED JOINTS (16'-6")
2 PAIR	26'-0" EXTENDED FIELD WELDED TYPE SWITCH POINTS (40'-0" RAIL)
2 PAIR	R.H. & L.H. SAMSON STOCK RAILS (40'-0" RAIL)

BILL OF SWITCH TIES			
PIECES	SIZE	LENGTH	BOARD FEET
34	7" X 9"	9'-0"	1606.50
38	7" X 9"	10'-0"	1995.00
32	7" X 9"	11'-0"	1848.00
22	7" X 9"	12'-0"	1386.00
20	7" X 9"	13'-0"	1365.00
18	7" X 9"	14'-0"	1323.00
4	10" X 9"	14'-0" DAP TIES	294.00
34	7" X 9"	14'-10"	2677.50
9	7" X 9"	24'-0"	1134.00
TOTAL		TOTAL	
207			13629.00

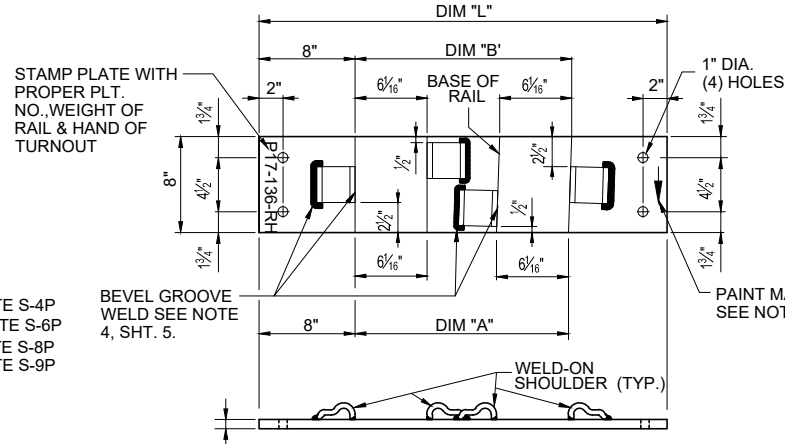
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				CHECKED B. SMITH				DRAWING SHEET NO. 3 OF 15		
				RECOMMENDED W. PREY				SCALE: NONE		
				DATE 2/2/15				DESIGNER PE STAMP	NO. 14 STANDARD TURNOUT - CROSSOVER LAYOUT AND BILL OF MATERIALS	
REV.	DATE	DESCRIPTION	DES.	ENG.						

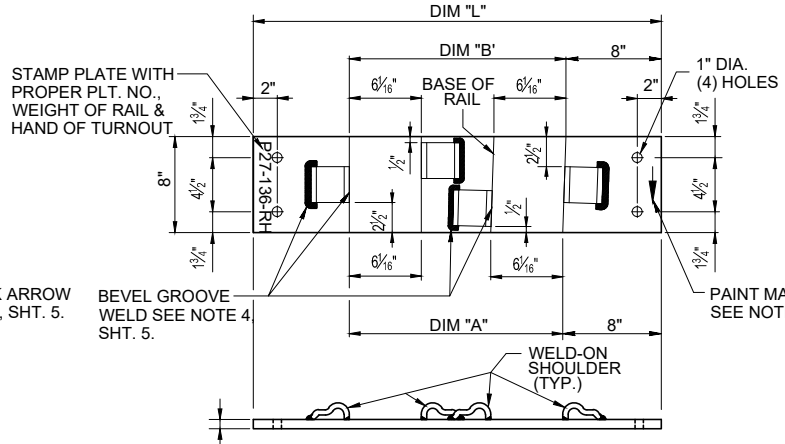
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SLIDE PLATE - S-4P, S-6P, S-8P, S-9P
 1" x 8" x 2'-0 1/2" LG. - MILLED - W/PANDROL CLIP
 2 - S-4P PLATES REQUIRED AS SHOWN
 2 - S-6P PLATES REQUIRED AS SHOWN
 2 - S-8P PLATES REQUIRED AS SHOWN
 2 - S-9P PLATES REQUIRED AS SHOWN

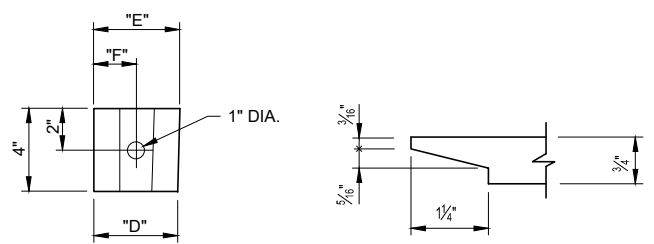


TURNOUT PLATES - P-17 THRU P-20 & P-41 THRU P-42
 3/4" x 8" x DIM "L" - FLAT - W/PANDROL CLIPS

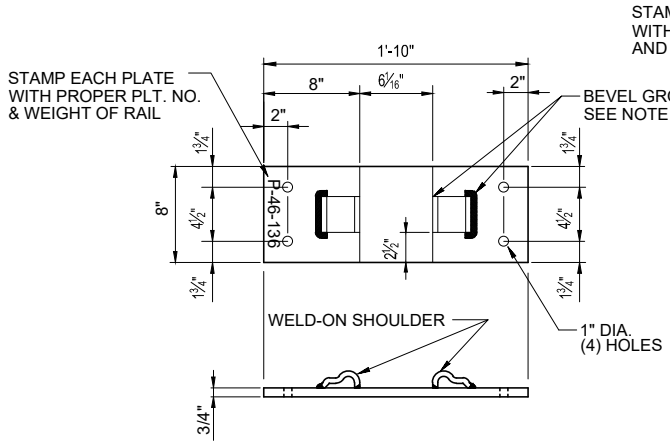


TURNOUT PLATES - P-27 AND P-28
 3/4" x 8" x DIM "L" - FLAT - W/PANDROL CLIPS

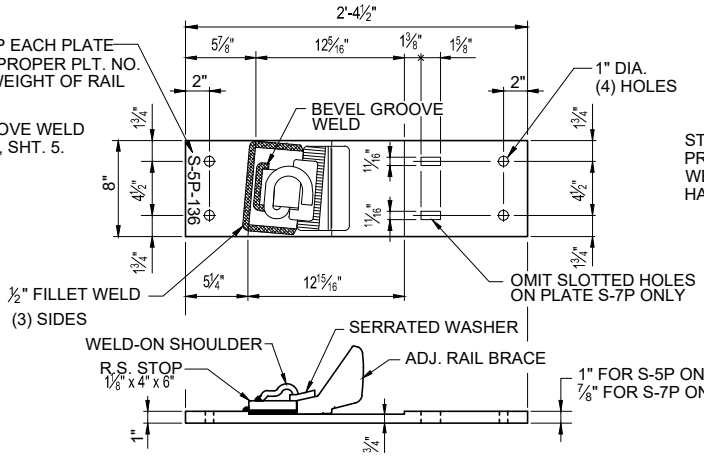
NOTES:
 1. FOR NOTES AND DIMENSIONS SEE ESD-2931-05



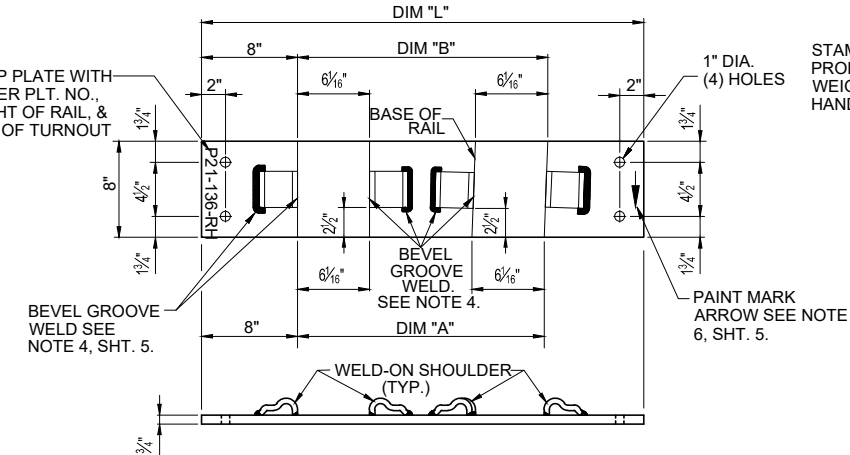
HOLD DOWN CLIP DETAIL SCALE: NONE
END DETAIL - BOTH ENDS SCALE: NONE



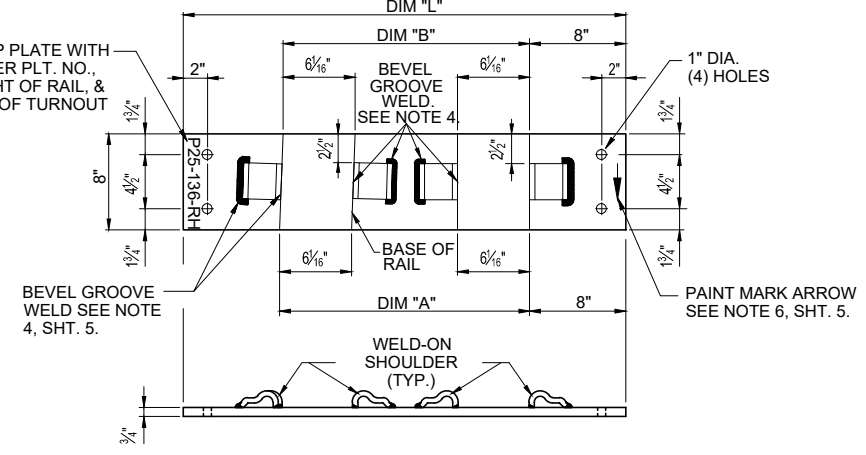
TURNOUT PLATES - P-46
 1 EA. 3/4" x 8" x 22" LG. - FLAT - W/PANDROL CLIPS



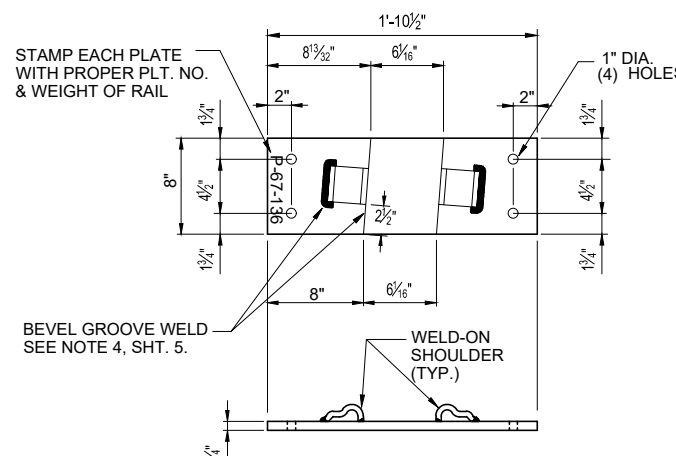
BRACE SLIDE PLATE - S-5P & S-7P
 1" x 8" x 2'-4 1/2" LG. - MILLED - W/ADJ. RAIL BRACE
 12 - S-5P PLATES REQUIRED AS SHOWN
 2 - S-7P PLATES REQUIRED AS SHOWN



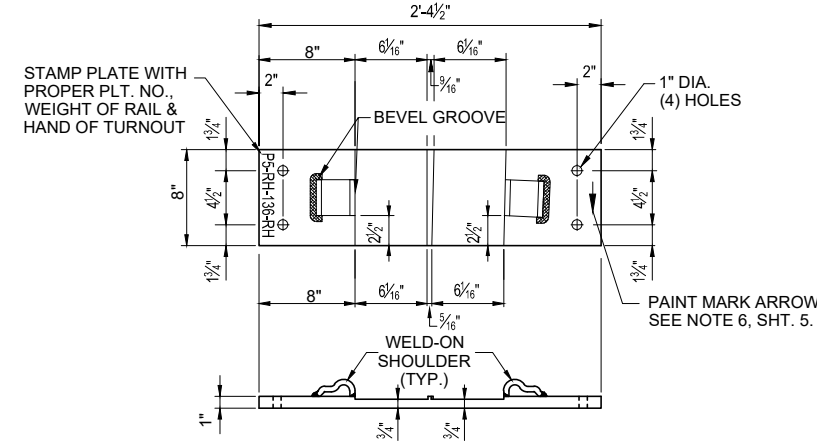
TURNOUT PLATES - P-21 THRU P-24, P-43 THRU P-45
 3/4" x 8" x DIM "L" - FLAT - W/PANDROL CLIPS



TURNOUT PLATES - P-25 AND P-26
 3/4" x 8" x DIM "L" FLAT W/PANDROL CLIPS

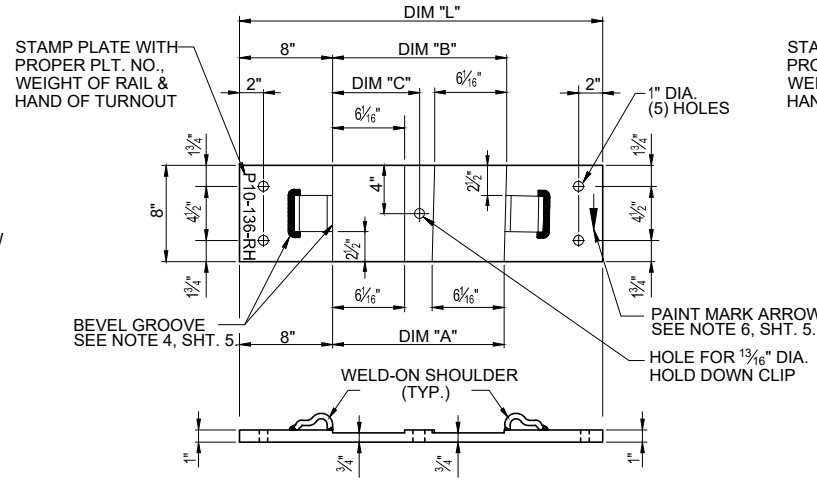


TURNOUT PLATES - P-47
 1 EA. 3/4" x 8" x 22 1/2" LG. - FLAT - W/PANDROL CLIPS

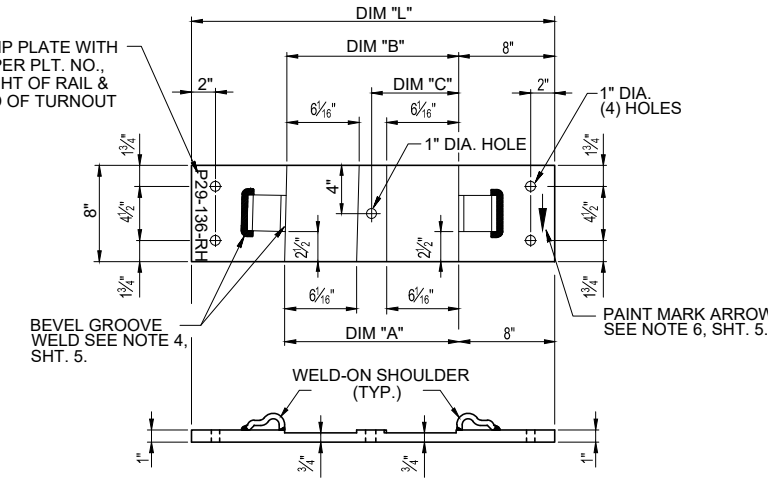


HEEL PLATE - P5-RH
 1" x 8" x 2'-4 1/2" LG. - MILLED - W/PANDROL CLIPS
 2 - P5-RH PLATES REQUIRED AS SHOWN FOR R.H. T.O.

HEEL PLATE - P6-LH
 1" x 8" x 2'-4 1/2" LG. - MILLED - W/PANDROL CLIPS
 2 - P6-LH PLATES REQUIRED AS SHOWN, EXCEPT OPPOSITE FOR L.H. T.O.



TURNOUT PLATES - P-10 THRU P-16 & P-40
 1" x 8" x DIM "L" - MILLED - W/PANDROLS



FROG PLATES - P-29, P-30 AND P-39
 1" x 8" x DIM "L" - MILLED - W/PANDROLS

REV.	DATE	DESCRIPTION	DES.	ENG.

REVISIONS	DRAWN RAILPROS
	CHECKED B. SMITH
	RECOMMENDED W. PREY
	DATE 2/2/15
	DESIGNER PE STAMP

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ENGINEERING STANDARD DRAWINGS

NO. 14 STANDARD TURNOUT - SWITCH AND TURNOUT PLATES

DRAWING NO. ESD-2931-04
DRAWING SHEET NO. 4 OF 15
SCALE: NONE
CONTRACT SHEET NO.

NOTES:

1. PLATES TO BE MADE OF MILD ROLLED STEEL.
2. EACH PLATE TO BE PLAINLY STAMPED WITH PLATE NO. AND 136 (WEIGHT OF RAIL) AND HAND OF TURNOUT (R.H. OR L.H.)
3. THE WELD-ON PRESSED STEEL SHOULDER, MADE OF MILD STEEL, TO BE PURCHASED FROM PANDROL INTERNATIONAL OR APPROVED ALTERNATE MEETING PANDROL'S DESIGN SPECIFICATIONS. MINIMUM $\frac{3}{8}$ " WELD ALONG BEVELED GROOVE OF THE SHOULDER. SEE WELD SPECIFICATIONS.
4. THE PRESSED STEEL SHOULDER MUST BE CAREFULLY WELDED TO THE PLATE. ANY WELD PROJECTING BEYOND THE VERTICAL FACE OF SHOULDER IN THE AREA OF THE RAIL SEAT MUST BE MACHINED OUT TO PROVIDE A CLEAR RAIL SEAT DIMENSION AS CALLED FOR.
5. THE PLATES AS SHOWN ARE FOR A 136 LB., NO. 14, RIGHT HAND, MACHINE OPERATED TURNOUT. FOR A LEFT HAND TURNOUT, PLATES P-13 THRU P-65 INCLUSIVE AND FROG GAGE PLATES FG-1P THRU FG-4P ARE TO BE OPPOSITE.
6. ARROW SHOWN ON DETAIL IS FOR EXAMPLE ONLY. USING DWG. NO. 5600-02 AS A GUIDE, PAINT MARK EACH PLATE WITH AN ARROW POINTING TOWARDS SWITCH POINT.

WELDING SPECIFICATIONS:

1. WHEN FIELD WELDING SHOULDERS OR STOPS TO GAGE PLATES, THE GAGE PLATES MUST BE PROPERLY POSITIONED AND SECURED IN PLACE BEFORE WELDING.
2. CHECK TRACK FOR CORRECT GAGE.
3. START WITH ONE GAGE PLATE. PLACE PANDROL SHOULDERS TIGHT AGAINST BASE OF RAIL AND WELD IN PLACE WHILE SIMULTANEOUSLY CONTROLLING CORRECT GAGE.
 - A. THE PRESSED STEEL SHOULDERS MUST BE CAREFULLY WELDED TO THE PLATE WITH 2 PASS $\frac{3}{8}$ " + FILLET OR BEVEL GROOVE WELD. ANY WELD PROJECTING BEYOND THE VERTICAL FACE OF SHOULDER IN THE AREA OF THE RAIL SEAT MUST BE MACHINED OUT TO PROVIDE A CLEAR RAIL SEAT DIMENSION AS CALLED FOR.
 - B. THE $1\frac{1}{2}$ " X 6" STOPS MUST BE SET FLUSH AGAINST SHOULDER OF MILLED PLATE AND CENTERED FOR WELDING. THE PLATES SHALL BE WELDED ON THREE SIDES ONLY WITH 3 PASS $\frac{1}{2}$ " + FILLET WELD AND NO WELD SHALL PROJECT BEYOND THE VERTICAL EDGE OF THE UNWELDED FOURTH SIDE.
4. WHEN WELDING PRESSED STEEL SHOULDERS, STOPS OR PLATES TO GAGE PLATES USE ONE OF THE FOLLOWING:
 - A. ELECTRODES $\frac{5}{32}$ INCH, WELDING SPEC. 7018XLM.
 - B. ELECTRODES $\frac{3}{16}$ INCH, WELDING SPEC. 7018XLM.
 - C. WIRE, WELDING $\frac{3}{32}$ INCH, NR-203, 1% NICKEL FLUX CORE.
5. OTHER ELECTRODES OR WIRE MEETING SPECIFICATIONS CALLED FOR MAY BE USED UPON APPROVAL BY THE ENGINEER.



BILL OF FROG PLATES AND DIMENSION TABLE

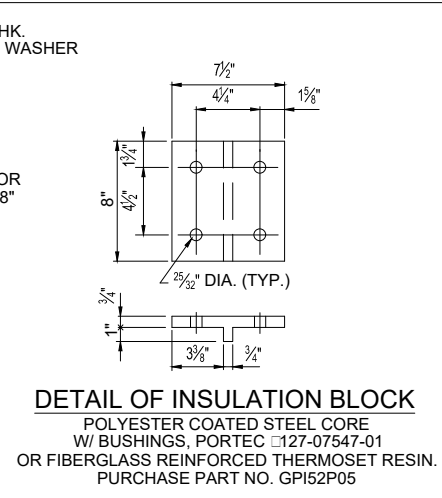
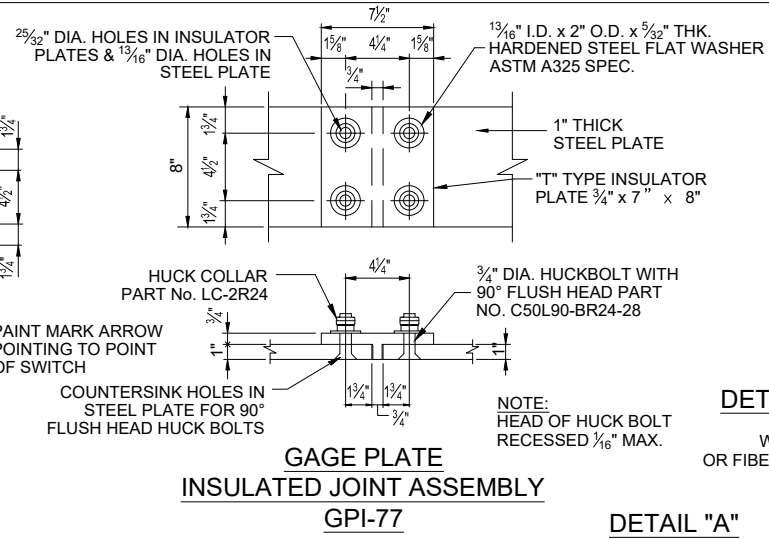
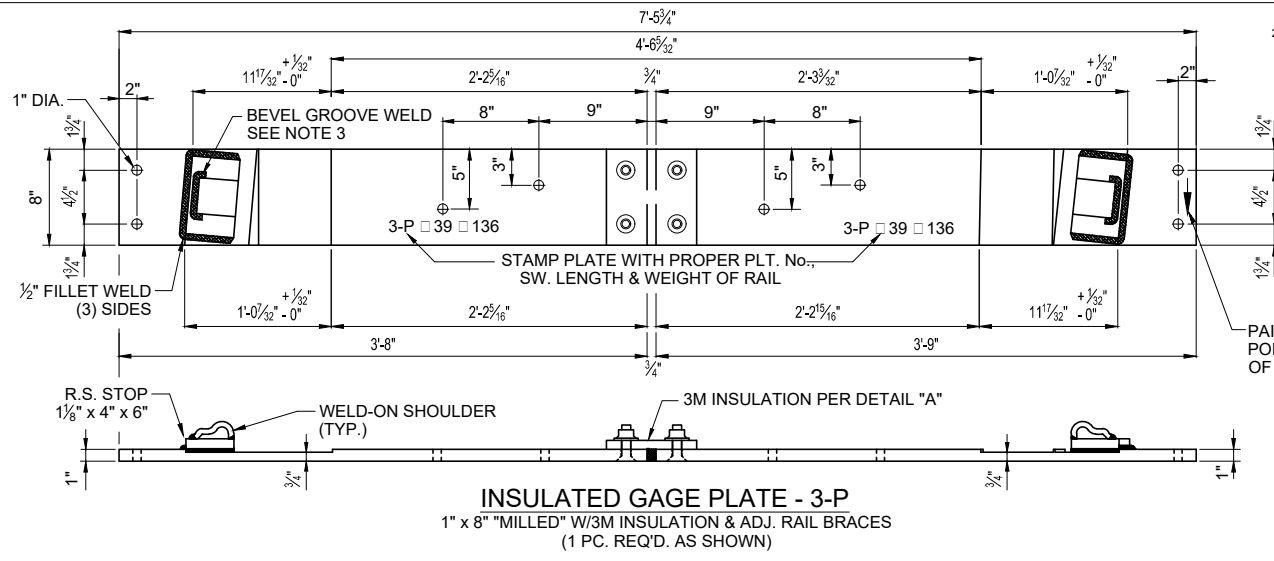
PLATE	DIM "A"	DIM "B"	DIM "L"	PIts REQ'D.
P-17	17 $\frac{1}{32}$ "	17 $\frac{1}{16}$ "	2'-10"	2 EA.
P-18	18 $\frac{9}{32}$ "	18 $\frac{9}{16}$ "	2'-10 $\frac{1}{2}$ "	1 EA.
P-19	19 $\frac{1}{32}$ "	19 $\frac{5}{16}$ "	2'-11 $\frac{1}{2}$ "	1 EA.
P-20	19 $\frac{27}{32}$ "	20 $\frac{9}{32}$ "	3'-0"	1 EA.
P-21	20 $\frac{25}{32}$ "	20 $\frac{31}{32}$ "	3'-1"	2 EA.
P-22	20 $\frac{7}{16}$ "	21 $\frac{1}{4}$ "	3'-2"	2 EA.
P-23	22 $\frac{1}{4}$ "	22 $\frac{19}{32}$ "	3'-2 $\frac{1}{2}$ "	2 EA.
P-24	23 $\frac{3}{32}$ "	23 $\frac{3}{16}$ "	3'-3 $\frac{1}{2}$ "	2 EA.
P-25	22 $\frac{19}{32}$ "	22 $\frac{27}{32}$ "	3'-3"	2 EA.
P-26	20 $\frac{27}{32}$ "	20 $\frac{9}{16}$ "	3'-1"	2 EA.
P-27	19 $\frac{9}{16}$ "	19 $\frac{1}{32}$ "	2'-11 $\frac{1}{2}$ "	1 EA.
P-28	18 $\frac{1}{4}$ "	17 $\frac{1}{16}$ "	2'-10 $\frac{1}{2}$ "	1 EA.
P-41	17 $\frac{19}{32}$ "	18 $\frac{9}{32}$ "	2'-10 $\frac{1}{2}$ "	1 EA.
P-42	18 $\frac{3}{32}$ "	19 $\frac{9}{16}$ "	2'-11 $\frac{1}{2}$ "	1 EA.
P-43	20 $\frac{3}{8}$ "	20 $\frac{5}{16}$ "	3'-1"	1 EA.
P-44	21 $\frac{1}{16}$ "	23 $\frac{3}{8}$ "	3'-2 $\frac{1}{2}$ "	1 EA.
P-45	23 $\frac{1}{4}$ "	23 $\frac{3}{16}$ "	3'-3 $\frac{1}{2}$ "	1 EA.

BILL OF FROG PLATES AND DIMENSION TABLE

PLATE	DIM "A"	DIM "B"	DIM "C"	DIM "L"	PIts REQ'D.	DIM "D"	DIM "E"	DIM "F"	Clips REQ'D.
P-10	13 $\frac{3}{32}$ "	13 $\frac{3}{4}$ "	6 $\frac{19}{32}$ "	2'-5 $\frac{1}{2}$ "	2 EA.	3 $\frac{1}{32}$ "	3 $\frac{1}{4}$ "	1 $\frac{9}{16}$ "	2
P-11	13 $\frac{19}{32}$ "	13 $\frac{27}{32}$ "	6 $\frac{7}{8}$ "	2'-6"	2 EA.	3 $\frac{19}{32}$ "	3 $\frac{27}{32}$ "	1 $\frac{3}{8}$ "	2
P-12	14 $\frac{1}{32}$ "	14 $\frac{1}{16}$ "	7 $\frac{3}{32}$ "	2'-6 $\frac{1}{2}$ "	2 EA.	4 $\frac{3}{32}$ "	4 $\frac{1}{32}$ "	2 $\frac{3}{32}$ "	2
P-13	14 $\frac{19}{16}$ "	15 $\frac{1}{16}$ "	7 $\frac{15}{32}$ "	2'-7"	2 EA.	4 $\frac{13}{16}$ "	4 $\frac{3}{32}$ "	2 $\frac{19}{32}$ "	2
P-14	15 $\frac{19}{32}$ "	15 $\frac{23}{32}$ "	7 $\frac{13}{16}$ "	2'-8"	2 EA.	5 $\frac{19}{32}$ "	5 $\frac{23}{32}$ "	2 $\frac{13}{16}$ "	2
P-15	16 $\frac{1}{8}$ "	16 $\frac{5}{16}$ "	8 $\frac{1}{8}$ "	2'-8 $\frac{1}{2}$ "	2 EA.	6 $\frac{1}{8}$ "	6 $\frac{3}{8}$ "	3 $\frac{1}{8}$ "	2
P-16	16 $\frac{19}{16}$ "	17 $\frac{3}{32}$ "	8 $\frac{1}{2}$ "	2'-9"	2 EA.	6 $\frac{13}{16}$ "	7 $\frac{3}{32}$ "	3 $\frac{1}{2}$ "	2
P-29	16 $\frac{7}{8}$ "	16 $\frac{1}{16}$ "	8 $\frac{7}{16}$ "	2'-9"	1 EA.	6 $\frac{27}{32}$ "	6 $\frac{9}{32}$ "	3 $\frac{9}{32}$ "	1
P-30	15 $\frac{1}{2}$ "	14 $\frac{29}{32}$ "	7 $\frac{9}{8}$ "	2'-7 $\frac{1}{2}$ "	1 EA.	5 $\frac{19}{32}$ "	4 $\frac{1}{8}$ "	2 $\frac{19}{32}$ "	1
P-39	14 $\frac{19}{16}$ "	15 $\frac{3}{8}$ "	7 $\frac{7}{16}$ "	2'-7 $\frac{1}{2}$ "	1 EA.	4 $\frac{27}{32}$ "	5 $\frac{13}{32}$ "	2 $\frac{9}{16}$ "	1
P-40	16 $\frac{3}{16}$ "	16 $\frac{3}{4}$ "	8 $\frac{1}{4}$ "	2'-9"	1 EA.	6 $\frac{3}{32}$ "	6 $\frac{29}{32}$ "	3 $\frac{1}{4}$ "	1

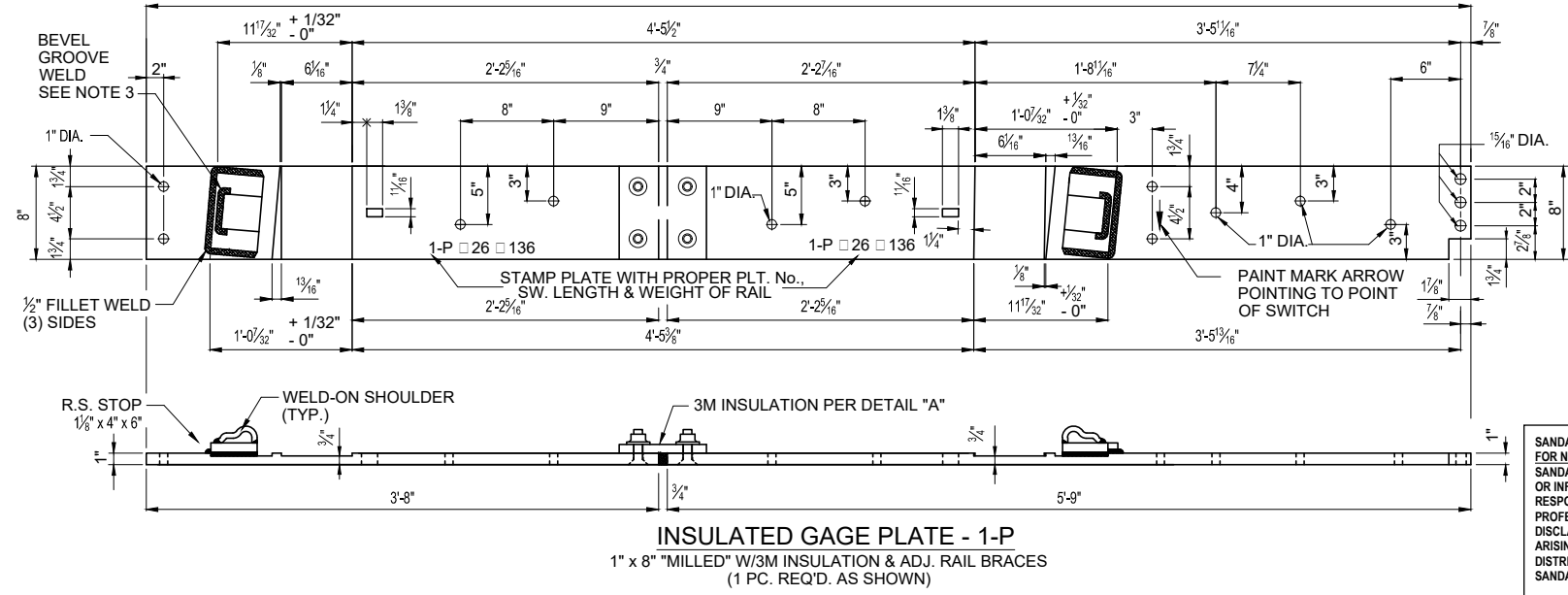
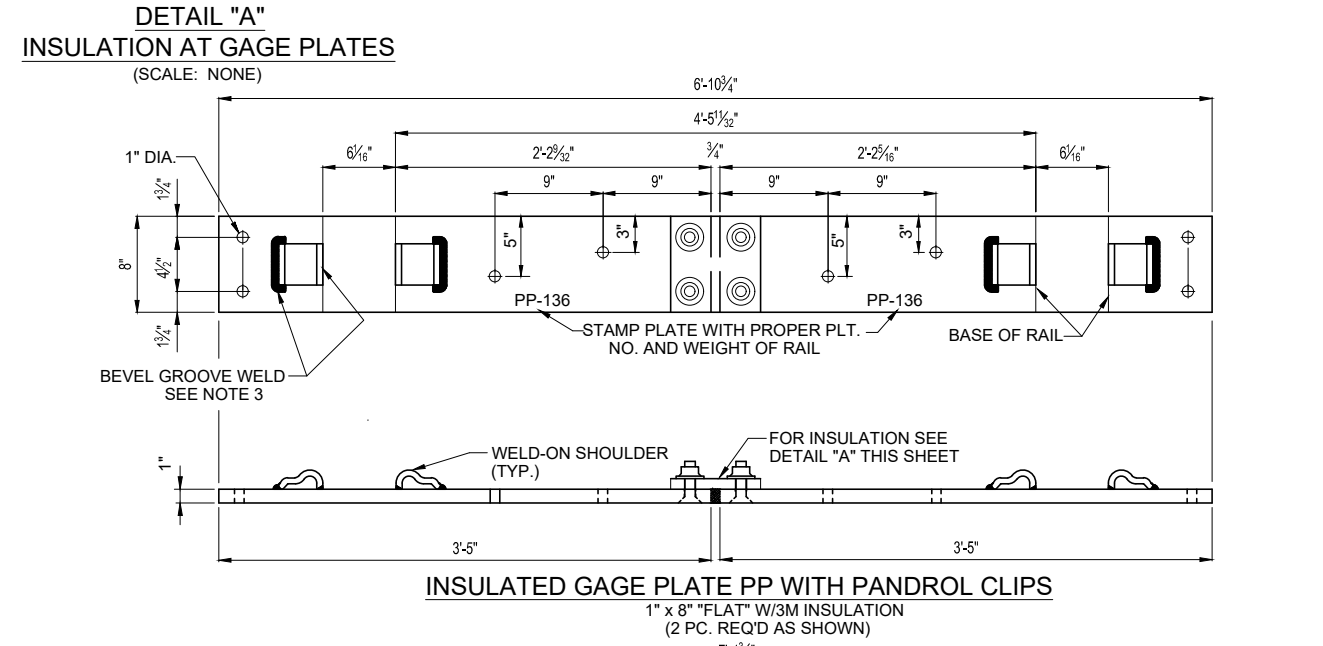
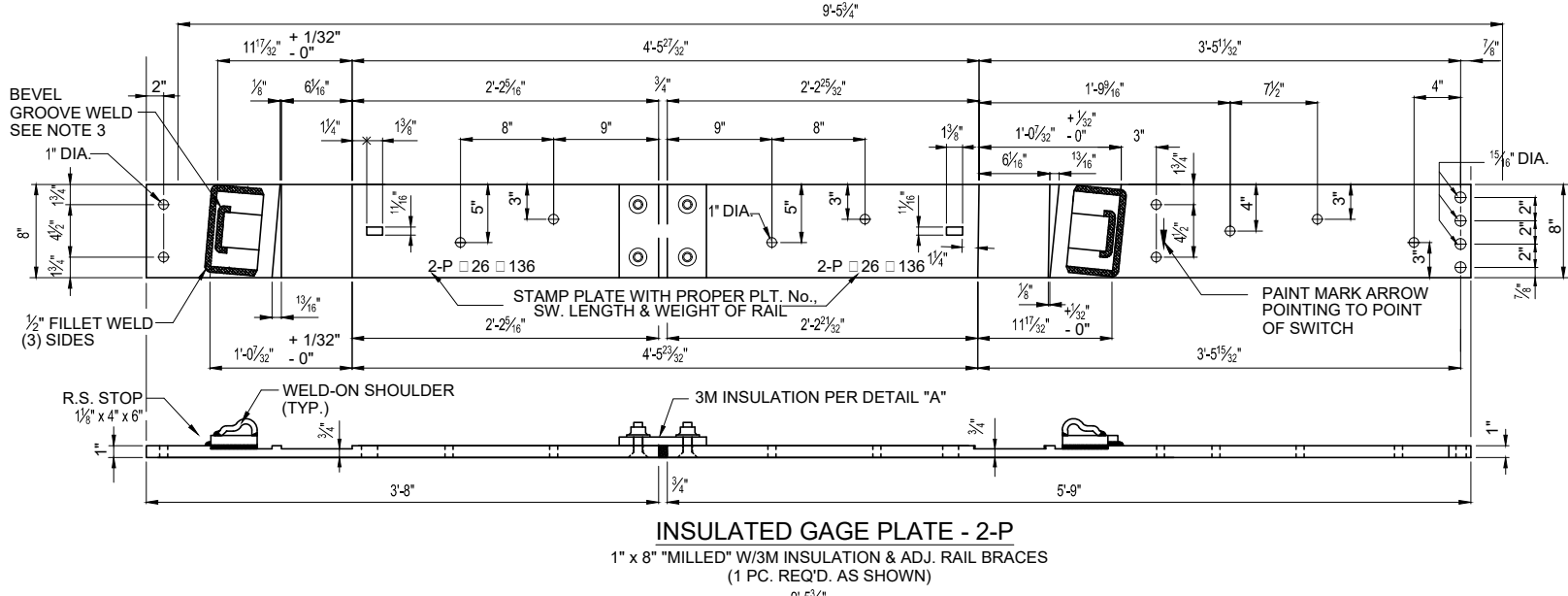
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				CHECKED B. SMITH <i>BSM</i>					DRAWING SHEET NO. 5 OF 15
				RECOMMENDED W. PREY <i>WP</i>					SCALE: NONE
				DATE 2/2/15					CONTRACT SHEET NO.
REV.	DATE	DESCRIPTION	DES.	ENG.	DESIGNER PE STAMP				



- NOTES:**
- PLATES TO BE MADE OF MILD ROLLED STEEL.
 - THE WELD - ON PRESSED STEEL SHOULDER, MADE OF MILD STEEL, TO BE PURCHASED FROM PANDROL INTERNATIONAL OR APPROVED ALTERNATE MEETING PANDROL'S DESIGN SPECIFICATIONS.
 - THE PRESSED STEEL SHOULDER MUST BE CAREFULLY WELDED TO GAGE PLATES WITH A MINIMUM 3/8" WELD ALONG THE BEVELLED GROOVES OF THE SHOULDER. ANY WELD PROJECTING BEYOND THE VERTICAL FACE OF SHOULDER IN THE AREA OF THE RAIL SEAT MUST BE MACHINED OUT TO PROVIDE A CLEAR RAIL SEAT DIMENSION AS CALLED FOR.
 - SWITCH GAGE PLATES FOR RIGHT HAND TURNOUT, MACHINE ON RIGHT, ELECTRICALLY INTERLOCKED FOR U.S. & S. CO'S STYLE M23A MACHINE. IF OTHER SWITCH MACHINE IS USED, SWITCH GAGE PLATES 1-P AND 2-P MAY VARY AND SHOULD BE MODIFIED AS REQUIRED BY SWITCH MANUFACTURER TO PROVIDE PROPER SEATING.
 - FOR EXTENSION PLATE AND DAP TIE DETAILS SEE SHEET ESD-2931-15.

REFERENCE DRAWINGS:
LAYOUT - No. 14, R.H. TURNOUT - 136 lb. -----ESD-2931-02
DETAILS - SWITCH EXTENSION PLATE & DAP TIES -----ESD-2931-15



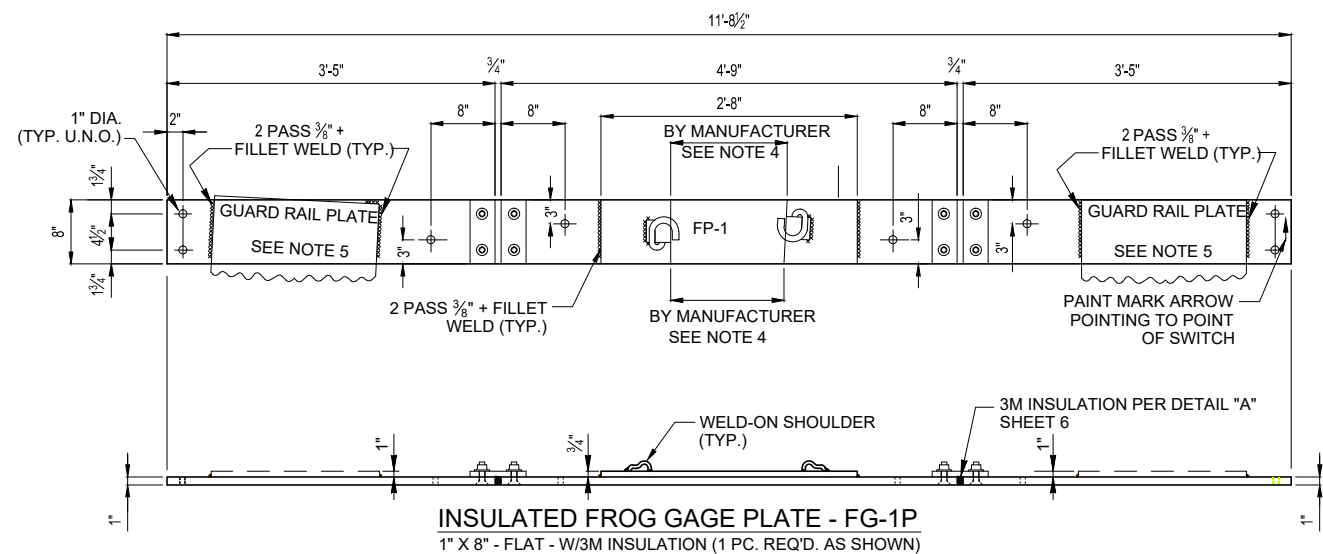
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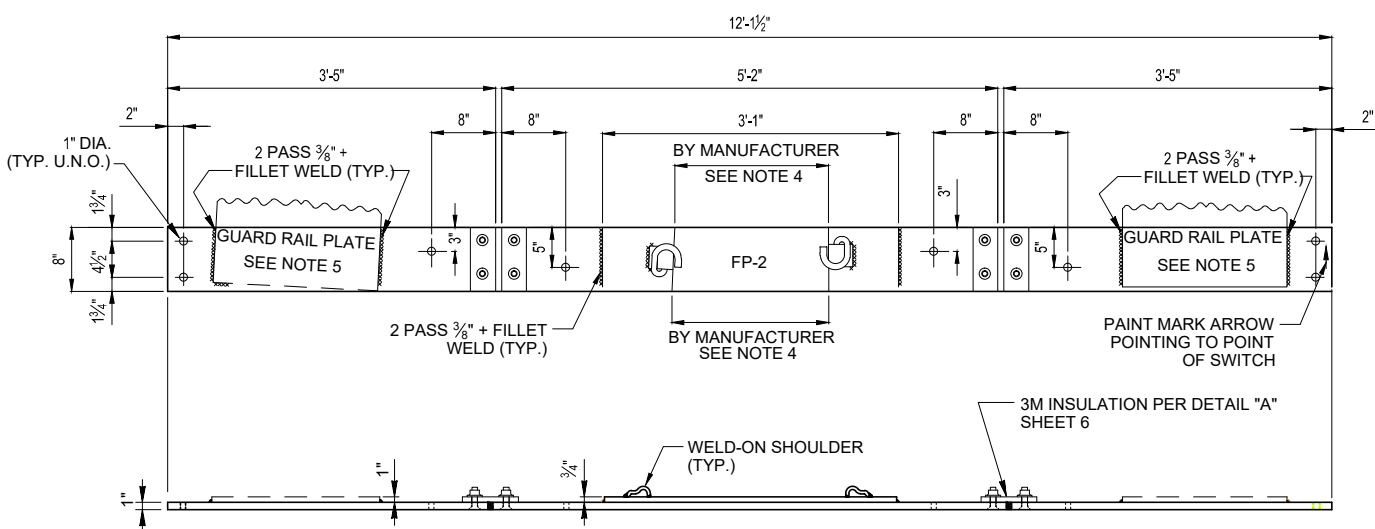
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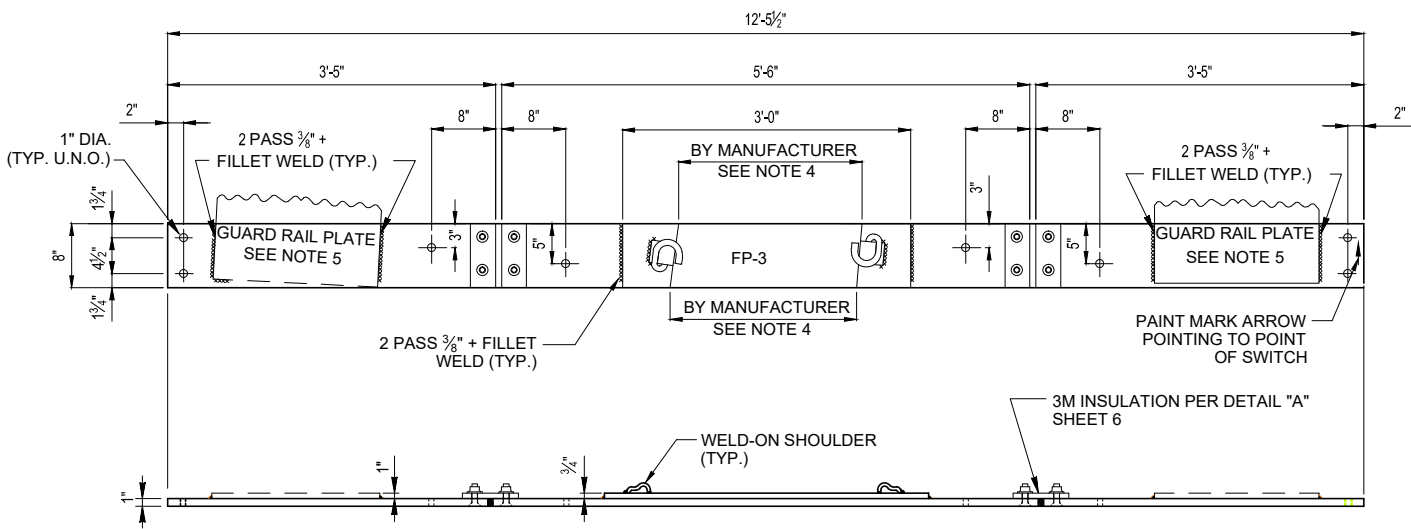
ENGINEERING STANDARD DRAWINGS
DRAWING NO. ESD-2931-06
DRAWING SHEET NO. 6 OF 15
SCALE: NONE
CONTRACT SHEET NO.
NO. 14 STANDARD TURNOUT - GAGE PLATES



INSULATED FROG GAGE PLATE - FG-1P
1" X 8" - FLAT - W/3M INSULATION (1 PC. REQ'D. AS SHOWN)



INSULATED FROG GAGE PLATE - FG-2P
1" X 8" - FLAT - W/3M INSULATION (1 PC. REQ'D. AS SHOWN)



INSULATED FROG GAGE PLATE - FG-3P
1" X 8" - FLAT - W/3M INSULATION (1 PC. REQ'D. AS SHOWN)

INSTRUCTIONS FOR WELDING

GUARD RAIL PLATES TO GAGE PLATES:

1. POSITION GAGE PLATES AT DESIGNATED TIE LOCATIONS AND ANCHOR IN PLACE.
2. CHECK TRACK FOR CORRECT GAGE.
3. STARTING WITH ONE GAGE PLATE, PLACE FROG PLATES WITH ADJUSTABLE BRACES AND SECURE TO FROG AND GUARD RAIL WITH "PANDROL" CLIPS.
4. RECHECK TRACK GAGE AND CORRECT IF NECESSARY.
5. CAREFULLY WELD FROG PLATE AND GUARD RAIL PLATE TO FROG GAGE PLATES WITH 3 PASS 1/2" + FILLET WELD. FOR WELDING USE THE FOLLOWING:
 - A. ELECTRODE, 5/32 INCH, WELDING SPEC. 7018XLM.
 - B. ELECTRODE, 3/16 INCH, WELDING SPEC. 7018XLM.
 - C. WIRE, 3/32 INCH, NR203, 10 NICKEL FLUX CORE.
 OTHER WIRE OR ELECTRODES MEETING SPECIFICATIONS AS CALLED FOR AND APPROVED BY THE ENGINEER MAY BE USED.

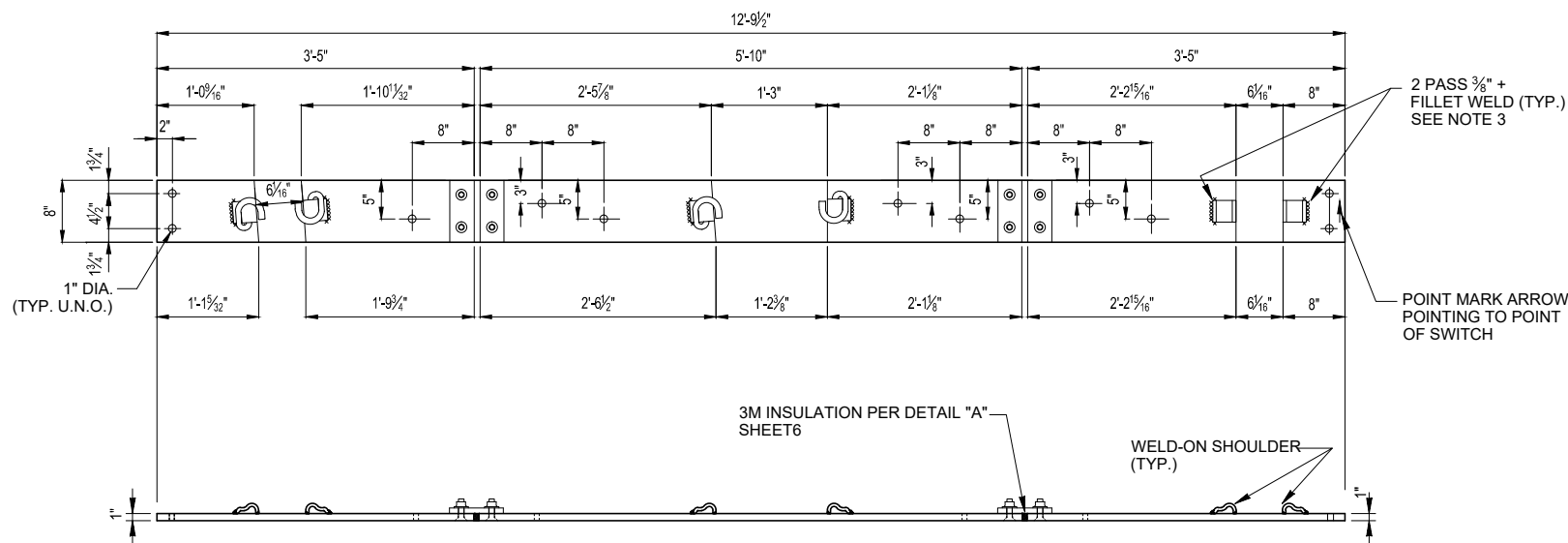
REFERENCE DWGS.

- LAYOUT - NO.14, R.H. TURNOUT - 136 LB. ----- ESD-2931-02
- NO. 14 R.H., RAIL BOUND MANGANESE FROG - 136 LB. ----- ESD-2931-09
- RAISED GUARD RAIL PLATES - 136 LB. ----- BY MANUFACTURER

NOTES:

1. PLATES TO BE MADE OF MILD ROLLED STEEL.
2. THE PLATES AS SHOWN ARE FOR A 136 LB., NO. 14, RIGHT HAND TURNOUT, FOR A LEFT HAND TURNOUT, PLATES ARE TO BE OPPOSITE.
3. THE WELD-ON PRESSED STEEL SHOULDER, MADE OF MILD STEEL, TO BE PURCHASED FROM "PANDROL INTERNATIONAL" OR APPROVED ALTERNATE MEETING "PANDROL'S" DESIGN SPECIFICATIONS. THE PRESSED STEEL SHOULDER MUST BE CAREFULLY WELDED TO ALL PLATES WITH A MINIMUM 2 PASS 3/8" + FILLET WELD ALONG THE BEVELED GROOVES OF THE SHOULDER. SHOULDERS ARE TO BE WELDED ONLY AFTER THE GAGE PLATE AND FROG ARE SECURED IN THE PROPER LOCATION ON THE TIE, WITH PROPER ALIGNMENT. ANY WELD PROJECTING BEYOND THE VERTICAL FACE OF THE SHOULDER IN THE AREA OF THE BASE OF RAIL SEAT MUST BE MACHINED OUT TO PROVIDE A CLEAR RAIL SEAT DIMENSION AS CALLED FOR.
4. MANUFACTURER OF FROG PLATES SHALL USE COMPLETED FROG TO VERIFY LOCATION OF SHOULDERS ON FROG PLATES FP-1, FP-2 AND FP-3 TO INSURE PROPER FIT. FROG PLATES WILL BE WELDED TO THE GAGE PLATES IN THE FIELD WITH A 3 PASS 1/2" + FILLET WELD. PLATES WILL BE WELDED ONLY AFTER THE GAGE PLATES ARE SECURED IN THE PROPER LOCATION ON THE TIE WITH THE FROG IN PLACE AT PROPER ALIGNMENT.
5. GUARD RAIL PLATES ARE TO BE INSTALLED AND WELDED TO THE FROG GAGE PLATES IN THE FIELD WITH A 3 PASS 1/2" + FILLET WELD CONTINUOUS ON BOTH ENDS OF THE PLATE. PLATES ARE TO BE WELDED ONLY AFTER THE GAGE PLATE AND THE FROG ARE SECURED IN THE PROPER LOCATION ON THE TIE WITH PROPER ALIGNMENT.

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INSULATED FROG GAGE PLATE - FG-4P
1" X 8" - FLAT - W/3M INSULATION (1 PC. REQ'D. AS SHOWN)

REV.	DATE	DESCRIPTION	DES.	ENG.

REVISIONS	DRAWN RAILPROS
CHECKED B. SMITH	RECOMMENDED W. PREY
DATE 2/2/15	DESIGNER PE STAMP



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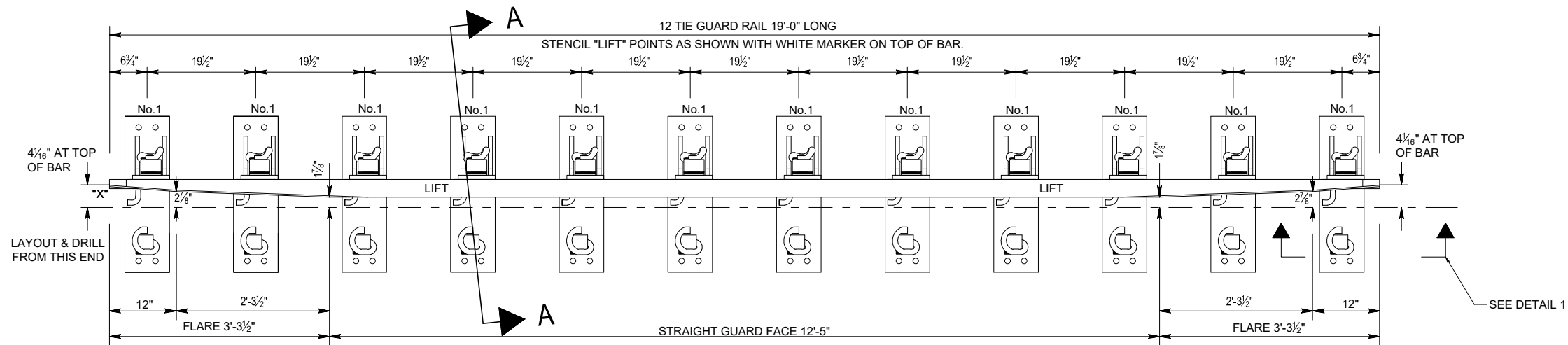


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ENGINEERING STANDARD DRAWINGS

NO. 14 STANDARD TURNOUT - FROG GAGE PLATES

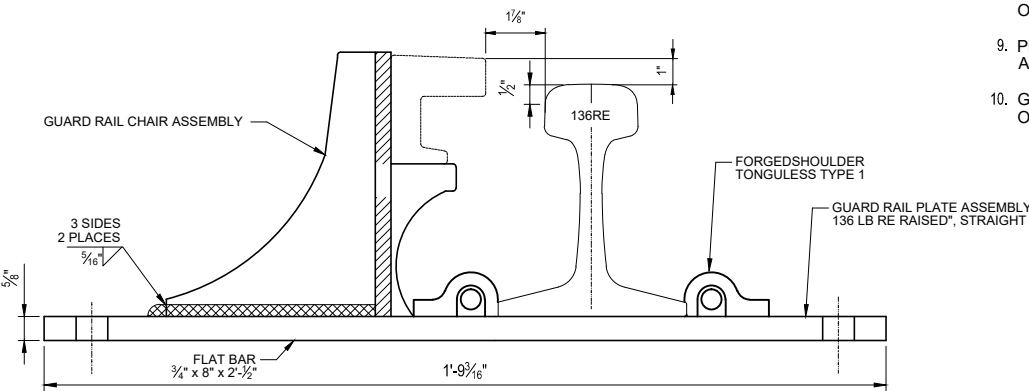
DRAWING NO.	ESD-2931-07
DRAWING SHEET NO.	7 OF 15
SCALE:	NONE
CONTRACT SHEET NO.	



ASSEMBLED 19'-0" GUARD RAIL
SCALE: NONE

COLLECTIVE DRILLING FROM END OF GUARD BAR MARKED "X"

"X" 6³/₄" x 2'-2¹/₄" x 3'-9³/₄" x 5'-5¹/₄" x 7'-0³/₄" x 8'-8¹/₄" x 10'-3³/₄" x 11'-11¹/₄" x 13'-6³/₄" x 15'-2¹/₄" x 16'-9³/₄" x 18'-5¹/₄"
HOLES 1" DIA. - 1¹/₈" A.B.



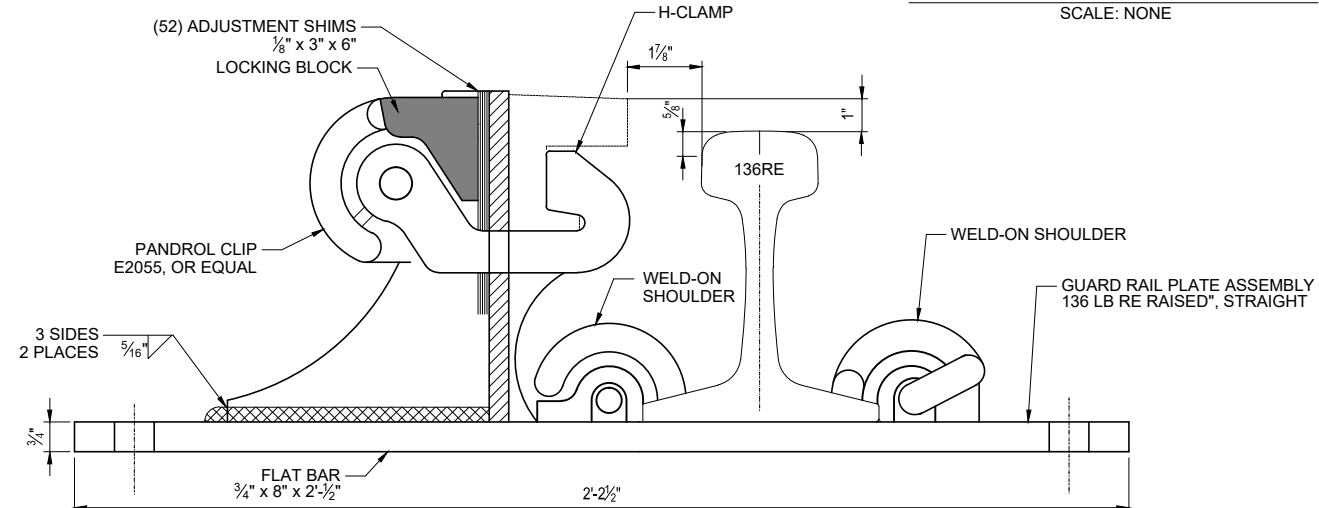
SECTION C-C: GUARD RAIL HARDWARE ASSEMBLY
SCALE: NONE

BILL OF MATERIAL	
QTY	DESCRIPTION
1	GUARD BAR, UIC33 1200 SERIES x 26' -0" LONG
10	GUARD RAIL PLATE ASSEMBLY, 136 LB RE RAISED 1", STRAIGHT
10	H-CLAMP
30	CLIP, PANDROL E2055 OR EQUAL
10	LOCKING BLOCK
40	SHIM, 1/8" x 3" x 6"

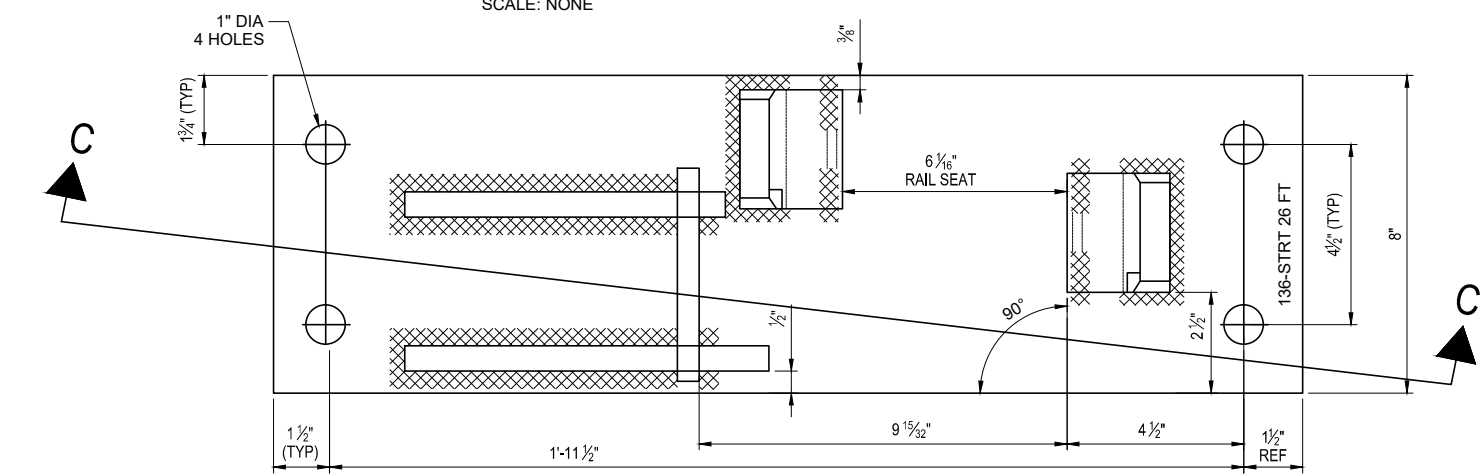
NOTES:

- GUARD RAIL SECTION U.I.C. 33 1200 SERIES (U69) UIC 860.0 GRADE 90A (GUARD FACE BRINELL 319 MIN.)
- BASE PLATE, BRACKET AND SHIMS MILD STEEL PER A.R.E.M.A. SPECIFICATION M7.
- PANDROL H-CLAMP OR APPROVED EQUAL.
- WORKMANSHIP AND TOLERANCES PER A.R.E.M.A. SPECIFICATIONS FOR SPECIAL TRACKWORK.
- WELDING PER ANSI A5S D1.1-92 OR LATEST REVISION.
- PLATE SPACING IS SET FOR SHIPPING ONLY. FINAL PLATE SPACING IS TO BE DETERMINED BY TIE SPACING AT TIME OF INSTALLATION.
- PANDROL SPRING CLIPS TO BE INCLUDED IN ASSEMBLY.
- LIFT POINTS AND WEIGHT OF ASSEMBLY TO BE MARKED ON HEAD OF WEAR BAR WITH WHITE PAINT.
- PLATE IS TO BE STAMPED WITH PLATE I.D. WITH 1/2" HIGH CHARACTERS AS SHOWN.
- GRIND AWAY CORNER OF PANDROL SHOULDER TO CLEAR FOOT OF CHAIR ASSEMBLY.

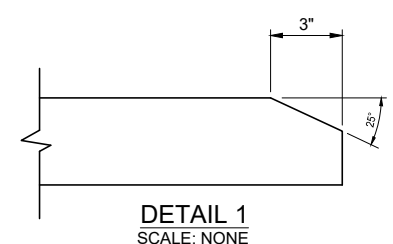
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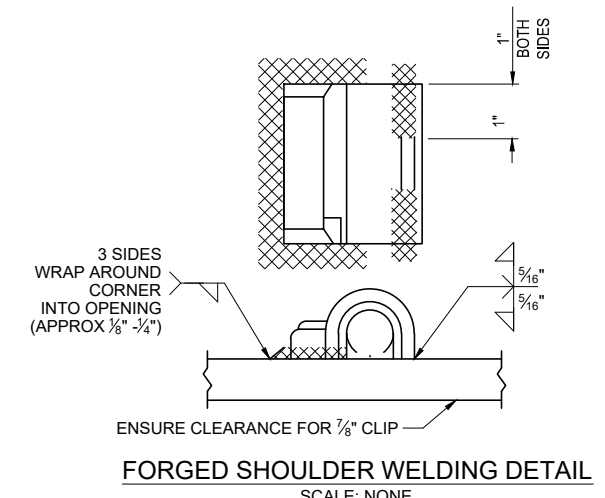
SECTION A-A: GUARD RAIL HARDWARE ASSEMBLY
SCALE: NONE



PLAN VIEW: GUARD RAIL HARDWARE ASSEMBLY
SCALE: NONE



DETAIL 1
SCALE: NONE



FORGED SHOULDER WELDING DETAIL
SCALE: NONE

REV.	DATE	DESCRIPTION	DES.	ENG.

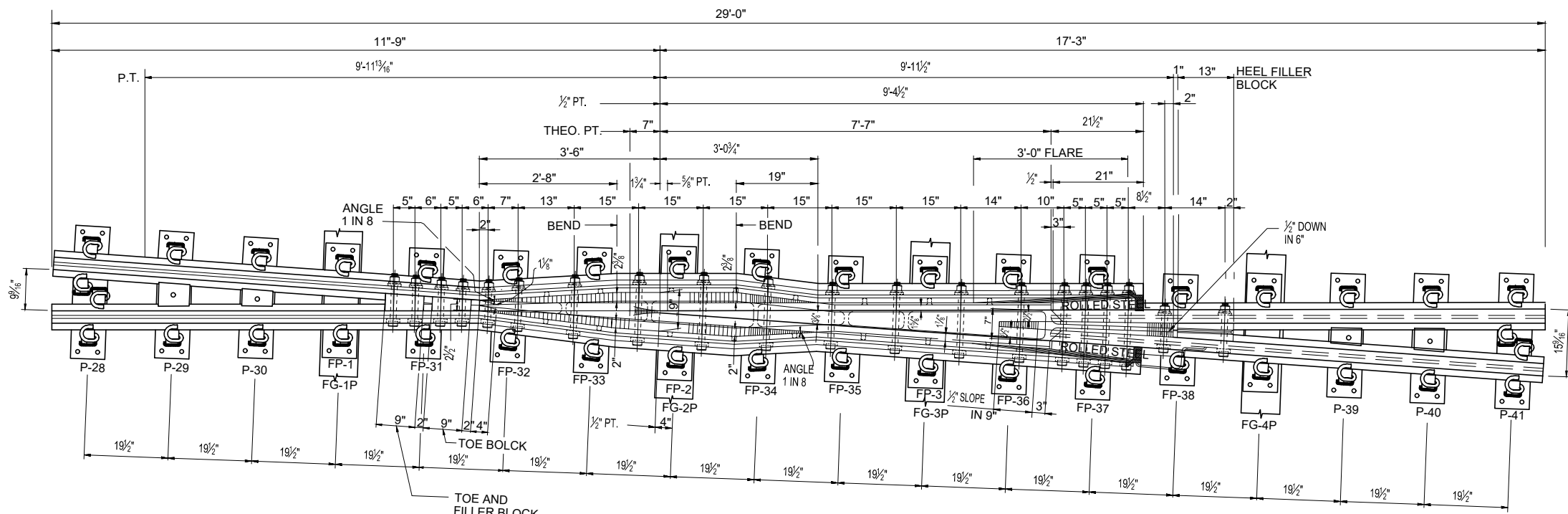
REVISIONS	DRAWN RAILPROS
	CHECKED B. SMITH
	RECOMMENDED B. SCHMITH
	DATE 4/25/17
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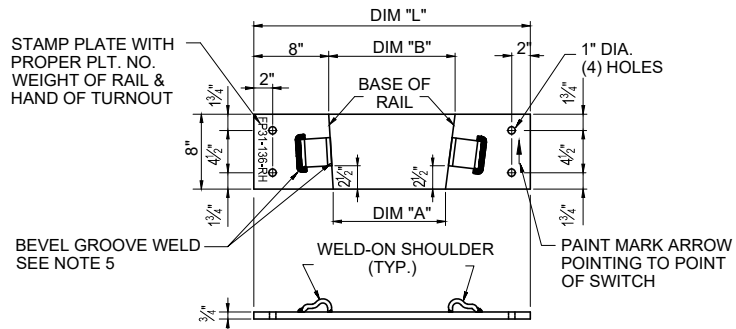
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ENGINEERING STANDARD DRAWINGS
NO. 14 STANDARD TURNOUT - 19'-0" GUARD RAIL

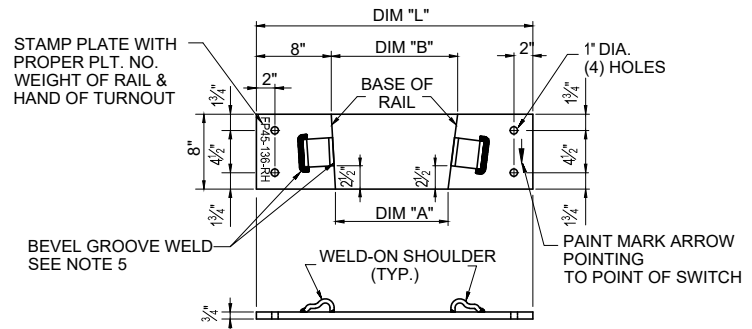
DRAWING NO. ESD-2931-08
DRAWING SHEET NO. 8 OF 15
SCALE: NONE
CONTRACT SHEET NO.



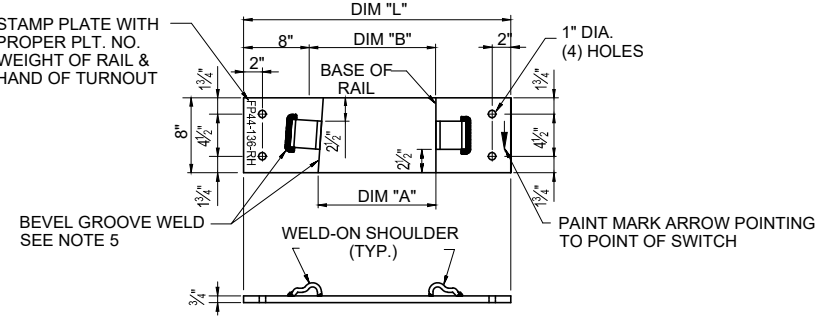
NO. 14 RAIL BOUND MANGANESE STEEL FROG



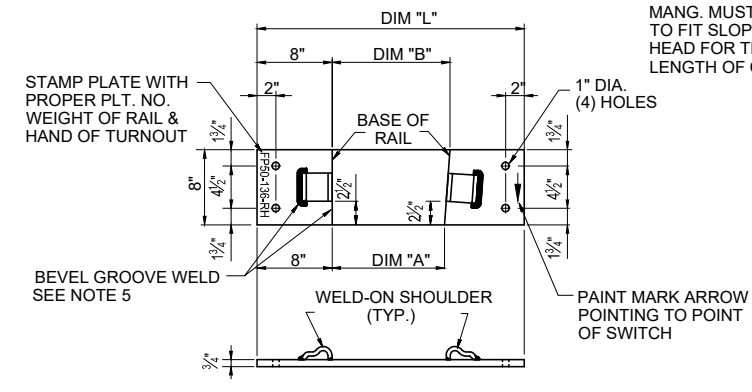
FROG PLATE - FP-31
3/4" x 8" x DIM "L" - FLAT - W/PANDROL CLIPS



FROG PLATES - FP-32 & FP-33
3/4" x 8" x DIM "L" - FLAT - W/PANDROL CLIPS

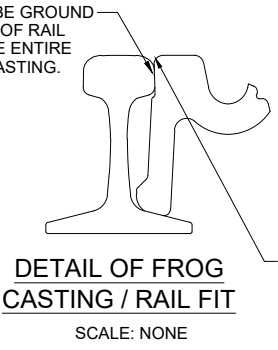


FROG PLATE - FP-34
3/4" x 8" x DIM "L" - FLAT - W/PANDROL CLIPS

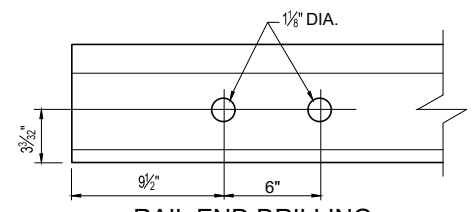


FROG PLATES - FP-35 THRU FP-38
3/4" x 8" x DIM "L" - FLAT - W/PANDROL CLIPS

DIMENSION TABLE				
PLATE	DIM "A"	DIM "B"	DIM "L"	PITS REQ'D.
FP-31	SEE NOTE "A"	2'-4 1/2"	1 EA.	
FP-32	SEE NOTE "A"	2'-5 1/2"	1 EA.	
FP-33	SEE NOTE "A"	2'-9"	1 EA.	
FP-34	SEE NOTE "A"	2'-11"	1 EA.	
FP-35	SEE NOTE "A"	2'-8 1/2"	1 EA.	
FP-36	SEE NOTE "A"	2'-11 1/2"	1 EA.	
FP-37	SEE NOTE "A"	3'-1"	1 EA.	
FP-38	SEE NOTE "A"	2'-4 1/2"	1 EA.	



DETAIL OF FROG CASTING / RAIL FIT
SCALE: NONE



RAIL END DRILLING

REFERENCE DWGS.

- LAYOUT - NO. 14, R.H. TURNOUT - 136 LB. ----- ESD-2931-02
- FROG GAGE PLATES DETAILS ----- ESD-2931-07
- RAISED GUARD RAIL PLATES - 136 LB. ----- BY MANUFACTURER

NOTE "A"

PLATES FP-31 THRU FP-38 ARE TO BE LAID OUT AND MARKED OFF FROM UNDER FROG TO INSURE PROPER LOCATION OF PANDROL SHOULDERS.

NOTE "B"

SPECIAL FROG PLATES FP-1, FP-2, AND FP-3 WITH STEEL SHOULDERS, SHOWN IN POSITION ON SHEET 7, ARE DESIGNED TO BE WELDED TO FROG GAGE PLATES. FOR MANUFACTURING DETAILS AND INSTALLATION PROCEDURES SEE DWG. ESD-2931-07.

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NOTES:

- FROG ANGLE 4°-05'-27".
- RAIL USED TO FABRICATE FROG IS TO BE 136 LB. HIGH STRENGTH.
- RAIL BOUND MANGANESE STEEL FROG PER CURRENT A.R.E.M.A. PLAN NO. 621 & 625 WITH EXPLOSIVE HARDENED MANGANESE HIGH INTEGRITY CASTING PER CURRENT A.R.E.M.A. SPECIFICATIONS AND MODIFIED FOR ARM LENGTHS AND PLATES WITH FASTENERS.
- ALL FROG PLATES SHALL BE STAMPED IN 1/2" CHARACTERS TO INDICATE MFG., FROG NO., R.H., RAIL SECTION AND PLATE NUMBER. MARK TO BE STAMPED ON SAME END OF ALL FROG PLATES.
- WORKMANSHIP AND MATERIALS SHALL BE PER CURRENT A.R.E.M.A. "MANUAL AND PORTFOLIO", EXCEPT AS OTHERWISE SPECIFIED.
- ANY CONSTRUCTION DETAILS NOT SHOWN SHALL BE IN ACCORDANCE WITH CURRENT A.R.E.M.A. RECOMMENDED PRACTICE.
- FROG PLATES ARE DESIGNED TO BE INSTALLED PERPENDICULAR TO MAIN TRACK.
- BODY BOLTS 1 3/8" DIA. H.T.C.S. - PER A.R.E.M.A. SPECIFICATIONS.
- TOE AND HEEL BLOCKS AND BOLTS PER A.R.E.M.A. SPECIFICATIONS.
- PLATES TO BE MADE OF MILD ROLLED STEEL.
- THE PLATES AS SHOWN ARE FOR A 136 LB., NO. 14, RIGHT HAND TURNOUT. FOR A LEFT HAND TURNOUT, PLATES TO BE OPPOSITE.
- THE WELD-ON PRESSED STEEL SHOULDER, MADE OF MILD STEEL AND MEETING "PANDROL'S" DESIGN SPECIFICATIONS SHALL BE USED. THE PRESSED STEEL SHOULDER MUST BE CAREFULLY WELDED TO ALL PLATES WITH A MINIMUM 2 PASS 3/8" + FILLET WELD ALONG THE BEVELED GROOVES OF THE SHOULDER. ANY WELD PROJECTING BEYOND THE VERTICAL FACE OF SHOULDER IN THE AREA OF THE BASE OF RAIL SEAT MUST BE MACHINED OUT TO PROVIDE A CLEAR RAIL SEAT DIMENSION AS CALLED FOR.
- MANUFACTURER OF FROG PLATES SHALL USE COMPLETED FROG TO VERIFY LOCATION OF ADJUSTABLE CLAMPS ON FROG PLATES FP-1, FP-2 AND FP-3 TO INSURE PROPER FIT. FROG PLATES WILL BE WELDED TO THE GAGE PLATES IN THE FIELD WITH A 3 PASS 1/2" + FILLET WELD. PLATES WILL BE WELDED ONLY AFTER THE GAGE PLATES ARE SECURED IN THE PROPER LOCATION ON THE TIE WITH THE FROG IN PLACE AT PROPER ALIGNMENT.
- GUARD RAIL PLATES ARE TO BE INSTALLED AND WELDED TO THE FROG GAGE PLATES IN THE FIELD WITH A 3 PASS 1/2" + FILLET WELD CONTINUOUS ON BOTH ENDS OF THE PLATE. PLATES ARE TO BE WELDED ONLY AFTER THE GAGE PLATE AND THE FROG ARE SECURED IN THE PROPER LOCATION ON THE TIE WITH PROPER ALIGNMENT.
- IDENTIFICATION TAG WITH RAISED METAL CHARACTERS TO BE APPLIED WHICH WILL STATE WEIGHT OF RAIL, FROG NO., MANUFACTURER AND YEAR MANUFACTURED.
- RAILS ENDS TO BE CUT AT 45 DEGREE ANGLE AT JOINT WITH FROG CASTING.

WELDING OF GAGE PLATE & GUARD RAIL PLATES:

- POSITION GAGE PLATES AT DESIGNATED TIE LOCATIONS AND ANCHOR IN PLACE.
- CHECK TRACK FOR CORRECT GAGE.
- STARTING WITH ONE GAGE PLATE, PLACE FROG PLATES WITH ELASTIC CLIPS AND SECURE TO FROG AND GUARD RAIL WITH "PANDROL" CLIPS OR APPROVED EQUAL.
- RECHECK TRACK GAGE IF NECESSARY.
- CAREFULLY WELD FROG PLATE AND GUARD RAIL PLATE TO FROG GAGE PLATES WITH 3 PASS 1/2" + FILLET WELD. FOR WELDING USE THE FOLLOWING:
 - ELECTRODE, 5/32 INCH, WELDING SPEC. 7018XLM.
 - ELECTRODE, 3/16 INCH, WELDING SPEC. 7018XLM.
 - WIRE, 3/32 INCH, NR203, 1-1 NICKEL FLUX CORE.
 OTHER WIRE OR ELECTRODES MEETING SPECIFICATIONS AS CALLED FOR AND APPROVED BY THE ENGINEER MAY BE USED.

REV.	DATE	DESCRIPTION	DES.	ENG.

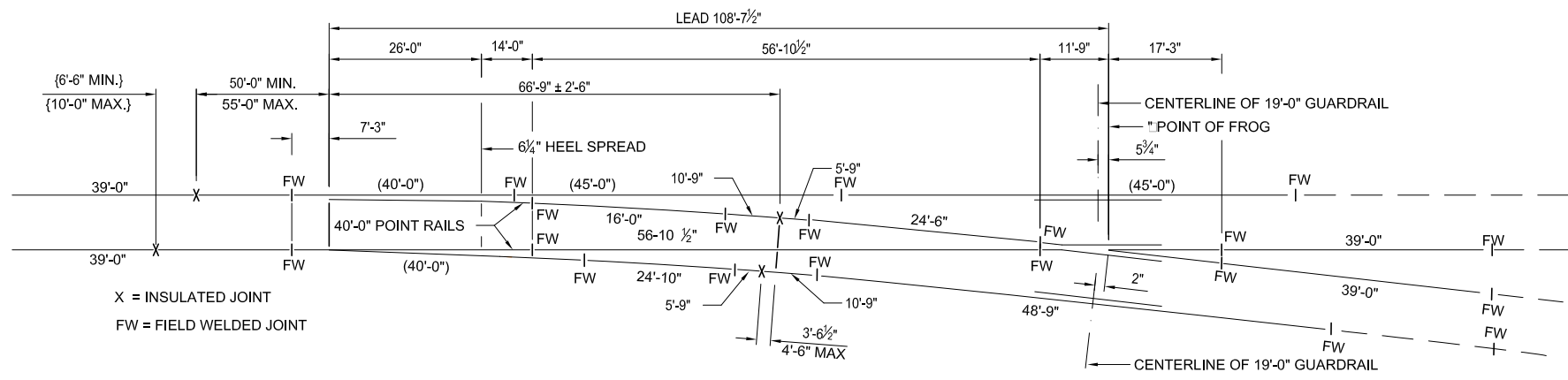
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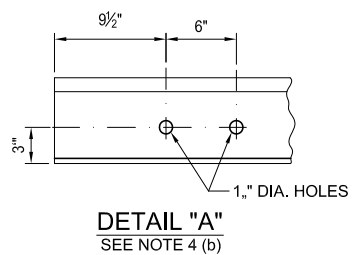
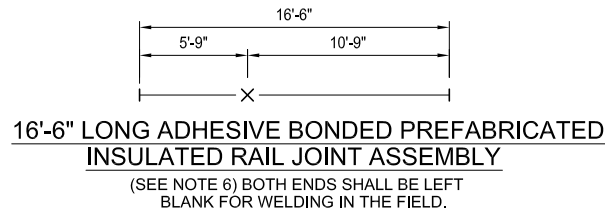
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ENGINEERING STANDARD DRAWINGS
NO. 14 STANDARD TURNOUT - RAILBOUND MANGANESE STEEL FROG

DRAWING NO. ESD-2931-09
DRAWING SHEET NO. 9 OF 15
SCALE: NONE
CONTRACT SHEET NO.

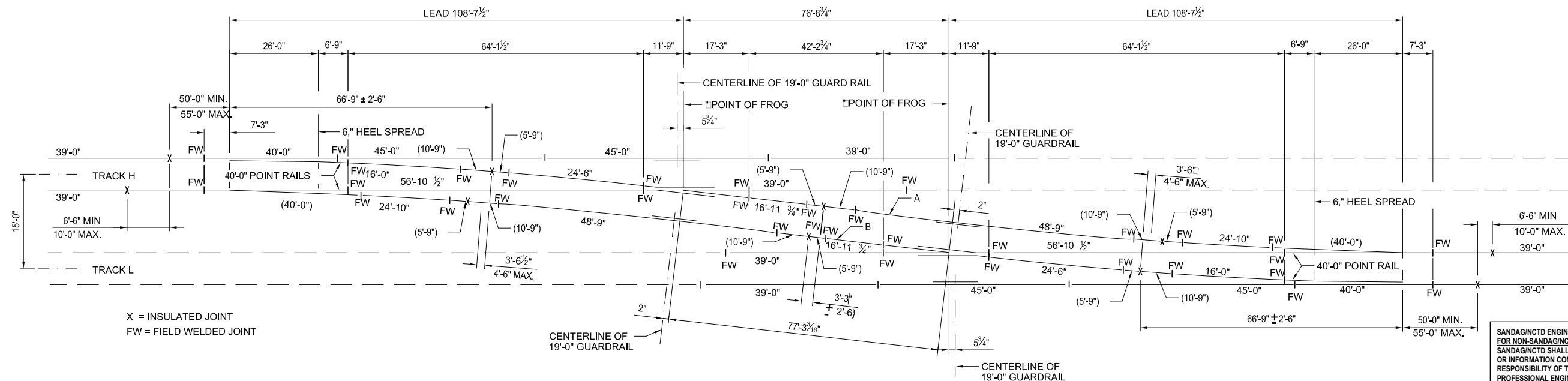


TURNOUT



NOTES:

1. SINCE THE PERMISSIBLE VARIATION IN STANDARD LENGTHS OF RAILS, FROGS AND SWITCH POINTS IS GREATER THAN THE NORMAL EXPANSION GAPS AT RAIL JOINTS AND THICKNESS OF FIBRE END POST IN INSULATED JOINTS, NO ALLOWANCE HAS BEEN MADE FOR EXPANSION GAPS AND FIBRE END POSTS IN COMPUTING LENGTHS OF RAILS SHOWN.
2. RAIL LAYOUT SHOWN FOR CROSSOVERS IS TO BE USED IN ALL CASES, EXCEPT WHERE COMPROMISE JOINTS ARE REQUIRED BETWEEN THE FROGS IN THE CROSSOVER TRACK. (COMPROMISE JOINTS CAN BE USED IN A TEMPORARY CONDITION.) WHEN COMPROMISE WELDS ARE REQUIRED, THE INSULATED JOINTS IN THE CROSSOVER TRACK SHALL ALWAYS BE OF THE HEAVIER SECTION AND THE RAIL LAYOUT SHALL BE CHANGED TO LOCATE COMPROMISE JOINTS AS DESCRIBED BELOW:
THE DESCRIPTIONS OF THE CHANGES IN RAIL LAYOUT WHEN COMPROMISE JOINTS ARE REQUIRED IN THE CROSSOVER TRACK ARE BASED ON ASSUMPTION THAT TRACK H IS LAID WITH HEAVIER RAIL THAN TRACK L. CROSSOVER ON 15'-0" TRACK CENTERS: AT LOCATION A THE 65'-6" RAIL SHALL BE REPLACED WITH 5'-0" OF THE HEAVIER RAIL AND 60'-6" OF THE LIGHTER RAIL. AT LOCATION B THE 16 1/4" RAIL SHALL BE REPLACED WITH 10'-0" OF THE HEAVIER RAIL AND 6'-11 3/4" OF THE LIGHTER RAIL.
3. IN ADDITION TO NOTE 1, NO ALLOWANCE HAS BEEN MADE IN RAIL LENGTHS TO PROVIDE GAPS NEEDED TO MAKE FIELD WELDS. IN THE FIELD IT WILL BE NECESSARY TO CUT RAIL ENDS TO PROVIDE CORRECT GAPS FOR FIELD WELDS.
4. FURNISH ALL RAIL SHOWN IN SOLID LINES ON THIS DRAWING:
(A.) RAILS LONGER THAN 39'-0" SHALL BE CONTINUOUS WELDED RAIL (CWR), TO BE FURNISHED WITH BOTH ENDS LEFT BLANK FOR WELDING IN THE FIELD.
(B.) ALL OTHER RAILS 39'-0" OR SHORTER AS SPECIFIED ON THE DRAWING, WITH BOTH ENDS DRILLED PER DETAIL "A", IF SO REQUIRED.
5. ALL RAIL FURNISHED FOR TURNOUT AND CROSSOVER SHALL BE "HEAD HARDENED" RAIL.
6. LOCATIONS OF INSULATED JOINTS ARE SHOWN ON TURNOUT AND CROSSOVER DIAGRAMS WITHOUT TOLERANCES, OR IF TOLERANCES ARE PERMISSIBLE, WITH (+ OR -). ALL INSULATED JOINTS ARE TO BE PROPERLY SUSPENDED IN CRIB AREA BETWEEN TWO TIES LOCATED 4" MINIMUM FROM EDGE OF NEAREST TIE TO EDGE OF INSULATED JOINT.
7. INSULATED JOINT MUST BE INSTALLED TO BE CENTERED BETWEEN TWO (2) TIES.
8. FIELD WELDED JOINTS DESIGNATED "FW" SHOULD BE IN CRIB AREA BETWEEN TWO TIES LOCATED 4" MINIMUM BETWEEN NEAREST TIE AND WELDED JOINT.
9. DIMENSIONS SHOWN IN PARENTHESIS (0'-0") ARE EXACT. RAILS FURNISHED FOR THESE LOCATIONS ARE LONGER AND MUST BE FIELD ADJUSTED (CUT) WITHIN TOLERANCES SHOWN IN BRACKETS (0'-0").
10. WHEN INSULATED JOINTS WITH TOLERANCES AND FIELD WELDED JOINTS FALL SHORT OF MINIMUM CLEARANCE FROM TIE OR TIE PLATE THE JOINT MAY BE MOVED WITHIN TOLERANCE LIMITS. BONDED INSULATED JOINT ASSEMBLIES AND STOCK RAILS ARE FURNISHED LONGER THAN SHOWN IN PARENTHESIS ON LAYOUT. THESE RAILS OR THEIR ADJACENT CONNECTING RAILS MUST BE TRIMMED IN THE FIELD TO FIT.
11. INSULATED JOINTS SHALL BE SAWCUT SQUARE.



CROSSOVER
(15'-0" TRACK CENTERS)

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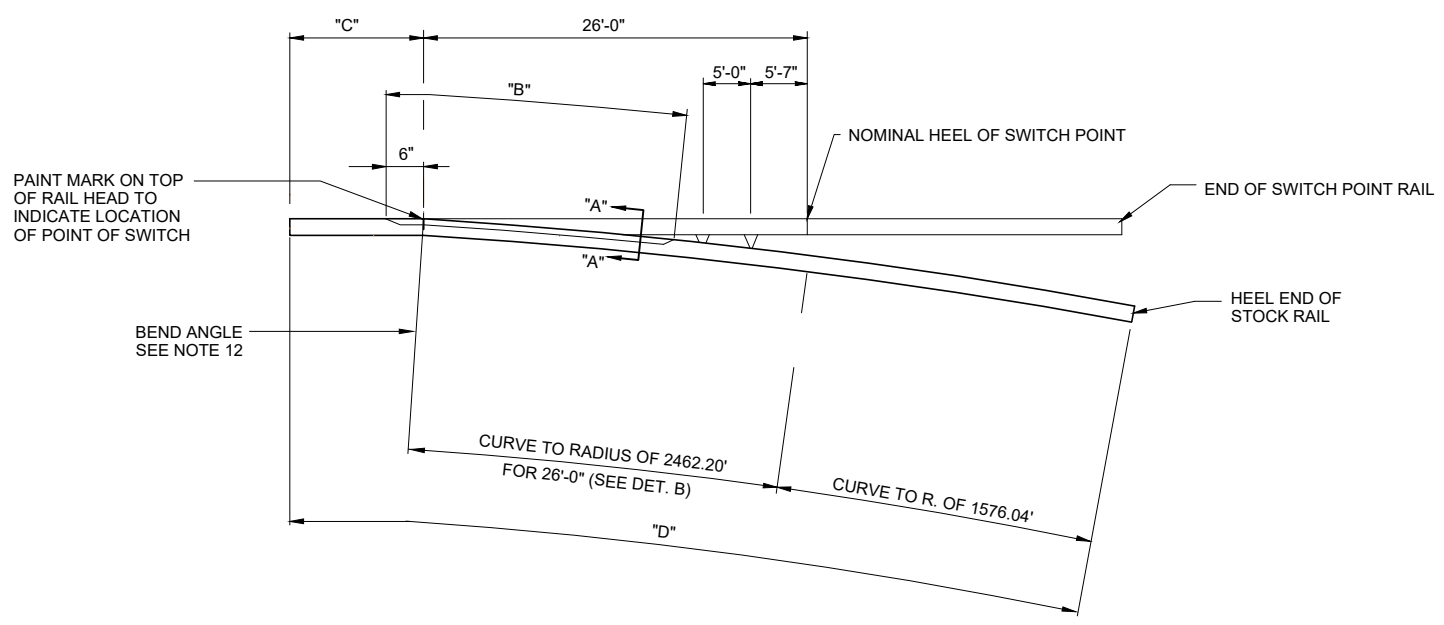
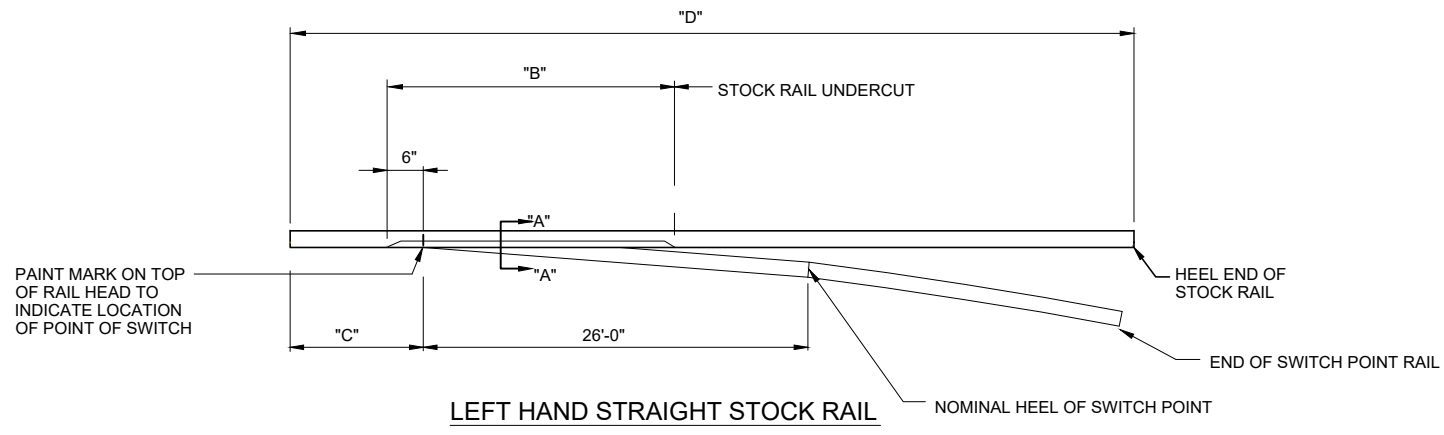
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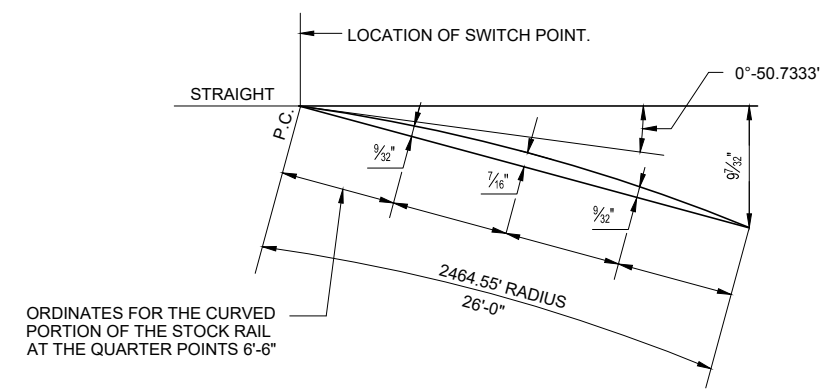
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ENGINEERING STANDARD DRAWINGS
NO. 14 STANDARD TURNOUT AND CROSSOVER INSULATED JOINT DIAGRAM

DRAWING NO.	ESD-2931-10
DRAWING SHEET NO.	10 OF 15
SCALE:	NONE
CONTRACT SHEET NO.	



RIGHT HAND CURVED STOCK RAIL
 STOCK RAILS SHOWN ARE FOR " RIGHT HAND TURNOUT".
 FOR LEFT HAND TURNOUT, STOCK RAILS ARE OPPOSITE HAND,
 BEING LEFT HAND CURVED STOCK RAIL AND
 RIGHT HAND STRAIGHT STOCK RAIL



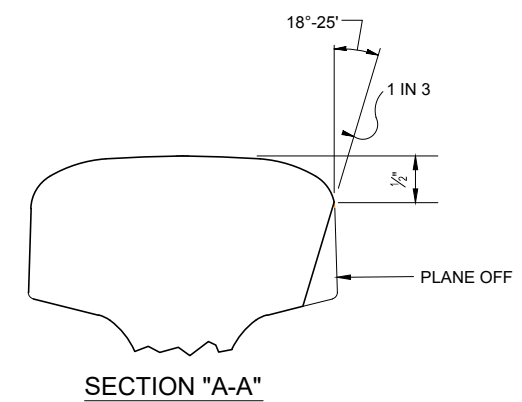
DETAIL "B"

NOTES:

1. ANY UN-NOTED DIMENSIONS TO BE FURNISHED BY FIELD FORCES FOR CORRECT ORDERING OF REPLACEMENT STOCK RAILS.
2. LENGTH OF SWITCH POINT (26'-0").
3. UNDERCUT STOCK RAILS TO BE MADE OF HIGH STRENGTH RAIL WITH ENDS BEVELED PER CURRENT A.R.E.M.A. PLAN NO. 1005.
4. FOR STOCK RAIL UNDERCUT LENGTH "B", PER SECTION "A-A", LENGTH "C" AND LENGTH "D" FOR NEW SAMSON SWITCH INSTALLATIONS OR REPLACEMENT ORDERS SEE TABLE BELOW.

LENGTHS B, C, & D FOR 136 LB. RAIL									
SW. PT. LENGTH	T.O. NO.	STOCK RAIL	B	FOR FIRST (NEW) INSTALL.					
				C	D	END DRILL. SEE NO. 10	C	D	END DRILL. SEE NO. 10
26'-0"	14	STR.	15'-2"	7'-3"	40'-0"	NONE	10'-0"	43'-0"	NONE
26'-0"	14	CURVED	15'-2"	7'-3"	40'-0"	NONE	12'-0"	43'-0"	NONE

5. BEND ANGLE IN BENT STOCK RAIL TO BE AS FOLLOWS: 0°-50.7333' OR 1" IN 5'-7 3/4".
6. THE CURVED PORTION OF THE CURVED STOCK RAIL SHALL BE CURVED PER DETAIL "B".



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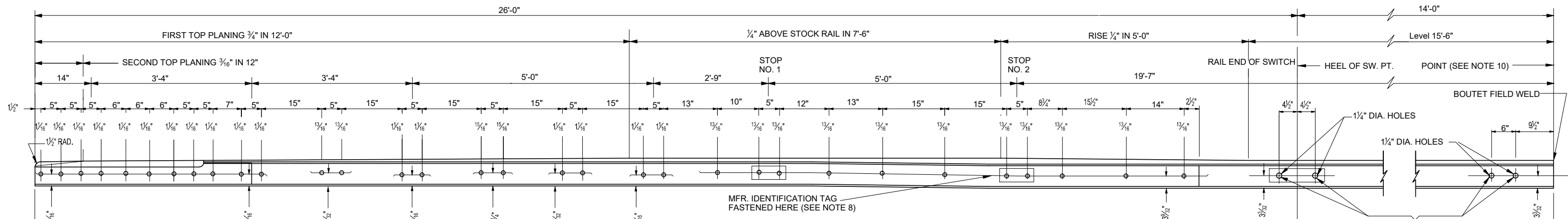
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CHECKED B. SMITH	DATE 2/2/15
RECOMMENDED W. PREY	DESIGNER PE STAMP

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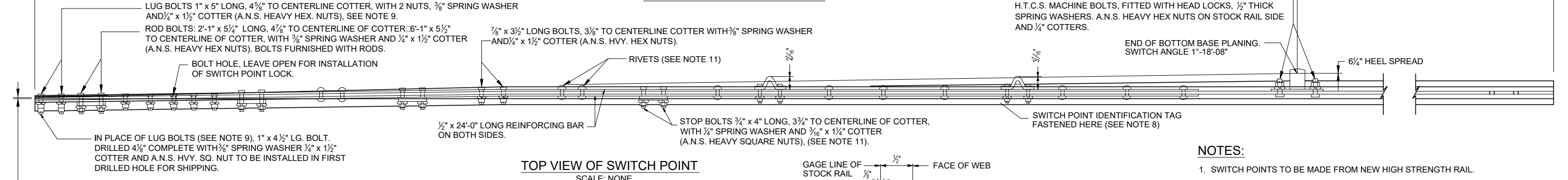
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ENGINEERING STANDARD DRAWINGS
 NO. 14 STANDARD TURNOUT -
 STRAIGHT OR CURVED UNDERCUT
 STOCK RAILS FOR 26'-0" SWITCH POINT

DRAWING NO.	ESD-2931-11
DRAWING SHEET NO.	11 OF 15
SCALE:	NONE
CONTRACT SHEET NO.	

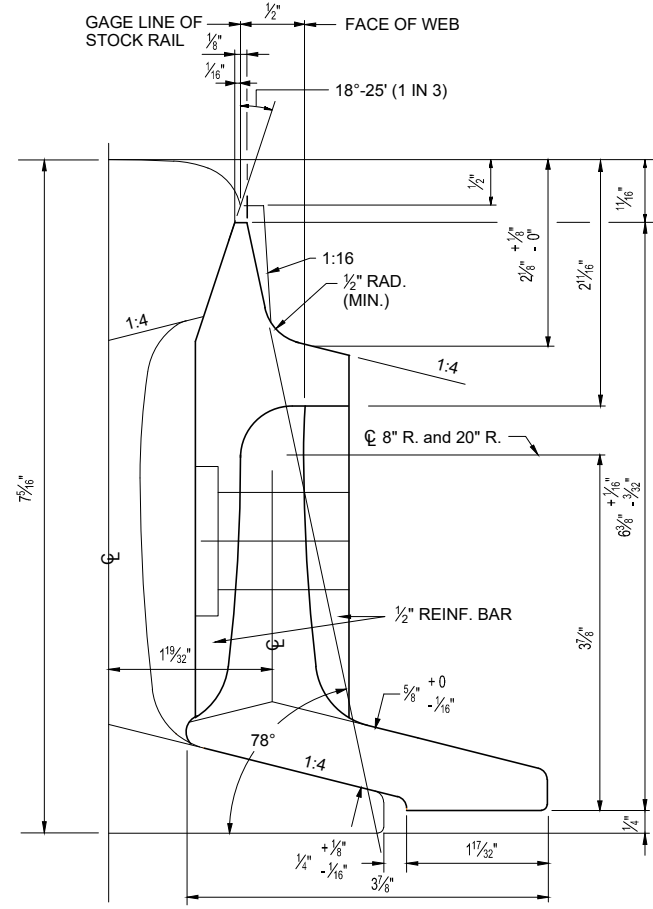


SIDE VIEW OF SWITCH POINT



TOP VIEW OF SWITCH POINT

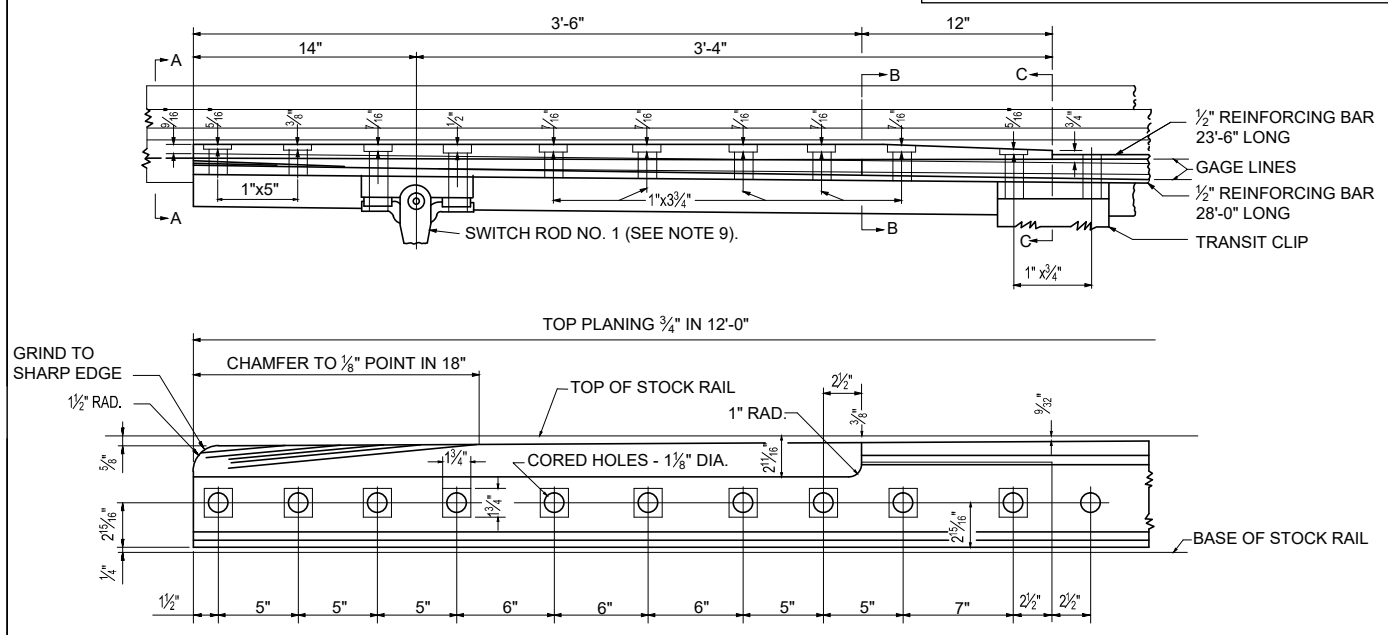
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END VIEW OF POINT WITH ALLOY STEEL TIP

NOTES:


- SWITCH POINTS TO BE MADE FROM NEW HIGH STRENGTH RAIL.
- CURVED LEFT HAND SWITCH POINT FOR RIGHT HAND TURNOUT SHOWN. MAKE OPPOSITE HAND FOR RIGHT AND LEFT HAND SWITCH POINTS FOR LEFT HAND TURNOUT.
- SIDE PLANING FIGURED ON GAGE LINE 5/8" BELOW TOP OF RAIL.
- MATERIALS AND WORKMANSHIP ALSO ANY CONSTRUCTION DETAILS NOT SHOWN, SHALL BE PER CURRENT A.R.E.M.A. "PORTFOLIO OF TRACKWORK PLANS" AND THE A.R.E.M.A. "MANUAL OF RAILWAY ENGINEERING", UNLESS OTHERWISE SPECIFIED ON THIS PLAN.
- IN ORDER TO ELIMINATE STRESS RAISERS, MANUFACTURERS SHALL PEEN THE EDGES OF THE BOLT HOLES AS INDICATED AT THE HEEL OF SWITCH POINT AND AT THE HEEL END OF THE SWITCH POINT RAIL, USING AIR HAMMER WITH SUITABLE HEAD AND FINISHING WITH DRIFT PIN. BRAND ON RAIL AT EDGE OF BOLT HOLE TO BE CAREFULLY REMOVED BY GRINDING BEFORE PEENING.
- SWITCH POINTS FOR TURNOUT SIDE MAY BE FURNISHED WITH ALLOY STEEL TIP.
- THE CONTOUR PLANING SHALL BE ON THE GAGE SIDE BEGINNING AT A DISTANCE OF 36" FROM THE POINT OF SWITCH AND SHALL BE SHAPED TO THE CONTOUR OF A NEW 136-LB. RAIL AND SHALL RUN OUT AT THE END OF TOP PLANING, WHERE THE SWITCH POINT HAS FULL HEEL CONTOUR.
- METAL IDENTIFICATION TAG SHOWING (1) DESIGN LENGTH OF SWITCH, (2) IN PARENTHESIS: THE ACTUAL LENGTH OF SWITCH POINT RAIL AND (3) THE TURNOUT NUMBER. MARK TAG THUS: 26'-0" (40'-0") NO. 14. TAG TO BE FASTENED TO SWITCH POINT, ON GAGE SIDE OF RAIL AT HEEL SPACER BLOCK IN LOCATION SHOWN. A SECOND METAL IDENTIFICATION TAG SHOWING HAND OF SWITCH POINT, WEIGHT OF RAIL, HS, MANUFACTURER AND WHEN MADE, TO BE FASTENED TO SWITCH POINT AT LOCATION SHOWN.
- UNLESS SPECIFIED ON ORDER, FRONT ROD LUG BOLTS AND TRANSIT CLIPS FOR SWITCH RODS NO. 1, 2, 3, AND 4 COMPLETE WITH BOLTS WILL NOT BE FURNISHED WITH SWITCH POINTS.
- AT HEEL END OF SWITCH POINT RAIL, BREAK SHARP CORNER AROUND THE ENTIRE PERIPHERY BY SLIGHTLY GRINDING. ALSO, "DO NOT" END HARDEN RAIL END.
- UNLESS SWITCH POINT ORDER SPECIFICALLY CALLS FOR USE OF 3/4" RIVETS AND 3/4" STOP BOLTS, MANUFACTURER CAN SUBSTITUTE 3/4" HUCK FASTENERS, BOLT PART NO. C-50-LR-BR2416 AND COLLAR PART NO. L3-2-R-24G FOR 3/4" RIVETS. AND FOR 3/4" STOP BOLTS USE HUCK FASTENERS, BOLT NO. C-50-LR-BR2424 AND COLLAR PART NO. L3-2-R-24G.



26'-0" SWITCH POINT WITH OPTIONAL MANGANESE OR ALLOY STEEL TIP


REV.	DATE	DESCRIPTION	DES.	ENG.

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	CHECKED B. SMITH
	RECOMMENDED W. PREY
	DATE 2/2/15
	DESIGNER PE STAMP



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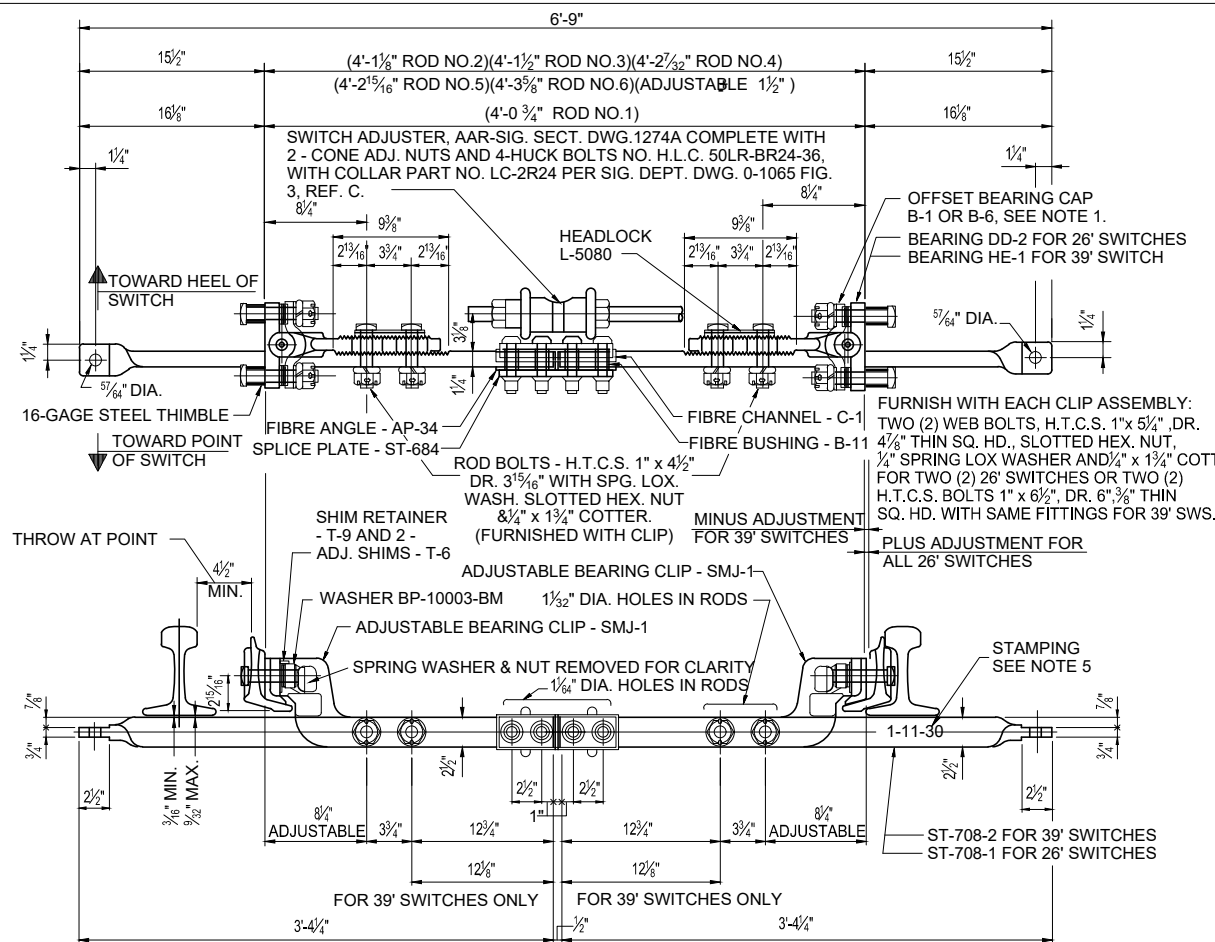
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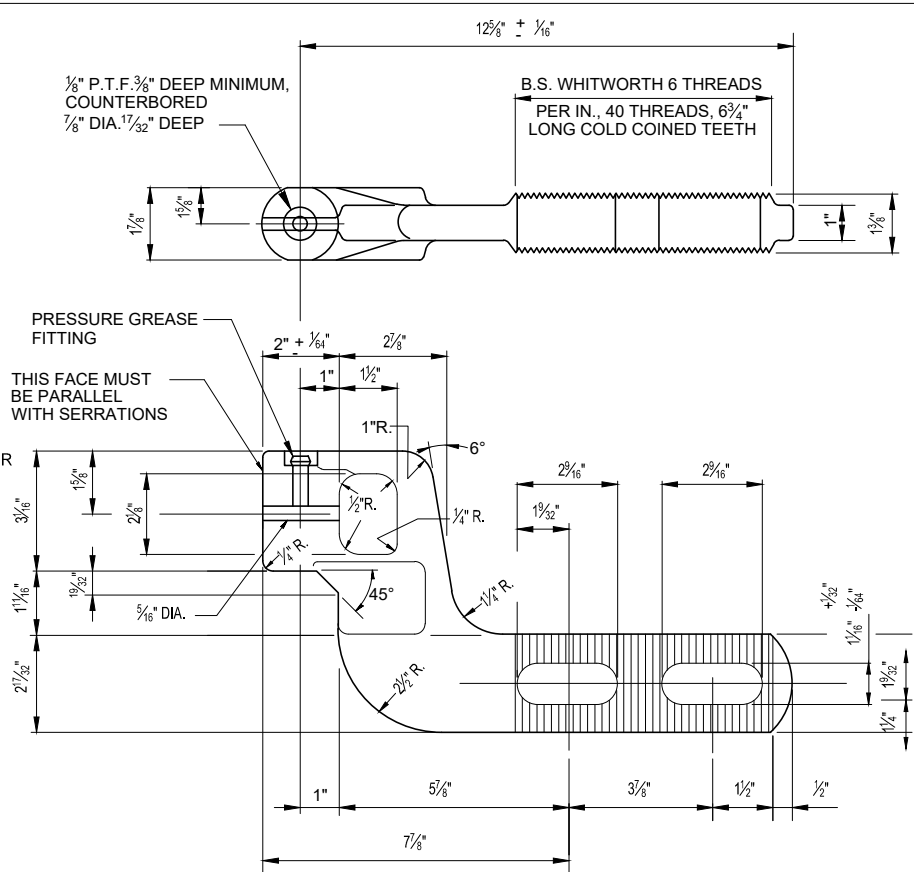
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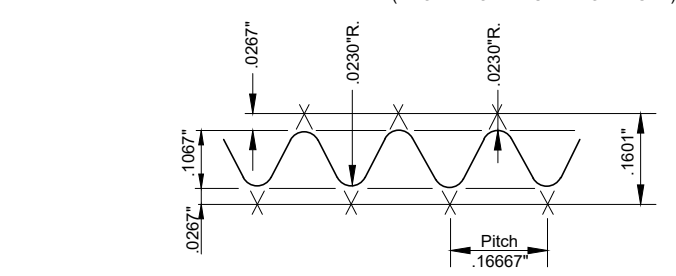
ENGINEERING STANDARD DRAWINGS NO. 14 STANDARD TURNOUT - 26'-0" SPLIT SWITCH POINT	DRAWING NO. ESD-2931-12
	DRAWING SHEET NO. 12 OF 15
	SCALE: NONE
	CONTRACT SHEET NO.



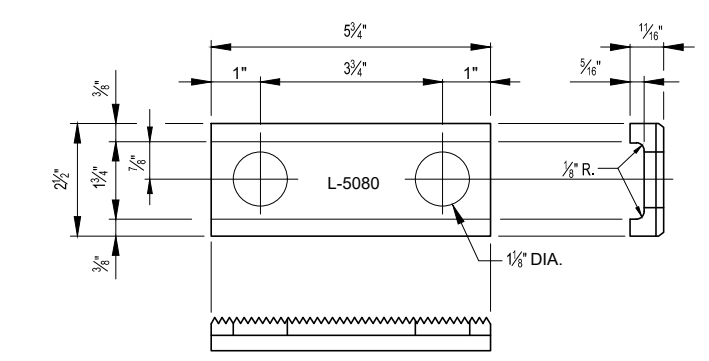
NO. 1 SWITCH ROD ASSEMBLY
(SHOWN FOR MACHINE ON RIGHT) SEE NOTE 2



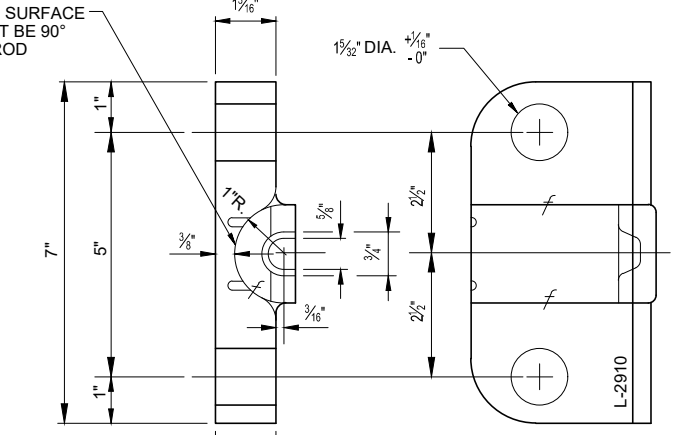
ADJUSTABLE BEARING CLIP - SMJ - 1
SCALE: NONE



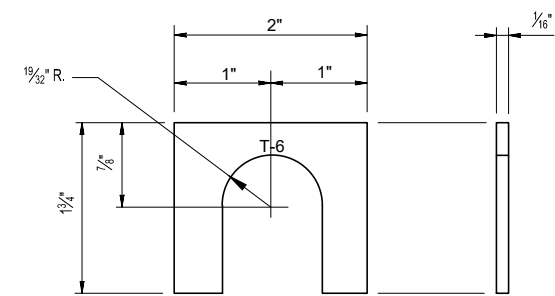
ENLARGED PROFILE OF SERRATIONS
SCALE: NONE



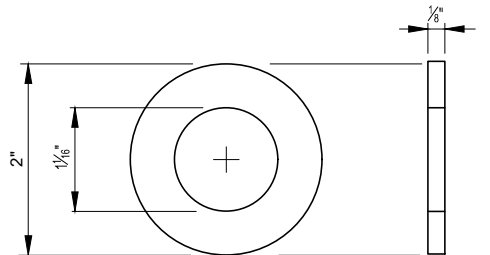
HEADLOCK L-5080
SCALE: NONE



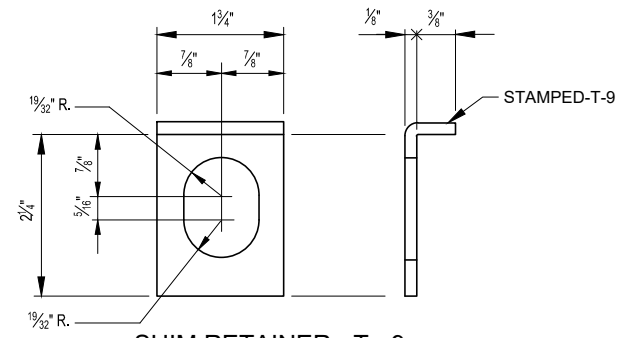
BEARING - DD - 2
SCALE: NONE



ADJUSTABLE SHIM - T - 6
SCALE: NONE



WROT WASHER - BP - 10003 - BM
SCALE: NONE



SHIM RETAINER - T - 9
SCALE: NONE

NOTES:

- WHILE THIS PLAN SHOWS BEARING CLIPS ASSEMBLED TO SWITCH ROD THIS CLIP ASSEMBLY MAY BE REQUISITIONED AND ORDERED SEPARATELY. WHEN A BEARING CLIP ASSEMBLY ONLY IS WANTED, REQUISITIONS AND ORDERS SHALL SPECIFY, RAIL SECTION AND LENGTH OF SWITCH. ALL PARTS SHOWN IN BILL OF MATERIAL SHALL BE FURNISHED WITH THESE CLIP ASSEMBLIES. WHEN AN INDIVIDUAL PART IS REQUIRED IT SHALL BE ORDERED BY PART NUMBER.
- WHEN COMPLETED RODS ARE ORDERED THEY SHALL BE ASSEMBLED AND INCLUDE ALL PARTS SHOWN IN BILL OF MATERIAL. REQUISITIONS AND ORDERS SHALL SPECIFY RAIL SECTION AND LENGTH OF SWITCH. ON INTERLOCKED SWITCHES WITH AUXILIARY THROW ROD, MACHINE SIDE (RIGHT OR LEFT) SHOULD ALSO BE SPECIFIED.

NOTES CONTINUED ON SHEET 14

LENGTH OF SWITCH	BILL OF MATERIAL FOR 1 TYPE "SMJ" SWITCH ROD ASSEMBLY				
	QTY.	PART NUMBER	MATERIAL SPECIF.	DESCRIPTION	DETAIL REMARKS
ALL	2	SMJ-1	S.A.E.1020-FOR.STL.	BEARING CLIP	MACHINED PER DETAIL
ALL	4		H.T.C.S.	WEB BOLT	SEE NOTE
26'	2	DD-2	MALLEABLE IRON	BEARING	PAT. NO. L-2910, MACHINED PER DETAIL
39'	2	HE-1	MALLEABLE IRON	BEARING	PAT. NO. L-2915, MACHINED PER DETAIL
26'	2	B-1	S.A.E.1045-FOR.STL.	OFFSET BEARING CAP	HEAT TREATED - BRINELL -.225 TO .250
39'	2	B-6	S.A.E.1045-FOR.STL.	OFFSET BEARING CAP	HEAT TREATED - BRINELL -.225 TO .250
26'	2	B-6	S.A.E.1045-FOR.STL.	OFFSET BEARING CAP	HEAT TREATED - BRINELL -.225 TO .250
ALL	4	T-9	S.A.E.1020	SHIM RETAINER	1/8" x 1 1/4" x 2 1/4"
ALL	12	T-6	STAINLESS STEEL	ADJUSTMENT SHIM	1/16" x 2" x 1 1/8"
ALL	4	BP-10003-BM	MALLEABLE IRON	WASHER	1 1/8" I.D. x 2" O.D. x 1/8" THICK
ALL	4		H.T.C.S.	ROD BOLT	1" x 4 1/2" DR. 3/16" REG. SQ. HD.
ALL	4		STEEL	SPG. LOX WASHER	FOR 1" ROD BOLTS
ALL	4		STEEL	COTTER	1/4" x 1 1/4" FOR ROD BOLTS
ALL	2		STEEL	GREASE FITTING	PRESSURE - FOR BEARING CLIP
ALL	2	L-5080	MALLEABLE IRON	HEADLOCK	FOR ROD BOLTS
26'	2		16-GAGE STEEL	THIMBLE	1 1/2" LONG - FOR SHIPPING
39'	2		16-GAGE STEEL	THIMBLE	2 1/2" LONG - FOR SHIPPING
Material for Vertical Rod					
16'-6"	1			VERTICAL ROD	USE ONE-ST-708-1
					USE ONE-ST-708-1
					TWIST, MACHINE AND DRILL END HOLE
39'	1			VERTICAL ROD	USE ONE-ST-708-2
					USE ONE-ST-708-2
					TWIST, MACHINE AND DRILL END HOLE
ALL	4		HIGH STRENGTH STEEL	CONN. & INSUL. BOLT	HIGH FASTENER NO. HLC-50LR-BR24-36
ALL	4		LOW CARBON STEEL	COLLAR	HUCK FASTENER NO. LC-2R24
ALL	1	ST-684	H.R. MILD STEEL	SPLICE PLATE	1/2" x 2 1/2" x 9 1/2" FOR INSULATION
ALL	2	AP-34	AAR-SIG.SEC.13-52	ANGLE	1/2" x 2 1/2" x 4 1/16" HARD FIBRE - PARAFIN COATED
ALL	4	B-11	AAR-SIG.SEC.13-52	BUSHING	1" O.D. HARD FIBRE - PARAFIN COATED
ALL	1	C-1	AAR-SIG.SEC.13-52	CHANNEL	1/8" x 1" x 10" HARD FIBRE - PARAFIN COATED
ALL	1		MALLEABLE IRON	SWITCH ADJUSTER	
ALL	2		MALLEABLE IRON	CONE ADJ. NUT	FOR 1/4" THROW RODS

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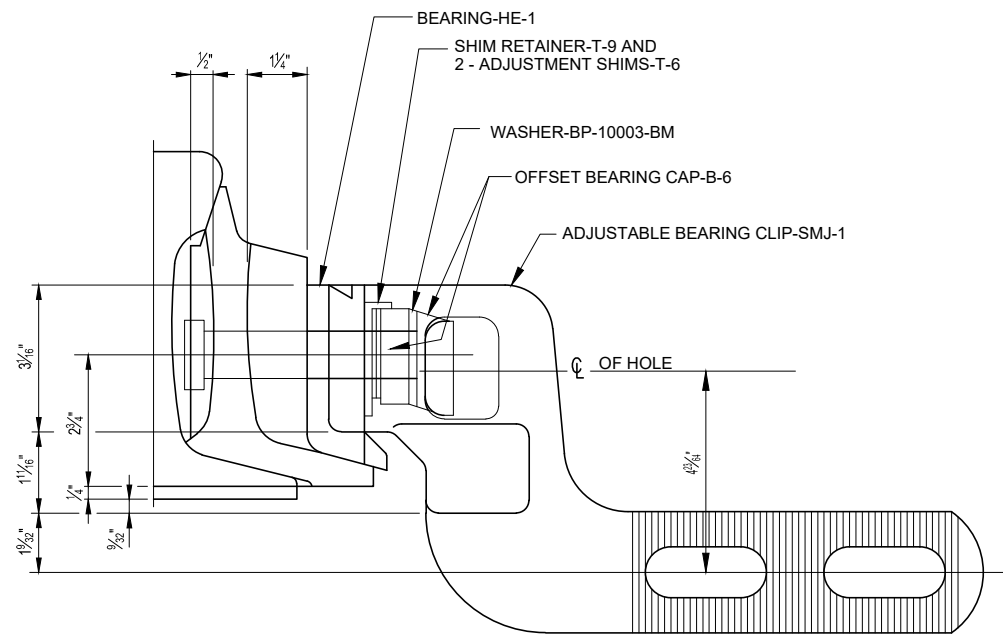
REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN RAILPROS
 CHECKED B. SMITH
 RECOMMENDED W. PREY
 DATE 2/2/15
 DESIGNER PE STAMP

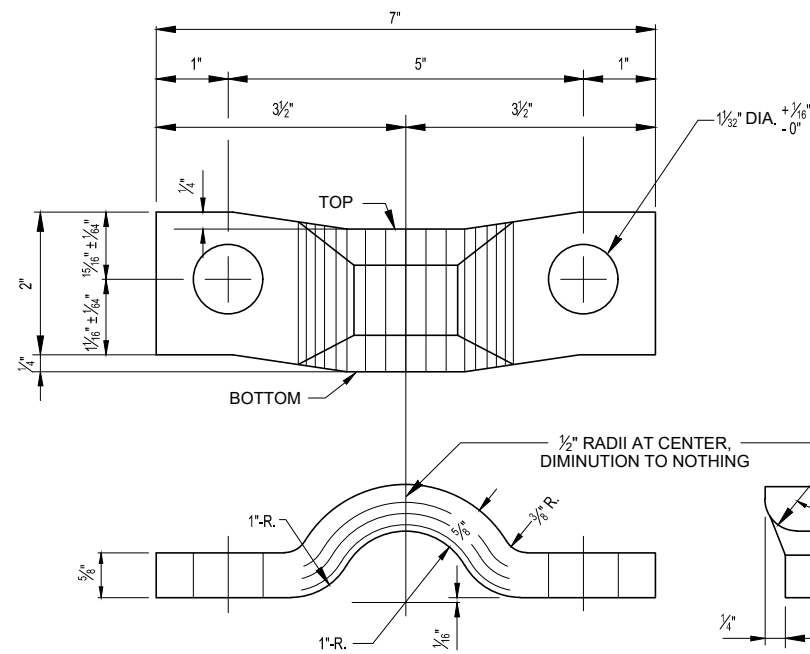
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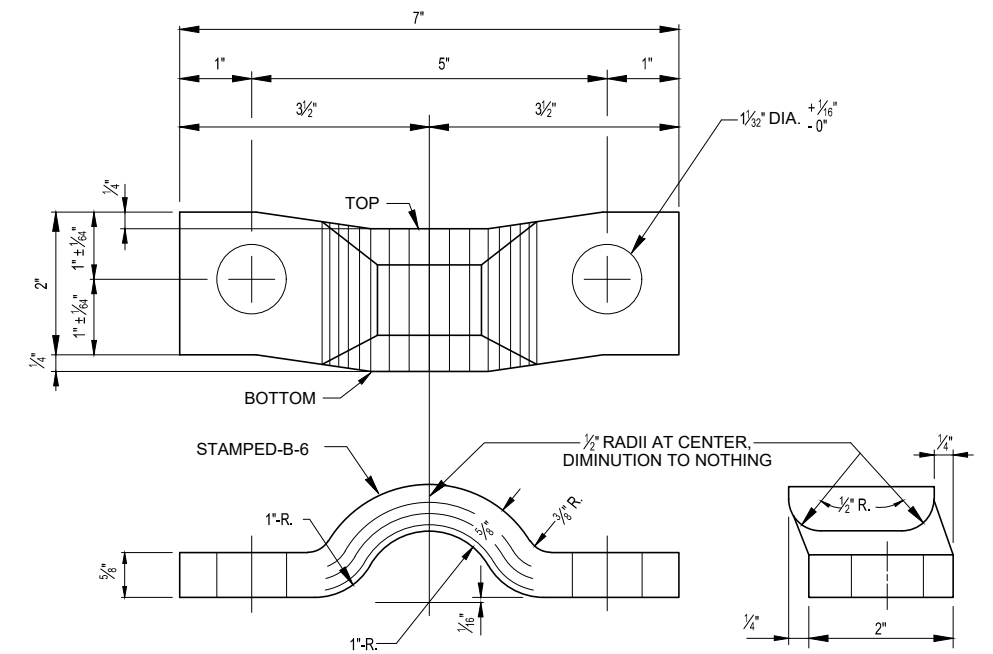
ENGINEERING STANDARD DRAWINGS		DRAWING NO.
NO. 14 STANDARD TURNOUT - SWITCH RODS AND MISC. DETAILS		ESD-2931-13
(1 OF 2)		DRAWING SHEET NO. 13 OF 15
SCALE: NONE		CONTRACT SHEET NO.



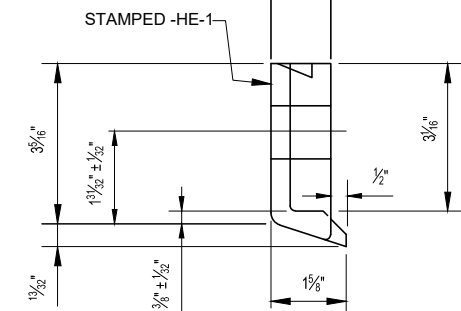
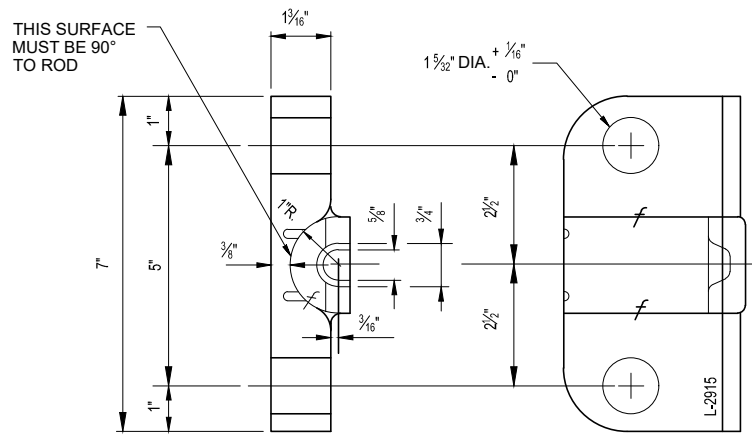
ELEVATION OF "SMJ" CLIP ASSEMBLY FOR 39' SWITCHES
(DRAWN FOR 136 LB. RAIL) SPRING WASHER AND NUT REMOVED



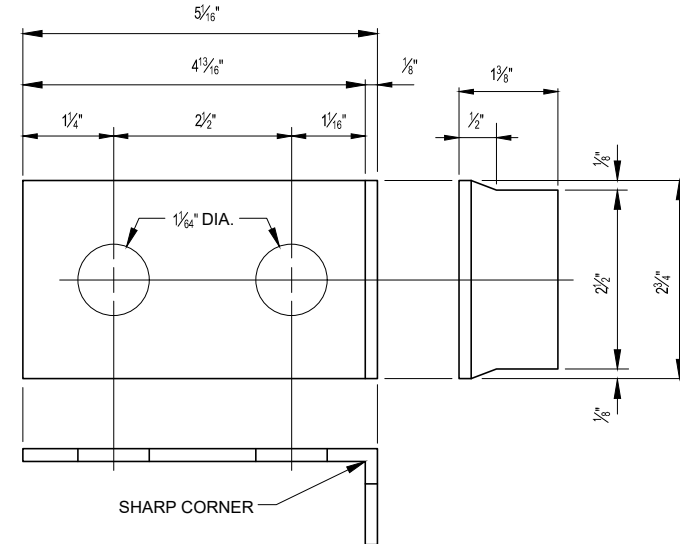
OFFSET BEARING CAP-B-1



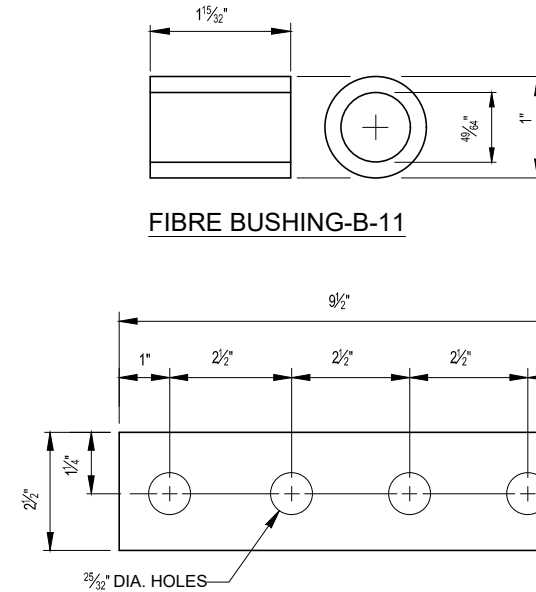
OFFSET BEARING CAP-B-6



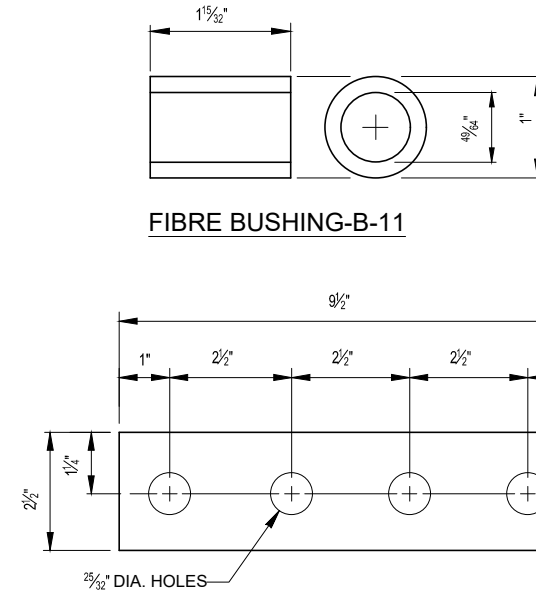
BEARING-HE-1



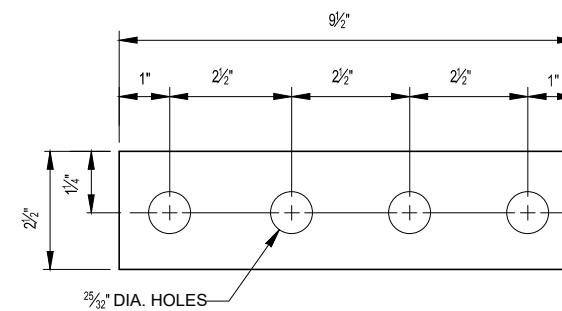
FIBRE ANGLE-AP-34



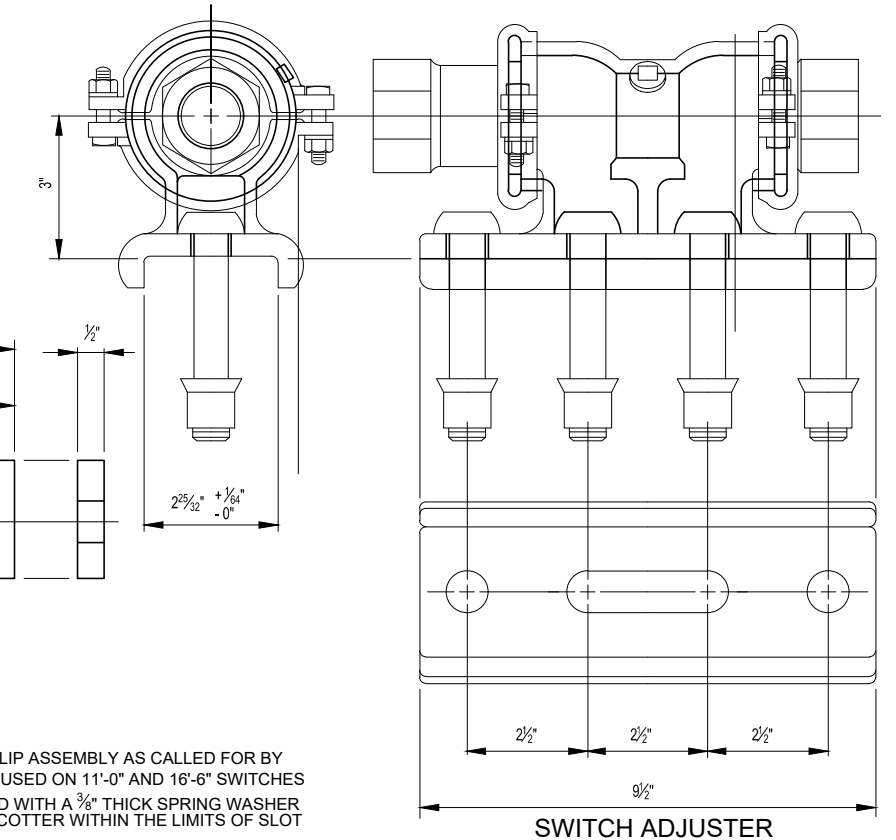
FIBRE CHANNEL-C-1



FIBRE BUSHING-B-11



SPLICE PLATE-ST-684



SWITCH ADJUSTER

NOTES: (CONTINUED FROM SHEET 13)

- TWO WEB BOLTS SHALL BE FURNISHED WITH EACH CLIP ASSEMBLY AS CALLED FOR BY NOTE IN TOP VIEW OF ROD ASSEMBLY. WHEN ROD IS USED ON 11'-0" AND 16'-6" SWITCHES THE 1/4" THICK SPRING WASHER SHOULD BE REPLACED WITH A 3/8" THICK SPRING WASHER BY THE STOREKEEPER OR FIELD FORCES, TO BRING COTTER WITHIN THE LIMITS OF SLOT IN WEB BOLT NUTS.
- MATERIALS AND WORKMANSHIP SHALL MEET CURRENT A.R.E.M.A. SPECIFICATIONS FOR SPECIAL TRACKWORK UNLESS OTHERWISE SPECIFIED.
- VERTICAL SWITCH ROD SHALL BE PLAINLY STAMPED TO INDICATE SWITCH THAT ROD ASSEMBLY CAN BE USED UPON. IDENTIFICATION MARKING WILL BE AS FOLLOWS: 1-39 FOR USE ON 39'-0" SWITCHES, 132-LB. AND 136-LB. RE RAIL SECTIONS. 1-11-30 FOR USE ON 11'-0" TO 30'-0" SWITCHES, 115-LB., 119-LB., 131-LB., 132-LB., 136-LB. R.E. RAIL SECTIONS.

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REVISIONS	DRAWN RAILPROS
	CHECKED B. SMITH
	RECOMMENDED W. PREY
	DATE 2/2/15
	DESIGNER PE STAMP

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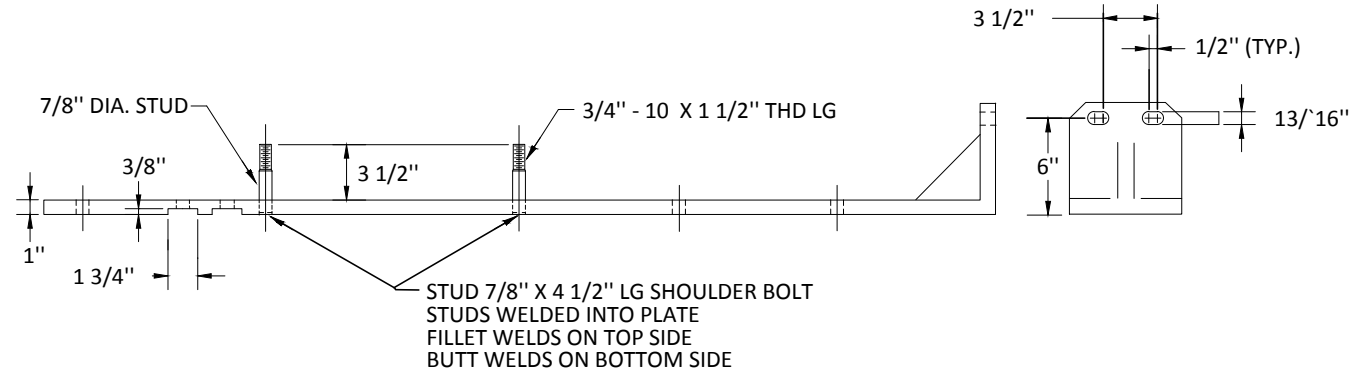
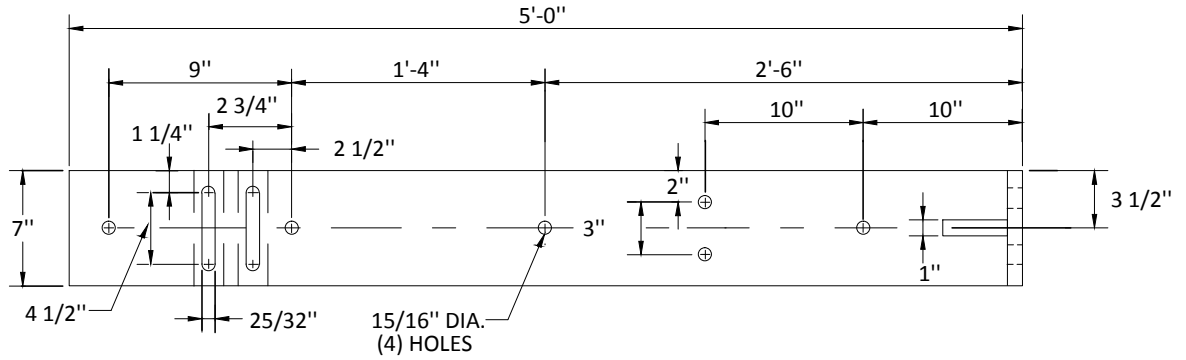
ENGINEERING STANDARD DRAWINGS

NO. 14 STANDARD TURNOUT -
SWITCH RODS AND MISC. DETAILS
(2 OF 2)

DRAWING NO.	ESD-2931-14
DRAWING SHEET NO.	14 OF 15
SCALE:	NONE
CONTRACT SHEET NO.	

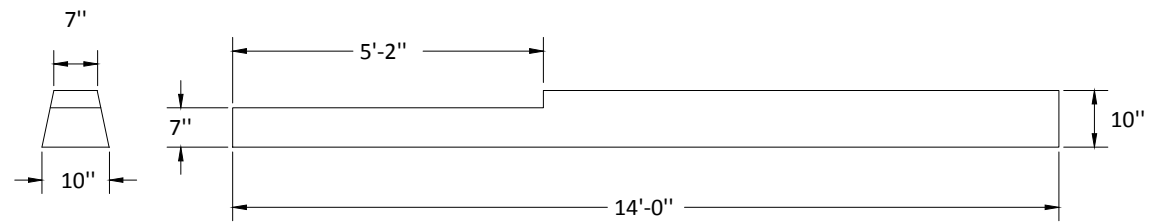
NOTE:
SEE SHEET ESD-2931-06 FOR NOTES

REFERENCE DRAWINGS:
SWITCH GAGE PLATE DETAILS-ESD-2931-06



- MOUNTING PLATE NOTES:**
1. EMORY CLOTH SHALL BE INSTALLED TO PROVIDE ABRASIVE MATERIAL BETWEEN SWITCH MACHINE FRAME AND SWITCH PLATE.
 2. ALL HOLES SHALL BE DRILLED NOT PUNCHED.
 3. ALL CORNERS OF PLATE SHALL BE CHAMFERED 1" X 1".

ANSALDO SWITCH MACHINE MOUNTING PLATE



- TRAPEZOID TIE NOTES:**
1. TRAPEZOID TIES SHALL BE DOUGLAS FIR OR GUM.
 2. TRAPEZOID TIES SHALL BE DAPPED AND TREATED AT THE MILL.
 3. TIES SHALL BE STRAIGHT AND FREE OF CRACKS OR OTHER DEFECTS.

14 FT. DAPPED TRAPEZOID TIE

DAP TIE
(2 PCS. REQ'D. AS SHOWN)

US&S SWITCH MACHINE MUST BE FURNISHED WITH FINISHED MOUNTING LUGS

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REVISIONS		DES.	ENG.	DATE	DESCRIPTION

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CHECKED B. SMITH	<i>BS</i>
RECOMMENDED W. PREY	<i>WP</i>
DATE	2/2/15

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ENGINEERING STANDARD DRAWINGS
NO. 14 STANDARD TURNOUT -
EXTENSION PLATE AND DAP TIE FOR
SWITCH MACHINE

DRAWING NO.	ESD-2931-15
DRAWING SHEET NO.	15 OF 15
SCALE:	NONE
CONTRACT SHEET NO.	

NO. 20 STANDARD TURNOUT ON WOOD TIES

(136LB., RIGHT HAND WITH RAIL BOUND MANGANESE FROG)

NOTES:

1. TURNOUT TO BE FABRICATED FROM 136 LB. HEAD HARDENED RAIL, FROM POINT END TO LAST LONG SWITCH TIE.
2. LOCATION OF INSULATED JOINTS IS DETERMINED BY DRAWING NUMBER ESD-2941-10. IT WILL BE SATISFACTORY TO RELOCATE THE INSULATED JOINT IN THE FIELD UP TO 12" SO AS TO PROVIDE A SUITABLE SUSPENDED JOINT, PROVIDED THE STAGGER OF INSULATED JOINTS DOES NOT EXCEED 4'-6". SUSPENDED INSULATED JOINTS MUST BE LOCATED IN A CRIB AREA BETWEEN TIES, A MINIMUM DISTANCE OF 4" FROM EDGE OF NEAREST TIE PLATE.
3. ALL INSULATED JOINTS ARE TO BE ADHESIVE BONDED PREFABRICATED INSULATED JOINTS PER ESD-2504 UNLESS OTHERWISE SPECIFIED.
4. ALL MATERIALS REQUIRED FOR HAND OR MACHINE OPERATED SWITCH OPERATION WILL BE FURNISHED PER REQUIREMENTS OF THE ENGINEER.
5. MATERIALS AND WORKMANSHIP, ALSO ANY CONSTRUCTION DETAILS NOT SHOWN, SHALL BE PER CURRENT A.R.E.M.A. "MANUAL AND PORTFOLIO" UNLESS OTHERWISE SPECIFIED.
6. WHERE REQUIRED, ALL IDENTIFICATION SYMBOLS TO BE PLAINLY STAMPED.
7. GAGE PLATES WILL BE FURNISHED INSULATED. SWITCH RODS WILL BE FURNISHED INSULATED UNLESS OTHERWISE SPECIFIED.
8. MANUFACTURER SHALL SUBMIT TWO COPIES OF SHOP DRAWINGS TO THE ENGINEER FOR APPROVAL PRIOR TO FABRICATION OF TURNOUT. SHOP DRAWINGS THAT CHANGE DETAILS OF THESE STANDARDS MUST CLEARLY SPECIFY SUCH PROPOSED CHANGES.
9. THE MATERIAL INCLUDED IN A "TURNOUT COMPLETE" IS EVERYTHING LISTED IN THE BILL OF MATERIALS. TO CONSTRUCT A COMPLETE TURNOUT, SWITCH TIES (PER LIST ON THIS SHEET) AND INSULATED JOINTS, FIELD WELDS, RUNNING RAIL, AND CLOSURE RAIL IDENTIFICATION ON SHEET ESD-2941-10 MUST ALSO BE SUPPLIED. THE MATERIAL FOR A "CROSSOVER COMPLETE" IS IDENTIFIED ON SHEET ESD-2941-03.
10. TIE PLATES SHALL CONFORM TO ENGINEERING STANDARD ESD-2454.
11. SCREW SPIKES (1/8" X 6-2 TPI) SHALL CONFORM TO ENGINEERING STANDARD ESD-2355-02. PLATE HOLES SHALL BE 1" DIAMETER. PILOT HOLES IN TIES SHALL BE 3/8" DIAMETER. SCREW SPIKES SHALL BE SCREWED INTO WOOD (NOT DRIVEN).
12. MANUFACTURER SHALL BEVEL RAIL ENDS PER CURRENT A.R.E.M.A. PLAN NO. 1005.
13. THE 39'-0" SWITCH POINT PER ESD-2941-12 IS TO BE FURNISHED WITH A "SMJ" NO. 1 & 5 SWITCH ROD PER DRAWINGS ESD-2941-13 AND ESD-2941-14. SWITCH RODS NO. 2,3,4 & 6 SHALL BE SIMILAR TO NO. 1 SWITCH ROD AND WILL BE FURNISHED WITHOUT BASKET ADJUSTMENT
14. FOR LOCATION OF INSULATED JOINTS FOR NO. 20 TURNOUT AND CROSSOVER, SEE DRAWING NO. ESD-2941-10.
15. GAGE PLATES FOR SWITCH AND FROG, SWITCH HEEL PLATE (FOR BOTH R.H. AND L.H. TURNOUTS) AND PLATES P-13 THRU P-66 ARE DESIGNED TO BE PERPENDICULAR TO THE MAIN LINE THRU RUN RAILS, WITH THE EXCEPTION OF PLATE P-67 TO BE PERPENDICULAR TO TURNOUT SIDE OF TRACK.
16. UPON COMPLETION OF TURNOUT INSTALLATION, RUNNING RAIL MUST BE ADJUSTED TO NCTD NEUTRAL RAIL TEMPERATURE.
17. ALL E-CLIPS SHALL BE GALVANIZED.
18. SWITCH POINTS SHALL BE FABRICATED PER AREMA SPECIFICATION NO. 9-28-92 AND ESD2941-12.
19. THE TOLERANCE FOR SPACING OF SWITCH TIES IS +/- 1/2" RELATIVE TO ADJACENT TIES AND 1 1/2" RELATIVE TO CUMULATIVE DIMENSION FROM THE POINT OF SWITCH (PS).
20. SWITCH POINT ROLLER SHALL BE AS APPROVED BY THE ENGINEER, SUBMITTED AS SHOP DRAWINGS PER NOTE 8 ABOVE. SWITCH POINT ROLLER BEARINGS WILL BE MOUNTED ABOVE PLATE AND WILL NOT BE LOCATED BETWEEN SWITCH TIES.
21. HELPER THROW ROD ASSEMBLIES SHALL CONFORM TO ESD-2941-02.
22. FOR SWITCH MACHINE LAYOUT REFER TO ESD-8615 OR ESD-8620.
23. HEAVY POINT (HP) FROG, FROG POINT WIDTH 27/32".

BILL OF MATERIAL FOR LATERAL TURNOUT	
QTY.	DESCRIPTION
1	No. 20 RAIL BOUND MANGANESE FROG
2	26'-0" "U-69" ADJUSTABLE GUARD RAIL W/ PLATES
1 PAIR	39'-0" EXTENDED FIELD WELDED TYPE SWITCH POINTS (56'-0" RAIL)
1 EACH	R.H. & L.H. SAMSON STOCK RAILS (64'-0")
1 EACH	17'-0" RAIL
1 EACH	22'-0" RAIL
1 EACH	45'-6 1/2" RAIL
1 EACH	53'-3" CURVED RAIL
1 EACH	53'-3" STRAIGHT RAIL
1 EACH	86'-6 1/2" STRAIGHT RAIL
1 EACH	138'-6" CURVED RAIL
1	No. 1 & 5 SMJ TYPE SWITCH ROD W/ BASKET
1 EACH	No. 2, 3, 4 & 6 SMJ TYPE SWITCH ROD W/O BASKET
1	VERTICAL SWITCH ROD ASSEMBLY W/ SMJ CLIPS
2	SWITCH MACHINE EXTENSION PLATES
2 EACH	TURNOUT PLATES P-13 THRU P-33
1 EACH	TURNOUT PLATES P-34 THRU P-43
1 EACH	TURNOUT PLATES P-56 THRU P-65
1 EACH	SINGLE RAIL PLATES P-66 AND P-67
1	SWITCH GAGE PLATE P-P
1 EACH	SWITCH GAGE PLATES G-0P THRU G-3P
1 EACH	FROG GAGE PLATES FG-1P THRU FG-4P
1 EACH	FROG PLATES FP-44 THRU FP-55
12	SLIDE PLATE S-5P
2	SLIDE PLATE S-7P
18	SLIDE PLATE S-8P
2	SLIDE PLATES S-9P THRU S-12P
2	HEEL PLATE P5-RH
2	ROLLER RISER PLATES RBP-1 AND RBP-2
4 PIECES	SWITCH POINT ROLLER ASSEMBLIES
7	D.I. RAIL HOLD DOWN CLIPS E-3706
5	D.I. RAIL HOLD DOWN CLIPS E-3707
6	D.I. RAIL HOLD DOWN CLIPS E-3708
2	D.I. RAIL HOLD DOWN CLIPS E-3709
4	D.I. RAIL HOLD DOWN CLIPS E-3710
22	BOLTLESS ADJUSTABLE BRACE ASSEMBLY
144	ROLLED STEEL TIE PLATES
288	RAIL CLIP (GALVANIZED) (ESD-2362)
8	"E"-CLIP (GALVANIZED) (ESD-2361)
576	SCREW SPIKES
2 EA.	EPOXY BONDED PREFABRICATED INSULATED JOINT 20'-0"

BILL OF MATERIAL FOR HELPER ASSEMBLY	
QTY.	DESCRIPTION
11	COTTER PIN, 3/16 X 1 3/4 LG
4	PIPE COUPLER
1	JAW PIN
9	COTTER PIN, 3/16 X 1 1/2
4	BOLT, 3/4- 10 X 3" LG, HVY HEX
8	PIN, PIPE CARRIER ROLLER
11	FLAT WASHER, 3/4, USS
11	LOCK WASHER, 3/4, HVY
6	NUT, 3/4- 10, HEAVY SQUARE
11	NUT, 3/4- 10, HEAVY HEX
6	RETAINER, BOLT
6	STUD, 3/4 X 14 W 3" 3/4- 10 THREAD BOTH ENDS
1	ROD OPERATING - No. 5 HELPER
2	ASSY - SWITCH POINT ADJUSTER
8	ROLLER, PIPE CARRIER
8	STAND, PIPE CARRIER
8	3/4 X 5 LG LAG BOLT
16	1/2 X 4 LG LAG BOLT
7	RIVET, 3/8" X 1 1/2, ROUND, STEEL
2	CONE NUT, SWITCH POINT ADJUSTER
4	LOCK WASHER, 1/4" HEAVY
6	NUT, 1 1/4- 7, HEAVY HEX, JAMB
2	PIPE - SCHEDULE 80 X 212 1/8 LG
1	CLEVIS
4	SCREW JAW ROD
2	SOLID JAW
9	JAW PIN
4	SCREW JAW, 1 1/4- 7 X 6 1/2 LG
2	CRANK STAND PIN
1	ADJUSTABLE LINK
1	CRANK, 3 ARM, STAGE 3
1	CRANK, 3 ARM, STAGE 2
1	CRANK, 3 ARM, STAGE 1
2	CRANK STAND
1	CRANK PLATE, STAGE 2
1	CRANK PLATE, STAGE 1

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EXTENSION PLATE AND DAP TIE FOR SWITCH MACHINE	ESD2941-06
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16'-0" GUARD RAIL	ESD2941-08
RAILBOUND MANGANESE FROG	ESD2941-09
INSULATED JOINT DIAGRAM	ESD2941-10
STRAIGHT OR CURVED UNDERCUT STOCK RAILS	ESD2941-11
39'-0" SPLIT SWITCH POINT	ESD2941-12
SWITCH RODS AND MISC. DETAILS (1 OF 2)	ESD2941-13
SWITCH RODS AND MISC. DETAILS (2 OF 2)	ESD2941-14

TURNOUT DATA

FROG NO.	20
FROG ANGLE	2°-51'-51"
FROG LENGTH	35'-9"
LENGTH OF SWITCH POINT	39'-0"
THICKNESS AT POINT	0"
ANGLE AT POINT	0°-27'-19"
HEEL SPREAD	6'-0 1/2"
ANGLE AT HEEL OF SWITCH	1°-04'-30"
LEAD	156'-0 1/2"
RADIUS OF TURNOUT CURVE	3329.91'
DEGREE OF TURNOUT CURVE	1° 43'-15"
RADIUS OF SWITCH	3605.70'
CENTRAL ANGLE OF SWITCH	0°-37'-11"
CENTRAL ANGLE OF CLOSURE	1°-47'-21"
CENTRAL ANGLE OF TURNOUT	2°-24'-32"
STRAIGHT CLOSURE	103'-6 1/2"
CURVED CLOSURE	103'-7 1/2"

BILL OF WOOD SWITCH TIES

PIECES	SIZE	LENGTH	BOARD FEET
30	7" x 9"	10'-0"	1575.00
19	7" x 9"	11'-0"	1155.00
16	7" x 9"	12'-0"	1008.00
14	7" x 9"	13'-0"	887.25
12	7" x 9"	14'-0"	882.00
2	10" x 9"	16'-0" DAP TIES	126.00
18	7" x 9"	15'-0"	1417.50
12	7" x 9"	16'-0"	1008.00
17	7" x 9"	17'-0"	1517.25
TOTAL			TOTAL
140			9576.00

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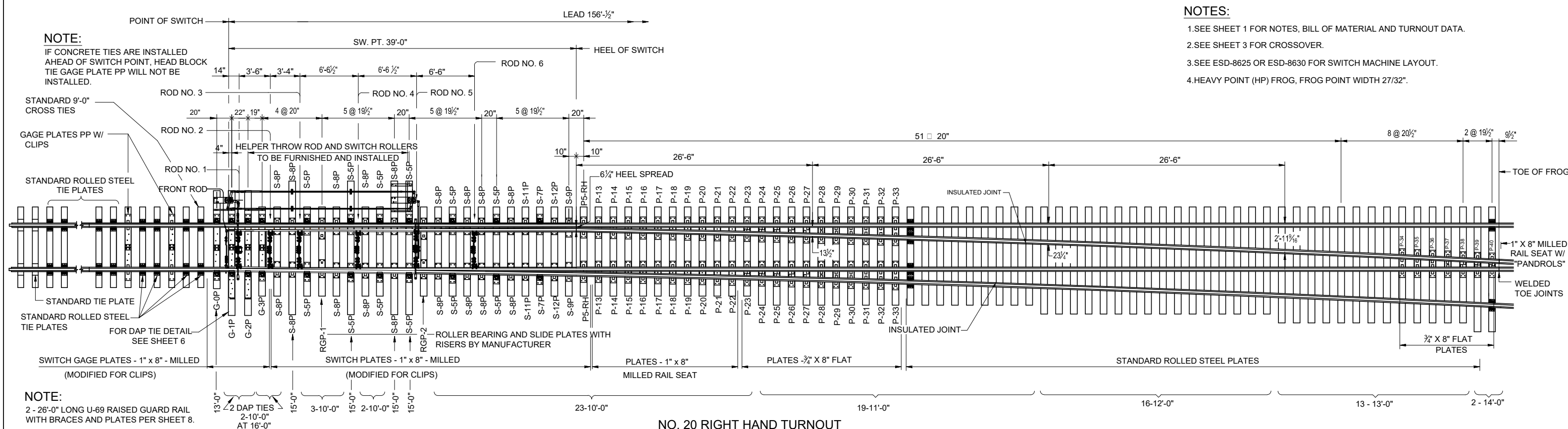
REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN RAILPROS	
CHECKED B. SMITH	
RECOMMENDED B. SCHMITH	
DATE	5/12/16
DESIGNER PE STAMP	

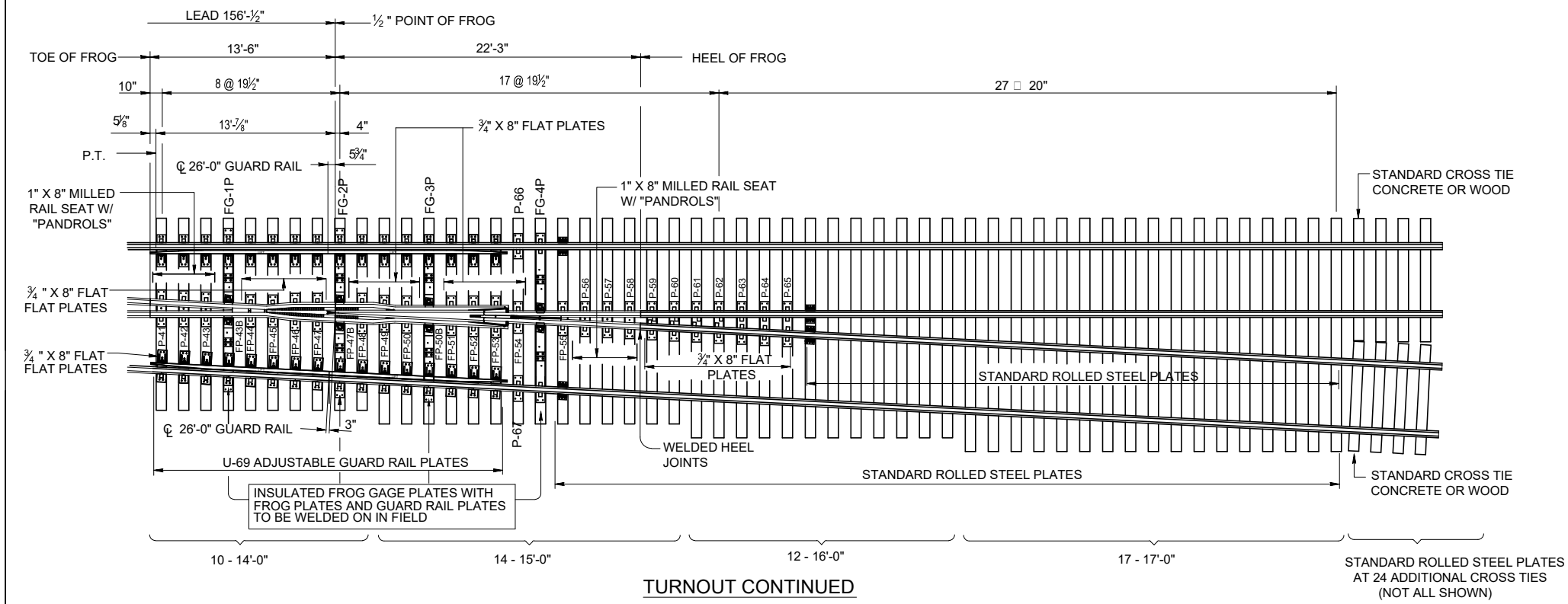


ENGINEERING STANDARD DRAWINGS	
NO. 20 STANDARD TURNOUT BILL OF MATERIALS AND GENERAL NOTES	

DRAWING NO.	ESD-2941-01
DRAWING SHEET NO.	1 OF 14
SCALE:	NONE
CONTRACT SHEET NO.	



- NOTES:**
1. SEE SHEET 1 FOR NOTES, BILL OF MATERIAL AND TURNOUT DATA.
 2. SEE SHEET 3 FOR CROSSOVER.
 3. SEE ESD-8625 OR ESD-8630 FOR SWITCH MACHINE LAYOUT.
 4. HEAVY POINT (HP) FROG, FROG POINT WIDTH 27/32".



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REV.	DATE	DESCRIPTION	DES.	ENG.

REVISIONS	DRAWN RAILPROS
CHECKED B. SMITH	RECOMMENDED B. SCHMITH
DATE 5/12/16	DESIGNER PE STAMP

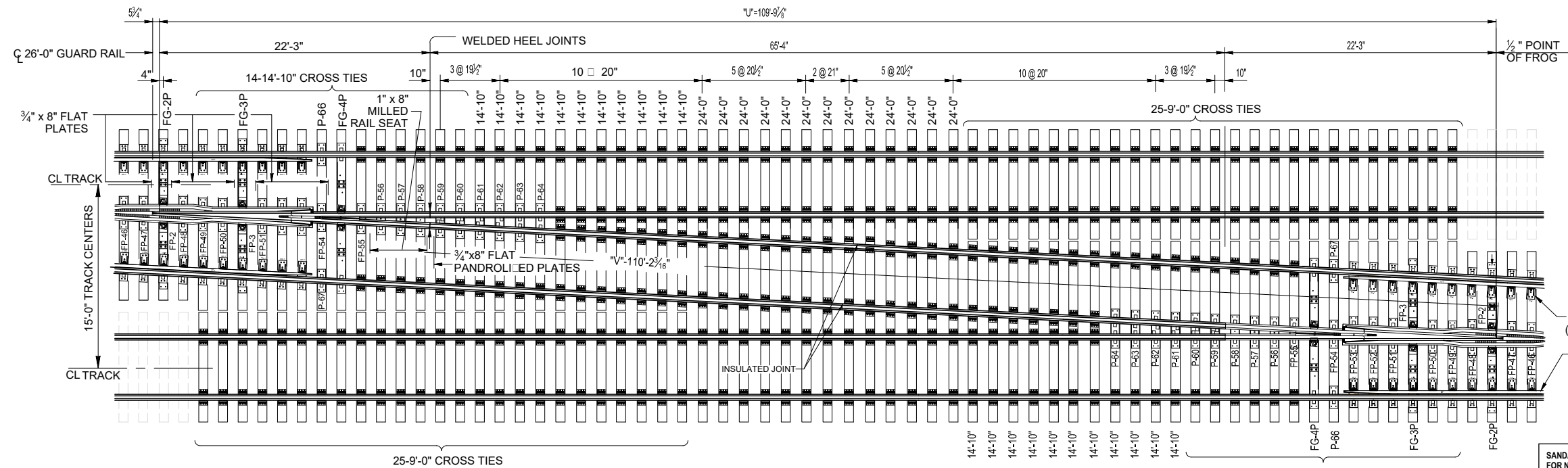
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ENGINEERING STANDARD DRAWINGS NO. 20 STANDARD TURNOUT - LAYOUT	DRAWING NO. ESD-2941-02
	DRAWING SHEET NO. 2 OF 14
	SCALE: NONE
	CONTRACT SHEET NO.



- NOTES:**
- 1. SEE SHEET 1 FOR NO. 20 TURNOUT DATA, BILL OF MATERIAL AND NOTES.
 - 2. SEE SHEET 2 FOR LAYOUT OF NO. 20 TURNOUT.
 - 3. SEE SHEET 4 FOR SWITCH AND TURNOUT PLATES.
 - 4. HEAVY POINT (HP) FROG, FROG POINT WIDTH 27/32".

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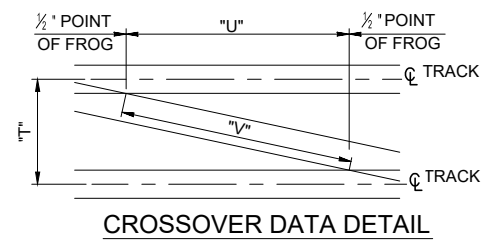
BILL OF MATERIAL FOR CROSSOVER

QTY.	DESCRIPTION
2	NO. 20 RAIL BOUND MANGANESE FROG
4	26'-0" "U-69" ADJUSTABLE GUARD RAIL W/ PLATES
2 PAIR	39'-0" EXTENDED FIELD WELDED TYPE SWITCH POINTS (56'-0" RAIL)
2 EACH	R.H. & L.H. SAMSON STOCK RAILS (64'-0")
2 EACH	17'-0" RAILS
2 EACH	22'-0" RAILS
2 EACH	29'-6" RAILS
2 EACH	45'-6 1/2" RAILS
2 EACH	53'-3" RAILS
2 EACH	86'-6 1/2" RAILS
2 EACH	104'-6" RAILS
2	"MF" TYPE FRONT ROD W/ "MF" CLIPS
2	NO. 1 SMJ TYPE SWITCH ROD W/ BASKET
2 EACH	NO. 2 THRU NO. 6 SMJ TYPE SWITCH ROD W/ BASKET
2	VERTICAL SWITCH ROD ASSEMBLY W/ SMJ CLIPS
4 EACH	TURNOUT PLATES P-13 THRU P-33
2 EACH	TURNOUT PLATES P-34 THRU P-43
2 EACH	TURNOUT PLATES P-56 THRU P-65
2 EACH	SINGLE RAIL PLATES P-66 AND P-67
2	SWITCH GAGE PLATE P-P
2 EACH	SWITCH GAGE PLATES G-0P THRU G-3P
2 EACH	FROG GAGE PLATES FG-1P THRU FG-4P
2 EACH	FROG PLATES FP-44 THRU FP-55
24	SLIDE PLATE S-5P
4	SLIDE PLATE S-7P
36	SLIDE PLATE S-8P
4	SLIDE PLATES S-9P THRU S-12P
4	HEEL PLATE P5-RH
4	ROLLER RISER PLATES RBP-1 AND RBP-2
8 PIECES	SWITCH POINT ROLLER ASSEMBLIES
14	D.I. RAIL HOLD DOWN CLIPS E-3706
10	D.I. RAIL HOLD DOWN CLIPS E-3707
12	D.I. RAIL HOLD DOWN CLIPS E-3708
4	D.I. RAIL HOLD DOWN CLIPS E-3709
8	D.I. RAIL HOLD DOWN CLIPS E-3710
44	BOLTLESS ADJUSTABLE BRACE ASSEMBLY
282	ROLLED STEEL TIE PLATES
564	RAIL CLIP (GALVANIZED) (ESD-2362)
24	"E"-CLIP (GALVANIZED) (ESD-2361)
1128	1 1/8" DIA. No. 5760 SCREW SPIKES
6 EA.	EPOXY BONDED PREFABRICATED INSULATED JOINT 20'-0"

BILL OF MATERIAL FOR HELPER ASSEMBLY (TWO REQUIRED)

QTY	DESCRIPTION
11	COTTER PIN, 3/16 X 1 3/4 LG
4	PIPE COUPLER
1	JAW PIN
9	COTTER PIN, 3/16 X 1 1/2
4	BOLT, 3/4-10 X 3" LG, HVY HEX
8	PIN, PIPE CARRIER ROLLER
11	FLAT WASHER, 3/4, USS
11	LOCK WASHER, 3/4, HVY
6	NUT, 3/4-10, HEAVY SQUARE
11	NUT, 3/4-10, HEAVY HEX
6	RETAINER, BOLT
6	STUD, 3/4 X 14 W 3" 3/4-10 THREAD BOTH ENDS
1	ROD OPERATING - 1 1/2 HELPER
2	ASSY - SWITCH POINT ADJUSTER
8	ROLLER, PIPE CARRIER
8	STAND, PIPE CARRIER
8	3/4 X 5 LG LAG BOLT
16	1/2 X 4 LG LAG BOLT
7	RIVET, 1/4" X 1 1/2, ROUND, STEEL
2	CONE NUT, SWITCH POINT ADJUSTER
4	LOCK WASHER, 1 1/4" HEAVY
6	NUT, 1 1/4-7, HEAVY HEX, JAMB
2	PIPE - SCHEDULE 80 X 2 1/2 7/8 LG
1	CLEVIS
4	SCREW JAW ROD
2	SOLID JAW
9	JAW PIN
4	SCREW JAW, 1 1/4-7 X 6 1/2 LG
2	CRANK STAND PIN
1	ADJUSTABLE LINK
1	CRANK, 3 ARM, STAGE 2
1	CRANK, 3 ARM, STAGE 3
1	CRANK, 3 ARM, STAGE 1
2	CRANK STAND
1	CRANK PLATE, STAGE 2
1	CRANK PLATE, STAGE 1

CROSSOVER (15'-0" TRACK CENTERS)



CROSSOVER DATA
MAIN TRACKS - TANGENT AND PARALLEL
CROSSOVER - TANGENT BETWEEN FROGS

TRACK CENTERS "T"	DISTANCE BETWEEN 1/2 FROG POINTS	
	ON MAIN TRACK "U"	ON CROSSOVER "V"
14'-0"	89'-9 3/8"	90'-2 1/8"
15'-0"	109'-9 1/8"	110'-2 3/8"
16'-0"	129'-9 13/16"	130'-2 3/8"
17'-0"	149'-9 1/2"	150'-2 1/2"
EACH 1"	1.666'	1.668'

BILL OF SWITCH TIES FOR CROSSOVER

PIECES	SIZE	LENGTH	BOARD FEET
50	7" X 9"	9'-0"	2362.50
60	7" X 9"	10'-0"	3150.00
38	7" X 9"	11'-0"	2310.00
32	7" X 9"	12'-0"	2016.00
28	7" X 9"	13'-0"	1774.50
24	7" X 9"	14'-0"	1764.00
4	10" X 9"	16'-0" DAP TIES	294.00
50	7" X 9"	14'-10"	4567.50
13	7" X 9"	24'-0"	1638.00
TOTAL			19876.50

BILL OF TURNOUT PLATES AND DIMENSION TABLE

PLATE	DIM "A"	DIM "B"	DIM "C"	DIM "L"	PLTS REQ'D.	CLIPS REQ'D.
P-13	12 3/16"	12 3/16"	6 1/16"	2'-5"	2 EA.	2
P-14	13 1/2"	13 3/8"	6 1/2"	2'-5 1/2"	2 EA.	2
P-15	13 3/8"	13 3/16"	6 1/8"	2'-6"	2 EA.	2
P-16	14 1/2"	14 1/2"	7 1/16"	2'-6"	2 EA.	2
P-17	14 3/16"	14 9/16"	7 3/16"	2'-6 1/2"	2 EA.	2
P-18	14 9/16"	15 1/16"	7 1/2"	2'-7"	2 EA.	2
P-19	15 1/32"	15 1/32"	7 9/16"	2'-7 1/2"	2 EA.	2
P-20	15 5/32"	15 5/32"	7 11/16"	2'-8"	2 EA.	2
P-21	16 1/4"	16 1/8"	8 1/16"	2'-8 1/2"	2 EA.	2
P-22	16 5/32"	16 1/16"	8 1/16"	2'-9"	2 EA.	2
P-41	16 1/8"	15 9/16"	8 1/16"	2'-8 1/2"	1 EA.	1
P-42	15 1/32"	14 7/16"	7 9/32"	2'-7 1/2"	1 EA.	1
P-43	14 5/8"	13 3/16"	7 3/32"	2'-6 1/2"	1 EA.	1
P-56	14 1/2"	14 5/32"	7 3/8"	2'-7"	1 EA.	1
P-57	15 3/8"	15 5/32"	7 1/16"	2'-8"	1 EA.	1
P-58	16 1/32"	16 1/4"	8 3/32"	2'-9"	1 EA.	1

BILL OF TURNOUT PLATES AND DIMENSION TABLE

PLATE	DIM "A"	DIM "B"	DIM "L"	PLTS REQ'D.
P-23	17 1/2"	17 3/32"	2'-9 1/2"	2 EA.
P-24	17 1/16"	17 9/32"	2'-10"	2 EA.
P-25	18 1/2"	18 3/32"	2'-11"	2 EA.
P-26	18 5/32"	18 1/16"	2'-11"	2 EA.
P-27	19 1/4"	19 1/32"	2'-11 1/8"	2 EA.
P-28	19 3/16"	20"	3'-0"	2 EA.
P-29	20 5/16"	20 1/32"	3'-0 1/2"	2 EA.
P-30	20 7/16"	21 3/32"	3'-1"	2 EA.
P-31	21 1/16"	21 1/32"	3'-1 1/2"	2 EA.
P-32	22"	22 1/8"	3'-2 1/2"	2 EA.
P-33	22 3/32"	22 1/32"	3'-3"	2 EA.
P-34	23 3/32"	22 3/32"	3'-3"	1 EA.
P-35	22 5/32"	21 5/32"	3'-2"	1 EA.
P-36	21 1/16"	20 5/32"	3'-1"	1 EA.
P-37	20 3/16"	19 3/16"	3'-0"	1 EA.
P-38	19 1/32"	18 1/16"	2'-10"	1 EA.
P-39	18 1/8"	17 1/8"	2'-10"	1 EA.
P-40	17 3/32"	16 3/32"	2'-9"	1 EA.
P-59	17 1/32"	17 9/32"	2'-10"	1 EA.
P-60	18 5/16"	18 3/32"	2'-11"	1 EA.
P-61	19 1/32"	19 1/16"	3'-0"	1 EA.
P-62	20 1/4"	20 1/32"	3'-1"	1 EA.
P-63	21 1/8"	21 1/32"	3'-2"	1 EA.
P-64	22 1/4"	22 1/32"	3'-3"	1 EA.
P-65	23 1/4"	23 1/32"	3'-4"	1 EA.
P-66	SEE DRAWING ESD-2941-04 FOR DETAILS			1 EA.
P-67	SEE DRAWING ESD-2941-04 FOR DETAILS			1 EA.

REVISIONS

REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN	RAILPROS
CHECKED	B. SMITH
RECOMMENDED	B. SCHMITH
DATE	5/12/16
DESIGNER PE STAMP	

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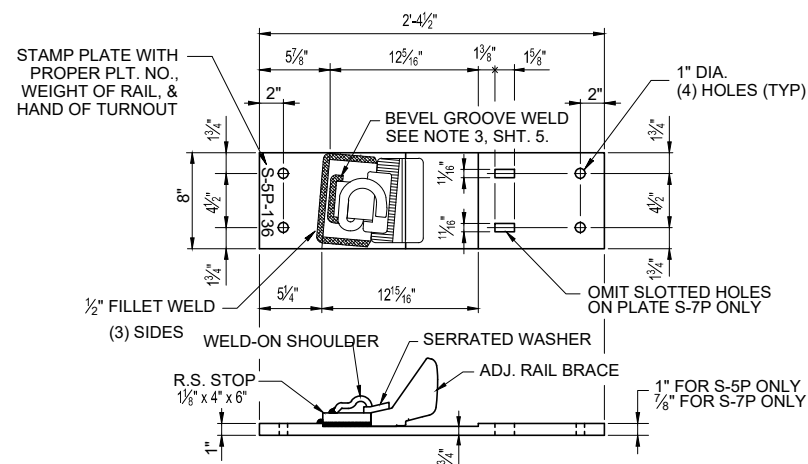
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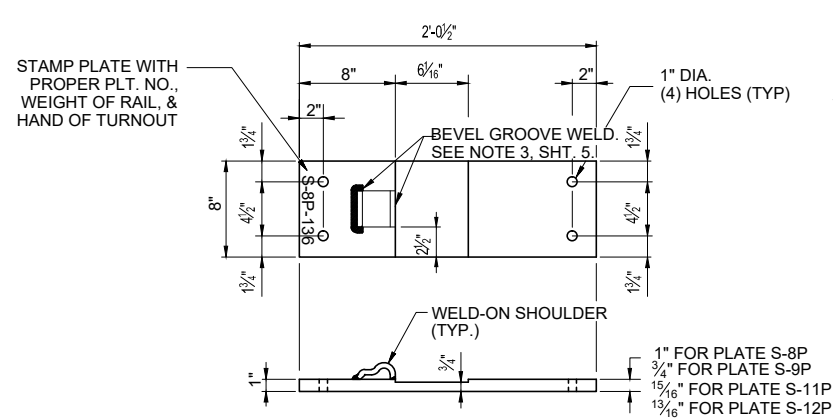
ENGINEERING STANDARD DRAWINGS

NO. 20 STANDARD TURNOUT - CROSSOVER LAYOUT AND BILL OF MATERIALS

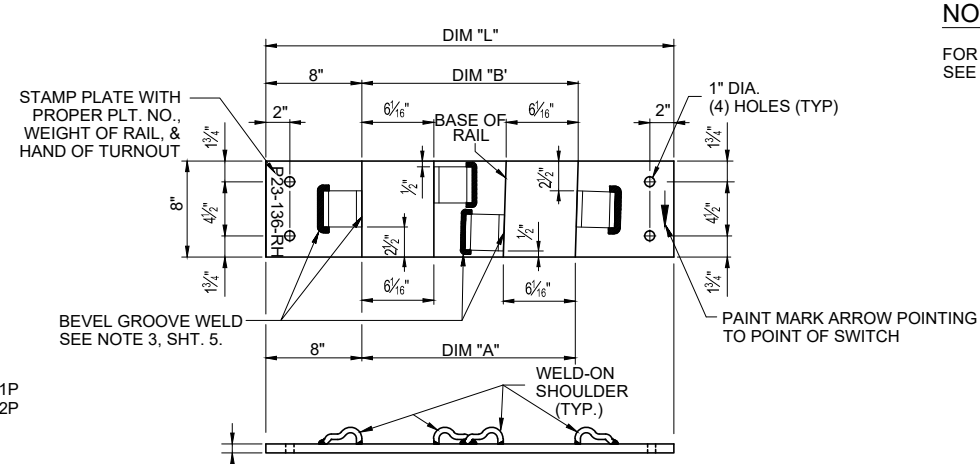
DRAWING NO. ESD-2941-03
DRAWING SHEET NO. 3 OF 14
SCALE: NONE
CONTRACT SHEET NO.



BRACE SLIDE PLATE - S-5P & S-7P
 1" x 8" x 2'-4 1/2" LG. - MILLED - W/ADJ. RAIL BRACE
 12 - S-5P PLATES REQUIRED AS SHOWN
 2 - S-7P PLATES REQUIRED AS SHOWN

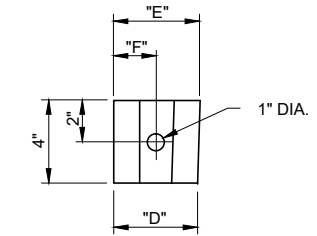


SLIDE PLATE - S-8P, S-9P, S-11P & S-12P
 1" x 8" x 2'-0 1/2" LG. - MILLED - W/ CLIP
 22 - S-8P PLATES REQUIRED AS SHOWN
 2 - S-9P PLATES REQUIRED AS SHOWN
 2 - S-11P PLATES REQUIRED AS SHOWN
 2 - S-12P PLATES REQUIRED AS SHOWN

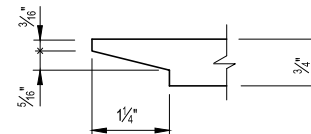


TURNOUT PLATES P-23 THRU P-27 & TURNOUT PLATES P-38 THRU P-40 & TURNOUT PLATES P-59 THRU P-62
 3/4" x 8" x DIM "L" - FLAT - W/ CLIPS

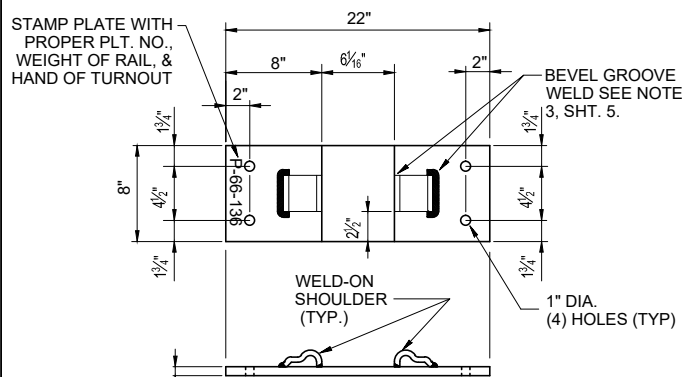
NOTE:
 FOR BILL OF TURNOUT PLATES AND DIMENSION TABLES SEE DRAWING 2941-03.



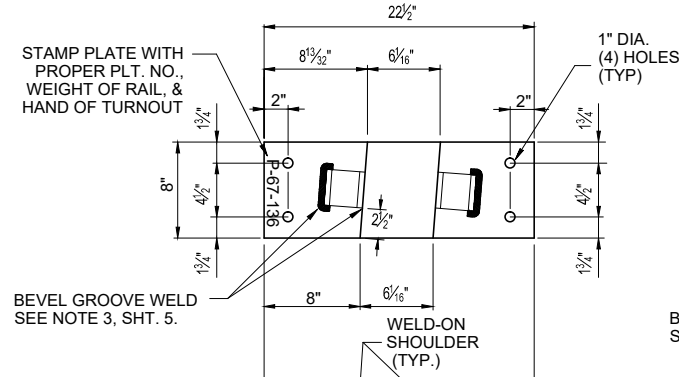
HOLD DOWN CLIP DETAIL



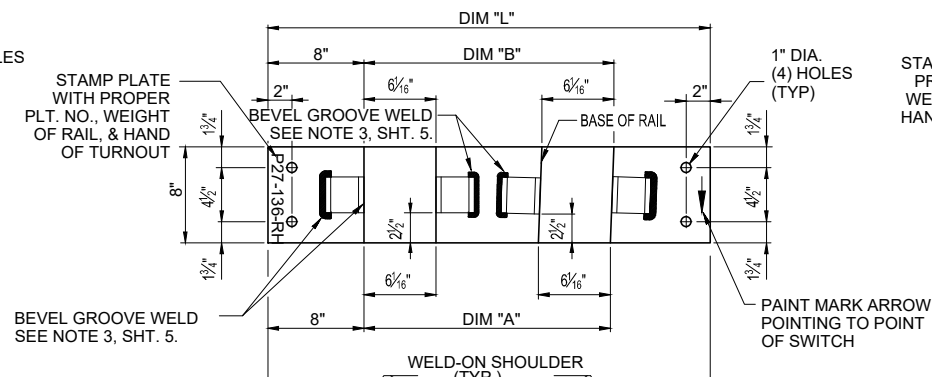
END DETAIL - BOTH ENDS



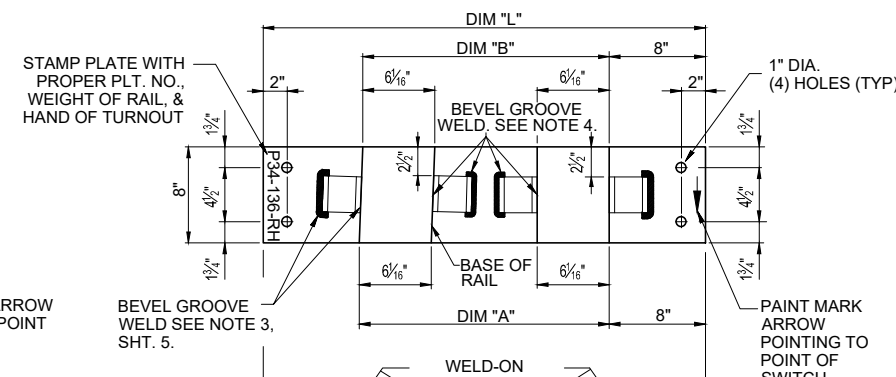
TURNOUT PLATES P-66
 1 EA. - 3/4" x 8" x 22" LG. - FLAT - W/ CLIPS



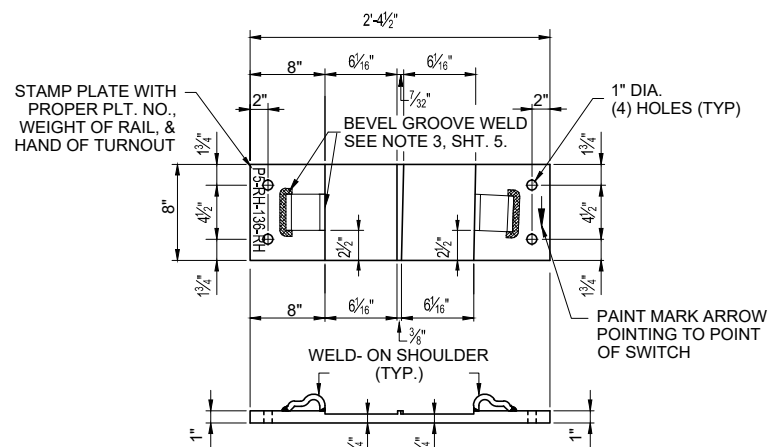
TURNOUT PLATES P-67
 1 EA. - 3/4" x 8" x 22 1/2" LG. - FLAT - W/ CLIPS



TURNOUT PLATES - P-28 THRU P-33, P-63, P-64, & P-65
 3/4" x 8" x DIM "L" - FLAT - W/ CLIPS

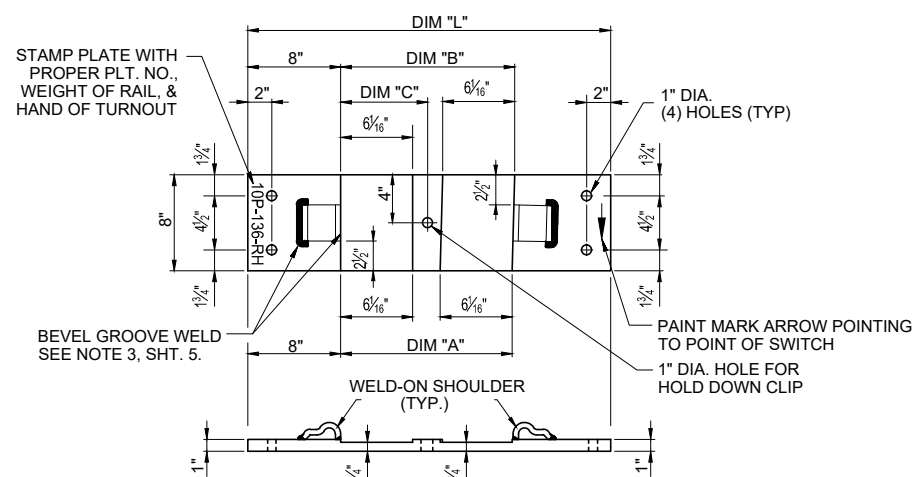


TURNOUT PLATES - P-34 THRU P-37
 3/4" x 8" x DIM "L" FLAT W/ CLIPS

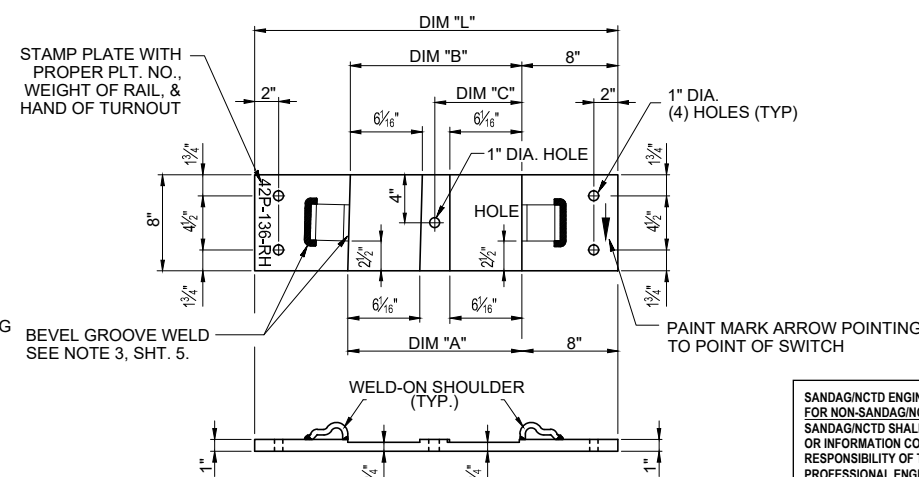


HEEL PLATE - P5-RH
 1" x 8" x 2'-4 1/2" LG. - MILLED - W/ CLIPS
 2 - P5-RH PLATES REQUIRED AS SHOWN FOR R.H. T.O.

HEEL PLATE - P6-LH
 1" x 8" x 2'-4 1/2" LG. - MILLED - W/ CLIPS
 2 - P6-RH PLATES REQUIRED AS SHOWN, EXCEPT OPPOSITE FOR L.H. T.O.



TURNOUT PLATES - P-13 THRU P-22 & P-56 THRU P-58
 1" x 8" x DIM "L" - MILLED



FROG PLATES - P-41, P-42 & P-43
 1" x 8" x DIM "L" - MILLED

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REV.	DATE	DESCRIPTION	DES.	ENG.

REVISIONS	DRAWN RAILPROS
	CHECKED B. SMITH
	RECOMMENDED W. PREY
	DATE 2/2/15
DESIGNER PE STAMP	

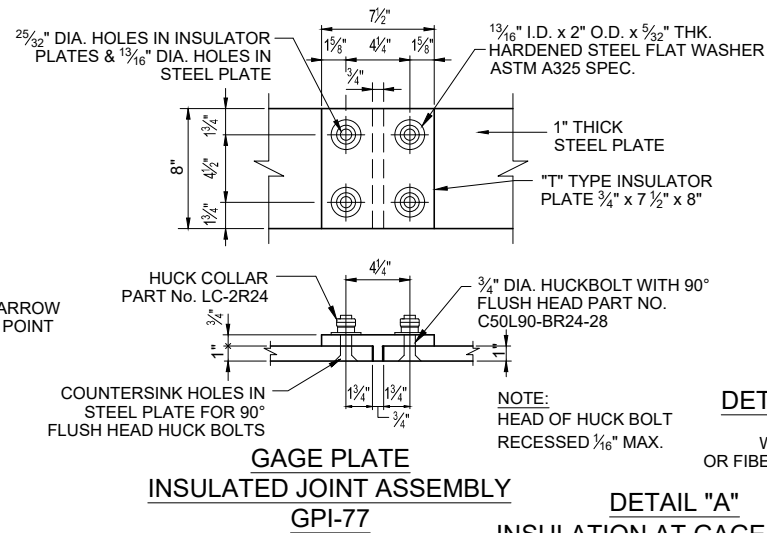
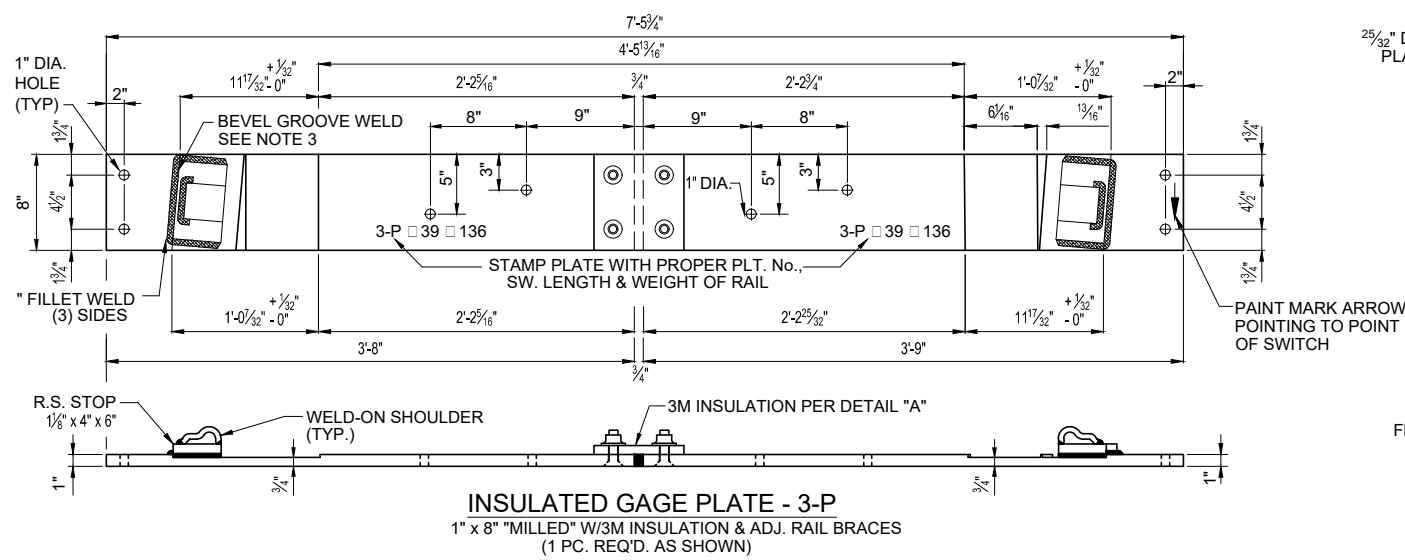

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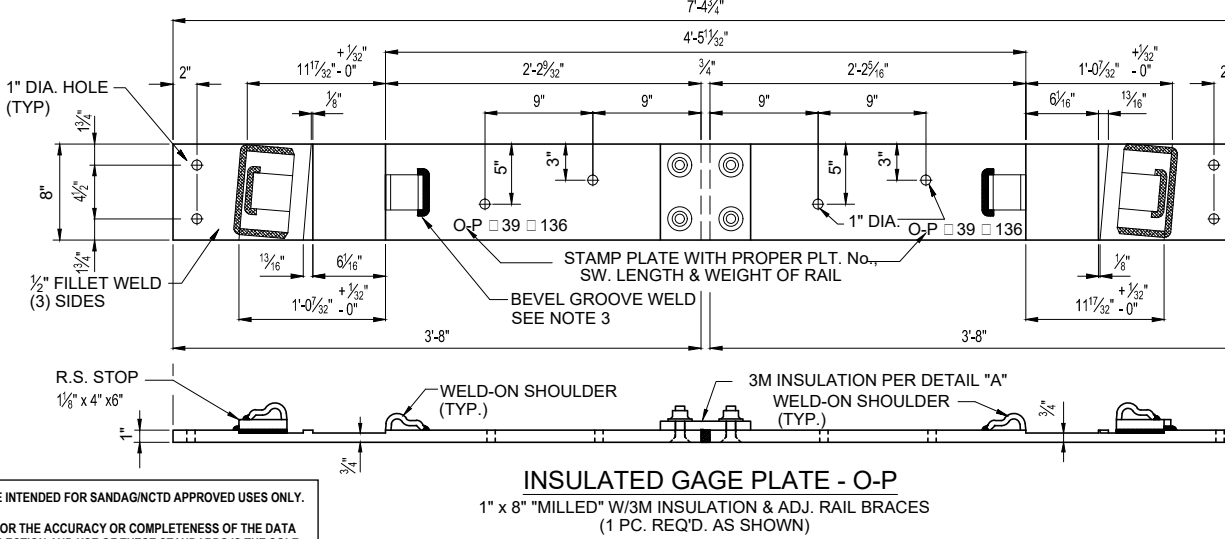
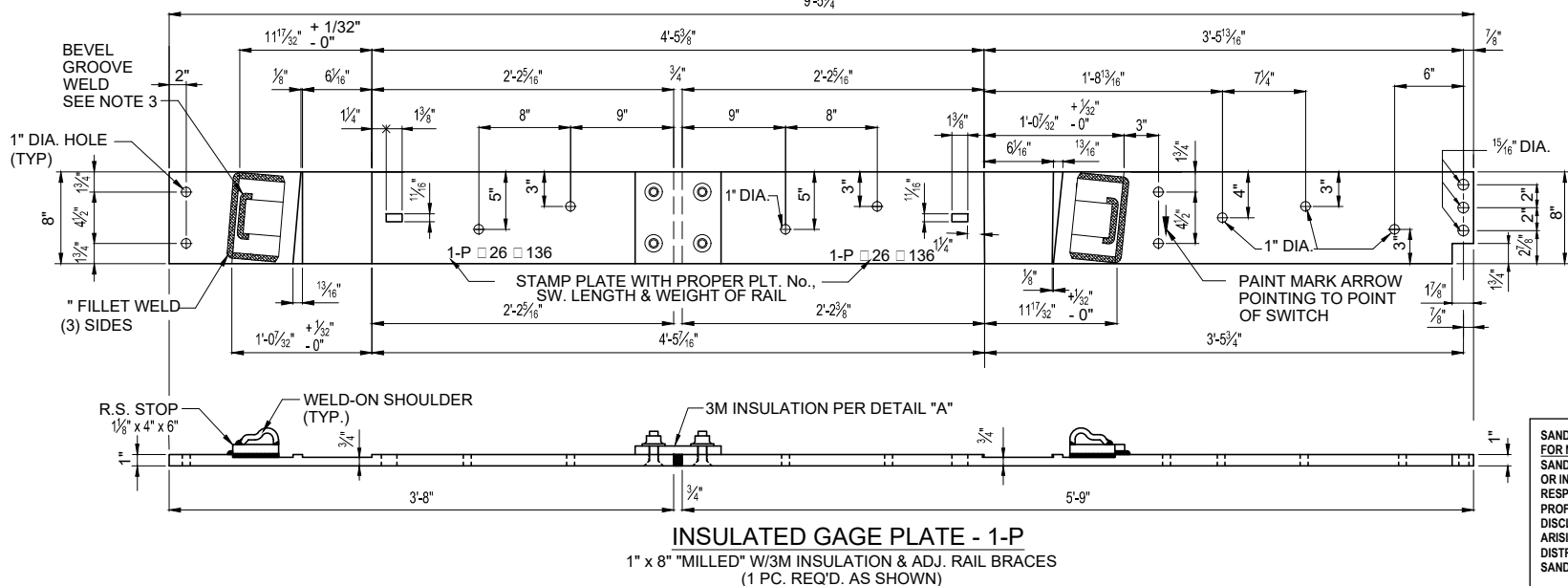
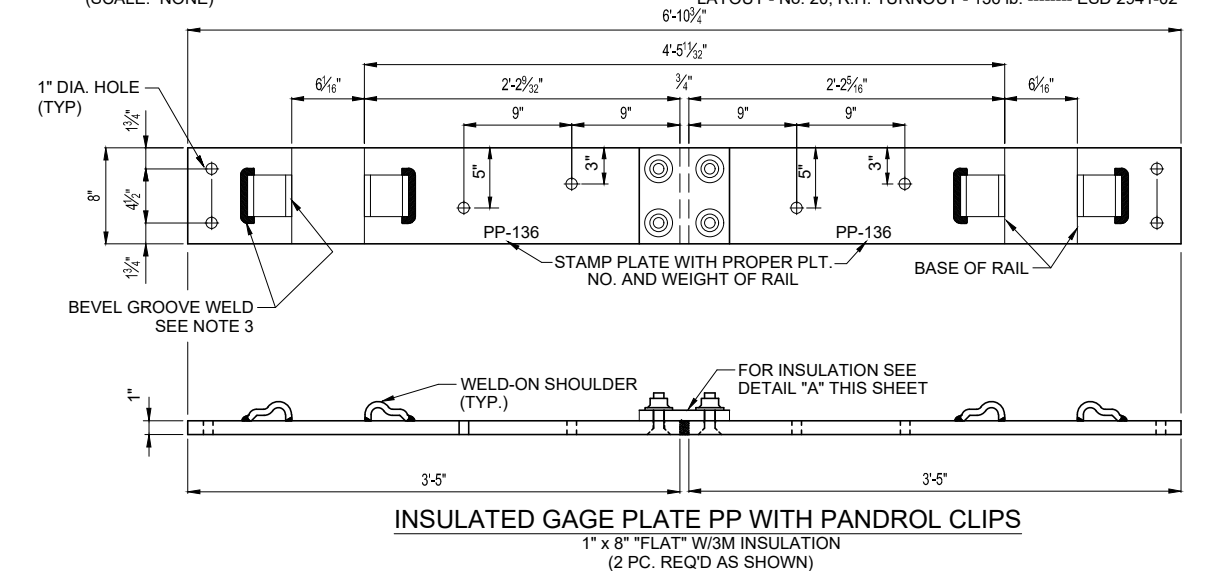
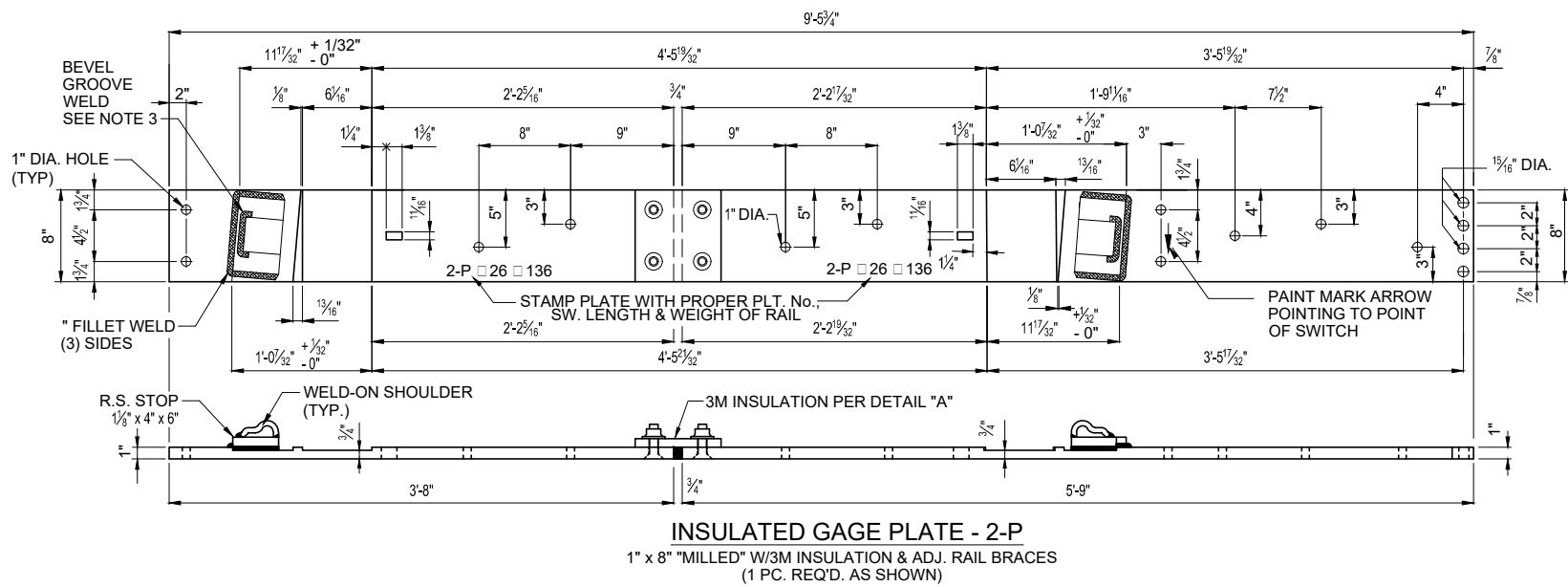
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ENGINEERING STANDARD DRAWINGS
 NO. 20 STANDARD TURNOUT - SWITCH AND TURNOUT PLATES

DRAWING NO.	ESD-2941-04
DRAWING SHEET NO.	4 OF 14
SCALE:	NONE
CONTRACT SHEET NO.	



- NOTES:**
1. PLATES TO BE MADE OF MILD ROLLED STEEL.
 2. THE WELD - ON PRESSED STEEL SHOULDER, MADE OF MILD STEEL, TO BE PURCHASED FROM PANDROL INTERNATIONAL OR APPROVED ALTERNATE MEETING PANDROL'S DESIGN SPECIFICATIONS.
 3. THE PRESSED STEEL SHOULDER MUST BE CAREFULLY WELDED TO GAGE PLATES WITH MINIMUM 3/8" WELD ALONG THE BEVELED GROOVES OF THE SHOULDER. ANY WELD PROJECTING BEYOND THE VERTICAL FACE OF SHOULDER IN THE AREA OF THE RAIL SEAT MUST BE MACHINED OUT TO PROVIDE A CLEAR RAIL SEAT DIMENSION AS CALLED FOR.
 4. SWITCH GAGE PLATES FOR RIGHT HAND TURNOUT, MACHINE ON RIGHT, ELECTRICALLY INTERLOCKED FOR U.S. & S. CO'S STYLE M23A MACHINE. IF OTHER SWITCH MACHINE IS USED, SWITCH GAGE PLATES 1-P AND 2-P MAY VARY AND SHOULD BE MODIFIED AS REQUIRED BY SWITCH MANUFACTURER TO PROVIDE PROPER SEATING.



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REV.	DATE	DESCRIPTION	DES.	ENG.

REVISIONS

DRAWN RAILPROS

CHECKED B. SMITH

RECOMMENDED W. PREY

DATE 2/2/15

DESIGNER PE STAMP



ENGINEERING STANDARD DRAWINGS

NO. 20 STANDARD TURNOUT - GAGE PLATES

DRAWING NO. ESD-2941-05

DRAWING SHEET NO. 5 OF 14

SCALE: NONE

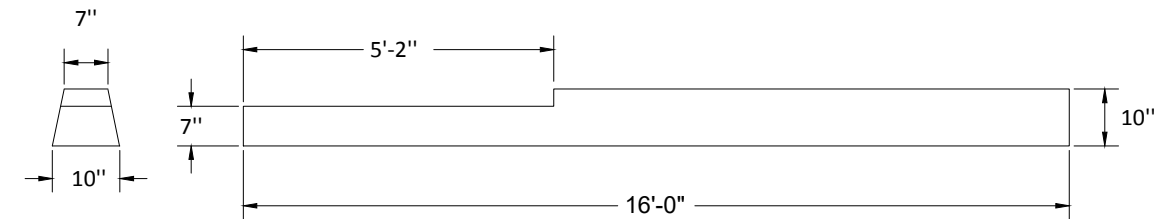
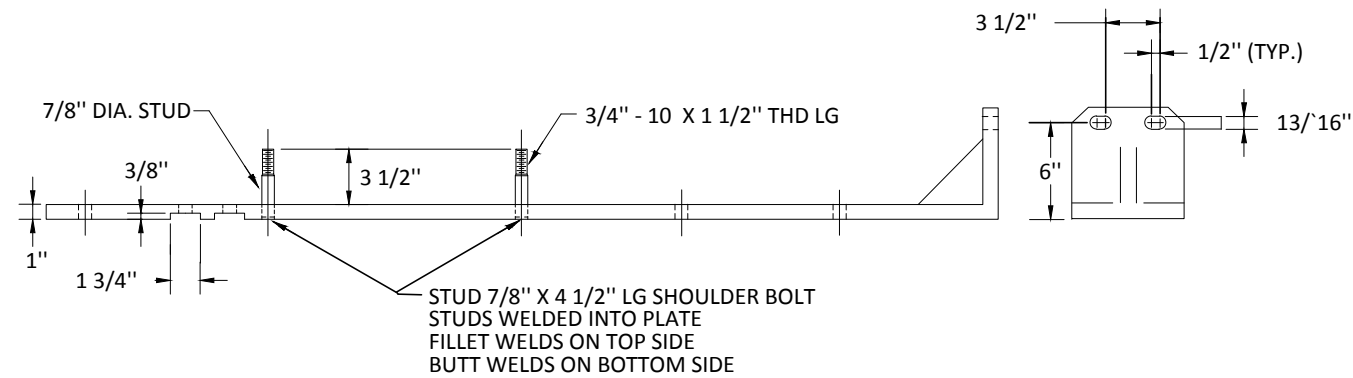
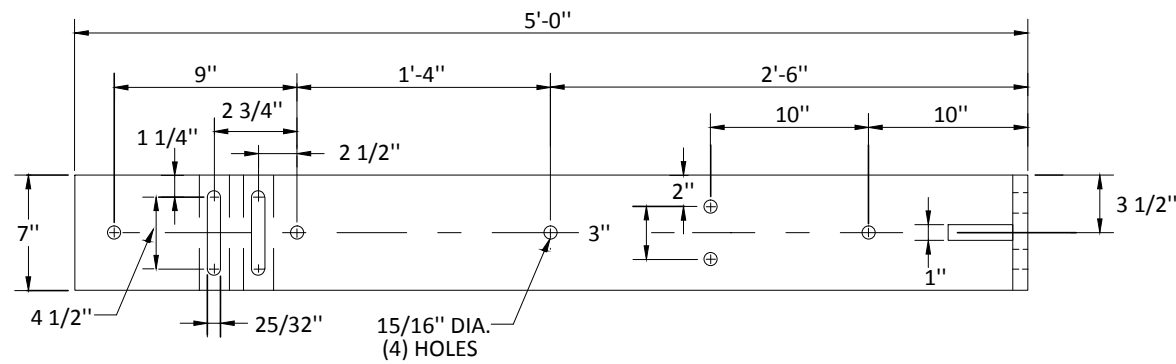
CONTRACT SHEET NO.

NOTE:

SEE SHEET ESD-2941-05 FOR NOTES

REFERENCE DRAWINGS:

SWITCH GAGE PLATE DETAILS-ESD-2941-05



MOUNTING PLATE NOTES:

1. EMORY CLOTH SHALL BE INSTALLED TO PROVIDE ABRASIVE MATERIAL BETWEEN SWITCH MACHINE FRAME AND SWITCH PLATE.
2. ALL HOLES SHALL BE DRILLED NOT PUNCHED.
3. ALL CORNERS OF PLATE SHALL BE CHAMFERED 1" X 1".

TRAPEZOID TIE NOTES:

1. TRAPEZOID TIES SHALL BE DOUGLAS FIR OR GUM.
2. TRAPEZOID TIES SHALL BE DAPPED AND TREATED AT THE MILL.
3. TIES SHALL BE STRAIGHT AND FREE OF CRACKS OR OTHER DEFECTS.

ANSALDO SWITCH MACHINE MOUNTING PLATE

DAP TIE

(2 PCS. REQ'D. AS SHOWN)

16 FT. DAPPED TRAPEZOID TIE

US&S SWITCH MACHINE MUST BE FURNISHED WITH FINISHED MOUNTING LUGS

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REVISIONS				DES.	ENG.
REV.	DATE	DESCRIPTION	DES.	ENG.	

DRAWN
RAILPROS
CHECKED
B. SMITH
RECOMMENDED
B. SCHMITH
DATE 5/12/16

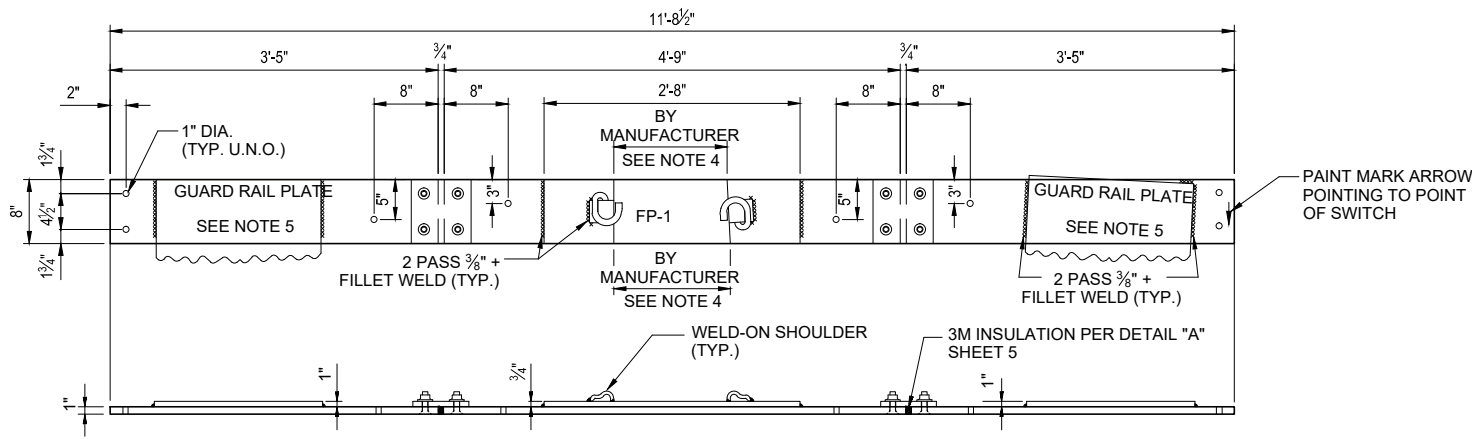
DESIGNER PE STAMP

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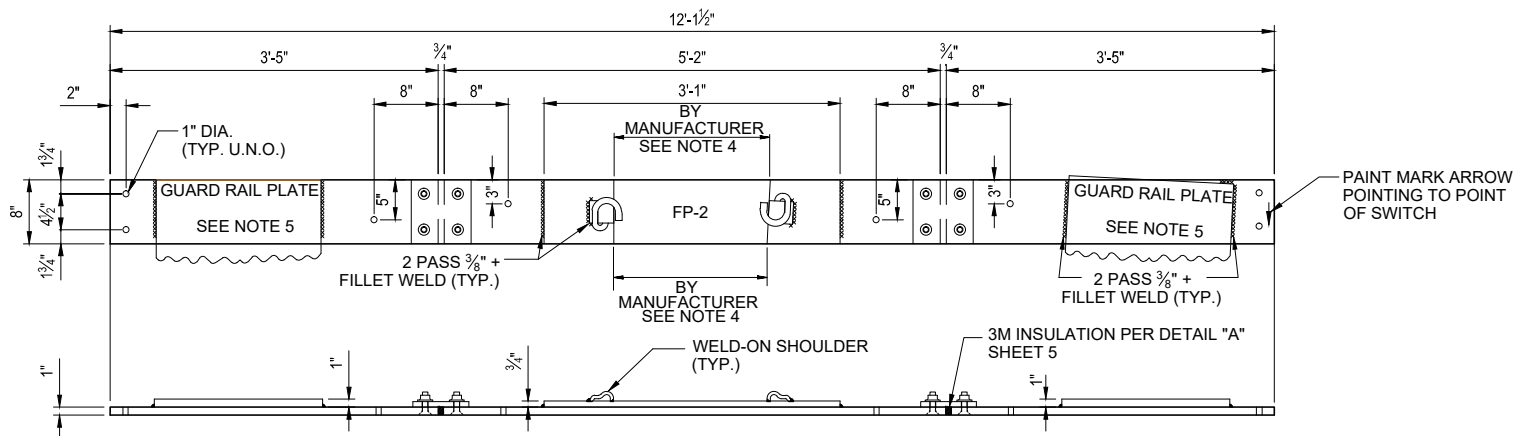
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ENGINEERING STANDARD DRAWINGS
NO. 20 STANDARD TURNOUT -
EXTENSION PLATE AND DAP TIE FOR
SWITCH MACHINE

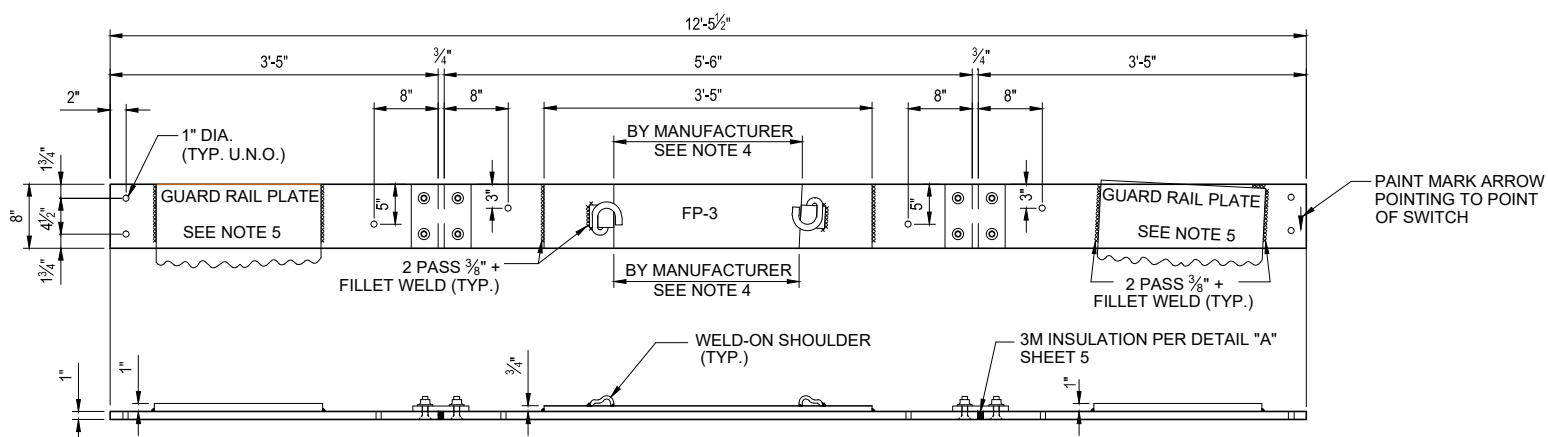
DRAWING NO. ESD-2941-06
DRAWING SHEET NO. 6 OF 14
SCALE: NONE
CONTRACT SHEET NO.



INSULATED FROG GAGE PLATE - FG-1P
1" x 8" - FLAT - W/3M INSULATION (1 PC. REQ'D. AS SHOWN)



INSULATED FROG GAGE PLATE - FG-2P
1" x 8" - FLAT - W/3M INSULATION (1 PC. REQ'D. AS SHOWN)



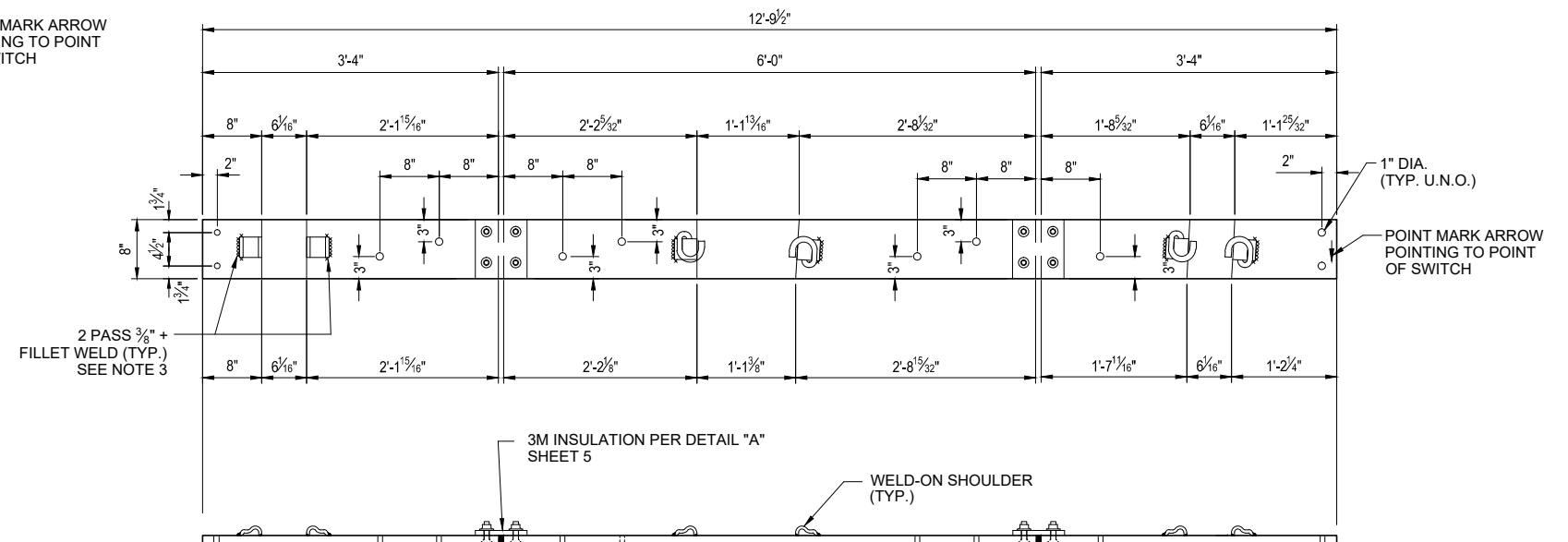
INSULATED FROG GAGE PLATE - FG-3P
1" x 8" - FLAT - W/3M INSULATION (1 PC. REQ'D. AS SHOWN)

NOTES:

1. PLATES TO BE MADE OF MILD ROLLED STEEL.
2. THE PLATES AS SHOWN ARE FOR A 136 LB., NO. 20, RIGHT HAND, MACHINE OPERATED TURNOUT. FOR A LEFT HAND TURNOUT, PLATES ARE TO BE OPPOSITE.
3. THE WELD-ON PRESSED STEEL SHOULDER, MADE OF MILD STEEL, AND MEETING PANDROL'S DESIGN SPECIFICATIONS SHALL BE USED. THE PRESSED STEEL SHOULDER MUST BE CAREFULLY WELDED TO ALL PLATES WITH A MINIMUM 2 PASS 3/8" + FILLET WELD ALONG THE BEVELED GROOVES OF THE SHOULDER. ANY WELD PROJECTING BEYOND THE VERTICAL FACE OF THE SHOULDER IN THE AREA OF THE BASE OF RAIL SEAT MUST BE MACHINED OUT TO PROVIDE A CLEAR RAIL SEAT DIMENSION AS CALLED FOR.
4. MANUFACTURER OF FROG PLATES SHALL USE COMPLETED FROG TO VERIFY LOCATION OF ADJUSTABLE CLAMPS ON FROG PLATES FP-1, FP-2, AND FP-3 TO INSURE PROPER FIT. FROG PLATES WILL BE WELDED TO THE GAGE PLATES IN THE FIELD WITH A 3 PASS 1/2" + FILLET WELD. PLATES WILL BE WELDED ONLY AFTER THE GAGE PLATES ARE SECURED IN THE PROPER LOCATION ON THE TIE WITH THE FROG IN PLACE AT PROPER ALIGNMENT.
5. GUARD RAIL PLATES ARE TO BE INSTALLED AND WELDED TO THE FROG GAGE PLATES IN THE FIELD WITH A 3 PASS 1/2" + FILLET WELD CONTINUOUS ON BOTH ENDS OF THE PLATE. PLATES ARE TO BE WELDED ONLY AFTER THE GAGE PLATE AND THE FROG ARE SECURED IN THE PROPER LOCATION ON THE TIE WITH PROPER ALIGNMENT.

REFERENCE DRAWINGS

LAYOUT - No.20, R.H., TURNOUT - 136 lb. ----- ESD-2941-02
- No. 20 R.H., RAIL BOUND MANGANESE FROG - 136 lb. ----- ESD-2941-09
- RAISED GUARD RAIL PLATES - 136 lb. ----- B□Manufacturer



INSULATED FROG GAGE PLATE - FG-4P
1" x 8" - FLAT - W/3M INSULATION (1 PC. REQ'D. AS SHOWN)

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REVISIONS				DRAWN RAILPROS		DESIGNER PE STAMP
				CHECKED B. SMITH		
				RECOMMENDED W. PREY		
				DATE 2/2/15		
REV.	DATE	DESCRIPTION	DES.	ENG.		



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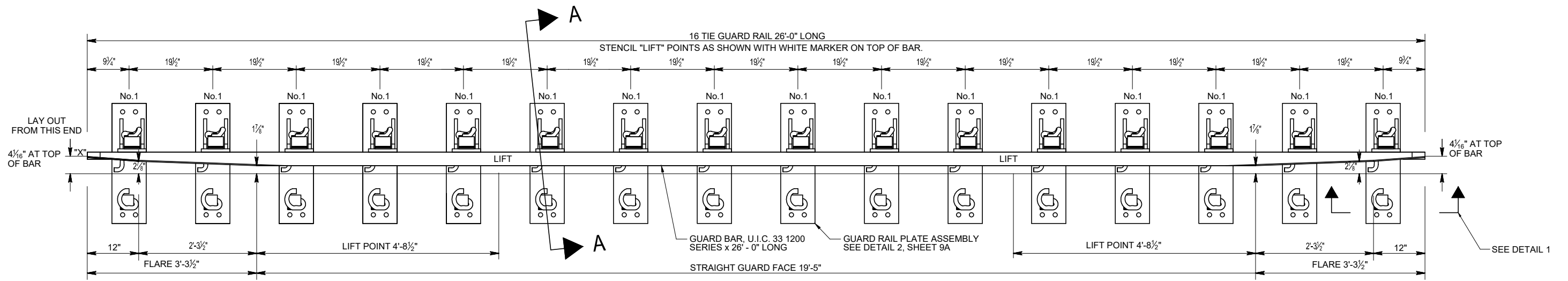
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ENGINEERING STANDARD DRAWINGS

NO. 20 STANDARD TURNOUT - FROG GAGE PLATES

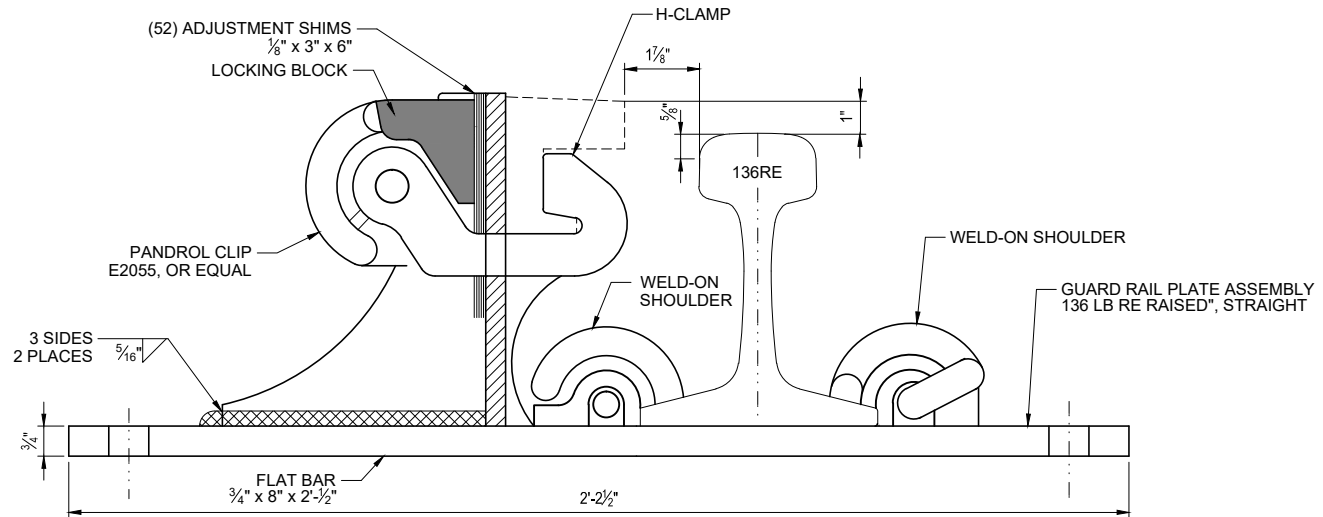
DRAWING NO.	ESD-2941-07
DRAWING SHEET NO.	7 OF 14
SCALE:	NONE
CONTRACT SHEET NO.	



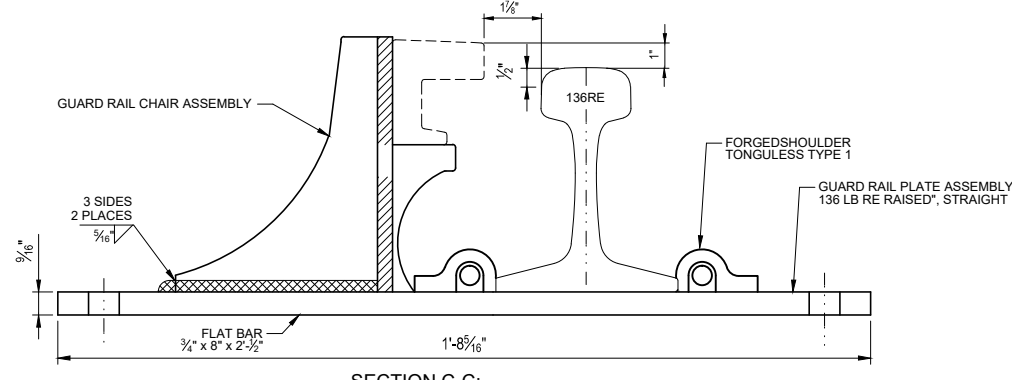
ASSEMBLED 26'-0" GUARD RAIL
SCALE: NONE

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BILL OF MATERIAL	
QTY	DESCRIPTION
1	GUARD BAR, UIC33 1200 SERIES x 26'-0" LONG
14	GUARD RAIL PLATE ASSEMBLY, 136 LB RE RAISED 1", STRAIGHT
14	H-CLAMP
42	CLIP, PANDROL E2055 OR EQUAL
14	LOCKING BLOCK
56	SHIM, 1/8" x 3" x 6"

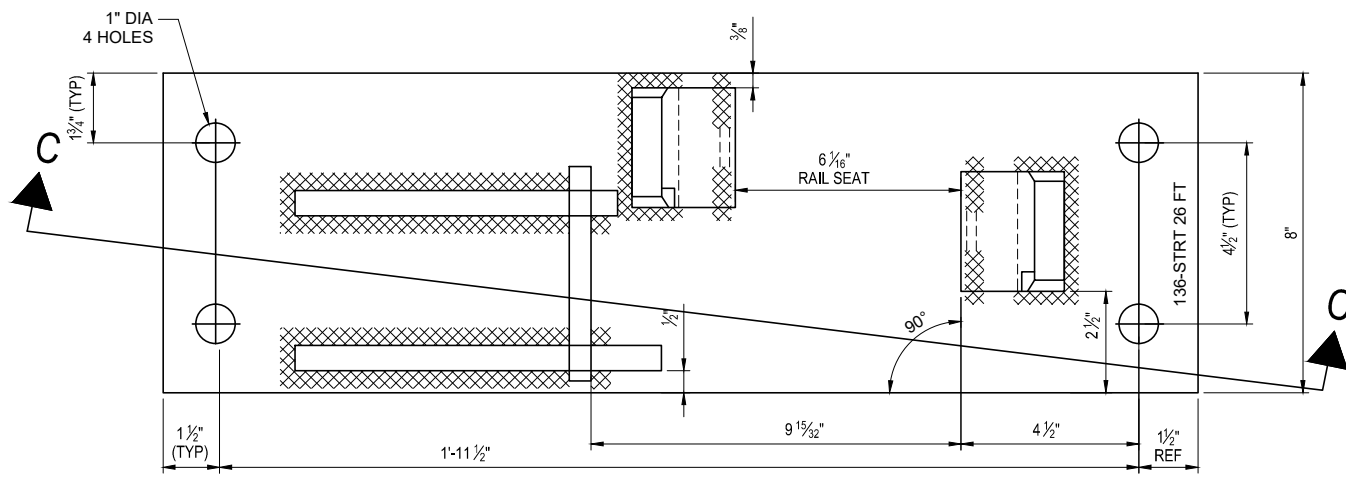


**SECTION A-A:
GUARD RAIL HARDWARE ASSEMBLY**
SCALE: NONE

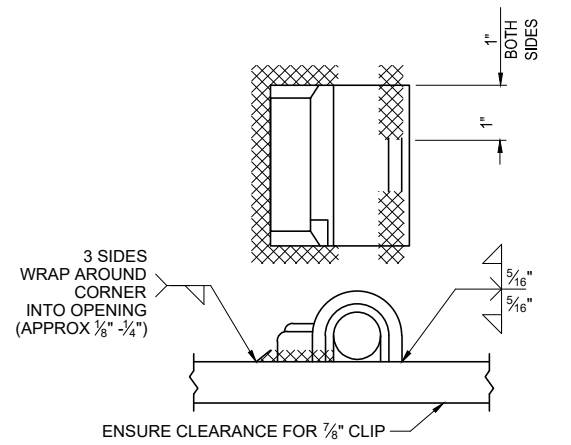


**SECTION C-C:
GUARD RAIL HARDWARE ASSEMBLY**
SCALE: NONE

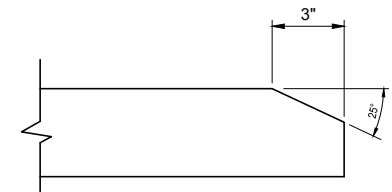
- NOTES:**
- GUARD RAIL SECTION U.I.C. 33 1200 SERIES-(U69) UIC 860.0 GRADE 90A (GUARD FACE BRINELL 319 MIN.)
 - BASE PLATE, BRACKET AND SHIMS MILD STEEL PER A.R.E.M.A. SPECIFICATION M7.
 - PANDROL H-CLAMP OR APPROVED EQUAL.
 - WORKMANSHIP AND TOLERANCES PER A.R.E.M.A. SPECIFICATIONS FOR SPECIAL TRACKWORK.
 - WELDING PER ANSI A5.1 D1.1-92 OR LATEST REVISION.
 - PLATE SPACING IS SET FOR SHIPPING ONLY. FINAL PLATE SPACING IS TO BE DETERMINED BY THE SPACING AT TIME OF INSTALLATION.
 - PANDROL SPRING CLIPS TO BE INCLUDED IN ASSEMBLY.
 - LIFT POINTS AND WEIGHT OF ASSEMBLY TO BE MARKED ON HEAD OF WEAR BAR WITH WHITE PAINT.
 - PLATE IS TO BE STAMPED WITH PLATE I.D. WITH 1/2" HIGH CHARACTERS AS SHOWN.
 - GRIND AWAY CORNER OF PANDROL SHOULDER TO CLEAR FOOT OF CHAIR ASSEMBLY.



**PLAN VIEW:
GUARD RAIL HARDWARE ASSEMBLY**
SCALE: NONE



FORGED SHOULDER WELDING DETAIL
SCALE: NONE



DETAIL 1
SCALE: NONE

REVISIONS		DES.	ENG.
R1	GUARD RAIL HARDWARE TO BOLTLESS		

DRAWN RAILPROS	DATE 4/25/17
CHECKED B. SMITH	DESIGNER PE STAMP
RECOMMENDED B. SCHMITH	

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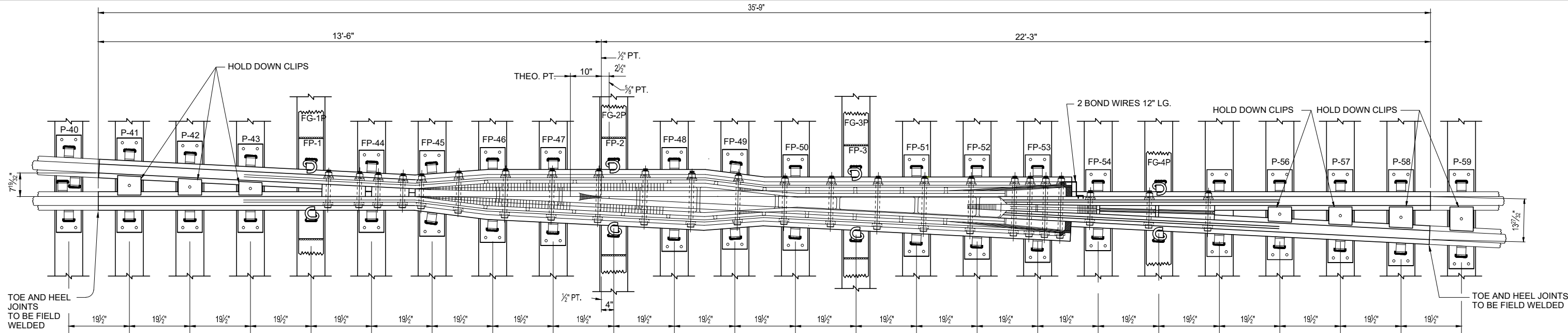
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ENGINEERING STANDARD DRAWINGS

NO. 20 TANGENTIAL TURNOUT - 26'-0"
GUARD RAIL

DRAWING NO.	ESD-2941-08
DRAWING SHEET NO.	8 OF 14
SCALE:	NONE
CONTRACT SHEET NO.	



No. 20 RAILBOUND MANGANESE STEEL FROG WITH PLATES

DIMENSION TABLE

PLATE	DIM "A"	DIM "B"	DIM "L"	Pits REQ'D.
FP-45	SEE NOTE "A"	2'-5 1/2"	1	
FP-49	" " "	2'-10 1/2"	1	

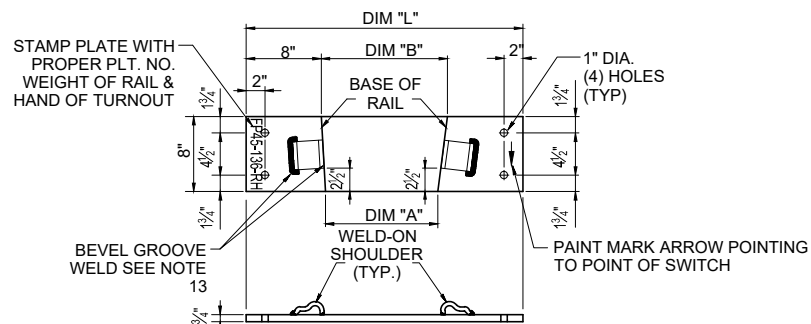
NOTE "A"
 PLATES FP-44 THRU FP-55 ARE TO BE LAID OUT AND MARKED OFF FROM UNDER FROG TO INSURE PROPER LOCATION OF SHOULDERS.

NOTE "B"
 SPECIAL FROG PLATES FP-1, FP-2, AND FP-3 WITH ADJUSTABLE CLAMPS, SHOWN IN POSITION ON THIS SHEET, ARE DESIGNED TO BE WELDED TO FROG GAGE PLATES. FOR MANUFACTURING DETAILS AND INSTALLATION PROCEDURES SEE SHEET 7.

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NOTES:

- FROG ANGLE 2°-51'-51".
- RAIL USED TO FABRICATE FROG IS TO BE 136 LB. HIGH STRENGTH.
- RAIL BOUND MANGANESE STEEL FROG PER CURRENT A.R.E.M.A. PLAN NO. 621 & 625 WITH EXPLOSIVE HARDENED MANGANESE HIGH INTEGRITY CASTING PER CURRENT A.R.E.M.A. SPECIFICATIONS AND MODIFIED FOR ARM LENGTHS AND PLATES WITH PANDROL FASTENERS.
- ALL FROG PLATES SHALL BE STAMPED IN 1/2" CHARACTERS TO INDICATE MFG., FROG NO., R.H., RAIL SECTION AND PLATE NUMBER. MARK TO BE STAMPED ON SAME END OF ALL FROG PLATES.
- FOR DETAILS OF FROG PLATES FP-1 THRU FP-3, SEE SHEET 7 FOR DETAILS OF FROG PLATES FP-44 THRU FP-55 SEE THIS SHEET.
- WORKMANSHIP AND MATERIALS SHALL BE PER CURRENT "A.R.E.M.A. SPECIFICATIONS FOR SPECIAL "TRACKWORK", EXCEPT AS OTHERWISE SPECIFIED.
- ANY CONSTRUCTION DETAILS NOT SHOWN SHALL BE IN ACCORDANCE WITH CURRENT A.R.E.M.A. RECOMMENDED PRACTICE.
- FROG PLATES ARE DESIGNED TO BE INSTALLED PERPENDICULAR TO MAIN TRACK.
- BODY BOLTS 13/8" DIA., H.T.C.S. - PER A.R.E.M.A. SPECIFICATIONS.
- TOE AND HEEL BLOCKS AND BOLTS PER A.R.E.M.A. SPECIFICATIONS.
- PLATES TO BE MADE OF MILD ROLLED STEEL.
- THE PLATES AS SHOWN ARE FOR A 136 LB., NO. 20, RIGHT HAND, TURNOUT. FOR A LEFT HAND TURNOUT, PLATES ARE TO BE OPPOSITE.
- THE WELD-ON PRESSED STEEL SHOULDER, MADE OF MILD STEEL, AND MEETING PANDROL'S DESIGN SPECIFICATIONS SHALL BE USED. THE PRESSED STEEL SHOULDER MUST BE CAREFULLY WELDED TO ALL PLATES WITH A MINIMUM 2 PASS 3/8" + FILLET WELD ALONG THE BEVELED GROOVES OF THE SHOULDER. ANY WELD PROJECTING BEYOND THE VERTICAL FACE OF THE SHOULDER IN THE AREA RAIL SEAT DIMENSION AS CALLED FOR.
- MANUFACTURER OF FROG PLATES SHALL USE COMPLETED FROG TO VERIFY LOCATION OF ADJUSTABLE CLAMPS ON FROG PLATES FP-1, FP-2, AND FP-3 TO INSURE PROPER FIT. FROG PLATES WILL BE WELDED TO THE GAGE PLATES IN THE FIELD WITH A 3 PASS 1/2" + FILLET WELD. PLATES WILL BE WELDED ONLY AFTER THE GAGE PLATES ARE SECURED IN THE PROPER LOCATION ON THE TIE WITH THE FROG IN PLACE AT PROPER ALIGNMENT.
- GUARD RAIL PLATES ARE TO BE INSTALLED AND WELDED TO THE FROG GAGE PLATES IN THE FIELD WITH A 3 PASS 1/2" + FILLET WELD CONTINUOUS ON BOTH ENDS OF THE PLATE. PLATES ARE TO BE WELDED ONLY AFTER THE GAGE PLATE AND THE FROG ARE SECURED IN THE PROPER LOCATION ON THE TIE WITH PROPER ALIGNMENT.
- IDENTIFICATION TAG WITH RAISED METAL CHARACTERS TO BE APPLIED WHICH WILL STATE WEIGHT OF RAIL, FROG NO., MANUFACTURER AND YEAR MANUFACTURED.
- RAIL ENDS TO BE CUT AT 45 DEGREE ANGLE AT JOINT WITH FROG CASTING.



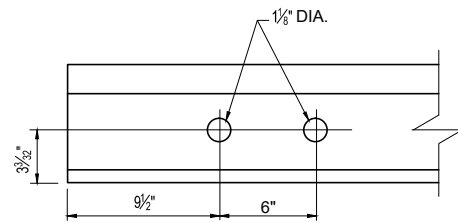
FROG PLATES - FP-45 & FP-49
 3/4" x 8" x DIM "L" - FLAT - W/ CLIPS

DIMENSION TABLE

PLATE	DIM "A"	DIM "B"	DIM "L"	Pits REQ'D.
FP-46	SEE NOTE "A"	2'-8 3/4"	1 EA.	
FP-47	" " "	2'-9 1/2"	1 EA.	
FP-48	" " "	2'-11 1/2"	1 EA.	
FP-50	" " "	2'-8 3/4"	1 EA.	
FP-51	" " "	2'-10 1/2"	1 EA.	
FP-52	" " "	2'-11 1/2"	1 EA.	
FP-53	" " "	3'-0 1/2"	1 EA.	
FP-54	" " "	2'-4"	1 EA.	
FP-55	" " "	2'-6"	1 EA.	

SPECIAL FROG PLATES WITH ADJUSTABLE CLAMPS

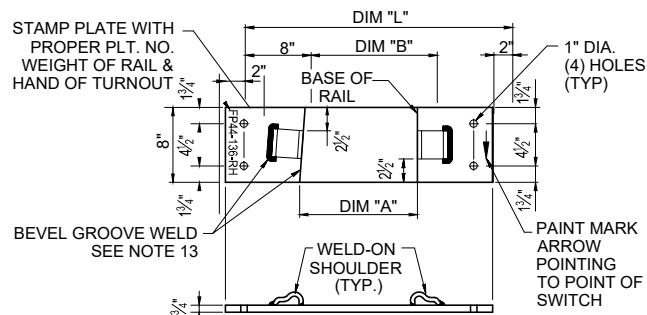
FP-1	SEE NOTE "B"	2'-8"	1 EA.
FP-2	" " "	3'-1"	1 EA.
FP-3	" " "	3'-0"	1 EA.



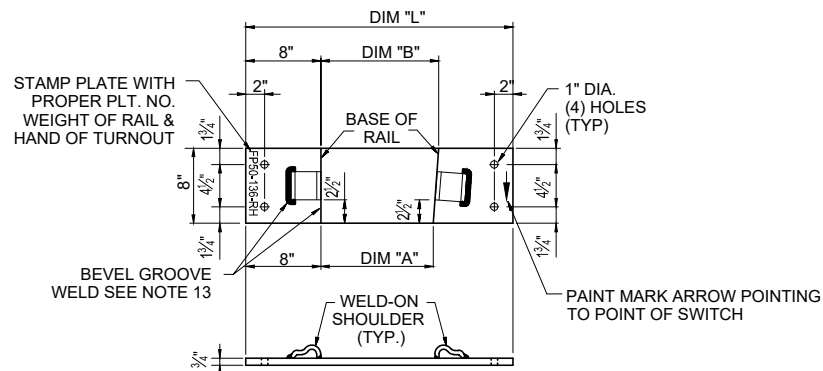
RAIL END DRILLING
 NOTE: RAIL END DRILLING CAN BE ELIMINATED IF NO TEMPORARY BOLTED JOINTS ARE TO BE USED.

DIMENSION TABLE

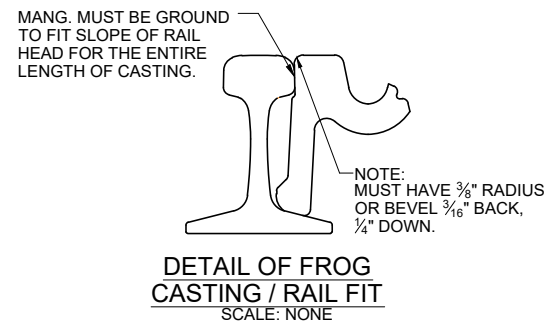
PLATE	DIM "A"	DIM "B"	DIM "L"	Pits REQ'D.
FP-44	SEE NOTE "A"	2'-4 1/2"	1 EA.	



FROG PLATE - FP-44
 3/4" x 8" x DIM "L" - FLAT - W/ CLIPS



FROG PLATES FP-46 THRU FP-48 & FP-50 THRU FP-55
 3/4" x 8" x DIM "L" - FLAT - W/PANDROL CLIPS



DETAIL OF FROG CASTING / RAIL FIT
 SCALE: NONE

REFERENCE DRAWINGS

- LAYOUT - No. 20, R.H., TURNOUT - 136 lb. ----- ESD-2941-02
- FROG GAGE PLATES W/ PANDROLS ----- ESD-2941-07
- RAISED GUARD RAIL PLATES - 136 lb. ----- B. Manufacturer

REVISIONS

REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN RAILPROS

CHECKED B. SMITH *BS*

RECOMMENDED W. PREY *WP*

DATE 2/2/15

DESIGNER PE STAMP

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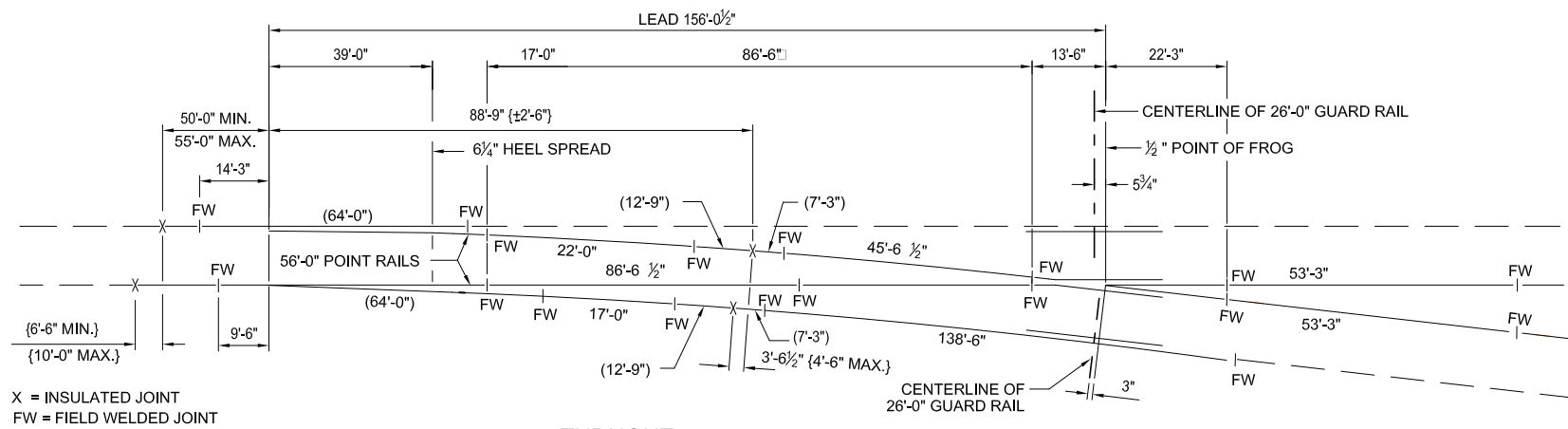
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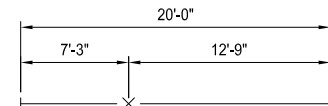
NO. 20 STANDARD TURNOUT - RAILBOUND MANGANESE STEEL FROG

DRAWING NO. ESD-2941-09
 DRAWING SHEET NO. 9 OF 14
 SCALE: NONE
 CONTRACT SHEET NO.



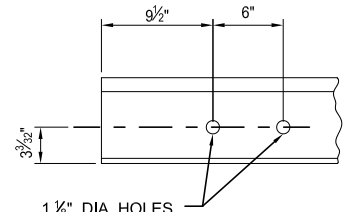
X = INSULATED JOINT
FW = FIELD WELDED JOINT

TURNOUT
SCALE: NONE



20'-0" LONG ADHESIVE BONDED PREFABRICATED INSULATED RAIL JOINT ASSEMBLY

(SEE NOTE 6) BOTH ENDS SHALL BE LEFT BLANK FOR WELDING IN THE FIELD. (SCALE: NONE)



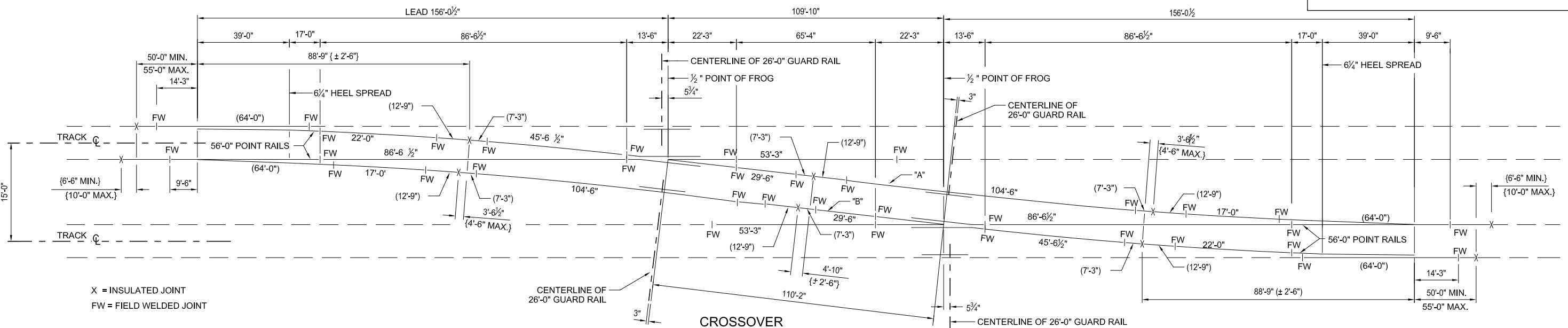
DETAIL "A"

SEE NOTE 4 (b)
SCALE: NONE

NOTES:

1. THE PERMISSIBLE VARIATION IN STANDARD LENGTHS OF RAILS, FROGS AND SWITCH POINTS IS GREATER THAN THE NORMAL EXPANSION GAPS AT RAIL JOINTS AND THICKNESS OF FIBRE END POST IN INSULATED JOINTS. NO ALLOWANCE HAS BEEN MADE FOR EXPANSION GAPS AND FIBRE END POSTS IN COMPUTING LENGTHS OF RAILS SHOWN.
2. RAIL LAYOUT SHOWN FOR CROSSOVERS IS TO BE USED IN ALL CASES, EXCEPT WHERE COMPROMISE JOINTS ARE REQUIRED BETWEEN THE FROGS IN THE CROSSOVER TRACK. (COMPROMISE JOINTS CAN BE USED IN A TEMPORARY CONDITION.) WHEN COMPROMISE WELDS ARE REQUIRED, THE INSULATED JOINTS IN THE CROSSOVER TRACK SHALL ALWAYS BE OF THE HEAVIER RAIL SECTION AND THE RAIL LAYOUT SHALL BE CHANGED TO LOCATE COMPROMISE JOINTS AS DESCRIBED BELOW: THE DESCRIPTIONS OF THE CHANGES IN RAIL LAYOUT WHEN COMPROMISE JOINTS ARE REQUIRED IN THE CROSSOVER TRACK ARE BASED ON ASSUMPTION THAT TRACK H IS LAID WITH THE HEAVIER RAIL THAN TRACK L. CROSSOVER ON 15'-0" TRACK CENTERS: AT LOCATION A THE 104'-6" RAIL SHALL BE REPLACED WITH 16'-6" OF THE HEAVIER RAIL AND 88'-6" OF THE LIGHTER RAIL. AT LOCATION B THE 29'-6" RAIL SHALL BE REPLACED WITH 10'-0" OF THE HEAVIER RAIL AND 19'-6" OF THE LIGHTER RAIL.
3. IN ADDITION TO NOTE 1, NO ALLOWANCE HAS BEEN MADE IN THE RAIL LENGTHS TO PROVIDE GAPS NEEDED TO MAKE FIELD WELDS. IN THE FIELD IT WILL BE NECESSARY TO CUT RAILS ENDS TO PROVIDE CORRECT GAPS FOR FIELD WELDS.
4. FURNISH ALL RAIL SHOWN IN SOLID LINES ON THIS DRAWING: (A.) RAILS LONGER THAN 39'-0" SHALL BE CONTINUOUS WELDED RAIL (CWR), TO BE FURNISHED WITH BOTH ENDS LEFT BLANK FOR WELDING IN THE FIELD. (B.) ALL OTHER RAILS 39'-0" OR SHORTER AS SPECIFIED ON THE DRAWING, WITH BOTH ENDS DRILLED PER DETAIL "A", IF SO REQUIRED.
5. ALL RAIL FURNISHED FOR TURNOUT AND CROSSOVER SHALL BE "HEAD HARDENED" EXCEPT GUARD RAILS.
6. LOCATIONS OF INSULATED JOINTS ARE SHOWN ON TURNOUT AND CROSSOVER DIAGRAMS WITHOUT TOLERANCES, OR IF TOLERANCES ARE PERMISSIBLE, WITH (+ OR -). ALL INSULATED JOINTS ARE TO BE PROPERLY SUSPENDED IN CRIB AREA BETWEEN TWO TIES LOCATED 4" MINIMUM FROM EDGE OF NEAREST TIE TO EDGE OF INSULATED JOINT.
7. INSULATED JOINT MUST BE INSTALLED TO BE CENTERED BETWEEN TWO (2) TIES.
8. FIELD WELDED JOINTS DESIGNATED "FW" SHOULD BE IN CRIB AREA BETWEEN TWO TIES LOCATED 4" MINIMUM BETWEEN NEAREST TIE AND WELDED JOINT. DIMENSIONS SHOWN IN PARENTHESIS (0'-0") ARE EXACT. RAILS FURNISHED FOR THESE LOCATIONS ARE LARGER AND MUST BE FIELD ADJUSTED (CUT) WITHIN TOLERANCES SHOWN IN BRACKETS (0'-0").
9. WHEN INSULATED JOINTS WITH TOLERANCES AND FIELD WELDED JOINTS FALL SHORT OF MINIMUM CLEARANCE FROM TIE OR TIE PLATE THE JOINT MAY BE MOVED WITHIN TOLERANCE LIMITS. BONDED INSULATED JOINT ASSEMBLIES AND STOCK RAILS ARE FURNISHED LONGER THAN SHOWN IN PARENTHESIS ON LAYOUT. THESE RAILS OR THEIR ADJACENT CONNECTING RAILS MUST BE TRIMMED IN THE FIELD TO FIT.
10. INSULATED JOINTS SHALL BE SAWCUT SQUARE.
11. HEAVY POINT (HP) FROG, FROG POINT WIDTH 27/32".

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X = INSULATED JOINT
FW = FIELD WELDED JOINT

CROSSOVER
15'-0" TRACK CENTERS
SCALE: NONE

REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN RAILPROS
CHECKED B. SMITH
RECOMMENDED W. PREY
DATE 2/2/15

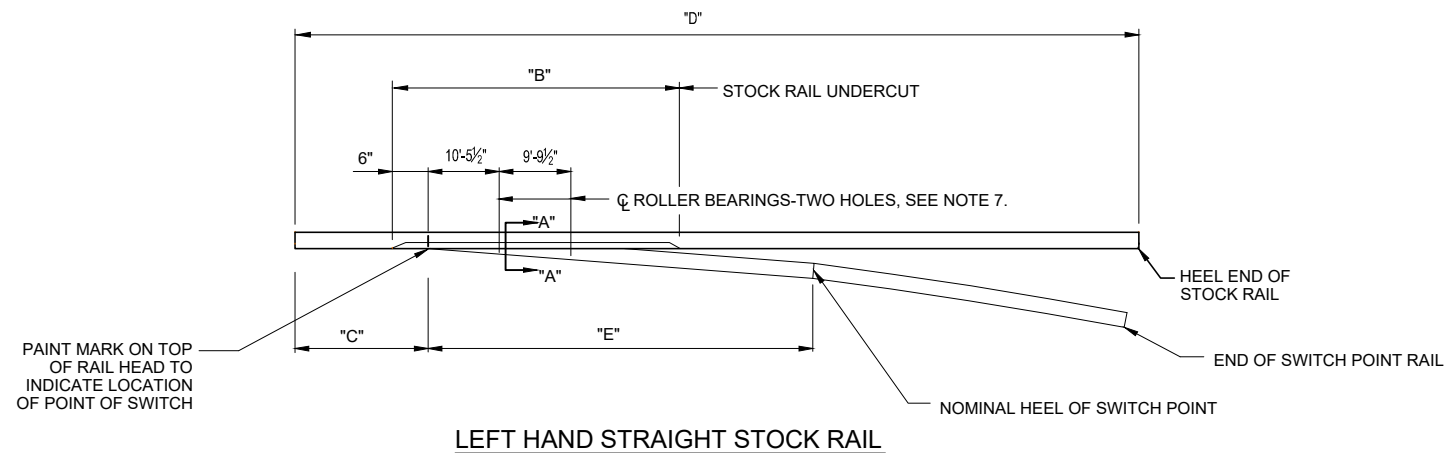
DESIGNER PE STAMP

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SAN DIEGO ASSOCIATION OF GOVERNMENTS
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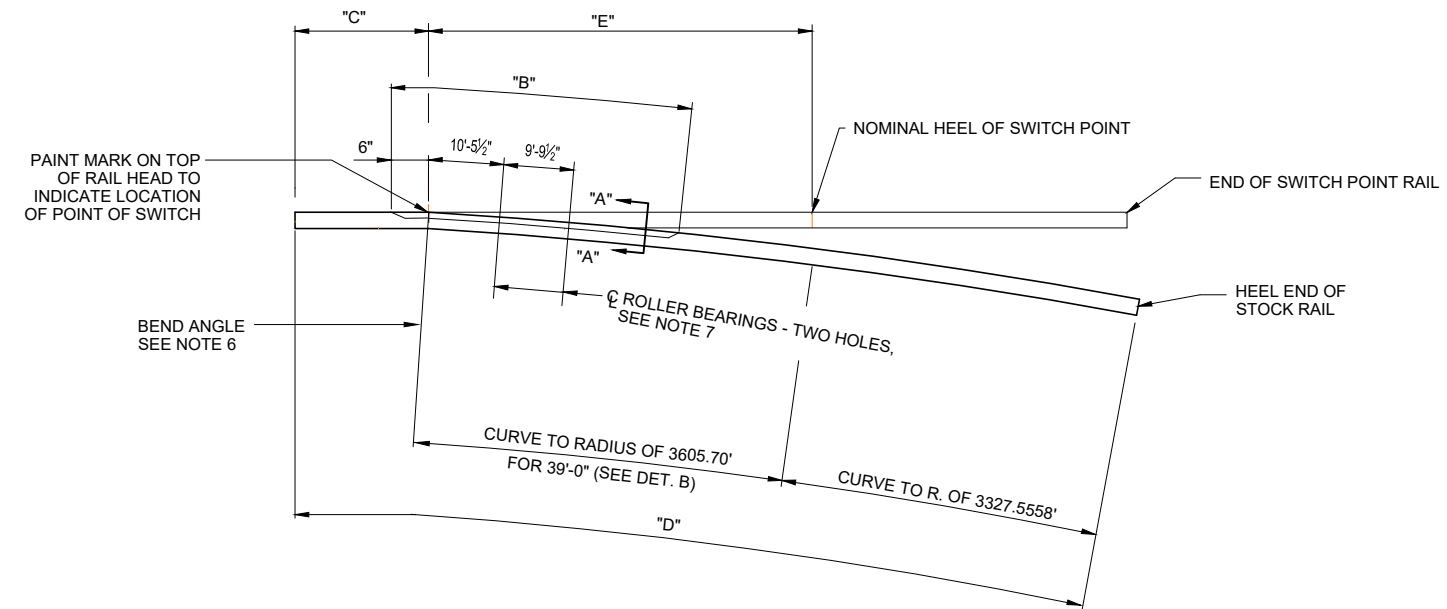
NORTH COUNTY TRANSIT DISTRICT
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ENGINEERING STANDARD DRAWINGS
NO. 20 STANDARD TURNOUT AND CROSSOVER INSULATED JOINT DIAGRAM

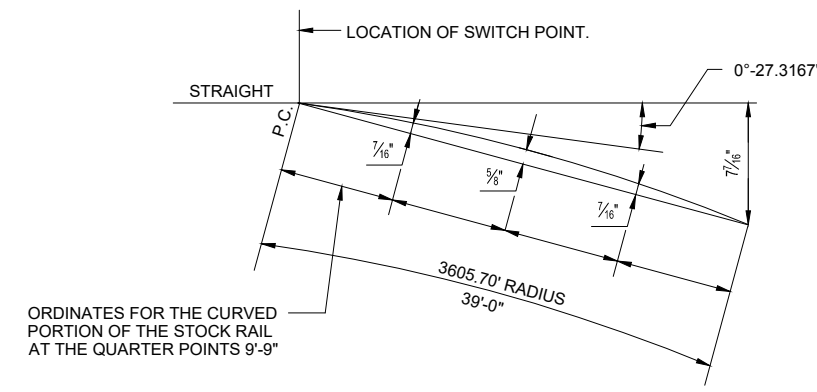
DRAWING NO. ESD-2941-10
DRAWING SHEET NO. 10 OF 14
SCALE: NONE
CONTRACT SHEET NO.



LEFT HAND STRAIGHT STOCK RAIL



RIGHT HAND CURVED STOCK RAIL
 STOCK RAILS SHOWN ARE FOR "RIGHT HAND TURNOUT".
 FOR LEFT HAND TURNOUT, STOCK RAILS ARE OPPOSITE HAND,
 BEING LEFT HAND CURVED STOCK RAIL AND
 RIGHT HAND STRAIGHT STOCK RAIL

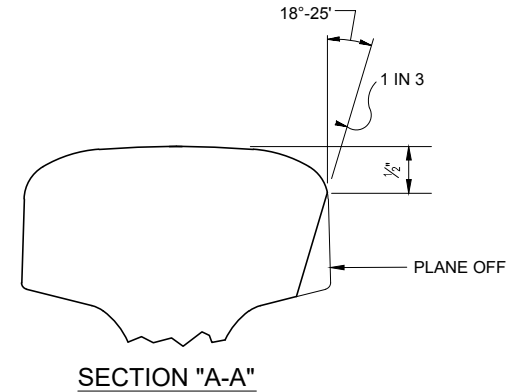


DETAIL "B"

NOTES:

1. INFORMATION OR DIMENSIONS SHOWN THUS "E" TO BE FURNISHED BY FIELD FORCES FOR CORRECT ORDERING OF REPLACEMENT STOCK RAILS.
2. "E" □ SWITCH POINT LENGTH
3. CROSS OUT ONE - FOR JOINTED RAIL TURNOUT.
4. UNDERCUT STOCK RAILS TO BE MADE OF HIGH STRENGTH RAIL WITH ENDS BEVELED PER CURRENT A.R.E.M.A. PLAN NO. 1005.
5. FOR STOCK RAIL UNDERCUT LENGTH "B", PER SECTION "A-A", LENGTH "C" AND LENGTH "D" FOR NEW SAMSON SWITCH INSTALLATIONS OR REPLACEMENT ORDERS SEE TABLE BELOW.
6. BEND ANGLE IN BENT STOCK RAIL TO BE AS FOLLOWS: 0°-27.3167' OR 1" IN 10'-5 27/32'.
7. THE CURVED PORTION OF THE CURVED STOCK RAIL SHALL BE CURVED PER DETAIL "B".
8. FOR ROLLER BEARINGS: DRILL TWO HOLES, 1 5/16" DIA. 3/4" ABOVE BASE OF RAIL. PERMISSIBLE VARIATIONS: DIA. 0" UNDER, 3/32" OVER. LOCATION 3/32" OVER OR UNDER.

LENGTHS B, C, & D FOR 136 LB. RAIL									
Sw. Pt. LENGTH	T.O. NO.	STOCK RAIL	B	FOR FIRST (NEW) INSTALL.			FOR REPLACE. ORDERS ONLY		
				C	D	END DRILL SEE NO. 10	C	D	END DRILL SEE NO. 10
39'-0"	20	STR.	23'-6"	10'-0"	67'-0"	NONE	10'-0"	70'-0"	NONE
39'-0"	20	CURVED	23'-6"	12'-0"	67'-0"	NONE	12'-0"	70'-0"	NONE



SECTION "A-A"

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REVISIONS				DRAWN RAILPROS	
				CHECKED B. SMITH	
				RECOMMENDED W. PREY	
				DATE 2/2/15	
REV.	DATE	DESCRIPTION	DES.	ENG.	DESIGNER PE STAMP

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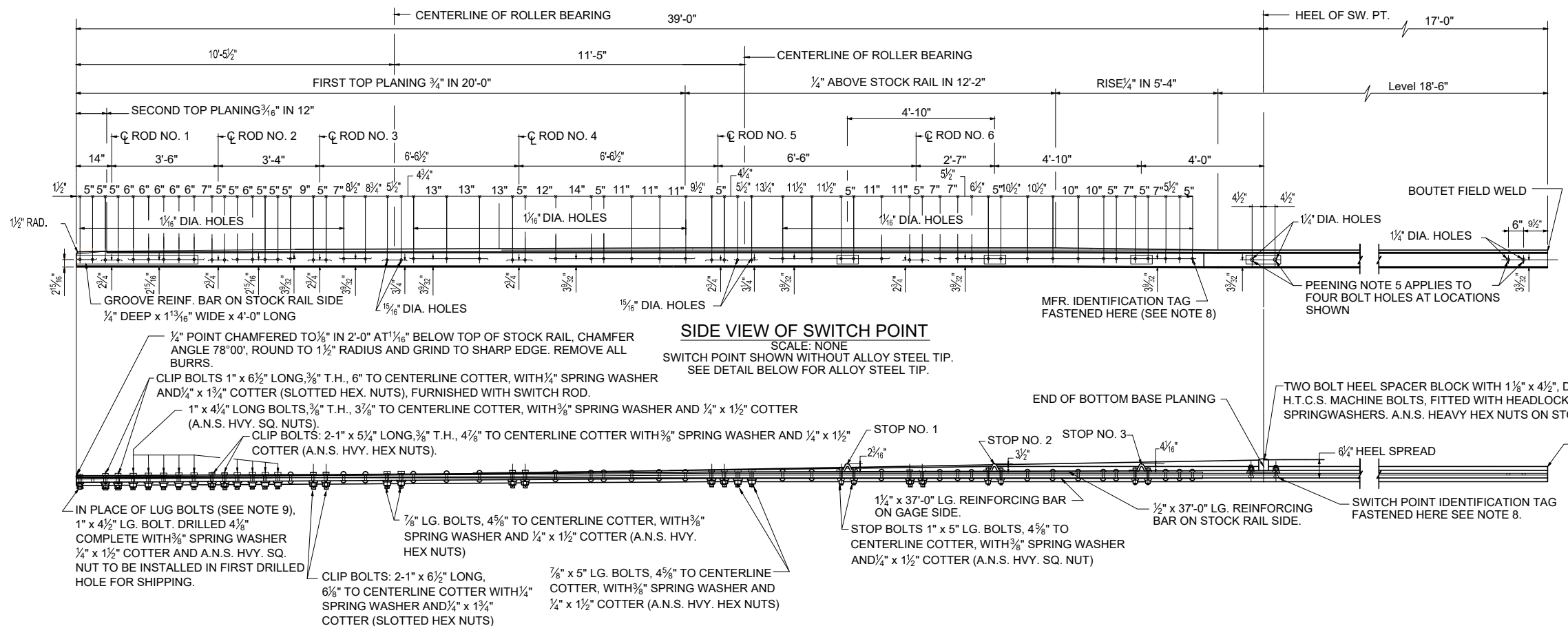
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ENGINEERING STANDARD DRAWINGS

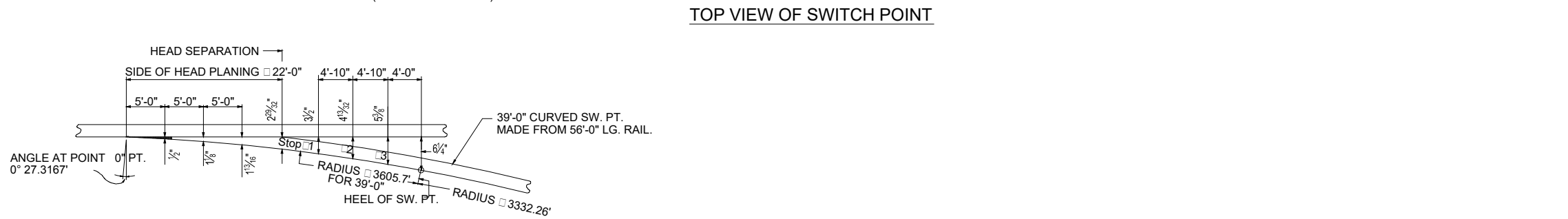
NO. 20 STANDARD TURNOUT -
 STRAIGHT OR CURVED UNDERCUT
 STOCK RAILS FOR 39'-0" SWITCH POINT

DRAWING NO.	ESD-2941-11
DRAWING SHEET NO.	11 OF 14
SCALE:	NONE
CONTRACT SHEET NO.	



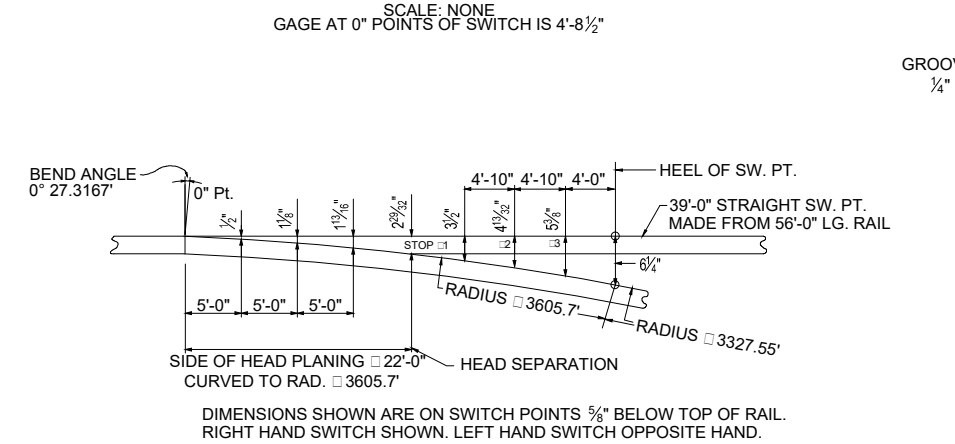
SIDE VIEW OF SWITCH POINT

SCALE: NONE
SWITCH POINT SHOWN WITHOUT ALLOY STEEL TIP.
SEE DETAIL BELOW FOR ALLOY STEEL TIP.

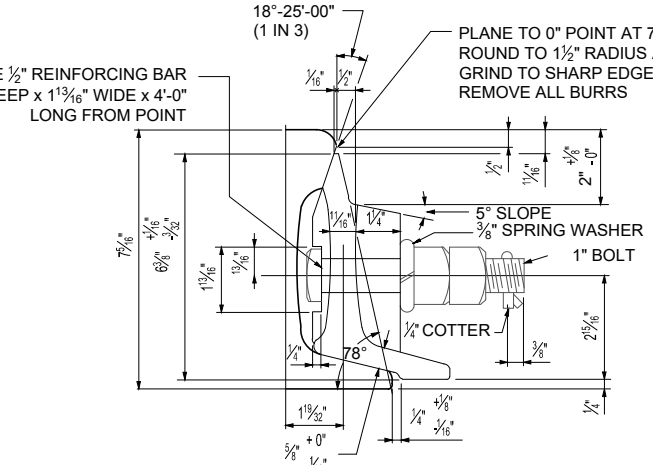
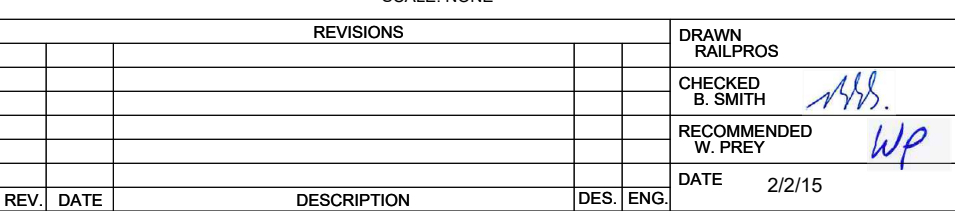


TOP VIEW OF SWITCH POINT

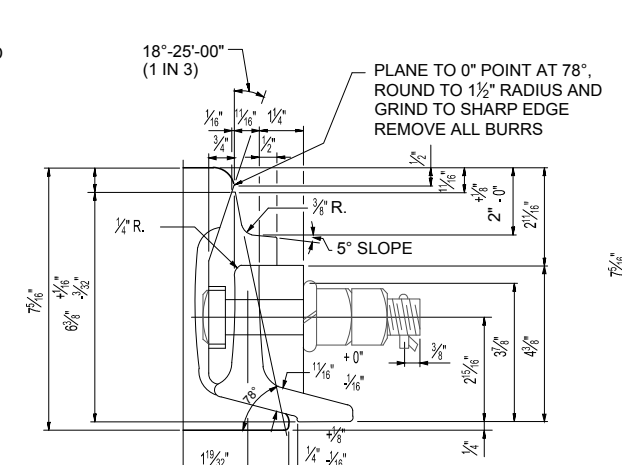
CURVED SWITCH POINT MAY BE EQUIPPED WITH MANGANESE OR ALLOY STEEL TIP



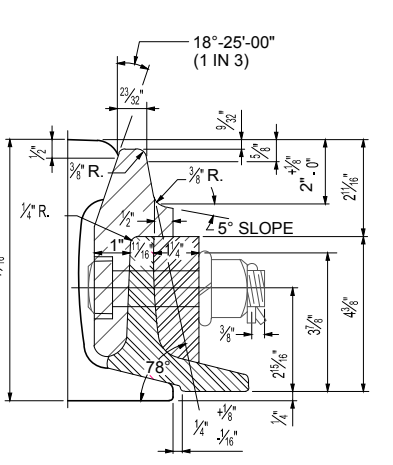
STRAIGHT SWITCH POINT WITHOUT MANGANESE OR ALLOY STEEL TIP



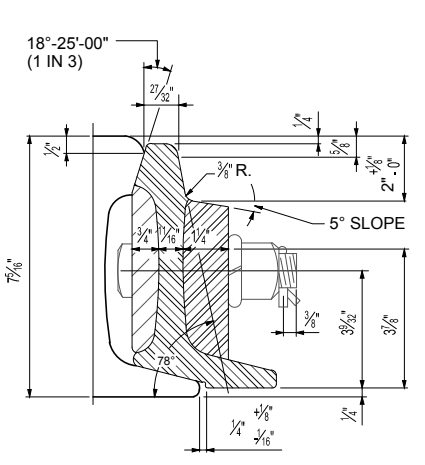
END VIEW AT POINT
SCALE: NONE
(WITHOUT MANG. OR ALLOY STEEL TIP)



END VIEW AT 'A-A'
SCALE: NONE



SECTION 'B-B'
SCALE: NONE



SECTION 'C-C'
SCALE: NONE

NOTES:

- SWITCH POINTS TO BE MADE FROM HIGH STRENGTH RAIL.
- CURVED LEFT HAND SWITCH POINT AND STRAIGHT HAND SWITCH POINT FOR RIGHT HAND TURNOUT SHOWN. MAKE OPPOSITE HAND FOR RIGHT AND LEFT HAND SWITCH POINTS FOR LEFT HAND TURNOUT.
- SIDE PLANING FIGURED ON GAGE LINE 5/8" BELOW TOP OF RAIL.
- MATERIALS AND WORKMANSHIP, ALSO ANY CONSTRUCTION DETAILS NOT SHOWN, SHALL BE PER CURRENT A.R.E.M.A. "MANUAL AND PORTFOLIO", UNLESS OTHERWISE SPECIFIED ON THIS PLAN.
- IN ORDER TO ELIMINATE STRESS RAISERS, MANUFACTURER SHALL PEEN THE EDGES OF THE BOLT HOLES AS INDICATED AT THE HEEL OF SWITCH POINT AND AT THE HEEL END OF THE SWITCH POINT RAIL, USING AIR HAMMER WITH SUITABLE HEAD AND FINISHING WITH DRIFT PIN. BRAND ON RAIL AT EDGE OF BOLT HOLE TO BE CAREFULLY REMOVED BY GRINDING BEFORE PEENING.
- THE TURNOUT SWITCH POINT (LEFT HAND POINT FOR RIGHT HAND TURNOUT) MAY BE FURNISHED WITH ALLOY STEEL TIP. THE MAIN LINE SWITCH POINT (RIGHT HAND POINT FOR RIGHT HAND TURNOUT) TO BE FURNISHED WITHOUT ALLOY STEEL TIP.
- THE CONTOUR PLANING SHALL BE ON THE GAGE SIDE BEGINNING AT A DISTANCE OF 7'-6" FROM THE POINT OF SWITCH AND SHALL BE SHAPED TO THE CONTOUR OF A NEW 136 LB. RAIL AND SHALL RUN OUT AT THE END OF TOP PLANING, WHERE THE HEAD HAS FULL HEAD CONTOUR.
- METAL IDENTIFICATION TAG SHOWING (1) DESIGN LENGTH OF SWITCH (2) IN PARENTHESIS, THE ACTUAL LENGTH OF SWITCH POINT RAIL AND (3) THE TURNOUT NUMBER. MARK TAG THUS: 39'-0" (56'-0") NO. 20. TAG TO BE FASTENED TO SWITCH POINT, ON GAGE SIDE OF RAIL AT HEEL SPACER BLOCK IN LOCATION SHOWN. A SECOND METAL IDENTIFICATION TAG SHOWING HAND OF SWITCH POINT, WEIGHT OF RAIL, HS, MANUFACTURER AND WHEN MADE, TO BE FASTENED TO SWITCH POINT AT LOCATION SHOWN.
- UNLESS SPECIFIED ON ORDER, FRONT ROD LUG BOLTS AND TRANSIT CLIPS FOR SWITCH RODS NO. 1, 2, 3, 4, 5 AND 6 COMPLETE WITH BOLTS WILL NOT BE FURNISHED WITH SWITCH POINTS.
- AT HEEL END OF SWITCH POINT RAIL, BREAK SHARP CORNER AROUND THE ENTIRE PERIPHERY BY SLIGHTLY GRINDING. ALSO, "DO NOT" END HARDEN RAIL END.

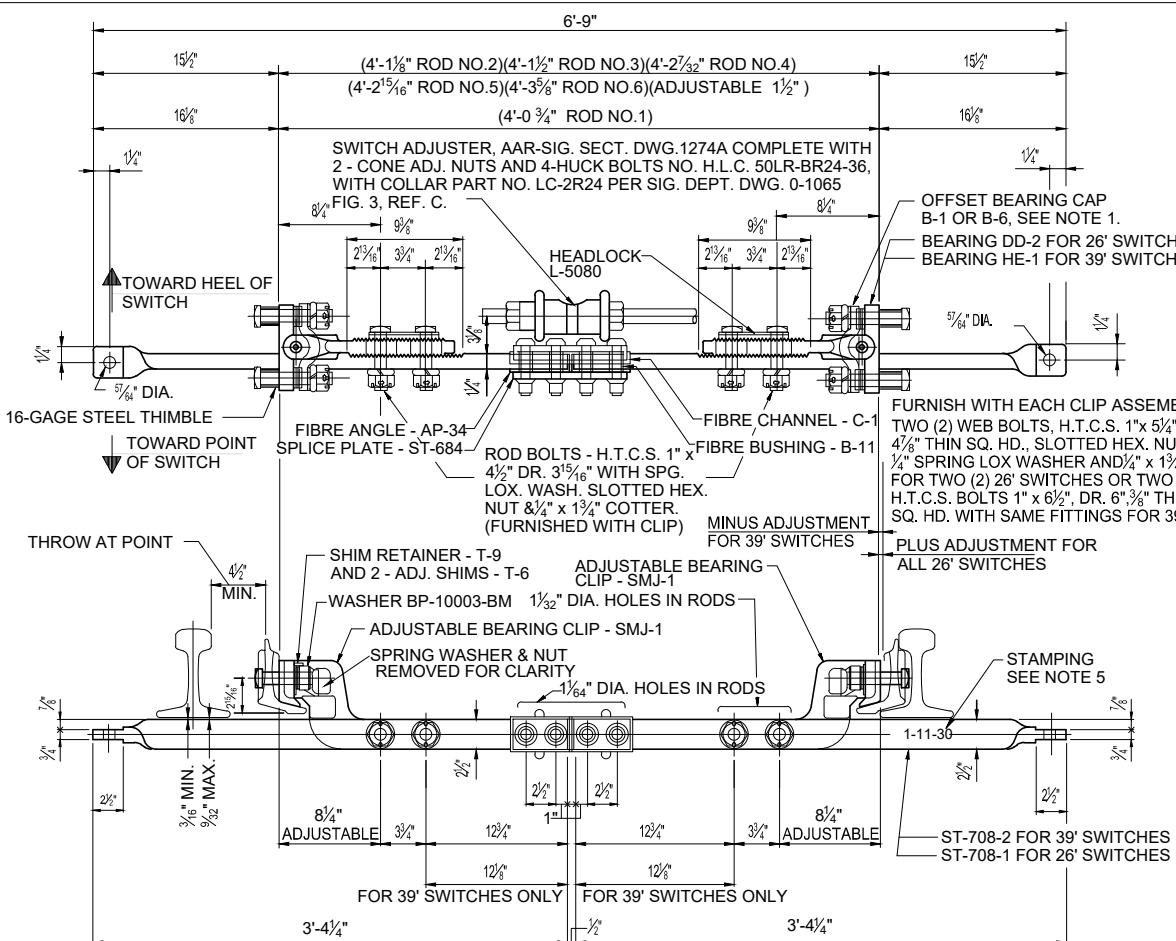
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REV.	DATE	DESCRIPTION	DES.	ENG.

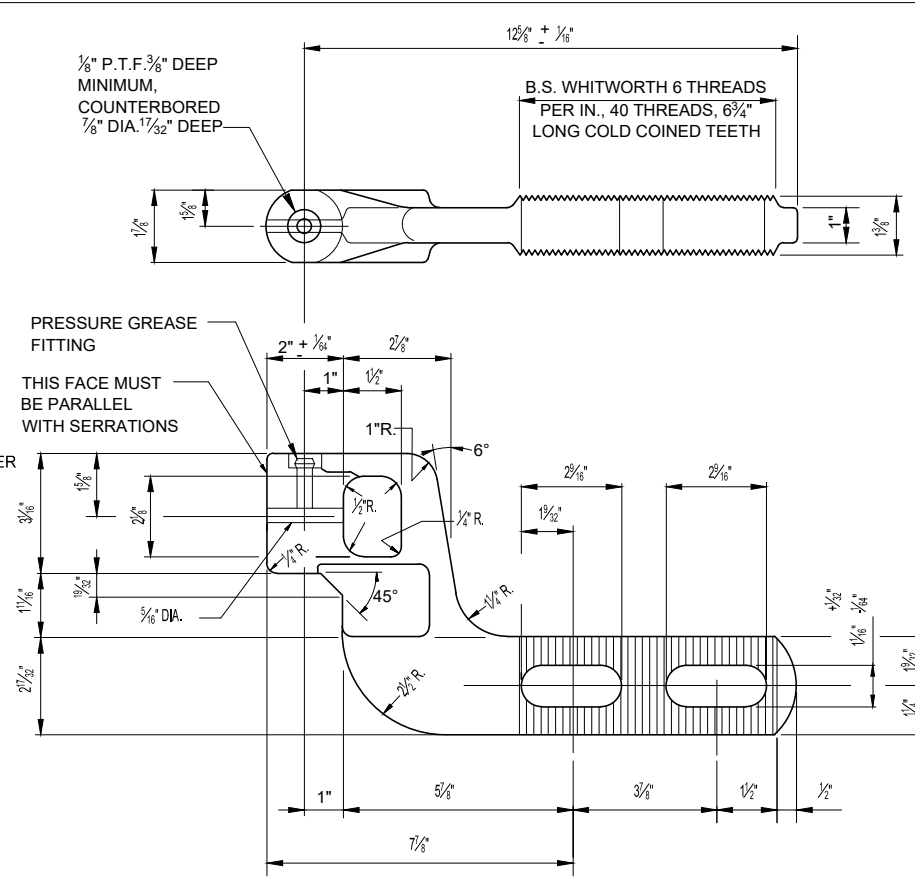
REVISIONS	DRAWN RAILPROS
	CHECKED B. SMITH
	RECOMMENDED W. PREY
	DATE 2/2/15
DESIGNER PE STAMP	



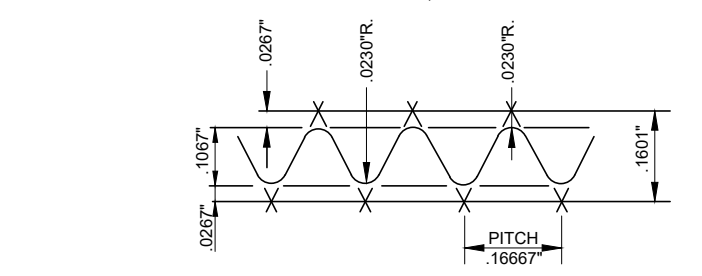
ENGINEERING STANDARD DRAWINGS	DRAWING NO. ESD-2941-12
NO. 20 STANDARD TURNOUT - 39'-0" SPLIT SWITCH POINT	DRAWING SHEET NO. 12 OF 14
	SCALE: NONE
	CONTRACT SHEET NO.



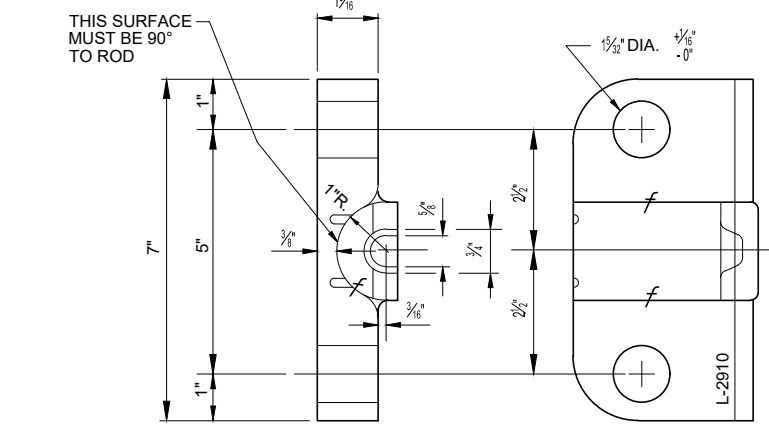
NO. 1 SWITCH ROD ASSEMBLY
(SHOWN FOR MACHINE ON RIGHT) SEE NOTE 2



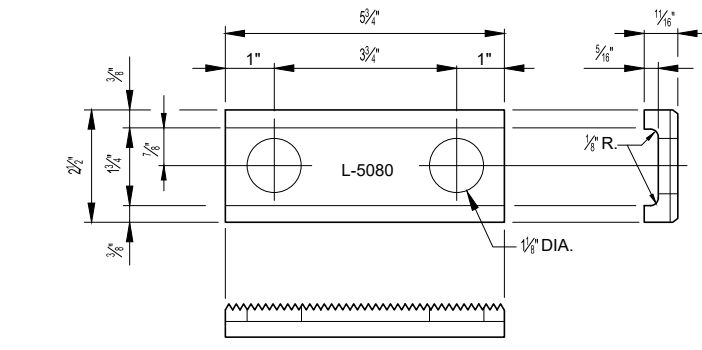
ADJUSTABLE BEARING CLIP - SMJ - 1
SCALE: NONE



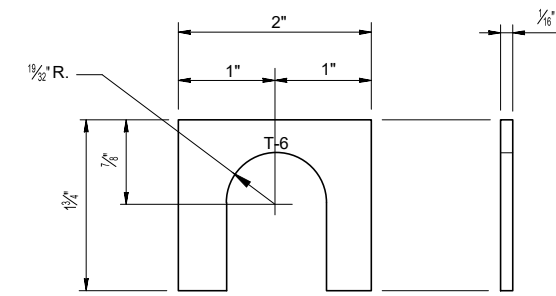
ENLARGED PROFILE OF SERRATIONS
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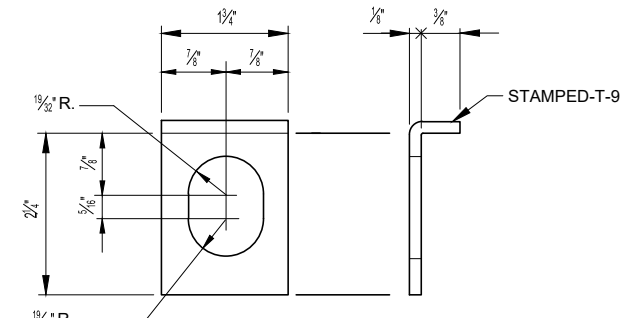
BEARING - DD - 2
SCALE: NONE



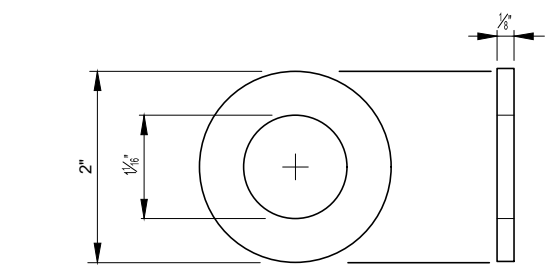
HEADLOCK L-5080
SCALE: NONE



ADJUSTABLE SHIM - T - 6
SCALE: NONE



SHIM RETAINER - T - 9
SCALE: NONE



WASHER - BP - 10003 - BM
SCALE: NONE

LENGTH OF SWITCH	BILL OF MATERIAL FOR 1 TYPE "SMJ" SWITCH ROD ASSEMBLY				
	QTY.	PART NUMBER	MATERIAL SPECIF.	DESCRIPTION	DETAIL REMARKS
ALL	2	SMJ-1	S.A.E.1020-FOR.STL.	BEARING CLIP	MACHINED PER DETAIL
ALL	4		H.T.C.S.	WEB BOLT	SEE NOTE
26'	2	DD-2	MALLEABLE IRON	BEARING	PAT. NO. L-2910, MACHINED PER DETAIL
39'	2	HE-1	MALLEABLE IRON	BEARING	PAT. NO. L-2915, MACHINED PER DETAIL
26'	2	B-1	S.A.E.1045-FOR.STL.	OFFSET BEARING CAP	HEAT TREATED - BRINELL -.225 TO .250
39'	2	B-6	S.A.E.1045-FOR.STL.	OFFSET BEARING CAP	HEAT TREATED - BRINELL -.225 TO .250
26'	2	B-6	S.A.E.1045-FOR.STL.	OFFSET BEARING CAP	HEAT TREATED - BRINELL -.225 TO .250
ALL	4	T-9	S.A.E.1020	SHIM RETAINER	1/8" x 1 1/4" x 2 1/4"
ALL	12	T-6	STAINLESS STEEL	ADJUSTMENT SHIM	1/16" x 2" x 1 1/2"
ALL	4	BP-10003-BM	MALLEABLE IRON	WASHER	1 1/16" I.D. x 2" O.D. x 1/16" THICK
ALL	4		H.T.C.S.	ROD BOLT	1" x 4 1/2" DR. 3 1/16" REG. SQ. HD.
ALL	4		STEEL	SPG. LOX WASHER	FOR 1" ROD BOLTS
ALL	4		STEEL	COTTER	1/4" x 1 1/4" FOR ROD BOLTS
ALL	2		STEEL	GREASE FITTING	PRESSURE FOR BEARING CLIP
ALL	2	L-5080	MALLEABLE IRON	HEADLOCK	FOR ROD BOLTS
26'	2		16-GAGE STEEL	THIMBLE	1 1/2" LONG - FOR SHIPPING
39'	2		16-GAGE STEEL	THIMBLE	2 1/2" LONG - FOR SHIPPING
MATERIAL FOR VERTICAL ROD					
16'-6"	1			VERTICAL ROD	USE ONE-ST-708-1
					USE ONE-ST-708-1
					TWIST, MACHINE AND DRILL END HOLE
39'	1			VERTICAL ROD	USE ONE-ST-708-2
					TWIST, MACHINE AND DRILL END HOLE
ALL	4		HIGH STRENGTH STEEL	CONN. & INSUL. BOLT	HIGH FASTENER NO. HLC-50LR- BR24-36
ALL	4		LOW CARBON STEEL	COLLAR	HUCK FASTENER NO. LC-2R24
ALL	1	ST-684	H.R. MILD STEEL	SPLICE PLATE	1/2" x 2 1/2" x 9 1/2" FOR INSULATION
ALL	2	AP-34	AAR-SIG.SEC.13-52	ANGLE	1/2" x 2 1/2" x 4 1/2" HARD FIBRE - PARAFIN COATED
ALL	4	B-11	AAR-SIG.SEC.13-52	BUSHING	1" O.D. HARD FIBRE - PARAFIN COATED
ALL	1	C-1	AAR-SIG.SEC.13-52	CHANNEL	1/2" x 1" x 10" HARD FIBRE - PARAFIN COATED
ALL	1		MALLEABLE IRON	SWITCH ADJUSTER	
ALL	2		MALLEABLE IRON	CONE ADJ. NUT	FOR 1 1/4" THROW RODS

NOTES:

- WHILE THIS PLAN SHOWS BEARING CLIPS ASSEMBLED TO SWITCH ROD THIS CLIP ASSEMBLY MAY BE REQUISITIONED AND ORDERED SEPARATELY. WHEN A BEARING CLIP ASSEMBLY ONLY IS WANTED, REQUISITIONS AND ORDERS SHALL SPECIFY, RAIL SECTION AND LENGTH OF SWITCH. ALL PARTS SHOWN IN BILL OF MATERIAL SHALL BE FURNISHED WITH THESE CLIP ASSEMBLIES. WHEN AN INDIVIDUAL PART IS REQUIRED IT SHALL BE ORDERED BY PART NUMBER.
- WHEN COMPLETED RODS ARE ORDERED THEY SHALL BE ASSEMBLED AND INCLUDE ALL PARTS SHOWN IN BILL OF MATERIAL. REQUISITIONS AND ORDERS SHALL SPECIFY RAIL SECTION AND LENGTH OF SWITCH. ON INTERLOCKED SWITCHES WITH AUXILIARY THROW ROD, MACHINE SIDE (RIGHT OR LEFT) SHOULD ALSO BE SPECIFIED.

NOTES CONTINUED ON SHEET 14

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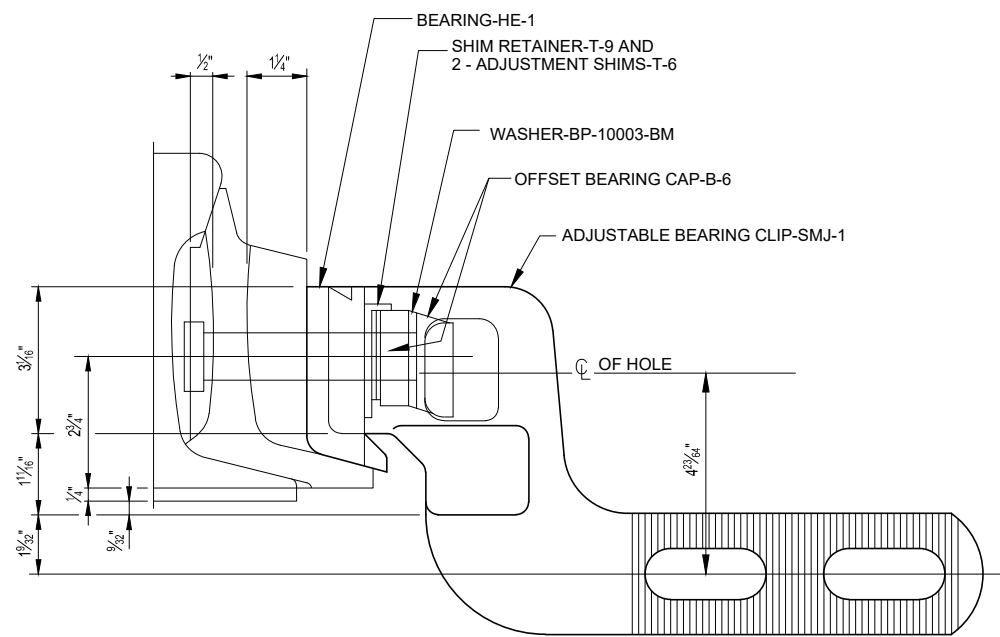
REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN RAILPROS
CHECKED B. SMITH
RECOMMENDED W. PREY
DATE 2/2/15
DESIGNER PE STAMP

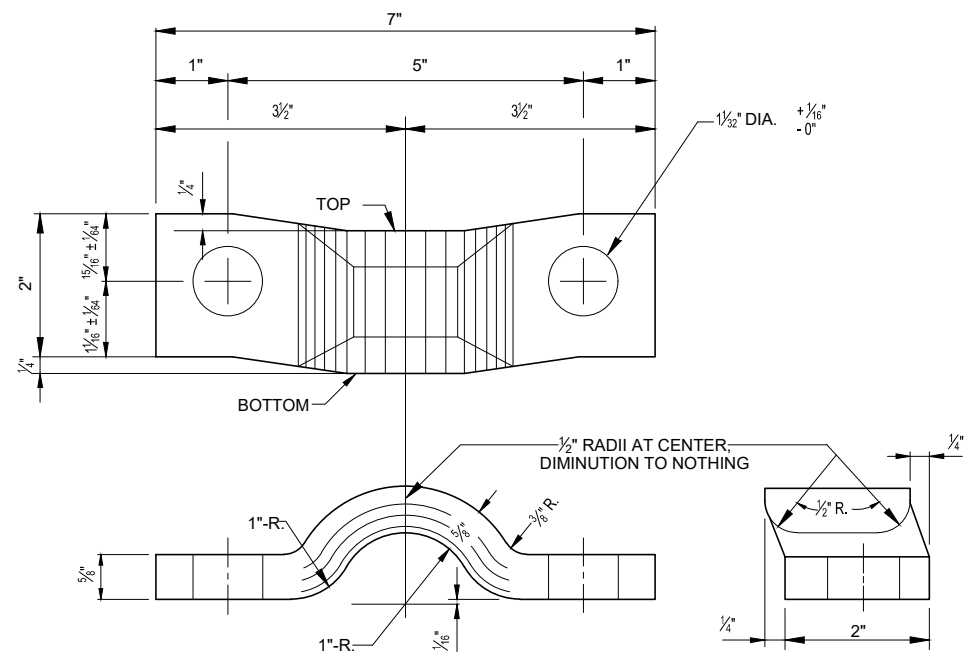
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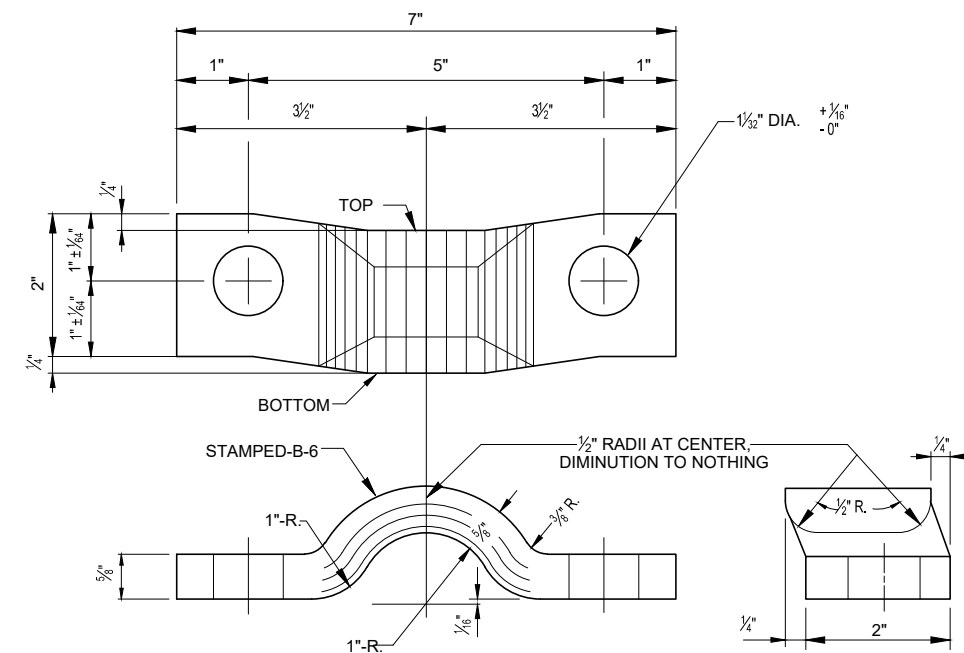
ENGINEERING STANDARD DRAWINGS
DRAWING NO. ESD-2941-13
DRAWING SHEET NO. 13 OF 14
SCALE: NONE
CONTRACT SHEET NO.
NO. 20 STANDARD TURNOUT - SWITCH RODS AND MISC. DETAILS (1 OF 2)



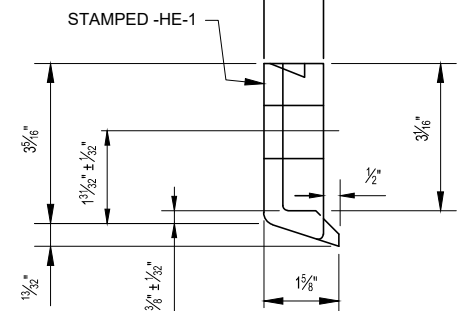
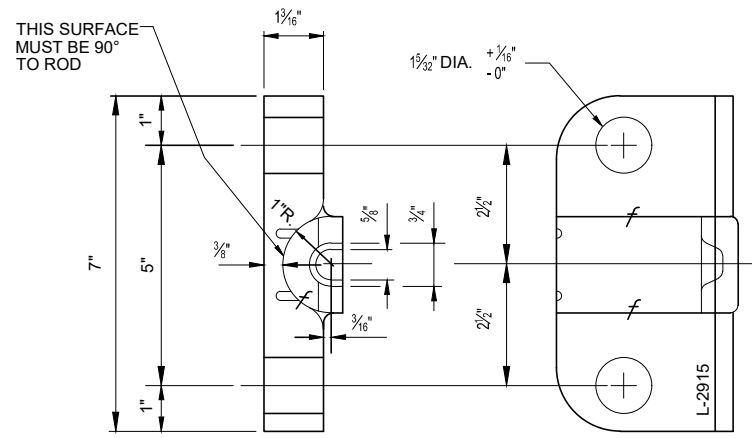
ELEVATION OF "SMJ"CLIP ASSEMBLY FOR 39' SWITCHES
(DRAWN FOR 136 LB. RAIL) SPRING WASHER AND NUT REMOVED



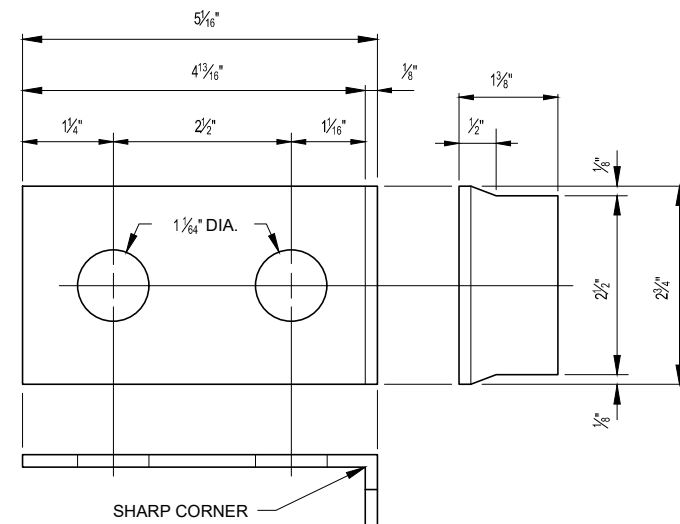
OFFSET BEARING CAP-B-1
SCALE: NONE



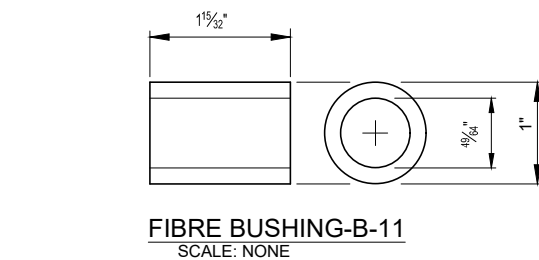
OFFSET BEARING CAP-B-6
SCALE: NONE



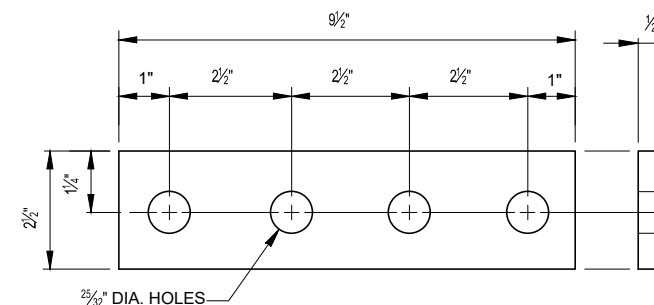
BEARING-HE-1
SCALE: NONE



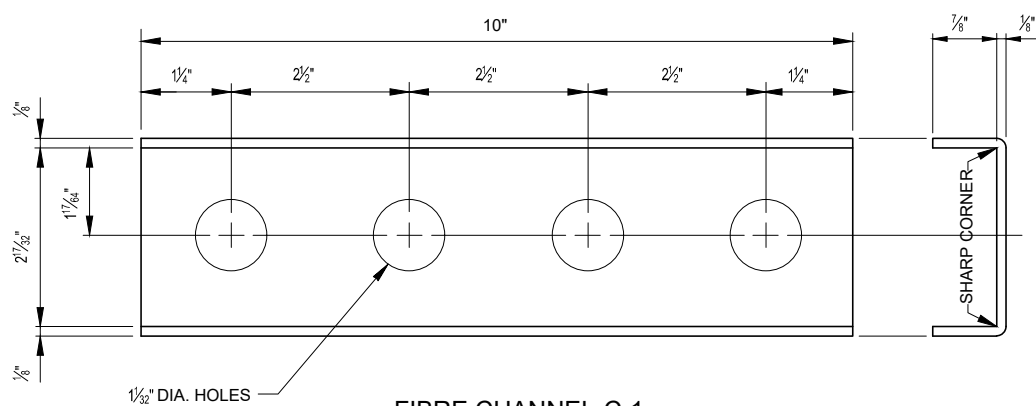
FIBRE ANGLE-AP-34
SCALE: NONE



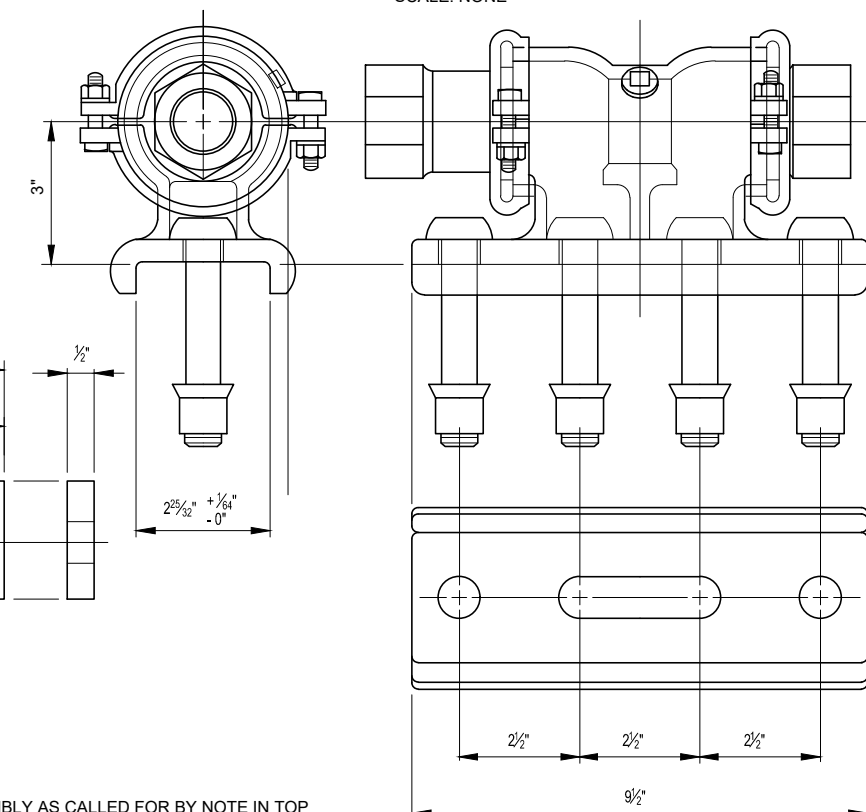
FIBRE BUSHING-B-11
SCALE: NONE



SPLICE PLATE-ST-684
SCALE: NONE



FIBRE CHANNEL-C-1
SCALE: NONE



SWITCH ADJUSTER
SCALE: NONE

NOTES: (CONTINUED FROM SHEET 13)

- TWO WEB BOLTS SHALL BE FURNISHED WITH EACH CLIP ASSEMBLY AS CALLED FOR BY NOTE IN TOP VIEW OF ROD ASSEMBLY. WHEN ROD IS USED ON 11'-0" AND 16'-6" SWITCHES THE 1/4" THICK SPRING WASHER SHOULD BE REPLACED WITH A 3/8" THICK SPRING WASHER BY THE STOREKEEPER OR FIELD FORCES, TO BRING COTTER WITHIN THE LIMITS OF SLOT IN WEB BOLT NUTS.
- MATERIALS AND WORKMANSHIP SHALL MEET CURRENT A.R.E.M.A. SPECIFICATIONS FOR SPECIAL TRACKWORK UNLESS OTHERWISE SPECIFIED.
- VERTICAL SWITCH ROD SHALL BE PLAINLY STAMPED TO INDICATE SWITCH THAT ROD ASSEMBLY CAN BE USED UPON. IDENTIFICATION MARKING WILL BE AS FOLLOWS:
1-39 FOR USE ON 39'-0" SWITCHES, 132-LB. AND 136-LB. RE RAIL SECTIONS. 1-11-30 FOR USE ON 11'-0" TO 30'-0" SWITCHES, 115-LB., 119-LB., 131-LB., 132-LB., 136-LB. R.E. RAIL SECTIONS.

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REV.	DATE	DESCRIPTION	DES.	ENG.

REVISIONS	DRAWN RAILPROS
CHECKED B. SMITH	
RECOMMENDED W. PREY	
DATE 2/2/15	
DESIGNER PE STAMP	

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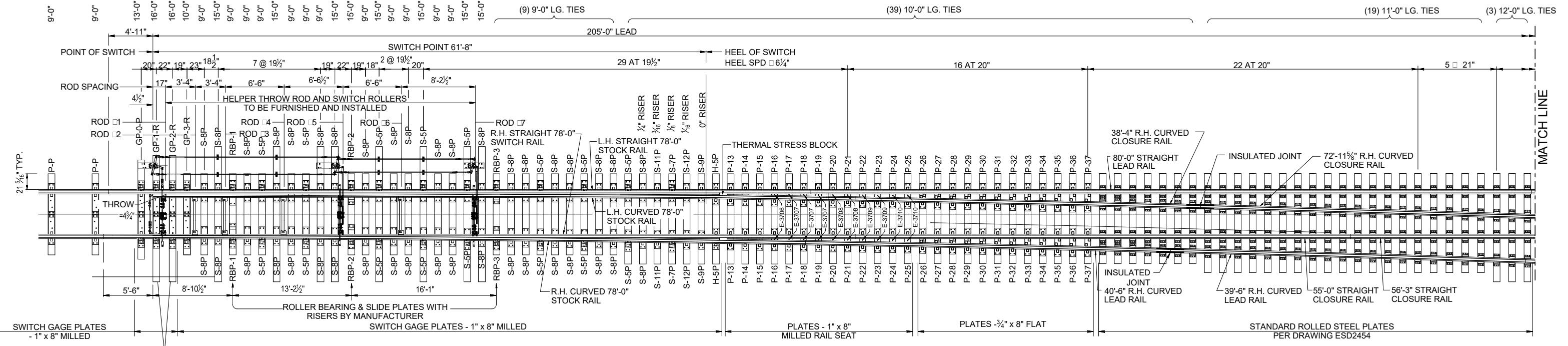
ENGINEERING STANDARD DRAWINGS
 NO. 20 STANDARD TURNOUT - SWITCH RODS AND MISC. DETAILS
 (2 OF 2)

DRAWING NO. ESD-2941-14
DRAWING SHEET NO. 14 OF 14
SCALE: NONE
CONTRACT SHEET NO.

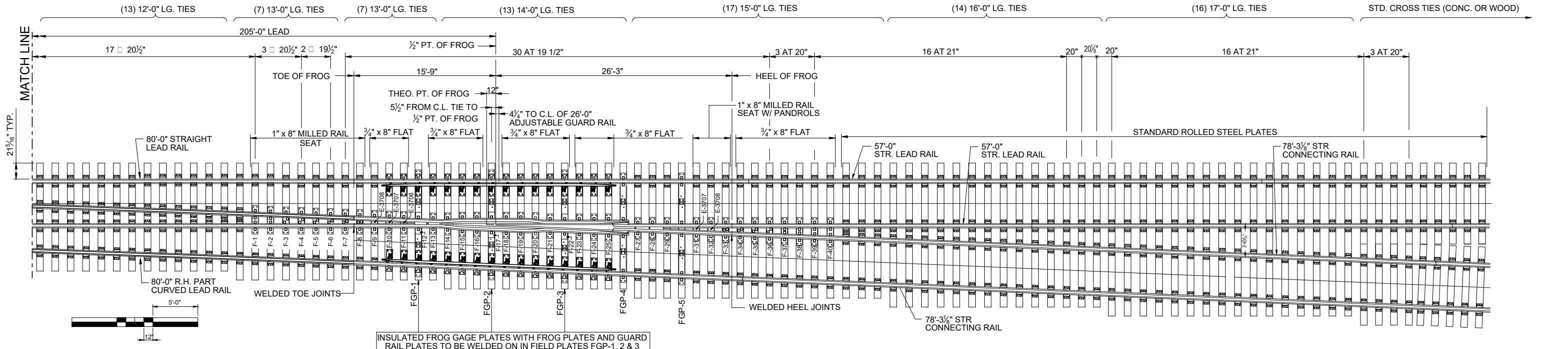
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NOTE:

1. SEE SHEET 1 FOR NOTES, BILL OF MATERIAL AND TURNOUT DATA.
2. SEE SHEET 4 FOR CROSSOVER AND CROSSOVER DATA.
3. IF CONCRETE TIES ARE INSTALLED AHEAD OF SWITCH POINT, HEAD BLOCK TIE GAGE PLATE PP WILL NOT BE INSTALLED
4. ALL 15'-0" SWITCH TIES TO BE CENTERED ON THRU-RUN GAGE
5. SEE ESD-8625 OR ESD-8630 FOR SWITCH MACHINE LAYOUT.



24 RIGHT HAND TURN OUT



24 RIGHT HAND TURN OUT (CONT.)
(LEFT HAND TURNOUT OPPOSITE HAND)

GRAPHIC SCALE

REV.	DATE	DESCRIPTION	DES.	ENG.

REVISIONS	DRAWN RAILPROS
CHECKED B. SMITH	RECOMMENDED B. SCHMITH
DATE 5/12/16	DESIGNER PE STAMP

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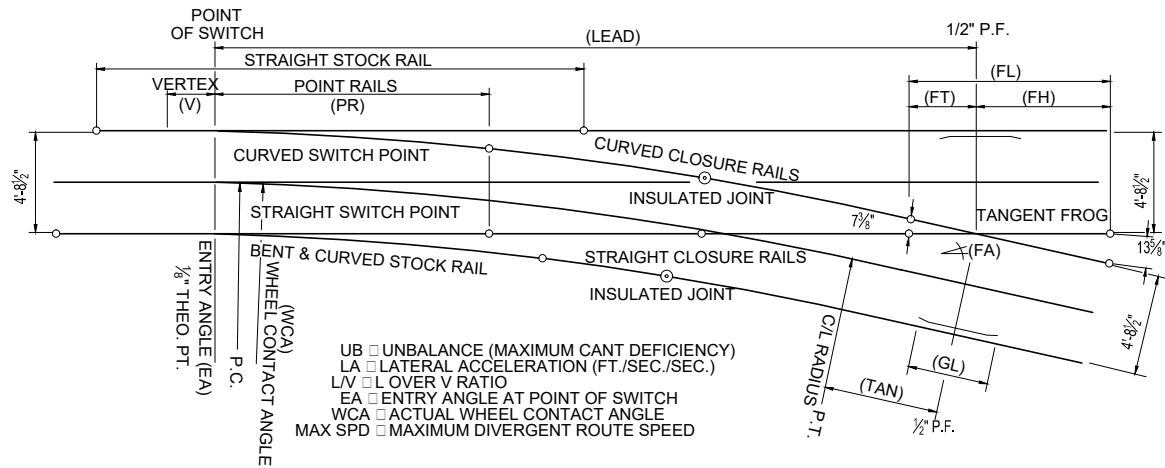
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ENGINEERING STANDARD DRAWINGS

NO. 24 TANGENTIAL TURNOUT - LAYOUT

DRAWING NO. ESD-2951-02
DRAWING SHEET NO. 2 OF 15
SCALE: NONE
CONTRACT SHEET NO.



DIST. FROM P.S.	GAGE LINE OFFSET
75'-0"	8 ¹ / ₈ "
100'-0"	14 ²⁹ / ₃₂ "
125'-0"	22 ⁷ / ₃₂ "
150'-0"	2 ⁷ / ₈ "
175'-0"	3 ⁶ / ₃₂ "

T.O. (MPH)	MAX SPD	FA	UB	LA	L/V	C/L RADIUS	V	EA	WCA	LEAD	PR	LIMITS	FT	FH	FL	TAN	GL
24 (60)	69.29	2°-23'-13"	4"	1.60830	0.0672	4815.0000'	4'-5 ²³ / ₃₂ "	00°-08'-00"	00°-09'-39"	205'-0"	78'-0"	553'-0"	15'-9"	26'-3"	42'-0"	13'-7 ³ / ₄ "	26'-0"

NO. 24 TANGENTIAL TURNOUT GEOMETRY

SCALE: NONE

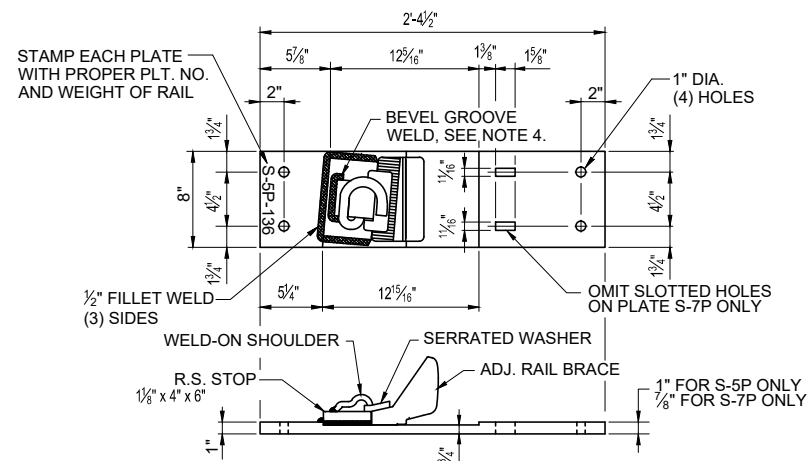
SPECIFICATIONS:

- TURNOUT & FROG ANGLE : STD. No.24 - 2°-23'-13"
- RAIL: 136RE HEAD HARDENED
- FLANGWAYS: 1 7/8" WIDE x 1 7/8" DEEP (MIN. DEPTH)
- RAIL ENDS SHALL BE UN-DRILLED. CROP IN FIELD.
- EXCEPT INSULATED JOINTS: 3 1/2" x 6" x 6" - 1 1/8" DIA. - 3 3/32" A.B.
- JOINT GAPS: 0" STD. - 3/16" INSUL.
- SWITCH POINTS: 61'-8" LONG TANGENTIAL ALIGNMENT (78'-0" LONG RAIL), POINT DETAIL PER A.R.E.M.A. 5100
- STOCK RAILS: 78'-0" SAMSON UNDERCUT
- SWITCH RODS: VERTICAL TYPE WITH "SMJ" CLIPS - 1 1/4" x 2 1/2"
- SWITCH PLATES: INSUL. GAGE PLATES - 1" x 8" MILLED WITH BOLTLESS ADJUSTABLE BRACE
- SLIDE PLATES - 1" x 8" MILLED WITH PANDROL CLIPS
- BRACE PLATES - 1" x 8" MILLED WITH BOLTLESS ADJUSTABLE BRACE
- ROLLER ASSY. PLATES - 1" x 8" MILLED WITH PANDROL CLIPS & ROLLER ASSY.
- TURNOUT PLATES P-5 & P-13 TO P-25 - 1" x 8" FLAT WITH PANDROL CLIPS & PLATE CLIPS (WHERE SHOWN)
- TURNOUT PLATES P-26 TO P-37 - 3/4" x 8" FLAT WITH PANDROL CLIPS
- GUARD RAILS: H.T. UIC-33 (U-69) - 26'-0" LONG ADJUSTABLE GUARD RAIL - 1/2" RAISED
- GUARD RAIL PLATES: 3/4" x 8" FLAT WITH PANDROL CLIPS & WELDED BRACKETS - PLT. "G"
- STANDARD TIE PLATES: PANDROL ROLLED SHOULDER
- FROG: NO. 24 RACOR RAILBOUND MANG. FROG - 42'-0" LG. - HI-INTEGRITY - MITERED HEEL - EXPLOSION HARDENED - FROG POINT WIDTH 27/32"
- FROG PLATES: TIE PLATES - 3/4" x 8" FLAT WITH PANDROL CLIPS
- INSUL GAGE PLATES - 1" x 8" FLAT WITH PANDROL CLIPS

NOTES:

- SEE COVER SHEET FOR NOTES AND BILL OF MATERIAL.
- SEE SHEET 2 FOR LAYOUT OF NO. 24 TURNOUT.
- SEE SHEET 4 FOR LAYOUT OF NO. 24 CROSSOVER.

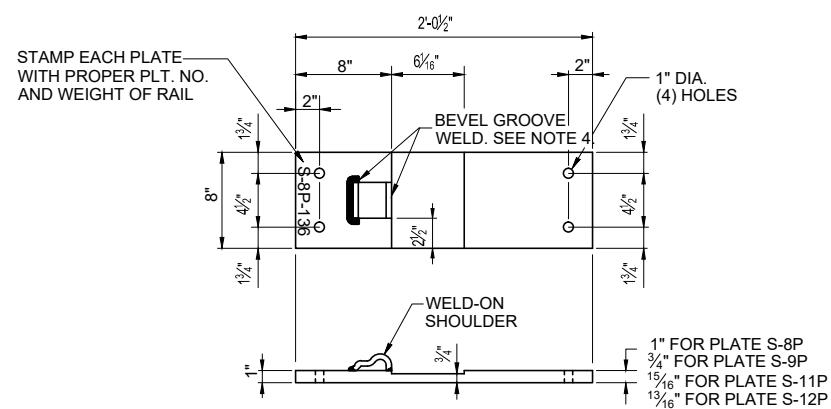
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SCALE: NONE

BRACE SLIDE PLATE - S-5P & S-7P

1" x 8" x 2'-4 1/2" LG. - MILLED - W/ADJ. RAIL BRACE
16 - S-5P PLATES REQUIRED AS SHOWN
2 - S-7P PLATES REQUIRED AS SHOWN



SCALE: NONE

SLIDE PLATE - S-8P, S-9P, S-11P & S-12P

1" x 8" x 2'-0 1/2" LG. - MILLED - W/PANDROL CLIP
40 - S-8P PLATES REQUIRED AS SHOWN
2 - S-9P PLATES REQUIRED AS SHOWN
2 - S-11P PLATES REQUIRED AS SHOWN
2 - S-12P PLATES REQUIRED AS SHOWN

NOTES:

- PLATES TO BE MADE OF MILD ROLLED STEEL.
- EACH PLATE TO BE PLAINLY STAMPED WITH PLATE NUMBER AND 136 (WEIGHT OF RAIL) AND HAND OF TURNOUT (R.H. OR L.H)
- THE WELD ON PRESSED SHOULDER, MADE OF MILD STEEL, AND MEETING "PANDROL'S" DESIGN SPECIFICATIONS SHALL BE USED.
- THE PRESSED STEEL SHOULDER MUST BE CAREFULLY WELDED TO ALL PLATES WITH A MINIMUM 2 PASS 3/8" + FILLET WELD ALONG THE BEVELED GROOVES OF THE SHOULDER. ANY WELD PROJECTING BEYOND THE VERTICAL FACE OF THE SHOULDER IN THE AREA OF THE RAIL SEAT MUST BE MACHINED OUT TO PROVIDE A CLEAR RAIL SEAT DIMENSION AS CALLED FOR.
- THE PLATES AS SHOWN ARE FOR A 136 LB. NO. 24 RIGHT HAND TURNOUT. FOR A LEFT HAND TURNOUT PLATES P-13 THRU P-37 INCLUSIVE AND FROG PLATE F-1 THRU F-36 ARE TO BE OPPOSITE.
- DIRECTION OF ARROW SHOWN IS AN EXAMPLE ONLY. USING SHEET 2 AS A GUIDE, PAINT MARK EACH PLATE WITH AN ARROW POINTING TOWARD SWITCH POINT.

WELDING SPECIFICATIONS:

- SET PRESSED STEEL SHOULDER FLUSH AGAINST LINE OF BASE OF RAIL OR SHOULDER OF MILLED PLATE AS SHOWN AND WELD WITH 2 - PASS 3/8" + WELD.
- STOP PLATE FOR ADJUSTABLE RAIL BRACE TO BE SET FLUSH WITH SHOULDER OF MILLED PLATE AS SHOWN AND WELD WITH 3 - PASS 1/2" + FILLET WELD.
- SHOULDERS AND STOPS ARE TO BE CAREFULLY WELDED TO PLATE. NO WELD SHALL PROJECT BEYOND THE VERTICAL EDGE OF THE UNWELDED FOURTH SIDE OF THE STOP PLATE OR VERTICAL FACE OF SHOULDER IN THE AREA OF THE RAIL SEAT. ANY WELD PROJECTING BEYOND THE FACE OF THE STOP OR SHOULDER MUST BE MACHINED OFF TO PROVIDE CLEAR DIMENSION CALLED FOR.
- FOR WELDING PRESSED STEEL SHOULDERS OR PLATE STOPS USE THE FOLLOWING:
A. ELECTRODE 1/8" 5/32 INCH, WELDING SPEC. 7018XLM.
B. ELECTRODE 3/16 INCH, WELDING SPEC. 7018XLM.
C. WIRE, WELDING 3/32 INCH, NR203, 1% NICKEL FLUX CORE.
OTHER WIRE OR ELECTRODES MEETING SPECIFICATIONS AS CALLED FOR, APPROVED BY THE ENGINEER, MAY BE USED.

REV.	DATE	DESCRIPTION	DES.	ENG.

REVISIONS	DRAWN RAILPROS
CHECKED B. SMITH	RECOMMENDED B. SCHMITH
DATE 11/20/15	DESIGNER PE STAMP

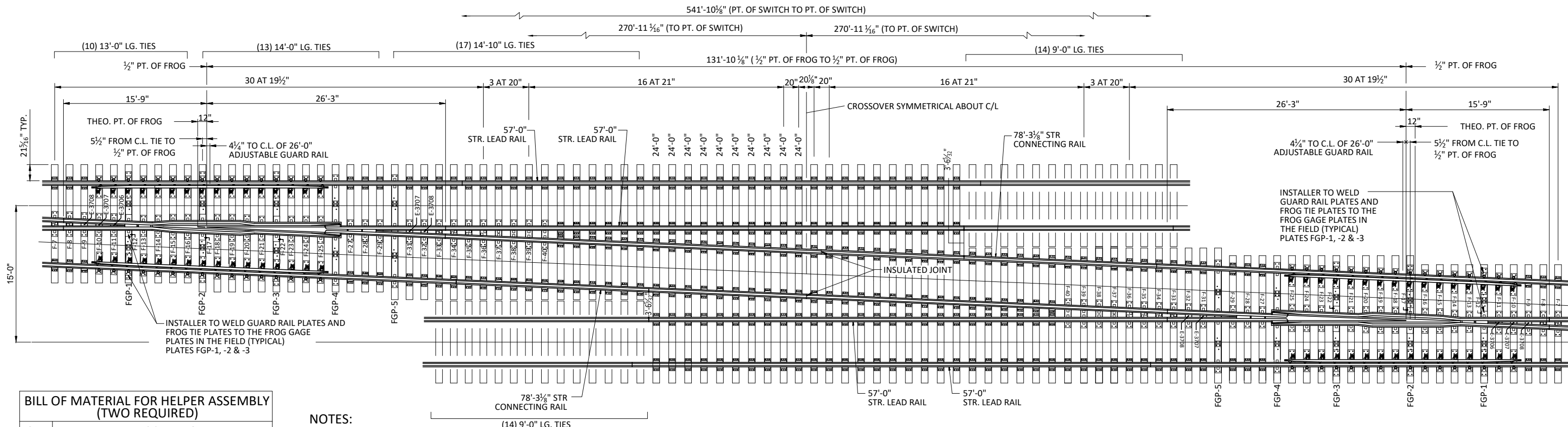
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ENGINEERING STANDARD DRAWINGS	DRAWING NO. ESD-2951-03
NO. 24 TANGENTIAL TURNOUT - TURNOUT DATA AND SWITCH PLATES	DRAWING SHEET NO. 3 OF 15
	SCALE: NONE
	CONTRACT SHEET NO.



BILL OF MATERIAL FOR HELPER ASSEMBLY (TWO REQUIRED)

QTY.	DESCRIPTION
11	COTTER PIN, 3/16" x 1 3/4 LG
4	PIPE COUPLER
1	JAW PIN
9	COTTER PIN, 3/16" x 1 1/2
6	BOLT, 3/4" - 10 X 3" LG, HVY HEX
8	PIN, PIPE CARRIER ROLLER
12	FLAT WASHER, 3/4", USS
12	LOCK WASHER, 3/4", HVY
6	NUT, 3/4" - 10, HEAVY SQUARE
12	NUT, 3/4" - 10, HEAVY HEX
6	RETAINER, BOLT
6	STUD, 3/8" X 14 W 3" 3/4- 10 THREAD BOTH ENDS
1	ROD OPERATING - No. 7 HELPER
1	ROD OPERATING - No. 5 HELPER
2	ASSY - SWITCH POINT ADJUSTER
8	ROLLER, PIPE CARRIER
8	STAND, PIPE CARRIER
8	3/4" x 5" LG LAG BOLT
16	1/2" x 4" LG LAG BOLT
8	RIVET, 3/4" x 1 1/2", ROUND, STEEL
4	CONE NUT, SWITCH POINT ADJUSTER
4	LOCK WASHER, 1 1/4" HEAVY
8	NUT, 1 1/4" - 7, HEAVY HEX, JAMB
2	PIPE - SCHEDULE 80 x 148 5/8" LG
2	PIPE - SCHEDULE 80 x 212 7/8" LG
1	CLEVIS
4	SCREW JAW ROD
4	SOLID JAW
11	JAW PIN
4	SCREW JAW, 1 3/4" - 7 x 6 1/2 LG
3	CRANK STAND PIN
1	ADJUSTABLE LINK
1	CRANK, 3 ARM, STAGE 3
1	CRANK, 3 ARM, STAGE 2
1	CRANK, 3 ARM, STAGE 1
3	CRANK STAND
1	CRANK PLATE, STAGE 3
1	CRANK PLATE, STAGE 2
1	CRANK PLATE, STAGE 1

NOTES:

- SEE SHEET 2 FOR NO. 24 TURNOUT.
- CROSSOVER FOR 15'-0" TRACK CENTERS IS SHOWN. FOR 16'-0" OR GREATER TRACK CENTERS, USE TWO TURNOUTS PER SHEET 1. FOR OTHER TRACK CENTER SPACING, MANUFACTURER TO FURNISH SHOP DRAWINGS DETAILING RAIL AND TIE LAYOUT AND DIMENSIONS THAT FOLLOW THESE EXAMPLES.
- CROSSOVER TO BE PRE-PLATED ON TIES. PREBORE TIES 5/8" X 5 1/2" DEEP. MANGANESE CASTINGS TO BE EXPLOSION HARDENED BRINELL 352 MINIMUM.

BILL OF MATERIAL FOR CROSSOVER

QTY.	DESCRIPTION
2 SETS	PORTEC "POLY" TRANSIT INSULATED JOINT KITS (PART #400205503)
3610 PCS.	SCREW SPIKES, 1 5/16" D. X 6" LONG
600 PCS.	ROLLED STEEL TIE PLATES
2 PAIR	61'-8" EXTENDED FIELD WELDED TYPE SWITCH POINTS (78'-0" RAIL)
4 EACH	THERMAL STRESS BLOCK ASSEMBLY
2 EACH	R.H. & L.H. SAMSON STOCK RAILS
2 EACH	No. 1, 5 & 7 SMJ TYPE SWITCH ROD
2 EACH	SWITCH RODS No. 2, 3, 4 & 6 SMJ TYPE
4 EACH	GAGE PLATE No. P-P
2 EACH	GAGE PLATE No. GP-0-P
2 EACH	GAGE PLATE No. GP-1-R OR GP-1-L
2 EACH	GAGE PLATE No. GP-2-R OR GP-2-L
2 EACH	GAGE PLATE No. GP-3-R OR GP-3-L
80 EACH	SLIDE PLATE S-8P
4 EACH	SLIDE PLATE S-9P
4 EACH	SLIDE PLATE S-11P
4 EACH	SLIDE PLATE S-12P
32 EACH	BRACE SLIDE PLATE S-5P
4 EACH	BRACE SLIDE PLATE S-7P
4 EACH	ROLLER BEARING BRACE PLATES RBP-1, RBP-2, & RBP-3
4 EACH	HEEL PLATE HP-5 & TURNOUT PLATES P-13 THRU P-37
6 EACH	EPOXY BONDED PREFABRICATED INSULATED JOINTS 20'-0"

No. 24 CROSSOVER

BILL OF MATERIAL FOR CROSSOVER

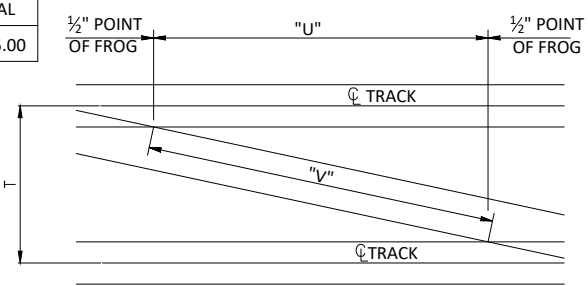
QTY.	DESCRIPTION
2 EACH	No.24 RAILBOUND MANGANESE FROG ~ 42'-0" LONG
2 EACH	FROG PLATES No. F-1 THRU F-40
2 EACH	FROG GAGE PLATES FGP-1 THRU FGP-5
4 EACH	26'-0" U-69 ADJUSTABLE GUARD RAIL W/ PLATES
2 EACH	L.H. & R.H. STRAIGHT STOCK RAILS - 78'-0"
2 EACH	L.H. & R.H. CURVED STOCK RAILS - 78'-0"
4 EACH	STRAIGHT LEAD RAILS - 80'-0"
2 EACH	R.H. CURVED LEAD RAILS - 39'-6" & 40'-6"
2 EACH	R.H. CURVED CLOSURE RAILS - 38'-4" & 72'-11 1/8"
2 EACH	STRAIGHT CLOSURE RAILS - 55'-0" & 56'-3"
2 EACH	R.H. PART CURVED RAIL - 80'-0"
4 EACH	STRAIGHT LEAD RAILS - 57'-0"
2 EACH	STRAIGHT CONNECTING RAILS - 78'-3 1/2"
12 PCS.	SWITCH POINT ROLLER ASSEMBLIES
2 EACH	D.I. RAIL HOLD DOWN CLIP - E-3706
5 EACH	D.I. RAIL HOLD DOWN CLIP - E-3707
4 EACH	D.I. RAIL HOLD DOWN CLIP - E-3708
2 EACH	D.I. RAIL HOLD DOWN CLIP - E-3709
2 EACH	D.I. RAIL HOLD DOWN CLIP - E-3710
64 PCS.	BOLTLESS ADJUSTABLE BRACE ASSEMBLIES
2100 PCS.	RAIL CLIP (GALVANIZED) (ESD-2362)
24 PCS.	"E"-CLIP (GALVANIZED) (ESD-2361)
16 PCS.	WELD-ON SHOULDER PR-2172-1 (USE ON FGP-4 & FGP-5)

BILL OF SWITCH TIES FOR CROSSOVER

PIECES	SIZE	LENGTH	BOARD FEET
74	7" x 9"	9'-0"	3591.00
80	7" x 9"	10'-0"	4410.00
38	7" x 9"	11'-0"	2194.50
32	7" x 9"	12'-0"	2016.00
36	7" x 9"	13'-0"	1911.00
26	7" x 9"	14'-0"	1911.00
4	10" x 9"	16'-0" DAP TIES	294.00
34	7" x 9"	14'-10"	2677.50
20	7" x 9"	24'-0"	2520.00
TOTAL			21525.00

CROSSOVER DATA

TRACK CENTERS "T"	DISTANCE BETWEEN 1/2 FROG POINTS	
	ON MAIN TRACK "U"	ON CROSSOVER "V"
14'-0"	107'-10 1/4"	108'-1 1/2"
15'-0"	131'-10 3/8"	132'-1 7/8"
16'-0"	155'-10"	156'-2"
17'-0"	179'-9 7/8"	150'-2 1/2"
EACH 1"	1.999'	2.001'



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REV.	DATE	DESCRIPTION	DES.	ENG.

REVISIONS	DRAWN RAILPROS
	CHECKED B. SMITH
	RECOMMENDED B. SCHMITH
	DATE 5/18/17
	DESIGNER PE STAMP

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ENGINEERING STANDARD DRAWINGS

NO.24 TANGENTIAL TURNOUT - CROSSOVER LAYOUT AND BILL OF MATERIALS

DRAWING NO.	ESD-2951-04
DRAWING SHEET NO.	4 OF 15
SCALE:	NONE
CONTRACT SHEET NO.	

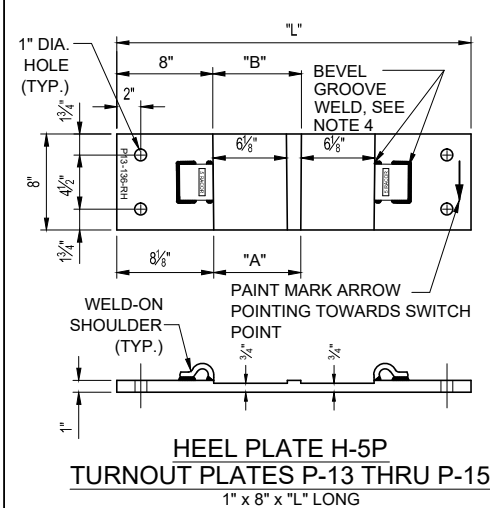


PLATE	"A"	"B"	"L"	QTY.
□H-5P	6 11/32"	6 15/32"	2'-5"	2
□P-13	6 5/8"	6 3/4"	2'-5"	2
□P-14	6 15/16"	7 1/16"	2'-5"	2
□P-15	7 1/4"	7 3/8"	2'-5 1/2"	2

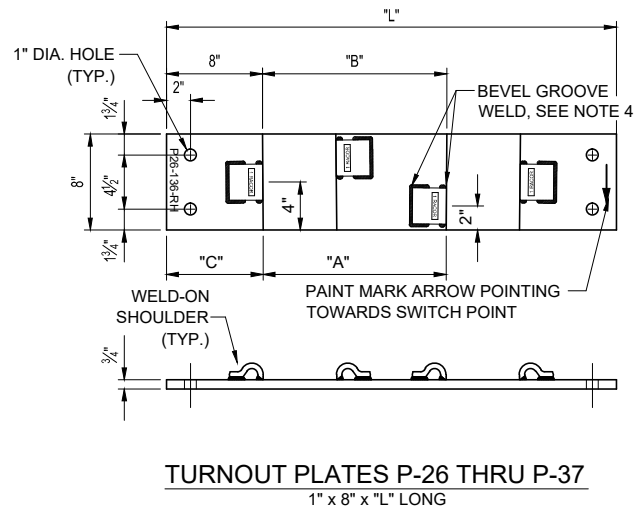


PLATE	"A"	"B"	"C"	"L"	QTY.
□P-26	11 1/16"	11 7/32"	8 5/32"	2'-9 1/2"	2
□P-27	11 15/32"	11 5/8"	8 5/32"	2'-9 1/2"	2
□P-28	11 7/8"	12 1/32"	8 5/32"	2'-10"	2
□P-29	12 9/32"	12 7/16"	8 5/32"	2'-10 1/2"	2
□P-30	12 11/16"	12 27/32"	8 5/32"	2'-11"	2
□P-31	13 1/8"	13 9/32"	8 5/32"	2'-11 1/2"	2
□P-32	13 17/32"	13 23/32"	8 3/16"	3'-0"	2
□P-33	13 31/32"	14 5/32"	8 3/16"	3'-0"	2
□P-34	14 13/32"	14 19/32"	8 3/16"	3'-1"	2
□P-35	14 7/8"	15 1/16"	8 3/16"	3'-1"	2
□P-36	15 5/16"	15 1/2"	8 3/16"	3'-1 1/2"	2
□P-37	15 25/32"	15 31/32"	8 3/16"	3'-2"	2

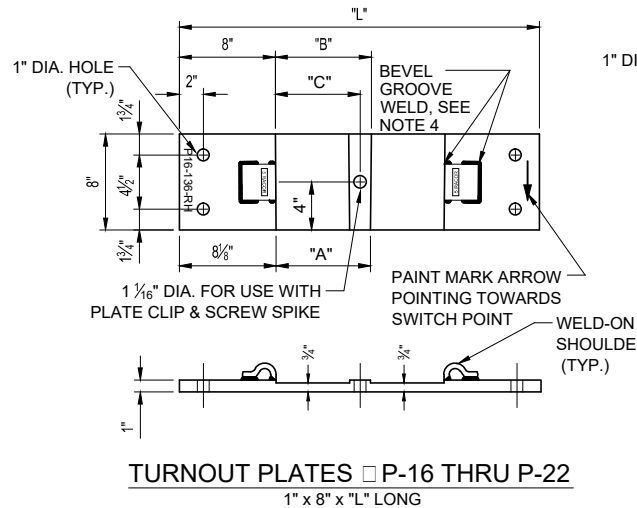
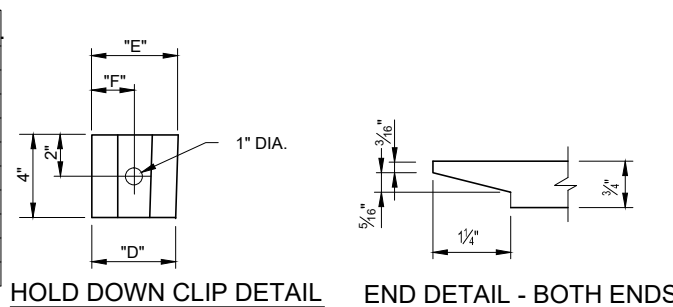
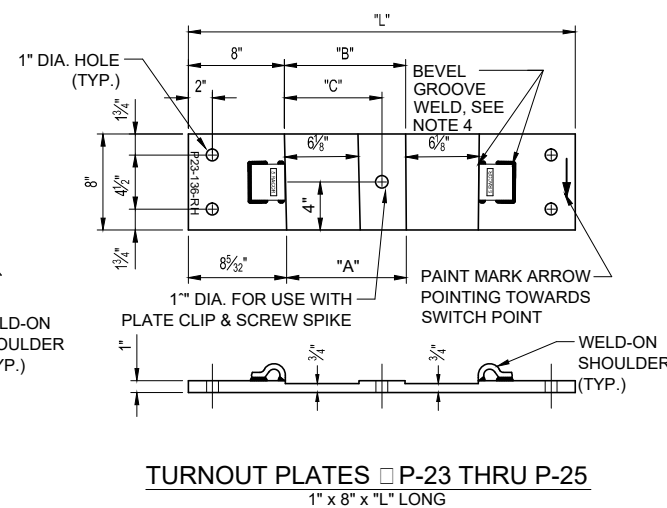


PLATE	"A"	"B"	"C"	"L"	QTY.
□P-16	7 17/32"	7 21/32"	6 7/8"	2'-6"	2
□P-17	7 7/8"	8"	7 1/16"	2'-6"	2
□P-18	8 3/16"	8 5/16"	7 7/32"	2'-7"	2
□P-19	8 17/32"	8 21/32"	7 13/32"	2'-7"	2
□P-20	8 7/8"	9"	7 9/16"	2'-7"	2
□P-21	9 7/32"	9 11/32"	7 3/4"	2'-8"	2
□P-22	9 9/16"	9 11/16"	7 29/32"	2'-8"	2
□P-23	9 15/16"	10 3/32"	8 3/32"	2'-8"	2
□P-24	10 5/16"	10 15/32"	8 9/32"	2'-8 1/2"	2
□P-25	10 11/16"	10 27/32"	8 15/32"	2'-9"	2



NOTES:

1. PLATES TO BE MADE OF MILD ROLLED STEEL.
2. EACH PLATE TO BE PLAINLY STAMPED WITH PLATE NUMBER AND 136 (WEIGHT OF RAIL) AND HAND OF TURNOUT (R.H. OR L.H)
3. THE WELD ON PRESSED SHOULDER, MADE OF MILD STEEL, AND MEETING "PANDROL'S" DESIGN SPECIFICATIONS SHALL BE USED.
4. THE PRESSED STEEL SHOULDER MUST BE CAREFULLY WELDED TO ALL PLATES WITH A MINIMUM 2 PASS 3/8" + FILLET WELD ALONG THE BEVELED GROOVES OF THE SHOULDER. ANY WELD PROJECTING BEYOND THE VERTICAL FACE OF THE SHOULDER IN THE AREA OF THE BASE OF THE RAIL SEAT MUST BE MACHINED OUT TO PROVIDE A CLEAR RAIL SEAT DIMENSION AS CALLED FOR.
5. THE PLATES AS SHOWN ARE FOR A 136 LB. NO. 24 RIGHT HAND TURNOUT. FOR A LEFT HAND TURNOUT PLATES P-13 THRU P-37 INCLUSIVE AND FROG PLATE F-1 THRU F-36 ARE TO OPPOSITE.
6. DIRECTION OF ARROW SHOWN IS AN EXAMPLE ONLY. USING SHEET 5800-02 AS A GUIDE, PAINT MARK EACH PLATE WITH AN ARROW POINTING TOWARD SWITCH POINT.

WELDING SPECIFICATIONS:

1. SET PRESSED STEEL SHOULDER FLUSH AGAINST LINE OF BASE OF RAIL OR SHOULDER OF MILLED PLATE AS SHOWN AND WELD WITH 2 - PASS 3/8" + WELD.
2. STOP PLATE FOR ADJUSTABLE RAIL BRACE TO BE SET FLUSH WITH SHOULDER OF MILLED PLATE AS SHOWN AND WELD WITH 3 - PASS 1/2" + FILLET WELD.
3. SHOULDERS AND STOPS ARE TO BE CAREFULLY WELDED TO PLATE. NO WELD SHALL PROJECT BEYOND THE VERTICAL EDGE OF THE UNWELDED FOURTH SIDE OF THE STOP PLATE OR VERTICAL FACE OF SHOULDER IN THE AREA OF THE RAIL SEAT. ANY WELD PROJECTING BEYOND THE FACE OF THE STOP OR SHOULDER MUST BE MACHINED OFF TO PROVIDE CLEAR DIMENSION CALLED FOR.
4. FOR WELDING PRESSED STEEL SHOULDERS OR PLATE STOPS FOR ADJUSTABLE USE THE FOLLOWING:
 - A. ELECTRODE 1 5/32 INCH, WELDING SPEC. 7018XLM.
 - B. ELECTRODE 3/16 INCH, WELDING SPEC. 7018XLM.
 - C. WIRE, WELDING 3/32 INCH, NR203, 1 □ NICKEL FLUX CORE.
 OTHER WIRE OR ELECTRODES MEETING SPECIFICATIONS AS CALLED FOR, APPROVED BY THE ENGINEER MAY BE USED.

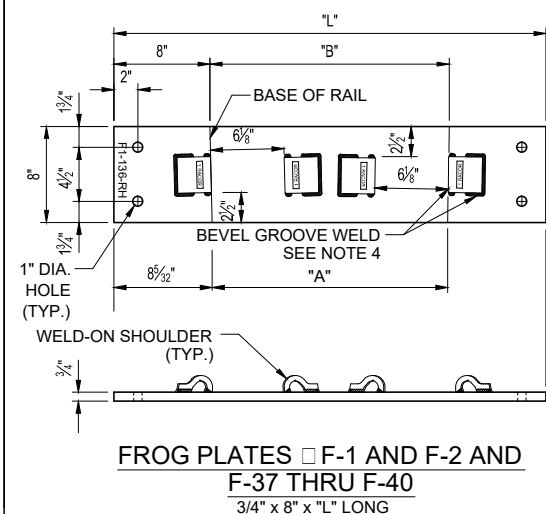


PLATE	"A"	"B"	"L"	QTY.
□F-1	21 1/32"	21 27/32"	3'-2"	1
□F-2	20 23/32"	21 1/32"	3'-1"	1
□F-37	19 5/8"	19 15/16"	3'-0"	1
□F-38	20 1/16"	20 3/4"	3'-1"	1
□F-39	21 3/32"	21 19/32"	3'-1 1/2"	1
□F-40	22 1/8"	9 11/32"	3'-2"	1

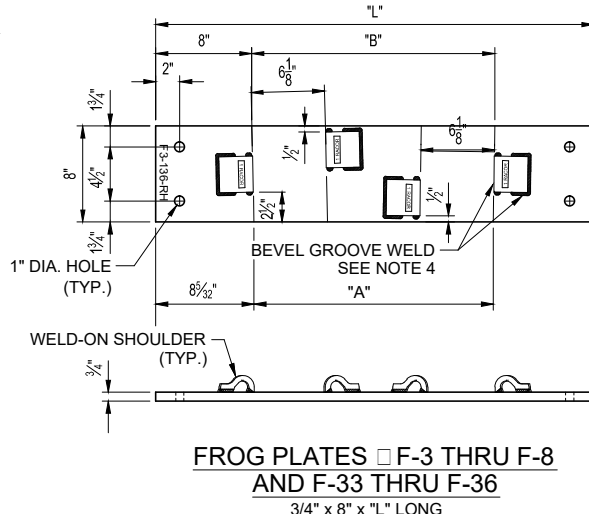


PLATE	"A"	"B"	"L"	QTY.
□F-3	19 29/32"	20 1/32"	3'-0 1/2"	1
□F-4	19 3/32"	19 13/32"	2'-11 1/2"	1
□F-5	18 1/16"	18 5/8"	2'-10 1/2"	1
□F-6	17 1/2"	17 13/16"	2'-10"	1
□F-7	16 23/32"	17 1/32"	2'-9"	1
□F-8	15 29/32"	16 1/32"	2'-8 1/2"	1
□F-33	16 1/32"	16 21/32"	2'-9"	1
□F-34	17 5/32"	17 15/32"	2'-9 1/2"	1
□F-35	17 31/32"	18 3/32"	2'-10 1/2"	1
□F-36	18 25/32"	19 3/32"	2'-11"	1

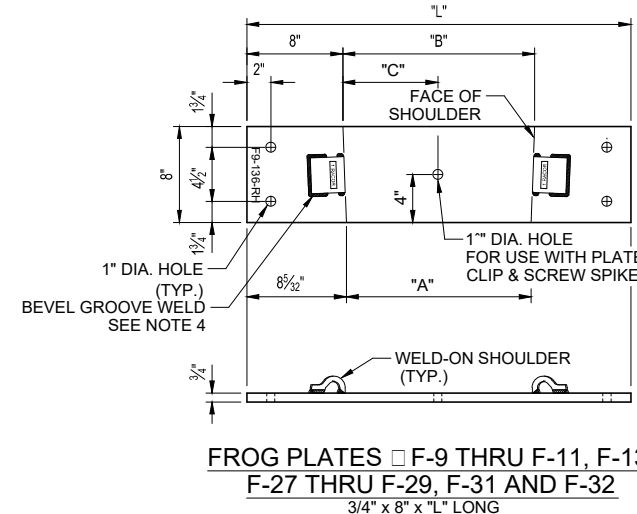


PLATE	"A"	"B"	"C"	"L"	QTY.
□F-9	15 3/32"	15 13/32"	7 23/32"	2'-7 1/2"	1
□F-10	14 9/32"	14 19/32"	7 3/16"	2'-6 1/2"	1
□F-11	13 15/32"	13 29/32"	6 29/32"	2'-6"	1
□F-13	11 21/32"	12 3/32"	6 29/32"	2'-4"	1
□F-27	11 15/32"	11 25/32"	6 29/32"	2'-4"	1
□F-28	12 3/32"	12 19/32"	6 29/32"	2'-4 1/2"	1
□F-29	13 3/32"	13 13/32"	6 29/32"	2'-5 1/2"	1
□F-31	14 23/32"	15 1/32"	7 17/32"	2'-7"	1
□F-32	15 17/32"	15 27/32"	7 17/32"	2'-8"	1

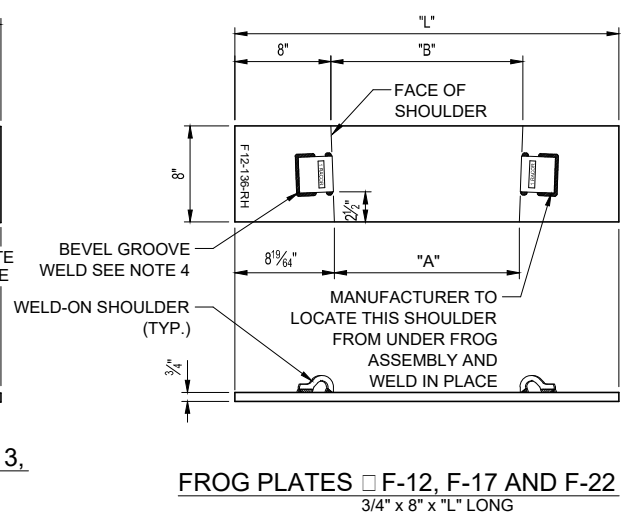


PLATE	"A"	"B"	"L"	QTY.
□F-12	12 23/32"	12 31/32"	2'-5"	2
□F-17	--	--	2'-10"	2
□F-22	--	--	2'-9 1/2"	2

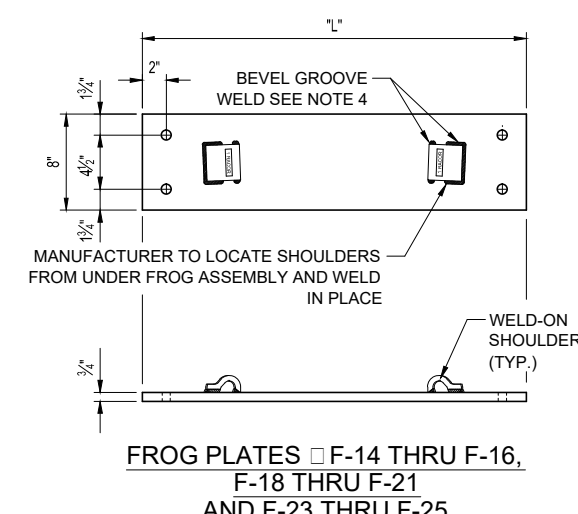


PLATE	"L"
F-14	2'-6"
F-15	2'-8 1/2"
F-16	2'-9"
F-18	2'-11"
F-19	2'-11 1/2"
F-20	2'-11"
F-21	2'-8 1/2"
F-23	2'-10"
F-24	2'-11"
F-25	2'-11 1/2"

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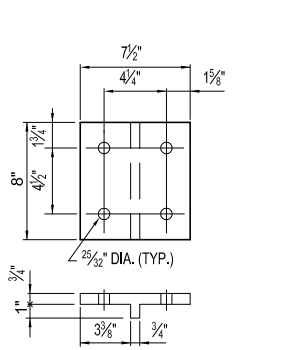
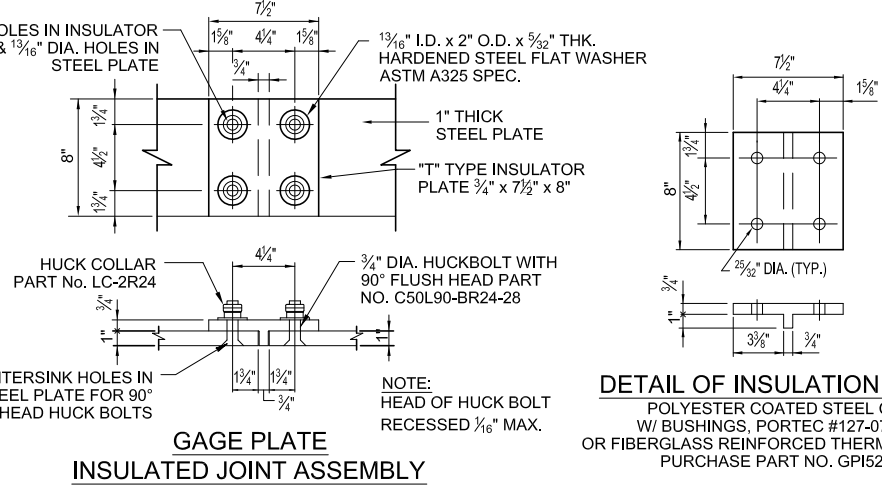
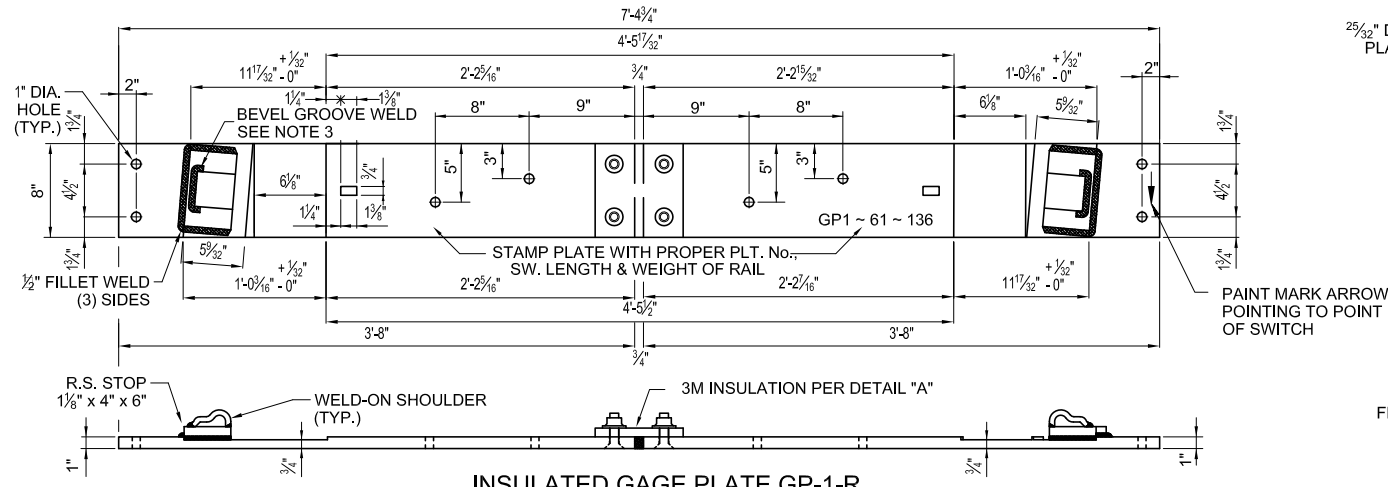
REV.	DATE	DESCRIPTION	DES.	ENG.

REVISIONS	DRAWN RAILPROS
	CHECKED B. SMITH
	RECOMMENDED W. PREY
	DATE 2/2/15
	DESIGNER PE STAMP

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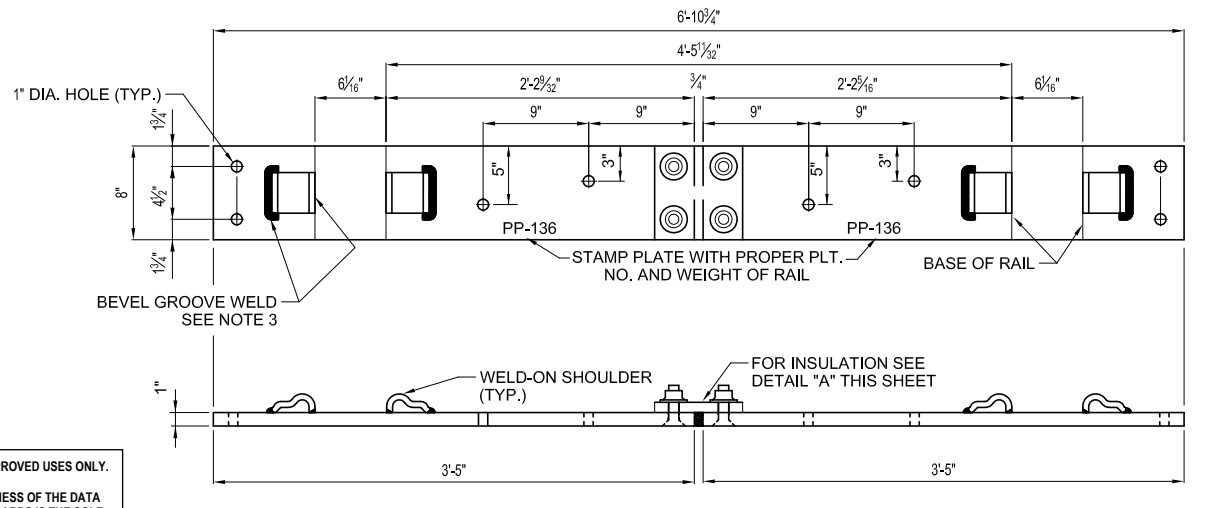
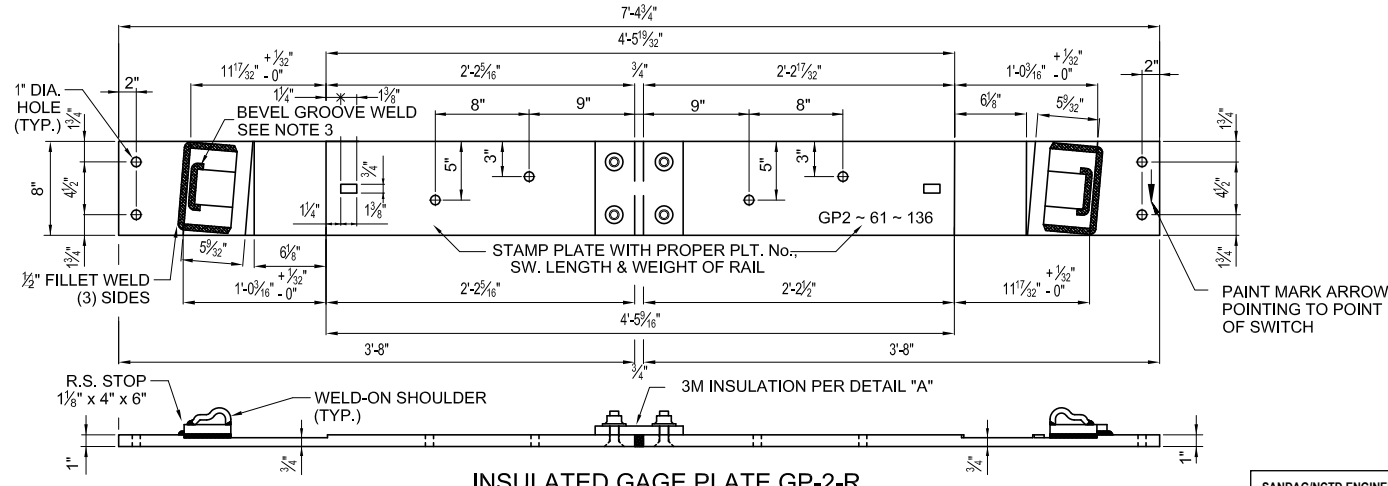
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ENGINEERING STANDARD DRAWINGS	DRAWING NO. ESD-2951-05
NO. 24 TANGENTIAL TURNOUT - TURNOUT AND FROG PLATES	DRAWING SHEET NO. 5 OF 15
	SCALE: NONE
	CONTRACT SHEET NO.

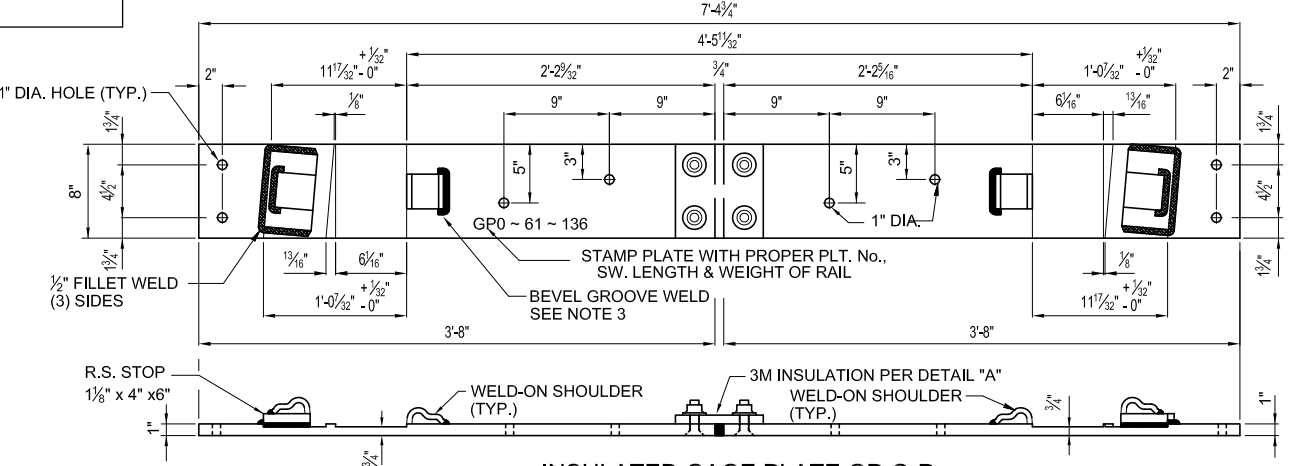
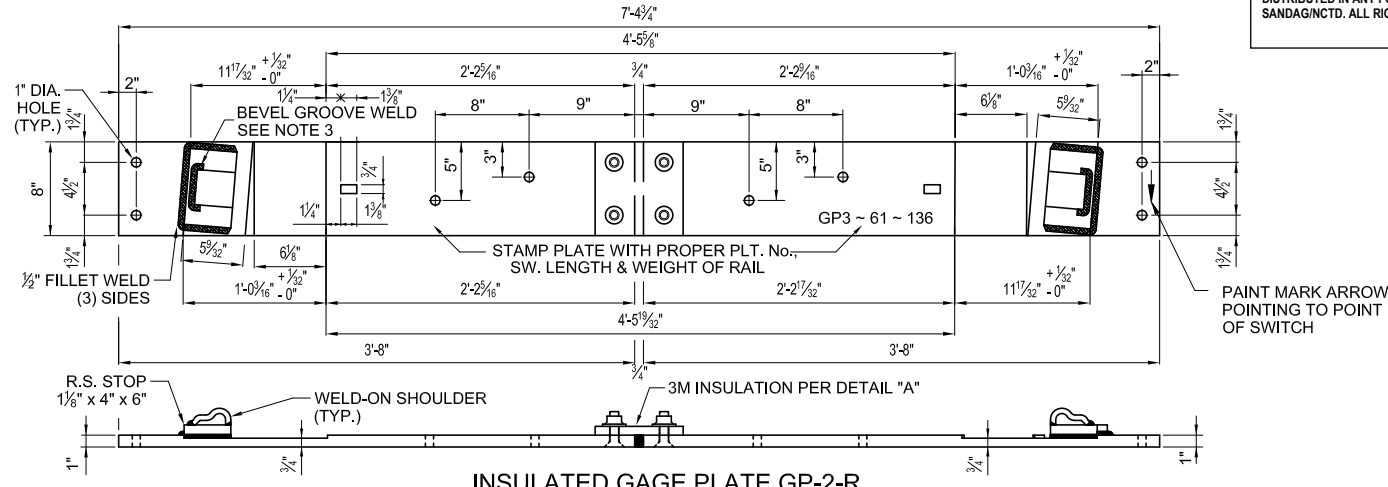


- NOTES:**
- PLATES TO BE MADE OF MILD ROLLED STEEL.
 - THE WELD - ON PRESSED STEEL SHOULDER, MADE OF MILD STEEL, AND MEETING PANDROL'S DESIGN SPECIFICATIONS SHALL BE USED.
 - THE PRESSED STEEL SHOULDER MUST BE CAREFULLY WELDED TO GAGE PLATES WITH A MINIMUM 3/8" WELD ALONG THE BEVELED GROOVES OF THE SHOULDER. ANY WELD PROJECTING BEYOND THE VERTICAL FACE OF SHOULDER IN THE AREA OF THE RAIL SEAT MUST BE MACHINED OUT TO PROVIDE A CLEAR RAIL SEAT DIMENSION AS CALLED FOR.
 - SWITCH GAGE PLATES FOR RIGHT HAND TURNOUT, MACHINE ON RIGHT, ELECTRICALLY INTERLOCKED FOR U.S. & S. CO'S STYLE M23A MACHINE. IF OTHER SWITCH MACHINE IS USED, SWITCH GAGE PLATES GP-1-R AND GP-2-R MAY VARY AND SHOULD BE MODIFIED AS REQUIRED BY SWITCH MANUFACTURER TO PROVIDE PROPER SEATING.

REFERENCE DRAWINGS:
 LAYOUT - No. 24, R.H. TURNOUT - 136 lb. --- ESD 2951-02



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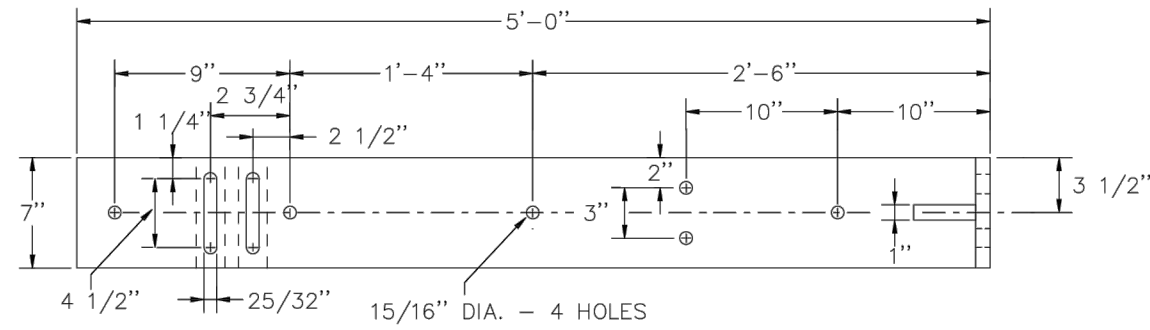
REV.	DATE	DESCRIPTION	DES.	ENG.	DESIGNER PE STAMP

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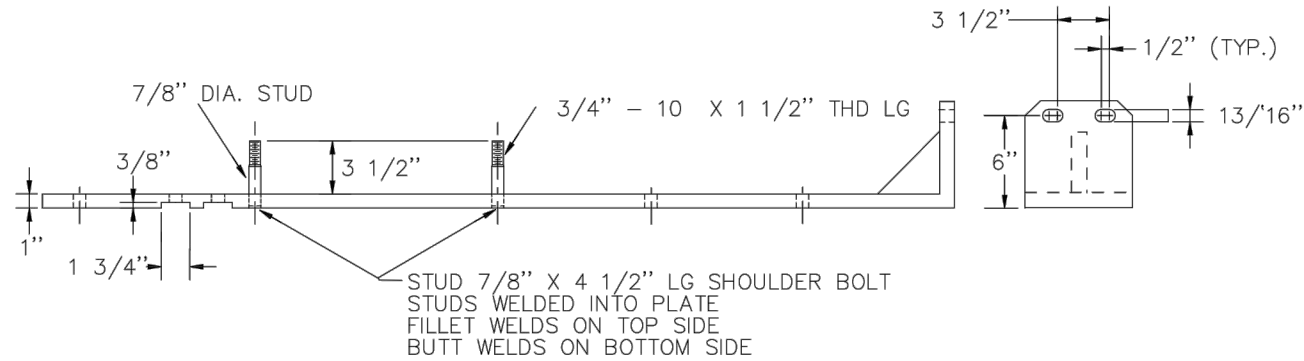
ENGINEERING STANDARD DRAWINGS
 NO. 24 TANGENTIAL TURNOUT - GAGE PLATES

DRAWING NO.	ESD-2951-06
DRAWING SHEET NO.	6 OF 15
SCALE:	NONE
CONTRACT SHEET NO.	



NOTE:
SEE SHEET NUMBER 6 FOR NOTES

REFERENCE DRAWINGS:
SWITCH GAGE PLATE DETAILS-ESD-2951-06

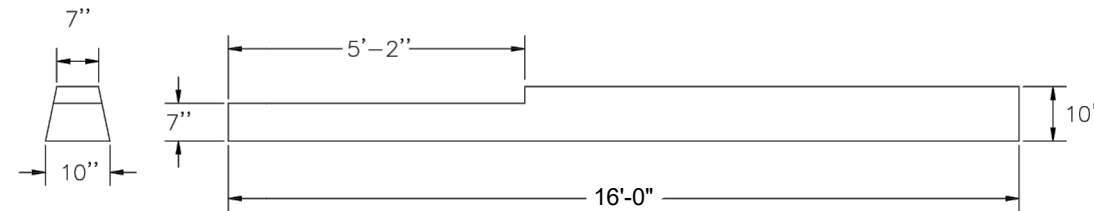


TRAPEZOID TIE NOTES:

1. TRAPEZOID TIES SHALL BE DOUGLAS FIR OR GUM.
2. TRAPEZOID TIES SHALL BE DAPPED AND TREATED AT THE MILL.
3. TIES SHALL BE STRAIGHT AND FREE OF CRACKS OR OTHER DEFECTS.

MOUNTING PLATE NOTES:

1. EMORY CLOTH SHALL BE INSTALLED TO PROVIDE ABRASIVE MATERIAL BETWEEN SWITCH MACHINE FRAME AND SWITCH PLATE.
2. ALL HOLES SHALL BE DRILLED NOT PUNCHED.
3. ALL CORNERS OF PLATE SHALL BE CHAMFERED 1" X 1".





ANSALDO M-23A SWITCH MACHINE MOUNTING PLATE

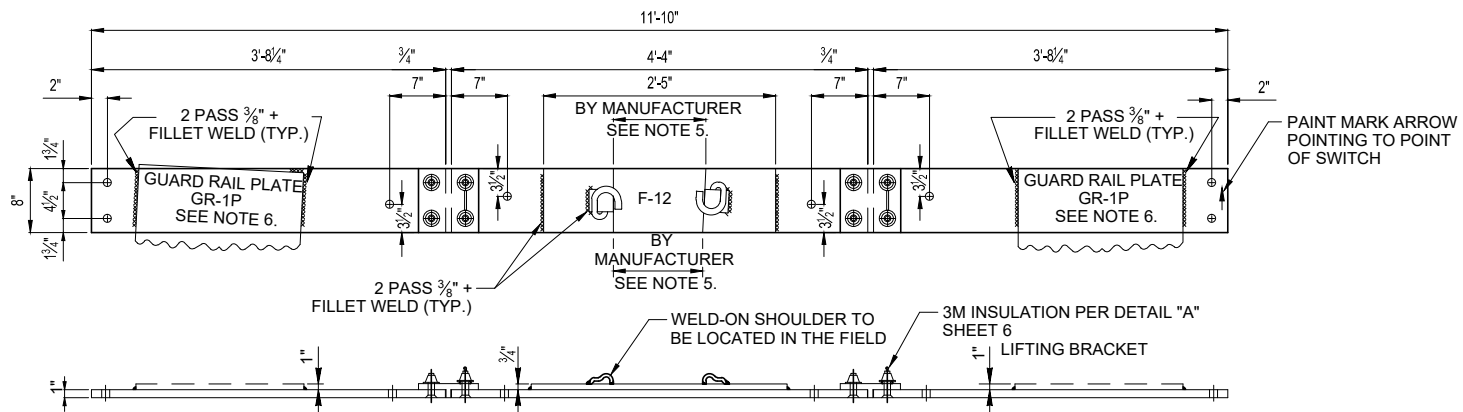
16 FT. DAPPED TRAPEZOID TIE

DAP TIE
(2 PCS. REQ'D. AS SHOWN)

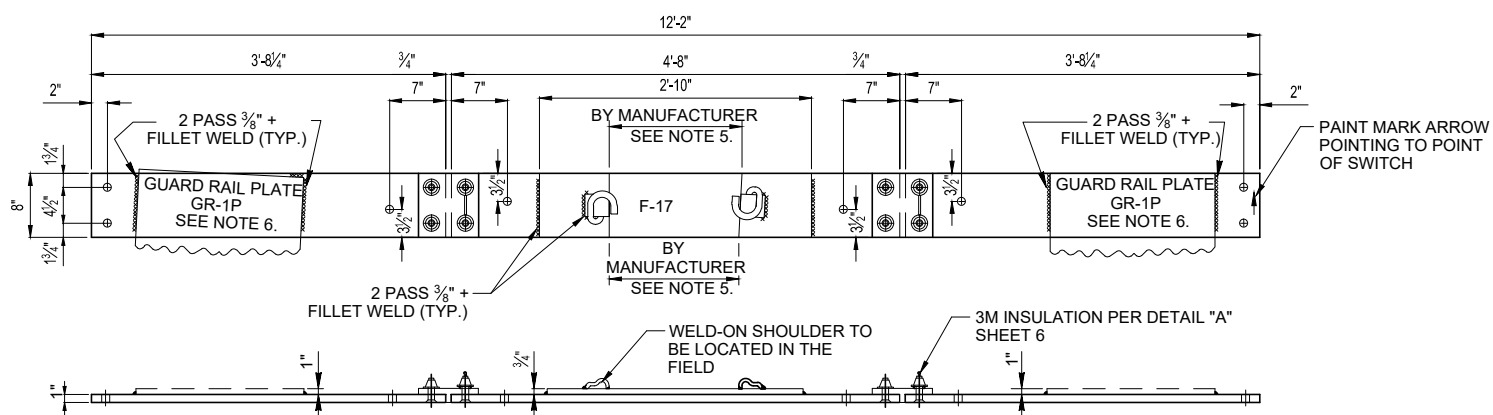
US&S SWITCH MACHINE MUST BE FURNISHED WITH FINISHED MOUNTING LUGS

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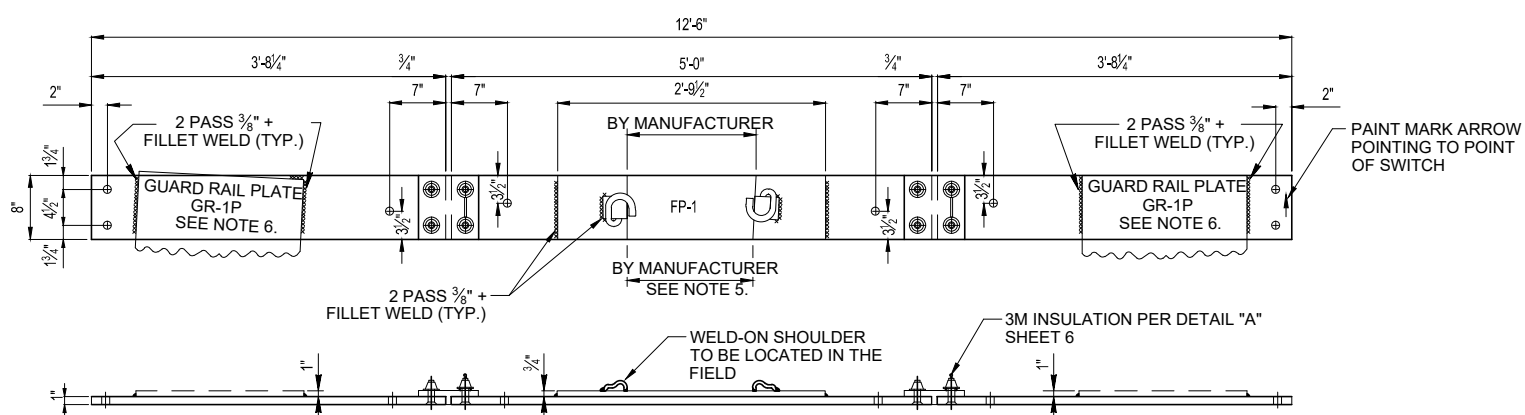
REVISIONS				DRAWN RAILPROS	 SAN DIEGO ASSOCIATION OF GOVERNMENTS 401 B Street, Suite 800 San Diego, CA. 92101 www.sandag.org	 NORTH COUNTY TRANSIT DISTRICT 810 Mission Avenue Oceanside, CA 92054 www.gonctd.com	ENGINEERING STANDARD DRAWINGS NO. 24 TANGENTIAL TURNOUT - EXTENSION PLATE AND DAP TIE FOR SWITCH MACHINE	DRAWING NO. ESD-2951-07
			CHECKED B. SMITH	DRAWING SHEET NO. 7 OF 15				
			RECOMMENDED B. SCHMITH	SCALE: NONE				
REV.	DATE	DESCRIPTION	DES.	ENG.				DESIGNER PE STAMP



INSULATED FROG GAGE PLATE - FGP-1
1" x 8" - FLAT - W/3M INSULATION (1 PC. REQ'D. AS SHOWN)



INSULATED FROG GAGE PLATE - FGP-2
1" x 8" - FLAT - W/3M INSULATION (1 PC. REQ'D. AS SHOWN)



INSULATED FROG GAGE PLATE - FGP-3
1" x 8" - FLAT - W/3M INSULATION (1 PC. REQ'D. AS SHOWN)

NOTES:

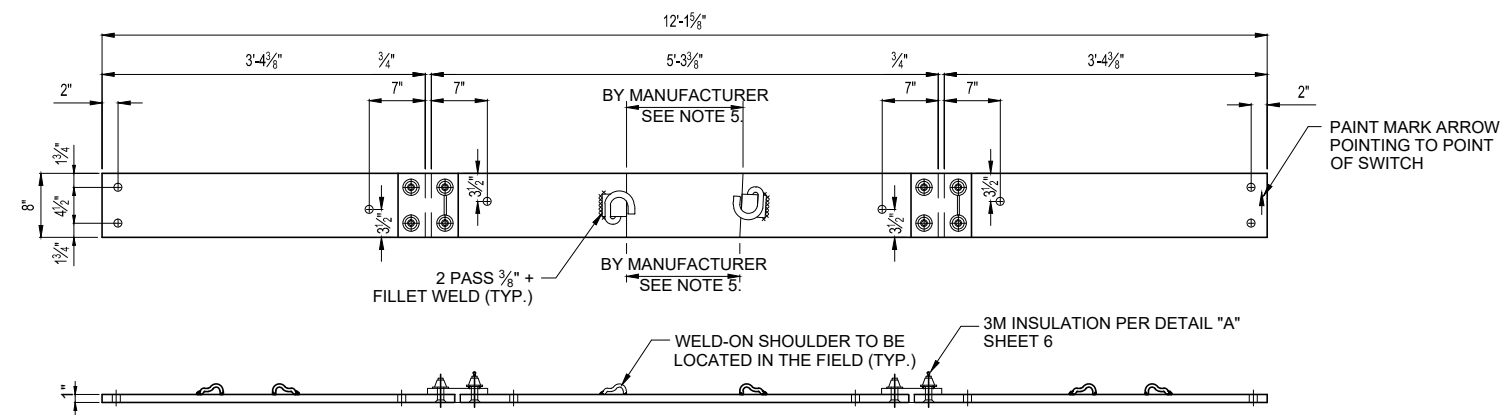
1. PLATES TO BE MADE OF MILD ROLLED STEEL.
2. THE PLATES AS SHOWN ARE FOR A 136 LB., NO. 24, RIGHT HAND, MACHINE OPERATED TURNOUT. FOR A LEFT HAND TURNOUT, PLATES ARE TO BE OPPOSITE.
3. THE WELD-ON PRESSED STEEL SHOULDER, MADE OF MILD STEEL, AND MEETING PANDROLS DESIGN SPECIFICATIONS SHALL BE USED.
4. THE PRESSED STEEL SHOULDER MUST BE CAREFULLY WELDED TO ALL PLATES WITH A MINIMUM 2 PASS 3/8" + FILLET WELD ALONG THE BEVELED GROOVES OF THE SHOULDER. ANY WELD PROJECTING BEYOND THE VERTICAL FACE OF THE SHOULDER IN THE AREA OF THE BASE OF RAIL SEAT MUST BE MACHINED OUT TO PROVIDE A CLEAR RAIL SEAT DIMENSION AS CALLED FOR.
5. MANUFACTURER OF FROG PLATES SHALL USE COMPLETED FROG TO VERIFY LOCATION OF SHOULDERS ON FROG PLATES FGP-1, FGP-2, AND FGP-3 TO INSURE PROPER FIT. FROG PLATES WILL BE WELDED TO THE GAGE PLATES IN THE FIELD WITH A 3 PASS 1/2 + FILLET WELD. PLATES WILL BE WELDED ONLY AFTER THE GAGE PLATES ARE SECURED IN THE PROPER LOCATION ON THE TIE WITH THE FROG IN PLACE AT PROPER ALIGNMENT.
6. GUARD RAIL PLATES ARE TO BE INSTALLED AND WELDED TO THE FROG GAGE PLATES IN THE FIELD WITH A 3 PASS 1/2 + FILLET WELD CONTINUOUS ON BOTH ENDS OF THE PLATE. PLATES ARE TO BE WELDED ONLY AFTER THE GAGE PLATE AND THE FROG ARE SECURED IN THE PROPER LOCATION ON THE TIE WITH PROPER ALIGNMENT.

**INSTRUCTIONS FOR WELDING
GUARD RAILS TO GAGE PLATES:**

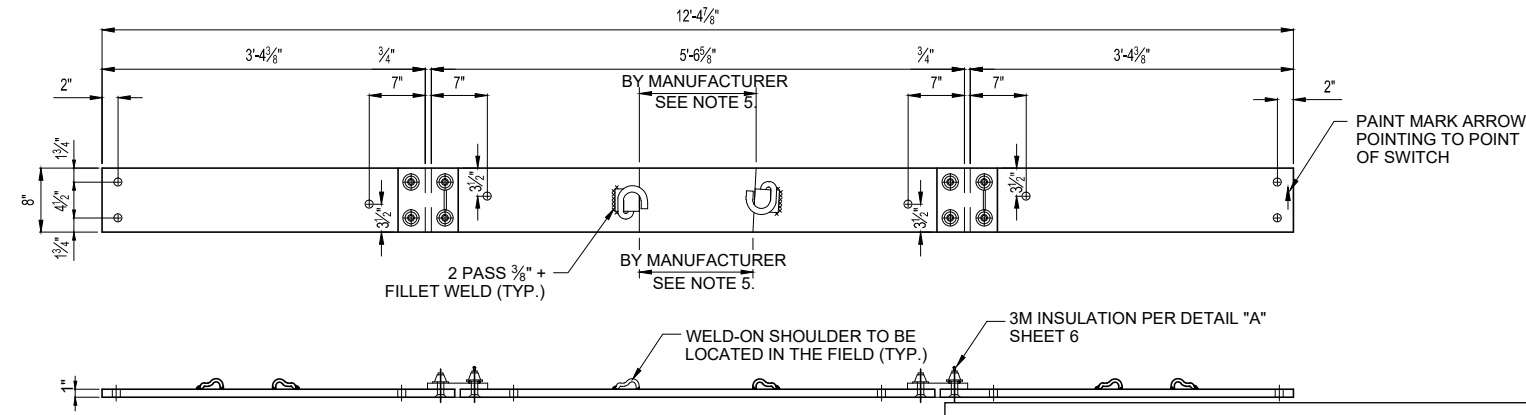
1. POSITION GAGE PLATES AT DESIGNATED TIE LOCATIONS AND ANCHOR IN PLACE.
 2. CHECK TRACK FOR CORRECT GAGE.
 3. STARTING WITH ONE GAGE PLATE, PLACE FROG PLATES WITH ADJUSTABLE BRACES AND SECURE TO FROG AND GUARD RAIL WITH PANDROL CLIPS.
 4. RECHECK TRACK GAGE AND CORRECT IF NECESSARY.
 5. CAREFULLY WELD FROG PLATE AND GUARD RAIL PLATE TO FROG GAGE PLATES WITH 3 PASS 1/2" + FILLET WELD. FOR WELDING USE THE FOLLOWING:
 - A. ELECTRODE, 5/32 INCH, WELDING SPEC. 7018XLM.
 - B. ELECTRODE, 3/16 INCH, WELDING SPEC. 7018XLM.
 - C. WIRE, 3/32 INCH, NR203, 1 \square NICKEL FLUX CORE
- OTHER WIRE OR ELECTRODES MEETING SPECIFICATIONS AS CALLED FOR AND APPROVED BY THE ENGINEER MAY BE USED.

REFERENCE DRAWINGS

LAYOUT - No.24, R.H., H.O. TURNOUT - 136 lb. ----- ESD-2951-02
- No. 24 R.H., RAIL BOUND MANGANESE FROG - 136 lb. ----- ESD-2951-10



INSULATED FROG GAGE PLATE - FGP-4
1" x 8" - FLAT - W/3M INSULATION (1 PC. REQ'D. AS SHOWN)



INSULATED FROG GAGE PLATE - FGP-5
1" x 8" - FLAT - W/3M INSULATION (1 PC. REQ'D. AS SHOWN)

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REV.	DATE	DESCRIPTION	DES.	ENG.

REVISIONS	DRAWN RAILPROS
	CHECKED B. SMITH <i>BS</i>
	RECOMMENDED W. PREY <i>WP</i>
	DATE 2/2/15
DESIGNER PE STAMP	

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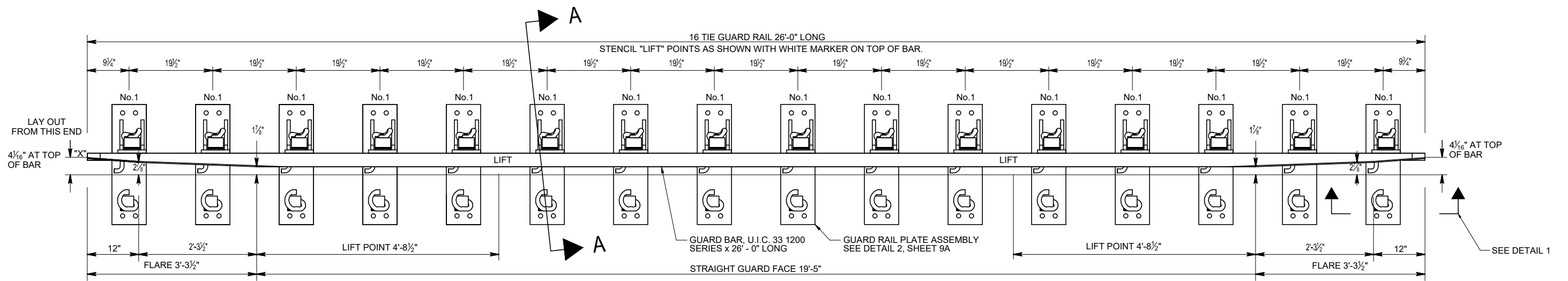
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ENGINEERING STANDARD DRAWINGS

NO. 24 TANGENTIAL TURNOUT -
FROG GAGE PLATES

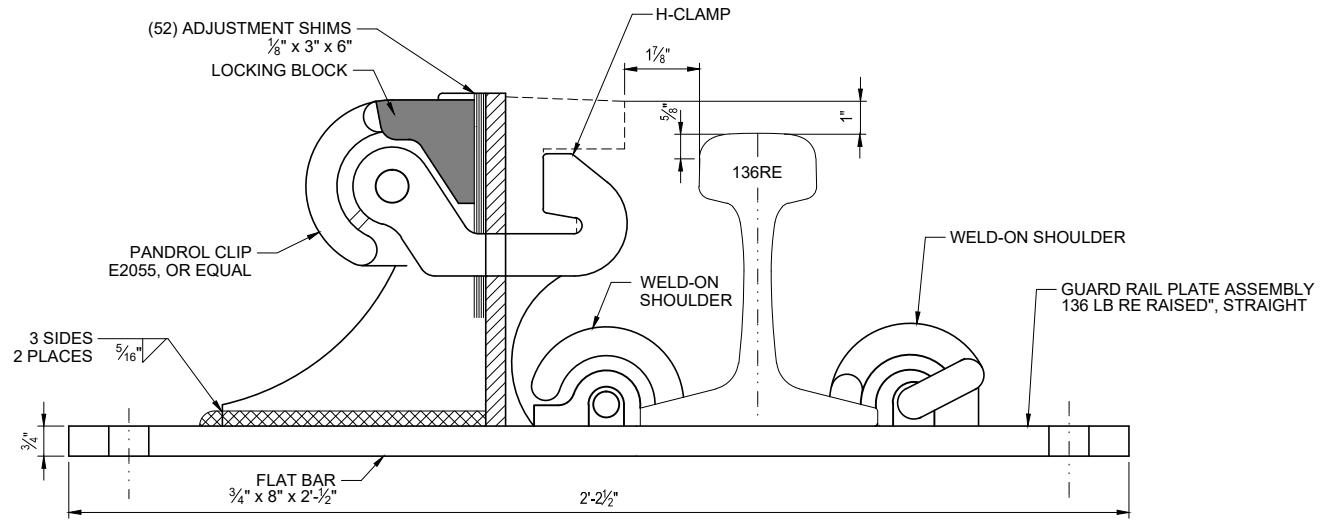
DRAWING NO.	ESD-2951-08
DRAWING SHEET NO.	8 OF 15
SCALE:	NONE
CONTRACT SHEET NO.	



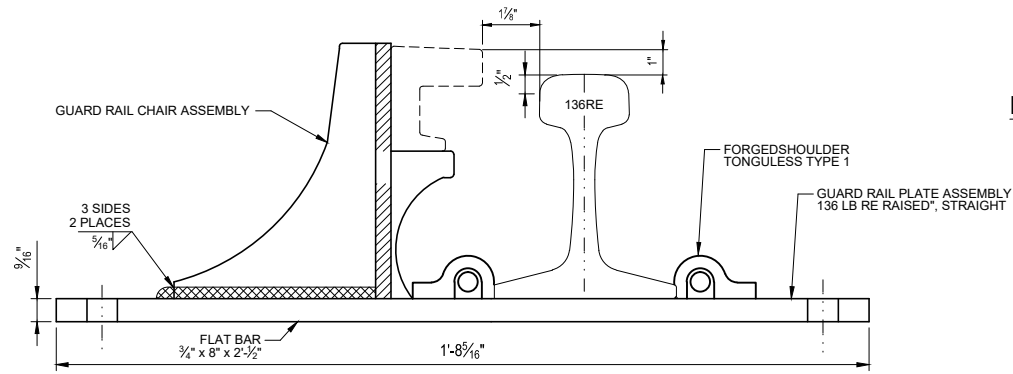
ASSEMBLED 26'-0" GUARD RAIL
SCALE: NONE

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BILL OF MATERIAL	
QTY	DESCRIPTION
1	GUARD BAR, UIC33 1200 SERIES x 26'-0" LONG
14	GUARD RAIL PLATE ASSEMBLY, 136 LB RE RAISED 1", STRAIGHT
14	H-CLAMP
42	CLIP, PANDROL E2055 OR EQUAL
14	LOCKING BLOCK
56	SHIM, 1/8" x 3" x 6"



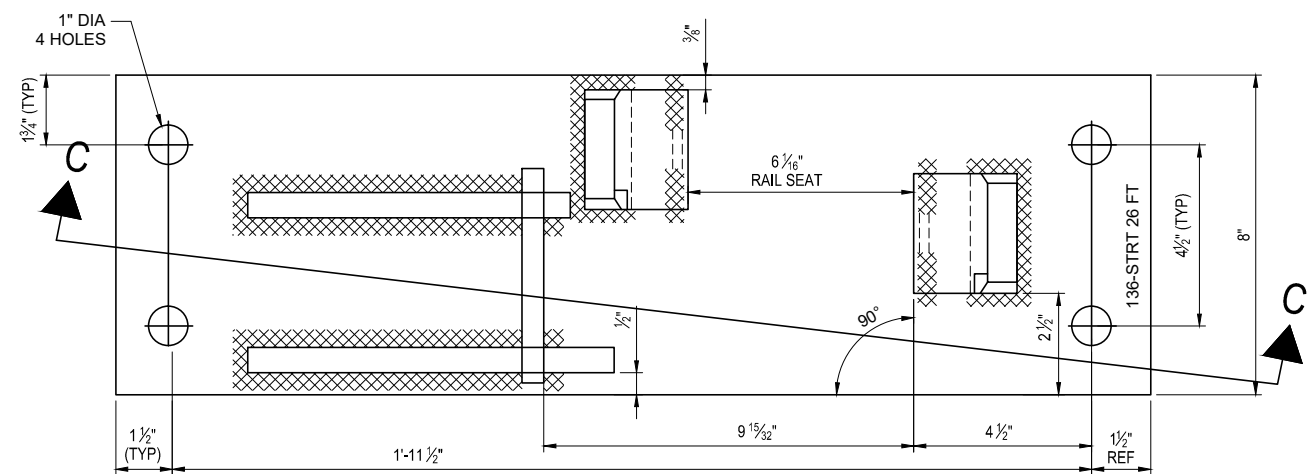
**SECTION A-A:
GUARD RAIL HARDWARE ASSEMBLY**
SCALE: NONE



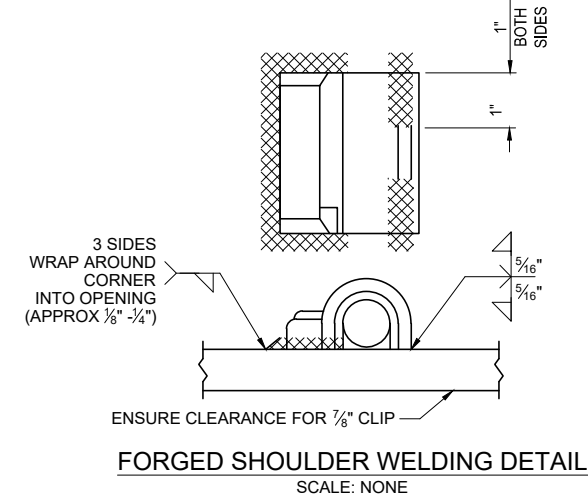
**SECTION C-C:
GUARD RAIL HARDWARE ASSEMBLY**
SCALE: NONE

NOTES:

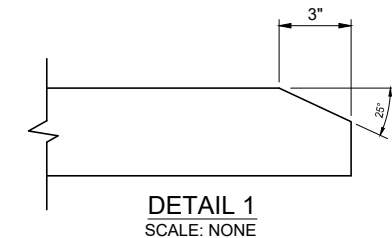
- GUARD RAIL SECTION U.I.C. 33 1200 SERIES-(U69) UIC 860.0 GRADE 90A (GUARD FACE BRINELL 319 MIN.)
- BASE PLATE, BRACKET AND SHIMS MILD STEEL PER A.R.E.M.A. SPECIFICATION M7.
- PANDROL H-CLAMP OR APPROVED EQUAL.
- WORKMANSHIP AND TOLERANCES PER A.R.E.M.A. SPECIFICATIONS FOR SPECIAL TRACKWORK.
- WELDING PER ANSI AWS D1.1-92 OR LATEST REVISION.
- PLATE SPACING IS SET FOR SHIPPING ONLY. FINAL PLATE SPACING IS TO BE DETERMINED BY THE SPACING AT TIME OF INSTALLATION.
- PANDROL SPRING CLIPS TO BE INCLUDED IN ASSEMBLY.
- LIFT POINTS AND WEIGHT OF ASSEMBLY TO BE MARKED ON HEAD OF WEAR BAR WITH WHITE PAINT.
- PLATE IS TO BE STAMPED WITH PLATE I.D. WITH 1/2" HIGH CHARACTERS AS SHOWN.
- GRIND AWAY CORNER OF PANDROL SHOULDER TO CLEAR FOOT OF CHAIR ASSEMBLY.



**PLAN VIEW:
GUARD RAIL HARDWARE ASSEMBLY**
SCALE: NONE



FORGED SHOULDER WELDING DETAIL
SCALE: NONE



DETAIL 1
SCALE: NONE

REVISIONS		DES.	ENG.
REV.	DATE	DESCRIPTION	

DRAWN RAILPROS
CHECKED B. SMITH <i>BSM</i>
RECOMMENDED B. SCHMITH <i>BAS</i>
DATE 4/25/17
DESIGNER PE STAMP

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ENGINEERING STANDARD DRAWINGS

NO. 24 TANGENTIAL TURNOUT - 26'-0"
GUARD RAIL

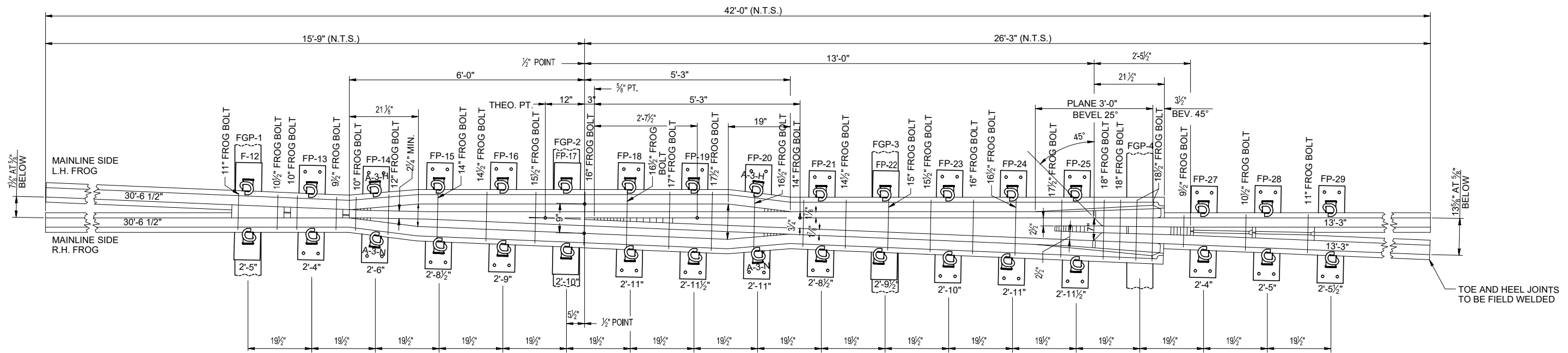
DRAWING NO. ESD-2951-09
DRAWING SHEET NO. 9 OF 15
SCALE: NONE
CONTRACT SHEET NO.

NOTES:

1. FROG ANGLE 2°-23'-13".
2. RAIL USED TO FABRICATE FROG IS TO BE 136 LB. HIGH STRENGTH.
3. RAIL BOUND MANGANESE STEEL FROG PER CURRENT A.R.E.M.A. PLAN NO. 621 & 625 WITH EXPLOSIVE HARDENED MANGANESE HIGH INTEGRITY CASTING PER CURRENT A.R.E.M.A. SPECIFICATIONS AND MODIFIED FOR ARM LENGTHS AND PLATES WITH PANDROL FASTENERS.
4. ALL FROG PLATES SHALL BE STAMPED IN 1/2" CHARACTERS TO INDICATE MFG., FROG NO., R.H., RAIL SECTION AND PLATE NUMBER. MARK TO BE STAMPED ON SAME END OF ALL FROG PLATES.
5. FOR DETAILS OF FROG PLATES SEE SHEET 5.
6. WORKMANSHIP AND MATERIALS SHALL BE PER CURRENT "A.R.E.M.A. SPECIFICATIONS FOR SPECIAL TRACKWORK", EXCEPT AS OTHERWISE SPECIFIED.
7. ANY CONSTRUCTION DETAILS NOT SHOWN SHALL BE IN ACCORDANCE WITH CURRENT A.R.E.M.A. RECOMMENDED PRACTICE.
8. FROG PLATES ARE DESIGNED TO BE INSTALLED PERPENDICULAR TO MAIN TRACK.
9. BODY BOLTS 1 3/8" DIA., H.T.C.S. - PER A.R.E.M.A. SPECIFICATIONS.
10. TOE AND HEEL BLOCKS AND BOLTS PER A.R.E.M.A. SPECIFICATIONS.

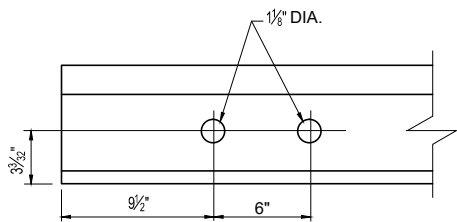
NOTES: CONT.

11. PLATES TO BE MADE OF MILD ROLLED STEEL.
12. THE PLATES AS SHOWN ARE FOR A 136 LB., NO. 24, RIGHT HAND TURNOUT. FOR A LEFT HAND TURNOUT, PLATES ARE TO BE OPPOSITE.
13. THE WELD-ON PRESSED STEEL SHOULDER, MADE OF MILD STEEL AND MEETING "PANDROL'S" DESIGN SPECIFICATIONS SHALL BE USED.
14. THE PRESSED STEEL SHOULDER MUST BE CAREFULLY WELDED TO ALL PLATES WITH A MINIMUM 2 PASS 3/8" + FILLET WELD ALONG THE BEVELED GROOVES OF THE SHOULDER. ANY WELD PROJECTING BEYOND THE VERTICAL FACE OF THE SHOULDER IN THE AREA OF THE BASE OF RAIL SEAT MUST BE MACHINED OUT TO PROVIDE A CLEAR RAIL SEAT DIMENSION AS CALLED FOR.
15. MANUFACTURER OF FROG PLATES SHALL USE COMPLETED FROG TO VERIFY LOCATION OF ADJUSTABLE CLAMPS ON FROG GAGE PLATES FGP-1, FGP-2, AND FGP-3 TO INSURE PROPER FIT. FROG PLATES WILL BE WELDED TO THE GAGE PLATES IN THE FIELD WITH A 3 PASS 1/2" + FILLET WELD. PLATES WILL BE WELDED ONLY AFTER THE GAGE PLATES ARE SECURED IN THE PROPER LOCATION ON THE TIE WITH THE FROG IN PLACE AT PROPER ALIGNMENT.
16. GUARD RAIL PLATES ARE TO BE INSTALLED AND WELDED TO THE FROG GAGE PLATES IN THE FIELD WITH A 3 PASS 1/2" + FILLET WELD CONTINUOUS ON BOTH ENDS OF THE PLATE. PLATES ARE TO BE WELDED ONLY AFTER THE GAGE PLATE AND THE FROG ARE SECURED IN THE PROPER LOCATION ON THE TIE WITH PROPER ALIGNMENT.
17. IDENTIFICATION TAG WITH RAISED METAL CHARACTERS TO BE APPLIED WHICH WILL STATE WEIGHT OF RAIL, FROG NO., MANUFACTURER AND YEAR MANUFACTURED.
18. RAIL ENDS TO BE CUT AT 45 DEGREE ANGLE AT JOINT WITH FROG CASTING.



NO. 24 RAILBOUND MANGANESE STEEL FROG WITH PANDROL PLATES

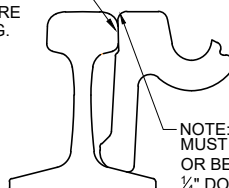
THE SPACING TIES ARE PERPENDICULAR TO MAIN LINE OF FROG
PLATES TO BE PERPENDICULAR TO CENTERLINE OF FROG



RAIL END DRILLING

NOTE: RAIL END DRILLING CAN BE ELIMINATED IF NO TEMPORARY BOLTED JOINTS ARE TO BE USED.

MANG. MUST BE GROUND TO FIT SLOPE OF RAIL HEAD FOR THE ENTIRE LENGTH OF CASTING.



DETAIL OF FROG CASTING / RAIL FIT

SCALE: NONE

NOTE "A"

PLATES F-12, F-17 AND F-22 ARE TO BE LAID OUT AND MARKED OFF FROM UNDER FROG TO INSURE PROPER LOCATION OF PANDROL SHOULDERS.

NOTE "B"

HEAVY POINT (HP) FROG, POINT OF FROG WIDTH 27/32"

REFERENCE DRAWINGS

- LAYOUT - No.24, R.H., H.O. TURNOUT - 136 lb. ----- ESD-2951-02
- DETAILS OF TURNOUT & FROG PLATES ----- ESD-2951-05
- FROG GAGE PLATES W/ PANDROLS ----- ESD-2951-08
- RAISED GUARD RAIL PLATES - 136 LB. ----- BY MANUFACTURER

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REVISIONS		DES.	ENG.
REV.	DATE	DESCRIPTION	DES. ENG.

DRAWN RAILPROS
CHECKED B. SMITH
RECOMMENDED B. SCHMITH
DATE 11/20/15
DESIGNER PE STAMP

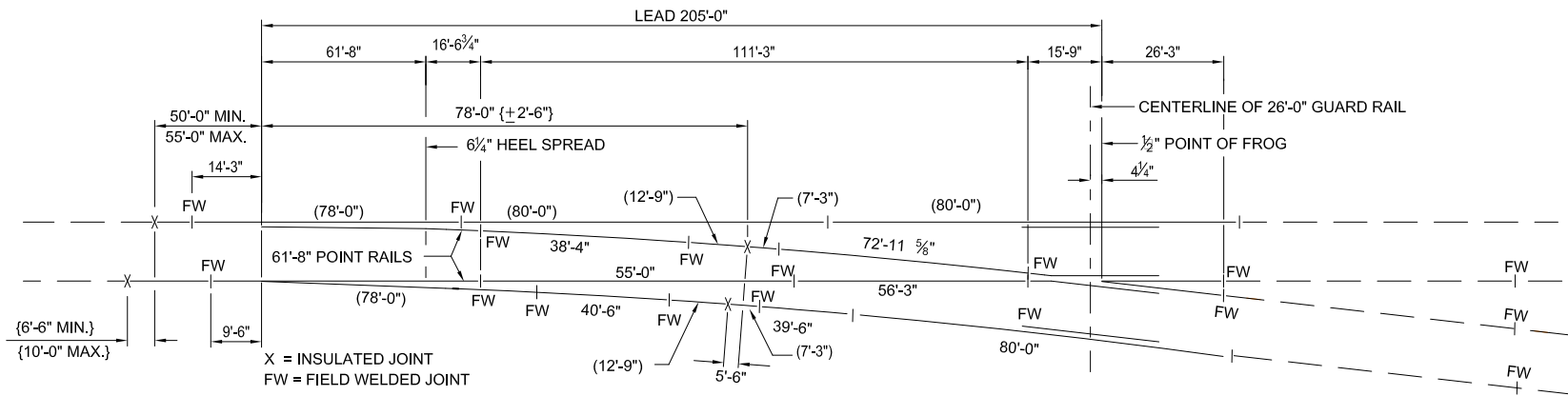
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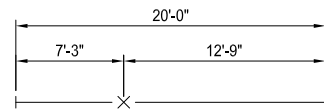
ENGINEERING STANDARD DRAWINGS

NO. 24 TANGENTIAL TURNOUT -
RAILBOUND MANGANESE STEEL FROG

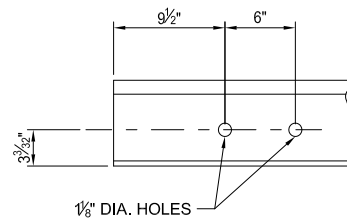
DRAWING NO. ESD-2951-10
DRAWING SHEET NO. 10 OF 15
SCALE: NONE
CONTRACT SHEET NO.



TURNOUT
SCALE: NONE



**20'-0" LONG ADHESIVE BONDED PREFABRICATED
INSULATED RAIL JOINT ASSEMBLY**
(SEE NOTE 6) BOTH ENDS SHALL BE LEFT BLANK FOR
WELDING IN THE FIELD. (SCALE: NONE)

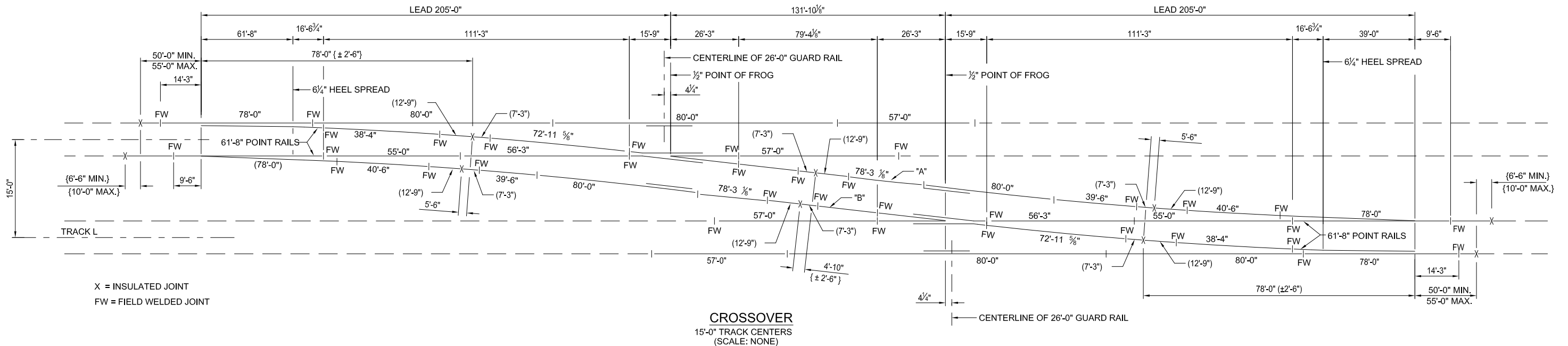


DETAIL "A"
SEE NOTE 4 (b)
SCALE: NONE

NOTES:

- SINCE THE PERMISSIBLE VARIATION IN STANDARD LENGTHS OF RAILS, FROGS AND SWITCH POINTS IS GREATER THAN THE NORMAL EXPANSION GAPS AT RAIL JOINTS AND THICKNESS OF FIBRE END POST IN INSULATED JOINTS, NO ALLOWANCE HAS BEEN MADE FOR EXPANSION GAPS AND FIBRE END POSTS IN COMPUTING LENGTHS OF RAILS SHOWN.
- RAIL LAYOUT SHOWN FOR CROSSOVERS IS TO BE USED IN ALL CASES, EXCEPT WHERE COMPROMISE JOINTS ARE REQUIRED BETWEEN THE FROGS IN THE CROSSOVER TRACK. (COMPROMISE JOINTS CAN BE USED IN A TEMPORARY CONDITION.) WHEN COMPROMISE WELDS ARE REQUIRED, THE INSULATED JOINTS IN THE CROSSOVER TRACK SHALL ALWAYS BE OF THE HEAVIER RAIL SECTION AND THE RAIL LAYOUT SHALL BE CHANGED TO LOCATE COMPROMISE JOINTS AS DESCRIBED BELOW:
THE DESCRIPTIONS OF THE CHANGES IN RAIL LAYOUT WHEN COMPROMISE JOINTS ARE REQUIRED IN THE CROSSOVER TRACK ARE BASED ON ASSUMPTION THAT TRACK H IS LAID WITH THE HEAVIER RAIL THAN TRACK L. CROSSOVER ON 15'-0" TRACK CENTERS: AT LOCATION A THE 80'-0" RAIL SHALL BE REPLACED WITH 16'-6" OF THE HEAVIER RAIL AND 63'-6" OF THE LIGHTER RAIL. AT LOCATION B THE 78'-3 1/8" RAIL SHALL BE REPLACED WITH 10'-0" OF THE HEAVIER RAIL AND 68'-3 1/8" OF THE LIGHTER RAIL.
- IN ADDITION TO NOTE 1, NO ALLOWANCE HAS BEEN MADE IN THE RAIL LENGTHS TO PROVIDE GAPS NEEDED TO MAKE FIELD WELDS. IN THE FIELD IT WILL BE NECESSARY TO CUT RAILS ENDS TO PROVIDE CORRECT GAPS FOR FIELD WELDS.
- FURNISH ALL RAIL SHOWN IN SOLID LINES ON THIS DRAWING:
(A.) RAILS LONGER THAN 39'-0" SHALL BE CONTINUOUS WELDED RAIL (CWR), TO BE FURNISHED WITH BOTH ENDS LEFT BLANK FOR WELDING IN THE FIELD.
(B.) ALL OTHER RAILS 39'-0" OR SHORTER AS SPECIFIED ON THE DRAWING, WITH BOTH ENDS DRILLED PER DETAIL "A", IF SO REQUIRED.
- ALL RAIL FURNISHED FOR TURNOUT AND CROSSOVER SHALL BE "HEAD HARDENED" EXCEPT GUARD RAILS.
- LOCATIONS OF INSULATED JOINTS ARE SHOWN ON TURNOUT AND CROSSOVER DIAGRAMS WITHOUT TOLERANCES, OR IF TOLERANCES ARE PERMISSIBLE, WITH (+ OR -). ALL INSULATED JOINTS ARE TO BE PROPERLY SUSPENDED IN CRIB AREA BETWEEN TWO TIES LOCATED 4" MINIMUM FROM EDGE OF NEAREST TIE TO EDGE OF INSULATED JOINT.
- INSULATED JOINT MUST BE INSTALLED TO BE CENTERED BETWEEN TWO (2) TIES.
- FIELD WELDED JOINTS DESIGNATED "FW" SHOULD BE IN CRIB AREA BETWEEN TWO TIES LOCATED 4" MINIMUM BETWEEN NEAREST TIE AND WELDED JOINT. DIMENSIONS SHOWN IN PARENTHESIS (0'-0") ARE EXACT. RAILS FURNISHED FOR THESE LOCATIONS ARE LARGER AND MUST BE FIELD ADJUSTED (CUT) WITHIN TOLERANCES SHOWN IN BRACKETS {0'-0"}.
- WHEN INSULATED JOINTS WITH TOLERANCES AND FIELD WELDED JOINTS FALL SHORT OF MINIMUM CLEARANCE FROM TIE OR TIE PLATE THE JOINT MAY BE MOVED WITHIN TOLERANCE LIMITS. BONDED INSULATED JOINT ASSEMBLIES AND STOCK RAILS ARE FURNISHED LONGER THAN SHOWN IN PARENTHESIS ON LAYOUT. THESE RAILS OR THEIR ADJACENT CONNECTING RAILS MUST BE TRIMMED IN THE FIELD TO FIT.
- INSULATED JOINTS SHALL BE SAWCUT SQUARE.

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CROSSOVER
15'-0" TRACK CENTERS
SCALE: NONE

REV.	DATE	DESCRIPTION	DES.	ENG.

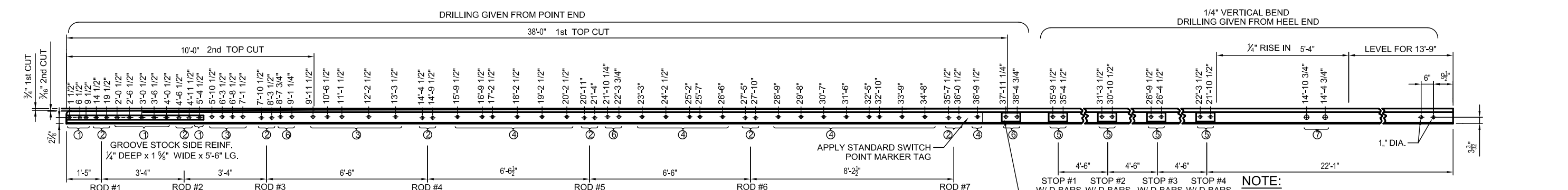
REVISIONS	DRAWN RAILPROS
	CHECKED B. SMITH
	RECOMMENDED W. PREY
	DATE 2/2/15
	DESIGNER PE STAMP

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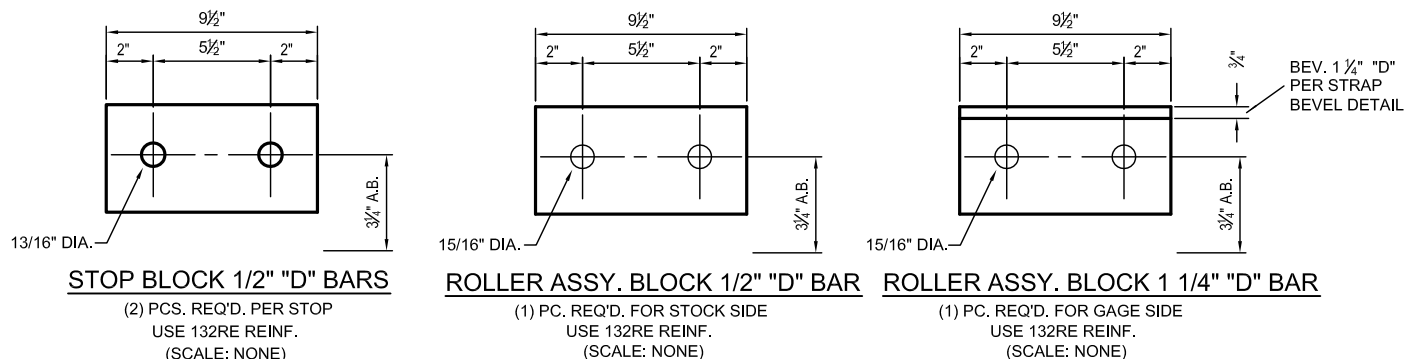
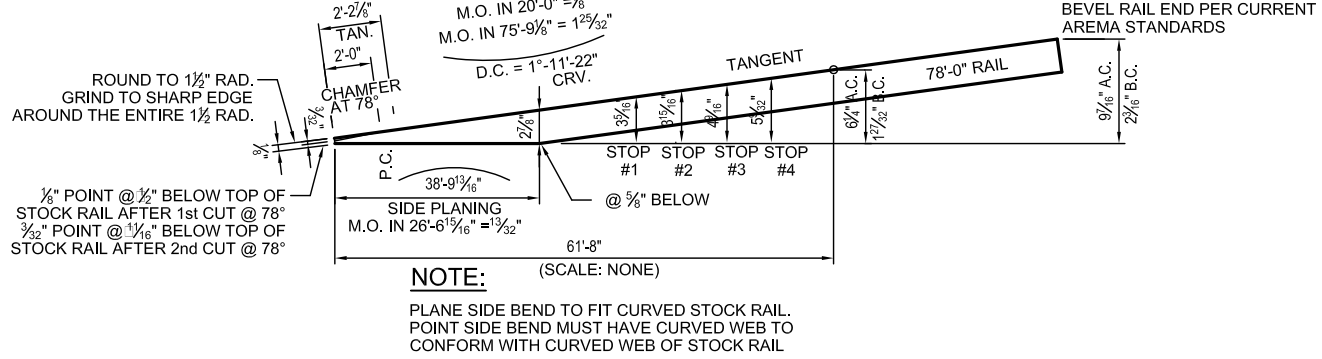
**NORTH COUNTY
TRANSIT DISTRICT**
810 Mission Avenue
Oceanside, CA 92054
www.gonctd.com

ENGINEERING STANDARD DRAWINGS
NO. 24 TANGENTIAL TURNOUT AND CROSSOVER
INSULATED JOINT DIAGRAM

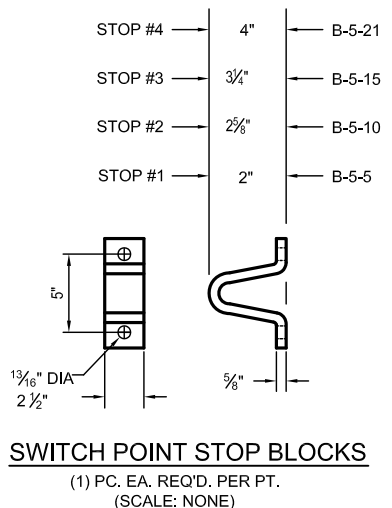
DRAWING NO. ESD-2951-11
DRAWING SHEET NO. 11 OF 15
SCALE: NONE
CONTRACT SHEET NO.



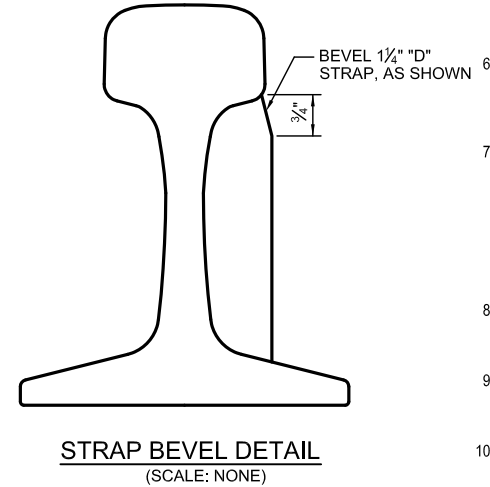
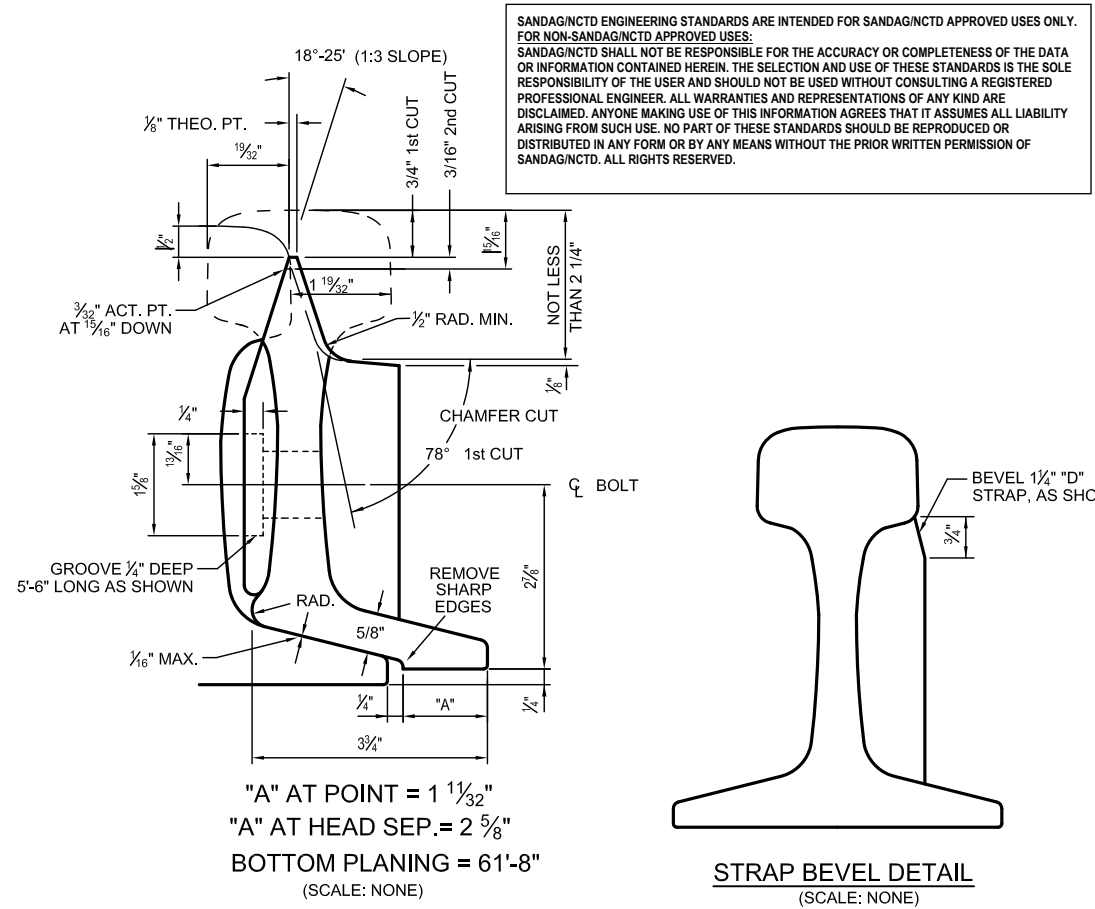
R.H. SW PT. (FOR LH TURNOUT) SHOWN
L.H. SW. PT. (FOR RH TURNOUT) OPP. HAND
(SCALE: NONE)



QUANTITIES SHOWN FOR (1) SWITCH POINT	
REIN. BARS	GAGE SIDE 1 1/4" "D" x 37'-0" LG. } USE 132RE REINF. STOCK RAIL SIDE 1/2" "D" x 37'-0" LG.
CLIPS	HEAD ROD TYPE "MJS" (FURNISHED WITH ROD) BACK RODS TYPE "MJS" (FURNISHED WITH ROD)
WEB BOLTS	HEAD ROD 1" DIA. (FURNISHED WITH ROD) BACK ROD 1" DIA. (FURNISHED WITH ROD)
ROD BOLTS	HEAD ROD 1" DIA. (FURNISHED WITH ROD) BACK ROD 1" DIA. (FURNISHED WITH ROD)
STOP BOLTS	SEE BOLT TABLE
REIN BAR	HUCKS - SEE BOLT TABLE BOLTS - SEE BOLT TABLE
INSTRUCTIONS	RAIL TO BE 136RE HEAD HARDENED

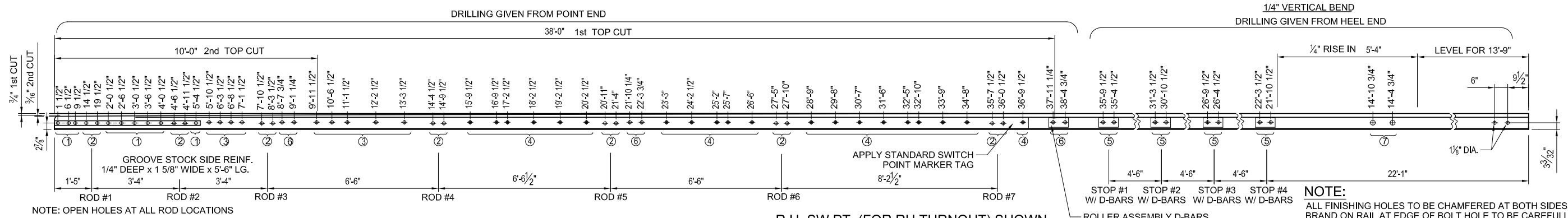


BOLT TABLE		QTY.	HOLE DIA.	A.B.
BOLT #	BOLT DESCRIPTION			
1	H.T. MACH., TH. SQ. HD., 1" x 4 1/2", DR. 4, W/SQ. NUT, SPRG. WASH. & 1/4" COTT.	9	1 1/16"	2 7/8"
2	NONE - OPEN TYPE "MJS" CLIP HOLES (PER 99-1054 sh.1-7)	—	1 1/16"	2 7/8"
3	H.T. MACH., TH. SQ. HD., 1" x 4 3/4", DR. 4 1/4, W/SQ. NUT, SPRG. WASH. & 1/4" COTT.	9	1 1/16"	3 1/4"
4	HUCK PIN C50LR-BR-24-36 WITH COLLAR LC-2R-24	20	13/16"	3 1/4"
5	H.T. MACH., SQ. HD., 3/4" x 4 1/4", DR. 3 3/4, W/SQ. NUT, SPRG. WASH. & 1/4" COTT.	8	13/16"	3 1/4"
6	NONE - OPEN ROLLER HOLES (PER 94-4119 sh.1)	—	15/16"	3 1/4"
7	NONE - OPEN THERMAL STRESS BLOCK HOLES (PER 99-1056 sh.1)	—	1 1/2"	3 1/4"



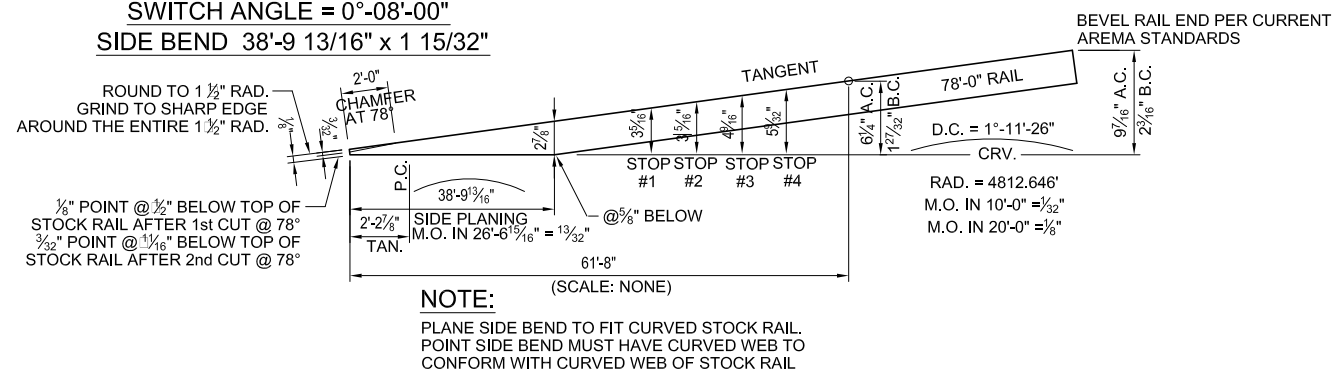
- NOTES:
- SWITCH POINTS TO BE MADE FROM NEW HIGH STRENGTH RAIL.
 - CURVED LEFT HAND SWITCH POINT AND STRAIGHT HAND SWITCH POINT FOR RIGHT HAND TURNOUT SHOWN. MAKE OPPOSITE HAND FOR RIGHT AND LEFT HAND SWITCH POINTS FOR LEFT HAND TURNOUT.
 - SIDE PLANING FIGURED ON GAGE LINE 5/8" BELOW TOP OF RAIL.
 - MATERIALS AND WORKMANSHIP, ALSO ANY CONSTRUCTION DETAILS NOT SHOWN, SHALL BE PER CURRENT A.R.E.M.A. "MANUAL AND PORTFOLIO", UNLESS OTHERWISE SPECIFIED ON THIS PLAN.
 - IN ORDER TO ELIMINATE STRESS RAISERS, MANUFACTURER SHALL PEEN THE EDGES OF THE BOLT HOLES AS INDICATED AT THE HEEL OF SWITCH POINT AND AT THE HEEL END OF THE SWITCH POINT RAIL, USING AIR HAMMER WITH SUITABLE HEAD AND FINISHING WITH DRIFT PIN. BRAND ON RAIL AT EDGE OF BOLT HOLE TO BE CAREFULLY REMOVED BY GRINDING BEFORE PEENING.
 - THE CONTOUR PLANING SHALL BE ON THE GAGE SIDE BEGINNING AT A DISTANCE OF 7'-6" FROM THE POINT OF SWITCH AND SHALL BE SHAPED TO THE CONTOUR OF A NEW 136 LB. RAIL AND SHALL RUN OUT AT THE END OF TOP PLANING, WHERE THE HEAD HAS FULL HEAD CONTOUR.
 - METAL IDENTIFICATION TAG SHOWING (1) DESIGN LENGTH OF SWITCH, (2) IN PARENTHESIS, THE ACTUAL LENGTH OF SWITCH POINT RAIL AND (3) THE TURNOUT NUMBER. MARK TAG THUS: 61'-8" (78'-0") NO. 24. TAG TO BE FASTENED TO SWITCH POINT, ON GAGE SIDE OF RAIL AT HEEL SPACER BLOCK IN LOCATION SHOWN. A SECOND METAL IDENTIFICATION TAG SHOWING HAND OF SWITCH POINT, WEIGHT OF RAIL, HS, MANUFACTURER AND WHEN MADE, TO BE FASTENED TO SWITCH POINT AT LOCATION SHOWN.
 - UNLESS SPECIFIED ON ORDER, FRONT ROD LUG BOLTS AND TRANSIT CLIPS FOR SWITCH RODS NO. 1, 2, 3, 4, 5 AND 6 COMPLETE WITH SWITCH POINTS WILL NOT BE FURNISHED WITH SWITCH POINTS.
 - AT HEEL END OF SWITCH POINT RAIL, BREAK SHARP CORNER AROUND THE ENTIRE PERIPHERY BY SLIGHTLY GRINDING. ALSO, "DO NOT" END HARDEN RAIL END.
 - MANGANESE TIP SHALL BE USED ON BOTH POINTS.

REVISIONS		DRAWN RAILPROS	<p>SAN DIEGO ASSOCIATION OF GOVERNMENTS 401 B Street, Suite 800 San Diego, CA. 92101 www.sandag.org</p>	<p>810 Mission Avenue Oceanside, CA 92054 www.gonctd.com</p>	<p>ENGINEERING STANDARD DRAWINGS</p> <p>NO. 24 TANGENTIAL TURNOUT - 61'-8" CURVED SPLIT SWITCH POINT</p>	DRAWING NO. ESD-2951-12		
		CHECKED B. SMITH				DRAWING SHEET NO. 12 OF 15		
		RECOMMENDED W. PREY				SCALE: NONE		
REV.	DATE	DESCRIPTION				DES.	ENG.	DATE



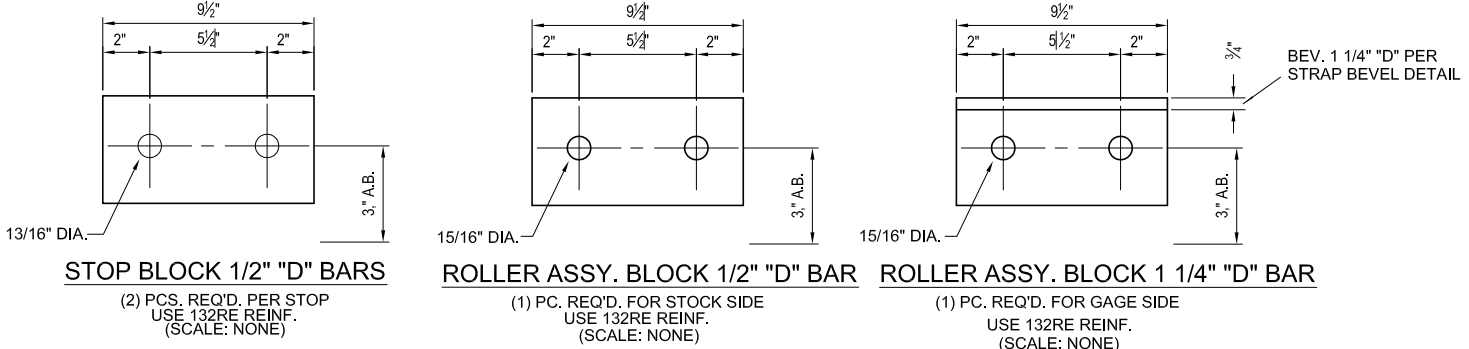
NOTE:
ALL FINISHING HOLES TO BE CHAMFERED AT BOTH SIDES.
BRAND ON RAIL AT EDGE OF BOLT HOLE TO BE CAREFULLY
REMOVED BY GRINDING, BEFORE CHAMFERING.

SWITCH ANGLE = 0°-08'-00"
SIDE BEND 38'-9 13/16" x 1 15/32"

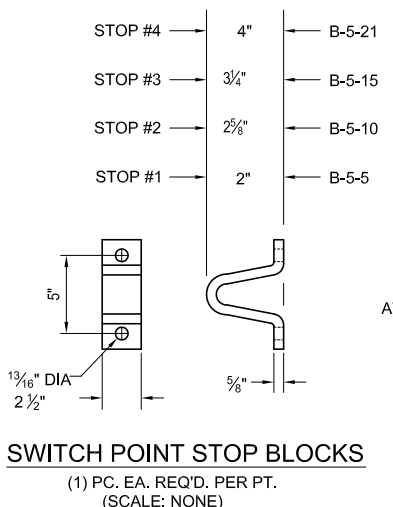


NOTE:
PLANE SIDE BEND TO FIT CURVED STOCK RAIL.
POINT SIDE BEND MUST HAVE CURVED WEB TO
CONFORM WITH CURVED WEB OF STOCK RAIL

R.H. SW PT. (FOR RH TURNOUT) SHOWN
L.H. SW. PT. (FOR LH TURNOUT) OPP. HAND
(SCALE: NONE)



QUANTITIES SHOWN FOR (1) SWITCH POINT			
REIN. BARS	GAGE SIDE	1 1/4" "D" x 37'-0" LG.	} USE 132RE REINF.
	STOCK RAIL SIDE	1/2" "D" x 37'-0" LG.	
CLIPS	HEAD ROD	TYPE "MJS" (FURNISHED WITH ROD)	
	BACK RODS	TYPE "MJS" (FURNISHED WITH ROD)	
WEB BOLTS	HEAD ROD	1" DIA. (FURNISHED WITH ROD)	
	BACK ROD	1" DIA. (FURNISHED WITH ROD)	
ROD BOLTS	HEAD ROD	1" DIA. (FURNISHED WITH ROD)	
	BACK ROD	1" DIA. (FURNISHED WITH ROD)	
STOP BOLTS	SEE BOLT TABLE		
REIN BAR	HUCKS - SEE BOLT TABLE BOLTS - SEE BOLT TABLE		
INSTRUCTIONS	RAIL TO BE 136RE HEAD HARDENED		

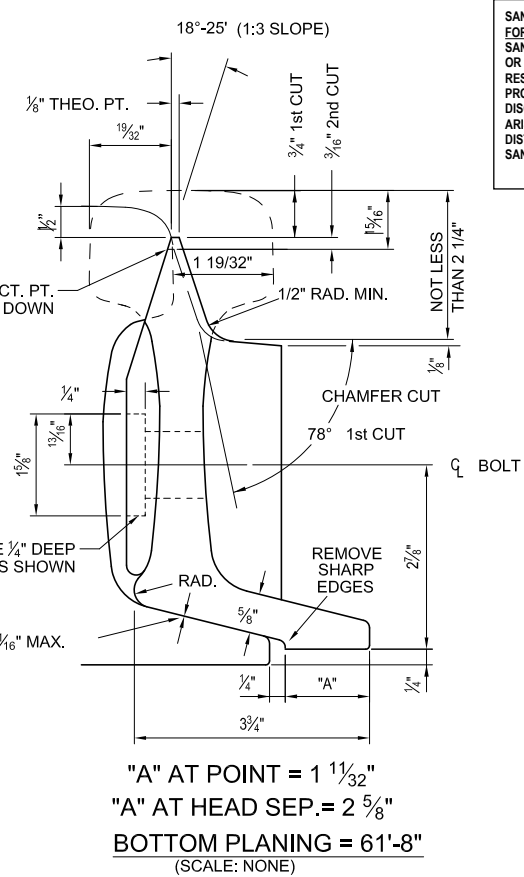


SWITCH POINT STOP BLOCKS
(1) PC. EA. REQ'D. PER PT.
(SCALE: NONE)

- HUCKS
- BOLTS

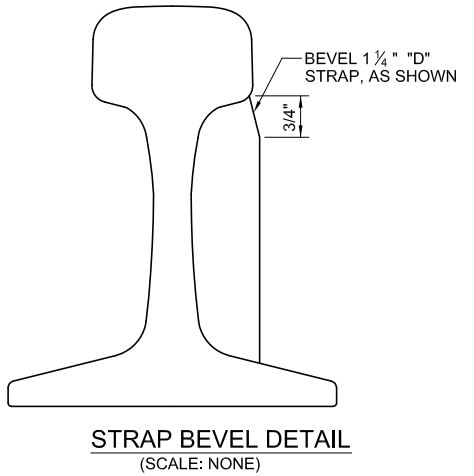
BOLT TABLE

BOLT #	BOLT DESCRIPTION	QTY.	HOLE DIA.	A.B.
1	H.T. MACH., TH. SQ. HD., 1" x 4 1/2", DR. 4", W/SQ. NUT, SPRG. WASH. & 1/4" COTT.	9	1 1/16"	2 7/8"
2	NONE - OPEN TYPE "MJS" CLIP HOLES (PER 99-1054 sh.1-7)	—	1 1/16"	2 7/8"
3	H.T. MACH., TH. SQ. HD., 1" x 4 3/4", DR. 4 1/4", W/SQ. NUT, SPRG. WASH. & 1/4" COTT.	9	1 1/16"	3 1/4"
4	HUCK PIN C50LR-BR-24-36 WITH COLLAR LC-2R-24	20	13/16"	3 1/4"
5	H.T. MACH., SQ. HD., 3/4" x 4 1/4", DR. 3 3/4", W/SQ. NUT, SPRG. WASH. & 1/4" COTT.	8	13/16"	3 1/4"
6	NONE - OPEN ROLLER HOLES (PER 94-4119 sh.1)	—	15/16"	3 1/4"
7	NONE - OPEN THERMAL STRESS BLOCK HOLES (PER 99-1056 sh.1)	—	1 1/2"	3 1/4"



"A" AT POINT = 1 11/32"
"A" AT HEAD SEP. = 2 5/8"
BOTTOM PLANING = 61'-8"
(SCALE: NONE)

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STRAP BEVEL DETAIL
(SCALE: NONE)

NOTES:

- SWITCH POINTS TO BE MADE FROM NEW HIGH STRENGTH RAIL.
- CURVED LEFT HAND SWITCH POINT AND STRAIGHT HAND SWITCH POINT FOR RIGHT HAND TURNOUT SHOWN. MAKE OPPOSITE HAND FOR RIGHT AND LEFT HAND SWITCH POINTS FOR LEFT HAND TURNOUT.
- SIDE PLANING FIGURED ON GAGE LINE 5/8" BELOW TOP OF RAIL.
- MATERIALS AND WORKMANSHIP, ALSO ANY CONSTRUCTION DETAILS NOT SHOWN, SHALL BE PER CURRENT A.R.E.M.A. "MANUAL AND PORTFOLIO", UNLESS OTHERWISE SPECIFIED ON THIS PLAN.
- IN ORDER TO ELIMINATE STRESS RAISERS, MANUFACTURER SHALL PEEN THE EDGES OF THE BOLT HOLES AS INDICATED AT THE HEEL OF SWITCH POINT AND AT THE HEEL END OF SWITCH POINT RAIL, USING AIR HAMMER WITH SUITABLE HEAD AND FINISHING WITH DRIFT PIN. BRAND ON RAIL AT EDGE OF BOLT HOLE TO BE CAREFULLY REMOVED BY GRINDING BEFORE PEENING.
- THE CONTOUR PLANING SHALL BE ON THE GAGE SIDE BEGINNING AT A DISTANCE OF 7'-6" FROM THE POINT OF SWITCH AND SHALL BE SHAPED TO THE CONTOUR OF A NEW 136 LB. RAIL AND SHALL RUN OUT AT THE END OF TOP PLANING, WHERE THE HEAD HAS FULL HEAD CONTOUR.
- METAL IDENTIFICATION TAG SHOWING (1) DESIGN LENGTH OF SWITCH, (2) IN PARENTHESIS, THE ACTUAL LENGTH OF SWITCH POINT RAIL AND (3) THE TURNOUT NUMBER. MARK TAG THUS: 61'-8" (78'-0") NO. 24. TAG TO BE FASTENED TO SWITCH POINT, ON GAGE SIDE OF RAIL AT HEEL SPACER BLOCK IN LOCATION SHOWN. A SECOND METAL IDENTIFICATION TAG SHOWING HAND OF SWITCH POINT, WEIGHT OF RAIL, HS, MANUFACTURER AND WHEN MADE, TO BE FASTENED TO SWITCH POINT AT LOCATION SHOWN.
- UNLESS SPECIFIED ON ORDER, FRONT ROD LUG BOLTS AND TRANSIT CLIPS FOR SWITCH RODS NO. 1, 2, 3, 4, 5 AND 6 COMPLETE WITH BOLTS WILL NOT BE FURNISHED WITH SWITCH POINTS.
- AT HEEL END OF SWITCH POINT RAIL, BREAK SHARP CORNER AROUND THE ENTIRE PERIPHERY BY SLIGHTLY GRINDING. ALSO, "DO NOT" END HARDEN RAIL END.
- MANGANESE TIP SHALL BE USED ON BOTH POINTS.

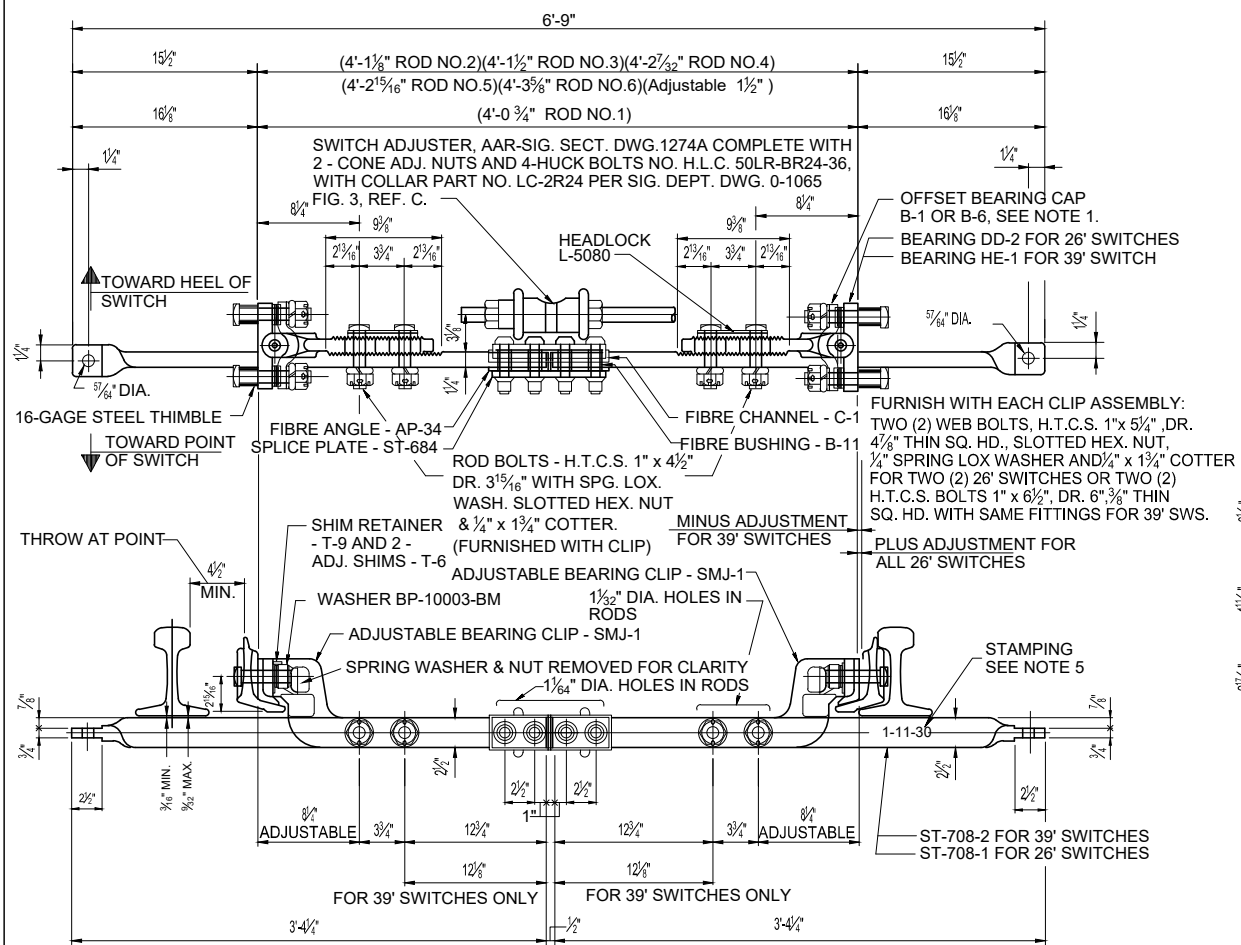
REV.	DATE	DESCRIPTION	DES.	ENG.

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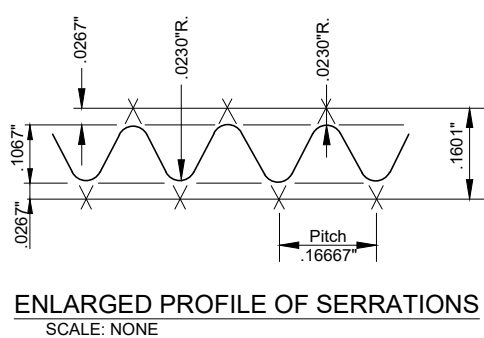
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ENGINEERING STANDARD DRAWINGS
NO. 24 TANGENTIAL TURNOUT -
61'-8" STRAIGHT SPLIT SWITCH
POINT

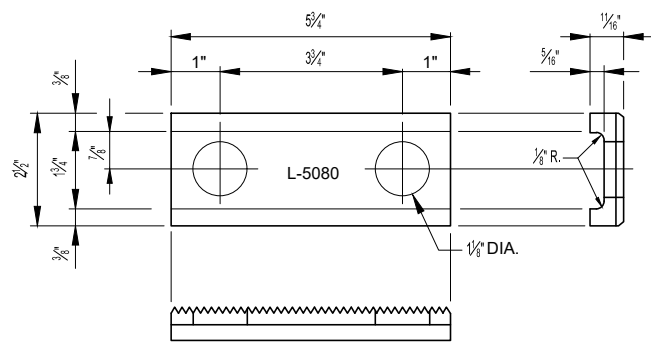
DRAWING NO.	ESD-2951-13
DRAWING SHEET NO.	13 OF 15
SCALE:	NONE
CONTRACT SHEET NO.	



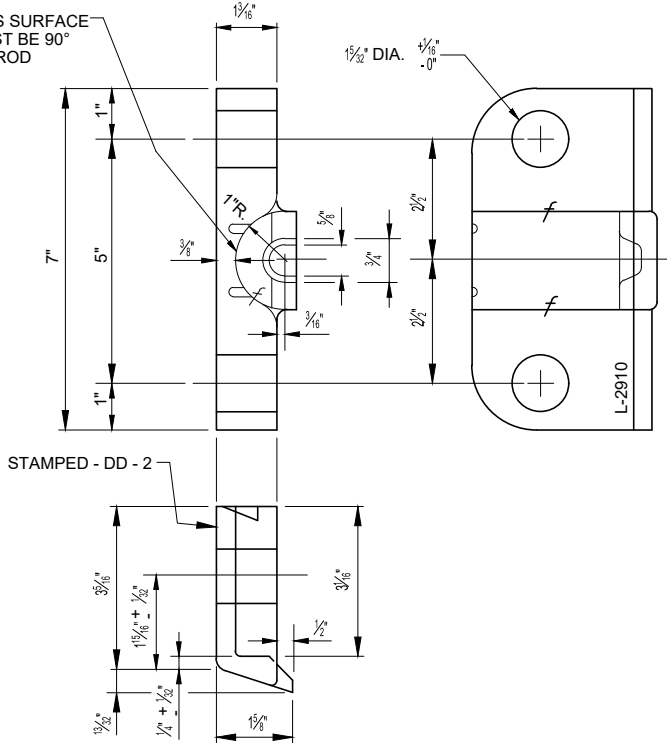
NO. 1 SWITCH ROD ASSEMBLY
(SHOWN FOR MACHINE ON RIGHT) SEE NOTE 2



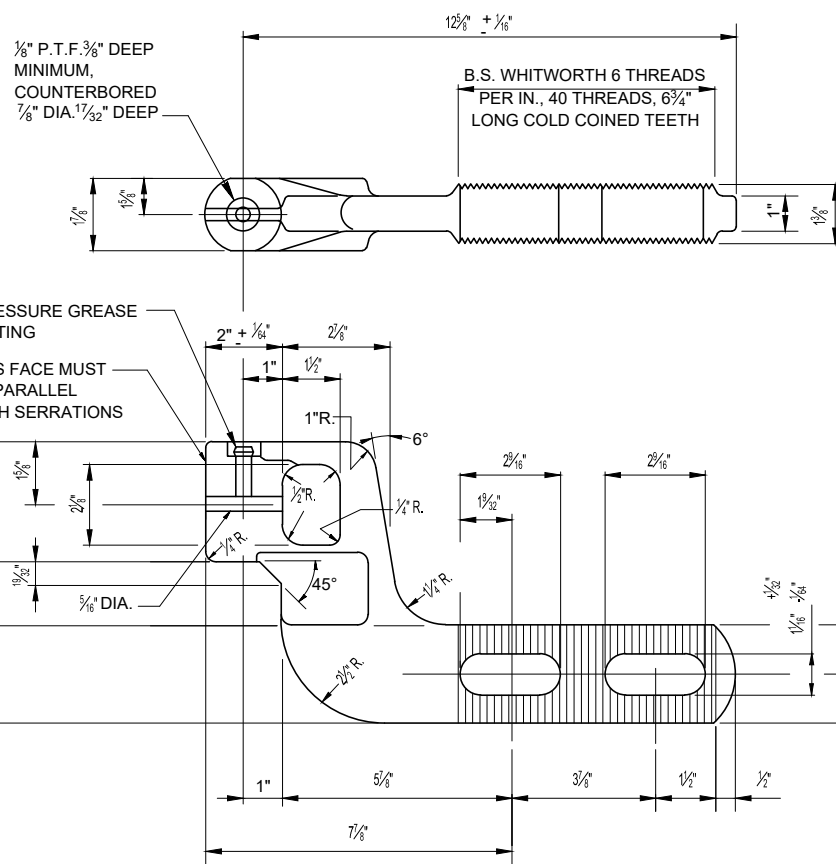
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SCALE: NONE



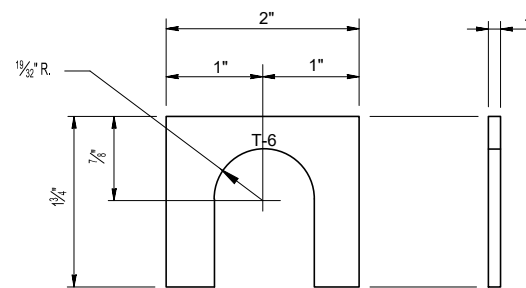
HEADLOCK L-5080
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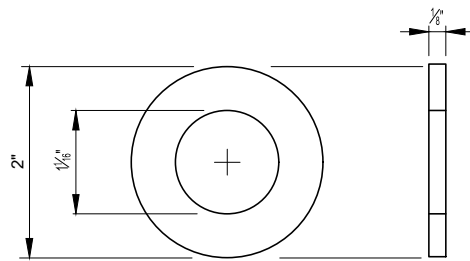
BEARING - DD - 2
SCALE: NONE



ADJUSTABLE BEARING CLIP - SMJ - 1
SCALE: NONE

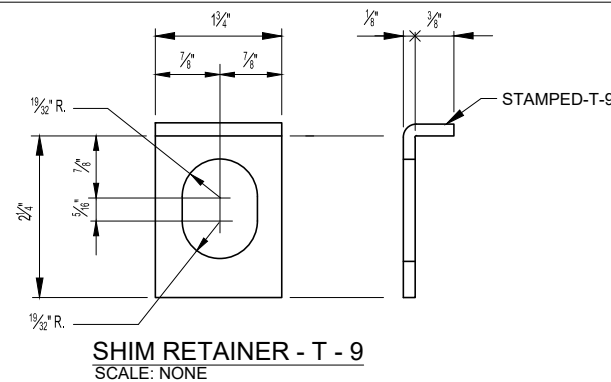


ADJUSTABLE SHIM - T - 6
SCALE: NONE



WASHER - BP - 10003 - BM
SCALE: NONE

BILL OF MATERIAL FOR 1 TYPE "SMJ" SWITCH ROD ASSEMBLY					
LENGTH OF SWITCH	MATERIAL FOR CLIP ASSEMBLIES				
	QTY.	PART NUMBER	MATERIAL SPECIF.	DESCRIPTION	DETAIL REMARKS
All	2	SMJ-1	S.A.E. 1020-FOR.STL.	Bearing Clip	MACHINED PER DETAIL
All	4		H.T.C.S.	WEB BOLT	SEE NOTE
26'	2	DD-2	MALLEABLE IRON	BEARING	PAT. NO. L-2910, MACHINED PER DETAIL
39'	2	HE-1	MALLEABLE IRON	BEARING	PAT. NO. L-2915, MACHINED PER DETAIL
26'	2	B-1	S.A.E. 1045-FOR.STL.	OFFSET BEARING CAP	HEAT TREATED - BRINELL - .225 to .250
39'	2	B-6	S.A.E. 1045-FOR.STL.	OFFSET BEARING CAP	HEAT TREATED - BRINELL - .225 to .250
26'	2	B-6	S.A.E. 1045-FOR.STL.	OFFSET BEARING CAP	HEAT TREATED - BRINELL - .225 to .250
All	4	T-9	S.A.E. 1020	SHIM RETAINER	1/8" x 1 1/4" x 2 1/4"
All	12	T-6	STAINLESS STEEL	ADJUSTMENT SHIM	1/8" x 2" x 1 1/8"
All	4	BP-10003-BM	MALLEABLE IRON	WASHER	1 1/2" I.D. x 2" O.D. x 1/8" THICK
All	4		H.T.C.S.	ROD BOLT	1" x 4 1/2" DR. 3 15/16" REG. SQ. HD. SLOTTED HEX NUT
All	4		STEEL	SPG. LOX WASHER	For 1" Rod Bolts
All	4		STEEL	COTTER	1/4" x 1 1/4" FOR ROD BOLTS
All	2		STEEL	GREASE FITTING	PRESSURE - FOR BEARING CLIP
All	2	L-5080	MALLEABLE IRON	HEADLOCK	FOR ROD BOLTS
26'	2		16-GAGE STEEL	THIMBLE	1 1/2" LONG - FOR SHIPPING
39'	2		16-GAGE STEEL	THIMBLE	2 1/2" LONG - FOR SHIPPING
MATERIAL FOR VERTICAL ROD					
16'-6"	1			VERTICAL ROD	USE ONE-ST-708-1 TWIST, MACHINE AND DRILL END HOLE
39'	1			VERTICAL ROD	USE ONE-ST-708-1 TWIST, MACHINE AND DRILL END HOLE
All	4		HIGH STRENGTH STEEL	CONN. & INSUL. BOLT	HIGH FASTENER NO. HLC-50LR-BR24-36
All	4		LOW CARBON STEEL	COLLAR	HUCK FASTENER NO. LC-2R24
All	1	ST-684	H.R. MILD STEEL	SPLICE PLATE	1/2" x 2 1/2" x 9 1/2" FOR INSULATION
All	2	AP-34	AAR-Sig.Sec.13-52	ANGLE	1/2" x 2 1/2" x 4 1/2" HARD FIBRE - PARAFIN COATED
All	4	B-11	AAR-Sig.Sec.13-52	BUSHING	1" O.D. HARD FIBRE - PARAFIN COATED
All	1	C-1	AAR-Sig.Sec.13-52	CHANNEL	1/8" x 1" x 10" HARD FIBRE - PARAFIN COATED
All	1		MALLEABLE IRON	SWITCH ADJUSTER	
All	2		MALLEABLE IRON	CONE ADJ. NUT	FOR 1 1/4" THROW RODS



SHIM RETAINER - T - 9
SCALE: NONE

NOTES:

- WHILE THIS PLAN SHOWS BEARING CLIPS ASSEMBLED TO SWITCH ROD THIS CLIP ASSEMBLY MAY BE REQUISITIONED AND ORDERED SEPARATELY. WHEN A BEARING CLIP ASSEMBLY ONLY IS WANTED, REQUISITIONS AND ORDERS SHALL SPECIFY, RAIL SECTION AND LENGTH OF SWITCH. ALL PARTS SHOWN IN BILL OF MATERIAL SHALL BE FURNISHED WITH THESE CLIP ASSEMBLIES. WHEN AN INDIVIDUAL PART IS REQUIRED IT SHALL BE ORDERED BY PART NUMBER.
- WHEN COMPLETED RODS ARE ORDERED THEY SHALL BE ASSEMBLED AND INCLUDE ALL PARTS SHOWN IN BILL OF MATERIAL. REQUISITIONS AND ORDERS SHALL SPECIFY RAIL SECTION AND LENGTH OF SWITCH. ON INTERLOCKED SWITCHES WITH AUXILIARY THROW ROD, MACHINE SIDE (RIGHT OR LEFT) SHOULD ALSO BE SPECIFIED.

"NOTES CONTINUED ON SHEET - DWG. ESD-2951-15"

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REV.	DATE	DESCRIPTION	DES.	ENG.

REVISIONS	DRAWN RAILPROS
	CHECKED B. SMITH
	RECOMMENDED W. PREY
	DATE 2/2/15
	DESIGNER PE STAMP

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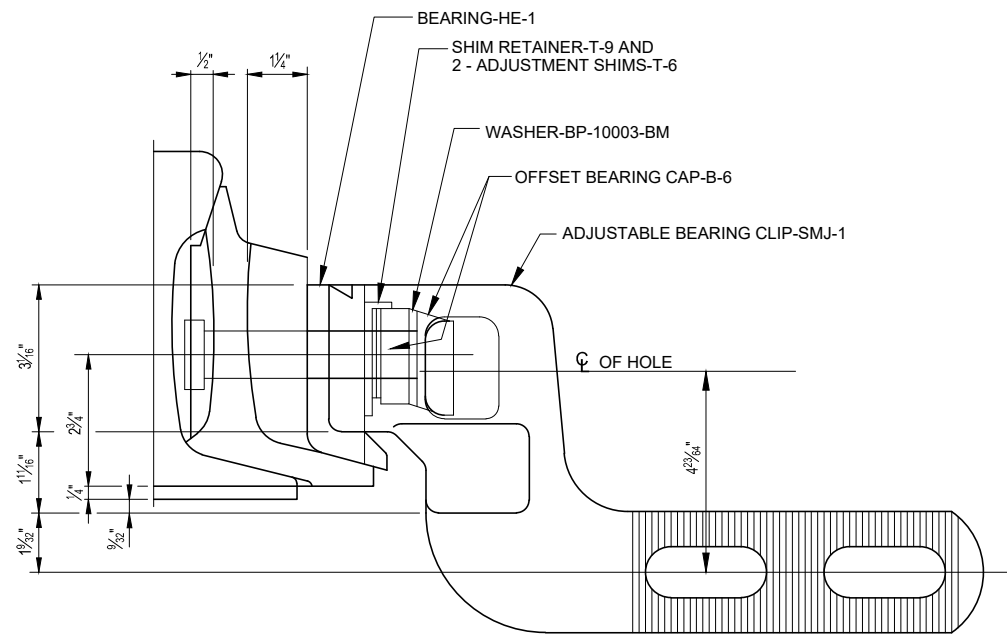
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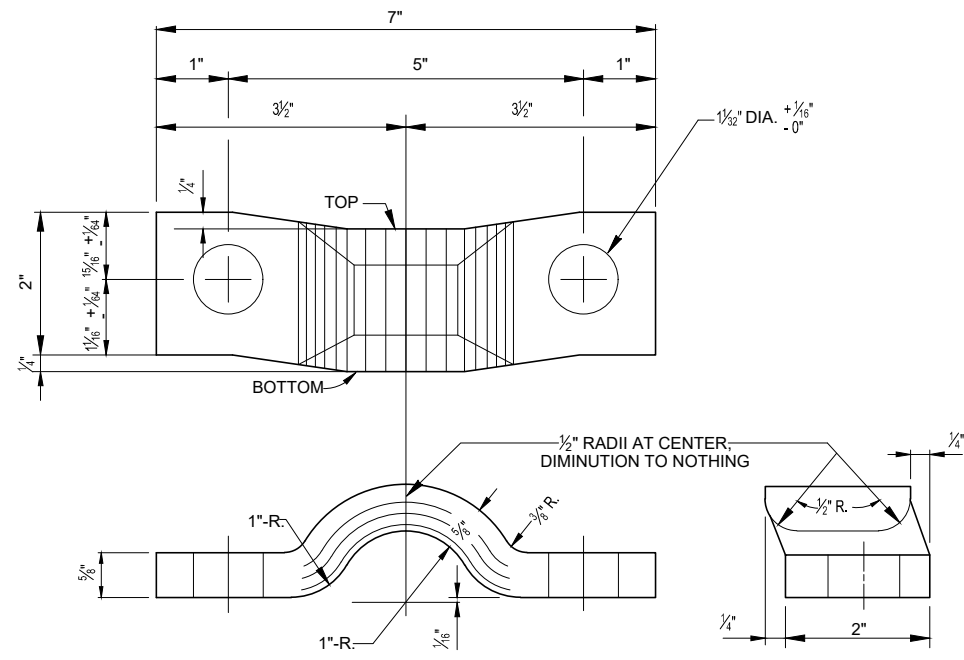
ENGINEERING STANDARD DRAWINGS

DRAWING NO. ESD-2951-14
DRAWING SHEET NO. 14 OF 15
SCALE: NONE
CONTRACT SHEET NO.

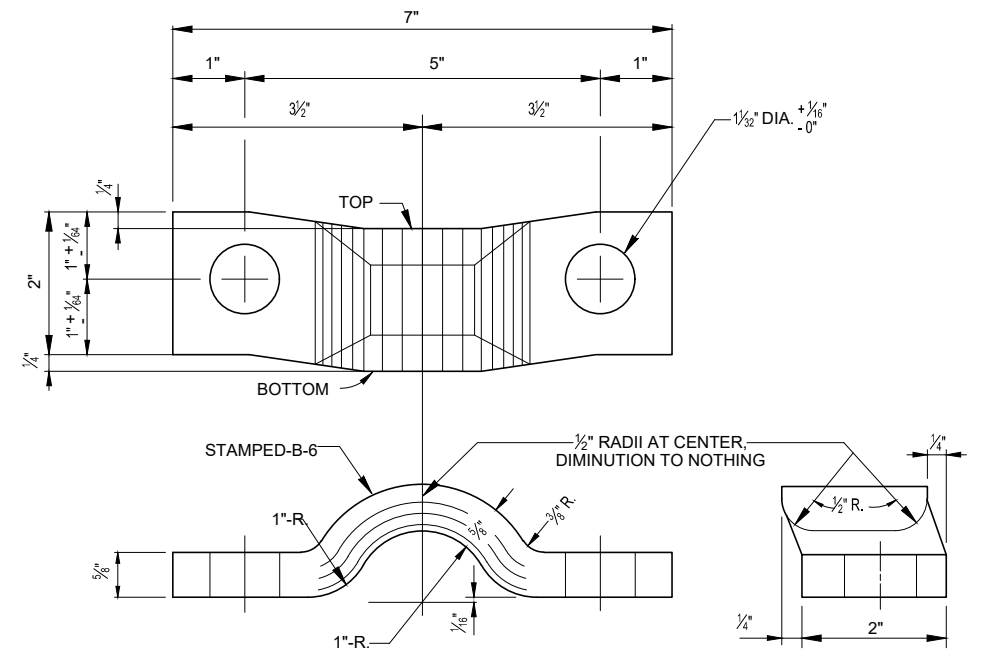
NO. 24 TANGENTIAL TURNOUT - SWITCH RODS AND MISC. DETAILS
(1 OF 2)



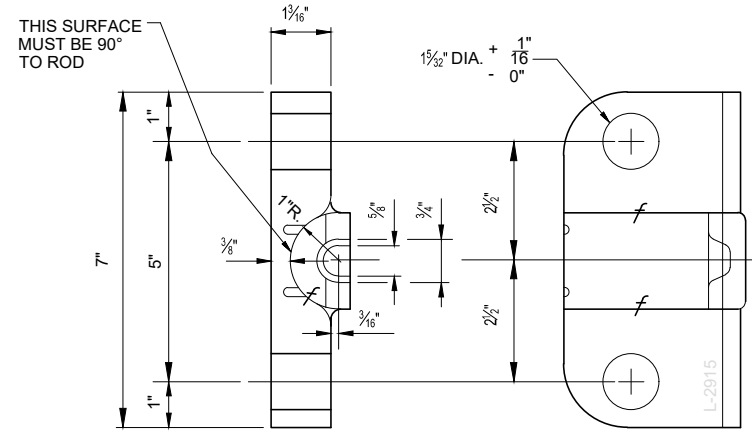
ELEVATION OF "SMJ"CLIP ASSEMBLY FOR 39' SWITCHES
 (DRAWN FOR 136 LB. RAIL) SPRING WASHER AND NUT REMOVED



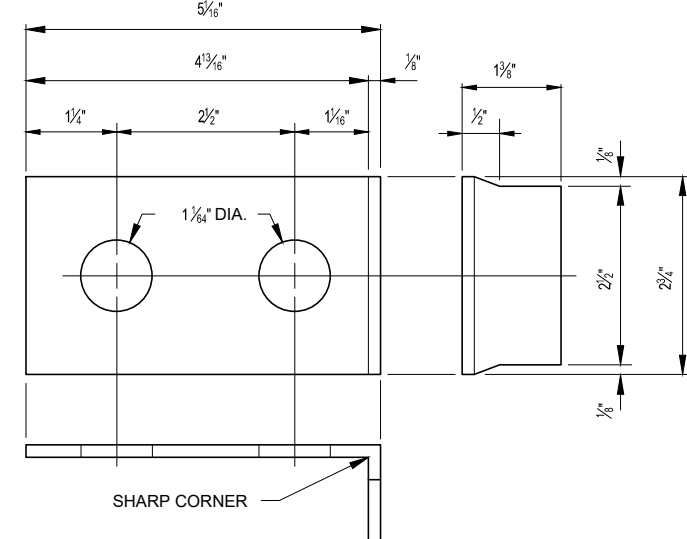
OFFSET BEARING CAP-B-6
 SCALE: NONE



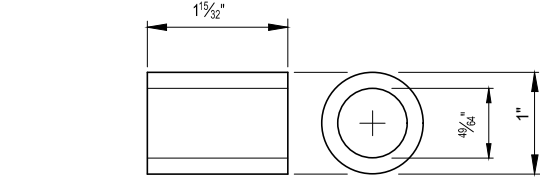
OFFSET BEARING CAP-B-6
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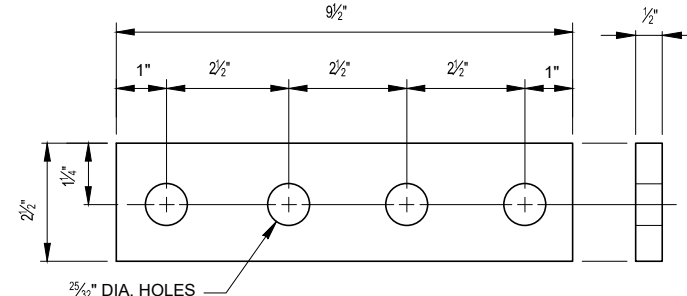
BEARING-HE-1
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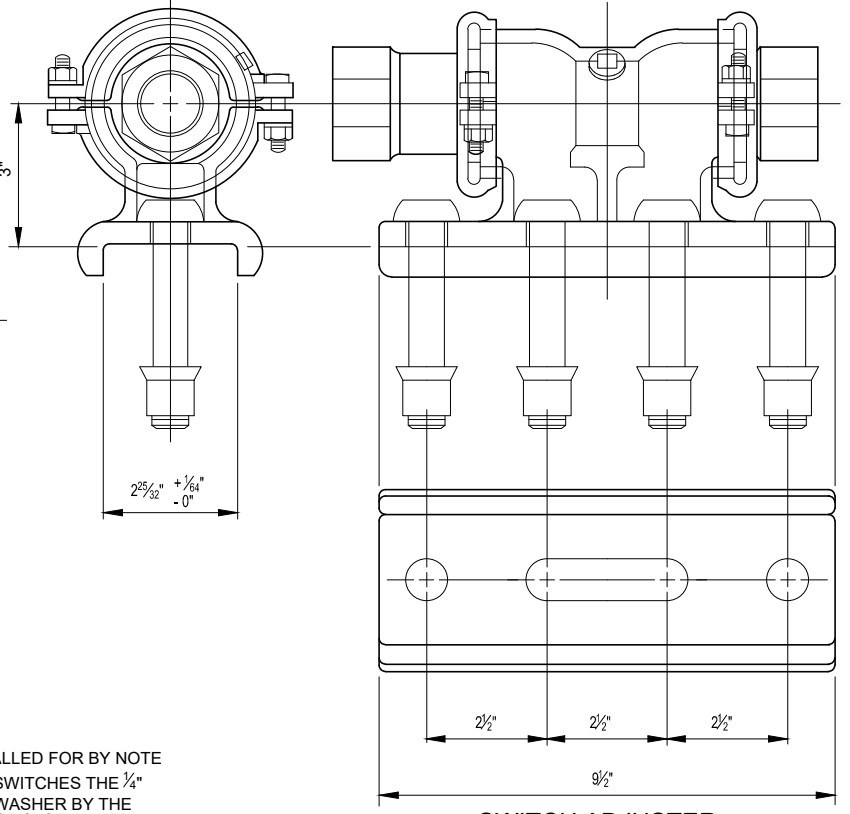
FIBRE ANGLE-AP-34
 SCALE: NONE



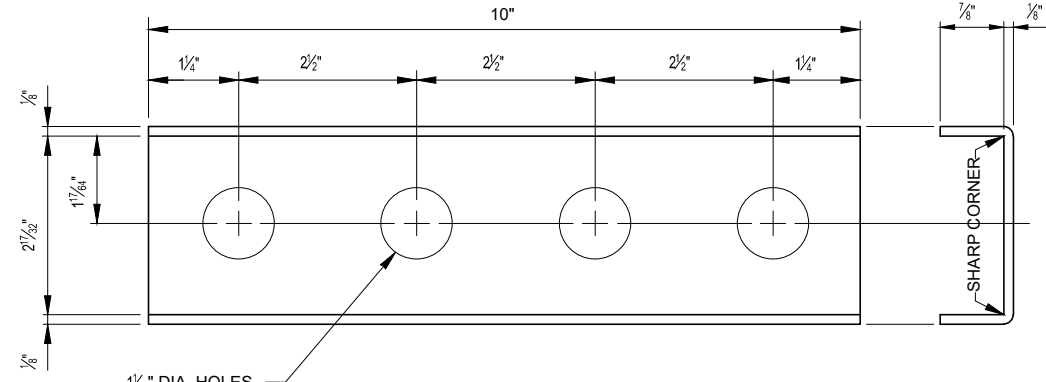
FIBRE BUSHING-B-11
 SCALE: NONE



SPLICE PLATE-ST-684
 SCALE: NONE



SWITCH ADJUSTER
 SCALE: NONE



FIBRE CHANNEL-C-1
 SCALE: NONE

NOTES: (CONTINUED FROM SHEET 14)

- TWO WEB BOLTS SHALL BE FURNISHED WITH EACH CLIP ASSEMBLY AS CALLED FOR BY NOTE IN TOP VIEW OF ROD ASSEMBLY. WHEN ROD IS USED ON 11'-0" AND 16'-6" SWITCHES THE 1/4" THICK SPRING WASHER SHOULD BE REPLACED WITH A 3/8" THICK SPRING WASHER BY THE STOREKEEPER OR FIELD FORCES, TO BRING COTTER WITHIN THE LIMITS OF SLOT IN WEB BOLT NUTS.
- MATERIALS AND WORKMANSHIP SHALL MEET CURRENT A.R.E.M.A. SPECIFICATIONS FOR SPECIAL TRACKWORK UNLESS OTHERWISE SPECIFIED.
- VERTICAL SWITCH ROD SHALL BE PLAINLY STAMPED TO INDICATE SWITCH THAT ROD ASSEMBLY CAN BE USED UPON. IDENTIFICATION MARKING WILL BE AS FOLLOWS:
 1-39 FOR USE ON 39'-0" SWITCHES, 132-LB. AND 136-LB. RAIL SECTIONS.
 1-11-30 FOR USE ON 11'-0" TO 30'-0" SWITCHES, 115-LB., 119-LB., 131-LB., 132-LB., 136-LB. R.E. RAIL SECTIONS.

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REVISIONS		DES.	ENG.
REV.	DATE	DESCRIPTION	DES. ENG.

DRAWN
RAILPROS

CHECKED
B. SMITH

RECOMMENDED
B. SCHMITH

DATE
2/2/15

DESIGNER PE STAMP

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ENGINEERING STANDARD DRAWINGS

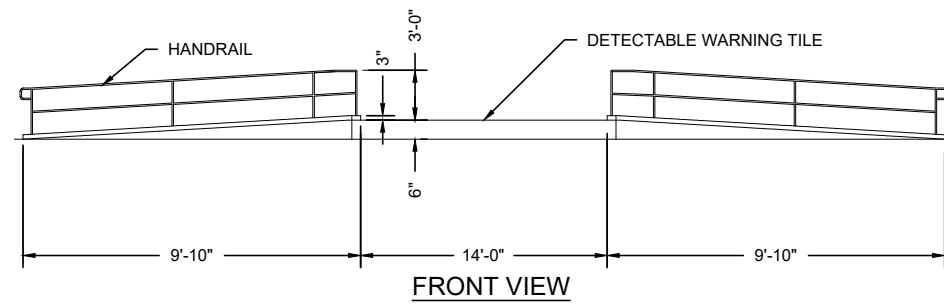
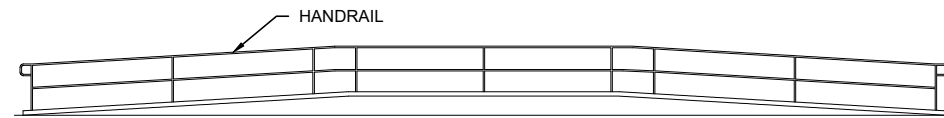
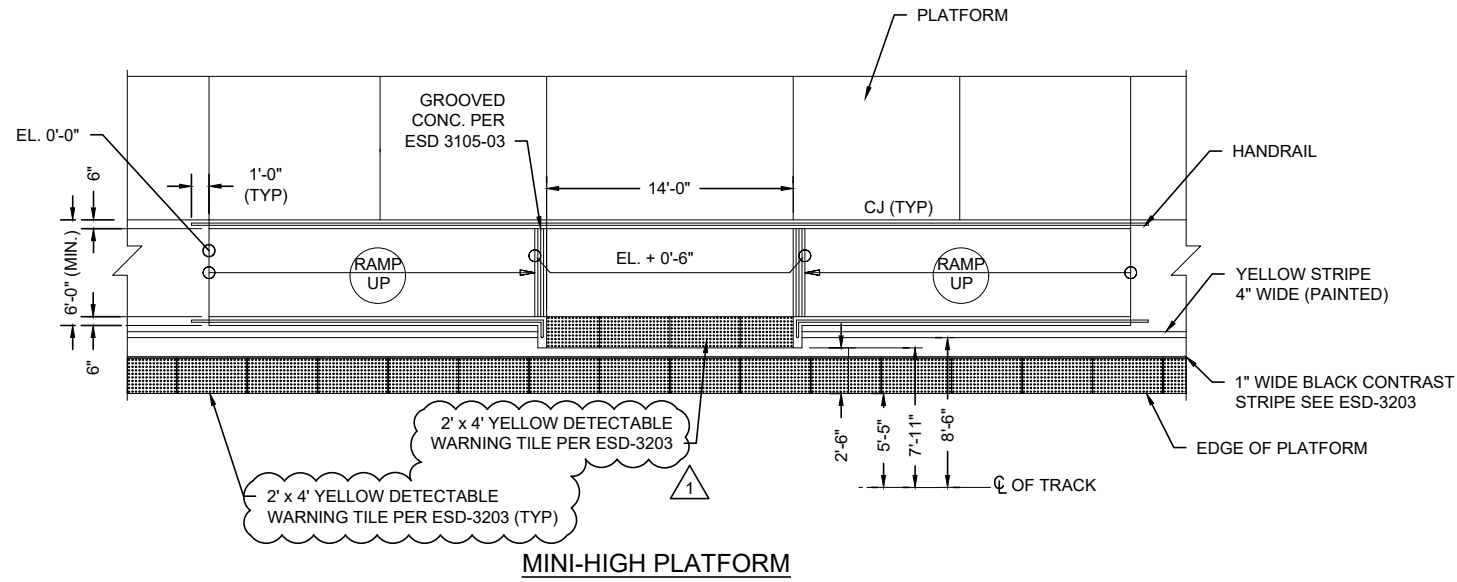
NO. 24 TANGENTIAL TURNOUT - SWITCH RODS AND MISC. DETAILS
 (2 OF 2)

DRAWING NO.	ESD-2951-15
DRAWING SHEET NO.	15 OF 15
SCALE:	NONE
CONTRACT SHEET NO.	

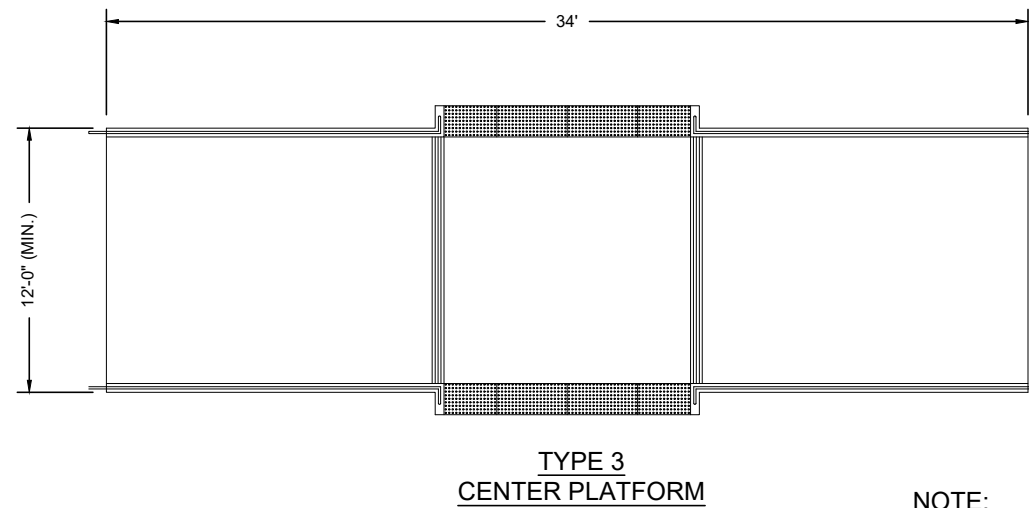
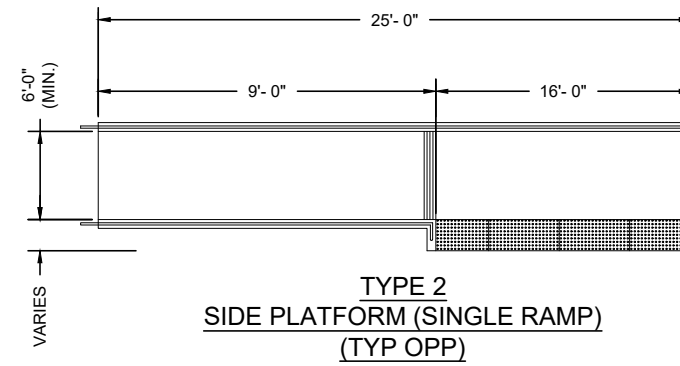
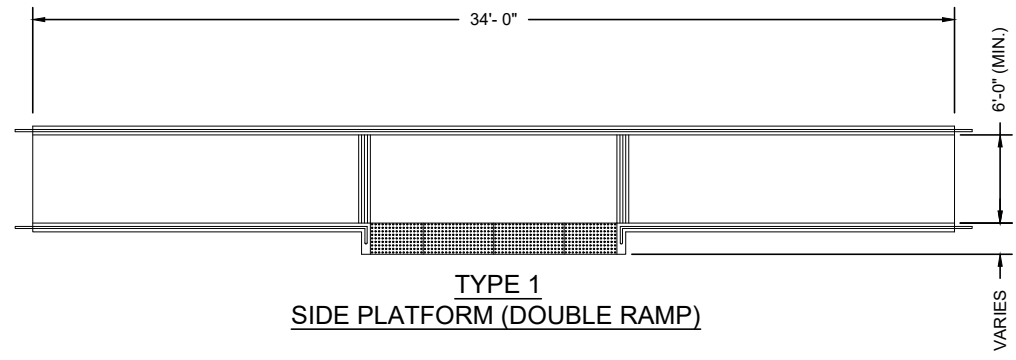
LOSSAN ENGINEERING STANDARD DRAWINGS

Section 3000

STATIONS



MINI-HANDRAIL



PLATFORM SCHEDULES

NOTE:

1. MINI-HIGH PLATFORM DESIGN, MATERIAL, FABRICATION AND INSTALLATION SHALL BE AS PER SANDAG SPECIFICATIONS.
2. MAXIMUM RAMP SLOPE = 12:1. (1 FOOT OF LENGTH FOR EACH INCH OF RISE.)

REV.	DATE	DESCRIPTION	DES.	ENG.
1	9/23/22	ADDED REFERENCE TO DETECTABLE WARNING TILE & UPDATED PATTERN	SH	DB
<p>△ REVISIONS</p> <p>DRAWN RAILPROS</p> <p>CHECKED A. ANDERSON</p> <p>RECOMMENDED B. SMITH</p> <p>DATE SEPT 2022</p>				

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DESIGNER PE STAMP

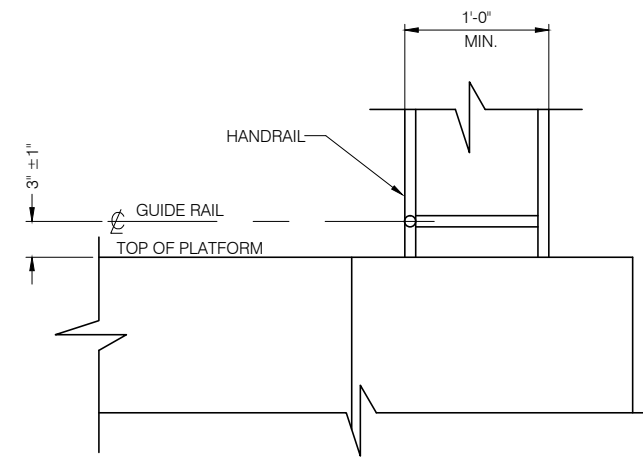
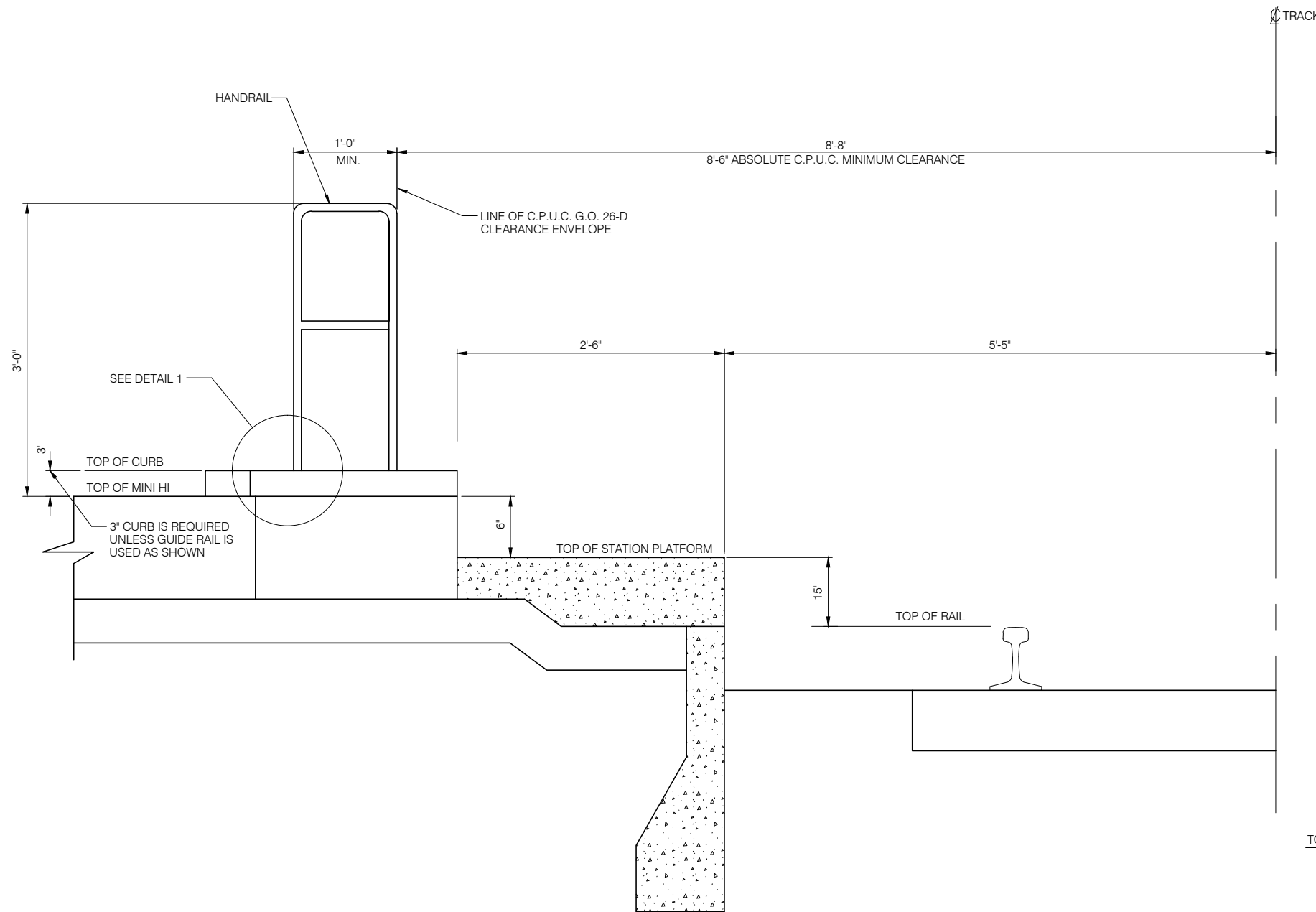


ENGINEERING STANDARD DRAWINGS

MINI HI PLATFORM LAYOUT
STATION PLATFORM 15"
ABOVE TOP OF RAIL

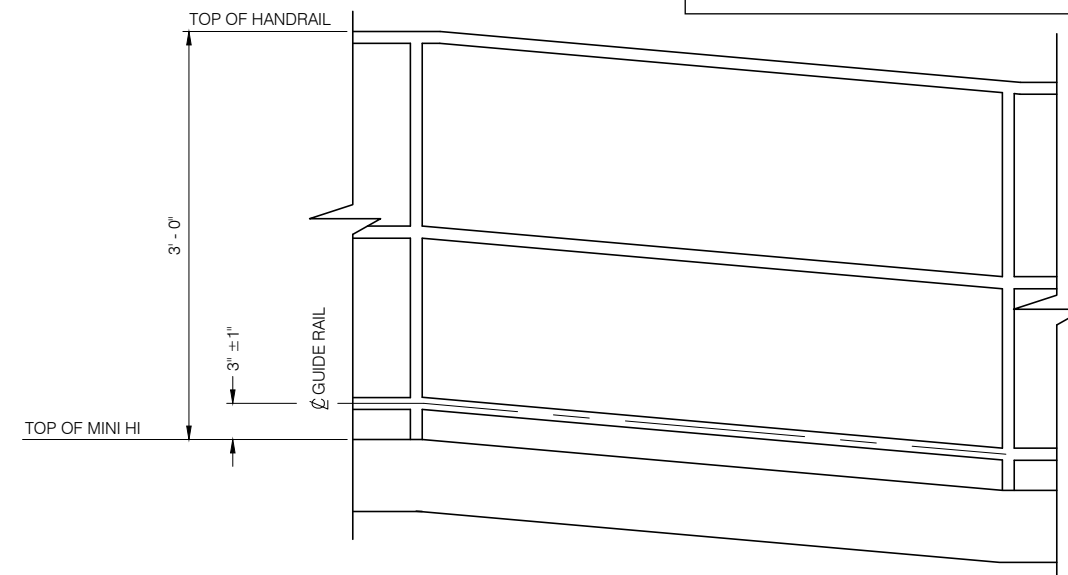
DRAWING NO.	ESD-3101-01
DRAWING SHEET NO.	1 OF 4
SCALE:	NONE
CONTRACT SHEET NO.	

NOTE:
 CLEARANCE SHOWN WILL ALSO APPLY TO HANDRAILS PARALLEL TO THE TRACK E.G. APPROACH RAMPS TO THE ADA PLATFORM.



DETAIL 1

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USE OF GUIDE RAIL IN LIEU OF 6" CURB

REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN RAILPROS
CHECKED B. SMITH <i>BSM</i>
RECOMMENDED B. SCHMITH <i>BAS</i>
DATE 5/19/17

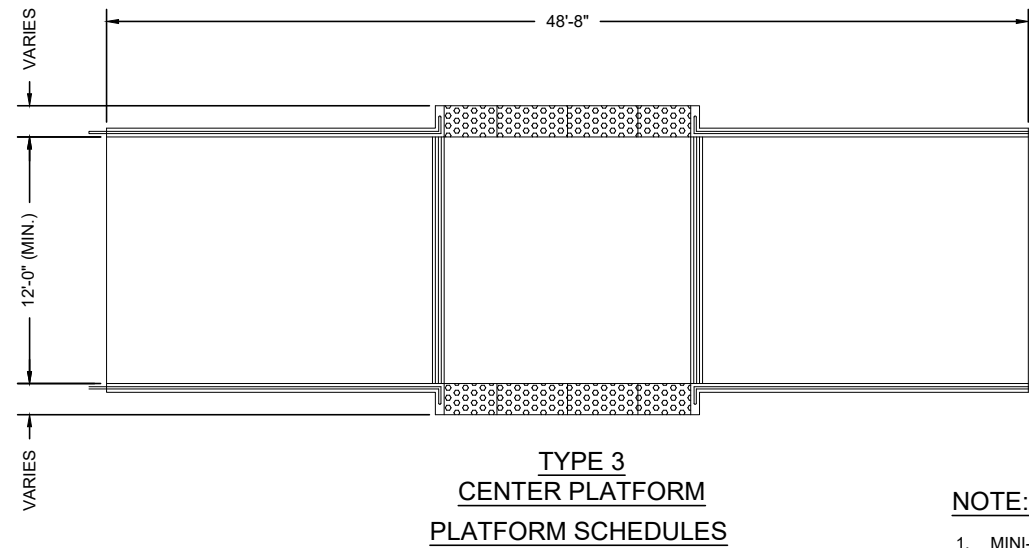
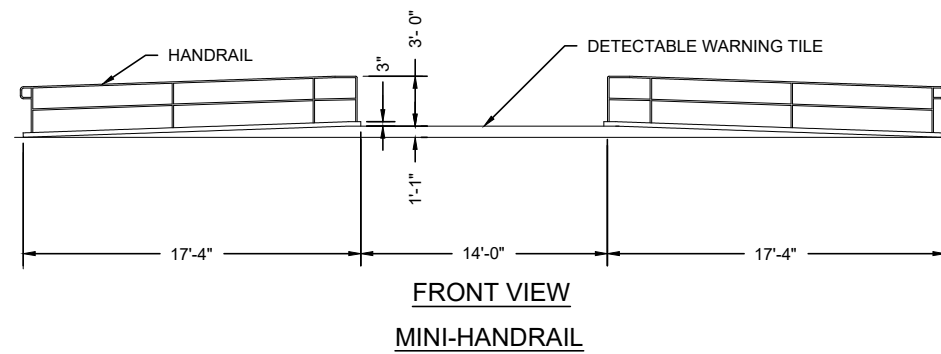
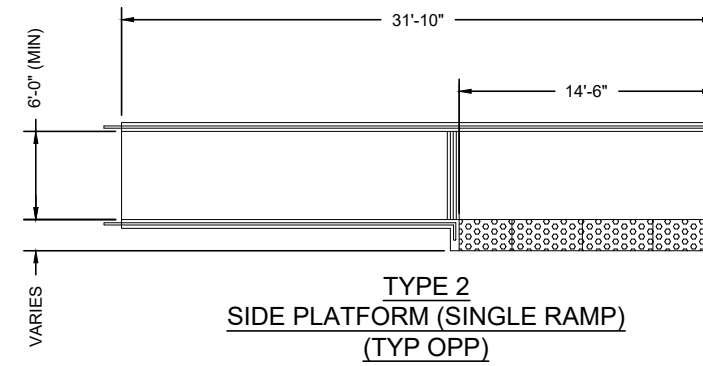
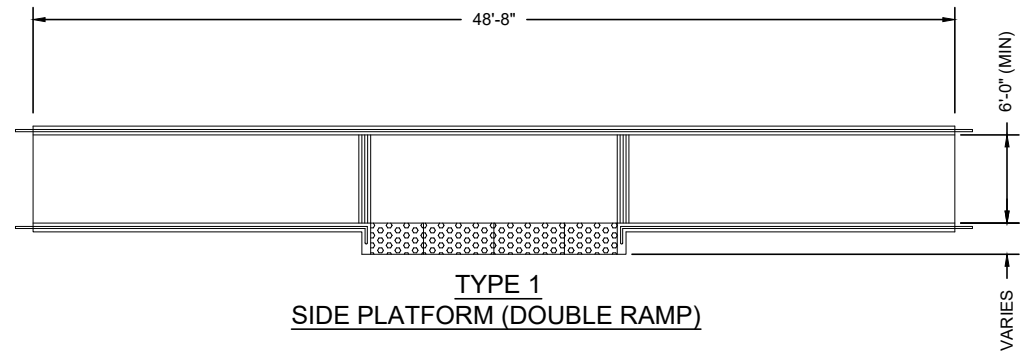
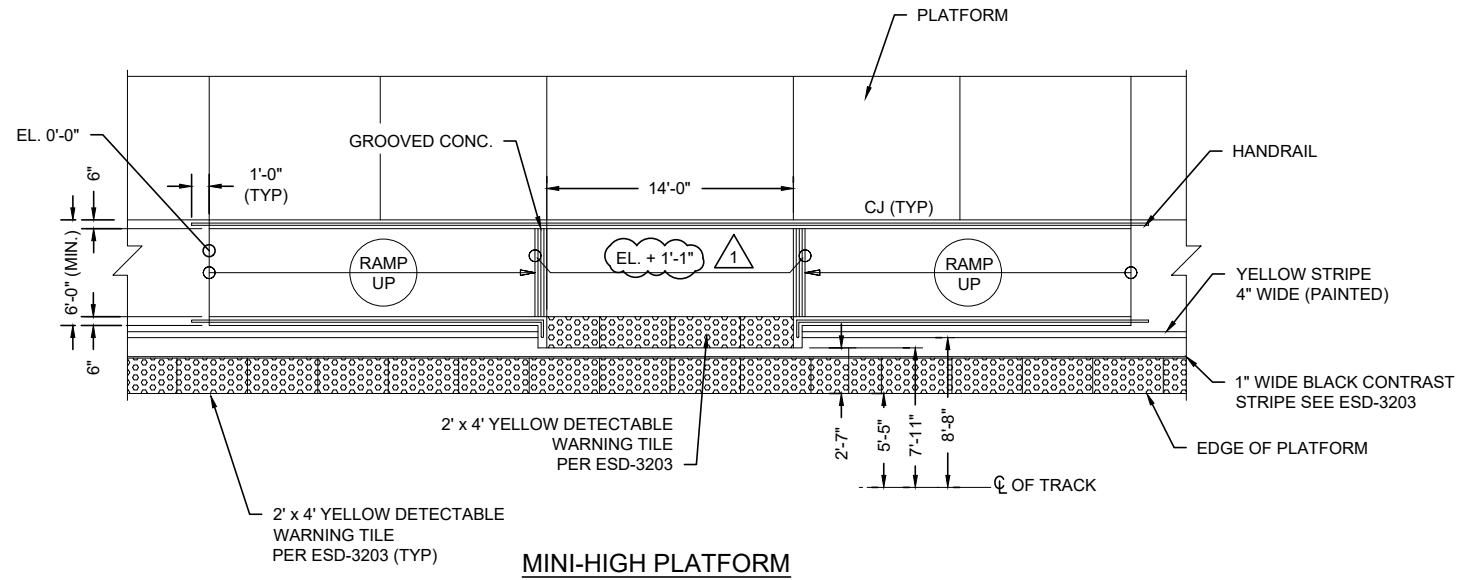
DESIGNER PE STAMP

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ENGINEERING STANDARD DRAWINGS
 MINI HI CLEARANCES
 STATION PLATFORM 15" ABOVE TOP OF RAIL

DRAWING NO. ESD-3101-02
DRAWING SHEET NO. 2 OF 4
SCALE: NONE
CONTRACT SHEET NO.



NOTE:

1. MINI-HIGH PLATFORM DESIGN, MATERIAL, FABRICATION AND INSTALLATION SHALL BE AS PER SANDAG SPECIFICATIONS.
2. MAXIMUM RAMP SLOPE = 1/12 . 1 FOOT OF LENGTH FOR EACH INCH OF RISE.

REV.	DATE	DESCRIPTION	DES.	ENG.
1	9/23/22	REVISIED ELEVATION AT TOP OF PLATFORM TO (cont): +1'-1"	SH	DB

REVISIONS	DRAWN	DATE
	RAILPROS	SEPT 2022
	CHECKED A. ANDERSON	
	RECOMMENDED B. SMITH	

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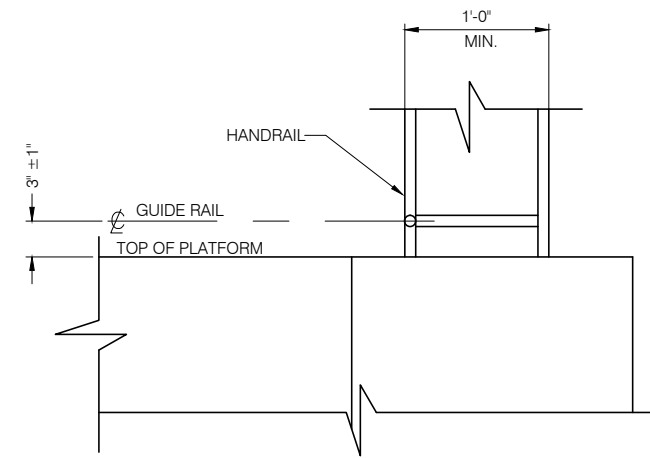
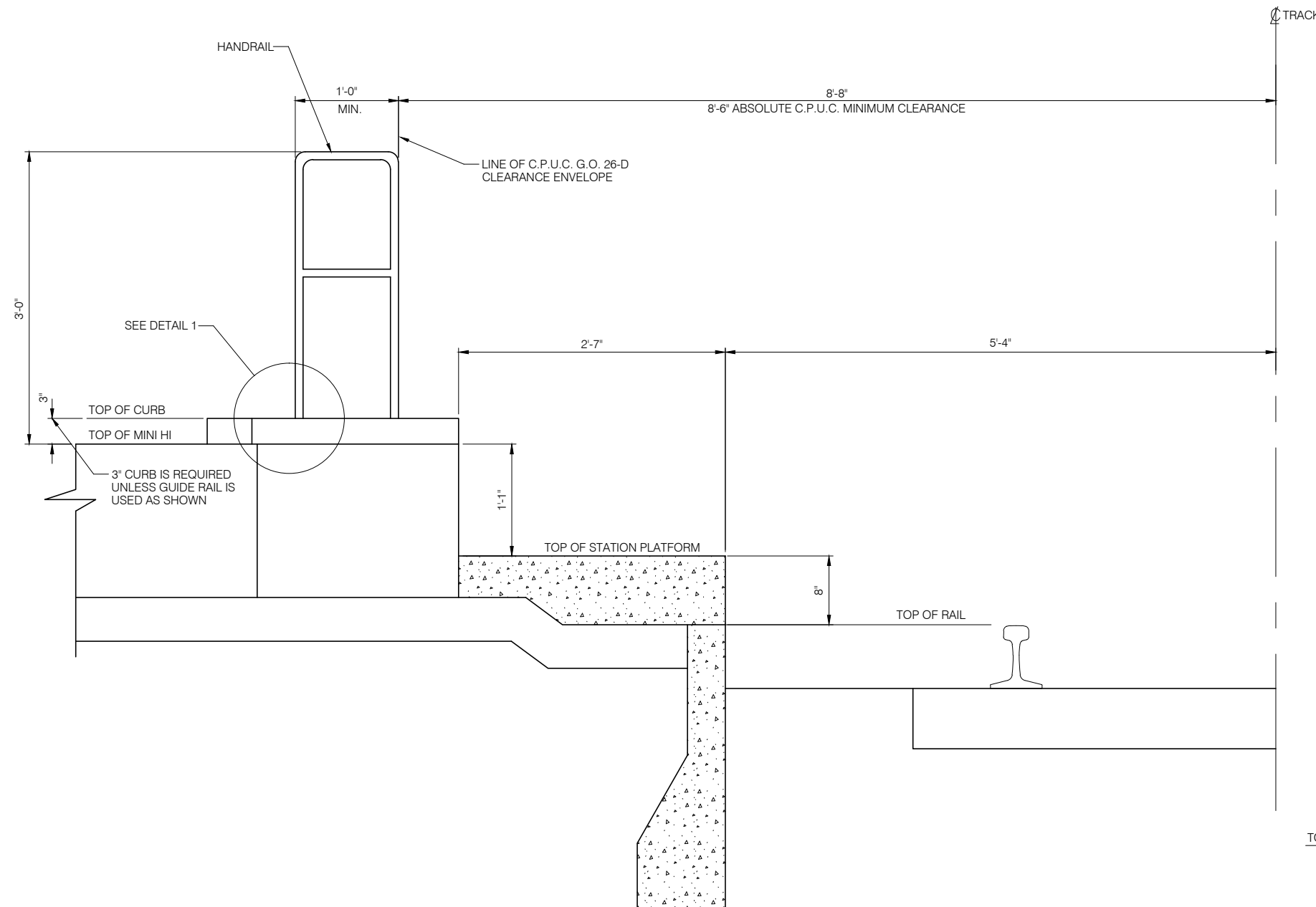
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ENGINEERING STANDARD DRAWINGS

**MINI HI PLATFORM LAYOUT
STATION PLATFORM 8"
ABOVE TOP OF RAIL
FOR MAINTENANCE ONLY**

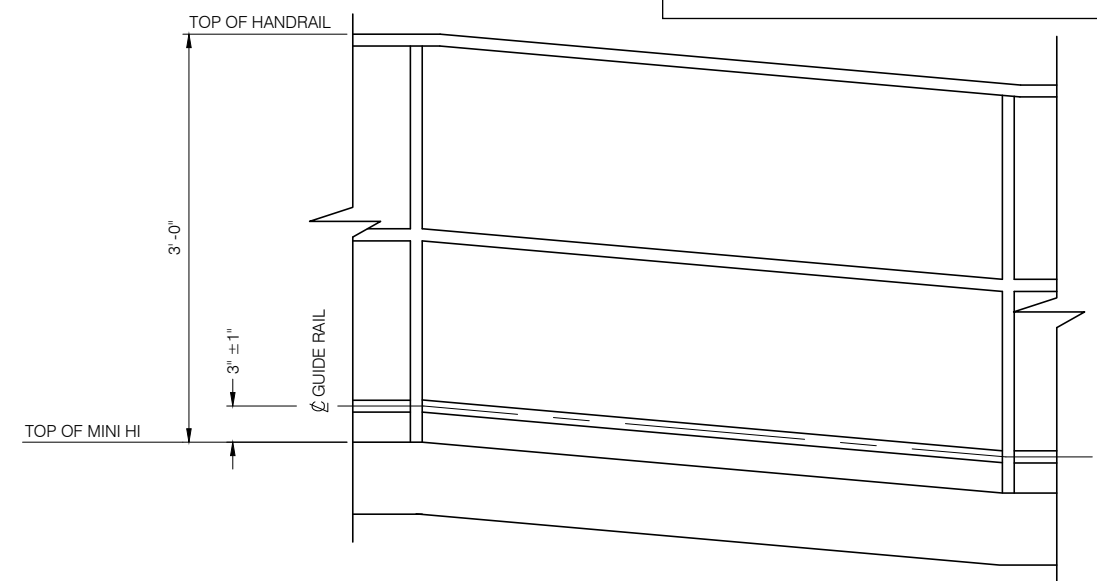
DRAWING NO.	ESD-3101-03
DRAWING SHEET NO.	3 OF 4
SCALE:	NONE
CONTRACT SHEET NO.	

NOTE:
 CLEARANCE SHOWN WILL ALSO APPLY TO HANDRAILS PARALLEL TO THE TRACK E.G. APPROACH RAMP TO THE ADA PLATFORM.



DETAIL 1

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USE OF GUIDE RAIL IN LIEU OF 6" CURB

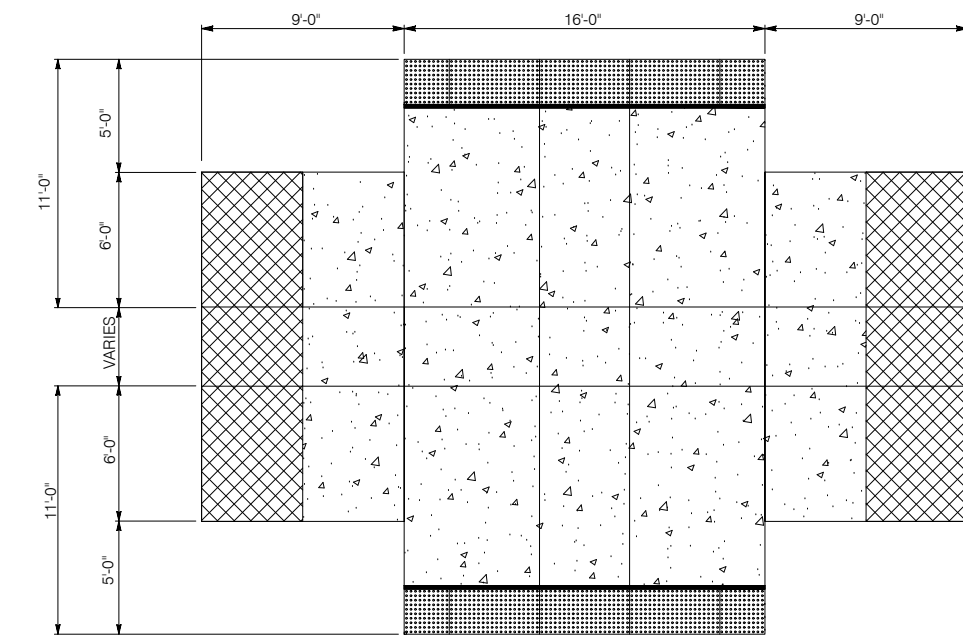
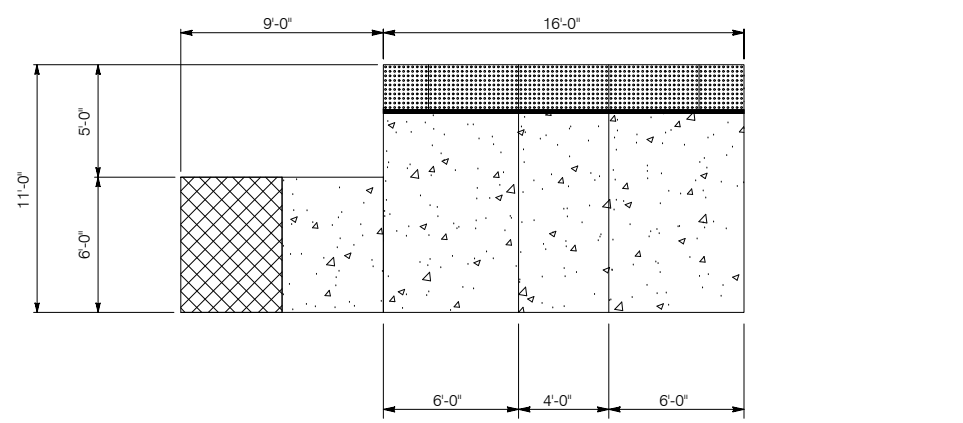
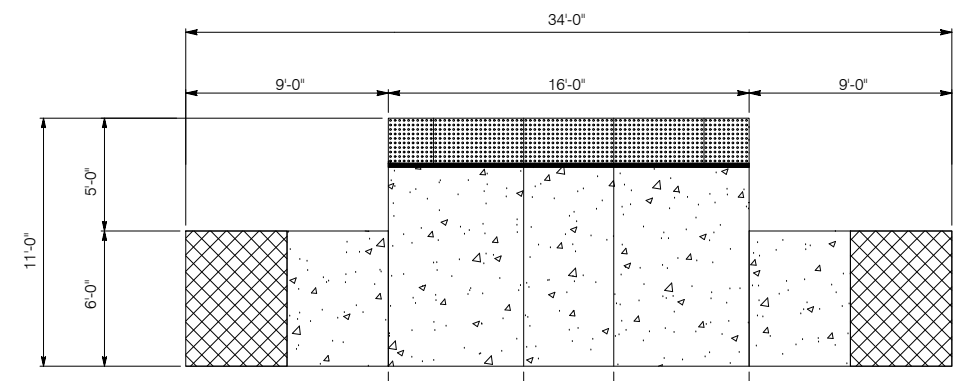
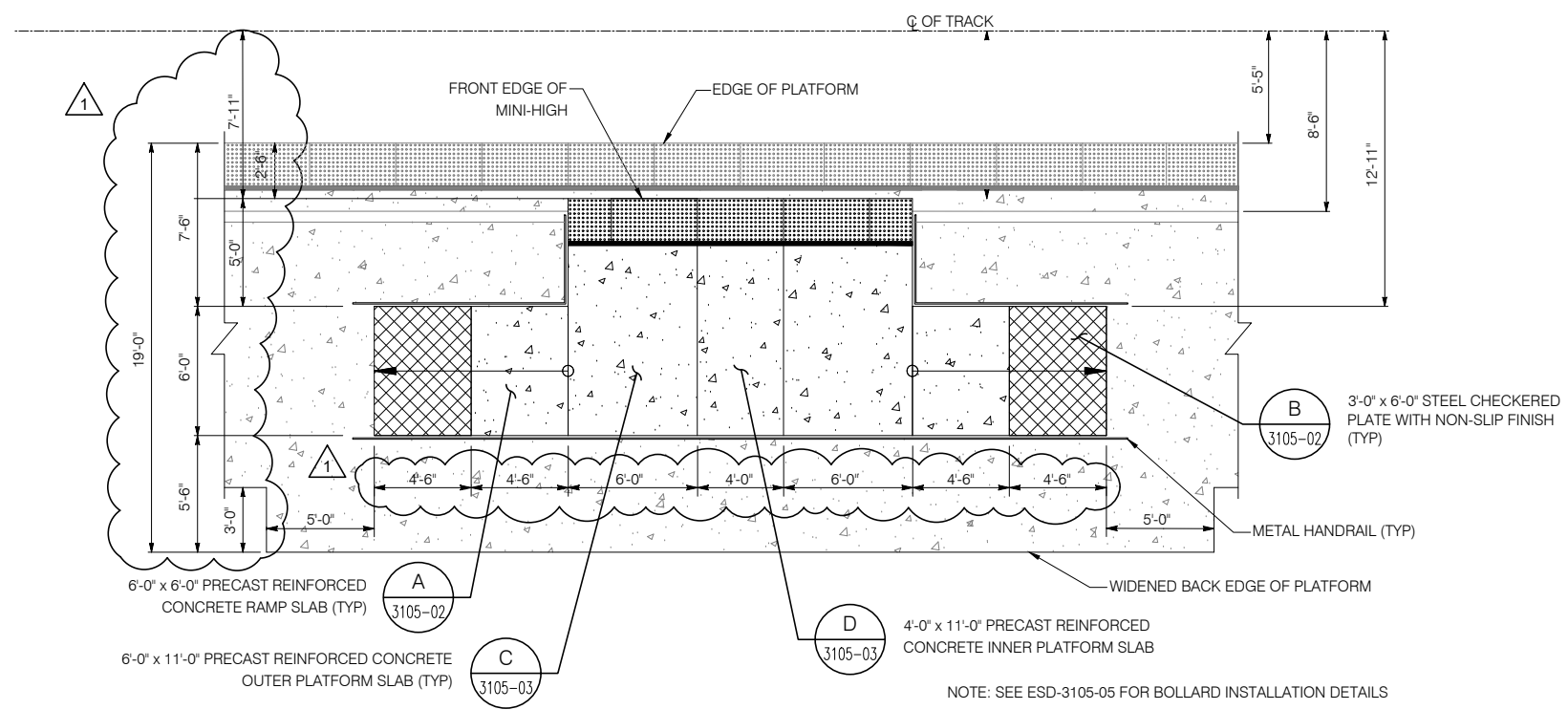
REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN RAILPROS
CHECKED B. SMITH <i>BSM</i>
RECOMMENDED B. SCHMITH <i>BAS</i>
DATE 5/19/17

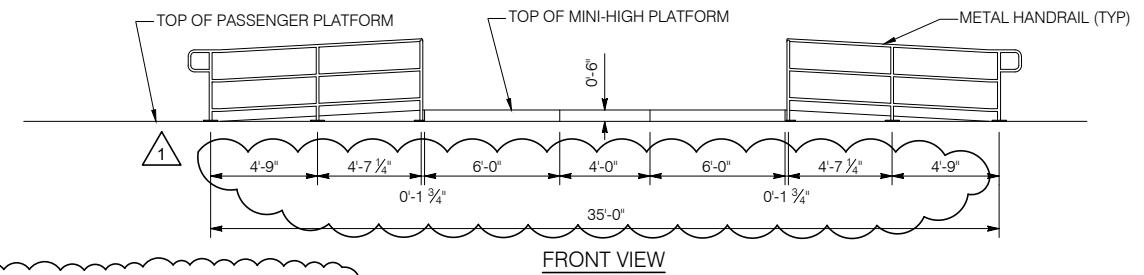
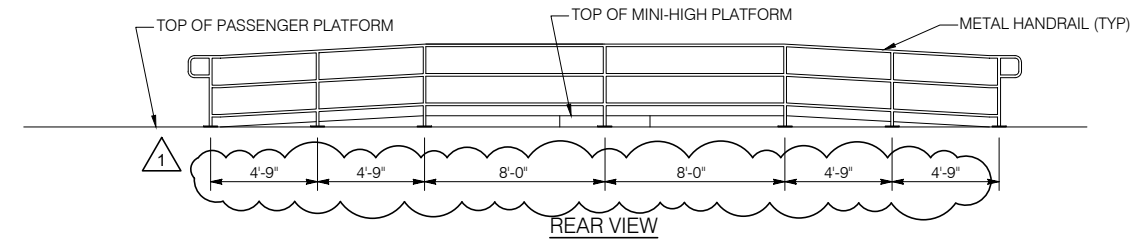
DESIGNER PE STAMP



ENGINEERING STANDARD DRAWINGS MINI HI CLEARANCES STATION PLATFORMS 8" ABOVE TOP OF RAIL FOR MAINTENANCE ONLY	DRAWING NO. ESD-3101-04
	DRAWING SHEET NO. 4 OF 4
	SCALE: NONE
	CONTRACT SHEET NO.



PLATFORM CONFIGURATIONS



MINI-HIGH HANDRAIL

- NOTES:**
- THIS SET OF STANDARD DRAWINGS (ESD 3105) IS FOR PLATFORMS 15" ABOVE TOP OF RAIL
 - CONCRETE SHALL DEVELOP 28-DAYS MIN. COMPRESSIVE STRENGTH OF 6000 PSI AND 4000 PSI AT TRANSFER.
 - SURFACE TEXTURE TO BE COARSE USING A STIFF BRISTLED BROOM AND SPRING STEEL DEVICE FINISH OR BY METHODS THAT WOULD YIELD THE SAME RESULT.
 - ALL REINFORCED STEEL SHALL BE ASTM A706 GRADE 60.
 - DOWEL BARS SHALL BE ASTM A615, GRADE 60, EPOXY COATED IN GREEN COLOR.
 - REFER TO CONTRACT DRAWINGS, DETAILS AND SPECIFICATIONS FOR FINAL MINI-HIGH PLATFORM DESIGN, MATERIAL, FABRICATION AND INSTALLATION REQUIREMENTS.
 - REFER TO ESD-3203 FOR DETECTABLE WARNING TILE AND MARKING DETAILS.
 - FOR DETAILS NOT SHOWN, SEE "ESD-3210 GENERAL NOTES" AND "ESD-3211 MISCELLANEOUS STRUCTURAL DETAILS" SHEETS.
 - MAXIMUM RAMP SLOPE = 12:1. (1 FOOT OF LENGTH FOR EACH INCH OF RISE.)

REV.	DATE	DESCRIPTION	DES.	ENG.
1	9/23/22	REVISIONS △ REVISIONS REVISE MINI-HIGH DIMENSIONS (cont): ADD STRUCTURAL REF. NOTE & SLOPE NOTE (cont): REVISED DRAWING SHEET NO.	SH	DB

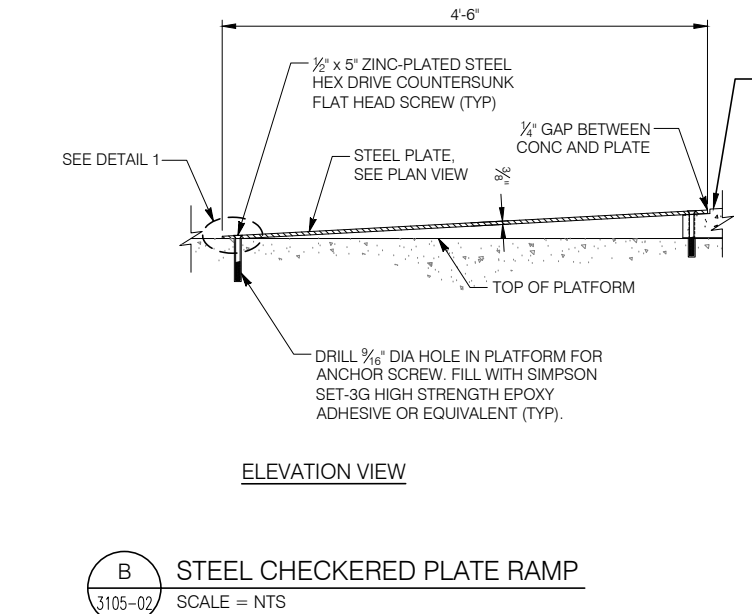
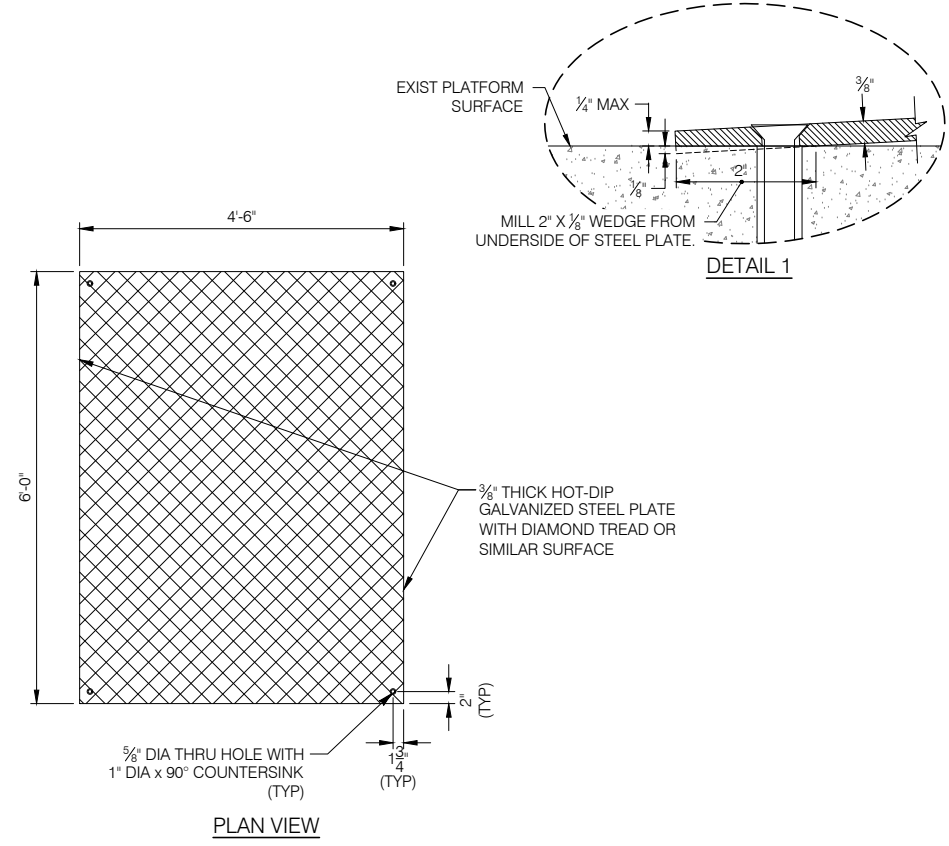
DRAWN RAILPROS	DATE SEPT 2022
CHECKED A. ANDERSON	DESIGNER PE STAMP
RECOMMENDED B. SMITH	

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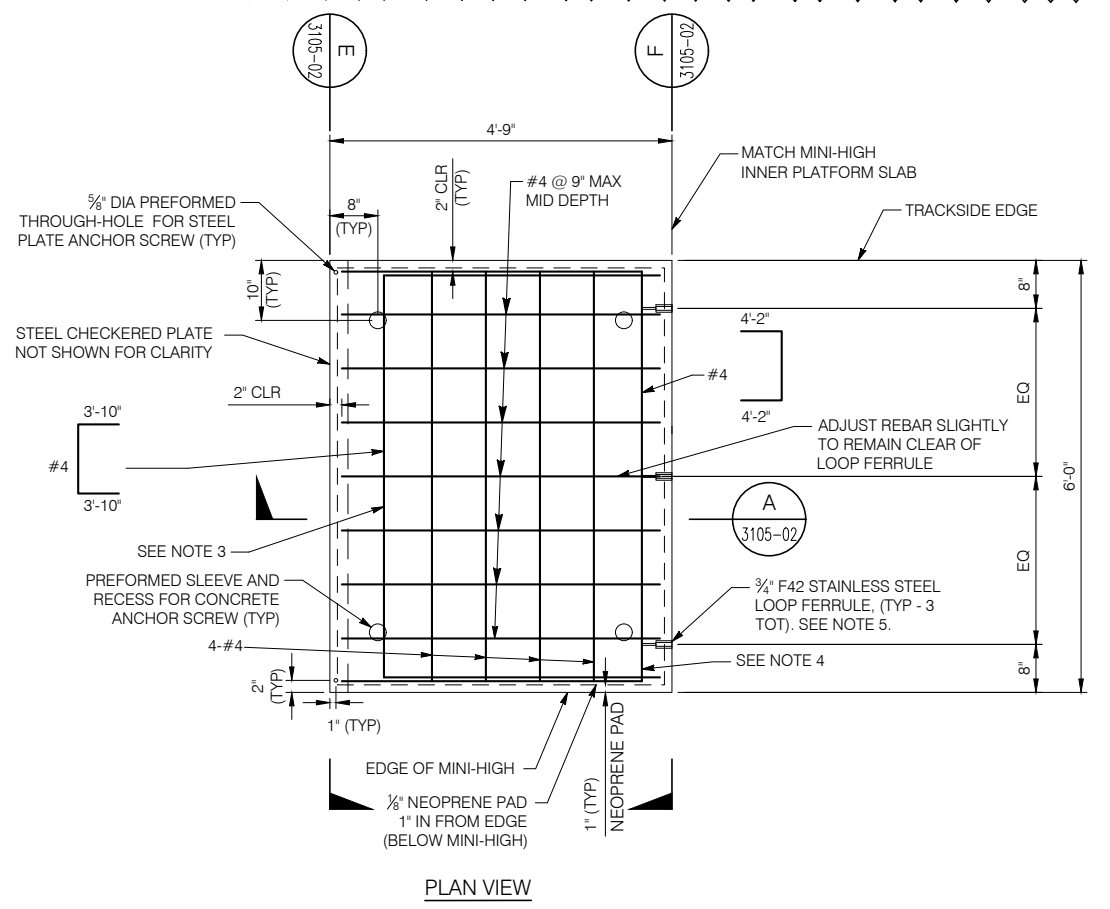


ENGINEERING STANDARD DRAWINGS
PRECAST MINI-HIGH OVERVIEW
DETAIL SHEET 1

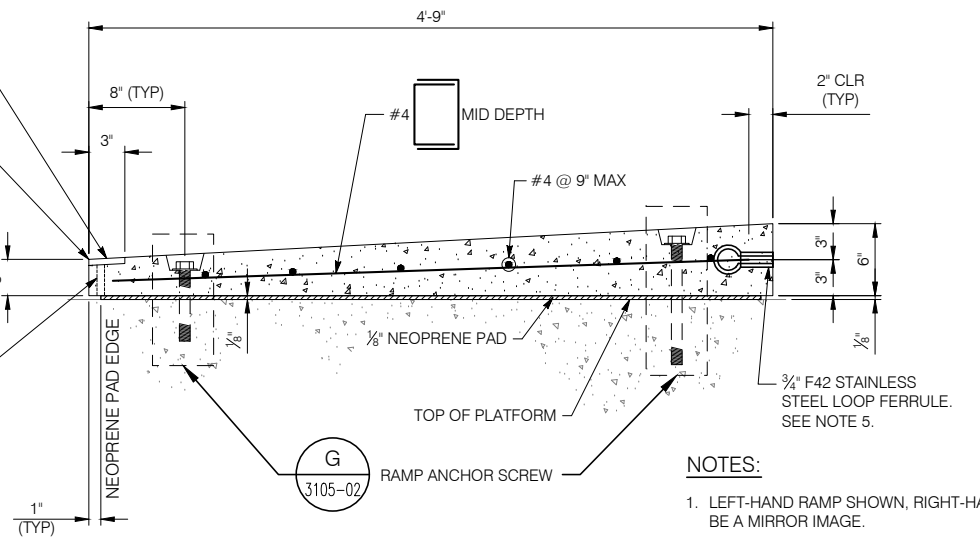
DRAWING NO. ESD-3105-01
DRAWING SHEET NO. 1 OF 5
SCALE: NONE
CONTRACT SHEET NO.



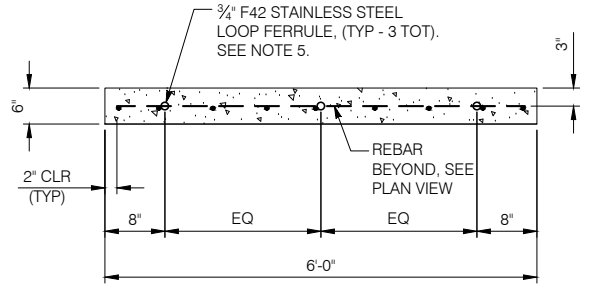
B STEEL CHECKERED PLATE RAMP
3105-02 SCALE = NTS



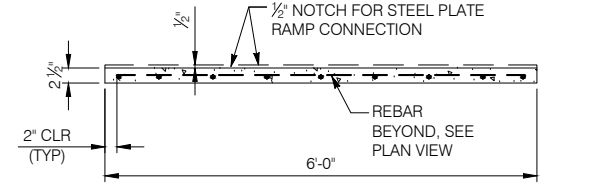
PLAN VIEW



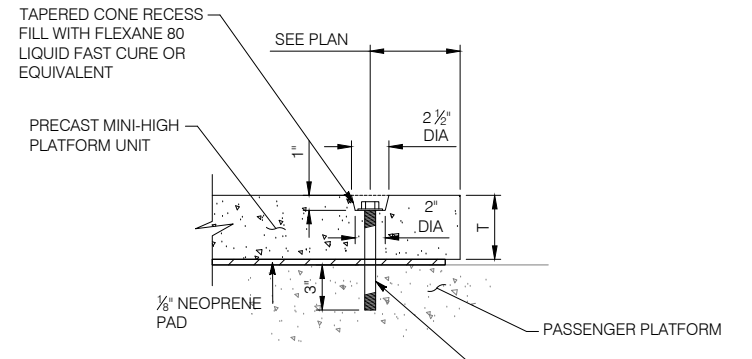
A MINI-HIGH RAMP SLAB SECTION
3105-02 SCALE = NTS



F UPPER EDGE OF RAMP SECTION
3105-02 SCALE = NTS



E LOWER EDGE OF RAMP SECTION
3105-02 SCALE = NTS



G RAMP ANCHOR SCREW
3105-02 SCALE = NTS

- NOTES:**
- LEFT-HAND RAMP SHOWN, RIGHT-HAND RAMP TO BE A MIRROR IMAGE.
 - FOR MINI-HIGH INNER AND OUTER PLATFORM SLAB DETAILS, SEE ESD-3105-03.
 - PLACE U-SHAPE REBAR MIN. 9" CLEAR FROM THE THINNER EDGE.
 - PLACE U-SHAPE REBAR CLEAR OF THE F42 STAINLESS STEEL LOOP FERRULES.
 - STEEL LOOP FERRULE SHALL HAVE A MINIMUM ALLOWABLE SHEAR CAPACITY OF 1900 LBS AND TENSION CAPACITY OF 2200 LBS.

REVISIONS			SH	DB	DRAWN	DATE
1	9/23/22	SWITCH DETAILS WITH ESD-3105-04 (cont): ADD STEEL RAMP DETAIL & DETAIL 1 (cont): REMOVE PRECAST RAMP ANCHORS (cont): INCREASE REBAR COVER; ADJUST DIMS (cont): REVISED DRAWING SHEET NO.			RAILPROS CHECKED A. ANDERSON RECOMMENDED B. SMITH	SEPT 2022
REV.	DATE	DESCRIPTION	DES.	ENG.		

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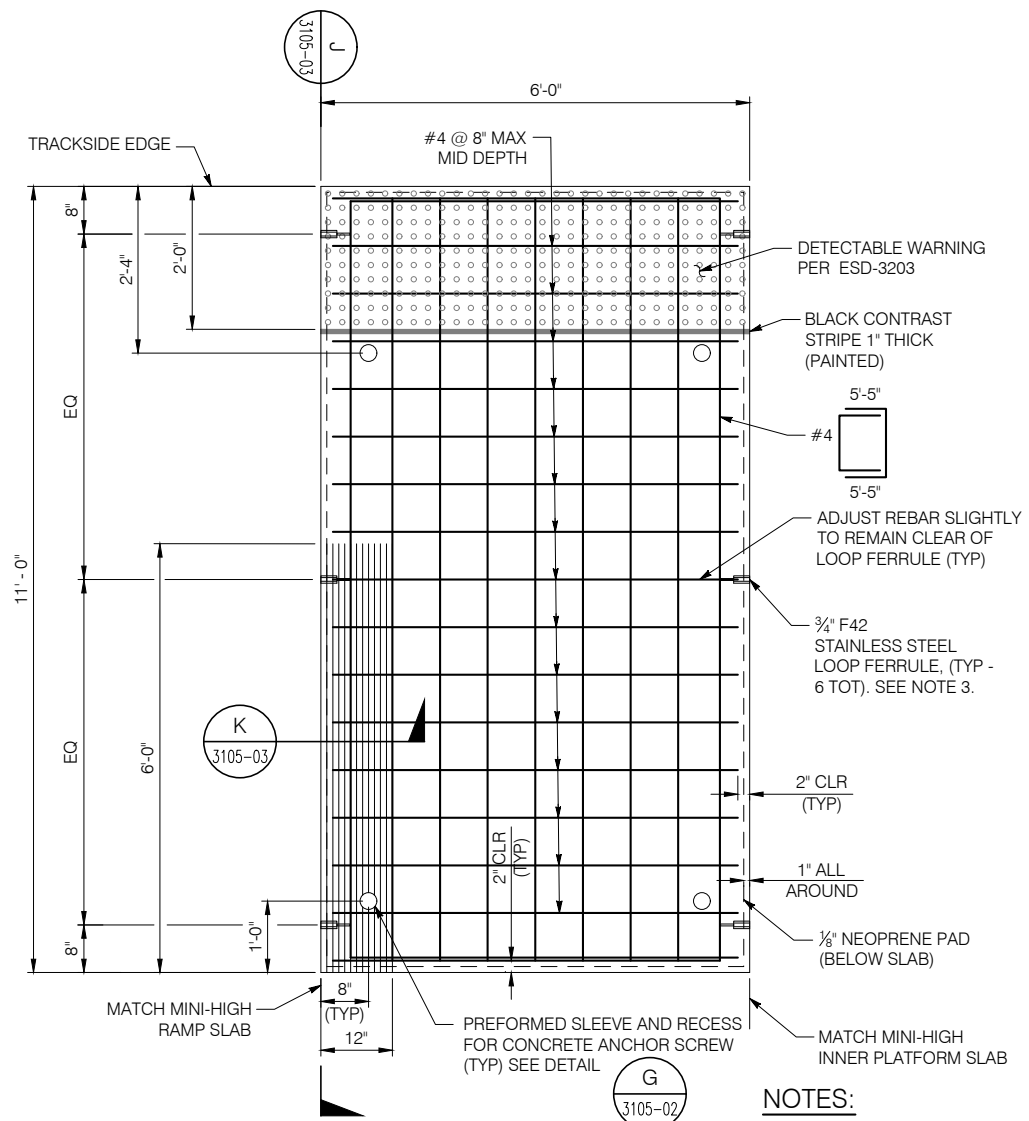
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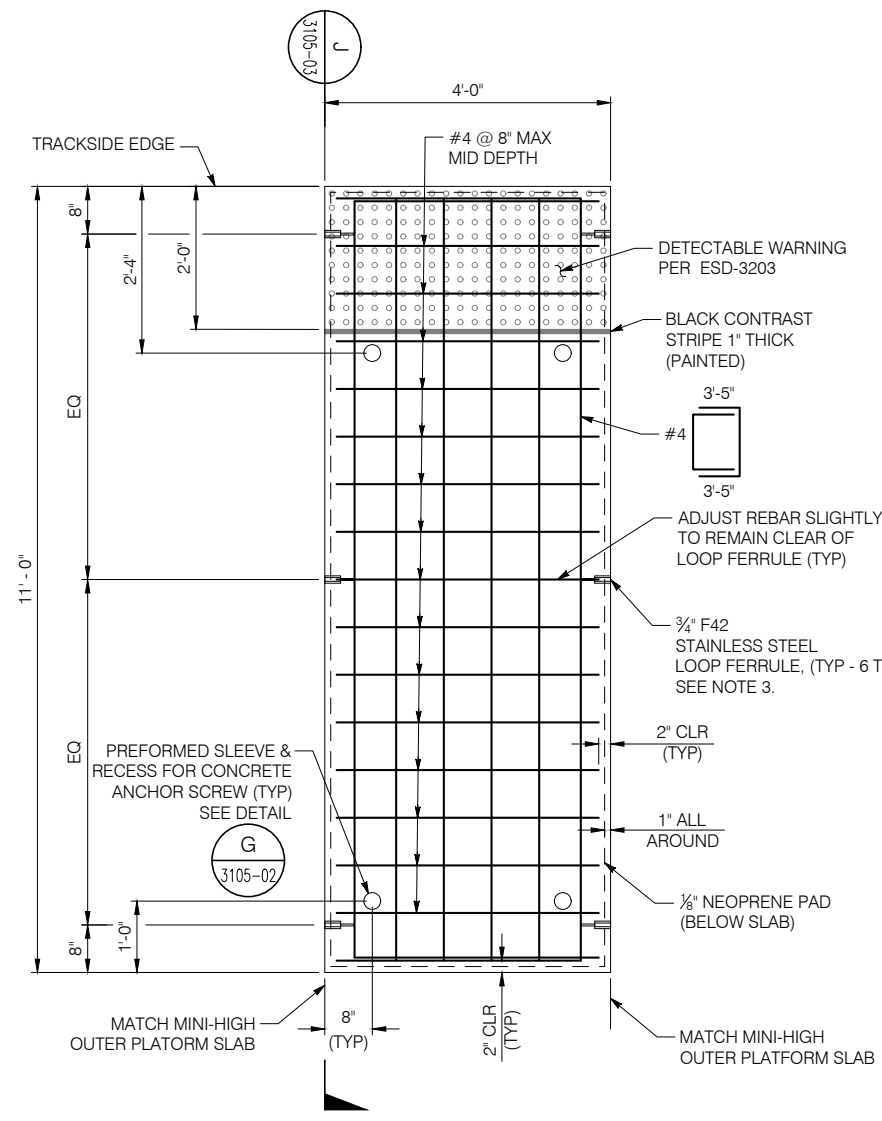
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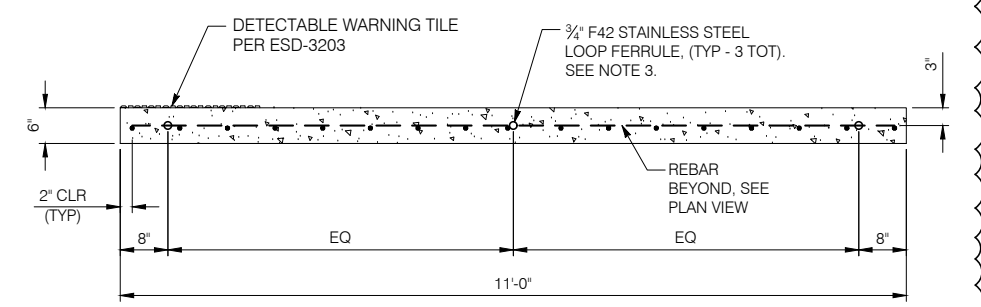
ENGINEERING STANDARD DRAWINGS	DRAWING NO. ESD-3105-02
PRECAST MINI-HIGH RAMP DETAILS DETAIL SHEET 2	DRAWING SHEET NO. 2 OF 5
SCALE: NONE	CONTRACT SHEET NO.



PLAN VIEW

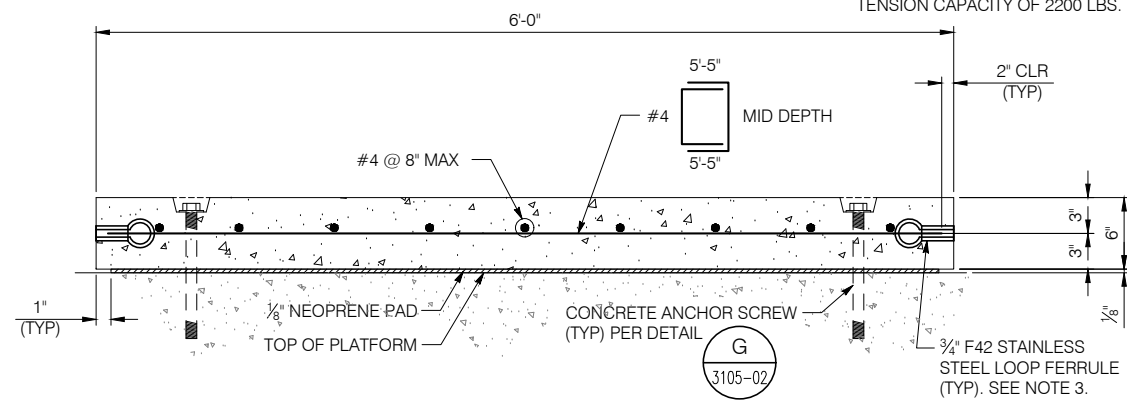


PLAN VIEW

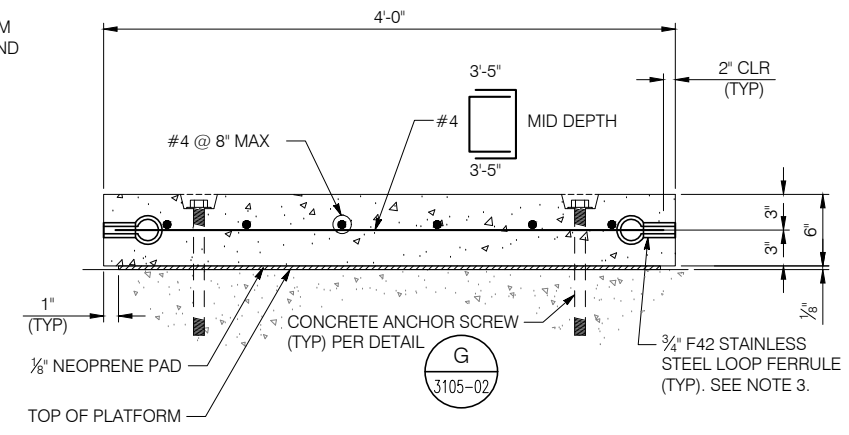


J SLAB EDGE SECTION
3105-03 SCALE = NTS

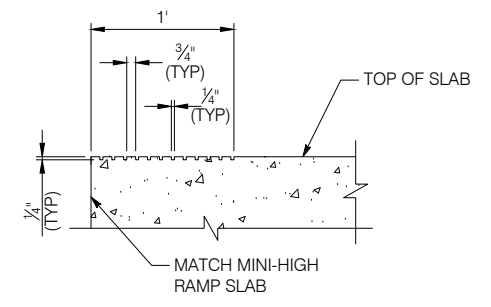
- NOTES:**
1. LEFT-HAND OUTER PLATFORM SLAB SHOWN, RIGHT-HAND TO BE A MIRROR IMAGE.
 2. FOR RAMP SLAB DETAILS, SEE ESD-3105-02.
 3. STEEL LOOP FERRULE SHALL HAVE A MINIMUM ALLOWABLE SHEAR CAPACITY OF 1900 LBS AND TENSION CAPACITY OF 2200 LBS.



C MINI-HIGH MAIN PLATFORM OUTER SLAB SECTION
3105-03 SCALE = NTS



D MINI-HIGH MAIN PLATFORM INNER SLAB SECTION
3105-03 SCALE = NTS



K GROOVED CONCRETE DETAIL
3105-03 SCALE = NTS

REVISIONS		SH	DB	DRAWN	DATE
1	9/23/22 INCREASE REBAR COVER; ADJUST DIMS; (cont): UPDATED GROOVED CONCRETE; (cont): REVISED DRAWING SHEET NO.			RAILPROS CHECKED A. ANDERSON RECOMMENDED B. SMITH DATE SEPT 2022	
REV.	DATE	DESCRIPTION	DES.	ENG.	

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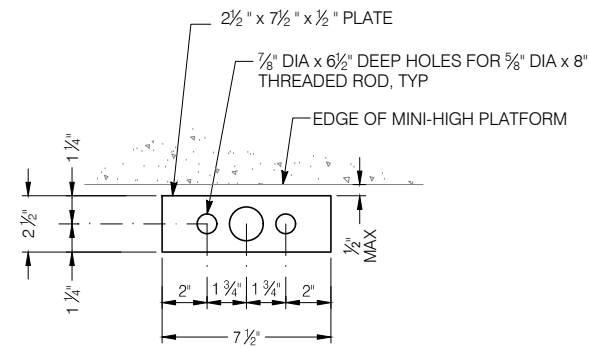
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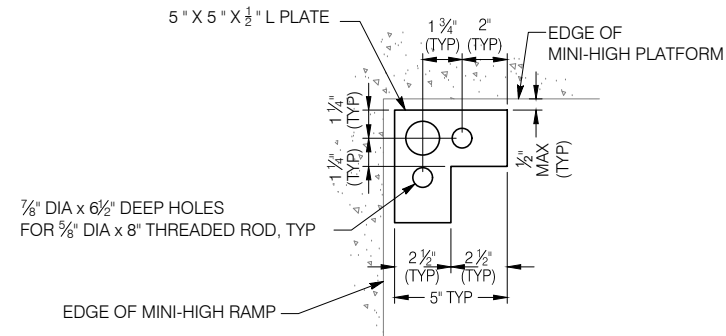
ENGINEERING STANDARD DRAWINGS		DRAWING NO.
PRECAST MINI-HIGH PLATFORM SLAB DETAILS		ESD-3105-03
DETAIL SHEET 3		DRAWING SHEET NO.
		3 OF 5
SCALE:		NONE
CONTRACT SHEET NO.		

NOTE:

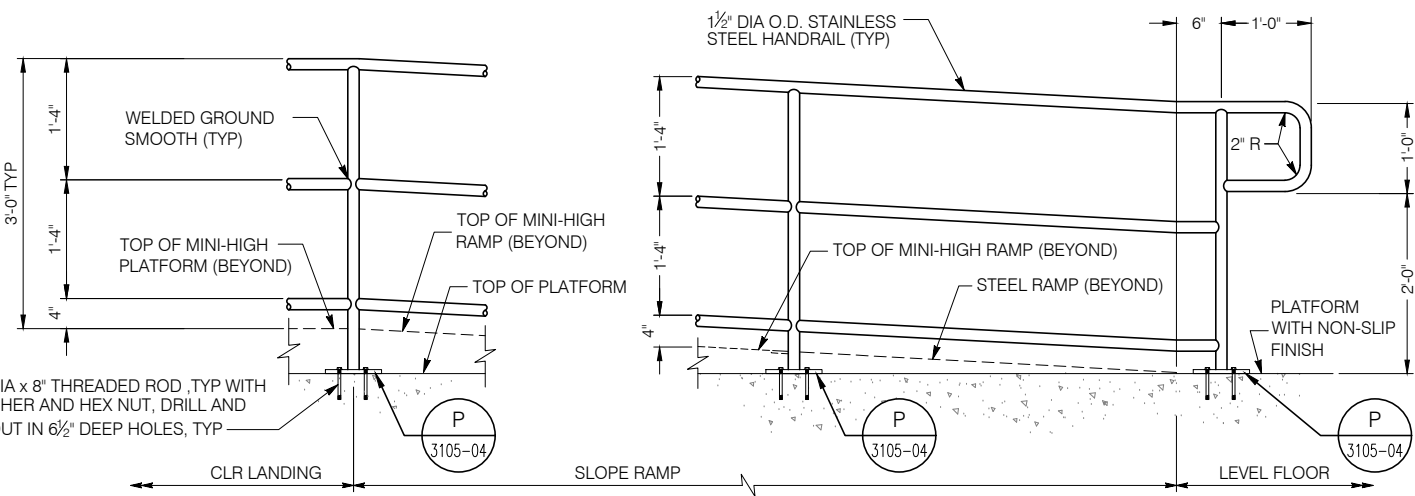
- FOR DETAILS NOT SHOWN SEE STANDARD PLANS 'ESD-3210' AND 'ESD-3211' SHEETS.



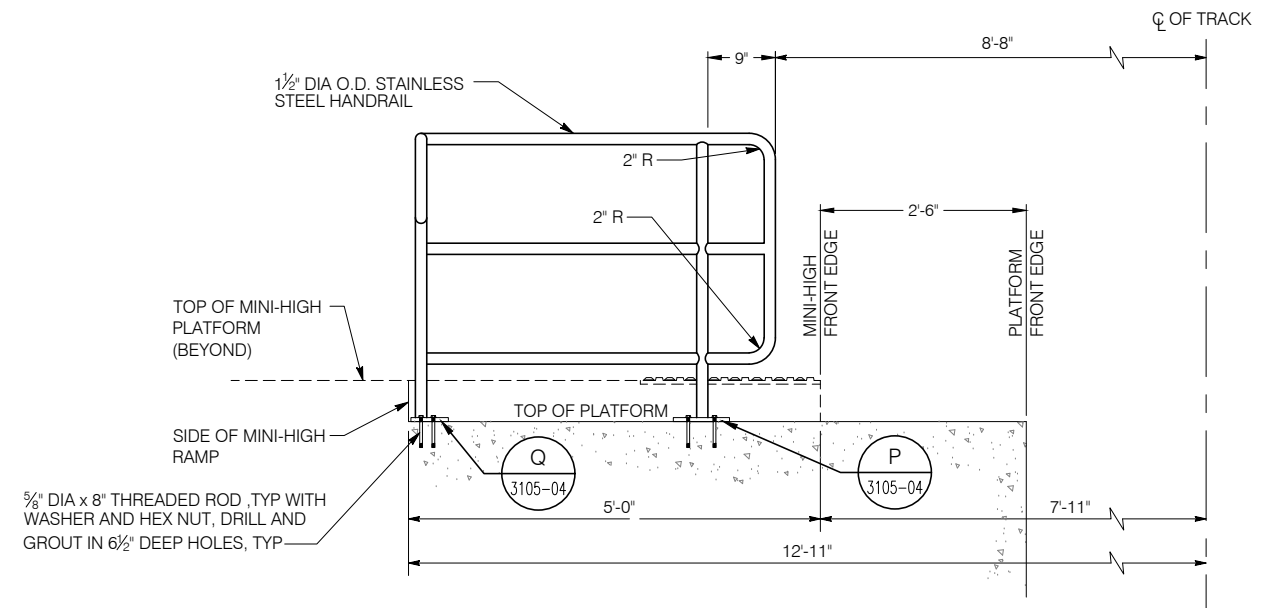
P BASE PLATE FOR SINGLE POST
3105-04 SCALE = NTS



Q BASE PLATE FOR SINGLE POST - INSIDE CORNER
3105-04 SCALE = NTS

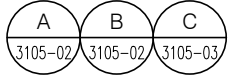


M TYPICAL HANDRAIL - RAMP SECTION
3105-04 SCALE = NTS



N TYPICAL HANDRAIL - LOADING AREA
3105-04 SCALE = NTS

NOTE: FOR MINI-HIGH PLATFORM AND RAMP DETAILS, SEE THE FOLLOWING:



REV.	DATE	DESCRIPTION	DES.	ENG.
1	9/23/22	SWITCH DETAILS WITH ESD-3105-02	SH	DB
		(cont): REVISE NOTES; ADD DETAIL FOR INSIDE		
		(cont): CORNER BASE PLATE;		
		(cont): REVISED DRAWING SHEET NO.		

REVISIONS	DATE
△	SEPT 2022

DRAWN RAILPROS
CHECKED A. ANDERSON
RECOMMENDED B. SMITH
DATE SEPT 2022

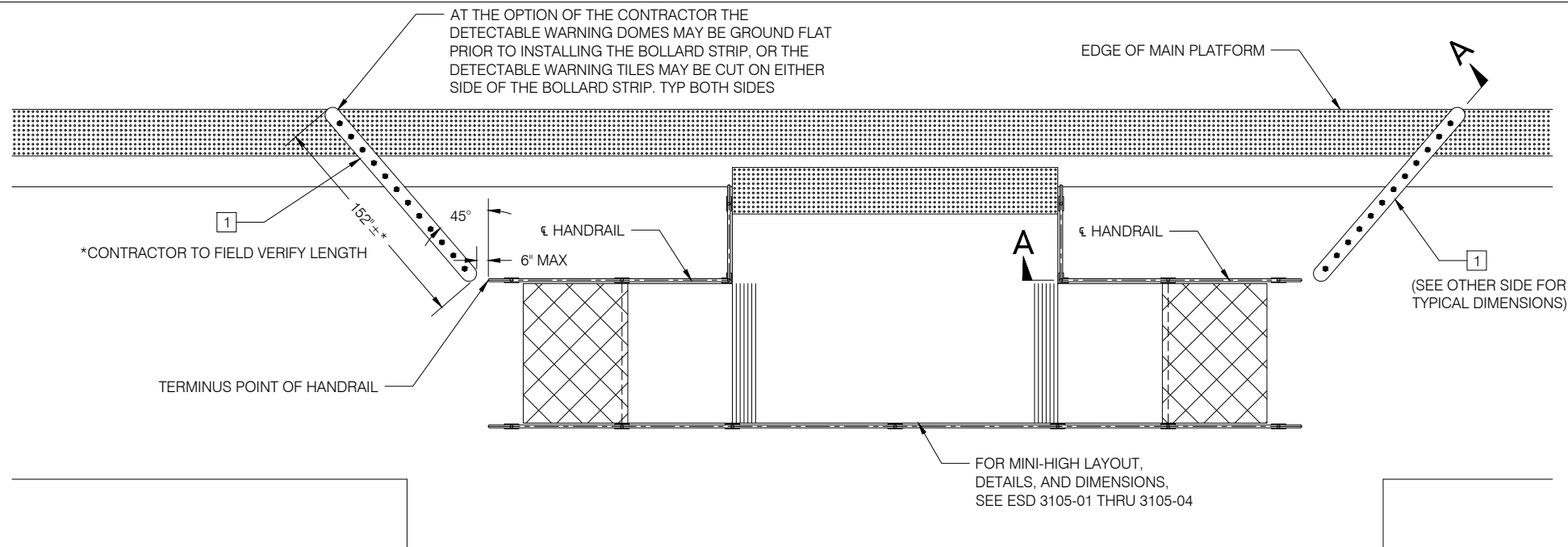
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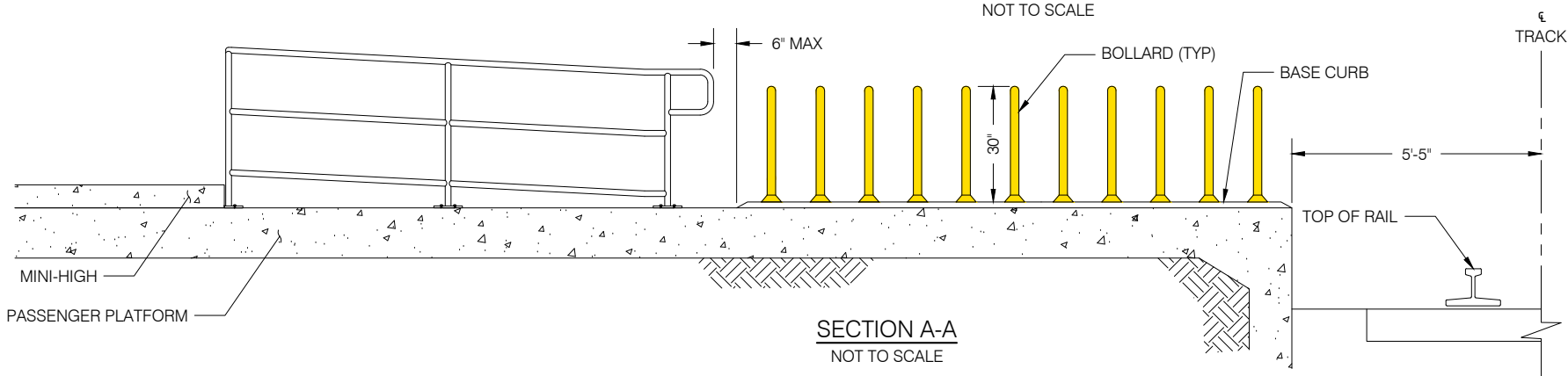
ENGINEERING STANDARD DRAWINGS
PRECAST MINI-HIGH HANDRAILS & BASE PLATES
DETAIL SHEET 4

DRAWING NO. ESD-3105-04
DRAWING SHEET NO. 4 OF 5
SCALE: NONE
CONTRACT SHEET NO.

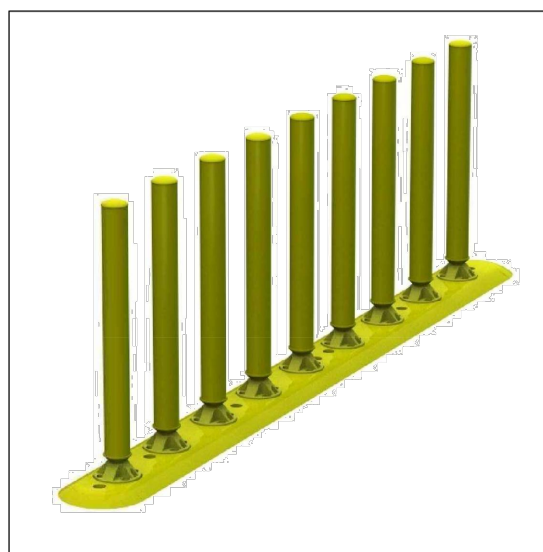


PLAN VIEW: TYPICAL BOLLARD INSTALLATION AT EACH MINI-HIGH RAMP

NOT TO SCALE



SECTION A-A
NOT TO SCALE



SAMPLE PRODUCT PHOTOS

NOT TO SCALE

CONSTRUCTION NOTE: EACH MINI HIGH

- 1. INSTALL MINI-HIGH PLATFORM BOLLARDS PER BOLLARD SPECIFICATIONS HEREON. INSTALLATION SHALL BE PER MANUFACTURER'S RECOMMENDATIONS.

BOLLARD SEPCIFICATIONS

1. DESIGN AND MECHANICAL REQUIREMENTS:

THE BOLLARDS SHALL BE FABRICATED TO WITHSTAND REPEATED IMPACTS BY MAINTENANCE VEHICLES, MOTORIZED CARTS, WHEELCHAIRS, AND PEDESTRIANS WITH MINIMUM DAMAGE POSSIBLE. BOLLARDS SHALL BE CONFIGURED AS MECHANICALLY INTER-LOCKED, FIXED CURB AS THE BASE CURB AND FLEXIBLE SELF-RIGHTING POST ASSEMBLY. THE FLEXIBLE SELF-RIGHTING POST ASSEMBLY SHALL CONSIST OF UPRIGHT TUBING AND A COMPRESSION REACTIVE SPRING ASSEMBLY. THE UPRIGHT TUBING SHALL HAVE A FIRE RETARDANT CAP AT THE TOP. THE COMPRESSION REACTIVE SPRING DEVICE SHALL ABSORB IMPACT STRESSES AND RETURN AND ALIGN TO ITS UPRIGHT POSITION AFTER REPEATED IMPACTS. THE SPRING DEVICE SHALL CONSIST OF A COMPRESSION REACTIVE SPRING, STAINLESS STEEL WIRE ROPE, AND TWO-PIECE KNUCKLE. THE FUNCTION OF THE KNUCKLE, UPPER AND LOWER, IS TO KEEP THE UPRIGHT ALIGNED IN ITS VERTICAL POSITION AT ALL TIMES. WHEN THE ASSEMBLY IS TWISTED, IMPACTED, OR BENT DOWN IN ANY DIRECTION WITHIN 360 DEGREES, THE ALIGNMENT TWO-PIECE KNUCKLE MEMBERS SHALL PROPERLY ALIGN THE ASSEMBLY TO ITS ORIGINAL UPRIGHT POSITION.

2. COMPONENT SPECIFICATIONS:

- RAIL: 36 INCH (914 MM) MODULES WITH 9 INCH (228 MM) POST SPACING, 8 INCH (203 MM) WIDE, BY 1 INCH (25 MM) HIGH.
- END CAPS: LARGE, 12 INCH (304 MM) LONG.
- END CAPS: SMALL, 4 INCH (101 MM) LONG.
- POST HEIGHT: 30 INCHES (762 MM)
- COLOR: YELLOW
- RETRO-REFLECTIVE SHEETING BANDS ARE NOT REQUIRED ON POSTS

4. DIMENSIONS:

- THE FIXED CURB SEGMENT NOMINAL DIMENSIONS SHALL BE 8 INCHES WIDE, 36 INCHES LONG, AND HEIGHT NOT TO EXCEED 1 INCH.
- END ROUNDED CAP NOMINAL DIMENSIONS SHALL BE 8 INCHES WIDE, 4 INCHES LONG, AND HEIGHT NOT TO EXCEED 1 INCH. AN ALTERNATE LONGER END CAP OF 12 INCHES LONG TO SUPPORT AN EXTRA UPRIGHT POST CAN BE USED TO ACCOMMODATE DIFFERENT RAIL INSTALLATION REQUIREMENTS.
- NOMINAL DIMENSION OF UPRIGHT TUBES SHALL BE 2.375 INCHES IN DIAMETER. THE HEIGHT OF THE BOLLARD ASSEMBLY INCLUDING UPRIGHT POST ASSEMBLY AND FIXED CURB SHALL BE A MINIMUM OF 30 INCHES UNLESS SPECIFIED OTHERWISE BY THE ENGINEER.

5. BASE CURB AND UPRIGHT BOLLARD POST:

- THE BASE CURB, UP-RIGHT POST, AND TWO PIECE KNUCKLE MATERIAL COMPOUND SHALL SATISFY IMPACT, MECHANICAL, COSMETIC, AND FIRE REQUIREMENTS. MATERIAL COMPOUND SHALL ACHIEVE THE FIRE RETARDANT REQUIREMENTS LISTED IN NOTE 7 BELOW.
- THE MATERIAL SHALL PROVIDE CHEMICAL RESISTANCE TO DAMAGE FROM WEATHER CONDITIONS, OZONE, AND HYDROCARBONS. THE MATERIAL SHALL ALSO HAVE A MINIMUM GLOSS RETENTION LEVEL OF 60% FOR THE LIFE EXPECTANCY OF FIVE YEARS OF WEATHERING.

6. COLOR STABILITY:

COLOR SHALL BE INTEGRAL THROUGH THE DEPTH OF EACH COMPONENT. THE MATERIAL SHALL RESIST COLOR FADING WHEN INSTALLED IN SUNNY AREAS OR DUE TO ANY ENVIRONMENTAL CONDITIONS.

7. FIRE REQUIREMENTS

THE BASE CURB, UP-RIGHT POST, AND TWO PIECE KNUCKLE MATERIAL MUST BE NON-COMBUSTIBLE CONSTRUCTION. THE MATERIAL COMPOUND MUST HAVE SUFFICIENT FIRE RETARDANT AND SHALL COMPLY WITH SAFETY REQUIREMENTS FOR FLAMMABILITY, SMOKE, AND TOXICITY. AS AN ALTERNATIVE, MATERIALS THAT MEET UL94 V-0 TEST REQUIREMENTS WILL ALSO BE CONSIDERED.

REV.	DATE	DESCRIPTION	DES.	ENG.
0	9/23/22	NEW SHEET	SH	DB

REVISIONS	DATE	DESCRIPTION	DES.	ENG.
△				

DRAWN RAILPROS	
CHECKED A. ANDERSON	<i>[Signature]</i>
RECOMMENDED B. SMITH	<i>[Signature]</i>
DATE	SEPT 2022

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ENGINEERING STANDARD DRAWINGS

PRECAST MINI-HIGH
PROTECTION BOLLARDS
DETAIL SHEET 5

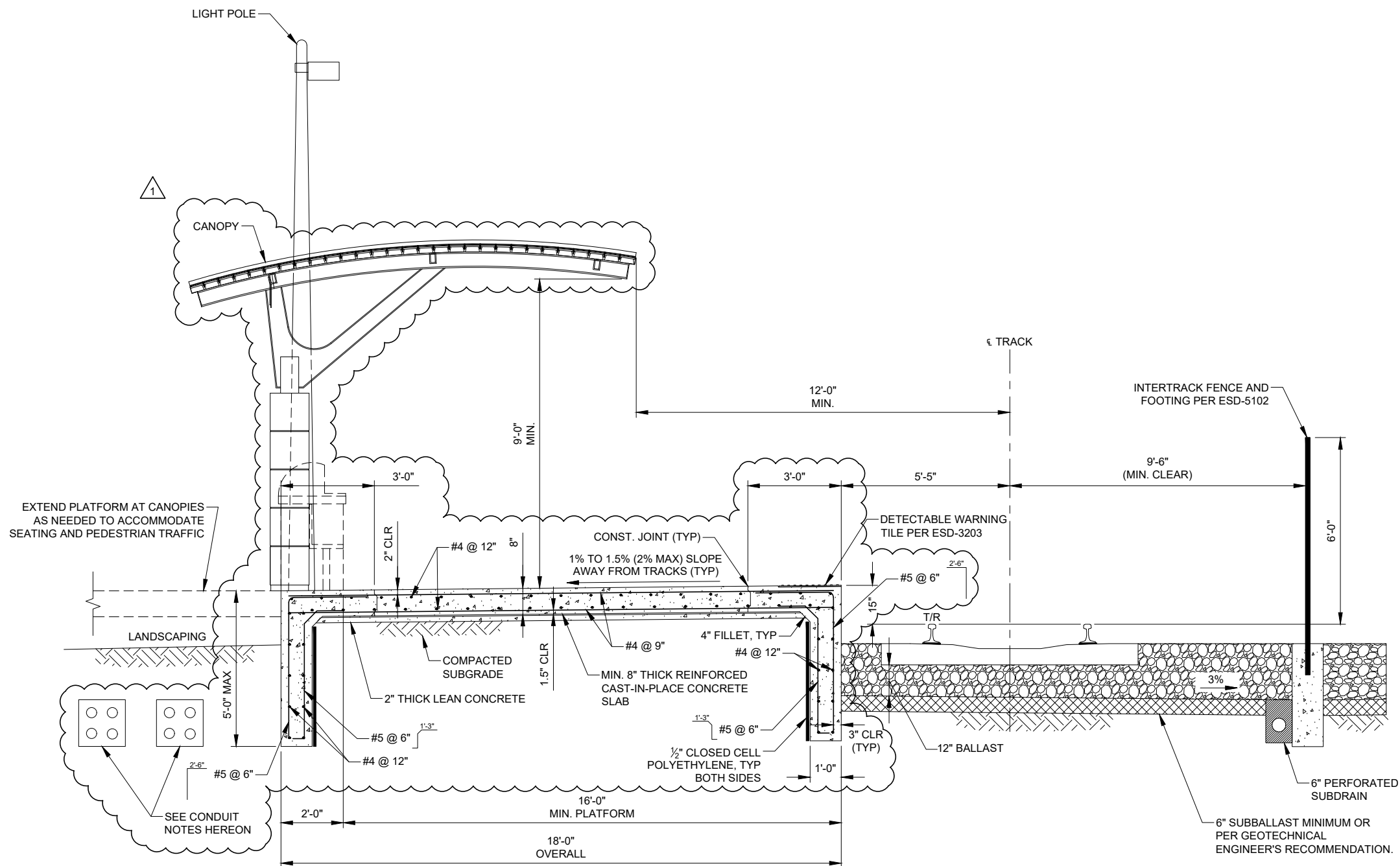
DRAWING NO.	ESD-3105-05
DRAWING SHEET NO.	5 OF 5
SCALE:	NONE
CONTRACT SHEET NO.	

GENERAL NOTES:

1. LIGHT POLE AND CANOPY SHOWN FOR REFERENCE ONLY. ACTUAL DESIGN SHALL BE PER PROJECT PLANS.
2. STATION FURNITURE (BENCHES, TRASH RECEPTACLES) SHALL BE PLACED AT THE BACK OF THE PLATFORM.
3. REFER TO ESD-2101 AND ESD-2102 FOR CLEARANCES.
4. FOR DETAILS NOT SHOWN, SEE ESD-3210 "GENERAL STRUCTURAL NOTES" & ESD-3211 "MISCELLANEOUS STRUCTURAL DETAILS".
5. PLATFORM STRUCTURAL DESIGN HAS BEEN DEVELOPED WITHOUT CONSIDERING EFFECTS OF CANOPY STRUCTURE AND OTHER STATION STRUCTURES. IF ANY STRUCTURE INTERACTS WITH PLATFORM STRUCTURES IT SHOULD BE PROPERLY DESIGNED AND DETAILED.
6. TURN DOWN DETAILS SHOWN CAN ALSO BE USED FOR THE PLATFORM ENCLOSURE IN OTHER DIRECTION, SUBJECT TO A MAX HEIGHT OF 5 FT.
7. FINISH EXPOSED TOP SURFACE OF PLATFORM WITH A MEDIUM BROOM FINISH APPLIED PARALLEL TO THE LONG DIMENSION OF THE PLATFORM.

CONDUIT:

1. CONDUIT SYSTEMS TO BE LOCATED BEHIND PLATFORM IF POSSIBLE. ENGINEER TO SPECIFY SIZE AND NUMBER OF CONDUITS AND SPARES.
2. PROVIDE SEPARATE CONDUIT BANKS FOR COMMUNICATIONS/POWER AND FIBER OPTIC. COORDINATE WITH NCTD.



SIDE PLATFORM - TYPICAL SECTION

REVISIONS		SH	DB	DRAWN	DATE
1	9/23/22	REVISIONS		RAILPROS	
		REVISE CANOPY, GENERAL NOTES; ADD (cont): CONDUIT NOTES & SLAB DESIGN		CHECKED A. ANDERSON	
				RECOMMENDED B. SMITH	
				DATE	SEPT 2022
REV.	DATE	DESCRIPTION	DES.	ENG.	

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DESIGNER PE STAMP

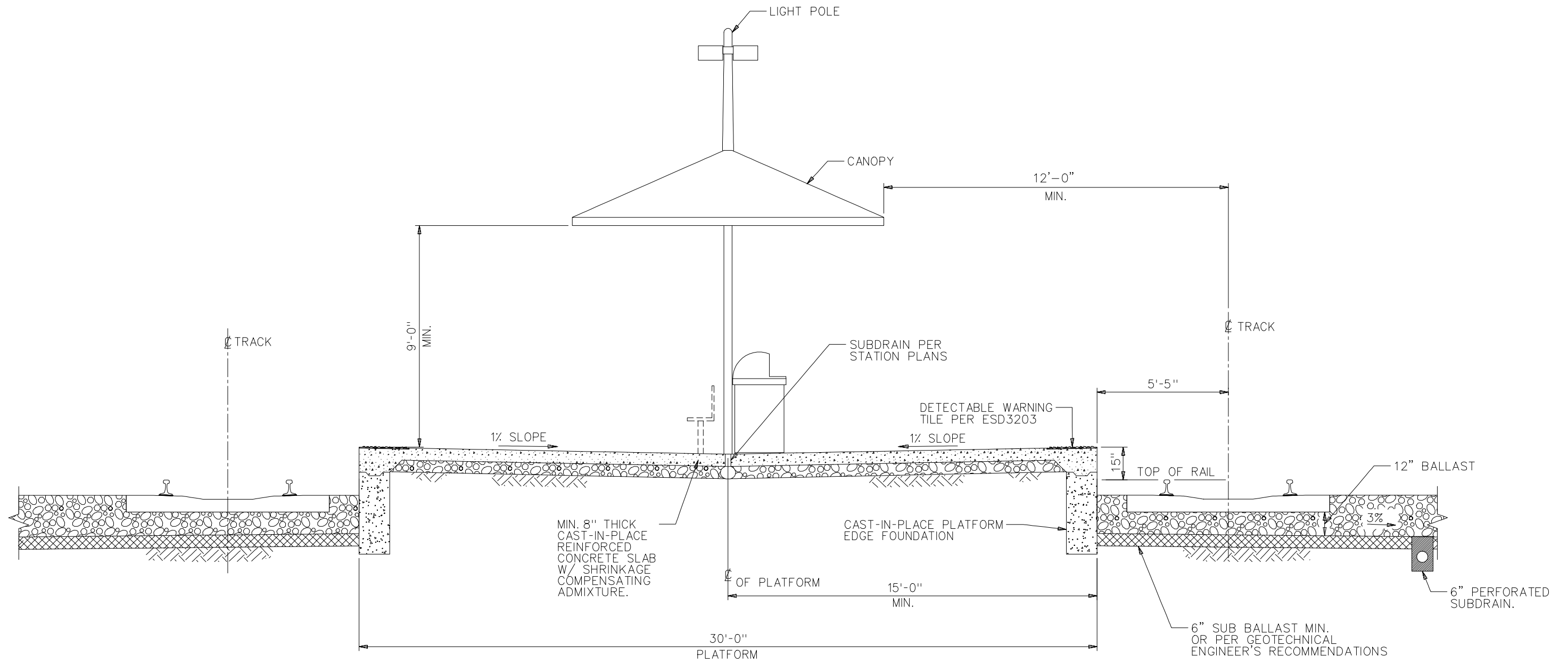
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ENGINEERING STANDARD DRAWINGS

SIDE PLATFORMS
 TYPICAL SECTION

DRAWING NO. ESD-3201
 DRAWING SHEET NO. 1 OF 1
 SCALE: NONE
 CONTRACT SHEET NO.



CENTER PLATFORM

NOTE:

1. LIGHT POLE AND CANOPY SHOWN AS REFERENCE ONLY. ACTUAL DESIGN TO BE DETERMINED BY THE ARCHITECT.
2. STATION FURNITURE (BENCHES, TRASH RECEPTACLES) SHALL BE PLACED AT THE CENTER OF THE PLATFORM.
3. IF APPROVAL IS GRANTED FOR CONSTRUCTION OF CENTER PLATFORM BY NCTD DIRECTOR OF ENGINEERING AND CONSTRUCTION, THE CONFIGURATION SHOWN ON THIS DRAWING IS RECOMMENDED.
4. ALSO REFER TO ESD-2101 AND ESD-2102 FOR CLEARANCES.

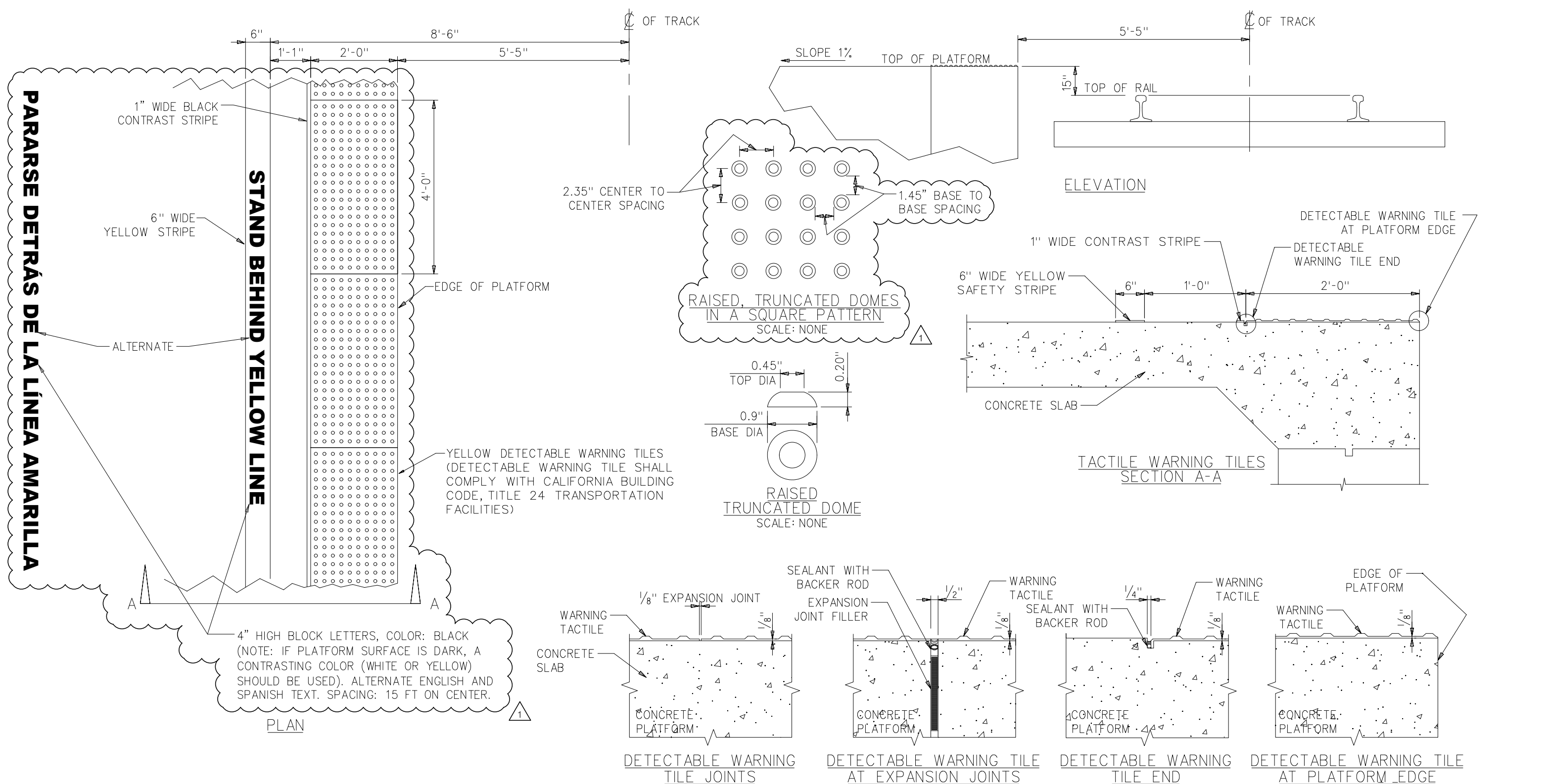
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REV.	DATE	DESCRIPTION	DES.	ENG.

REVISIONS	DRAWN RAILPROS
	CHECKED B. SMITH <i>MB</i>
	RECOMMENDED B. SCHMITH <i>BAS</i>
	DATE 04/25/17
	DESIGNER PE STAMP



ENGINEERING STANDARD DRAWINGS	DRAWING NO. ESD-3202
CENTER PLATFORMS TYPICAL SECTIONS	DRAWING SHEET NO. 1 OF 1
	SCALE: NTS
	CONTRACT SHEET NO.



REV.	DATE	DESCRIPTION	DES.	ENG.
1	9/23/22	REVISIÓN TRUNCATED DOME PATTERN, ADDED (cont): SPANISH TEXT TO SAFETY STRIPE	SH	DB
<p>△ REVISIONS</p> <p>DRAWN RAILPROS</p> <p>CHECKED A. ANDERSON</p> <p>RECOMMENDED B. SMITH</p> <p>DATE SEPT 2022</p>				
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<p>NORTH COUNTY TRANSIT DISTRICT</p> <p>810 Mission Avenue Oceanside, CA 92054 www.gonctd.com</p>				
<p>ENGINEERING STANDARD DRAWINGS</p> <p>DETECTABLE WARNING TILE AND MARKING DETAILS</p>				
DRAWING NO. ESD-3203				
DRAWING SHEET NO. 1 OF 1				
SCALE: NONE				
CONTRACT SHEET NO.				

GENERAL NOTES:

- ALL WORKS SHALL CONFORM TO THE MINIMUM STANDARDS OF THE FOLLOWING:
 - BUILDING CODE - CBC 2019.
 - MINIMUM DESIGN LOADS FOR BUILDINGS AND OTHER STRUCTURES ASCE 7-10.
 - AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 2017 WITH CALIFORNIA AMENDMENTS.
 - ACI BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE, ACI 318-14.
 - REGULATING AGENCIES WHICH HAVE AUTHORITY OVER ANY PORTION OF THE WORK.
 - CODES AND STANDARDS (LATEST EDITION) LISTED IN THESE NOTES AND SPECIFICATION.
 - AREMA MANUAL FOR RAILWAY ENGINEERING 2019.
- THE STANDARDS PROVIDED ARE MINIMUM VALUES, AND SITE SPECIFIC VALUES SHOULD BE DETERMINED BY THE ENGINEER.
- VERIFY ALL DIMENSIONS AND JOB CONDITIONS BEFORE STARTING WORK AND NOTIFY ENGINEER OF ANY DISCREPANCIES. VERIFY ALL REQUIRED MEASUREMENTS FOR BUILT-IN ITEMS ON THE JOB SITE.
- NOTES AND DETAILS TAKE PRECEDENCE OVER THESE GENERAL NOTES AND THE TYPICAL DETAILS ON THE DRAWINGS.
- DIMENSIONS TAKE PRECEDENCE OVER SCALE SHOWN ON THE DRAWINGS.
- COORDINATE STRUCTURAL WORK WITH THE ARCHITECTURAL, MECHANICAL, PLUMBING, ELECTRICAL AND CIVIL.
- COORDINATE NUMBER, SIZE AND LOCATION OF ALL OPENINGS, SLEEVES, CHASES, DEPRESSED AREAS, AND OTHER MISCELLANEOUS ITEMS WITH THE OTHER TRADE CONTRACTORS.
- THE STRUCTURAL DRAWINGS AND SPECIFICATIONS DO NOT INDICATE THE MEANS AND METHODS OF CONSTRUCTION. THE CONTRACTOR SHALL PROTECT THE STRUCTURE DURING CONSTRUCTION AND PROVIDE BRACING AND SHORING FOR LOADS DUE TO CONSTRUCTION EQUIPMENT, ETC.
- SHOP DRAWING SHALL BE SUBMITTED FOR APPROVAL.

FOUNDATIONS:

- FOR SUBSURFACE CONDITIONS AND FOUNDATION RECOMMENDATIONS, REFER TO GEOTECHNICAL REPORT.
- SOIL GRADATION, EXCAVATION AND BACKFILL SHALL BE IN ACCORDANCE TO THE PROJECT SPECIFICATIONS.
- PROVIDE SLAB ON GRADE ISOLATION / CONTRACTION JOINTS. REFER TO SPECIFICATION FOR ADDITIONAL INFORMATION.
- BACKFILL FOR FOOTING AND UTILITY TRENCHES WITHIN BUILDING AREA SHALL BE MECHANICALLY COMPACTED IN LAYERS TO A MINIMUM OF 95 PERCENT PER ASTM D1557. PLACE FILLS IN 6 INCHES TO 8 INCHES MAXIMUM LAYERS.
- REMOVE ALL ABANDONED FOOTINGS, UTILITIES, ETC. COMPLETELY. THAT INTERFERE WITH NEW CONSTRUCTION. NEW FOOTING MUST EXTEND INTO BEARING SOILS AS SPECIFIED IN THE SOILS REPORT.
- RECOMMENDATIONS CONTAINED IN THE SOILS REPORT ARE PART OF THESE SPECIFICATIONS. ALL EXCAVATIONS FOR FOOTINGS SHALL BE INSPECTED AND APPROVED BY GEOTECH ENGINEER PRIOR TO PLACING CONCRETE.
- PROVIDE TWO COPIES OF COMPACTION REPORT REVIEWED, ACCEPTED AND STAMPED BY THE ENGINEER OF RECORD. THE REPORTS ARE TO BE SUBMITTED TO AND ACCEPTED BY THE BUILDING SAFETY DIVISION PRIOR TO CALL FOR FOUNDATION INSPECTION.
- COMPLY WITH CALIFORNIA OSHA REQUIREMENTS AND PROVIDE FOR DESIGN AND INSTALLATION OF ALL CRIBBING SHEATHING AND SHORING REQUIRED TO SAFELY RETAIN EXCAVATIONS.
- CORROSION PROTECTION SHALL BE IN ACCORDANCE TO THE GUIDELINES LISTED IN THE "SANDAG DESIGN CRITERIA FOR LOSSAN CORRIDOR IN SAN DIEGO COUNTY, VOLUME III, SECTION 14".

REINFORCING STEEL:

- DETAIL AND PLACE REINF. STEEL IN ACCORDANCE WITH THE SPECIFICATIONS FOR STRUCTURAL CONCRETE FOR BUILDINGS ACI 301 AND THE MANUAL OF STANDARD PRACTICE FOR DETAILING REINF. CONCRETE STRUCTURES ACI 315.
- REINFORCING BARS ASTM A615 GRADE 60.
- WELDED WIRE FABRIC A-185 (SHEET ONLY).
- BEND BAR COLD. STAGGER LAPS OF HORIZONTAL REINFORCING IN WALLS AND FOOTINGS. BAR DEVELOPMENT AND SPLICE LENGTHS MUST BE IN ACCORDANCE WITH ACI 318.
- LAP WELDED WIRE FABRIC 12 INCHES.

CONCRETE:

- CONCRETE CONSTRUCTION SHALL CONFORM TO THE "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE" (ACI 318) AND ACI 301.
- REINFORCED CONCRETE: $f_c = 4.0$ KSI (UON), $n=8$
- PORTLAND CEMENT: ASTM C-150
AGGREGATES: ASTM C-33
READY MIXED CONCRETE: ASTM C-94
- PLACEMENT VIBRATION AND CURING OF CONCRETE SHALL CONFORM TO ACI 301. ROUGHEN ALL CONCRETE SURFACES AGAINST WHICH FRESH CONCRETE IS TO BE PLACED.
- CLEAR COVER TO THE REINFORCEMENT SHALL BE THE MOST STRINGENT OF FOLLOWING, THOSE LISTED IN PROJECT GEOTECHNICAL REPORT OR AS MARKED ON THE DRAWINGS.
 - CONCRETE CAST AGAINST EARTH 3 INCHES
 - CONCRETE EXPOSED TO EARTH OR WEATHER
 - PRINCIPAL REINFORCEMENT 2 INCHES
 - STIRRUPS, TIES & SPIRALS 1½ INCHES
 - CONCRETE NOT EXPOSED TO EARTH OR WEATHER
 - PRINCIPAL REINFORCEMENT 1½ INCHES
 - STIRRUPS, TIES & SPIRALS 1 INCHES
- ALL REINFORCING BARS ANCHOR BOLTS AND OTHER CONCRETE INSERTS SHALL BE WELL SECURED IN POSITION PRIOR TO PLACING CONCRETE.
- PROVIDE SLEEVES FOR PLUMBING AND ELECTRICAL OPENINGS BEFORE PLACING CONCRETE. DO NOT CUT ANY REINFORCING THAT MAY CONFLICT. CORING IN CONCRETE IS NOT PERMITTED UNLESS CONFIRMED WITH ENGINEER OF RECORD. NOTIFY ENGINEER IN ADVANCE OF CONDITION NOT SHOWN IN THE DRAWINGS.
- PLATFORMS AND RAMPS CONCRETE SLABS SHALL HAVE SHRINKAGE COMPENSATING ADMIXTURE PER PROJECT SPECIFICATIONS. OTHER ADMIXTURES SHALL NOT BE USED WITHOUT APPROVAL FROM ENGINEER.
- MAXIMUM FREE DROP OF ANY CONCRETE SHALL BE 4 FEET.
- ANTICIPATE THE DEFLECTION OF ALL FORMWORK AND SUPPORT SYSTEMS. PROVIDE AND PLACE EXTRA CONCRETE AS NECESSARY TO PRODUCE FINISHED SURFACES WITH SPECIFIED TOLERANCES AT DESIGNATED ELEVATIONS AND CONTOURS AT NO ADDITIONAL COST TO THE OWNER.
- LEAN CONCRETE SHALL BE 2500 PSI (MIN.)
- EXPOSED SURFACES SHALL BE FORMED SMOOTH AND UNIFORM WITHOUT RUBBING AND PLASTERING.
- EXPOSED EDGES OF 90 DEGREES OR LESS SHALL BE SMOOTHLY CHAMFERED TO ¼ INCHES WITHOUT TROWEL MARKS.
- CONCRETE SHALL COMPLY WITH SANDAG SERVICE LIFE DESIGN GUIDE FOR CORROSION PREVENTION OF CONCRETE STRUCTURES IN SAN DIEGO COUNTY.

STRUCTURAL STEEL:

- ALL STRUCTURAL STEEL SHALL BE ASTM A-36, A-53, A-588, A-595 OR AS NOTED ON THE DRAWINGS.
- HOT-DIP GALVANIZING SHALL BE PERFORMED IN ACCORDANCE WITH THE REQUIREMENTS OF ASTM A-123 FOR STRUCTURAL STEEL AND ASTM A-153 FOR STEEL HARDWARE.
- ALL DESIGN FABRICATION AND ERECTION OF STRUCTURAL STEEL SHALL BE PERFORMED IN ACCORDANCE WITH THE AISC MANUAL OF STEEL CONSTRUCTION, LATEST EDITION.
- ALL WELDING SHALL CONFORM TO STRUCTURAL WELDING CODE AWS D.1.1. LATEST EDITION. ELECTRODES SHALL BE E70-XX.
- ALL CONNECTION BOLTS SHALL BE ASTM A-325 HEXAGONAL HEAD COMPLETE WITH HEX NUT AND WASHERS AND SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM SPECIFICATIONS, UNLESS OTHERWISE NOTED ON INDIVIDUAL DRAWINGS.
- SIZE OF THE BOLT HOLES TO BE ⅛" LARGER THAN BOLT DIAMETER, UNLESS OTHERWISE NOTED.
- WELDER SHALL BE BY AWS CERTIFIED WELDERS MEETING CITY OF SAN DIEGO STANDARDS.

EQUIPMENT OPENING LOCATIONS:

- VERIFY ALL DIMENSIONS AND LOCATION OF MECHANICAL OR OTHER EQUIPMENT, OPENINGS AND SUPPORT BEAMS FOR EQUIPMENT. COORDINATE WITH EQUIPMENT SUPPLIERS, MECHANICAL CONTRACTOR AND MECHANICAL DRAWINGS. VERIFY CLEARANCES TO EXISTING AND NEW CONSTRUCTION.

STATION PLATFORM DESIGN LOADS AND PARAMETERS:

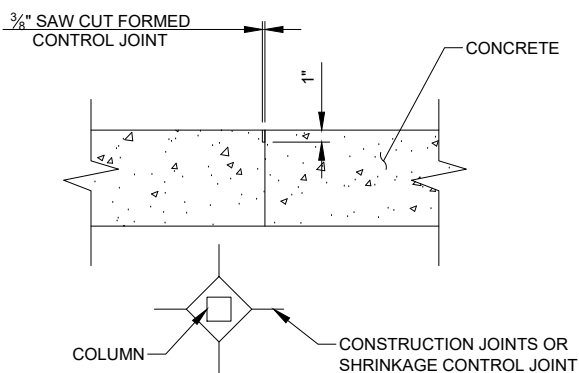
DEAD LOAD:	
REINFORCED CONCRETE	150 PCF
BALLAST	120 PCF
LIVE LOAD:	
PEDESTRIAN CONSTRUCTION	150 PSF
ASSHTO H10 MAINTENANCE VEHICLE COOPER E80 PER AREMA	80 PSF
EARTH LOAD:	
SOIL DENSITY	120 PCF
ANGLE OF FRICTION	30 DEG
COHESION	0
SUBGRADE MODULUS	90 PCF



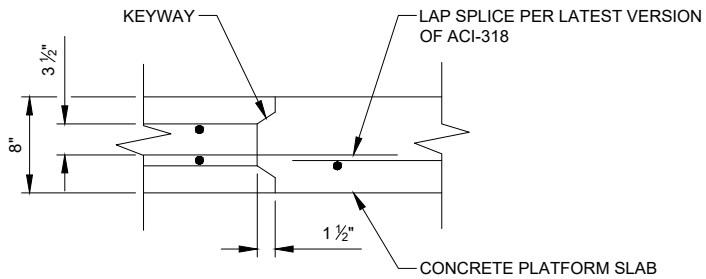
<p>△ REVISIONS</p> <table border="1"> <tr> <td>0</td> <td>9/23/22</td> <td>NEW SHEET</td> <td>SH</td> <td>DB</td> </tr> </table>		0	9/23/22	NEW SHEET	SH	DB	<p>DRAWN RAILPROS</p> <p>CHECKED A. ANDERSON <i>[Signature]</i></p> <p>RECOMMENDED B. SMITH <i>[Signature]</i></p> <p>DATE SEPT 2022</p>	<p>SANDAG/CTD ENGINEERING STANDARDS ARE INTENDED FOR SANDAG/CTD APPROVED USES ONLY. FOR NON-SANDAG/CTD APPROVED USES: SANDAG/CTD SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF THE DATA OR INFORMATION CONTAINED HEREIN. THE SELECTION AND USE OF THESE STANDARDS IS THE SOLE RESPONSIBILITY OF THE USER AND SHOULD NOT BE USED WITHOUT CONSULTING A REGISTERED PROFESSIONAL ENGINEER. ALL WARRANTIES AND REPRESENTATIONS OF ANY KIND ARE DISCLAIMED. ANYONE MAKING USE OF THIS INFORMATION AGREES THAT IT ASSUMES ALL LIABILITY ARISING FROM SUCH USE. NO PART OF THESE STANDARDS SHOULD BE REPRODUCED OR DISTRIBUTED IN ANY FORM OR BY ANY MEANS WITHOUT THE PRIOR WRITTEN PERMISSION OF SANDAG/CTD. ALL RIGHTS RESERVED.</p>	<p>SANDAG</p> <p>SAN DIEGO ASSOCIATION OF GOVERNMENTS 401 B Street, Suite 800 San Diego, CA. 92101 www.sandag.org</p>	<p>NORTH COUNTY TRANSIT DISTRICT</p> <p>810 Mission Avenue Oceanside, CA 92054 www.gonctd.com</p>	<p>ENGINEERING STANDARD DRAWINGS</p> <p>GENERAL STRUCTURAL NOTES (as referenced from certain ESD drawings)</p>	<p>DRAWING NO. ESD-3210</p> <p>DRAWING SHEET NO. 1 OF 1</p> <p>SCALE: NONE</p> <p>CONTRACT SHEET NO.</p>
0	9/23/22	NEW SHEET	SH	DB								
REV.	DATE	DESCRIPTION	DES.	ENG.	DESIGNER PE STAMP							

GENERAL NOTES:

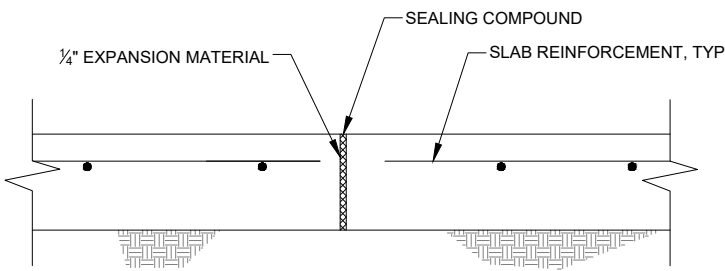
- WHERE COLUMN SPACING EXCEEDS 8'-0" PROVIDE ADDITIONAL CONSTRUCTION JOINTS OR SHRINKAGE CONTROL JOINTS TO MAINTAIN A 8'-0" MAXIMUM JOINT SPACING AT THE CANOPIES.
- SAW CUT WITHIN 12 HOURS OF CONCRETE PLACEMENT.
- PROVIDE ISOLATION JOINTS AROUND ALL COLUMNS.
- FOR SLAB REINFORCEMENT, SEE PLATFORM STRUCTURAL DETAILS.
- SEE DRAINAGE PLANS, MECHANICAL AND CANOPY DRAWINGS.
- HOLES WILL BE PERMITTED IN THE OUTER 1/2" OF THE WEB FOR WIRE, RINGS, ETC. TIE WEB TO #3 REINFORCING BARS @ 12 MAXIMUM INTERVALS TO SUPPORT THE WATERSTOP IN PROPER POSITION DURING CONCRETE PLACEMENT. ALTERNATIVE DETAIL MAY BE SUBMITTED FOR APPROVAL OF THE ENGINEER.
- WATERSTOP TO HAVE 5 OR MORE PAIRS OF RAISED RIBS TO PROVIDE 0.1 SQUARE INCH MINIMUM RIB CROSS-SECTION AREA ON EACH HALF OF THE WATERSTOP.



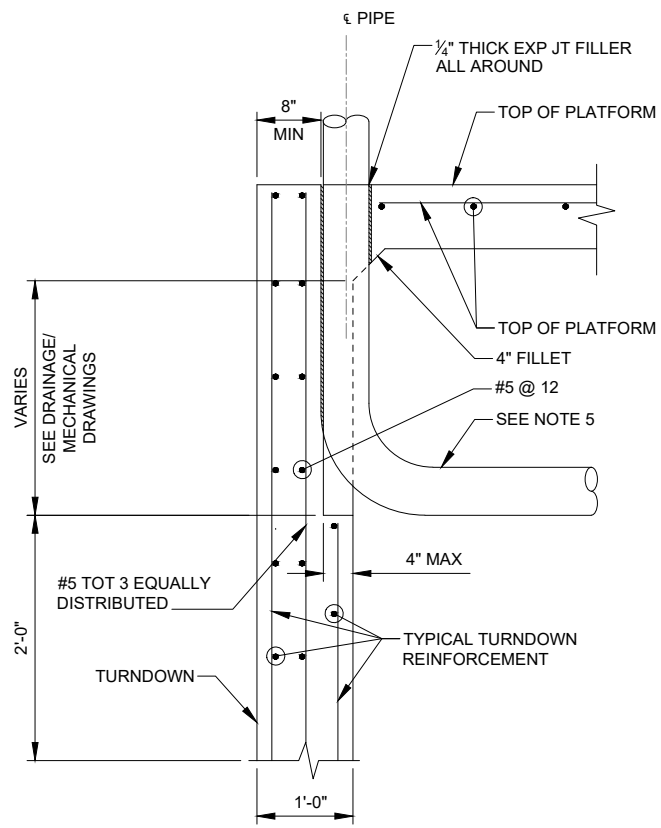
1 CONTROL JOINT DETAIL
SCALE = NTS



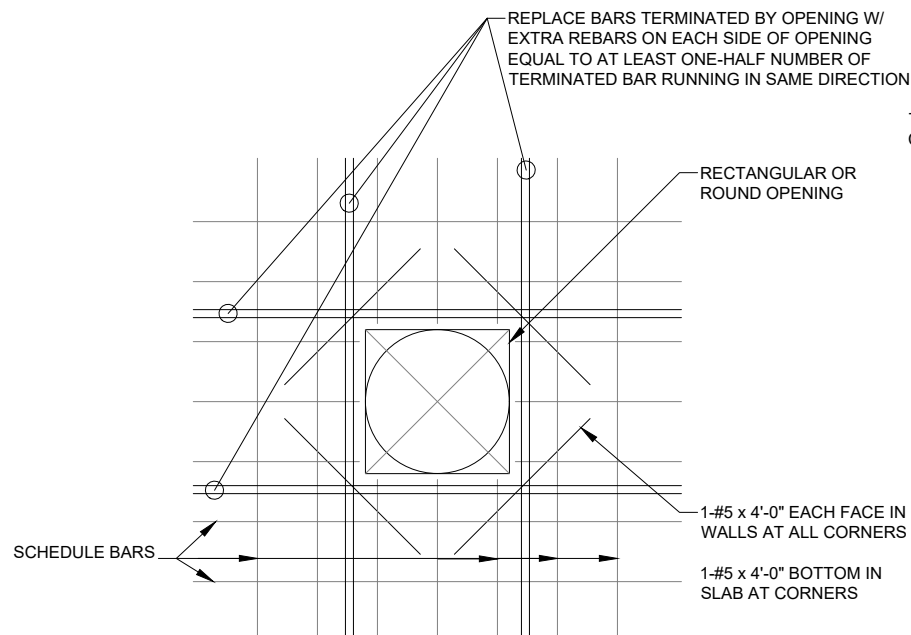
2 CONSTRUCTION JOINT DETAIL
SCALE = NTS



3 SLAB EXPANSION JOINT DETAIL
SCALE = NTS

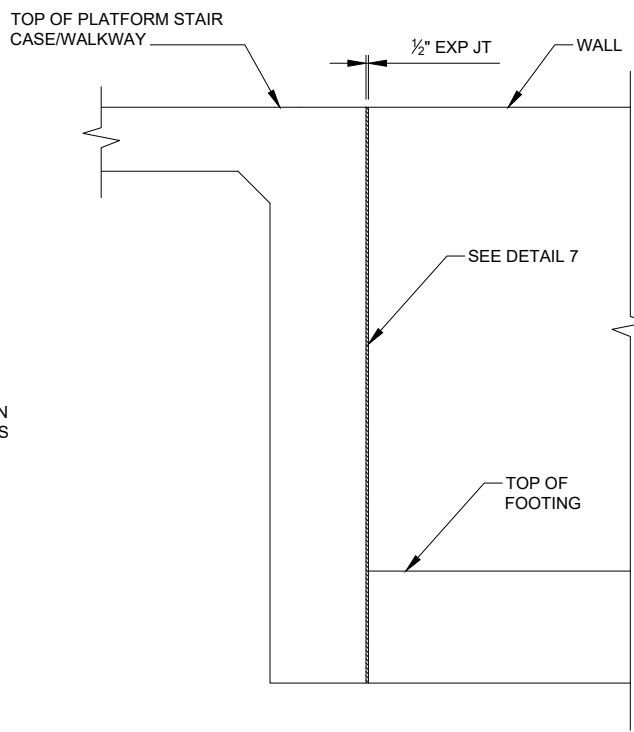


4 PIPE SLEEVES AT WALLS AND TURNDOWNS
SCALE = NTS

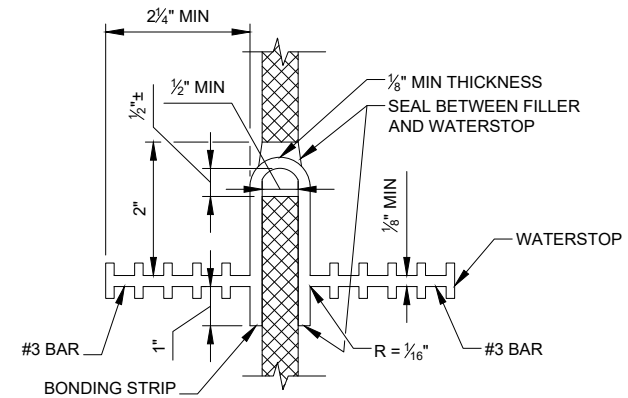


- NOTES:**
- THE EXTRA REBAR SHALL EXTEND PAST THE OPENING A DISTANCE OF TWICE THE LAP LENGTH OR TO THE END OF THE BAR, WHICHEVER IS LESS.
 - BEFORE POURING CONCRETE THE CONTRACTOR SHALL VERIFY WITH OTHER TRADES THE SIZE AND THE LOCATION OF THE REQUIRED OPENINGS.
 - AT OPENING 18" OR LESS IN DIAMETER OR ON ANY SIDE, NO EXTRA REBARS ARE REQUIRED UNLESS SHOWN OTHERWISE. SCHEDULED REBARS SHALL BE SPREAD (NOT CUT) TO ALLOW OPENING TO BE MADE, SUCH OPENINGS SHALL BE PROVIDED WITH A MIN OF 1-#5 EF ALL SIDES TO BE PLACED ALONG EDGES. SUCH BARS SHALL EXTEND AT LEAST 2'-0" BEYOND THE CORNERS OF THE OPENING.

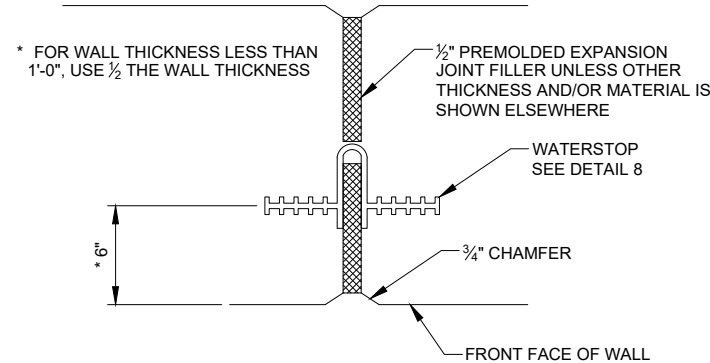
5 TYPICAL REINFORCING AT OPENING IN WALL AND SLABS
SCALE = NTS



6 TYPICAL CONNECTION AT PLATFORM
SCALE = NTS



8 WATERSTOP DETAIL
SCALE = NTS



7 WALL EXPANSION JOINT DETAIL
SCALE = NTS

REVISIONS		SH	DB	DATE	DESCRIPTION	DES.	ENG.
0	9/23/22				NEW SHEET		
REV.	DATE				DESCRIPTION	DES.	ENG.

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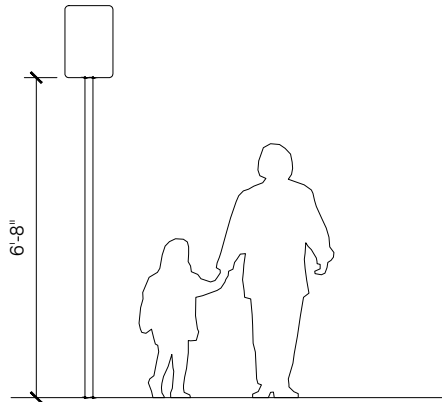
DESIGNER PE STAMP

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ENGINEERING STANDARD DRAWINGS
MISCELLANEOUS STRUCTURAL DETAILS

DRAWING NO. ESD-3211
DRAWING SHEET NO. 1 OF 1
SCALE: NONE
CONTRACT SHEET NO.



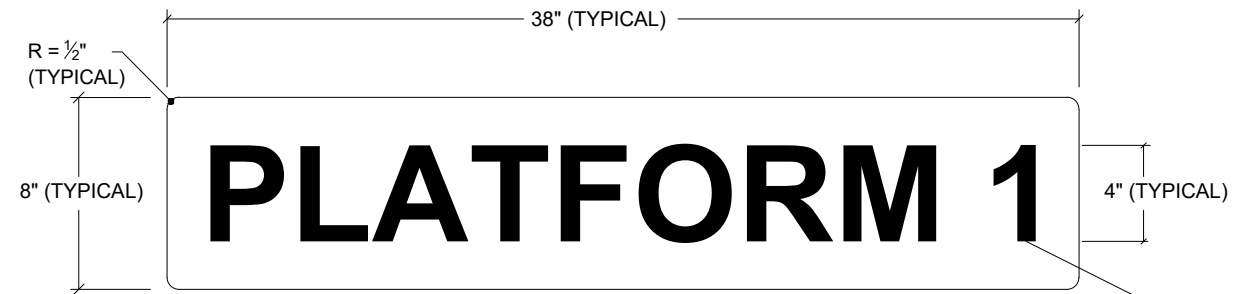
SIGN TYPE 3
INFORMATION / DIRECTIONAL SIGN

PLATFORM 2

PLATFORM 3

PLATFORM 4

B COPY LAYOUTS



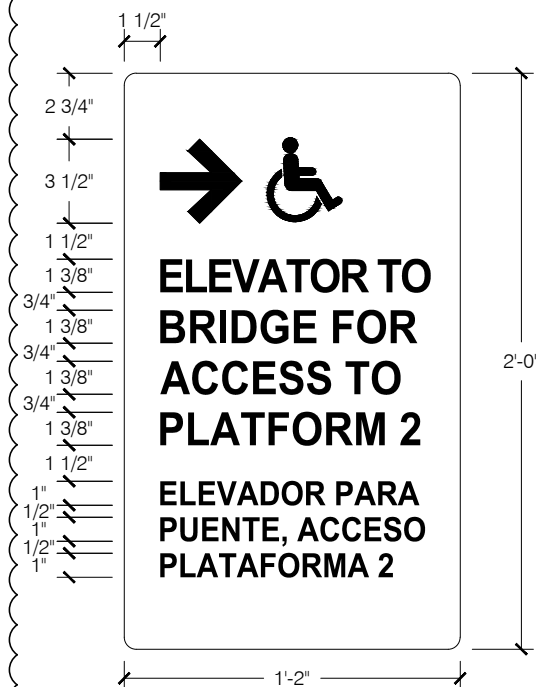
COPY SILKSCREEN OR PAINTED ON BOTH SIDES
COLOR: WHITE

1 PLATFORM ID SIGN
(SEE ESD-3307-03 FOR INSTALLATION)

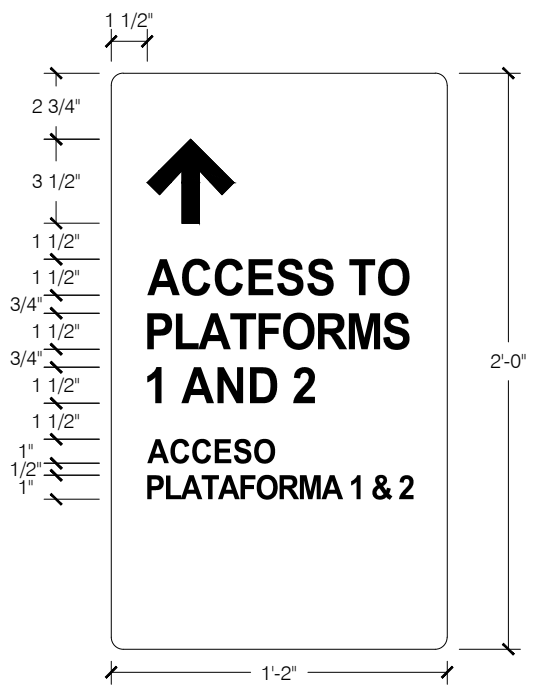
NOTE: ALL PLATFORM NUMBER SIGNS ARE TO BE DOUBLE-FACED

- NOTES:
1. DIMENSIONS & NOTES TYPICAL EXCEPT AS NOTED.
 2. CONTINUE PAINT COLOR USED ON FRONT SURFACES OF SIGNS TO SIDES.
 3. SEAL SIGNS WITH TRANSPARENT ANTI-GRAFFITI FILM.
 4. SIGN FONT TO BE BERTHOLD AKZIDENZ GROTESK SUPER. ADJUST WIDTH TO FIT TEXT ON SIGN.
 5. EXIT SIGN BRAILLE TO COMPLY WITH 2010 ADA STANDARDS FOR ACCESSIBLE DESIGN.

SEE NOTE 5



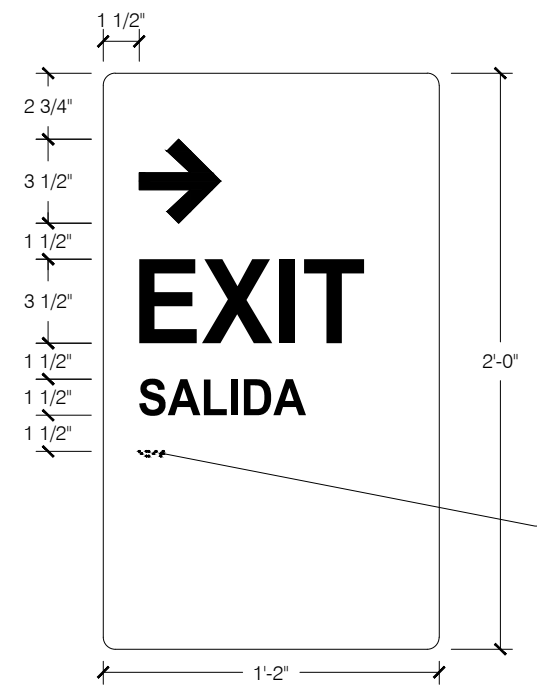
6 DIRECTIONAL SIGN
7 COPY LINES



5 DIRECTIONAL SIGN
5 COPY LINES



4 DIRECTIONAL SIGN
4 COPY LINES



3 EXIT SIGN
(SEE ESD-3307-04 FOR INSTALLATION)

A COPY LAYOUTS

REV.	DATE	DESCRIPTION	DES.	ENG.
1	9/23/22	CAPITALIZED ALL SIGNS AND REVISED (cont): WORDING. ADDED SPANISH TO SIGNS. (cont): ADDED BRAILLE TO EXIT SIGN. (cont): REPLACED "TRACK" WITH "PLATFORM"	SH	DB

△ REVISIONS

DRAWN RAILPROS

CHECKED A. ANDERSON

RECOMMENDED B. SMITH

DATE SEPT 2022

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DESIGNER PE STAMP

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www.sandag.org

NORTH COUNTY TRANSIT DISTRICT

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Oceanside, CA 92054
www.gonctd.com

ENGINEERING STANDARD DRAWINGS

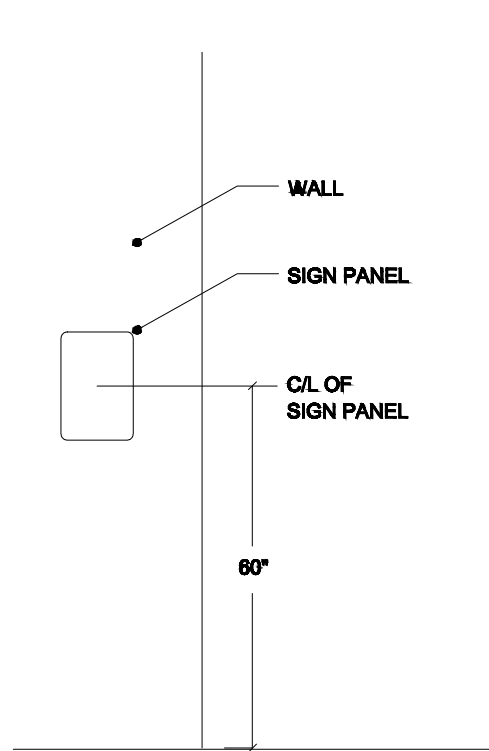
INFORMATION / RESTRICTIVE COPY LAYOUTS

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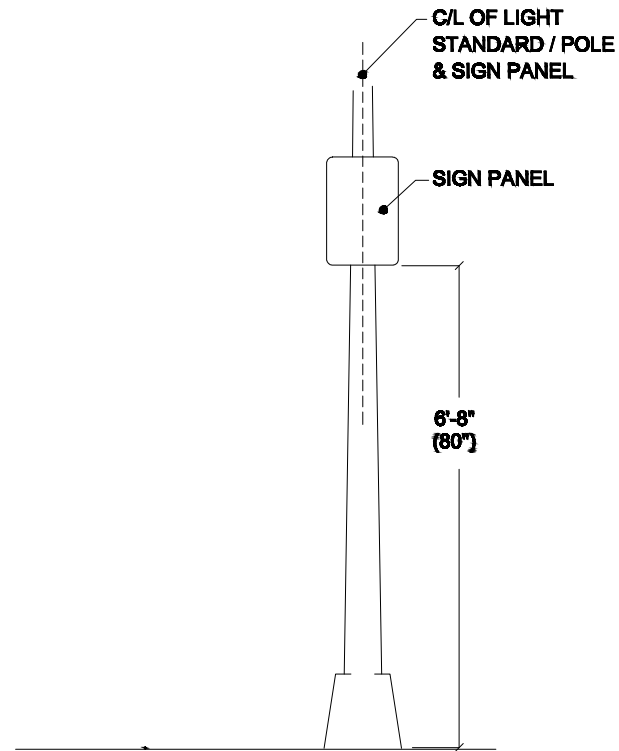
DRAWING SHEET NO. 1 OF 4

SCALE: NONE

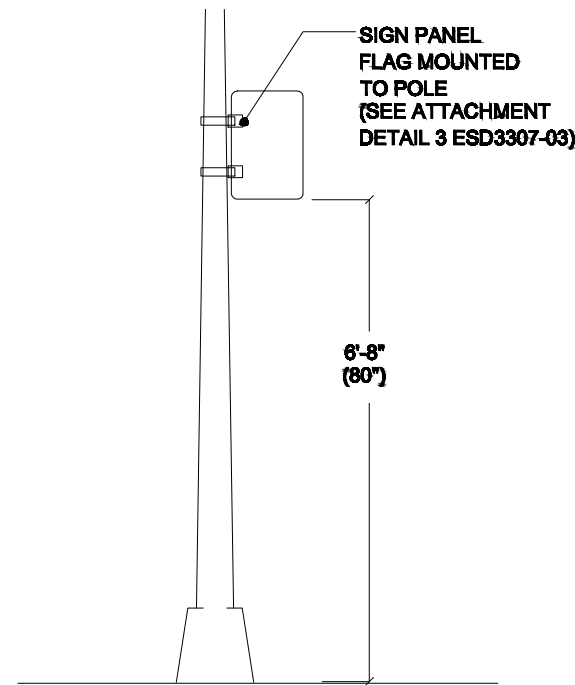
CONTRACT SHEET NO.



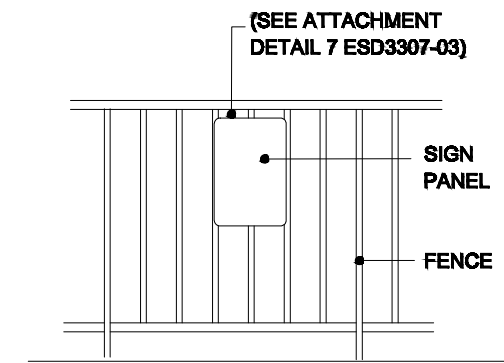
① WALL MOUNT



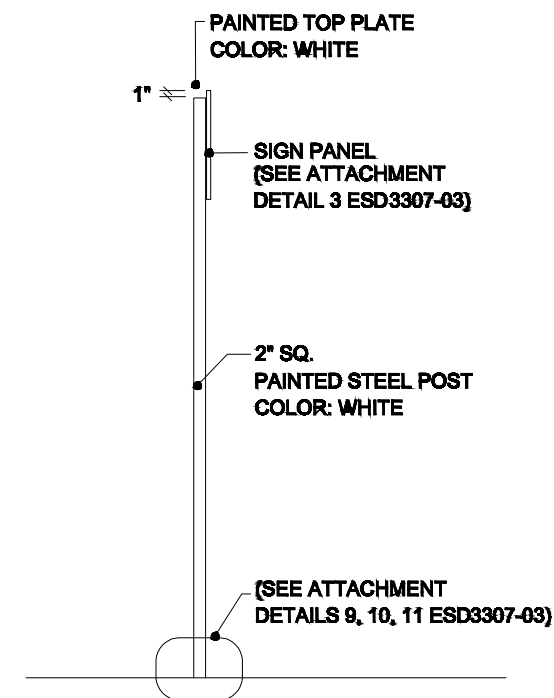
② LIGHT POLE MOUNT (DIRECTIONAL SIGN)



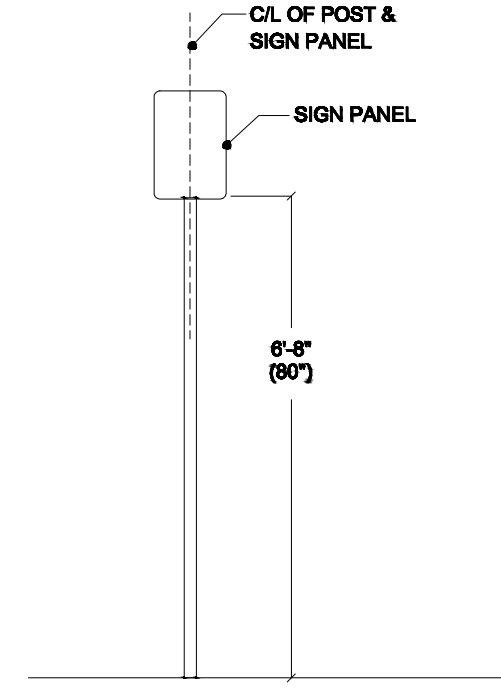
③ LIGHT POLE MOUNT (TRACK IDENTIFICATION SIGN)



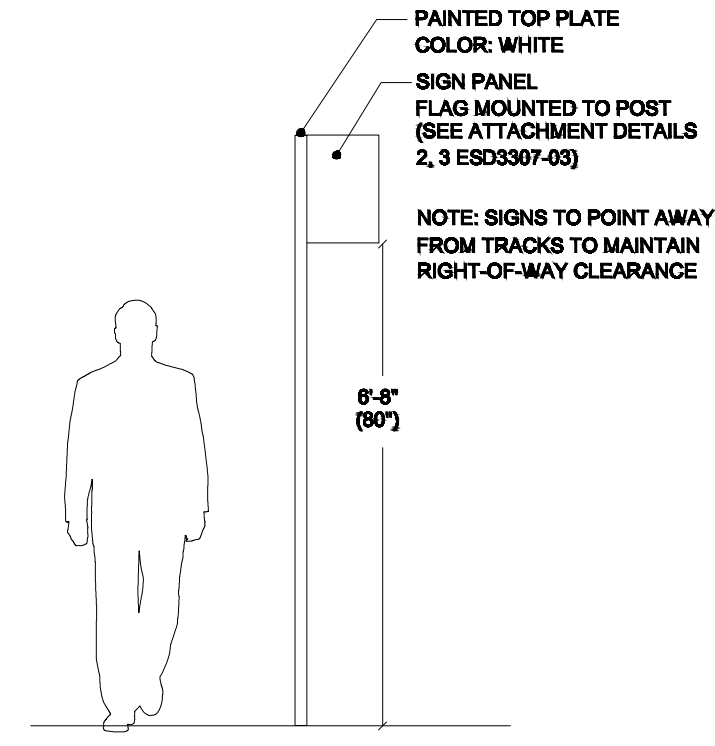
④ FENCE MOUNT



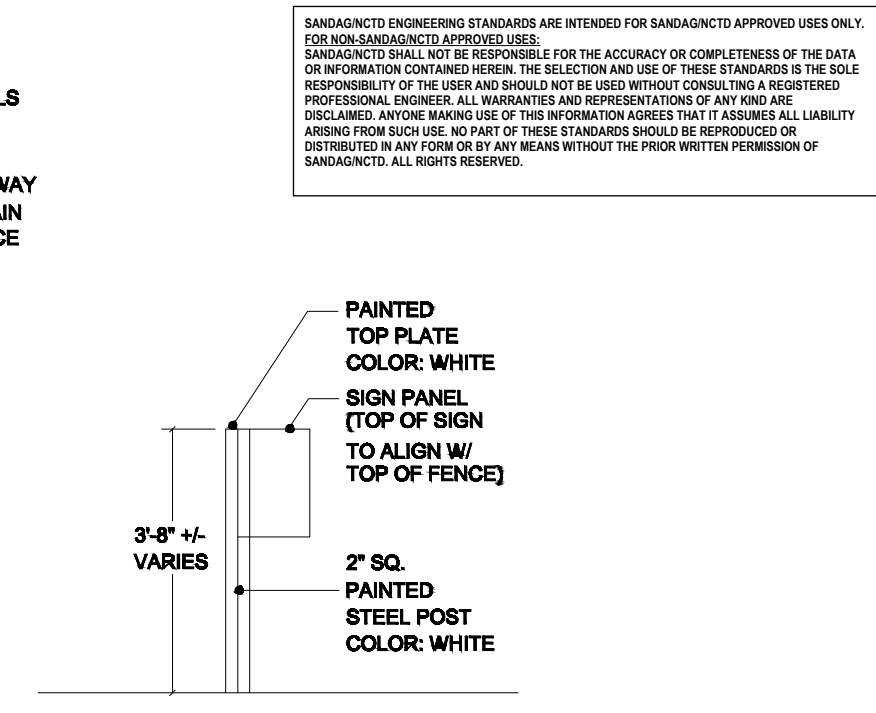
⑤ POST MOUNT (RESTRICTIVE SIGN)



⑥ POST MOUNT (RESTRICTIVE SIGN)



⑦ FLAG MOUNT - TALL (EXIT SIGN)



⑧ FLAG MOUNT - SHORT (EXIT SIGN)

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A ELEVATIONS / MOUNTING CONDITIONS

REV.	DATE	DESCRIPTION	DES.	ENG.

REVISIONS	DRAWN RAILPROS
	CHECKED B. SMITH <i>BS</i>
	RECOMMENDED B. SCHMITH <i>BAS</i>
	DATE 01/22/16
DESIGNER PE STAMP	

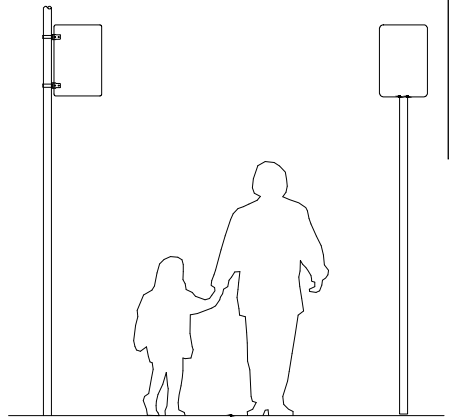
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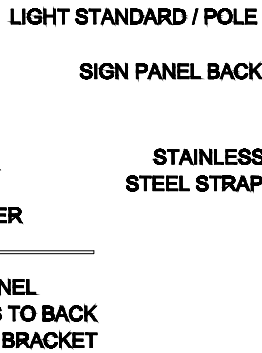
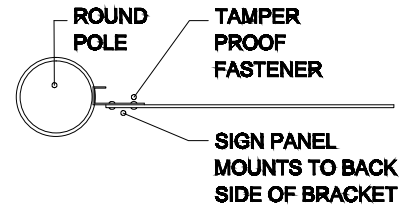
ENGINEERING STANDARD DRAWINGS
INFORMATION / RESTRICTIVE SIGN
DETAILS

DRAWING NO.	ESD-3307-02
DRAWING SHEET NO.	2 OF 4
SCALE:	NONE
CONTRACT SHEET NO.	

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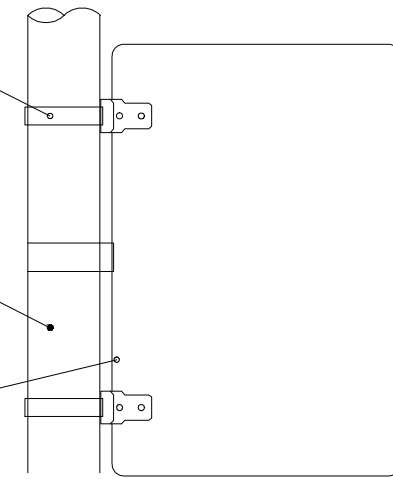
SIGN TYPE 3 - TRACK IDENTIFICATION INFORMATION / DIRECTIONAL SIGN



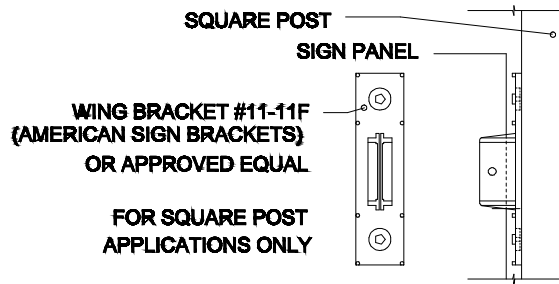
H4-D-007 STRAP ON L-MOUNT BRACKET STAINLESS STEEL AS MANUFACTURED BY WESTERN HIGHWAYS OR APPROVED EQUAL

ST. STL. STRAPS @ ROUND POLES (SEE B ESD 3307-01)
ST. STL. BRACKETS @ SQ. POSTS (SEE B9 ESD3307-02)

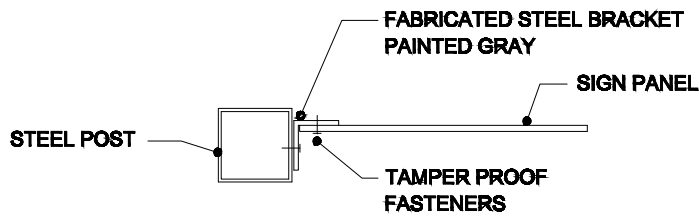
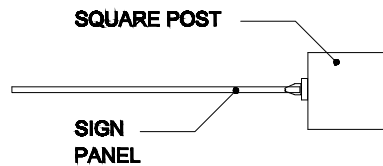
POLE/POST COLOR: WHITE
SIGN FACE



1 FLAG MOUNT TO ROUND POLE



2 FLAG MOUNT TO SQUARE POST

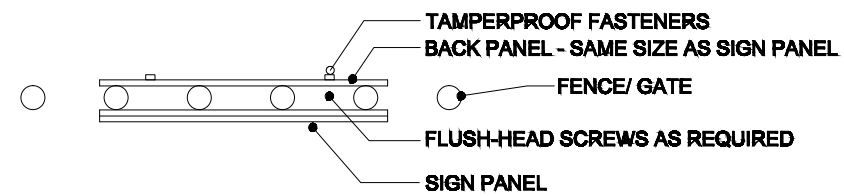


3 FLAG MOUNT TO SQUARE STEEL POST

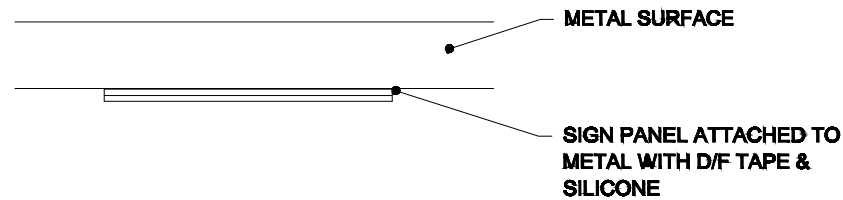
1/8" THICK PAINTED ALUMINUM BACK PANEL MECHANICALLY ATTACHED TO POST WITH FLUSH-HEAD SCREWS AS REQ'D.

1/8" THICK PAINTED ALUM. SIGN PANEL ATTACHED TO BACK PANEL W/ 3M VHB TAPE AROUND PERIMETER & SILICONE ADHESIVE AS REQ'D. FOR SAFE & SECURE MOUNTING. APPLY QUALITY PRIMARY TO ALL PAINTED SURFACES TO PREVENT ELECTROLYSIS. TYPICAL, ALL SIGNS.

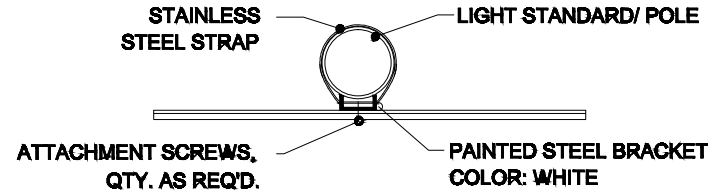
4 SQUARE POST MOUNT



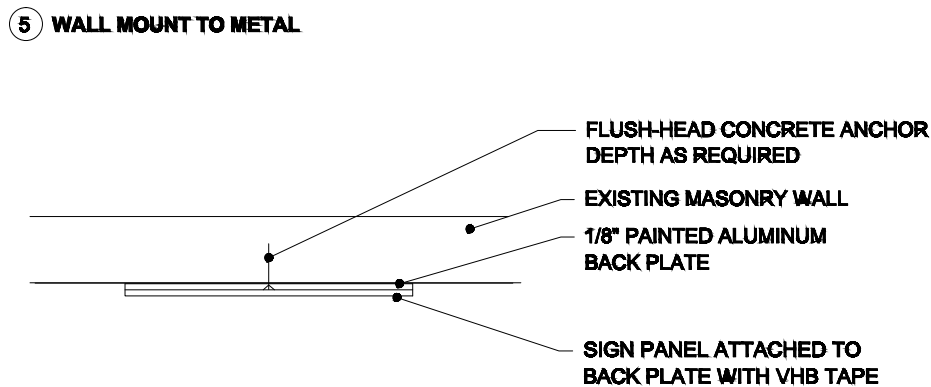
5 WALL MOUNT TO METAL



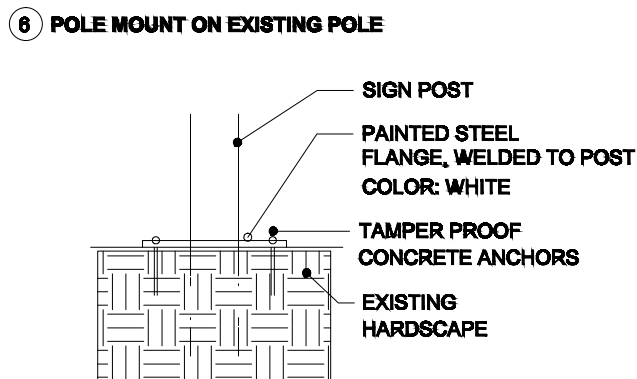
6 POLE MOUNT ON EXISTING POLE



7 FENCE MOUNT

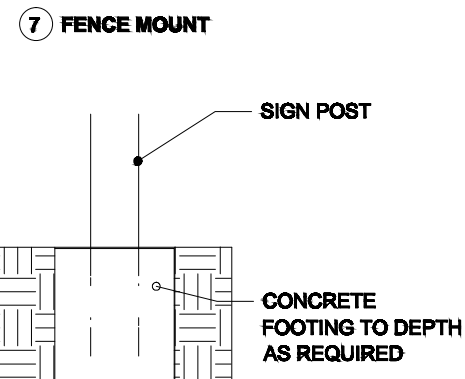


8 WALL MOUNT TO MASONRY

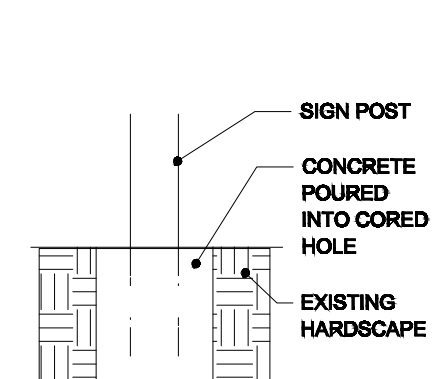


9 HARDSCAPE MOUNTING CONDITION WITH FLANGE

A ATTACHMENT DETAILS



10 LANDSCAPE MOUNTING CONDITION



11 HARDSCAPE MOUNTING CONDITION CORE AND DRILL

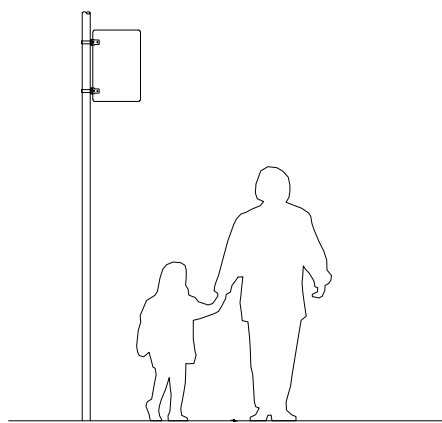
REV.	DATE	DESCRIPTION	DES.	ENG.

REVISIONS	DRAWN RAILPROS
CHECKED B. SMITH	<i>BS</i>
RECOMMENDED B. SCHMITH	<i>BS</i>
DATE 01/22/16	DESIGNER PE STAMP

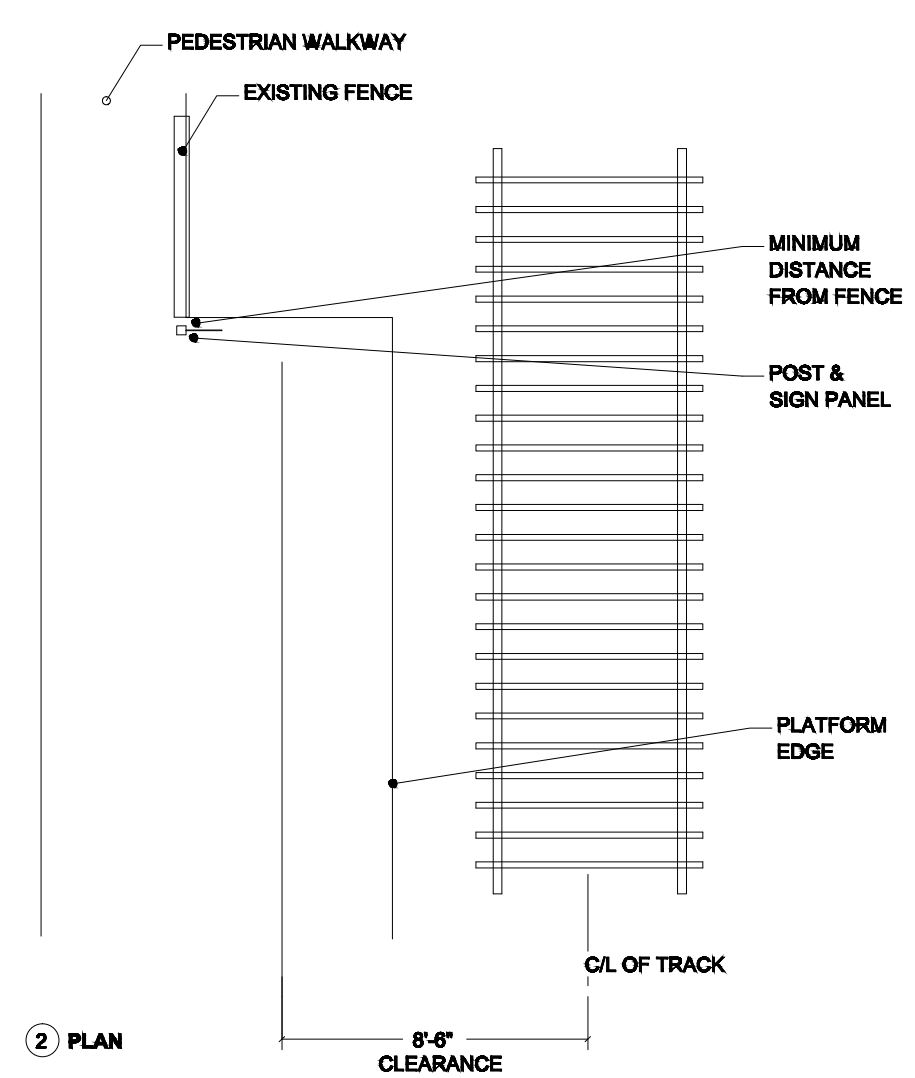
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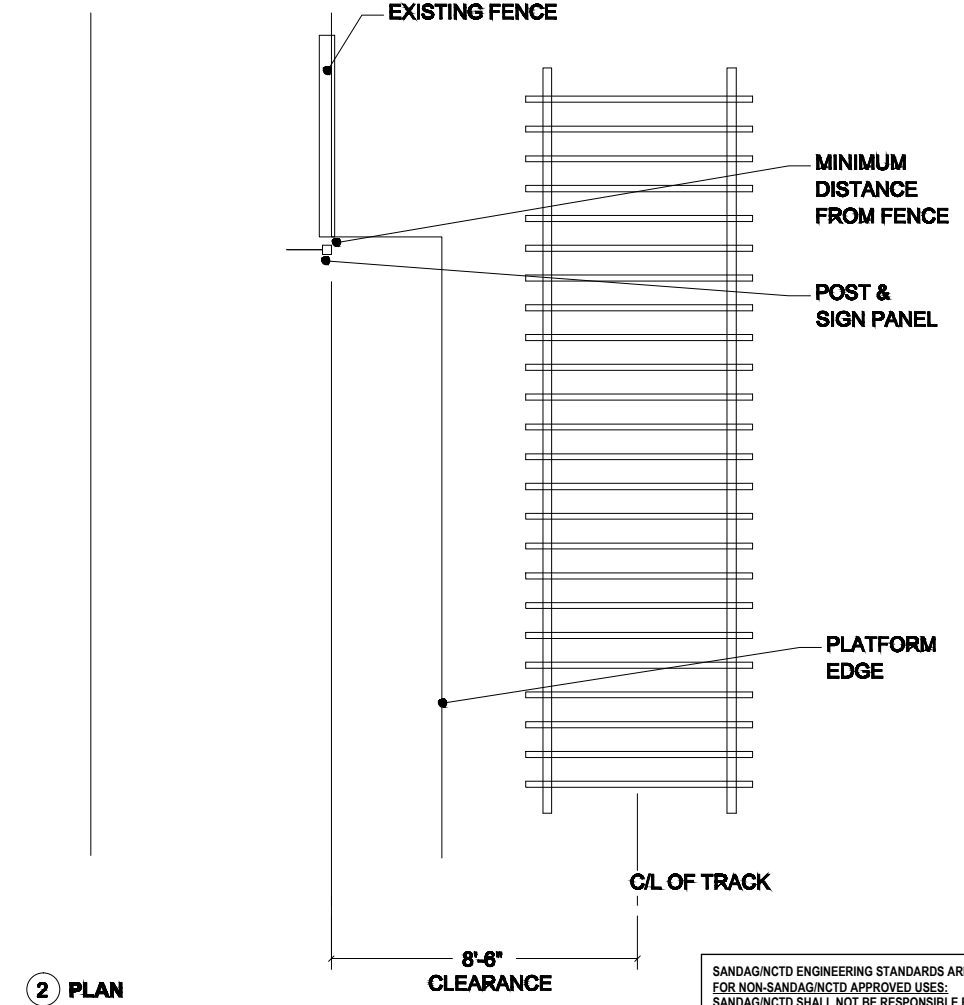
ENGINEERING STANDARD DRAWINGS INFORMATION / RESTRICTIVE SIGN ANCHOR / MOUNTING DETAILS	DRAWING NO. ESD-3307-03
	DRAWING SHEET NO. 3 OF 4
	SCALE: NONE
	CONTRACT SHEET NO.



SIGN TYPE 3 - EXIT SIGN
INFORMATION / DIRECTIONAL SIGN



2 PLAN

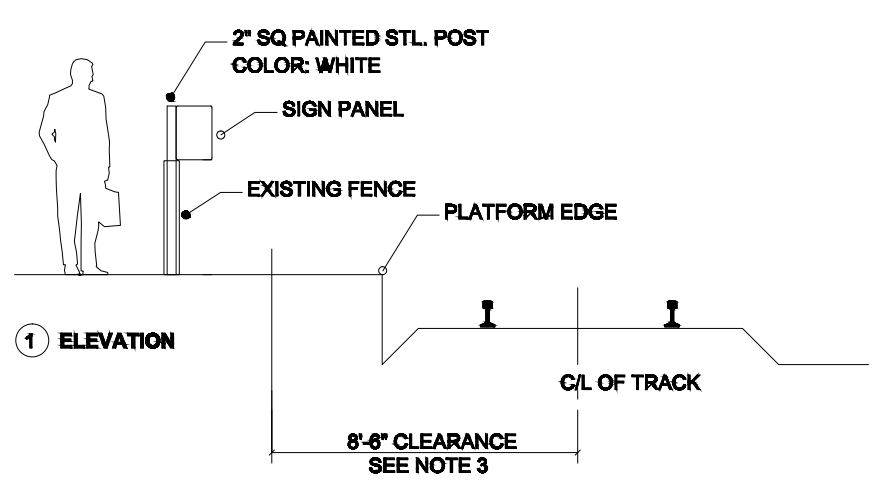


2 PLAN

NOTES:

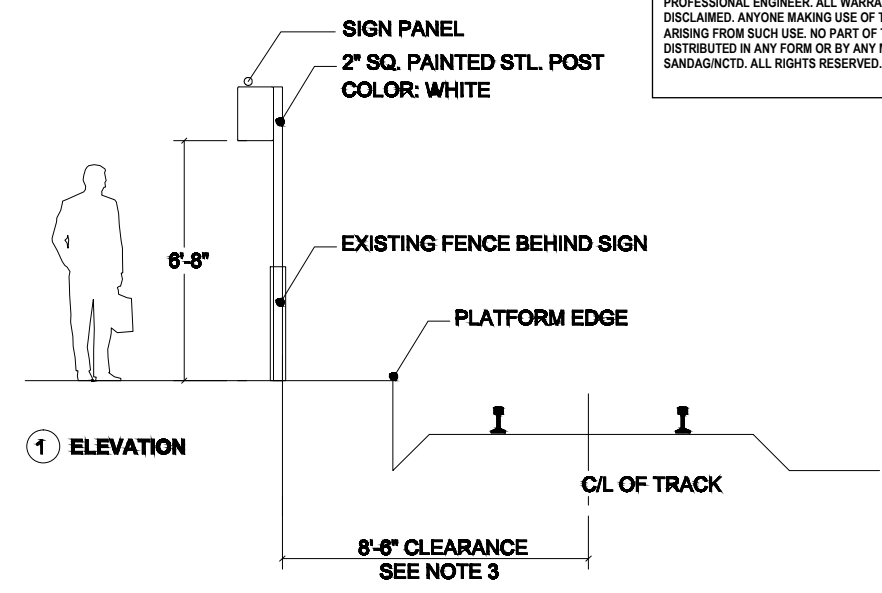
1. WHERE FENCE IS LOCATED LESS THAN 10'-2" FROM CENTERLINE OF TRACK, INSTALL TALL VERSION OF SIGN WITH SIGN PANEL POINTING AWAY FROM TRACK. (SEE A)
2. WHERE DISTANCE FROM CENTERLINE OF TRACK TO FENCE IS 10'-2" OR GREATER, INSTALL SHORT VERSION OF SIGN WITH SIGN PANEL POINTING TOWARD TRACK. (SEE B)
3. REFER TO ESD2101 AND ESD2102 FOR MINIMUM CLEARANCES.

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1 ELEVATION

B FLAG MOUNT - SHORT (EXIT SIGN)



1 ELEVATION

A FLAG MOUNT - TALL (EXIT SIGN)

REV.	DATE	DESCRIPTION	DES.	ENG.

DESIGNER PE STAMP

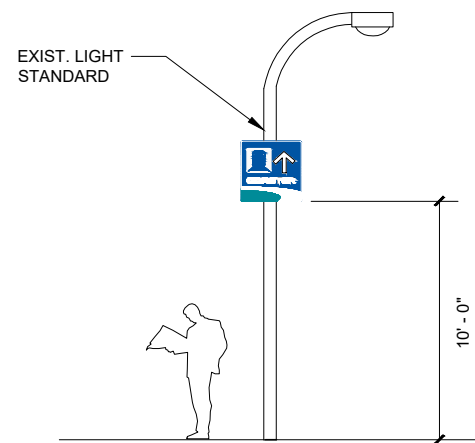
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Oceanside, CA 92054
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ENGINEERING STANDARD DRAWINGS

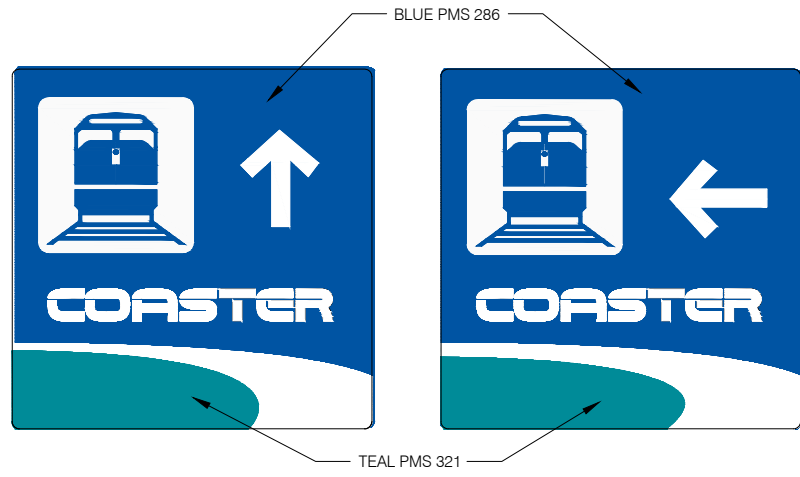
INFORMATION / RESTRICTIVE SIGN
EXIT SIGN LOCATION DETAILS

DRAWING NO.	ESD-3307-04
DRAWING SHEET NO.	4 OF 4
SCALE:	NONE
CONTRACT SHEET NO.	



MOUNTING ELEVATION

SCALE: NONE

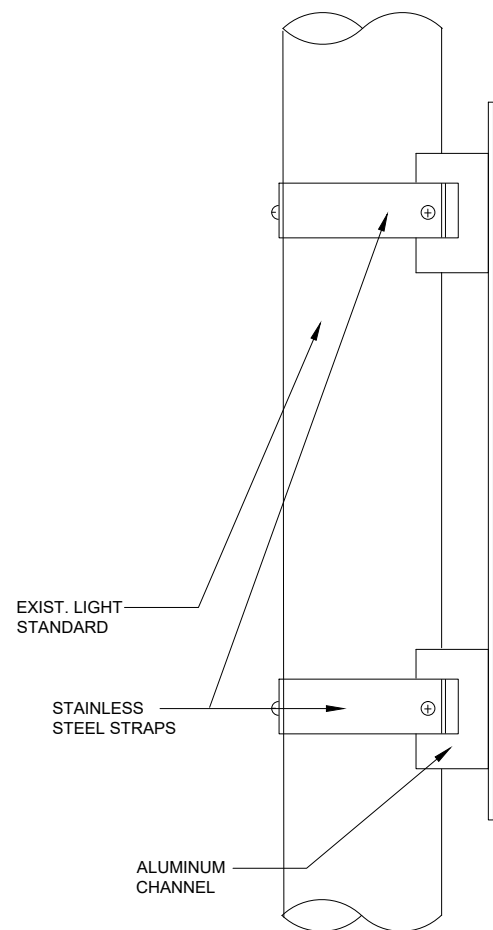


SIGN 3308.1

SCALE: NONE

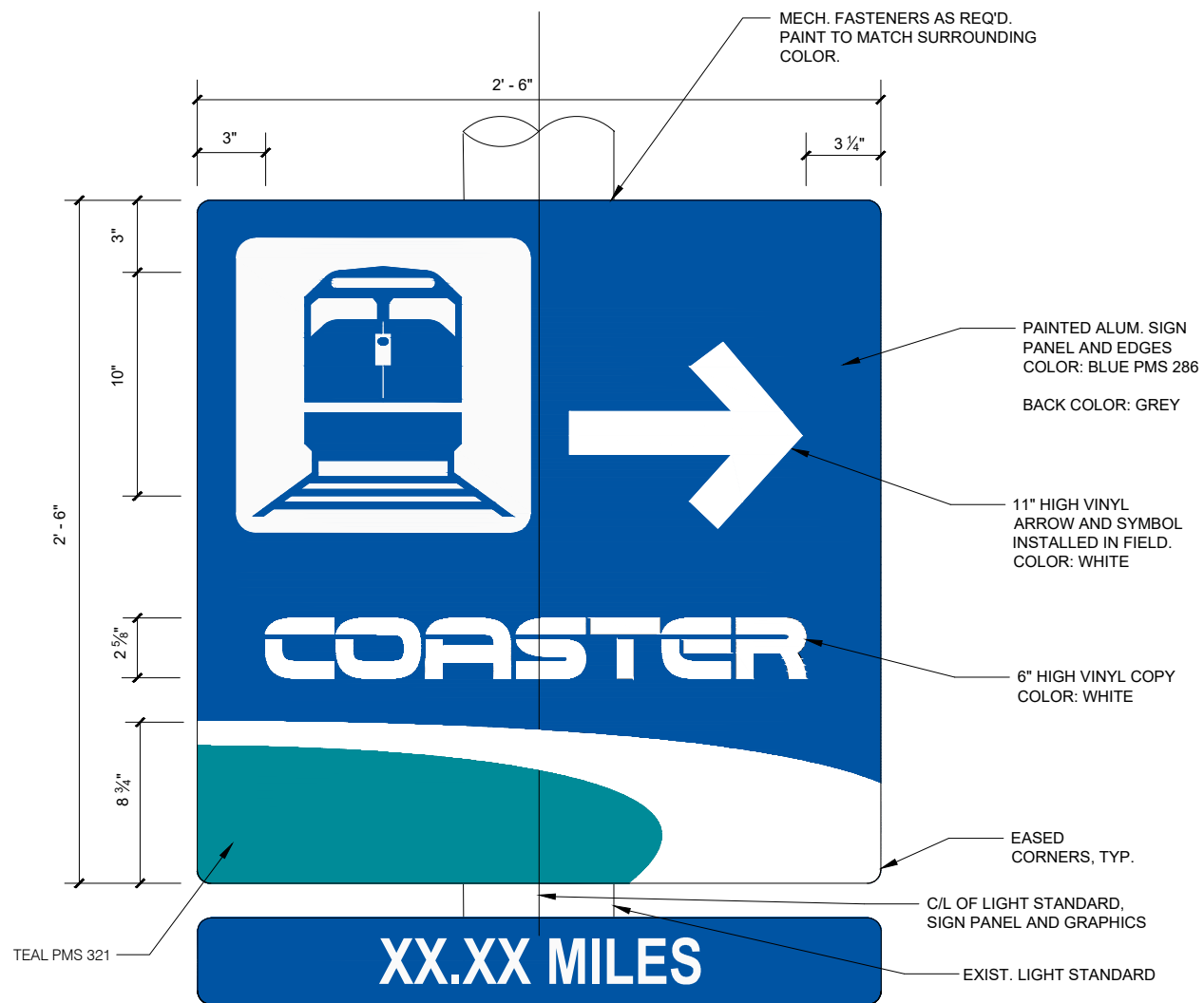
SIGN 3308.2

SCALE: NONE



MOUNTING DETAIL

SCALE: NONE



SIGN 3308.3

SCALE: NONE

TRAILBLAZER SIGN:

PAINTED ALUM. SIGN PANELS ATTACHED TO EXISTING LIGHT STANDARD.

SIGNS:

MOUNTING:

1. SEE DRAWINGS ESD-3307 AND ESD-5210 FOR POST/MOUNTING AND ANCHORAGE DETAILS.

MATERIAL:

1. 1/8" THICK MILL FINISH ALUMINUM PANEL, ALCOA 6016-T6 OR EQUAL.

COATINGS:

1. PAINT ALL SIDES WITH LINEAR POLYURETHANE.
2. COLOR FACE OF PANEL WITH ENGINEERING GRADE, PRESSURE SENSITIVE, RETRO-REFLECTIVE WHITE VINYL SHEETING. SILK SCREEN LEGEND WITH BLACK INK.
3. FINISH WITH EXTERIOR GRADE PRESSURE SENSITIVE CLEAR MYLAR, 3M-1150 OR EQUAL.
4. EXPOSED PORTIONS OF PLANK (TYPE A) TO BE PAINTED WITH METALLIC AND LAMPBLACK, MAKING A VERY DARK BROWN.
5. BASE OF PLANK TO HAVE A COAT OF COAL TAR APPLIED HOT TO 6" ABOVE GROUND.

NOTE:

SIZE AND MATERIAL OF EXISTING LIGHT STANDARD MAY VARY. SIGN CONTRACTOR SHALL PROVIDE ADJUSTMENT HARDWARE & ATTACHMENT DEVICES SUITABLE FOR VARIOUS TYPES OF LIGHT STANDARDS. CONTINUE PAINT USED ON PANEL SURFACE AROUND PANEL EDGES.

LOCATION:

THIS SIGN SHALL BE LOCATED BY PROJECT ENGINEER IN LIAISON WITH THE CITY TRAFFIC ENGINEER ON EXISTING CITY LIGHT STANDARDS. SIGNS SHALL BE AT KEY DECISION POINTS ALONG PRIMARY ARTERIAL ROADS APPROACHING THE STATION.

COLORS:

- BLUE: PMS 286
- TEAL GREEN: PMS 321

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REV.	DATE	DESCRIPTION	DES.	ENG.

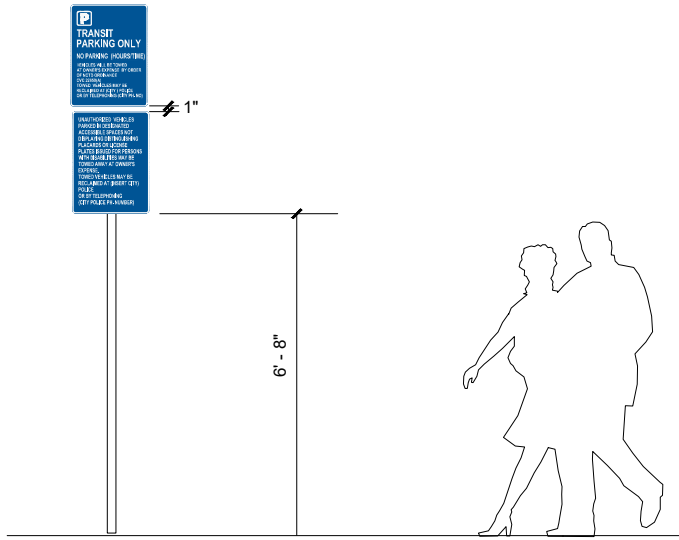
DRAWN
RAILPROS
CHECKED
B. SMITH
RECOMMENDED
B. SCHMITH
DATE 01/15/16

DESIGNER PE STAMP

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ENGINEERING STANDARD DRAWINGS		DRAWING NO.
STATION TRAILBLAZER SIGNS		ESD-3308
		DRAWING SHEET NO. 1 OF 1
SCALE: NONE		CONTRACT SHEET NO.

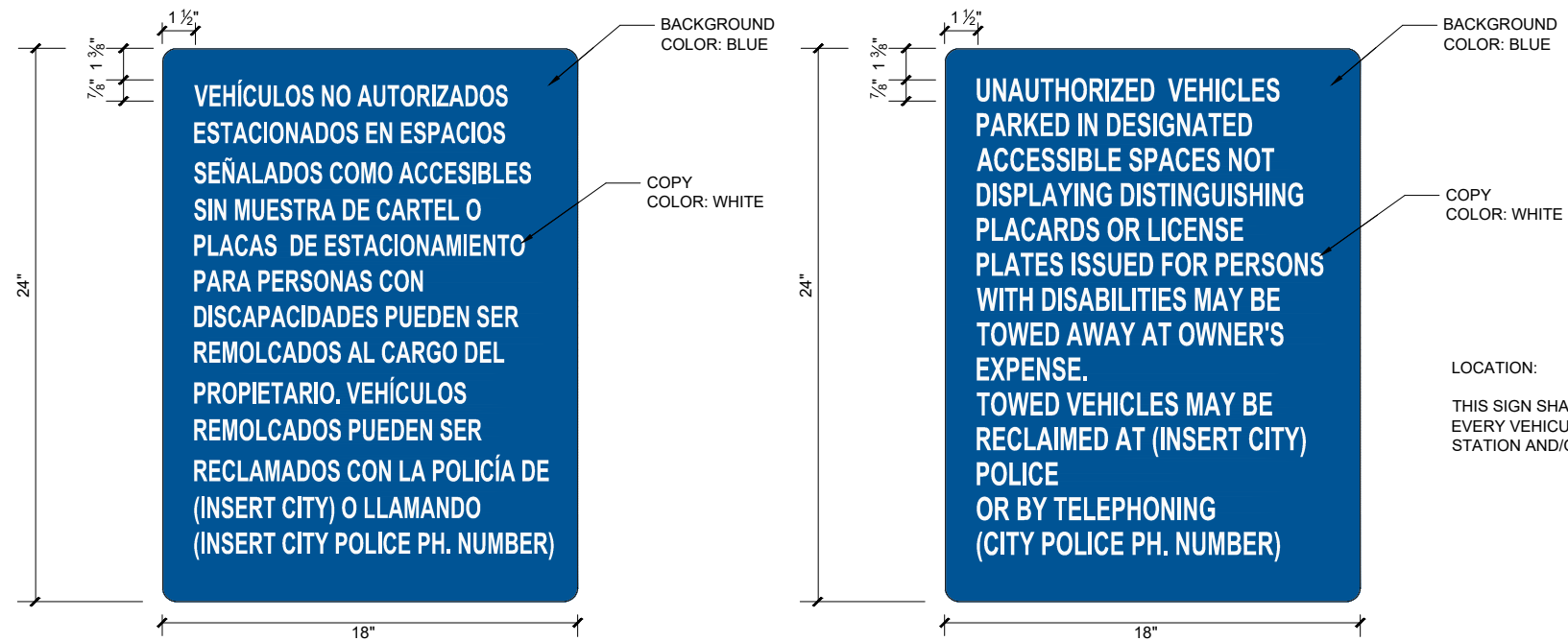


MOUNTING ELEVATION

SCALE: NONE

CITY	PH. NUMBER
CARLSBAD	(760) 931-2197
OCEANSIDE	(760) 435-4900
SAN DIEGO	(619) 531-2000
SOLANA BEACH	(760) 966-3500
SAN DIEGO COUNTY SHERIFF	(858) 565-5200
ENCINITAS	(858) 565-5200

NOTE:
PROJECT ENGINEER TO VERIFY THAT THE PHONE NUMBERS ARE STILL CURRENT AT TIME OF ISSUE OF PLANS.



SIGN 3309.1

SCALE: NONE

SIGNS

- LOCATION AND MOUNTING:
1. LOCATE ON EXISTING FENCE OR POST AS AVAILABLE, OTHERWISE INSTALL NEW POST.
 2. THIS SIGN SHALL BE LOCATED AT EVERY VEHICULAR ENTRANCE TO AREAS DESIGNATED FOR TRANSIT PARKING.
 3. SEE DRAWINGS ESD-3307 AND ESD-5210 FOR POST/MOUNTING AND ANCHORAGE DETAILS.

MATERIAL:

1. 1/8" THICK MILL FINISH ALUMINUM PANEL, ALCOA 6016-T6 OR EQUAL.

COATINGS:

1. PAINT ALL SIDES WITH LINEAR POLYURETHANE.
2. COLOR FACE OF PANEL WITH ENGINEERING GRADE, PRESSURE SENSITIVE, RETRO-REFLECTIVE WHITE VINYL SHEETING. SILK SCREEN LEGEND WITH BLACK INK.
3. FINISH WITH EXTERIOR GRADE PRESSURE SENSITIVE CLEAR MYLAR, 3M-1150 OR EQUAL.
4. EXPOSED PORTIONS OF PLANK (TYPE A) TO BE PAINTED WITH METALLIC AND LAMPBLACK, MAKING A VERY DARK BROWN.
5. BASE OF PLANK TO HAVE A COAT OF COAL TAR APPLIED HOT TO 6" ABOVE GROUND.

NOTE: CONTINUE PAINT USED ON PANEL SURFACE AROUND PANEL EDGES

LOCATION:

THIS SIGN SHALL BE LOCATED AT EVERY VEHICULAR ENTRANCE TO THE STATION AND/OR PARKING AREA.

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REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN RAILPROS	CHECKED B. SMITH <i>BS</i>	RECOMMENDED B.SCHMITH <i>BAS</i>	DATE 12/11/15	DESIGNER PE STAMP
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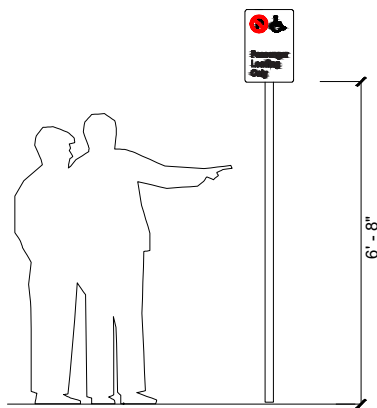
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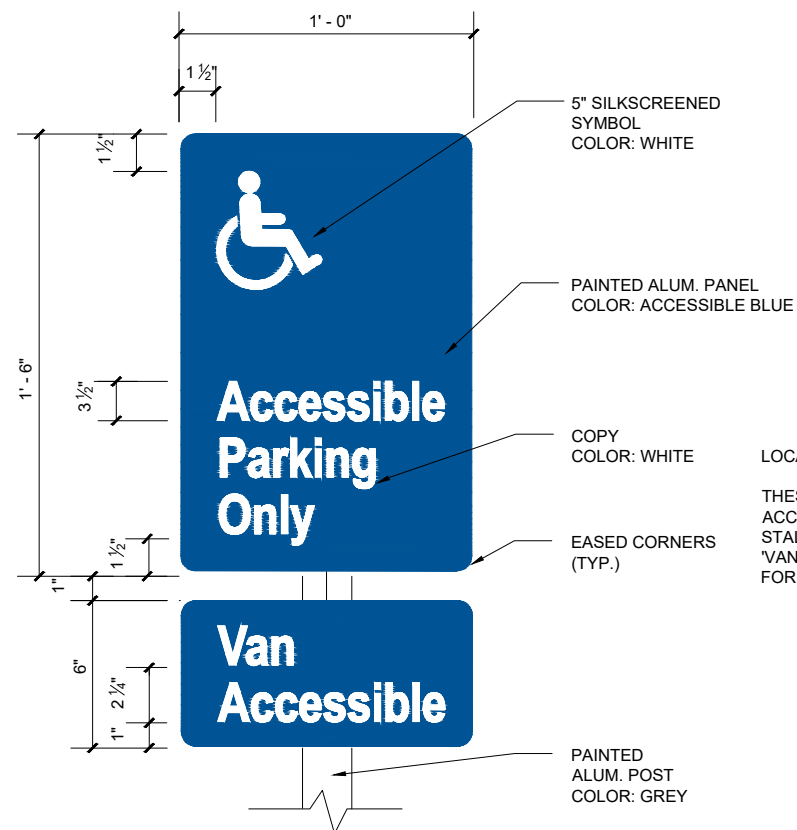
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ENGINEERING STANDARD DRAWINGS	DRAWING NO. ESD-3309
ACCESS/RESTRICTIVE SIGNS	DRAWING SHEET NO. 1 OF 1
	SCALE: NONE
	CONTRACT SHEET NO.

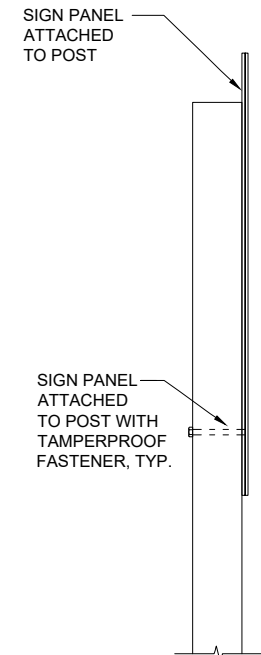


MOUNTING ELEVATION
SCALE: NONE



LOCATION:
THESE SIGNS ARE LOCATED AT EACH ACCESSIBLE PARKING STALL. EACH STALL TO BE VERIFIED WITH OWNER IF 'VAN ACCESSIBLE' SIGN IS REQUIRED FOR DESIGNATED VAN STALLS.

SIGN 3310-01
SCALE: NONE



TYPICAL SIDEVIEW
SCALE: NONE

- SIGNS**
- LOCATION AND MOUNTING:**
- LOCATE ON EXISTING FENCE OR POST AS AVAILABLE, OTHERWISE INSTALL NEW POST.
 - SEE DRAWINGS ESD-3307 AND ESD-5210 FOR POST/MOUNTING AND ANCHORAGE DETAILS.
- MATERIAL:**
- 1/8" THICK MILL FINISH ALUMINUM PANEL, ALCOA 6016-T6 OR EQUAL.
- COATINGS:**
- PAINT ALL SIDES WITH LINEAR POLYURETHANE.
 - COLOR FACE OF PANEL WITH ENGINEERING GRADE, PRESSURE SENSITIVE, RETRO-REFLECTIVE WHITE VINYL SHEETING. SILK SCREEN LEGEND WITH BLACK INK.
 - FINISH WITH EXTERIOR GRADE PRESSURE SENSITIVE CLEAR MYLAR, 3M-1150 OR EQUAL.
 - EXPOSED PORTIONS OF PLANK (TYPE A) TO BE PAINTED WITH METALLIC AND LAMPBLACK, MAKING A VERY DARK BROWN.
 - BASE OF PLANK TO HAVE A COAT OF COAL TAR APPLIED HOT TO 6" ABOVE GROUND.

SANDAG/NCTD ENGINEERING STANDARDS ARE INTENDED FOR SANDAG/NCTD APPROVED USES ONLY. FOR NON-SANDAG/NCTD APPROVED USES: SANDAG/NCTD SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF THE DATA OR INFORMATION CONTAINED HEREIN. THE SELECTION AND USE OF THESE STANDARDS IS THE SOLE RESPONSIBILITY OF THE USER AND SHOULD NOT BE USED WITHOUT CONSULTING A REGISTERED PROFESSIONAL ENGINEER. ALL WARRANTIES AND REPRESENTATIONS OF ANY KIND ARE DISCLAIMED. ANYONE MAKING USE OF THIS INFORMATION AGREES THAT IT ASSUMES ALL LIABILITY ARISING FROM SUCH USE. NO PART OF THESE STANDARDS SHOULD BE REPRODUCED OR DISTRIBUTED IN ANY FORM OR BY ANY MEANS WITHOUT THE PRIOR WRITTEN PERMISSION OF SANDAG/NCTD. ALL RIGHTS RESERVED.

REV.	DATE	DESCRIPTION	DES.	ENG.

DESIGNER PE STAMP

SANDAG

SAN DIEGO ASSOCIATION OF GOVERNMENTS
401 B Street, Suite 800
San Diego, CA. 92101
www.sandag.org

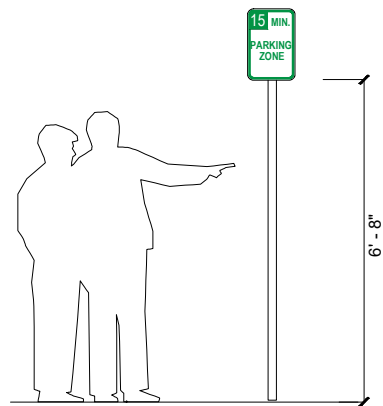
NORTH COUNTY TRANSIT DISTRICT

810 Mission Avenue
Oceanside, CA 92054
www.gonctd.com

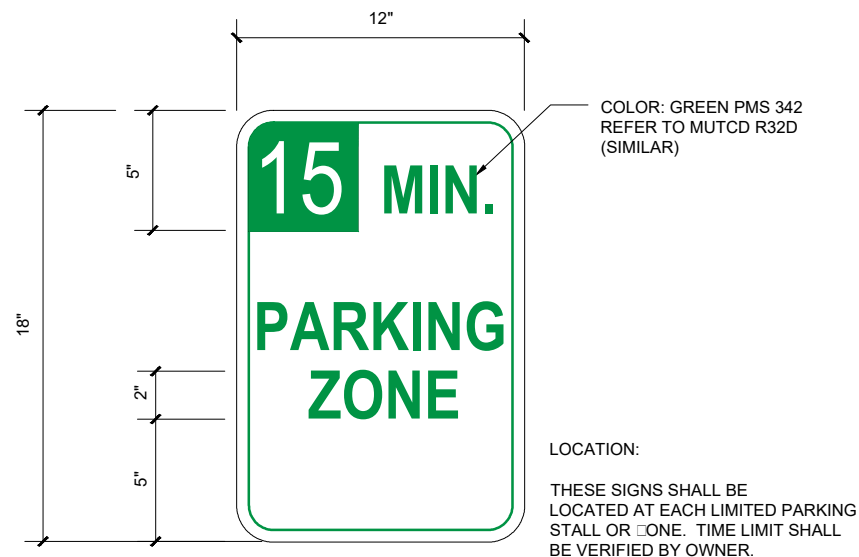
ENGINEERING STANDARD DRAWINGS

RESTRICTIVE SIGN

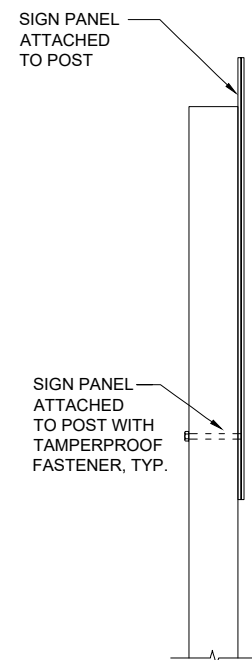
DRAWING NO. ESD-3310-01
DRAWING SHEET NO. 1 OF 6
SCALE: NONE
CONTRACT SHEET NO.



MOUNTING ELEVATION
SCALE: NONE



SIGN 3310-02
SCALE: NONE



TYPICAL SIDEVIEW
SCALE: NONE

SIGNS

LOCATION AND MOUNTING:

1. LOCATE ON EXISTING FENCE OR POST AS AVAILABLE, OTHERWISE INSTALL NEW POST.
2. SEE DRAWINGS ESD-3307 AND ESD-5210 FOR POST/MOUNTING AND ANCHORAGE DETAILS.

MATERIAL:

1. 1/8" THICK MILL FINISH ALUMINUM PANEL, ALCOA 6016-T6 OR EQUAL.

COATINGS:

1. PAINT ALL SIDES WITH LINEAR POLYURETHANE.
2. COLOR FACE OF PANEL WITH ENGINEERING GRADE, PRESSURE SENSITIVE, RETRO-REFLECTIVE WHITE VINYL SHEETING. SILK SCREEN LEGEND WITH BLACK INK.
3. FINISH WITH EXTERIOR GRADE PRESSURE SENSITIVE CLEAR MYLAR, 3M-1150 OR EQUAL.
4. EXPOSED PORTIONS OF PLANK (TYPE A) TO BE PAINTED WITH METALLIC AND LAMPBLACK, MAKING A VERY DARK BROWN.
5. BASE OF PLANK TO HAVE A COAT OF COAL TAR APPLIED HOT TO 6" ABOVE GROUND.

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REV.	DATE	DESCRIPTION	DES.	ENG.	DESIGNER PE STAMP

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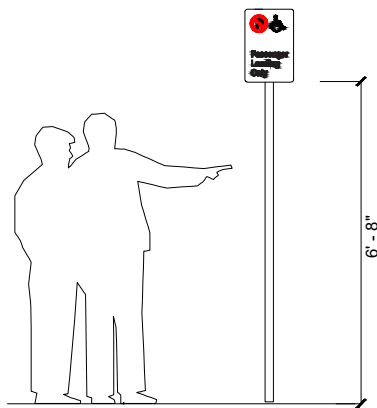
NORTH COUNTY TRANSIT DISTRICT

810 Mission Avenue
Oceanside, CA 92054
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ENGINEERING STANDARD DRAWINGS

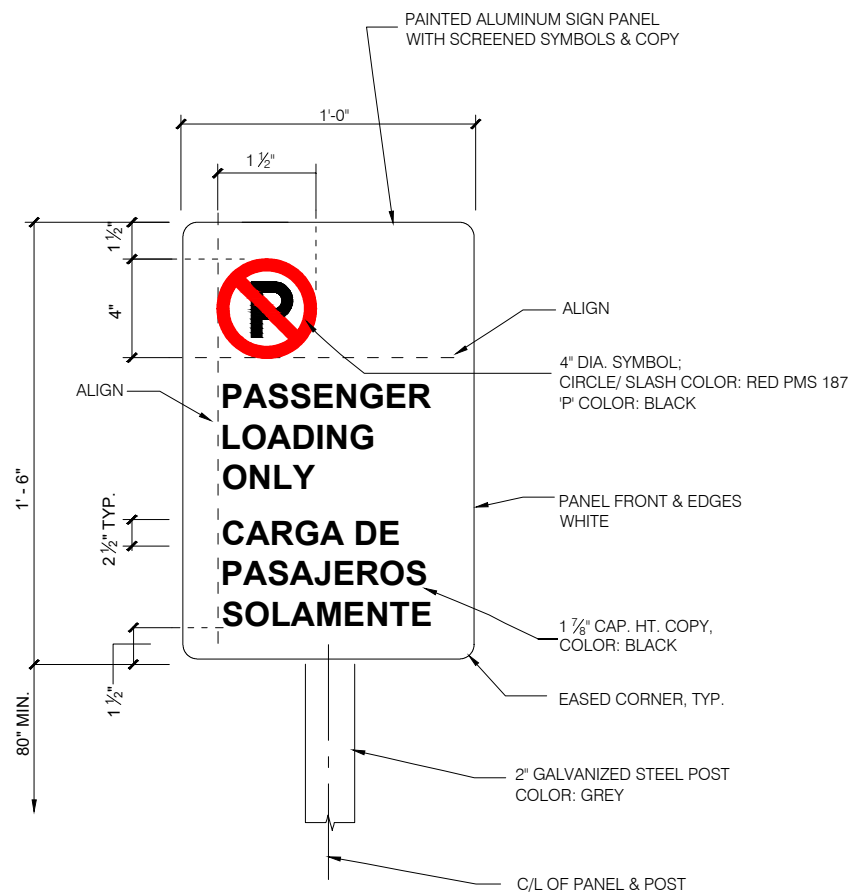
RESTRICTIVE SIGN

DRAWING NO.	ESD-3310-02
DRAWING SHEET NO.	2 OF 6
SCALE:	NONE
CONTRACT SHEET NO.	

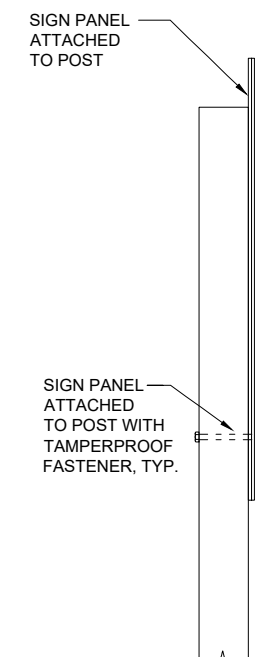


MOUNTING ELEVATION
SCALE: NONE

LOCATION:
THESE SIGNS SHALL BE LOCATED IN EVEN INCREMENTS ALONG THE PASSENGER LOADING ZONE CURB. A MINIMUM OF THREE WILL BE REQUIRED.



SIGN 3310-03
SCALE: NONE



TYPICAL SIDEVIEW
SCALE: NONE

SIGNS

LOCATION AND MOUNTING:

1. LOCATE ON EXISTING FENCE OR POST AS AVAILABLE, OTHERWISE INSTALL NEW POST.
2. SEE DRAWINGS ESD-3307 AND ESD-5210 FOR POST/MOUNTING AND ANCHORAGE DETAILS.

MATERIAL:

1. 1/8" THICK MILL FINISH ALUMINUM PANEL, ALCOA 6016-T6 OR EQUAL.

COATINGS:

1. PAINT ALL SIDES WITH LINEAR POLYURETHANE.
2. COLOR FACE OF PANEL WITH ENGINEERING GRADE, PRESSURE SENSITIVE, RETRO-REFLECTIVE WHITE VINYL SHEETING. SILK SCREEN LEGEND WITH BLACK INK.
3. FINISH WITH EXTERIOR GRADE PRESSURE SENSITIVE CLEAR MYLAR, 3M-1150 OR EQUAL.
4. EXPOSED PORTIONS OF PLANK (TYPE A) TO BE PAINTED WITH METALLIC AND LAMPBLACK, MAKING A VERY DARK BROWN.
5. BASE OF PLANK TO HAVE A COAT OF COAL TAR APPLIED HOT TO 6" ABOVE GROUND.

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REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN RAILPROS	
CHECKED B. SMITH	<i>BS</i>
RECOMMENDED B. SCHMITH	<i>BAS</i>
DATE	12/11/15
DESIGNER PE STAMP	

SANDAG

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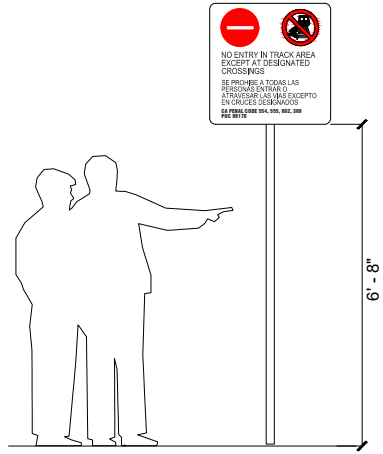
NORTH COUNTY TRANSIT DISTRICT

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Oceanside, CA 92054
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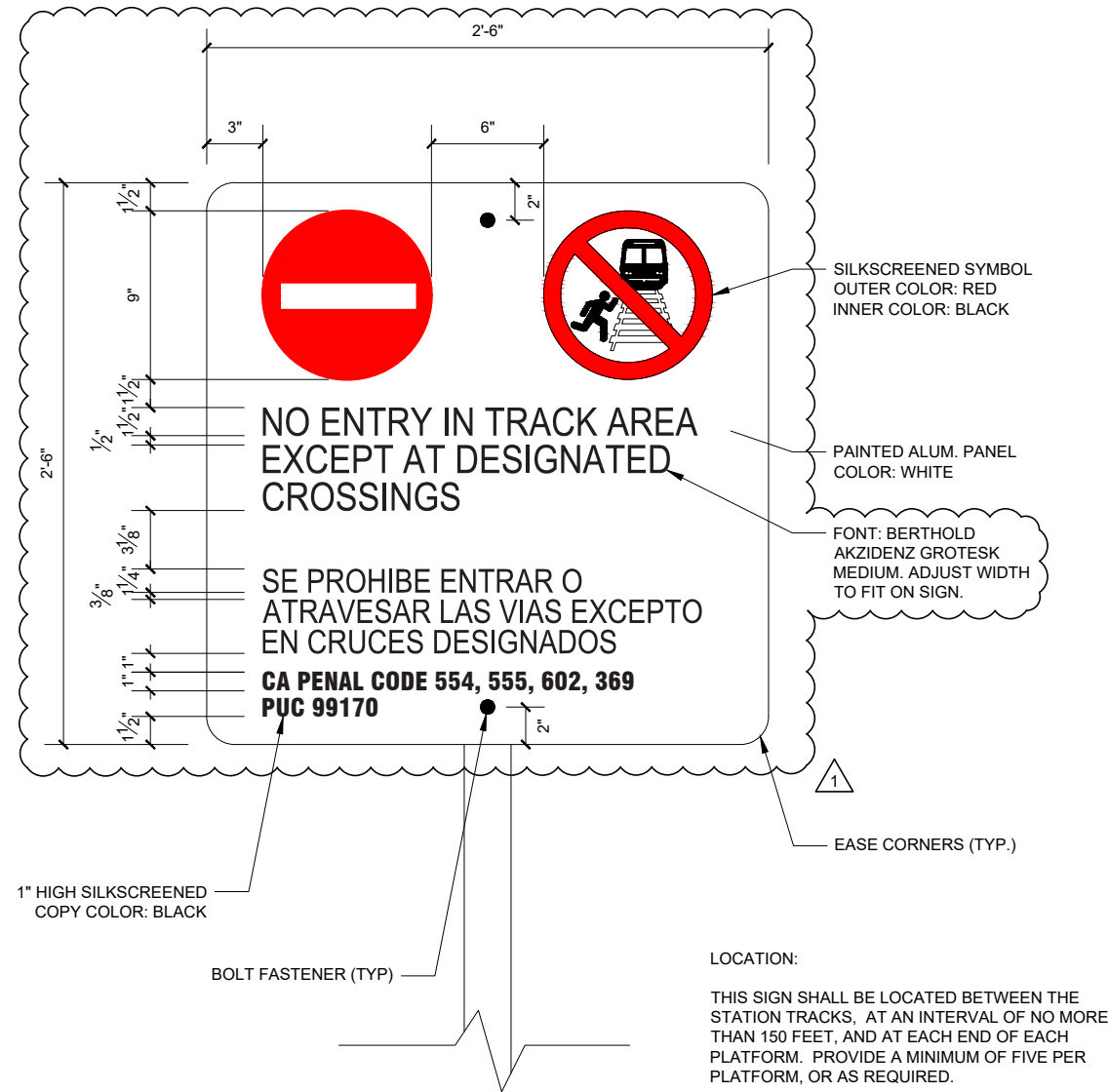
ENGINEERING STANDARD DRAWINGS

RESTRICTIVE SIGN

DRAWING NO.	ESD-3310-03
DRAWING SHEET NO.	3 OF 6
SCALE:	NONE
CONTRACT SHEET NO.	



MOUNTING ELEVATION
SCALE: NONE



SIGN 3310-04
SCALE: NONE

SIGNS

LOCATION AND MOUNTING:

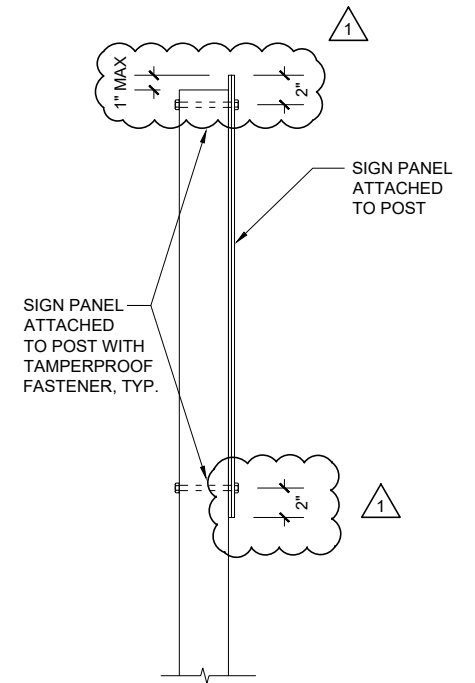
1. LOCATE ON EXISTING FENCE OR POST AS AVAILABLE, OTHERWISE INSTALL NEW POST.
2. SEE DRAWINGS ESD-3307 AND ESD-5210 FOR POST/MOUNTING AND ANCHORAGE DETAILS.

MATERIAL:

1. 1/8" THICK MILL FINISH ALUMINUM PANEL, ALCOA 6016-T6 OR EQUAL.

COATINGS:

1. PAINT ALL SIDES WITH LINEAR POLYURETHANE.
2. COLOR FACE OF PANEL WITH ENGINEERING GRADE, PRESSURE SENSITIVE, RETRO-REFLECTIVE WHITE VINYL SHEETING. SILK SCREEN LEGEND WITH BLACK INK.
3. FINISH WITH EXTERIOR GRADE PRESSURE SENSITIVE CLEAR MYLAR, 3M-1150 OR EQUAL.
4. EXPOSED PORTIONS OF PLANK (TYPE A) TO BE PAINTED WITH METALLIC AND LAMPBLACK, MAKING A VERY DARK BROWN.
5. BASE OF PLANK TO HAVE A COAT OF COAL TAR APPLIED HOT TO 6" ABOVE GROUND.



TYPICAL SIDEVIEW
SCALE: NONE

REV.	DATE	DESCRIPTION	DES.	ENG.
1	9/23/22	ENLARGE SIGN, REVISE TEXT, MOVE (cont): SYMBOLS, ADD UPPER BOLT	SH	DB

SANDAG/CTD ENGINEERING STANDARDS ARE INTENDED FOR SANDAG/CTD APPROVED USES ONLY. FOR NON-SANDAG/CTD APPROVED USES: SANDAG/CTD SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF THE DATA OR INFORMATION CONTAINED HEREIN. THE SELECTION AND USE OF THESE STANDARDS IS THE SOLE RESPONSIBILITY OF THE USER AND SHOULD NOT BE USED WITHOUT CONSULTING A REGISTERED PROFESSIONAL ENGINEER. ALL WARRANTIES AND REPRESENTATIONS OF ANY KIND ARE DISCLAIMED. ANYONE MAKING USE OF THIS INFORMATION AGREES THAT IT ASSUMES ALL LIABILITY ARISING FROM SUCH USE. NO PART OF THESE STANDARDS SHOULD BE REPRODUCED OR DISTRIBUTED IN ANY FORM OR BY ANY MEANS WITHOUT THE PRIOR WRITTEN PERMISSION OF SANDAG/CTD. ALL RIGHTS RESERVED.

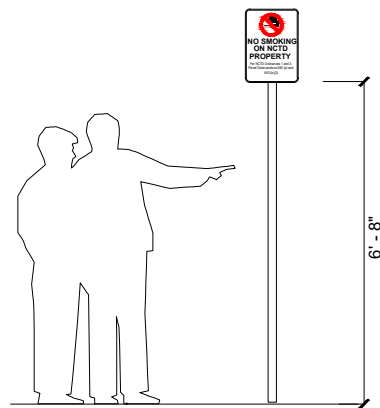
DESIGNER PE STAMP

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San Diego, CA. 92101
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Oceanside, CA 92054
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ENGINEERING STANDARD DRAWINGS
RESTRICTIVE SIGN

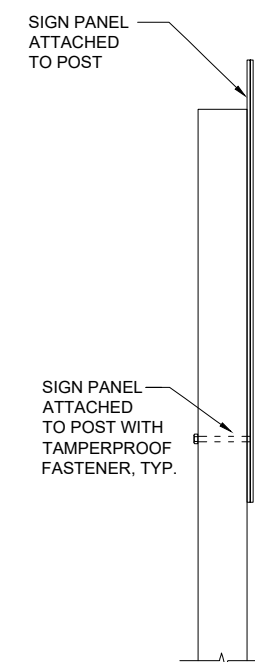
DRAWING NO. ESD-3310-04
DRAWING SHEET NO. 4 OF 6
SCALE: NONE
CONTRACT SHEET NO.



MOUNTING ELEVATION
SCALE: NONE



SIGN 3310-05
SCALE: NONE



TYPICAL SIDEVIEW
SCALE: NONE

SIGNS

LOCATION AND MOUNTING:

1. LOCATE ON EXISTING FENCE OR POST AS AVAILABLE, OTHERWISE INSTALL NEW POST.
2. SEE DRAWINGS ESD-3307 AND ESD-5210 FOR POST/MOUNTING AND ANCHORAGE DETAILS.

MATERIAL:

1. 1/8" THICK MILL FINISH ALUMINUM PANEL, ALCOA 6016-T6 OR EQUAL.

COATINGS:

1. PAINT ALL SIDES WITH LINEAR POLYURETHANE.
2. COLOR FACE OF PANEL WITH ENGINEERING GRADE, PRESSURE SENSITIVE, RETRO-REFLECTIVE WHITE VINYL SHEETING. SILK SCREEN LEGEND WITH BLACK INK.
3. FINISH WITH EXTERIOR GRADE PRESSURE SENSITIVE CLEAR MYLAR, 3M-1150 OR EQUAL.
4. EXPOSED PORTIONS OF PLANK (TYPE A) TO BE PAINTED WITH METALLIC AND LAMPBLACK, MAKING A VERY DARK BROWN.
5. BASE OF PLANK TO HAVE A COAT OF COAL TAR APPLIED HOT TO 6" ABOVE GROUND.

SANDAG/NCTD ENGINEERING STANDARDS ARE INTENDED FOR SANDAG/NCTD APPROVED USES ONLY. FOR NON-SANDAG/NCTD APPROVED USES: SANDAG/NCTD SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF THE DATA OR INFORMATION CONTAINED HEREIN. THE SELECTION AND USE OF THESE STANDARDS IS THE SOLE RESPONSIBILITY OF THE USER AND SHOULD NOT BE USED WITHOUT CONSULTING A REGISTERED PROFESSIONAL ENGINEER. ALL WARRANTIES AND REPRESENTATIONS OF ANY KIND ARE DISCLAIMED. ANYONE MAKING USE OF THIS INFORMATION AGREES THAT IT ASSUMES ALL LIABILITY ARISING FROM SUCH USE. NO PART OF THESE STANDARDS SHOULD BE REPRODUCED OR DISTRIBUTED IN ANY FORM OR BY ANY MEANS WITHOUT THE PRIOR WRITTEN PERMISSION OF SANDAG/NCTD. ALL RIGHTS RESERVED.

REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN RAILPROS	
CHECKED B. SMITH	<i>B.S.</i>
RECOMMENDED B.SCHMITH	<i>B.S.</i>
DATE	12/11/15
DESIGNER PE STAMP	



ENGINEERING STANDARD DRAWINGS
RESTRICTIVE SIGN

DRAWING NO.	ESD 3310-05
DRAWING SHEET NO.	5 OF 6
SCALE:	NONE
CONTRACT SHEET NO.	

SIGNS

LOCATION AND MOUNTING:

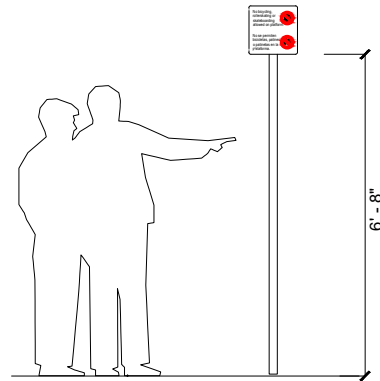
1. LOCATE ON EXISTING FENCE OR POST AS AVAILABLE, OTHERWISE INSTALL NEW POST.
2. SEE DRAWINGS ESD-3307 AND ESD-5210 FOR POST/MOUNTING AND ANCHORAGE DETAILS.

MATERIAL:

1. $\frac{3}{8}$ " THICK MILL FINISH ALUMINUM PANEL, ALCOA 6016-T6 OR EQUAL.

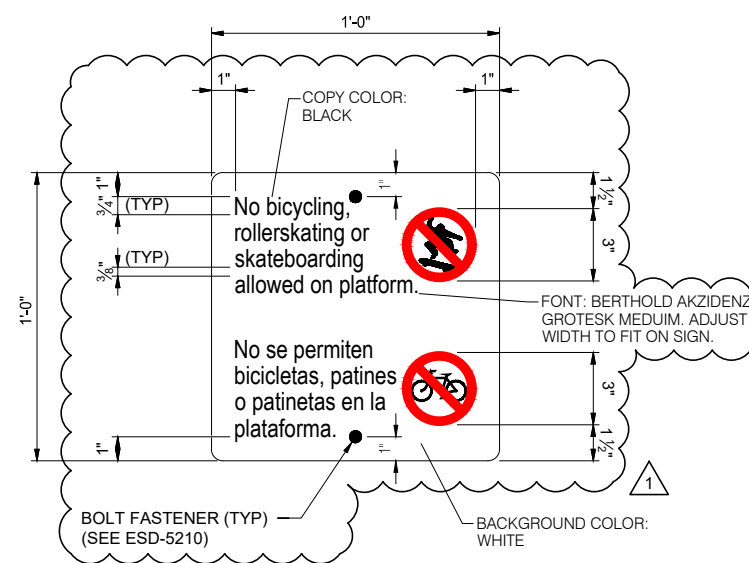
COATINGS:

1. PAINT ALL SIDES WITH LINEAR POLYURETHANE.
2. COLOR FACE OF PANEL WITH ENGINEERING GRADE, PRESSURE SENSITIVE, RETRO-REFLECTIVE WHITE VINYL SHEETING. SILK SCREEN LEGEND WITH BLACK INK.
3. FINISH WITH EXTERIOR GRADE PRESSURE SENSITIVE CLEAR MYLAR, 3M-1150 OR EQUAL.
4. EXPOSED PORTIONS OF PLANK (TYPE A) TO BE PAINTED WITH METALLIC AND LAMPBLACK, MAKING A VERY DARK BROWN.
5. BASE OF PLANK TO HAVE A COAT OF COAL TAR APPLIED HOT TO 6" ABOVE GROUND.



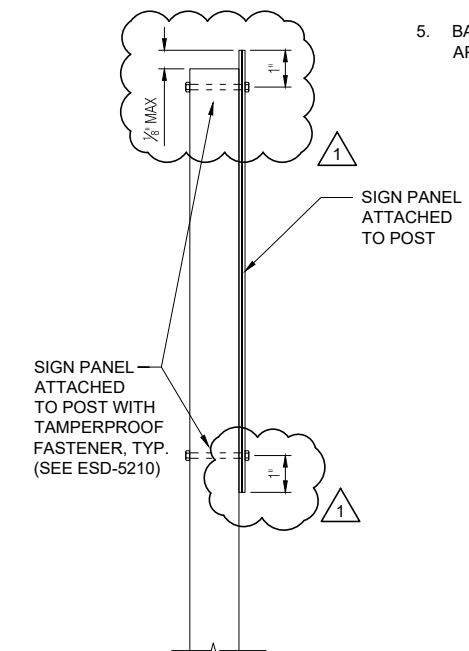
MOUNTING ELEVATION

SCALE: NONE



SIGN 3310-06

SCALE: NONE



TYPICAL SIDEVIEW

SCALE: NONE

REVISIONS

REV.	DATE	DESCRIPTION	DES.	ENG.
1	9/23/22	ADD BIKE SYMBOL & CLARIFY DIMENSIONS (cont): ADD UPPER BOLT	SH	DB

DRAWN RAILPROS	
CHECKED A. ANDERSON	<i>[Signature]</i>
RECOMMENDED B. SMITH	<i>[Signature]</i>
DATE	SEPT 2022

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DESIGNER PE STAMP

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www.sandag.org

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ENGINEERING STANDARD DRAWINGS

RESTRICTIVE SIGN

DRAWING NO.	ESD-3310-06
DRAWING SHEET NO.	6 OF 6
SCALE:	NONE
CONTRACT SHEET NO.	

SIGNS

LOCATION AND MOUNTING:

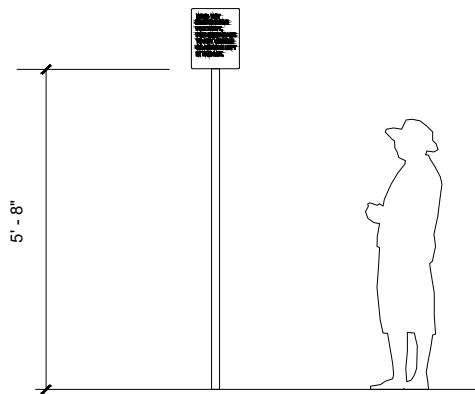
1. LOCATE ON EXISTING FENCE OR POST AS AVAILABLE, OTHERWISE INSTALL NEW POST.
2. SEE DRAWINGS ESD-3307 AND ESD-5210 FOR POST/MOUNTING AND ANCHORAGE DETAILS.

MATERIAL:

1. 1/8" THICK MILL FINISH ALUMINUM PANEL, ALCOA 6016-T6 OR EQUAL.

COATINGS:

1. PAINT ALL SIDES WITH LINEAR POLYURETHANE.
2. COLOR FACE OF PANEL WITH ENGINEERING GRADE, PRESSURE SENSITIVE, RETRO-REFLECTIVE WHITE VINYL SHEETING. SILK SCREEN LEGEND WITH BLACK INK.
3. FINISH WITH EXTERIOR GRADE PRESSURE SENSITIVE CLEAR MYLAR, 3M-1150 OR EQUAL.
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5. BASE OF PLANK TO HAVE A COAT OF COAL TAR APPLIED HOT TO 6" ABOVE GROUND.



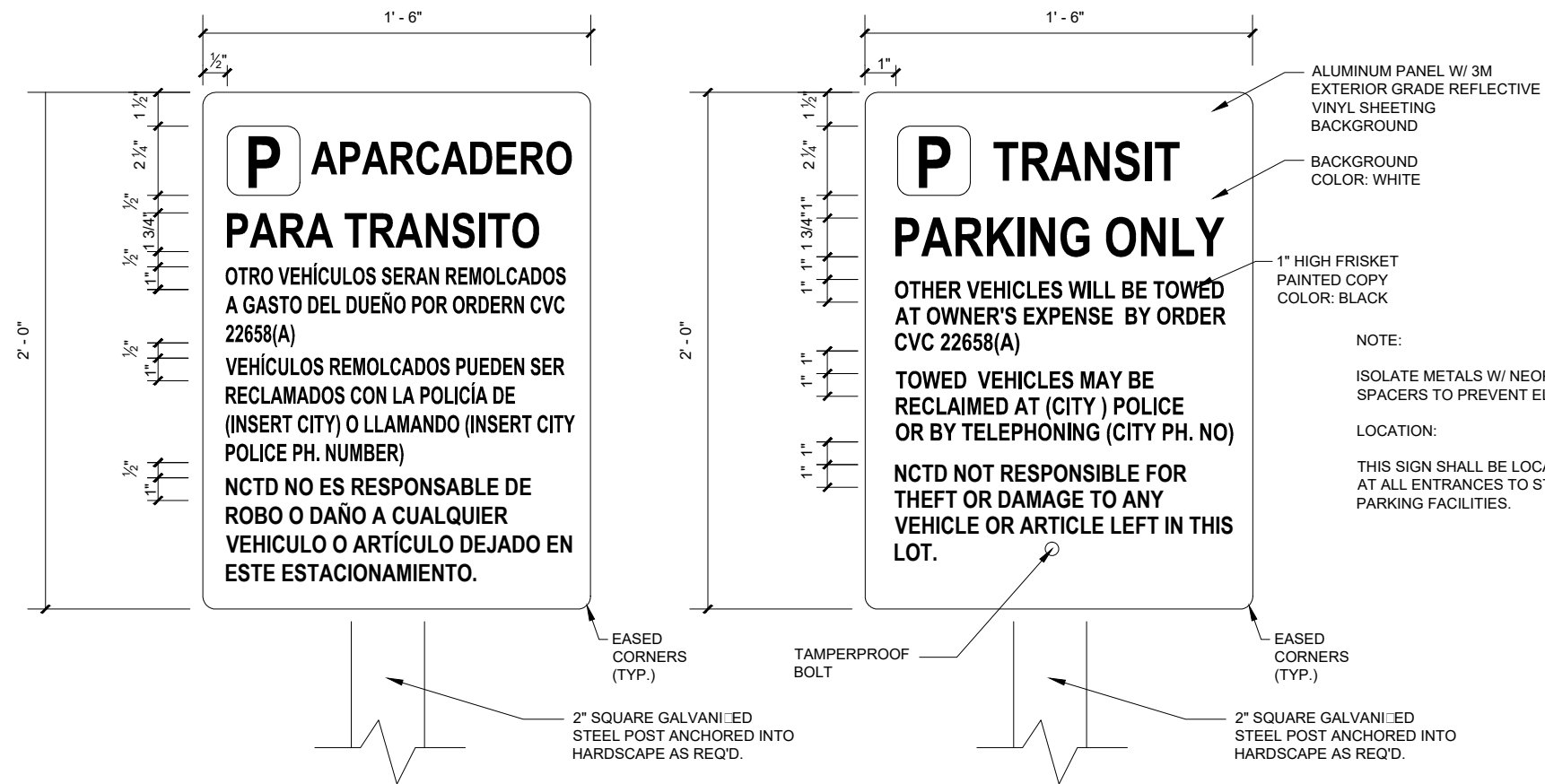
MOUNTING ELEVATION

SCALE: NONE

CITY	PH. NUMBER
CARLSBAD	(760) 931-2197
OCEANSIDE	(760) 435-4900
SAN DIEGO	(619) 531-2000
SOLANA BEACH	(760) 966-3500
SAN DIEGO COUNTY SHERIFF	(858) 565-5200
ENCINITAS	(858) 565-5200

NOTE:

PROJECT ENGINEER TO VERIFY THAT THE PHONE NUMBERS ARE STILL CURRENT AT TIME OF ISSUE OF PLANS.



SIGN 3311.1

SCALE: NONE

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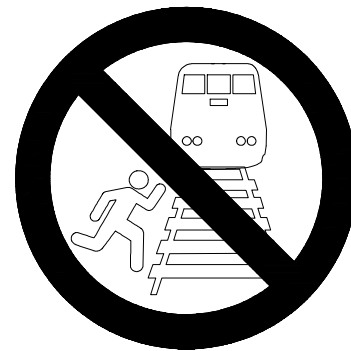
REV.	DATE	DESCRIPTION	DES.	ENG.	DESIGNER PE STAMP

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 www.gonctd.com

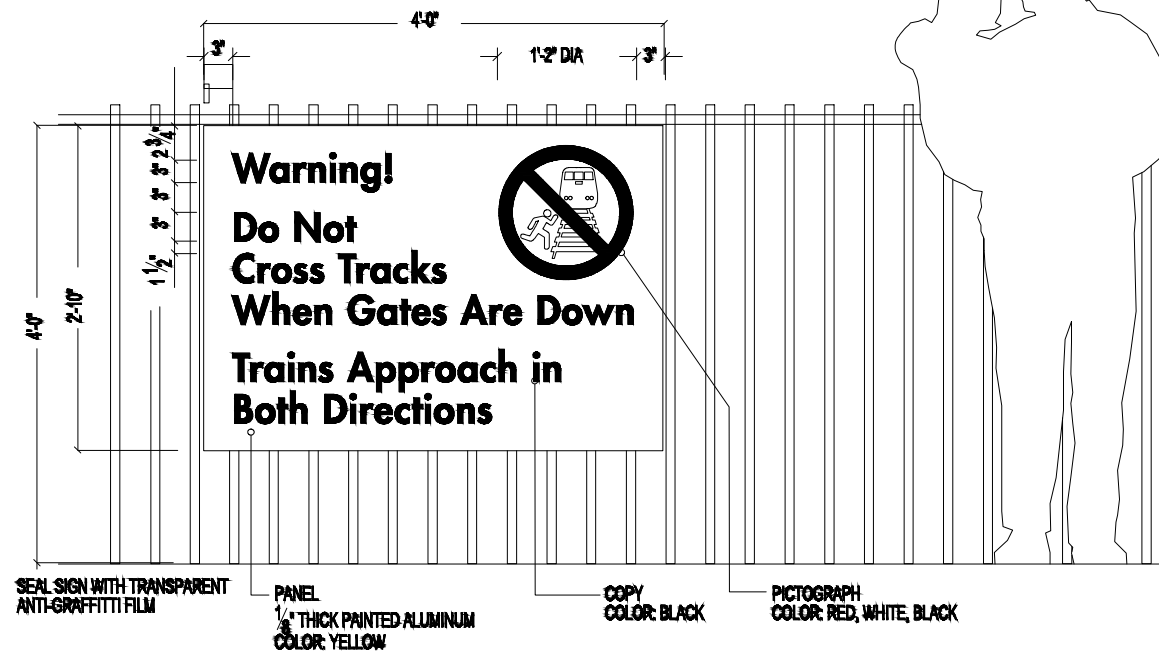
ENGINEERING STANDARD DRAWINGS
 PARKING RESTRICTION/RESPONSIBILITY SIGNS

DRAWING NO.	ESD-3311
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	

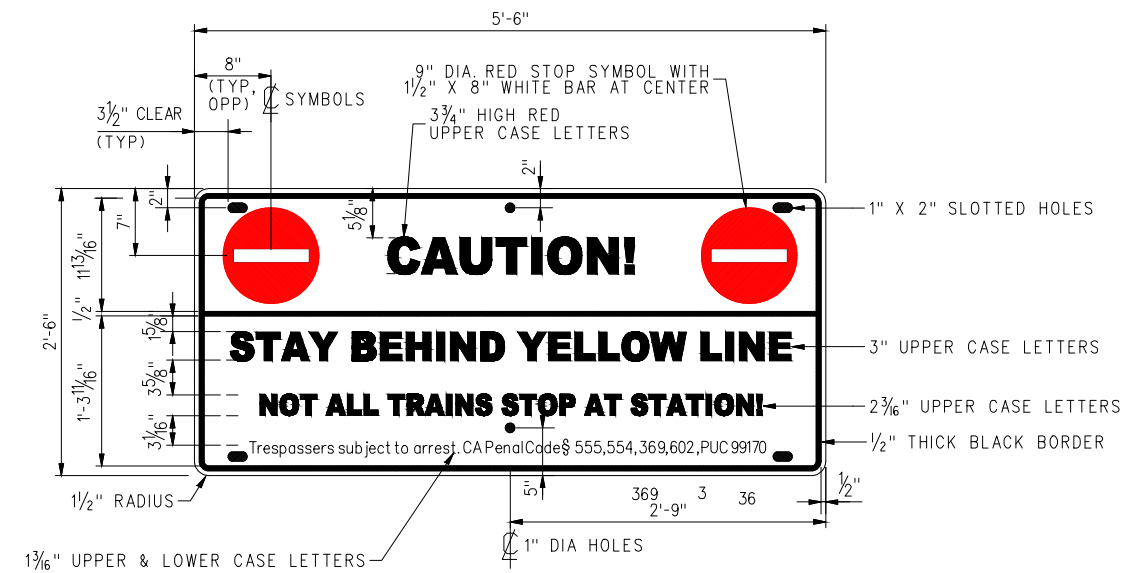


B DETAIL / PICTOGRAPH

NOTE:
FOR MOUNTING INSTRUCTIONS SEE
ENGINEERING STANDARD ESD 3307-03



A ELEVATION - CROSSING WARNING SIGN
(SIGN TYPE 14)



C CAUTION SIGN

DETAIL "C" NOTES:

- SIGN TO BE CONSTRUCTED OF 1/8" THICK MILL FINISH ALUMINUM PANEL, ALCOA 6016-T6 OR EQUAL.
- SIGN FILM/SHEETING TO BE 3M HIGH INTENSITY PRISMATIC SERIES 3930-WHITE.
- SIGN TO BE COATED WITH 3M 1160 PREMIUM PROTECTIVE OVERLAY.
- COPY AND BORDER TO BE BLACK UNLESS OTHERWISE NOTED.
- FOR MOUNTING INSTRUCTIONS SEE ENGINEERING STANDARD ESD 3307-03.
- SIGNS TO BE PLACED STARTING 50 FEET AWAY FROM NEAREST PEDESTRIAN CROSSING, ADDITIONAL SIGNS TO BE SPACED 100 FEET APART AS NEEDED ALONG FENCING TO COVER ENTIRE LENGTH OF PLATFORM.
- FOR STATIONS THAT DO NOT HAVE INTERTRACK FENCING, SIGNS ARE TO BE LOCATED ON STATION PLATFORM AT LOCATIONS CLEARLY VISIBLE TO ALL PASSENGERS AND PEDESTRIANS.

SANDAG/CTD ENGINEERING STANDARDS ARE INTENDED FOR SANDAG/CTD APPROVED USES ONLY. FOR NON-SANDAG/CTD APPROVED USES: SANDAG/CTD SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF THE DATA OR INFORMATION CONTAINED HEREIN. THE SELECTION AND USE OF THESE STANDARDS IS THE SOLE RESPONSIBILITY OF THE USER AND SHOULD NOT BE USED WITHOUT CONSULTING A REGISTERED PROFESSIONAL ENGINEER. ALL WARRANTIES AND REPRESENTATIONS OF ANY KIND ARE DISCLAIMED. ANYONE MAKING USE OF THIS INFORMATION AGREES THAT IT ASSUMES ALL LIABILITY ARISING FROM SUCH USE. NO PART OF THESE STANDARDS SHOULD BE REPRODUCED OR DISTRIBUTED IN ANY FORM OR BY ANY MEANS WITHOUT THE PRIOR WRITTEN PERMISSION OF SANDAG/CTD. ALL RIGHTS RESERVED.

REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN
RAILPROS

CHECKED
B. SMITH *BSM*

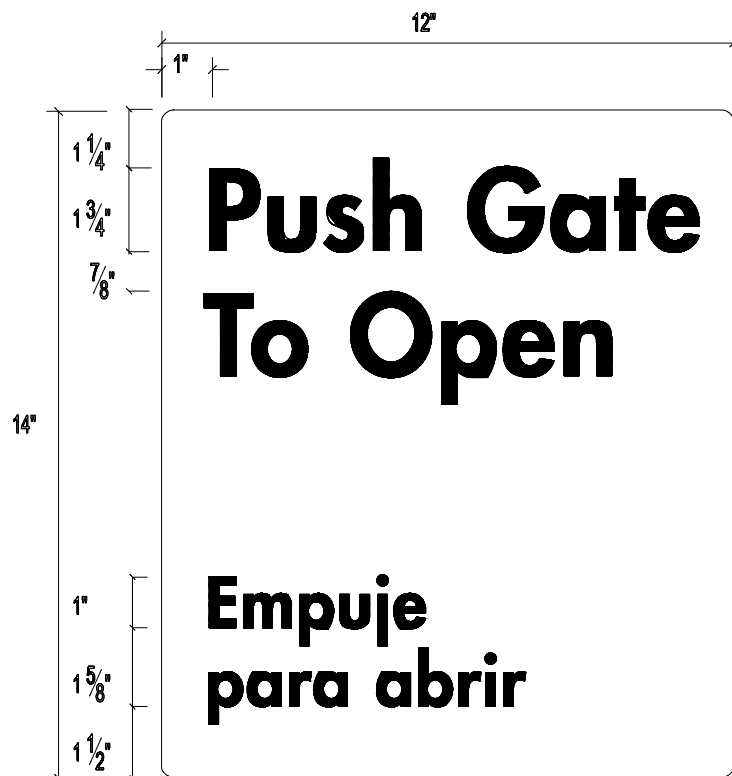
RECOMMENDED
B. SCHMITH *BAS*

DATE 12/2/16

DESIGNER PE STAMP



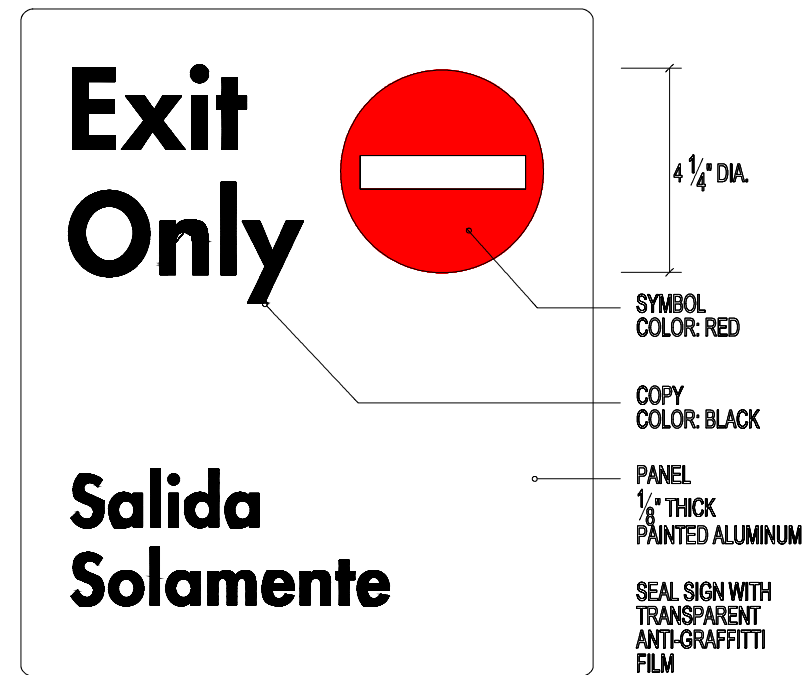
ENGINEERING STANDARD DRAWINGS PEDESTRIAN WARNING SIGNS AT STATION PLATFORMS	DRAWING NO. ESD-3317
	DRAWING SHEET NO. 1 OF 1
	SCALE: NONE
	CONTRACT SHEET NO.



RESTRICTIVE SIGN



COPY LAYOUT



COPY LAYOUT

SIGNS

LOCATION AND MOUNTING:

1. LOCATE ON EXISTING FENCE OR POST AS AVAILABLE, OTHERWISE INSTALL NEW POST.
2. SEE DRAWINGS ESD-3307 AND ESD-5210 FOR POST/MOUNTING AND ANCHORAGE DETAILS.

MATERIAL:

1. 1/8" THICK MILL FINISH ALUMINUM PANEL, ALCOA 6016-T6 OR EQUAL.

COATINGS:

1. PAINT ALL SIDES WITH LINEAR POLYURETHANE.
2. COLOR FACE OF PANEL WITH ENGINEERING GRADE, PRESSURE SENSITIVE, RETRO-REFLECTIVE WHITE VINYL SHEETING. SILK SCREEN LEGEND WITH BLACK INK.
3. FINISH WITH EXTERIOR GRADE PRESSURE SENSITIVE CLEAR MYLAR, 3M-1150 OR EQUAL.
4. EXPOSED PORTIONS OF PLANK (TYPE A) TO BE PAINTED WITH METALLIC AND LAMPBLACK, MAKING A VERY DARK BROWN.
5. BASE OF PLANK TO HAVE A COAT OF COAL TAR APPLIED HOT TO 6" ABOVE GROUND.

SYMBOL
COLOR: RED

COPY
COLOR: BLACK

PANEL
1/8" THICK
PAINTED ALUMINUM

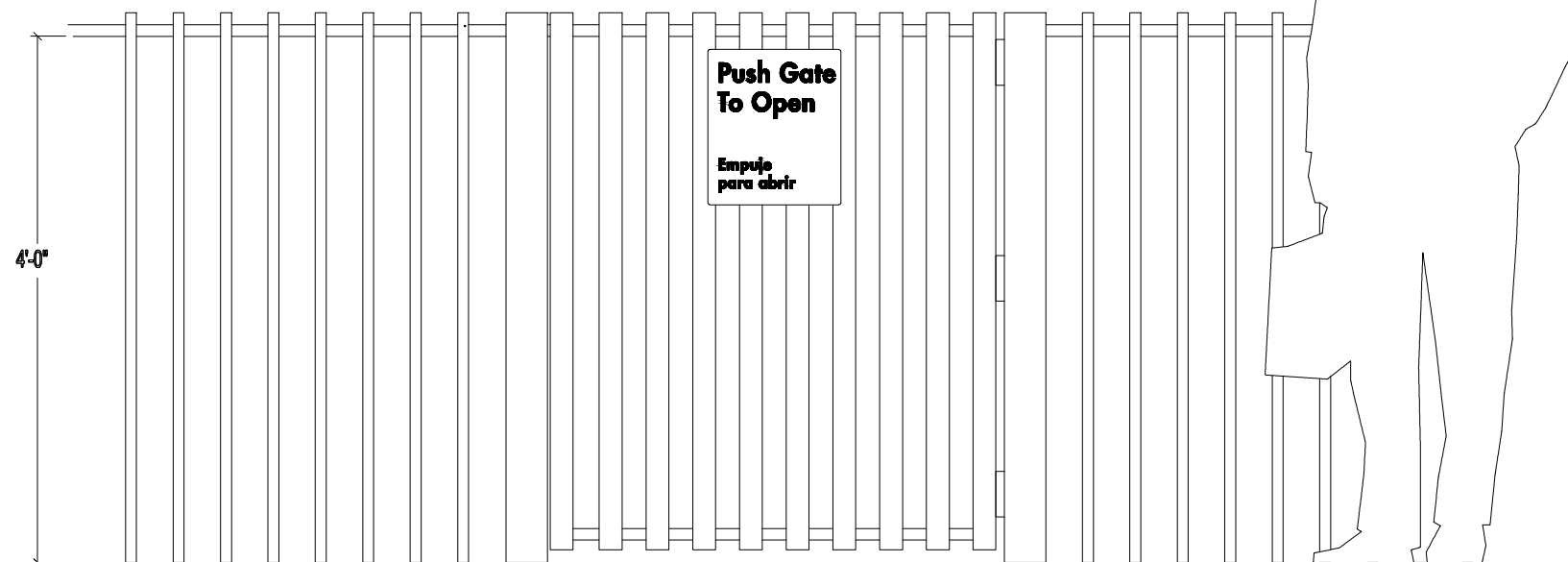
SEAL SIGN WITH
TRANSPARENT
ANTI-GRAFFITI
FILM

MOUNTING DETAIL
FOR GATE CONDITION
SEE DETAIL B-3
PER ES3307-02

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Exit

DETAIL



ELEVATION

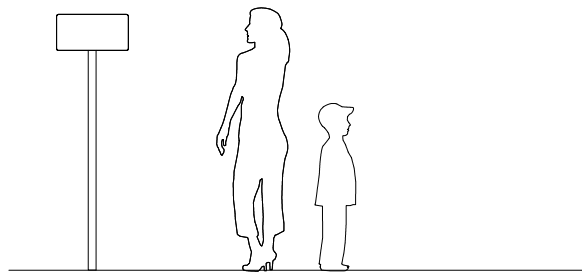
REV.	DATE	DESCRIPTION	DES.	ENG.	DATE	DESIGNER PE STAMP
					12/11/15	

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ENGINEERING STANDARD DRAWINGS
PEDESTRIAN DIRECTIONAL SIGN GATE MOUNTED SIGN
TYPE 15

DRAWING NO.	ESD-3318
DRAWING SHEET NO.	1 OF 2
SCALE:	NONE
CONTRACT SHEET NO.	

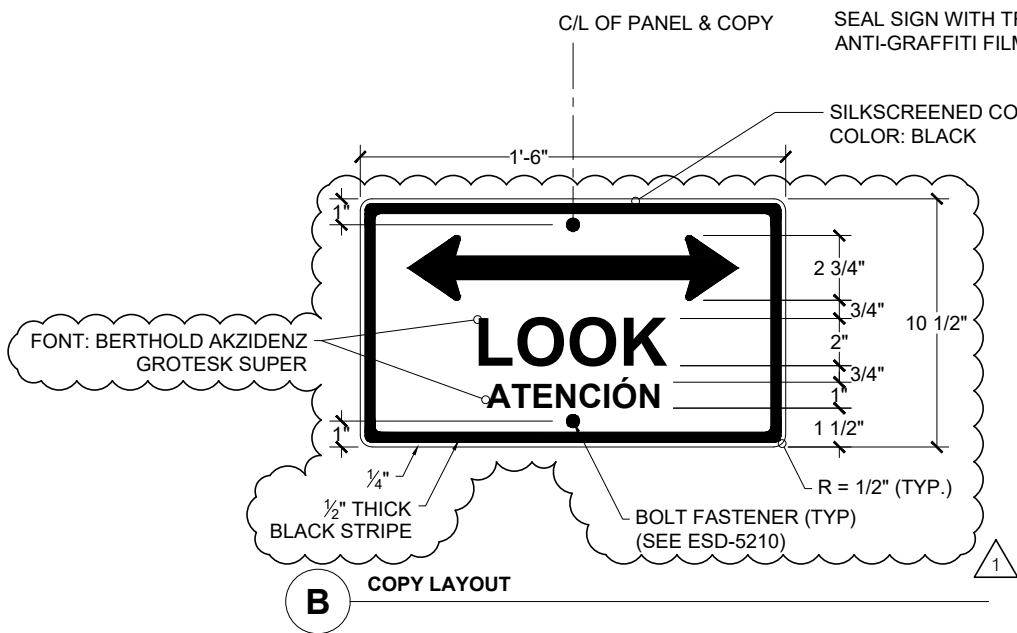


SIGN TYPE 16
PEDESTRIAN DIRECTIONAL SIGN - POLE MOUNTED

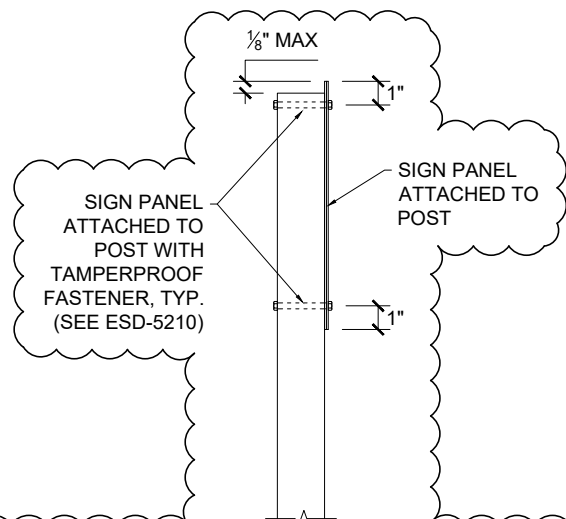
3M EXTERIOR GRADE
VINYL DIE CUT SHEETING
COLOR: WHITE

SEAL SIGN WITH TRANSPARENT
ANTI-GRAFFITI FILM

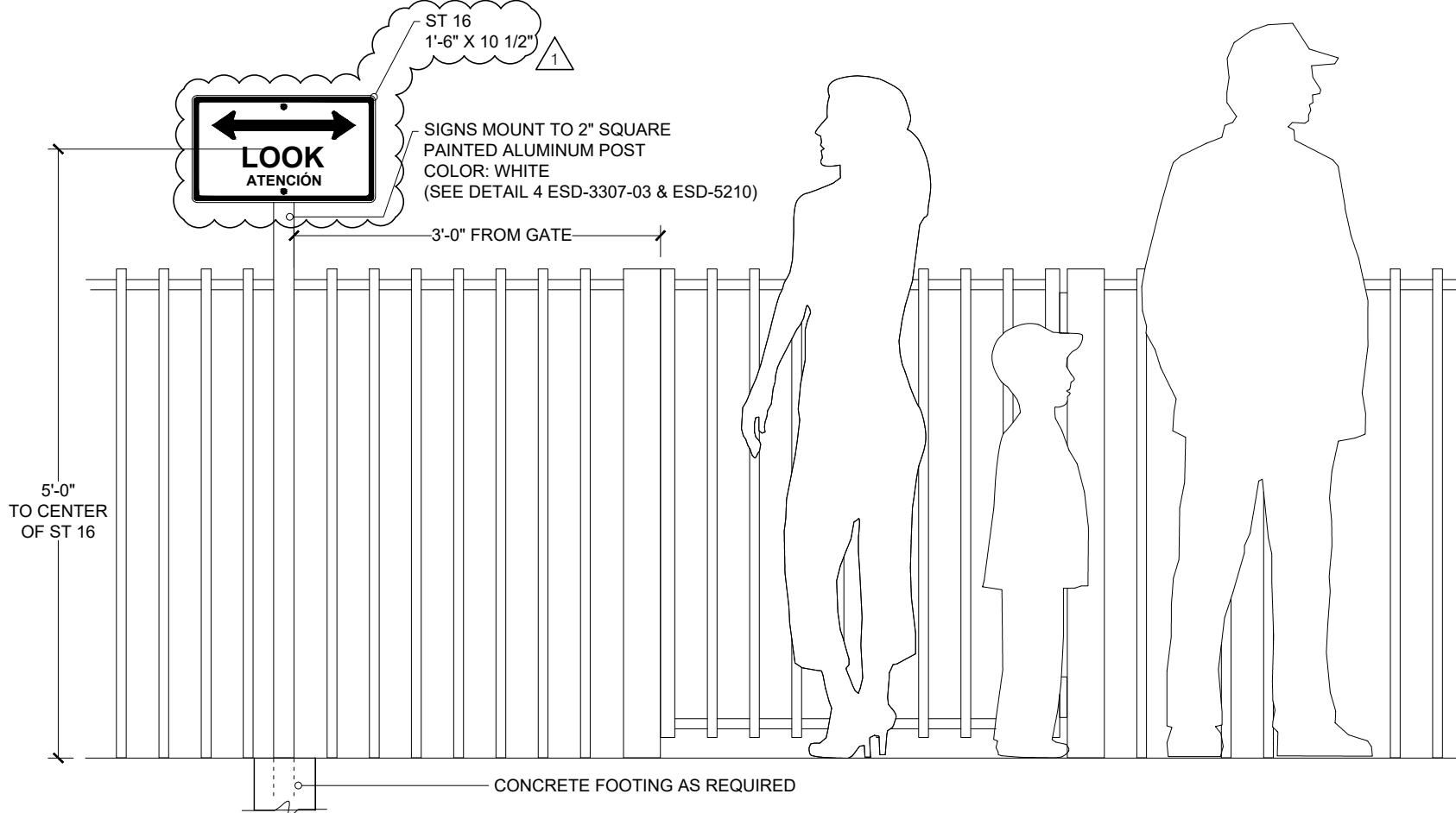
SILKSCREENED COPY
COLOR: BLACK



B COPY LAYOUT



C SECTION



A ELEVATION

SIGNS

LOCATION AND MOUNTING:

1. LOCATE ON EXISTING FENCE OR POST AS AVAILABLE, OTHERWISE INSTALL NEW POST.
2. SEE DRAWINGS ESD-3307 AND ESD-5210 FOR POST/MOUNTING AND ANCHORAGE DETAILS.

MATERIAL:

1. 1/8" THICK MILL FINISH ALUMINUM PANEL, ALCOA 6016-T6 OR EQUAL.

COATINGS:

1. PAINT ALL SIDES WITH LINEAR POLYURETHANE.
2. COLOR FACE OF PANEL WITH ENGINEERING GRADE, PRESSURE SENSITIVE, RETRO-REFLECTIVE WHITE VINYL SHEETING. SILK SCREEN LEGEND WITH BLACK INK.
3. FINISH WITH EXTERIOR GRADE PRESSURE SENSITIVE CLEAR MYLAR, 3M-1150 OR EQUAL.
4. EXPOSED PORTIONS OF PLANK (TYPE A) TO BE PAINTED WITH METALLIC AND LAMPBLACK, MAKING A VERY DARK BROWN.
5. BASE OF PLANK TO HAVE A COAT OF COAL TAR APPLIED HOT TO 6" ABOVE GROUND.

△ REVISIONS

REV.	DATE	DESCRIPTION	DES.	ENG.
1	9/23/22	ADD MORE SIGN DIMS, ADD SPANISH; (cont): INCREASE SIGN SIZE; ADD UPPER BOLT (cont): & SECTION C	SH	DB

DRAWN	RAILPROS
CHECKED	A. ANDERSON
RECOMMENDED	B. SMITH
DATE	SEPT 2022

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DESIGNER PE STAMP

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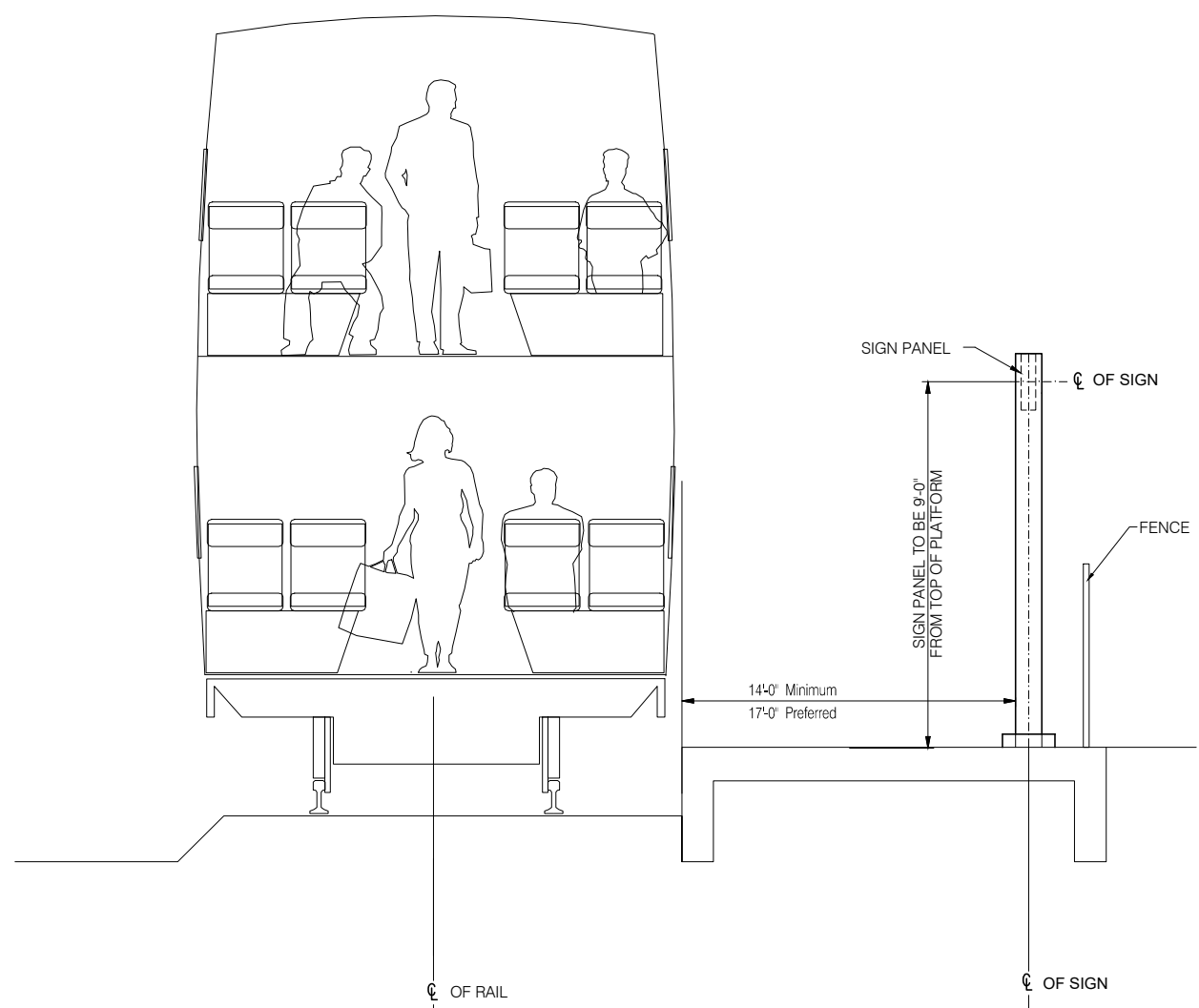
ENGINEERING STANDARD DRAWINGS

PEDESTRIAN DIRECTIONAL LOOK SIGN
POST MOUNTED SIGN TYPE 16

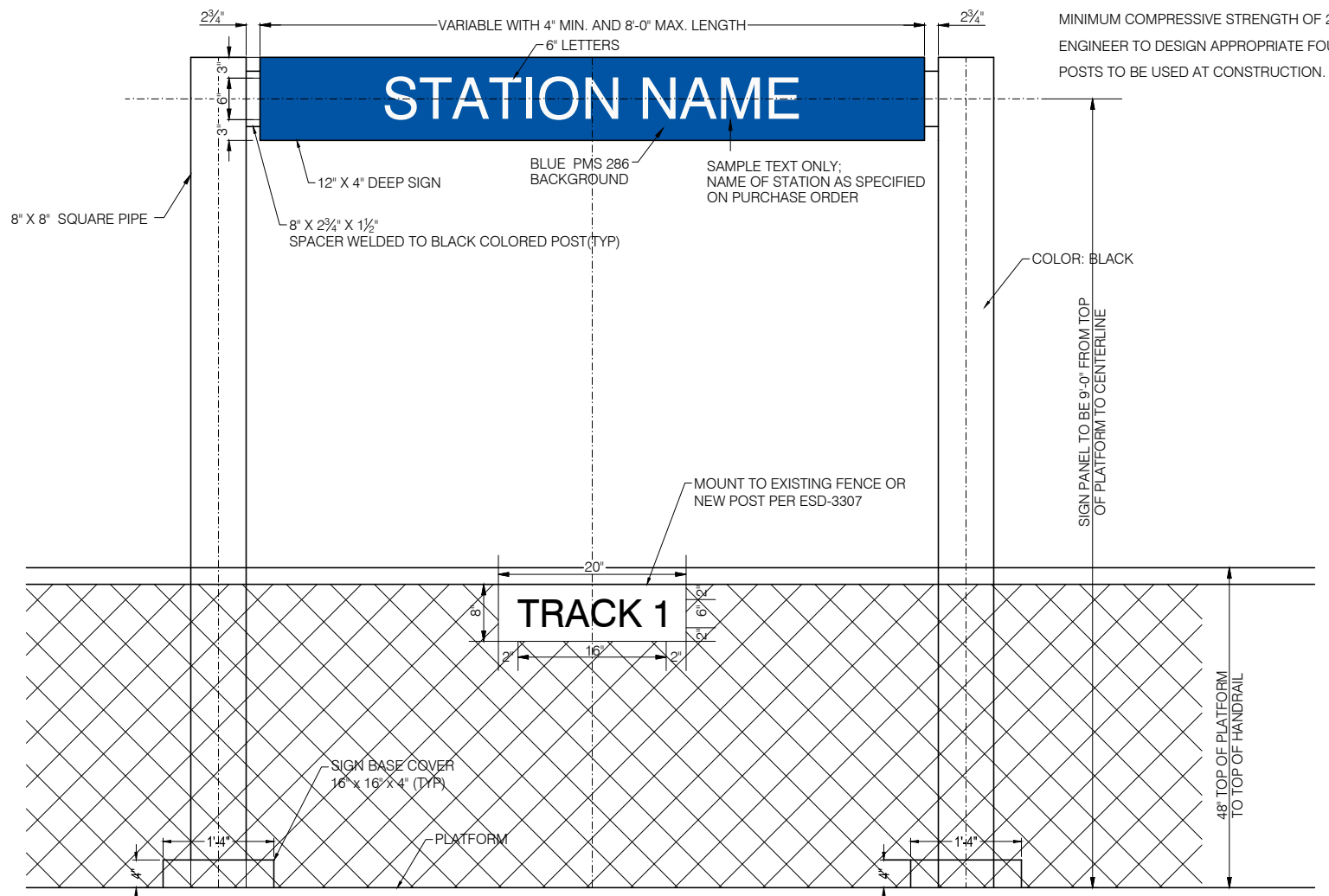
DRAWING NO.	ESD-3319
DRAWING SHEET NO.	2 OF 2
SCALE:	NONE
CONTRACT SHEET NO.	

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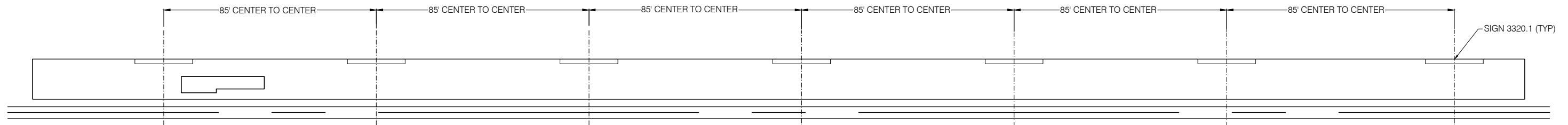
- NOTES:**
- SIGNS TO BE PLACED AT ALL STATIONS, ONE SIGN EVERY 85' ON EACH PLATFORM.
 - SIGN TO BE 3290 SILVER 3M ENGINEER GRADE BACKGROUND
 - LETTERS TO BE ARIAL BOLD PER DRAWING ESD1212 WHITE 3M
 - 3650-12 "SCOTCHCAL PLUS" SERIES "C" NON-REFLECTIVE
 - OR 3M PROCESSED INK.
- SIGN:**
 NEAREST POINT OF SIGN TO BE A MINIMUM OF 10'-0" FROM THE GAGE SIDE OF NEAREST RAIL. CONCRETE FOOTINGS TO HAVE A MINIMUM COMPRESSIVE STRENGTH OF 2500 PSI @ 28 DAYS. ENGINEER TO DESIGN APPROPRIATE FOUNDATION FOR SIGN POSTS TO BE USED AT CONSTRUCTION.



LOCATION DETAIL
SCALE: NONE



SIGN 3320.1
SCALE: NONE



PLATFORM PLAN VIEW- SIGN LOCATION
SCALE: NONE

REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN RAILPROS	
CHECKED B. SMITH	<i>BS</i>
RECOMMENDED B. SCHMITH	<i>BAS</i>
DATE	12/11/15

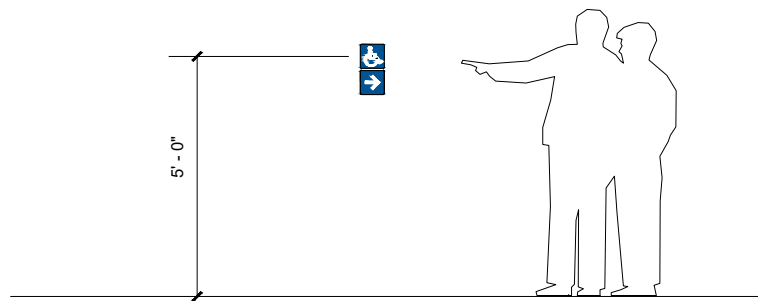
DESIGNER PE STAMP

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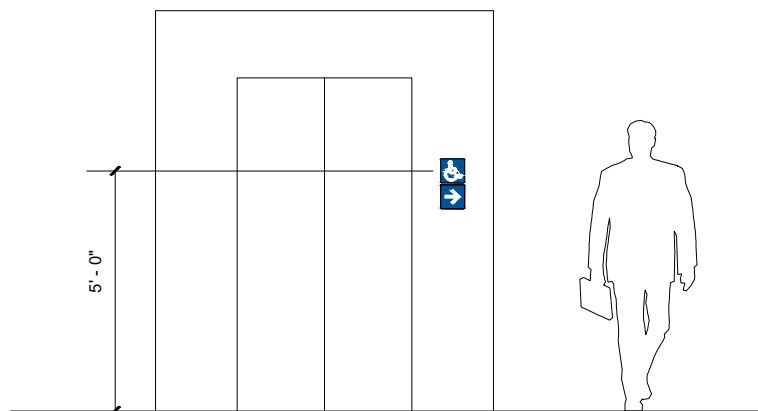
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ENGINEERING STANDARD DRAWINGS
 STATION IDENTIFICATION SIGNS - FOR PASSENGERS

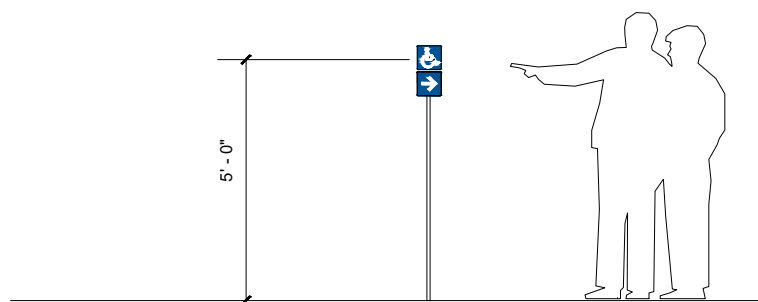
DRAWING NO.	ESD-3320
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	



WALL MOUNTED LOCATION
SCALE: NONE

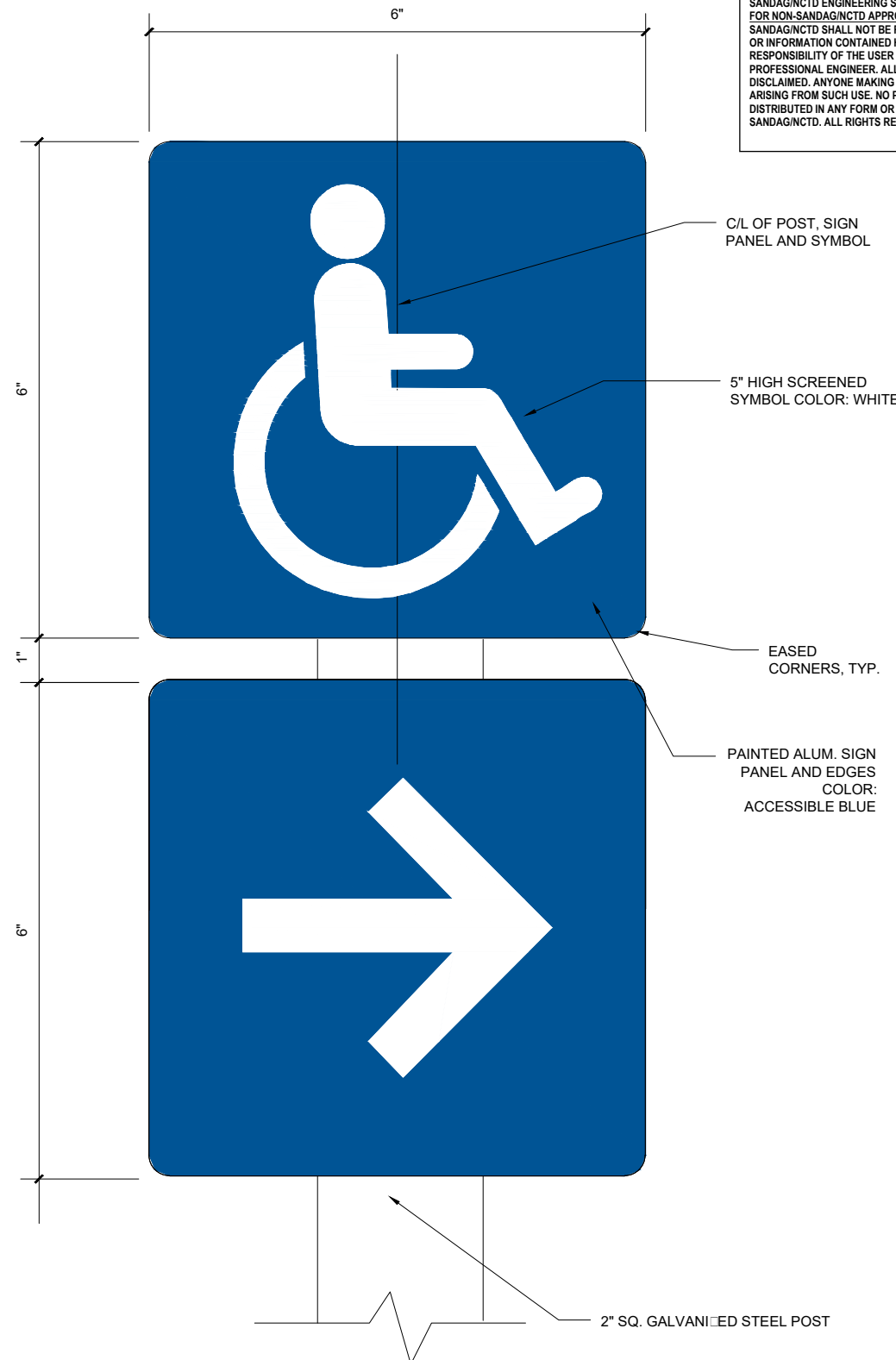


LOCATION AT ELEVATOR
SCALE: NONE



POST MOUNTED LOCATION
SCALE: NONE

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SIGN 3323.1
SCALE: NONE

SIGNS

LOCATION AND MOUNTING:

1. LOCATE ON EXISTING FENCE OR POST AS AVAILABLE, OTHERWISE INSTALL NEW POST.
2. SEE DRAWINGS ESD-3307 AND ESD-5210 FOR POST/MOUNTING AND ANCHORAGE DETAILS.

MATERIAL:

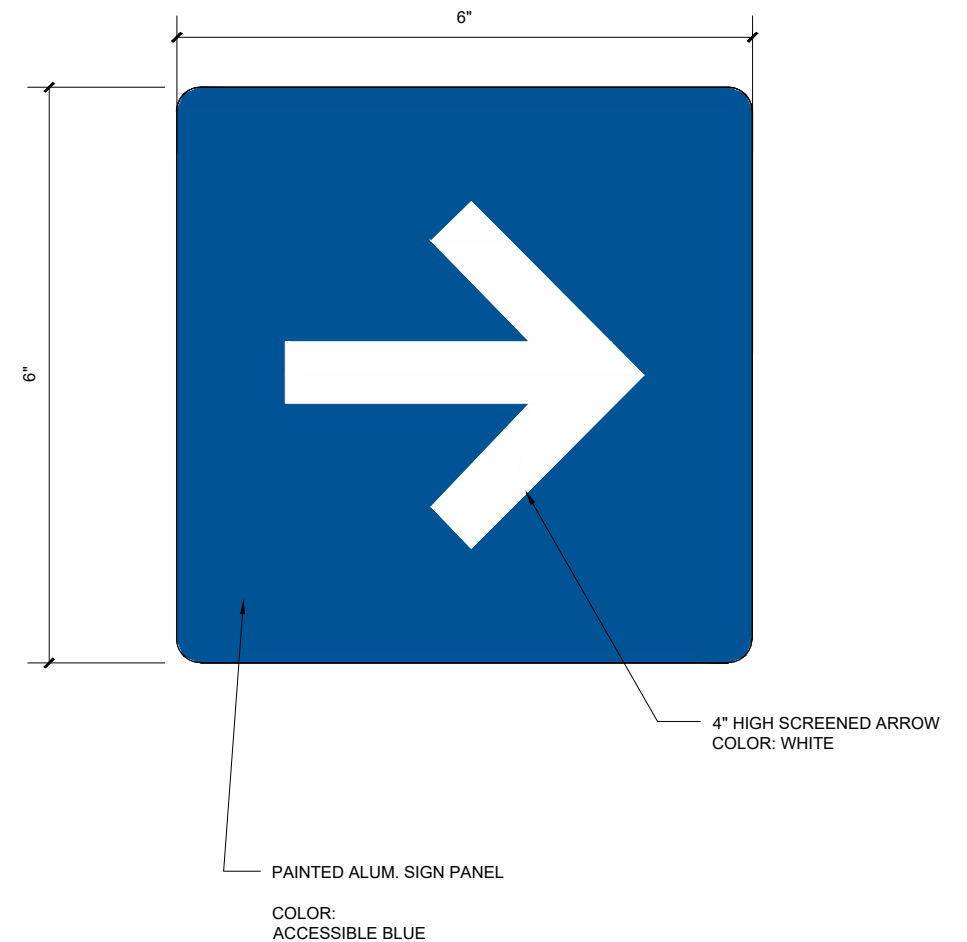
1. 1/8" THICK MILL FINISH ALUMINUM PANEL, ALCOA 6016-T6 OR EQUAL.

COATINGS:

1. PAINT ALL SIDES WITH LINEAR POLYURETHANE.
2. COLOR FACE OF PANEL WITH ENGINEERING GRADE, PRESSURE SENSITIVE, RETRO-REFLECTIVE WHITE VINYL SHEETING. SILK SCREEN LEGEND WITH BLACK INK.
3. FINISH WITH EXTERIOR GRADE PRESSURE SENSITIVE CLEAR MYLAR, 3M-1150 OR EQUAL.
4. EXPOSED PORTIONS OF PLANK (TYPE A) TO BE PAINTED WITH METALLIC AND LAMPBLACK, MAKING A VERY DARK BROWN.
5. BASE OF PLANK TO HAVE A COAT OF COAL TAR APPLIED HOT TO 6" ABOVE GROUND.

LOCATION:

THIS SIGN SHALL BE LOCATED AT EACH ACCESSIBLE ENTRY POINT. ARROW SIGNS ARE LOCATED AT NON-ACCESSIBLE ENTRANCES AND SHALL POINT TO ACCESSIBLE ENTRANCES.



REV.	DATE	DESCRIPTION	DES.	ENG.	DATE	DESIGNER PE STAMP
					12/11/15	

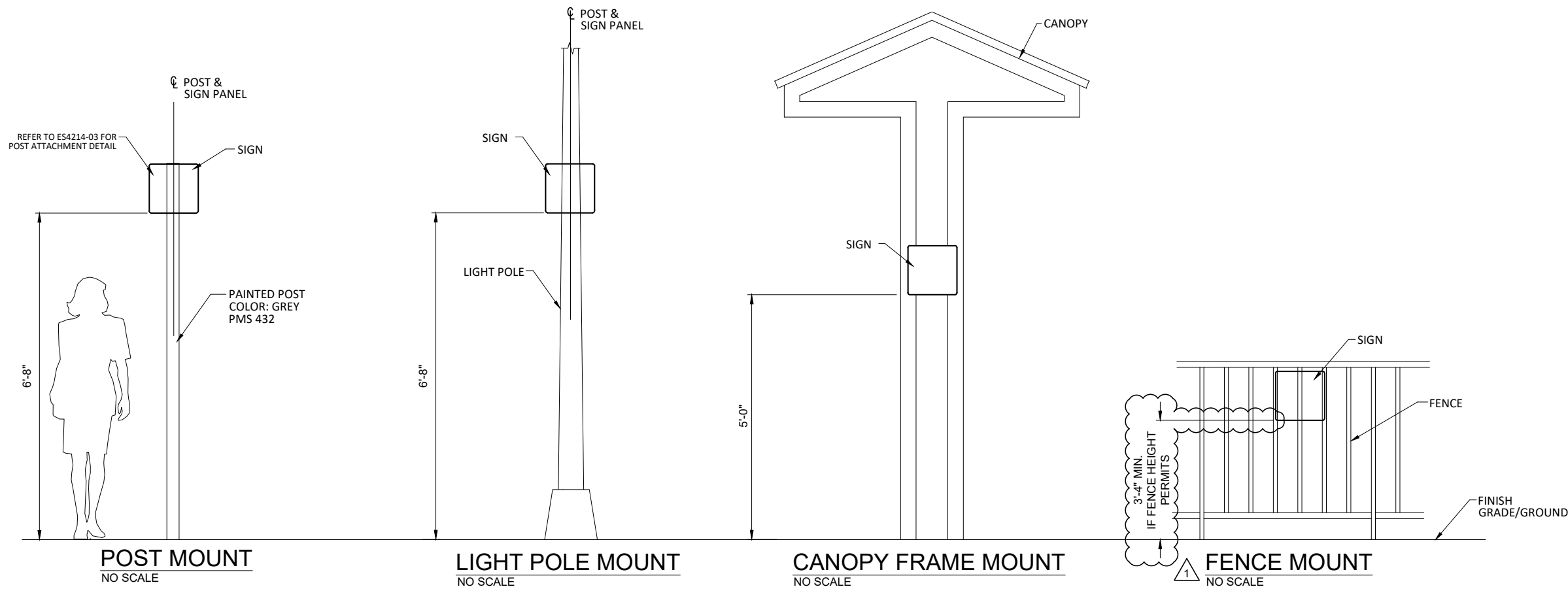
DRAWN
RAILPROS
 CHECKED
B. SMITH
 RECOMMENDED
B. SCHMITH
 DATE 12/11/15


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ENGINEERING STANDARD DRAWINGS
 ACCESSIBILITY IDENTIFICATION AND DIRECTIONAL SIGNS

DRAWING NO. ESD-3323
 DRAWING SHEET NO. 1 OF 1
 SCALE: NONE
 CONTRACT SHEET NO.

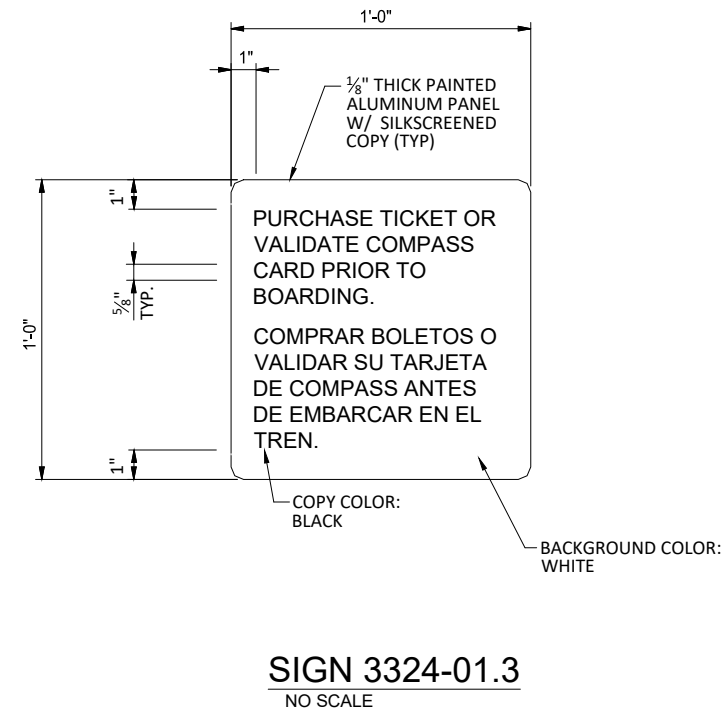
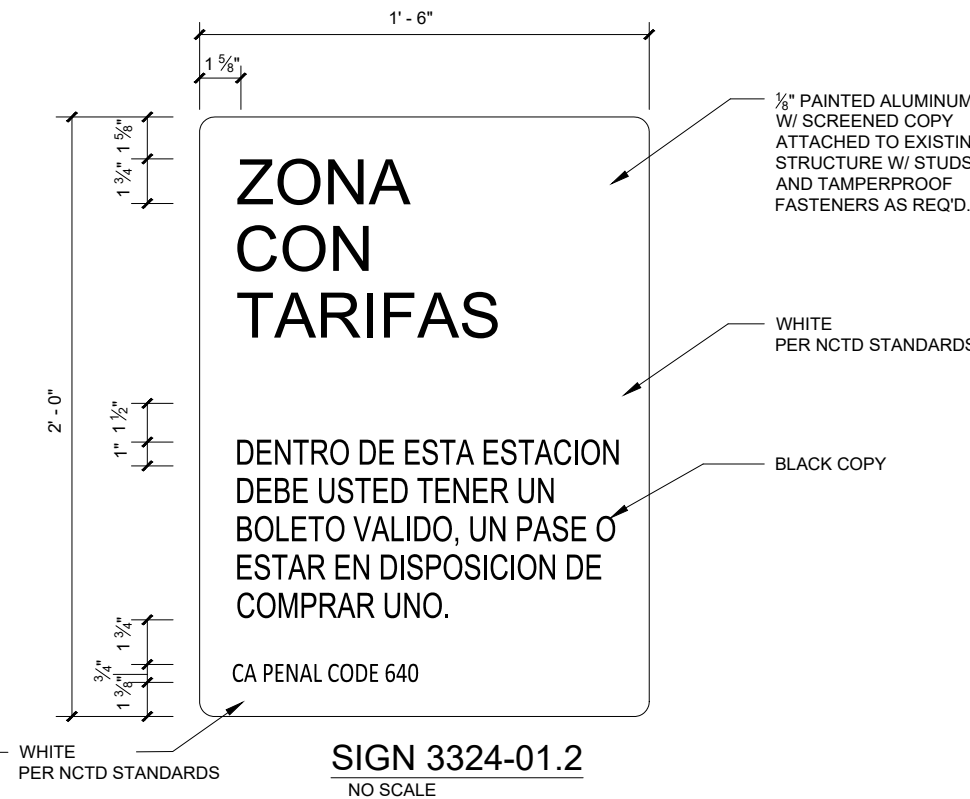
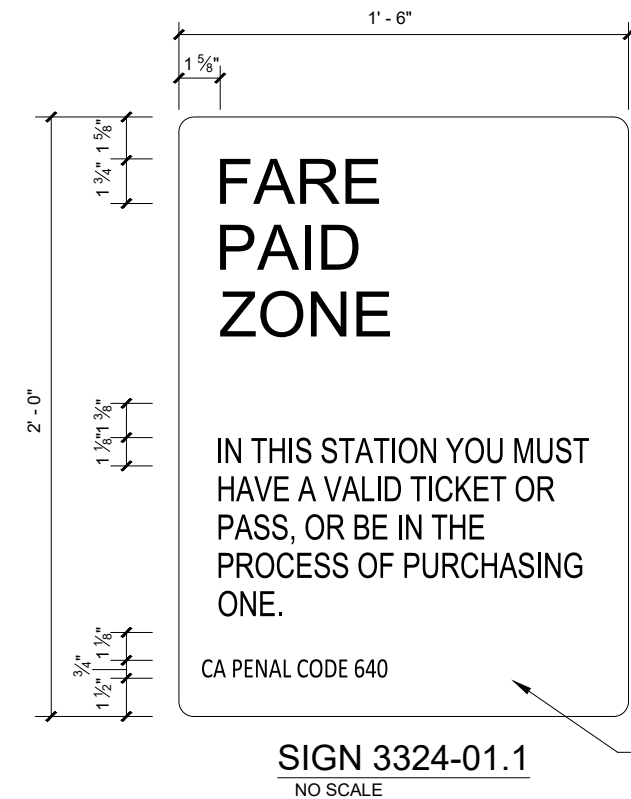
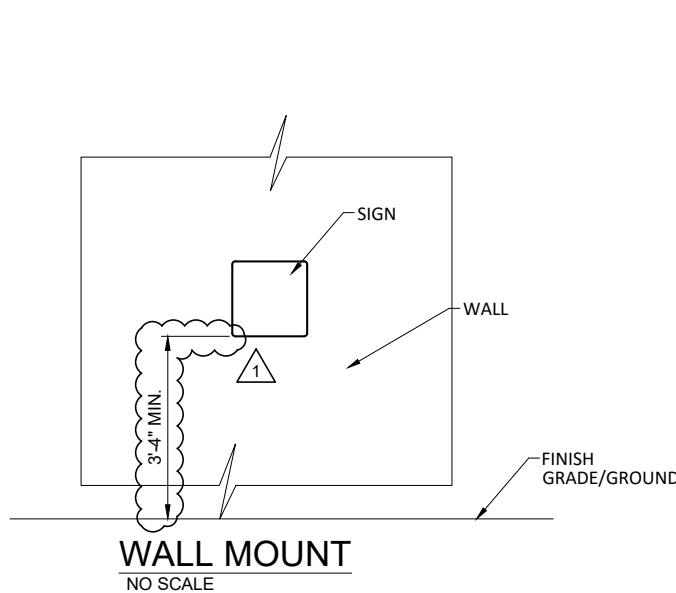


- NOTES:**
1. ALL DIMENSIONS AND NOTES TYPICAL EXCEPT AS NOTED.
 2. BACK OF SIGN PANELS TO BE PAINTED GREY.
 3. VERIFY SPANISH TRANSLATIONS WITH SANDAG.
 4. SIGN FONT TO BE BERTHOLD AKZIDENZ GROTESK MEDIUM. ADJUST WIDTH TO FIT ON SIGN.

- SIGNS**
- LOCATION AND MOUNTING:**
1. LOCATE ON EXISTING FENCE OR POST AS AVAILABLE, OTHERWISE INSTALL NEW POST.
 2. SEE DRAWINGS ESD-3307 AND ESD-5210 FOR POST/MOUNTING AND ANCHORAGE DETAILS.

- MATERIAL:**
1. 1/8" THICK MILL FINISH ALUMINUM PANEL, ALCOA 6016-T6 OR EQUAL.

- COATINGS:**
1. PAINT ALL SIDES WITH LINEAR POLYURETHANE.
 2. COLOR FACE OF PANEL WITH ENGINEERING GRADE, PRESSURE SENSITIVE, RETRO-REFLECTIVE WHITE VINYL SHEETING. SILK SCREEN LEGEND WITH BLACK INK.
 3. FINISH WITH EXTERIOR GRADE PRESSURE SENSITIVE CLEAR MYLAR, 3M-1150 OR EQUAL.
 4. EXPOSED PORTIONS OF PLANK (TYPE A) TO BE PAINTED WITH METALLIC AND LAMPBLACK, MAKING A VERY DARK BROWN.
 5. BASE OF PLANK TO HAVE A COAT OF COAL TAR APPLIED HOT TO 6" ABOVE GROUND.



REVISIONS		SH	DB	DRAWN	DATE
1	9/23/22	ADD MIN. WALL & FENCE MOUNTING HEIGHT		RAILPROS	SEPT 2022
		(cont): DEFINE SIGN FONT; CORRECT SHT #		CHECKED	
		(cont): REMOVE "-01" FROM DRWG NO.		A. ANDERSON	
				RECOMMENDED	
				B. SMITH	
REV.	DATE	DESCRIPTION	DES.	ENG.	

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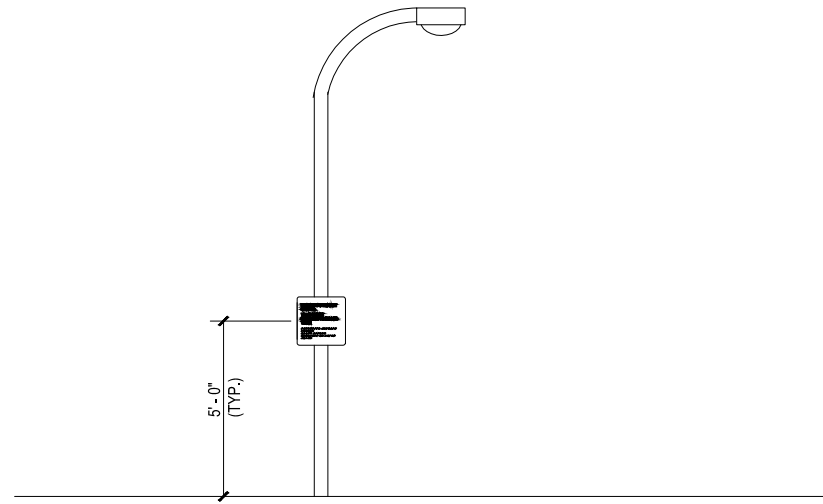
DESIGNER PE STAMP

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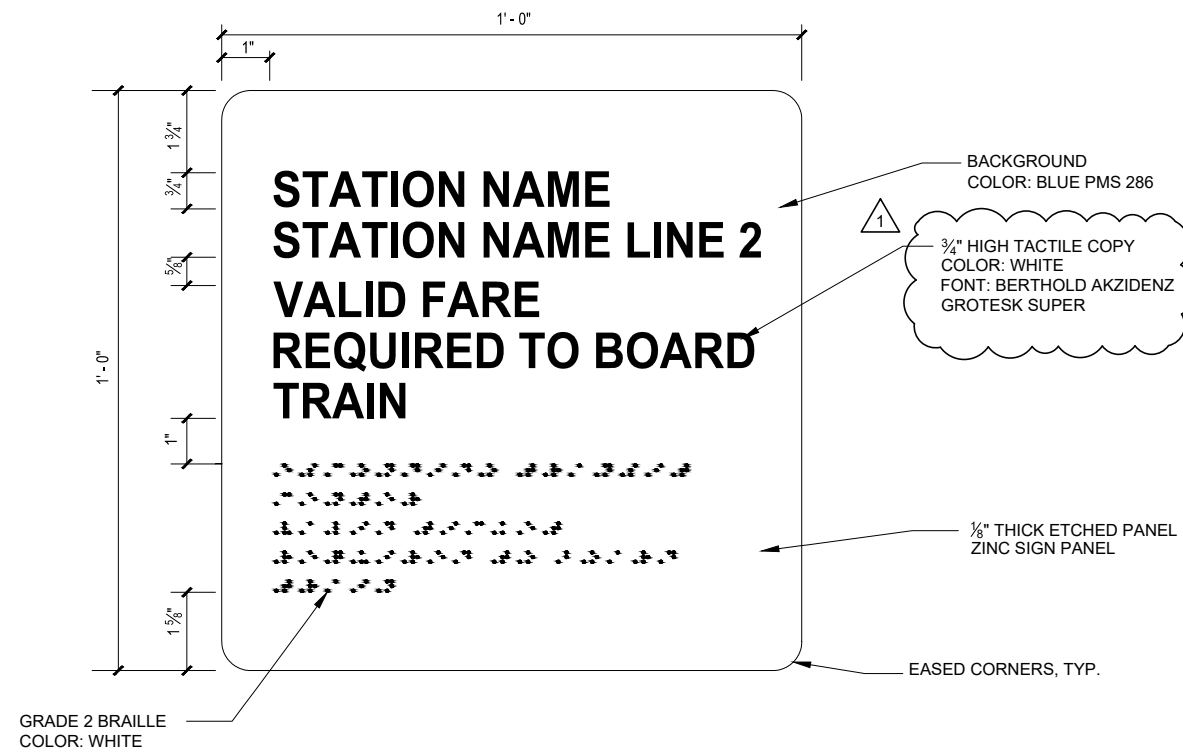
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 810 Mission Avenue
 Oceanside, CA 92054
 www.gonctd.com

ENGINEERING STANDARD DRAWINGS
 FARE COLLECTION SIGNS

DRAWING NO. ESD-3324
 DRAWING SHEET NO. 1 OF 1
 SCALE: NONE
 CONTRACT SHEET NO.



LIGHT STANDARD ELEVATION (WHERE OCCURS)
SCALE: NONE



SIGN 3325.1
SCALE: NONE

SIGNS

LOCATION AND MOUNTING:

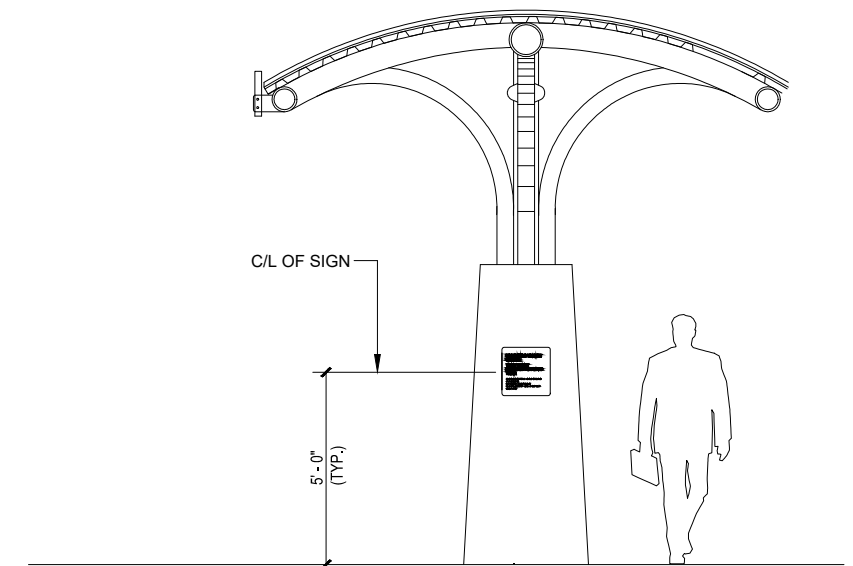
1. LOCATE ON EXISTING FENCE OR POST AS AVAILABLE, OTHERWISE INSTALL NEW POST.
2. LOCATE ONE SIGN AT EACH ENTRANCE TO EACH STATION PLATFORM.
3. SEE DRAWINGS ESD-3307 AND ESD-5210 FOR POST/MOUNTING AND ANCHORAGE DETAILS.

MATERIAL:

1. 1/8" THICK MILL FINISH ALUMINUM PANEL, ALCOA 6016-T6 OR EQUAL.

COATINGS:

1. PAINT ALL SIDES WITH LINEAR POLYURETHANE.
2. COLOR FACE OF PANEL WITH ENGINEERING GRADE, PRESSURE SENSITIVE, RETRO-REFLECTIVE WHITE VINYL SHEETING. SILK SCREEN LEGEND WITH BLACK INK.
3. FINISH WITH EXTERIOR GRADE PRESSURE SENSITIVE CLEAR MYLAR, 3M-1150 OR EQUAL.
4. EXPOSED PORTIONS OF PLANK (TYPE A) TO BE PAINTED WITH METALLIC AND LAMPBLACK, MAKING A VERY DARK BROWN.
5. BASE OF PLANK TO HAVE A COAT OF COAL TAR APPLIED HOT TO 6" ABOVE GROUND.



MOUNTING AT CANOPY
SCALE: NONE

REVISIONS		SH	DB	DRAWN	DATE
1	9/23/22	ADD SIGN LOCATION REQUIREMENT; ADD SIGN (cont): FONT TYPE.		RAILPROS	SEPT 2022
				CHECKED A. ANDERSON	
				RECOMMENDED B. SMITH	
REV.	DATE	DESCRIPTION	DES.	ENG.	

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DESIGNER PE STAMP

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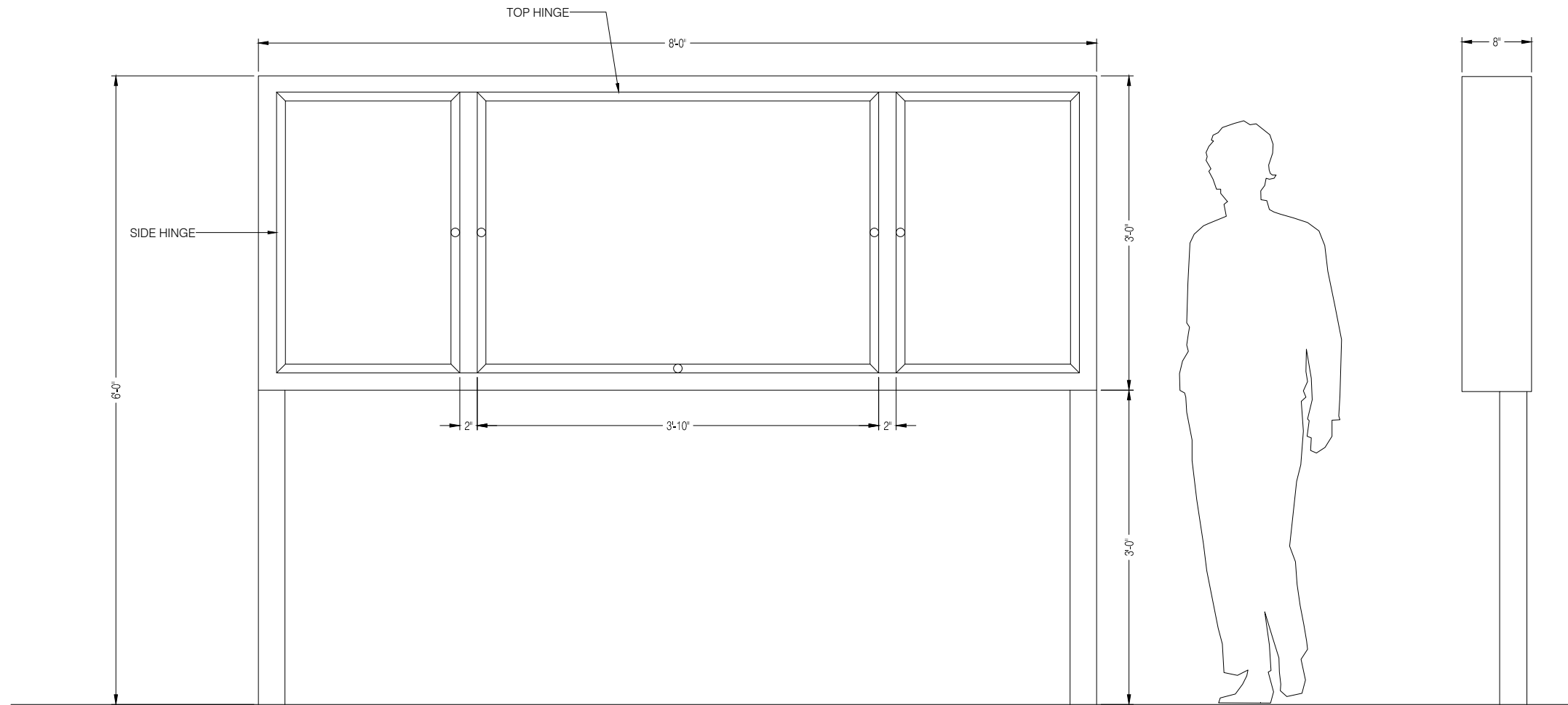
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ENGINEERING STANDARD DRAWINGS
ADA EXTERIOR STATION IDENTIFICATION SIGNS

DRAWING NO. ESD-3325
DRAWING SHEET NO. 1 OF 1
SCALE: NONE
CONTRACT SHEET NO.

NOTES:

1. DISPLAY CASE SHALL BE MANUFACTURED OF 3" X 3" ALUMINUM TUBE.
2. DISPLAY CASE SHALL BE SINGLE FACE, NON-ILLUMINATED AND WEATHER PROOFED.
3. DOOR PANEL SHALL BE CLEARPLEX DOORS WITH LOCKS.
4. DISPLAY CASE DOOR SHALL HAVE A COUNTERSUNK, TAMPERPROOF STAR-HEAD BOLT ON THE TOP & BOTTOM CORNERS OF DOOR WITH NUTS WELDED TO BOLT ON INTERIOR SIDE OF DOOR TO PREVENT BOLT'S REMOVAL.
5. ANCHOR STRUCTURE TO EXISTING HARDSCAPE FOR SAFE & SECURE INSTALLATION. ENGINEER TO PROVIDE
6. MINIMUM OF 1 DISPLAY CASE FOR EACH PLATFORM.
7. FRAMEWORK TO BE BLACK ANODIZED ALUMINUM.



TYPICAL ELEVATION
SCALE: NONE

SIDE VIEW
SCALE: NONE

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REV.	DATE	DESCRIPTION	DES.	ENG.	DESIGNER PE STAMP

DRAWN
RAILPROS

CHECKED
B. SMITH *BS*

RECOMMENDED
B. SCHMITH *BAS*

DATE 01/22/16

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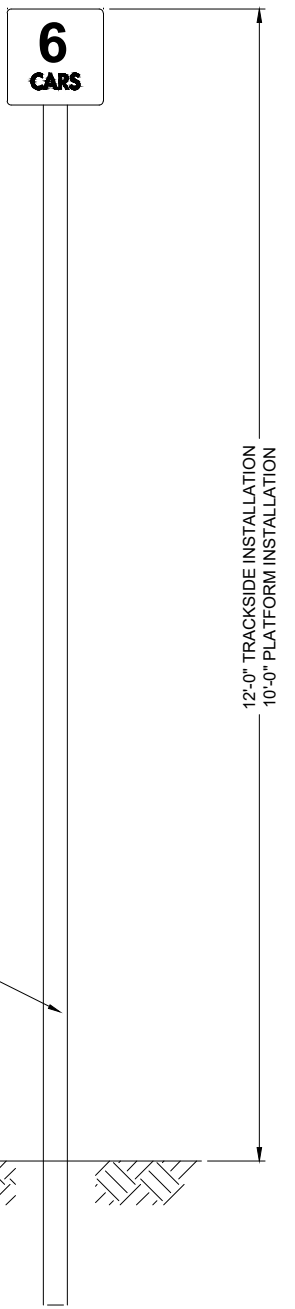
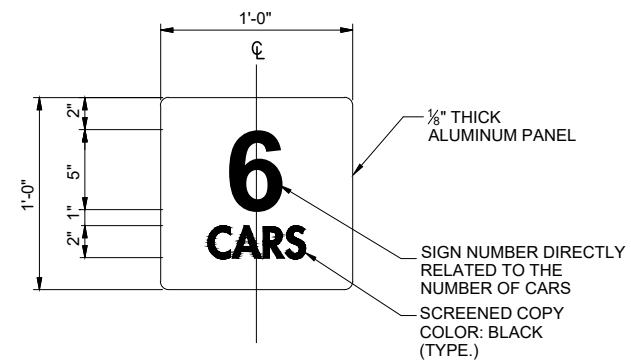
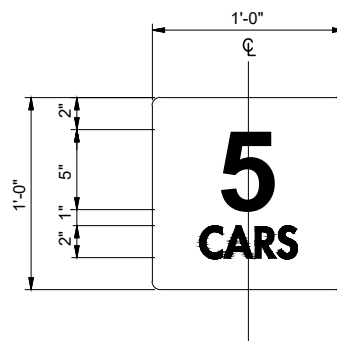
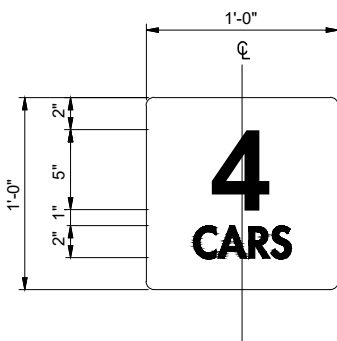
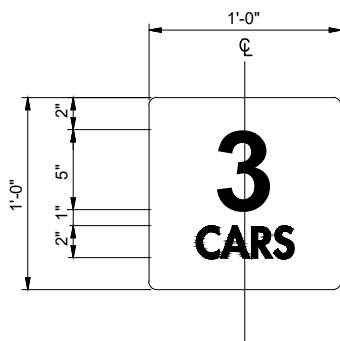
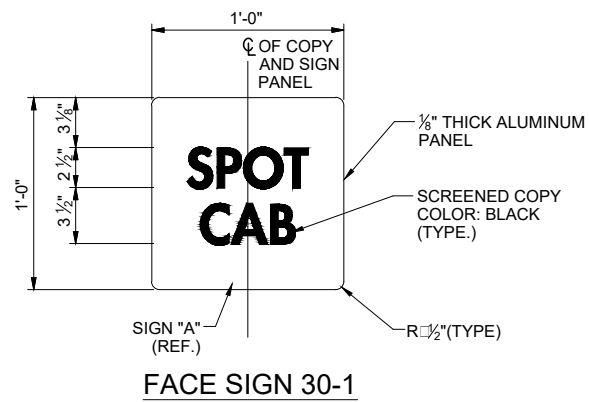
NORTH COUNTY TRANSIT DISTRICT

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<p>ENGINEERING STANDARD DRAWINGS</p> <p>MAP/INFORMATION DISPLAY CASE</p>	DRAWING NO. ESD-3328
	DRAWING SHEET NO. 1 OF 1
	SCALE: NONE
	CONTRACT SHEET NO.

NOTE:
CONTACT NCTD FOR LATEST PLACEMENT REQUIREMENTS.

TYPE "A" SIGNS
NO SCALE



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SIGNS

LOCATION AND MOUNTING:

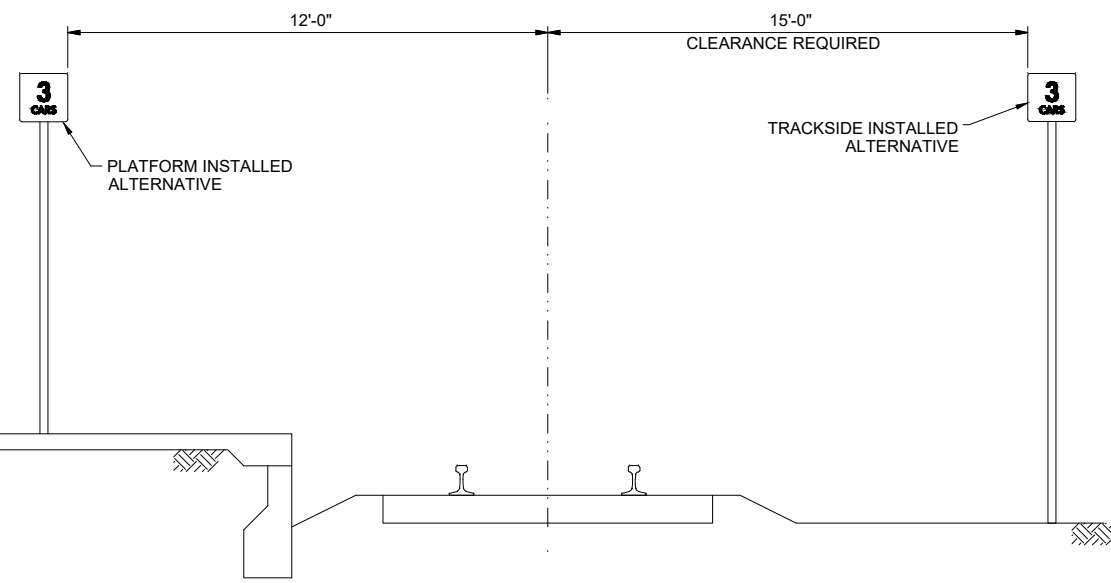
1. LOCATE ON EXISTING FENCE OR POST AS AVAILABLE, OTHERWISE INSTALL NEW POST.
2. SEE DRAWINGS ESD-3307 AND ESD-5210 FOR POST/MOUNTING AND ANCHORAGE DETAILS.

MATERIAL:

1. 1/8" THICK MILL FINISH ALUMINUM PANEL, ALCOA 6016-T6 OR EQUAL.

COATINGS:

1. PAINT ALL SIDES WITH LINEAR POLYURETHANE.
2. COLOR FACE OF PANEL WITH ENGINEERING GRADE, PRESSURE SENSITIVE, RETRO-REFLECTIVE WHITE VINYL SHEETING. SILK SCREEN LEGEND WITH BLACK INK.
3. FINISH WITH EXTERIOR GRADE PRESSURE SENSITIVE CLEAR MYLAR, 3M-1150 OR EQUAL.
4. EXPOSED PORTIONS OF PLANK (TYPE A) TO BE PAINTED WITH METALLIC AND LAMPBLACK, MAKING A VERY DARK BROWN.
5. BASE OF PLANK TO HAVE A COAT OF COAL TAR APPLIED HOT TO 6" ABOVE GROUND.
6. REFER TO ESD-3330-01 FOR PLACEMENT REQUIREMENTS.



TYPE "B" PLATFORM SECTION
NO SCALE

REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN
RAILPROS
CHECKED
B. SMITH
RECOMMENDED
B. SCHMITH
DATE 12/11/15

DESIGNER PE STAMP



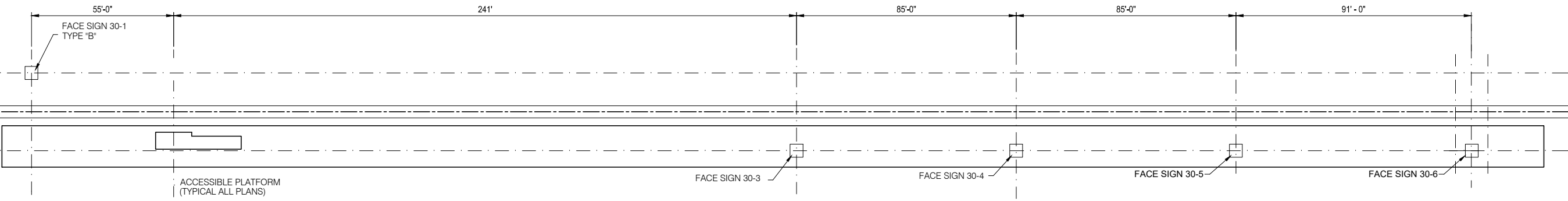
ENGINEERING STANDARD DRAWINGS		DRAWING NO.
SPOT CAB SIGN		ESD-3330-01
		DRAWING SHEET NO. 1 OF 2
		SCALE: NONE
		CONTRACT SHEET NO.

NOTES:

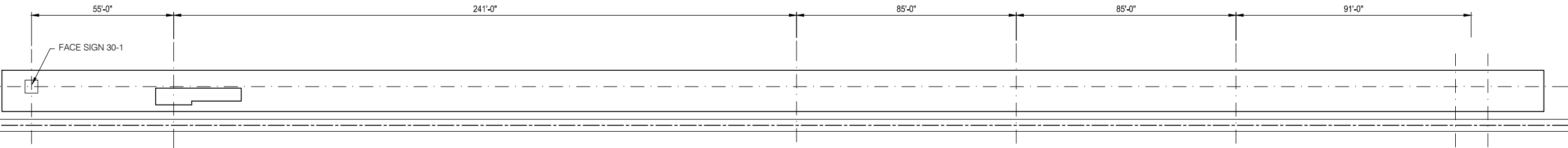
- SIGNS SHALL BE ORIENTED FACING TRAIN, AND AT RIGHT ANGLES TO THE TRACK.
- CONTRACTOR TO FURNISH SHOP DRAWINGS FOR ACTUAL PLACEMENT AT EACH STATEMENT.

LEGEND:

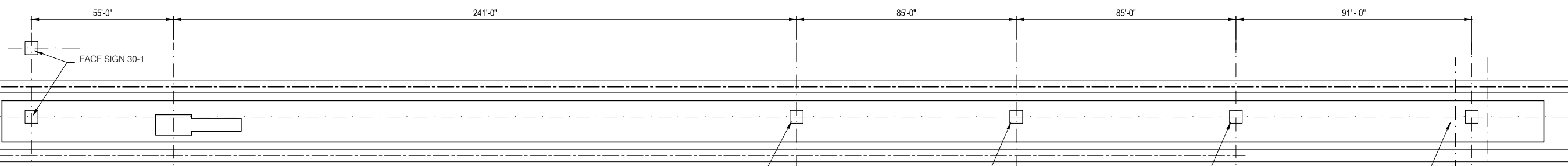
- TYPE 'A'
- CENTERLINE OF TRACK
- ACCESSIBLE PLATFORM



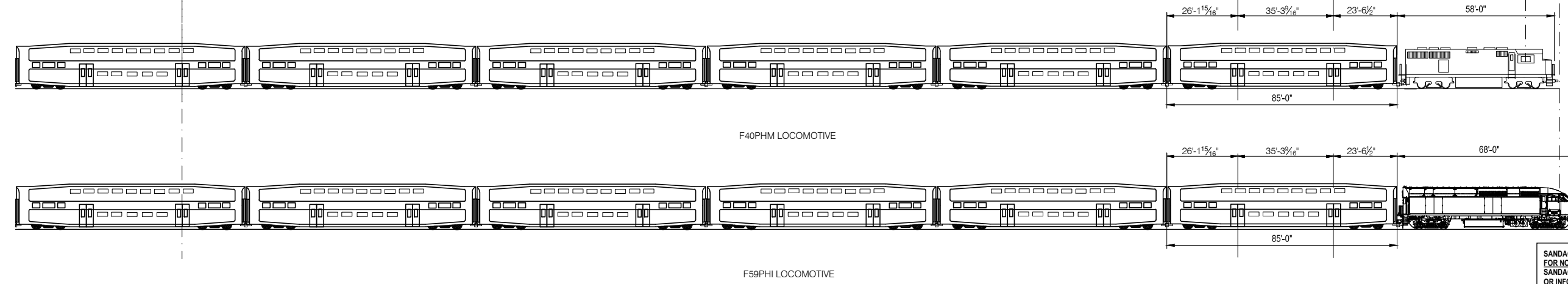
PLAN 1 - SINGLE TRACK - PLATFORM INSTALLED SPOT CAB SIGN ALTERNATIVE



PLAN 2 - SINGLE TRACK - TRACKSIDE INSTALLED SPOT CAB SIGN ALTERNATIVE



PLAN 3 - DOUBLE TRACK SPOT SIGN CAB LOCATIONS




SIGN ON PLATFORM TO BE VISIBLE TO INBOUND TRAINS ON BOTH SIGNS

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REV.	DATE	DESCRIPTION	DES.	ENG.

REVISIONS	DRAWN RAILPROS
	CHECKED B. SMITH
	RECOMMENDED B. SCHMITH
	DATE 12/11/15
	DESIGNER PE STAMP



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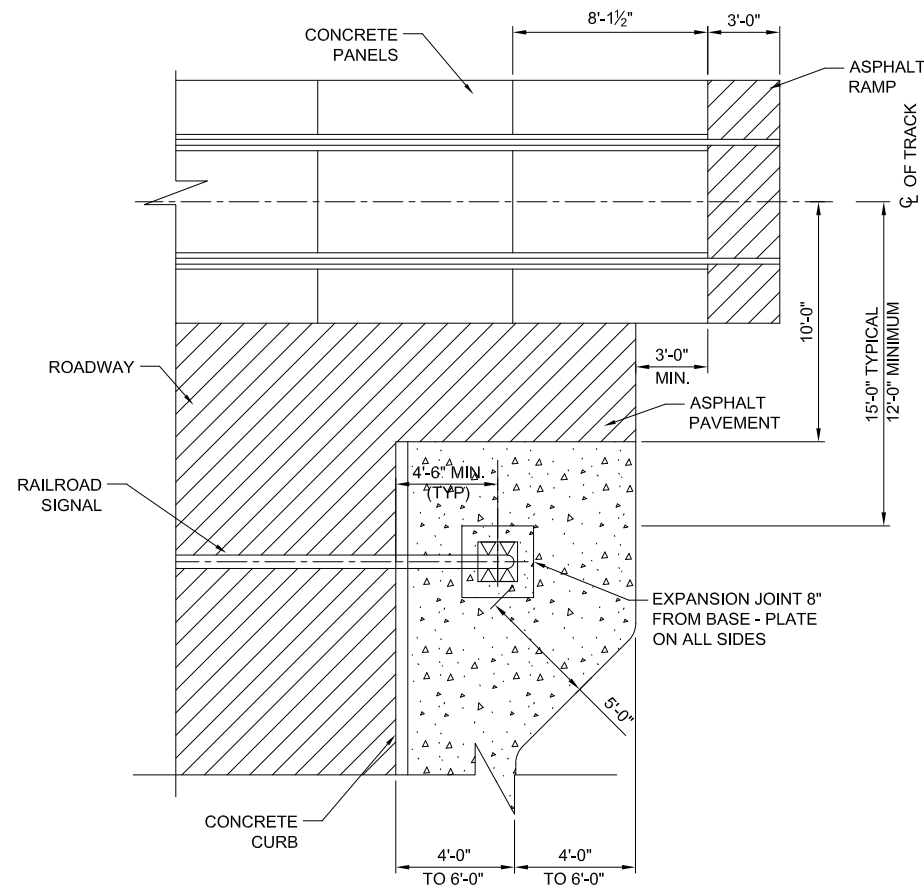
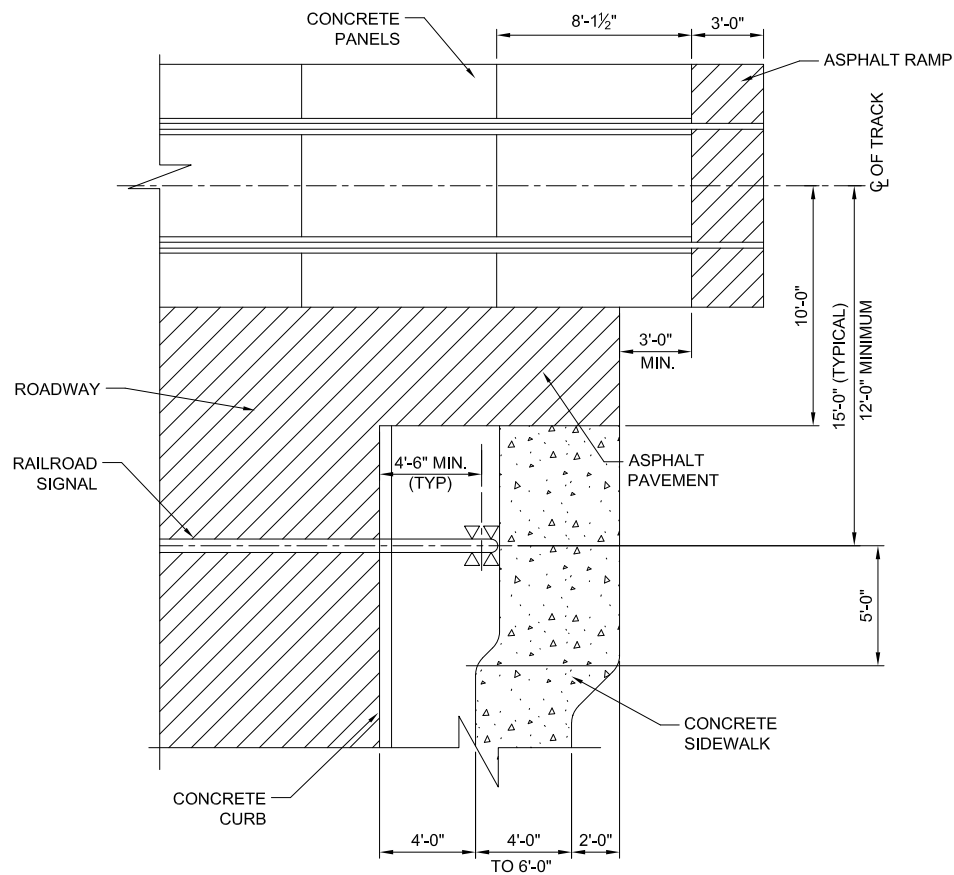
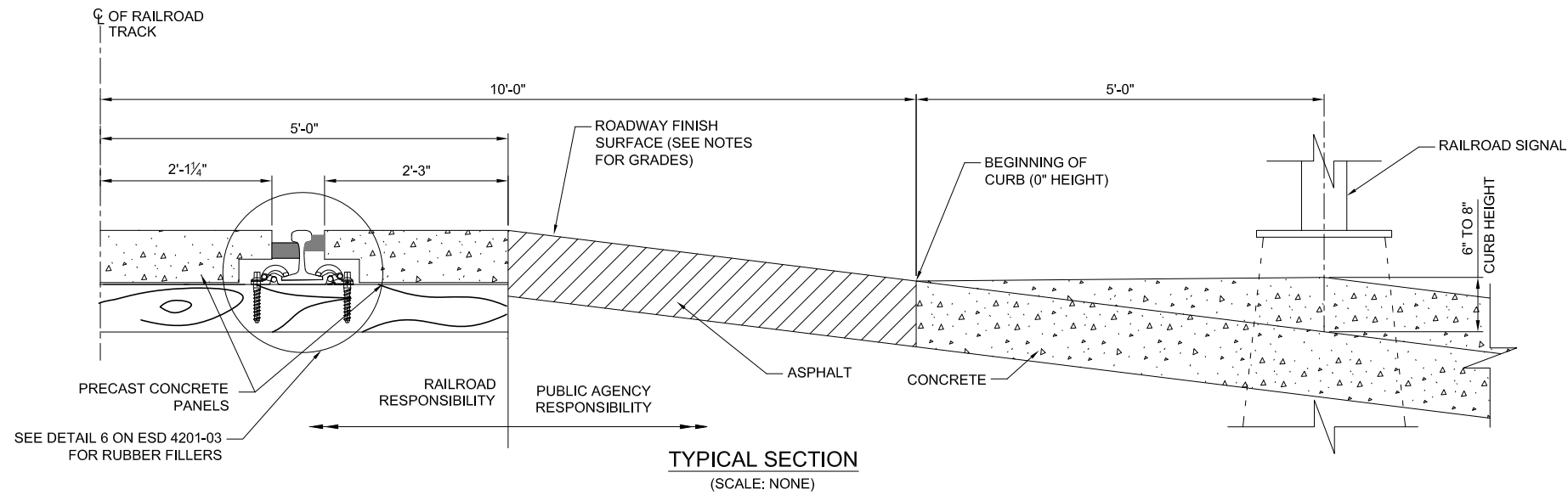
810 Mission Avenue
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ENGINEERING STANDARD DRAWINGS	DRAWING NO. ESD-3330-02
SPOT CAB SIGN	DRAWING SHEET NO. 2 OF 2
	SCALE: NONE
	CONTRACT SHEET NO.

LOSSAN ENGINEERING STANDARD DRAWINGS

Section 4000

GRADE CROSSINGS



NOTES:

1. ASPHALT CONCRETE PAVEMENT, CURB, GUTTER AND SIDEWALKS SHALL BE CONSTRUCTED AS PER CITY OR COUNTY STANDARD PLANS AND SPECIFICATIONS AND SHALL ALSO MEET THE REQUIREMENTS OF "STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION" PUBLISHED BY THE AMERICAN PUBLIC WORKS ASSOCIATION.
2. WHERE CROSSINGS INVOLVE TWO OR MORE TRACKS, THE TOP OF RAILS FOR ALL TRACKS SHALL BE BROUGHT TO THE SAME PLANE WHERE PRACTICABLE, UNLESS TRACK SUPERELEVATION DICTATE OTHERWISE.
3. THE SURFACE OF THE HIGHWAY SHALL BE IN THE SAME PLANE AS THE TOP OF RAILS FOR A DISTANCE OF TWO FEET OUTSIDE OF NEAREST RAIL OR AT LEAST ONE FOOT OUTSIDE THE OUTER EDGE OF THE PRECAST CONCRETE PANELS) FOR EITHER MULTIPLE OR SINGLE TRACK CROSSINGS. THE SURFACE OF THE HIGHWAY SHOULD ALSO NOT BE MORE THAN 3 INCHES HIGHER OR LOWER THAN THE TOP OF THE NEAREST RAIL AT A POINT 30 FEET FROM THE RAIL UNLESS TRACK SUPERELEVATION DICTATE OTHERWISE. FROM THIS POINT, APPROACH GRADES NOT IN EXCESS OF SIX PERCENT ARE DESIRABLE (THREE PERCENT PREFERRED). VERTICAL CREST CURVES OF SUCH LENGTH AS REQUIRED TO PROVIDE RIDING CONDITIONS AND SIGHT DISTANCES NORMALLY APPLIED TO THE HIGHWAY UNDER CONSIDERATION SHOULD BE PROVIDED ON EACH SIDE OF THE RAILROAD TRACK OR TRACKS.
4. THE CURB SHALL BE FULL HEIGHT UP TO 15 FEET FROM THE CENTERLINE OF THE NEAREST TRACK. THE CURB SHALL THEN TRANSITION FROM FULL HEIGHT TO ZERO HEIGHT WITHIN THE NEXT 5 FEET AND SHALL HAVE ZERO HEIGHT 10 FEET FROM THE CENTERLINE OF THE TRACK.
5. THE ROADWAY AND SIDEWALKS SHALL BE CONSTRUCTED OF ASPHALT CONCRETE IN THE AREA LOCATED 10 FEET FROM THE CENTERLINE OF THE NEAREST TRACK.
6. DRAINAGE CATCH BASINS OR INLETS SHOULD NOT BE LOCATED WITHIN 30 FEET OF THE CENTERLINE OF THE NEAREST TRACK.
7. ALL CONSTRUCTION AND MAINTENANCE WORK WITHIN 25 FEET OF THE NEAREST TRACK SHALL COMPLY WITH FEDERAL RAILROAD ADMINISTRATION OFFICE OF SAFETY, CODE OF FEDERAL REGULATIONS, TITLE 49, PART 214, "ROADWAY WORKER" AND SHALL BE PERFORMED UNDER THE SUPERVISION OF THE EIC/FLAGPERSON PROVIDED BY NCTD/MTS.
8. SIDEWALK SLOPES, CROSS-SLOPES, WIDTHS, AND SURFACES SHALL COMPLY WITH THE AMERICANS WITH DISABILITIES ACT AND CALIFORNIA TITLE 24, INCLUDING AT THE FLANGEWAY AND FIELD SIDE FILLER OF THE CROSSING PANELS.
9. REFER TO THE LOSSAN SAN DIEGO COMMUNICATION AND SIGNAL STANDARD PLANS FOR ADDITIONAL INFORMATION ON SITE LAYOUT. COORDINATE ALL WORK WITH SIGNAL FORCES.
10. COMPLY WITH MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES AS MOST RECENTLY ADOPTED AND REVISED BY THE APPLICABLE JURISDICTION.
11. COMPLY WITH AMERICANS WITH DISABILITIES ACT AND CALIFORNIA TITLE 24.
12. FOR CONCRETE PANEL DETAILS, SEE ESD 4201-01 THROUGH 4201-03.

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REV.	DATE	DESCRIPTION	DES.	ENG.

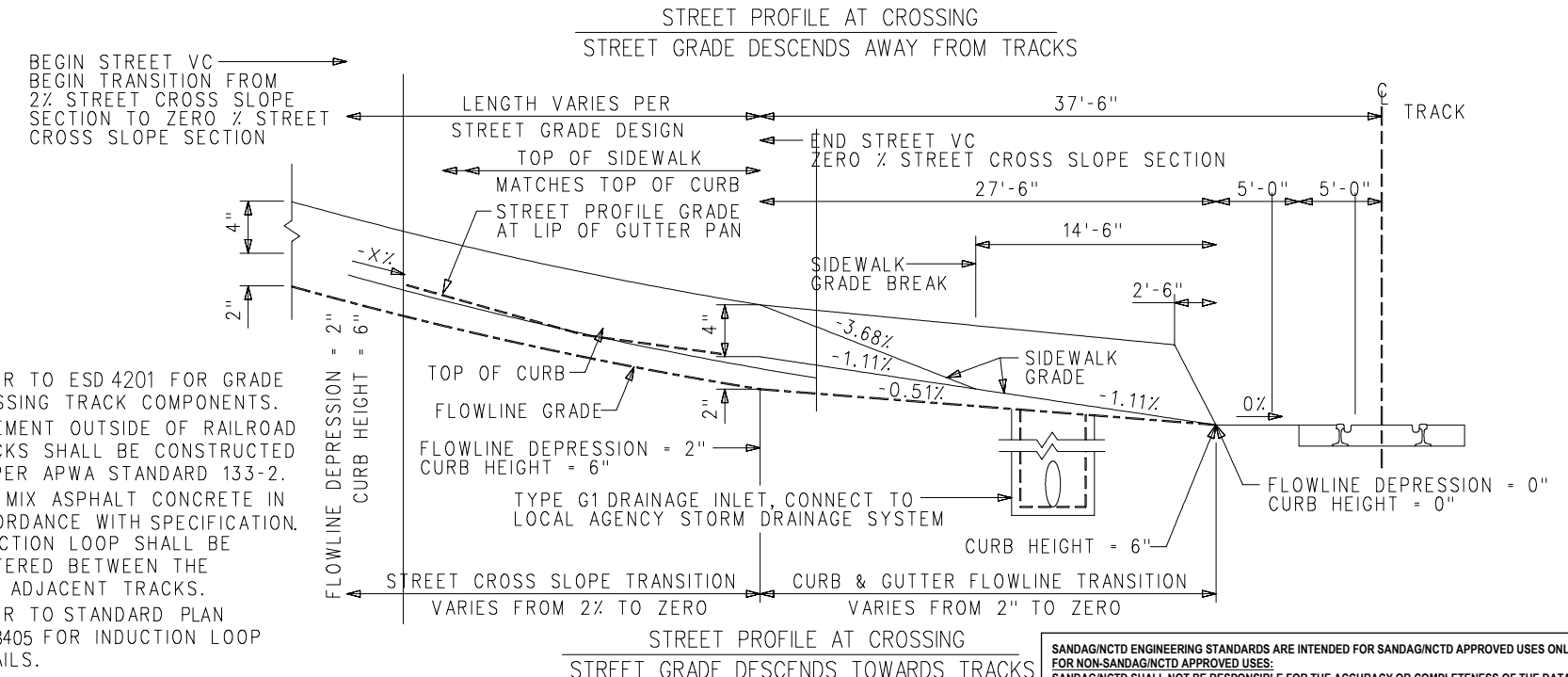
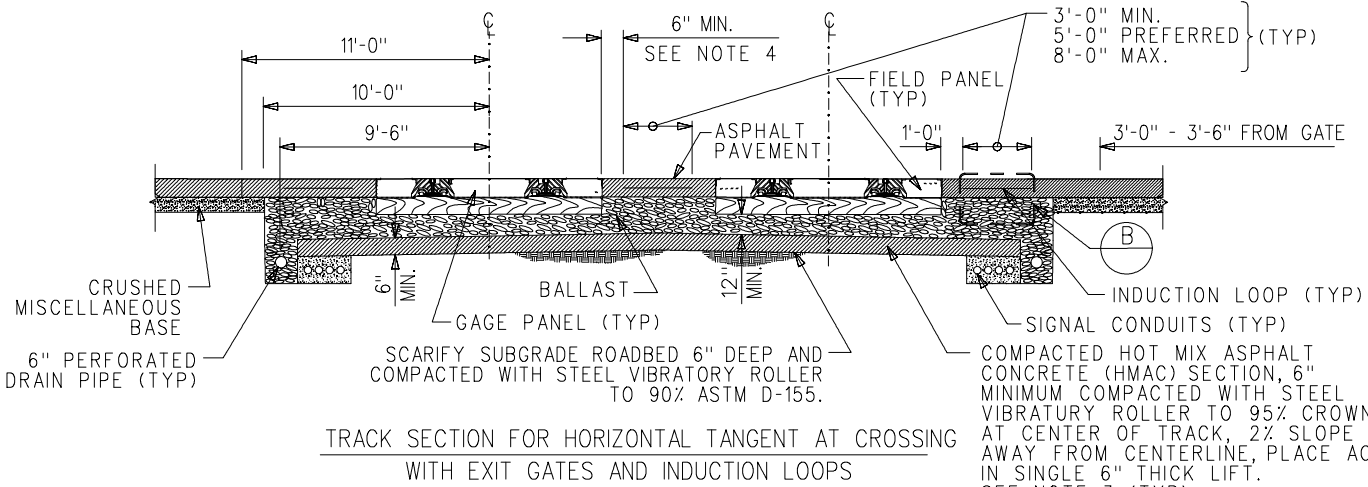
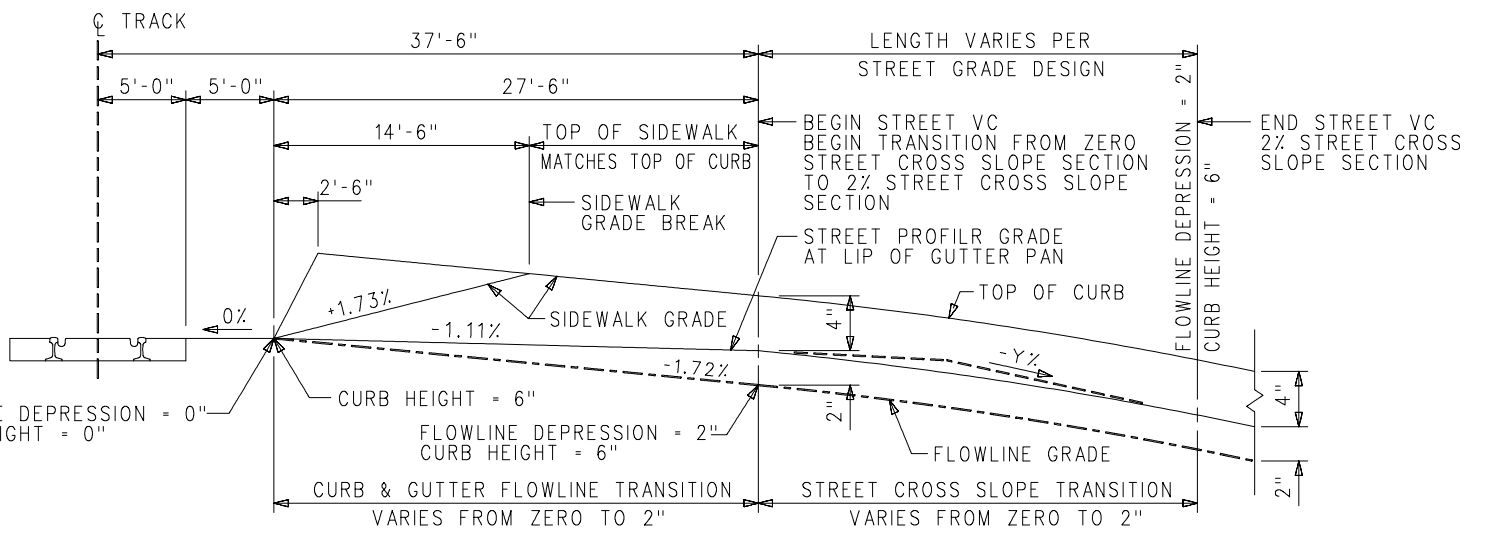
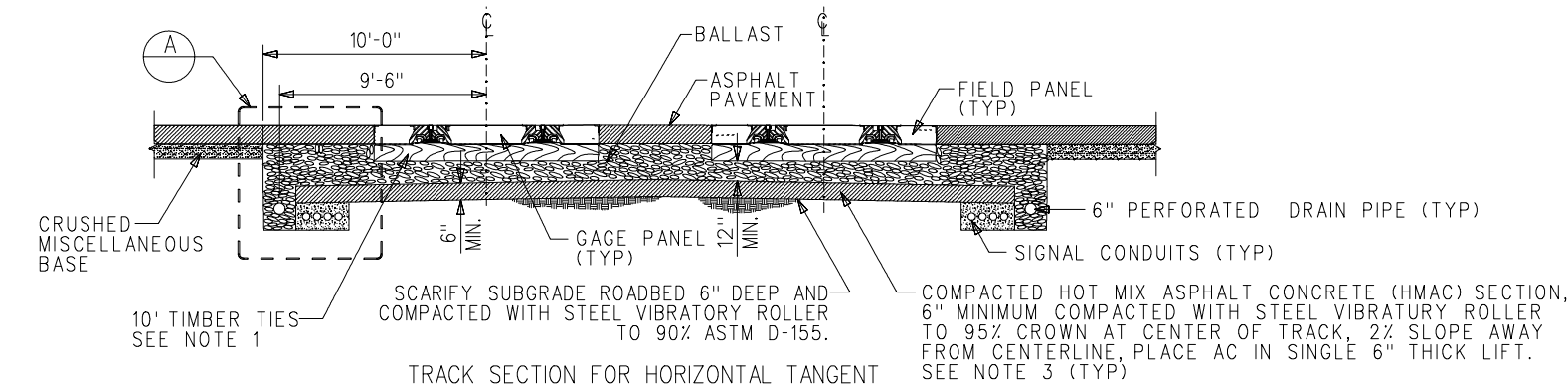
REVISIONS	DRAWN RAILPROS
	CHECKED B. SMITH <i>BS</i>
	RECOMMENDED B. SCHMITH <i>BS</i>
	DATE 04/25/17
DESIGNER PE STAMP	

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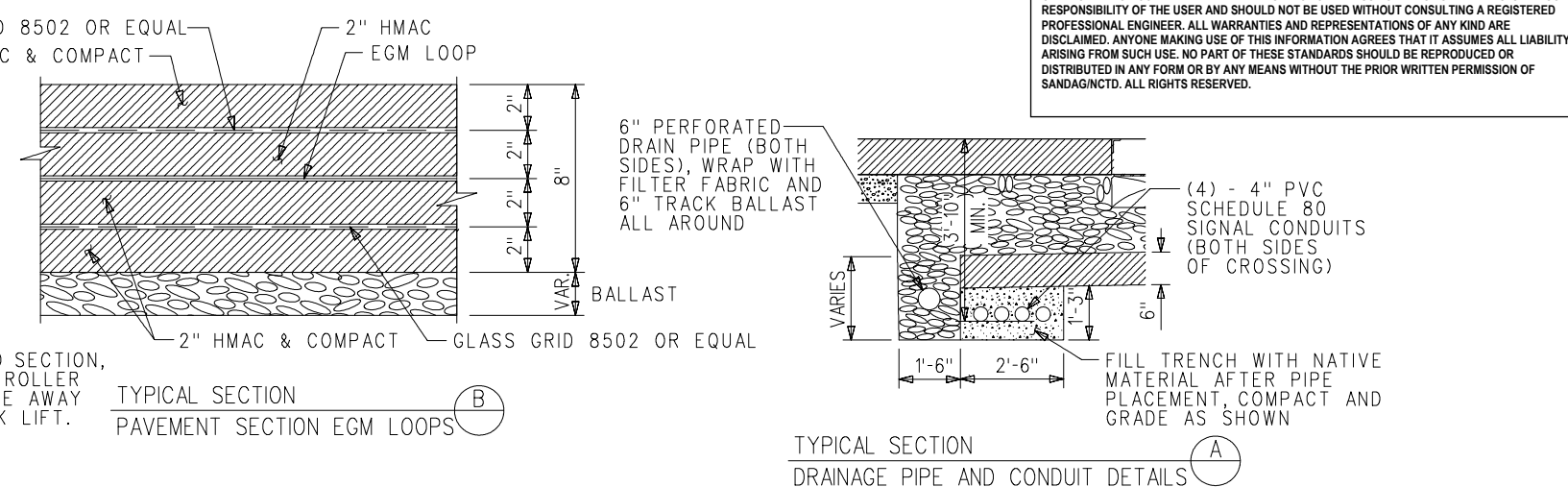
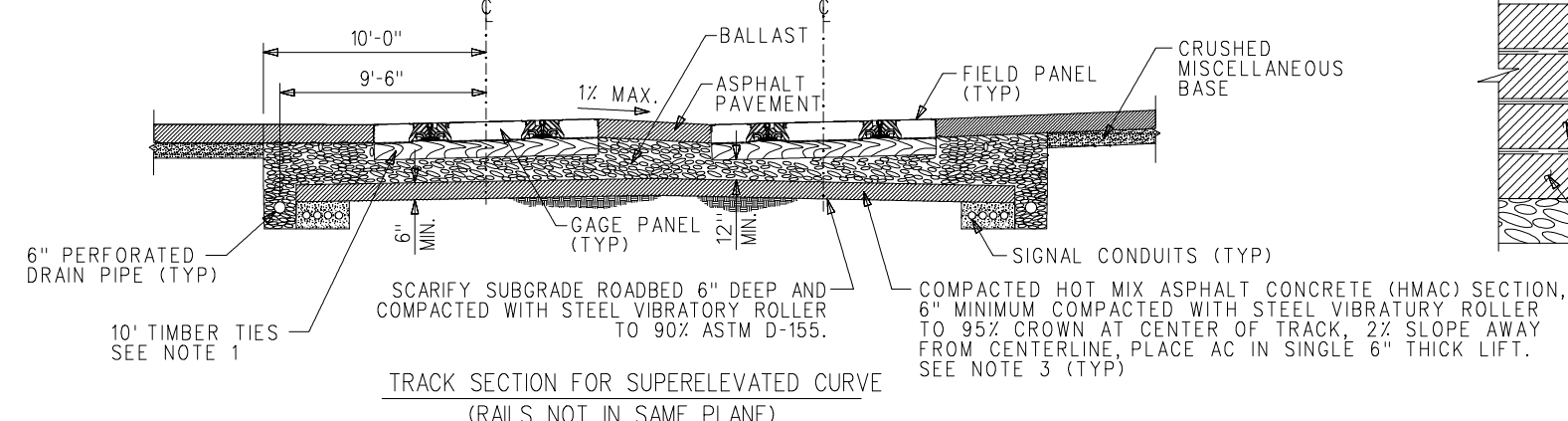
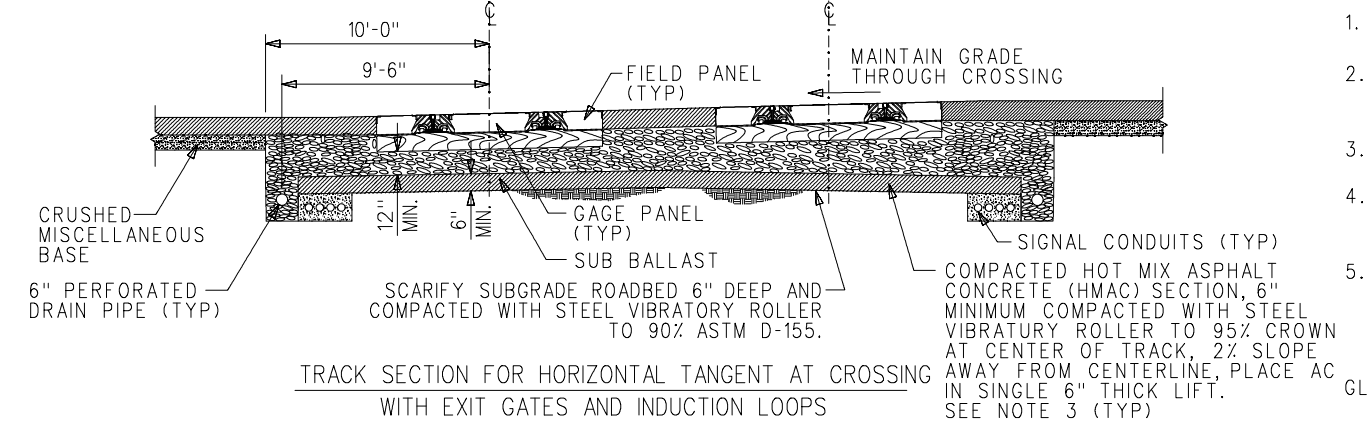
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ENGINEERING STANDARD DRAWINGS
GRADE CROSSING STREET AND SIDEWALK DETAILS

DRAWING NO.	ESD-4001-01
DRAWING SHEET NO.	1 OF 2
SCALE:	NONE
CONTRACT SHEET NO.	



- NOTES:**
- REFER TO ESD 4201 FOR GRADE CROSSING TRACK COMPONENTS.
 - PAVEMENT OUTSIDE OF RAILROAD TRACKS SHALL BE CONSTRUCTED AS PER APWA STANDARD 133-2.
 - HOT MIX ASPHALT CONCRETE IN ACCORDANCE WITH SPECIFICATION.
 - INDUCTION LOOP SHALL BE CENTERED BETWEEN THE TWO ADJACENT TRACKS.
 - REFER TO STANDARD PLAN ESD 8405 FOR INDUCTION LOOP DETAILS.

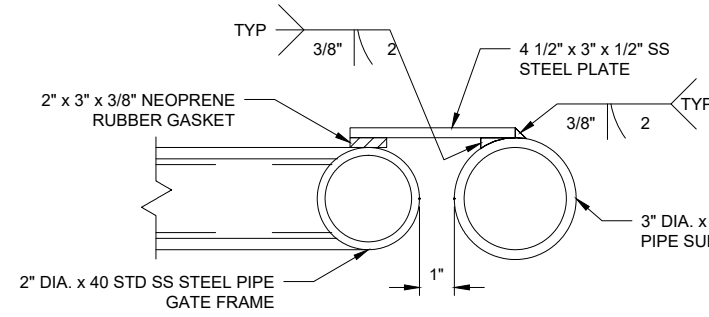


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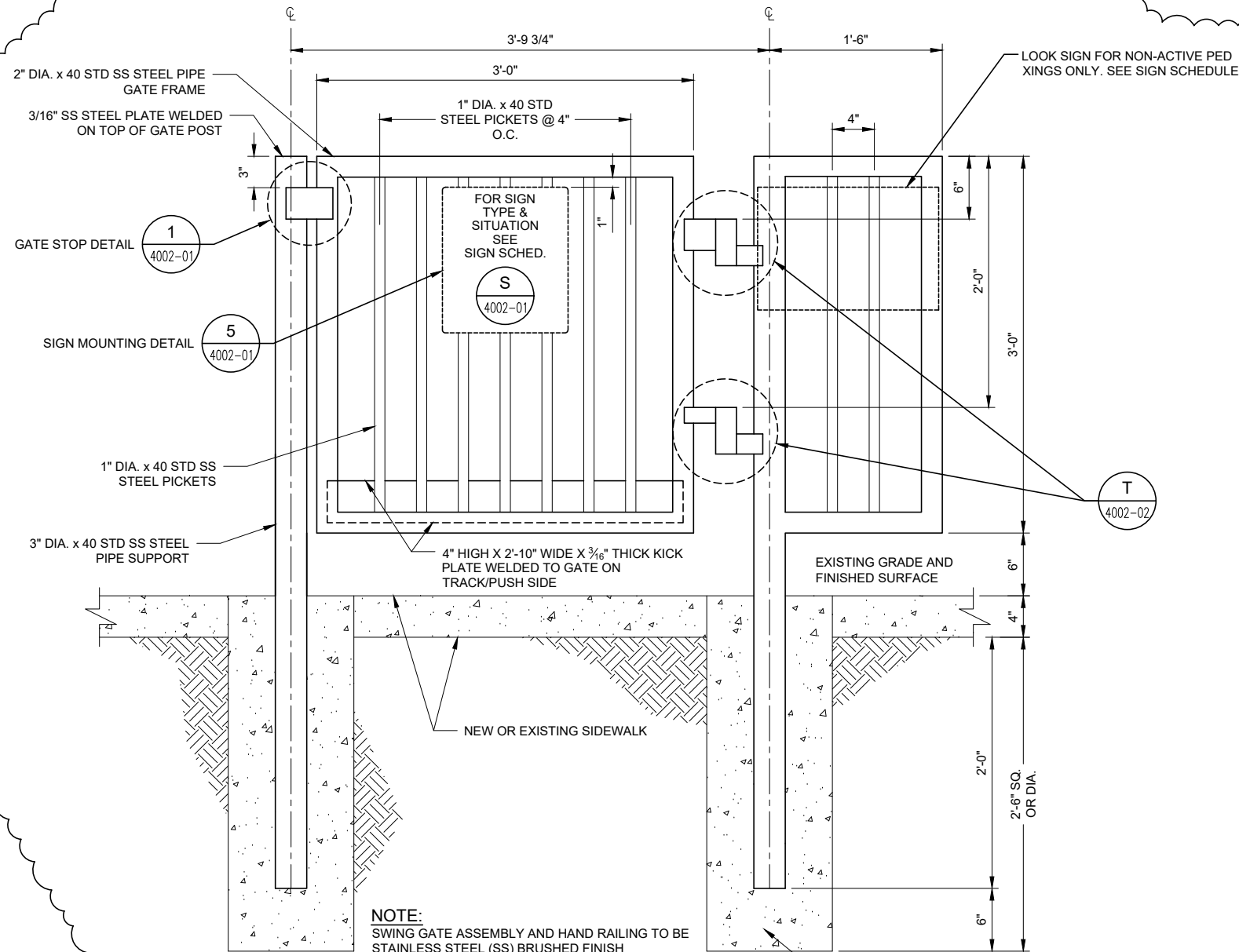
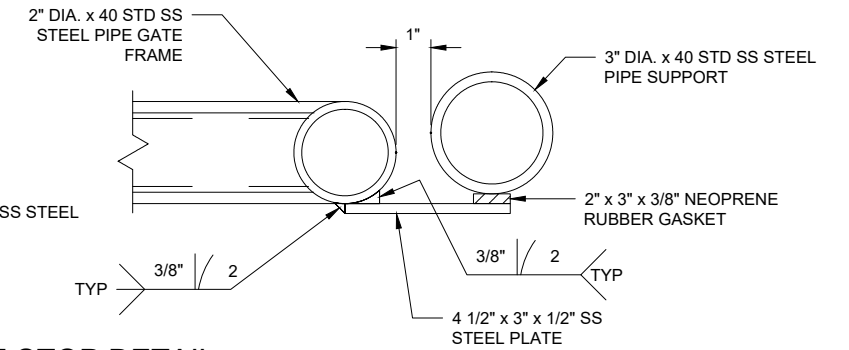
REVISIONS		DRAWN RAILPROS		 SAN DIEGO ASSOCIATION OF GOVERNMENTS 401 B Street, Suite 800 San Diego, CA. 92101 www.sandag.org	 810 Mission Avenue Oceanside, CA 92054 www.gonctd.com	ENGINEERING STANDARD DRAWINGS HIGHWAY-RAIL GRADE CROSSING TYPICAL SECTIONS	DRAWING NO. ESD-4001-02
		CHECKED B. SMITH					DRAWING SHEET NO. 2 OF 2
		RECOMMENDED B. SCHMITH					SCALE: NONE
REV.	DATE	DESCRIPTION	DES.	ENG.	DATE 10/08/15	DESIGNER PE STAMP	CONTRACT SHEET NO.

3/8" x 3" SS 316 BOLT WITH 1/8" THICK NEOPRENE GASKET (AGAINST SIGN PANEL) & 1/8" THICK PLASTIC WASHERS ON BOTH SIDES (TYP)

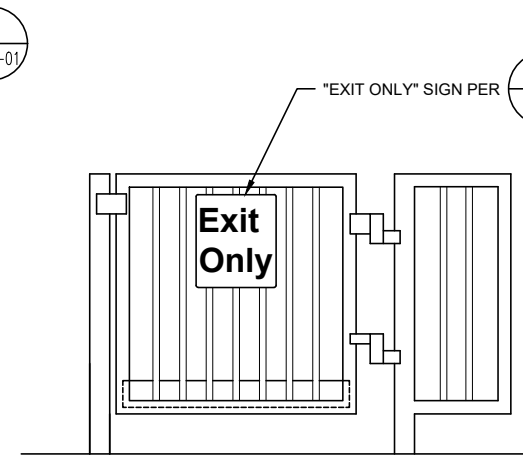
2 SIGN MOUNTING DETAIL
- NTS



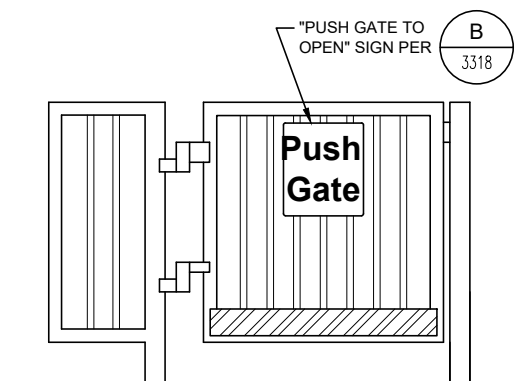
1 GATE STOP DETAIL
- NTS



R SWING GATE DETAILS
- NTS



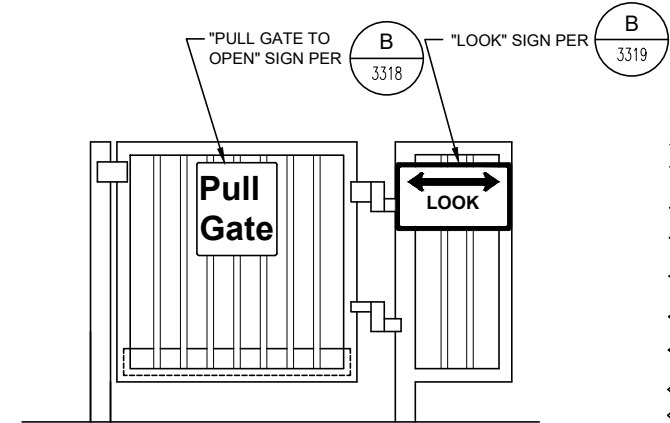
APPROACH - ELEVATION VIEW



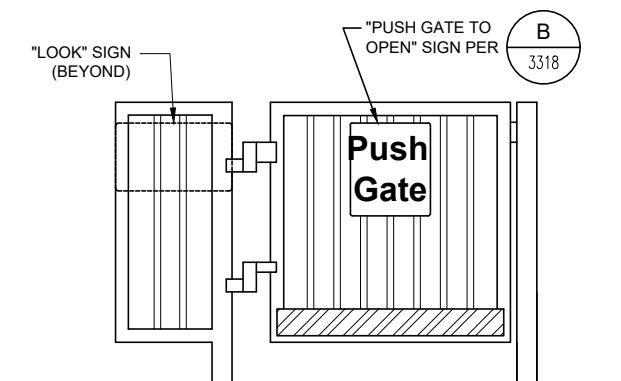
TRACK SIDE - ELEVATION VIEW

ACTIVE PED CROSSINGS

- CROSSINGS THAT INCLUDE A MECHANICAL PED GATE ARM
- GATES USED FOR EMERGENCY EXITS ONLY



APPROACH - ELEVATION VIEW



TRACK SIDE - ELEVATION VIEW

NON-ACTIVE PED CROSSINGS

- CROSSINGS WITH NO MECHANICAL PED GATE ARM
- GATES USED FOR PRIMARY ENTRY AND EXIT TO CROSSING
- REFER TO "SWING GATE ONLY" DETAIL - ESD-4017

S SIGN SCHEDULE
- NTS

REVISIONS		SH	DB	DRAWN	DATE
1	9/23/22	ADDED "LOOK" SIGN TO SIDE RAILING; ADD (cont): SIGN SCHEDULE; REMOVE SIGN DETAILS (cont): (ALREADY ON SEPARATE ESD)		RAILPROS A. ANDERSON	SEPT 2022
				RECOMMENDED B. SMITH	
REV.	DATE	DESCRIPTION	DES.	ENG.	

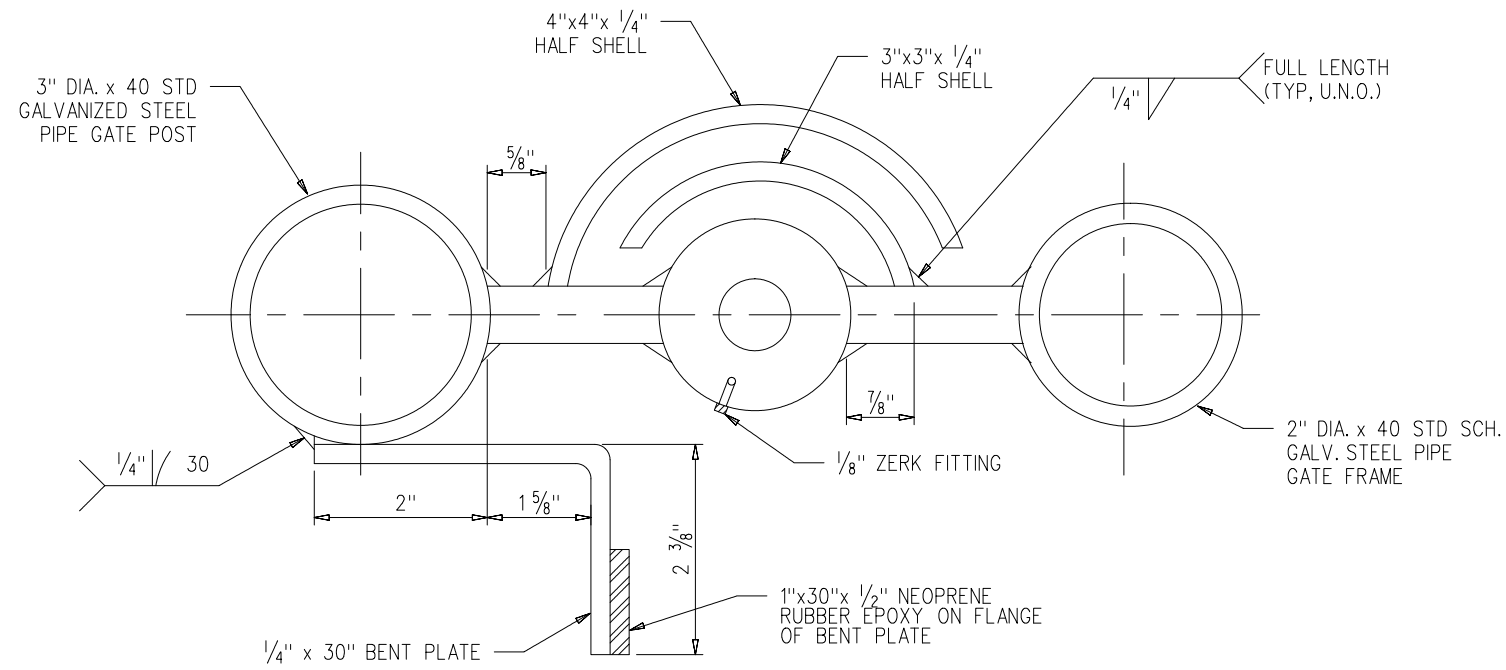
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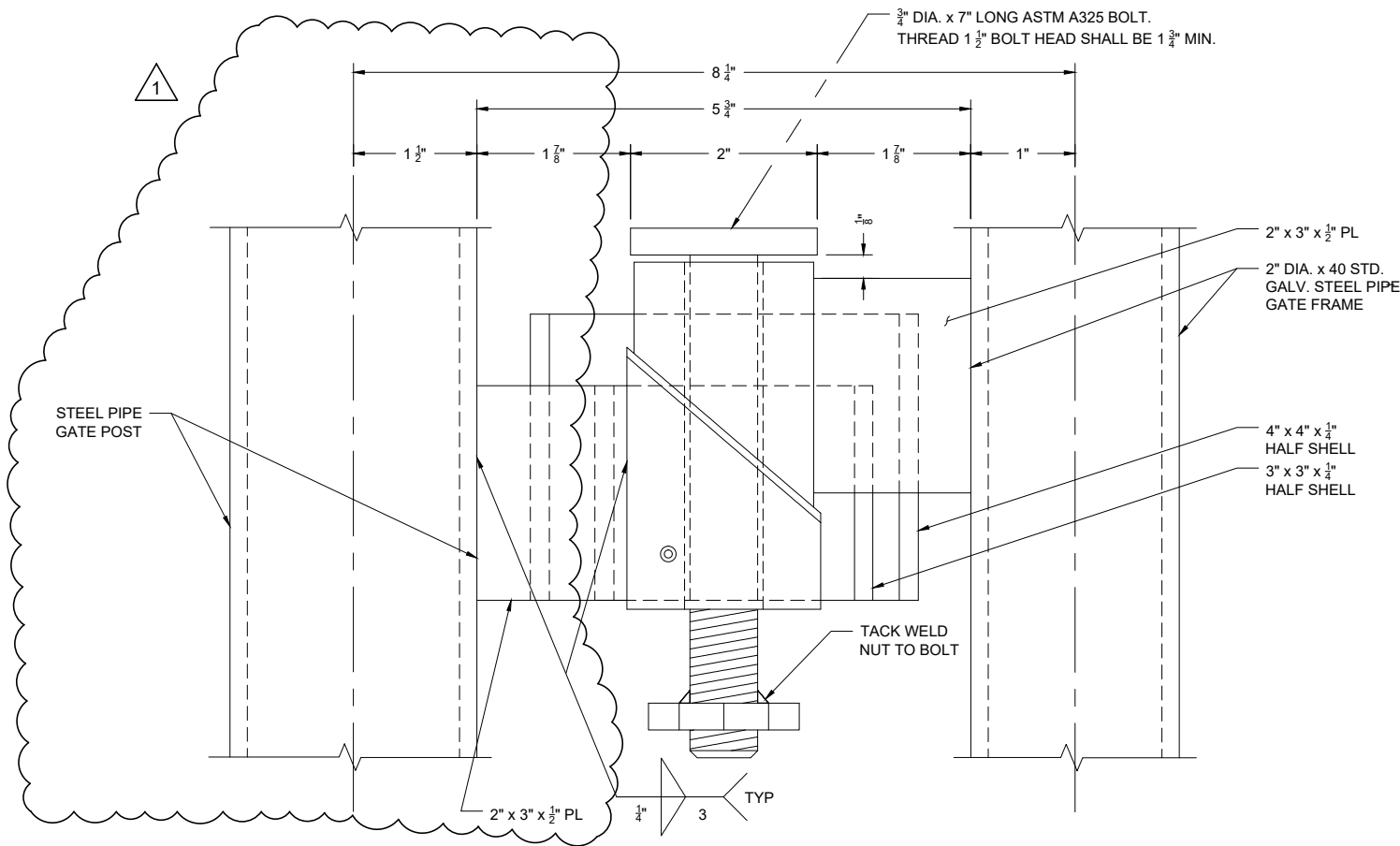
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ENGINEERING STANDARD DRAWINGS
PEDESTRIAN SWING GATE DETAILS
DRAWING NO. ESD-4002-01
DRAWING SHEET NO. 1 OF 2
SCALE: NONE
CONTRACT SHEET NO.

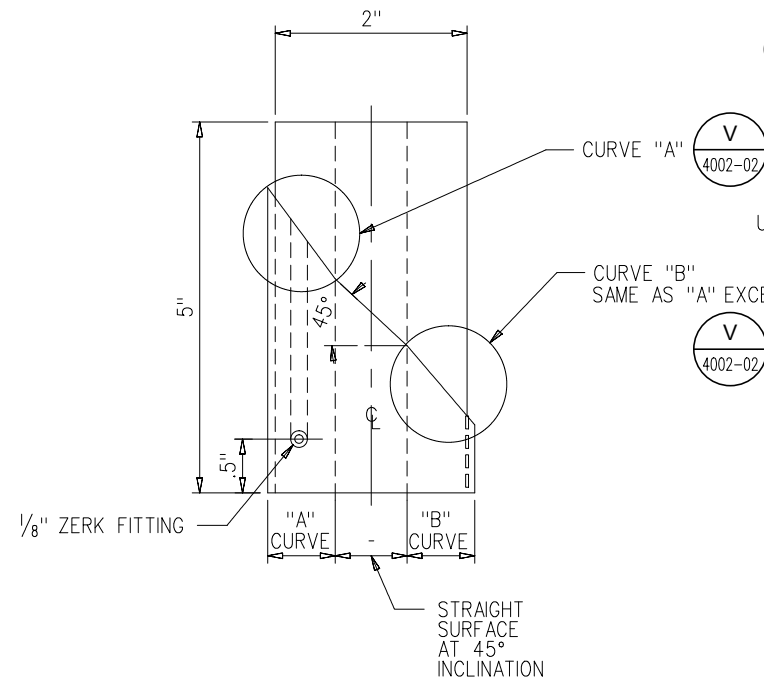
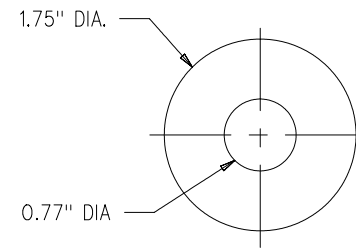


PLAN VIEW

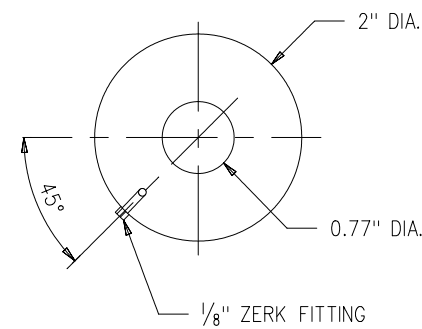


ELEVATION VIEW

T GATE HINGE DETAIL
SCALE = NTS

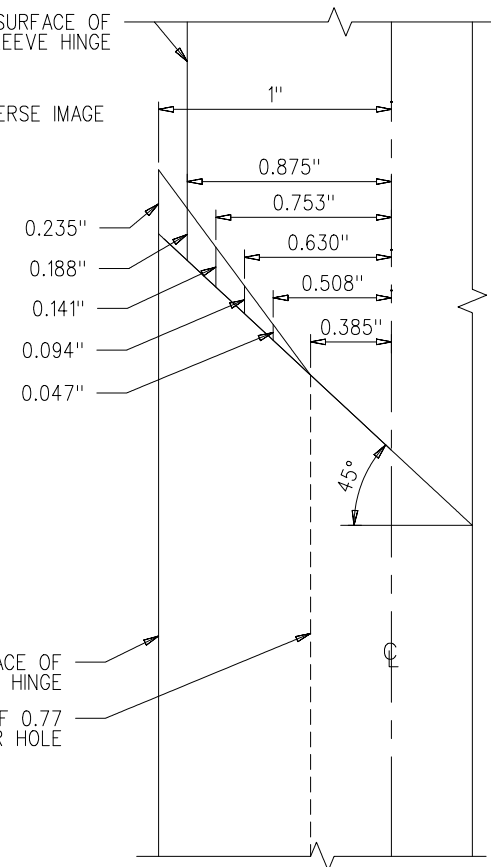


U HINGE SLEEVE DETAILS
SCALE = NTS



OUTER SURFACE OF LOWER SLEEVE HINGE
EDGE OF 0.77 ANGULAR HOLE

V HINGE SLEEVE CURVE DETAIL
SCALE = NTS



NOTE: CURVE "A" SHOWN.
CURVE "B" SAME AS "A"
EXCEPT REVERSE IMAGE

NOTES:

- HINGE SLEEVE GRADE OF STEEL TO BE ASTM A441 HARDENED STEEL.
- ALL HINGE SLEEVE DIMENSIONS ARE IN INCHES UNLESS OTHERWISE NOTED.
- HINGE SLEEVE MACHINING SHALL BE PRECISION TO THE NEAREST THOUSANDTH OF AN INCH (0.001)
- ROTATING CURVED CONTACT SURFACES OF HINGE SLEEVE, (CURVE SURFACES "B" AND "A") TO BE POLISHED.
- CONSTRUCT AND ASSEMBLE ONE GATE FOR TESTING, THE ENGINEER TO WITNESS GATE TESTING AND APPROVE GATE OPENING AND CLOSING OPERATION BEFORE ANY WORK DONE AT ANY PEDESTRIAN CROSSING. IF GATE OPERATION IS NOT APPROVED BY ENGINEER, MODIFY GATE AND GATE HINGE AS NECESSARY AND REPEAT TESTING UNTIL GATE OPERATION IS APPROVED BY ENGINEER.
- FORCE REQUIRED TO OPERATE SHALL BE 22N (5 LBS) MAX.

REVISIONS		SH	DB	DATE	DESCRIPTION	DES.	ENG.
1	9/23/22				ADD MISSING INFO TO GATE HINGE DETAIL		

<p>△ REVISIONS</p> <p>1 9/23/22 ADD MISSING INFO TO GATE HINGE DETAIL</p>	<p>DRAWN RAILPROS</p> <p>CHECKED A. ANDERSON</p> <p>RECOMMENDED B. SMITH</p> <p>DATE SEPT 2022</p>	<p>SANDAG/CTD ENGINEERING STANDARDS ARE INTENDED FOR SANDAG/CTD APPROVED USES ONLY. FOR NON-SANDAG/CTD APPROVED USES: SANDAG/CTD SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF THE DATA OR INFORMATION CONTAINED HEREIN. THE SELECTION AND USE OF THESE STANDARDS IS THE SOLE RESPONSIBILITY OF THE USER AND SHOULD NOT BE USED WITHOUT CONSULTING A REGISTERED PROFESSIONAL ENGINEER. ALL WARRANTIES AND REPRESENTATIONS OF ANY KIND ARE DISCLAIMED. ANYONE MAKING USE OF THIS INFORMATION AGREES THAT IT ASSUMES ALL LIABILITY ARISING FROM SUCH USE. NO PART OF THESE STANDARDS SHOULD BE REPRODUCED OR DISTRIBUTED IN ANY FORM OR BY ANY MEANS WITHOUT THE PRIOR WRITTEN PERMISSION OF SANDAG/CTD. ALL RIGHTS RESERVED.</p>
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DESIGNER PE STAMP

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ENGINEERING STANDARD DRAWINGS

PEDESTRIAN SWING GATE DETAILS

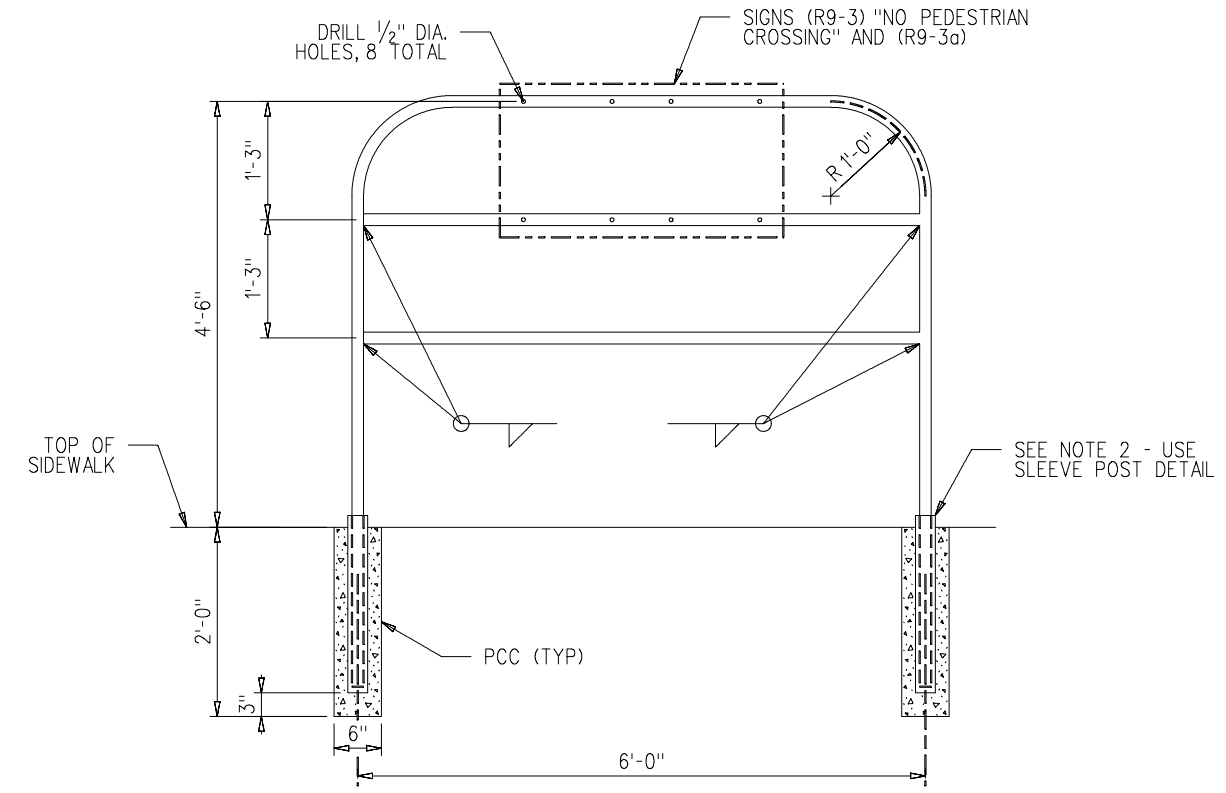
DRAWING NO. ESD-4002-02

DRAWING SHEET NO. 2 OF 2

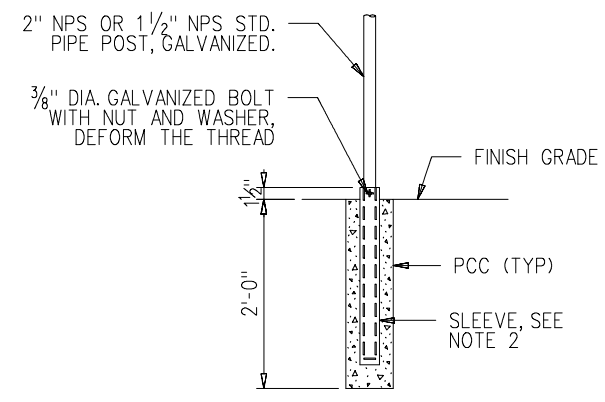
SCALE: NONE

CONTRACT SHEET NO.

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TYPE 1

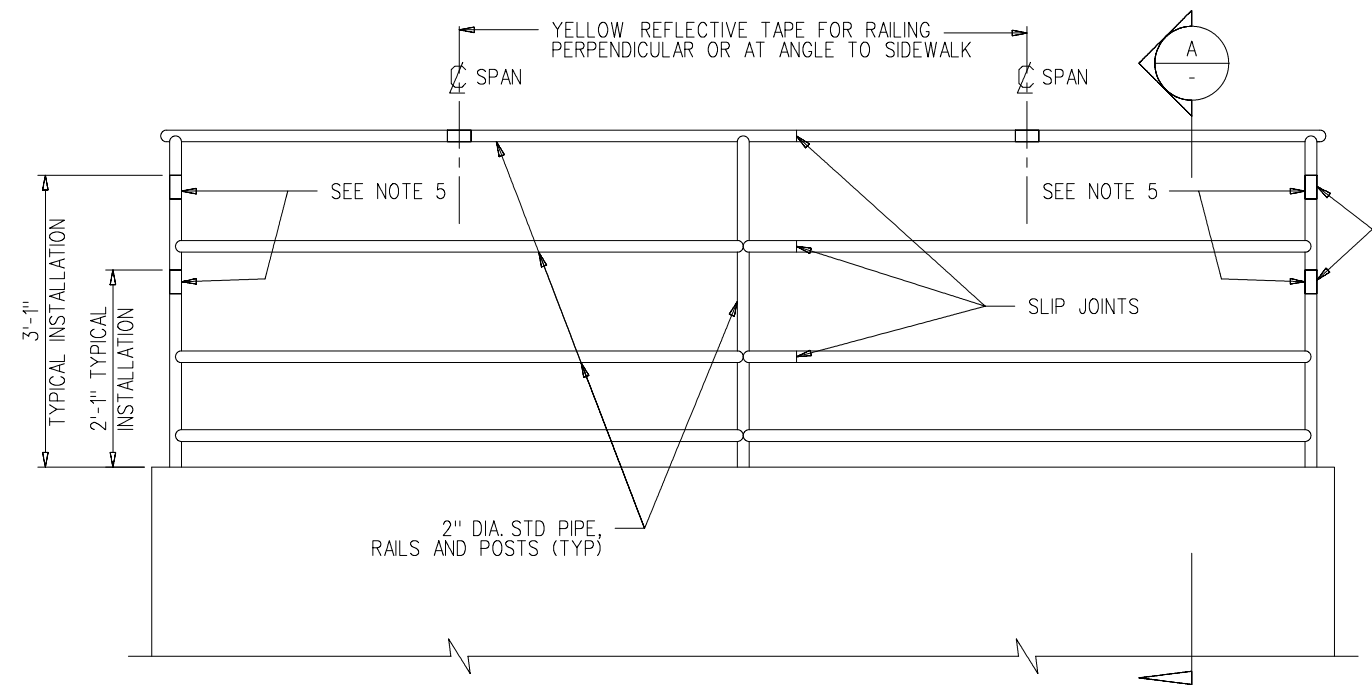


SLEEVE POST DETAIL

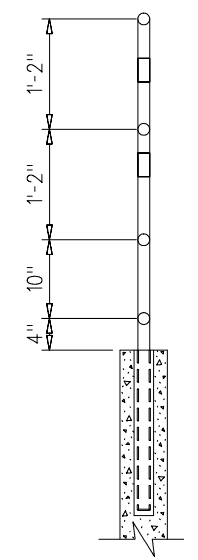
NOTES:

1. PEDESTRIAN BARRICADE SHALL BE AS PER CALTRANS PLAN ES-7P AND AS MODIFIED HEREWITH.
2. PIPE POST TO BE SET 1'-6" BACK FROM FACE OF CURB UNLESS OTHERWISE SPECIFIED.
3. STEEL SLEEVE TO BE CONSTRUCTED WITH A DIAMETER OF 1/4" LARGER THAN POST. WALL THICKNESS OF SLEEVE TO BE SAME AS POST OR LARGER.
4. CONTRACTOR MAY SUBMIT ALTERNATIVE DETAILS FOR APPROVAL BY SCRRA.
5. FOR MINIMUM PIPE DIAMETERS AND WALL THICKNESS REFER TO ASTM A6M.
6. THE LOCATION OF BARRICADE SHALL BE COORDINATED WITH LOCAL AUTHORITY.
7. THE "CROSS ONLY AT CROSSWALKS" (R9-2) AND "USE CROSSWALK" (R9-3b) SIGNS AS PER CA MUTCD SHALL BE INSTALLED AT APPROPRIATE LOCATIONS AS NEEDED.

PEDESTRIAN BARRICADE DETAILS



TYPE B



SECTION A

METAL HAND RAILING DETAILS

NOTES:

1. METAL HAND RAILING SHALL BE AS PER APWA STANDARD PLAN 600-2, "TYPE B" AND AS MODIFIED HEREWITH.
2. RAILS, POSTS AND PICKETS SHALL BE GALVANIZED STEEL PIPE.
3. MAXIMUM SPACING OF POSTS SHALL BE 8'-0" ON STRAIGHT ALIGNMENTS, AND 6'-0" ON CURVED ALIGNMENTS WITH LESS THAN 30' RADIUS. MAKE SPACING UNIFORM BETWEEN CHANGES IN ALIGNMENTS.
4. WELDS SHALL BE SLOT OR FILLET WELDS EQUAL TO THICKNESS OF PIPE. WELD ALL JOINTS ALL AROUND.
5. INSTALL HIGH VISIBILITY YELLOW REFLECTIVE TAPE 3" x 3".

REV.	DATE	DESCRIPTION	DES.	ENG.

REVISIONS	DRAWN RAILPROS
	CHECKED B. SMITH
	RECOMMENDED B. SCHMITH
	DATE 10/08/15

DESIGNER PE STAMP

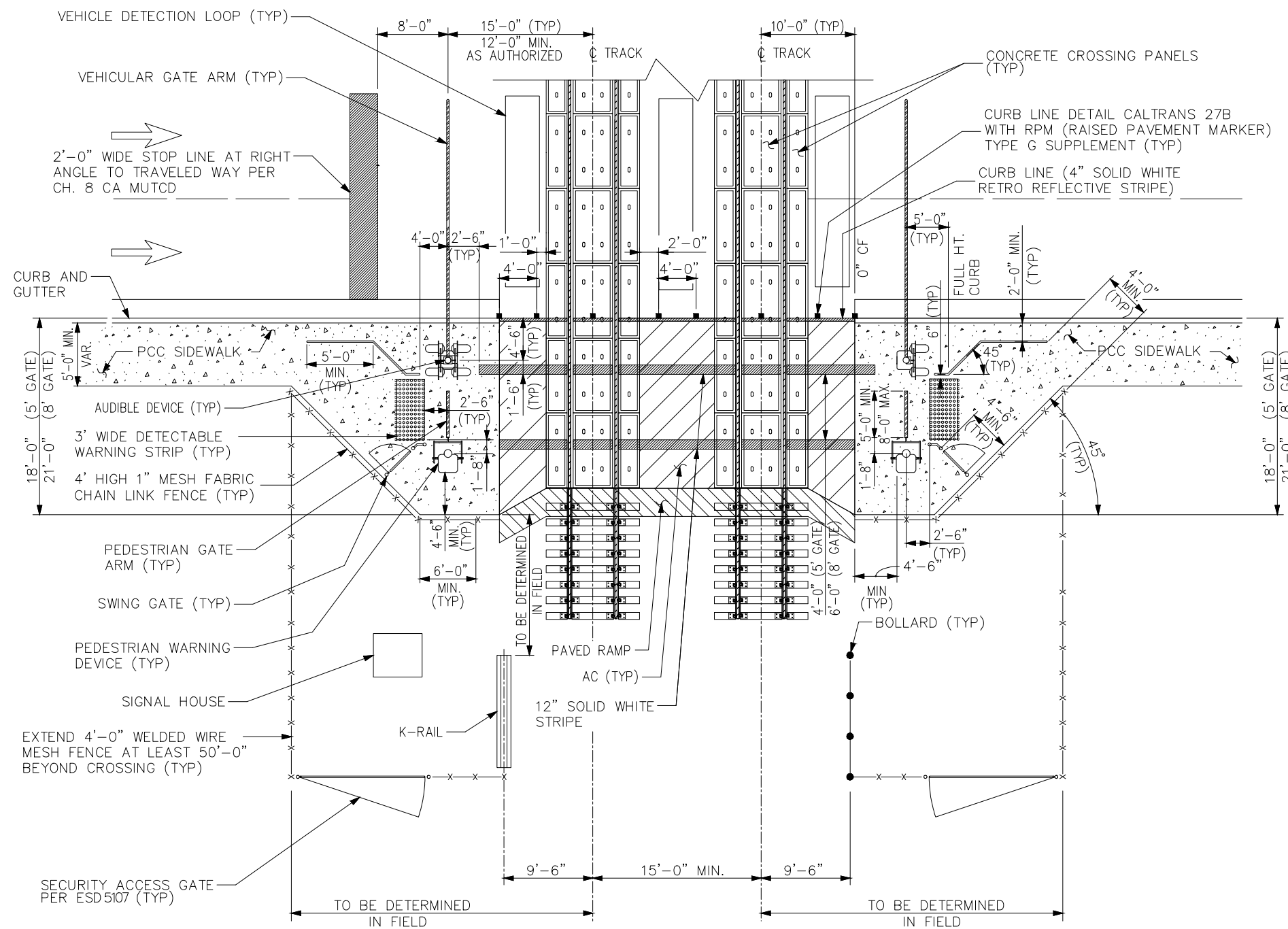
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ENGINEERING STANDARD DRAWINGS

PEDESTRIAN BARRICADE AND METAL HAND RAILING DETAILS






DRAWING NO.	ESD-4005
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	



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2. FOLLOW CALIFORNIA MUTCD FOR STRIPING, SIGNING, AND OTHER TRAFFIC WARNING DEVICES.
3. REFER TO THE FOLLOWING FOR ADDITIONAL DESIGN INFORMATION:
 - a. ENGINEERING STANDARD ES4201 FOR CONCRETE PANELS AND PAVED END RAMP.
 - b. ENGINEERING STANDARD ESD-5101 FOR INTER-TRACK FENCE.
 - c. ENGINEERING STANDARD ESD-5107 FOR SECURITY ACCESS GATE, K - RAIL AND BOLLARDS.
 - d. ENGINEERING STANDARD ESD-4001 FOR TRACK SECTIONS AND ASPHALT CONCRETE PAVEMENT DETAILS.
 - e. ENGINEERING STANDARD ESD-4002 FOR SWING GATE DETAILS.
 - f. ENGINEERING STANDARD ESD-8308 AND ESD-8309 FOR PEDESTRIAN WARNING DEVICES.
 - g. CALTRANS STANDARD PLANS A20A FOR TRAFFIC LINES (STRIPES) AND A88A FOR DETECTABLE WARNING SURFACE (STRIPE), SQUARE GRID PATTERN.
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5. PREEMPTION AND TOTAL WARNING TIME SHALL TAKE INTO CONSIDERATION THE PEDESTRIAN WALKING DISTANCE AND CLEARANCE TIME AND SHALL MEET THE REGULATIONS AND REQUIREMENTS OF THE AMERICAN WITH DISABILITIES ACT (ADA) AND CA MUTCD.
6. THE WIDTH OF SIDEWALKS ON THE SIDE OF THE GATES OPPOSITE THE RAIL SHALL BE A MINIMUM OF FIVE (5) FEET.

LEGEND

-  STRIPING
-  DETECTABLE WARNING STRIP
-  CONCRETE
-  AC PAVEMENT (SHOWN FOR PEDESTRIAN FACILITY ONLY)
-  DIRECTION OF TRAFFIC

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RAILPROS
 CHECKED
B. SMITH
 RECOMMENDED
B. SCHMITH
 DATE 02/19/016
 DESIGNER PE STAMP



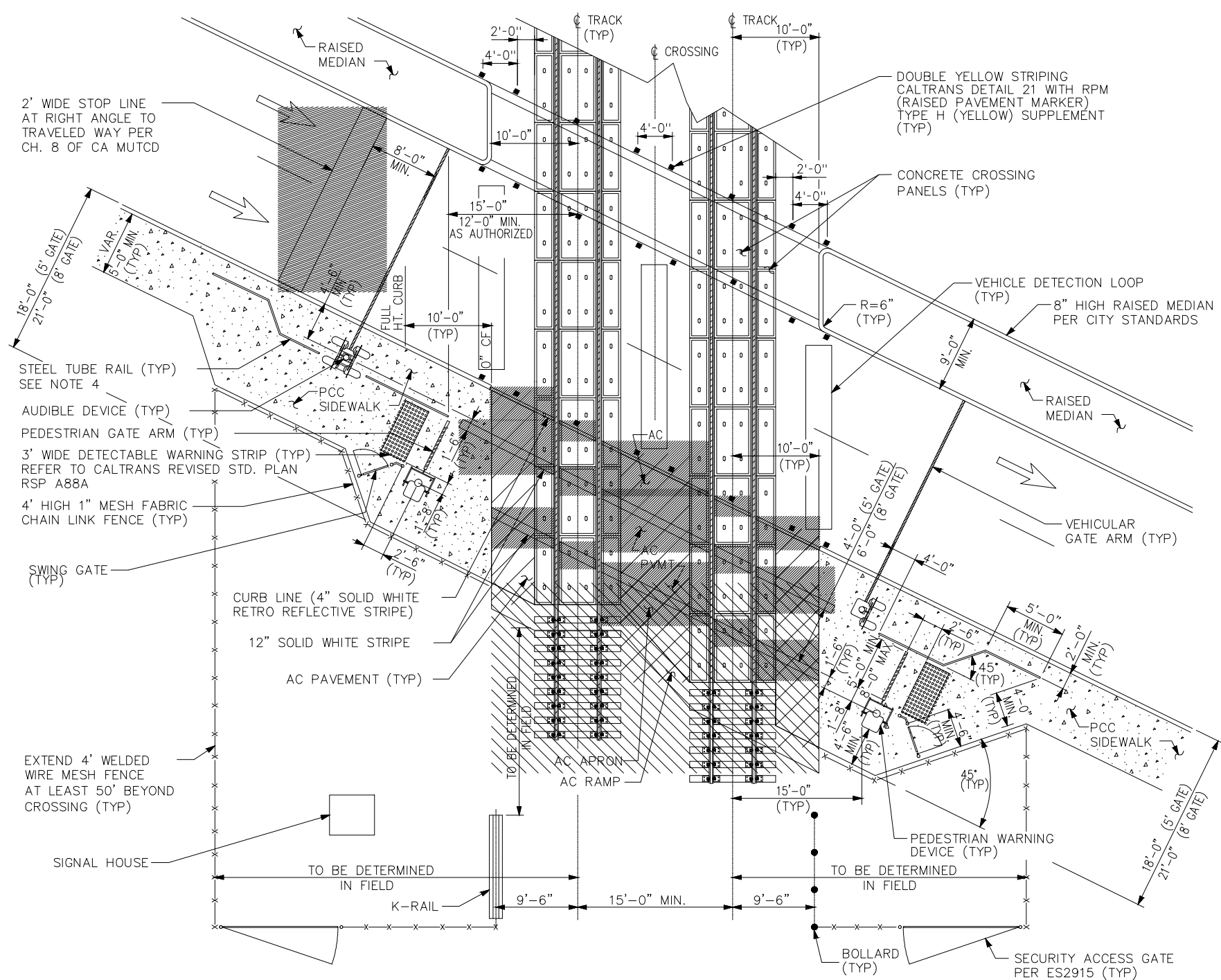
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ENGINEERING STANDARD DRAWINGS
 PEDESTRIAN FACILITIES AT ACUTE ANGLE VEHICLE
 CROSSING - ENTRANCE / EXIT GATES

DRAWING NO.	ESD - 4012
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	



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 - c. ENGINEERING STANDARD ESD-5107 FOR SECURITY ACCESS GATE, K - RAIL AND BOLLARDS.
 - d. ENGINEERING STANDARD ESD-4001 FOR TRACK SECTIONS AND ASPHALT CONCRETE PAVEMENT DETAILS.
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 6. THE WIDTH OF SIDEWALKS ON THE SIDE OF THE GATES OPPOSITE THE RAIL SHALL BE A MINIMUM OF FIVE (5) FEET.

LEGEND

	STRIPING
	DETECTABLE WARNING STRIP
	CONCRETE
	AC PAVEMENT (SHOWN FOR PEDESTRIAN FACILITY ONLY)
	DIRECTION OF TRAFFIC

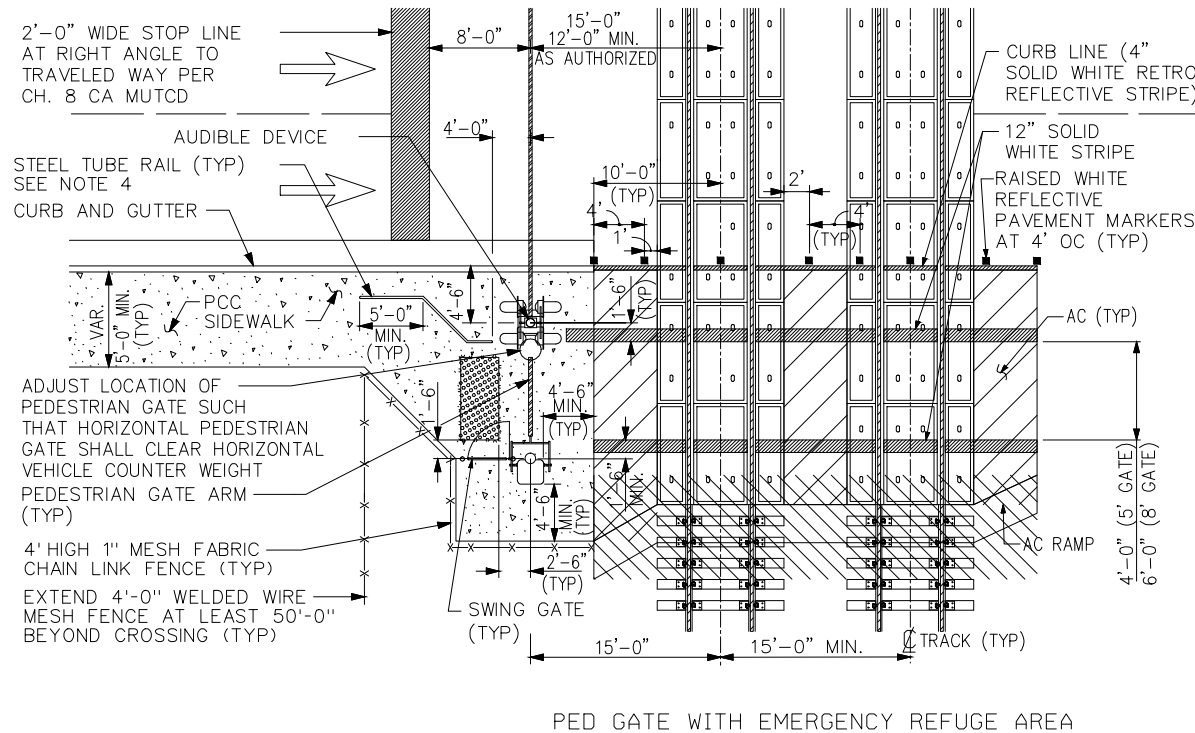
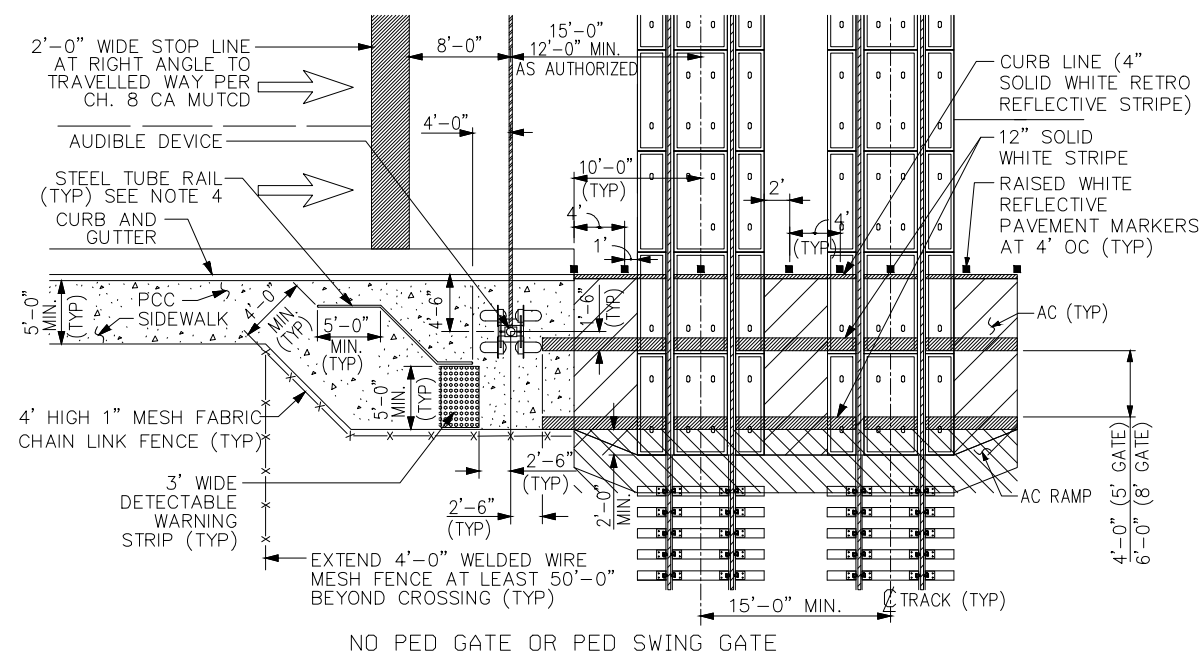
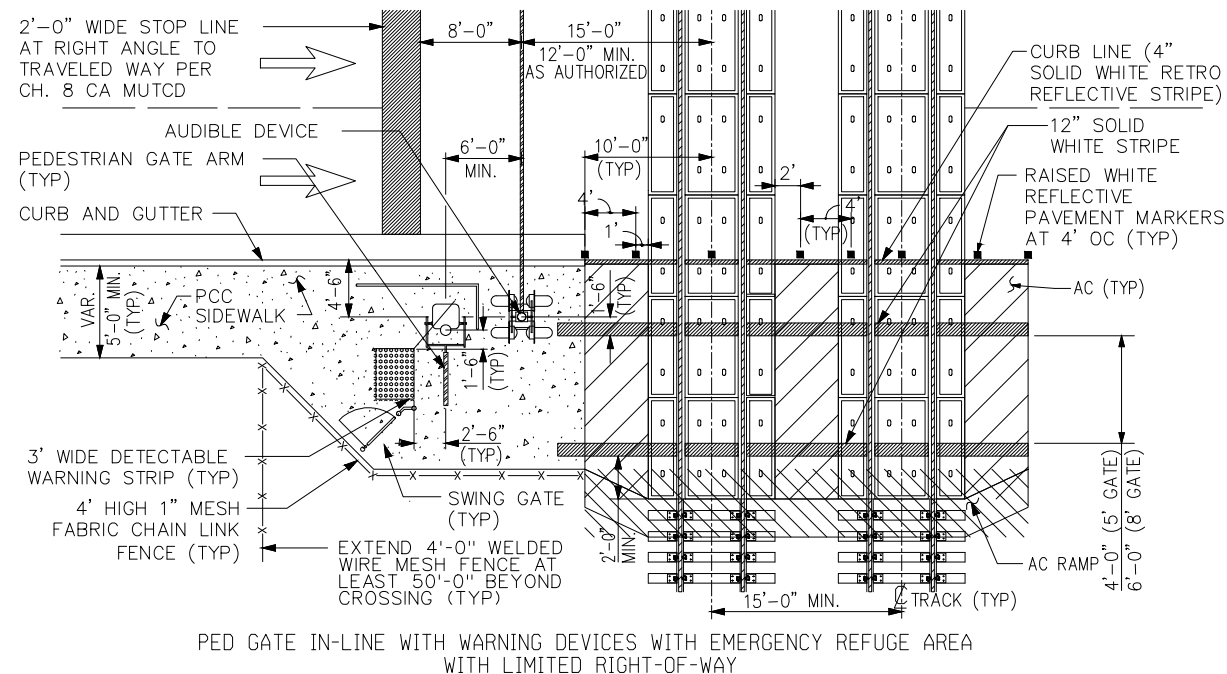
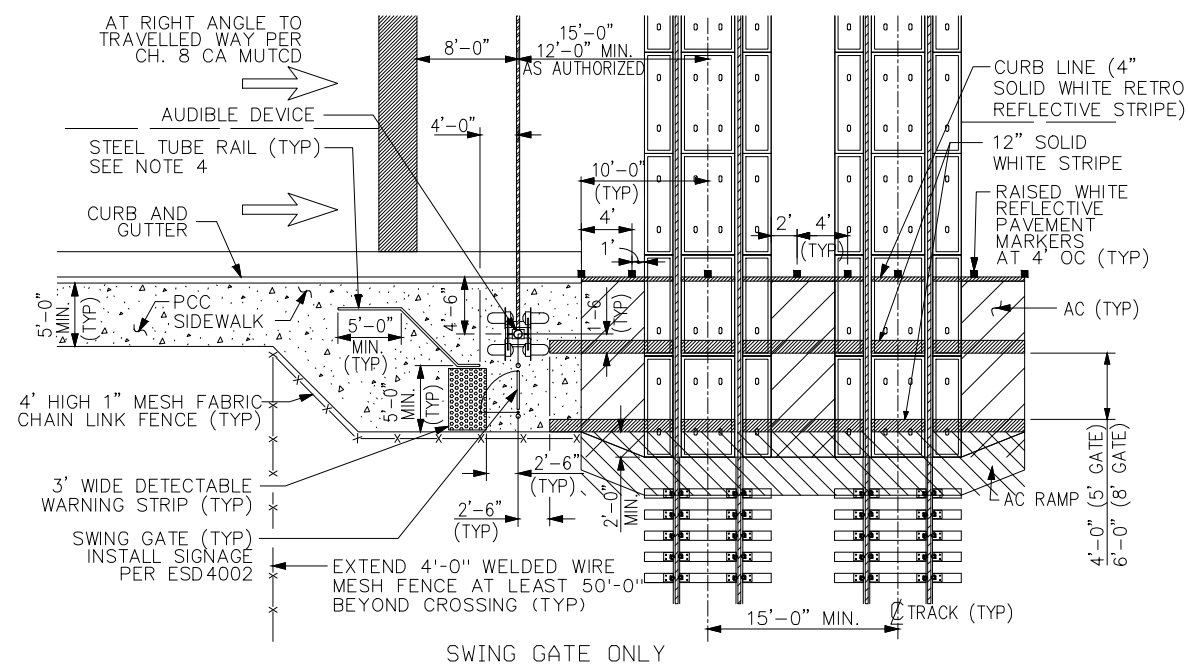
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REV.	DATE	DESCRIPTION	DES.	ENG.

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	CHECKED B. SMITH <i>MSB</i>
	RECOMMENDED B. SCHMITH <i>BAS</i>
	DATE 02/19/016
	DESIGNER PE STAMP



ENGINEERING STANDARD DRAWINGS PEDESTRIAN FACILITIES AT ACUTE ANGLE VEHICLE CROSSING - ENTRANCE / EXIT GATES	DRAWING NO. ESD - 4014
	DRAWING SHEET NO. 1 OF 1
	SCALE: NONE
	CONTRACT SHEET NO.



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REVISIONS

DRAWN
RAILPROS

CHECKED
B. SMITH *BS*

RECOMMENDED
B. SCHMITH *BS*

DATE 02/19/016

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ENGINEERING STANDARD DRAWINGS

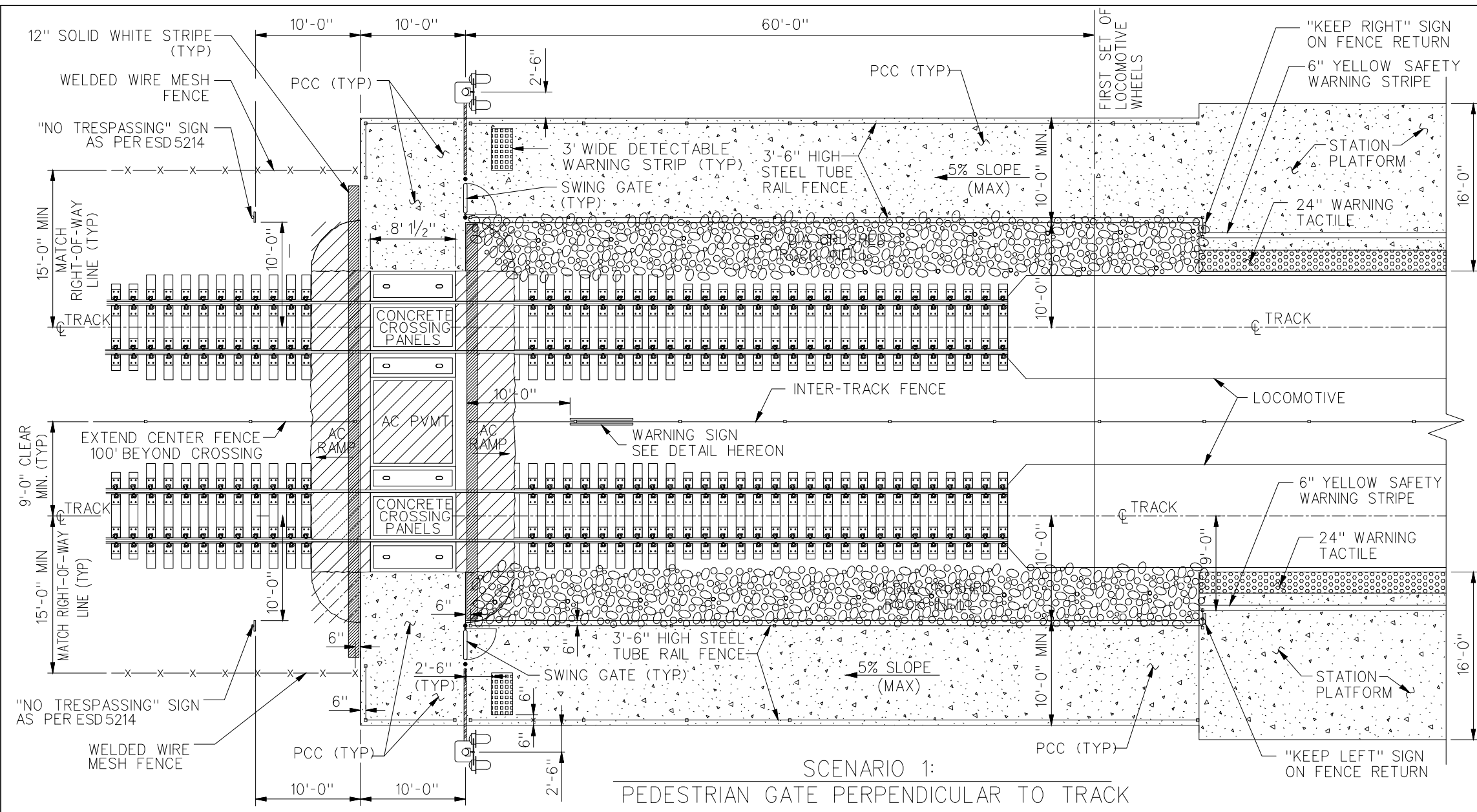
TYPICAL PEDESTRIAN TREATMENT DETAILS

DRAWING NO. ESD - 4017

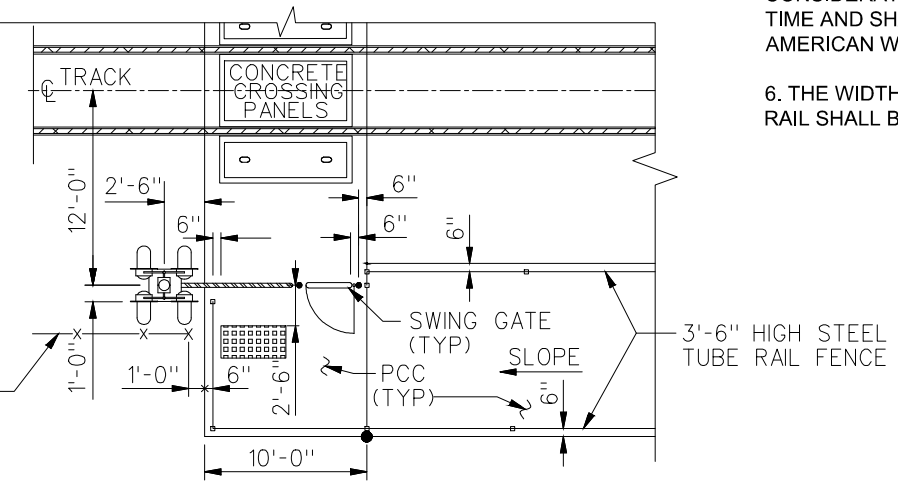
DRAWING SHEET NO. 1 OF 1

SCALE: NONE

CONTRACT SHEET NO.



SCENARIO 1:
PEDESTRIAN GATE PERPENDICULAR TO TRACK



SCENARIO 2:
PEDESTRIAN GATE PARALLEL TO TRACK



WARNING SIGN DETAIL
SCALE: NONE

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REV.	DATE	DESCRIPTION	DES.	ENG.

REVISIONS

DRAWN RAILPROS

CHECKED B. SMITH

RECOMMENDED B. SCHMITH

DATE 02/19/016

DESIGNER PE STAMP

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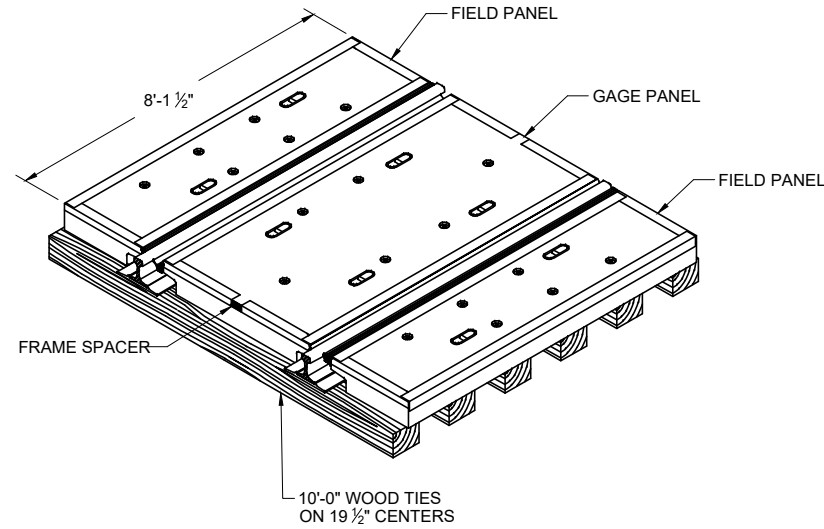
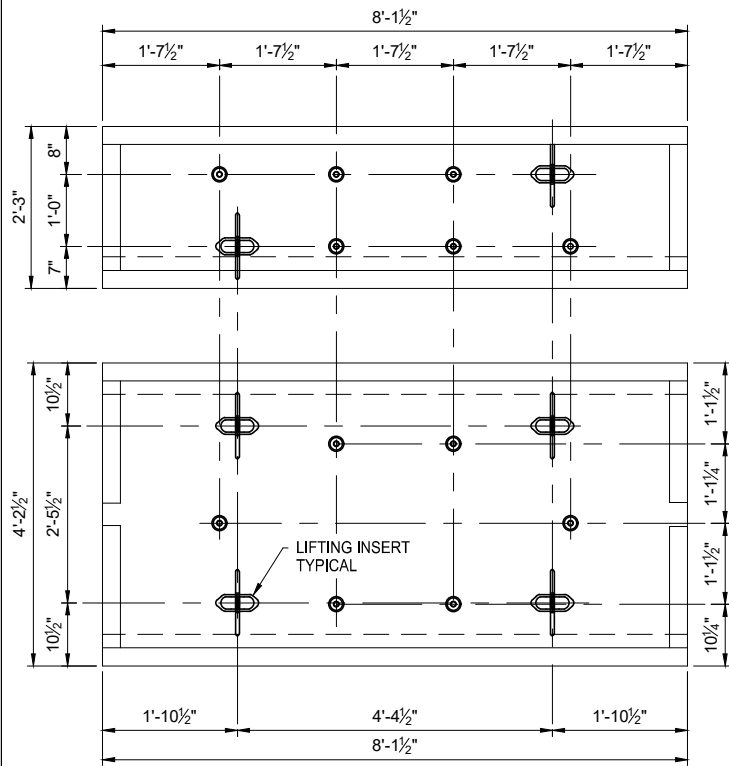
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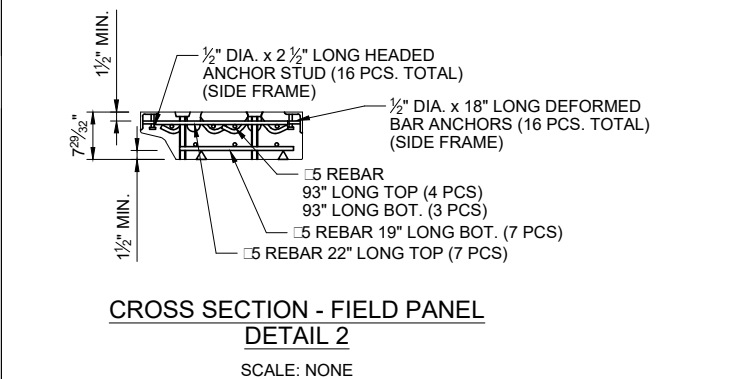
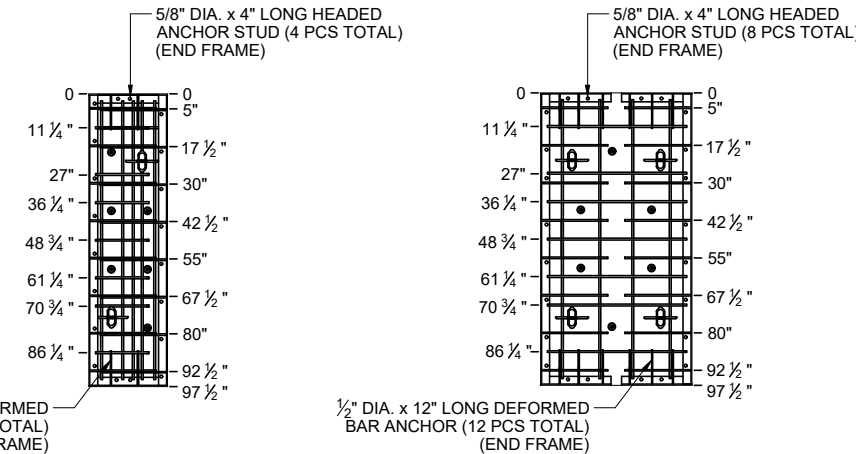
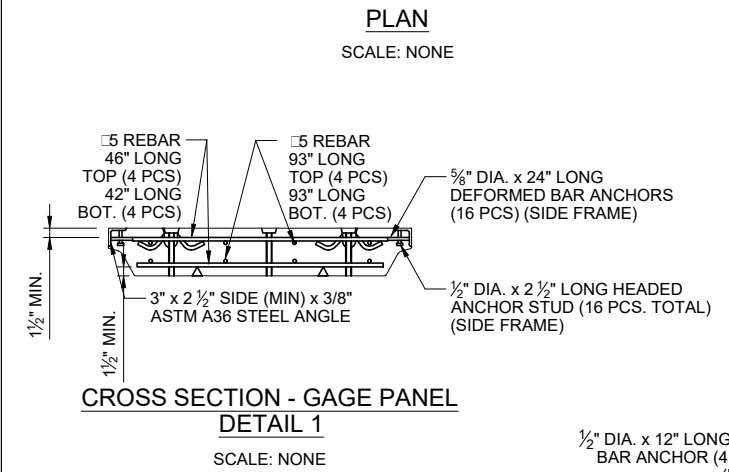
ENGINEERING STANDARD DRAWINGS

PEDESTRIAN CROSSING ADJACENT TO STATION

DRAWING NO.	ESD - 4021
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	



RAIL SIZE	PANEL HEIGHT	GAGE PANEL WEIGHT	FIELD PANEL WEIGHT
136	7 7/8"	3125 LBS.	1675 LBS.



NOTE:
CONCRETE COMPRESSIVE STRENGTH SHALL BE AS FOLLOWS:
28 DAYS \square 6000PSI MINIMUM.
SHIPMENT \square 4000PSI MINIMUM.
REMOVAL FROM FORMS \square 2500PSI MINIMUM.

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MATERIAL SPECIFICATIONS:

- STRUCTURAL STEEL SHALL CONFORM TO ASTM A-36 SPECIFICATIONS. WELDING TO BE PER AWS CODE.
- ALL EXPOSED STEEL TO RECEIVE ONE COAT PRIMER.
- END ANGLES FOR GAGE PANEL SHOULD HAVE 3" GAP TO IMPROVE SHUNT RESISTANCE.
- REINFORCING MATERIAL AND CLADDING TO BE CONSTRUCTED TO MEET SHUNTING REQUIREMENT.
- A NON-CONDUCTIVE SPACER TO BE ATTACHED TO GAGE FRAME CLADDING ON ENDS OF PANELS SHOULD EXTEND BEYOND CONCRETE + 1/8", -0" TO IMPROVE MATCH WITH ADJACENT PANELS.
- REINFORCING STEEL SHALL CONFORM TO CURRENT ASTM A-615 SPECIFICATION, GRADE 60. IF ANY WELDING OF REINFORCEMENT STEEL IS REQUIRED, MATERIAL SHALL CONFORM TO ASTM A-706 SPECIFICATION, GRADE 60.
- CONCRETE MATERIAL MIXING, PLACING AND CURING TO BE IN ACCORDANCE WITH PCI "MANUAL FOR QUALITY CONTROL: PRECAST AND PRESTRESSED CONCRETE." MANUAL 115, EDITION 4.
- CEMENT SHALL HAVE NO MORE THAN 0.6% TOTAL ALKALI CONTENT.
- MAXIMUM WATER/CEMENT RATIO \square 0.40 (BY WEIGHT). AIR ENTRAINMENT \square 2% \pm 1% IN PLASTIC CONCRETE. SLUMP 3" MAXIMUM.
- TOP SURFACE SHALL BE NON-CRACK DESIGN AND IS TO BE SEALED TO PREVENT ION MIGRATION DUE TO SALTING.
- CURING SHALL FOLLOW THE RECOMMENDATIONS AND PROCEDURES FOR PCI IN 4TH EDITION DIVISION 4.
- 3/16" WEEP/INSPECTION HOLES SHALL BE PLACED EVERY TWO FEET MINIMUM ALONG THE TOP OF THE STEEL FRAME ALONG A LINE 3/4" FROM OUTSIDE EDGE.
- FLANGWAY FILLER TO BE PERMANENTLY PRE-ATTACHED AND HAVE THE FOLLOWING PROPERTIES:
 - TENSILE STRENGTH (ASTM D412) 850 PSI MIN.
 - ULTIMATE ELONGATION (ASTM D412) 400% MIN.
 - TEAR STRENGTH (ASTM D624) AT 25 DEGREES CELSIUS, 150-PLI MIN.
 - HARDNESS (ASTM D2240) 75 \pm 5% SHORE A.
 - COMPRESSION SET (ASTM 395 METHOD B) 100 DEGREES CELSIUS FOR 70 HOURS, 45% MAX.
 - ACCELERATED AGING TEST (ASTM D573) 70 HOURS AT 100 DEGREES CELSIUS MUST NOT EXHIBIT A REDUCTION IN PROPERTIES BY GREATER THAN 20%.
 - ONE RESISTANCE TEST (ASTM D518) MUST HAVE NO CRACKING AFTER EXPOSURE TO 50-PPHM ONE FOR 96 HOURS AT 40 DEGREES CELSIUS.
 - VOLUME RESISTIVITY \square 1 X 10 (OHM-CM) OR GREATER (ASTM D257), BUT USING 18% NaCl/WATER SOLUTION IN PLACE OF DISTILLED WATER FOR 168 HOURS AT 25 DEGREES CELSIUS AND TESTED AT 500 VDC.
 - ELECTRICAL RESISTANCE: MINIMUM RESISTANCE 10 MEGA OHMS MEASURED AT 500 VDC.
 - LOW TEMPERATURE BRITTLENESS (ASTM D2137) AT - 40 DEGREES CELSIUS.
 - A SAMPLE SELECTION OF THE FLANGWAY FILLER MATERIAL SHALL BE PHYSICALLY TESTED BY APPLYING A LATERAL FORCE OF 10 LB./IN. AT 50 DEGREES CELSIUS. THE MAXIMUM LATERAL DISPLACEMENT OF THE TEST IS NOT TO EXCEED 1/4". TEST RESULTS MUST BE SUBMITTED FOR APPROVAL OF THE ENGINEER.
 - MANUFACTURER TO DESIGN THE PRE-ATTACHED FLANGWAY FILLER TO ALLOW FOR REMOVAL OF PANELS FOR MAINTENANCE WITHOUT DAMAGING THE FLANGWAY FILLER OR ANY OTHER COMPONENTS DESIGNED TO HOLD PANEL TOGETHER.
 - SIDEWALKS AND FLANGWAY WIDTHS MUST COMPLY WITH AMERICANS WITH DISABILITIES ACT AND CALIFORNIA TITLE 24 REQUIREMENTS.

FINISH:

- ALL RECESSES AND MINOR CONCRETE SPALLS ARE TO BE FILLED AND FINISHED TO THE PANEL DIMENSIONS USING THE APPROVED BONDING AGENT AND REPAIR MATERIAL. SURFACE OF THE REPAIRED AREA IS TO MATCH THE COLOR AND TEXTURE OF THE SURROUNDING AREAS.
- THE DRIVING SURFACE IS TO HAVE A LIGHT BROOM FINISH OR AS APPROVED BY THE ENGINEER. THE ADDITION OF WATER TO THE CONCRETE SURFACE FINISH DURING CASTING IS NOT PERMITTED.

GENERAL:

- THE MANUFACTURER SHALL BE ISO 9000 OR AAR M-1003 CERTIFIED. ALL TESTING PERSONNEL SHALL BE A MINIMUM OF ACI LEVEL 1 CERTIFIED.
- THE FABRICATOR SHALL BE RESPONSIBLE FOR LOADING AND PROPERLY SECURING ALL PRECAST CONCRETE MEMBERS FOR SHIPMENT.
- THE MANUFACTURER SHALL WARRANT THE PRODUCT FOR A MINIMUM OF TEN YEARS AGAINST DEFECTS IN MATERIALS AND WORKMANSHIP.
- MANUFACTURER TO PERMANENTLY MARK EACH PANEL WITH A CONCRETE IMPRINT FOR SIZE OF RAIL, WEIGHT OF PANEL, MANUFACTURER'S I.D., MONTH/DAY/YEAR OF MANUFACTURE AND CROSSING TYPE. END OF EACH PANEL TO BE STENCILED WITH SIZE OF RAIL, WEIGHT OF PANEL AND CROSSING TYPE.
- DEVIATIONS FROM THESE REQUIREMENTS MAY BE APPROVED BY THE ENGINEER.

NOTES:

- GRADE CROSSING GAGE PANELS SHALL BE SHUNT RESISTANT.
- PANELS SHALL BE STEEL CLAD USING 3" X 3" X 3/8" ANGLE.
- PANELS MUST BE MANUFACTURED FOR APPROPRIATE WEIGHT OF WELDED RAIL WITH "PANDROL" TYPE PLATES AND FASTENERS (OR APPROVED EQUAL).
- PANELS SHOULD BE INSTALLED ON 10 FT., FLAT, GOOD QUALITY TIMBER RAILROAD TIES. TIE SPACING THROUGH CROSSING AREA SHOULD BE 19 1/2" CENTERS.
- REFER TO MANUFACTURER'S INSTALLATION AND HANDLING MANUAL FOR INSTALLATION INSTRUCTIONS.
- EXCAVATION FOR CROSSING SUBGRADE OR SIGNAL CONDUITS SHALL NOT OCCUR UNTIL NCTD SIGNAL LINES AND PUBLIC UTILITY UNDERGROUND LINES HAVE BEEN LOCATED BY THEIR OWNERS.
- POSITIVE DRAINAGE IS KEY TO GOOD GRADE CROSSINGS. A 6" ASPHALT UNDERLAYMENT WILL BE PLACED OVER COMPACTED SUBGRADE (95% RELATIVE COMPACTION) AND CROWNED IN THE CENTER TO DRAIN TO BOTH SIDES OF THE TRACK STRUCTURE WITH A 2% SLOPE TOWARDS THE 6" PERFORATED PIPES. THE ASPHALT LAYER SHOULD EXTEND 10 FT. BEYOND THE ENDS OF THE CROSSING ALONG THE TRACK
- BALLAST SECTION UNDER CROSSING TIES TO BE A MINIMUM OF 12" OF APPROVED CRUSHED ROCK BALLAST.
- SIGNAL CONDUITS AND SPARES ARE TO BE PLACED IN TRENCHES. AT CROSSINGS WHERE RAISED MEDIAN ISLANDS ARE TO BE INSTALLED, ONE OF THE FOUR CONDUITS (ON BOTH SIDES OF THE TRACK) IS TO BE TERMINATED AND CAPPED IN THE CENTER OF CROSSING. ALL SIGNAL CONDUITS AND SPARES ARE TO BE CAPPED ON BOTH ENDS. SIGNAL CONDUITS ARE TO EXTEND A MINIMUM OF 8 FT. BEYOND TRAVELED ROADWAY OR SIDEWALK AREA.
- PERFORATED DRAIN LINES TO BE PLACED IN SUCH A MANNER AS TO PROVIDE GOOD DRAINAGE IN CROSSING. CARRYING WATER AWAY FROM THE STREET AND TRACK AREAS. THE DRAIN LINES SHALL BE CONNECTED TO AN EXISTING STORM DRAIN, IF AVAILABLE. IF NOT, SUITABLE SWALE OR DITCH SHALL BE INSTALLED TO CARRY THE WATER A SUFFICIENT DISTANCE FROM THE CROSSING.
- CONCRETE CROSSING PANELS WITH PRE- ATTACHED RUBBER -FILLERS TO BE INSTALLED PER MANUFACTURERS INSTRUCTIONS.
- 10 FT. WOOD TIES MUST BE OF GOOD QUALITY AND FLAT. CHECK TIES FOR HIGH AND LOW SPOTS, USING EITHER A LEVEL OR A STRING. TIES MUST NOT BE ADDED. REMOVE THE LOW TIES. ON EITHER END OF THE CROSSING 24 - 10 FT. TRANSITION TIES AT 19 1/2" CENTERS, WITH "PANDROL" TYPE PLATES, OR APPROVED EQUAL, SHOULD BE INSTALLED BEYOND THE END OF THE CROSSING PANELS. INSTALL WOOD TIES WITH HEART DOWN.
- NO RAIL JOINTS ALLOWED IN CROSSING UNLESS APPROVED BY THE ENGINEER.
- PANELS SHOULD BE PLACED IN A WIDTH SUITABLE TO INCLUDE THE SIDEWALK ON BOTH SIDES OF THE STREET AND 3 FT. MINIMUM BEYOND BACK OF SIDEWALK.
- BALLAST IN THE CRIB AREA IS TO BE APPROXIMATELY 3/4" LOWER THAN THE TOP OF THE TIE. REMOVE ANY DEBRIS AND STONES FROM THE TOP OF THE TIES.
- PLACE THE FIRST PANELS IN THE CENTER OF THE CROSSING. PLACE PANELS WORKING TOWARDS EITHER END. DOING THIS WILL MINIMIZE ANY MISTAKES IN THE TIE SPACING.
- TIES ARE TO BE FIELD - DRILLED FOR LAG SCREWS. DO NOT OVERDRIVE THE LAG SCREW.
- HIGHWAY APPROACHES TO CROSSING SHOULD BE 3 TO 8 FT. WIDE TO ALLOW FOR PROPER COMPACTION USING A VIBRATORY ROLLER. PLATE COMPACTORS ARE NOT SUFFICIENT FOR HIGHWAY APPLICATIONS. LIFTS OF ASPHALT SHOULD NOT BE MORE THAN 3" THICK. THE FINAL LIFT OF ASPHALT SHOULD BE 1/2" TO 3/4" HIGHER THAN THE TOP OF THE CROSSING SURFACE (ASPHALT WILL SETTLE). DO NOT ALLOW HIGHWAY TRAFFIC OVER THE CROSSING UNTIL THE FINAL LAYER OF ASPHALT HAS BEEN COMPACTED.
- RECOMMENDED MINIMUM WIDTH OF CUT IS 20' FOR SINGLE TRACK. SEE ES2006-02 FOR TYPICAL SECTIONS.
- THE HOT MIX ASPHALTIC CONCRETE (HMAC) UNDERLAYMENT SHALL EXTEND TEN FEET PAST THE END OF THE CONCRETE PANEL IN EACH DIRECTION PER ASTM DSST. D1557-91 90% COMPACTION.
- ALL HOLES AND BLOCKOUTS WITHIN SIDEWALK AREA SHALL BE FILLED FLUSH WITH EPOXY TO MATCH THE COLOR OF THE SURROUNDING AREA.
- ASPHALT TRAINMAN'S RAMPS, IN COMPLIANCE WITH CPUC GENERAL ORDERS, INCLUDING GO 118 AND 26-D, SHALL BE PROVIDED.
- ALL SIDEWALKS AND PEDESTRIAN PATHS OF TRAVEL MUST COMPLY WITH AMERICANS WITH DISABILITIES ACT AND CALIFORNIA TITLE 24 REQUIREMENTS.

TOLERANCES:

- OUT OF SQUARE 3/16" (MEASURED ALONG THE DIAGONAL).
- LENGTH, WIDTH AND THICKNESS: \pm 1/8"
- THE BOTTOM SURFACE, WHICH WILL BE IN CONTACT WITH THE TIES, SHALL NOT UNDULATE IN ANY DIRECTION MORE THAN 3/32". SEE SPECIAL TESTING NOTE 3.
- REINFORCEMENT PLACEMENT SHALL BE \pm 3/4" HORIZONTAL, \pm 1/8" VERTICAL.

SPECIAL TESTING:

- TWICE ANNUALLY, VENDORS SHALL SUBMIT (VIA AN INDEPENDENT TESTING LABORATORY TO NCTD) THE FOLLOWING TEST ON THE APPROVED MIX DESIGN:
 - ASTM C666 FREEZE/THAW
 - ASTM C227 MORTAR BAR METHOD
 - ASTM C1260 AT TOTAL ALKALI BURDEN \square 0.06%
- GAGE PANELS SHALL BE DESIGNED WITH SHUNT
- RESISTANT FEATURES IN ORDER TO PROVIDE A MINIMUM ELECTRICAL RESISTANCE.
- A REPRESENTATIVE SAMPLE OF PANELS SHALL BE CHECKED PERIODICALLY FOR BOTTOM FLATNESS BY USING A STRAIGHT EDGE CALIBRATED TO WITHIN \pm 1/32" AND A TAPER GAGE AS FOLLOWS:
 - 8 POSITIONS OF FLATBAR (----) CHECK FLATNESS AT
 - EACH POSITION USING TAPER GAGE.

REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN RAILPROS	
CHECKED B. SMITH	<i>B.S.</i>
RECOMMENDED B. SCHMITH	<i>B.S.</i>
DATE	03/03/16

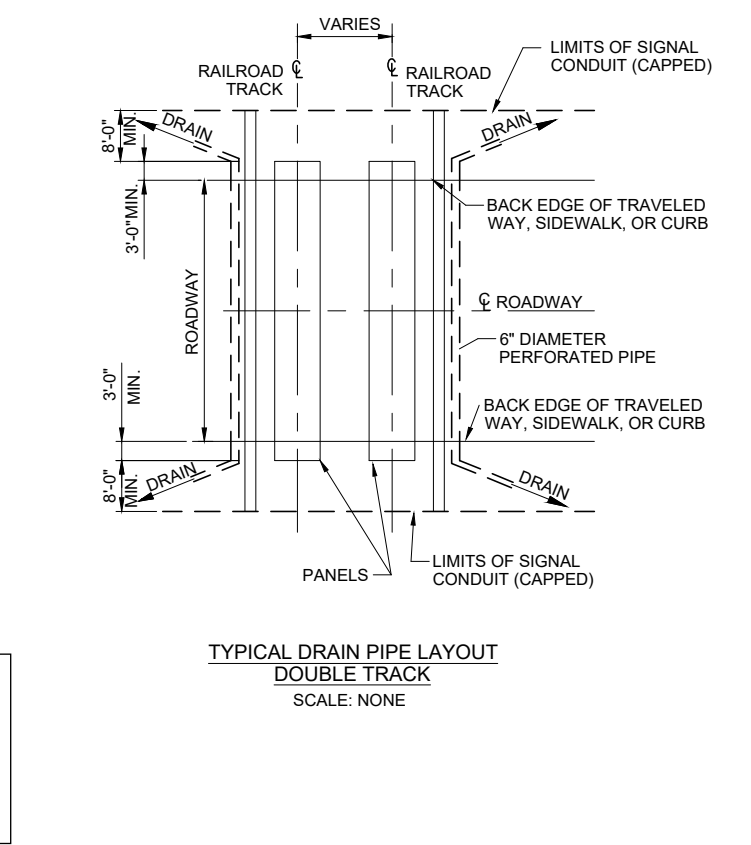
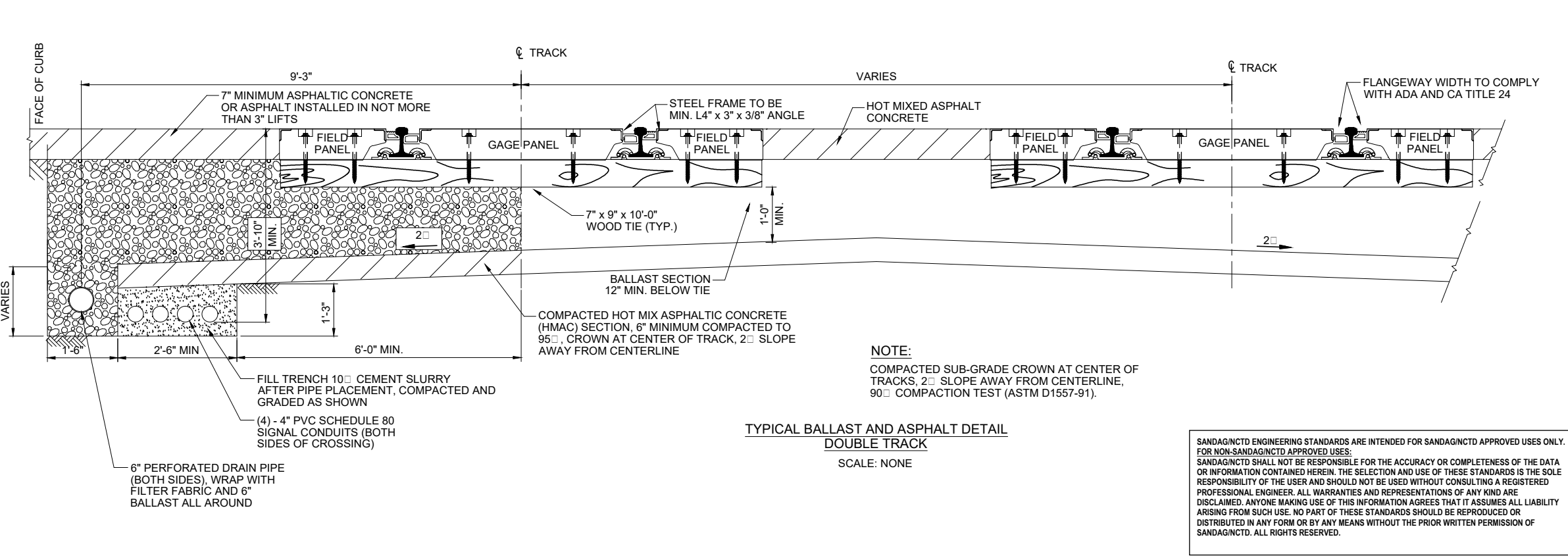
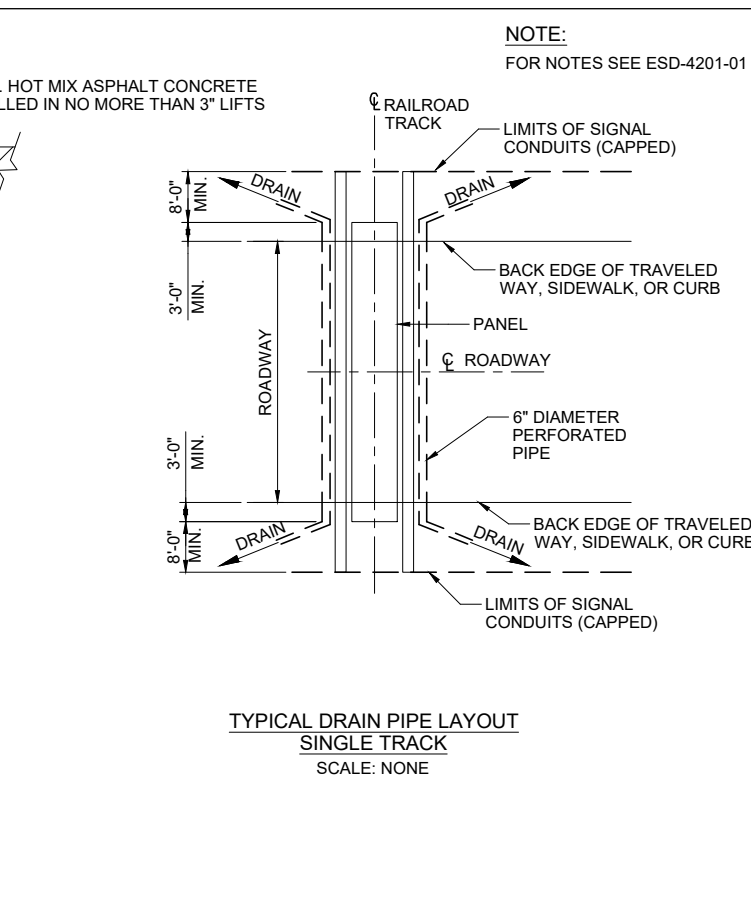
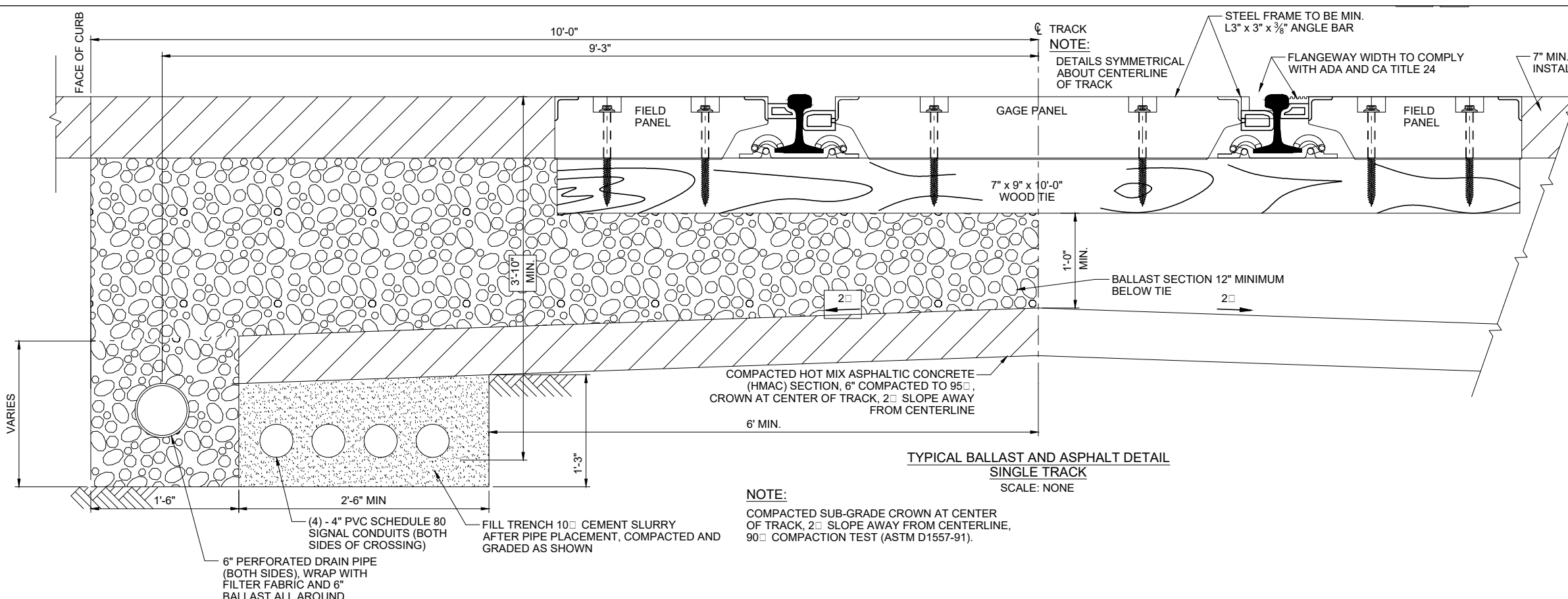
DESIGNER PE STAMP

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ENGINEERING STANDARD DRAWINGS
PRECAST CONCRETE PANELS FOR HIGHWAY - RAIL
GRADE CROSSING

DRAWING NO.	ESD-4201-01
DRAWING SHEET NO.	1 OF 3
SCALE:	NONE
CONTRACT SHEET NO.	



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REV.	DATE	DESCRIPTION	DES.	ENG.

REVISIONS	DRAWN RAILPROS
	CHECKED B. SMITH <i>BS</i>
	RECOMMENDED B. SCHMITH <i>BS</i>
	DATE 2/14/18
	DESIGNER PE STAMP

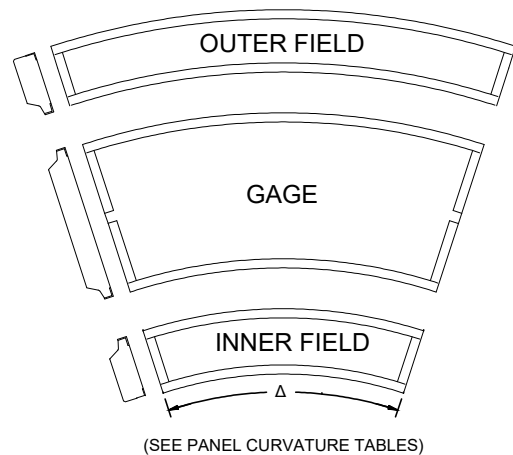
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ENGINEERING STANDARD DRAWINGS

PRECAST CONCRETE PANELS FOR HIGHWAY - RAIL
GRADE CROSSING DETAILS

DRAWING NO.	ESD-4201-02
DRAWING SHEET NO.	2 OF 3
SCALE:	NONE
CONTRACT SHEET NO.	



CURVATURE TABLE (ON CONCRETE TIES)

DEGREE OF CURVE	RADIUS IN FEET	Δ	CURVE PANEL □
2° OR LESS	2865'	0.20°	NO
3°	1910'	0.30°	YES
4°	1433'	0.40°	YES
5°	1146'	0.50°	YES
6°	955'	0.60°	YES
7°	819'	0.70°	YES
8°	717'	0.80°	YES
9°	637'	0.90°	YES
10°	574'	1.00°	YES
11°	522'	1.10°	YES
12°	478'	1.20°	YES
13°	442'	1.30°	YES
14°	410'	1.40°	YES

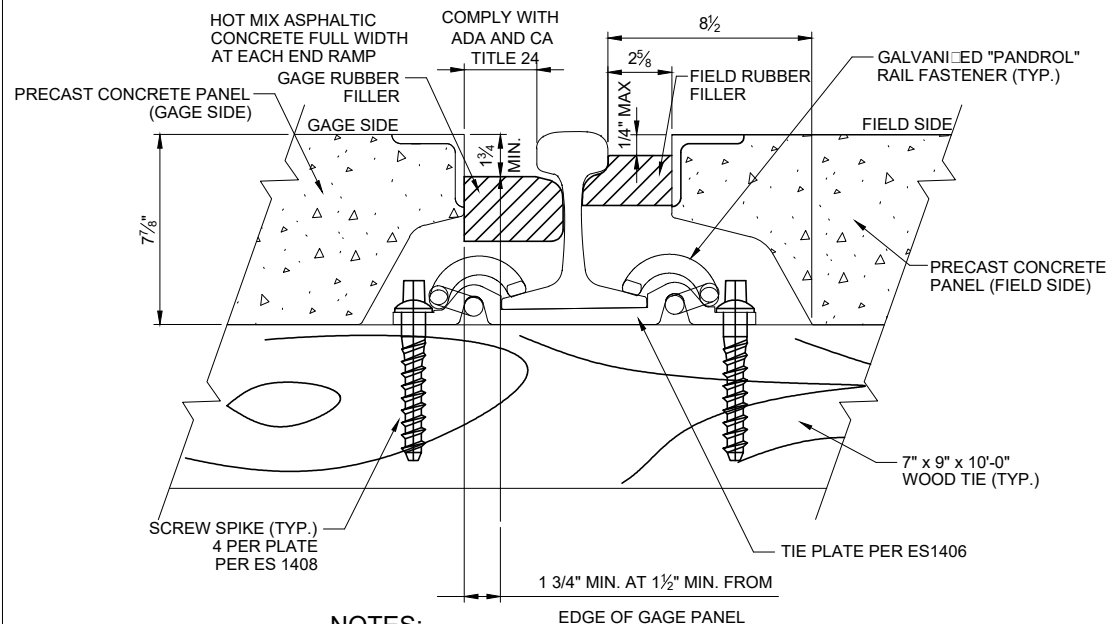
CURVATURE TABLE (ON WOOD TIES)

DEGREE OF CURVE	RADIUS IN FEET	Δ	CURVE PANEL □
3° OR LESS	1910'	0.24°	NO
4°	1433'	0.32°	YES
5°	1146'	0.40°	YES
6°	955'	0.48°	YES
7°	819'	0.56°	YES
8°	717'	0.66°	YES
9°	637'	0.74°	YES
10°	574'	0.82°	YES
11°	522'	0.90°	YES
12°	478'	0.98°	YES
13°	442'	1.06°	YES
14°	410'	1.14°	YES

NOTES:

- A. A CURVED PANEL IS A PANEL THAT IS PIE SHAPED WITH A LONGER OUTER LENGTH THAN THE INNER LENGTH WITH TRUE CURVED OUTER AND INNER STEEL.
- B. CURVED PANELS USE STANDARD REINFORCEMENT SIMILAR TO TANGENT PANEL STANDARD REINFORCEMENT.
- C. LAG HOLES MUST LINE UP WITH THE CENTERLINE OF TIES.

**CURVED CONCRETE PANELS
DETAIL 5**



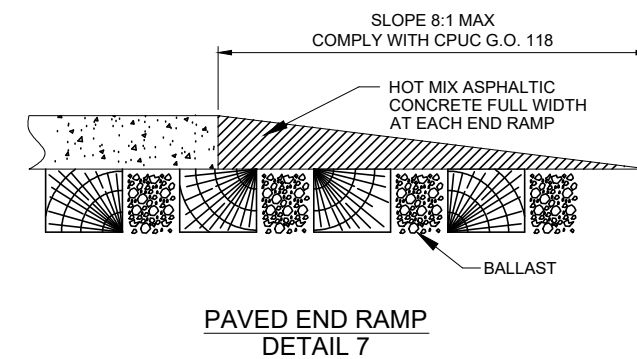
NOTES:

- A. VENDOR SHALL SUBMIT PRE-ATTACHED FLANGWAY FILLER DESIGN AND DETAILS FOR REVIEW AND APPROVAL PRIOR TO FABRICATION.
- B. SHUNT RESISTANT RUBBER FILLERS BOLTED TO STEEL FRAME ON 12" CENTERS.
- C. LAG-DOWN CONCRETE PANELS WITH PRE-ATTACHED RUBBER FILLER COMES IN STANDARD LENGTHS OF 8'-1 1/2".
- D. FLANGWAY FILLER AND FIELD SIDE FILLER MUST COMPLY WITH AMERICANS WITH DISABILITIES ACT AND CALIFORNIA TITLE 24 REQUIREMENTS ALONG THE PATH TRAVELED BY PEDESTRIANS.

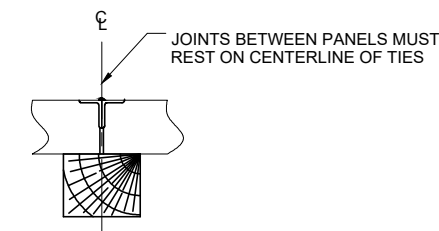
DETAIL 6

NOTE:

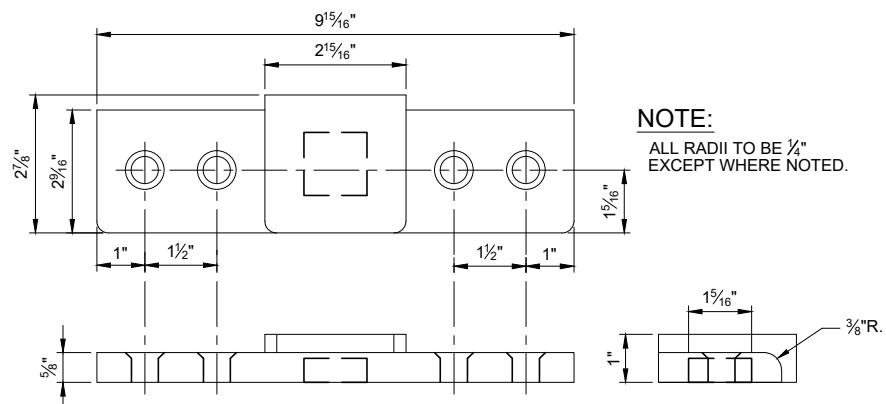
FOR NOTES SEE ESD-4201-01.



**PAVED END RAMP
DETAIL 7**

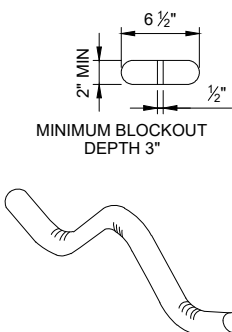


**JOINT BETWEEN PANELS
DETAIL 8**



NOTE:
ALL RADII TO BE 1/4" EXCEPT WHERE NOTED.

**TYPICAL SHUNT SPACER
DETAIL 9**

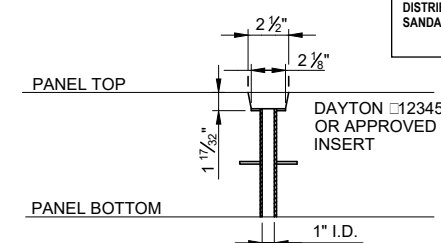


LIFTING INSERTS SHALL BE DESIGNED WITH A MINIMUM SAFETY FACTOR OF 4. PROFESSIONAL ENGINEER STAMPED AND SEALED DETAILS AND DESIGN CALCULATIONS MUST BE SUBMITTED TO THE SANDAG DIRECTOR OF ENGINEERING AND CONSTRUCTION FOR REVIEW AND APPROVAL PRIOR TO FABRICATION.

LIFTING INSERTS SHALL BE MECHANICALLY GALVANIZED OR SIMILARLY PROTECTED AGAINST CORROSION.

LIFTING DEVICES SHALL BE USABLE WITH BURKE OR DAYTON 5-TON CLUTCH SYSTEMS.

**TYPICAL LIFTING DEVICE
AND BLOCKOUT
DETAIL 10**



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**LAG HOLE DETAIL
DETAIL 11**

REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN RAILPROS
CHECKED B. SMITH
RECOMMENDED B. SCHMITH
DATE 10/08/15
DESIGNER PE STAMP

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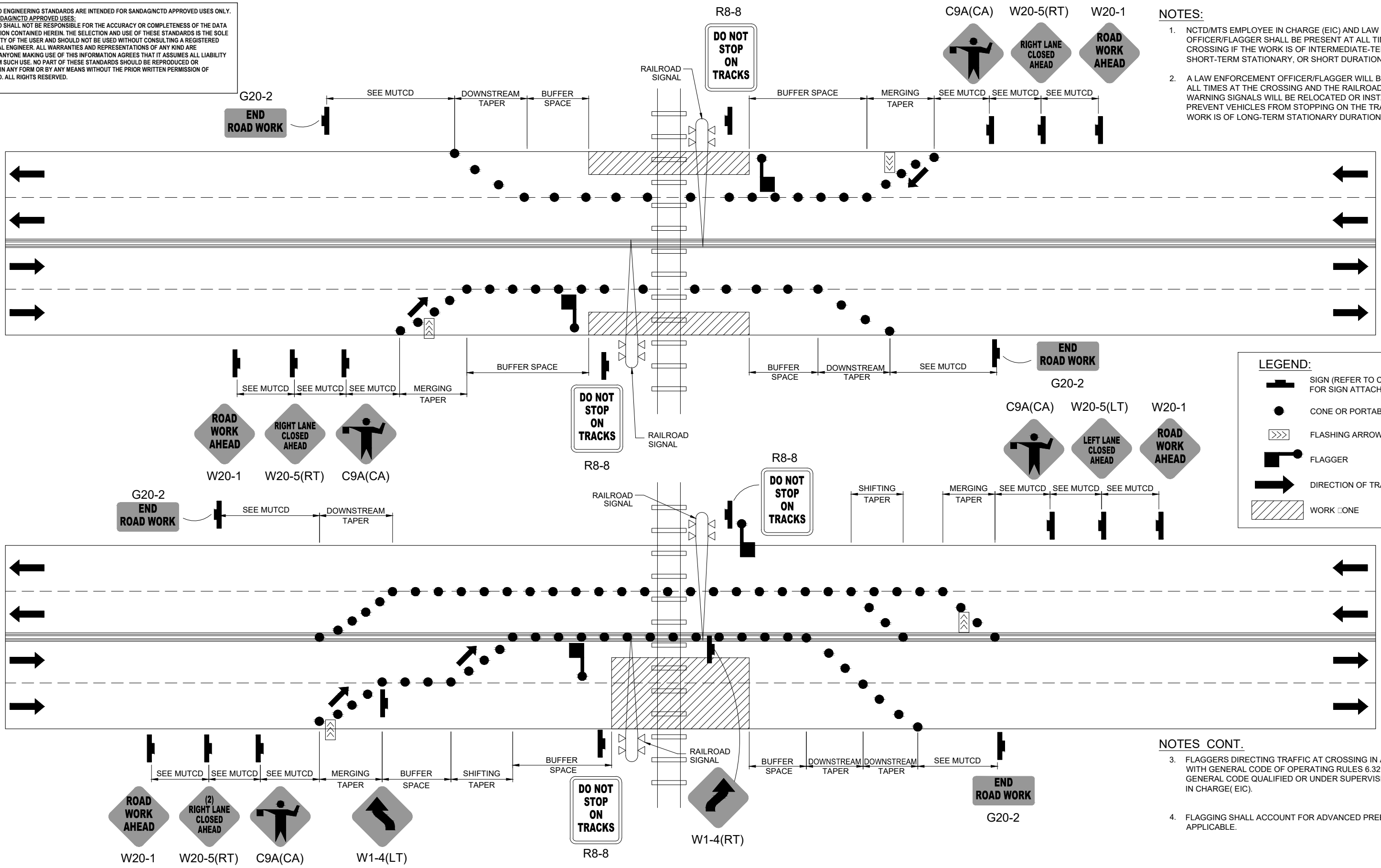
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ENGINEERING STANDARD DRAWINGS
PRECAST CONCRETE PANELS FOR HIGHWAY - RAIL
GRADE CROSSING DETAILS

DRAWING NO. ESD-4201-03
DRAWING SHEET NO. 3 OF 3
SCALE: NONE
CONTRACT SHEET NO.

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- NOTES:**
1. NCTD/MTS EMPLOYEE IN CHARGE (EIC) AND LAW ENFORCEMENT OFFICER/FLAGGER SHALL BE PRESENT AT ALL TIMES AT THE CROSSING IF THE WORK IS OF INTERMEDIATE-TERM STATIONARY, SHORT-TERM STATIONARY, OR SHORT DURATION.
 2. A LAW ENFORCEMENT OFFICER/FLAGGER WILL BE PRESENT AT ALL TIMES AT THE CROSSING AND THE RAILROAD CROSSING WARNING SIGNALS WILL BE RELOCATED OR INSTALLED TO PREVENT VEHICLES FROM STOPPING ON THE TRACK IF THE WORK IS OF LONG-TERM STATIONARY DURATION.



LEGEND:

- SIGN (REFER TO CA MUTCD FOR SIGN ATTACHMENT)
- CONE OR PORTABLE DELINEATOR
- FLASHING ARROW SIGN
- FLAGGER
- DIRECTION OF TRAFFIC
- WORK ZONE

- NOTES CONT.**
3. FLAGGERS DIRECTING TRAFFIC AT CROSSING IN ACCORDANCE WITH GENERAL CODE OF OPERATING RULES 6.32 SHALL BE GENERAL CODE QUALIFIED OR UNDER SUPERVISION OF EMPLOYEE IN CHARGE (EIC).
 4. FLAGGING SHALL ACCOUNT FOR ADVANCED PREEMPTION, WHERE APPLICABLE.

REV.	DATE	DESCRIPTION	DES.	ENG.

REVISIONS

DRAWN
RAILPROS

CHECKED
B. SMITH *BS*

RECOMMENDED
B. SCHMITH *BS*

DATE 10/08/15

DESIGNER PE STAMP

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ENGINEERING STANDARD DRAWINGS

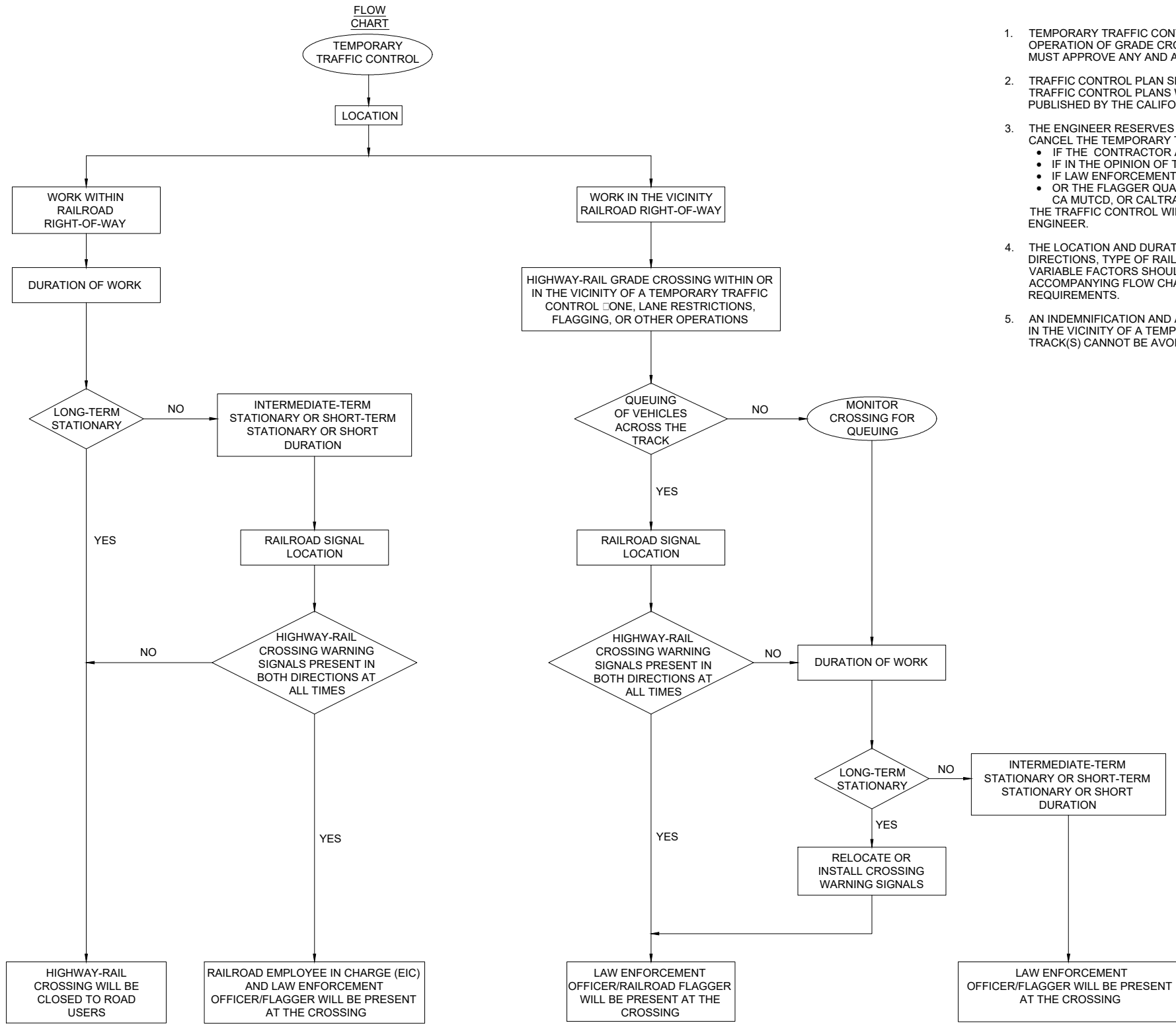
TEMPORARY TRAFFIC CONTROL FLOW CHART

DRAWING NO. ESD-4301-01

DRAWING SHEET NO. 1 OF 2

SCALE: NONE

CONTRACT SHEET NO.



NOTES:

- TEMPORARY TRAFFIC CONTROL PLANNING AND DESIGN SHALL BE COORDINATED WITH THE ENGINEER. IN ORDER TO ASSURE NO DEGRADATION OF THE SAFE OPERATION OF GRADE CROSSINGS AND TO PROVIDE SAFE AND EFFICIENT MOVEMENTS OF TRAINS, VEHICLES, BICYCLISTS AND PEDESTRIANS, THE ENGINEER MUST APPROVE ANY AND ALL TEMPORARY TRAFFIC CONTROL PLANS AND DEVICES.
- TRAFFIC CONTROL PLAN SHALL BE SUBMITTED TO THE ENGINEER FOR ALL ACTIVITIES LOCATED WITHIN OR IN THE VICINITY OF HIGHWAY-RAIL GRADE CROSSINGS. TRAFFIC CONTROL PLANS WILL COMPLY WITH THE CURRENT EDITION OF THE "CALIFORNIA MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" (CA MUTCD) PUBLISHED BY THE CALIFORNIA DEPARTMENT OF TRANSPORTATION (CALTRANS).
- THE ENGINEER RESERVES THE RIGHT TO CLOSE THE CROSSING TO VEHICLE TRAFFIC, REVOKE THE RIGHT OF ENTRY AGREEMENT OR ASK THE CONTRACTOR TO CANCEL THE TEMPORARY TRAFFIC CONTROL
 - IF THE CONTRACTOR ACTIVITY DOES NOT MEET CA MUTCD SECTION 6G-18 REQUIREMENTS
 - IF IN THE OPINION OF THE ENGINEER, THE WORK INTERFERES WITH OR ENDANGERS THE MOVEMENT OF ROAD USERS AND TRAIN TRAFFIC
 - IF LAW ENFORCEMENT OFFICER(S) OR FLAGGER(S) ARE NOT PRESENT AT THE HIGHWAY-RAIL GRADE CROSSING
 - OR THE FLAGGER QUALIFICATIONS, CLOTHING, HAND-SIGNAL DEVICES, FLAGGER PROCEDURES AND FLAGGER STATIONS DOES NOT MEET THE SANDAG/NCTD, CA MUTCD, OR CALTRANS REQUIREMENTS.
 THE TRAFFIC CONTROL WILL BE TERMINATED INSTANTLY AND WORK WILL BE RESUMED AT A LATER DATE AFTER APPROVAL HAS BEEN GRANTED BY THE ENGINEER.
- THE LOCATION AND DURATION OF TEMPORARY TRAFFIC CONTROL, PROTECTION OR LACK OF PROTECTION BY RAILROAD CROSSING WARNING SYSTEM IN BOTH DIRECTIONS, TYPE OF RAIL AND HIGHWAY TRAFFIC AND FLAGGING CAN AFFECT THE DESIGN AND SELECTION OF THE TEMPORARY TRAFFIC CONTROL PLAN. THESE VARIABLE FACTORS SHOULD BE CAREFULLY STUDIED PRIOR TO DESIGNING AND IMPLEMENTING TEMPORARY TRAFFIC CONTROL PLAN. REFER TO THE ACCOMPANYING FLOW CHART THAT PROVIDES A QUICK REFERENCE TO THE RELATIONSHIP BETWEEN RAILROAD CROSSING CONDITIONS AND TRAFFIC CONTROL REQUIREMENTS.
- AN INDEMNIFICATION AND ASSUMPTION OF LIABILITY AGREEMENT WILL BE EXECUTED AND SUBMITTED WHEN HIGHWAY-RAIL GRADE CROSSING EXIST WITHIN OR IN THE VICINITY OF A TEMPORARY TRAFFIC CONTROL ONE, LANE RESTRICTIONS, FLAGGING OR OTHER OPERATIONS AND QUEUING OF VEHICLES ACROSS THE TRACK(S) CANNOT BE AVOIDED.

CHART
MINIMUM RECOMMENDED DELINEATOR AND SIGN PLACEMENT

TRAFFIC ** SPFFD	TAPER LENGTH (EACH LANE)	DELINEATOR SPACING		SIGN SPACING (BETWEEN SIGNS)	BUFFER SPACE (OR FLAGGER STATION)
		TAPER	TANGENT		
25 MPH	150 Ft	25 Ft	50 Ft	150 Ft	55 Ft
30 MPH	200 Ft	30 Ft	60 Ft	200 Ft	85 Ft
35 MPH	250 Ft	35 Ft	70 Ft	250 Ft	120 Ft
40 MPH	350 Ft	40 Ft	80 Ft	350 Ft	170 Ft
x 45 MPH	550 Ft	45 Ft	90 Ft	550 Ft	220 Ft
x 50 MPH	600 Ft	50 Ft	100 Ft	600 Ft	280 Ft
x 55 MPH	1000 Ft	50 Ft	100 Ft	1000 Ft	335 Ft

NOTES: * REFER TO SECTION 8 OF WATCH MANUAL FOR HIGH SPEED SITUATIONS. DISTANCES SHOWN IN PARENTHESIS ARE APPROXIMATE. ** 85TH PERCENTILE SPEED OR AS DIRECTED BY THE ENGINEER.

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REV.	DATE	DESCRIPTION	DES.	ENG.

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B. SMITH *BS*

RECOMMENDED
B. SCHMITH *BAS*

DATE 10/08/15

DESIGNER PE STAMP



ENGINEERING STANDARD DRAWINGS

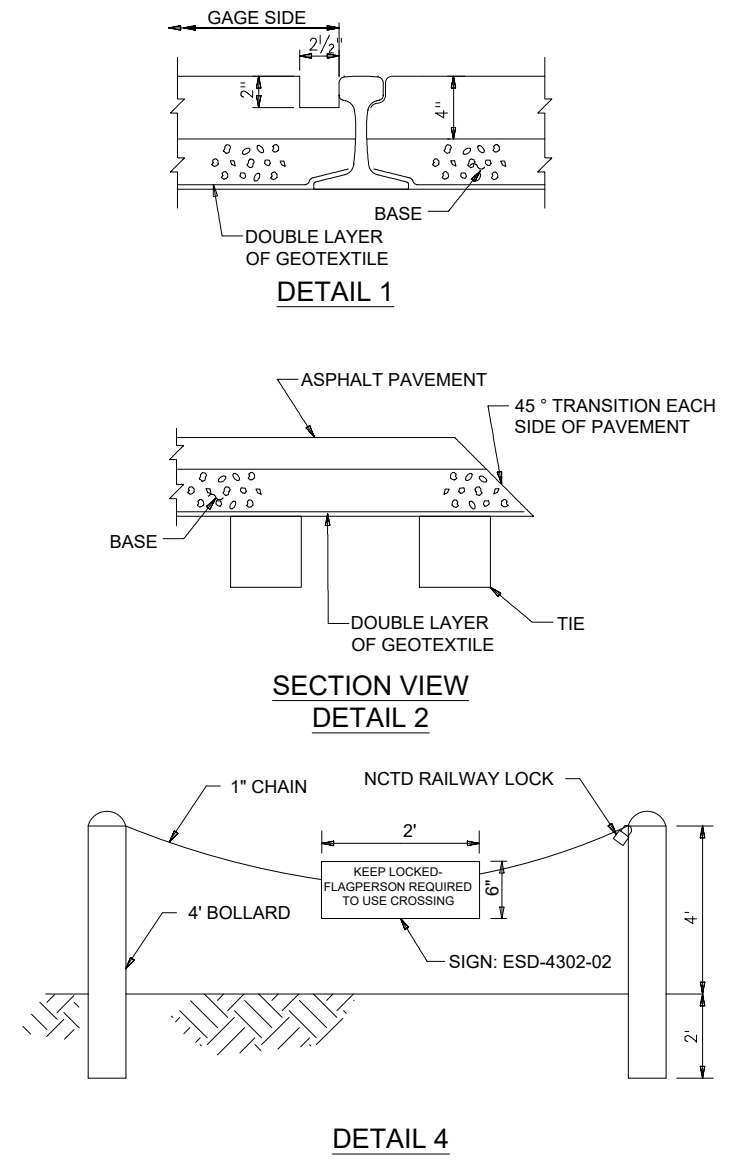
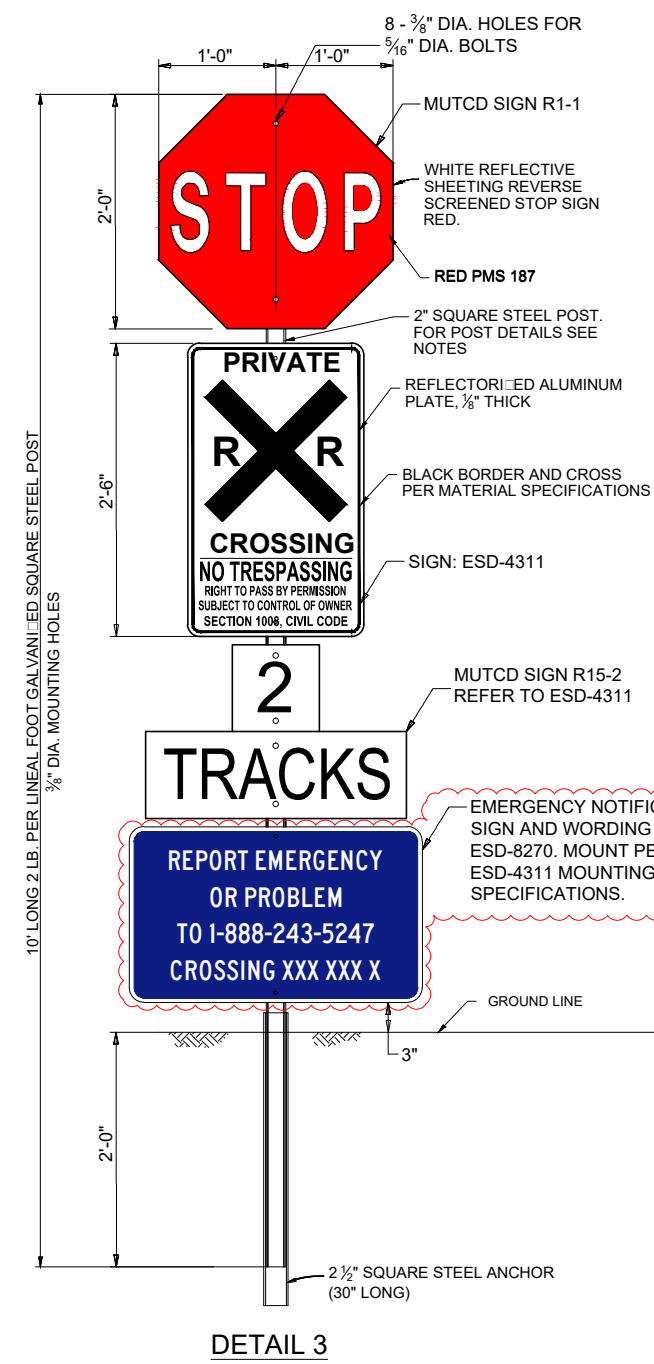
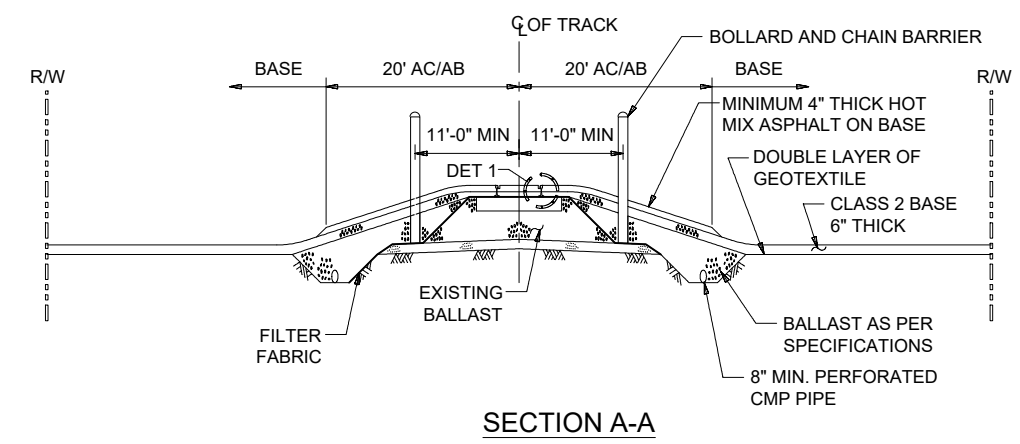
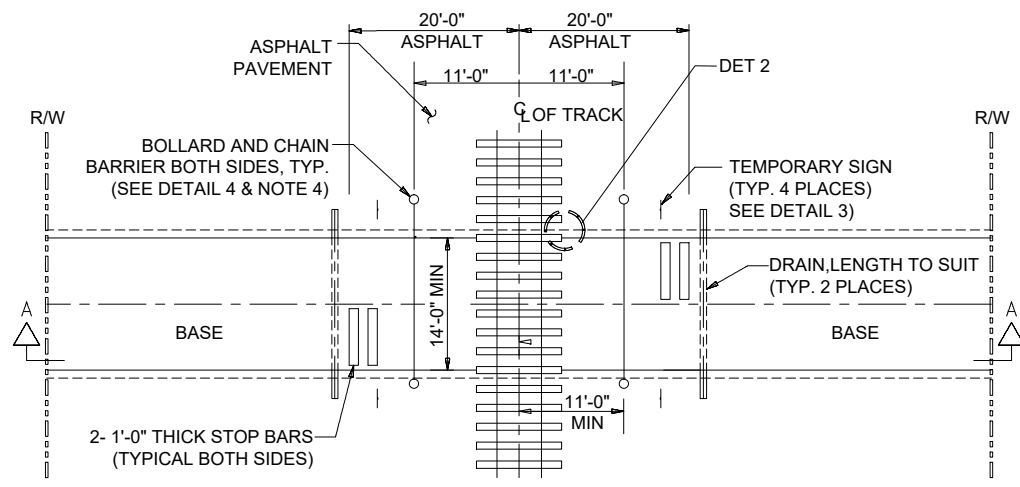
TRAFFIC CONTROL WORK IN VICINITY OF HIGHWAY-RAIL GRADE CROSSING

DRAWING NO. ESD-4301-02

DRAWING SHEET NO. 2 OF 2

SCALE: NONE

CONTRACT SHEET NO.



NOTES:

1. REQUESTS FOR TEMPORARY CONSTRUCTION CROSSINGS WILL BE CONSIDERED BY SANDAG/NCTD ONLY WHERE IT IS SHOWN THAT EXTREME HARDSHIP AND/OR UNUSUAL CONDITIONS EXIST THAT JUSTIFIES THE CROSSING.
2. GEOTEXTILE MUST BE PLACED OVER THE TIE PLATES, BASE OF RAIL, AND OTHER TRACK MATERIAL (OTM) TO KEEP ASPHALT AND BASE AWAY. THE MINIMUM WEIGHT OF GEOTEXTILE SHALL BE 4.5 OZ. PER SQ. YARD AND THICKNESS SHALL BE 40 MILS.
3. THE CROSSING MUST NOT BE USED WITHOUT NCTD AUTHORIZED PERSONNEL.
4. BARRIER BOLLARDS SHALL MEET ENGINEERING STANDARD ESD-5107.
5. CHAIN BARRIER GATES WILL BE LOCKED WITH NCTD LOCK ONLY.
6. COLD MIX ASPHALT IS NOT APPROVED MATERIAL FOR THE PAVEMENT. HOT MIX ASPHALT MUST COMPLY WITH CALTRANS SPECIFICATIONS.
7. IF HEAVY EQUIPMENT WILL BE CROSSING THE TRACKS, THE ASPHALT PAVEMENT ELEVATION MUST BE AT THE SAME ELEVATION AS THE TOP OF THE RAIL ELEVATION FOR 5 FEET ON EACH SIDE OF THE TRACK.
8. ENVIRONMENTAL LAW SHALL BE FOLLOWED WHEN DISPOSING OF THE ASPHALT MATERIALS.

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REVISIONS				DES.	ENG.
1	6/18	ADDED EMERGENCY NOTIFICATION SIGN TO PLAN			
REV.	DATE	DESCRIPTION	DES.	ENG.	DATE

DRAWN
RAILPROS

CHECKED
A. ANDERSON

RECOMMENDED
B. SMITH *AB*

DATE 06/18/18

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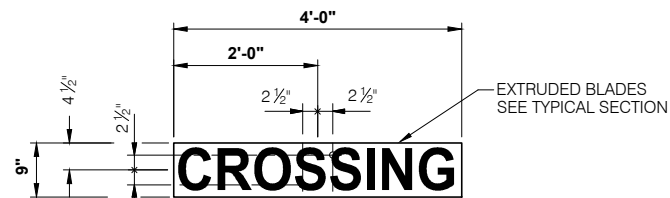
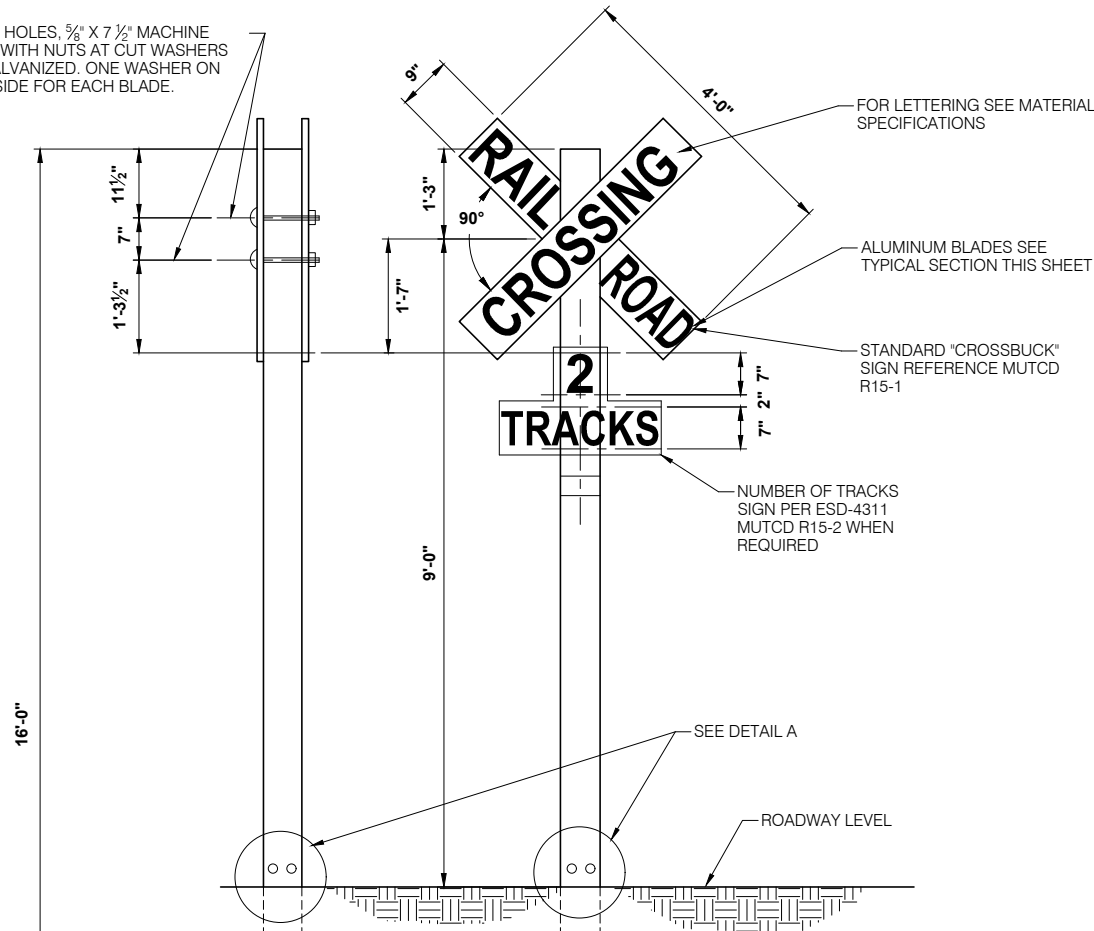
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ENGINEERING STANDARD DRAWINGS

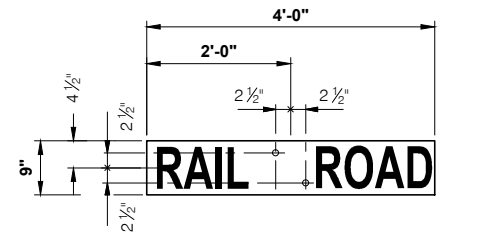
TEMPORARY CONSTRUCTION CROSSING

DRAWING NO.	ESD-4302
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	

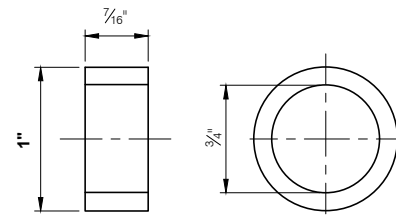
3/4" DIA. HOLES, 5/8" X 7 1/2" MACHINE BOLTS WITH NUTS AT CUT WASHERS ALL GALVANIZED. ONE WASHER ON EACH SIDE FOR EACH BLADE.



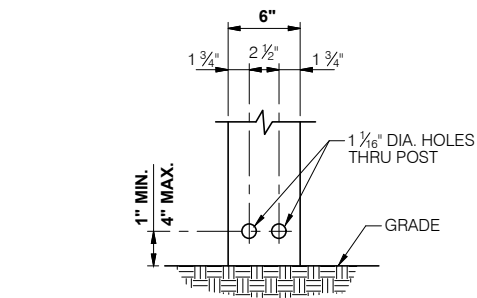
FRONT VIEW OF SIGN NO. R15-1 BLADE
NO SCALE



REAR VIEW OF SIGN NO. R15-1 BLADE
NO SCALE

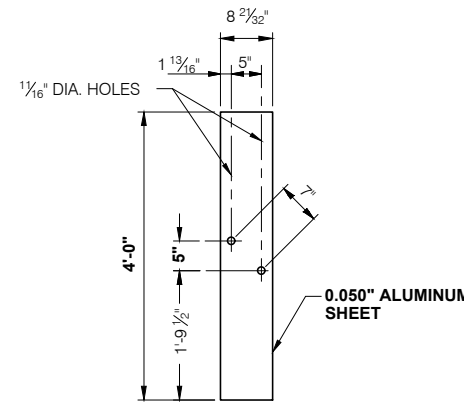


DETAIL OF ALUMINUM BUSHING
NO SCALE

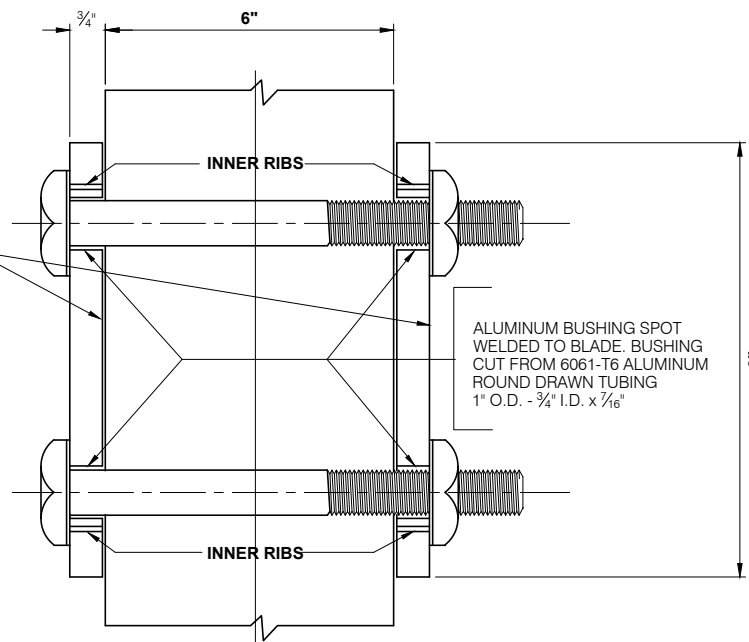


DETAIL "A"
NO SCALE

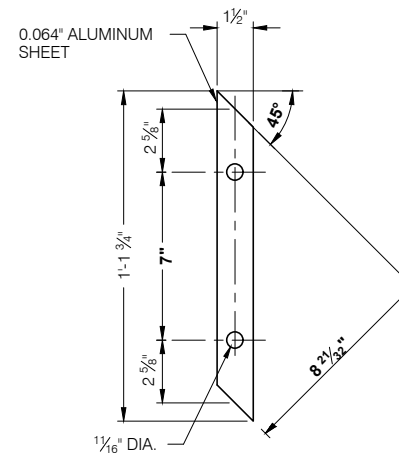
"BREAK AWAY" SIGN POST. 6" x 6" POST MUST BE DRILLED PER DETAIL "A". IF 4" x 4" POST IS USED, DRILLING PER DETAIL "A" NOT REQUIRED.



DETAIL OF INSERT
NO SCALE

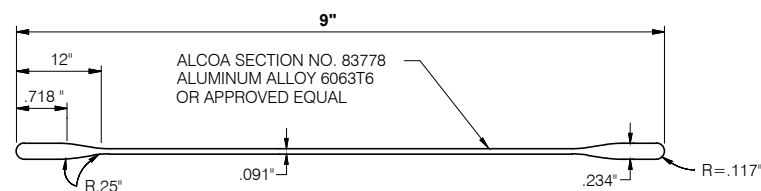


FRONT BACK
SECTION THRU ALTERNATE BLADES
NO SCALE



DETAIL OF ALUMINUM BACK UP PLATE
NO SCALE

CPUC STANDARD NO. 1-R OR MUTCD SECTION 8B-2
"CROSSBUCK" SIGN
NO SCALE



TYPICAL SECTION THRU BLADES FOR STANDARD "CROSSBUCK" SIGN NO. R15-1
NO SCALE

THIS SIGN COMPLIES WITH THE REQUIREMENTS OF CALIFORNIA PUBLIC UTILITIES COMMISSION GENERAL ORDER NO. 75-C AND MUTCD SECTION 8B-2

BILL OF MATERIAL	
ITEM	
NO REQ'D	RAILROAD CROSSING SIGN-COMPLETE
1 SET	NO. R15-1 ALUMINUM CROSSBUCKS, ALCOA EXTRUDED SECTION NO. 83778, ALUMINUM ALLOY 6063T6, OR APPROVED EQUAL, 2 BLADES PER SET.
1	6" x 6" x 16'-0" "CLEAN" TREATED TIMBER POST
2 *	5/8" x 7 1/2" GALVANIZED MACHINE BOLTS.
2	GALVANIZED HEX NUTS, TAMPER RESISTANT, 5/8" DIA. TAP.
4	GALVANIZED CUT WASHERS FOR 5/8" DIA. BOLTS.
*	ADJUST BOLT LENGTH IF TO BE USED ON OTHER THAN 6" THICK POST.
NO REQ'D	RAILROAD CROSSING SIGN-COMPLETE (ALTERNATE)
1 SET	NO. R15-1 EXTRUDED ALUMINUM CROSSBUCKS (2 PER SET)
1 SET	NO. R15-1 INSERTS (2 PER SET)
1	6" x 6" x 16'-0" "CLEAN" TREATED TIMBER POST
2 *	5/8" x 8 1/2" GALVANIZED MACHINE BOLTS.
2	GALVANIZED HEX NUTS, TAMPER RESISTANT, 5/8" DIA. TAP.
4	GALVANIZED CUT WASHERS FOR 5/8" DIA. BOLTS.
*	ADJUST BOLT LENGTH IF TO BE USED ON OTHER THAN 6" THICK POST.

NOTES:

NO. R15-1 RAILROAD CROSSING SIGN:

- SIGN NO. R15-1 WILL BE USED ON NEW INSTALLATIONS AND FOR THE REPLACEMENT OF EXISTING RAILROAD HIGHWAY CROSSING SIGNS. ON AN ATTRITION BASIS, AS RENEWALS ARE REQUIRED, EXISTING WOODEN "CROSSBUCK" BLADES WILL BE REPLACED WITH EXTRUDED ALUMINUM BLADES PER THIS DRAWING, WHEN RENEWAL OF SIGN MESSAGE IS REQUIRED.
- TWO DOUBLE - FACED, HIGHWAY CROSSING SIGNS SHALL BE PROVIDED AT EACH HIGHWAY CROSSING OF A TRACK OR TRACKS, ONE ON EACH SIDE OF THE TRACK OR ON THE OUTSIDE OF MULTIPLE TRACK CROSSINGS EXCEPT AS OTHERWISE PROVIDED.
- NUMBER OF TRACKS SIGN, M.U.T.C.D NO. R15-2 SHALL BE USED IN CONJUNCTION WITH SIGN NO. R15-1 WHEN REQUIRED.
- THE SIGN SHALL BE ERECTED ON THE RIGHT HAND SIDE OF THE ROADWAY ON EACH APPROACH TO THE CROSSING. THE SIGN SHALL BE NO CLOSER THAN 4'-1" FROM THE FACE OF THE CURB TO THE CENTER OF POST OR WHERE THERE IS NO CURB, NO CLOSER THAN 8'-1" FROM EDGE OF TRAVELED WAY TO CENTER OF POST. ADDITIONALLY THE SIGNS ARE TO BE PLACED NO CLOSER THAN 12' FROM THE CENTER LINE OF TRACK TO THE CENTER OF POST EXCEPT AS SHOWN FOR INDIVIDUAL STATE REQUIREMENTS.
- COMPLY WITH MUTCD AND FEDERAL RAILROAD ADMINISTRATION REQUIREMENTS.

MATERIAL SPECIFICATIONS:

SIGNS:
SEE BILL OF MATERIAL FOR EXTRUSION SPECIFICATIONS
PAINT ALL SIDES WITH LINEAR POLYURETHANE. COLOR FACE OF PANEL WITH ENGINEERING GRADE, PRESSURE SENSITIVE, RETRO-REFLECTIVE WHITE VINYL SHEETING. SILK SCREEN LEGEND WITH BLACK INK. FINISH WITH EXTERIOR GRADE PRESSURE SENSITIVE CLEAR MYLAR, 3M-1150 OR EQUAL.

TEXT STYLE:
TEXT TO BE "ARIAL BOLD" PER STANDARD DRAWING ESD1212.

HARDWARE:
SEE BILL OF MATERIAL

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REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN RAILPROS	
CHECKED B. SMITH	<i>BSM</i>
RECOMMENDED B. SCHMITH	<i>BBS</i>
DATE	10/08/15
DESIGNER PE STAMP	

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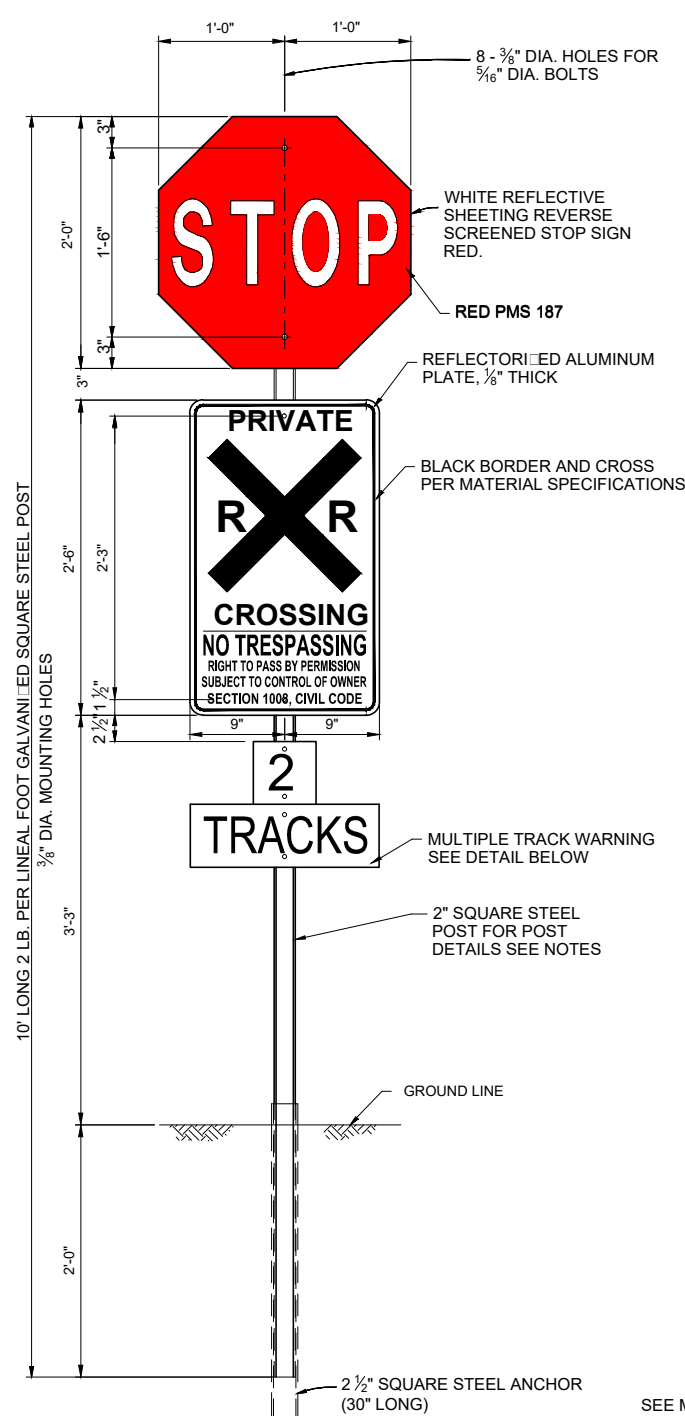
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ENGINEERING STANDARD DRAWINGS

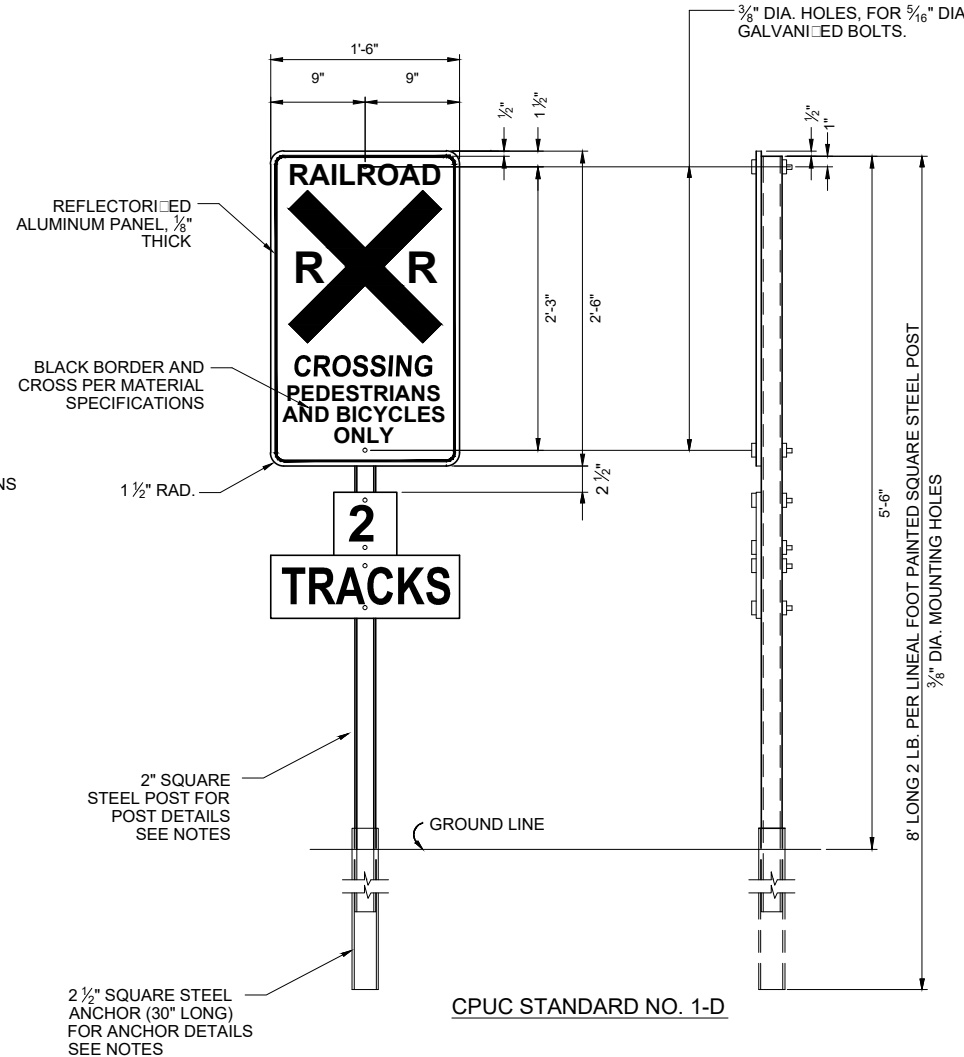
RAILROAD CROSSING CROSSBUCK

DRAWING NO.	ESD-4310
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	

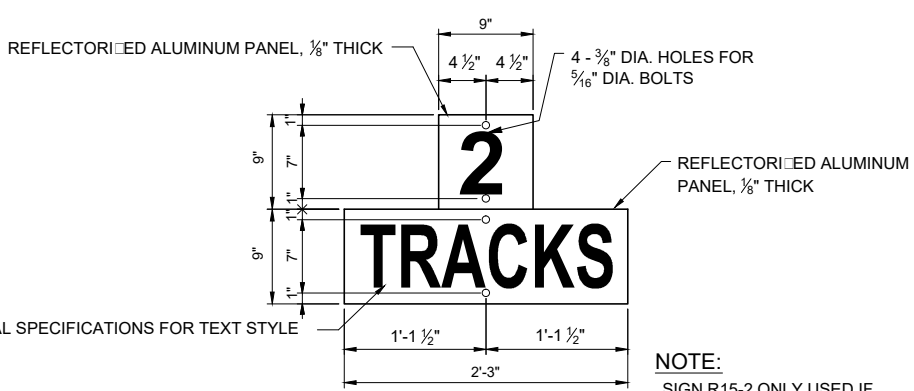


CPUC STANDARD NO. 1-C

THIS SIGN COMPLIES WITH THE REQUIREMENTS OF CALIFORNIA PUBLIC UTILITIES GENERAL ORDER NO. 75-C



CPUC STANDARD NO. 1-D



NO. R15-2 SCALE: NONE

NOTE: SIGN R15-2 ONLY USED IF TWO OR MORE TRACKS, NUMBER TO CORRESPOND TO NUMBER OF TRACKS AT CROSSING.

BILL OF MATERIAL	
NO REQ'D	ITEM
No. 1-C - PRIVATE CROSSING SIGN - COMPLETE	
1	NO. 1-C "STOP" PANEL.
1	NO. 1-C "PRIVATE CROSSING" PANEL.
1	2.79 LB. PER LINEAL FOOT SQUARE STEEL POST, 10 FEET LONG, WITH 3/8" DIA KNOCKOUT HOLES, 4" X 8" X 1/8" TRIANGULAR ANCHOR PLATE AND POINTED END, ALL GALVANIZED IN ACCORDANCE WITH A.S.T.M. SPEC. A-386
4	5/16" DIA, -20 X 2 3/4" ALUMINUM CARRIAGE BOLTS, ALLOY 2024-T4.
4	5/16"-20 TAMPER RESISTANT NUTS, ALCOA PIECE NO. V-30-1365.
4	1/2" X 17/64" X 0.064" PLAIN FLAT. ALUMINUM WASHERS FOR 5/16" DIA. BOLTS, ALLOY 2024-T4.
No. 1-D - PEDESTRIAN AND BICYCLE CROSSING SIGN - COMPLETE	
1	NO. 1-D SIGN PANEL.
1	2.79 LB. PER LINEAL FOOT FLANGED CHANNEL STEEL POST, POINTED
2	8'-0" LONG, POINTED END, WITH 3/8" DIAMETER KNOCKOUT HOLES
2	5/16" DIAMETER BY 2 3/4" GALVANIZED MACHINE BOLTS, GALVANIZED HEXAGON NUTS, 5/16" DIAMETER TAP, GALVANIZED CUT WASHERS FOR 5/16" DIAMETER BOLTS.
No. R15-2 - NUMBER OF TRACKS (WHERE REQUIRED)	
1	NUMBER SIGN PANEL 1/8" X 9" X 9" WITH 3/8" DIAMETER MOUNTING HOLES.
1	"TRACKS" SIGN PANEL 1/8" X 9" X 27" WITH 3/8" DIAMETER MOUNTING HOLES.
4	5/16" DIAMETER BY 2 3/4" GALVANIZED MACHINE BOLTS, GALVANIZED HEXAGON NUTS, 5/16" DIAMETER TAP, GALVANIZED CUT WASHERS FOR 5/16" DIAMETER BOLTS.

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NOTES:

- CPUC STANDARD NO. 1-C PRIVATE CROSSING SIGN:**
TWO SIGNS SHALL BE USED AT EACH PRIVATE GRADE CROSSING NOT EQUIPPED WITH AUTOMATIC WARNING DEVICES, ONE FACING EACH ROAD APPROACH UNLESS THERE IS NO SPACE TO LOCATE THE SIGN OR SIGNS.
- CPUC STANDARD NO. 1-D PEDESTRIAN AND BICYCLE CROSSING SIGN:**
FOR USE AT LOCATIONS DESIGNATED BY ORDER OF THE CALIFORNIA PUBLIC UTILITIES COMMISSION. THE WORDING "AND BICYCLES" IS OPTIONAL AND MAY BE OMITTED WHERE APPROPRIATE.
- CPUC STANDARD NO. R15-2 MULTIPLE TRACK WARNING:**
FOR USE AT MULTIPLE TRACK CROSSINGS.

MATERIAL SPECIFICATIONS:

- SIGNS:**
1/8" THICK MILL FINISH ALUMINUM PANEL, ALCOA 6016-T6 OR EQUAL. PAINT ALL SIDES WITH LINEAR POLYURETHANE. COLOR FACE OF PANEL WITH ENGINEERING GRADE, PRESSURE SENSITIVE, RETRO-REFLECTIVE WHITE VINYL SHEETING. SILK SCREEN LEGEND WITH BLACK INK. FINISH WITH EXTERIOR GRADE PRESSURE SENSITIVE CLEAR MYLAR, 3M-1150 OR EQUAL.
- STEEL POSTS:**
12 GAGE (.105 THICK) 2.42 LBS. PER LINEAL FOOT SQUARE STEEL TUBE (ASTM A-36) WITH 3/8" DIA. KNOCKOUT HOLES. ALL GALVANIZED IN ACCORDANCE WITH ASTM A-386.
- STEEL ANCHORS:**
12 GAGE (.105 THICK) 2.42 LBS. PER LINEAL FOOT SQUARE STEEL TUBE (ASTM A-36) WITH 3/8" DIA. KNOCKOUT HOLES. ALL GALVANIZED IN ACCORDANCE WITH ASTM A-386.
- TEXT STYLE:**
TEXT TO BE "ARIAL BOLD" PER ENGINEERING STANDARD ESD1212.
- HARDWARE:**
ALL HARDWARE TO BE VANDAL RESISTANT.
- BOLTS:** 5/16" X 2 3/4" LONG ALUMINUM CARRIAGE BOLTS, 2024-T4 ALLOY. (FOR SIGNS)
- BOLTS:** 5/16" X 3 1/2" LONG ALUMINUM CARRIAGE BOLTS, 2024-T4 ALLOY. (FOR ANCHORS)
- NUTS:** TAMPER RESISTANT, ALCOA OR EQUAL.
- WASHERS:** PLAIN, FLAT ALUMINUM WASHERS.

REV.	DATE	DESCRIPTION	DES.	ENG.

DESIGNER PE STAMP

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ENGINEERING STANDARD DRAWINGS
PRIVATE RAILROAD CROSSING SIGNS

DRAWING NO.	ESD-4311
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	

LOSSAN ENGINEERING STANDARD DRAWINGS

Section 5000

RIGHT-OF-WAY

1. SCOPE

PIPELINES INCLUDED UNDER THESE SPECIFICATIONS ARE THOSE INSTALLED TO CARRY STEAM, WATER OR ANY NON-FLAMMABLE SUBSTANCE WHICH FROM ITS NATURE OR PRESSURE, MIGHT CAUSE DAMAGE IF ESCAPING ON OR IN THE VICINITY OF RAILROAD PROPERTY.

2. GENERAL REQUIREMENTS

- a. PIPELINES UNDER RAILROAD TRACKS SHALL BE ENCASED IN A LARGER PIPE OR CONDUIT CALLED THE CASING PIPE AS INDICATED IN FIGURE 1. DESIGN SHALL BE BASED ON SUPERIMPOSED LOAD DUE TO RAILROAD (COOPER E-80) LOADING WITH APPLICABLE IMPACT IN COMBINATION WITH INTERNAL PRESSURE, EXTERNAL LOADS AND INSTALLATION LOADS.
- b. CASING PIPE MAY BE OMITTED UNDER THE FOLLOWING CONDITIONS PROVIDING THAT OPEN TRENCHING IS APPROVED.
 - (1) UNDER INDUSTRIAL TRACKS, AND UNDER SLOW SPEED BRANCH LINE TRACKS IN PAVED CITY STREETS WHERE LINE PRESSURE IS LESS THAN 100 PSI. THE PIPE JOINTS ARE TO BE OF LEAK PROOF CONSTRUCTION AND THE PIPE MATERIAL SHALL SAFELY WITHSTAND THE COMBINATION OF INTERNAL PRESSURE AND EXTERNAL LOADS. JOINTS SHALL BE MECHANICAL OR WELDED TYPE.
 - (2) FOR NON-PRESSURE SEWER AND STORM DRAIN CROSSINGS UNDER LIGHT TRAFFIC BRANCH LINES WHERE THE PIPE STRENGTH IS CAPABLE OF WITHSTANDING RAILROAD LOADING.
- c. PIPELINES SHALL BE LOCATED, WHERE PRACTICABLE, TO CROSS TRACKS AT APPROXIMATELY RIGHT ANGLES THERETO BUT PREFERABLY AT NOT LESS THAN 45 DEGREES AND SHALL NOT BE PLACED WITHIN CULVERTS, NOR UNDER RAILROAD BRIDGES. PIPELINES SHALL PREFERABLY BE INSTALLED UNDER TRACKS BY DRY BORING OR JACKING.
- d. PIPELINES LAID LONGITUDINALLY ON RAILROAD RIGHTS-OF-WAY SHALL BE LOCATED AS FAR AS PRACTICABLE FROM ANY TRACKS OR OTHER IMPORTANT STRUCTURES. IF LOCATED WITHIN 25 FEET OF THE CENTERLINE OF ANY TRACK OR WHERE THERE IS DANGER OF DAMAGE FROM LEAKAGE TO ANY BRIDGE, BUILDING OR STRUCTURE, THE CARRIER PIPE SHALL BE ENCASED OR OF SPECIAL DESIGN AS APPROVED BY THE ENGINEER.

3. CARRIER PIPE

- a. CARRIER LINE PIPE AND JOINTS SHALL BE OF ACCEPTED MATERIAL AND CONSTRUCTION AS APPROVED BY THE ENGINEER. PIPE MATERIAL UNDER AND ADJACENT TO TRACKS MUST BE CAPABLE OF SUPPORTING A MINIMUM OF 3600 POUNDS PER SQUARE FOOT FOR COVER HEIGHTS OF 30 FEET OR LESS. FOR HEIGHTS GREATER THAN 30 FEET, SUPPORTING WEIGHT SHALL BE INCREASED PROPORTIONATELY. THE PIPE SHALL BE LAID WITH SUFFICIENT SLACK SO THAT IT IS NOT IN TENSION.
- b. PLASTIC PIPE IN A CASING IS AN ACCEPTABLE MATERIAL IF IT IS PVC OR HIGH DENSITY POLYETHYLENE AND MINIMUM SCHEDULE 40. INTERNAL PRESSURE NOT TO EXCEED 100 PSI.
- c. DUCTILE IRON PIPE IN A CASING IS ACCEPTABLE AS FOLLOWS:
 - CLASS 52 FOR DIAMETERS OF 4" THRU 10"
 - CLASS 53 FOR DIAMETERS OF 12" THRU 14"
 - CLASS 54 FOR DIAMETERS OF 16" THRU 18"
 - CLASS 56 FOR DIAMETERS OF 20" THRU 24"
- d. REINFORCED CONCRETE PIPE IS ACCEPTABLE IF IT IS CLASS V. MINIMUM OF CLASS III RCP IS ACCEPTABLE FOR LONGITUDINAL PIPE LOCATED 45 FEET OR MORE FROM THE CENTERLINE OF TRACK.
- e. VITRIFIED CLAY PIPE (ASTM C-700) IN A CASING IS ACCEPTABLE IF IT IS EXTRA STRENGTH WITH JOINTS PER ASTM C-425 AND BASED ON A LOAD FACTOR OF 1.5 LONGITUDINAL VITRIFIED CLAY PIPE AS DESCRIBED ABOVE IS ACCEPTABLE UNCASED IF BACKFILL IS COMPACTED TO MATCH DENSITY OF ADJACENT SOIL.

4. CASING PIPE

CASING PIPE AND JOINTS SHALL BE OF LEAK PROOF CONSTRUCTION, CAPABLE OF WITHSTANDING RAILROAD LOADING (COOPER E-80), MINIMUM SIZE TO BE DETERMINED FROM TABLE 1. TABLE 1 INDICATES A MINIMUM THICKNESS BASED UPON SUPERIMPOSED LOADS ONLY AND IT IS THE RESPONSIBILITY OF THE INSTALLER TO PROVIDE A CASING WHICH IS ADEQUATE FOR THE LOADS THAT RESULT DURING INSTALLATION. IF ADDITIONAL TRACKS ARE CONSTRUCTED IN THE FUTURE, THE CASING SHALL BE EXTENDED CORRESPONDINGLY BY THE PIPELINE OWNER.

STEEL CASING PIPE TO HAVE A MINIMUM YIELD STRENGTH OF 35,000 PSI. WHEN CASING IS INSTALLED WITHOUT BENEFIT OF A PROTECTIVE COATING, AND SAID CASING IS NOT CATHODICALLY PROTECTED, THE WALL THICKNESS SHOWN IN TABLE 1 SHALL BE INCREASED TO THE NEAREST STANDARD SIZE WHICH IS A MINIMUM OF 0.063" GREATER THAN THE THICKNESS SHOWN EXCEPT FOR DIAMETERS LESS THAN 14". CASING DISTANCES SHOWN IN FIGURE 1 ARE MEASURED PERPENDICULAR TO THE TRACK.

5. CONSTRUCTION

- a. CASING SHALL BE SO CONSTRUCTED AS TO PREVENT LEAKAGE OF ANY SUBSTANCE FROM THE CASING THROUGHOUT ITS LENGTH, EXCEPT AT ITS ENDS. CASING SHALL BE SO INSTALLED AS TO PREVENT THE FORMATION OF A WATERWAY UNDER THE RAILROAD, WITH AN EVEN BEARING THROUGH ITS LENGTH, AND SHALL SLOPE TO ONE END (EXCEPT FOR LONGITUDINAL OCCUPANCY).
- b. INSTALLATION BY OPEN-TRENCH METHODS SHALL COMPLY WITH AREMA MANUAL FOR RAILROAD ENGINEERING, INSTALLATION OF PIPE CULVERTS, CHAPTER 1, PART 4.12.
- c. DRY BORED OR JACKED INSTALLATIONS SHALL HAVE A BORED HOLE DIAMETER ESSENTIALLY THE SAME AS THE OUTSIDE DIAMETER OF THE PIPE PLUS THE THICKNESS OF THE PROTECTIVE COATING. IF VOIDS SHOULD DEVELOP OR IF THE BORED DIAMETER IS GREATER THAN THE OUTSIDE DIAMETER OF THE PIPE (INCLUDING COATING) BY MORE THAN ONE INCH, THE SPACE SHALL BE FILLED BY GROUTING OR OTHER REMEDIAL MEASURES AS APPROVED BY THE ENGINEER. BORING OPERATIONS SHALL NOT BE STOPPED IF SUCH STOPPAGE WOULD BE DETRIMENTAL TO RAILROAD OPERATIONS.
- d. TUNNELING OPERATIONS SHALL BE CONDUCTED AS APPROVED BY THE ENGINEER. IF VOIDS ARE CAUSED BY THE TUNNELING OPERATIONS, THEY SHALL BE FILLED BY PRESSURE GROUTING OR BY OTHER APPROVED METHODS WHICH WILL PROVIDE PROPER SUPPORT.
- e. VOID BETWEEN CASING AND CARRIER PIPE TO BE FILLED WITH SAND IN ALL HIGH PRESSURE INSTALLATIONS. VOID TO BE PARTIALLY FILLED IN OTHERS AS DIRECTED.
- f. EXCAVATIONS AND BORE PITS SHALL BE A MINIMUM DISTANCE OF TWENTY FEET FROM THE CENTERLINE OF THE NEAREST TRACK. SHORING PLANS AND CALCULATIONS MAY BE REQUIRED TO BE SUBMITTED TO THE ENGINEER FOR APPROVAL PRIOR TO CONSTRUCTION PER AREMA MANUAL AND LOSSAN STANDARDS.
- g. FIBER OPTIC CABLE LINES MAY BE ON THE RIGHT-OF-WAY, THE APPLICANT SHALL CALL DIGALERT TO DETERMINE IF FIBER OPTIC CABLES ARE PRESENT. APPLICANT SHALL CALL PRIOR TO DIGGING TO VERIFY LOCATION AND ARRANGE INSPECTION

6. PROTECTION AT END OF CASING

THE ENDS OF THE CASING ARE TO BE SUITABLY SEATED AGAINST THE ENTRANCE OF FOREIGN MATERIAL, BUT ARE NOT TO BE TIGHTLY SEALED.

7. DEPTH OF INSTALLATION

REFER TO FIGURE 1 FOR MINIMUM COVER DEPTHS FOR PIPELINE CROSSINGS. PIPELINES LAID LONGITUDINALLY ON RAILROAD RIGHTS-OF-WAY, 45 FEET OR LESS FROM CENTERLINE OF TRACK, SHALL BE BURIED NOT LESS THAN 4 FEET FROM GROUND SURFACE TO TOP OF PIPE. WHERE PIPELINE IS LAID MORE THAN 45 FEET FROM CENTERLINE OF TRACK, MINIMUM COVER SHALL BE AT LEAST 3 FEET.

8. SHUT - OFF VALVES

ACCESSIBLE EMERGENCY SHUT-OFF VALVES SHALL BE INSTALLED WITHIN EFFECTIVE DISTANCES EACH SIDE OF THE RAILROAD AS AGREED TO BY THE ENGINEER AND THE PIPELINE COMPANY. WHERE PIPELINES ARE PROVIDED WITH AUTOMATIC CONTROL STATIONS AT LOCATIONS AND WITHIN DISTANCES APPROVED BY THE ENGINEER, NO ADDITIONAL VALVES SHALL BE REQUIRED.

9. APPROVAL OF PLANS

PLANS OR SHOP DRAWINGS FOR PROPOSED INSTALLATION SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL PRIOR TO CONSTRUCTION. PLANS SHALL BE DRAWN TO SCALE SHOWING RELATION OF PROPOSED PIPELINE TO TRACKS, ANGLE OF CROSSING, MILEPOST LOCATION, RIGHTS-OF-WAY AND GENERAL LAYOUT OF TRACKS AND RAILROAD FACILITIES.

PLANS SHALL INCLUDE ALL APPURTENANT FEATURES OF THE PIPELINE, SUCH AS VALVES, MANHOLES, VENTS, CASING ETC., LOCATED ON RAILROAD PROPERTY. CROSS SECTION OR PROFILE SHALL SHOW PIPELINE AND APPURTENANT FEATURES AS TO THE TRACKS AND SURROUNDING GROUND. THE EXECUTION OF THE WORK ON MTS/NCTD RIGHTS-OF-WAY SHALL BE SUBJECT TO THE INSPECTION AND DIRECTION OF SANDAG/NCTD/MTS FIELD ENGINEER OR HIS/HER AUTHORIZED REPRESENTATIVE.

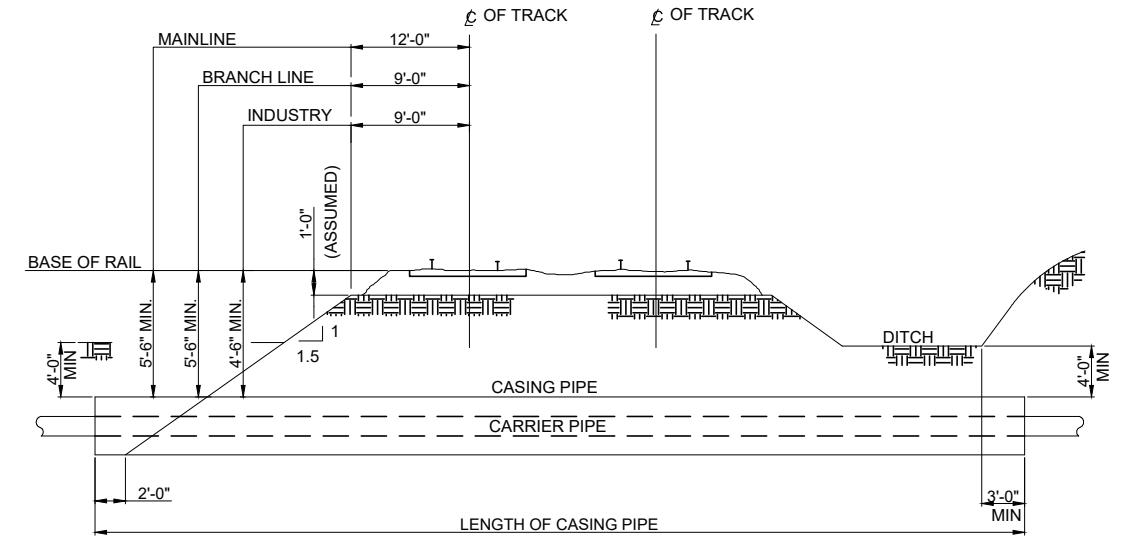
10. EXECUTION OF WORK

THE PIPELINE AGREEMENT AND CONTRACTORS RIGHTS OF ENTRY AGREEMENT SHALL BE FULLY EXECUTED BEFORE ANY WORK WILL BE ALLOWED ON MTS/NCTD RIGHT-OF-WAY. THE EXECUTION OF THE WORK ON THE RIGHTS-OF-WAY, INCLUDING THE SUPPORTING OF TRACKS, SHALL BE SUBJECT TO THE INSPECTION AND DIRECTION OF THE ENGINEER. A MINIMUM OF 5 DAYS NOTICE TO THE ENGINEER/ROW MANAGER IS REQUIRED PRIOR TO ENTRY ON RIGHT-OF-WAY FOR CONSTRUCTION.

SANDAG/NCTD ENGINEERING STANDARDS ARE INTENDED FOR SANDAG/NCTD APPROVED USES ONLY. FOR NON-SANDAG/NCTD APPROVED USES: SANDAG/NCTD SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF THE DATA OR INFORMATION CONTAINED HEREIN. THE SELECTION AND USE OF THESE STANDARDS IS THE SOLE RESPONSIBILITY OF THE USER AND SHOULD NOT BE USED WITHOUT CONSULTING A REGISTERED PROFESSIONAL ENGINEER. ALL WARRANTIES AND REPRESENTATIONS OF ANY KIND ARE DISCLAIMED. ANYONE MAKING USE OF THIS INFORMATION AGREES THAT IT ASSUMES ALL LIABILITY ARISING FROM SUCH USE. NO PART OF THESE STANDARDS SHOULD BE REPRODUCED OR DISTRIBUTED IN ANY FORM OR BY ANY MEANS WITHOUT THE PRIOR WRITTEN PERMISSION OF SANDAG/NCTD. ALL RIGHTS RESERVED.

(TABLE 1)
STEEL CASING
(CASING WITH PROTECTIVE COATING)

NOMINAL DIAMETER (INCHES)	MIN. WALL THICKNESS (INCHES)	NOMINAL DIAMETER (INCHES)	MIN. WALL THICKNESS (INCHES)
14" & UNDER	0.250" (1/4")	44" & 46"	0.656" (21/32")
16"	0.281" (9/32")	48"	0.688" (11/16")
18"	0.312" (5/16")	50"	0.719" (23/32")
20" & 22"	0.344" (11/32")	52"	0.750" (3/4")
24"	0.375" (3/8")	54"	0.781" (25/32")
26"	0.406" (13/32")	56" & 58"	0.812" (13/16")
28"	0.438" (7/16")	60"	0.844" (27/32")
30"	0.469" (15/32")	62"	0.875" (7/8")
32"	0.500" (1/2")	64"	0.906" (29/32")
34" & 36"	0.531" (17/32")	66" & 68"	0.938" (15/16")
38"	0.562" (9/16")	70"	0.969" (31/32")
40"	0.594" (19/32")	72"	1.000" (1")
42"	0.625" (5/8")	OVER 72" MUST BE APPROVED BY SANDAG	



CASING REQUIREMENTS - FIG. 1

REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN RAILPROS	
CHECKED B. SMITH	<i>BS</i>
RECOMMENDED B. SCHMITH	<i>BBS</i>
DATE	10/08/15
DESIGNER PE STAMP	



ENGINEERING STANDARD DRAWINGS	DRAWING NO. ESD-5001
NEW PIPELINES FOR NON-FLAMMABLE SUBSTANCES	DRAWING SHEET NO. 1 OF 1
	SCALE: NONE
	CONTRACT SHEET NO.

1. SCOPE

PIPELINES INCLUDED UNDER THESE SPECIFICATIONS ARE THOSE INSTALLED TO CARRY OIL, GAS, PETROLEUM PRODUCTS OR OTHER FLAMMABLE, HIGHLY VOLATILE OR HAZARDOUS SUBSTANCES UNDER PRESSURE.

2. GENERAL REQUIREMENTS

- a. PIPELINES UNDER RAILROAD TRACKS SHALL BE ENCASED IN A LARGER PIPE OR CONDUIT CALLED THE CASING PIPE AS INDICATED IN FIGURE 1. DESIGN SHALL BE BASED ON SUPERIMPOSED LOAD DUE TO RAILROAD (COOPER E-80) LOADING WITH APPLICABLE IMPACT IN COMBINATION WITH INTERNAL PRESSURE, EXTERNAL LOADS AND INSTALLATION LOADS
- b. PIPELINES SHALL BE INSTALLED UNDER TRACKS BY DRY BORING OR JACKING.
- c. PIPELINES SHALL BE LOCATED, WHERE PRACTICABLE, TO CROSS TRACKS AT APPROXIMATELY RIGHT ANGLES THERETO BUT PREFERABLY AT NOT LESS THAN 45 DEGREES AND SHALL NOT BE PLACED WITHIN A CULVERT, UNDER RAILROAD BRIDGES NOR CLOSER THAN 100 FEET IN ANY PORTION OF ANY RAILROAD BRIDGE, BUILDING OR OTHER IMPORTANT STRUCTURE, EXCEPT IN SPECIAL CASES AND THEN BY SPECIAL DESIGN AS APPROVED BY THE ENGINEER.
- d. STEEL CARRIER PIPE UNDER SECONDARY OR INDUSTRY TRACKS OR ON RAILROAD RIGHT- OF-WAY NOT UNDER A RAILROAD TRACK MAY BE INSTALLED WITHOUT CASING BY PERMISSION OF THE ENGINEER.
- e. PIPELINES LAID LONGITUDINALLY ON RAILROAD RIGHT-OF-WAY SHALL BE LOCATED AS FAR AS PRACTICABLE FROM ANY TRACKS OR OTHER IMPORTANT STRUCTURES. IF LOCATED WITHIN 45 FEET OF THE CENTERLINE OF ANY TRACK OR WHERE THERE IS DANGER OF DAMAGE FROM LEAKAGE TO ANY BRIDGE, BUILDING OR TO STRUCTURE, THE CARRIER PIPE SHALL BE ENCASED OR OF SPECIAL DESIGN AS APPROVED BY THE ENGINEER.
- f. ANY REPLACEMENT TO A CARRIER PIPE SHALL BE CONSIDERED A NEW INSTALLATION, SUBJECT TO THE REQUIREMENTS OF THESE SPECIFICATIONS.
- g. SIGNS TO INDICATE LOCATION OF PIPELINE AT THE RIGHT-OF-WAY LINE ARE TO BE INSTALLED AND MAINTAINED BY THE PIPELINE COMPANY.

3. CARRIER PIPE

PIPELINES CARRYING OIL, LIQUEFIED PETROLEUM GAS, NATURAL OR MANUFACTURED GAS AND OTHER FLAMMABLE PRODUCTS SHALL CONFORM TO THE REQUIREMENTS OF ANSI B-31.8 AND ANSI B-31.4 AND OTHER APPLICABLE CODES, EXCEPT THAT THE MAXIMUM ALLOWABLE STRESSES FOR DESIGN OF STEEL PIPE SHALL NOT EXCEED THE FOLLOWING PERCENTAGES OR THE SPECIFIED MINIMUM YIELD STRENGTH (MULTIPLIED BY LONGITUDINAL JOINT FACTOR) OF THE PIPE AS DEFINED IN THE CODES:

- a. STEEL WELDED PIPE UNDER RAILROAD TRACKS THAT IS PROTECTED WITH A STEEL CASING (THE FOLLOWING PERCENTAGES APPLY TO HOOP STRESS):
 - 1. SEVENTY-TWO PERCENT FOR INSTALLATION ON OIL PIPELINES.
 - 2. FIFTY PERCENT FOR PIPELINES CARRYING LIQUEFIED PETROLEUM, GAS AND OTHER FLAMMABLE LIQUIDS WITH LOW FLASH POINT.
 - 3. SIXTY PERCENT FOR INSTALLATIONS ON GAS PIPELINES.
- b. STEEL PIPE WITHOUT A CASING UNDER SECONDARY OR INDUSTRY TRACKS (THE FOLLOWING PERCENTAGES APPLY TO THE SUM OF THE HOOP STRESS DUE TO THE MAXIMUM ANTICIPATED INTERNAL PRESSURE AND THE FLEXURAL RING STRESS DUE TO EXTERNAL LOADS):
 - 1. SIXTY PERCENT FOR INSTALLATION ON OIL PIPELINES.
 - 2. FORTY PERCENT FOR PIPELINES CARRYING LIQUEFIED PETROLEUM, GAS AND OTHER FLAMMABLE LIQUIDS WITH LOW FLASH POINT.
 - 3. FIFTY PERCENT FOR INSTALLATIONS ON GAS PIPELINES.
- c. STEEL PIPE LAID LONGITUDINALLY ON RAILROAD RIGHT-OF-WAY WITHOUT THE PROTECTION OF A CASING (THE FOLLOWING PERCENTAGES APPLY TO HOOP STRESS):
 - 1. SIXTY PERCENT FOR INSTALLATION ON OIL PIPELINES.
 - 2. FORTY PERCENT FOR PIPELINES CARRYING LIQUEFIED PETROLEUM, GAS AND OTHER FLAMMABLE LIQUIDS WITH LOW FLASH POINT.
 - 3. FORTY PERCENT FOR INSTALLATIONS ON GAS PIPELINES.

THE PIPE SHALL BE LAID WITH SUFFICIENT SLACK SO THAT IT IS NOT IN TENSION. IF THE MAXIMUM ALLOWABLE STRESS IN THE CARRIER PIPE ON EITHER SIDE OF THE CROSSING IS LESS THAN THE SPECIFIED ABOVE, THE CARRIER PIPE AT THE CROSSING SHALL BE DESIGNED AT THE SAME STRESS AS THE ADJACENT CARRIER PIPE.

4. CASING PIPE

- a. CASING PIPE AND JOINTS SHALL BE OF STEEL AND OF LEAK PROOF CONSTRUCTION, CAPABLE OF WITHSTANDING RAILROAD LOADING (COOPER E-80) AND HAVING SPECIFIED MINIMUM YIELD STRENGTH OF AT LEAST 35,000 PSI. THE INSIDE DIAMETER OF THE CASING PIPE SHALL BE SUFFICIENT TO ALLOW THE CARRIER PIPE TO BE REMOVED SUBSEQUENTLY WITHOUT DISTURBING THE CASING PIPE OR ROADBED.
- b. TABLE 1 INDICATES A MINIMUM THICKNESS BASED UPON SUPERIMPOSED LOADS ONLY AND IT IS THE RESPONSIBILITY OF THE LICENSEE AND/OR THE INSTALLER TO PROVIDE A CASING WHICH IS ADEQUATE FOR THE LOADS THAT RESULT DURING INSTALLATION. THE WALL THICKNESS SHALL BE DECREASED BY 0.063 INCH, IF THE CASING IS INSTALLED WITH A PROTECTIVE COATING AND IS A CATHODICALLY PROTECTED, EXCEPT FOR DIAMETERS UNDER 14 INCHES.
- c. NEW CASING PIPE UNDER RAILROAD TRACKS AND ACROSS RAILROAD RIGHT-OF-WAY SHALL EXTEND TO THE GREATER OF THE FOLLOWING DISTANCES, MEASURED AT RIGHT ANGLE TO CENTERLINE OF TRACK. IF ADDITIONAL TRACK ARE CONSTRUCTED IN THE FUTURE, THE CASING SHALL BE EXTENDED.
 - 1. ACROSS THE ENTIRE WIDTH OF THE RAILROAD RIGHT-OF-WAY IF PRACTICABLE
 - 2. THREE FEET BEYOND THE DITCH LINE.

4. CASING PIPE (CONTINUED)

- 3. TWO FEET BEYOND THE TOE OF SLOPE.
- 4. A MINIMUM DISTANCE OF 25 FEET FROM EACH SIDE OF THE CENTERLINE OF OUTSIDE TRACK WHEN CASING IS SEALED AT BOTH ENDS, AND
- 5. A MINIMUM DISTANCE OF 45 FEET FROM EACH SIDE OF THE CENTERLINE OF OUTSIDE TRACK WHEN CASING IS OPEN AT BOTH ENDS.
- d. THE DEPTH OF THE CASING SHALL BE AS SHOWN IN FIGURE 1. DISTANCE OF 20 FEET ON EACH SIDE OF THE CENTERLINE OF THE TRACK FOR HORIZONTAL DIRECTIONAL DRILLING.

5. CONSTRUCTION

- a. CASING SHALL BE SO CONSTRUCTED AS TO PREVENT LEAKAGE OF ANY SUBSTANCE FROM THE CASING THROUGHOUT ITS LENGTH, EXCEPT AT ITS ENDS. CASING SHALL BE SO INSTALLED AS TO PREVENT THE FORMATION OF A WATERWAY UNDER THE RAILROAD, WITH AN EVEN BEARING THROUGH ITS LENGTH, AND SHALL SLOPE TO ONE END (EXCEPT FOR LONGITUDINAL OCCUPANCY).
- b. INSTALLATION BY OPEN-TRENCH METHODS SHALL COMPLY WITH AREMA MANUAL FOR RAILROAD ENGINEERING, INSTALLATION OF PIPE CULVERTS, CHAPTER 1, PART 4.12.
- c. DRY BORED OR JACKED INSTALLATIONS SHALL HAVE A BORED HOLE DIAMETER ESSENTIALLY THE SAME AS THE OUTSIDE DIAMETER OF THE PIPE PLUS THE THICKNESS OF THE PROTECTIVE COATING. IF VOIDS SHOULD DEVELOP OR IF THE BORED DIAMETER IS GREATER THAN THE OUTSIDE DIAMETER OF THE PIPE (INCLUDING COATING) BY MORE THAN ONE INCH, THE SPACE SHALL BE FILLED BY GROUTING OR OTHER REMEDIAL MEASURES AS APPROVED BY THE ENGINEER. BORING OPERATIONS SHALL NOT BE STOPPED IF SUCH STOPPAGE WOULD BE DETRIMENTAL TO PROJECT AS DETERMINED BY THE ENGINEER.
- d. TUNNELING OPERATIONS SHALL BE CONDUCTED AS APPROVED BY THE ENGINEER. IF VOIDS ARE CAUSED BY THE TUNNELING OPERATIONS, THEY SHALL BE FILLED BY PRESSURE GROUTING OR BY OTHER APPROVED METHODS WHICH WILL PROVIDE PROPER SUPPORT.
- e. WHERE CASING AND/OR CARRIER PIPE IS CATHODICALLY PROTECTED, THE ENGINEER SHALL BE NOTIFIED AND SUITABLE TEST MADE TO INSURE THAT THE OTHER RAILWAY STRUCTURES AND FACILITIES ARE ADEQUATELY PROTECTED FROM THE CATHODIC CURRENT IN ACCORDANCE WITH THE RECOMMENDATIONS OF REPORTS OF CORRELATING COMMITTEE ON CATHODIC PROTECTION, PUBLISHED BY THE NATIONAL ASSOCIATION OF CORROSION ENGINEERS.

6. INSPECTION AND TESTING

ANSI AND APPLICABLE CODES CURRENT AT TIME OF CONSTRUCTING THE PIPELINE, SHALL GOVERN THE INSPECTION AND TESTING OF THE FACILITY WITHIN THE RAILROAD RIGHT-OF-WAY EXCEPT THAT THE PROOF TESTING OF STRENGTH OF CARRIER PIPE SHALL BE IN ACCORDANCE WITH THE APPLICABLE ANSI CODE.

7. SUPPORTS

ALL SUPPORTS, INSULATIONS OR CENTERING DEVICES FOR THE CARRIER PIPE SHALL BE SO DESIGNED AND CONSTRUCTED THAT NO LOADS FROM THE ROADBED, TRACK, TRAFFIC OR CASING PIPE ITSELF ARE TRANSMITTED TO THE CARRIER PIPE. THE SPACING OF SUCH SUPPORTS LONGITUDINALLY IN THE CASING SHALL NOT BE GREATER THAN 10 FEET.

8. SEALS

BOTH ENDS OF THE CASING SHALL BE SUITABLY SEALED IN THE OUTSIDE OF THE CARRIER PIPE.

9. VENTS

CASING PIPE, UNLESS OTHERWISE AUTHORIZED OR AS STATED BELOW, SHALL BE PROPERLY VENTED. VENT PIPES SHALL BE OF SUFFICIENT DIAMETER (BUT IN NO CASE LESS THAN 2 INCHES IN DIAMETER) AND SHALL BE ATTACHED NEAR THE END OF CASING AND PROJECT THROUGH GROUND SURFACE AT RIGHT-OF-WAY LINES OR NOT LESS THAN THE DISTANCE SPECIFIED IN FIGURE 1 (MEASURED AT RIGHT ANGLES) FROM CENTERLINE OF NEAREST TRACK. WHEN CASING DOES NOT EXTEND TO RIGHT-OF-WAY LINE, THE VENT MUST BE IN LOCATION APPROVED BY THE ENGINEER.

VENT PIPES ARE NOT REQUIRED AT END OF CASING WHERE DISTANCES SPECIFIED FROM CENTERLINE OF TRACK TO END OF CASING IS LESS THAN 35 FEET. VENT PIPE TO BE VERTICAL AND SHALL EXTEND NOT LESS THAN 4 FEET ABOVE GROUND SURFACE. TOP OF VENT PIPE SHALL BE FITTED WITH DOWN-TURNED ELBOW PROPERLY SCREENED, OR A RELIEF VALVE. VENTS IN LOCATIONS SUBJECT TO HIGH WATER SHALL BE EXTENDED ABOVE MAXIMUM ELEVATION OF HIGH WATER AND SHALL BE SUPPORTED AND PROTECTED IN A MANNER THAT MEETS THE APPROVAL OF THE ENGINEER. VENT PIPES SHALL BE AT LEAST 4 FEET (VERTICALLY) FROM AERIAL ELECTRIC WIRES.

10. DEPTH OF INSTALLATION

REFER TO FIGURE 1 FOR MINIMUM COVER DEPTHS FOR PIPELINE CROSSINGS. PIPELINES LAID LONGITUDINALLY ON RAILROAD RIGHTS-OF-WAY, 45 FEET OR LESS FROM CENTERLINE OF TRACK, SHALL BE BURIED NOT LESS THAN 5 FEET FROM GROUND SURFACE TO TOP OF PIPE. WHERE PIPELINE IS LAID MORE THAN 45 FEET FROM CENTERLINE OF TRACK, MINIMUM COVER SHALL BE AT LEAST 4 FEET.

11. SHUT - OFF VALVES

ACCESSIBLE EMERGENCY SHUT-OFF VALVES SHALL BE INSTALLED WITHIN EFFECTIVE DISTANCES EACH SIDE OF THE RAILROAD AS AGREED TO BY THE ENGINEER AND THE PIPELINE COMPANY. WHERE PIPELINES ARE PROVIDED WITH AUTOMATIC CONTROL STATIONS AT LOCATIONS AND WITHIN DISTANCES APPROVED BY THE ENGINEER, NO ADDITIONAL VALVES SHALL BE REQUIRED.

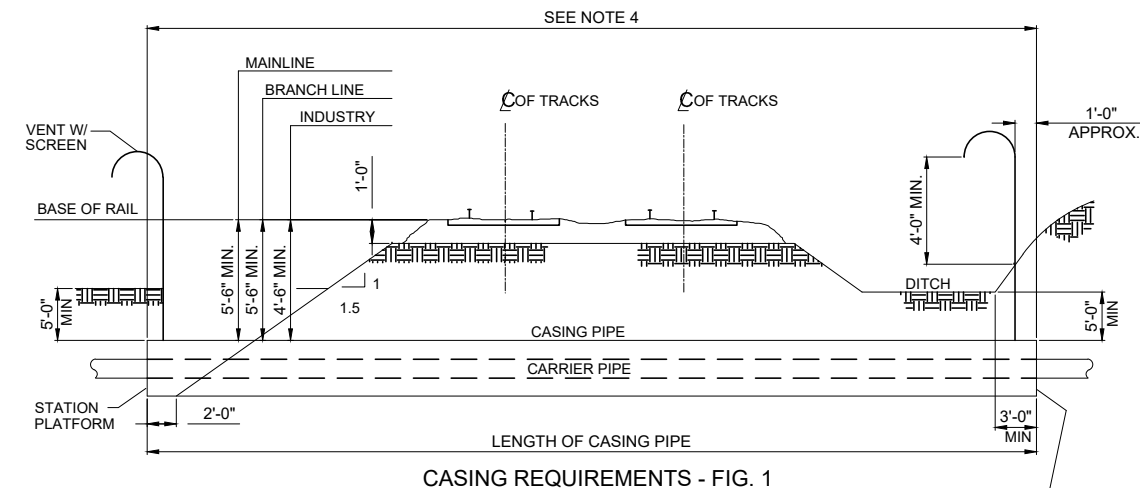
12. APPROVAL OF PLANS

PLANS OR SHOP DRAWINGS FOR PROPOSED INSTALLATION SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL PRIOR TO CONSTRUCTION. PLANS SHALL BE DRAWN TO SCALE SHOWING RELATION OF PROPOSED PIPELINE TO RAILROAD TRACKS, ANGLE OF CROSSING, MILEPOST LOCATION OR RAILROAD SERVICE STATION, RIGHTS-OF-WAY AND GENERAL LAYOUT OF TRACKS AND RAILROAD FACILITIES. PLANS SHALL INCLUDE ALL APPURTENANT FEATURES OF THE PIPELINE, SUCH AS VALVES, MANHOLES, VENTS, CASING ETC., LOCATED ON RAILROAD PROPERTY. CROSS SECTION OR PROFILE SHALL SHOW PIPELINE AND APPURTENANT FEATURES AS TO THE TRACKS AND SURROUNDING GROUND. THE EXECUTION OF THE WORK ON RAILROAD RIGHTS-OF-WAY SHALL BE SUBJECT TO THE INSPECTION AND DIRECTION OF THE ENGINEER OR HIS/HER AUTHORIZED REPRESENTATIVE.

13. EXECUTION OF WORK

THE PIPELINE AGREEMENT AND CONTRACTORS RIGHTS OF ENTRY AGREEMENT SHALL BE FULLY EXECUTED BEFORE ANY WORK WILL BE ALLOWED ON MTS/NCTD RIGHT-OF-WAY. THE EXECUTION OF THE WORK ON RIGHTS-OF-WAY, INCLUDING THE SUPPORTING OF TRACKS, SHALL BE SUBJECT TO THE INSPECTION AND DIRECTION OF THE ENGINEER. A MINIMUM OF 5 DAYS NOTICE TO SANDAG IS REQUIRED PRIOR TO ENTRY ON RIGHT-OF-WAY FOR CONSTRUCTION.

NOMINAL DIAMETER (INCHES)	MIN. WALL THICKNESS (INCHES)	NOMINAL DIAMETER (INCHES)	MIN. WALL THICKNESS (INCHES)
14" & UNDER	0.250" (1/4")	44" & 46"	0.656" (2 1/32")
16"	0.281" (9/32")	48"	0.688" (1 1/16")
18"	0.312" (5/16")	50"	0.719" (23/32")
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40"	0.594" (19/32")	72"	1.000" (1")
42"	0.625" (5/8")	OVER 72"	MUST BE APPROVED BY SANDAG

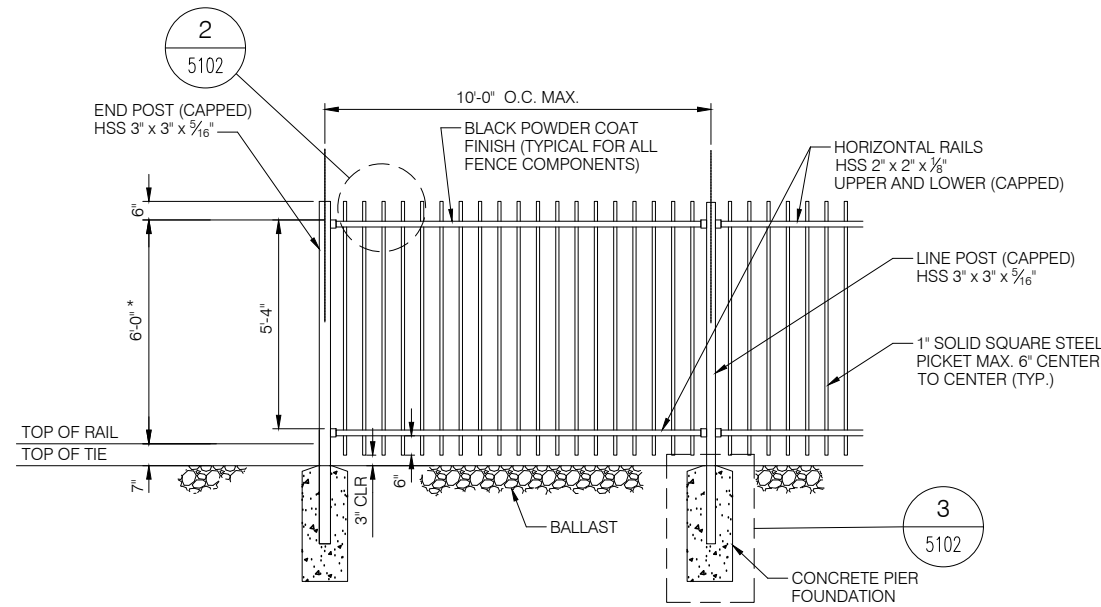


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REVISIONS				DRAWN RAILPROS	<p>SAN DIEGO ASSOCIATION OF GOVERNMENTS 401 B Street, Suite 800 San Diego, CA. 92101 www.sandag.org</p>	<p>NORTH COUNTY TRANSIT DISTRICT</p> <p>810 Mission Avenue Oceanside, CA 92054 www.gonctd.com</p>	<p>ENGINEERING STANDARD DRAWINGS</p> <p>NEW PIPELINES FOR FLAMMABLE SUBSTANCES</p>	DRAWING NO. ESD-5002
			CHECKED B. SMITH	DRAWING SHEET NO. 1 OF 1				
			RECOMMENDED B. SCHMITH	SCALE: NONE				
REV.	DATE	DESCRIPTION	DES.	ENG.				DATE

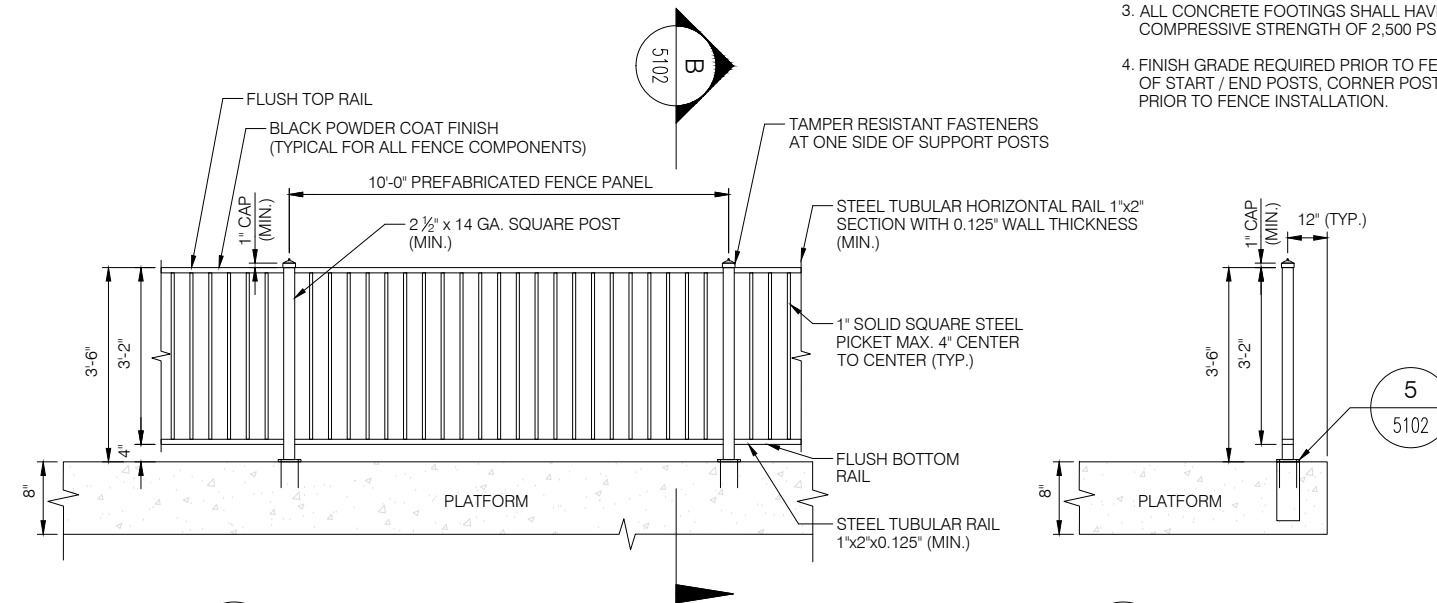
NOTES:

1. ALL HSS STEEL SHALL BE ASTM A500 GRADE B, ALL MISCELLANEOUS STEEL SHALL BE ASTM A36 UNLESS OTHERWISE NOTED.
2. REFER TO ESD-3210 FOR ADDITIONAL STRUCTURAL NOTES.
3. ALL CONCRETE FOOTINGS SHALL HAVE A MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 2,500 PSI.
4. FINISH GRADE REQUIRED PRIOR TO FENCE INSTALLATION. LOCATION OF START / END POSTS, CORNER POSTS AND GATE POSTS REQUIRED PRIOR TO FENCE INSTALLATION.

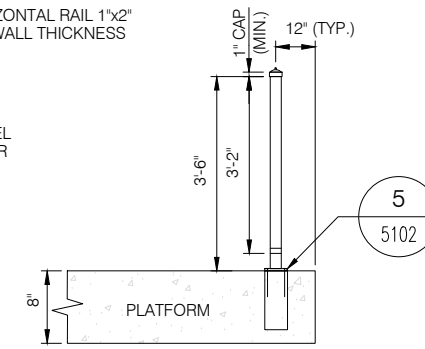


* NOTE: FENCE HEIGHT = 4' @ 150' FROM C OF GRADE CROSSINGS.

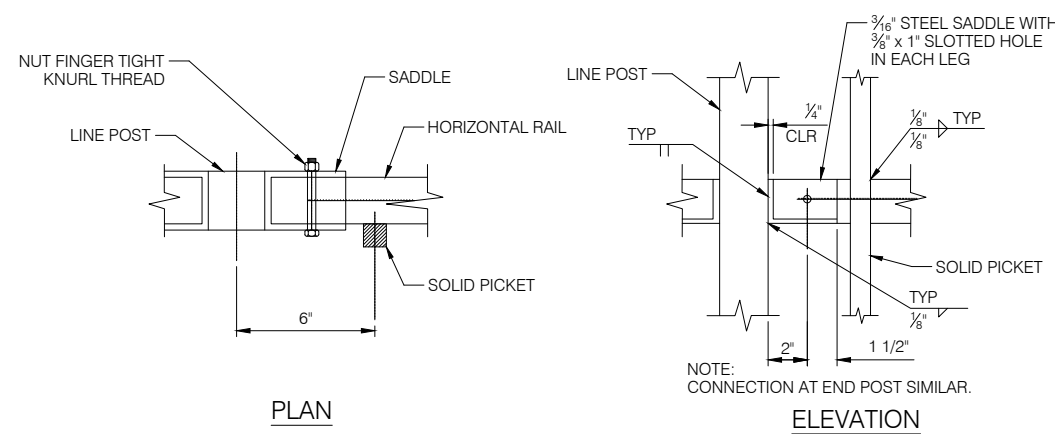
1 INTERTRACK FENCE DETAIL
NTS



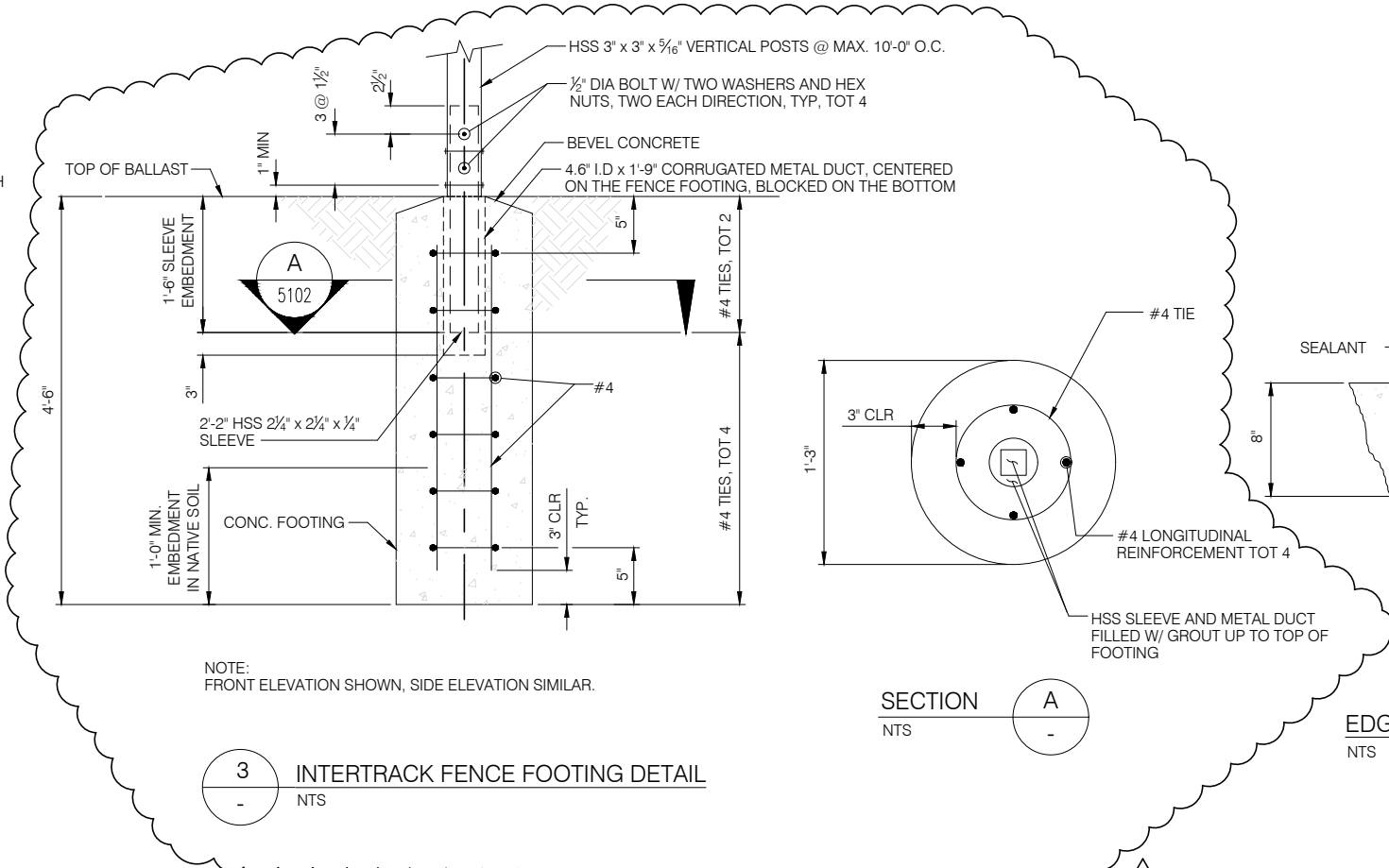
4 PLATFORM EDGE FENCE DETAIL
NTS



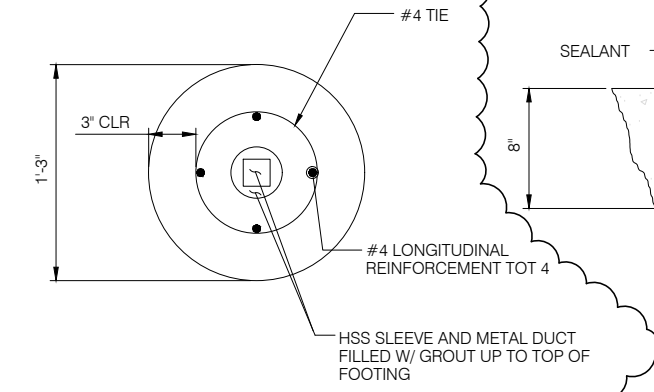
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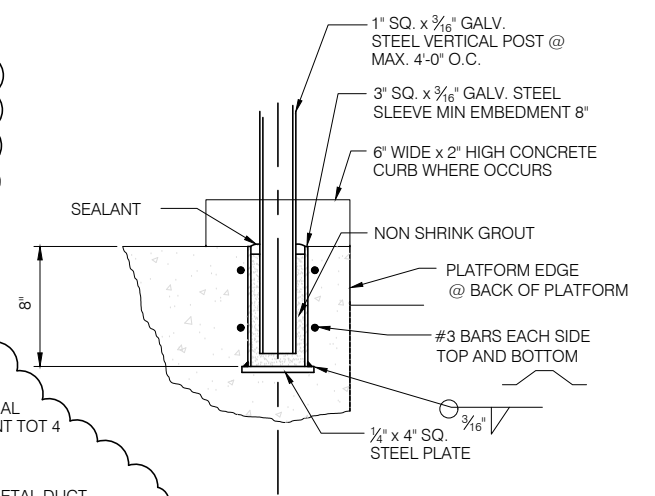
2 TYPICAL RAIL TO LINE POST CONNECTION FOR INTERTRACK PICKET FENCE
NTS



3 INTERTRACK FENCE FOOTING DETAIL
NTS



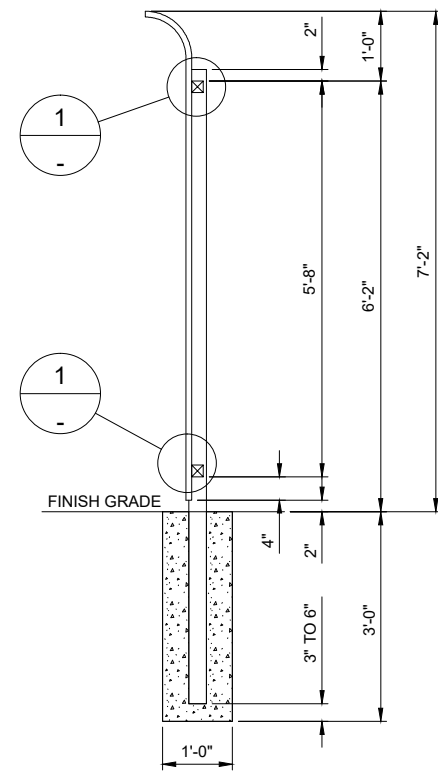
A SECTION
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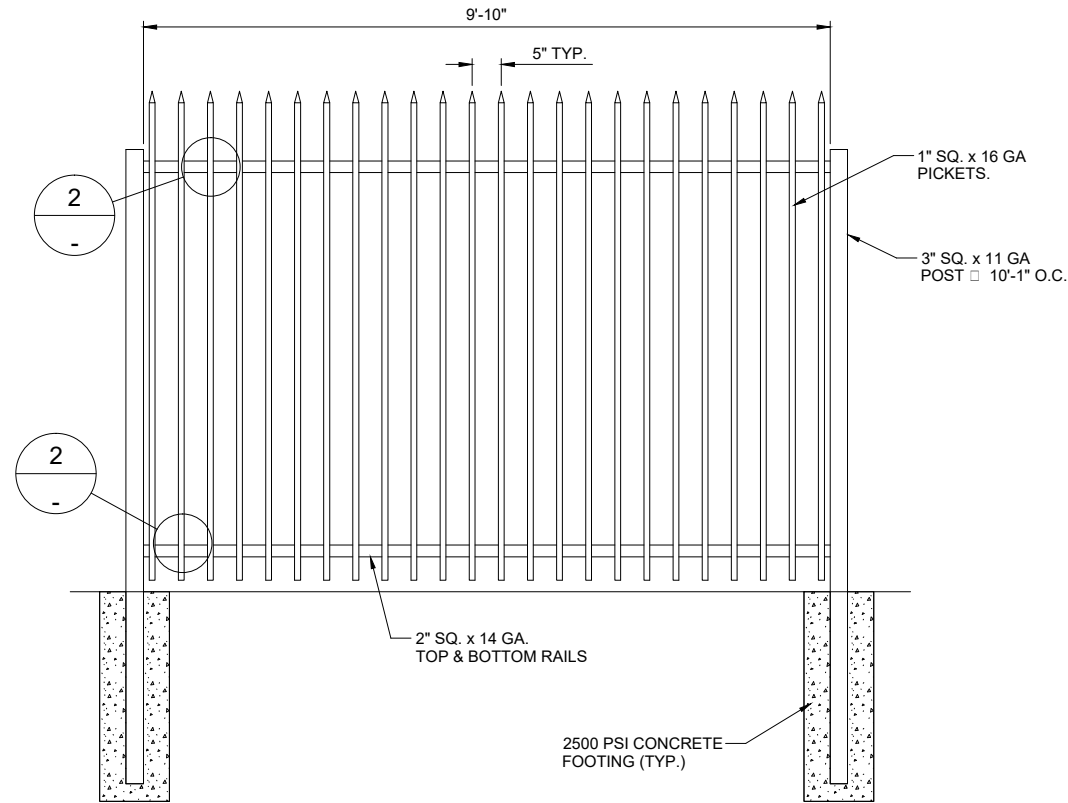
5 EDGE FENCE SLEEVE DETAIL
NTS

REV.	DATE	DESCRIPTION	DES.	ENG.
1	9/23/22	UPDATED POST AND FOOTING DIMENSIONS (cont): UPDATED NOTES	SH	DB

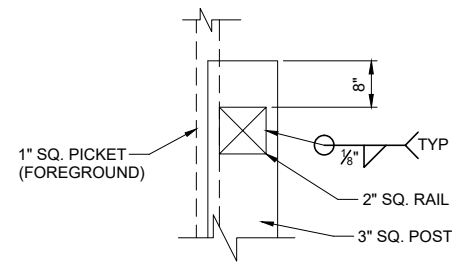
<p>REVISIONS</p> <p>1 9/23/22 UPDATED POST AND FOOTING DIMENSIONS (cont): UPDATED NOTES</p>	<p>DRAWN RAILPROS</p> <p>CHECKED A. ANDERSON</p> <p>RECOMMENDED B. SMITH</p> <p>DATE SEPT 2022</p>	<p>SANDAG/CTD ENGINEERING STANDARDS ARE INTENDED FOR SANDAG/CTD APPROVED USES ONLY. FOR NON-SANDAG/CTD APPROVED USES: SANDAG/CTD SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF THE DATA OR INFORMATION CONTAINED HEREIN. THE SELECTION AND USE OF THESE STANDARDS IS THE SOLE RESPONSIBILITY OF THE USER AND SHOULD NOT BE USED WITHOUT CONSULTING A REGISTERED PROFESSIONAL ENGINEER. ALL WARRANTIES AND REPRESENTATIONS OF ANY KIND ARE DISCLAIMED. ANYONE MAKING USE OF THIS INFORMATION AGREES THAT IT ASSUMES ALL LIABILITY ARISING FROM SUCH USE. NO PART OF THESE STANDARDS SHOULD BE REPRODUCED OR DISTRIBUTED IN ANY FORM OR BY ANY MEANS WITHOUT THE PRIOR WRITTEN PERMISSION OF SANDAG/CTD. ALL RIGHTS RESERVED.</p>	<p>SANDAG</p> <p>SAN DIEGO ASSOCIATION OF GOVERNMENTS 401 B Street, Suite 800 San Diego, CA. 92101 www.sandag.org</p>	<p>NORTH COUNTY TRANSIT DISTRICT</p> <p>810 Mission Avenue Oceanside, CA 92054 www.gonctd.com</p>	<p>ENGINEERING STANDARD DRAWINGS</p> <p>STATION FENCE DETAILS</p>	<p>DRAWING NO. ESD-5102</p> <p>DRAWING SHEET NO. 1 OF 1</p> <p>SCALE: NONE</p> <p>CONTRACT SHEET NO.</p>
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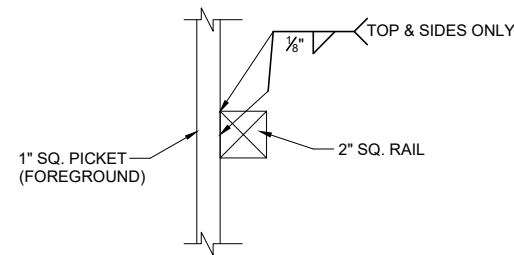
SIDE VIEW
SCALE: 3/4" = 1'-0"



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



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



DETAIL 2
SCALE: 3" = 1'-0"

NOTES:

1. ALL STEEL TO BE H.D. GALVANIZED PER ASTM A123.
2. ALL CONCRETE FOOTINGS SHALL HAVE A MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 2,500 PSI.
3. FINISH GRADE REQUIRED PRIOR TO FENCE INSTALLATION. LOCATION OF START / END POSTS, CORNER POSTS AND GATE POSTS REQUIRED PRIOR TO FENCE INSTALLATION.

MATERIAL SPECIFICATIONS:

- A. PICKETS: 1 INCH. SQUARE STEEL TUBULAR MEMBERS MANUFACTURED PER ASTM A-500 HAVING A YIELD STRENGTH OF 50,000 PSI. WALL THICKNESS SHALL BE 16 GAUGE. SPACE PICKETS AT 5 INCHES CENTER TO CENTER. ATTACH EACH PICKET TO RAILS BY WELDING WITH GAS METAL ARC METHOD.
- B. RAILS: 2 INCH SQUARE STEEL TUBULAR MEMBERS MANUFACTURED PER ASTM A-500, HAVING A YIELD STRENGTH OF 50,000 PSI. WALL THICKNESS SHALL BE 14 GAUGE. ATTACH EACH RAIL TO POSTS BY WELDING WITH THE GAS METAL ARC METHOD.
- C. POSTS: 3 INCH SQUARE STEEL TUBULAR MEMBERS MANUFACTURED PER ASTM A-500 HAVING A YIELD STRENGTH OF 50,000 PSI. WALL THICKNESS SHALL BE 11 GAUGE. SPACE POSTS AT 10'-1" CENTER TO CENTER.
- D. FINISH: ALL COMPONENTS TO BE GIVEN A 4-STAGE PRE-TREATMENT PROCESS THAT CLEANS AND PREPARES THE GALVANIZED SURFACE FOR THE FINISH COAT. ALL METAL IS THEN TO BE GIVEN A POLYESTER RESIN BASED POWDER COATING APPLIED BY THE ELECTROSTATIC SPRAY PROCESS, TO A THICKNESS OF 2.5 MILS. THE FINISH IS THEN TO BE BAKED IN A 450 DEG. OVEN FOR 20 MINUTES. COLOR FOR FINISH TO BE BLACK.

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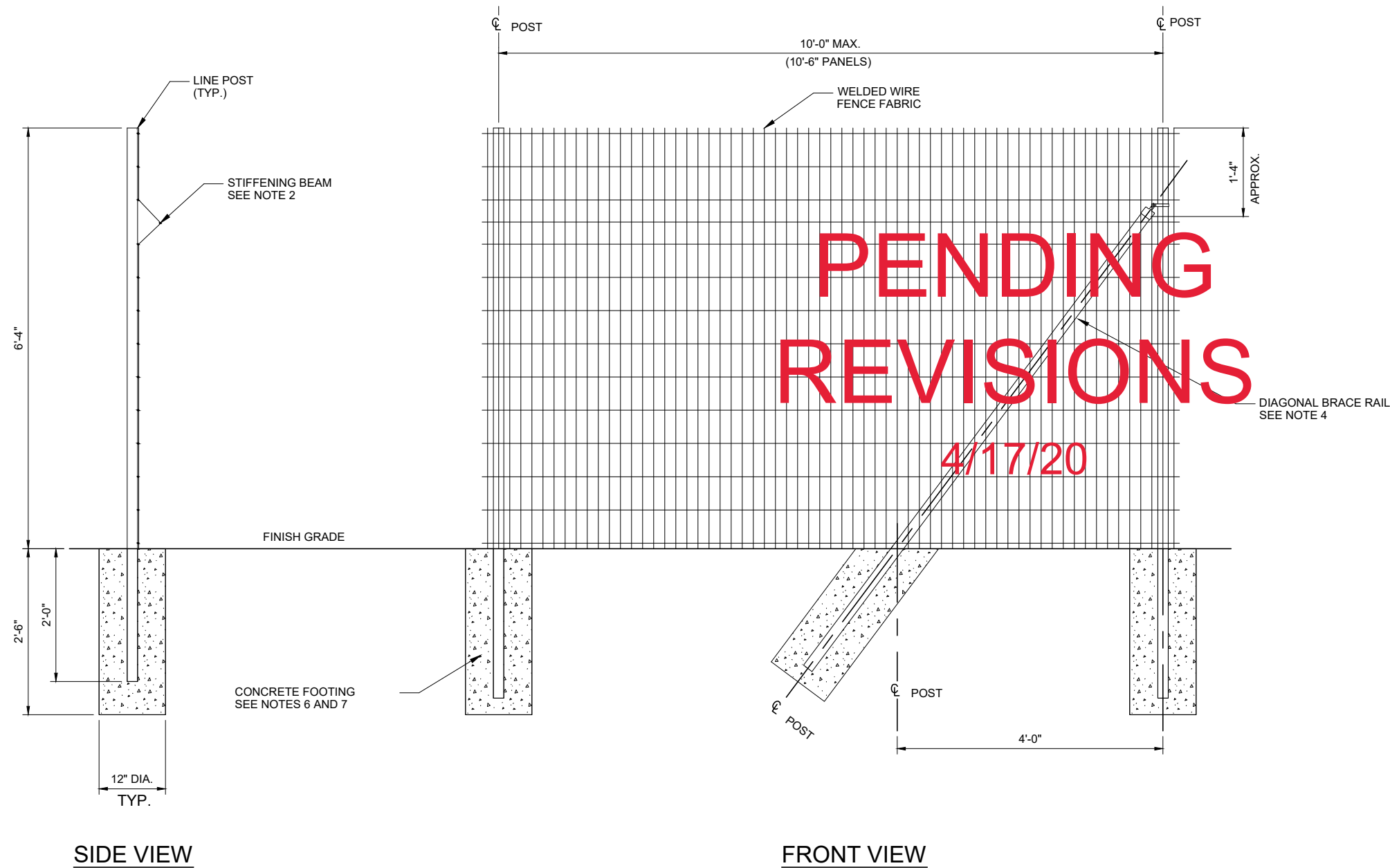
REVISIONS	DRAWN RAILPROS
	CHECKED B. SMITH <i>BSM</i>
	RECOMMENDED B. SCHMITH <i>BAS</i>
	DATE 10/08/15
DESIGNER PE STAMP	



ENGINEERING STANDARD DRAWINGS R.O.W. FENCE DETAILS (TUBE STEEL)	DRAWING NO. ESD-5104
	DRAWING SHEET NO. 1 OF 1
	SCALE: NONE
	CONTRACT SHEET NO.

NOTES:

1. WELDED WIRE FENCE FABRIC TO BE #6 GAUGE HARDENED STEEL WIRE WELDED INTO A 2" X 6" RECTANGULAR PATTERN PER ASTM A123, CLASS C1, 1.2 O₂ PER SQUARE FOOT. HOT DIP GALVANIZED AFTER WELDING.
2. TRIANGULAR SHAPED STIFFENING BEAM TO BE PLACED HORIZONTALLY APPROXIMATELY 12" DOWN FROM TOP OF WELDED WIRE MESH PANEL.
3. POSTS, BRACE RAILS AND GATE FRAMES SHALL BE STANDARD WEIGHT SCHEDULE 40 GALVANIZED PIPE PER ASTM A53 WITH A MINIMUM YIELD STRENGTH OF 35,000 PSI.
4. DIAGONAL BRACING AT 500 FT. MAXIMUM SPACING AND AT ALL TERMINAL, GATE AND CORNER POSTS.
5. TIE WIRE SHALL BE #9 GAUGE STEEL AND HOT-DIP GALVANIZED 1.2 O₂ PER SQUARE FOOT. TIES TO BE PLACED AT 16" O.C. AT ALL LINE POSTS AND DIAGONAL BRACING.
6. CONCRETE FOOTINGS TO HAVE A MINIMUM COMPRESSIVE STRENGTH OF 2500 PSI AT 28 DAYS.
7. LINE POST FOOTINGS SHOWN ON THIS DRAWING, FOOTINGS AT GATE AND END POSTS TO BE 12" DIA. X 3'-0" DEEP. ALL FOOTINGS TO BE CROWNED AT TOP FOR DRAINAGE.



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CHECKED B. SMITH	<i>BS</i>
RECOMMENDED B. SCHMITH	<i>BBS</i>
DATE	10/08/15
DESIGNER PE STAMP	

SANDAG

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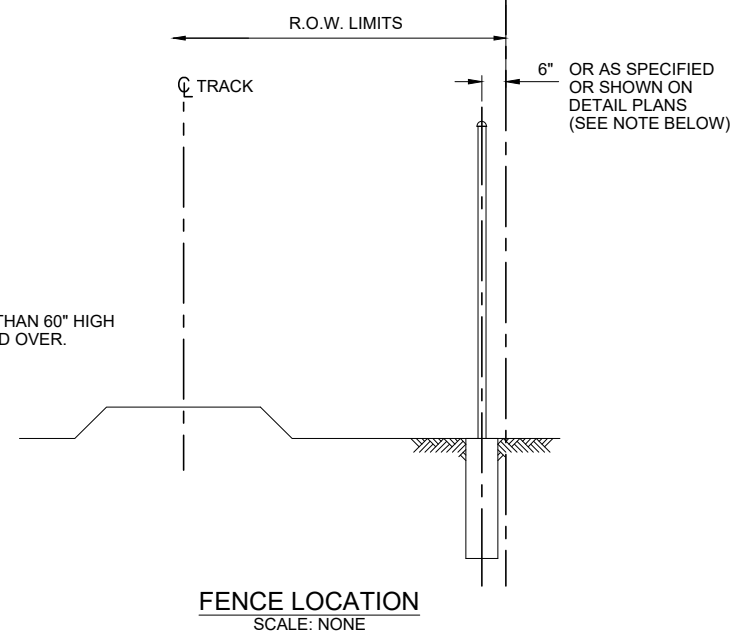
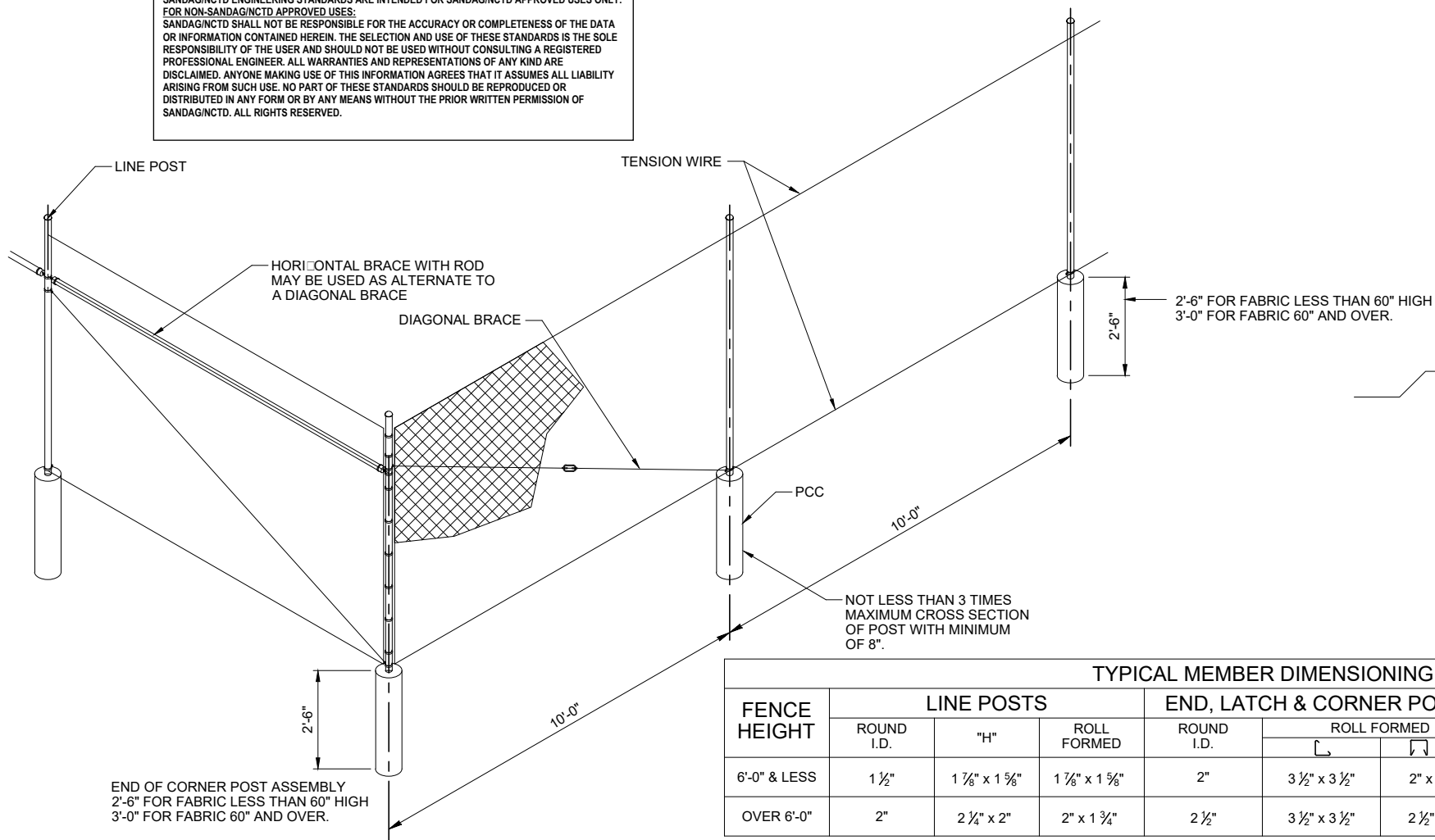
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ENGINEERING STANDARD DRAWINGS

R.O.W. FENCE DETAILS (WELDED WIRE MESH)

DRAWING NO.	ESD-5105
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	

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NOTES:

1. THE TABLE BELOW SHOWS EXAMPLE OF POST AND BRACE SECTIONS WHICH MAY COMPLY WITH THE SPECIFICATIONS.
2. SECTIONS SHOWN IN THE TABLES MUST ALSO COMPLY WITH THE STRENGTH REQUIREMENTS AND OTHER PROVISIONS OF THE SPECIFICATIONS.
3. OTHER SECTIONS WHICH COMPLY WITH THE STRENGTH REQUIREMENTS AND OTHER PROVISIONS OF THE SPECIFICATIONS MAY BE USED ON APPROVAL OF SANDAG DIRECTOR OF ENGINEERING.
4. OPTIONS EXERCISED SHALL BE UNIFORM ON ANY ONE PROJECT.
5. DIMENSIONS SHOWN ARE NOMINAL.
6. WIRE GAGE TO BE 11 GA. OR 9 GA. AS DETERMINED BY FIELD CONDITIONS.
7. FOR ADDITIONAL INFORMATION REFER TO SANDAG/NCTD STANDARD SPECIFICATIONS GENERAL PROVISIONS SECTION 80, RIGHT OF WAY AND TRAFFIC CONTROL FACILITIES - FENCING.
8. FENCE POSTS SHALL BE SET IN CONCRETE FOOTINGS INTO SUITABLE SOIL CONFORMING TO THE DETAILS SHOWN ON THIS DRAWING AND CROWNED AT THE TOP TO SHED WATER.
9. PORTLAND CEMENT CONCRETE FOR METAL POST FOOTINGS AND FOR DEADMEN SHALL BE PRODUCED FROM COMMERCIAL QUALITY AGGREGATES AND CEMENT AND SHALL CONTAIN NOT LESS THAN 275KG OF CEMENT PER CUBIC METER.

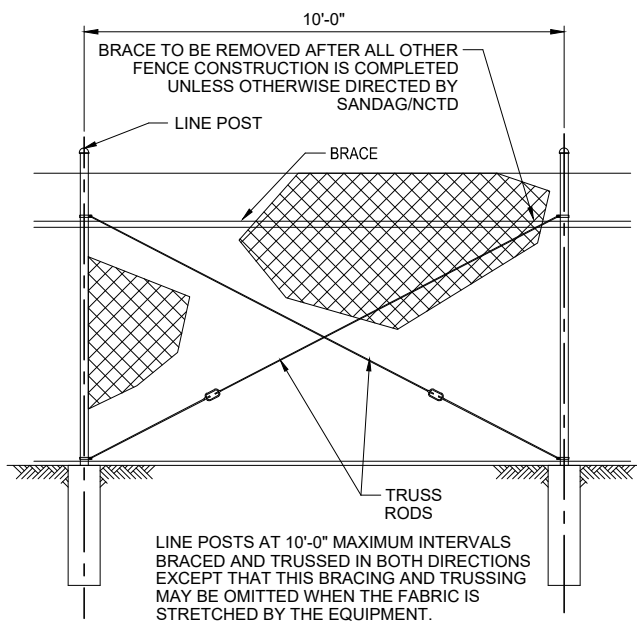
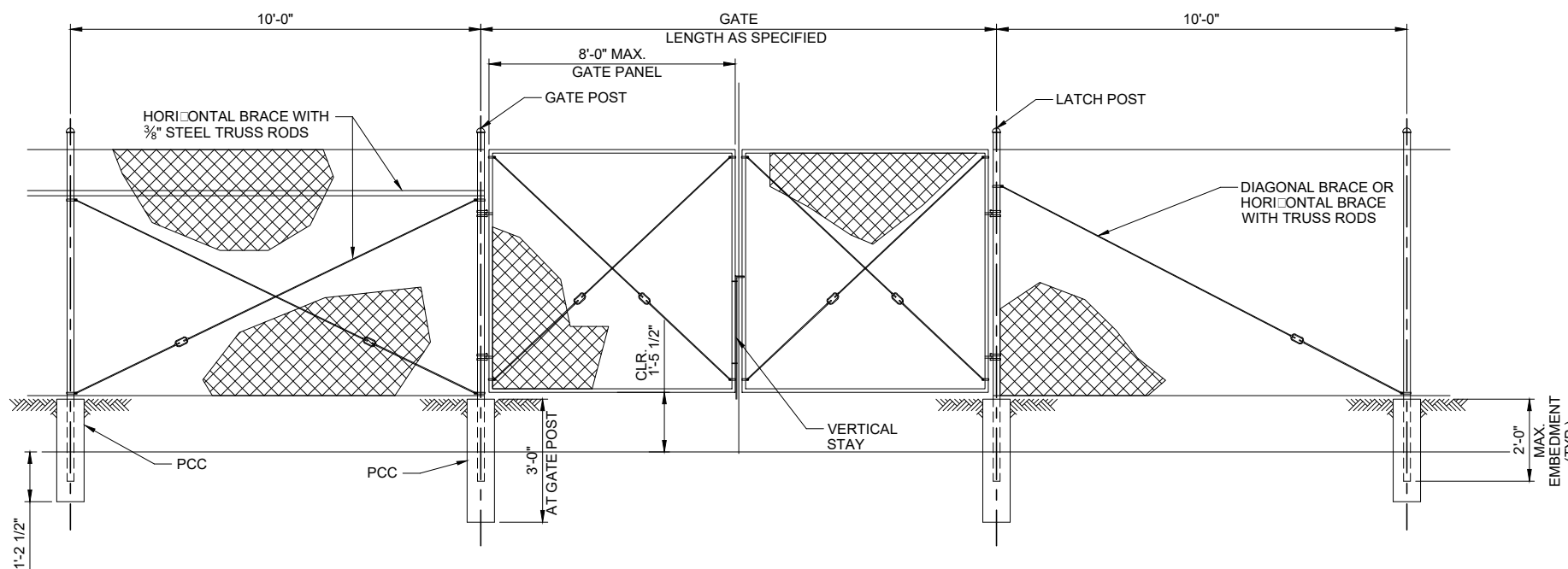
FABRIC TYPES:

- TYPE CL-4 □ 48" FABRIC.
- TYPE CL-6 □ 72" FABRIC.

TYPICAL MEMBER DIMENSIONING (SEE NOTES)										
FENCE HEIGHT	LINE POSTS			END, LATCH & CORNER POSTS			BRACES			
	ROUND I.D.	"H"	ROLL FORMED	ROUND I.D.	ROLL FORMED		ROUND I.D.	"H"	ROLL FORMED	
					┌	└			┌	└
6'-0" & LESS	1 1/2"	1 7/8" x 1 5/8"	1 7/8" x 1 5/8"	2"	3 1/2" x 3 1/2"	2" x 1 3/4"	1 1/4"	1 1/2" x 1 5/16"	1 5/8" x 1 1/4"	1 3/4" x 1 1/4"
OVER 6'-0"	2"	2 1/4" x 2"	2" x 1 3/4"	2 1/2"	3 1/2" x 3 1/2"	2 1/2" x 2 1/2"	1 1/4"	1 1/2" x 1 5/16"	1 5/8" x 1 1/4"	1 3/4" x 1 1/4"

GATE POST 6'-0" AND LESS		
GATE WIDTHS	NOMINAL I.D.	WEIGHT PER FT.
UP THRU 6'	2"	4.95
OVER 6' THRU 12'	4"	10.79
OVER 12' TO 18'	5"	14.62
OVER 18' TO 24' MAX.	6"	18.97
GATE POST OVER 6'-0"		
GATE WIDTHS	NOMINAL I.D.	WEIGHT PER FT.
UP THRU 6'	3"	7.58
OVER 6' THRU 12'	5"	14.62
OVER 12' TO 18'	6"	18.97
OVER 18' TO 24' MAX.	8"	28.55

ABOVE POST DIMENSIONS AND WEIGHTS ARE MINIMUMS. LARGER SIZES MAY BE USED ON APPROVAL OF SANDAG.



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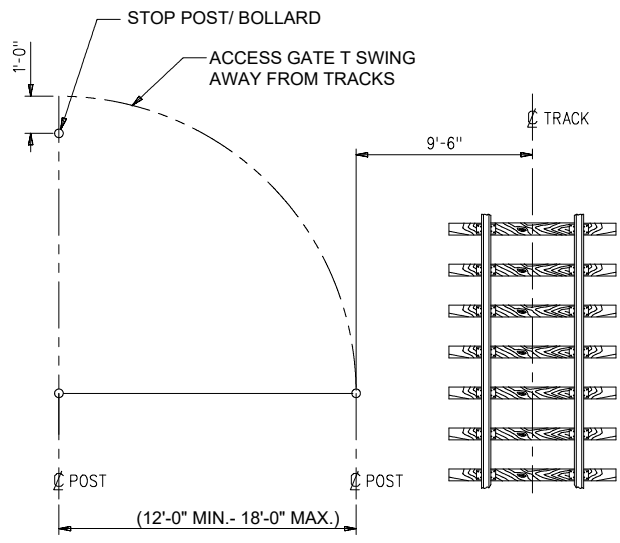
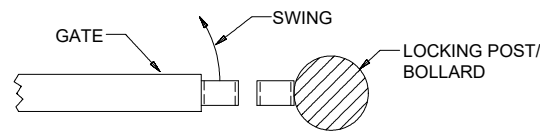
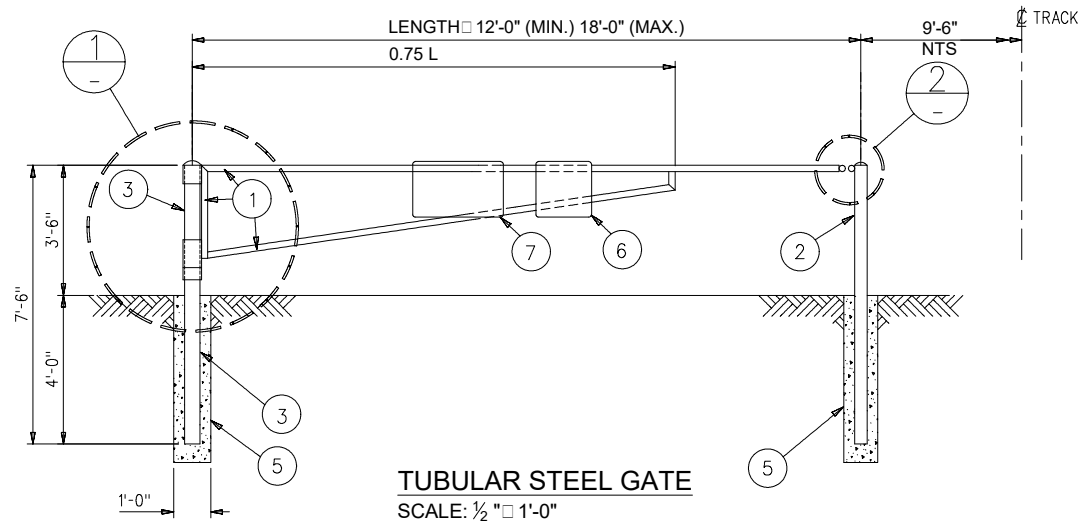
DRAWN RAILPROS	DESIGNER PE STAMP
CHECKED B. SMITH	
RECOMMENDED B. SCHMITH	
DATE 10/08/15	

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ENGINEERING STANDARD DRAWINGS	DRAWING NO. ESD-5106
	DRAWING SHEET NO. 1 OF 1
	SCALE: NONE
	CONTRACT SHEET NO.

R.O.W. FENCE DETAILS (CHAIN LINK)



NOTES:

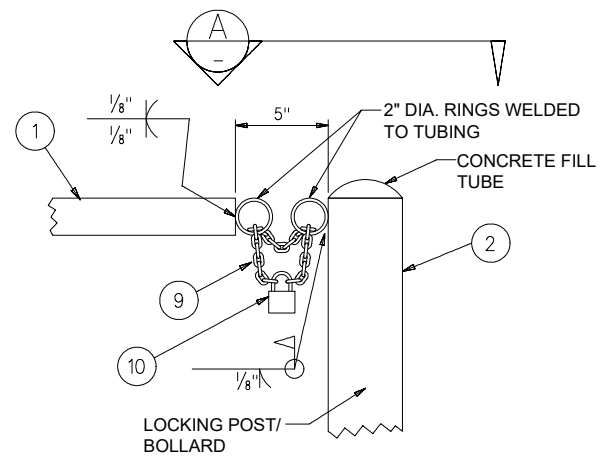
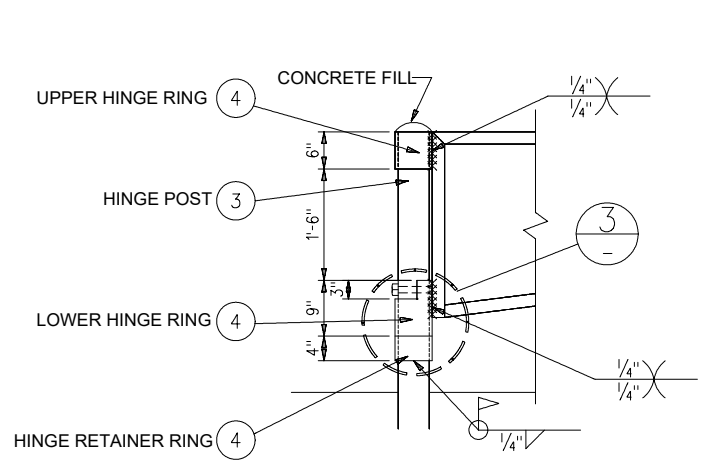
- EXISTING ELEMENTS OF RIGHT-OF-WAY SECURITY WILL BE INTEGRATED INTO THE LAYOUT TO OBTAIN EFFECTIVE DETERRENCE WITH MINIMUM OF NEW CONSTRUCTION. BUILDINGS, WALLS, DITCHES, UTILITY POLES, FENCES, SIGNS WITH POSTS(AT LEAST SIX INCHES IN WIDTH), MONUMENTS, ABUTMENTS OR PERMANENT LANDSCAPING MORE THAN 3 FEET TALL ARE ACCEPTABLE DETERRENCE. IF FENCE, WALL OR BUILDING IS WITHIN 12 FEET OF THE CENTERLINE OF TRACK, NO BARRIER IS REQUIRED.
- SECURITY GATE TYPICAL LAYOUT PLAN ILLUSTRATED FOUR SITUATIONS, ONE IN EACH QUADRANT THAT CAN BE USED TO DENY ACCESS. AUTHORIZED PERSONS MAY RECOMMEND OTHER ELEMENTS OF VEHICLE CONTROL TO FIT CONDITIONS.
- SECURITY GATES WILL BE PLACED AT LEAST 25 FEET FROM THE ROADWAY TO ALLOW AUTHORIZED VEHICLES TO STOP CLEAR OF TRAFFIC TO OPEN/CLOSE LOCKED GATES. THE TRACK SIDE OF THE PARKING AREA IS TO BE CLOSED OFF WITH BOLLARDS, K-RAIL, OR OTHER BARRIERS.
- INSTALLATION OF BOLLARDS OR GATE POSTS MAY BE ADJUSTED TO AVOID CONFLICT WITH SIGNAL OR OTHER UNDERGROUND UTILITIES. LOCATIONS OF UNDERGROUND UTILITIES MUST BE CLEARLY ESTABLISHED PRIOR TO ANY EXCAVATION.
- BOLLARDS WILL BE SPACED 48" TO 66" ON CENTER AND EACH RUN OF LOCATION WILL BE UNIFORM. BOLLARDS AND K-RAIL WILL NOT IMPEDE PEDESTRIAN OR SIDEWALK TRAFFIC.
- SECURITY GATES WILL BE PAINTED PROTECT RUST PREVENT ENAMEL GLOSS SAFETY YELLOW, SKU NO. 01-0597101.
- INSTALLATION OF ELEMENTS MUST NOT BLOCK DRAINAGE FROM TRACK OR ALONG THE TRACK, THE "OVERHANGING" BOLLARD WILL BE USED TO SPAN DRAINAGE OR UNDERGROUND UTILITIES AND STILL MAINTAIN A GAP BETWEEN BOLLARDS OR NOT MORE THAN 66 INCHES. LOCAL GRADING OR OTHER WORK IS NEEDED TO DRAIN THE SECURED AREA, IT WILL BE CARRIED OUT AS PART OF THE INSTALLATION.
- STOP BOLT WILL BE 1" IN DIAMETER BY 7" LONG. BOTH ENDS OF THE BOLT WILL BE WELDED TO HINGE POST THEN CUT AND GRIND THREADED END FLUSH TO HINGE POST SO AS NOT TO IMPEDE ROTATION OF LOWER HINGE RING.

LEGEND:

- 1 2" STANDARD WEIGHT TUBE (OUTSIDE DIA. - 2.375" - INSIDE DIA. - 2.067")
- 2 4" STANDARD WEIGHT TUBE (OUTSIDE DIA. - 4.5" - INSIDE DIA. - 4.026")
- 3 5" STANDARD WEIGHT TUBE (OUTSIDE DIA. - 5.563" - INSIDE DIA. - 5.047")
- 4 6" EXTRA STRENGTH TUBE (OUTSIDE DIA. - 6.625" - INSIDE DIA. - 5.761")
- 5 6" MINIMUM 2500 PSI CONCRETE BACKFILL
- 6 NO TRESPASSING SIGN (BOTH SIDES) PER ESD 5214-02.2
- 7 MODIFIED TYPE "OM1-3" (AS PER MUTCD) WARNING SIGN TO READ: "KEEP LOCKED, FLAGPERSON REQUIRED TO USE CROSSING" PER ESD-4302-02

LEGEND:(CONT.)

- 8 STOP BOLT
- 9 GRADE 70 HIGH TENSILE STEEL 3/4," APPROXIMATELY 2 FT. LONG CHAIN
- 10 S & G OR EQUAL ENVIRONMENTAL PADLOCK



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DRAWN RAILPROS	
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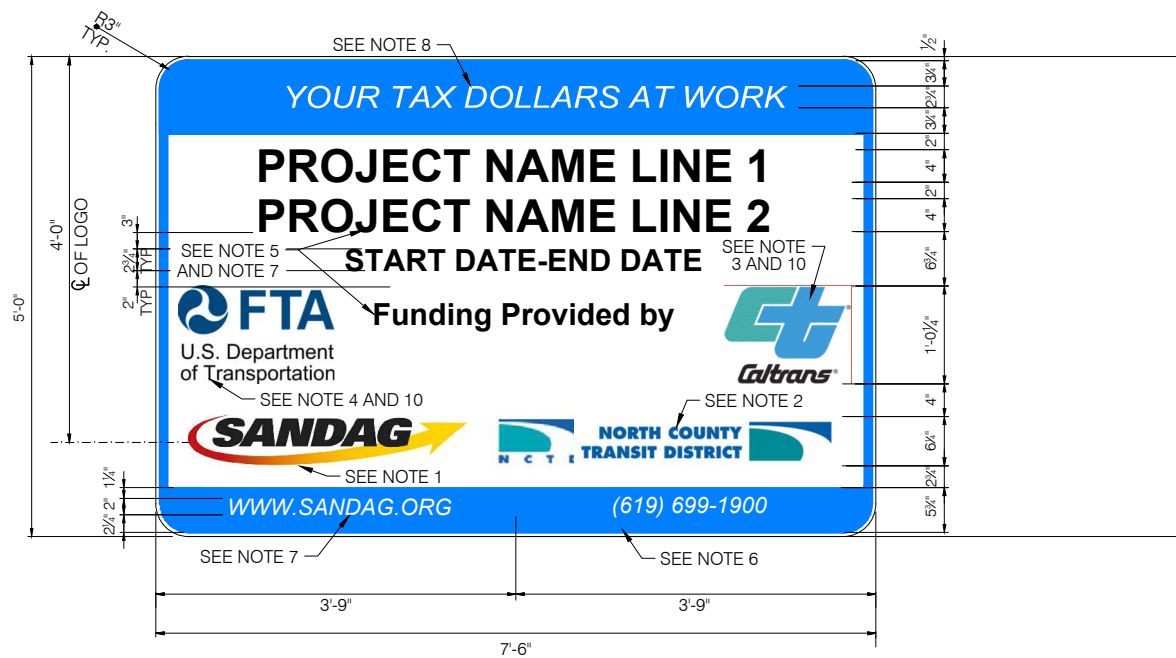
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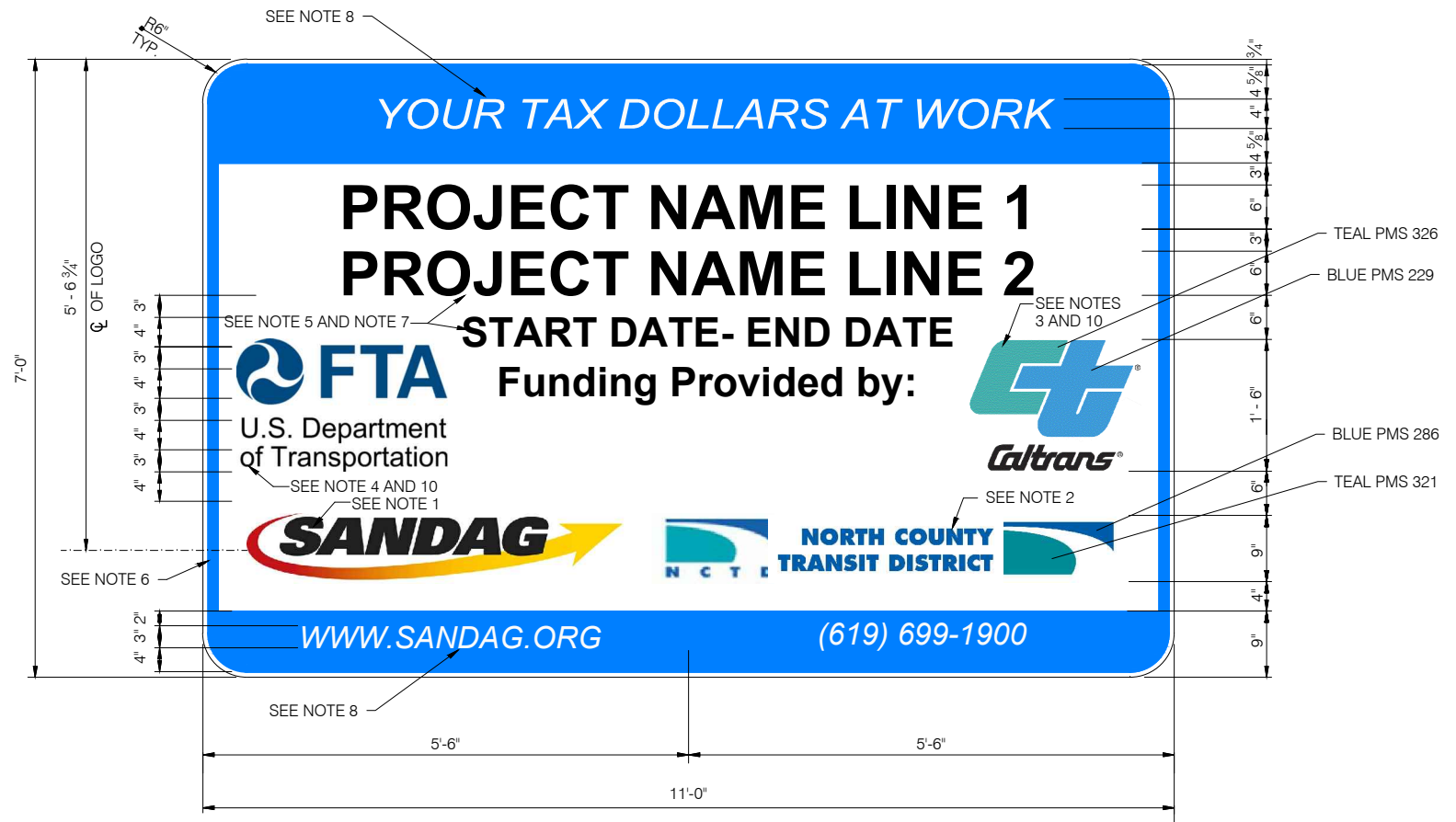
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ENGINEERING STANDARD DRAWINGS SECURITY ACCESS GATE DETAILS	DRAWING NO. ESD-5107
	DRAWING SHEET NO. 1 OF 1
	SCALE: NONE
	CONTRACT SHEET NO.



TYPE 1



TYPE 2

NOTES:

- "SANDAG" LOGO COLORS PER SANDAG STANDARDS ARE PANTONE RED PMS 186 AND GOLD PMS 116.
- "NCTD" LOGO COLORS PER NCTD STANDARDS ARE TEAL PMS 321 AND BLUE PMS 286.
- "CALTRANS" LOGO COLORS PER CALTRANS STANDARDS ARE PANTONE TEAL PMS 326, LIGHT BLUE PMS 229, AND BLACK PMS 433.
- "FTA U.S. DEPARTMENT OF TRANSPORTATION" LOGO COLORS IS DARK BLUE PMS 294.
- EXCEPT AS OTHERWISE SHOWN THE LEGEND OF THE SIGN SHALL BE BLACK (PMS 433 X) ON A WHITE BACKGROUND NON - REFLECTIVE.
- THE BORDERS OF THE SIGNS SHALL BE PAINTED "BLUE" (PMS 286), 3/4" THICK FOR TYPE 1 SIGN, 1" FOR TYPE 2 SIGN NON - REFLECTIVE
- LETTER STYLE SHALL BE "ARIAL - BOLD"
- LETTER STYLE SHALL BE "ARIAL - ITALICS"
- REFER TO CALTRANS STANDARD PLANS RS1 AND RS3 FOR INSTALLATIONS DETAILS.
- FOR MORE THAN TWO FUNDING LOGOS, SCALE LOGOS PROPORTIONALLY TO FIT AS NEEDED.
- 3/8" THICK MILL FINISH ALUMINUM PANEL, ALCOA 6016-T6 OR EQUAL.

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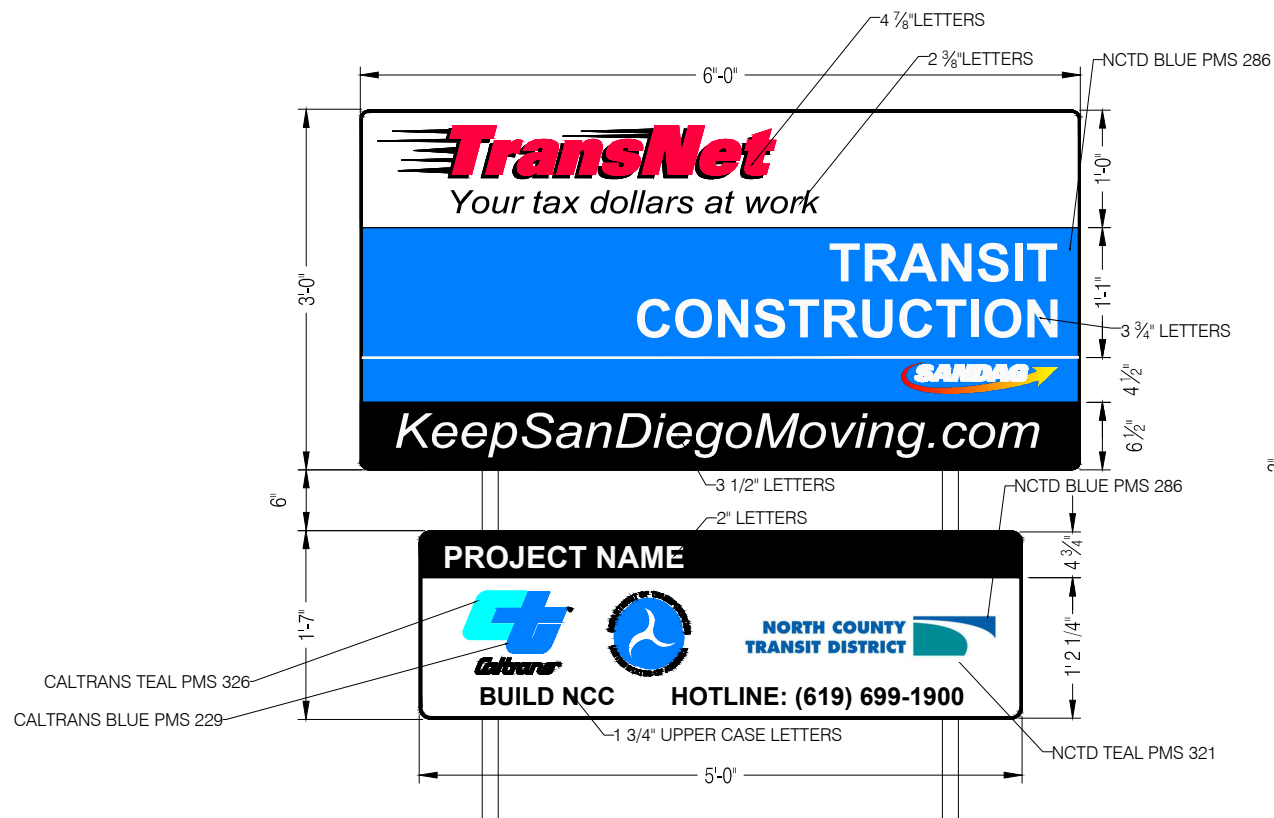
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ENGINEERING STANDARD DRAWINGS

FUNDING SIGNS-NON TRANSNET

DRAWING NO.	ESD-5201
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	



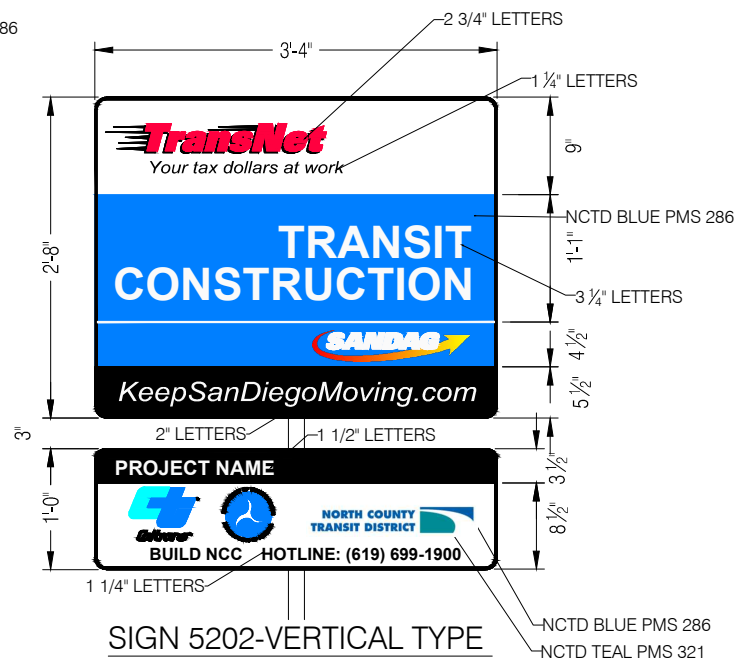
SIGN 5202-HORIZONTAL TYPE

TRANSNET SIGN DIMENSIONS (HORIZONTAL):

72"W X 36"H - (6.0' W X 3.0' H)

CONSTRUCTION DETAILS:

- 0.063" ANODIZED ALUMINUM PANELS
- AVERY-DENNISON T-6500 HIGH INTENSITY SERIES PRISMATIC REFLECTIVE SHEETING (3M TYPE IV), OR EQUIVALENT
- AVERY-DENNISON T-9500 OMNIVIEW SERIES" PREMIUM PRISMATIC GRADE REFLECTIVE SHEETING (3M TYPE IX DIAMOND GRADE VIP), OR EQUIVALENT - TO BE USED FOR *KEEPSANDIEGOMOVING* URL AREA ONLY
- AVERY-DENNISON OL-1000. PREMIUM ANTI-GRAFFITI OVERLAY FILM, OR EQUIVALENT
- UV INKS TO BE USED WITHOUT EXCEPTION



SIGN 5202-VERTICAL TYPE

TRANSNET SIGN DIMENSIONS (VERTICAL):

40" W X 32" H - (3.33' W X 2.66' H)

CONSTRUCTION DETAILS:

- 0.063" ANODIZED ALUMINUM PANELS
- AVERY-DENNISON T-6500 HIGH INTENSITY SERIES PRISMATIC REFLECTIVE SHEETING (3M TYPE IV), OR EQUIVALENT
- AVERY-DENNISON T-9500 OMNIVIEW SERIES" PREMIUM PRISMATIC GRADE REFLECTIVE SHEETING (3M TYPE IX DIAMOND GRADE VIP), OR EQUIVALENT - TO BE USED FOR *KEEPSANDIEGOMOVING* URL AREA ONLY
- AVERY-DENNISON OL-1000. PREMIUM ANTI-GRAFFITI OVERLAY FILM, OR EQUIVALENT
- UV INKS TO BE USED WITHOUT EXCEPTION

SECONDARY SIGN DIMENSIONS (VERTICAL):

40" W X 12" H - (3.33' W X 1.0' H)
TO BE MOUNTED 3" BELOW PRIMARY SIGN

CONSTRUCTION DETAILS:

- SAME AS MATERIALS USED FOR TRANSNET SIGN
- ARTWORK FOR SECONDARY SIGN IS FOR ILLUSTRATIVE PURPOSES AND WILL VARY DEPENDING ON JURISDICTION OR PROJECT TYPE.
- CUSTOM VERSIONS FOR SPECIFIC PROJECTS CAN BE REQUESTED THROUGH ELIABETH COX, ELIABETH.COX@SANDAG.ORG.

NOTES:

1. "SANDAG" LOGO COLORS PER SANDAG STANDARDS ARE PANTONE RED PMS 186 AND GOLD PMS 116.
2. "NCTD" LOGO COLORS PER NCTD STANDARDS ARE TEAL PMS 321 AND BLUE PMS 286.
3. "CALTRANS" LOGO COLORS PER CALTRANS STANDARDS ARE PANTONE TEAL PMS 326, LIGHT BLUE PMS 229, AND BLACK PMS 433.
4. "U.S. DEPARTMENT OF TRANSPORTATION" LOGO COLORS IS DARK BLUE PMS 294.
5. EXCEPT AS OTHERWISE SHOWN THE LEGEND OF THE SIGN SHALL BE BLACK (PMS 433 X) ON A WHITE BACKGROUND NON - REFLECTIVE.
6. THE BORDERS OF THE SIGNS SHALL BE PAINTED "BLUE" (PMS 286), 3/4" THICK FOR TYPE 1 SIGN, 1" FOR TYPE 2 SIGN NON - REFLECTIVE
7. LETTER STYLE SHALL BE "ARIAL - BOLD"
8. LETTER STYLE SHALL BE "ARIAL - ITALICS"
9. REFER TO CALTRANS STANDARD PLANS RS1 AND RS3 FOR INSTALLATIONS DETAILS.
10. FOR MORE THAN TWO FUNDING LOGOS, SCALE LOGOS PROPORTIONALLY TO FIT AS NEEDED.
11. 1/8" THICK MILL FINISH ALUMINUM PANEL, ALCOA 6016-T6 OR EQUAL.
12. SIGN PRODUCTION CONTINGENT ON APPROVAL OF FULL SCALE PROOF USING ACTUAL MATERIALS BY KEITH KANIEL.
13. HOTLINE NUMBER TO BE ASSIGNED BY SANDAG/NCTD COMMUNICATIONS OFFICE.

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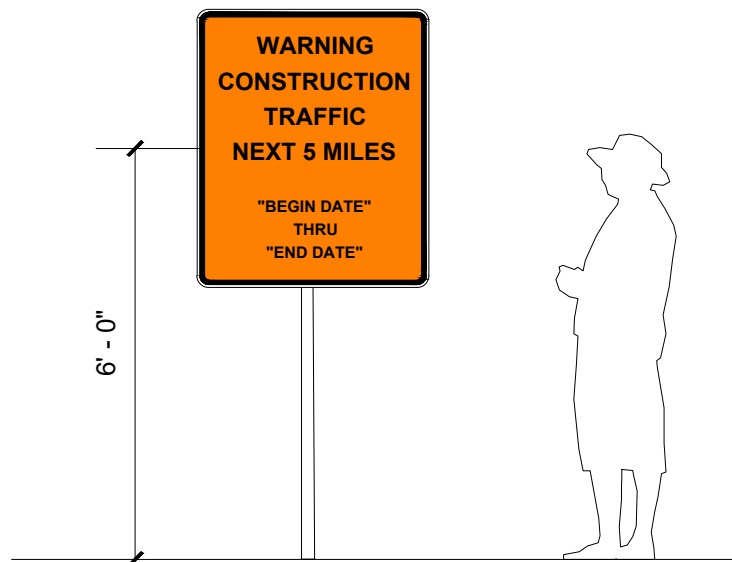
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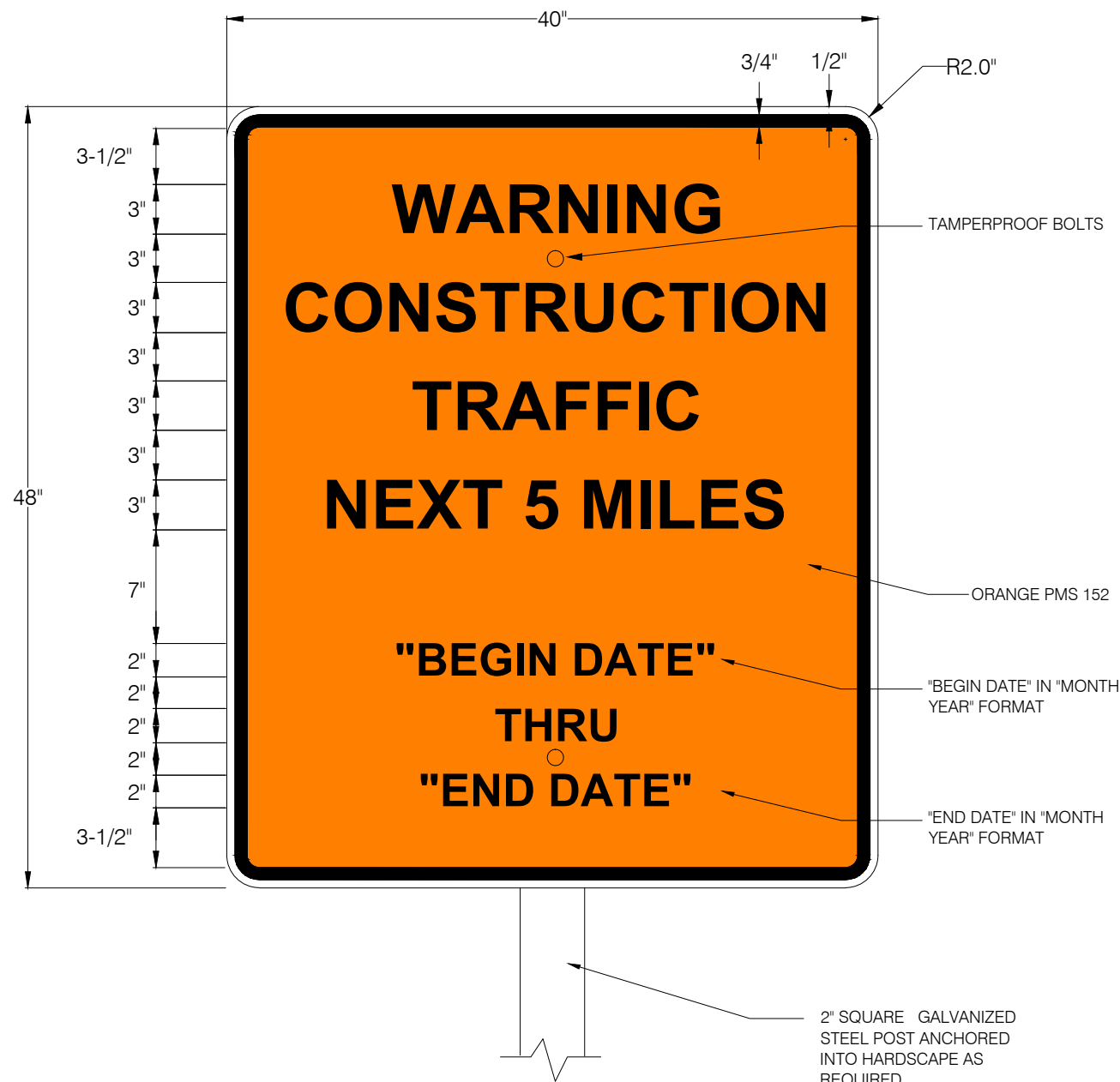
ENGINEERING STANDARD DRAWINGS

FUNDING SIGNS-TRANSNET
TRANSIT CONSTRUCTION

DRAWING NO.	ESD-5202
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	



MOUNTING ELEVATION
SCALE: NTS



RESTRICTIVE SIGN:
ALUMINUM SIGN PANEL W/ REFLECTIVE VINYL SHEETING & FRISKET PAINTED COPY; ATTACHED TO POST. REFER TO IS-003 FOR ADDITIONAL SIGN DESCRIPTIONS.

COLORS:
LEGEND,BORDER - BLACK
BACKGROUND - ORANGE
(RETROFLECTIVE)

NOTE:
ISOLATE METALS W/ NEOPRENE SPACERS TO PREVENT ELECTROLYSIS.

LOCATION:
THIS SIGN SHALL BE LOCATED ALONG OLD PACIFIC HIGHWAY AT REGULAR INTERVALS AS PER OWNER

ANCHOR:
REFER TO ESD-5210

SIGN 5203 - "WARNING CONSTRUCTION TRAFFIC" SIGN - FRONT VIEW.
SCALE: NTS

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REVISIONS				DESIGNER PE STAMP
REV.	DATE	DESCRIPTION	DES. ENG.	

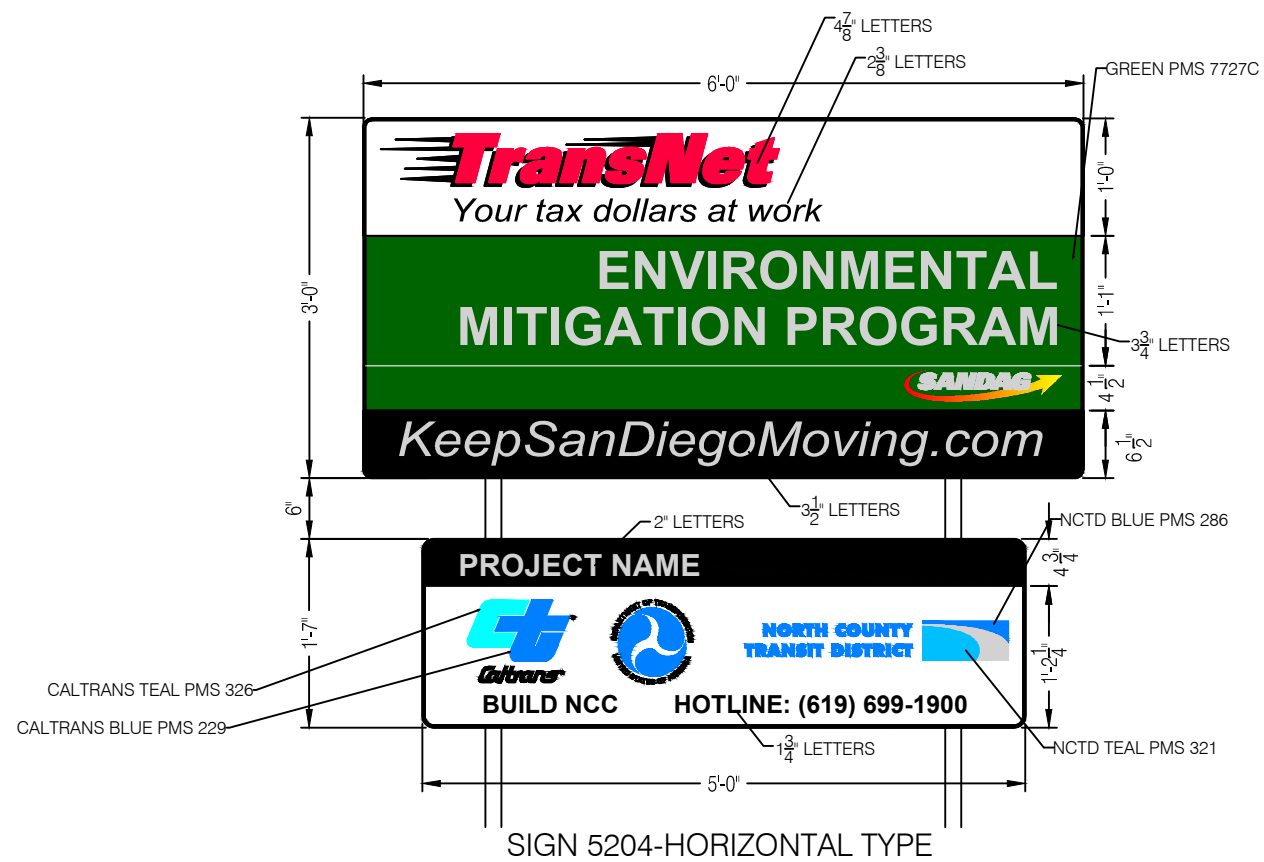
SAN DIEGO ASSOCIATION OF GOVERNMENTS
401 B Street, Suite 800
San Diego, CA. 92101
www.sandag.org

810 Mission Avenue
Oceanside, CA 92054
www.gonctd.com

ENGINEERING STANDARD DRAWINGS

TEMPORARY SANDAG WARNING CONSTRUCTION TRAFFIC SIGNS

DRAWING NO.	ESD-5203
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	

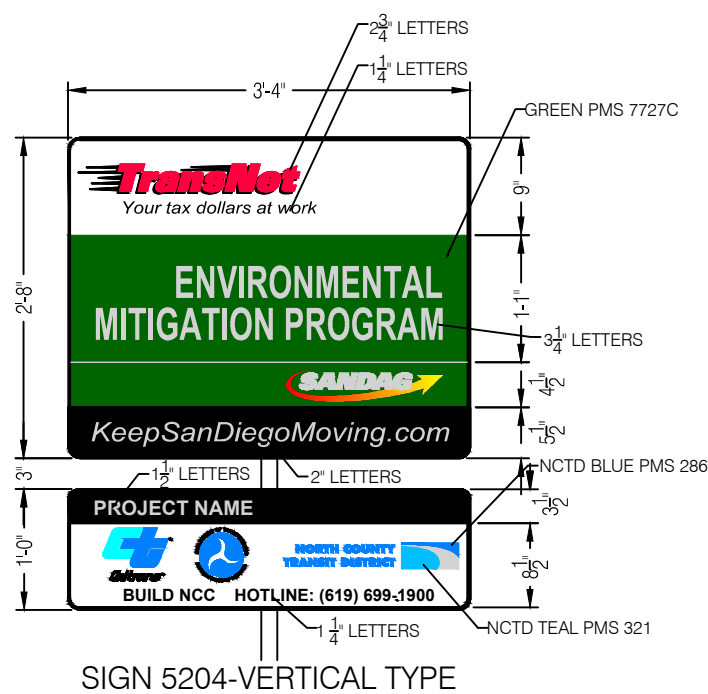


TRANSNET SIGN DIMENSIONS (HORIZONTAL):

72"W X 36"H - (6.0' W X 3.0' H)

CONSTRUCTION DETAILS:

- 0.063" ANODIZED ALUMINUM PANELS
- AVERY-DENNISON T-6500 HIGH INTENSITY SERIES PRISMATIC REFLECTIVE SHEETING (3M TYPE IV), OR EQUIVALENT
- AVERY-DENNISON T-9500 OMNIVIEW SERIES* PREMIUM PRISMATIC GRADE REFLECTIVE SHEETING (3M TYPE IX DIAMOND GRADE VIP), OR EQUIVALENT - TO BE USED FOR *KEEPSANDIEGOMOVING* URL AREA ONLY
- AVERY-DENNISON OL-1000. PREMIUM ANTI-GRAFFITI OVERLAY FILM, OR EQUIVALENT
- UV INKS TO BE USED WITHOUT EXCEPTION



TRANSNET SIGN DIMENSIONS (VERTICAL):

40" W X 32" H - (3.33' W X 2.66' H)

CONSTRUCTION DETAILS:

- 0.063" ANODIZED ALUMINUM PANELS
- AVERY-DENNISON T-6500 HIGH INTENSITY SERIES PRISMATIC REFLECTIVE SHEETING (3M TYPE IV), OR EQUIVALENT
- AVERY-DENNISON T-9500 OMNIVIEW SERIES* PREMIUM PRISMATIC GRADE REFLECTIVE SHEETING (3M TYPE IX DIAMOND GRADE VIP), OR EQUIVALENT - TO BE USED FOR *KEEPSANDIEGOMOVING* URL AREA ONLY
- AVERY-DENNISON OL-1000. PREMIUM ANTI-GRAFFITI OVERLAY FILM, OR EQUIVALENT
- UV INKS TO BE USED WITHOUT EXCEPTION

SECONDARY SIGN DIMENSIONS (VERTICAL):

40" W X 12" H - (3.33' W X 1.0' H)
TO BE MOUNTED 3" BELOW PRIMARY SIGN

CONSTRUCTION DETAILS:

- SAME AS MATERIALS USED FOR TRANSNET SIGN
- ARTWORK FOR SECONDARY SIGN IS FOR ILLUSTRATIVE PURPOSES AND WILL VARY DEPENDING ON JURISDICTION OR PROJECT TYPE.

NOTES:

- "SANDAG" LOGO COLORS PER SANDAG STANDARDS ARE PANTONE RED PMS 186 AND GOLD PMS 116.
- "NCTD" LOGO COLORS PER NCTD STANDARDS ARE TEAL PMS 321 AND BLUE PMS 286.
- "CALTRANS" LOGO COLORS PER CALTRANS STANDARDS ARE PANTONE TEAL PMS 326, LIGHT BLUE PMS 229, AND BLACK PMS 433.
- "U.S. DEPARTMENT OF TRANSPORTATION" LOGO COLORS IS DARK BLUE PMS 294.
- EXCEPT AS OTHERWISE SHOWN THE LEGEND OF THE SIGN SHALL BE BLACK (PMS 433 X) ON A WHITE BACKGROUND NON - REFLECTIVE.
- THE BORDERS OF THE SIGNS SHALL BE PAINTED "GREEN" (PMS 7727C), 3/4" THICK FOR TYPE 1 SIGN, 1" FOR TYPE 2 SIGN NON - REFLECTIVE
- LETTER STYLE SHALL BE "ARIAL - BOLD"
- LETTER STYLE SHALL BE "ARIAL - ITALICS"
- REFER TO CALTRANS STANDARD PLANS RS1 AND RS3 FOR INSTALLATIONS DETAILS.
- FOR MORE THAN TWO FUNDING LOGOS, SCALE LOGOS PROPORTIONALLY TO FIT AS NEEDED.
- 1/8" THICK MILL FINISH ALUMINUM PANEL, ALCOA 6016-T6 OR EQUAL.
- SIGN PRODUCTION CONTINGENT ON APPROVAL OF FULL SCALE PROOF USING ACTUAL MATERIALS BY KEITH KANDEL.
- HOTLINE NUMBER TO BE ASSIGNED BY SANDAG/NCTD COMMUNICATIONS OFFICE.

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REV.	DATE	DESCRIPTION	DES.	ENG.

SANDAG

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San Diego, CA. 92101
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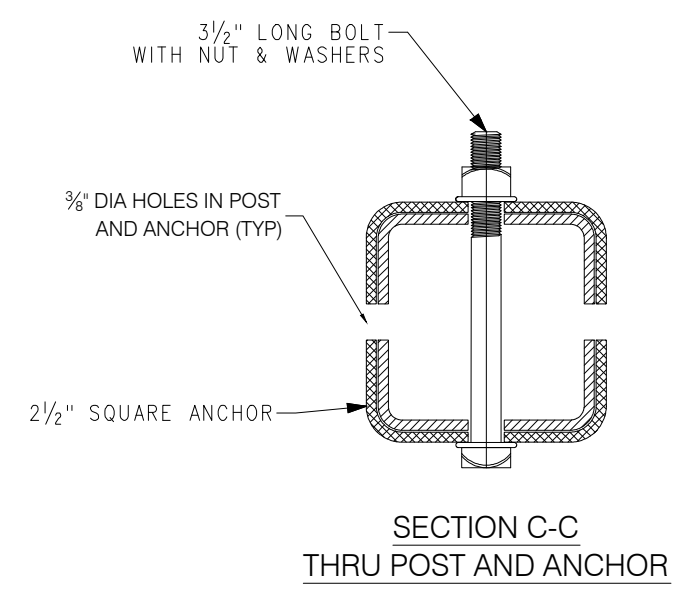
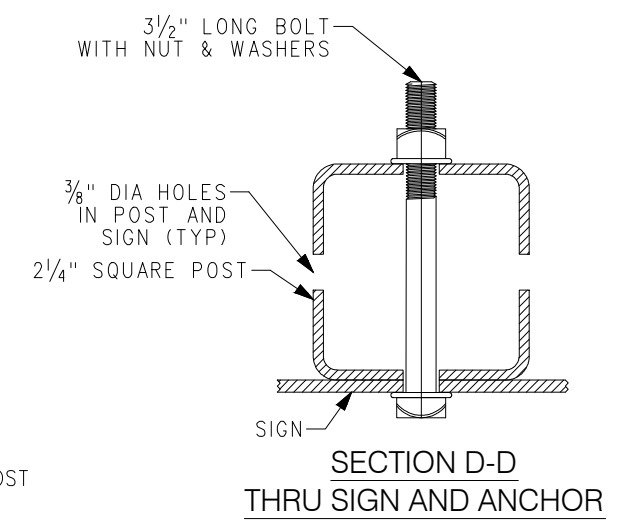
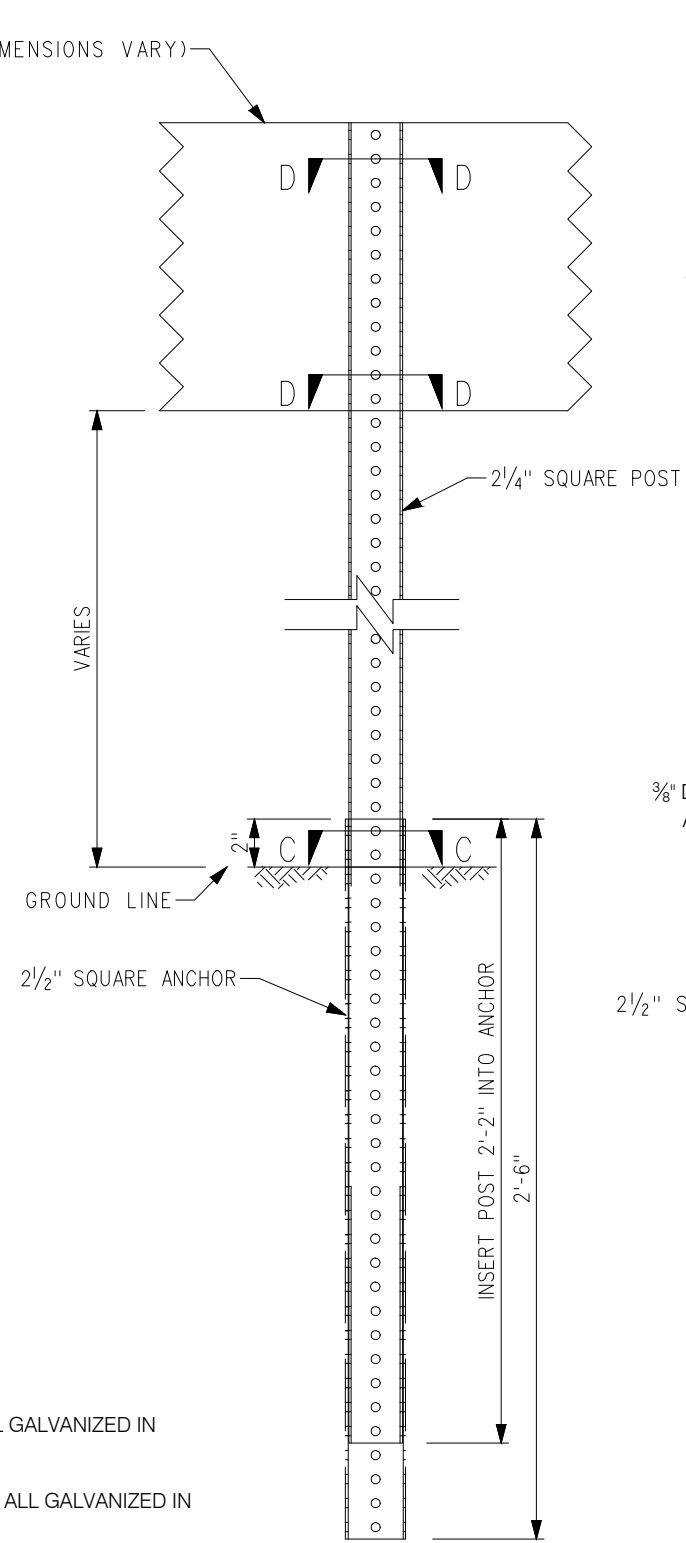
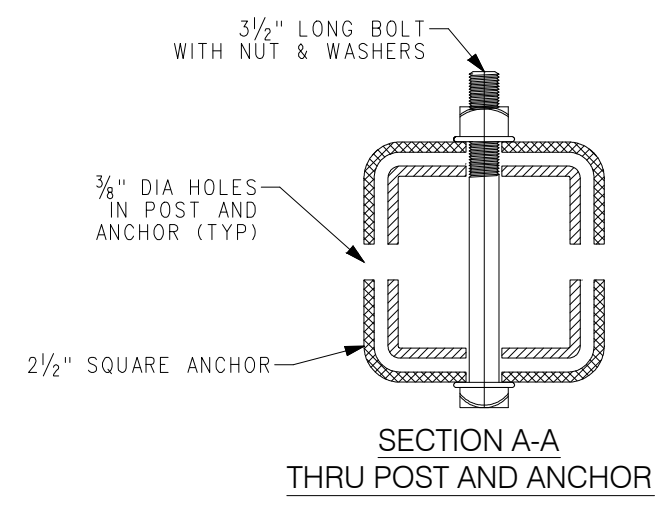
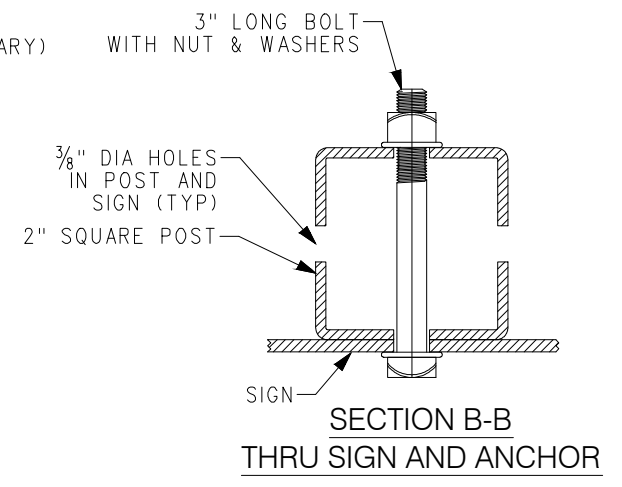
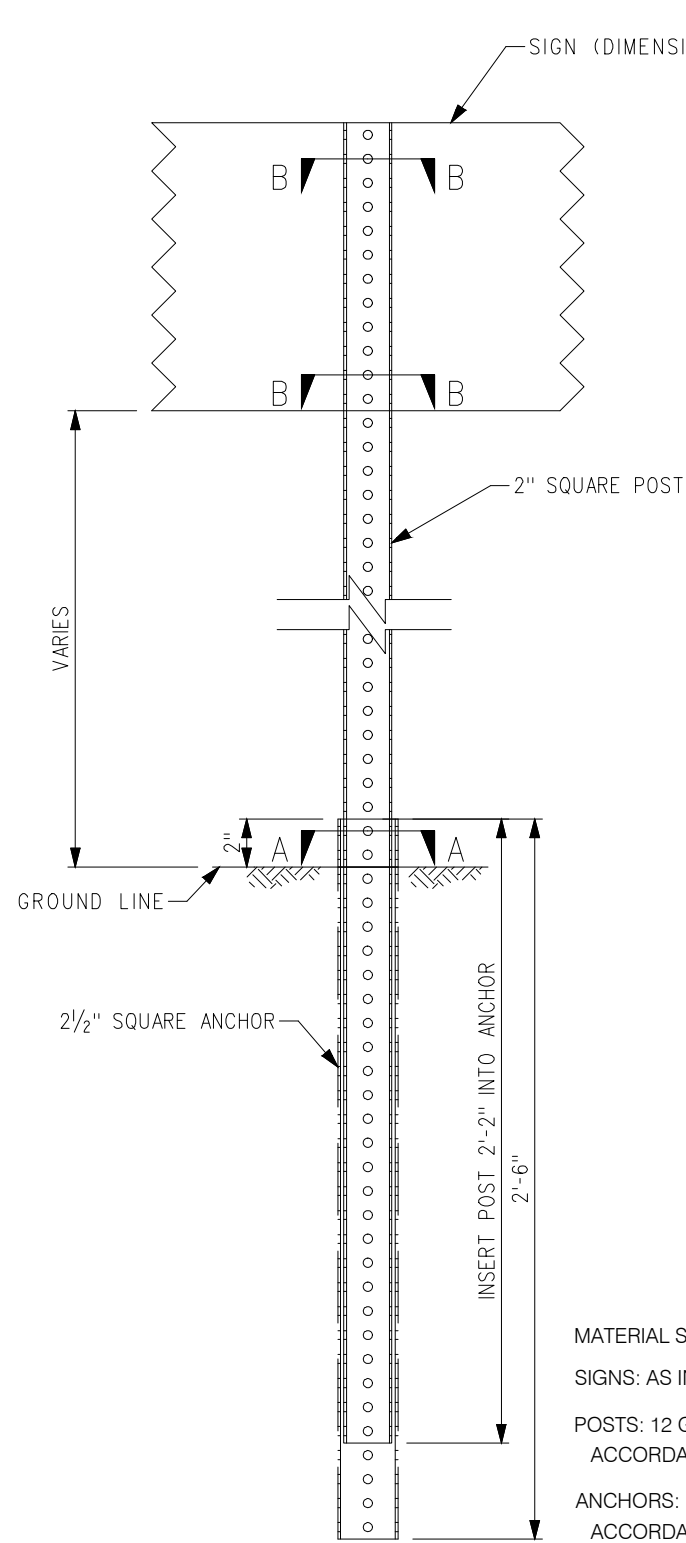
NORTH COUNTY TRANSIT DISTRICT

810 Mission Avenue
Oceanside, CA 92054
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ENGINEERING STANDARD DRAWINGS



FUNDING SIGNS - TRANSNET
ENVIRONMENTAL MITIGATION PROGRAM

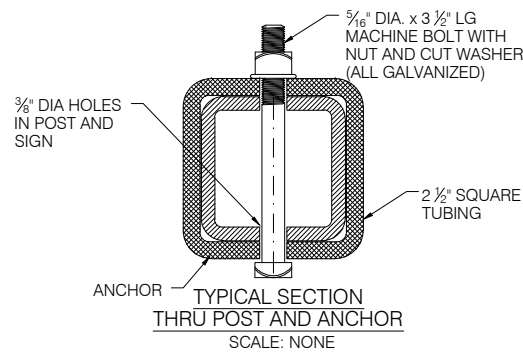
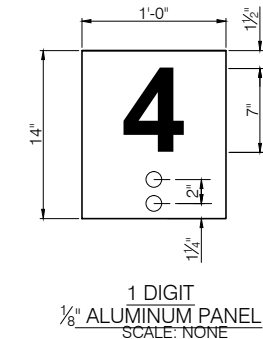
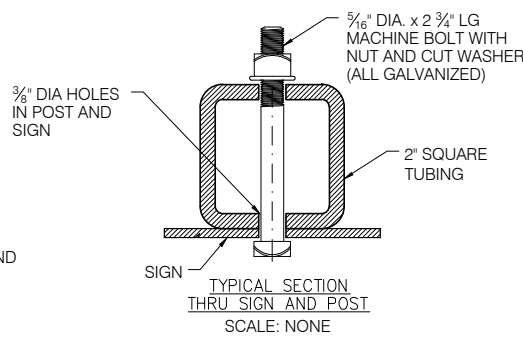
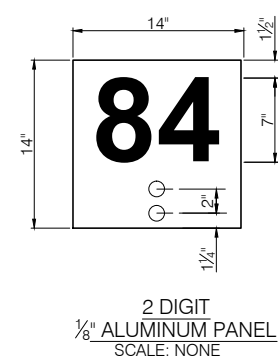
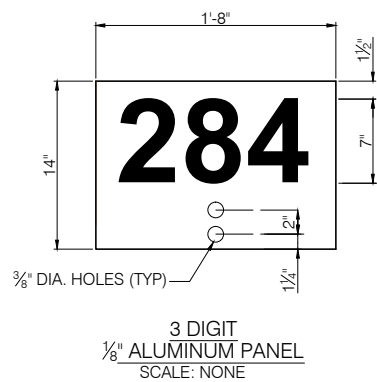
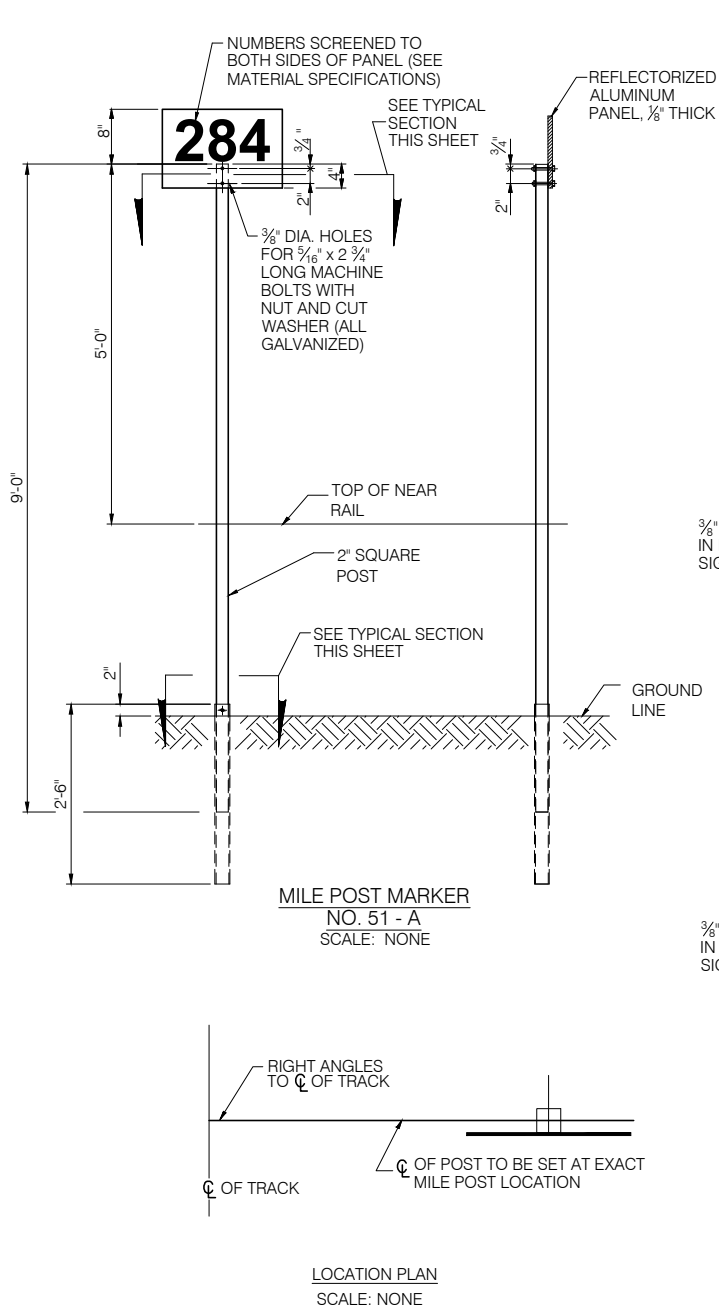
DRAWING NO.	ESD-5204
DRAWING SHEET NO.	1 OF 1
SCALE:	NO SCALE
CONTRACT SHEET NO.	



MATERIAL SPECIFICATIONS:
 SIGNS: AS INDICATED ON INDIVIDUAL SIGN STANDARD.
 POSTS: 12 GAGE (.105" THICK) SQUARE STEEL TUBE (ASTM A-36) WITH 3/8" DIA. MOUNTING HOLES 1" O.C. ALL GALVANIZED IN ACCORDANCE WITH ASTM A-386. 2" TUBE @ 2.42 LB/FT. 2 1/4" TUBE @ 2.77 LB/FT.
 ANCHORS: 12 GAGE (.105" THICK) SQUARE STEEL TUBE (ASTM A-36) WITH 3/8" DIA. MOUNTING HOLES 1" O.C. ALL GALVANIZED IN ACCORDANCE WITH ASTM A-386. 2-1/2" TUBE @ 3.14 LB/FT.
 HARDWARE: GALVANIZED ALUMINUM. VANDAL RESISTANT. BOLTS: 5/16" DIAMETER CARRIAGE BOLTS, 2024-T4 ALLOY. LENGTH: 3" OR 3-1/2" NUTS: TAMPER RESISTANT. ALCOA OR EQUAL. WASHERS: FLAT. 3/8" I.D., 3/4" O.D.
 LOCATION: CL OF POST SHALL BE 9 TO 15 FT, MEASURED PREPENDICULAR TO CL OF TRACK, FROM FIELD SIDE OF NEAREST RAIL UNLESS OTHERWISE SPECIFIED ON INDIVIDUAL SIGN STANDARD. INSTALLER SHALL AVOID DAMAGING UNDERGROUND UTILITIES WHEN SETTING ANCHOR.

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REV.	DATE	DESCRIPTION	DES.	ENG.	DESIGNER PE STAMP	 SAN DIEGO ASSOCIATION OF GOVERNMENTS 401 B Street, Suite 800 San Diego, CA. 92101 www.sandag.org	 NORTH COUNTY TRANSIT DISTRICT 810 Mission Avenue Oceanside, CA 92054 www.gonctd.com	ENGINEERING STANDARD DRAWINGS DETAILS FOR INSTALLING SIGNS AT GRADE	DRAWING NO.
									DRAWING SHEET NO.
									1 OF 1
									SCALE:
									NONE
									CONTRACT SHEET NO.



BILL OF MATERIAL	
NUMBER REQUIRED	ITEM
NO. 51-A MILE POST SIGN - COMPLETE	
1	NO. 51-A-DOUBLE-FACED MILE BOARD PANEL (SPECIFY MILE)
1	2" x 2" x 9'-0" LONG SQUARE POST FOR NO. 51-A SIGN
1	2 1/2" x 2 1/2" x 30" LONG SQUARE POST ANCHOR FOR NO. 51-A SIGN
2	CARRIAGE BOLTS WITH NUTS AND WASHERS (GALVANIZED) PER SPECIFICATIONS BELOW

NO. 51A MILEPOST SIGN

- TO PROVIDE THE MESSAGE IN BOTH DIRECTIONS ALONG THE TRACK, ONE DOUBLE-FACED ALUMINUM MILE BOARD PANEL WITH WHITE REFLECTIVE SHEETING BACKGROUND AND BLACK PLASTIC NUMERALS WILL BE MOUNTED AT RIGHT ANGLES TO THE TRACK ON EACH MILE POST.
- THE POST WILL BE SET WITH TRACK SIDE OF POST 9'-0" TO 18'-0" FROM NEAR RAIL OF TRACK AND WITH THE CENTER OF THIS FACE AT THE EXACT MILE POST LOCATION.
- ON SINGLE TRACK, MILE POSTS WILL BE SET ON RIGHT HAND SIDE OF THE TRACK AS ONE FACES IN THE DIRECTION OF INCREASING MILE POSTS. ON MULTIPLE TRACK RAILROAD, INCLUDING SIDE TRACKS, MILE POST WILL BE SET ON THE FIELD SIDE OF BOTH OUTSIDE TRACKS.
- ON MULTIPLE TRACK TERRITORY WHERE SPREAD TRACKS EXIST, THE LETTER 'X' WILL PRECEDE THE MILE POST NUMBERS ON THE NEWER LINE. AT THE OPTION OF THE SANDAG DIRECTOR OF ENGINEERING AND CONSTRUCTION, WHERE THE DISTANCE SEPARATING THE TWO LINES IS NOT SUFFICIENT TO WARRANT SUCH DESIGNATION, THE LETTER 'X' NEED NOT PRECEDE THE MILE POST NUMBERS ON THE NEWER LINE.
- WHEN THE MILE POST LOCATION FALLS ON A BRIDGE OR ROAD CROSSING THE MILE POST WILL BE SET AT THE NEAREST END OF THE BRIDGE OR CROSSING.

MATERIAL SPECIFICATIONS:

SIGNS:
1/8" THICK MILL FINISH ALUMINUM PANEL, ALCOA 6016-T6 OR EQUAL. PAINT ALL SIDES WITH LINEAR POLYURETHANE. COLOR FACE OF PANEL WITH ENGINEERING GRADE, PRESSURE SENSITIVE, RETRO-REFLECTIVE WHITE VINYL SHEETING. SILK SCREEN LEGEND WITH BLACK INK. FINISH WITH EXTERIOR GRADE PRESSURE SENSITIVE CLEAR MYLAR, 3M-1150 OR EQUAL.

STEEL POSTS:
12 GAGE (.105 THICK) 2.42 LBS. PER LINEAL FOOT 2" SQUARE STEEL POST (ASTM A-36) WITH 3/8" DIA. KNOCKOUT HOLES. ALL GALVANIZED IN ACCORDANCE WITH ASTM A-386.

ANCHORS:
12 GAGE (.105 THICK) 2.42 LBS. PER LINEAL FOOT 2" SQUARE STEEL POST (ASTM A-36) WITH 3/8" DIA. KNOCKOUT HOLES. ALL GALVANIZED IN ACCORDANCE WITH ASTM A-386.

TEXT STYLE:
TEXT TO BE 'ARIAL BOLD' PER SANDAG STANDARD ESD1212, SIZE AS INDICATED.

HARDWARE:
ALL HARDWARE TO BE VANDAL RESISTANT.
BOLTS: 5/16" x 2 3/4" LONG ALUMINUM CARRIAGE BOLTS, 2024-T4 ALLOY. (FOR SIGN)
BOLTS: 5/16" x 3 1/2" LONG ALUMINUM CARRIAGE BOLTS, 2024-T4 ALLOY. (FOR ANCHOR)
NUTS: TAMPER RESISTANT, ALCOA OR EQUAL.
WASHERS: PLAIN, FLAT ALUMINUM WASHERS.

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REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN RAILPROS CHECKED B. SMITH RECOMMENDED B. SCHMITH DATE 10/08/15	DESIGNER PE STAMP
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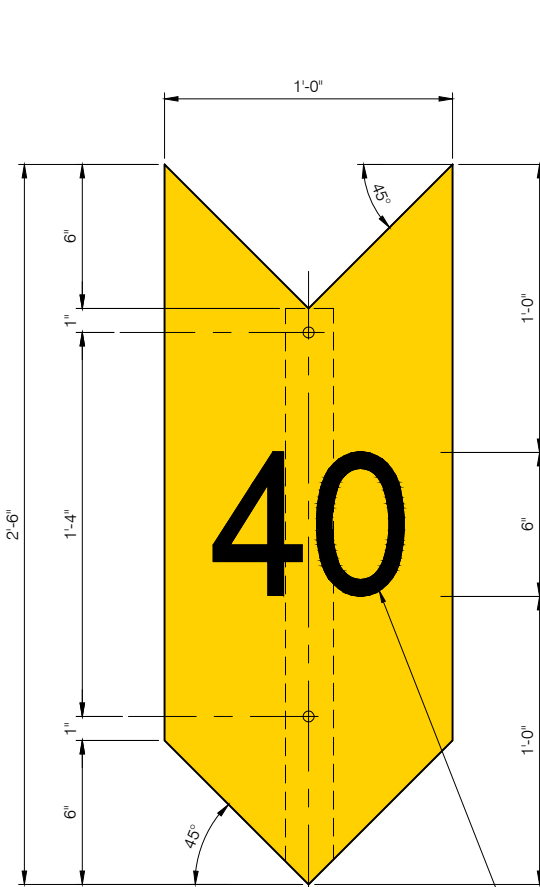
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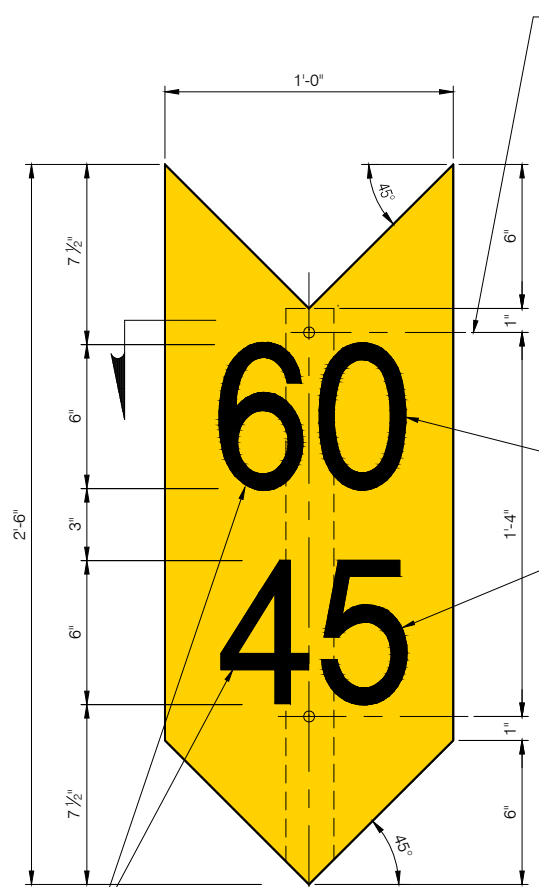
ENGINEERING STANDARD DRAWINGS

MILEPOST SIGN

DRAWING NO.	ESD-5211
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	



SIGN 5213-ONE SPEED SIGN



SIGN 5213-TWO SPEED SIGN

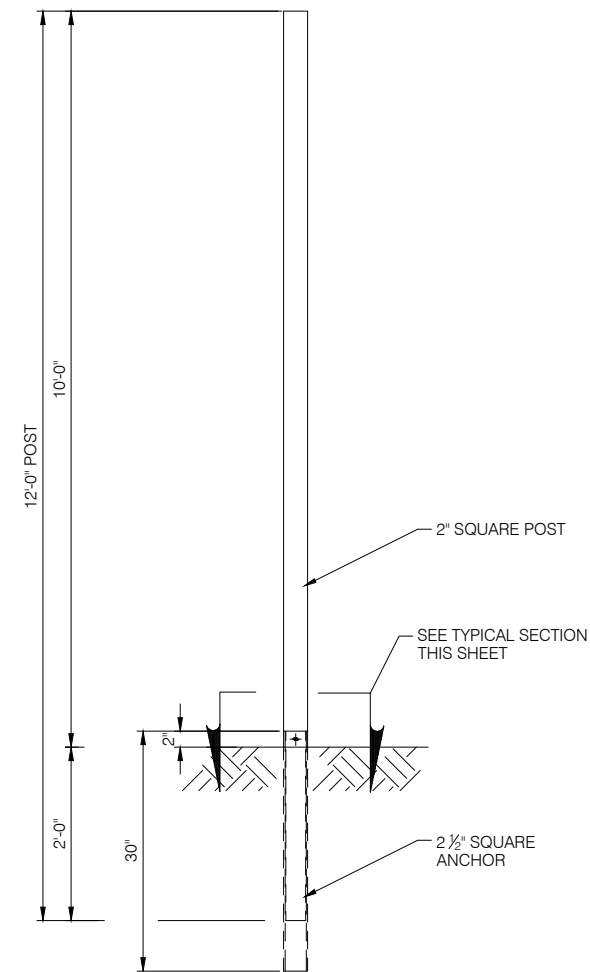
3/8" DIA. HOLES FOR
5/16" x 2 3/4" LONG
MACHINE BOLTS WITH
NUT AND CUT WASHER
(ALL GALVANIZED)
CADMIUM PLATED HEX-HEAD BOLT, FLAT WASHER
AND HEX-NYLOCK ELASTIC OPEN END CAP NUT.
(POSTS TO HAVE 3/8" DIA. KNOCK-OUT PLUGS)

SEE TYPICAL SECTION
THIS SHEET

PASSENGER SPEED

FREIGHT SPEED

SPEEDS AND LOCATION OF
SPEED SIGNS TO BE GIVEN BY
TRACK ENGINEER



STEEL MOUNTING POST AND
INSTALLATION DETAIL

BILL OF MATERIAL	
NUMBER REQUIRED	ITEM
SPEED SIGN - COMPLETE	
1	PERMANENT SPEED SIGN (SPECIFY ONE OR TWO SPEED)
1	2" x 2" x 11'-6" LONG SQUARE POST FOR SPEED SIGN
1	2 1/2" x 2 1/2" x 30" LONG SQUARE ANCHOR FOR SIGN POST
2	CARRIAGE BOLTS WITH NUTS AND WASHERS (GALVANIZED) PER SPECIFICATIONS BELOW

INSTALLATION NOTES:

- ALL SIGNS TO BE PLACED ON RIGHT SIDE OF TRACK IN DIRECTION OF APPROACH TO SPEED CHANGE WITH NEAREST POINT OF SIGN TO BE A MINIMUM OF TEN (10) FEET FROM THE GAGE SIDE OF THE NEAREST RAIL. SIGNS WILL BE PLACED ON OUTSIDE OF EACH TRACK.
- REDUCED SPEED SIGNS WILL BE LOCATED 2500 FEET IN ADVANCE OF THE RESTRICTED LOCATION AND WILL INDICATE THE MAXIMUM SPEED PERMITTED AS SHOWN IN THE CURRENT TIME TABLE. WHERE TWO SPEEDS ARE SHOWN, THE HIGHER SPEED APPLIES TO PASSENGER TRAINS AND THE LOWER SPEED TO FREIGHT TRAINS. WHERE ONE SPEED IS SHOWN, IT APPLIES TO ALL TRAINS.
- INCREASE SPEED SIGNS WILL BE PLACED TO INDICATE WHERE SPEED OF TRAIN MAY BE INCREASED. THIS SIGN SHALL NOT BE PLACED WHERE THERE IS LESS THAN ONE HALF MILE BETWEEN THE END OF ONE SPEED RESTRICTION AND THE BEGINNING OF ANOTHER SPEED RESTRICTION.

MATERIAL SPECIFICATIONS:

SIGNS:
1/8" THICK MILL FINISH ALUMINUM PANEL, ALCOA 6016-T6 OR EQUAL.
PAINT ALL SIDES WITH LINEAR POLYURETHANE. COLOR FACE OF PANEL WITH DIAMOND GRADE, PRESSURE SENSITIVE, RETRO-REFLECTIVE YELLOW VINYL SHEETING. SILK SCREEN LEGEND WITH BLACK INK. FINISH WITH EXTERIOR GRADE PRESSURE SENSITIVE CLEAR MYLAR, 3M-1150 OR EQUAL.

POSTS:
12 GAGE (.105 THICK) 2.42 LBS. PER LINEAL FOOT SQUARE STEEL POST (ASTM A-36) WITH 3/8" DIA. KNOCKOUT HOLES. ALL GALVANIZED IN ACCORDANCE WITH ASTM A-386.

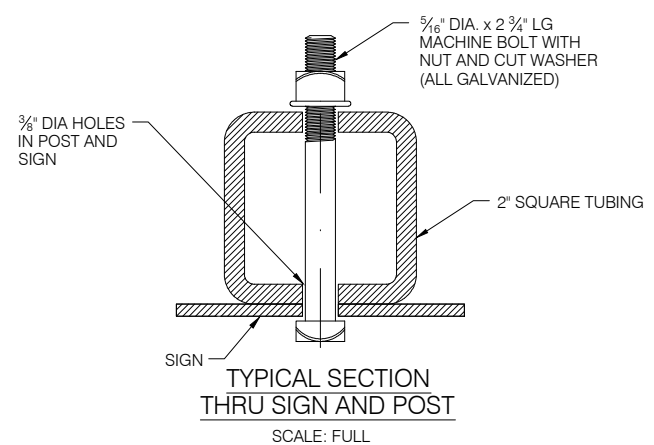
ANCHORS:
12 GAGE (.105 THICK) 2.42 LBS. PER LINEAL FOOT SQUARE STEEL POST (ASTM A-36) WITH 3/8" DIA. KNOCKOUT HOLES. ALL GALVANIZED IN ACCORDANCE WITH ASTM A-386.

TEXT STYLE:
TEXT TO BE "ARIAL BOLD" PER SANDAG STANDARD ESD1212, SIZE AS INDICATED.

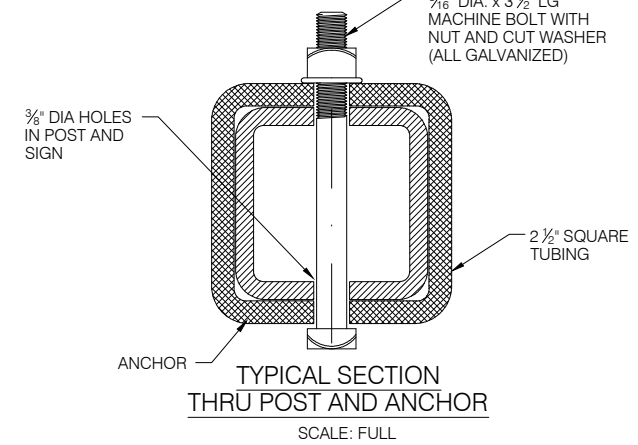
HARDWARE:
ALL HARDWARE TO BE VANDAL RESISTANT.
BOLTS: 3/8" X 2 3/4" LONG ALUMINUM CARRIAGE BOLTS, 2024-T4 ALLOY. (FOR SIGN)
BOLTS: 3/8" X 3 1/2" LONG ALUMINUM CARRIAGE BOLTS, 2024-T4 ALLOY. (FOR ANCHOR)
NUTS: TAMPER RESISTANT, ALCOA OR EQUAL.
WASHERS: PLAIN, FLAT ALUMINUM WASHERS.

COLORS:
LETTERING: BLACK
SIGN REFLECTIVE: PMS 116 YELLOW REFLECTIVE

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TYPICAL SECTION
THRU SIGN AND POST
SCALE: FULL



TYPICAL SECTION
THRU POST AND ANCHOR
SCALE: FULL

REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN
RAILPROS
CHECKED
B. SMITH
RECOMMENDED
B. SCHMITH
DATE 10/08/15

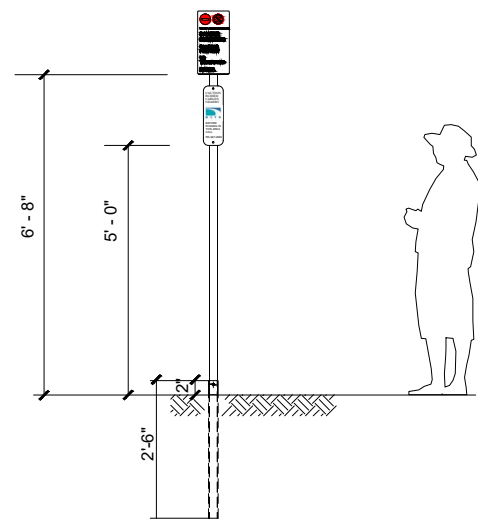
DESIGNER PE STAMP

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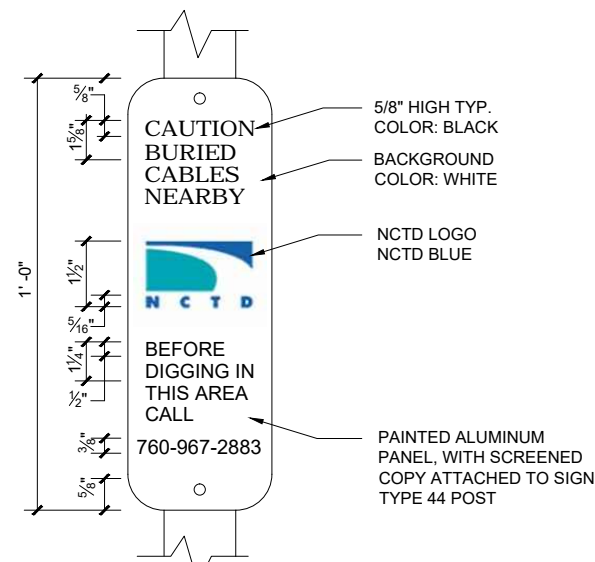
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Oceanside, CA 92054
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ENGINEERING STANDARD DRAWINGS
RAIL SPEED LIMIT SIGN

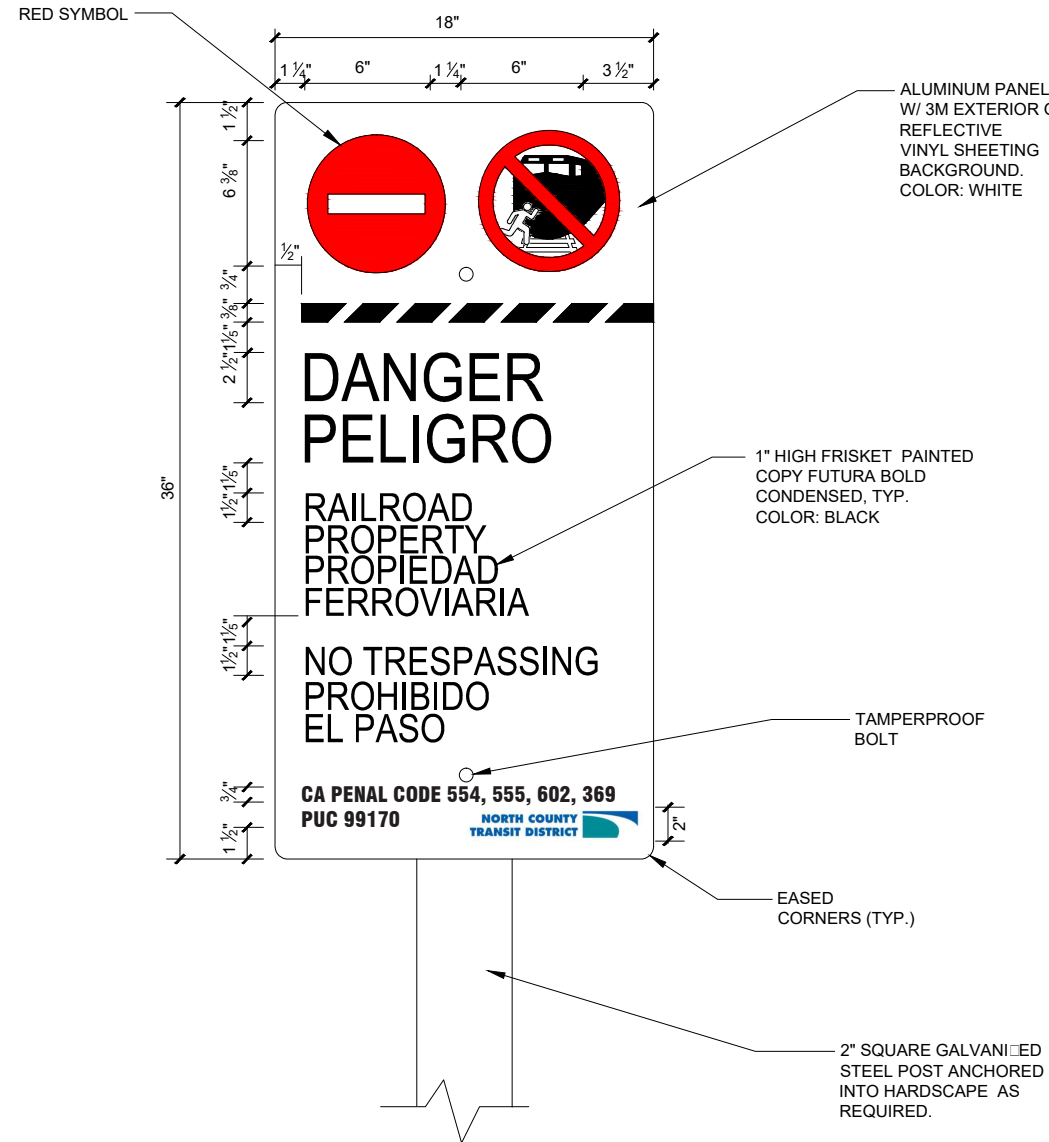
DRAWING NO. ESD-5213
DRAWING SHEET NO. 1 OF 1
SCALE: NONE
CONTRACT SHEET NO.



MOUNTING ELEVATION
SCALE: NONE



SIGN 5214-01.1
SCALE: NONE



SIGN 5214-01.2
SCALE: NONE

RESTRICTIVE SIGN:

ALUMINUM SIGN PANEL W/ REFLECTIVE VINYL SHEETING & FRISKET PAINTED COPY: ATTACHED TO POST.

SIGNS:

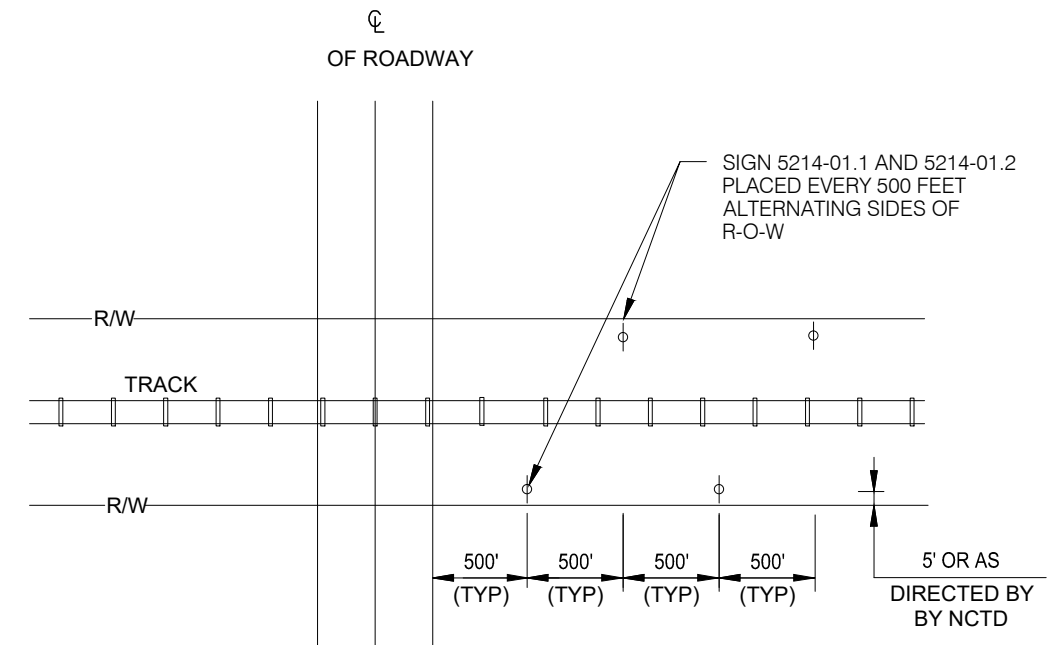
1/8" THICK MILL FINISH ALUMINUM PANEL, ALCOA 6016-T6 OR EQUAL. PAINT ALL SIDES WITH LINEAR POLYURETHANE. COLOR FACE OF PANEL WITH ENGINEERING GRADE, PRESSURE SENSITIVE, RETRO-REFLECTIVE WHITE VINYL SHEETING. SILK SCREEN LEGEND WITH BLACK INK. FINISH WITH EXTERIOR GRADE PRESSURE SENSITIVE CLEAR MYLAR, 3M-1150 OR EQUAL. EXPOSED PORTIONS OF PLANK (TYPE A) TO BE PAINTED WITH METALLIC AND LAMPBLACK, MAKING A VERY DARK BROWN. BASE OF PLANK TO HAVE A COAT OF COAL TAR APPLIED HOT TO 6" ABOVE GROUND.

NOTE:

ISOLATE METALS W/ NEOPRENE SPACERS TO PREVENT ELECTROLYSIS.

LOCATION:

THIS SIGN SHALL BE LOCATED ALONG RAILROAD RIGHT OF WAY AT EVERY 500 FEET ALTERNATING SIDES OF THE TRACK OR AS DIRECTED BY THE ENGINEER.



LOCATION PLAN
NO SCALE

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REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN RAILPROS
CHECKED B. SMITH <i>BSM</i>
RECOMMENDED B. SCHMITH <i>BBS</i>
DATE 12/2/16

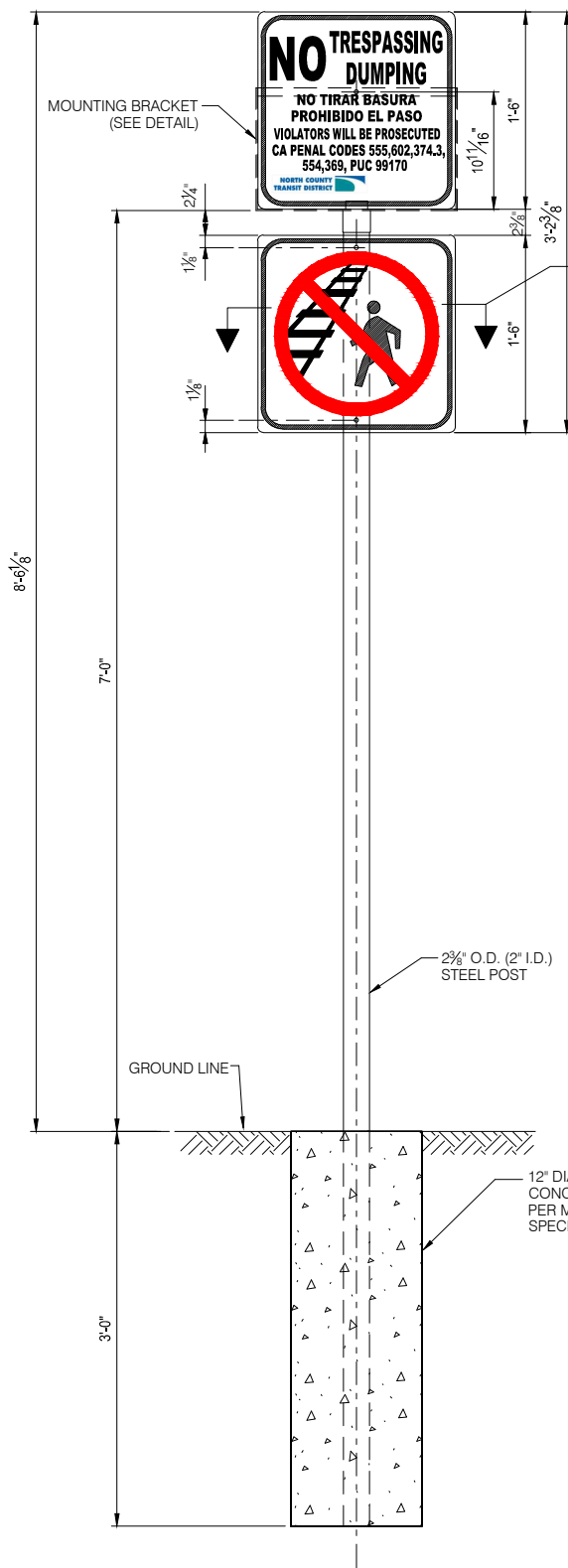
DESIGNER PE STAMP

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San Diego, CA. 92101
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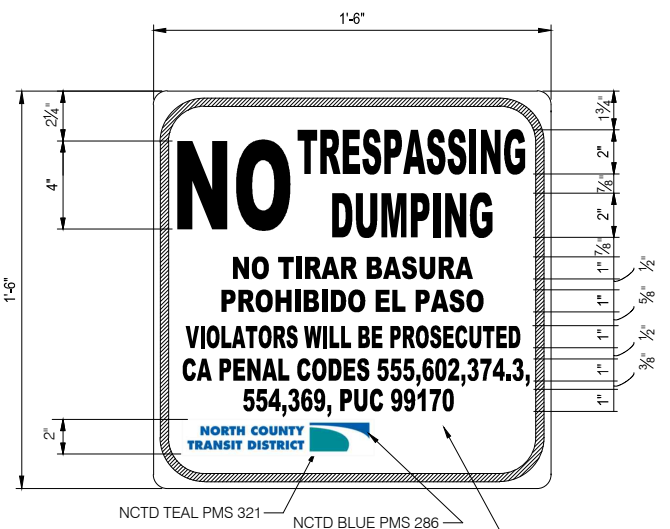
NORTH COUNTY TRANSIT DISTRICT
810 Mission Avenue
Oceanside, CA 92054
www.gonctd.com

ENGINEERING STANDARD DRAWINGS
NO TRESPASSING ON R-O-W SIGN

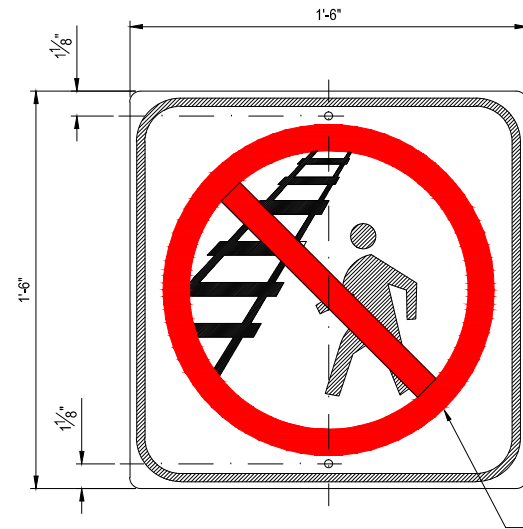
DRAWING NO. ESD-5214-01
DRAWING SHEET NO. 1 OF 4
SCALE: NONE
CONTRACT SHEET NO.



SIGN ELEVATION
SCALE: NONE

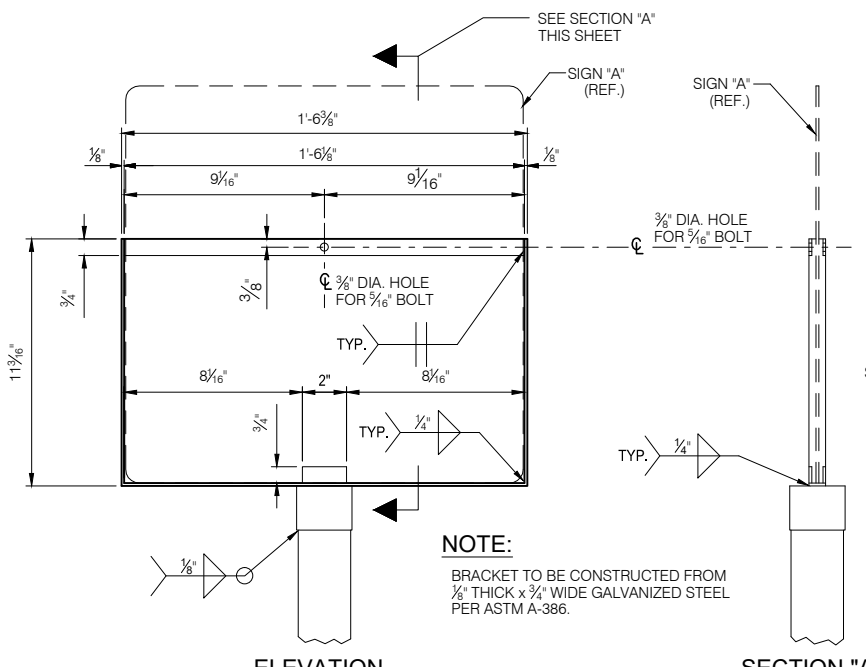


SIGN 5214-02.1
NO SCALE



SIGN 5214-02.2
NO SCALE

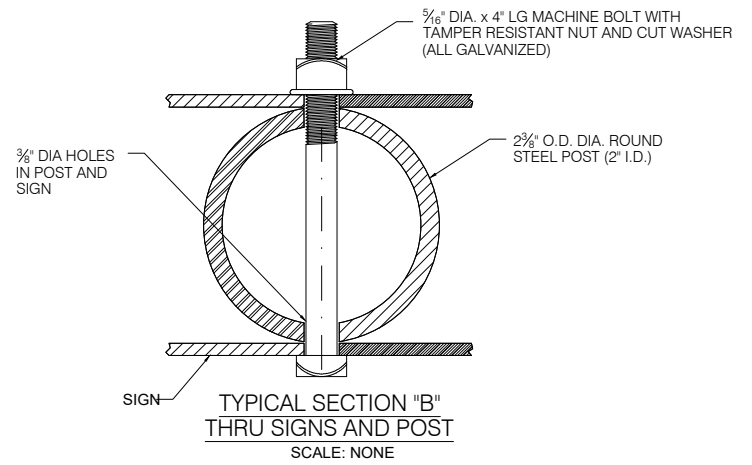
SANDAG/NCTD ENGINEERING STANDARDS ARE INTENDED FOR SANDAG/NCTD APPROVED USES ONLY. FOR NON-SANDAG/NCTD APPROVED USES, SANDAG/NCTD SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF THE DATA OR INFORMATION CONTAINED HEREIN. THE SELECTION AND USE OF THESE STANDARDS IS THE SOLE RESPONSIBILITY OF THE USER AND SHOULD NOT BE USED WITHOUT CONSULTING A REGISTERED PROFESSIONAL ENGINEER. ALL WARRANTIES AND REPRESENTATIONS OF ANY KIND ARE DISCLAIMED. ANYONE MAKING USE OF THIS INFORMATION AGREES THAT IT ASSUMES ALL LIABILITY ARISING FROM SUCH USE. NO PART OF THESE STANDARDS SHOULD BE REPRODUCED OR DISTRIBUTED IN ANY FORM OR BY ANY MEANS WITHOUT THE PRIOR WRITTEN PERMISSION OF SANDAG/NCTD. ALL RIGHTS RESERVED.



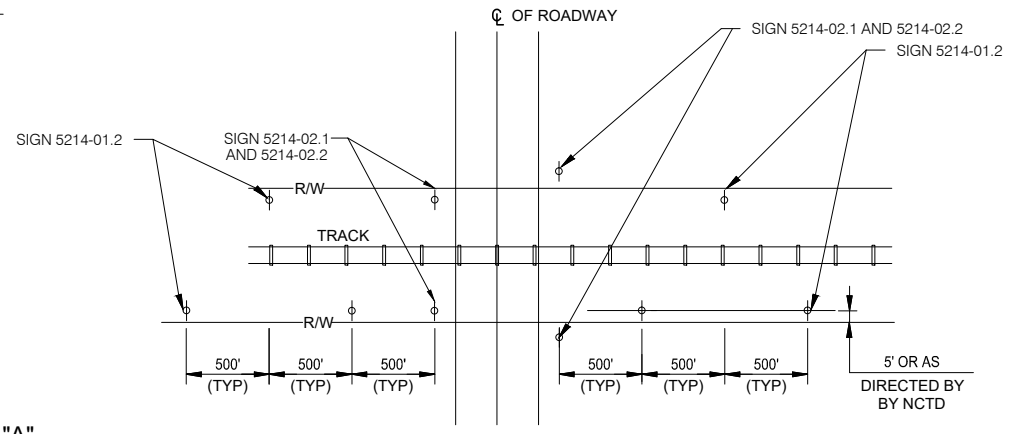
BRACKET DETAIL
NO SCALE



SECTION 'A'



TYPICAL SECTION 'B' THRU SIGNS AND POST
SCALE: NONE



LOCATION PLAN
NO SCALE

NOTE:
ORIENTATION OF SIGN WILL BE COORDINATED WITH SANDAG.

MATERIAL SPECIFICATIONS:
SIGNS:
1/2" THICK MILL FINISH ALUMINUM PANEL, ALCOA 6016-T6 OR EQUAL. PAINT ALL SIDES WITH LINEAR POLYURETHANE. COLOR FACE OF PANEL WITH ENGINEERING GRADE, PRESSURE SENSITIVE, RETRO-REFLECTIVE WHITE VINYL SHEETING. SILK SCREEN LEGEND WITH BLACK INK. FINISH WITH EXTERIOR GRADE PRESSURE SENSITIVE CLEAR MYLAR, 3M-1150 OR EQUAL.

STEEL POSTS:
2 3/8" O.D. (2" I.D.) WITH 2 3/8" PRESSED STEEL POST CAP. ALL GALVANIZED IN ACCORDANCE WITH ASTM A-386.

TEXT STYLE:
TEXT TO BE "ARIAL BOLD" PER DRAWING ESD-1212.

HARDWARE:
ALL HARDWARE TO BE VANDAL RESISTANT. BOLTS: 3/16" X 4" LONG ALUMINUM CARRIAGE BOLTS, 2024-T4 ALLOY. NUTS: TAMPER RESISTANT, ALCOA OR EQUAL. WASHERS: PLAIN, FLAT ALUMINUM WASHERS.

CONCRETE:
2500 PSI @ 28 DAYS.

LOCATION:
AT LOCATIONS ACCESSIBLE BY MOTOR VEHICLES LIKE GRADE CROSSINGS AND NEAR ACCESS POINTS TO R/W.

REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN RAILPROS
CHECKED B. SMITH <i>BSM</i>
RECOMMENDED B. SCHMITH <i>BBS</i>
DATE 12/2/16

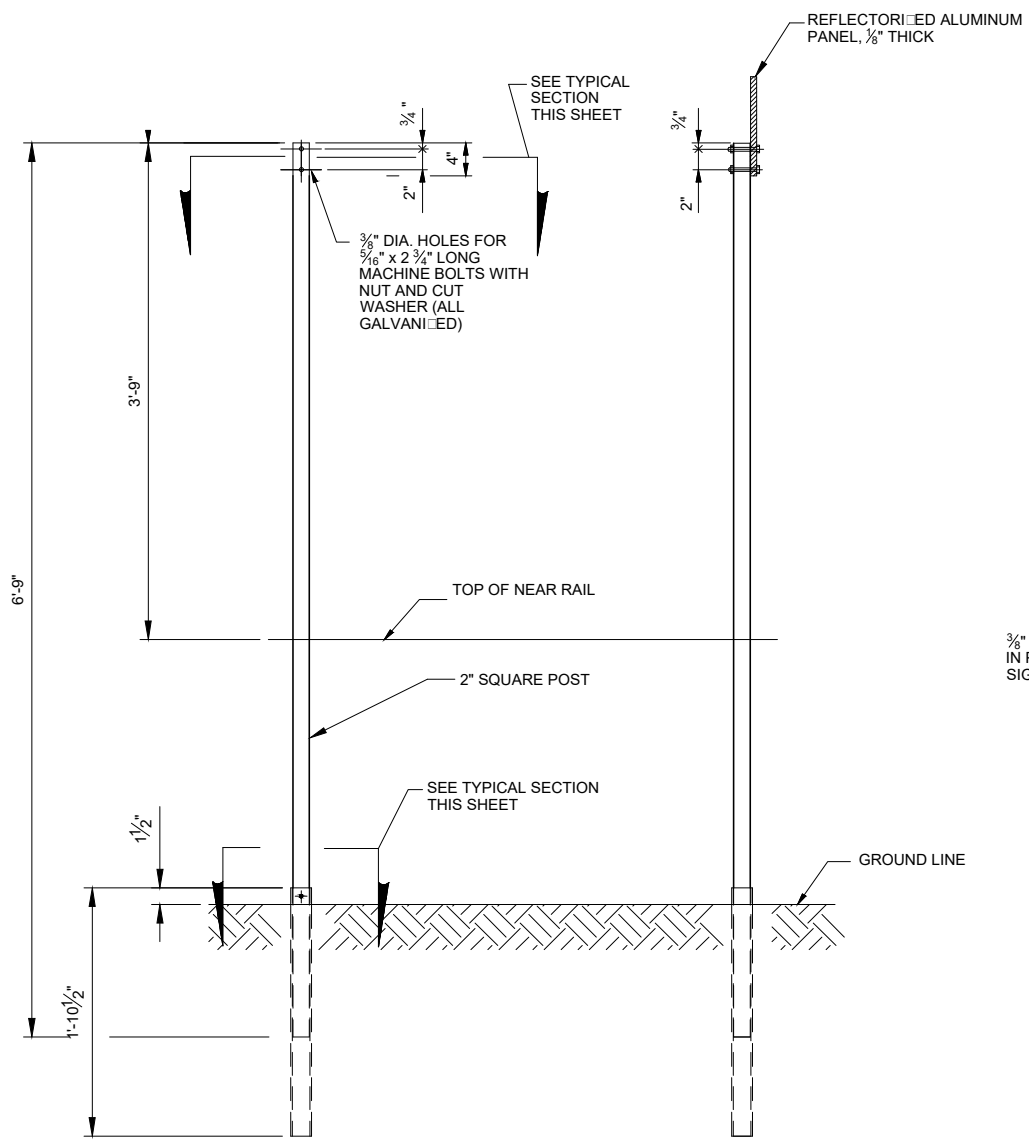
DESIGNER PE STAMP

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San Diego, CA. 92101
www.sandag.org

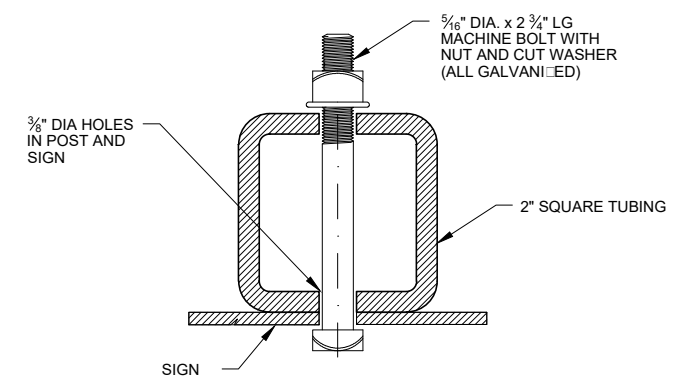
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810 Mission Avenue
Oceanside, CA 92054
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ENGINEERING STANDARD DRAWINGS
NO TRESPASSING OR DUMPING ON R-O-W SIGN

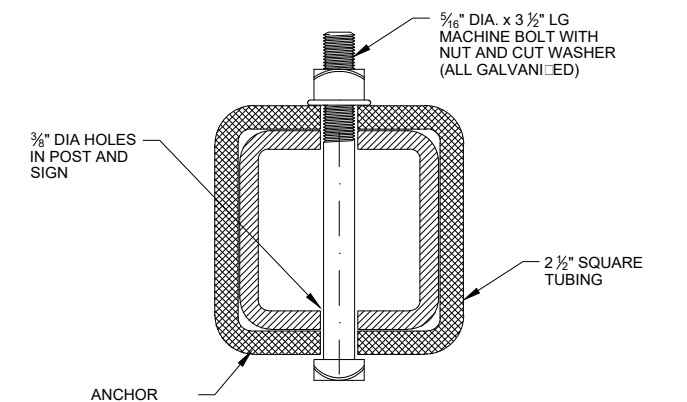
DRAWING NO. ESD-5214-02
DRAWING SHEET NO. 2 OF 4
SCALE: NONE
CONTRACT SHEET NO.



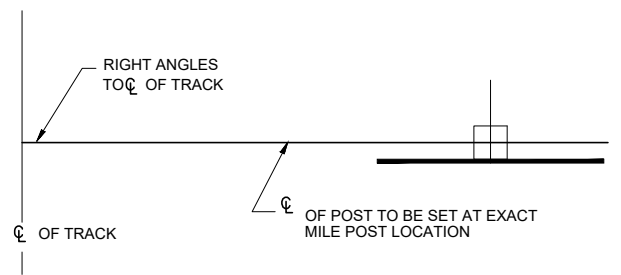
**MILE POST MARKER
NO. 51 - A**
SCALE: NONE



**TYPICAL SECTION
THRU SIGN AND POST**
SCALE: NONE



**TYPICAL SECTION
THRU POST AND ANCHOR**
SCALE: NONE



LOCATION PLAN
SCALE: NONE



SIGN 5214-03
SCALE: NONE

NOTE:
ORIENTATION OF SIGN WILL BE COORDINATED WITH THE ENGINEER.
SEE DRAWING 5214-02 FOR MOUNTING DETAILS.

MATERIAL SPECIFICATIONS:

SIGNS:
1/8" THICK MILL FINISH ALUMINUM PANEL, ALCOA 6016-T6 OR EQUAL. PAINT ALL SIDES WITH LINEAR POLYURETHANE. COLOR FACE OF PANEL WITH ENGINEERING GRADE, PRESSURE SENSITIVE, RETRO-REFLECTIVE WHITE VINYL SHEETING. SILK SCREEN LEGEND WITH BLACK INK. FINISH WITH EXTERIOR GRADE PRESSURE SENSITIVE CLEAR MYLAR, 3M-1150 OR EQUAL.

STEEL POSTS:
2 3/8" O.D., (2" I.D.) WITH 2 3/8" PRESSED STEEL POST CAP. ALL GALVANIZED IN ACCORDANCE WITH ASTM A-386.

TEXT STYLE:
TEXT TO BE "ARIAL BOLD" PER SANDAG STANDARD ESD1212.

HARDWARE:
ALL HARDWARE TO BE VANDAL RESISTANT.
BOLTS: 3/16" X 4" LONG ALUMINUM CARRIAGE BOLTS, 2024-T4 ALLOY.
NUTS: TAMPER RESISTANT, ALCOA OR EQUAL.
WASHERS: PLAIN, FLAT ALUMINUM WASHERS.

CONCRETE:
2500 PSI @ 28 DAYS.

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REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN
RAILPROS

CHECKED
B. SMITH *BSM*

RECOMMENDED
B. SCHMITH *BBS*

DATE 12/2/16

DESIGNER PE STAMP

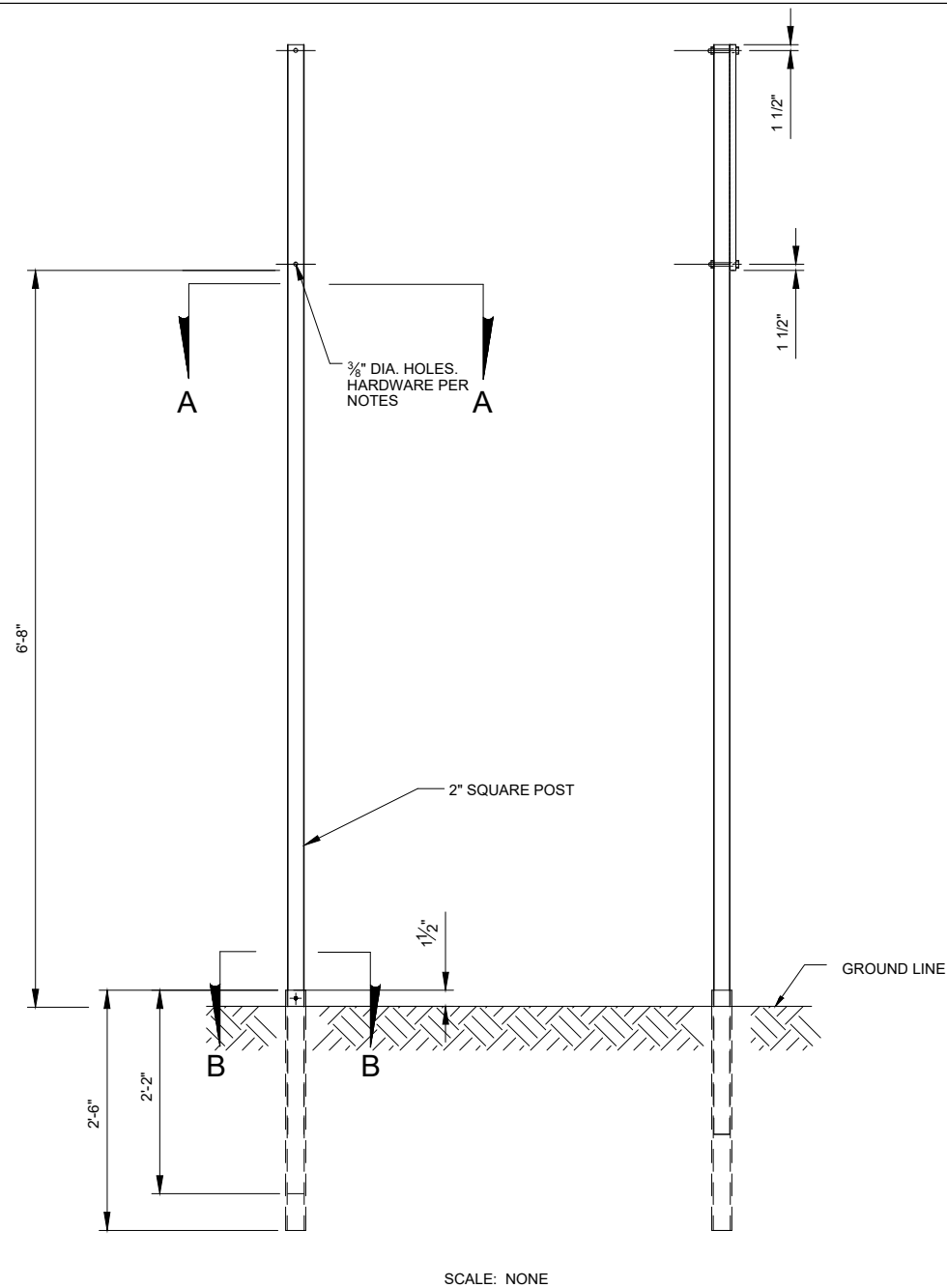
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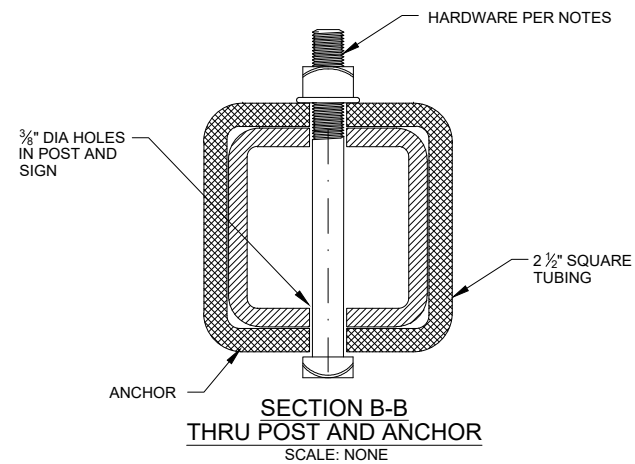
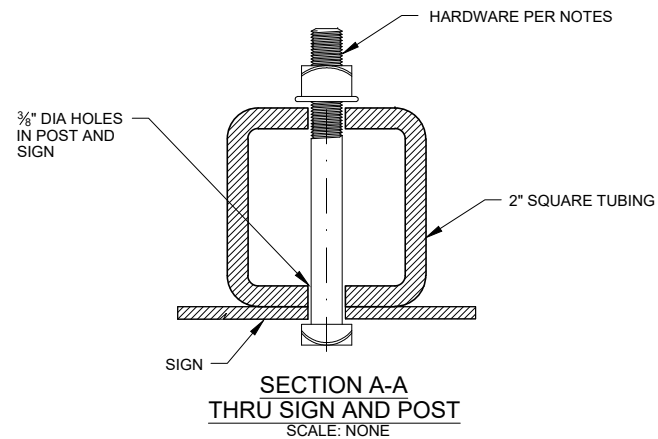
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ENGINEERING STANDARD DRAWINGS	DRAWING NO. ESD-5214-03
	DRAWING SHEET NO. 3 OF 4
	SCALE: NONE
	CONTRACT SHEET NO.



SCALE: NONE



NOTE:
 ORIENTATION OF SIGN WILL BE COORDINATED WITH THE ENGINEER/NCTD
 MOUNT TO POST AS SHOWN OR IF AVAILABLE MOUNT TO INTER-TRACK FENCE OR PLATFORM FENCE WITH APPROPRIATE TAMPER PROOF FASTENERS.

MATERIAL SPECIFICATIONS:

SIGNS:
 1/8" THICK MILL FINISH ALUMINUM PANEL, ALCOA 6016-T6 OR EQUAL.
 PAINT ALL SIDES WITH LINEAR POLYURETHANE. COLOR FACE OF PANEL WITH ENGINEERING GRADE, PRESSURE SENSITIVE, RETRO-REFLECTIVE WHITE VINYL SHEETING. SILK SCREEN LEGEND WITH BLACK INK. FINISH WITH EXTERIOR GRADE PRESSURE SENSITIVE CLEAR MYLAR, 3M-1150 OR EQUAL.

STEEL POSTS:
 2 3/8" O.D., (2" I.D.) WITH 2 3/8" PRESSED STEEL POST CAP.
 ALL GALVANIZED IN ACCORDANCE WITH ASTM A-386.

TEXT STYLE:
 TEXT TO BE "ARIAL BOLD" PER SANDAG STANDARD ESD1212.

HARDWARE:
 ALL HARDWARE TO BE VANDAL RESISTANT.
 BOLTS: 3/8" X 3" LONG ALUMINUM CARRIAGE BOLTS, 2024-T4 ALLOY.
 NUTS: TAMPER RESISTANT, ALCOA OR EQUAL.
 WASHERS: PLAIN, FLAT ALUMINUM WASHERS.

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REV.	DATE	DESCRIPTION	DES.	ENG.	DESIGNER PE STAMP

DRAWN
RAILPROS

CHECKED
B. SMITH *BSM*

RECOMMENDED
B. SCHMITH *BSB*

DATE 5/18/17

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ENGINEERING STANDARD DRAWINGS	DRAWING NO.	ESD-5214-04
	DRAWING SHEET NO.	4 OF 4
	SCALE:	NONE
	CONTRACT SHEET NO.	

HIGH SPEED TRAIN WARNING SIGN

BILL OF MATERIAL	
ITEM	
QTY.	WHISTLING POINT SIGN - COMPLETE
1	WHISTLING POINT SIGN
1	MULTIPLE CROSSING SIGN (WHERE APPLICABLE)
1	2" x 2" x 7'-0" LONG SQUARE POST FOR WHISTLING POINT SIGN
1	2 1/2" x 2 1/2" x 30" LONG SQUARE POST ANCHOR FOR WHISTLING POINT SIGN
2	CARRIAGE BOLTS WITH NUTS AND WASHERS (GALVANIZED) PER SPECIFICATIONS BELOW

NOTES:

- SIGNS TO BE LOCATED ON ENGINEER'S SIDE, FACING DIRECTION OF APPROACH. POST TO BE SET 13 FEET FROM CENTER LINE OF TRACK, AND TO BE OUTSIDE OF DITCH IT CUTS.
- WHISTLING BOARD TO BE LOCATED AS NEARLY AS PRACTICABLE ONE - FOURTH MILE DISTANT FROM CROSSING OR OTHER OBSTRUCTION.
- WHERE THERE ARE MULTIPLE PUBLIC CROSSINGS NOT MORE THAN ONE - FOURTH MILE APART, SIGN BEARING LETTER "X" LOCATED ONE - FOURTH MILE IN ADVANCE OF FIRST CROSSING WILL DISPLAY A FIGURE WHICH REPRESENTS THE NUMBER OF CROSSINGS INVOLVED. WHISTLE SIGNAL UNDER PROVISIONS OF RULE 5.8.2 (11) MUST BE SOUNDED UNTIL ENGINE HAS PAST OVER LAST CROSSING.

MATERIAL SPECIFICATIONS:

SIGNS:
 1/8" THICK MILL FINISH ALUMINUM PANEL, ALCOA 6016-T6 OR EQUAL. PAINT ALL SIDES WITH LINEAR POLYURETHANE. COLOR FACE OF PANEL WITH ENGINEERING GRADE, PRESSURE SENSITIVE, RETRO-REFLECTIVE WHITE VINYL SHEETING. SILK SCREEN LEGEND WITH BLACK INK. FINISH WITH EXTERIOR GRADE PRESSURE SENSITIVE CLEAR MYLAR, 3M-1150 OR EQUAL.

STEEL POSTS:
 12 GAGE (.105 THICK) 2.42 LBS. PER LINEAL FOOT SQUARE STEEL POST (ASTM A-36) WITH 3/8" DIA. KNOCKOUT HOLES. ALL GALVANIZED IN ACCORDANCE WITH ASTM A-386.

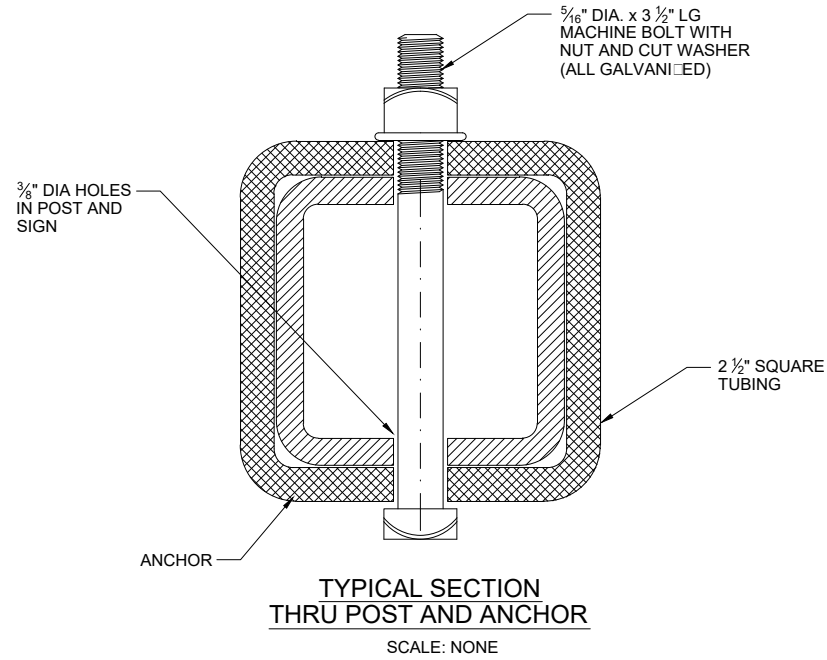
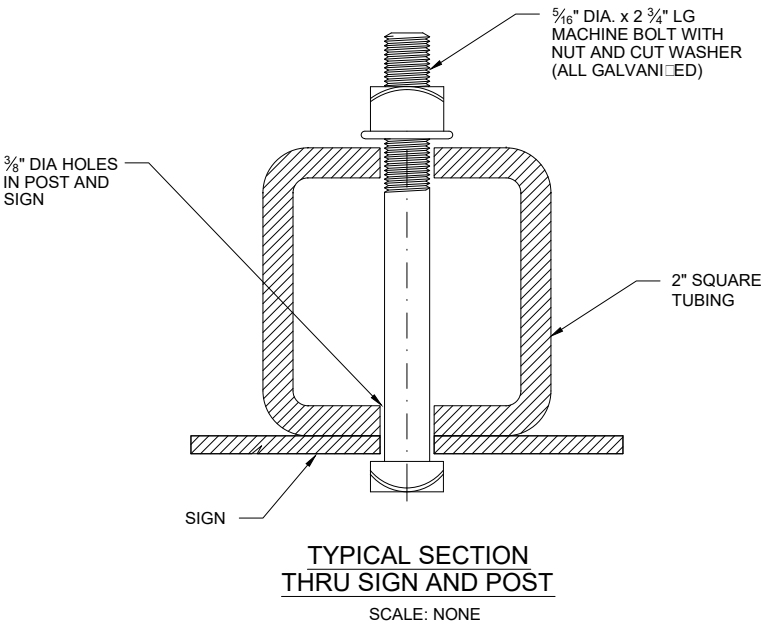
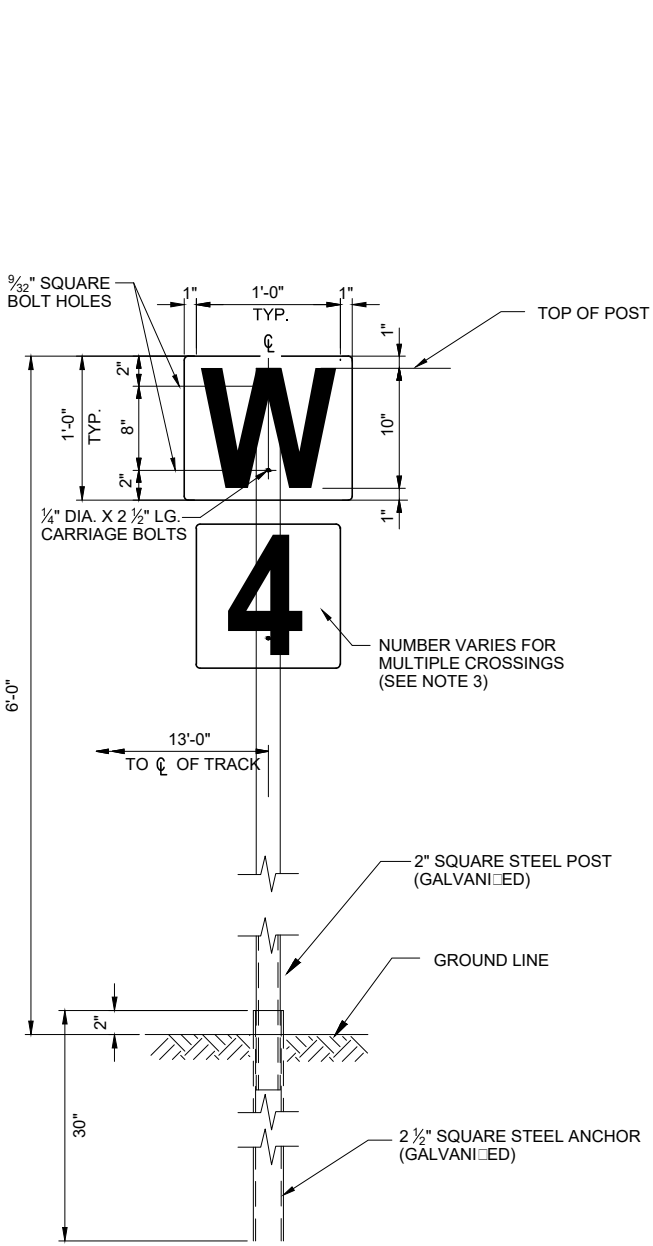
ANCHORS:
 12 GAGE (.105 THICK) 2.42 LBS. PER LINEAL FOOT SQUARE STEEL POST (ASTM A-36) WITH 3/8" DIA. KNOCKOUT HOLES. ALL GALVANIZED IN ACCORDANCE WITH ASTM A-386.

TEXT STYLE:
 TEXT TO BE "ARIAL BOLD" PER DRAWING ESD-1212, SIZE AS INDICATED.

HARDWARE:
 ALL HARDWARE TO BE VANDAL RESISTANT. BOLTS: 5/16" X 2 3/4" LONG ALUMINUM CARRIAGE BOLTS, 2024-T4 ALLOY. (FOR SIGN)
 BOLTS: 5/16" X 3 1/2" LONG ALUMINUM CARRIAGE BOLTS, 2024-T4 ALLOY. (FOR ANCHOR)
 NUTS: TAMPER RESISTANT, ALCOA OR EQUAL.
 WASHERS: PLAIN, FLAT ALUMINUM WASHERS.

COLOR:
 BLACK LETTERING
 WHITE REFLECTIVE BACKGROUND

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REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN RAILPROS	DESIGNER PE STAMP
CHECKED B. SMITH <i>BS</i>	
RECOMMENDED B. SCHMITH <i>BBS</i>	
DATE 10/08/15	

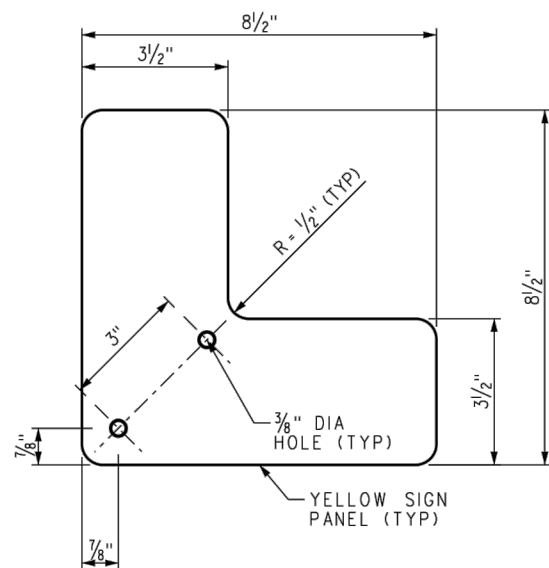


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 www.sandag.org

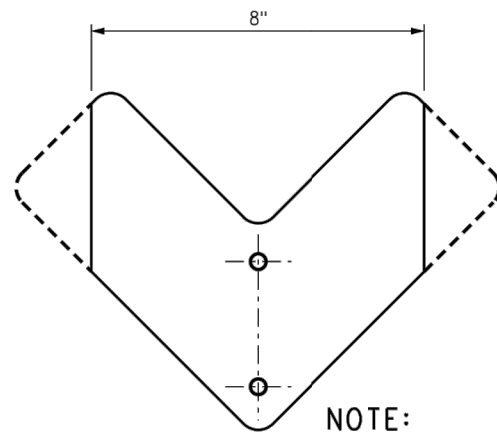


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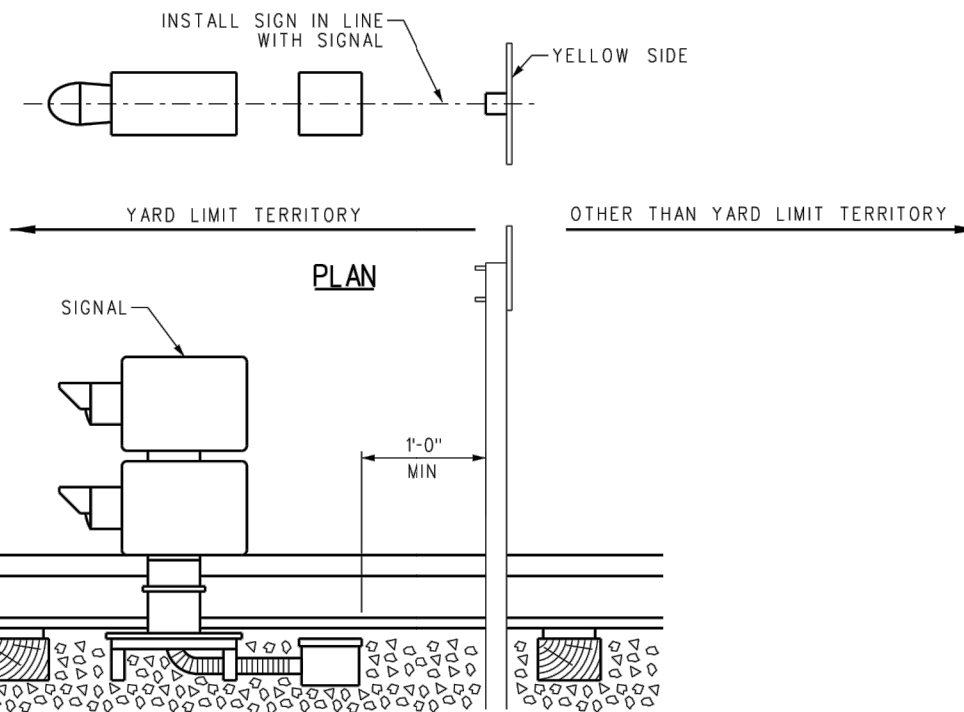
ENGINEERING STANDARD DRAWINGS WHISTLING POINT SIGN	DRAWING NO. ESD-5216
	DRAWING SHEET NO. 1 OF 1
	SCALE: NONE
	CONTRACT SHEET NO.



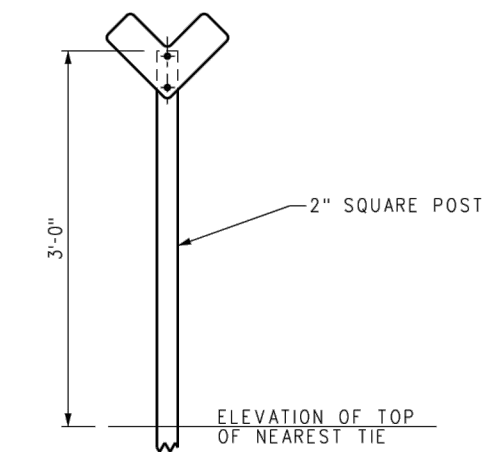
**SIGN PLATE
DETAIL 1**



**OPTIONAL CUT
FOR LIMITED CLEARANCE
DETAIL 2**



**ELEVATION
INSTALLATION LOCATION
DETAIL 4**



**ANCHORED PER SCRRR ES5210
YARD LIMIT SIGN
DETAIL 3**

MATERIAL SPECIFICATIONS		
PRODUCT	SYSTEM	MANUFACTURER AND PRODUCT
HIGH INTENSITY SHEETING (YELLOW)	1	3M DG3 4091
	2	AVERY DENNISON OMNI - CUBE T-11501
ANTI - GRAFFITI OVERLAY	1	3M PREMIUM PROTECTIVE OVERLAY FILM 1160
	2	NIKKALITE BRAND HI - SCALE F-40801
	3	AVERY DENNISON OL - 1000 PREMIUM ANTI - GRAFFITIFILM
PANEL	1	1/8" THICK ALUMINUM, ALCOA 6016-T6 OR EQUAL
POSTS, ANCHORS & HARDWARE	1	PER ESD-5210

INSTALLATION NOTES

1. SIGN SHALL BE INSTALLED TO INDICATE LIMIT OF TERRITORY OPERATED UNDER RULE 6.13.
2. THE POST SHALL BE SET PER THE LOCATION PLAN ON THIS SHEET. EXCEPTIONS SHALL REQUIRE THE APPROVAL OF NCTD.

MATERIAL NOTES:

1. SIGNS SHALL INCLUDE ALUMINUM PANEL, RETROREFLECTIVE SHEETING, POLYURETHANE PAINT, SCREENED-PROCESS COLORS OR FILM, UV PROTECTION OVERLAY, ANTI-GRAFFITIOVERLAY, POSTS, ANCHORS AND HARDWARE.
2. ALUMINUM PANEL SHALL BE ALCOA 6016-T6 OR EQUAL.
3. POSTS, ANCHORS, AND HARDWARE SHALL BE AS PER DRAWING ESD-5210
4. PANEL SHALL BE PAINTED ON ALL SIDES WITH TWO PART ACRYLIC POLYURETHANE PAINT COATING.
5. RETROREFLECTIVE SHEETING SHALL CONFORM TO THE REQUIREMENTS OF ASTM D4956, CLASS IX OR GREATER. RETROREFLECTIVE SHEETING SHALL HAVE CLASS 1, 3, OR 4 ADHESIVE BACKING WHICH SHALL BE PRESSURE SENSITIVE AND FUNGUS RESISTANT.

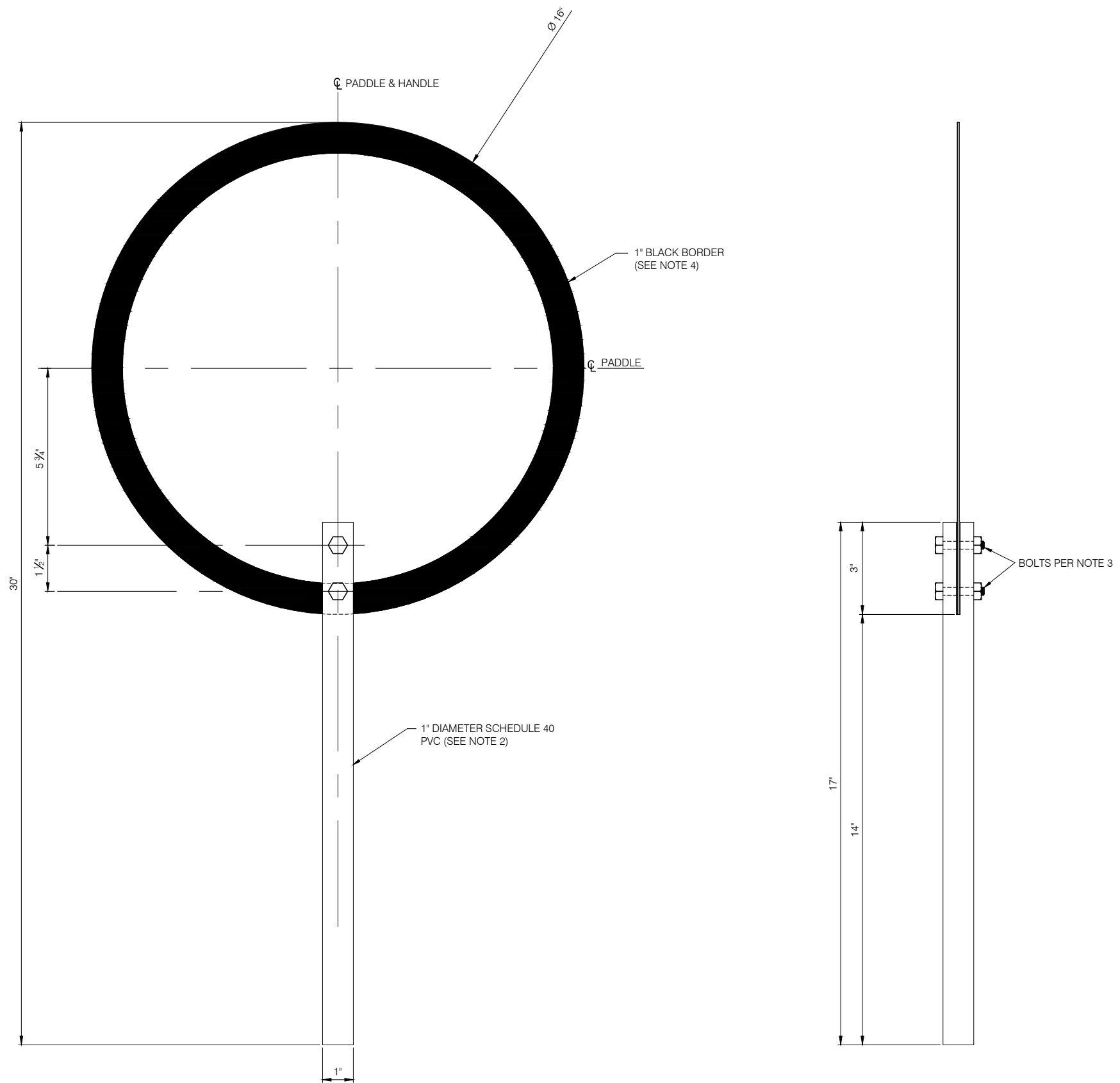
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REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN RAILPROS	
CHECKED B. SMITH	<i>BS</i>
RECOMMENDED B. SCHMITH	<i>BBS</i>
DATE	10/08/15
DESIGNER PE STAMP	



ENGINEERING STANDARD DRAWINGS	DRAWING NO.	ESD-5217
	DRAWING SHEET NO.	1 OF 1
	SCALE:	NONE
	CONTRACT SHEET NO.	



NOTES:

1. TARGET PLATE TO BE .063 ALODINED ALUMINUM WITH NON-REFLECTIVE WHITE VINYL APPLIED TO BOTH SIDES.
2. HANDLE TO BE SCHEDULE 40 PVC SLOTTED TO ACCOMMODATE TARGET PLATE.
3. HANDLE TO BE SECURED TO TARGET PLATE WITH TWO 1/2" X 20 X 1 1/2" PLATED HEX HEAD BOLTS. NUTS TO BE 1/2" X 20 ROUND BASE WELD NUTS.
4. A 1" BLACK BORDER SHALL BE SILK SCREENED TO BOTH SIDES OF TARGET PLATE WITH NO SPACE BETWEEN EDGE OF TARGET PLATE AND BORDER.

SANDAG/NCCTD ENGINEERING STANDARDS ARE INTENDED FOR SANDAG/NCCTD APPROVED USES ONLY. FOR NON-SANDAG/NCCTD APPROVED USES, SANDAG/NCCTD SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF THE DATA OR INFORMATION CONTAINED HEREIN. THE SELECTION AND USE OF THESE STANDARDS IS THE SOLE RESPONSIBILITY OF THE USER AND SHOULD NOT BE USED WITHOUT CONSULTING A REGISTERED PROFESSIONAL ENGINEER. ALL WARRANTIES AND REPRESENTATIONS OF ANY KIND ARE DISCLAIMED. ANYONE MAKING USE OF THIS INFORMATION AGREES THAT IT ASSUMES ALL LIABILITY ARISING FROM SUCH USE. NO PART OF THESE STANDARDS SHOULD BE REPRODUCED OR DISTRIBUTED IN ANY FORM OR BY ANY MEANS WITHOUT THE PRIOR WRITTEN PERMISSION OF SANDAG/NCCTD. ALL RIGHTS RESERVED.

REVISONS		DES.	ENG.
REV.	DATE	DESCRIPTION	DES. ENG.

DRAWN
RAILPROS

CHECKED
B. SMITH *BS*

RECOMMENDED
B. SCHMITH *BAS*

DATE 10/08/15

DESIGNER PE STAMP



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ENGINEERING STANDARD DRAWINGS

WARNING PADDLE

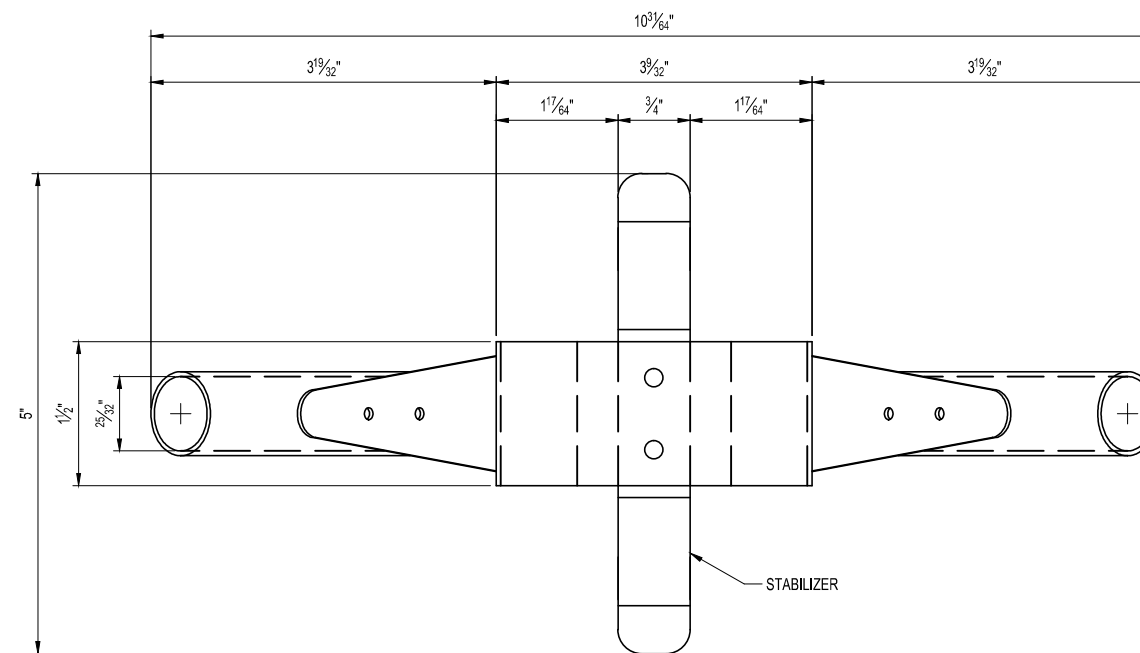
DRAWING NO. ESD-5218

DRAWING SHEET NO. 1 OF 1

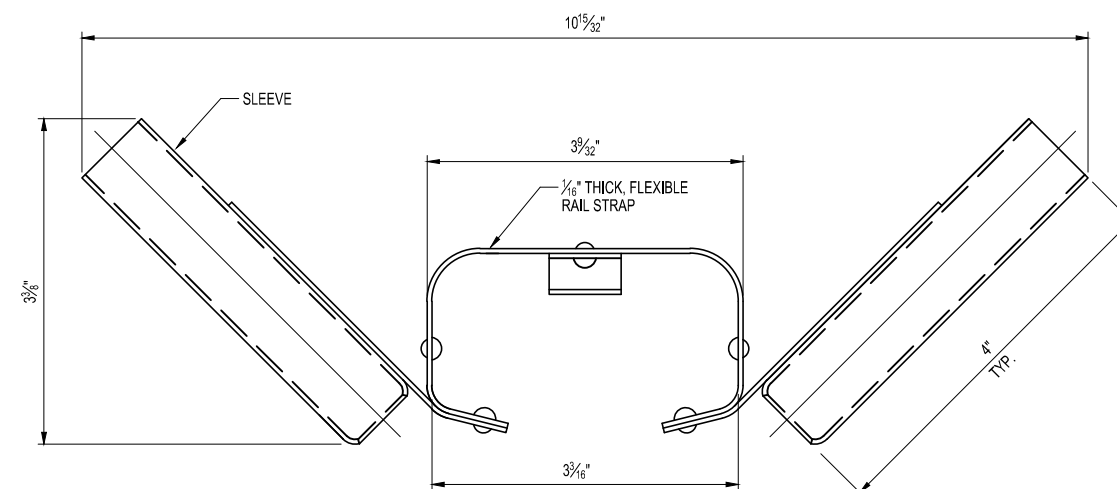
SCALE: NONE

CONTRACT SHEET NO.

MATERIAL: STEEL
 COATING: COLD GALVANIZING PAINT



PLAN



ELEVATION

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REV.	DATE	DESCRIPTION	DES.	ENG.

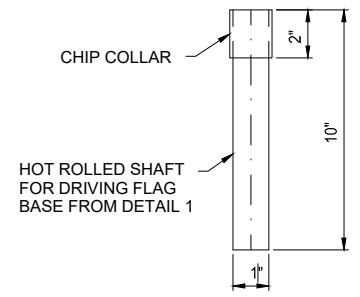
REVISIONS	DRAWN RAILPROS
	CHECKED B. SMITH <i>BS</i>
	RECOMMENDED B. SCHMITH <i>BAS</i>
	DATE 10/08/15
DESIGNER PE STAMP	

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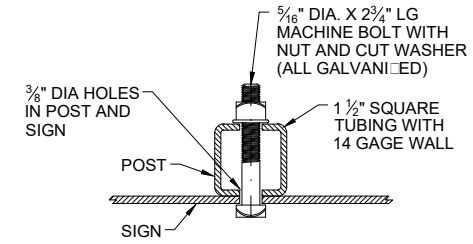
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ENGINEERING STANDARD DRAWINGS FLAG STANCHION	DRAWING NO. ESD-5219
	DRAWING SHEET NO. 1 OF 1
	SCALE: NONE
	CONTRACT SHEET NO.

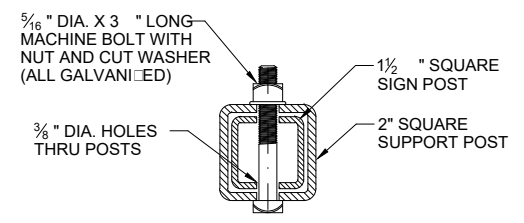
BILL OF MATERIAL	
1	2-PIECE FLAG HOLDER TO CONSIST OF THE FOLLOWING: FLAG: 1 EACH, INCLUDES 4 EACH 5/16" DIA. BOLT, NUT AND WASHER. SPECIFY FLAG COLOR(S). FLAG STEM: 1 EACH. FLAG BASE: 1 EACH. FLAG BASE DRIVER: 1 EACH. (IF REQUIRED)
1	1-PIECE FLAG HOLDER TO CONSIST OF THE FOLLOWING: FLAG: 1 EACH, INCLUDES 3 EACH 5/16" DIA. BOLT, NUT AND WASHER. SPECIFY FLAG COLOR(S). FLAG STEEL ROD FORK AND STEM: 1 EACH



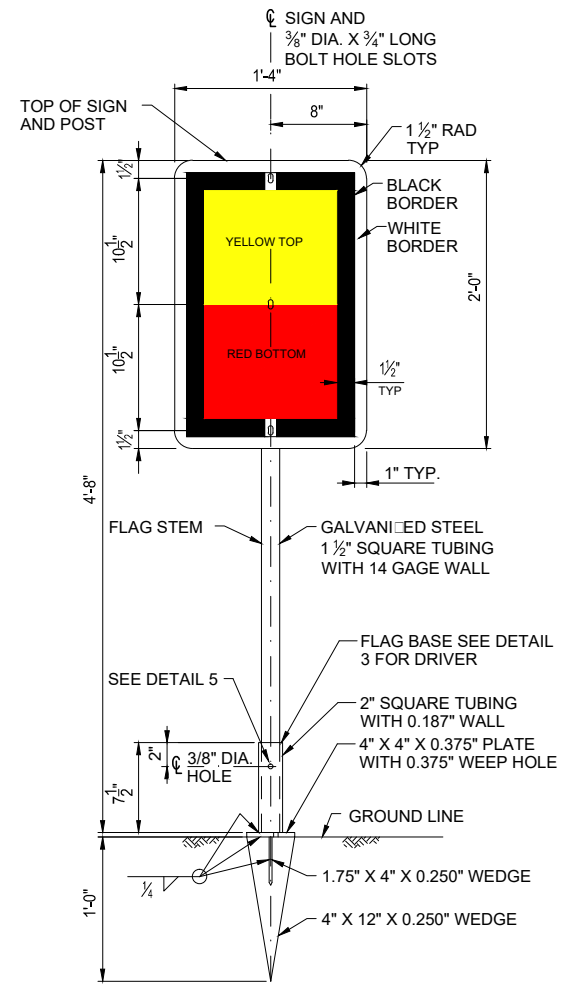
**FLAG BASE DRIVER
FOR 2-PIECE FLAG HOLDER
DETAIL 3
SCALE: NONE**



**TYPICAL SECTION
THRU SIGN AND POST
DETAIL 4
SCALE: NONE**

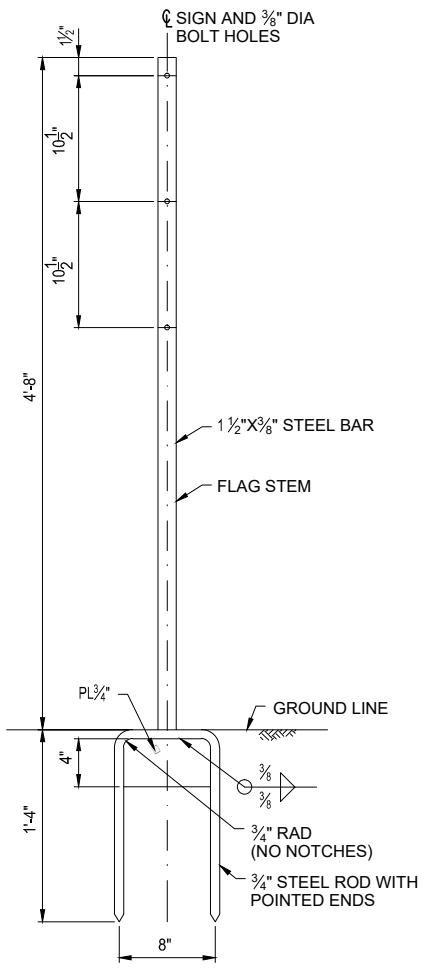


**TYPICAL SECTION
THRU POST AND BASE
DETAIL 5
SCALE: NONE**



NOTE:
YELLOW-RED FLAG ILLUSTRATED. PURCHASE REQUISITIONS MUST SPECIFY COLOR(S) OF FLAG. ALL COLORS OF FLAGS HAVE BLACK BORDER.

**2 - PIECE FLAG HOLDER
FLAG BASE, STEM WITH SIGN
DETAIL 1
SCALE: NONE**



**1 - PIECE FLAG HOLDER
STEEL ROD FORK AND STEM WITHOUT SIGN
DETAIL 2
SCALE: NONE**

INSTALLATION NOTES:

- A. PURPOSE: TO ASSIST TRAIN CREWS AND OTHERS IN ACCURATELY DETERMINING LOCATIONS OF SPEED RESTRICTIONS AND FORM B TRACK BULLETINS.
- B. WHERE USED: AS SPECIFIED BY THE GCOR.
- C. PLACEMENT: ALL SIGNS THIS PAGE ARE DISPLAYED TO THE FIELD SIDE OF TRACK, FOR THE APPROPRIATE DIRECTION OF TRAFFIC MOVEMENT. ACTUAL LOCATION MAY BE ADJUSTED SLIGHTLY TO AVOID OBSTRUCTIONS. CARE MUST BE USED IN PLACEMENT TO ENSURE SIGN DOES NOT OBSTRUCT WALKWAY, MAINTENANCE ROAD, DRAINAGE DITCH, SIDE TRACKS, ETC. IN ALL CASES PLACEMENT MUST CONFORM TO THE CLEARANCES SPECIFIED IN CPUC G.O. 26-D. WHEN INSTALLING 2-PIECE FLAG HOLDER, DRIVE FLAG BASE WITH FLAG BASE DRIVER ONLY. DO NOT STRIKE REFLECTIVE TAPE TO BE APPLIED TO FLAG BASE.

SPECIFICATIONS:

MATERIAL:
SIGN PLATE TO BE 1/8" THICK SHEET ALUMINUM, MILL FINISH, SIMILAR TO ALCOA 61S-T6 (61 ST).

FINISH:
SIGN PLATE TO BE COATED WITH WIDE ANGLE SCOTCHLITE REFLECTIVE SHEETING AS FOLLOWS:
STOP FLAG - RED (ONE SIDE ONLY AND NATURAL FINISH ON BACK).
SLOW FLAG - YELLOW (ONE SIDE ONLY AND NATURAL FINISH ON BACK).
RESUME SPEED FLAG - GREEN (ONE SIDE ONLY AND NATURAL FINISH ON BACK).
YELLOW - RED FLAG - (ONE SIDE ONLY AND NATURAL FINISH ON BACK).
ALL FLAGS HAVE BLACK AND WHITE BORDERS.
FLAG BASE TO BE COATED WITH WIDE ANGLE SCOTCHLITE REFLECTIVE WHITE SHEETING AT EXPOSED SECTION OF BASE.

LOCATION AND USE:
REFER TO RULE 5.4.

NOTES:
DISTANCE FROM CENTERLINE OF TRACK TO FLAG POST MUST NOT BE LESS THAN 10 FEET NOR MORE THAN 13 FEET, EXCEPT AS PRESCRIBED BY RULE 5.4.

COLORS:
RED: PMS 187
YELLOW: PMS 116

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REV.	DATE	DESCRIPTION	DES.	ENG.

REVISIONS

DRAWN RAILPROS

CHECKED B. SMITH

RECOMMENDED B. SCHMITH

DATE 10/08/15

DESIGNER PE STAMP

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ENGINEERING STANDARD DRAWINGS

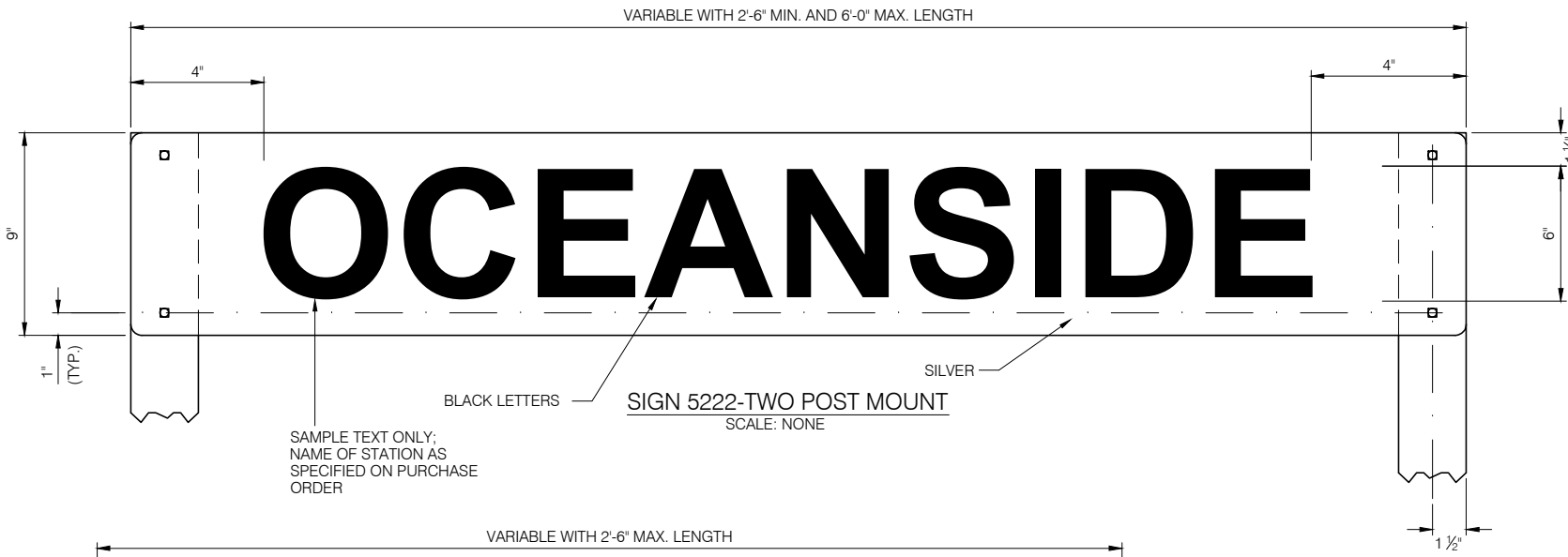
STOP, SLOW, AND RESUME SPEED FLAGS AND SIGN

DRAWING NO. ESD-5220

DRAWING SHEET NO. 1 OF 1

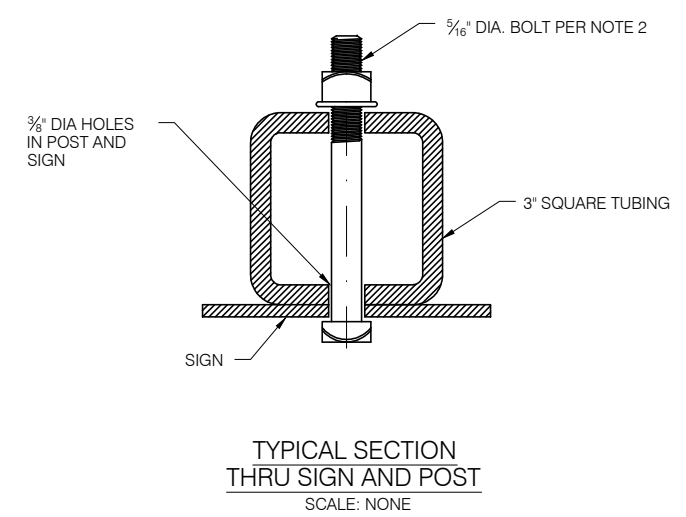
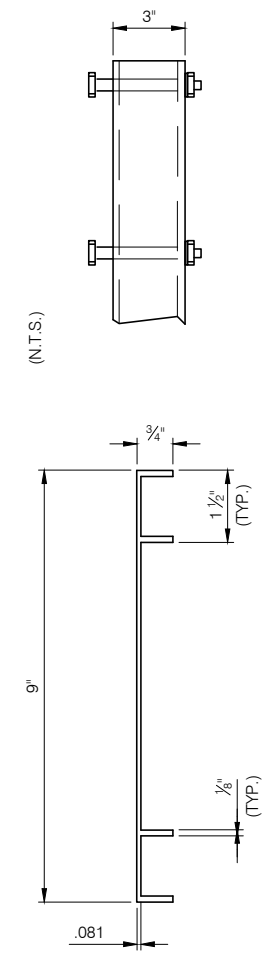
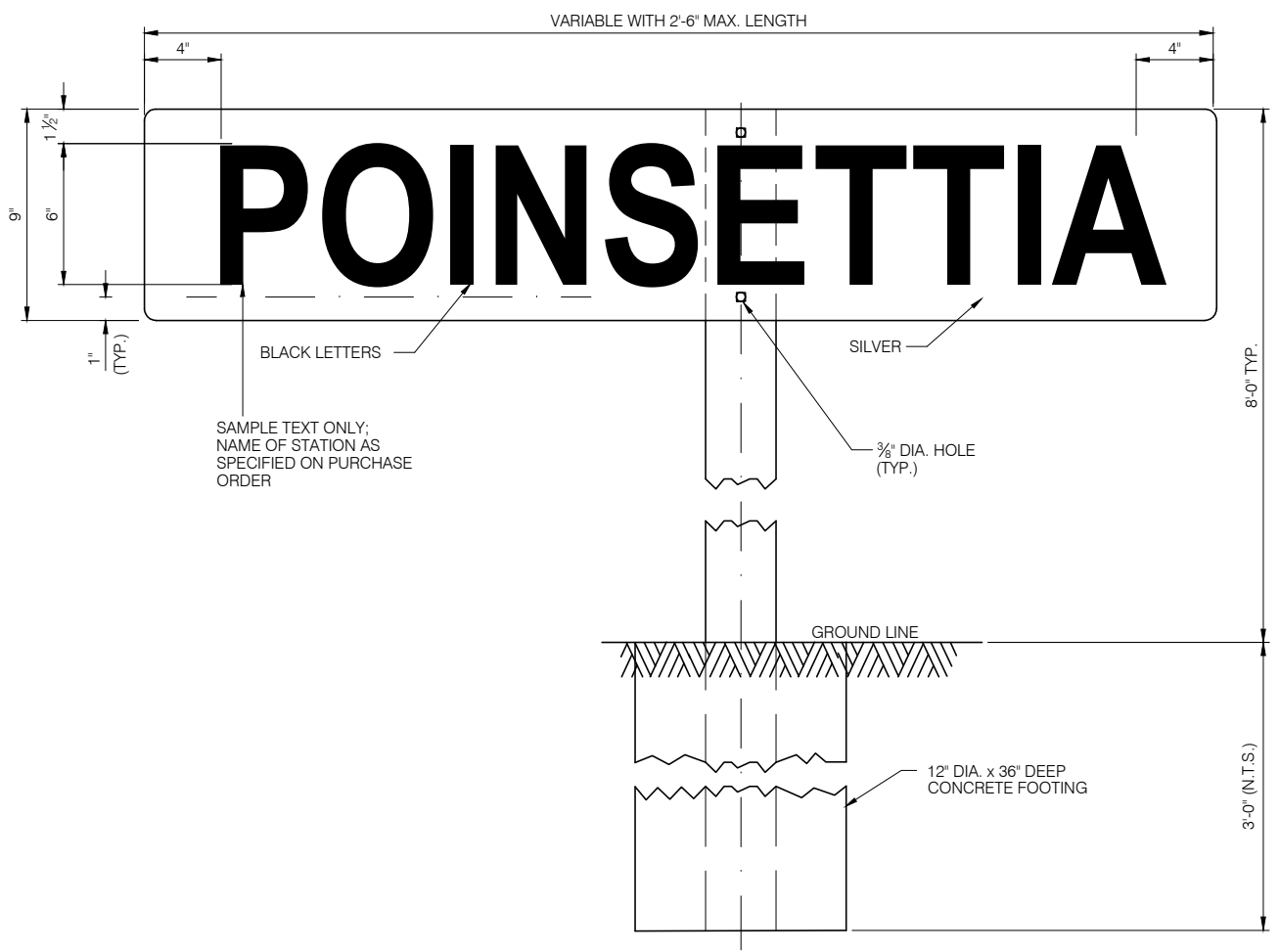
SCALE: NONE

CONTRACT SHEET NO.



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- NOTES:**
- SIGNS TO BE PLACED AT ALL STATIONS AND BUSINESS TRACKS LISTED ON TIME TABLE SCHEDULE PAGE.
 - IN TWC TERRITORY, ONE SIGN IS REQUIRED AT EACH END OF SIDINGS IN PLAIN VIEW FROM APPROACHING TRAINS. MOUNT SIGN ON ONE SIDE OF POST WITH 5/16" X 4 1/2" CARRIAGE BOLT AND HEX NYLOCK CAP (5" LONG BOLT WHERE SIGNS ARE REQUIRED AT BOTH SIDES OF POST).
 - AT OTHER LOCATIONS IN TWC TERRITORY WHERE SIGNS ARE REQUIRED, ONE SIGN TO BE MOUNTED ON BOTH SIDES OF POST AT TIMETABLE STATION LOCATION.
 - IN OTHER THAN CTC OR TWC TERRITORY, ONE SIGN TO BE MOUNTED ON EACH SIDE OF POST AND LOCATED AT TIME-TABLE STATION LOCATION.
 - SIGN TO BE 3290 SILVER 3M ENGINEER GRADE BACKGROUND ON EXTRUSION (REF. DIE NO. AY-0984).
 - LETTERS TO BE ARIAL BOLD PER DRAWING ESD1212 BLACK 3M 3650-12 'SCOTCHCAL PLUS' SERIES 'C' NON-REFLECTIVE OR 3M PROCESSED INK.
 - TO MINIMIZE THE LENGTH OF THE SIGN, ABBREVIATIONS THAT MAKE MEANING CLEAR MAY BE USED. REQUISITIONS FOR STATION SIGNS SHOULD SPECIFY MOUNTING HARDWARE REQUIRED PER TYPICAL MOUNTING DETAILS
 - STATION SIGN SHOULD BE PLACED ON OPPOSITE SIDE OF SWITCH STAND IF POSSIBLE, 10'-0" OUT AND 10'-0" AHEAD OF SWITCH POINTS.



ALL SIGNS:

NEAREST POINT OF SIGN TO BE A MINIMUM OF 10'-0" FROM THE GAGE SIDE OF NEAREST RAIL. CONCRETE FOOTINGS TO HAVE A MINIMUM COMPRESSIVE STRENGTH OF 2500 PSI @ 28 DAYS.

REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN RAILPROS CHECKED B. SMITH RECOMMENDED B. SCHMITH DATE 10/08/15	DESIGNER PE STAMP
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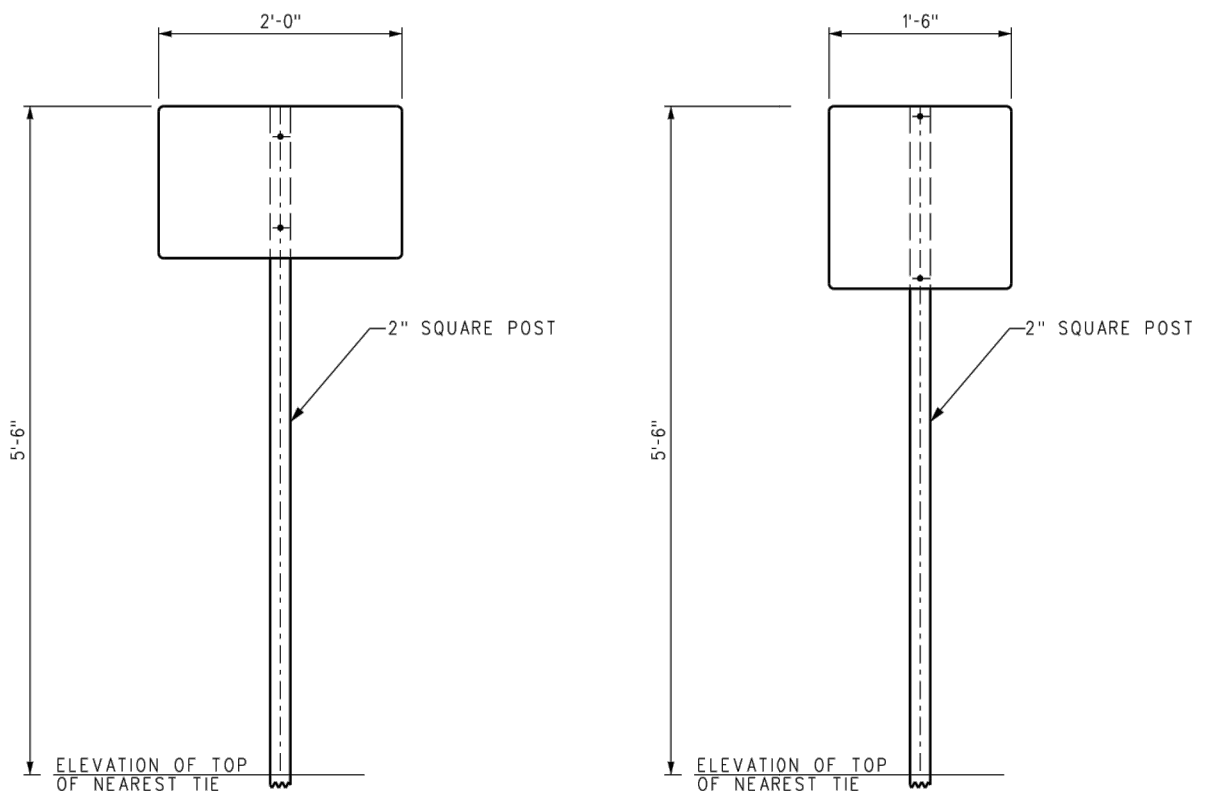
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ENGINEERING STANDARD DRAWINGS

STATION APPROACH SIGN - FOR ENGINEER

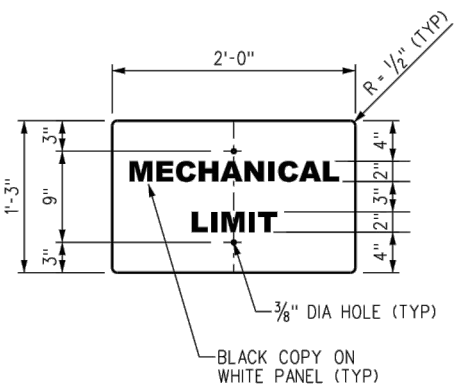
DRAWING NO.	ESD-5222
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	



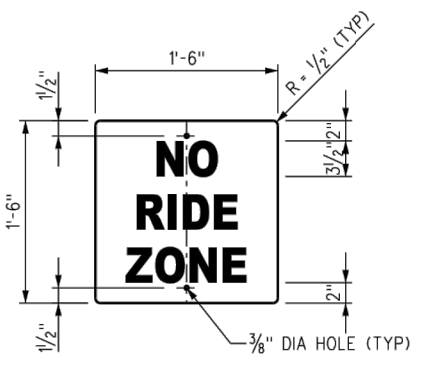
MATERIAL SPECIFICATIONS		
PRODUCT	SYSTEM	MANUFACTURER AND PRODUCT
HIGH INTENSITY SHEETING (WHITE)	1	3M SCOTCHLITE HIGH INTENSITY PRISMATIC WHITE GRADE 3930 SHEETING
	2	NIPPON CARBIDE RETRO-REFLECTIVE SHEETING TYPE VIII CRYSTAL GRADE
	3	AVERY DENNISON OMNI-VIEW T-9500 PRISMATIC HIGH INTENSITY SHEETING
COPY / GRAPHICS (BLACK)	1	3M PROCESS COLOR SERIES 8851 INK
	2	NIPPON CARBIDE GRAFFITI RESISTANT 3803 INK
	3	AVERY DENNISON 4930 INK
ANTI - GRAFFITI OVERLAY	1	3M PREMIUM PROTECTIVE OVERLAY FILM 1160
	2	NIKKALITE BRAND HI - SCALE F-40801
	3	AVERY DENNISON OL - 1000 PREMIUM ANTI - GRAFFITI FILM
PANEL	1	1/8" THICK ALUMINUM, ALCOA 6016-T6 OR EQUAL
POSTS, ANCHORS & HARDWARE	1	PER ESD-5210

INSTALLATION NOTES

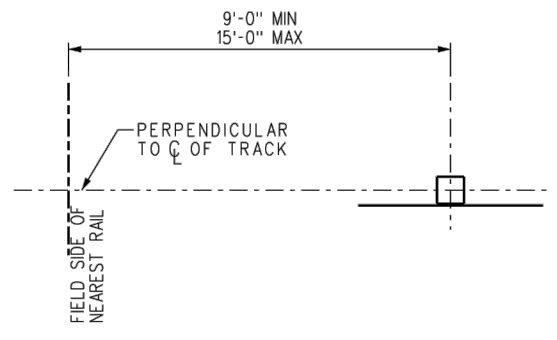
1. THE SIGNS SHALL BE SET PER THE LOCATION PLAN ON THIS SHEET. THE POST SHALL BE SET ON THE RIGHT HAND SIDE OF THE TRACK AS ONE FACES THE YARD. FACE OF THE SIGN SHALL BE SET FACING TRAINS APPROACHING THE YARD. THE ENGINEER WILL DESIGNATE STATIONS AT WHICH SIGNS WILL BE USED AND THE DISTANCES THEY WILL BE SET OUTSIDE THE HEAD BLOCKS.



MECHANICAL LIMIT SIGN
SIGN 5223.1



NO RIDE ZONE SIGN
SIGN 5223.2



LOCATION PLAN

MATERIAL NOTES:

1. SIGNS SHALL INCLUDE ALUMINUM PANEL, RETROREFLECTIVE SHEETING, POLYURETHANE PAINT, SCREENED-PROCESS COLORS OR FILM, UV PROTECTION OVERLAY, ANTI-GRAFFITI OVERLAY, POSTS, ANCHORS AND HARDWARE.
2. ALUMINUM PANEL SHALL BE ALCOA 6016-T6 OR EQUAL.
3. TEXT FONT SHALL BE 1/32" ARIEL BOLD 3/32" AS PER DRAWING ESD-1212 SIZE AS INDICATED.
4. POSTS, ANCHORS, AND HARDWARE SHALL BE AS PER DRAWING ESD-5210
5. PANEL SHALL BE PAINTED ON ALL SIDES WITH TWO PART ACRYLIC POLYURETHANE PAINT COATING.
6. RETROREFLECTIVE SHEETING SHALL CONFORM TO THE REQUIREMENTS OF ASTM D4956, CLASS IX OR GREATER. RETROREFLECTIVE SHEETING SHALL HAVE CLASS 1, 3, OR 4 ADHESIVE BACKING WHICH SHALL BE PRESSURE SENSITIVE AND FUNGUS RESISTANT.
7. SCREENED-PROCESS COLORS AND NONREFLECTIVE, OPAQUE BLACK FILM SHALL HAVE EQUIVALENT OUTDOOR WEATHERABILITY CHARACTERISTICS AS THE RETROREFLECTIVE SHEETING.

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CHECKED B. SMITH	<i>BS</i>
RECOMMENDED B. SCHMITH	<i>BBS</i>
DATE	10/08/15

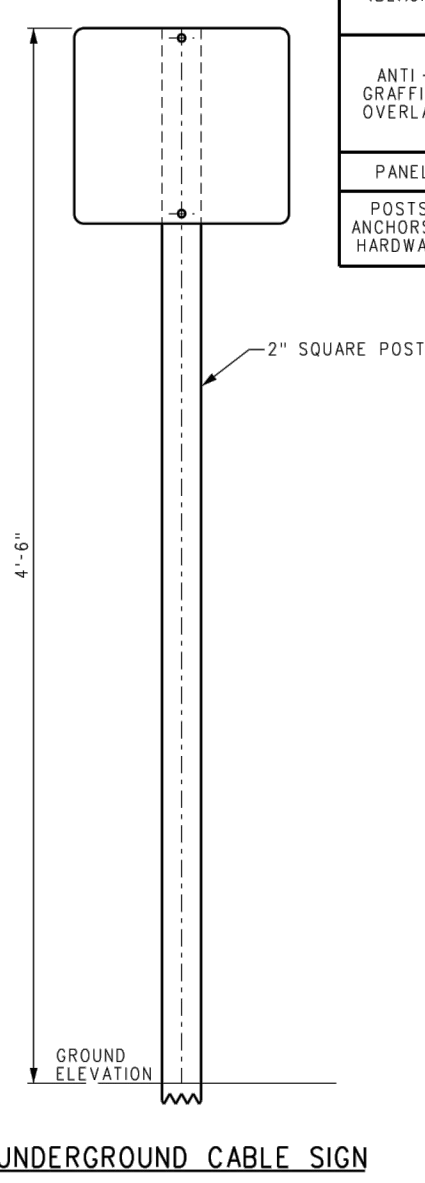
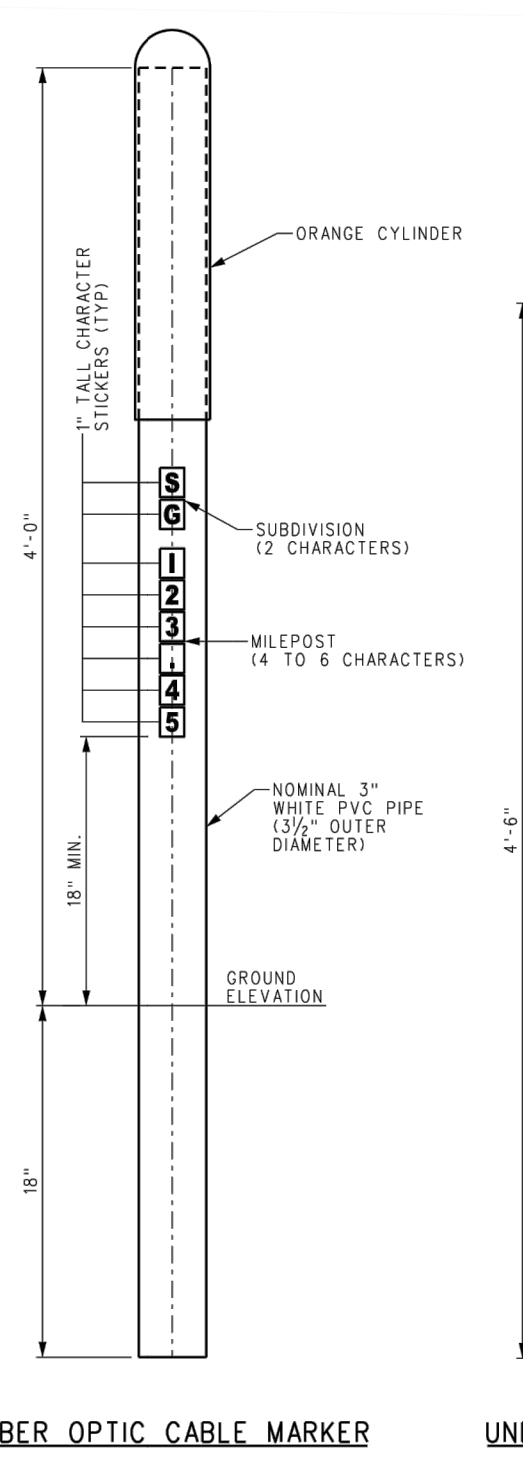
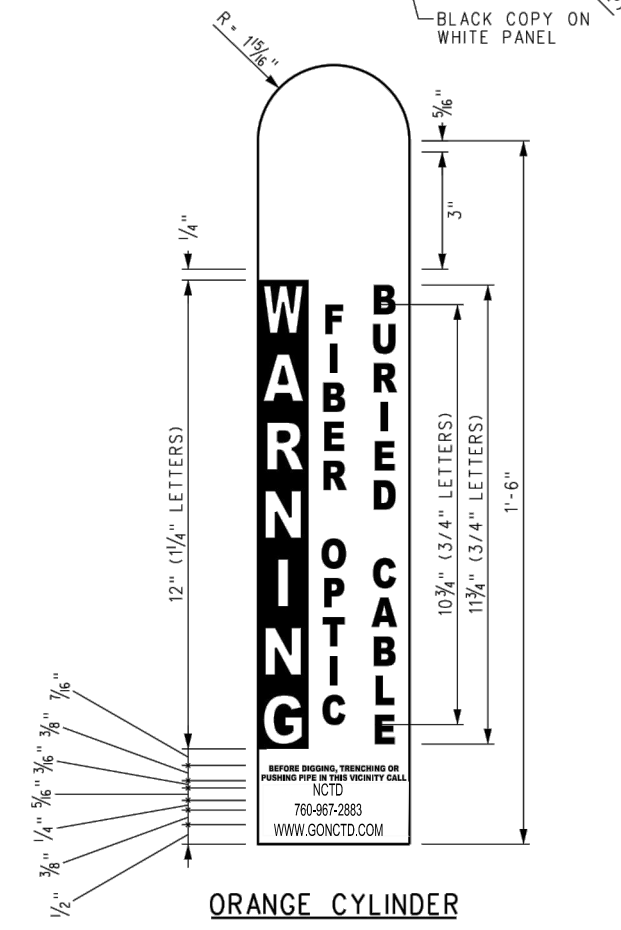
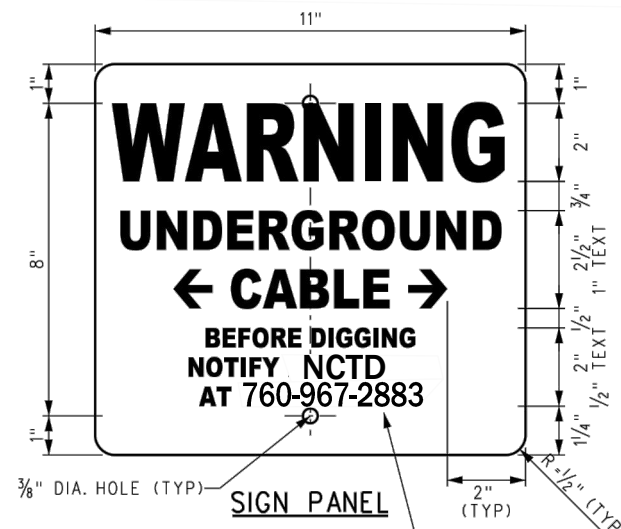
DESIGNER PE STAMP

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ENGINEERING STANDARD DRAWINGS
MECHANICAL LIMIT AND NO RIDE ONE SIGNS

DRAWING NO. ESD-5223
DRAWING SHEET NO. 1 OF 1
SCALE: NONE
CONTRACT SHEET NO.



MATERIAL SPECIFICATIONS		
PRODUCT	SYSTEM	MANUFACTURER AND PRODUCT
HIGH INTENSITY SHEETING (WHITE)	1	3M SCOTCHLITE HIGH INTENSITY PRISMATIC WHITE GRADE 3930 SHEETING
	2	NIPPON CARBIDE RETRO-REFLECTIVE SHEETING TYPE VIII CRYSTAL GRADE
	3	AVERY DENNISON OMNI-VIEW T-9500 PRISMATIC HIGH INTENSITY SHEETING
COPY / GRAPHICS (BLACK)	1	3M PROCESS COLOR SERIES 8851 INK
	2	NIPPON CARBIDE GRAFFITI RESISTANT 3803 INK
	3	AVERY DENNISON 4930 INK
ANTI - GRAFFITI OVERLAY	1	3M PREMIUM PROTECTIVE OVERLAY FILM 1160
	2	NIKKALITE BRAND HI - SCALE F-40801
	3	AVERY DENNISON OL - 1000 PREMIUM ANTI - GRAFFITI FILM
PANEL	1	1/8" THICK ALUMINUM, ALCOA 6016-T6 OR EQUAL
POSTS, ANCHORS & HARDWARE	1	PER ESD-5210

INSTALLATION NOTES

- SIGNS OR MARKERS SHALL BE PLACED ADJACENT TO ALL UNDERGROUND SIGNAL, COMMUNICATION AND ELECTRICAL CABLES.
- SIGN FACE SHALL BE ORIENTED PARALLEL TO CABLE.
- CL OF SIGN OR MARKER POST SHALL BE SET NO CLOSER THAN 9'-0" FROM THE FIELD SIDE OF THE NEAREST RAIL. EXCEPTIONS SHALL REQUIRE THE APPROVAL OF SCRRRA. INSTALLER SHALL AVOID DAMAGING UNDERGROUND UTILITY.
- SIGNS OR MARKERS SHALL BE PLACED:
 - NO MORE THAN 500' APART
 - AT EVERY SPLICE LOCATION
 - AT EVERY POINT OF CHANGE OF DIRECTION
 - ON EACH SIDE OF BORE OR BRIDGE ATTACHMENT
 - WITHIN SIGHT OF MARKERS BEFORE AND AFTER.
 - 1' OFFSET FROM THE UNDERGROUND RUNNING LINE WHEREVER POSSIBLE. THE ACTUAL OFFSET SHALL BE PERMANENTLY NOTED ON THE SIGN OR MARKER.
- MARKERS SHALL BE INDIVIDUALLY NUMBERED AND SHOWN ON THE AS-BUILT DRAWINGS.

MATERIAL NOTES:

- SIGNS SHALL INCLUDE ALUMINUM PANEL, RETROREFLECTIVE SHEETING, POLYURETHANE PAINT, SCREENED-PROCESS COLORS OR FILM, UV PROTECTION OVERLAY, ANTI-GRAFFITI OVERLAY, POSTS, ANCHORS AND HARDWARE.
- ALUMINUM PANEL SHALL BE ALCOA 6016-T6 OR EQUAL.
- TEXT FONT SHALL BE 1/32" ARIEL BOLD 3/32" AS PER DRAWING ESD-1212 SIZE AS INDICATED.
- POSTS, ANCHORS, AND HARDWARE SHALL BE AS PER DRAWING ESD-5210
- PANEL SHALL BE PAINTED ON ALL SIDES WITH TWO PART ACRYLIC POLYURETHANE PAINT COATING.
- RETROREFLECTIVE SHEETING SHALL CONFORM TO THE REQUIREMENTS OF ASTM D4956, CLASS IX OR GREATER. RETROREFLECTIVE SHEETING SHALL HAVE CLASS 1, 3, OR 4 ADHESIVE BACKING WHICH SHALL BE PRESSURE SENSITIVE AND FUNGUS RESISTANT.
- SCREENED-PROCESS COLORS AND NONREFLECTIVE, OPAQUE BLACK FILM SHALL HAVE EQUIVALENT OUTDOOR WEATHERABILITY CHARACTERISTICS AS THE RETROREFLECTIVE SHEETING.

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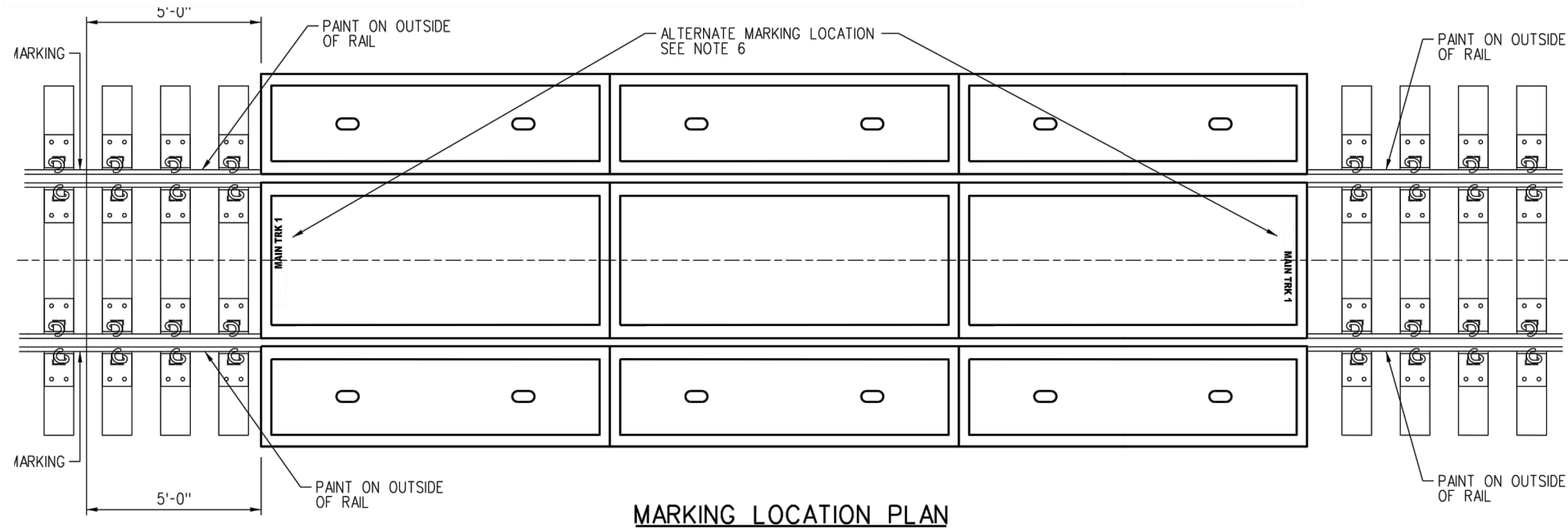
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DATE 10/08/15
DESIGNER PE STAMP

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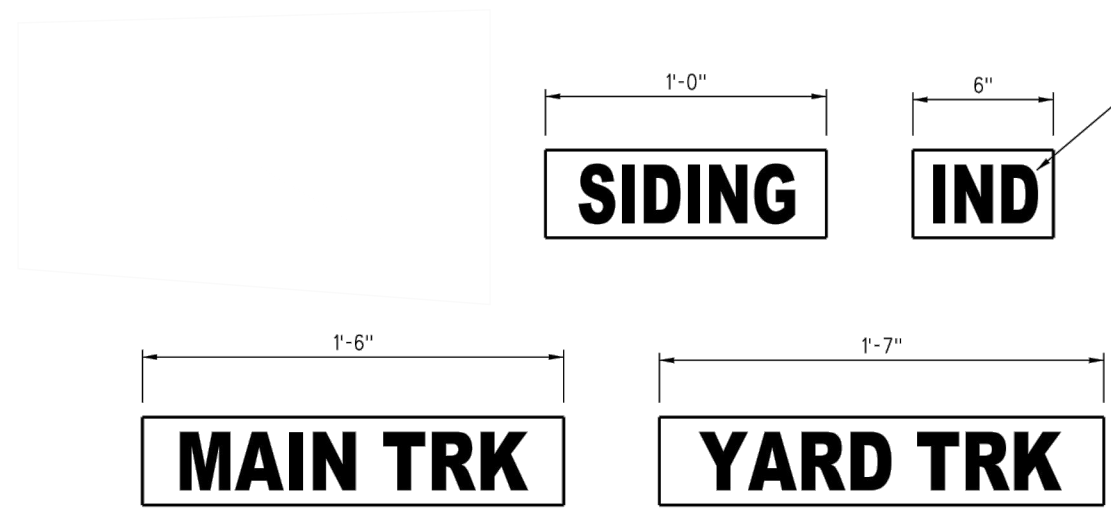
ENGINEERING STANDARD DRAWINGS
UNDERGROUND CABLE SIGN AND FIBER OPTIC CABLE MARKER

DRAWING NO. ESD-5229
DRAWING SHEET NO. 1 OF 1
SCALE: NONE
CONTRACT SHEET NO.



NOTES:

1. TRACK IDENTIFICATION MARKINGS TO BE UTILIZED AT ALL TRACK LOCATIONS WHERE CROSSINGS EXIST.
2. RAIL TO BE MARKED ON THE WEB WITH TEXT FACING THE FIELD SIDE OF THE TRACK. MARKING TO BE MADE 5'-0" FROM THE END OF THE CROSSING PANELS.
3. MARKING WILL MATCH WHAT THE TRACK IS DESIGNATED IN TIMETABLE.
4. LOCATIONS WITH MULTIPLE MAIN LINE TRACKS SHALL BE MARKED WITH MAIN TRK FOLLOWED BY THE TRACK NUMBER. EXAMPLE: MAIN TRK 2.
5. SIDING, INDUSTRY AND YARD TRACKS WILL BE MARKED WITH THE MATCHING STENCIL.
6. IN LOCATIONS WHERE WEB OF RAIL IS BLOCKED FROM VIEW, THE IDENTIFICATION MARKING MAY BE MADE ON THE TOP SURFACE OF THE CROSSING PLANKS. TEXTS TO BE LOCATED ON THE OUTER EDGE READABLE WHEN FACING AWAY FROM THE CENTER OF THE CROSSING.
7. MARKING TO BE MADE USING 2 3/4" GOTHIC LETTERING STENCIL.
8. OSHA SAFETY WHITE SPRAY PAINT TO BE UTILIZED. BLACK PAINT MAY BE USED WHEN SUBSTRATE AND WHITE PAINT IS DIFFICULT TO SEE.



STENCIL FONT TYPE SHOWN FOR CLARITY
SEE NOTE 7 FOR FONT SIZE AND TYPE.



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ENGINEERING STANDARD DRAWINGS
MARKING FOR TRACK IDENTIFICATION

DRAWING NO.	ESD-5230
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	

LOSSAN ENGINEERING STANDARD DRAWINGS

Section 6000

STRUCTURES

BRIDGE STANDARDS

SUPERSTRUCTURE TYPE		* COMMON SPAN RANGE, ft
PC/PS CONCRETE SLAB - (14" TO 20" DEEP)		UP TO 24
30" DEEP PC/PS CONCRETE DOUBLE CELL BOX BEAM		20-36
42" DEEP PC/PS CONCRETE DOUBLE CELL BOX BEAM		30-49
51" DEEP PC/PS CONCRETE DOUBLE CELL BOX BEAM		49-56
ROLLED STEEL GIRDER		31-69
STEEL DECK PLATE GIRDER		60-150
STEEL THROUGH-PLATE-GIRDER		75-150
PC/PS CONCRETE BULB-TEE GIRDER		90-140
PC/PS CONCRETE SINGLE CELL BOX GIRDER		60-130
CIP PS CONCRETE GIRDER		70-200

* SPAN LENGTHS ARE FOR TANGENT TRACK ONLY

NOTE:
FOR SPANS OUTSIDE THE COMMON SPAN RANGE, ADDITIONAL DETAILED DESIGN WILL BE REQUIRED.

DRAWING SCHEDULE	
SHEET NO.	DESCRIPTION
6001	TITLE PAGE AND DRAWING SCHEDULE
6010	PC/PS CONCRETE SLAB - TYPICAL PLAN AND ELEVATION
6011	PC/PS CONCRETE SLAB - TYPICAL CROSS SECTION AT BENT
6020	30" DEEP PC/PS CONCRETE DOUBLE CELL BOX GIRDER - TYPICAL PLAN AND ELEVATION
6021	30" DEEP PC/PS CONCRETE DOUBLE CELL BOX GIRDER - TYPICAL CROSS SECTION AT BENT
6030	42" DEEP PC/PS CONCRETE DOUBLE CELL BOX GIRDER - TYPICAL PLAN AND ELEVATION
6031	42" DEEP PC/PS CONCRETE DOUBLE CELL BOX GIRDER - TYPICAL CROSS SECTION AT BENT
6040	51" DEEP PC/PS CONCRETE DOUBLE CELL BOX GIRDER - TYPICAL PLAN AND ELEVATION
6041	51" DEEP PC/PS CONCRETE DOUBLE CELL BOX GIRDER - TYPICAL CROSS SECTION AT BENT
6050	ROLLED STEEL BEAM - TYPICAL PLAN AND ELEVATION
6051	ROLLED STEEL BEAM - TYPICAL CROSS SECTION AT BENT
6060	STEEL DECK PLATE GIRDER - TYPICAL PLAN AND ELEVATION
6061	STEEL DECK PLATE GIRDER - TYPICAL CROSS SECTION AT BENT
6070	STEEL THROUGH-PLATE-GIRDER - TYPICAL PLAN AND ELEVATION
6071	STEEL THROUGH-PLATE-GIRDER - TYPICAL CROSS SECTION AT BENT
6080	PC/PS CONCRETE BULB-TEE GIRDER - TYPICAL PLAN AND ELEVATION
6081	PC/PS CONCRETE BULB-TEE GIRDER - TYPICAL CROSS SECTION AT BENT
6090	PC/PS CONCRETE SINGLE CELL BOX GIRDER - TYPICAL PLAN AND ELEVATION
6091	PC/PS CONCRETE SINGLE CELL BOX GIRDER - TYPICAL CROSS SECTION AT BENT
6100	CIP PS CONCRETE GIRDER - TYPICAL PLAN AND ELEVATION
6101	CIP PS CONCRETE GIRDER - TYPICAL CROSS SECTION AT BENT

SECTION 6000 PLANS ARE PROVIDED FOR INFORMATION ONLY AND ARE INTENDED TO SHOW BRIDGE TYPES CURRENTLY USED ON THE LOSSAN CORRIDOR. THESE PLANS ARE NOT INTENDED FOR CONSTRUCTION. DESIGNER SHALL PREPARE DETAILED BRIDGE DESIGNS BASED ON THE BRIDGE TYPE SELECTION REPORT PREPARED DURING PRELIMINARY DESIGN STAGE.

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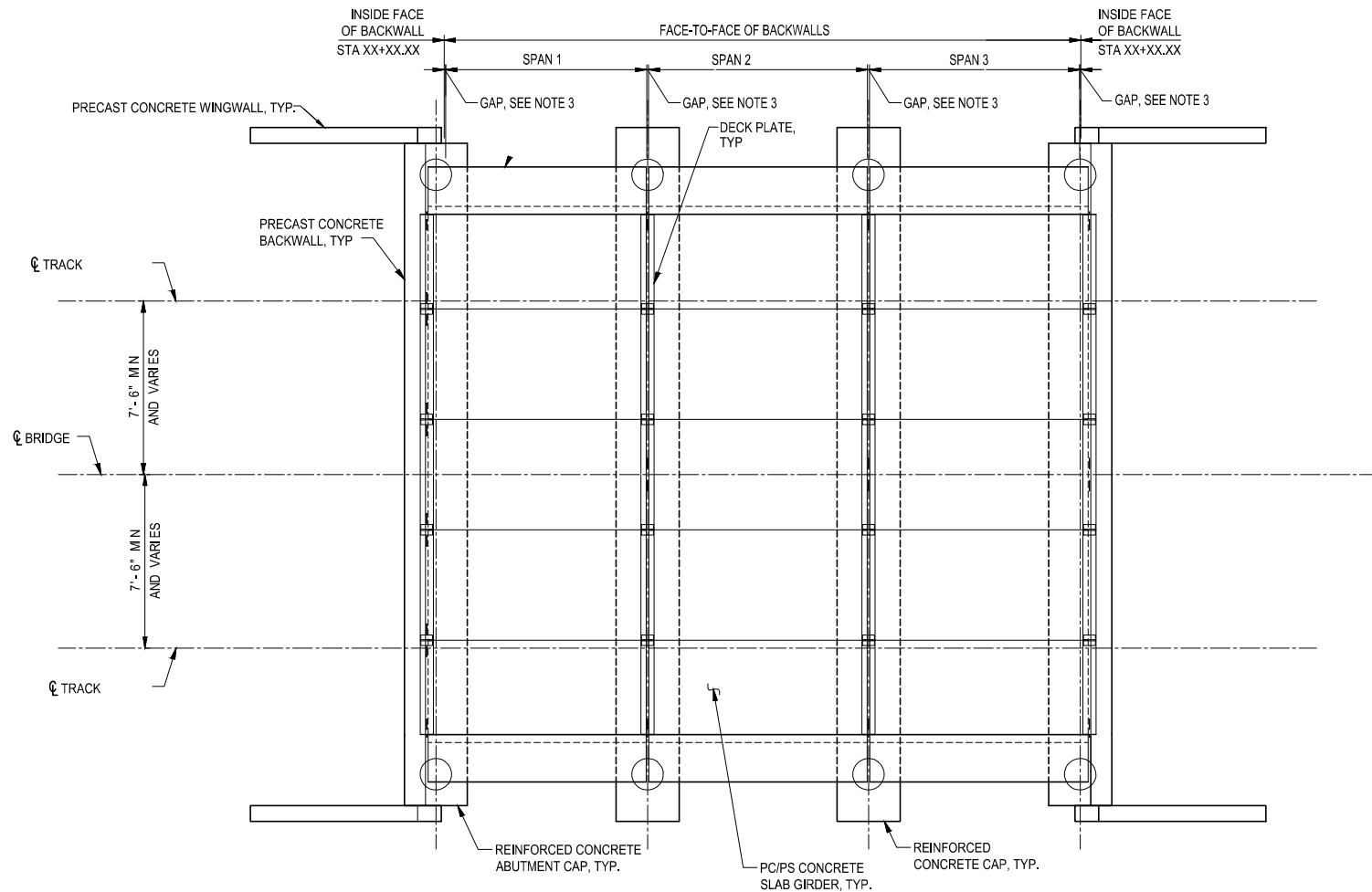
REV.	DATE	DESCRIPTION	DES.	ENG.	DATE	DESIGNER PE STAMP
					5/27/15	

DRAWN HDR
CHECKED B. SMITH *BS*
RECOMMENDED W. PREY *WP*
DATE 5/27/15

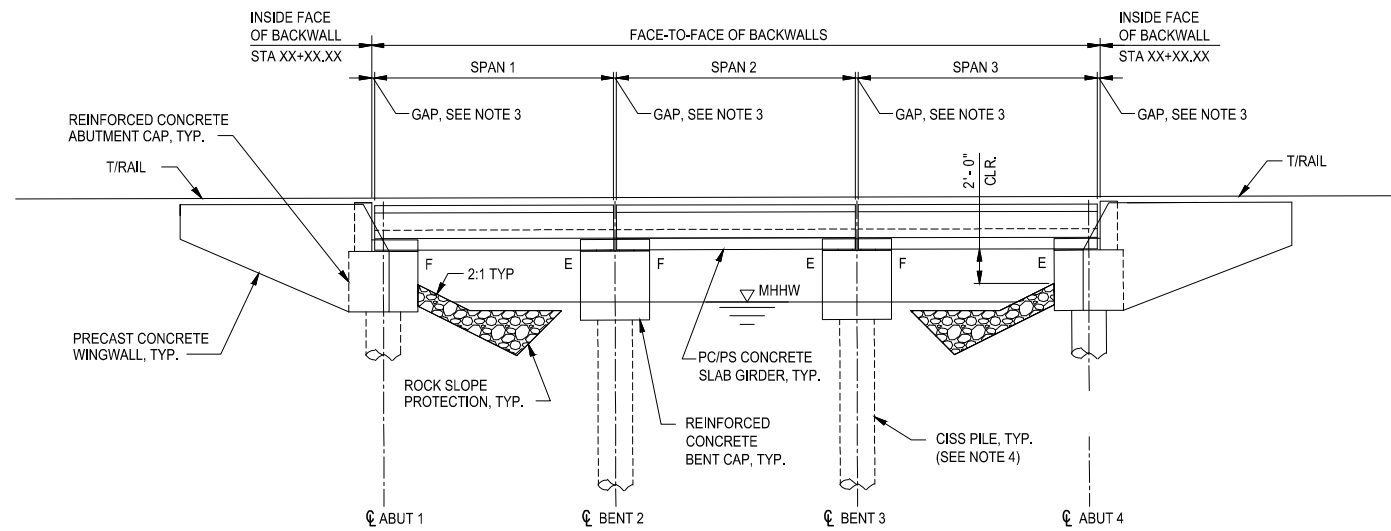


ENGINEERING STANDARD DRAWINGS
BRIDGE STANDARDS TITLE PAGE/DRAWING SCHEDULE

DRAWING NO. ESD-6001
DRAWING SHEET NO. 1 OF 1
SCALE: NONE
CONTRACT SHEET NO.



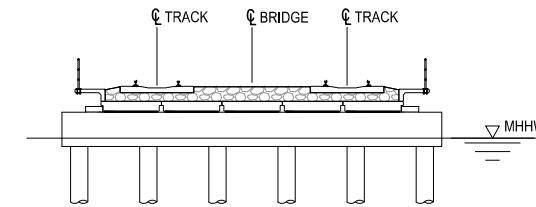
PLAN
NO SCALE



ELEVATION
NO SCALE
HANDRAIL NOT SHOWN FOR CLARITY

NOTES:

1. F = FIXED END
E = EXPANSION END
2. MHHW - MEAN HIGHER HIGH WATER;
TO BE DETERMINED BY HYDROLOGIST.
3. GAP TO BE DETERMINED FROM ANALYSIS, 2' MIN
4. PILE TYPE SELECTION AND DESIGN TO BE DONE
PER GEOTECHNICAL RECOMMENDATIONS



TYPICAL SECTION
NO SCALE

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REV.	DATE	DESCRIPTION	DES.	ENG.

REVISIONS	DRAWN HDR
	CHECKED B. SMITH
	RECOMMENDED W. PREY
	DATE 5/27/15

DESIGNER PE STAMP



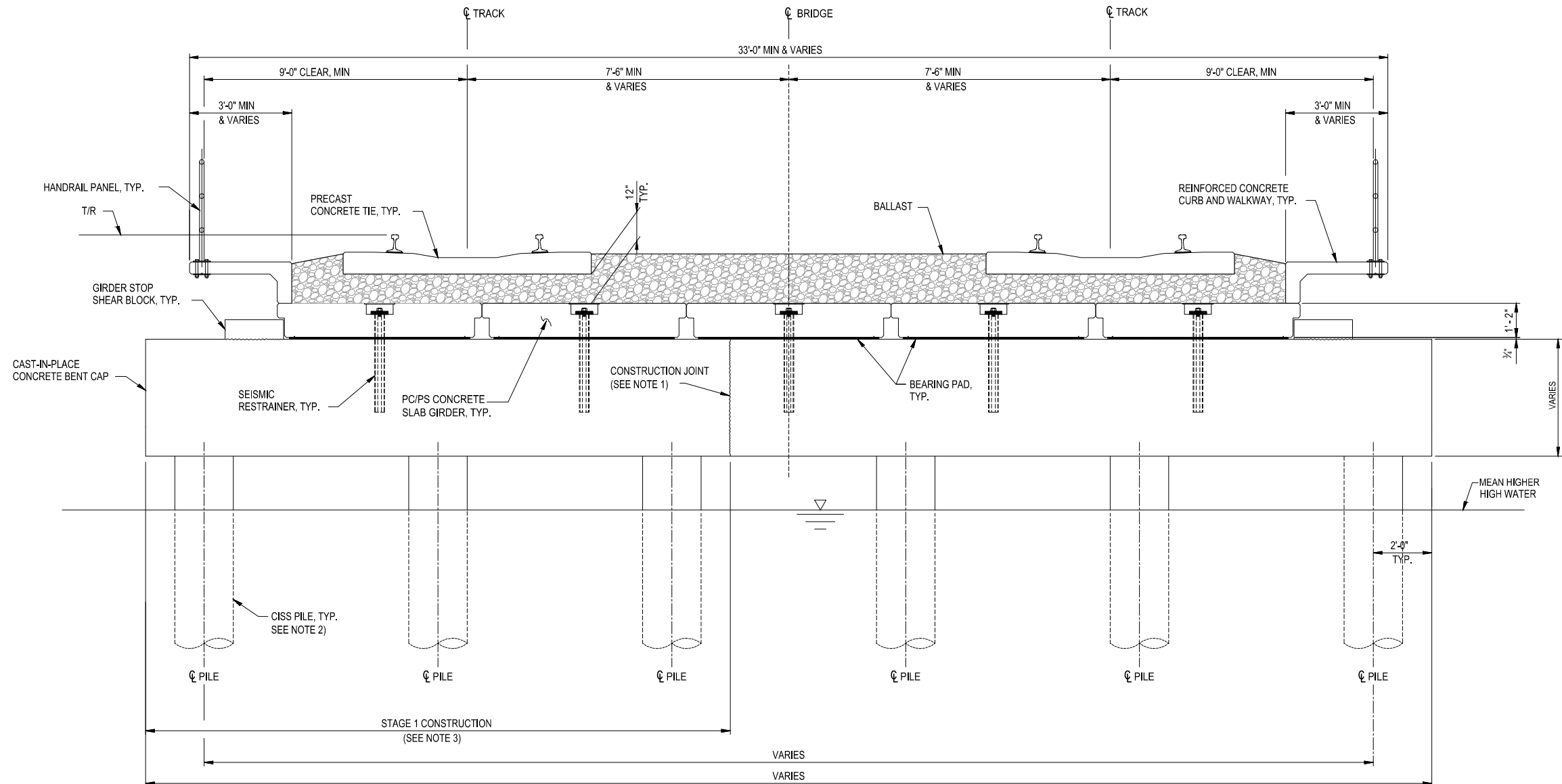
ENGINEERING STANDARD DRAWINGS

PC/PS CONCRETE SLAB GIRDER BRIDGE TYPICAL PLAN AND ELEVATION

DRAWING NO. ESD-6010
DRAWING SHEET NO. 1 OF 2
SCALE: NONE
CONTRACT SHEET NO.

NOTES:

1. POTENTIAL CONSTRUCTION JOINT TO BE PROVIDED WHERE REQUIRED BY CONSTRUCTION SEQUENCING.
2. PILE TYPE SELECTION AND DESIGN TO BE DONE PER GEOTECHNICAL RECOMMENDATIONS.
3. WIDTH VARIES BASED ON PROJECT REQUIREMENTS.



TYPICAL SECTION

SANDAG/NCCTD ENGINEERING STANDARDS ARE INTENDED FOR SANDAG/NCCTD APPROVED USES ONLY. FOR NON-SANDAG/NCCTD APPROVED USES, SANDAG/NCCTD SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF THE DATA OR INFORMATION CONTAINED HEREIN. THE SELECTION AND USE OF THESE STANDARDS IS THE SOLE RESPONSIBILITY OF THE USER AND SHOULD NOT BE USED WITHOUT CONSULTING A REGISTERED PROFESSIONAL ENGINEER. ALL WARRANTIES AND REPRESENTATIONS OF ANY KIND ARE DISCLAIMED. ANYONE MAKING USE OF THIS INFORMATION AGREES THAT IT ASSUMES ALL LIABILITY ARISING FROM SUCH USE. NO PART OF THESE STANDARDS SHOULD BE REPRODUCED OR DISTRIBUTED IN ANY FORM OR BY ANY MEANS WITHOUT THE PRIOR WRITTEN PERMISSION OF SANDAG/NCCTD. ALL RIGHTS RESERVED.

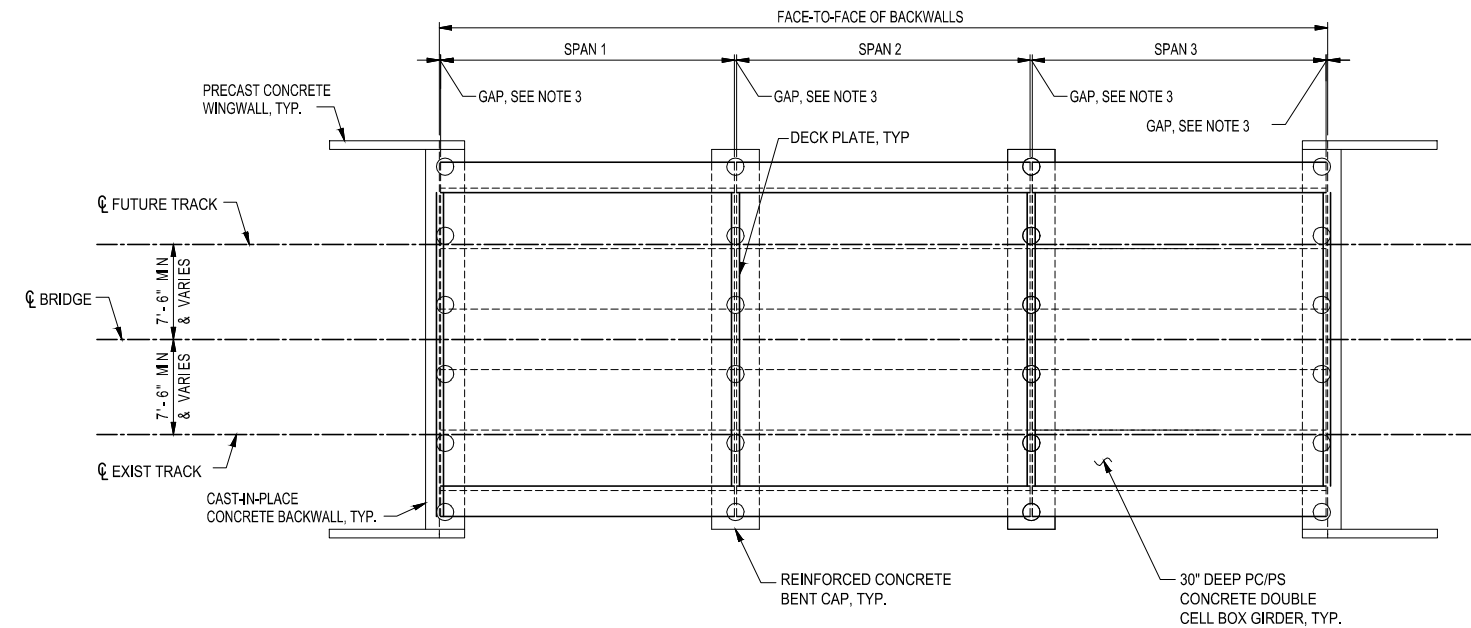
REV.	DATE	DESCRIPTION	DES.	ENG.

REVISIONS	DRAWN HDR
	CHECKED B. SMITH <i>MSB</i>
	RECOMMENDED W. PREY <i>WP</i>
	DATE 5/27/15
DESIGNER PE STAMP	

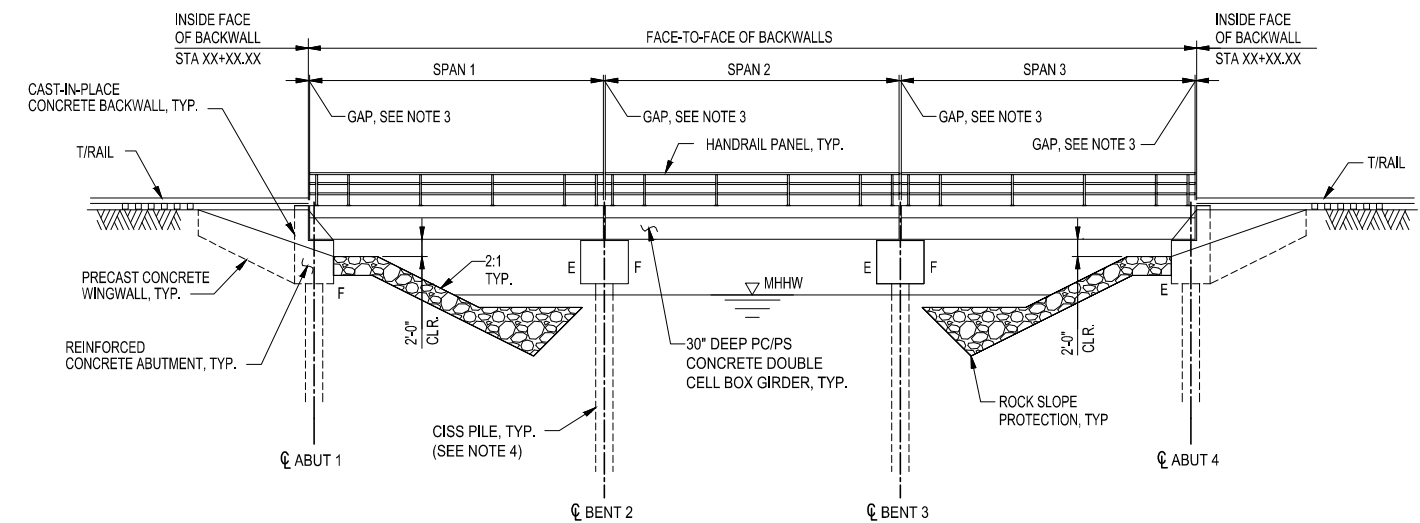


ENGINEERING STANDARD DRAWINGS
 PC/PS CONCRETE SLAB GIRDER BRIDGE TYPICAL
 CROSS SECTION AT BENT

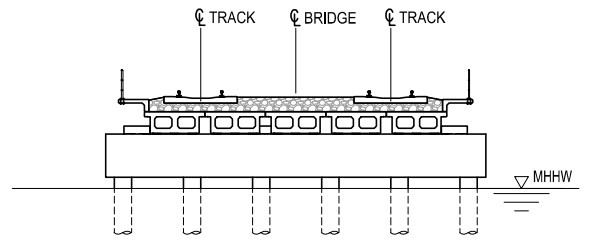
DRAWING NO.	ESD-6011
DRAWING SHEET NO.	2 OF 2
SCALE:	NONE
CONTRACT SHEET NO.	



PLAN



ELEVATION



TYPICAL SECTION

NOTES:

1. F = FIXED END
E = EXPANSION END
2. MHHW - MEAN HIGHER HIGH WATER;
TO BE DETERMINED BY HYDROLOGIST.
3. GAP TO BE DETERMINED FROM ANALYSIS, 2' MIN
4. PILE TYPE SELECTION AND DESIGN TO BE DONE
PER GEOTECHNICAL RECOMMENDATIONS

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REV.	DATE	DESCRIPTION	DES.	ENG.

REVISIONS

DRAWN HDR

CHECKED B. SMITH *BS*

RECOMMENDED W. PREY *WP*

DATE 5/27/15

DESIGNER PE STAMP

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San Diego, CA. 92101
www.sandag.org

810 Mission Avenue
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www.gonctd.com

ENGINEERING STANDARD DRAWINGS

30" DEEP PC/PS CONCRETE DOUBLE CELL GIRDER
BRIDGE TYPICAL PLAN AND ELEVATION

DRAWING NO. ESD-6020

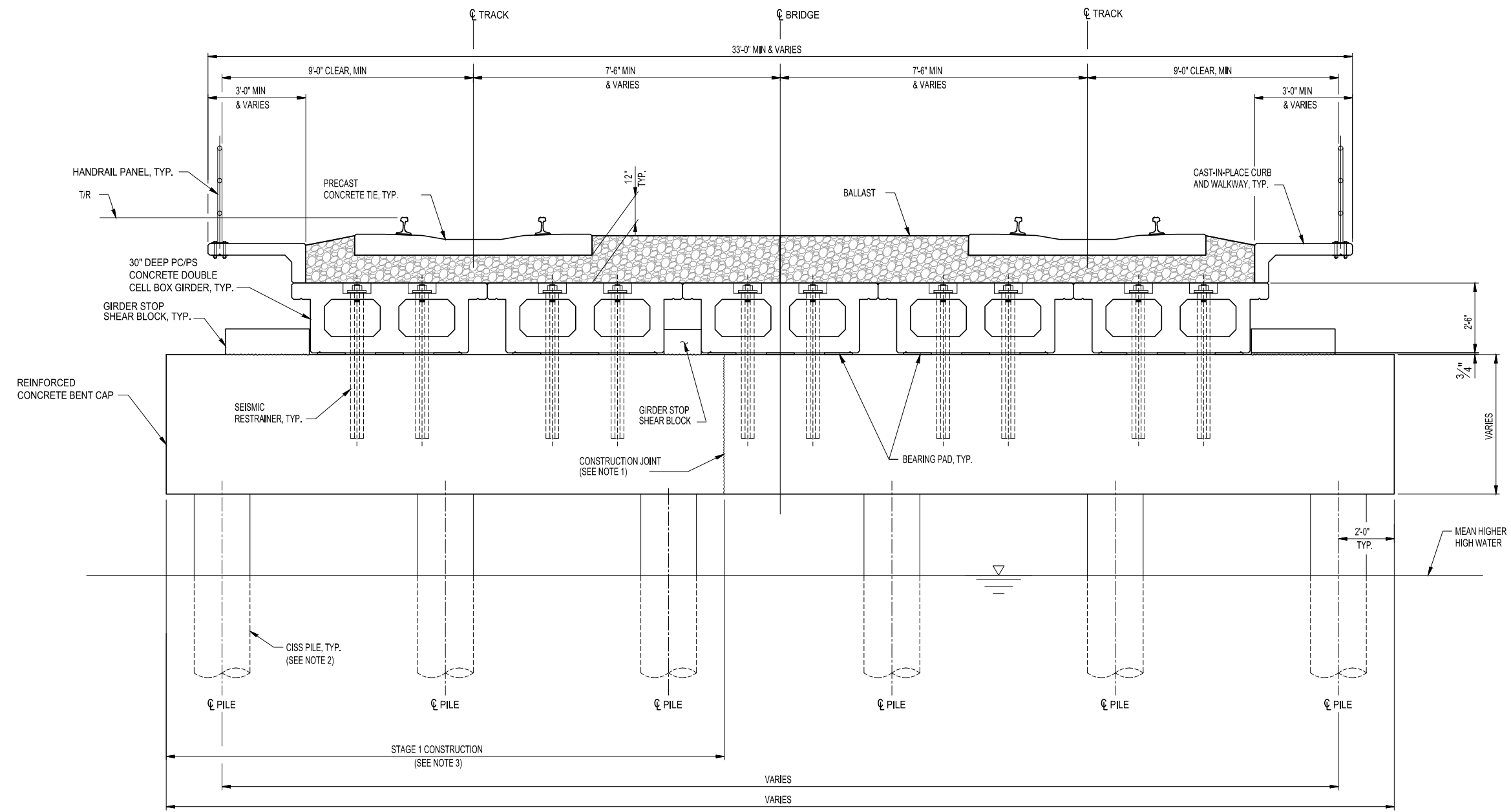
DRAWING SHEET NO. 1 OF 2

SCALE: NONE

CONTRACT SHEET NO.

NOTES:

1. POTENTIAL CONSTRUCTION JOINT TO BE PROVIDED WHERE REQUIRED BY CONSTRUCTION SEQUENCING.
2. PILE TYPE SELECTION AND DESIGN TO BE DONE PER GEOTECHNICAL RECOMMENDATIONS.
3. WIDTH VARIES BASED ON PROJECT REQUIREMENTS.




TYPICAL SECTION

SANDAG/INCTD ENGINEERING STANDARDS ARE INTENDED FOR SANDAG/INCTD APPROVED USES ONLY. FOR NON-SANDAG/INCTD APPROVED USES: SANDAG/INCTD SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF THE DATA OR INFORMATION CONTAINED HEREIN. THE SELECTION AND USE OF THESE STANDARDS IS THE SOLE RESPONSIBILITY OF THE USER AND SHOULD NOT BE USED WITHOUT CONSULTING A REGISTERED PROFESSIONAL ENGINEER. ALL WARRANTIES AND REPRESENTATIONS OF ANY KIND ARE DISCLAIMED. ANYONE MAKING USE OF THIS INFORMATION AGREES THAT IT ASSUMES ALL LIABILITY ARISING FROM SUCH USE. NO PART OF THESE STANDARDS SHOULD BE REPRODUCED OR DISTRIBUTED IN ANY FORM OR BY ANY MEANS WITHOUT THE PRIOR WRITTEN PERMISSION OF SANDAG/INCTD. ALL RIGHTS RESERVED.


REV.	DATE	DESCRIPTION	DES.	ENG.

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CHECKED B. SMITH	RECOMMENDED W. PREY
DATE 5/27/15	DESIGNER PE STAMP



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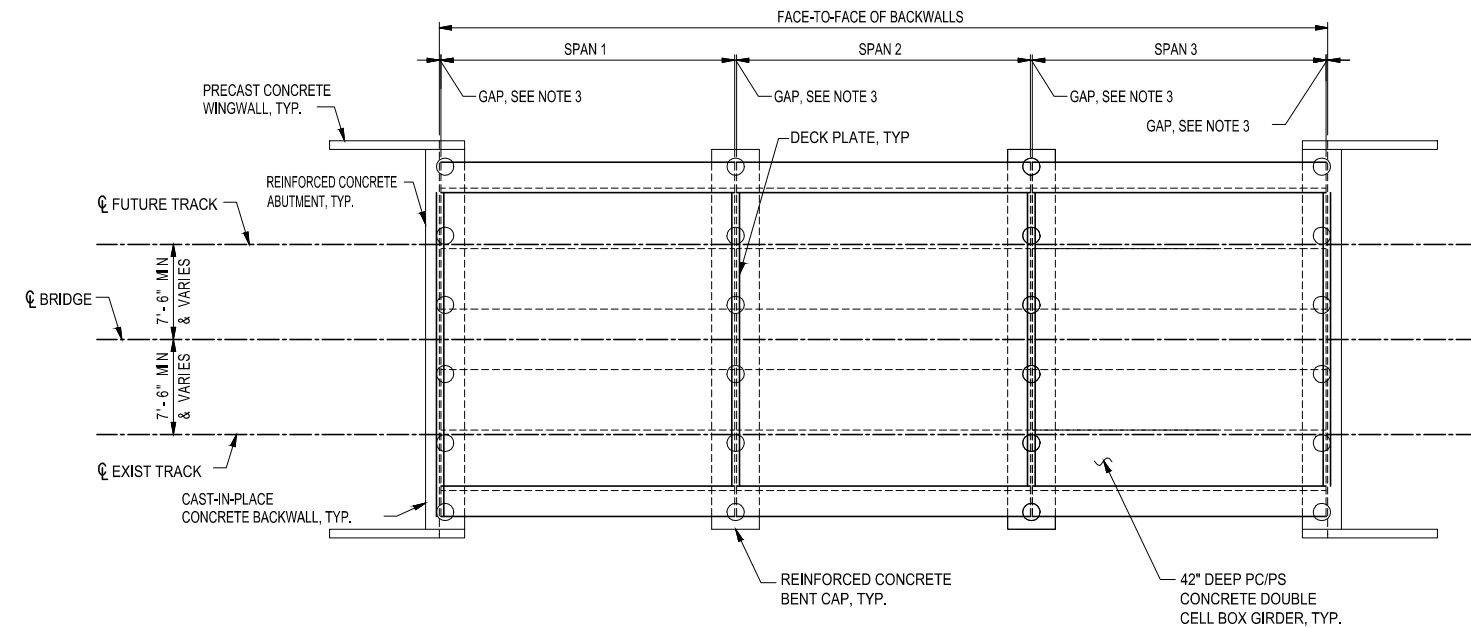
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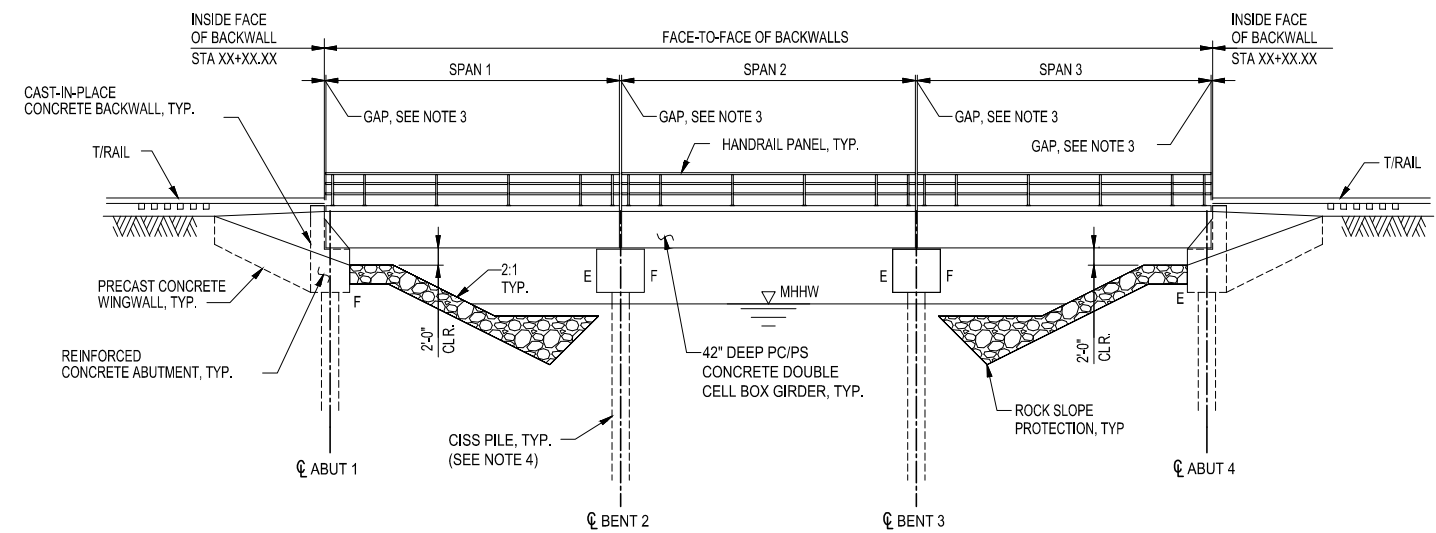
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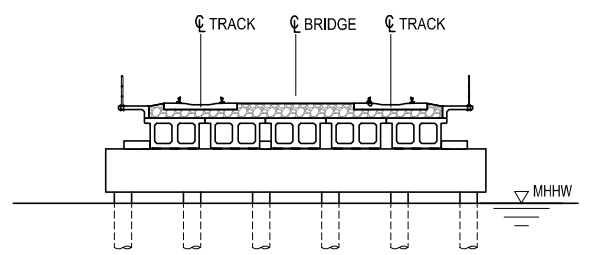
ENGINEERING STANDARD DRAWINGS	DRAWING NO. ESD-6021
30" DEEP PC/PS CONCRETE DOUBLE CELL BOX GIRDER BRIDGE TYPICAL CROSS SECTION AT BENT	DRAWING SHEET NO. 2 OF 2
SCALE: NONE	CONTRACT SHEET NO.



PLAN
NO SCALE



ELEVATION
NO SCALE



TYPICAL SECTION
NO SCALE

NOTES:

1. F = FIXED END
E = EXPANSION END
2. MHHW - MEAN HIGHER HIGH WATER;
TO BE DETERMINED BY HYDROLOGIST.
3. GAP TO BE DETERMINED FROM ANALYSIS, 2' MIN
4. PILE TYPE SELECTION AND DESIGN TO BE DONE
PER GEOTECHNICAL RECOMMENDATIONS

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REV.	DATE	DESCRIPTION	DES.	ENG.

REVISIONS

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RECOMMENDED W. PREY *WP*

DATE 5/27/15

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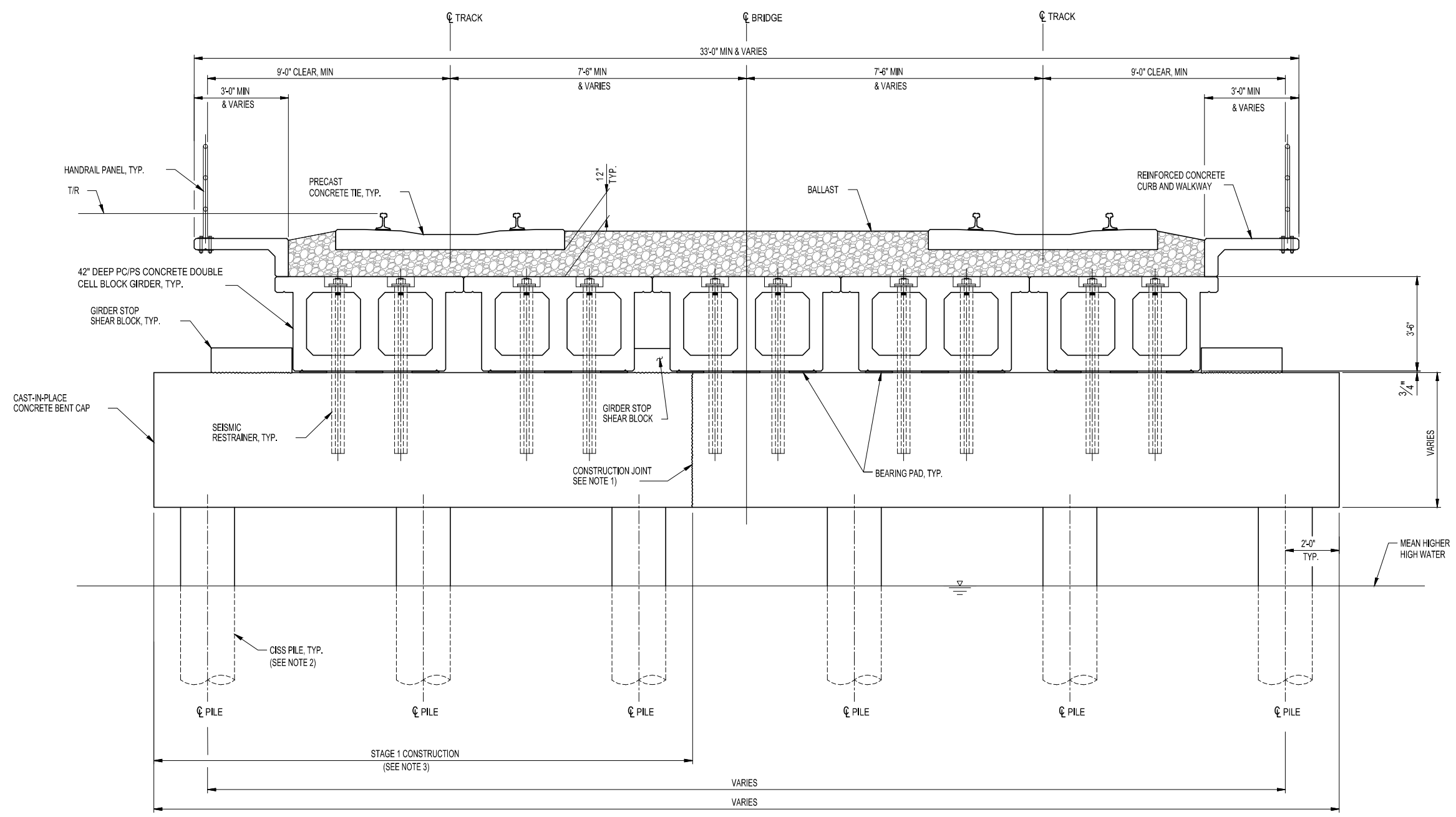
ENGINEERING STANDARD DRAWINGS

42" DEEP PC/PS CONCRETE DOUBLE CELL BOX GIRDER
BRIDGE TYPICAL PLAN AND ELEVATION

DRAWING NO.	ESD-6030
DRAWING SHEET NO.	1 OF 2
SCALE:	NONE
CONTRACT SHEET NO.	

NOTES:

1. POTENTIAL CONSTRUCTION JOINT TO BE PROVIDED WHERE REQUIRED BY CONSTRUCTION SEQUENCING.
2. PILE TYPE SELECTION AND DESIGN TO BE DONE PER GEOTECHNICAL RECOMMENDATIONS.
3. WIDTH VARIES BASED ON PROJECT REQUIREMENTS.



TYPICAL SECTION AT BENT
NO SCALE

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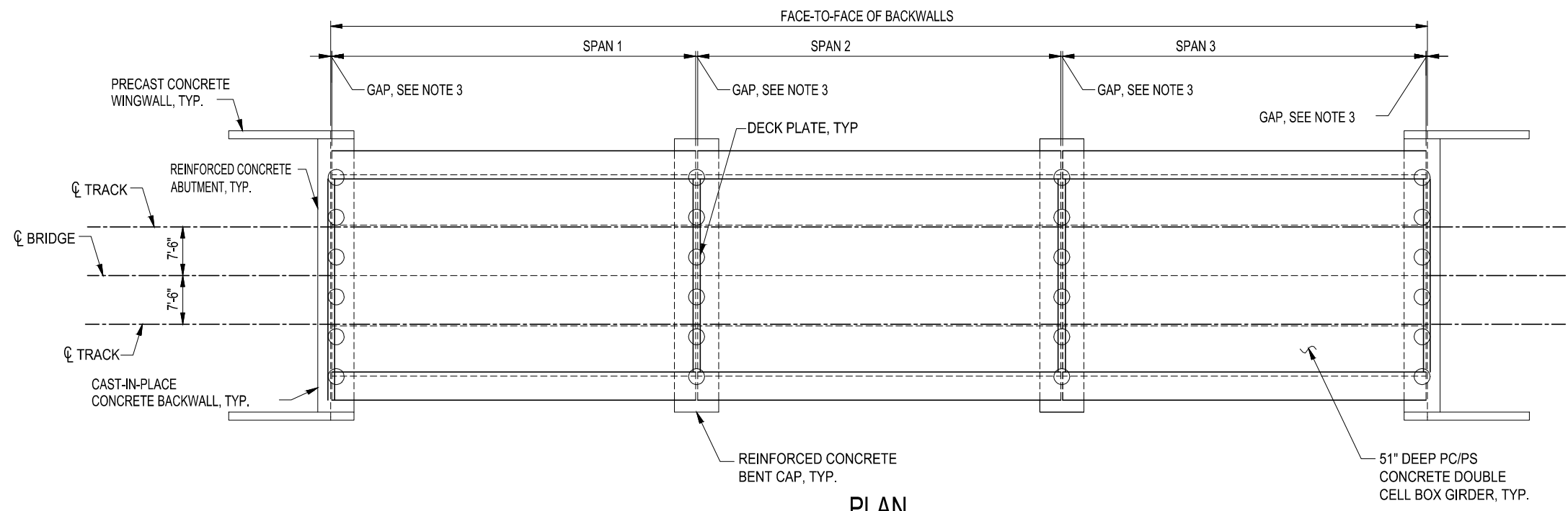
REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN HDR
 CHECKED B. SMITH
 RECOMMENDED W. PREY
 DATE 5/27/15
 DESIGNER PE STAMP



ENGINEERING STANDARD DRAWINGS
 42" DEEP PC/PS CONCRETE DOUBLE CELL BOX GIRDER
 BRIDGE TYPICAL CROSS SECTION AT BENT

DRAWING NO. ESD-6031
 DRAWING SHEET NO. 2 OF 2
 SCALE: NONE
 CONTRACT SHEET NO.



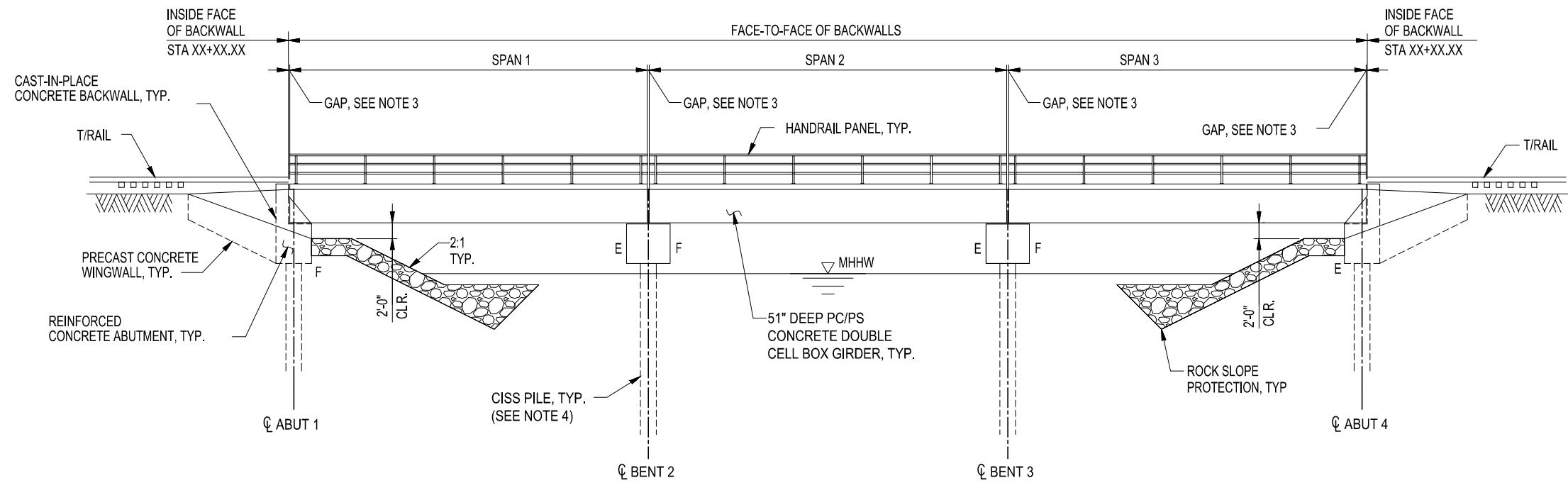
PLAN

NO SCALE

NOTES:

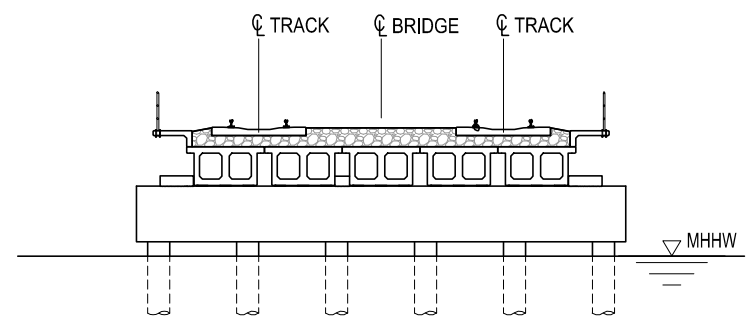
1. F = FIXED END
E = EXPANSION END
2. MHHW - MEAN HIGHER HIGH WATER;
TO BE DETERMINED BY HYDROLOGIST.
3. GAP TO BE DETERMINED FROM ANALYSIS, 2" MIN
4. PILE TYPE SELECTION AND DESIGN TO BE DONE
PER GEOTECHNICAL RECOMMENDATIONS

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ELEVATION

NO SCALE



TYPICAL SECTION

NO SCALE

REV.	DATE	DESCRIPTION	DES.	ENG.

REVISIONS	DRAWN HNTB
CHECKED B. SMITH	RECOMMENDED W. PREY
DATE 5/27/15	DESIGNER PE STAMP

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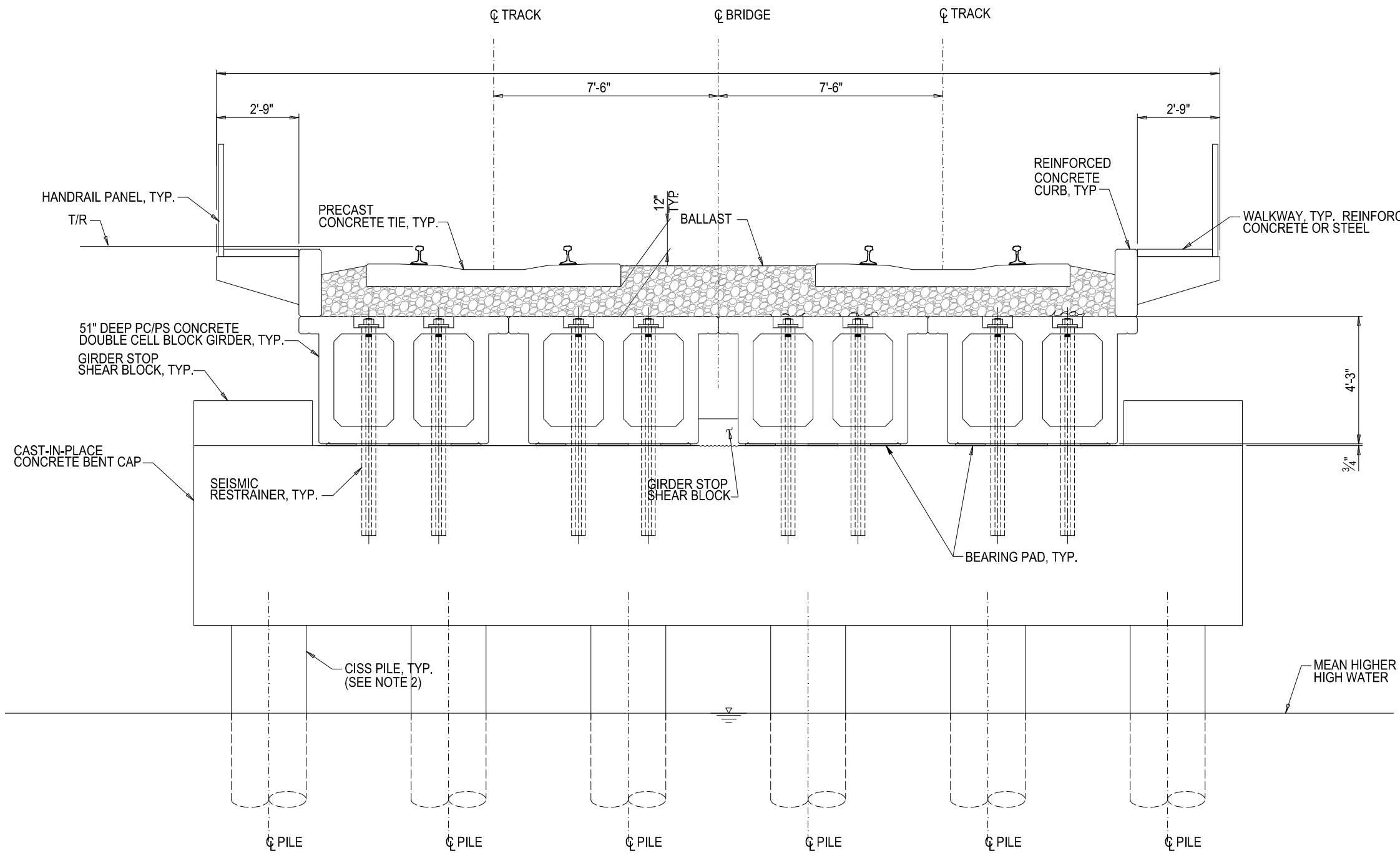
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ENGINEERING STANDARD DRAWINGS	DRAWING NO. ESD-6040
51" DEEP PC/PS CONCRETE DOUBLE CELL BOX GIRDER BRIDGE TYPICAL PLAN AND ELEVATION	DRAWING SHEET NO. 1 OF 2
	SCALE: NONE
	CONTRACT SHEET NO.

NOTES:

1. POTENTIAL CONSTRUCTION JOINT TO BE PROVIDED WHERE REQUIRED BY CONSTRUCTION SEQUENCING.
2. PILE TYPE SELECTION AND DESIGN TO BE DONE PER GEOTECHNICAL RECOMMENDATIONS.
3. WIDTH VARIES BASED ON PROJECT REQUIREMENTS.



TYPICAL SECTION AT BENT

NO SCALE

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REV.	DATE	DESCRIPTION	DES.	ENG.

REVISIONS

DRAWN
HNTB

CHECKED
B. SMITH *BS*

RECOMMENDED
W. PREY *WP*

DATE 5/27/15

DESIGNER PE STAMP



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ENGINEERING STANDARD DRAWINGS

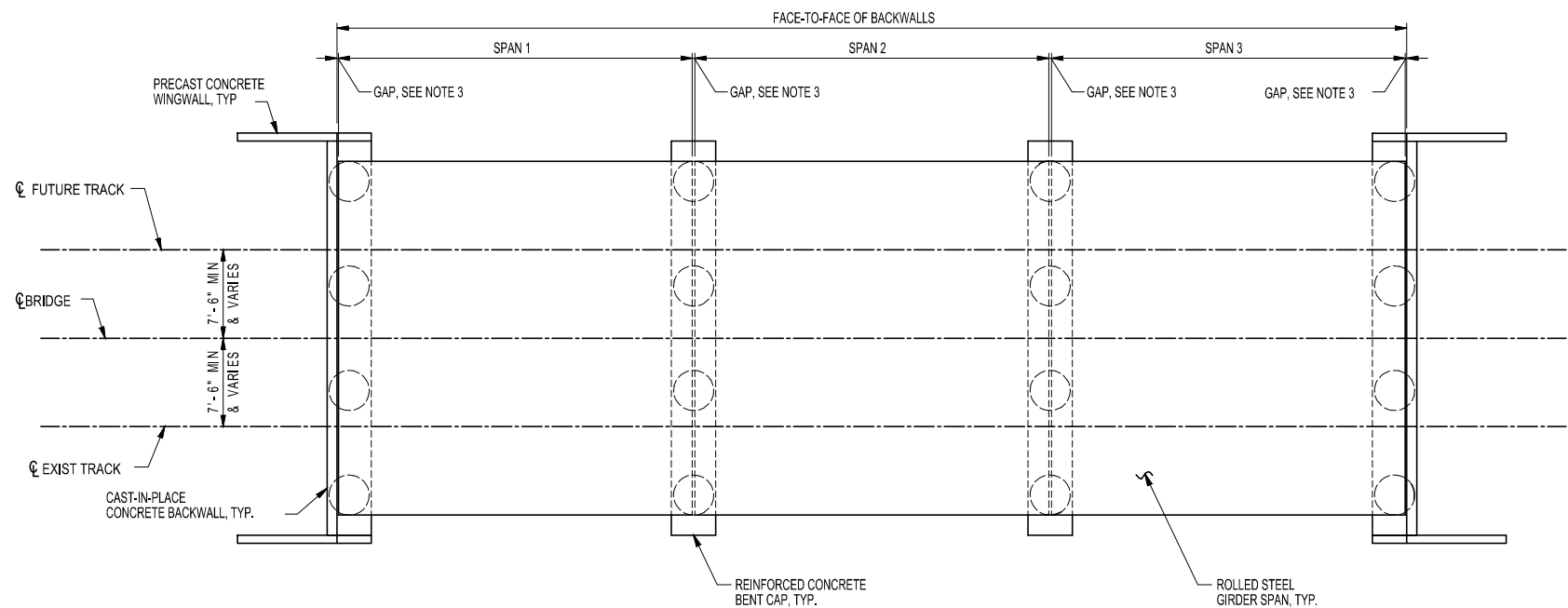
51" DEEP PC/PS CONCRETE DOUBLE CELL BOX GIRDER
BRIDGE TYPICAL CROSS SECTION AT BENT

DRAWING NO. ESD-6041

DRAWING SHEET NO. 2 OF 2

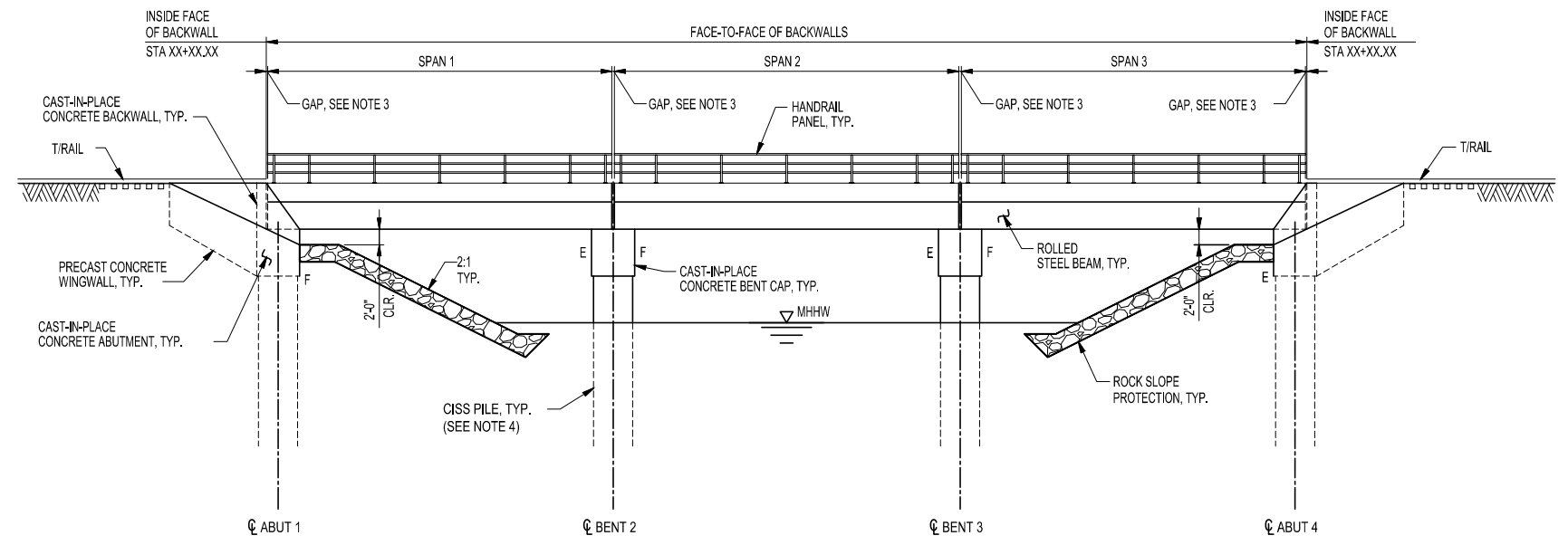
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CONTRACT SHEET NO.

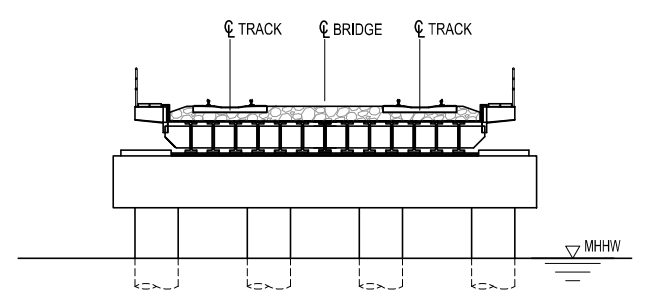


PLAN
NO SCALE

- NOTES:
1. F = FIXED END
E = EXPANSION END
 2. MHHW - MEAN HIGHER HIGH WATER;
TO BE DETERMINED BY HYDROLOGIST.
 3. GAP TO BE DETERMINED FROM ANALYSIS, 2' MIN
 4. PILE TYPE SELECTION AND DESIGN TO BE DONE
PER GEOTECHNICAL RECOMMENDATIONS



ELEVATION
NO SCALE



TYPICAL SECTION
NO SCALE

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REVISIONS		DRAWN	HDR
		CHECKED	B. SMITH
		RECOMMENDED	W. PREY
		DATE	5/27/15
REV.	DATE	DESCRIPTION	DES. ENG.

DESIGNER PE STAMP

SANDAG

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San Diego, CA. 92101
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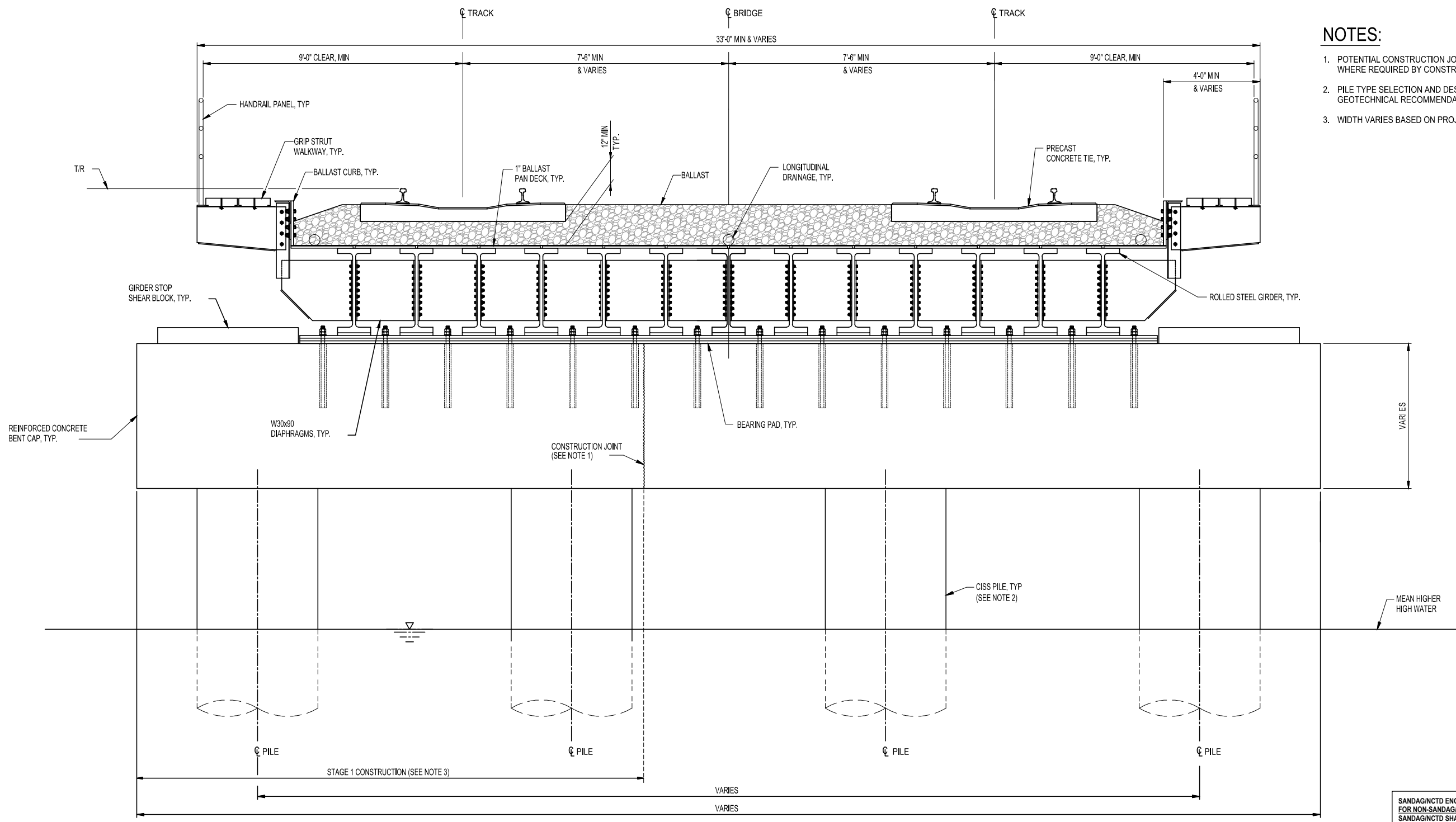
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ENGINEERING STANDARD DRAWINGS

ROLLED STEEL GIRDER BRIDGE TYPICAL PLAN AND ELEVATION

DRAWING NO.	ESD-6050
DRAWING SHEET NO.	1 OF 12
SCALE:	NONE
CONTRACT SHEET NO.	



NOTES:

1. POTENTIAL CONSTRUCTION JOINT TO BE PROVIDED WHERE REQUIRED BY CONSTRUCTION SEQUENCING.
2. PILE TYPE SELECTION AND DESIGN TO BE DONE PER GEOTECHNICAL RECOMMENDATIONS.
3. WIDTH VARIES BASED ON PROJECT REQUIREMENTS.

TYPICAL SECTION
NO SCALE

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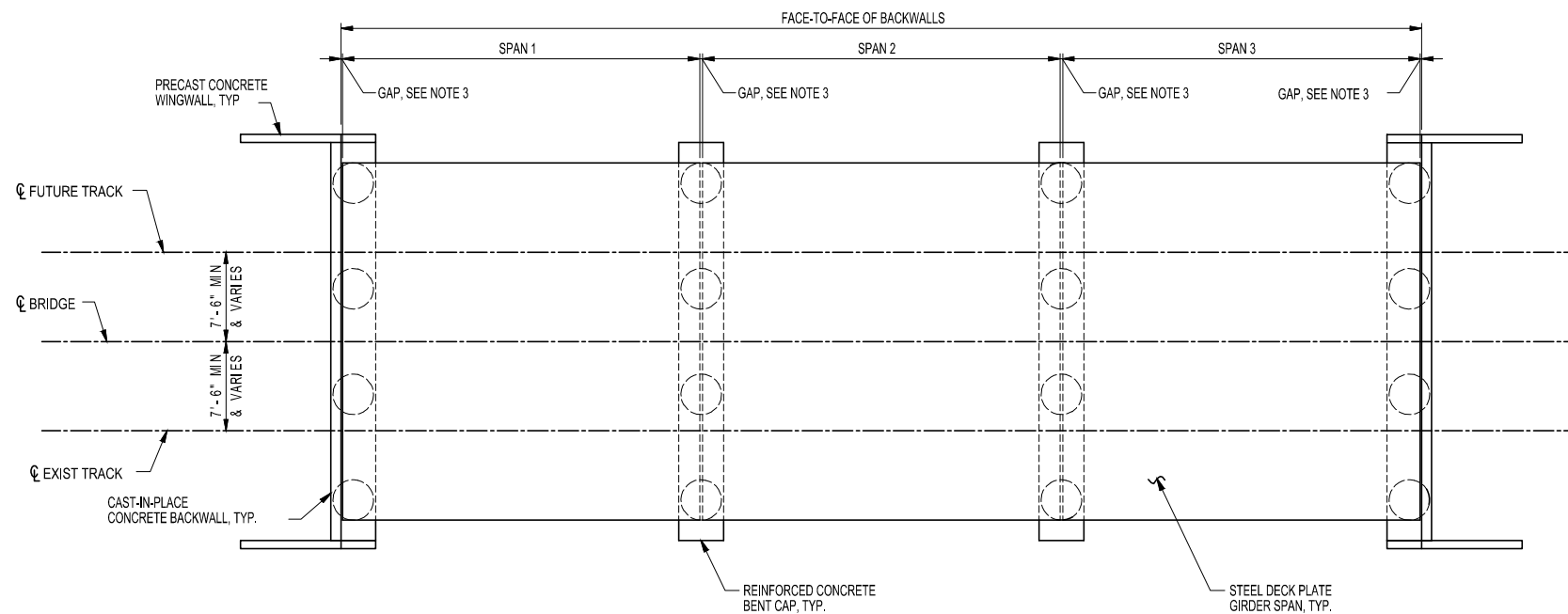
REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN HDR
 CHECKED B. SMITH
 RECOMMENDED W. PREY
 DATE 5/27/15
 DESIGNER PE STAMP



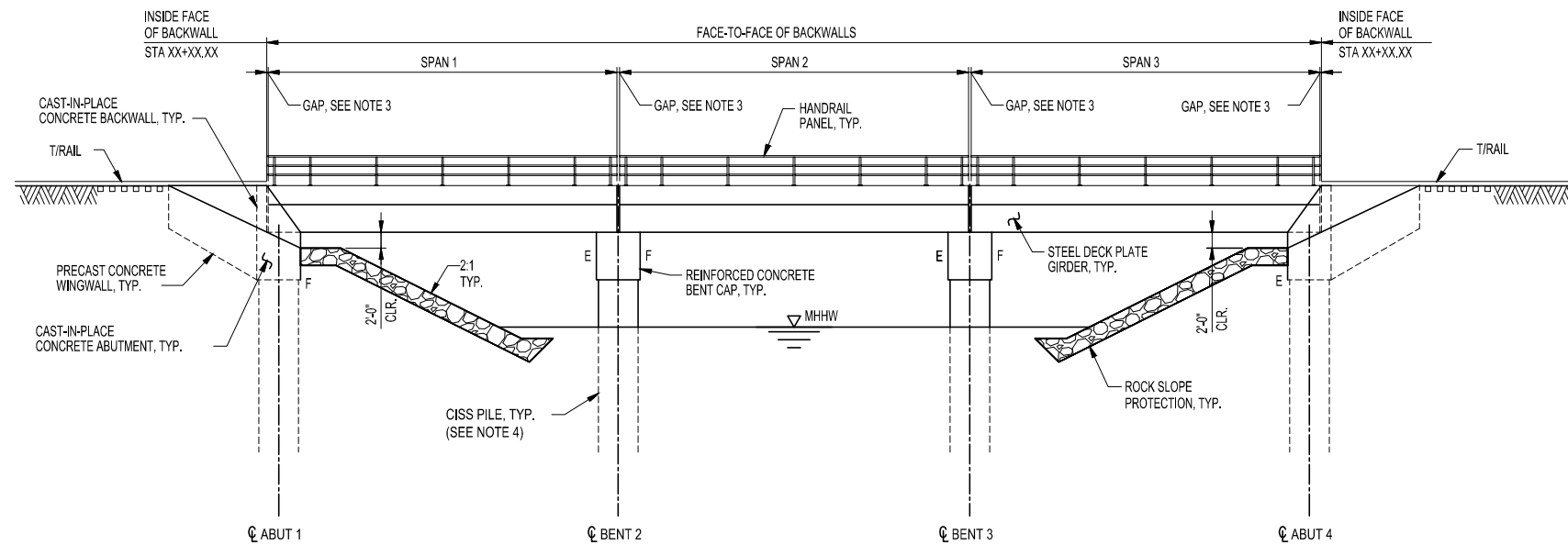
ENGINEERING STANDARD DRAWINGS
 ROLLED STEEL GIRDER BRIDGE
 TYPICAL CROSS SECTION

DRAWING NO. ESD-6051
 DRAWING SHEET NO. 2 OF 12
 SCALE: NONE
 CONTRACT SHEET NO.

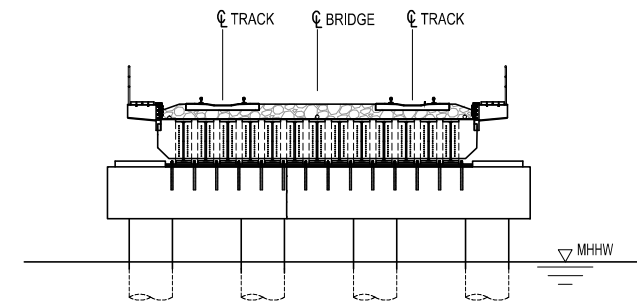


PLAN
NO SCALE

- NOTES:
1. F = FIXED END
E = EXPANSION END
 2. MHHW - MEAN HIGHER HIGH WATER;
TO BE DETERMINED BY HYDROLOGIST.
 3. GAP TO BE DETERMINED FROM ANALYSIS, 2" MIN
 4. PILE TYPE SELECTION AND DESIGN TO BE DONE
PER GEOTECHNICAL RECOMMENDATIONS



ELEVATION
NO SCALE



TYPICAL SECTION
NO SCALE

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REV.	DATE	DESCRIPTION	DES.	ENG.

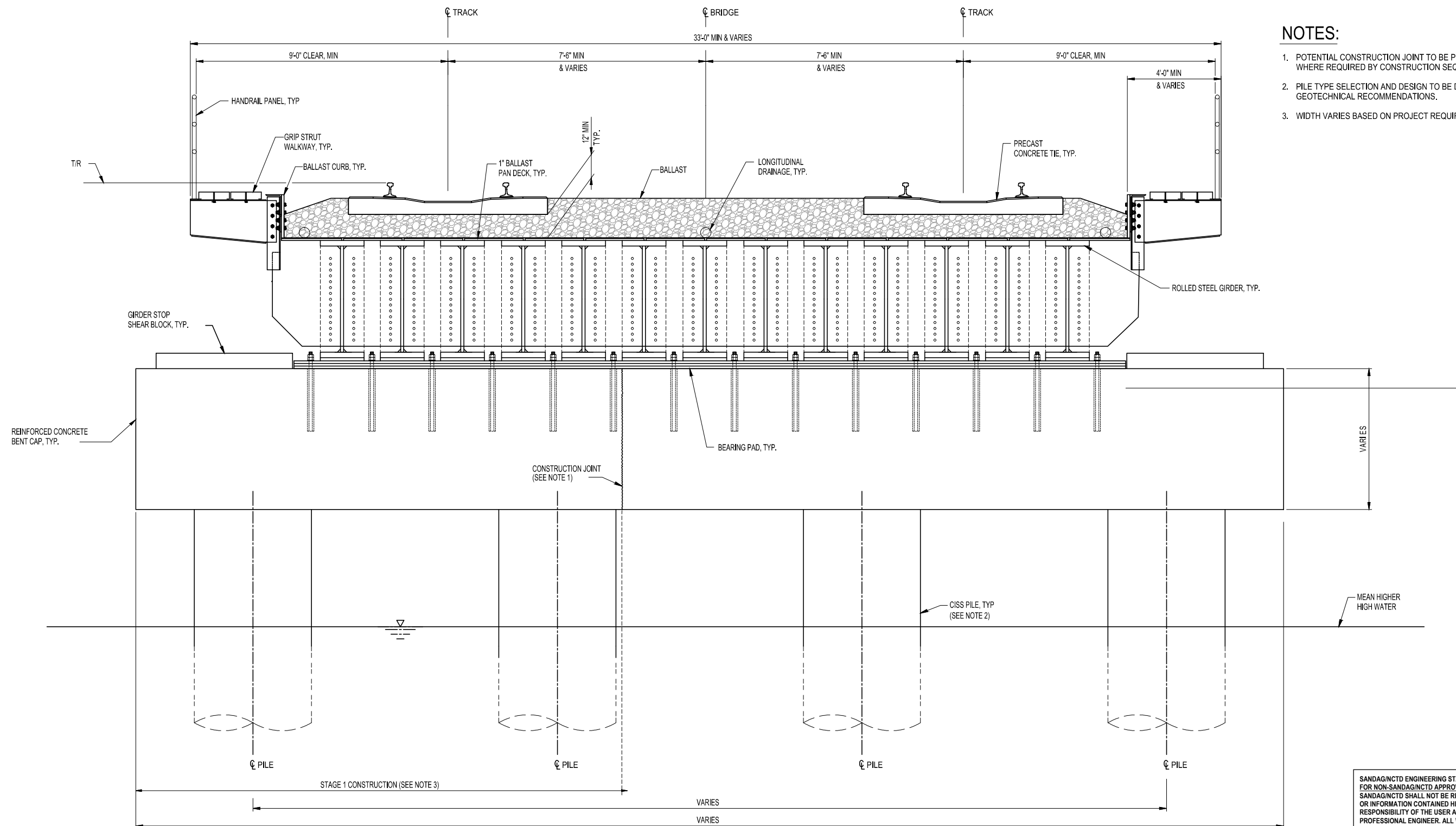
REVISIONS	DRAWN HDR
	CHECKED B. SMITH <i>BS</i>
	RECOMMENDED W. PREY <i>WP</i>
	DATE 5/27/15
	DESIGNER PE STAMP



ENGINEERING STANDARD DRAWINGS

STEEL DECK PLATE GIRDER BRIDGE TYPICAL PLAN AND ELEVATION

DRAWING NO.	ESD-6060
DRAWING SHEET NO.	3 OF 12
SCALE:	NONE
CONTRACT SHEET NO.	



NOTES:

1. POTENTIAL CONSTRUCTION JOINT TO BE PROVIDED WHERE REQUIRED BY CONSTRUCTION SEQUENCING.
2. PILE TYPE SELECTION AND DESIGN TO BE DONE PER GEOTECHNICAL RECOMMENDATIONS.
3. WIDTH VARIES BASED ON PROJECT REQUIREMENTS.

TYPICAL SECTION

NO SCALE

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			5/27/15	

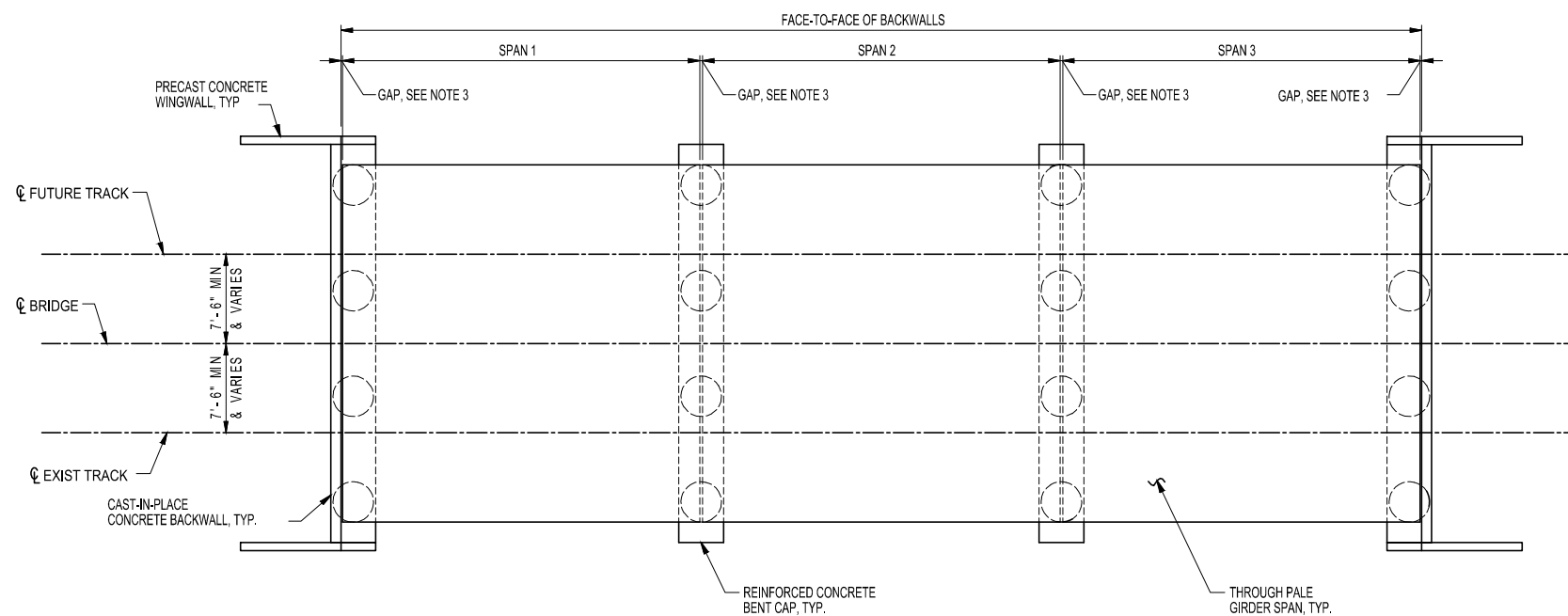
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CHECKED B. SMITH	<i>MSB</i>
RECOMMENDED W. PREY	<i>WP</i>
DATE	5/27/15
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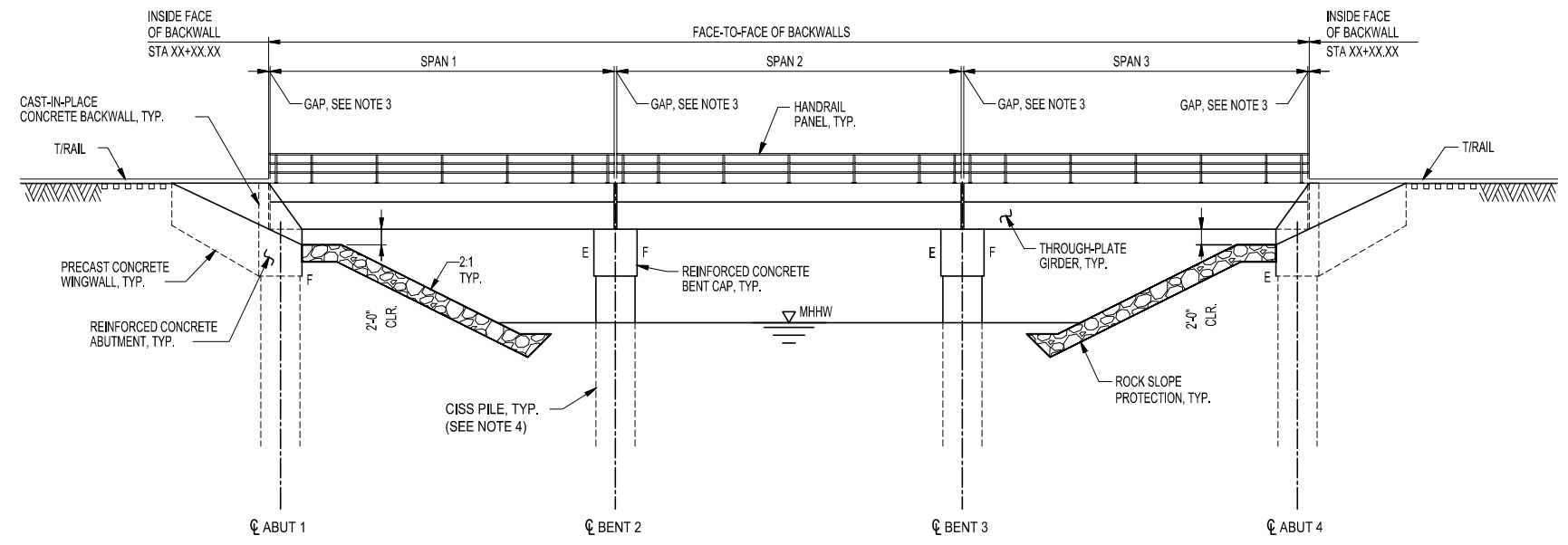
ENGINEERING STANDARD DRAWINGS
 STEEL DECK PLATE GIRDER BRIDGE
 TYPICAL CROSS SECTION

DRAWING NO.	ESD-6061
DRAWING SHEET NO.	4 OF 12
SCALE:	NONE
CONTRACT SHEET NO.	

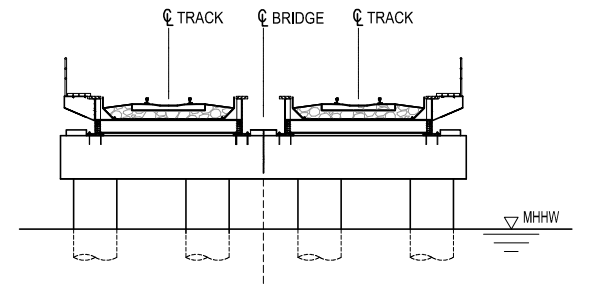


PLAN
NO SCALE

- NOTES:
1. F = FIXED END
E = EXPANSION END
 2. MHHW - MEAN HIGHER HIGH WATER;
TO BE DETERMINED BY HYDROLOGIST.
 3. GAP TO BE DETERMINED FROM ANALYSIS, 2" MIN
 4. PILE TYPE SELECTION AND DESIGN TO BE DONE
PER GEOTECHNICAL RECOMMENDATIONS



ELEVATION
NO SCALE



TYPICAL SECTION
NO SCALE

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REV.	DATE	DESCRIPTION

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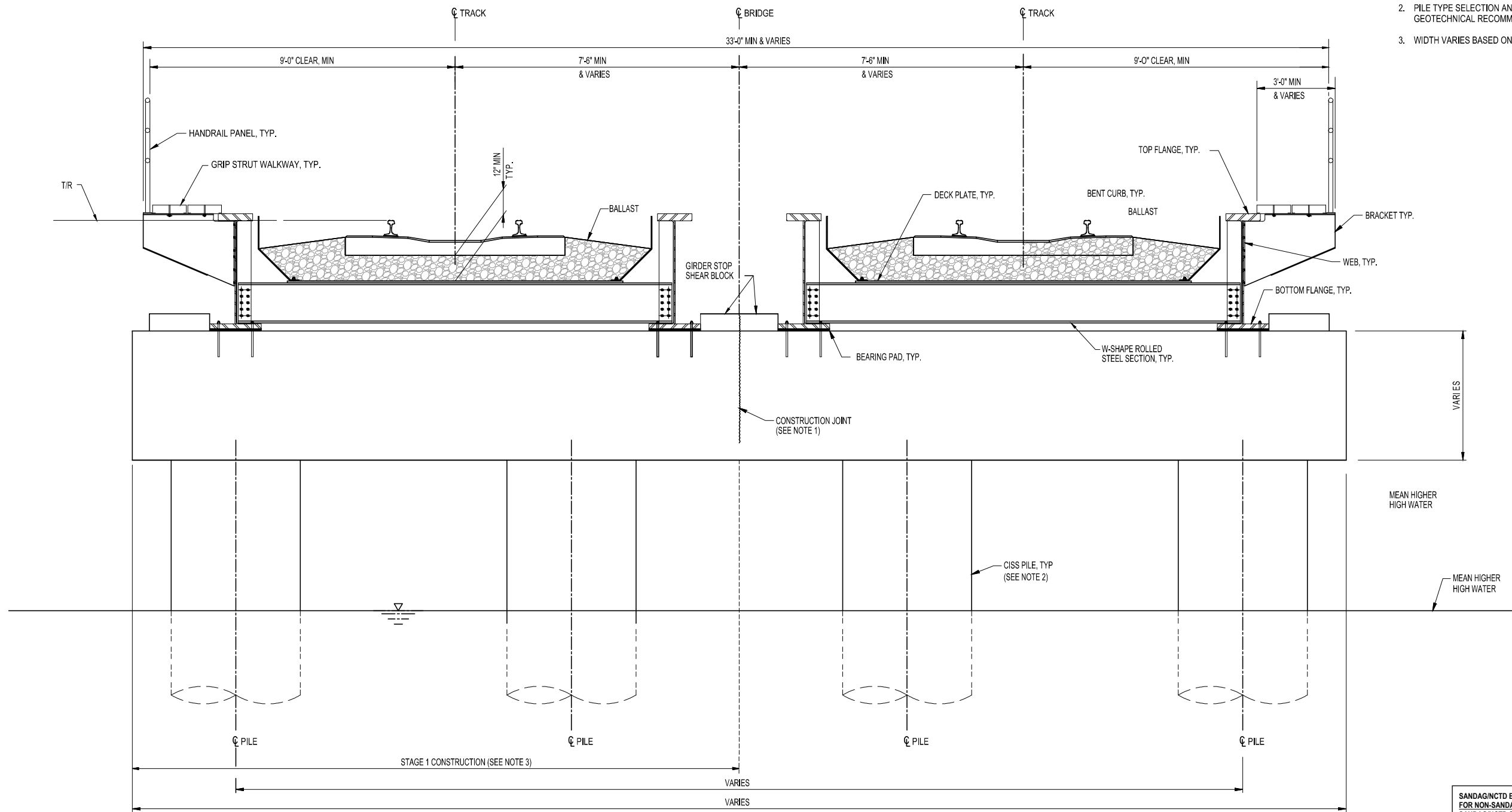
ENGINEERING STANDARD DRAWINGS

STEEL THROUGH-PLATE GIRDER BRIDGE TYPICAL PLAN
AND ELEVATION

DRAWING NO. ESD-6070
DRAWING SHEET NO. 5 OF 12
SCALE: NONE
CONTRACT SHEET NO.

NOTES:

1. POTENTIAL CONSTRUCTION JOINT TO BE PROVIDED WHERE REQUIRED BY CONSTRUCTION SEQUENCING.
2. PILE TYPE SELECTION AND DESIGN TO BE DONE PER GEOTECHNICAL RECOMMENDATIONS.
3. WIDTH VARIES BASED ON PROJECT REQUIREMENTS.



TYPICAL SECTION
NO SCALE

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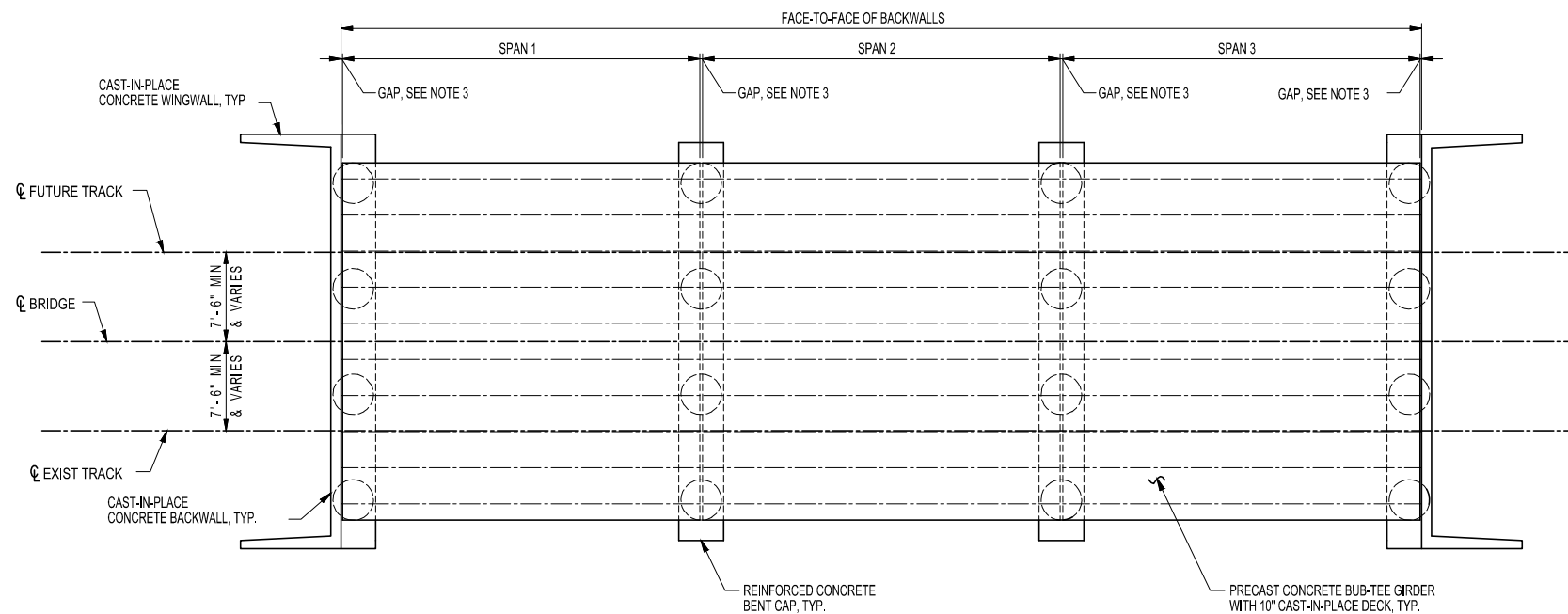
REVISIONS		DRAWN	DESIGNER PE STAMP
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		CHECKED B. SMITH <i>BS</i>	
		RECOMMENDED W. PREY <i>WP</i>	
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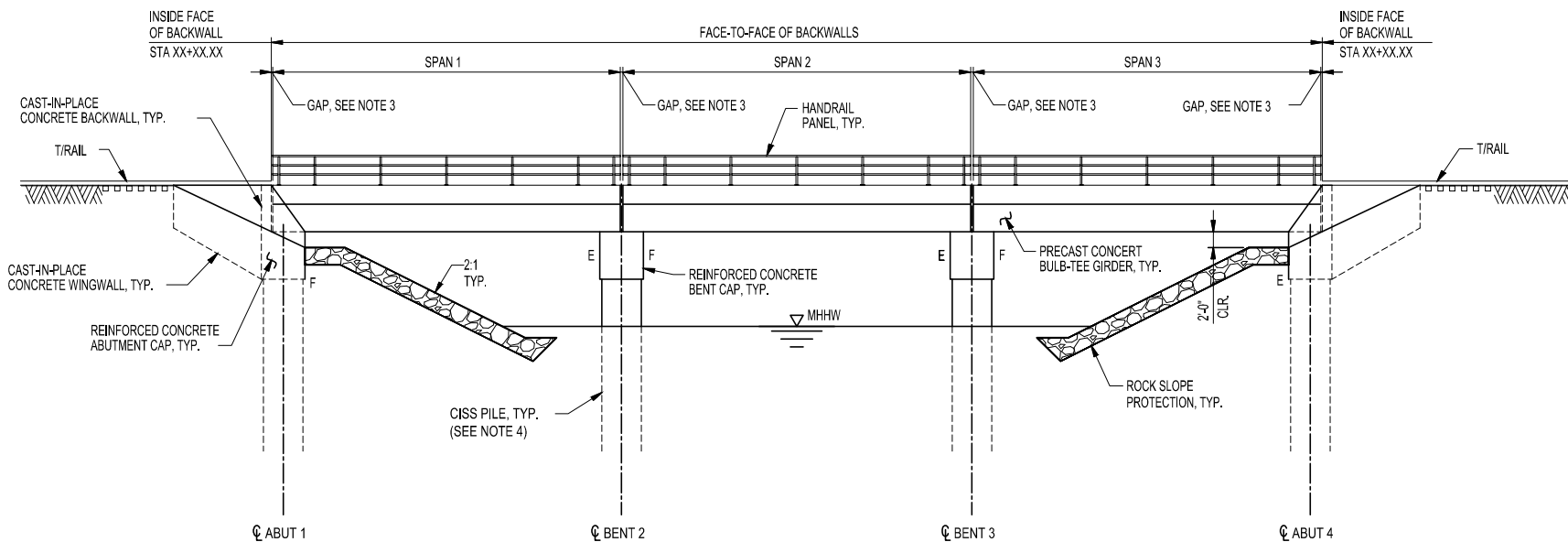
ENGINEERING STANDARD DRAWINGS
STEEL THROUGH-PLATE GIRDER BRIDGE
TYPICAL CROSS SECTION

DRAWING NO.	ESD-6071
DRAWING SHEET NO.	6 OF 12
SCALE:	NONE
CONTRACT SHEET NO.	

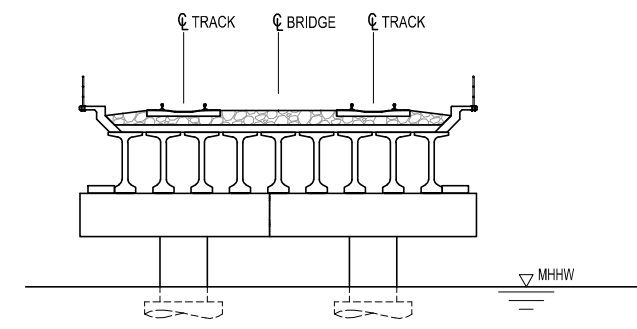


PLAN
NO SCALE

- NOTES:
1. F = FIXED END
E = EXPANSION END
 2. MHHW - MEAN HIGHER HIGH WATER;
TO BE DETERMINED BY HYDROLOGIST.
 3. GAP TO BE DETERMINED FROM ANALYSIS, 2" MIN
 4. PILE TYPE SELECTION AND DESIGN TO BE DONE
PER GEOTECHNICAL RECOMMENDATIONS



ELEVATION
NO SCALE



TYPICAL SECTION
NO SCALE

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REV.	DATE	DESCRIPTION	DES.	ENG.

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	CHECKED B. SMITH <i>MSB</i>
	RECOMMENDED W. PREY <i>WP</i>
	DATE 5/27/15

DESIGNER PE STAMP

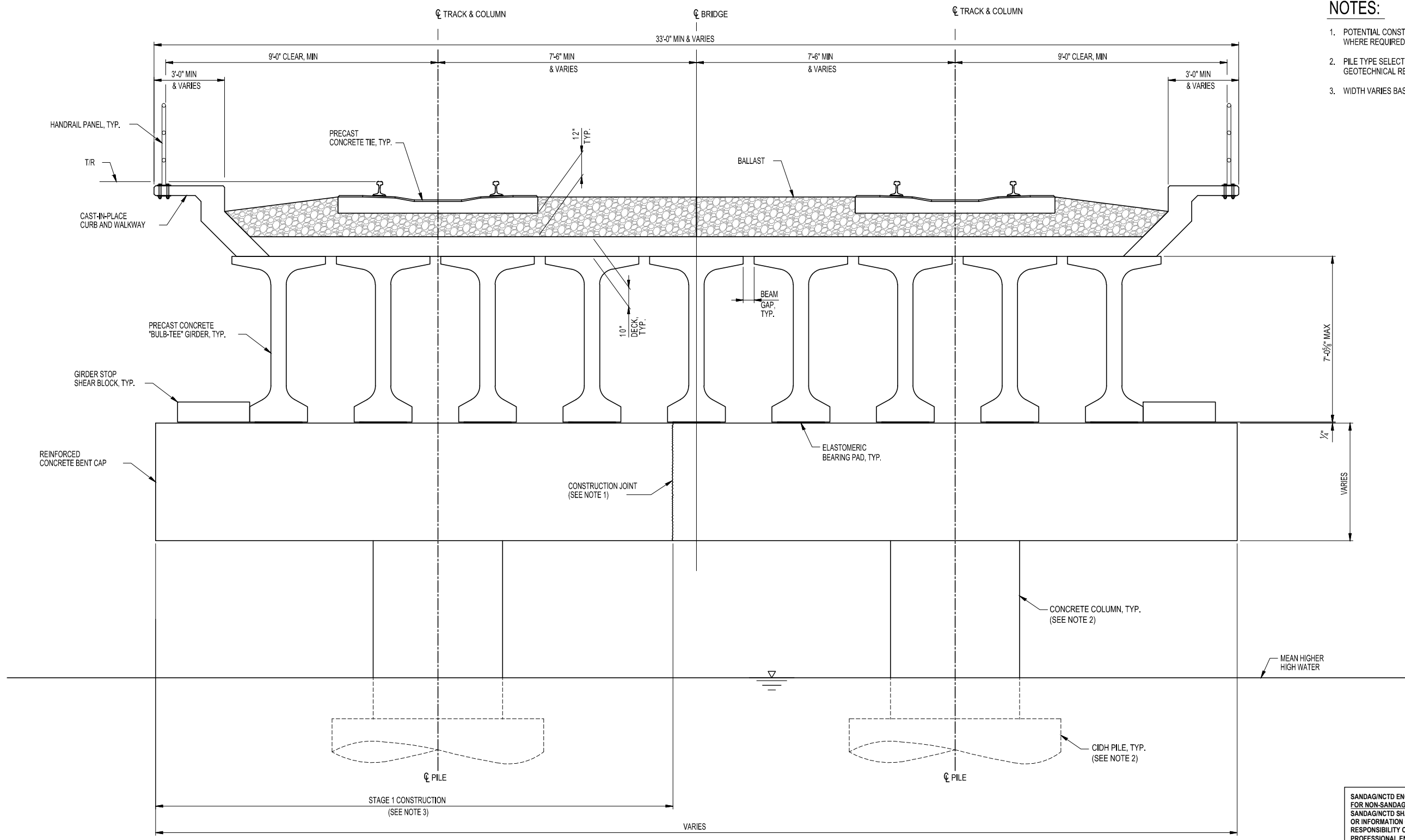
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ENGINEERING STANDARD DRAWINGS

PC/PS CONCRETE BULB-TEE GIRDER BRIDGE TYPICAL
PLAN AND ELEVATION

DRAWING NO.	ESD-6080
DRAWING SHEET NO.	7 OF 12
SCALE:	NONE
CONTRACT SHEET NO.	



- NOTES:**
- POTENTIAL CONSTRUCTION JOINT TO BE PROVIDED WHERE REQUIRED BY CONSTRUCTION SEQUENCING.
 - PILE TYPE SELECTION AND DESIGN TO BE DONE PER GEOTECHNICAL RECOMMENDATIONS.
 - WIDTH VARIES BASED ON PROJECT REQUIREMENTS.

TYPICAL SECTION
NO SCALE

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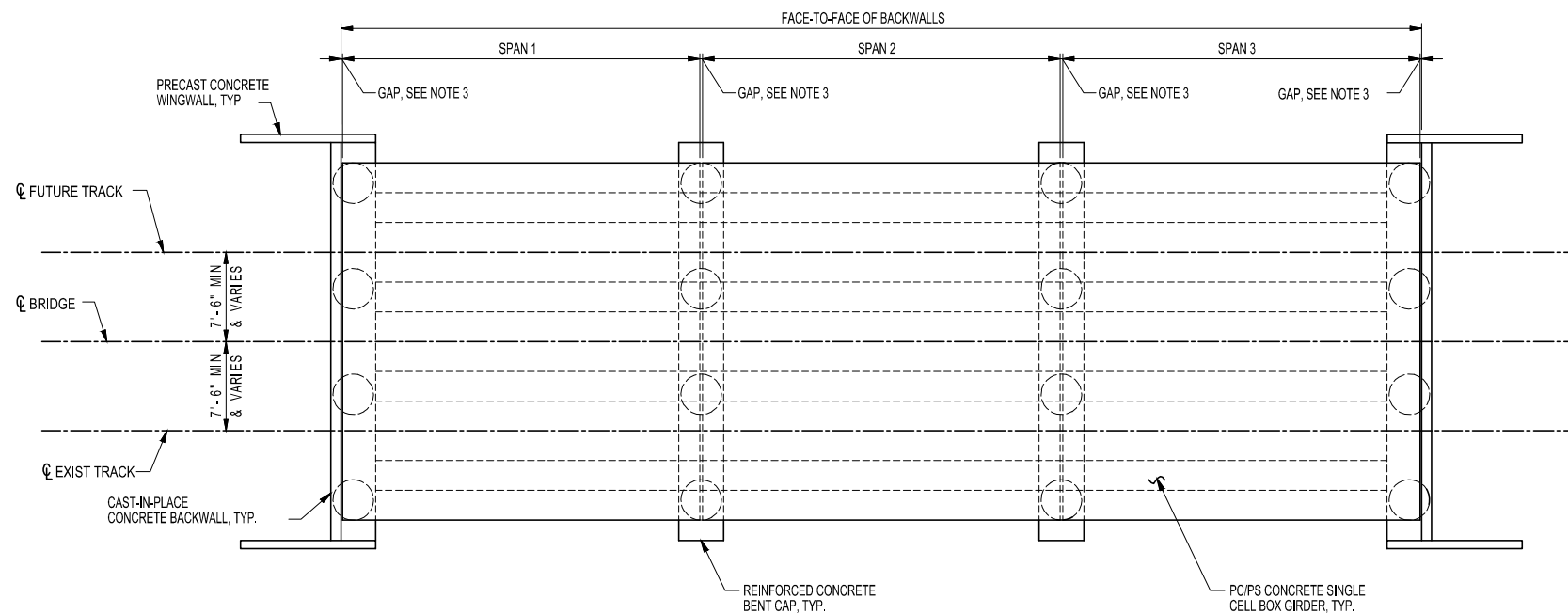
REV.	DATE	DESCRIPTION	DES.	ENG.

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W. PREY
 DATE 5/27/15
 DESIGNER PE STAMP



ENGINEERING STANDARD DRAWINGS
 PC/PS CONCRETE BULB-TEE GIRDER BRIDGE
 TYPICAL CROSS SECTION

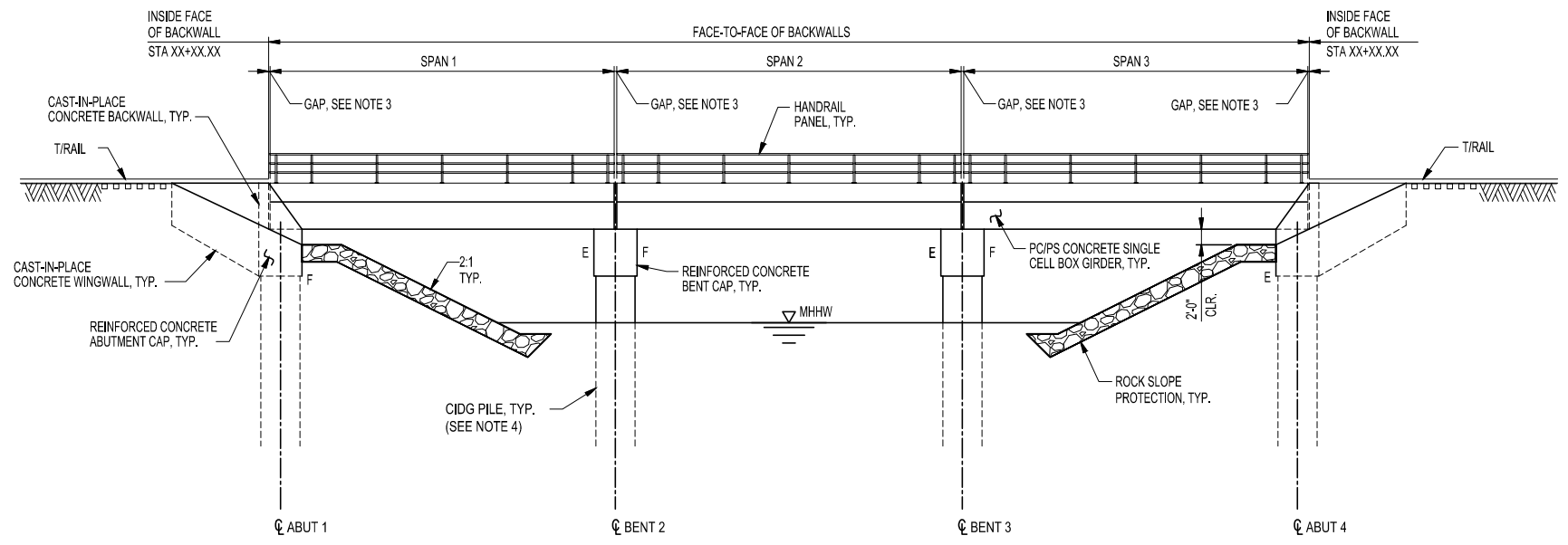
DRAWING NO. ESD-6081
 DRAWING SHEET NO. 8 OF 12
 SCALE: NONE
 CONTRACT SHEET NO.



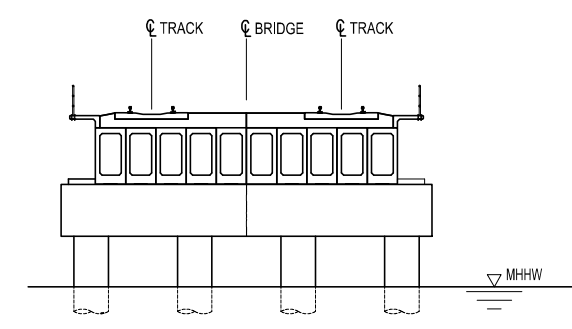
PLAN
NO SCALE

NOTES:

1. F = FIXED END
E = EXPANSION END
2. MHHW - MEAN HIGHER HIGH WATER;
TO BE DETERMINED BY HYDROLOGIST.
3. GAP TO BE DETERMINED FROM ANALYSIS, 2" MIN
4. PILE TYPE SELECTION AND DESIGN TO BE DONE
PER GEOTECHNICAL RECOMMENDATIONS



ELEVATION
NO SCALE




TYPICAL SECTION
NO SCALE


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REVISIONS	DRAWN HDR
	CHECKED B. SMITH <i>BS</i>
	RECOMMENDED W. PREY <i>WP</i>
	DATE 5/27/15
DESIGNER PE STAMP	

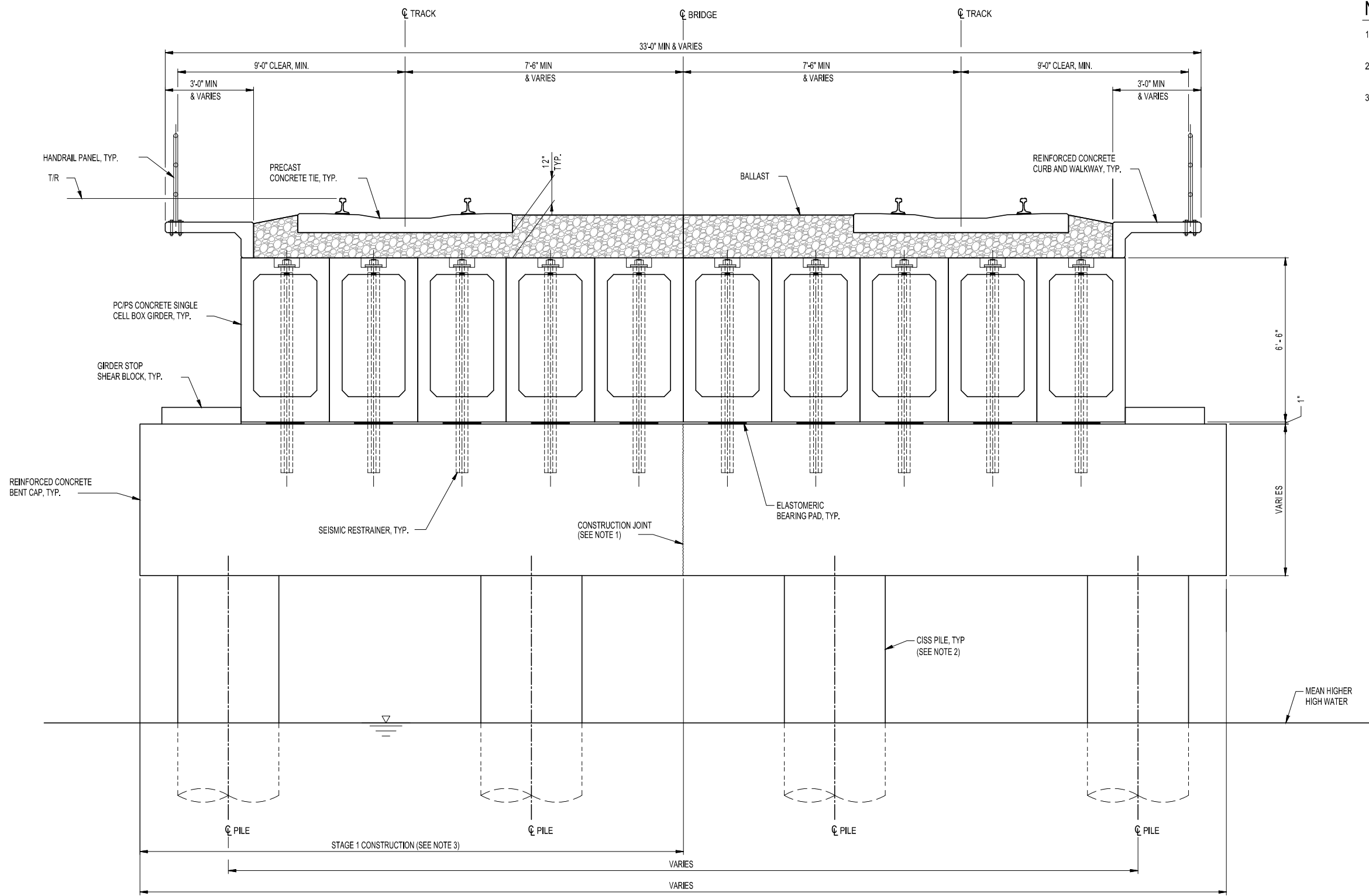


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ENGINEERING STANDARD DRAWINGS	DRAWING NO. ESD-6090
PC/PS CONCRETE SINGLE CELL BOX GIRDER BRIDGE TYPICAL PLAN AND ELEVATION	DRAWING SHEET NO. 9 OF 12
	SCALE: NONE
	CONTRACT SHEET NO.



- NOTES:**
- POTENTIAL CONSTRUCTION JOINT TO BE PROVIDED WHERE REQUIRED BY CONSTRUCTION SEQUENCING.
 - PILE TYPE SELECTION AND DESIGN TO BE DONE PER GEOTECHNICAL RECOMMENDATIONS.
 - WIDTH VARIES BASED ON PROJECT REQUIREMENTS.

TYPICAL SECTION
NO SCALE

SANDAG/INTD ENGINEERING STANDARDS ARE INTENDED FOR SANDAG/INTD APPROVED USES ONLY. FOR NON-SANDAG/INTD APPROVED USES: SANDAG/INTD SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF THE DATA OR INFORMATION CONTAINED HEREIN. THE SELECTION AND USE OF THESE STANDARDS IS THE SOLE RESPONSIBILITY OF THE USER AND SHOULD NOT BE USED WITHOUT CONSULTING A REGISTERED PROFESSIONAL ENGINEER. ALL WARRANTIES AND REPRESENTATIONS OF ANY KIND ARE DISCLAIMED. ANYONE MAKING USE OF THIS INFORMATION AGREES THAT IT ASSUMES ALL LIABILITY ARISING FROM SUCH USE. NO PART OF THESE STANDARDS SHOULD BE REPRODUCED OR DISTRIBUTED IN ANY FORM OR BY ANY MEANS WITHOUT THE PRIOR WRITTEN PERMISSION OF SANDAG/INTD. ALL RIGHTS RESERVED.

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RECOMMENDED W. PREY *WP*

DATE 5/27/15

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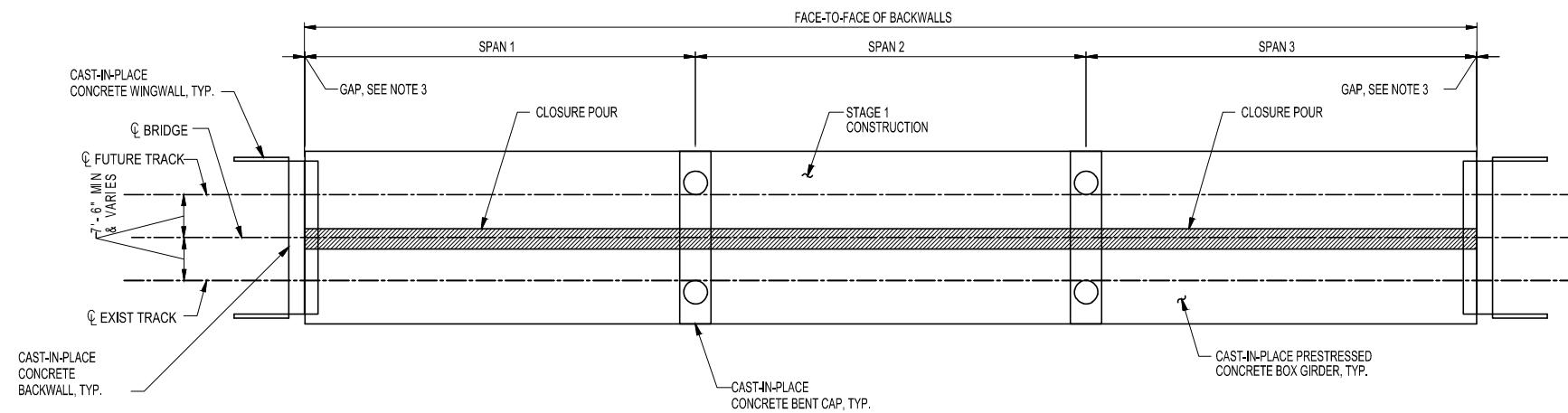
PC/PS CONCRETE SINGLE CELL BOX GIRDER BRIDGE
TYPICAL CROSS SECTION

DRAWING NO. ESD-6091

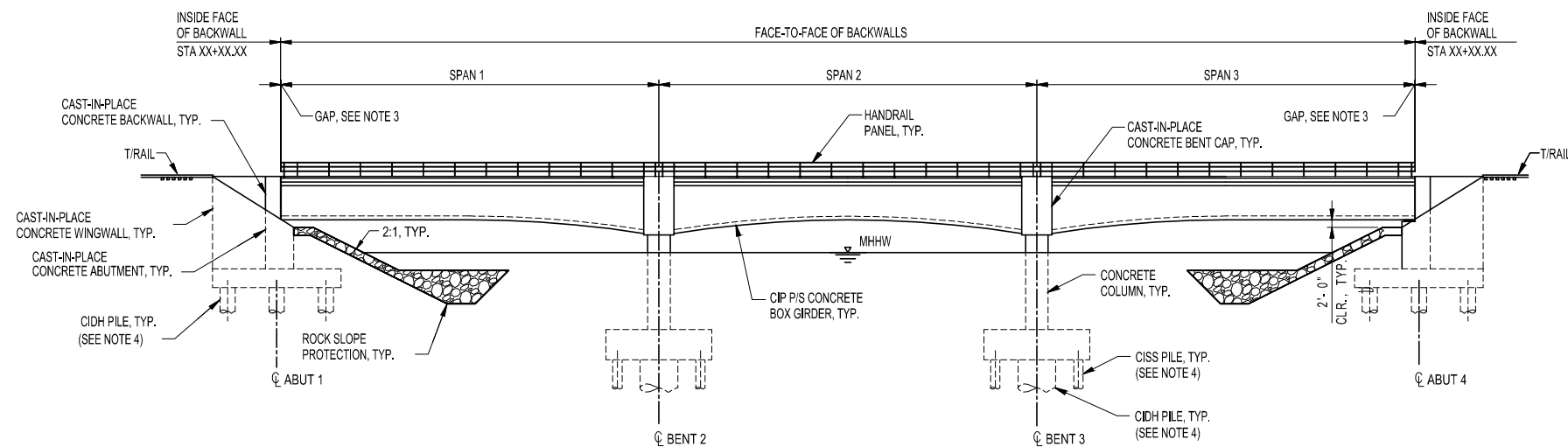
DRAWING SHEET NO. 10 OF 12

SCALE: NONE

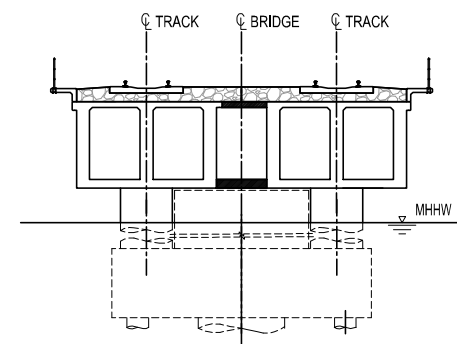
CONTRACT SHEET NO.



PLAN
NO SCALE



ELEVATION
NO SCALE



TYPICAL SECTION
NO SCALE

NOTES:

1. FOUNDATION TYPE TO BE DESIGNED PER GEOTECHNICAL RECOMMENDATIONS.
2. MHHW - MEAN HIGHER HIGH WATER; TO BE DETERMINED BY HYDROLOGIST.
3. GAP TO BE DETERMINED FROM ANALYSIS, 2' MIN
4. PILE TYPE SELECTION AND DESIGN TO BE DONE PER GEOTECHNICAL RECOMMENDATIONS

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REVISIONS	DRAWN HDR
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RECOMMENDED W. PREY	
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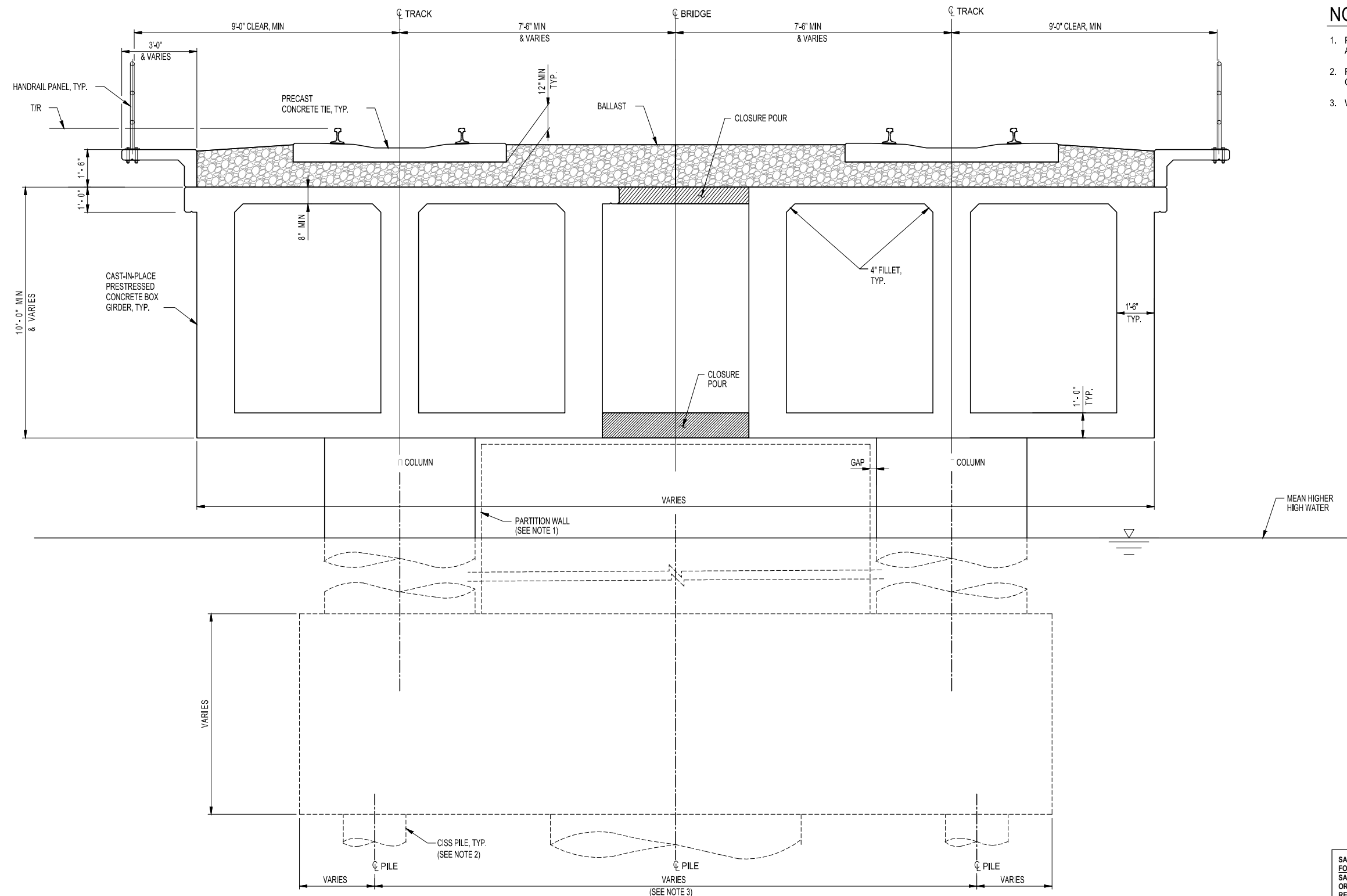
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ENGINEERING STANDARD DRAWINGS

CIP PS CONCRETE GIRDER BRIDGE
TYPICAL PLAN AND ELEVATION

DRAWING NO.	ESD-6100
DRAWING SHEET NO.	11 OF 12
SCALE:	NONE
CONTRACT SHEET NO.	



- NOTES:**
- PARTITION WALL NOT REQUIRED - BASED ON ARCHITECTURAL OR STRUCTURAL NEED.
 - PILE TYPE SELECTION AND DESIGN TO BE DONE PER GEOTECHNICAL RECOMMENDATIONS.
 - WIDTH VARIES BASED ON PROJECT REQUIREMENTS.

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TYPICAL SECTION AT BENT
NO SCALE

REV.	DATE	DESCRIPTION	DES.	ENG.

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CIP PS CONCRETE GIRDER BRIDGE
TYPICAL CROSS SECTION

DRAWING NO.	ESD-6101
DRAWING SHEET NO.	12 OF 12
SCALE:	NONE
CONTRACT SHEET NO.	

TABLE 1 - ROUND SMOOTH STEEL PIPE (SSP)					
OUTSIDE PIPE DIAMETER	THICKNESS (IN.)	WEIGHT (LB./FT.)	COVER *		20'-0" LENGTH WEIGHT (LB.)
			MIN. (FT.)	MAX. (FT.)	
12"	3/16	24	1'-6"	18'-0"	480
18"	1/4	48	1'-6"	18'-0"	960
21"	5/16	69	1'-6"	18'-0"	1,380
24"	5/16	80	1'-6"	18'-0"	1,600
30"	3/8	119	1'-6"	18'-0"	2,380
36"	1/2	190	1'-6"	18'-0"	3,800
42"	1/2	222	1'-6"	18'-0"	4,440
48"	5/8	317	1'-6"	18'-0"	6,340
60"	3/4	475	1'-6"	18'-0"	9,500
72"	7/8	666	1'-6"	18'-0"	13,320

* COVER TO BE MEASURED FROM BASE OF RAIL TO TOP OF PIPE

CONSTRUCTION NOTES

GENERAL:

THESE STRUCTURES ARE DESIGNED FOR COOPER E80 LIVE LOAD WITH IMPACT, AND COVER AS SHOWN IN TABLE 1 AND TABLE 2.

TABLE 1 INDICATES THE MINIMUM REQUIRED THICKNESS FOR STRUCTURAL STABILITY.

INSTALLATION:

INSTALLATION OF SMOOTH STEEL PIPE (SSP) SHALL CONFORM TO THE CURRENT AMERICAN RAILWAY ENGINEERING AND MAINTENANCE-OF-WAY ASSOCIATION (AREMA) MANUAL FOR RAILWAY ENGINEERING, CHAPTER 1, PART 4. CULVERT LENGTHS ARE TO BE BASED ON STANDARD MAINLINE ROADBED SECTIONS.

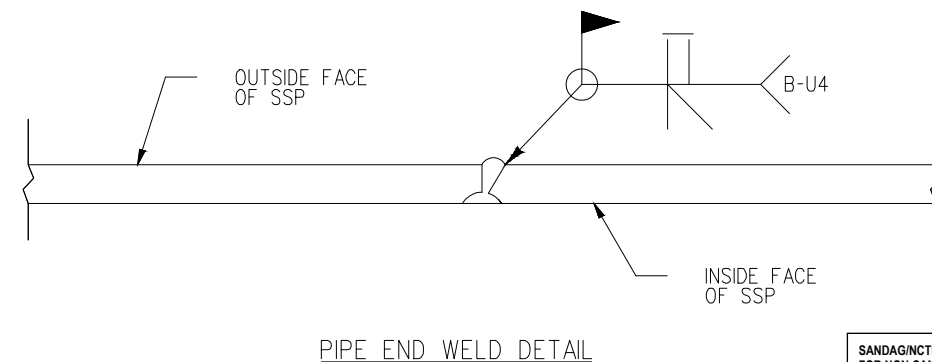
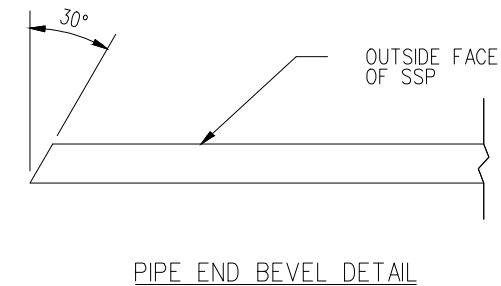
MATERIALS:

PIPE SHALL BE IN ACCORDANCE WITH ASTM INTERNATIONAL A139. PIPE TO BE GRADE B AND STEEL SHALL HAVE A MINIMUM YIELD STRENGTH OF 35 KSI. A HYDROSTATIC TEST IS NOT REQUIRED.

SMOOTH STEEL PIPE SHALL HAVE A WELDED STRAIGHT LONGITUDINAL SEAM. THE ENDS OF EACH SECTION OF PIPE SHALL BE SQUARE CUT. ONE END SHALL BE SUITABLY BEVELED FOR FIELD WELDING SECTIONS TOGETHER.

TABLE 2 - ROUND CORRUGATED STEEL PIPE (CSP) - SEE NOTE BELOW							
INSIDE PIPE DIAMETER	GAGE	THICKNESS (IN.)	WEIGHT (LB./FT.)	COVER *		20'-0" LENGTH WEIGHT (LB.)	CONNECTING BANDS GAGE
				MIN. (FT.)	MAX. (FT.)		
12"	14	0.079	12	1'-6"	18'-0"	240	16
18"	14	0.079	18	1'-6"	18'-0"	360	16
21"	14	0.079	21	1'-6"	18'-0"	420	16
24"	14	0.079	24	1'-6"	18'-0"	480	16
30"	14	0.079	30	1'-6"	18'-0"	600	16
36"	14	0.079	41	2'-6"	18'-0"	820	16
42"	14	0.079	47	2'-6"	18'-0"	940	16
48"	12	0.109	74	2'-6"	18'-0"	1,480	14
60"	12	0.109	92	2'-6"	18'-0"	1,840	14
72"	10	0.138	140	3'-6"	18'-0"	2,800	12

1. COVER TO BE MEASURED FROM BASE OF RAIL TO TOP OF PIPE.
 2. CORRUGATED METAL PIPE MAY ONLY BE USED FOR DRAINS HORIZONTAL TO TRACK OR UNDER MAINTENANCE ROADS AND IN YARDS OR FOR EMERGENCY REPAIRS.



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		CHECKED B. SMITH <i>BS</i>				DRAWING SHEET NO. 1 OF 1
		RECOMMENDED B. SCHMITH <i>BBS</i>				SCALE: NONE
		DATE 02/19/16				CONTRACT SHEET NO.
REV.	DATE	DESCRIPTION	DES. ENG.	DESIGNER PE STAMP		

LOSSAN ENGINEERING STANDARD DRAWINGS

Section 7000

MAINTENANCE AND LAYOVER FACILITIES

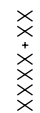
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LOSSAN ENGINEERING STANDARD DRAWINGS

Section 8000

SIGNAL

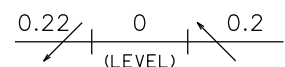
ENGINEERING STATION



MILE POST



PROFILE (GRADE)



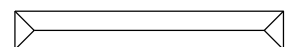
CENTERLINE



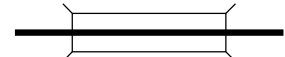
TRACK



STATION



BRIDGE



TUNNEL



METER SERVICE

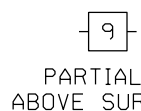


INSTRUMENT ENCLOSURES



NUMERALS IN SIGNAL ENCLOSURES INDICATE SIZE OF UNIT AND MAY VARY.

BATTERY HOUSINGS

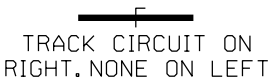
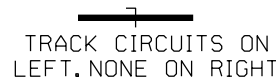


BELOW SURFACE

PARTIALLY ABOVE SURFACE

ABOVE SURFACE

INSULATED RAIL JOINTS

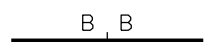


TRACK CIRCUITS IN BOTH DIRECTIONS

TRACK CIRCUITS ON LEFT, NONE ON RIGHT

TRACK CIRCUIT ON RIGHT, NONE ON LEFT

TRACK CIRCUITS



B/R - TRACK BATTERY WITH FLOATER RELAY LOCATION
 EC - ELECTRONICALLY CODED
 R - TRACK RELAY LOCATION
 B - TRACK BATTERY LOCATION

DETECTORS



HOT BOX DETECTOR



CLEARANCE DETECTOR



PRESENCE DETECTOR

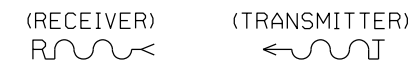


HIGH WATER DETECTOR



DRAGGING EQUIPMENT DETECTOR

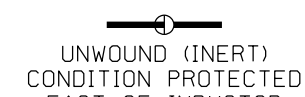
OVERLAY CIRCUIT



ATS INDUCTORS



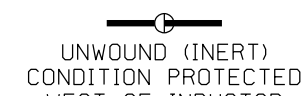
CLEAR (CIRCUIT CLOSED)



UNWOUND (INERT) CONDITION PROTECTED EAST OF INDUCTOR



ALERT (CIRCUIT OPEN)



UNWOUND (INERT) CONDITION PROTECTED WEST OF INDUCTOR

CONSTANT WARNING UNITS



BI-DIRECTIONAL CONSTANT WARNING DEVICE

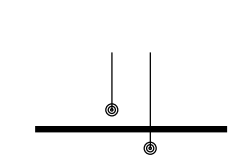


SIMULATED BI-DIRECTIONAL CONSTANT WARNING DEVICE

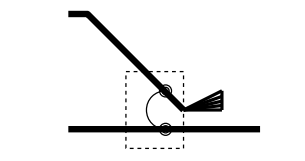


UNI-DIRECTIONAL CONSTANT WARNING DEVICE

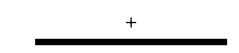
MISCELLANEOUS



TRACK WIRE CONNECTION



FOULING JUMPER



TRACK CIRCUIT POLARITY



RING 10

SHUNTS/COUPLERS



DUAL WIDE BAND SHUNT



NARROW BAND/FREQ. SELECTABLE SHUNT

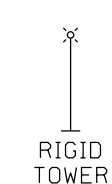


TUNED JOINT COUPLER

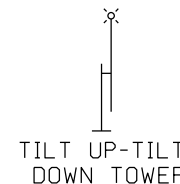


NARROW BAND SHUNT WITH DUMMY LOAD

ANTENNA TOWERS



RIGID TOWER



TILT UP-TILT DOWN TOWER



SOLAR TOWER

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CHECKED	EJR
RECOMMENDED	BAS
DATE	MARCH 18, 2017
DESIGNER PE STAMP	

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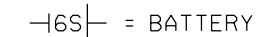
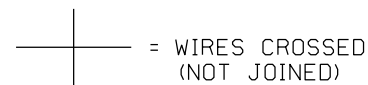
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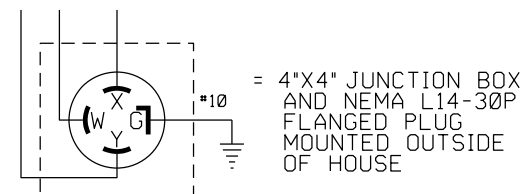
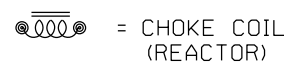
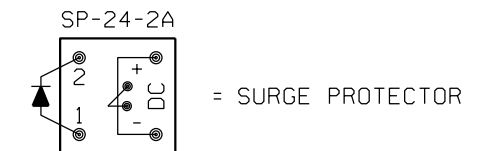
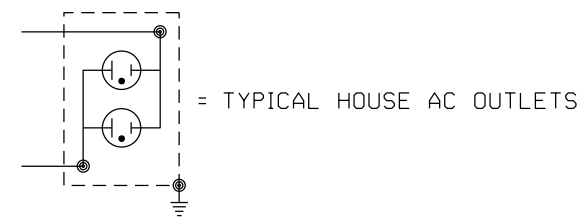
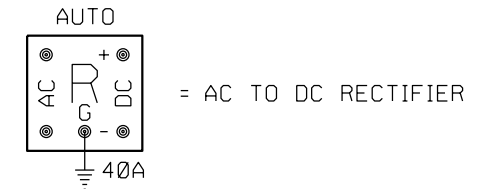
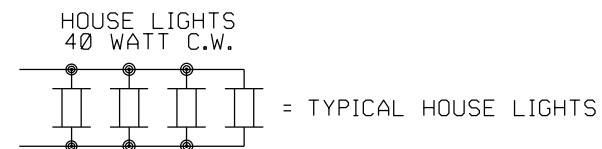
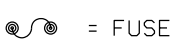
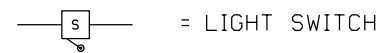
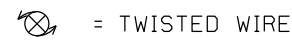
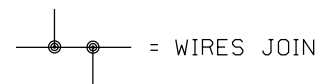
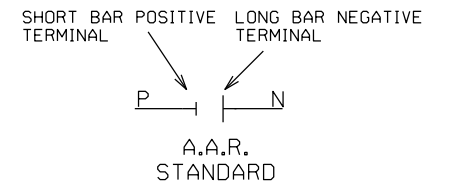
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ENGINEERING STANDARD DRAWINGS
 CIRCUIT PLAN SYMBOLS

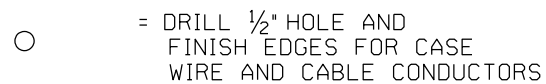
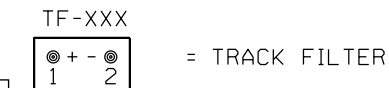
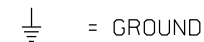
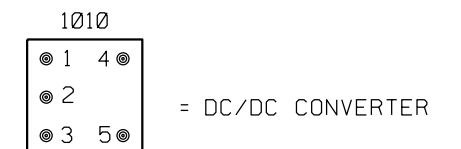
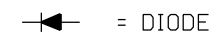
DRAWING NO. ESD-8100
 DRAWING SHEET NO. 1 OF 1
 SCALE: NONE
 CONTRACT SHEET NO.



NOTE:
6 = NO. OF CELLS
S = LEAD ACID



NOTE:
SHOW PART NUMBER AND PERTINENT INFO



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		CHECKED	EJR	
		E. ROE		
		RECOMMENDED	WP	
		W. PREY		
		DATE	FEBRUARY 2015	
REV.	DATE	DESCRIPTION	DES. ENG.	



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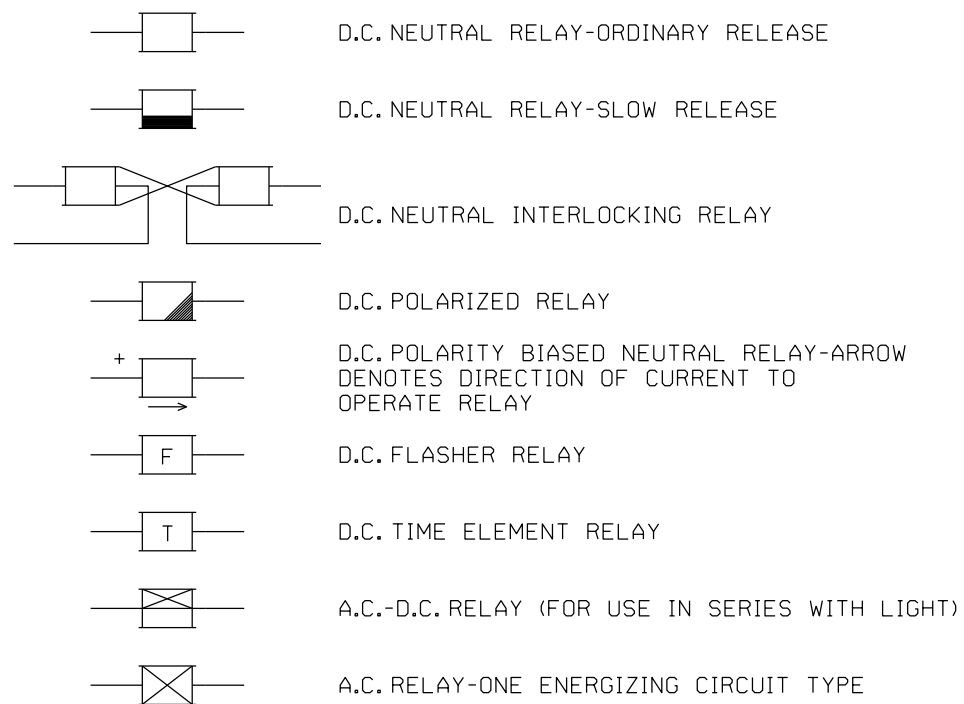


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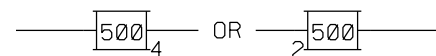
ENGINEERING STANDARD DRAWINGS
COMPONENT SYMBOLS

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SCALE: NONE
CONTRACT SHEET NO.

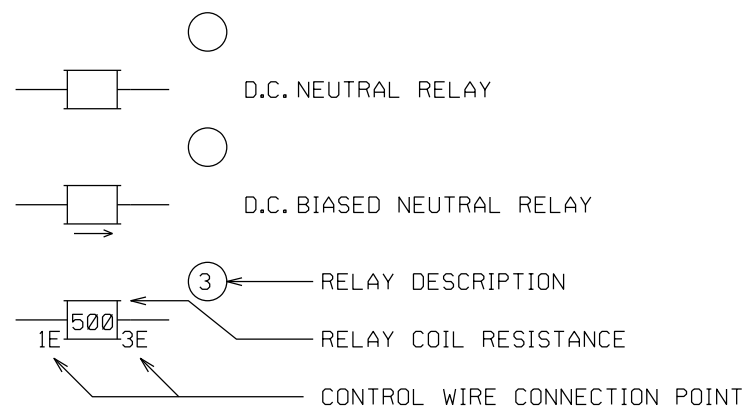
SHELF RELAYS



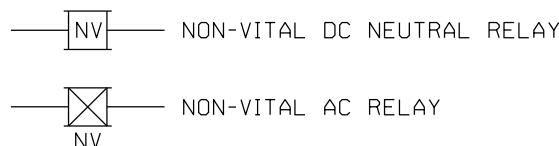
RELAY RESISTANCE TO BE SHOWN IN BOX
 NUMBER OF FRONT & BACK CONTACTS TO BE SHOWN TO THE SIDE



VITAL PLUG-IN RELAYS



NON-VITAL RELAYS



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ACCEPTABLE PLUG-IN RELAYS

RELAY TAB NO.	RELAY DESCRIPTION	GRS	SAFETRAN
①	RELAY, 2 OR .5 OHM, BIASED NEUTRAL DC TRACK, WITH 4FB-2F-1B CONTACTS.	A62-120	400510 OR
	RELAY, 2 OR .5 OHM, BIASED NEUTRAL DC TRACK, WITH 6FB CONTACTS.	A62-654	400512
②	RELAY 4 OHM, BIASED NEUTRAL DC TRACK	A62-682	400521
③	RELAY, 500 OHM, BIASED NEUTRAL	A62-125	400500
④	RELAY, 80 OHM FLASHER W/400700-8X FLASHER MODULE, 50FPM	A62-197	400700-7X
⑤	RELAY, 100/100 OHM POWER TRANSFER HEAVY DUTY W/400800-1X RECTIFIER ASSY	A62-406	400801-X
⑥	RELAY, TIMER, SLOW RELEASE, 160 OHM OPERATING COIL AND 272 OHM TIMER CONTROL COIL, FOR TCR CIRCUIT APPLICATIONS, FROM 1 SEC TO 52 MINUTES	ANSALDO PN 150EVTSD	
⑦	RELAY, 450/.2 OHM LIGHT OUT WITH RECTIFIER 400300-2X, WITH 6FB CONTACTS	A62-231	400301 OR
	RELAY, 450/.069 OHM LIGHT OUT WITH RECTIFIER 400300-2X, WITH 4FB CONTACTS.	A62-217	400302
⑧	RELAY, 500 OHM MAGNETIC STICK	A62-247	400900
⑨	RELAY, 500 OHM BIASED SWITCH MOTOR CONTROL WITH EXTRA HEAVY DUTY CONTACTS	A62-429	400520
⑩	RELAY, 500 OHM TIMER, 1 SEC MINIMUM TO 19 MINUTES 59 SEC MAXIMUM, TYPE B2	A62-691	451000-X 451000-B
⑪	RELAY, .064/135 OHM SW OVERLOAD, FOR LOW VOLTAGE 20 AMP CLUTCH SLIP MACHINES WITH GEAR RATIO 360:1.	A62-430	400601
	RELAY, .064/135 OHM SW OVERLOAD, FOR HIGH AND LOW VOLTAGE MACHINES. HIGH VOLT GEAR 189:1 CLUTCH SLIP / 14 AMPS HIGH VOLT GEAR 360:1 CLUTCH SLIP / 12 AMPS LOW VOLT GEAR 528:1 CLUTCH SLIP / 12 AMPS	A62-431	400605
⑫	RELAY, 194 OHM BIASED NEUTRAL SLOW RELEASE	NA	400530
⑬	RELAY, 60 OHM NEUTRAL SERIES LINE	A62-557	400028 OR
	RELAY, 63 OHM BIASED NEUTRAL SERIES LINE	A62-140	400501
⑭	RELAY, 500 OHM NEUTRAL REGULAR RELEASE	A62-262	400000
⑮	RELAY, 350 OHM, NEUTRAL, WITH HEAVY DUTY CONTACTS	A62-309	400027
⑯	RELAY, 350 OHM, BIASED NEUTRAL, TYPE B2, WITH 8FB-4F-2B CONTACTS.	A62-145	450501
⑰	RELAY, 350 OHM, BIASED NEUTRAL, TYPE B2, WITH 12FB CONTACTS	A62-150	450500
⑳	RELAY, 2250 OHM NON-VITAL, 120 VOLTS AC POWER OFF, TWO SETS OF CONTACTS	KRPA-11AG-120	
㉑	RELAY, 120 OHM NON-VITAL, 12 VOLT DC POWER OFF, TWO SETS OF CONTACTS	KRPA-11DG-12	
㉒	RELAY, 120 OHM NON-VITAL, 12 VOLT DC POWER OFF, THREE SETS OF CONTACTS	KRPA-14DG-12	

NOTE: SEE STANDARD DRAWING ESD-8120 FOR RELAY CONTACT ARRANGEMENTS

REV.	DATE	DESCRIPTION	DES.	ENG.	DATE	DESIGNER PE STAMP
					FEBRUARY 2015	

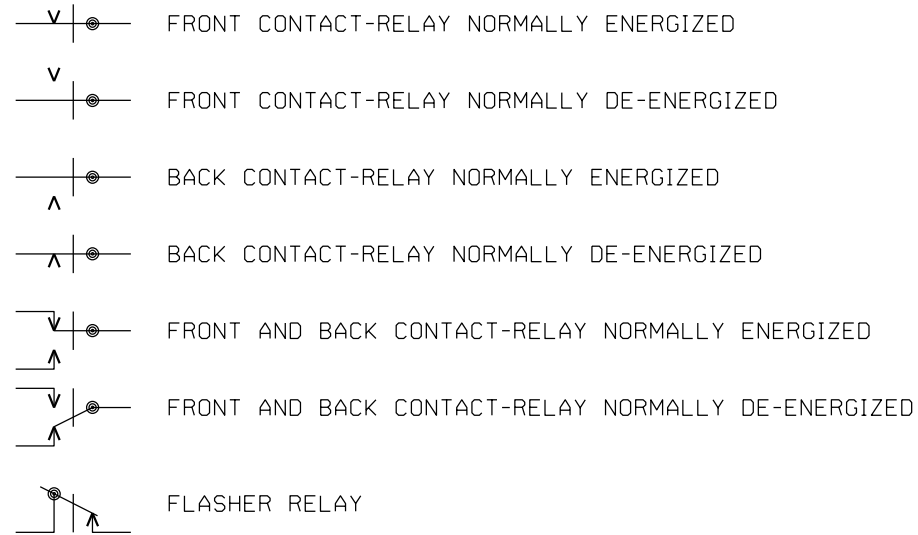
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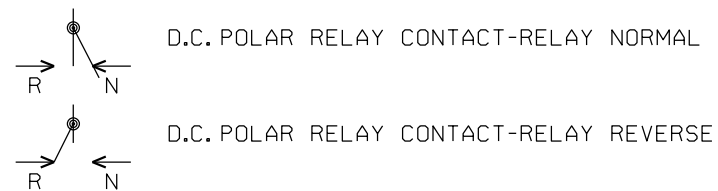
ENGINEERING STANDARD DRAWINGS
 SHELF & VITAL RELAYS

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DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	

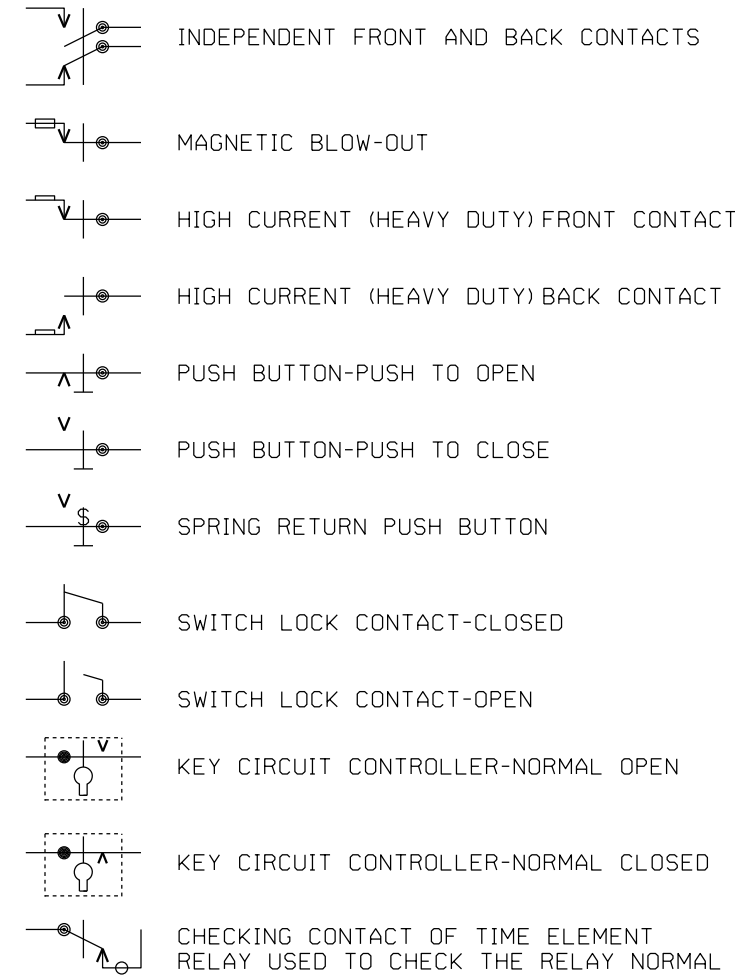
RELAY CONTACTS - TWO POSITION RELAYS



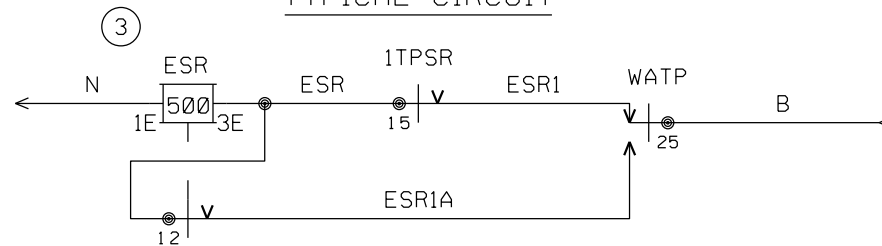
RELAY CONTACTS - THREE POSITION RELAYS



RELAY CONTACTS WITH SPECIAL CHARACTERISTICS



TYPICAL CIRCUIT



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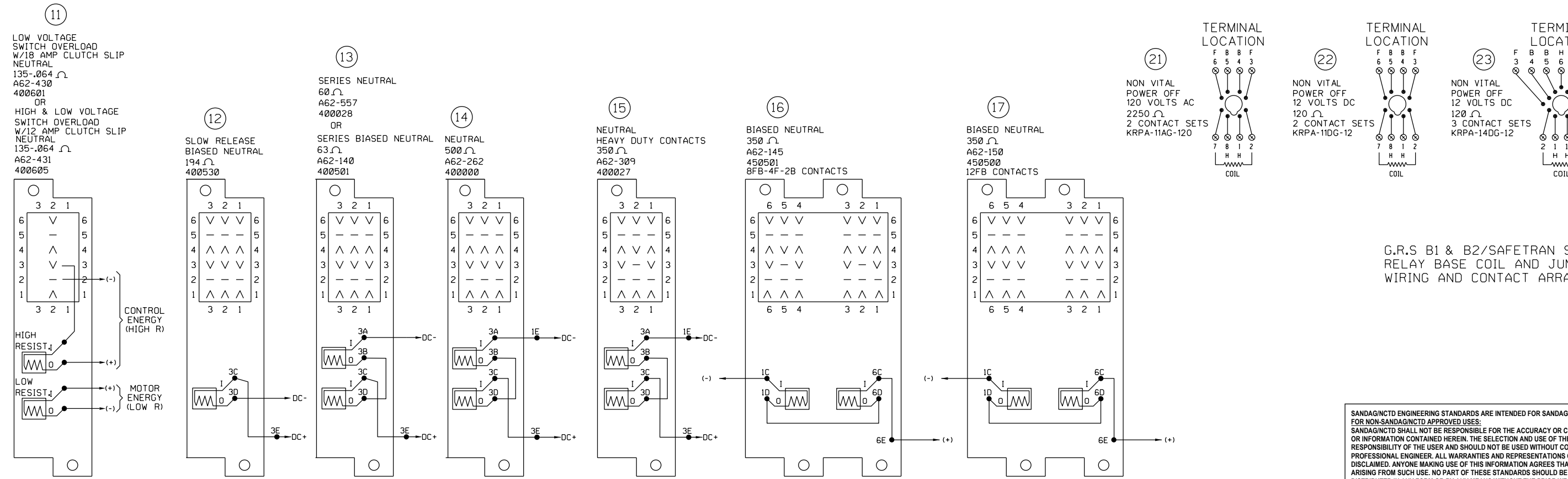
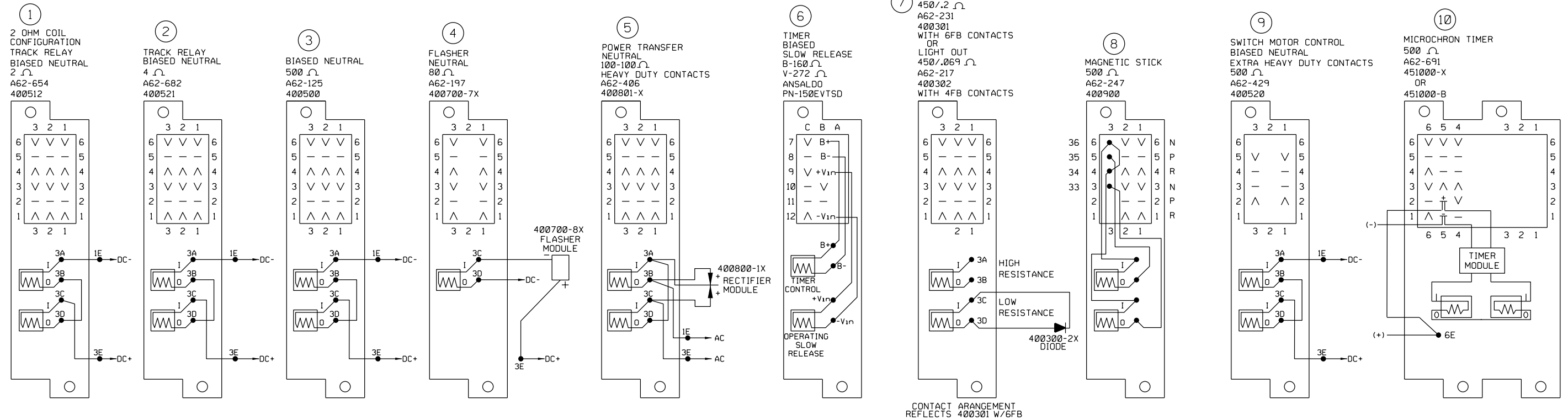
REV.	DATE	DESCRIPTION	DES.	ENG.

REVISIONS	DRAWN PRE, INC.
	CHECKED E. ROE <i>EJR</i>
	RECOMMENDED W. PREY <i>WP</i>
	DATE FEBRUARY 2015
DESIGNER PE STAMP	



ENGINEERING STANDARD DRAWINGS
RELAY CONTACT SYMBOLS

DRAWING NO.	ESD-8115
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	



G.R.S B1 & B2/SAFETRAN ST1 & ST2 RELAY BASE COIL AND JUMPER WIRING AND CONTACT ARRANGEMENT.

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REV.	DATE	DESCRIPTION	DES.	ENG.

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SANDAG

SAN DIEGO ASSOCIATION OF GOVERNMENTS
401 B Street, Suite 800
San Diego, CA. 92101
www.sandag.org

NORTH COUNTY TRANSIT DISTRICT

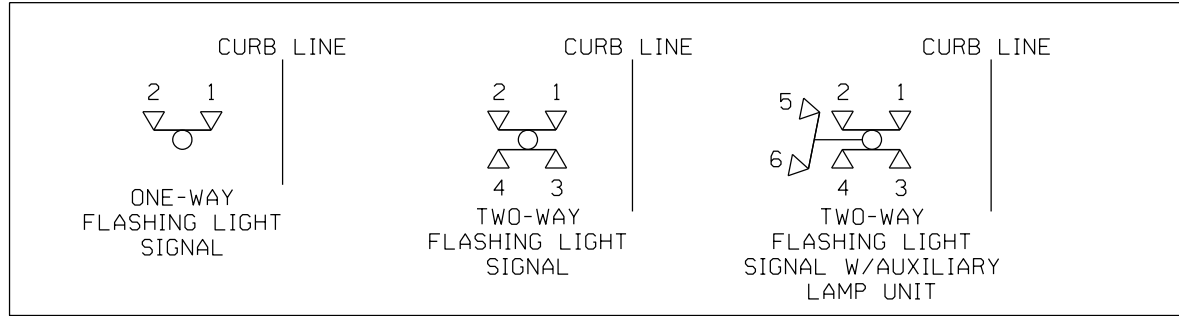
810 Mission Avenue
Oceanside, CA 92054
www.gonctd.com

ENGINEERING STANDARD DRAWINGS

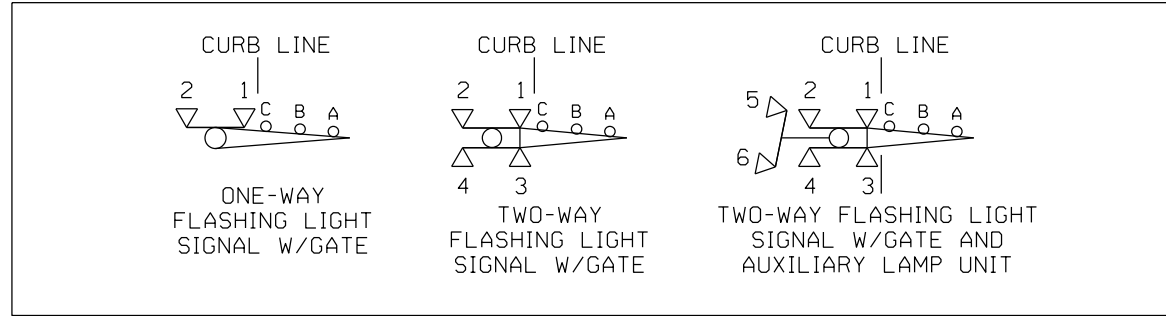
DRAWING NO. ESD-8120
DRAWING SHEET NO. 1 OF 1
SCALE: NONE
CONTRACT SHEET NO.

PLUG-IN RELAY BASE COIL & JUMPER WIRING WITH CONTACT ARRANGEMENT

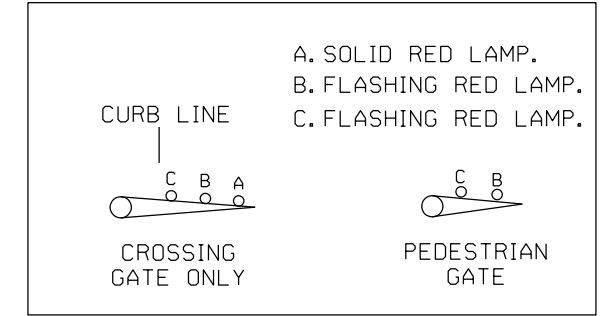
STANDARD NO. 8



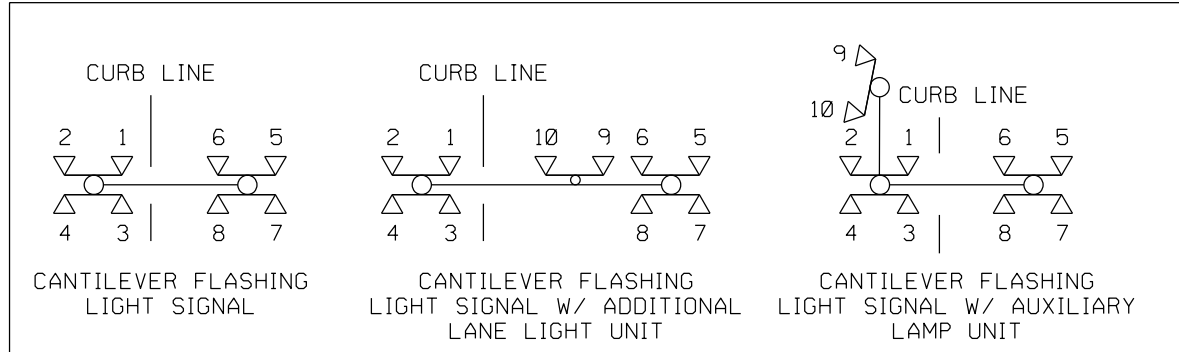
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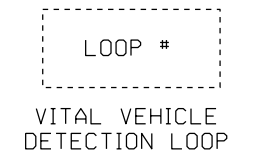
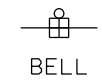
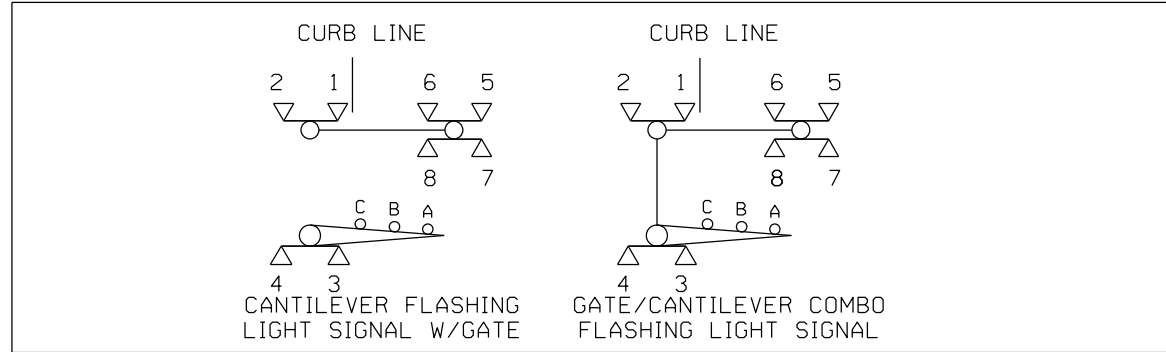
GATE ARM LAMPS



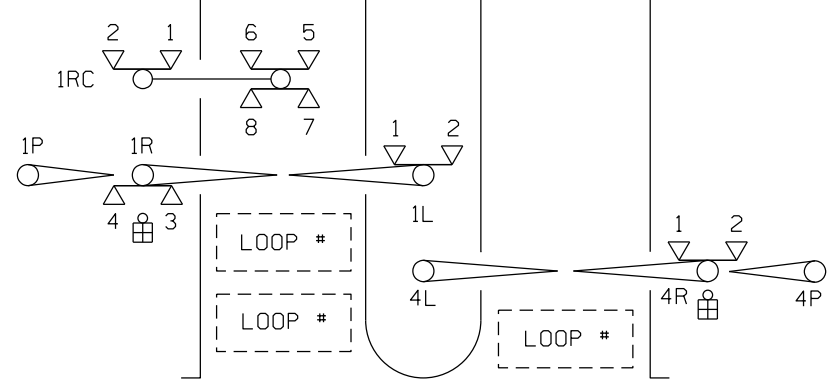
STANDARD NO. 8A



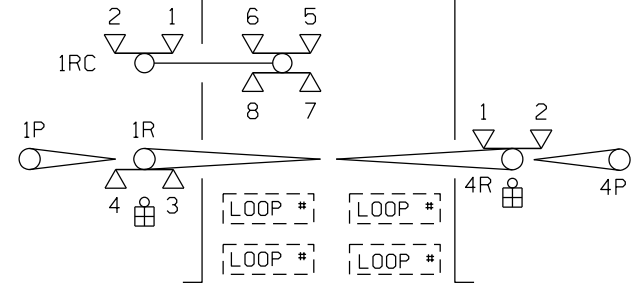
STANDARD NO. 9A



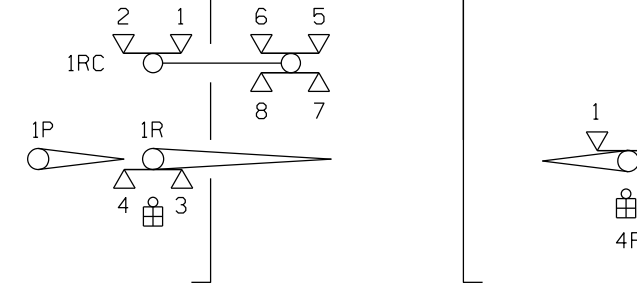
TYPICAL ST.
MP 0.00
DOT # 000 000 0
PUC XX-0.0



TYPICAL ST.
MP 0.00
DOT # 000 000 0
PUC XX-0.0



TYPICAL ST.
MP 0.00
DOT # 000 000 0
PUC XX-0.0



SEE NOTE 2.

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- NOTES:
1. ODD NUMBER LAMPS ARE STREET-SIDE.
 2. PEDESTRIAN GATES LOCATED IN A QUADRANT WITHOUT FLASHING LIGHTS WILL HAVE ONE-WAY FLASHERS AND BELL INSTALLED ON THE PED GATE.

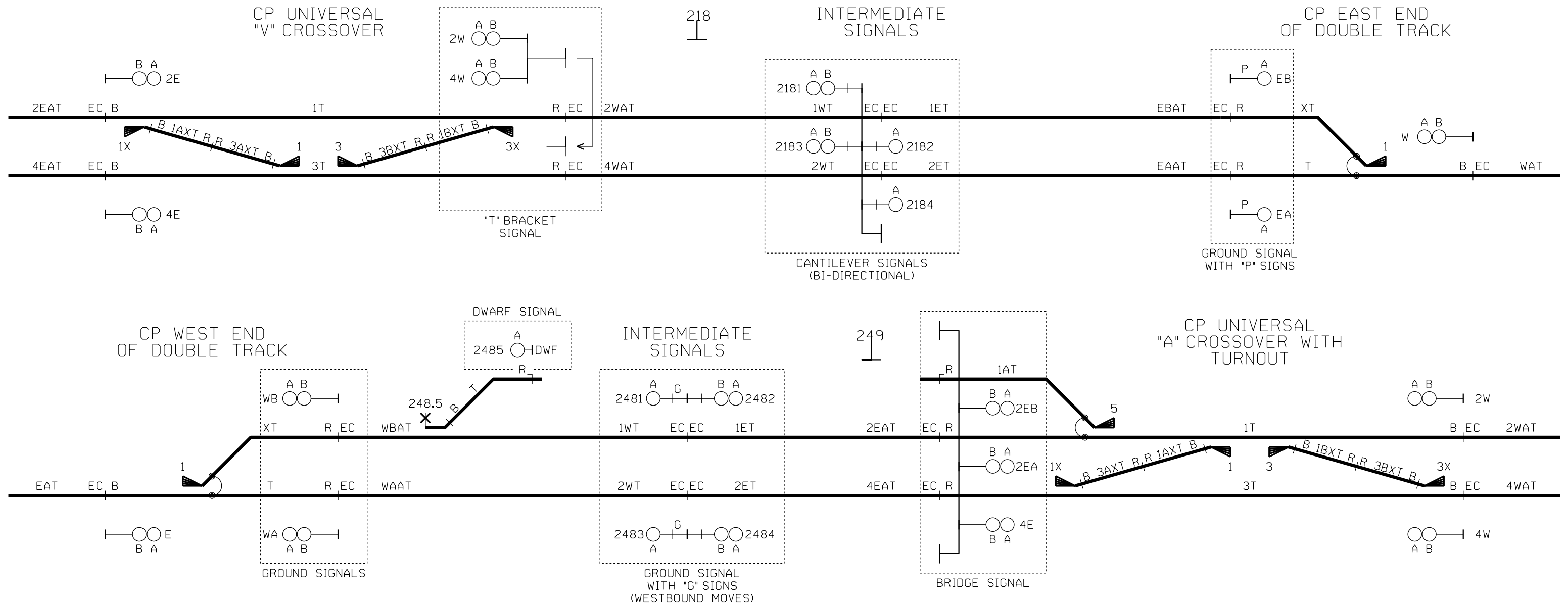
REV.	DATE	DESCRIPTION	DES.	ENG.

REVISIONS	DRAWN PRE, INC.
CHECKED E. ROE	RECOMMENDED W. PREY
DATE FEBRUARY 2015	DESIGNER PE STAMP



ENGINEERING STANDARD DRAWINGS	DRAWING NO. ESD-8125
GRADE CROSSING SYMBOLS	DRAWING SHEET NO. 1 OF 1
	SCALE: NONE
	CONTRACT SHEET NO.

THIS DRAWING REFLECTS WARNING DEVICE SYMBOLS AND IDENTIFICATION LABELING ONLY. REFERENCE ESD-8350 THROUGH ESD-8385 FOR TYPICAL LOCATION PLANS.



- NOTES:
- CONTROL POINT SIGNALS WILL BE IDENTIFIED ON THE CIRCUIT PLANS, BUT WILL HAVE NO IDENTIFICATION PLATES MOUNTED ON THE SIGNALS, WITH THE EXCEPTION OF "P" PLATES WHERE WARRANTED. POWER SWITCHES & TRACK WILL BE IDENTIFIED BY ODD NUMBERING.
 - NUMBER PLATES WILL BE MOUNTED ON ALL INTERMEDIATE AND AUTOMATIC SIGNALS WITH THE EXCEPTION OF HAND THROW SWITCH LEAVING SIGNALS.
 - THE SIGNAL NUMBER SHALL CONSIST OF THE NUMBER OF THE LOWEST NUMERICAL MILEPOST BEFORE REACHING THE SIGNAL WITH A SUFFIX OF ONE DIGIT WITH AN ODD NUMBER FOR WESTBOUND AND AN EVEN NUMBER FOR EASTBOUND.
 - A "P" OR PROTECT SIGN WILL BE MOUNTED ON THE FIRST SIGNALS IN ANY APPROACH TO A HAZARD DETECTOR.
 - A "G" OR GRADE SIGN WILL BE MOUNTED ON INTERMEDIATE SIGNALS LOCATED ON AN ASCENDING GRADE EQUAL TO OR GREATER THAN 1 PERCENT.
 - ALL SIGNALS SHALL BE COLORLIGHT UNLESS OTHERWISE NOTED.

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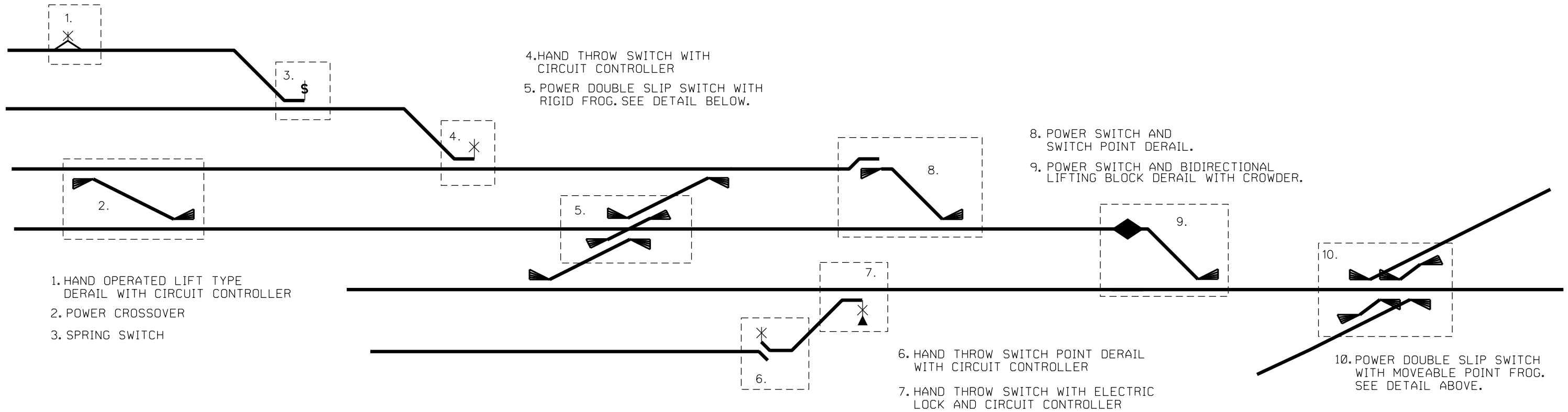
REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN	PRE, INC.
CHECKED	EJR
RECOMMENDED	BAS
DATE	MARCH 18, 2017
DESIGNER PE STAMP	



ENGINEERING STANDARD DRAWINGS WAYSIDE SIGNAL SYMBOLS	DRAWING NO.	ESD-8130
	DRAWING SHEET NO.	1 OF 1
	SCALE:	NONE
	CONTRACT SHEET NO.	

LINE PLAN SWITCH CONFIGURATIONS



- 1. HAND OPERATED LIFT TYPE DERAIL WITH CIRCUIT CONTROLLER
- 2. POWER CROSSOVER
- 3. SPRING SWITCH

- 4. HAND THROW SWITCH WITH CIRCUIT CONTROLLER
- 5. POWER DOUBLE SLIP SWITCH WITH RIGID FROG. SEE DETAIL BELOW.

- 8. POWER SWITCH AND SWITCH POINT DERAIL.
- 9. POWER SWITCH AND BIDIRECTIONAL LIFTING BLOCK DERAIL WITH CROWDER.

- 6. HAND THROW SWITCH POINT DERAIL WITH CIRCUIT CONTROLLER
- 7. HAND THROW SWITCH WITH ELECTRIC LOCK AND CIRCUIT CONTROLLER

- 10. POWER DOUBLE SLIP SWITCH WITH MOVEABLE POINT FROG. SEE DETAIL ABOVE.

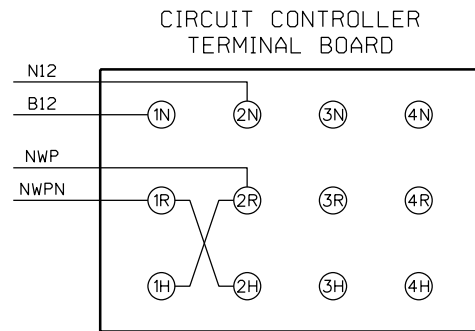
SANDAG/NCTD ENGINEERING STANDARDS ARE INTENDED FOR SANDAG/NCTD APPROVED USES ONLY. FOR NON-SANDAG/NCTD APPROVED USES: SANDAG/NCTD SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF THE DATA OR INFORMATION CONTAINED HEREIN. THE SELECTION AND USE OF THESE STANDARDS IS THE SOLE RESPONSIBILITY OF THE USER AND SHOULD NOT BE USED WITHOUT CONSULTING A REGISTERED PROFESSIONAL ENGINEER. ALL WARRANTIES AND REPRESENTATIONS OF ANY KIND ARE DISCLAIMED. ANYONE MAKING USE OF THIS INFORMATION AGREES THAT IT ASSUMES ALL LIABILITY ARISING FROM SUCH USE. NO PART OF THESE STANDARDS SHOULD BE REPRODUCED OR DISTRIBUTED IN ANY FORM OR BY ANY MEANS WITHOUT THE PRIOR WRITTEN PERMISSION OF SANDAG/NCTD. ALL RIGHTS RESERVED.

REV.	DATE	DESCRIPTION	DES.	ENG.

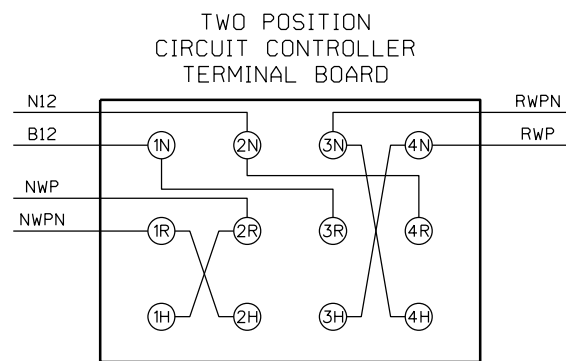
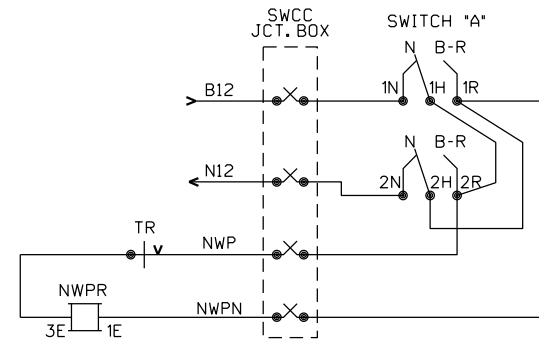
DRAWN	PRE, INC.
CHECKED	EJR
RECOMMENDED	WP
DATE	FEBRUARY 2015
DESIGNER PE STAMP	



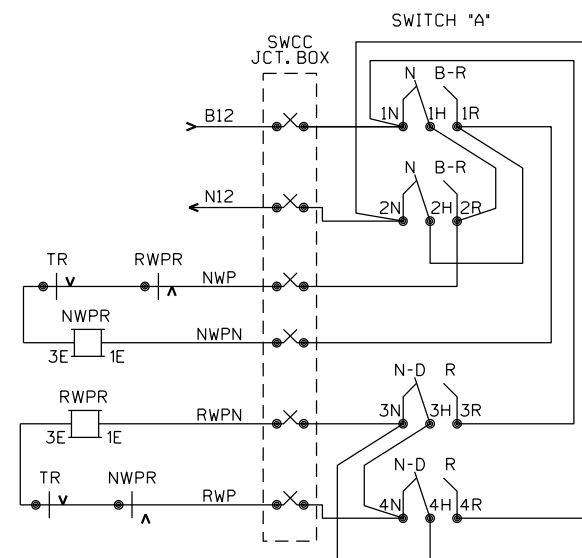
ENGINEERING STANDARD DRAWINGS SWITCH AND DERAIL SYMBOLS	DRAWING NO. ESD-8135 DRAWING SHEET NO. 1 OF 1 SCALE: NONE CONTRACT SHEET NO.
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NWPR ONLY



NWPR & RWPR



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- NOTES:
1. NORMAL POSITION OF SWITCH IS FOR MAIN TRACK.

REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN	PRE, INC.			
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DATE	FEBRUARY 2015			DESIGNER PE STAMP



ENGINEERING STANDARD DRAWINGS SWITCH CIRCUIT CONTROLLER CONTACT SYMBOLS	DRAWING NO. ESD-8140 DRAWING SHEET NO. 1 OF 1 SCALE: NONE CONTRACT SHEET NO.
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ASPECT	RULE	NAME
G G/R 	9.1.3	CLEAR (WITH OR WITHOUT NUMBER PLATE)
Y/FG 	9.1.4	APPROACH SIXTY (WITH OR WITHOUT NUMBER PLATE)
Y/G 	9.1.5	APPROACH FIFTY (WITH OR WITHOUT NUMBER PLATE)
Y/Y 	9.1.6	APPROACH DIVERGING (WITH OR WITHOUT NUMBER PLATE)
FY FY/R 	9.1.7	ADVANCE APPROACH (WITH OR WITHOUT NUMBER PLATE)
Y/FR Y/L 	9.1.8	APPROACH RESTRICTING (WITH OR WITHOUT NUMBER PLATE)

ASPECT	RULE	NAME
Y Y/R 	9.1.9	APPROACH (WITH OR WITHOUT NUMBER PLATE)
R/G 	9.1.10	DIVERGING CLEAR (WITHOUT NUMBER PLATE)
R/FY 	9.1.11	DIVERGING ADVANCE APPROACH (WITHOUT NUMBER PLATE)
R/Y 	9.1.12	DIVERGING APPROACH (WITHOUT NUMBER PLATE)
FR/R L/R 	9.1.13	RESTRICTING (WITH OR WITHOUT NUMBER PLATE)
R/FR R/L 	9.1.13	RESTRICTING (WITH OR WITHOUT NUMBER PLATE)

ASPECT	RULE	NAME
R R/R 	9.1.14	STOP AND PROCEED (WITH NUMBER PLATE)
R R/R 	9.1.15	STOP (WITHOUT NUMBER PLATE)

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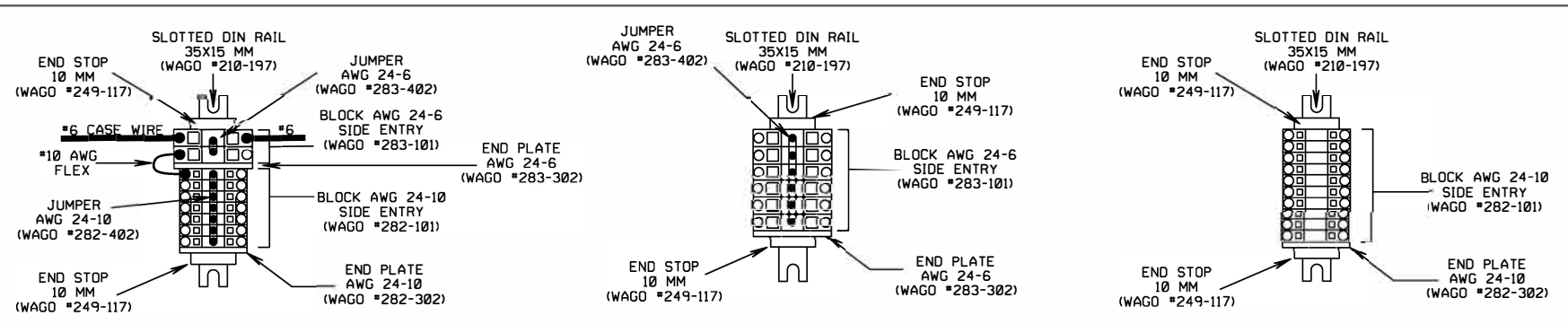
REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN	PRE, INC.
CHECKED	<i>EJR</i>
RECOMMENDED	<i>WP</i>
DATE	FEBRUARY 2015
DESIGNER PE STAMP	



ENGINEERING STANDARD DRAWINGS SIGNAL ASPECTS AND APPLICABLE RULES	DRAWING NO.	ESD-8147
	DRAWING SHEET NO.	1 OF 1
	SCALE:	NONE
	CONTRACT SHEET NO.	

TYPICAL WAGO CONFIGURATIONS

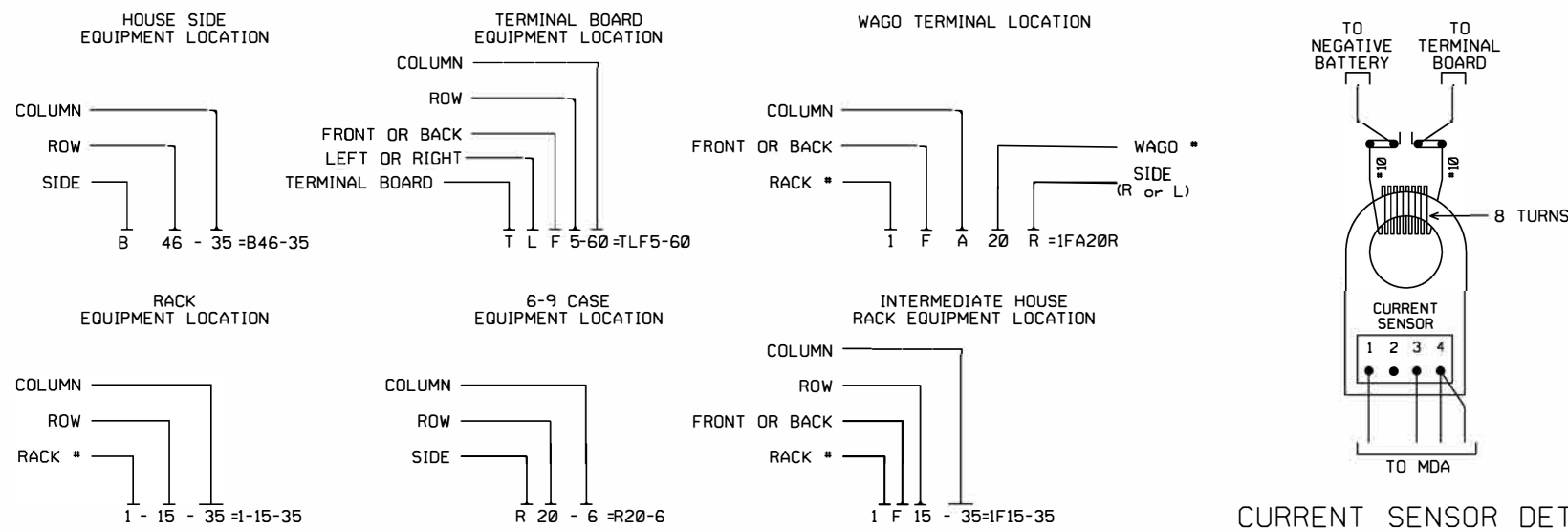


TYPICAL 12VDC BATTERY BUSS CONFIGURATION I

TYPICAL 12VDC BATTERY BUSS CONFIGURATION II

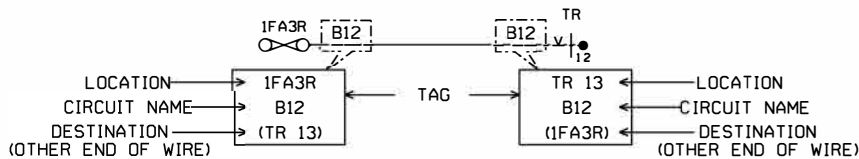
TYPICAL ELECTROLOGIX I/O INTERFACE CONFIGURATION

REFER TO SITE SPECIFIC CIRCUIT PLANS FOR APPLICABLE WAGO CONFIGURATIONS

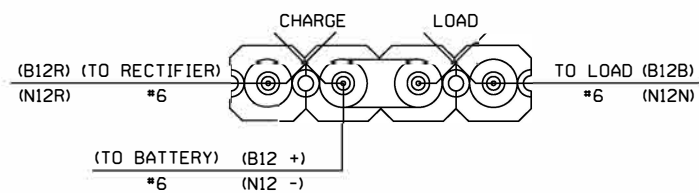


CURRENT SENSOR DETAIL

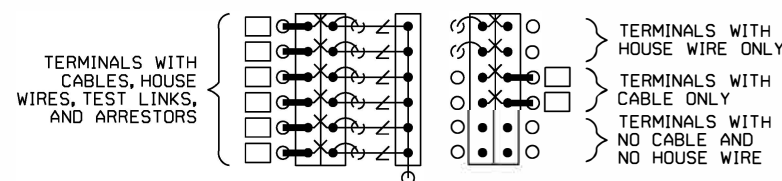
LOCATION LEGENDS



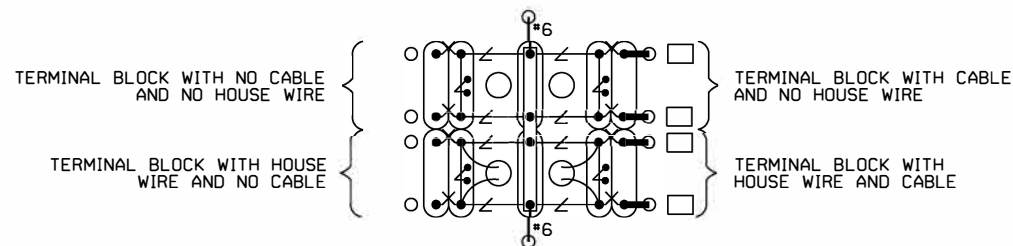
WIRE TAGGING DETAILS



DETAIL A



CABLE TERMINATION DETAIL



TRACK WIRE TERMINATION DETAIL

EQUIPMENT NOTES:

1. ALL INTERNAL CASE WIRES SHALL BE "TAGGED" USING NON-SHRINK WHITE VINYL MARKING SLEEVES.
2. EQUIVALENT ALSTOM PLUG-IN RELAYS MAY BE SUBSTITUTED FOR SIEMENS RELAYS SHOWN.
3. WAGO RAIL MOUNT "THROUGH" TERMINAL BLOCKS SHALL BE INSTALLED AS SHOWN.
4. NO. 14-16 RING TERMINALS SHALL BE AMP #327743 WITH 1/4" STUD PIDG. NO. 10-12 AWG RING TERMINALS SHALL BE AMP #35110 WITH 1/4" STUD PIDG.
5. L&W INDUSTRIES, INC. TERMINAL POST INSULATING SHIELDS AND CAPS SHALL BE INSTALLED ON ALL AC POWER TERMINALS. EQUIVALENT INSULATORS ARE ACCEPTABLE.

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GENERAL NOTES:

1. CONTRACTOR SHALL FURNISH SIGNAL ENCLOSURES AS SHOWN ON CONTRACT DRAWINGS. THE TOP AND BOTTOM OF EQUIPMENT RACKS SHALL BE PROPERLY SECURED TO THE ENCLOSURE. EQUIPMENT SHALL BE INSTALLED AND WIRED TO PROVIDE A COMPLETE AND OPERATING SYSTEM AS SHOWN ON THE CONTRACT DRAWINGS.
2. ALL INSULATION ON WIRE NO. 2 AND SMALLER SHALL BE INSULATED WITH MODIFIED ETHYLENE TETRAFLUOROETHYLENE (ETFE) CONFORMING TO ASTM D3159 (I.E. OKOZEL MANUFACTURED BY OKONITE).
3. APPLICATION LOGIC PROGRAMMING FOR SYSTEMS SHALL BE FURNISHED BY THE ENGINEER.
4. BOLTS, NUTS, WASHERS AND MISCELLANEOUS HARDWARE MAY BE SUBSTITUTED WITH COMPARABLE MATERIAL OF EQUAL OR BETTER QUALITY.
5. CONTRACTOR SHALL PERFORM NECESSARY TESTS TO ENSURE ENCLOSURE IS COMPLETE AND WILL OPERATE AS INTENDED.
6. ALL EQUIPMENT SHALL BE SECURED TO AVOID DAMAGE DURING SHIPMENT. HEAVY APPARATUS AND RELAYS SHALL BE REMOVED FROM THEIR MOUNTINGS AND PLACED IN SEPARATE PACKAGES TO PREVENT DAMAGE DURING SHIPMENT. ALL MATERIALS PACKAGED SEPARATELY SHALL BE SECURED AND SHIPPED WITH THE ENCLOSURE.
7. UNLESS NOTED OTHERWISE, WIRES SHALL BE NO. 16 AWG FLEX. ALL GROUND WIRES SHALL BE NO. 6 AWG SOFTDRAWN COPPER. WIRES TO BATTERIES SHALL BE NO. 6 AWG FLEX CASE WIRE.
8. ALL WIRE TAGS SHALL BE MADE TO SHOW LOCATION, CIRCUIT NAME AND DESTINATION PER EXAMPLE.

WIRING NOTES:

1. INSULATION ON SOLID CONDUCTORS SHALL BE REMOVED AND THE EXPOSED BARE WIRE THOROUGHLY CLEANED TO PROVIDE HIGH CONDUCTIVITY, TAKING CARE NOT TO NICK OR DAMAGE WIRE.
2. THE BARE WIRE SHALL BE FORMED TO PRODUCE AN EYELET WHICH SHALL BE PLACED OVER THE BINDING POST. THE EYELET SHALL BE SIZED TO PROVIDE A TIGHT FITTING LOOP AROUND THE POST BUT LOOSE ENOUGH TO EASILY SLIDE ON OR OFF.
3. INSULATION ON FLEX CONDUCTORS SHALL BE REMOVED USING A SPRING LOADED STRIPPING TOOL RECOMMENDED BY THE MANUFACTURER OF THE WIRE AND THE EXPOSED BARE WIRE THOROUGHLY CLEANED TO PROVIDE HIGH CONDUCTIVITY.
4. EYELET SHALL BE ATTACHED TO FLEX CONDUCTORS, ONLY NCTD APPROVED EYELET SHALL BE UTILIZED. A COMPRESSION TOOL RECOMMENDED BY THE MANUFACTURER OF THE EYELET SHALL BE USED TO ATTACH EYELET.
5. A FLAT WASHER SHALL BE PLACED ON THE BINDING POST. THE EYELET SHALL BE PLACED ON THE POST FOLLOWED BY ANOTHER FLAT WASHER. IF APPLICABLE, THE SECOND EYELET SHALL BE PLACED ON THE POST FOLLOWED BY A FLAT WASHER. A NUT SHALL BE APPLIED AND SECURELY TIGHTENED WITH A TERMINAL WRENCH.
6. AN INSULATED TEST LINK SHALL BE INSTALLED ONCE THE SOLID CONDUCTORS AND EYELETS ARE ATTACHED. THE TEST LINK SHALL BE SECURED USING ONE FLAT AND ONE CROWN NUT AND THE CIRCUIT "CLOSED" BY APPLYING THE BRASS NUT.
7. FLEX CONDUCTORS SHALL BE TAGGED USING NCTD APPROVED TAGS.
8. WHERE POSSIBLE, SPARE SOLID CABLE CONDUCTORS SHALL BE ATTACHED TO SPARE BINDING POSTS. NO MORE THAN ONE SOLID CONDUCTOR SHALL BE SECURED TO A POST.

REV.	DATE	DESCRIPTION	DES.	ENG.

REVISIONS	DRAWN	PRE, INC.
	CHECKED	<i>EJR</i>
	RECOMMENDED	<i>WP</i>
	DATE	FEBRUARY 2015
	DESIGNER PE STAMP	



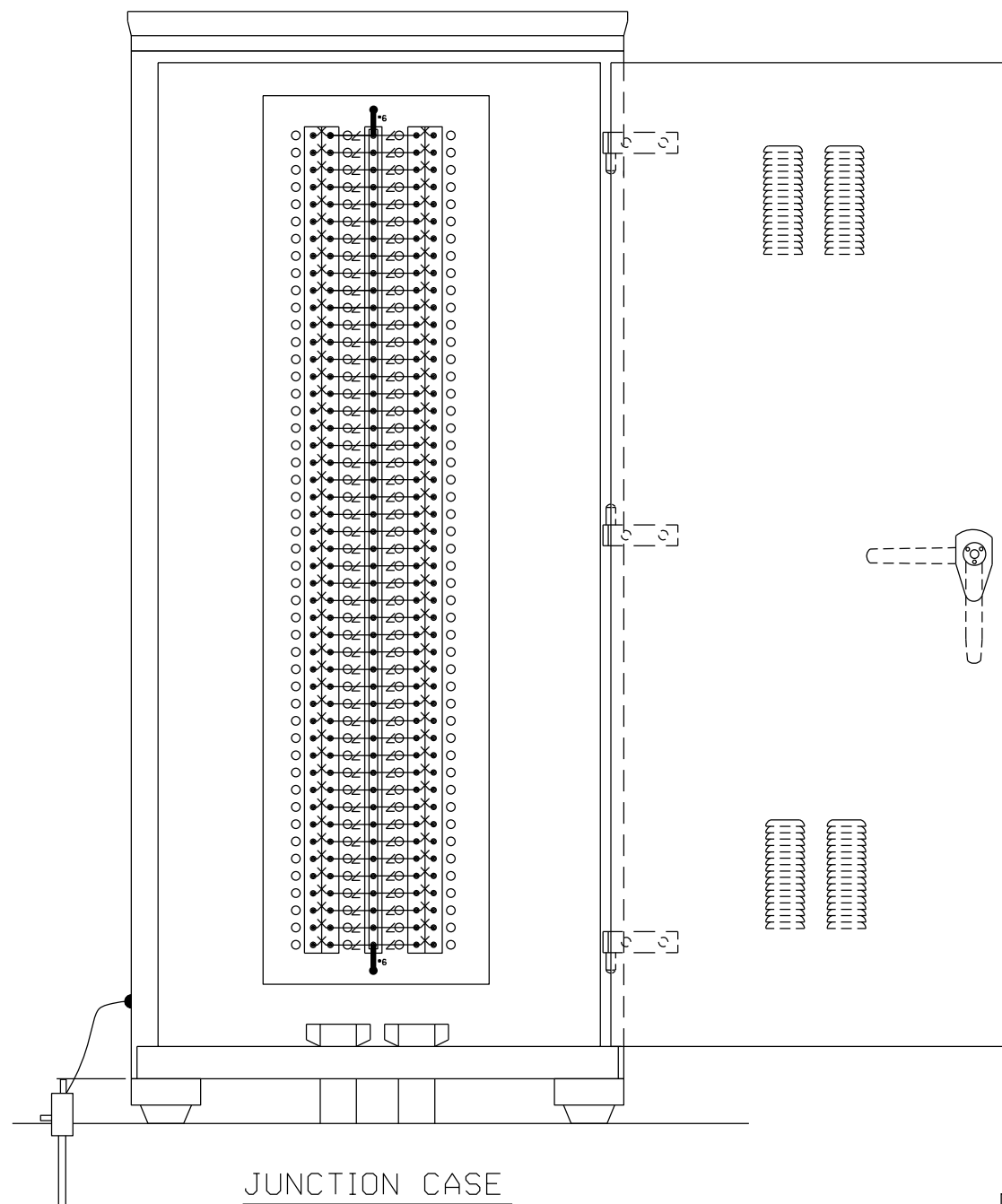
ENGINEERING STANDARD DRAWINGS
INSTRUMENT HOUSE WIRING DETAILS

DRAWING NO.	ESD-8150
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	

CASE DIMENSIONS

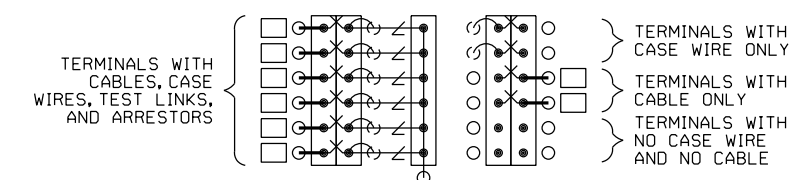
41"W X 74 3/4"H X 24"D - OPTION A

31"W X 61 3/4"H X 24"D - OPTION B

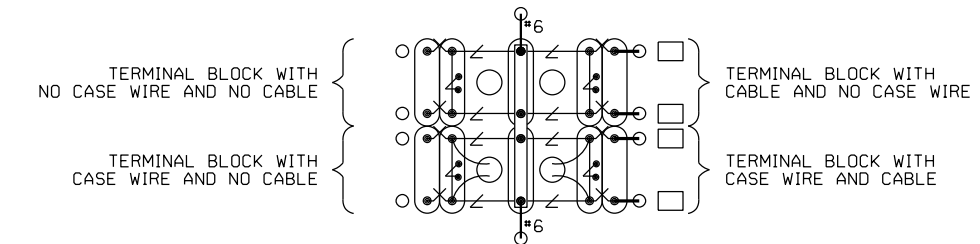


JUNCTION CASE

TERMINAL BOARD DETAIL



CABLE TERMINATION DETAIL



TRACK WIRE TERMINATION DETAIL

NOTES:

- CASE OPTION SIZE TO BE DETERMINED BY THE ENGINEER. CASE SHALL BE EQUIPPED WITH A PLYWOOD BACKBOARD SETUP WITH A MINIMUM OF 48 - 2 POST TERMINALS ARRANGED AS OUTLINED IN THE TERMINAL BOARD DETAIL ABOVE AND DISPLAYED IN THE CASE.
- INSULATION ON SOLID CONDUCTORS SHALL BE REMOVED AND THE EXPOSED BARE WIRE THOROUGHLY CLEANED TO PROVIDE HIGH CONDUCTIVITY, TAKING CARE NOT TO NICK OR DAMAGE WIRE.
- THE BARE WIRE SHALL BE FORMED TO PRODUCE AN EYELET WHICH SHALL BE PLACED OVER THE BINDING POST. THE EYELET SHALL BE SIZED TO PROVIDE A TIGHT FITTING LOOP AROUND THE POST BUT LOOSE ENOUGH TO EASILY SLIDE ON AND OFF.
- INSULATION ON FLEX CONDUCTORS SHALL BE REMOVED USING A SPRING LOADED STRIPPING TOOL RECOMMENDED BY THE MANUFACTURER OF THE WIRE AND THE EXPOSED BARE WIRE THOROUGHLY CLEANED TO PROVIDE HIGH CONDUCTIVITY.
- EYELET SHALL BE ATTACHED TO FLEX CONDUCTORS. ONLY APPROVED EYELETS SHALL BE UTILIZED. A COMPRESSION TOOL RECOMMENDED BY THE MANUFACTURER OF THE EYELET SHALL BE USED TO ATTACH THE EYELET.
- A FLAT WASHER SHALL BE PLACED ON THE BINDING POST. THE EYELET SHALL THEN BE PLACED ON THE POST FOLLOWED BY ANOTHER FLAT WASHER. IF APPLICABLE THE SECOND EYELET SHALL BE PLACED ON THE POST FOLLOWED BY A FLAT WASHER. A NUT SHALL BE APPLIED AND SECURELY TIGHTENED WITH A TERMINAL WRENCH.
- AN INSULATED TEST LINK SHALL BE INSTALLED ONCE THE SOLID CONDUCTORS AND EYELETS ARE ATTACHED. THE TEST LINK SHALL BE SECURED USING ONE FLAT AND ONE CROWN NUT AND THE CIRCUIT "CLOSED" BY APPLYING THE BRASS NUT.
- FLEX CONDUCTORS SHALL BE TAGGED USING APPROVED TAGS.
- WHERE POSSIBLE, SPARE SOLID CABLE CONDUCTORS SHALL BE ATTACHED TO SPARE BINDING POSTS AND TAGGED. NO MORE THAN ONE SOLID CONDUCTOR SHALL BE SECURED TO A POST.

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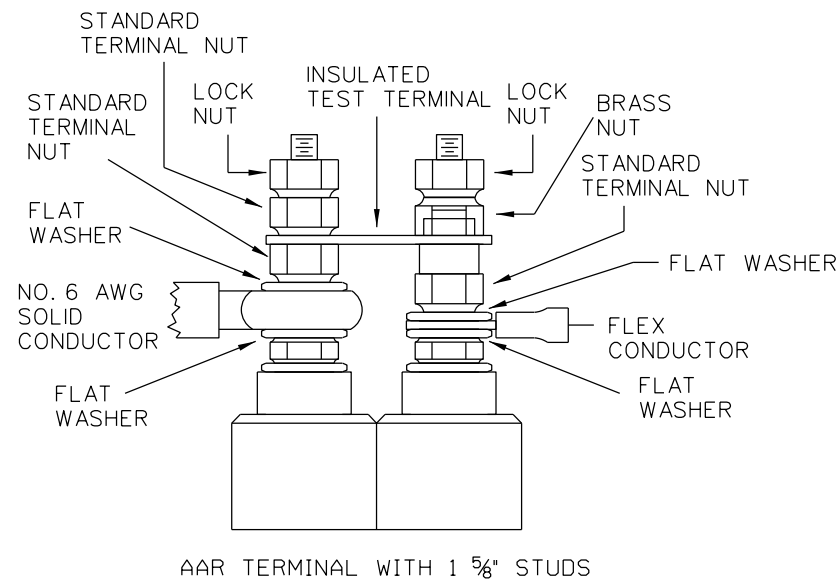
REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN	PRE, INC.
CHECKED	<i>EJR</i>
RECOMMENDED	<i>WP</i>
DATE	FEBRUARY 2015
DESIGNER PE STAMP	

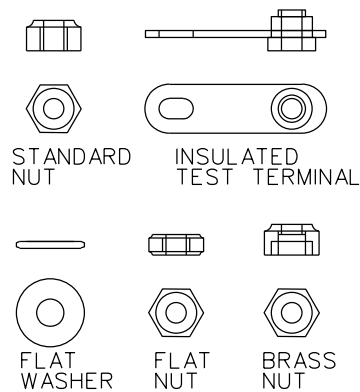
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ENGINEERING STANDARD DRAWINGS CABLE JUNCTION CASE WIRING DETAILS	DRAWING NO.	ESD-8155
	DRAWING SHEET NO.	1 OF 1
	SCALE:	NONE
	CONTRACT SHEET NO.	



AAR TERMINAL WITH 1 5/8" STUDS

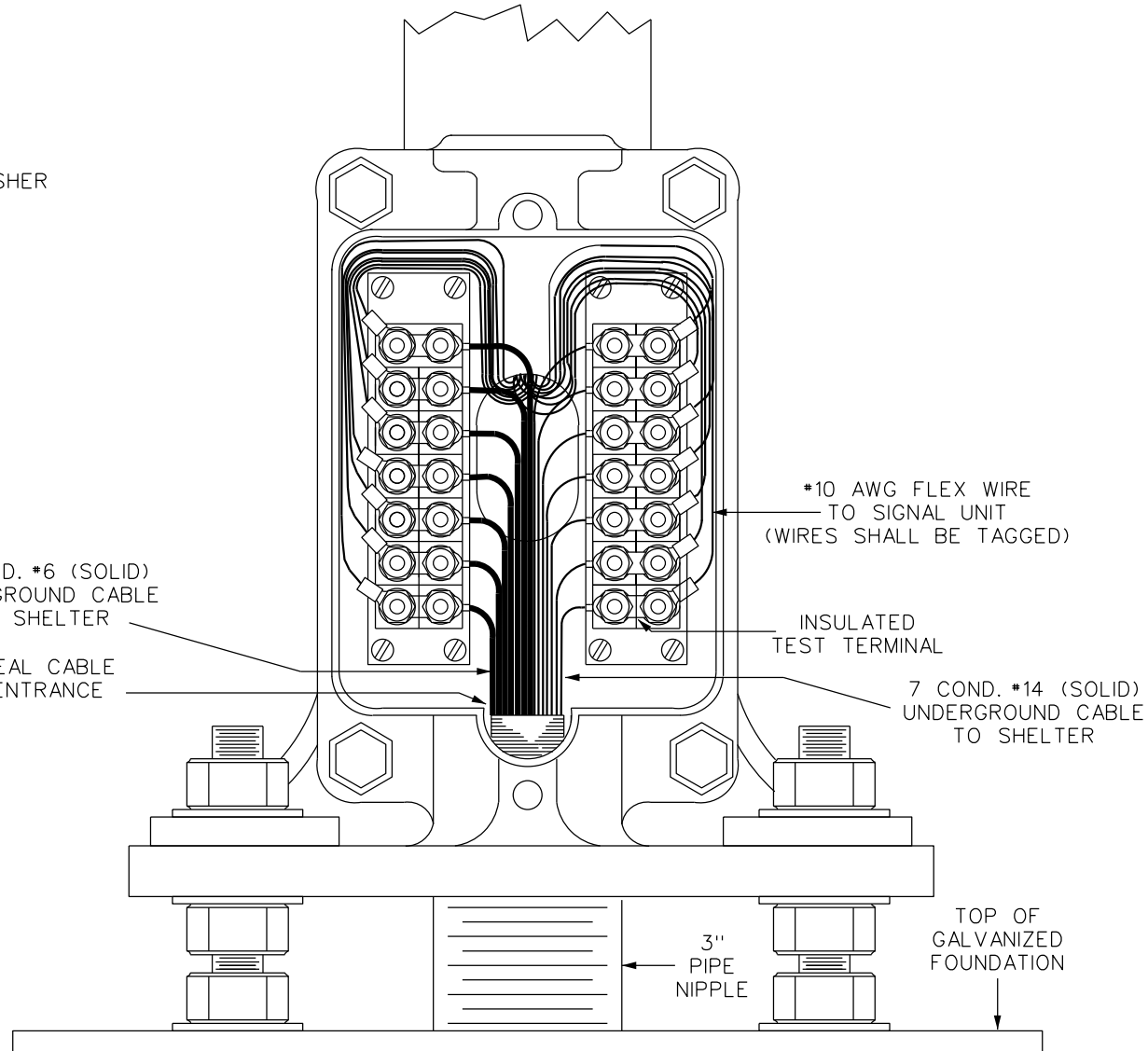


TURN THIS DIRECTION TO TIGHTEN NUT

PLACE SOLID WIRE EYELET OVER TERMINAL POST AS SHOWN

7 COND. #6 (SOLID) UNDERGROUND CABLE TO SHELTER

SEAL CABLE ENTRANCE




NOTES:

- INSULATION ON SOLID CONDUCTORS SHALL BE REMOVED AND THE EXPOSED BARE WIRE THOROUGHLY CLEANED TO PROVIDE HIGH CONDUCTIVITY, TAKING CARE NOT TO DAMAGE WIRE.
- THE BARE WIRE SHALL BE FORMED TO PRODUCE AN EYELET WHICH SHALL BE PLACED OVER THE BINDING POST. THE EYELET SHALL BE SIZED TO PROVIDE A TIGHT FITTING LOOP AROUND THE POST BUT LOOSE ENOUGH TO EASILY SLIDE ON AND OFF.
- INSULATION ON FLEX CONDUCTORS SHALL BE REMOVED AND THE EXPOSED BARE WIRE THOROUGHLY CLEANED TO PROVIDE HIGH CONDUCTIVITY.
- TERMINALS SHALL BE ATTACHED TO FLEX CONDUCTORS. ONLY APPROVED TERMINALS SHALL BE UTILIZED. A COMPRESSION TOOL RECOMMENDED BY THE MANUFACTURER OF THE TERMINAL SHALL BE USED TO ATTACH THE TERMINAL.
- A FLAT WASHER SHALL BE PLACED ON THE BINDING POST. THE TERMINAL SHALL THEN BE PLACED ON THE POST FOLLOWED BY ANOTHER FLAT WASHER. IF APPLICABLE, PLACE THE SECOND TERMINAL ON THE POST FOLLOWED BY A FLAT WASHER. A NUT SHALL BE APPLIED AND SECURELY TIGHTENED WITH A TERMINAL WRENCH.
- AN INSULATED TEST TERMINAL SHALL BE INSTALLED ONCE THE SOLID CONDUCTORS AND TERMINALS ARE ATTACHED. THE TEST TERMINAL SHALL BE SECURED WITH A SINGLE TERMINAL NUT AND THE CIRCUIT "CLOSED" BY APPLYING THE BRASS NUT. A STANDARD NUT SHALL BE PLACED ON EACH TERMINAL POST TO LOCK DOWN THE INSULATED TEST TERMINAL NUTS.
- FLEX CONDUCTORS SHALL BE TAGGED USING APPROVED TAGS.
- WHERE POSSIBLE, SPARE SOLID CABLE CONDUCTORS SHALL BE ATTACHED TO SPARE BINDING POSTS AND TAGGED. NOT MORE THAN ONE SOLID CONDUCTOR SHALL BE SECURED TO A POST.
- CONDUCTORS ARE LANDED IN NUMERICAL ORDER WITH NUMBER ONE ON TOP.


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REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN	PRE, INC.
CHECKED	EJR
RECOMMENDED	WP
DATE	FEBRUARY 2015
DESIGNER PE STAMP	

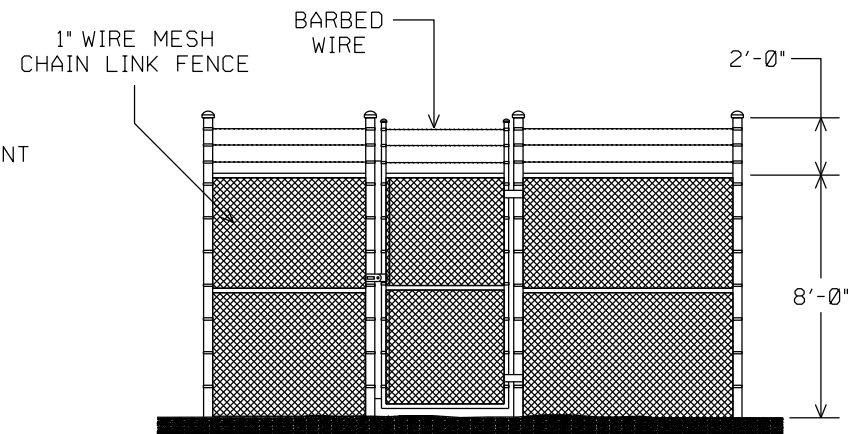
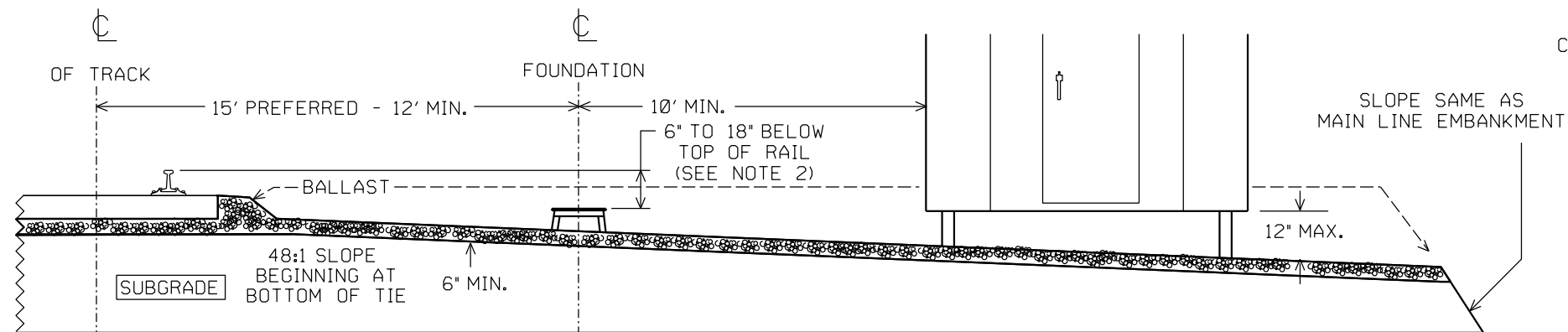


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ENGINEERING STANDARD DRAWINGS	DRAWING NO. ESD-8210
TYPICAL CABLE TERMINATION	DRAWING SHEET NO. 1 OF 1
	SCALE: NONE
	CONTRACT SHEET NO.

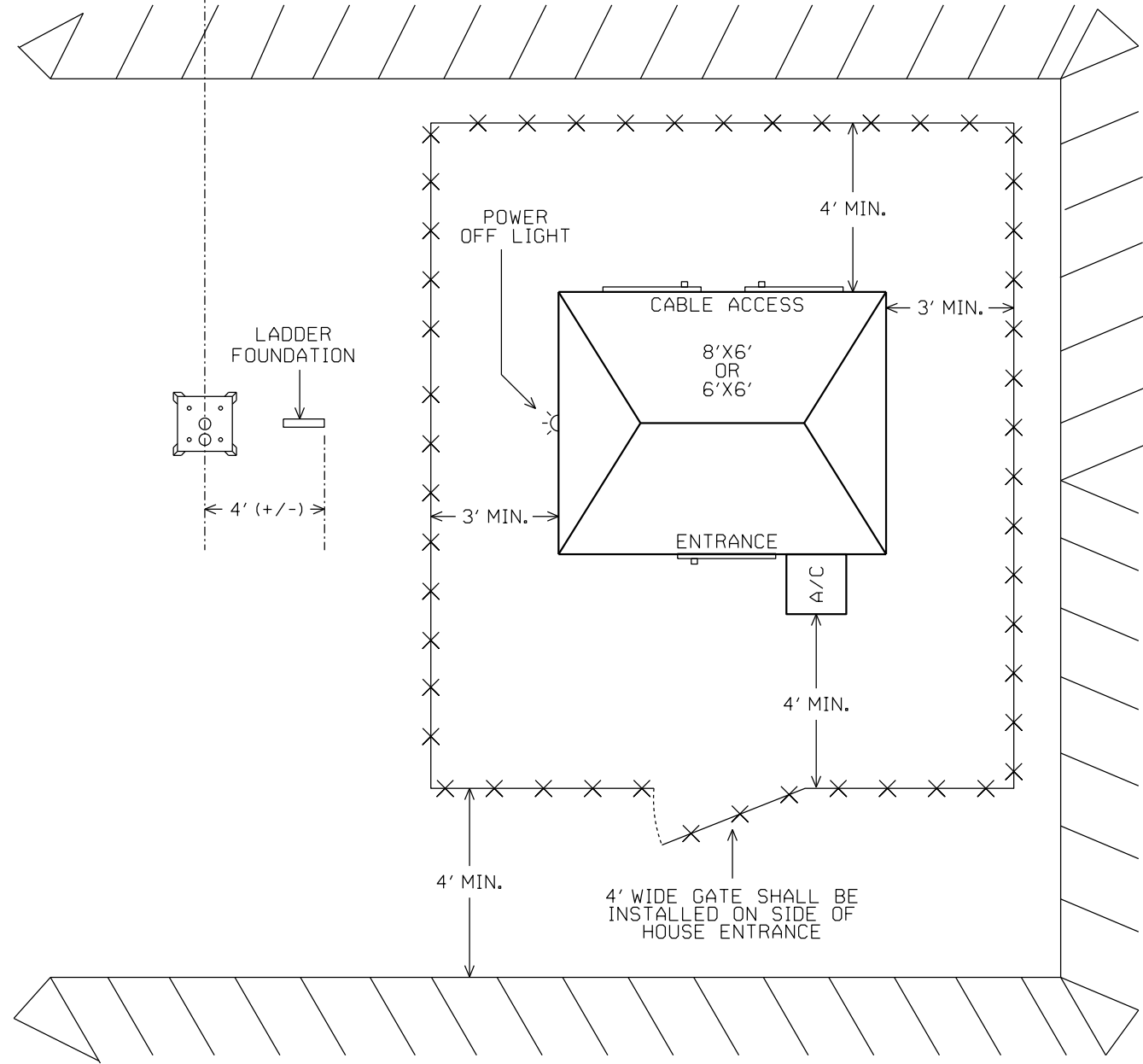
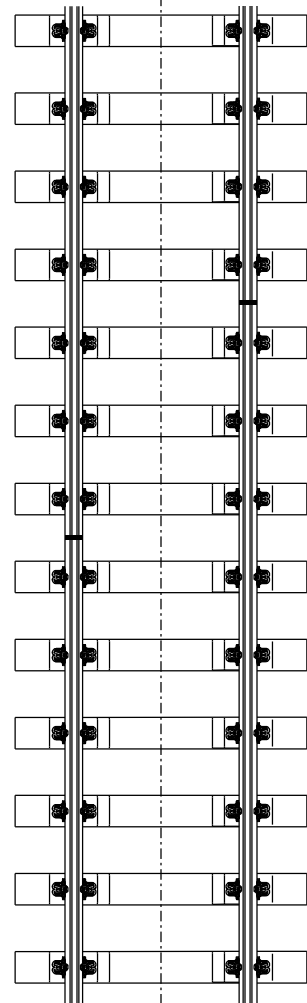


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NOTES:

- WHERE NOT INDICATED ON PLAN, PLACE EQUIPMENT ACCORDING TO THIS DRAWING UNLESS OTHERWISE AUTHORIZED BY NCTD.
- TOP OF SIGNAL FOUNDATION SHALL BE LOCATED NO MORE THAN 12" ABOVE FINAL GRADE.
- WALKWAY BALLAST SHALL BE PLACED AROUND INSTRUMENT SHELTER AND UP TO TOE OF TRACK SECTION.
- STORM DRAINS AND DRAINAGE DITCH SHALL BE DIVERTED AROUND BERM OR APPROPRIATE DRAINAGE PIPE INSTALLED.
- POWER OFF LIGHT SHALL BE INSTALLED ON INTERMEDIATE SIGNAL AND REMOTE CROSSING SHELTERS. LAMP SHALL BE VELCORP GEMS P/N LC2-001WB-W AND PLACED ON TRACK SIDE, VISIBLE TO APPROACHING TRAINS.
- INTERMEDIATE SIGNAL HOUSES ARE TYPICALLY 8'X6'. REMOTE CROSSING START HOUSES ARE TYPICALLY 6'X6'.
- ORIENTATION OF INSTRUMENT HOUSE CAN BE ADJUSTED BASED ON SITE CONDITIONS AS REQUIRED, SUBJECT TO APPROVAL BY NCTD.




REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN	PRE, INC.
CHECKED	EJR
RECOMMENDED	BS
DATE	MARCH 18, 2017
DESIGNER PE STAMP	

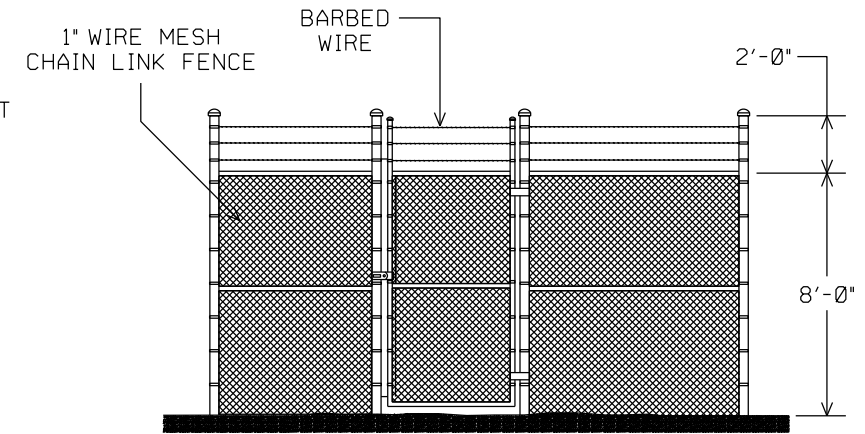
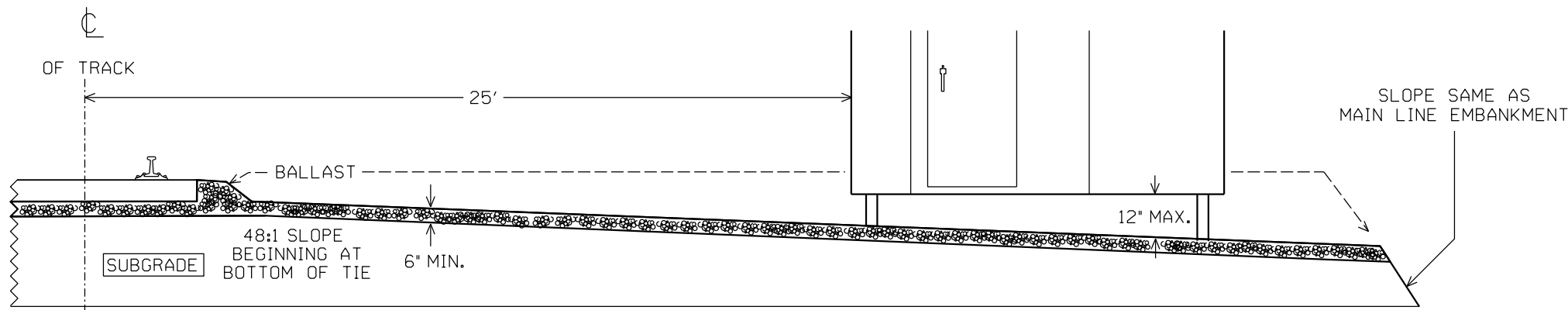


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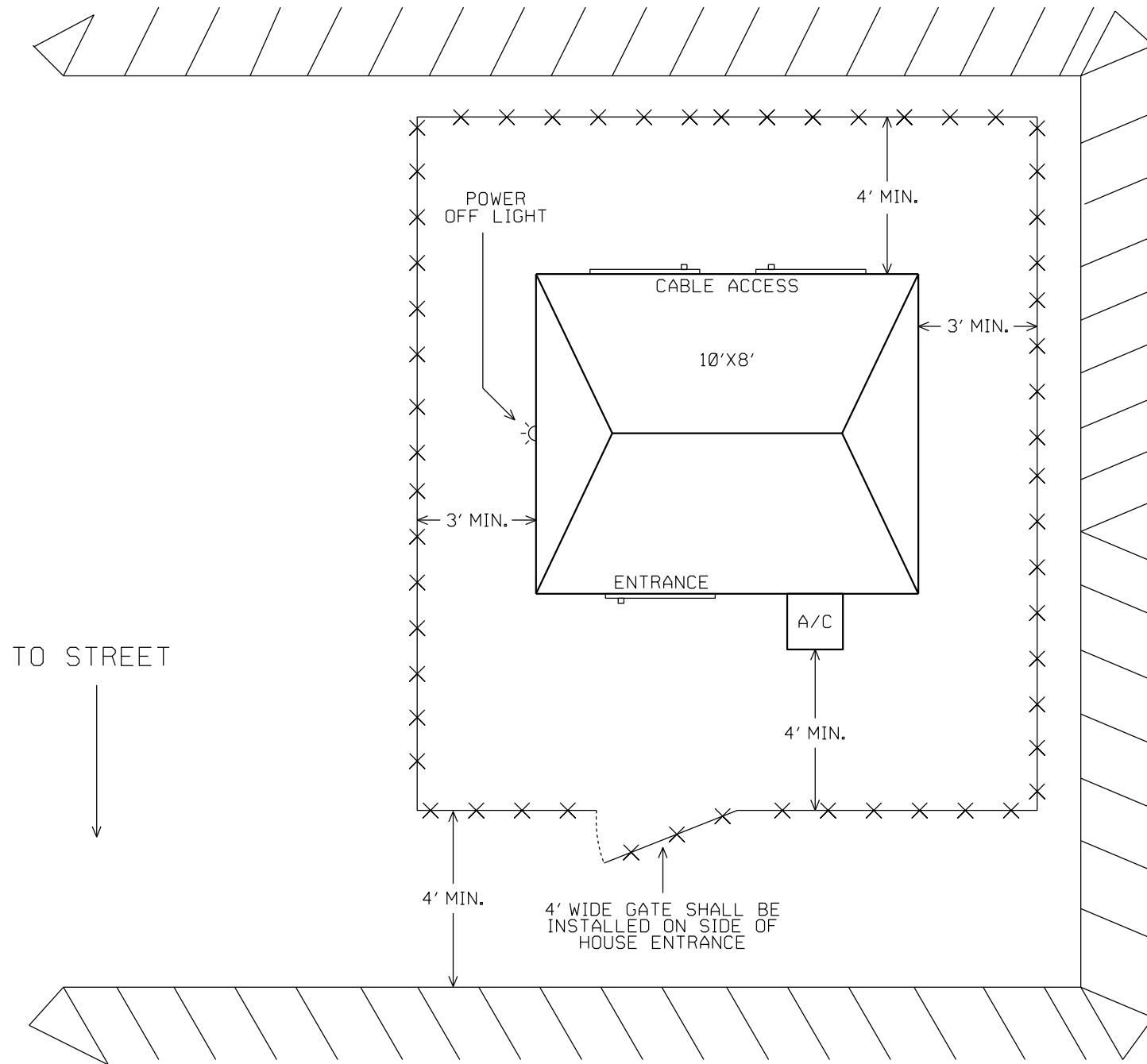
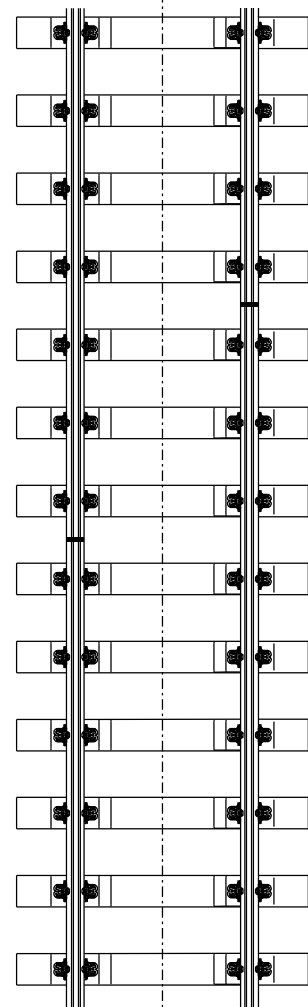


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ENGINEERING STANDARD DRAWINGS TYPICAL INTERMEDIATE SIGNAL/REMOTE START LOCATION AND BERM WITH SECURITY FENCE	DRAWING NO.	ESD-8215-01
	DRAWING SHEET NO.	1 OF 1
	SCALE:	NONE
	CONTRACT SHEET NO.	



SECURITY FENCE DETAIL



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NOTES:

- WHERE NOT INDICATED ON PLAN, PLACE EQUIPMENT ACCORDING TO THIS DRAWING UNLESS OTHERWISE AUTHORIZED BY NCTD.
- WALKWAY BALLAST SHALL BE PLACED AROUND INSTRUMENT SHELTER AND UP TO TOE OF TRACK SECTION.
- STORM DRAINS AND DRAINAGE DITCH SHALL BE DIVERTED AROUND BERM OR APPROPRIATE DRAINAGE PIPE INSTALLED.
- POWER OFF LIGHT SHALL BE INSTALLED ON GRADE CROSSING SHELTERS. LAMP SHALL BE VELCORP GEMS P/N LC2-001WB-W AND PLACED ON TRACK SIDE, VISIBLE TO APPROACHING TRAINS.
- GRADE CROSSING HOUSES ARE TYPICALLY 10'X8'.
- ORIENTATION OF INSTRUMENT HOUSE CAN BE ADJUSTED BASED ON SITE CONDITIONS AS REQUIRED, SUBJECT TO APPROVAL BY NCTD.

REV.	DATE	DESCRIPTION	DES.	ENG.

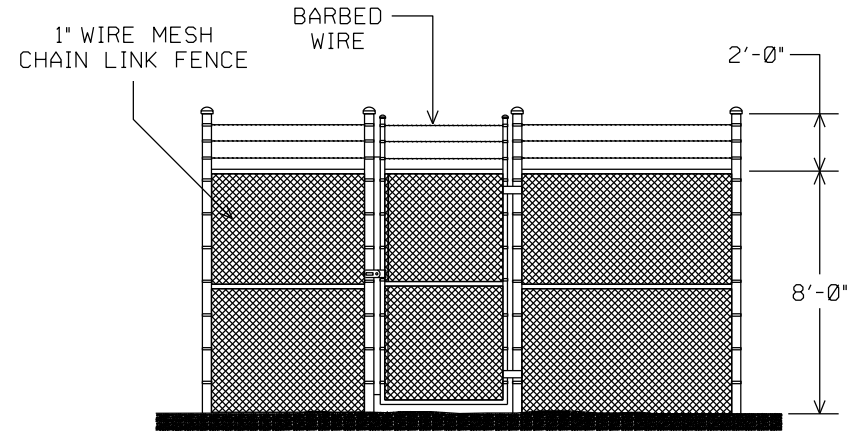
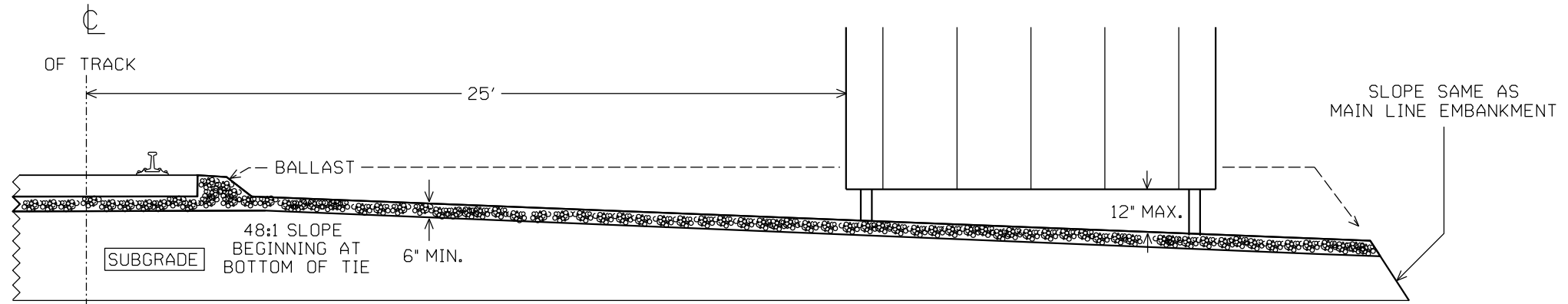
REVISIONS	DRAWN PRE, INC.
CHECKED E. ROE	<i>EJR</i>
RECOMMENDED B. SCHMITH	<i>BS</i>
DATE MARCH 18, 2017	DESIGNER PE STAMP

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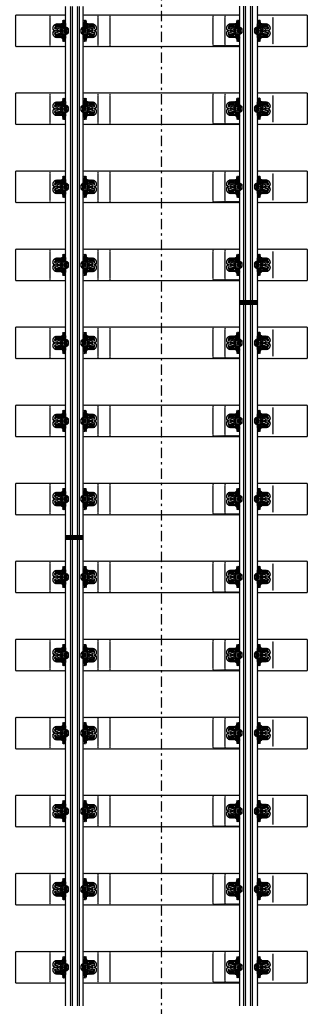
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ENGINEERING STANDARD DRAWINGS
 TYPICAL GRADE CROSSING LOCATION AND BERM WITH SECURITY FENCE

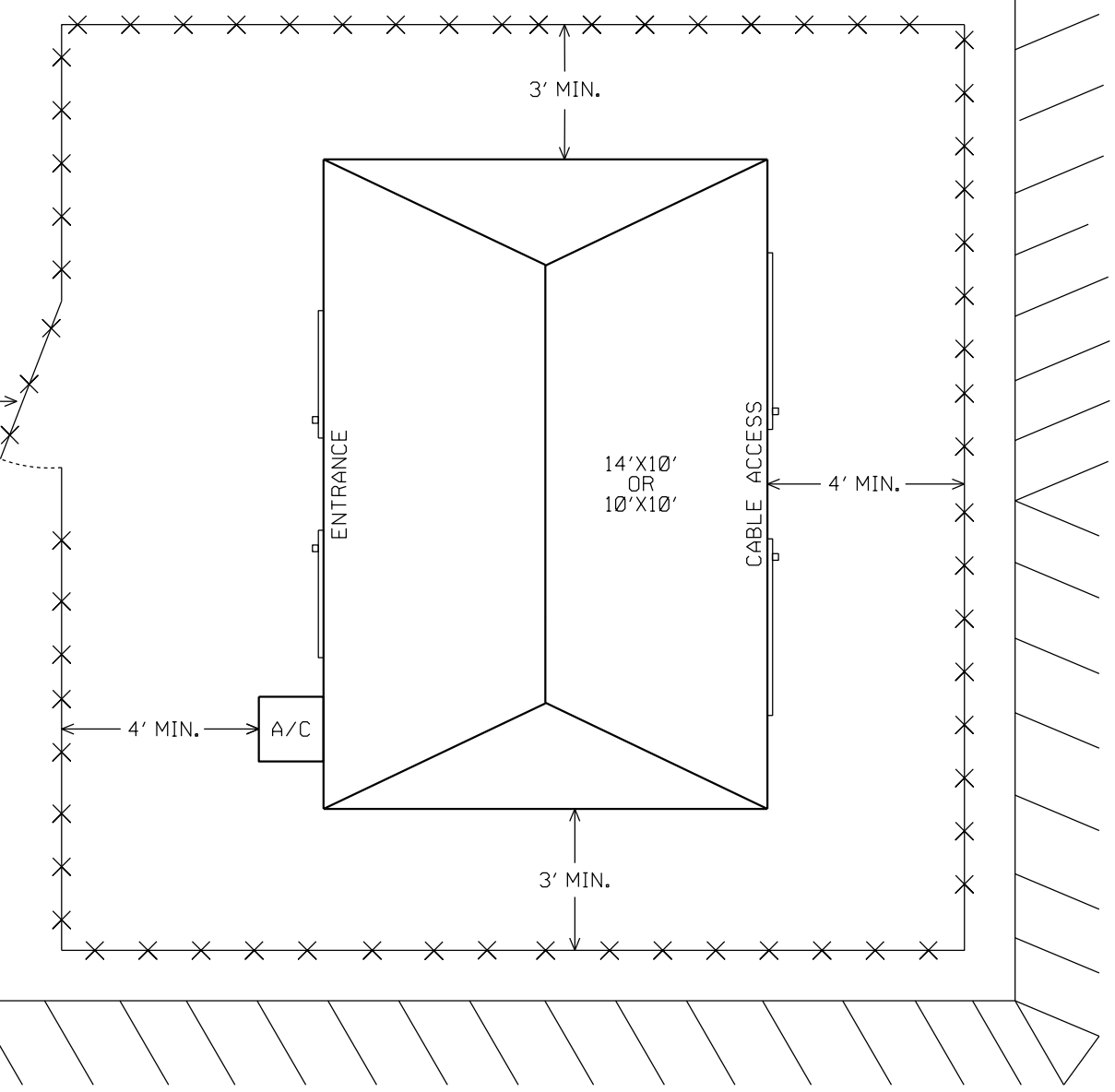
DRAWING NO.	ESD-8215-02
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	



SECURITY FENCE DETAIL



4' WIDE GATE SHALL BE INSTALLED ON SIDE OF HOUSE ENTRANCE




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- NOTES:
- WHERE NOT INDICATED ON PLAN, PLACE EQUIPMENT ACCORDING TO THIS DRAWING UNLESS OTHERWISE AUTHORIZED BY NCTD.
 - WALKWAY BALLAST SHALL BE PLACED AROUND INSTRUMENT SHELTER AND UP TO TOE OF TRACK SECTION.
 - STORM DRAINS AND DRAINAGE DITCH SHALL BE DIVERTED AROUND BERM OR APPROPRIATE DRAINAGE PIPE INSTALLED.
 - END OF DOUBLE TRACK AND SINGLE CROSSOVER HOUSES ARE TYPICALLY 10'X10'. UNIVERSAL CROSSOVER HOUSES ARE TYPICALLY 14'X10'.
 - ORIENTATION OF INSTRUMENT HOUSE CAN BE ADJUSTED BASED ON SITE CONDITIONS AS REQUIRED, SUBJECT TO APPROVAL BY NCTD.

REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN	PRE, INC.
CHECKED	EJR
RECOMMENDED	BS
DATE	MARCH 18, 2017

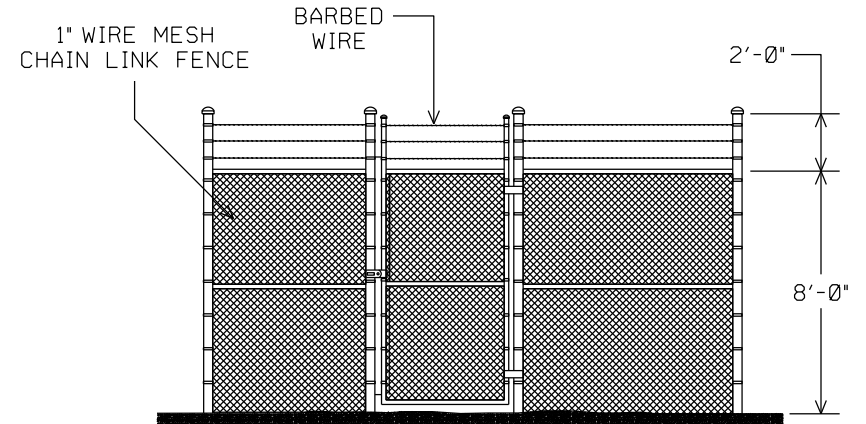
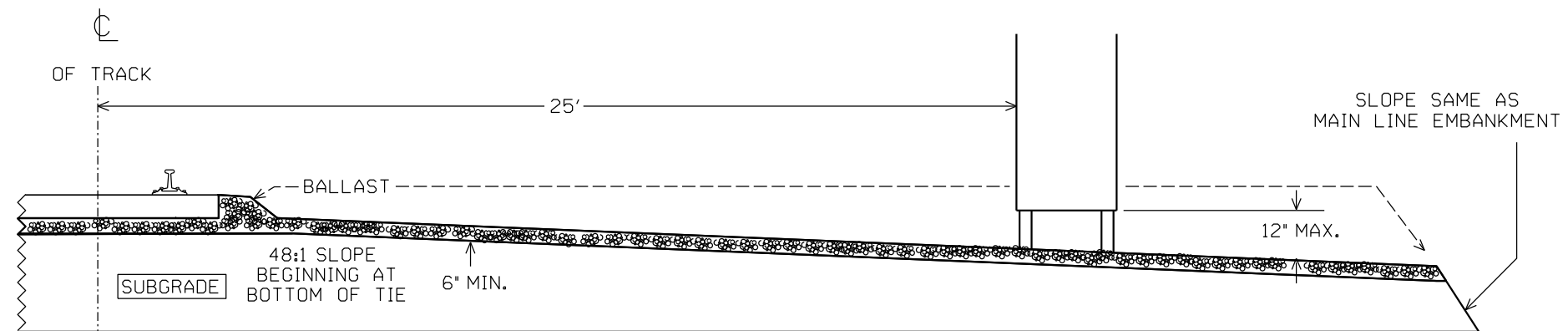


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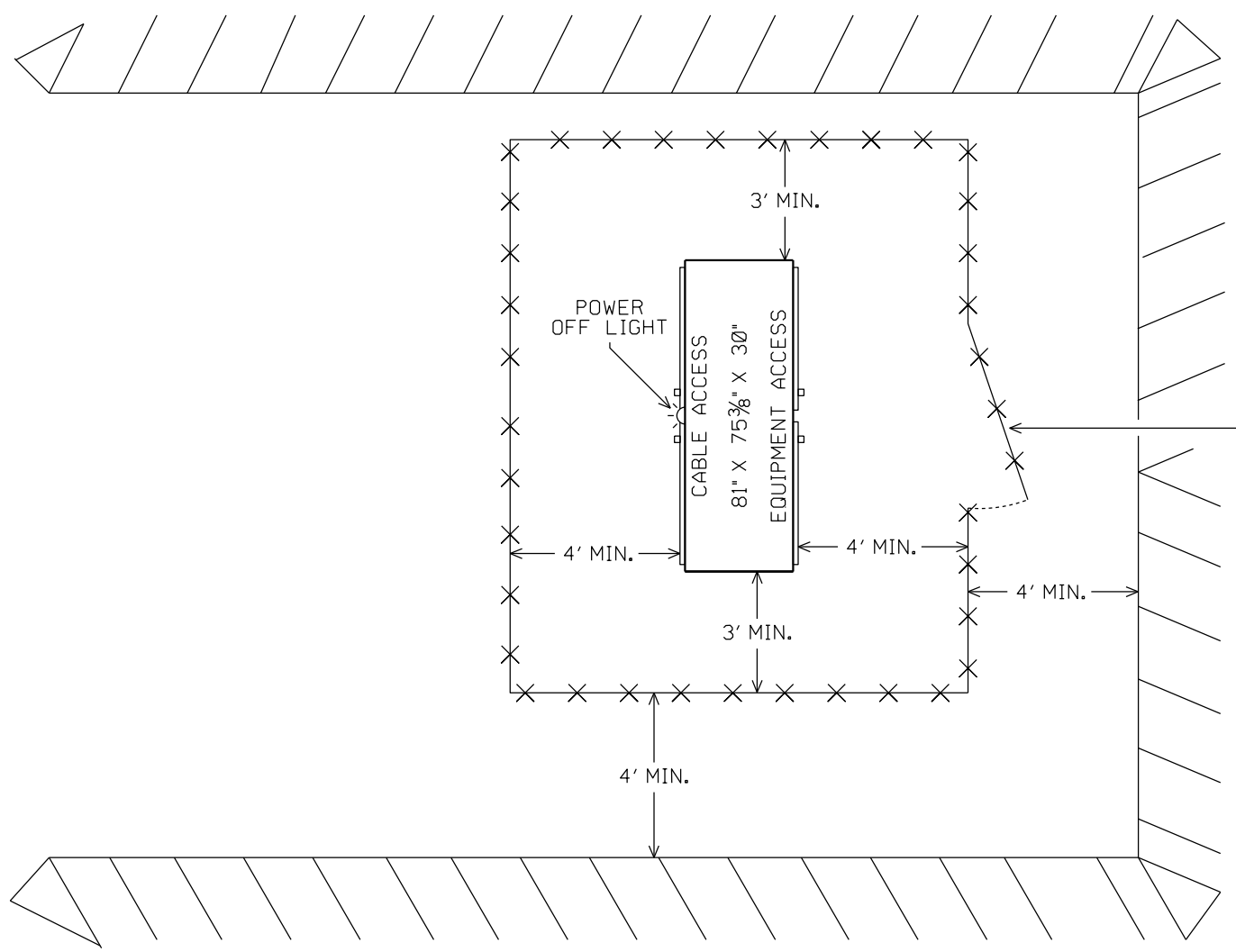
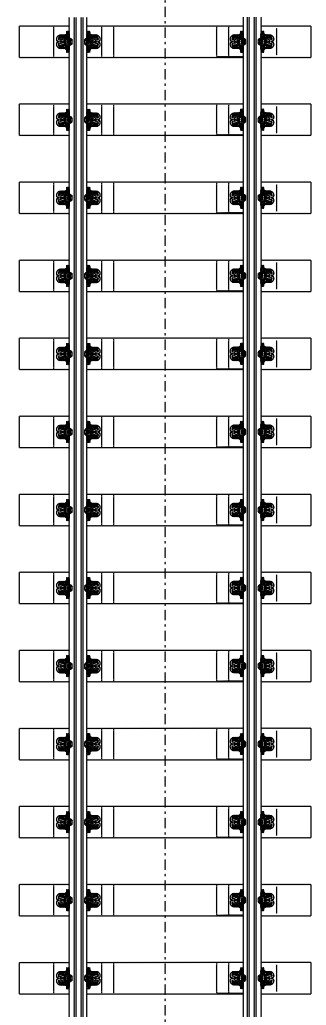


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ENGINEERING STANDARD DRAWINGS TYPICAL CONTROL POINT LOCATION AND BERM WITH SECURITY FENCE	DRAWING NO.	ESD-8215-03
	DRAWING SHEET NO.	1 OF 1
	SCALE:	NONE
	CONTRACT SHEET NO.	



SECURITY FENCE DETAIL
SEE ESD-5106 FOR FENCE REQUIREMENTS



4' WIDE GATE SHALL BE INSTALLED ON SIDE OF CASE EQUIPMENT ACCESS

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- NOTES:
- WHERE NOT INDICATED ON PLAN, PLACE EQUIPMENT ACCORDING TO THIS DRAWING UNLESS OTHERWISE AUTHORIZED BY NCTD.
 - WALKWAY BALLAST SHALL BE PLACED AROUND INSTRUMENT CASE AND UP TO TOE OF TRACK SECTION.
 - STORM DRAINS AND DRAINAGE DITCH SHALL BE DIVERTED AROUND BERM OR APPROPRIATE DRAINAGE PIPE INSTALLED.
 - POWER OFF LIGHT SHALL BE INSTALLED ON SWITCH LOCK CASES. LAMP SHALL BE VELCORP GEMS P/N LC2-001WB-W AND PLACED ON TRACK SIDE, VISIBLE TO APPROACHING TRAINS.
 - SWITCH LOCK/LEAVING SIGNAL CASES ARE TYPICALLY SIZED AS SHOWN.
 - ORIENTATION OF INSTRUMENT CASE CAN BE ADJUSTED BASED ON SITE CONDITIONS AS REQUIRED, SUBJECT TO APPROVAL BY NCTD.

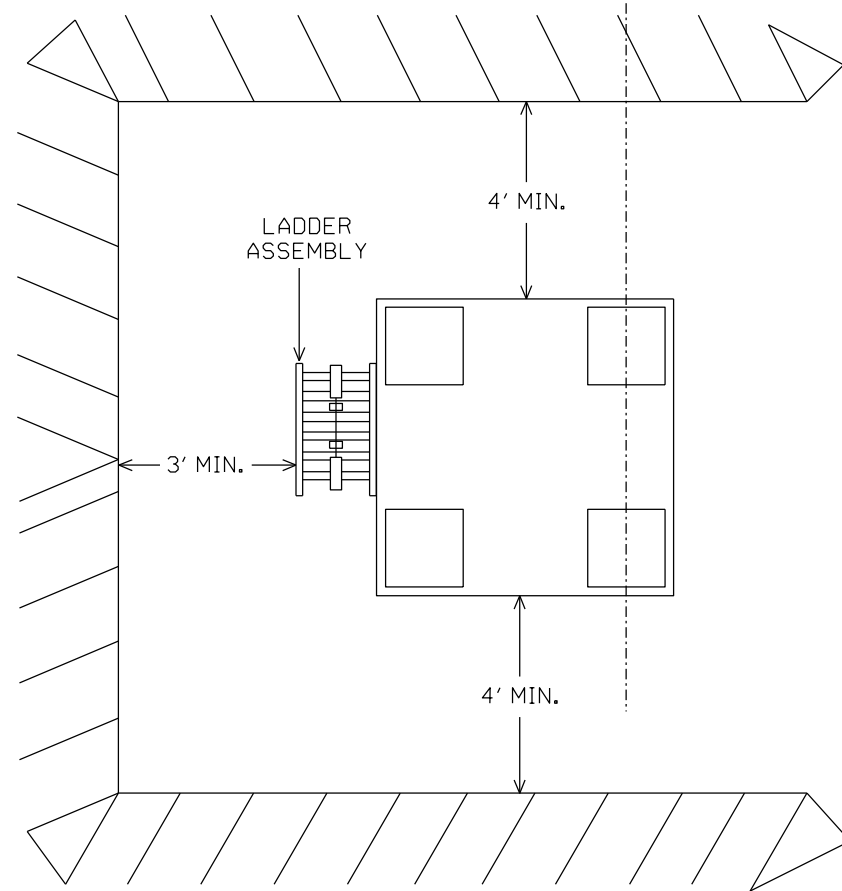
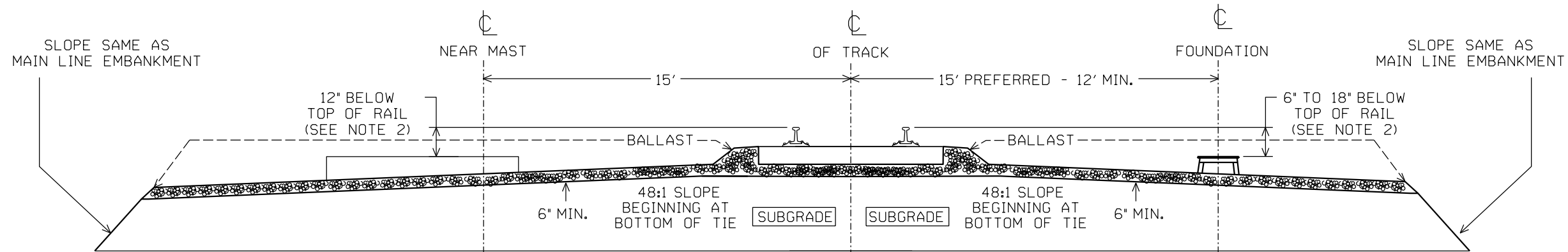
REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN	PRE, INC.
CHECKED	EJR
RECOMMENDED	WP
DATE	FEBRUARY 2015
DESIGNER PE STAMP	

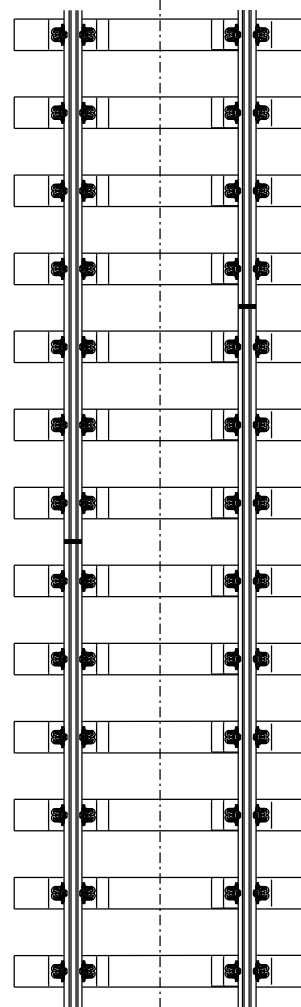
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ENGINEERING STANDARD DRAWINGS TYPICAL SWITCH LOCK/LEAVING SIGNAL LOCATION AND BERM WITH SECURITY FENCE	DRAWING NO.	ESD-8215-04
	DRAWING SHEET NO.	1 OF 1
	SCALE:	NONE
	CONTRACT SHEET NO.	



CANTILEVER
SIGNAL



GROUND
SIGNAL

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NOTES:

- WHERE NOT INDICATED ON PLAN, PLACE EQUIPMENT ACCORDING TO THIS DRAWING UNLESS OTHERWISE AUTHORIZED BY NCTD.
- TOP OF SIGNAL FOUNDATION SHALL BE LOCATED NO MORE THAN 12" ABOVE FINAL GRADE.
- WALKWAY BALLAST SHALL BE PLACED AROUND INSTRUMENT SHELTER AND UP TO TOE OF TRACK SECTION.
- STORM DRAINS AND DRAINAGE DITCH SHALL BE DIVERTED AROUND BERM OR APPROPRIATE DRAINAGE PIPE INSTALLED.

REV.	DATE	DESCRIPTION	DES.	ENG.

REVISIONS	DRAWN	PRE, INC.
	CHECKED	<i>EJR</i>
	RECOMMENDED	<i>WP</i>
	DATE	FEBRUARY 2015
	DES.	
	ENG.	
	DATE	
	DESIGNER PE STAMP	



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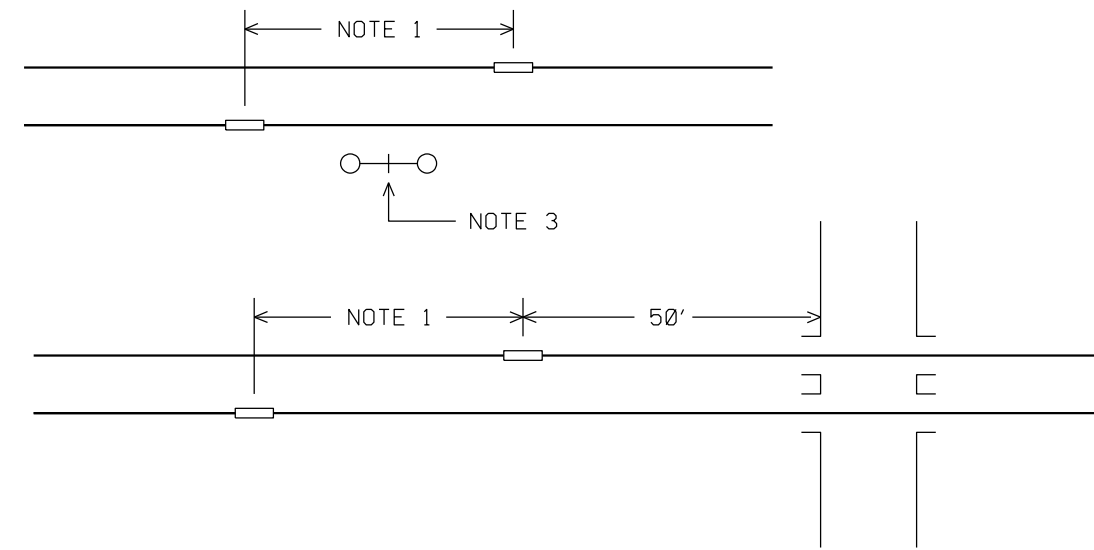
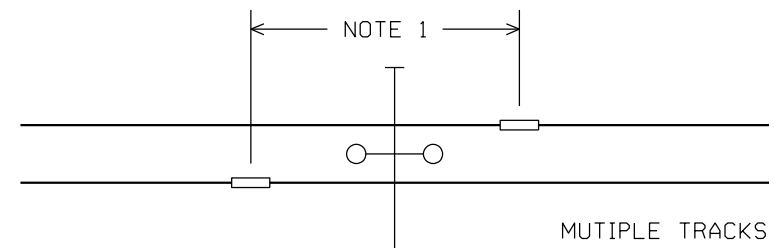
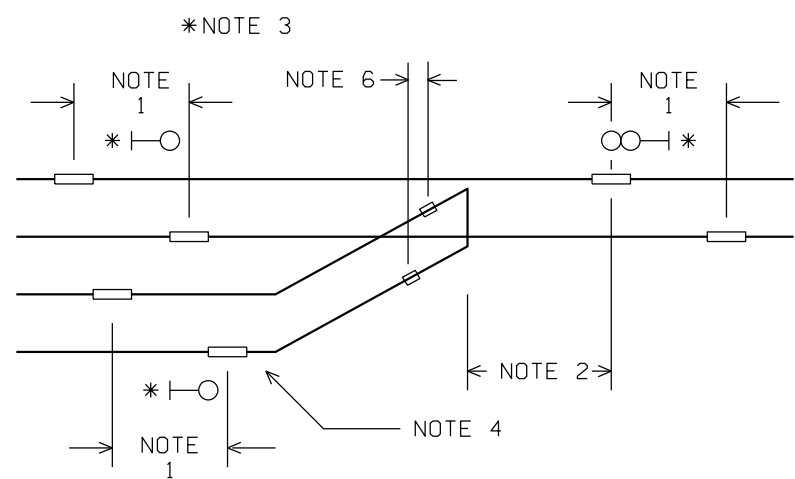
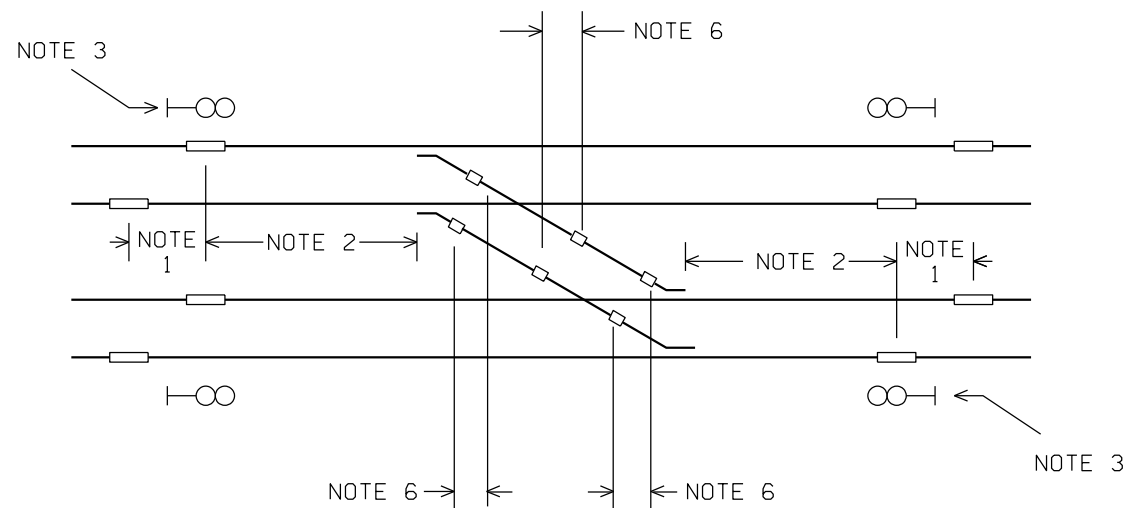


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ENGINEERING STANDARD DRAWINGS

TYPICAL WAYSIDE SIGNAL LOCATION AND BERM

DRAWING NO.	ESD-8215-05
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	



NOTES:

1. MAIN TRACK JOINT STAGGER MAY VARY FROM 3 TIE CRIBS TO 8'-0".
2. PREFERRED DISTANCE FROM POINT OF SWITCH TO FIRST INSULATED JOINT SHALL BE APPROXIMATELY 50' UNLESS OTHERWISE APPROVED BY NCTD.
3. SIGNAL SHALL BE CENTERED BETWEEN INSULATED JOINTS.
4. INSULATED JOINT SHALL BE PLACED APPROXIMATELY 50' BEYOND CLEARANCE POINT - 13' - 6" TRACK CENTERS.
5. UNLESS OTHERWISE APPROVED BY NCTD, SIGNALS ON CANTILEVERS AND BRIDGES SHALL BE LOCATED DIRECTLY ABOVE CENTERLINE OF TRACK. CANTILEVER AND BRIDGE MAST SHALL BE CENTERED BETWEEN INSULATED JOINTS.
6. TURNOUT JOINT STAGGER MAY VARY FROM 1'-0" TO 4'-6". JOINTS SHALL BE LOCATED IN THE CENTER OF CROSSOVER 40'-0" MINIMUM FROM EFFECTIVE INSULATED TURNOUT JOINT NEAR HEADBLOCKS.

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REV.	DATE	DESCRIPTION	DES.	ENG.

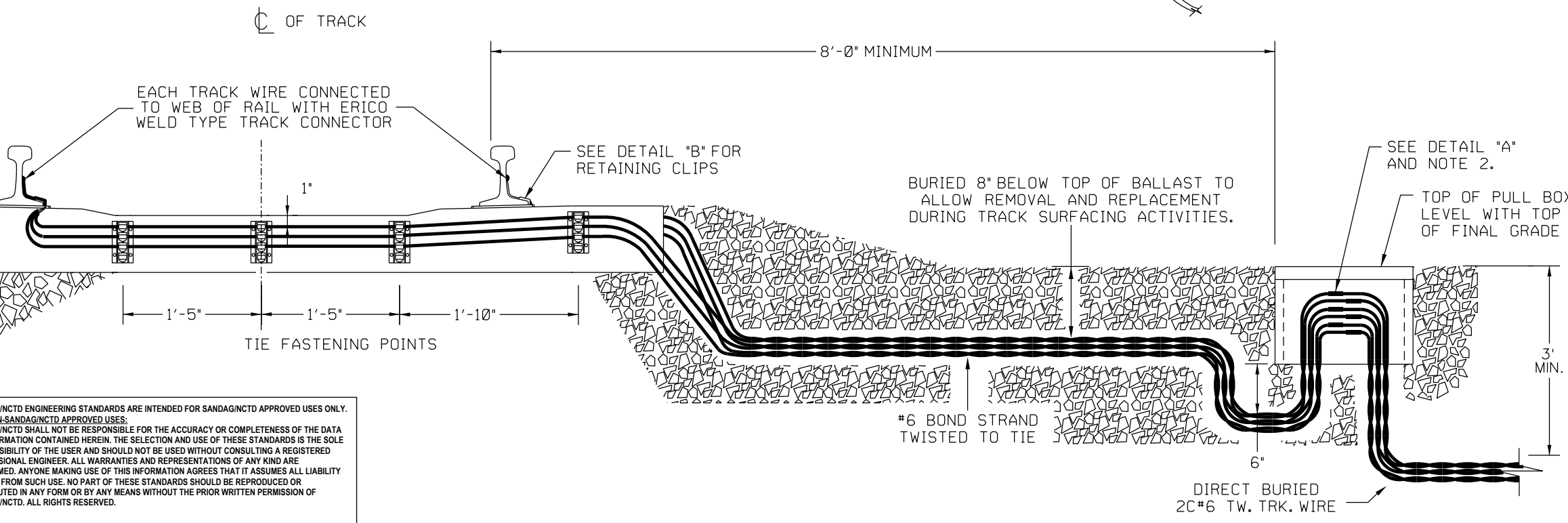
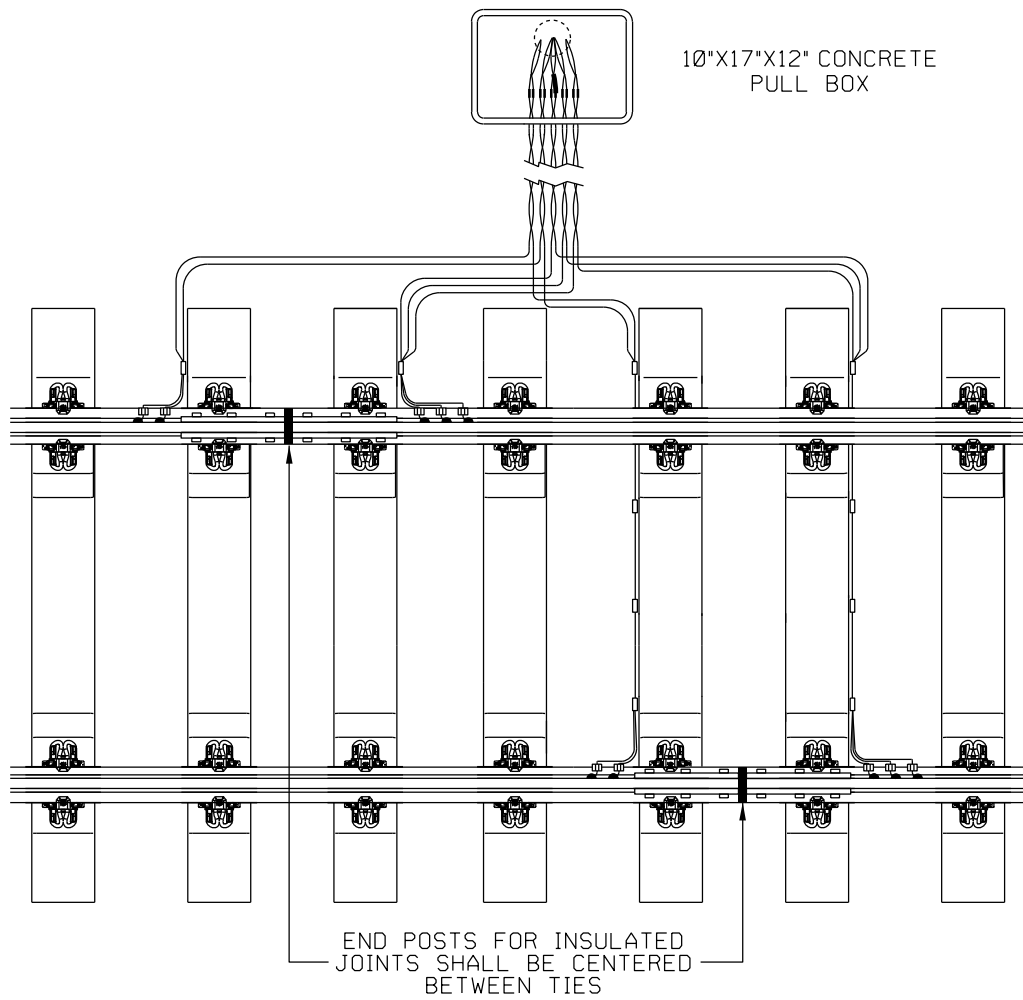
DRAWN	PRE, INC.
CHECKED	E. ROE <i>EJR</i>
RECOMMENDED	W. PREY <i>WP</i>
DATE	FEBRUARY 2015
DESIGNER PE STAMP	



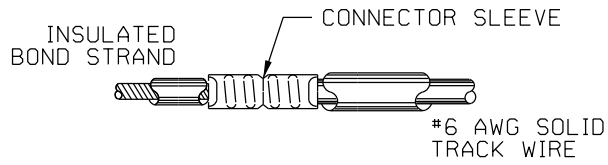
ENGINEERING STANDARD DRAWINGS

STANDARD PLACEMENT OF INSULATED JOINTS

DRAWING NO.	ESD-8220
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	

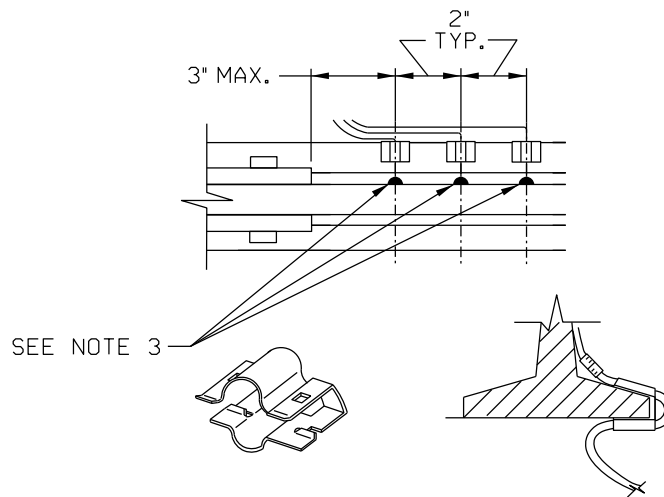


DETAIL A - PULL BOX SPLICE



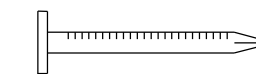
1. USE NICOPRESS TOOL TO COMPRESS CONNECTOR SLEEVE.
2. USE 3M-SCOTCH-23 RUBBER TAPE TO INSULATE COMPRESSED SLEEVE.
3. USE A HEAVY WALL HEAT SHRINK SLEEVE TO SEAL EACH INDIVIDUAL SPLICE.

DETAIL B - RETAINING CLIPS

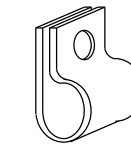


USE TO SECURE BOND STRAND TO TIE

WOOD TIE APPLICATION

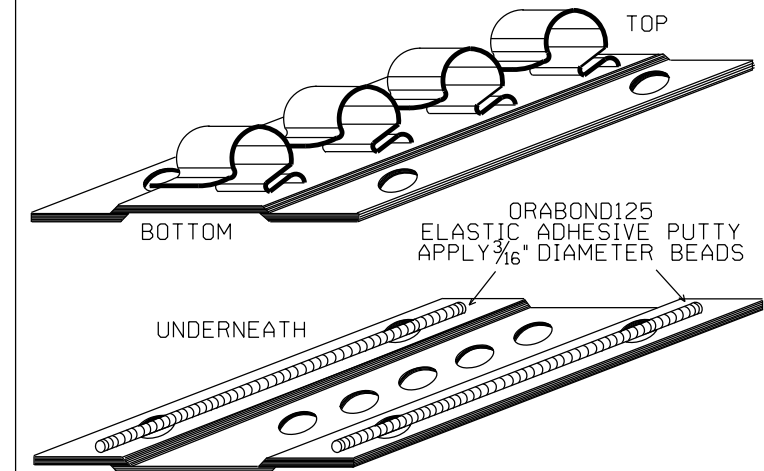


1-INCH GALVANIZED ROOFING NAIL



WIRE CLAMP

GLUED TO CONCRETE TIE APPLICATION
ERICO PN GC-HSC89



NOTES:

1. PLACE A LAYER OF GRAVEL SUITABLE FOR DRAINAGE AT A MINIMUM OF 6" BELOW AND EXTENDING 12" FROM EACH SIDE OF THE PULL BOX. GRAVEL SHALL BE COMPACTED PRIOR TO PLACEMENT OF PULL BOX.
2. THERE SHALL BE A MAXIMUM OF ONE SPLICE PER TRACK WIRE. SPLICE SOLID TRACK WIRE TO BOND STRAND USING A COMPRESSION SLEEVE. MATERIALS USED TO SEAL SPLICE SHALL PROVIDE, AT A MINIMUM, THE SAME INSULATING QUALITIES AS THE WIRES BEING SPLICED.
3. CONTRACTOR SHALL BOND TRACK WIRES FOR ELECTROCODE AND DC TRACK CIRCUITS PRIOR TO BONDING ANY OTHER TRACK WIRES. THIS IS TO ENSURE THAT WAYSIDE SIGNAL CIRCUITS ARE AS CLOSE TO THE INSULATED JOINTS AS POSSIBLE.
4. A SLACK COIL SHALL BE PROVIDED IN EACH SOLID CONDUCTOR OF SUFFICIENT LENGTH TO ALLOW THE SPLICE TO BE PULLED ABOVE THE TOP OF PULL BOX.
5. WIRES SHALL FOLLOW THE CONTOUR OF TIE AND RAIL WITH NO EXCESS SLACK.
6. WHERE THE PULL BOX IS IN THE TRAVELED RIGHT OF WAY IT MUST BE DESIGNED AND INSTALLED FOR H-20-44 BRIDGE LOADING AND EQUIPPED WITH A COVER DESIGNED FOR VEHICULAR TRAFFIC.
7. WELD TYPE TRACK CONNECTIONS ARE TO BE INSTALLED PER MANUFACTURER'S RECOMENDATION.
8. WHERE POSSIBLE, ALL TRACK WIRES SHALL BE INSTALLED IN SUCH A MANNER THEY CAN BE VISUALLY INSPECTED FROM THE FIELD SIDE OF THE TRACK.
9. FOR ATTACHING GLUED TIE CLIPS TO CONCRETE TIES, REFER TO MANUFACTURER'S INSTALLATION INSTRUCTION SHEET.

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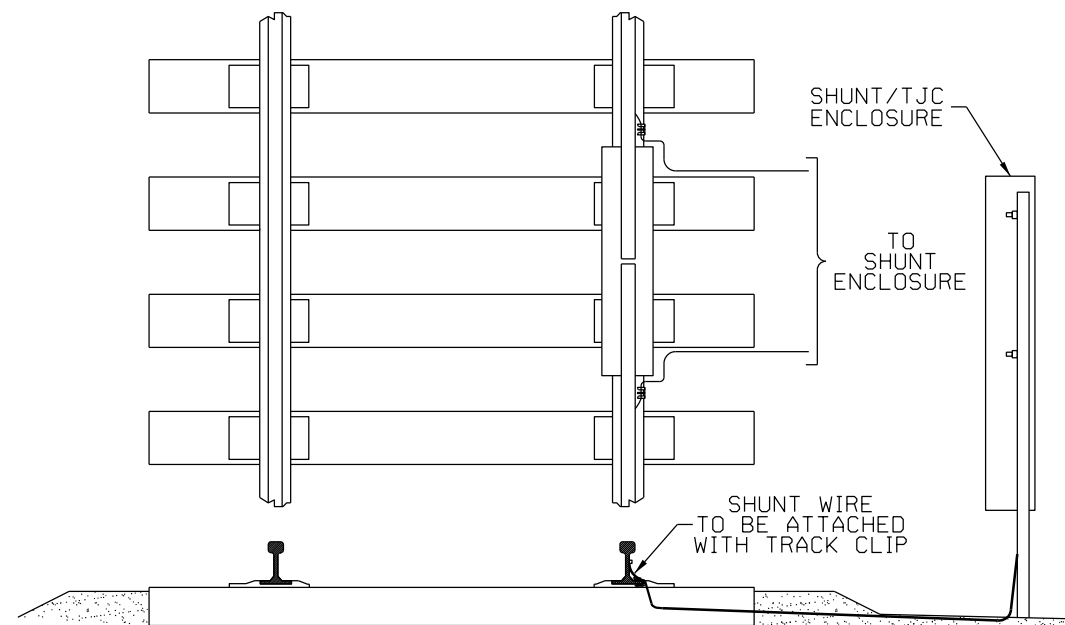
REV.	DATE	DESCRIPTION	DES.	ENG.

REVISIONS	DRAWN	PRE, INC.
	CHECKED	EJR
	RECOMMENDED	WP
	DATE	FEBRUARY 2015
	DESIGNER PE STAMP	

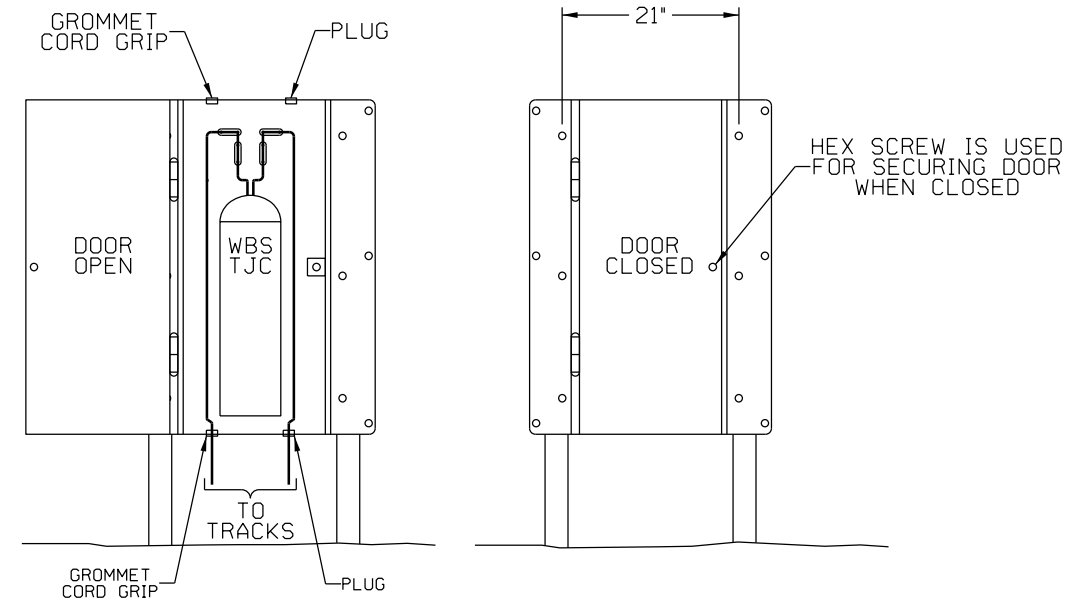
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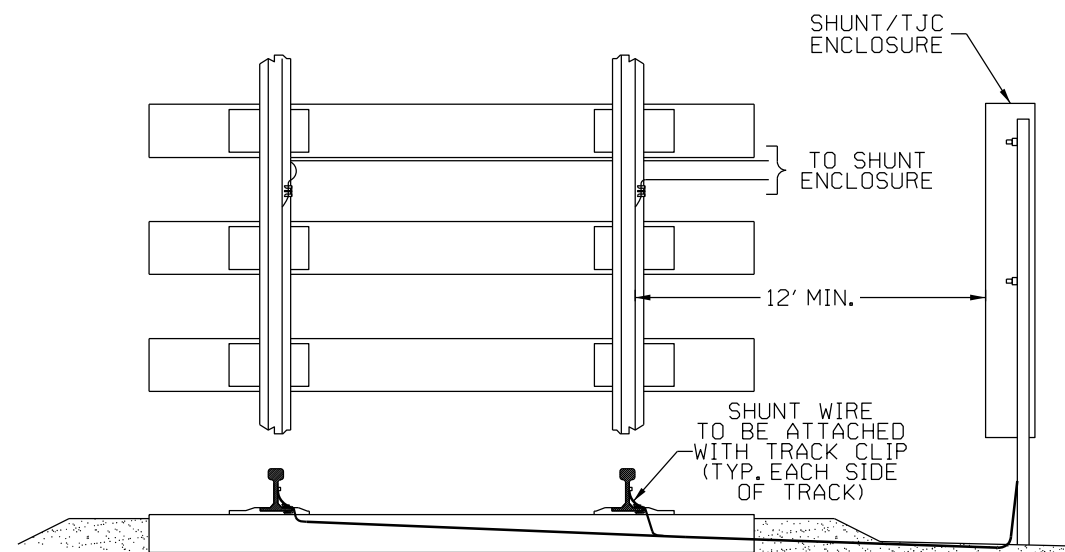
ENGINEERING STANDARD DRAWINGS TRACK WIRE INSTALLATION	DRAWING NO.	ESD-8230
	DRAWING SHEET NO.	1 OF 1
	SCALE:	NONE
	CONTRACT SHEET NO.	



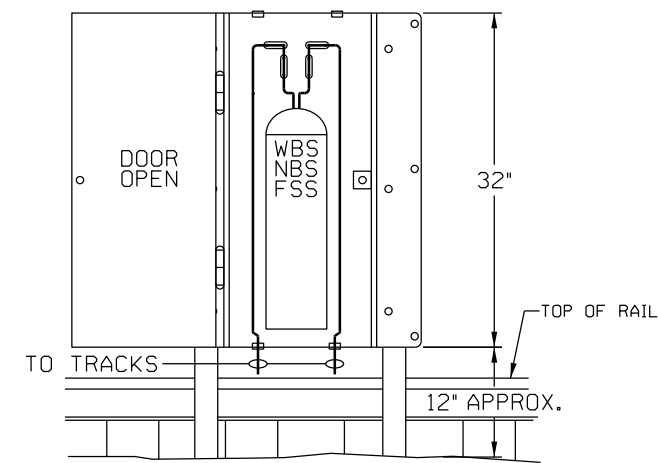
TUNED JOINT COUPLER



SHUNT/TJC ENCLOSURE



TERMINATION SHUNT



SHUNT/TJC ENCLOSURE

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NOTES:

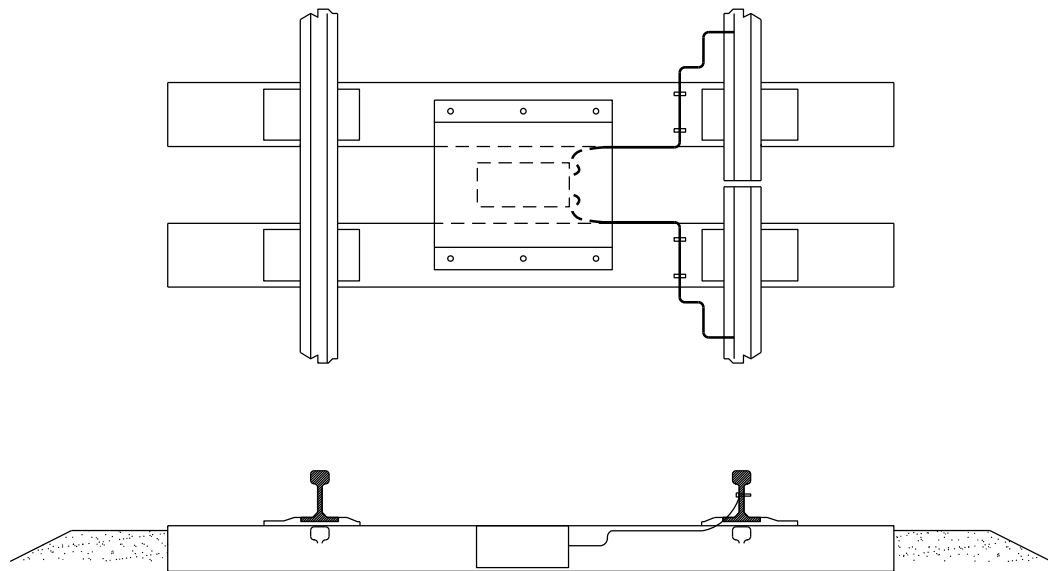
1. TRACKSIDE INSTALLATION OF TERMINATION SHUNTS AS SHOWN IN THIS STANDARD IS THE PREFERRED METHOD, INSTALLATION OF TERMINATION SHUNTS BETWEEN THE RAILS IS ALLOWED ONLY BY APPROVAL OF NCTD.
2. MULTIPLE SHUNT/TJC'S WILL UTILIZE ONE TRACK WIRE. MULTIPLE CONNECTOR ERICO #SBPG11L OR APPROVED EQUAL.
3. TRACK WIRE TO BE BURIED 8" BELOW TOP OF BALLAST TO ALLOW REMOVAL AND REPLACEMENT DURING TRACK SURFACING ACTIVITIES.
4. SHUNT ENCLOSURE PART NUMBER 500400-100-04-GRAY AS MANUFACTURED BY G&B SPECIALTIES, OR APPROVED EQUAL.
5. EXCESS LEAD LENGTH MUST BE REMOVED. DOUBLE TRACK WIRE IF ENCLOSURE IS MORE THAN 12' FROM NEAR RAIL.
6. OUTSIDE OF SHUNT ENCLOSURE SHOULD BE PAINTED GRAY.

REVISIONS				DRAWN	PRE, INC.	DESIGNER PE STAMP
				CHECKED	<i>EJR</i>	
				RECOMMENDED	<i>BS</i>	
1	10/16/17	REVISED PART NUMBER FOR SHUNT ENCLOSURE	RMM PRE	DATE	OCTOBER 16, 2017	
REV.	DATE	DESCRIPTION	DES.	ENG.		

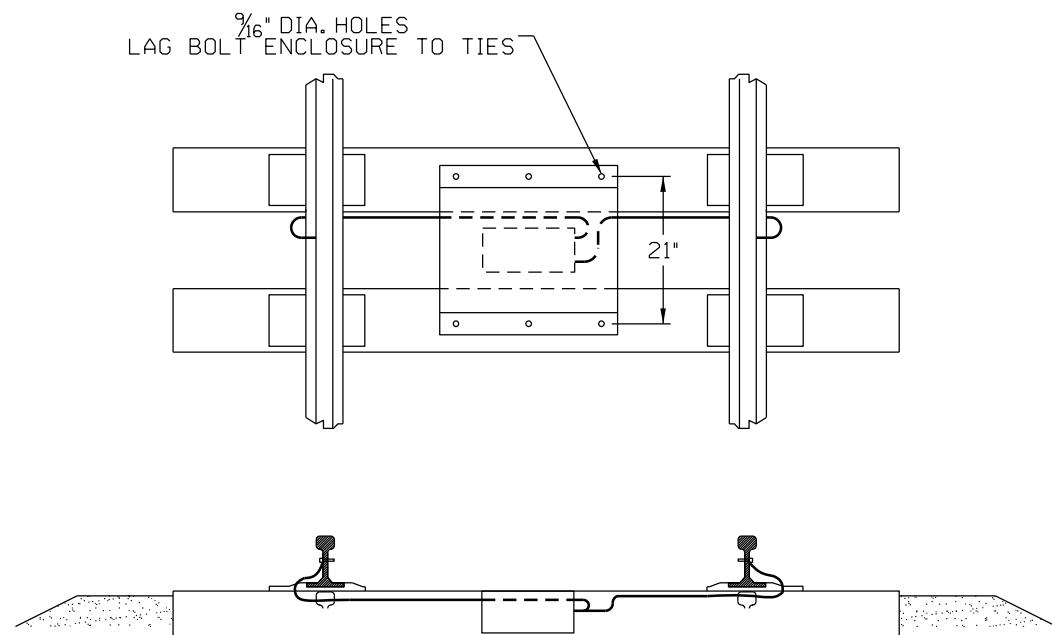
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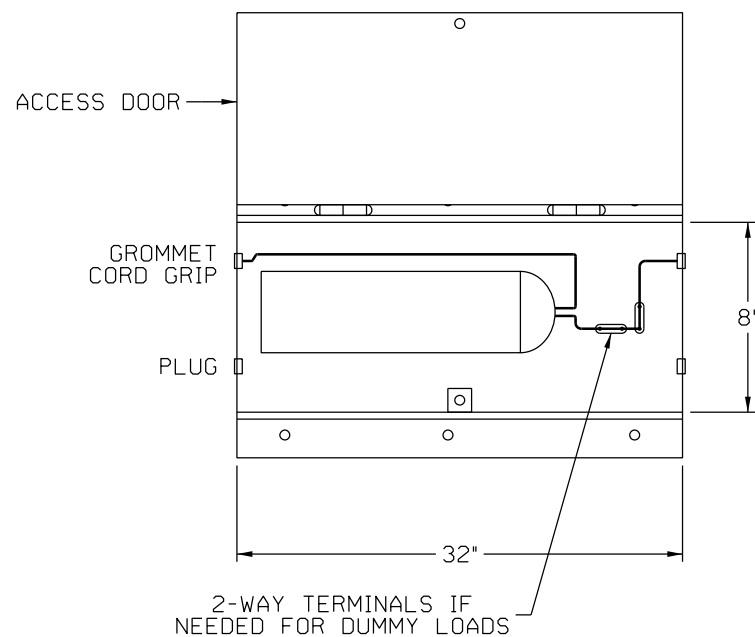
ENGINEERING STANDARD DRAWINGS		DRAWING NO.	ESD-8235-01
TERMINATION SHUNT INSTALLATION		DRAWING SHEET NO.	1 OF 2
		SCALE:	NONE
		CONTRACT SHEET NO.	



TUNED JOINT COUPLER



TERMINATION SHUNT



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NOTES:

1. WIRES FROM SHUNT OR TJC ATTACHED TO TIE LIKE STANDARD TRACK CONNECTION.
2. THIS METHOD OF SHUNT/COUPLER INSTALLATION SHALL ONLY BE USED WHEN TRACK SIDE INSTALLATION IS NOT POSSIBLE. THIS INSTALLATION REQUIRES APPROVAL OF NCTD.

REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN	PRE, INC.
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RECOMMENDED	W. PREY <i>WP</i>
DATE	FEBRUARY 2015
DESIGNER PE STAMP	

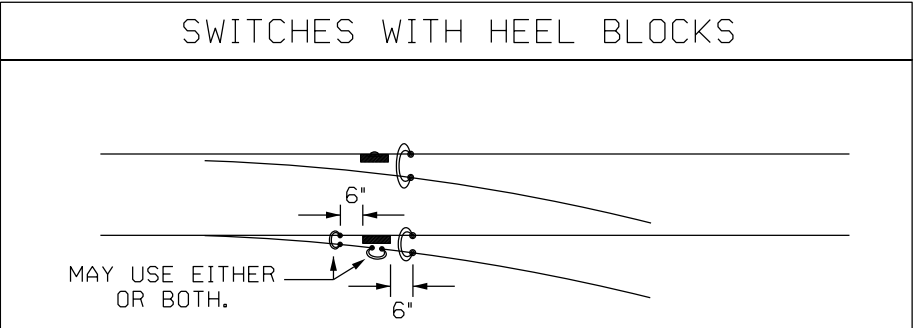
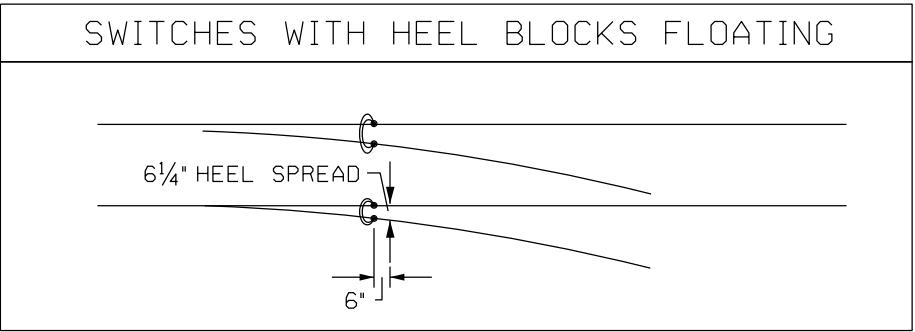
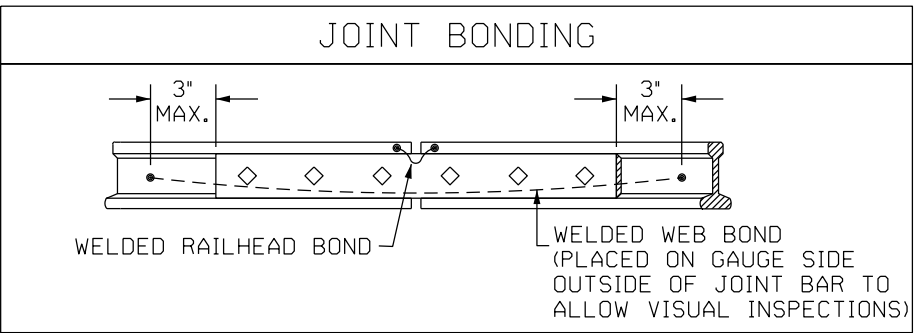
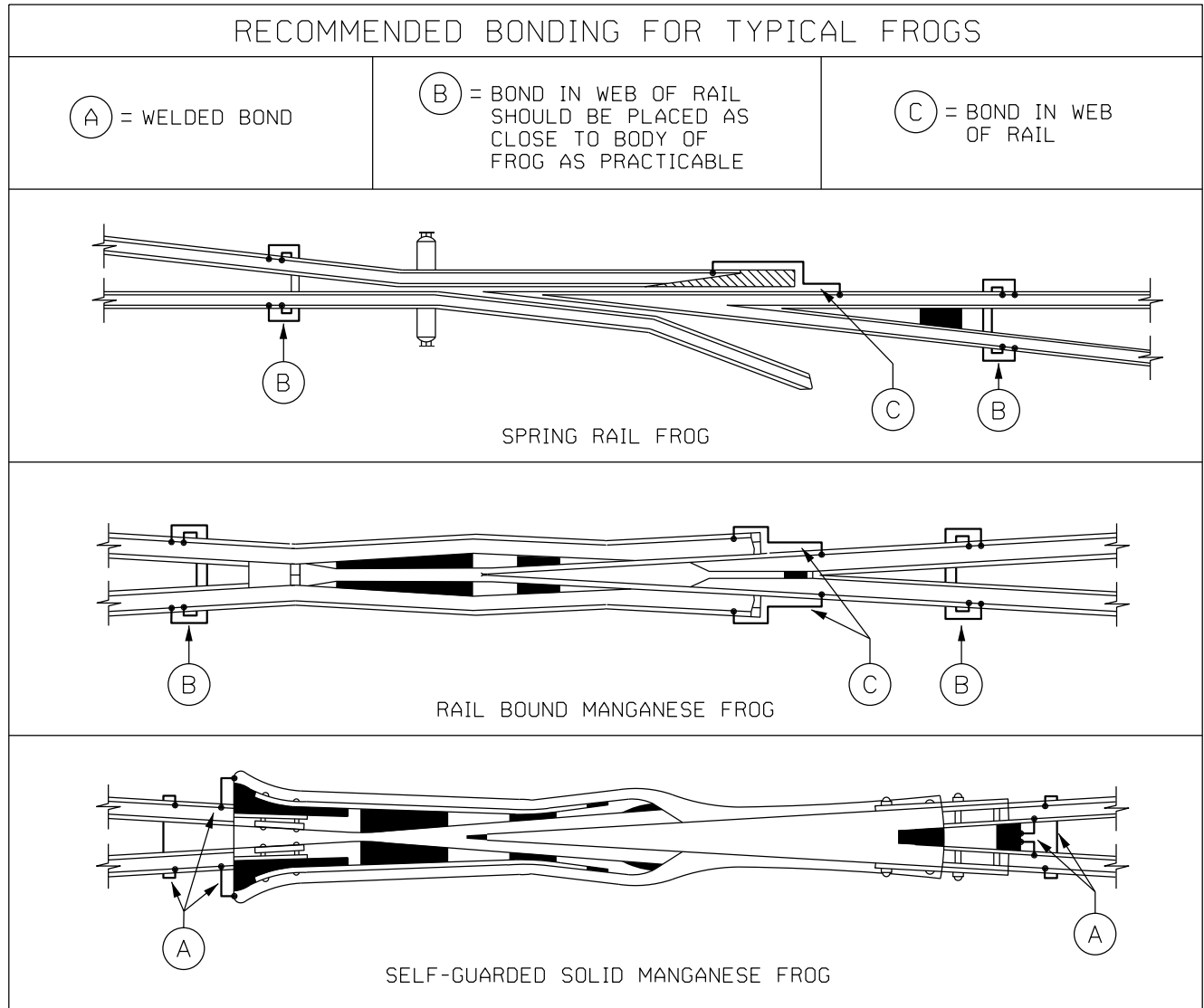
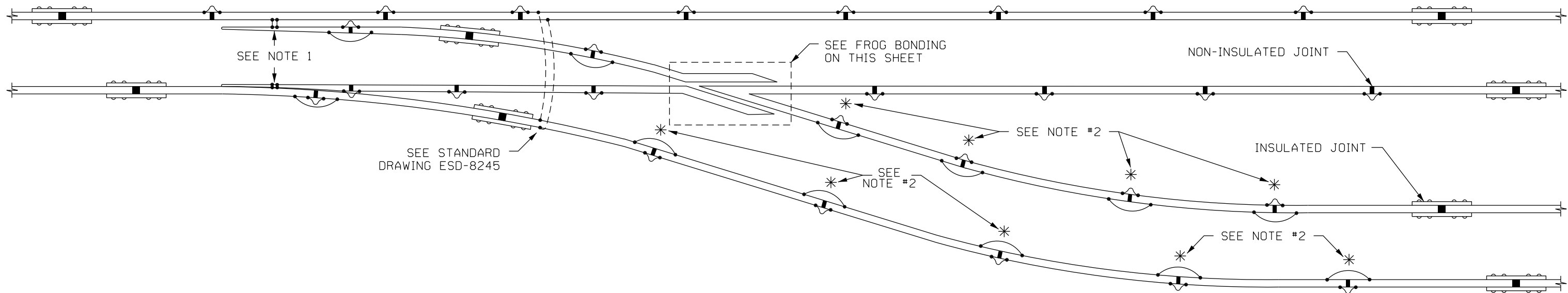
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ENGINEERING STANDARD DRAWINGS TERMINATION SHUNT INSTALLTION	DRAWING NO.	ESD-8235-02
	DRAWING SHEET NO.	2 OF 2
	SCALE:	NONE
	CONTRACT SHEET NO.	



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- NOTES:
- ALL FROG BONDS AND BONDS LOCATED AT THE SWITCH POINTS SHALL BE APPLIED TO THE WEB OF RAIL. THESE BONDS SHALL BE 12" LONG AND SHALL BE OF THE WELDED TYPE.
 - TURNOUTS ARE TO BE DOUBLE BONDED USING ONE WEB TYPE BOND AND ONE RAILHEAD BOND, WITH EXCEPTION TO JOINTS MARKED WITH A * THESE JOINTS ONLY REQUIRE RAILHEAD BOND ONLY WHEN TURNOUT TERMINATES IN A TRACK RELAY.
 - ALL RAILHEAD BONDS AND WEB BONDS SHALL BE OF THE WELDED TYPE.
 - ALL WELDED BONDS ARE TO BE INSTALLED PER MANUFACTURER'S RECOMENDATIONS.

REV.	DATE	DESCRIPTION	DES. ENG.

DRAWN	PRE, INC.		
CHECKED	E. ROE	<i>EJR</i>	
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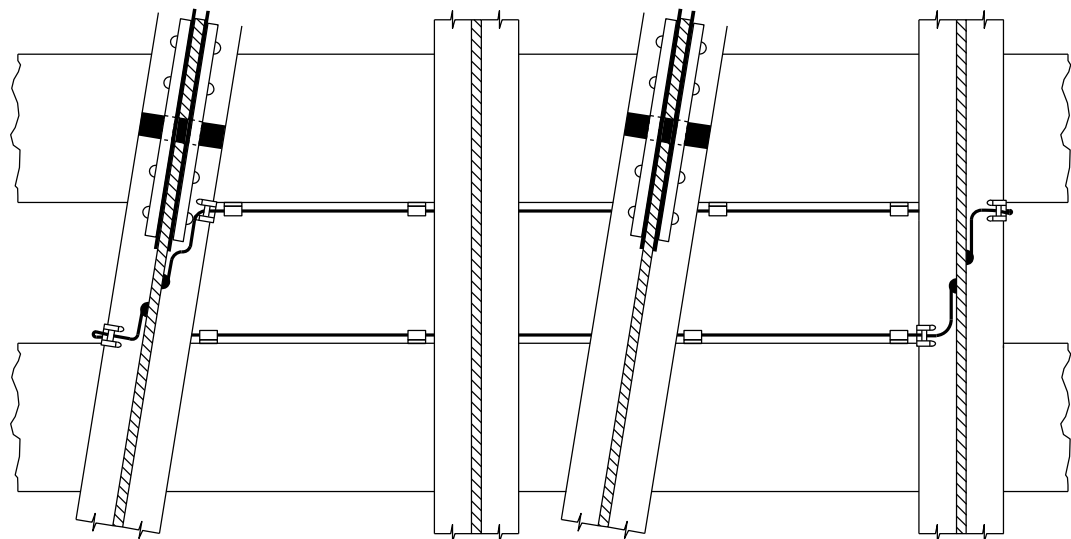
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ENGINEERING STANDARD DRAWINGS

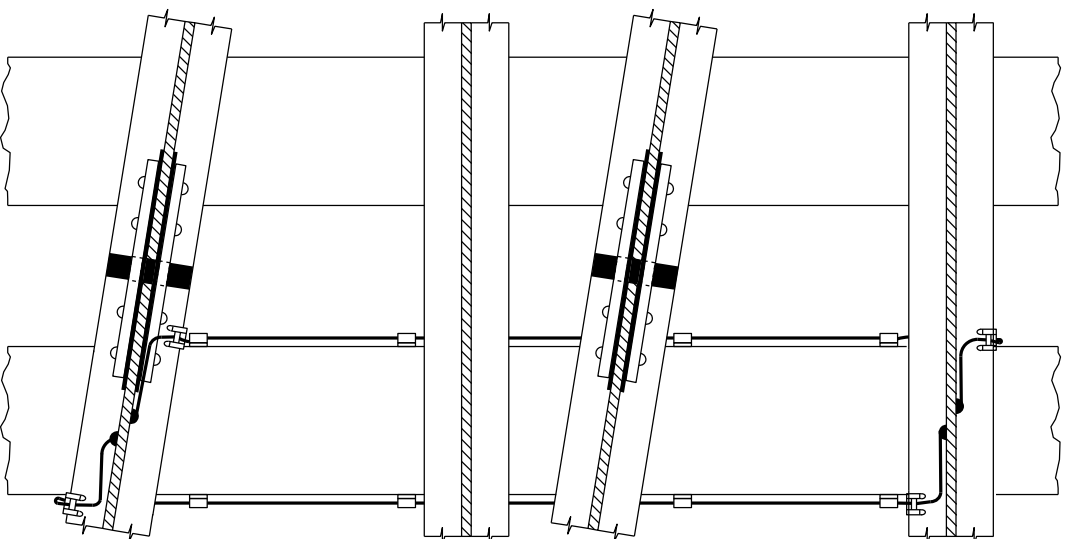
RAIL AND FROG BONDING DETAILS

DRAWING NO.	ESD-8240
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	

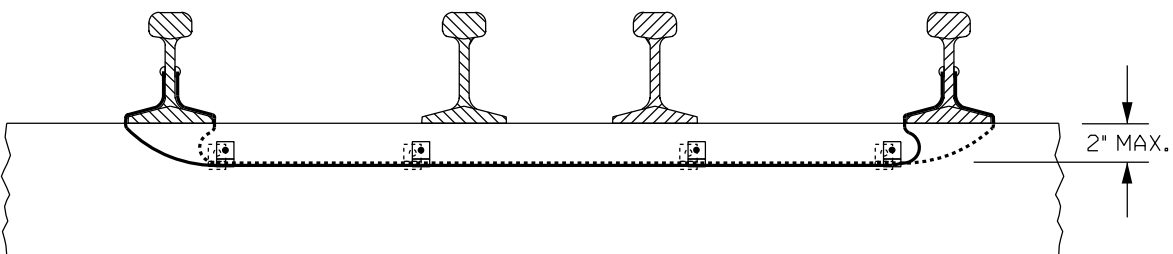
FOULING BRIDLE CONFIGURATION



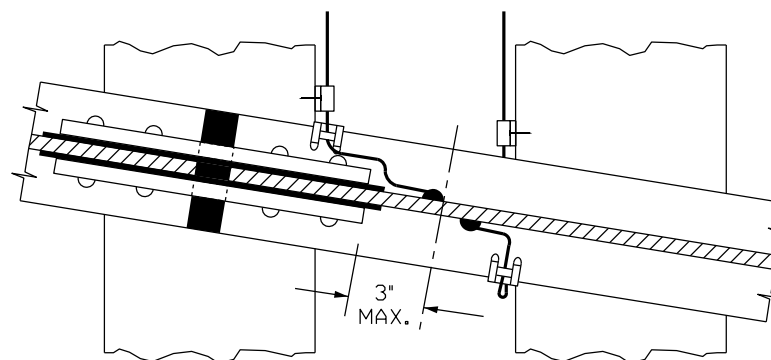
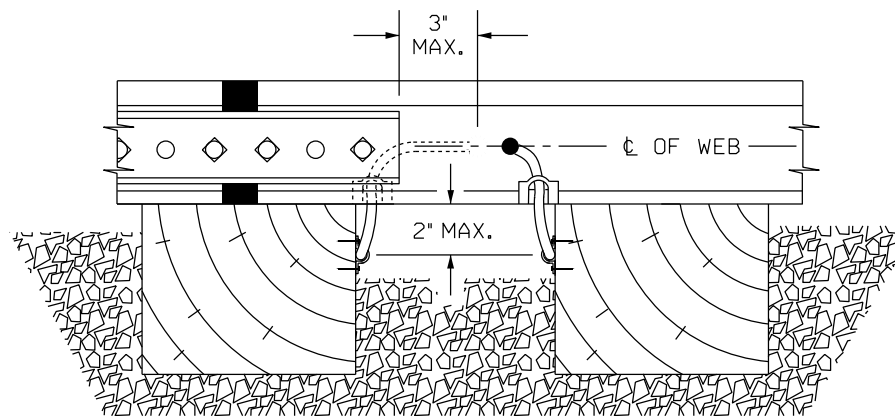
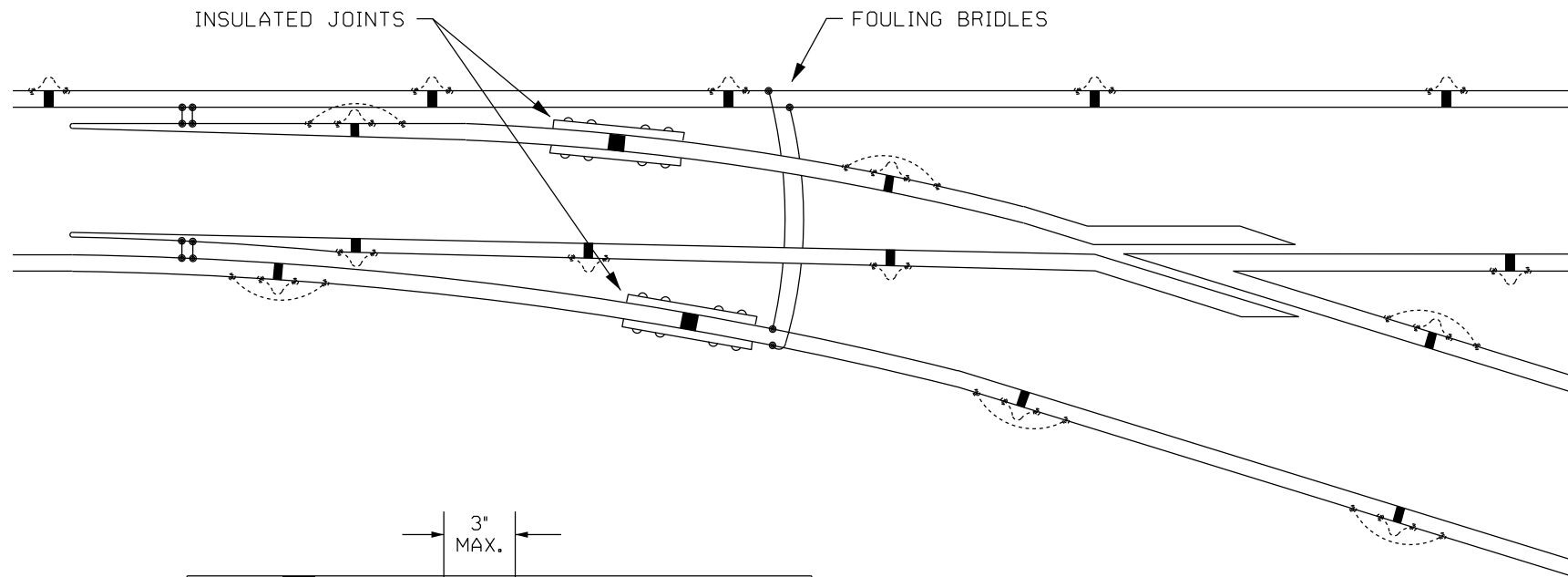
METHOD A: (TOP VIEW)
FOULING BRIDLES LOCATED IN SAME CRIB



METHOD B: (TOP VIEW)
FOULING BRIDLES LOCATED ON SAME TIE



FRONT VIEW



DETAIL VIEW

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NOTES:

1. LOCATE FOULING BRIDLES AS NEAR TO TURNOUT INSULATED JOINT AS POSSIBLE.
2. FOULING BRIDLES SHALL BE INSTALLED USING METHOD "A" OR METHOD "B", AS SHOWN IN THIS STANDARD DRAWING. USE TWO STRANDED INSULATED TRACK WIRES INSTALLED WITH A WELDED WEB BOND.
3. FOULING BRIDLES SHALL BE MAINTAINED FREE OF SPLICES AND SHALL BE EXPOSED FOR VISUAL INSPECTION.
4. AVOID PLACING FOULING BRIDLES WHERE THEY MAY COME IN CONTACT WITH RAIL ANCHORS.
5. USE INSULATED WIRE CLAMPS FOR FASTENING FOULING BRIDLES TO WOOD TIES. AVOID DRIVING NAILS WHERE CONTACT MAY BE MADE WITH TRACK SPIKES OR ANCHORS.
6. ALL WELDED TRACK CONNECTIONS ARE TO BE INSTALLED PER MANUFACTURER'S RECOMENDATION.

REV.	DATE	DESCRIPTION	DES.	ENG.

REVISIONS	DRAWN	PRE, INC.
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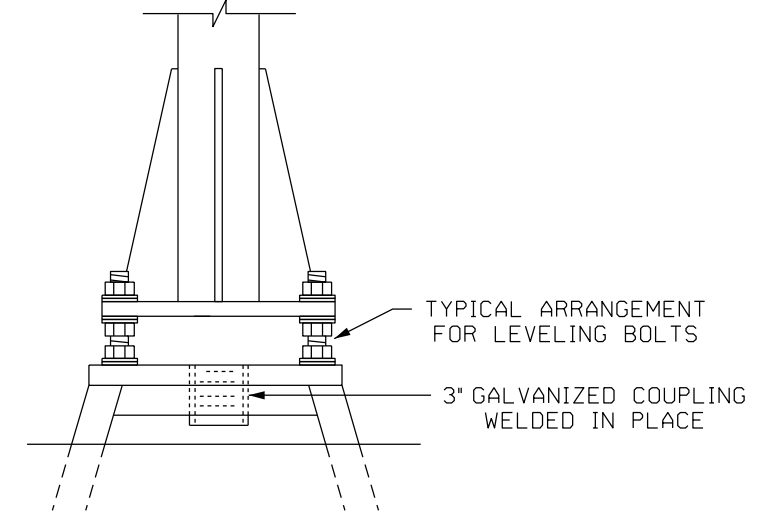
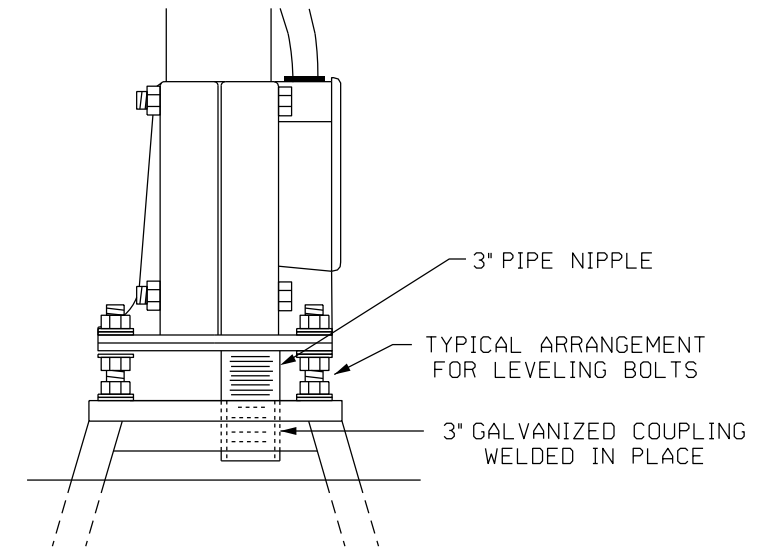
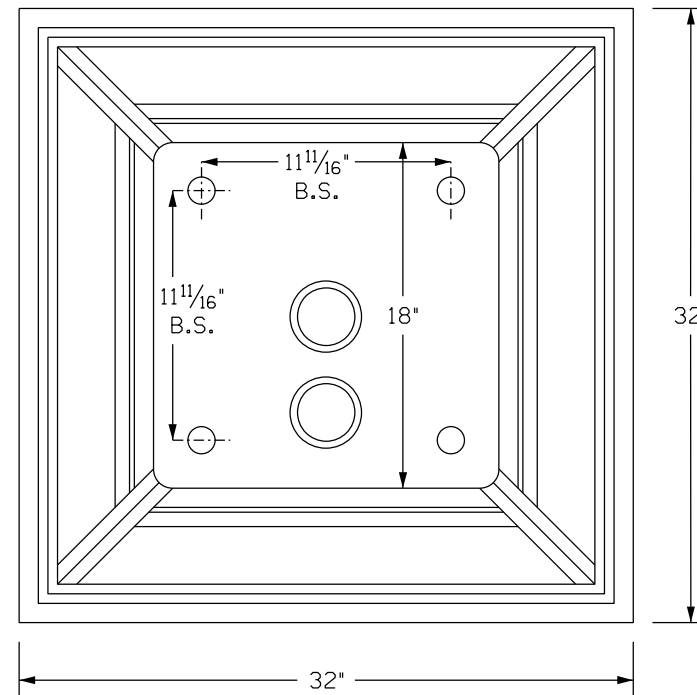
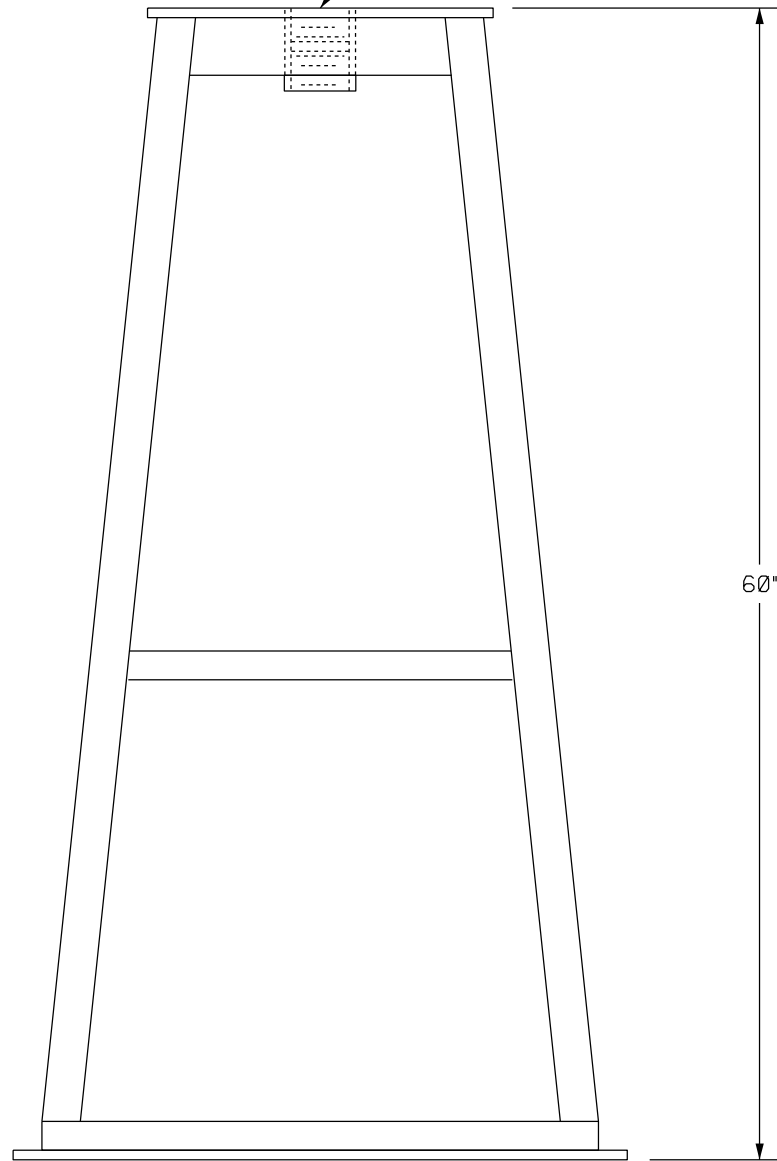
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ENGINEERING STANDARD DRAWINGS
 STANDARD PLACEMENT OF FOULING WIRES

DRAWING NO. ESD-8245
 DRAWING SHEET NO. 1 OF 1
 SCALE: NONE
 CONTRACT SHEET NO.

STANDARD 3" GALVANIZED STEEL PIPE COUPLINGS WELDED TO FOUNDATION. COUPLINGS SHALL BE ATTACHED TO ALLOW PLACEMENT OF 3" PIPE NIPPLE IN BOTTOM OR TOP OF COUPLING.



NOTES:

- FOUNDATIONS TO BE HOT DIPPED GALVANIZED.
- FURNISHED WITH 4 EA 1" X 8" BOLTS WITH HEX HEADS, 12 NUTS AND 16 FLAT WASHERS.
- BOLTS TO BE THREADED TO ALLOW FOR LEVELING
- BOLTS, WASHERS AND NUTS SHALL BE CADMIUM STEEL AND SHALL BE PACKAGED SEPARATELY IN A WATER TIGHT CONTAINER SECURELY ATTACHED TO THE FOUNDATION.

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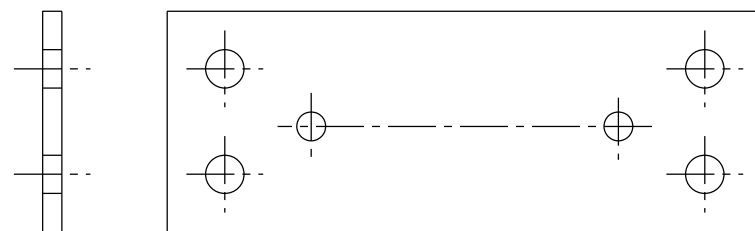
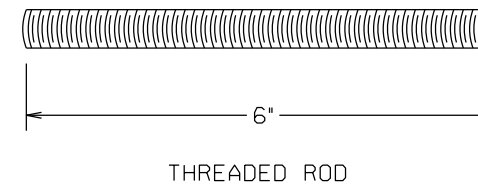
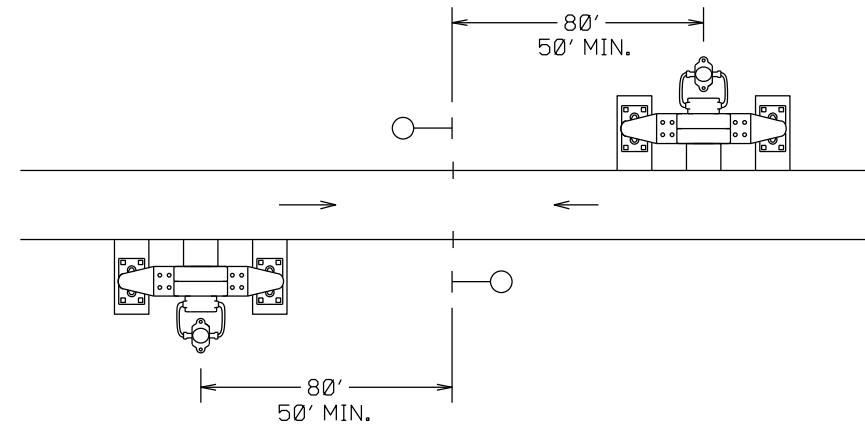
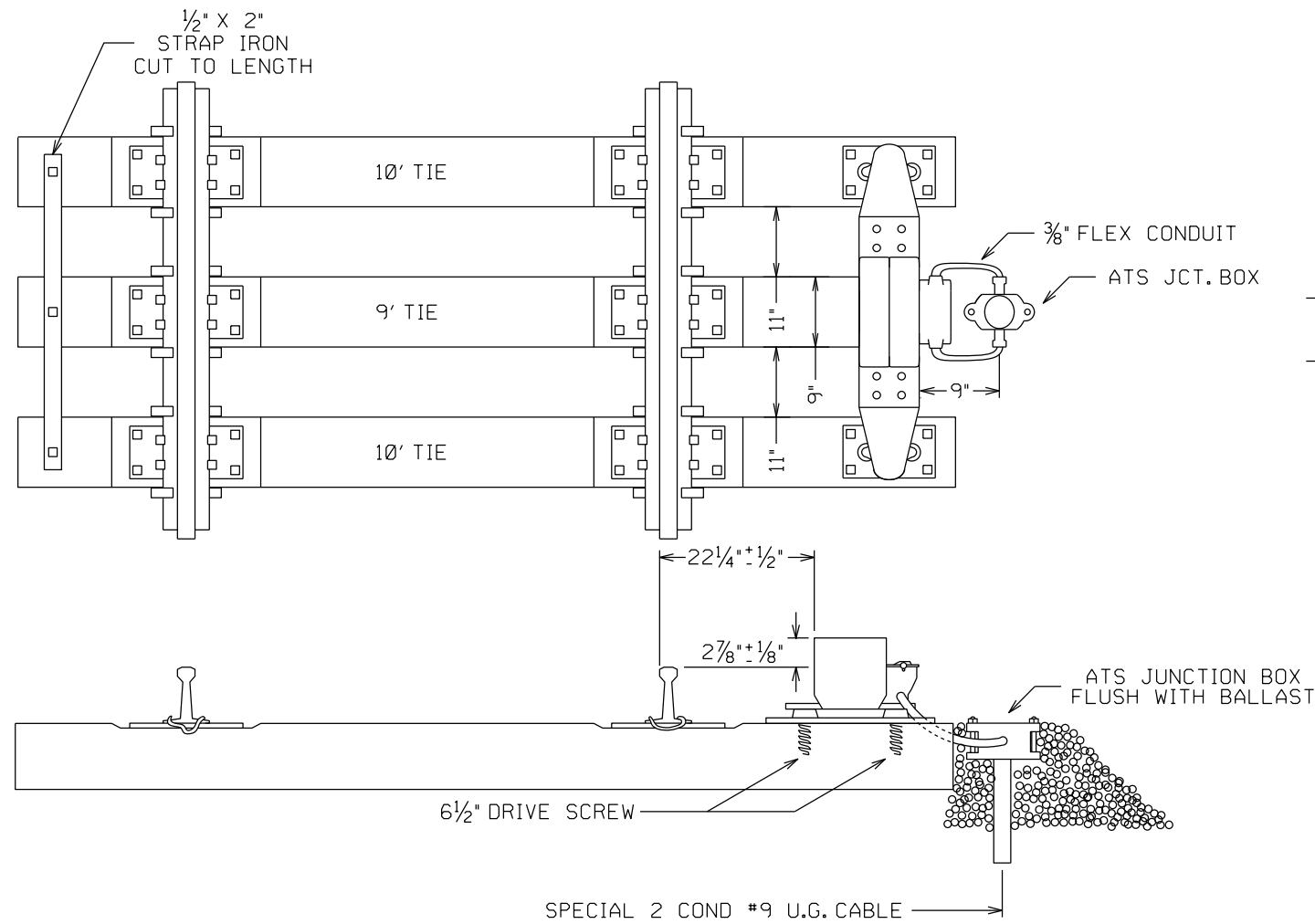
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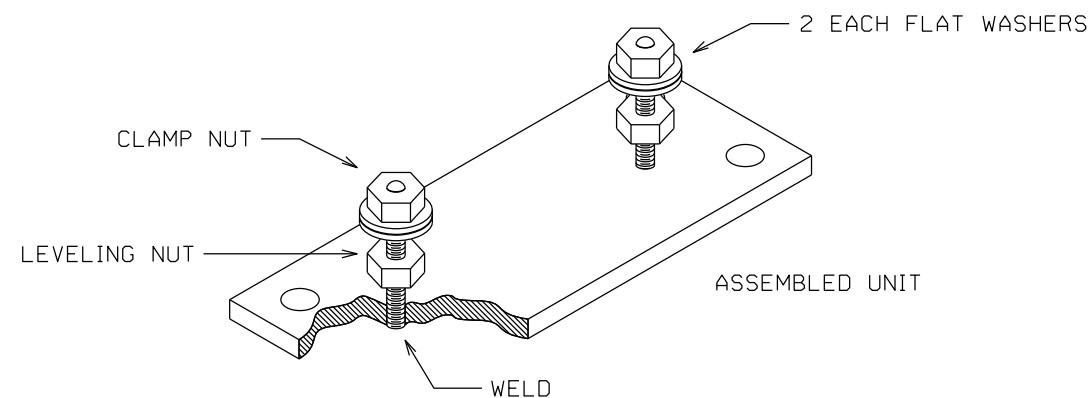
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ENGINEERING STANDARD DRAWINGS
 GALVANIZED STEEL SIGNAL AND GATE FOUNDATION

DRAWING NO.	ESD-8255
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	



INDUCTOR BASE PLATE
SAE 1020 STEEL



SANDAG/NCTD ENGINEERING STANDARDS ARE INTENDED FOR SANDAG/NCTD APPROVED USES ONLY. FOR NON-SANDAG/NCTD APPROVED USES, SANDAG/NCTD SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF THE DATA OR INFORMATION CONTAINED HEREIN. THE SELECTION AND USE OF THESE STANDARDS IS THE SOLE RESPONSIBILITY OF THE USER AND SHOULD NOT BE USED WITHOUT CONSULTING A REGISTERED PROFESSIONAL ENGINEER. ALL WARRANTIES AND REPRESENTATIONS OF ANY KIND ARE DISCLAIMED. ANYONE MAKING USE OF THIS INFORMATION AGREES THAT IT ASSUMES ALL LIABILITY ARISING FROM SUCH USE. NO PART OF THESE STANDARDS SHOULD BE REPRODUCED OR DISTRIBUTED IN ANY FORM OR BY ANY MEANS WITHOUT THE PRIOR WRITTEN PERMISSION OF SANDAG/NCTD. ALL RIGHTS RESERVED.

- NOTES:
1. ALL ATS INDUCTORS WHEN INSTALLED ARE TO BE GAUGED WITH A STANDARD ATS GAUGE, AND MONTHLY THEREAFTER.
 2. USE OF MINIMUM DIMENSIONS AS SHOWN IN THIS STANDARD REQUIRES NCTD APPROVAL.

REV.	DATE	DESCRIPTION	DES.	ENG.

REVISIONS	DRAWN	PRE, INC.
	CHECKED	<i>EJR</i>
	RECOMMENDED	<i>WP</i>
	DATE	FEBRUARY 2015
	DESIGNER PE STAMP	

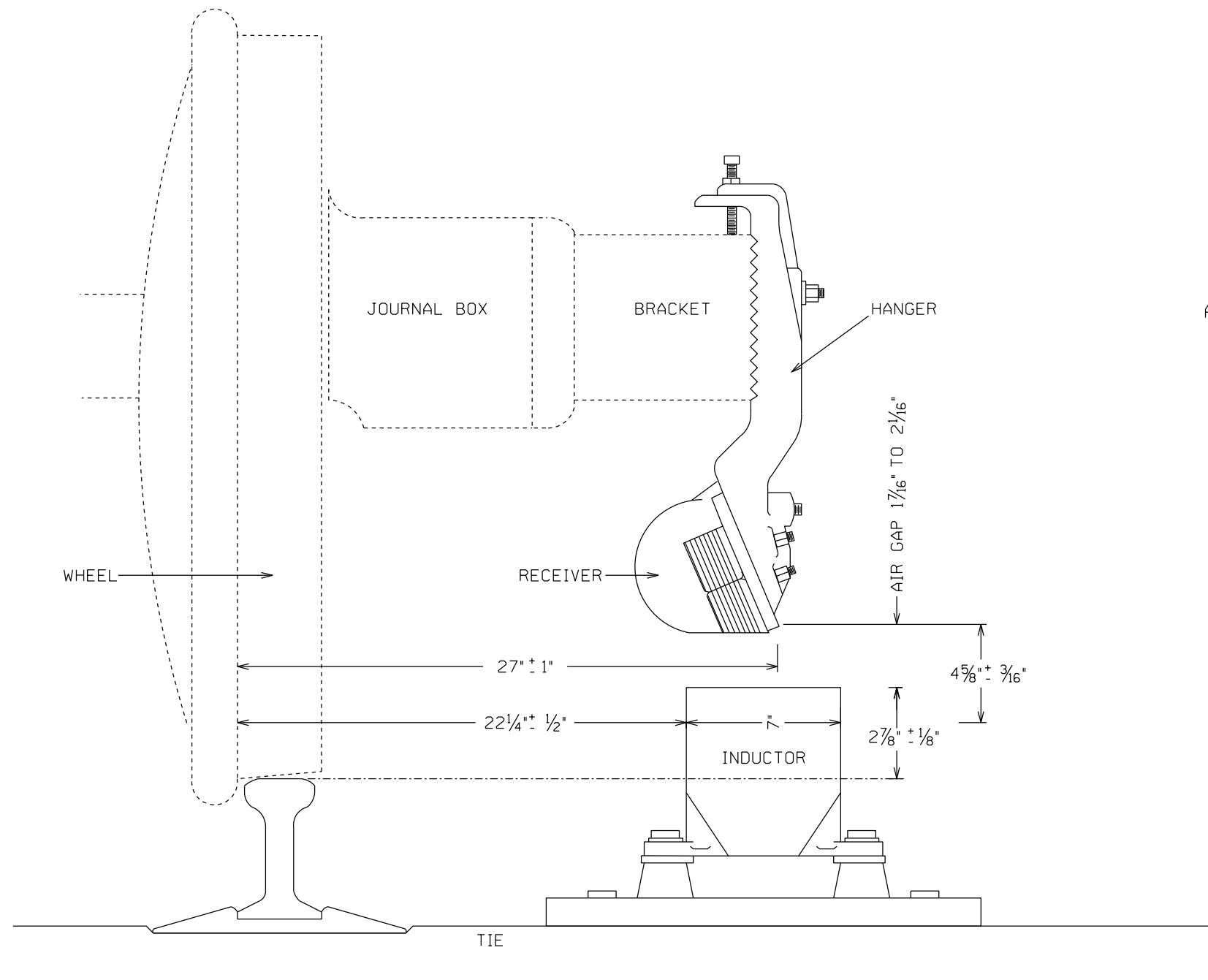
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San Diego, CA. 92101
www.sandag.org

810 Mission Avenue
Oceanside, CA 92054
www.gonctd.com

ENGINEERING STANDARD DRAWINGS

AUTOMATIC TRAIN STOP (ATS)
INDUCTOR LAYOUT

DRAWING NO.	ESD-8260-01
DRAWING SHEET NO.	1 OF 2
SCALE:	NONE
CONTRACT SHEET NO.	



AUTOMATIC TRAIN STOP LOCOMOTIVE
RECEIVER AND WAYSIDE INDUCTOR

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REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN	PRE, INC.
CHECKED	<i>EJR</i>
RECOMMENDED	<i>WP</i>
DATE	FEBRUARY 2015
DESIGNER PE STAMP	



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**NORTH COUNTY
TRANSIT DISTRICT**

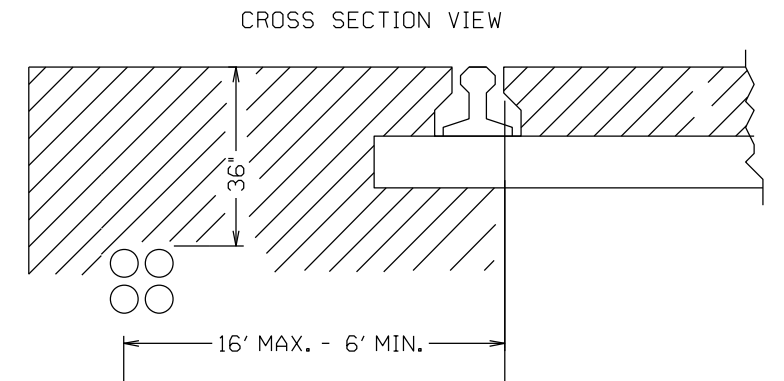
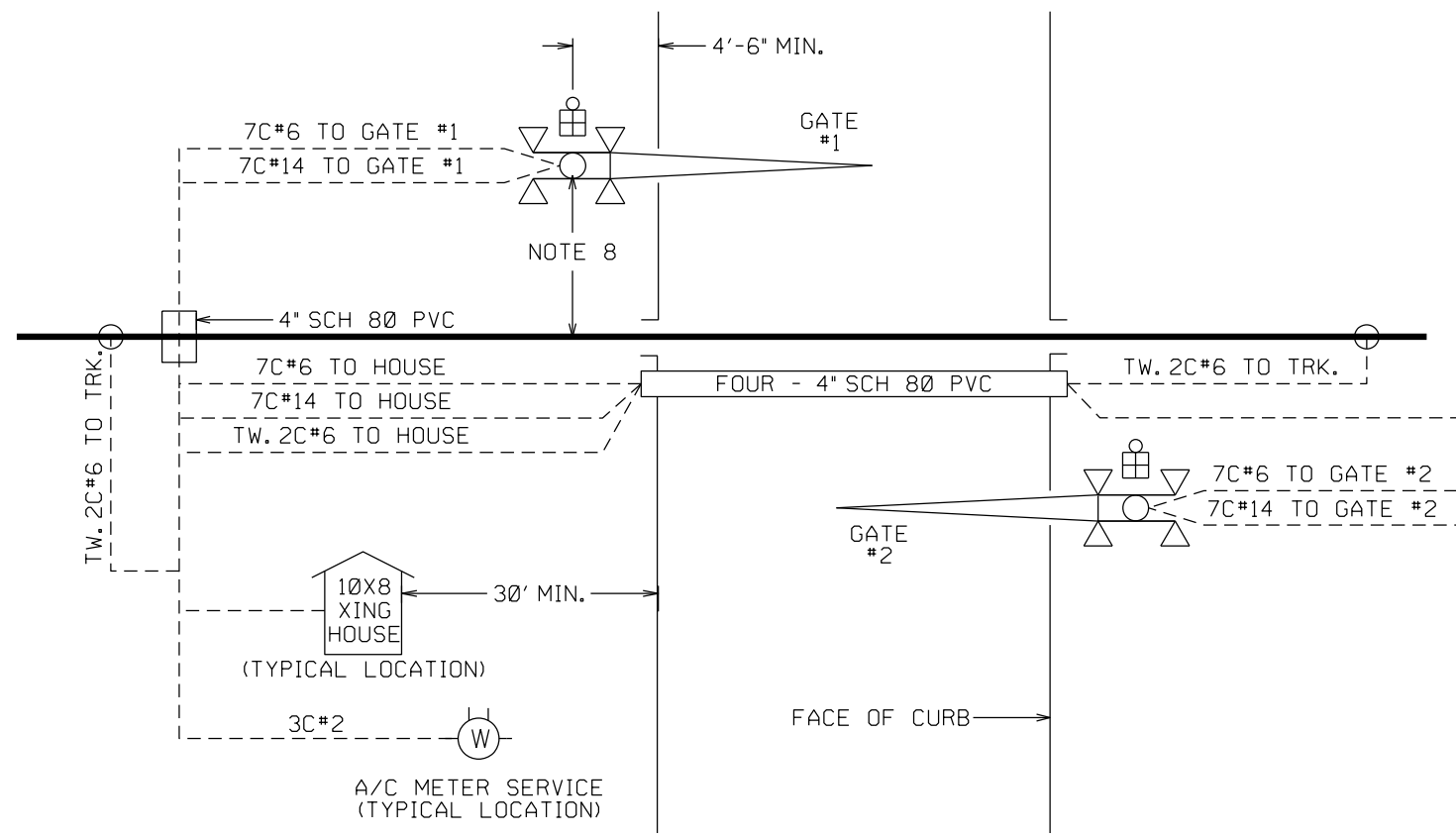


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ENGINEERING STANDARD DRAWINGS

AUTOMATIC TRAIN STOP (ATS)
PLACEMENT REQUIREMENTS

DRAWING NO.	ESD-8260-02
DRAWING SHEET NO.	2 OF 2
SCALE:	NONE
CONTRACT SHEET NO.	



TYPICAL LOCATION OF FOUR 4" SCH 80 PVC. SIDE OF TRACK FOR LOCATION OF CONDUIT TO BE APPROVED BY FIELD ENGINEER. SPARE CONDUITS TO BE CAPPED.

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NOTES:

1. XING HOUSE, CASE AND METER SERVICE LOCATION IS TYPICAL, MAY BE LOCATED IN ANY QUADRANT.
2. XING HOUSE AND CASE LOCATED 25' FROM NEAR RAIL. VARIATION ONLY ON APPROVAL BY NCCTD.
3. CABLE UNDER TRACK, SIDEWALKS AND ROADWAYS TO BE PLACED IN 4" SCH. 80 PVC.
4. GATES LOCATED 15' FROM CENTERLINE OF TRACK. VARIATION ONLY ON APPROVAL BY NCCTD.
5. TRACK LEADS LOCATED MIN. 50' FROM CURB FACE.
6. 120' MIN. ISLAND CIRCUIT LENGTH.
7. CONDUIT TO BE PLACED UNDER TRACK IN FRONT OF THE 10X8 HOUSE.
8. 15' IS THE DESIRABLE CLEARANCE FROM CENTER LINE OF TRACK. MINIMUM OF 12' MUST BE MAINTAINED.
9. POWER OFF LIGHT SHALL BE INSTALLED ON GRADE CROSSING SHELTERS. LAMP SHALL BE VELCORP GEMS P/N LC2-001WB-W AND PLACED ON TRACK SIDE, VISIBLE TO APPROACHING TRAINS.

REV.	DATE	DESCRIPTION	DES.	ENG.

REVISIONS	DRAWN	PRE, INC.
	CHECKED	EJR
	E. ROE	
	RECOMMENDED	WP
	W. PREY	
	DATE	FEBRUARY 2015
	DESIGNER PE STAMP	

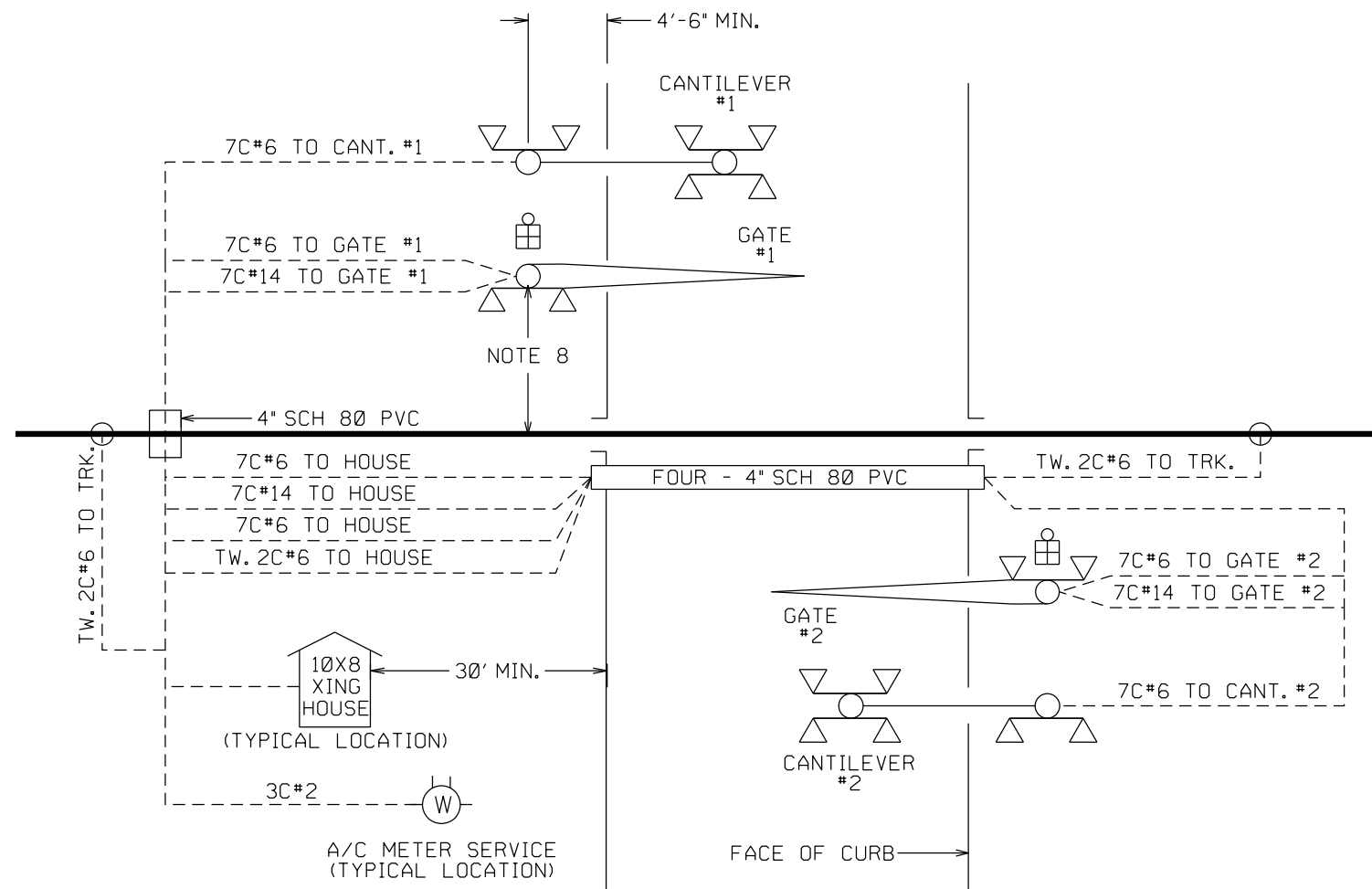
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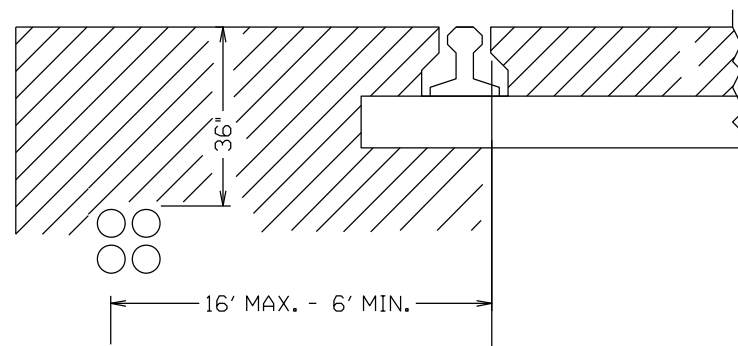
ENGINEERING STANDARD DRAWINGS

TYPICAL LOCATION
FLASHING LIGHT SIGNALS WITH GATES

DRAWING NO.	ESD-8262
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	



CROSS SECTION VIEW



TYPICAL LOCATION OF FOUR 4" SCH 80 PVC. SIDE OF TRACK FOR LOCATION OF CONDUIT TO BE APPROVED BY FIELD ENGINEER. SPARE CONDUITS TO BE CAPPED.

SANDAG/NCTD ENGINEERING STANDARDS ARE INTENDED FOR SANDAG/NCTD APPROVED USES ONLY. FOR NON-SANDAG/NCTD APPROVED USES: SANDAG/NCTD SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF THE DATA OR INFORMATION CONTAINED HEREIN. THE SELECTION AND USE OF THESE STANDARDS IS THE SOLE RESPONSIBILITY OF THE USER AND SHOULD NOT BE USED WITHOUT CONSULTING A REGISTERED PROFESSIONAL ENGINEER. ALL WARRANTIES AND REPRESENTATIONS OF ANY KIND ARE DISCLAIMED. ANYONE MAKING USE OF THIS INFORMATION AGREES THAT IT ASSUMES ALL LIABILITY ARISING FROM SUCH USE. NO PART OF THESE STANDARDS SHOULD BE REPRODUCED OR DISTRIBUTED IN ANY FORM OR BY ANY MEANS WITHOUT THE PRIOR WRITTEN PERMISSION OF SANDAG/NCTD. ALL RIGHTS RESERVED.

NOTES:

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- CABLE UNDER TRACK, SIDEWALKS AND ROADWAYS TO BE PLACED IN 4" SCH. 80 PVC.
- GATES LOCATED 15' FROM CENTERLINE OF TRACK. VARIATION ONLY ON APPROVAL BY NCTD.
- TRACK LEADS LOCATED MIN. 50' FROM CURB FACE.
- 120' MIN. ISLAND CIRCUIT LENGTH.
- CONDUIT TO BE PLACED UNDER TRACK IN FRONT OF THE 10X8 HOUSE.
- 15' IS THE DESIRABLE CLEARANCE FROM CENTER LINE OF TRACK. MINIMUM OF 12' MUST BE MAINTAINED.
- POWER OFF LIGHT SHALL BE INSTALLED ON GRADE CROSSING SHELTERS. LAMP SHALL BE VELCORP GEMS P/N LC2-001WB-W AND PLACED ON TRACK SIDE, VISIBLE TO APPROACHING TRAINS.

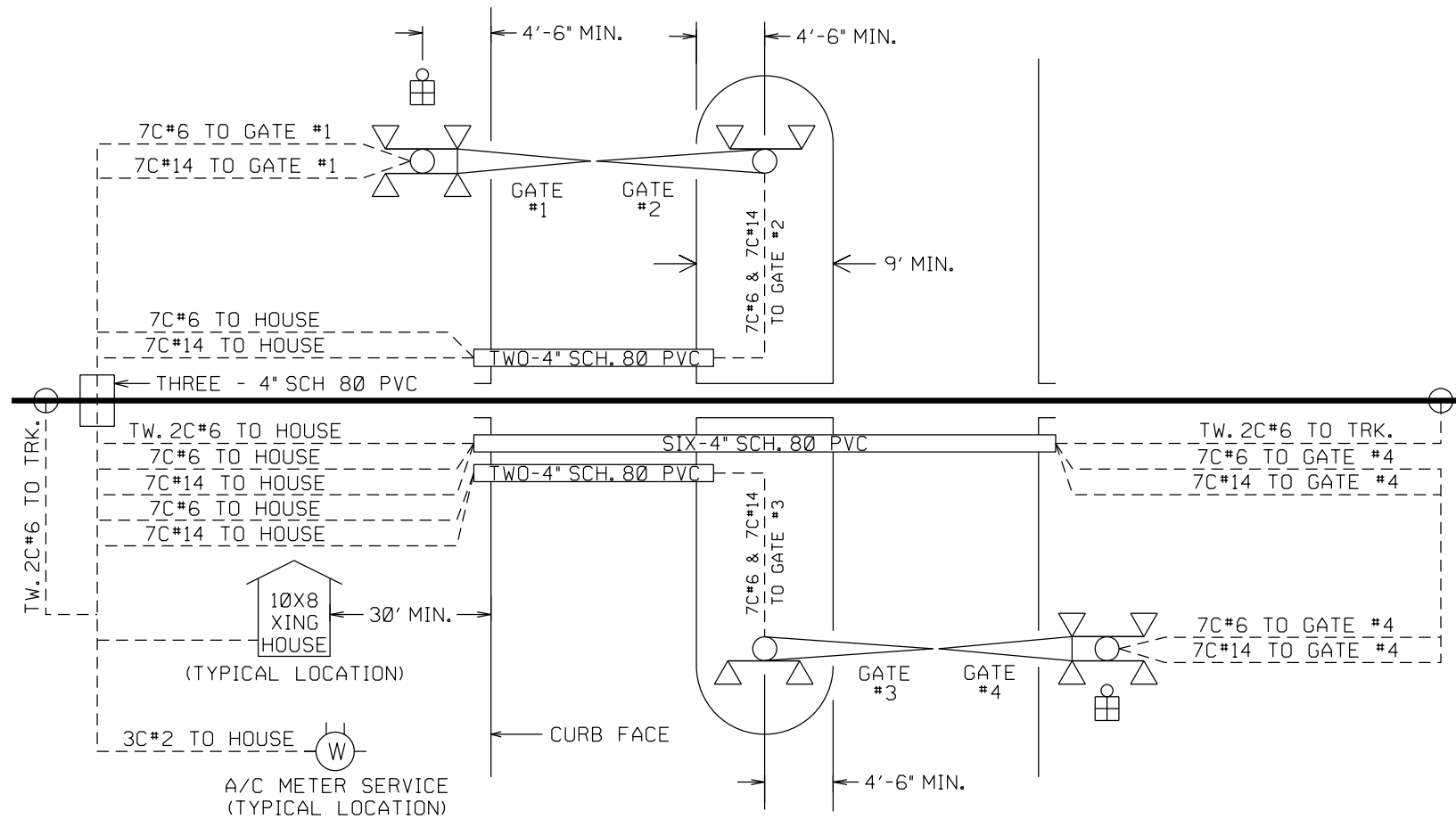
REV.	DATE	DESCRIPTION	DES.	ENG.

REVISIONS	DRAWN	PRE, INC.
	CHECKED	<i>EJR</i>
	E. ROE	
	RECOMMENDED	<i>WP</i>
	W. PREY	
	DATE	FEBRUARY 2015
	DESIGNER PE STAMP	

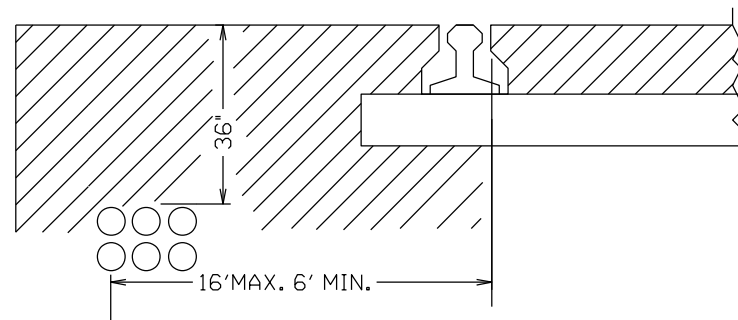
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ENGINEERING STANDARD DRAWINGS TYPICAL LOCATION CANTILEVER FLASHING LIGHT SIGNALS WITH GATES	DRAWING NO.	ESD-8264
	DRAWING SHEET NO.	1 OF 1
	SCALE:	NONE
	CONTRACT SHEET NO.	



CROSS SECTION VIEW



TYPICAL LOCATION OF SIX 4" SCH 80 PVC. SIDE OF TRACK FOR LOCATION OF CONDUIT TO BE APPROVED BY FIELD ENGINEER. SPARE CONDUITS TO BE CAPPED.

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NOTES:

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- XING HOUSE AND CASE LOCATED 25' FROM NEAR RAIL. VARIATION ONLY ON APPROVAL BY NCTD.
- CABLE UNDER TRACK, SIDEWALKS AND ROADWAYS TO BE PLACED IN 4" SCH. 80 PVC.
- GATES LOCATED 15' FROM CENTERLINE OF TRACK. VARIATION ONLY ON APPROVAL BY NCTD.
- TRACK LEADS LOCATED MIN. 50' FROM CURB FACE.
- 120' MIN. ISLAND CIRCUIT LENGTH.
- CONDUIT TO BE PLACED UNDER TRACK IN FRONT OF THE 10X8 HOUSE.
- 15' IS THE DESIRABLE CLEARANCE FROM CENTER LINE OF TRACK. MINIMUM OF 12' MUST BE MAINTAINED.
- POWER OFF LIGHT SHALL BE INSTALLED ON GRADE CROSSING SHELTERS. LAMP SHALL BE VELCORP GEMS P/N LC2-001WB-W AND PLACED ON TRACK SIDE, VISIBLE TO APPROACHING TRAINS.

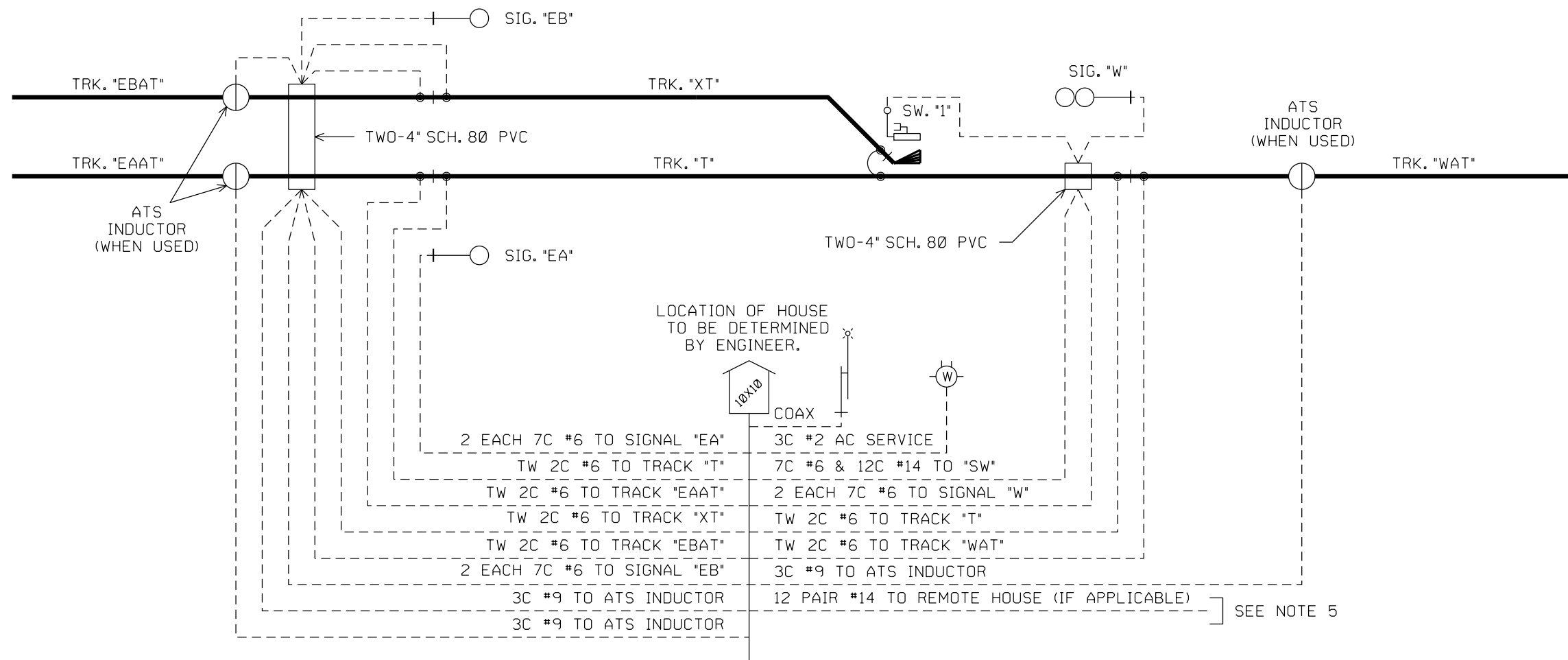
REV.	DATE	DESCRIPTION	DES.	ENG.

REVISIONS	DRAWN	PRE, INC.
	CHECKED	EJR
	E. ROE	
	RECOMMENDED	WP
	W. PREY	
	DATE	FEBRUARY 2015
	DESIGNER PE STAMP	



ENGINEERING STANDARD DRAWINGS
TYPICAL LOCATION
FLASHING LIGHT SIGNALS
WITH GATES AND MEDIAN

DRAWING NO.	ESD-8266
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	



NOTES:

1. CABLE UNDER TRACK TO BE PLACED IN 4" SCH 80 PVC.
2. TRACK CONNECTION TO BE MADE IN ACCORDANCE WITH ESD-8230.
3. EACH WAYSIDE SIGNAL SHALL BE CABLED TO SUPPORT A MINIMUM OF 2 SIGNAL HEADS.
4. ATS WAYSIDE INDUCTOR TO BE PLACED IN ACCORDANCE WITH ESD-8260-01.
5. IF A COMMUNICATIONS LINK IS NEEDED TO INTERCONNECT MULTIPLE CONTROL UNITS, A 12 PAIR #14 AWG CABLE, OMNICABLE P/N L41412, OR APPROVED EQUAL SHALL BE USED TO ESTABLISH THIS LINK.

SANDAG/NCTD ENGINEERING STANDARDS ARE INTENDED FOR SANDAG/NCTD APPROVED USES ONLY. FOR NON-SANDAG/NCTD APPROVED USES: SANDAG/NCTD SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF THE DATA OR INFORMATION CONTAINED HEREIN. THE SELECTION AND USE OF THESE STANDARDS IS THE SOLE RESPONSIBILITY OF THE USER AND SHOULD NOT BE USED WITHOUT CONSULTING A REGISTERED PROFESSIONAL ENGINEER. ALL WARRANTIES AND REPRESENTATIONS OF ANY KIND ARE DISCLAIMED. ANYONE MAKING USE OF THIS INFORMATION AGREES THAT IT ASSUMES ALL LIABILITY ARISING FROM SUCH USE. NO PART OF THESE STANDARDS SHOULD BE REPRODUCED OR DISTRIBUTED IN ANY FORM OR BY ANY MEANS WITHOUT THE PRIOR WRITTEN PERMISSION OF SANDAG/NCTD. ALL RIGHTS RESERVED.

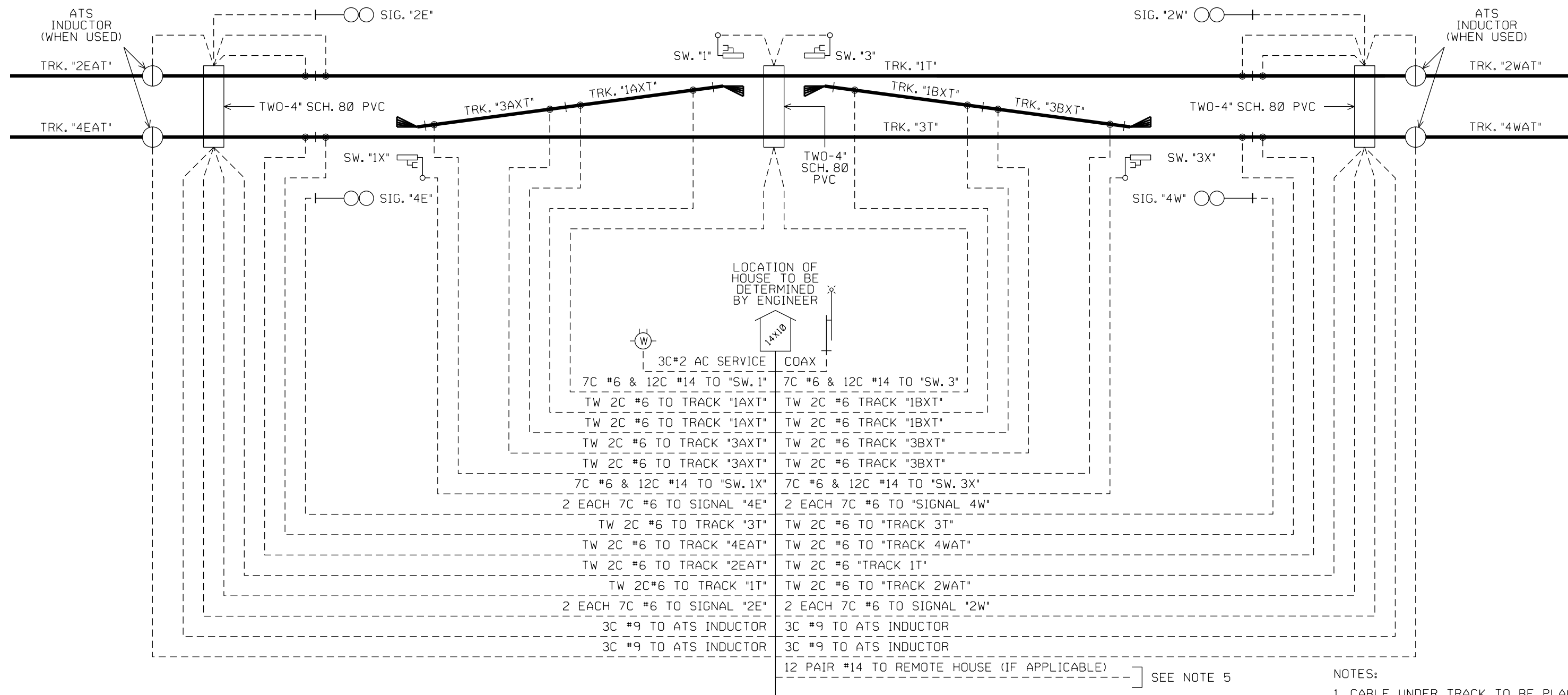
REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN	PRE, INC.
CHECKED	<i>EJR</i>
RECOMMENDED	<i>BAS</i>
DATE	MARCH 18, 2017
DESIGNER PE STAMP	



ENGINEERING STANDARD DRAWINGS
TYPICAL LOCATION
EAST END OF SIDING

DRAWING NO.	ESD-8268
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	



- NOTES:
1. CABLE UNDER TRACK TO BE PLACED IN 4" SCH 80 PVC.
 2. TRACK CONNECTION TO BE MADE IN ACCORDANCE WITH ESD-8230.
 3. EACH WAYSIDE SIGNAL SHALL BE CABLED TO SUPPORT A MINIMUM OF 2 SIGNAL HEADS.
 4. ATS WAYSIDE INDUCTOR TO BE PLACED IN ACCORDANCE WITH ESD-8260-01.
 5. IF A COMMUNICATIONS LINK IS NEEDED TO INTERCONNECT MULTIPLE CONTROL UNITS, A 12 PAIR #14 AWG CABLE, OMNICABLE P/N L41412, OR APPROVED EQUAL SHALL BE USED TO ESTABLISH THIS LINK.

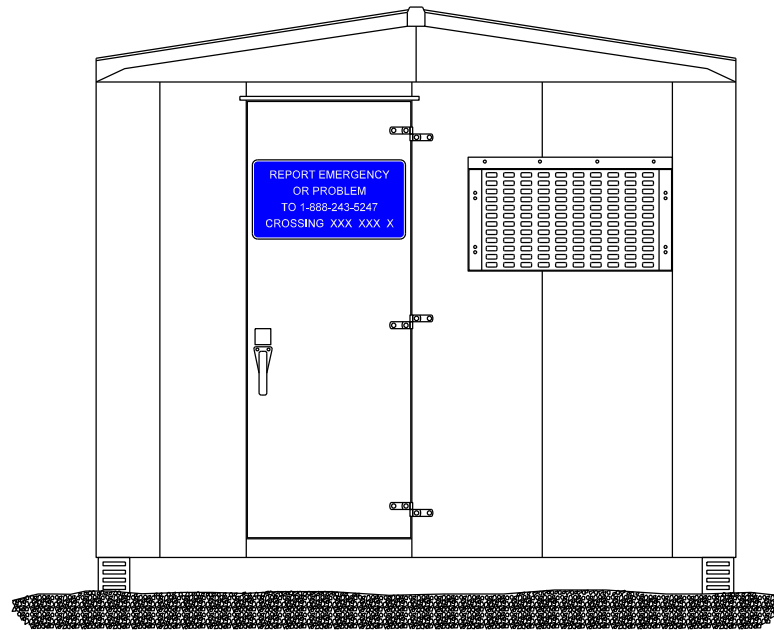
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REV.	DATE	DESCRIPTION	DES.	ENG.

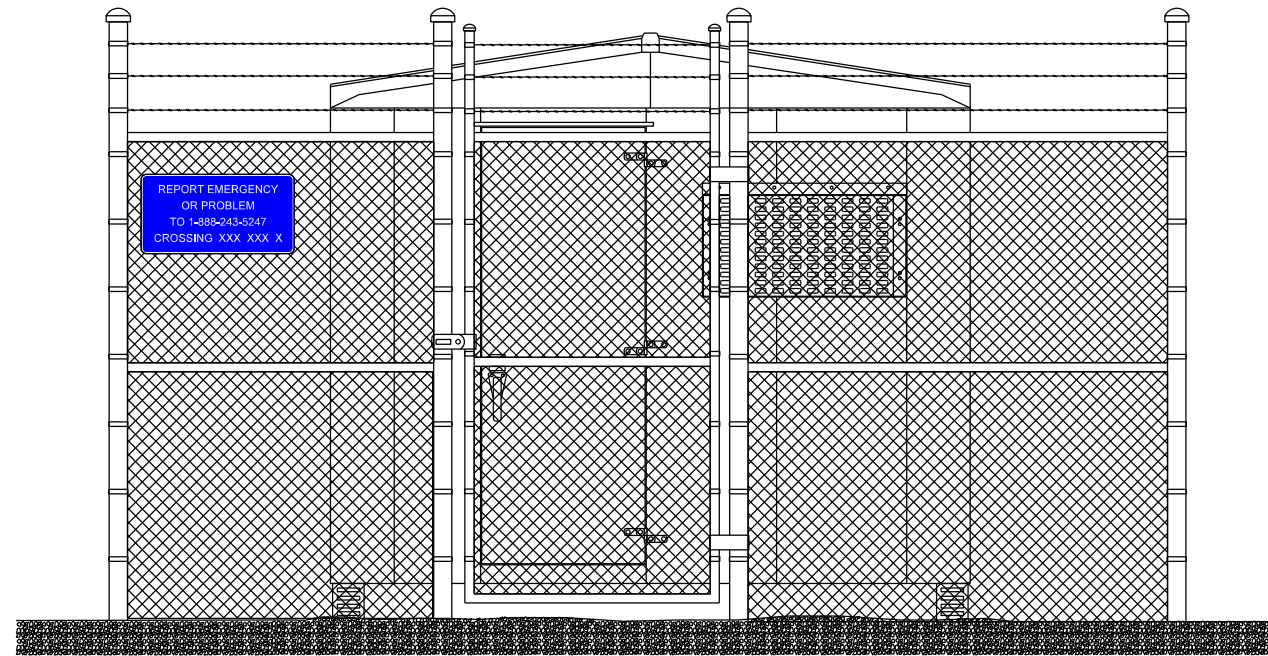
DRAWN	PRE, INC.
CHECKED	<i>EJR</i>
RECOMMENDED	<i>BAS</i>
DATE	MARCH 18, 2017
DESIGNER PE STAMP	



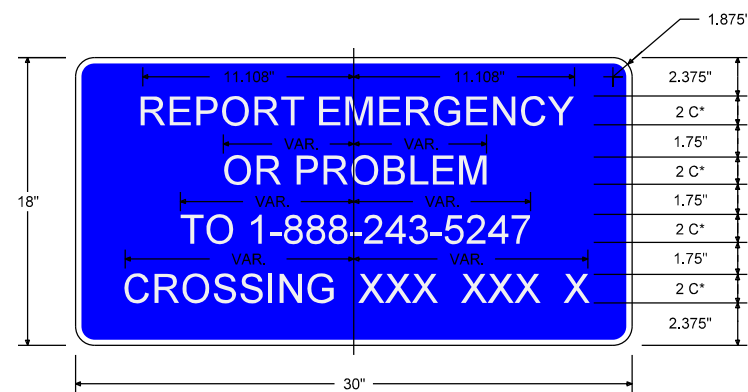
ENGINEERING STANDARD DRAWINGS TYPICAL LOCATION UNIVERSAL CROSSOVER	DRAWING NO.	ESD-8269
	DRAWING SHEET NO.	1 OF 1
	SCALE:	NONE
	CONTRACT SHEET NO.	



MOUNTED ON SIDE OF HOUSE



MOUNTED ON SECURITY FENCE



COLORS:
 LEGEND: WHITE RETROREFLECTIVE
 BACKGROUND: BLUE RETROREFLECTIVE
 *SERIES 2000 STANDARD ALPHABETS

SIGN DETAIL

SAN DIEGO SUBDIVISION HOTLINE NUMBER
 1-888-243-5247

ESCONDIDO SUBDIVISION HOTLINE NUMBER
 1-866-502-6673

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- NOTES:
1. WHEN MOUNTING SIGN ON HOUSE, PLACE SIGN ON STREET SIDE OF HOUSE WHERE IT CAN BE SEEN BY MOTORISTS.
 2. WHEN MOUNTING SIGN ON SECURITY FENCE, PLACE SIGN ON STREET SIDE OF HOUSE WHERE IT CAN BE SEEN BY MOTORISTS, AND AS CLOSE AS POSSIBLE TO TRACK.
 3. CONFIRM INFORMATION TO BE PROVIDED ON SIGN WITH NCTD.

REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN	PRE, INC.
CHECKED	<i>EJR</i>
RECOMMENDED	<i>WP</i>
DATE	FEBRUARY 2015
DESIGNER PE STAMP	



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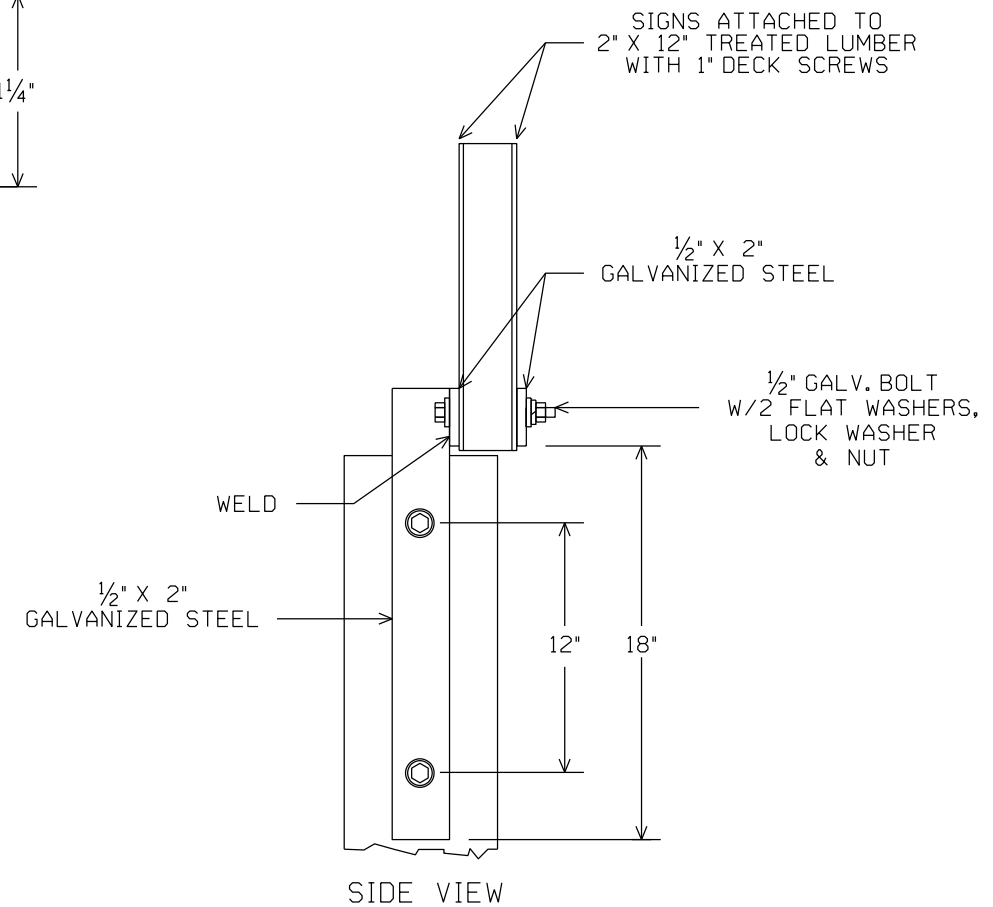
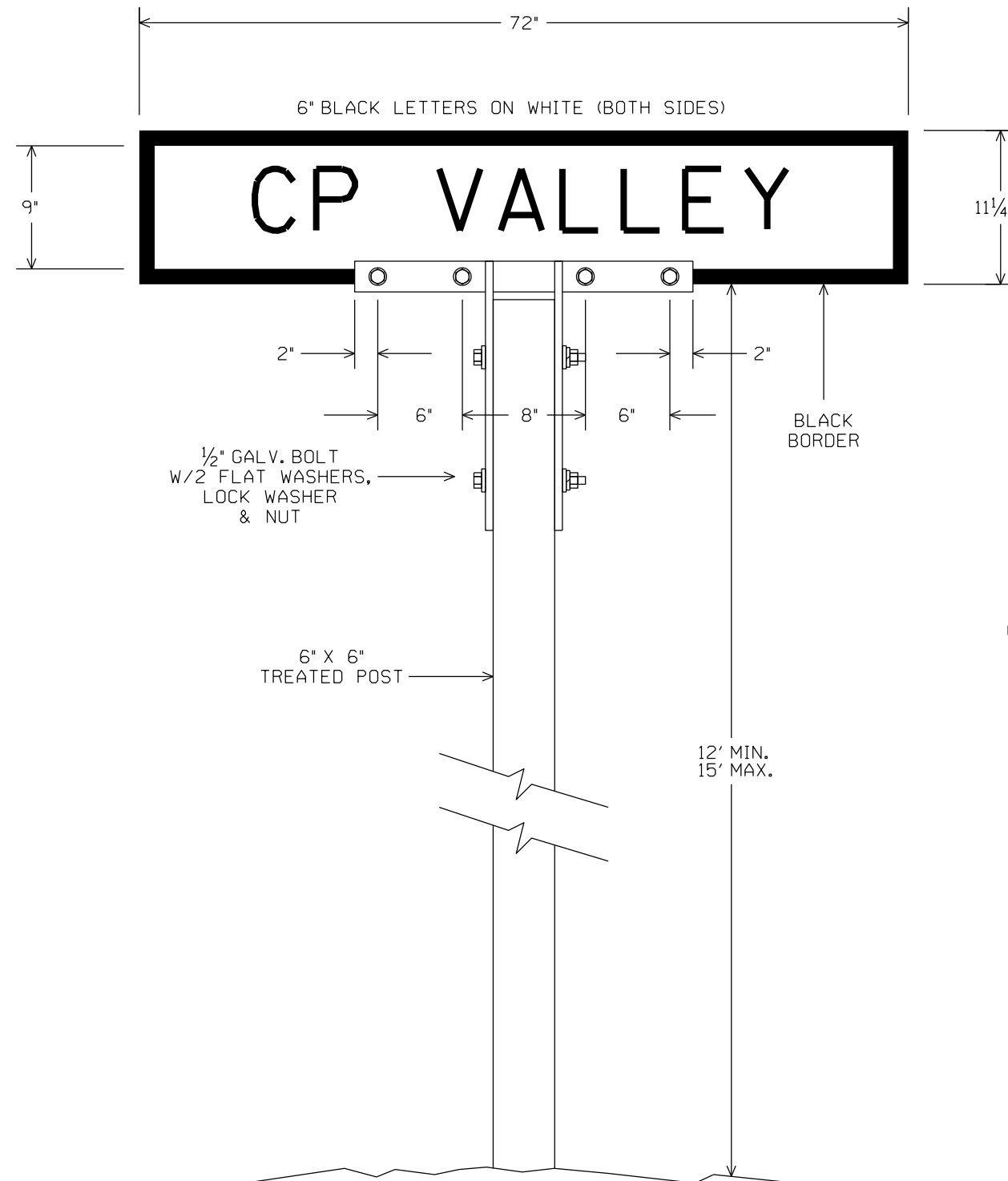


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ENGINEERING STANDARD DRAWINGS

EMERGENCY NOTIFICATION SIGN FOR
 HIGHWAY GRADE CROSSING SHELTER

DRAWING NO.	ESD-8270
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	



NOTES:

1. 1/8" THICK MILL ALUMINUM PANEL WITH PRESSURE SENSITIVE, NON-REFLECTIVE WHITE VINYL SHEETING, SILK SCREEN LEGEND AND BORDER WITH BLACK INK. FINISH WITH EXTERIOR GRADE PRESSURE SENSITIVE CLEAR MYLAR, 3M-1150 OR EQUAL.
2. LETTER STYLE SHALL BE "FUTURA BOLD".
3. 6"x6" POST SHALL EXTEND A MINIMUM OF 4' BELOW TOP OF FINAL GRADE.
4. OUTER EDGE OF 2"x12" SIGN BOARD SHALL BE PAINTED BLACK.

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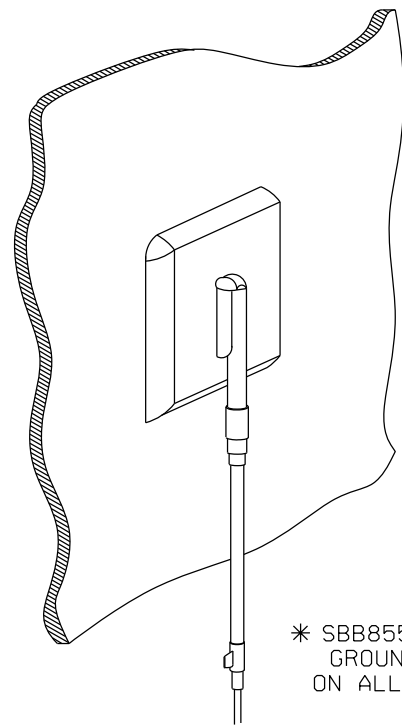
REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN	PRE, INC.
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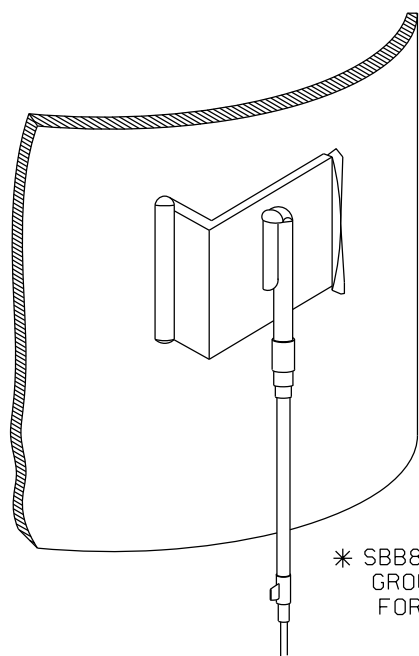
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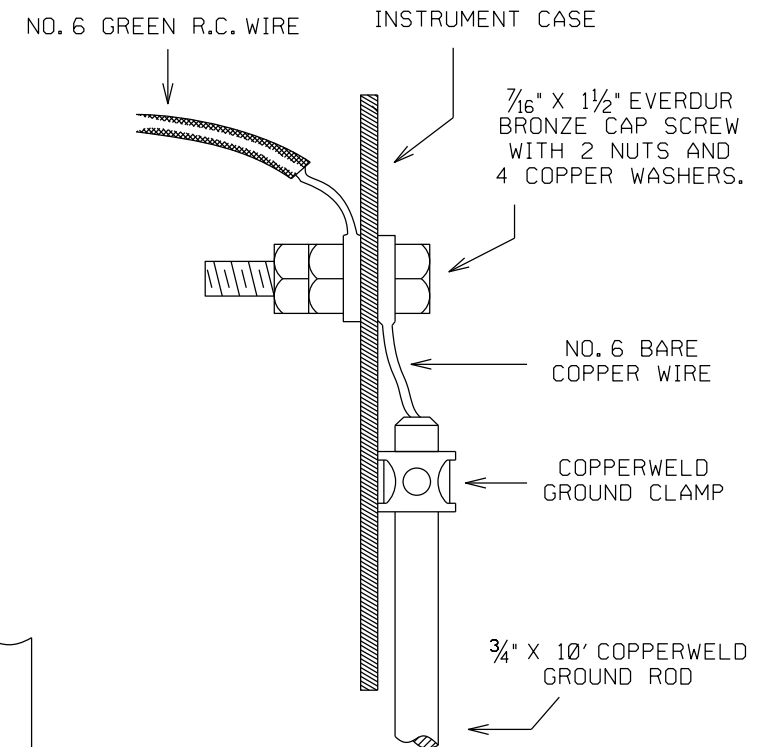
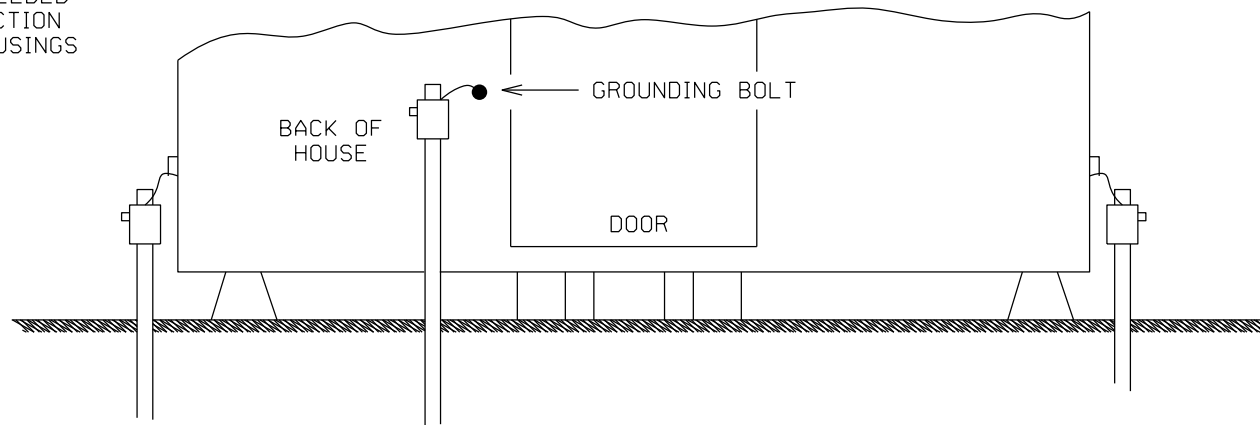
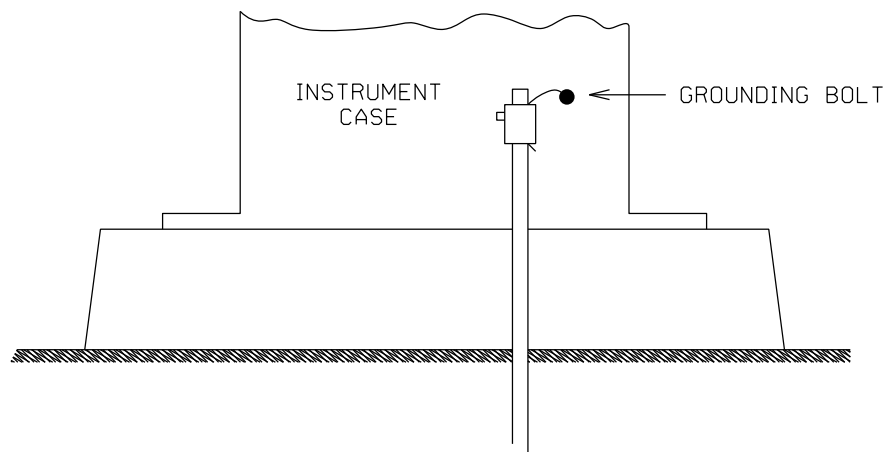
ENGINEERING STANDARD DRAWINGS	DRAWING NO. ESD-8271
CONTROL POINT SIGN	DRAWING SHEET NO. 1 OF 1
	SCALE: NONE
	CONTRACT SHEET NO.



* SBB855C1G36 WELDED GROUND CONNECTION ON ALL NEW HOUSINGS



* SBB855E1G72 WELDED GROUND CONNECTION FOR SIGNAL MASTS



* SBGR1181 CALDWELD ONE SHOT GROUND ROD CONNECTION

NOTES:
ALL NEW SIGNAL HOUSES TO BE GROUNDED ON EACH CORNER WITH WELDED GROUND CONNECTIONS. SEE ESD-8281 FOR GROUNDING REQUIREMENTS OF NEW HOUSES AND CASES.

ALL EXISTING SIGNAL LOCATIONS TO BE GROUNDED WITH EITHER METHOD SHOWN, IF ADDITIONAL GROUNDING IS REQUIRED, ADD SURFACE OF GROUND AND CONNECT TO MAIN ROD WITH NO.6 BARE COPPER WIRE.

DO NOT MAKE ANY SHARP BENDS IN THE GROUND WIRE.

* ERICO PRODUCTS OR EQUIVALENT.

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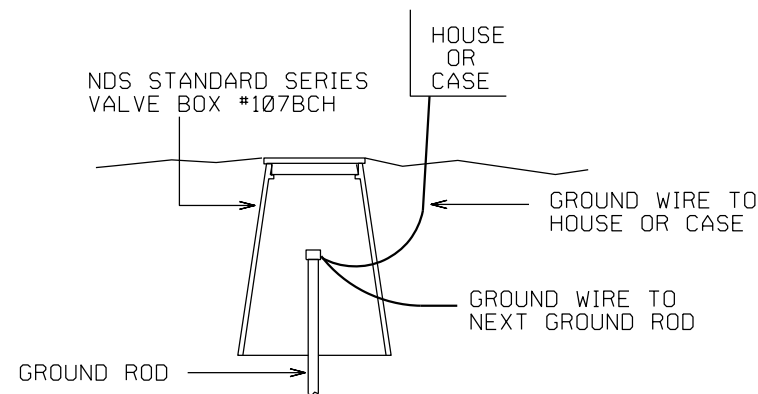
REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN	PRE, INC.
CHECKED	EJR
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DESIGNER PE STAMP	

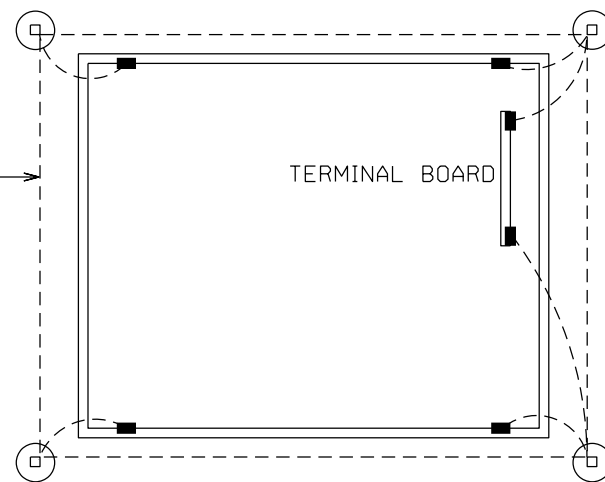
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ENGINEERING STANDARD DRAWINGS TYPICAL GROUNDING FOR SIGNAL LOCATIONS	DRAWING NO.	ESD-8280-01
	DRAWING SHEET NO.	1 OF 1
	SCALE:	NONE
	CONTRACT SHEET NO.	

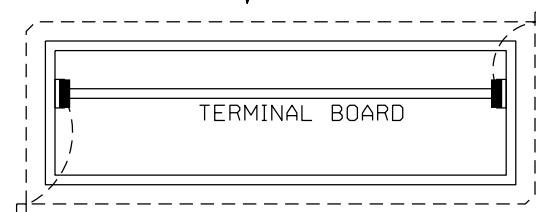


GROUND WIRE PLACED A MINIMUM OF 12" FROM ENCLOSURE



TYPICAL SIGNAL HOUSE GROUNDING

GROUND WIRE PLACED A MINIMUM OF 12" FROM ENCLOSURE



TYPICAL SIGNAL CASE GROUNDING

- NDS STANDARD SERIES VALVE BOX #107BCH
- GROUND ROD
- GROUND CONNECTION WELDED TO ENCLOSURE
- NO. 6 AWG BARE COPPER WIRE

GROUNDING NOTES:

1. GROUND RODS SHALL BE 3/4" DIA. A MINIMUM OF 10' IN LENGTH.
2. PLACE GROUND RODS IN GROUND THAT HAS PREFERABLY BEEN UNDISTURBED.
3. CLEAN GROUND WIRE AND ROD WITH EMERY CLOTH TO PROVIDE GOOD ADHESION FOR WELD MATERIAL.
4. ALL GROUND WIRES SHALL BE WELDED TO GROUND RODS.
5. ALL GROUND WIRE RUNS SHALL BE AS DIRECT AS POSSIBLE - FREE OF UNNECESSARY LOOPS AND BENDS. BENDS IN GROUND WIRES SHALL NOT HAVE A RADIUS LESS THAN 8" OR BENDS GREATER THAN 90 DEGREES.
6. ALL EXTERNAL GROUND WIRE SHALL BE NO. 6 AWG SOLID COPPER.
7. GROUND RODS SHALL BE DRIVEN 4" BELOW GROUND LEVEL WITH NDS VALUE BOX INSTALLED OVER GROUND ROD FOR EASY INSPECTION. TOP OF VALVE BOX SHALL BE LEVEL WITH FINAL GRADE.
8. ALL INTERNAL GROUND WIRES SHALL BE NO. 6 AWG STRAND WITH GREEN INSULATION.
9. RESISTANCE SHALL NOT EXCEED 15 OHMS BETWEEN GROUND SYSTEM AND EARTH GROUND.

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REV.	DATE	DESCRIPTION	DES.	ENG.

REVISIONS	DRAWN	PRE, INC.
	CHECKED	<i>EJR</i>
	E. ROE	
	RECOMMENDED	<i>BAS</i>
	B. SCHMITH	
	DATE	MARCH 18, 2017
DESIGNER PE STAMP		

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NORTH COUNTY TRANSIT DISTRICT

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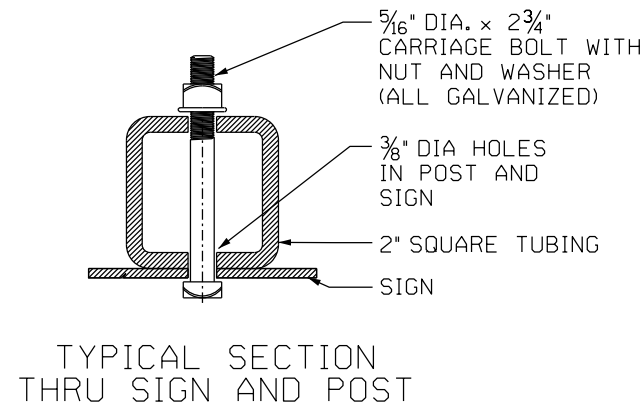
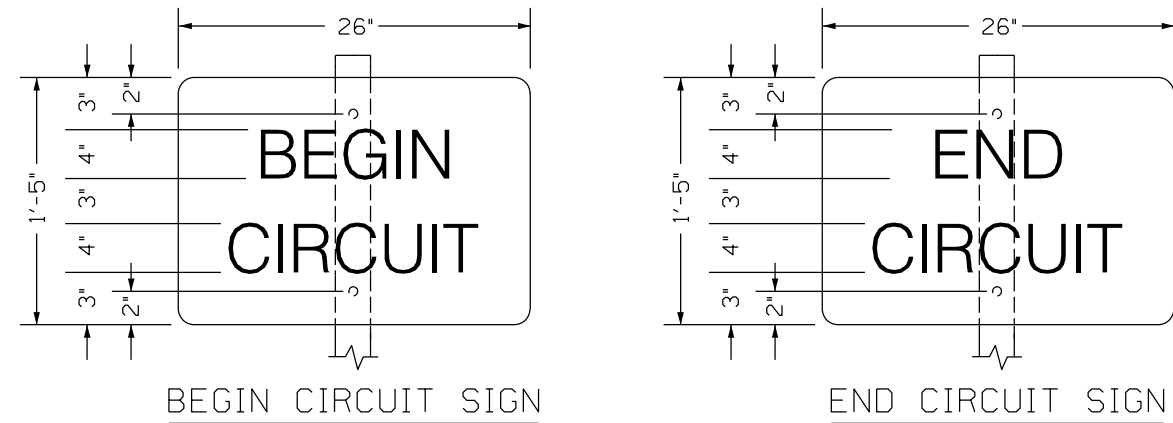
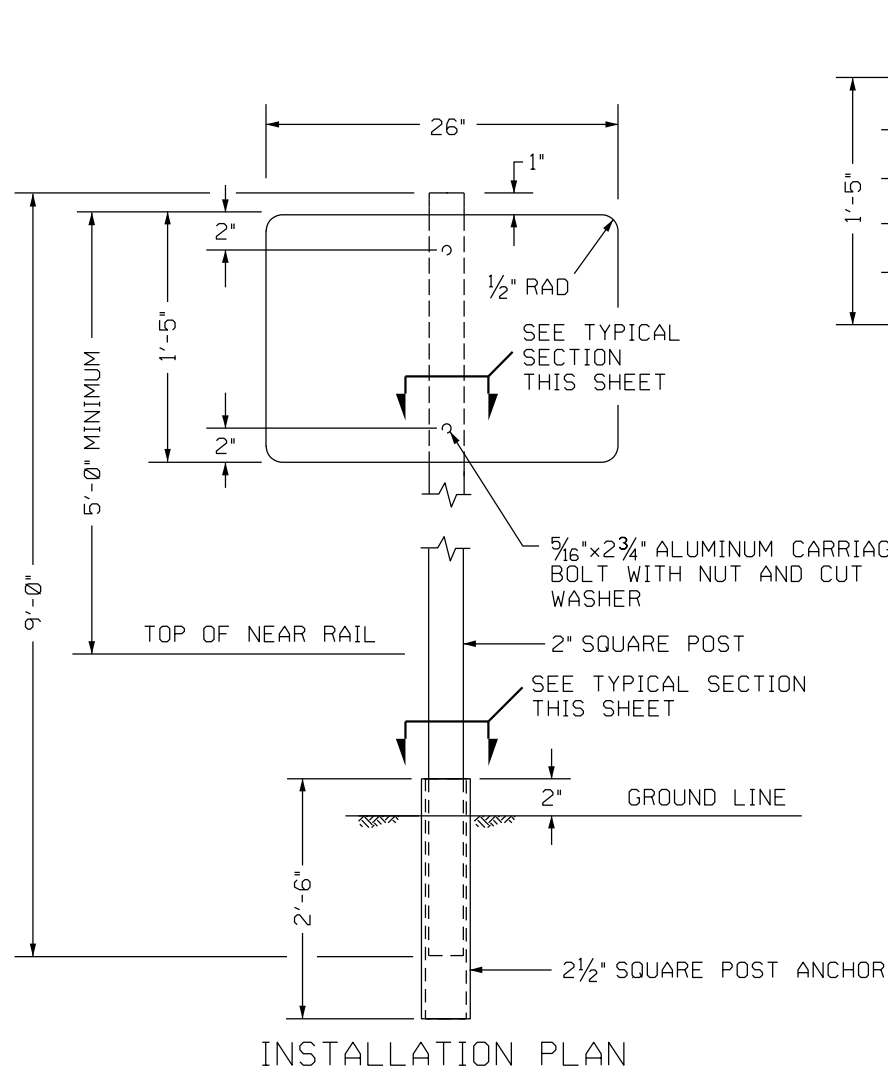
ENGINEERING STANDARD DRAWINGS

TYPICAL GROUNDING FOR SIGNAL LOCATIONS

DRAWING NO. ESD-8280-02
DRAWING SHEET NO. 1 OF 1
SCALE: NONE
CONTRACT SHEET NO.

BILL OF MATERIAL
BEGIN/END CIRCUIT SIGN - COMPLETE

QTY	ITEM
1	BEGIN/END CIRCUIT SIGN
1	2" x 2" x 9'-0" LONG SQUARE POST
1	2 1/2" x 2 1/2" x 30" LONG SQUARE POST ANCHOR
2	5/16" x 2 3/4" CARRIAGE BOLTS WITH NUTS AND WASHERS (GALVANIZED) PER SPECIFICATIONS BELOW
2	5/16" x 3 1/2" CARRIAGE BOLTS WITH NUTS AND WASHERS (GALVANIZED) PER SPECIFICATIONS BELOW



SPECIFICATIONS

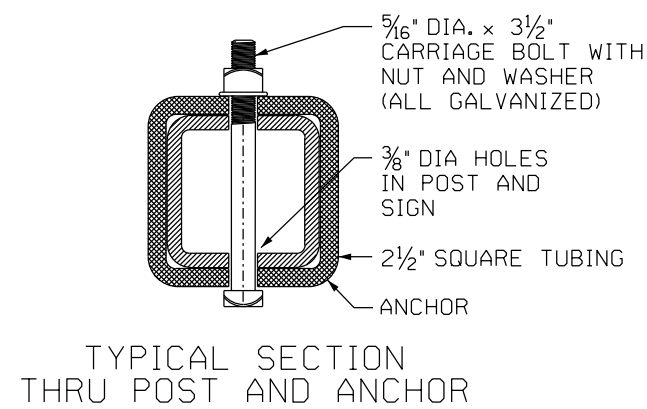
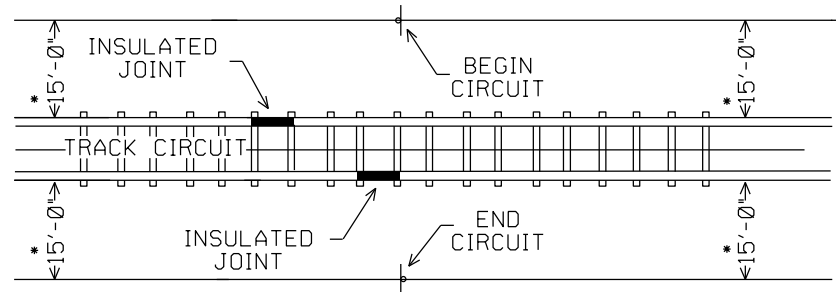
MATERIAL:
SIGNS: 1/8" THICK MILL FINISH ALUMINIUM PANEL, ALCOA 6016-T6 OR EQUAL.
PAINT ALL SIDES WITH LINEAR POLYURETHANE.
COLOR FACE OF PANEL WITH ENGINEERING GRADE PRESSURE SENSITIVE, RETRO-REFLECTIVE VINYL SHEETING.
SILK SCREEN LEGEND WITH BLACK INK.
FINISH WITH EXTERIOR GRADE PRESSURE SENSITIVE CLEAR MYLAR, 3M-1150 OR EQUAL.

STEEL POSTS: 12 GAGE (.105 THICK) 2.42 LBS. PER LINEAR FOOT 21*2" SQUARE STEEL POST (ATSM A-36) WITH 3*8" DIA. KNOCKOUT HOLES. ALL GALVANIZED IN ACCORDANCE WITH ATSM A-386.

HARDWARE: ALL HARDWARE TO BE VANDAL RESISTANT
BOLTS 5/16" ALUMINUM CARRIAGE BOLTS, 2024-T4 ALLOY, LENGTHS AS SHOWN.
BOLTS SHOWN ARE 2 3/4" & 3 1/2".

NUTS TAMPER RESISTANT, ALCOA OR EQUAL.
WASHERS PLAIN FLAT ALUMINUM WASHERS.

NOTES:
LETTERS TO BE 4" HIGH, BLACK ON WHITE RETRO-REFLECTIVE SHEETING.
LETTER STYLE SHALL BE "FUTURA BOLD"



NOTE:
* 15' - 0" PREFERRED
12' - 0" MINIMUM

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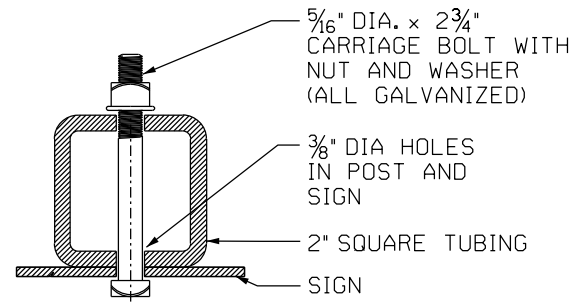
REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN	PRE, INC.
CHECKED	EJR
RECOMMENDED	WP
DATE	FEBRUARY 2015
DESIGNER PE STAMP	

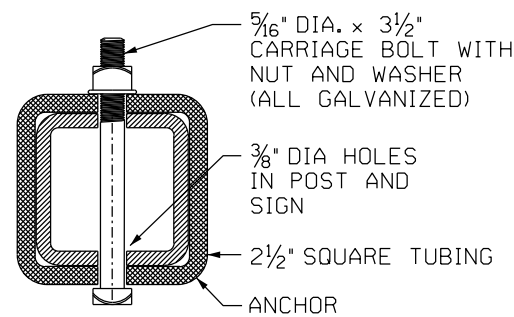
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San Diego, CA. 92101
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TRANSIT DISTRICT**
810 Mission Avenue
Oceanside, CA 92054
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ENGINEERING STANDARD DRAWINGS		DRAWING NO. ESD-8290
BEGIN CIRCUIT AND END CIRCUIT SIGN		DRAWING SHEET NO. 1 OF 1
SCALE: NONE		CONTRACT SHEET NO.



TYPICAL SECTION THRU SIGN AND POST



TYPICAL SECTION THRU POST AND ANCHOR

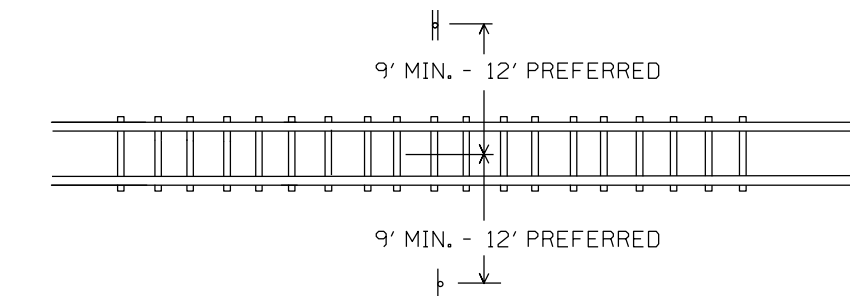
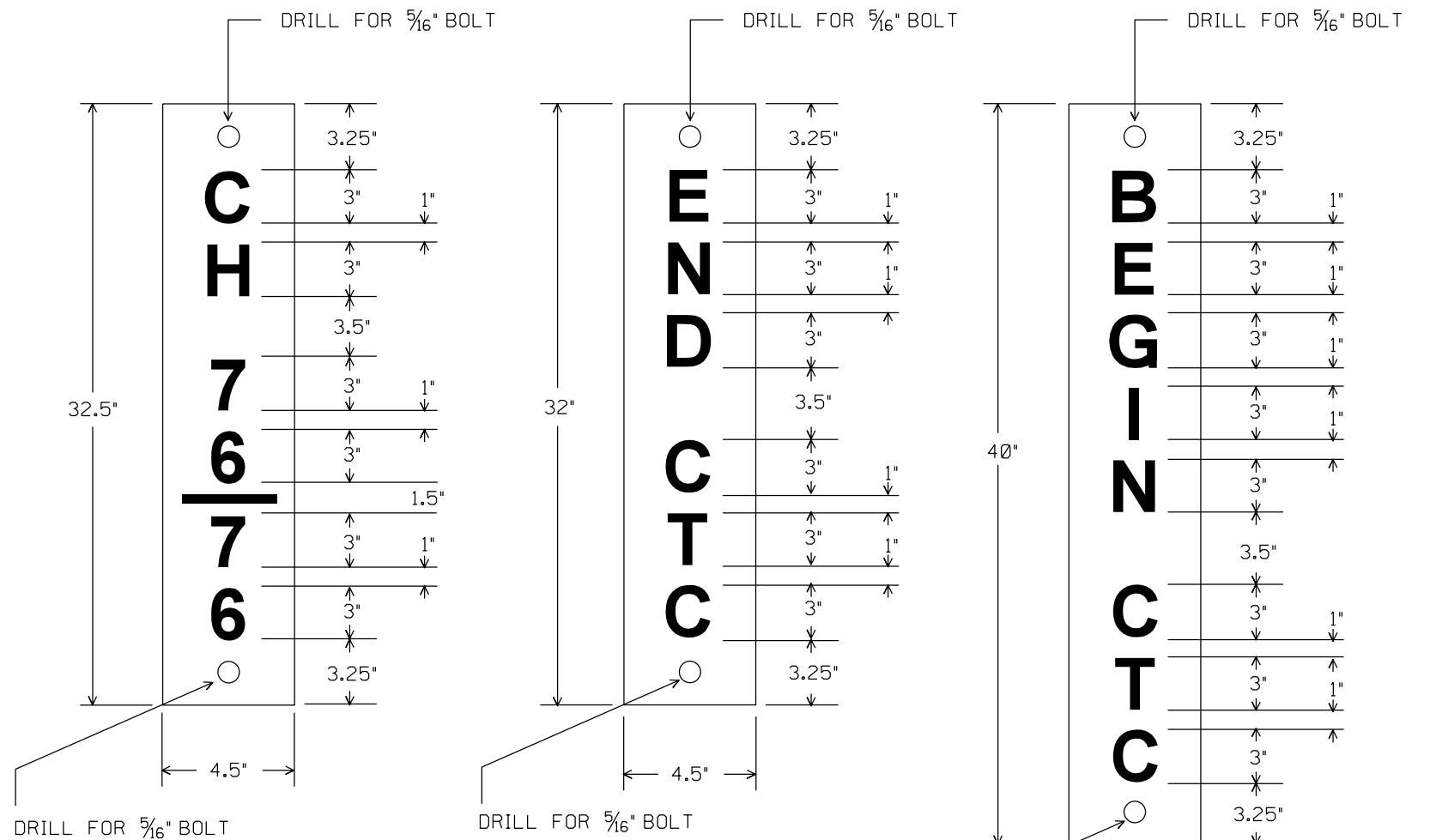
SPECIFICATIONS

MATERIAL:
 SIGNS: 1/8" THICK MILL FINISH ALUMINIUM PANEL, ALCOA 6016-T6 OR EQUAL.
 PAINT ALL SIDES WITH LINEAR POLYURETHANE.
 COLOR FACE OF PANEL WITH ENGINEERING GRADE PRESSURE SENSITIVE, RETRO-REFLECTIVE VINYL SHEETING, SILK SCREEN LEGEND WITH BLACK INK.
 FINISH WITH EXTERIOR GRADE PRESSURE SENSITIVE CLEAR MYLAR, 3M-1150 OR EQUAL.

STEEL POSTS: 12 GAGE (.105 THICK) 2.42 LBS. PER LINEAR FOOT 2 1/2" SQUARE STEEL POST (ATSM A-36) WITH 3/8" DIA. KNOCKOUT HOLES. ALL GALVANIZED IN ACCORDANCE WITH ATSM A-386.

HARDWARE: ALL HARDWARE TO BE VANDAL RESISTANT
BOLTS 5/16" ALUMINUM CARRIAGE BOLTS, 2024-T4 ALLOY, LENGTHS AS SHOWN. BOLTS SHOWN ARE 2" & 3 1/2".
NUTS TAMPER RESISTANT, ALCOA OR EQUAL.
WASHERS PLAIN FLAT ALUMINUM WASHERS.

NOTES:
 LETTERS TO BE 3" HIGH, BLACK ON WHITE RETRO-REFLECTIVE SHEETING.
 LETTER STYLE SHALL BE "FUTURA BOLD"
 POST SHALL BE DRIVEN A MINIMUM OF 18" BELOW FINAL GRADE.
 POST SHALL BE OF SUFFICIENT LENGTH THAT TOP OF SIGN IS A MINIMUM OF 8' ABOVE TOP OF RAIL.



LOCATION PLAN

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NOTES:

- "BEGIN CTC" AND "END CTC" SIGNS MAY BE MOUNTED ON A SINGLE POST.
- OBTAIN RADIO CHANNEL NUMBERS FROM ENGINEER.
- RADIO CHANNEL SIGNS MAY BE MOUNTED ON A SINGLE POST.

REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN	PRE, INC.
CHECKED	EJR
RECOMMENDED	WP
DATE	FEBRUARY 2015
DESIGNER PE STAMP	

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810 Mission Avenue
 Oceanside, CA 92054
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ENGINEERING STANDARD DRAWINGS
 CTC & RADIO CHANNEL SIGN

DRAWING NO.	ESD-8291
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	

EMERGENCY NOTIFICATION SIGN
SEE ESD-8270 FOR SIGN DETAIL

**REPORT EMERGENCY
OR PROBLEM
TO 1-888-243-5247
CROSSING XXX XXX X**

OF ROADWAY,
LANE STRIPING,
MEDIAN CURB
OR FORM OF
DELINEARIZATION
DEVICE

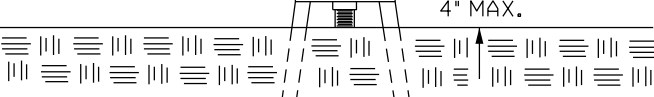
3' FROM FACE OF
CURB OR EDGE OF
TRAVELED ROADWAY

MIDDLE LAMP TO BE
CENTERED BETWEEN TIP LAMP
AND CURB LAMP AND MUST
CLEAR WIND BRACKET

3'-6" MIN.
4'-6" MAX.

CROWN OF ROADWAY

FACE OF
CURB
(SEE
NOTE 4)



SEE
NOTE 3

2'-0" MIN.

EDGE OF BACK-
GROUND OR PART
NEAREST ROADWAY

CLEARANCE AREA

17'-0" MIN.
SEE NOTE 3

INSTALL UNI-DIRECTIONAL
ELECTRONIC BELL IN EACH
QUADRANT WITH WARNING DEVICES

SEE NOTE 6

**RAIL
CROSSING**
CROSSING ROAD

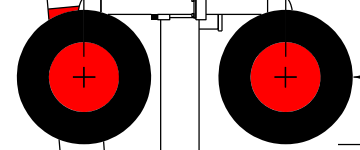
CENTER CROSSBUCK BETWEEN TOP OF
MAST AND TOP OF FLASHING LIGHT
ASSEMBLY OR MULTIPLE TRACKS SIGN

16'-0" GATE MAST

TRACKS

WHERE
REQUIRED

15" 15"



SEE NOTE 8

**REPORT EMERGENCY
OR PROBLEM
TO 1-888-243-5247
CROSSING XXX XXX X**

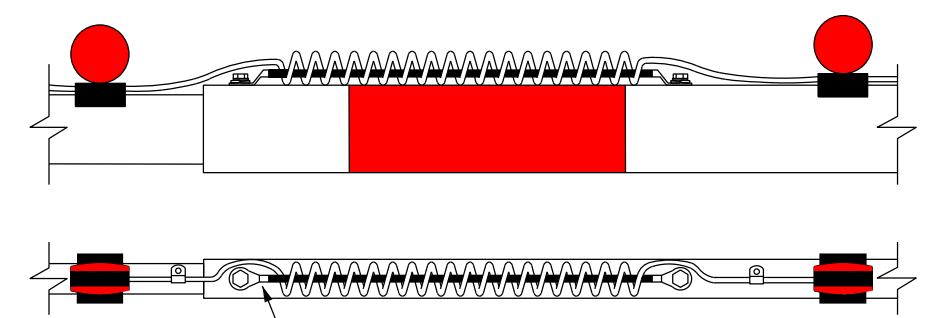
WHERE
APPLICABLE
(SEE NOTE 7)

8'-6" PREFERRED

JUNCTION BOX
ACCESS

4" MAX.

60" OR LESS (USE SHORT COIL CORD)
MFG P/N NEG-2018-CC-S
MORE THAN 60" (USE LONG COIL CORD)
MFG P/N NEG-2018-CC-L



USING A SELF TAPPING SCREW AND WASHER,
#10 AWG RING TERMINAL AND #10 AWG DOUBLE
INSULATED WIRE, SECURE THE COIL CORD TO
THE GATE ARM AS SHOWN. USE CABLE CLAMPS
AS NEEDED TO PROVIDE ADDITIONAL SECURING
OF COILED AND STRAIGHT CORDS TO THE GATE
ARM.

GATE LAMP WIRING DETAIL

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DISTRIBUTED IN ANY FORM OR BY ANY MEANS WITHOUT THE PRIOR WRITTEN PERMISSION OF
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NOTES:

1. THIS STANDARD SHALL APPLY TO ALL NEW CONSTRUCTION FOR GRADE CROSSING WARNING DEVICES EQUIPPED WITH FLASHING LIGHT SIGNALS WITH OR WITHOUT GATES.
2. REFER TO STANDARD DRAWINGS ESD-8350 THRU ESD-8390 FOR INFORMATION REGARDING PLACEMENT OF WARNING DEVICES.
3. TYPICAL MINIMUM CLEARANCE IS 2' FROM FACE OF CURB TO CLOSEST PART OF SIGNAL, WINDGUARD OR GATE ARM IN THE UPRIGHT POSITION FOR A DISTANCE OF 17' ABOVE THE ROADWAY.
4. WHERE THERE IS NO CURB, A MINIMUM HORIZONTAL CLEARANCE OF 2' FROM EDGE OF A PAVED OR SURFACED SHOULDER SHALL BE PROVIDED WITH A MINIMUM CLEARANCE OF 6' FROM THE EDGE OF TRAVELED ROADWAY.
5. TOP OF FOUNDATION TO BE NO MORE THAN 4" ABOVE SURFACE OF THE GROUND. PROPER DRAINAGE SHOULD BE PROVIDED SO THAT THE ELECTRICAL CONNECTION JUNCTION BOX CAN NOT BE COMPROMISED BY RETAINED WATER.
6. TYPICAL GATE MAST SHALL BE 16'-0" TALL, ALTHOUGH AN 18'-0" GATE MAST MAY BE USED TO PROVIDE MINIMUM CLEARANCE FOR AN ADJUSTABLE WIND SUPPORT THAT IS EXTENDED INTO THE CLEARANCE ENVELOPE.
7. EMERGENCY NOTIFICATION SIGN SHALL BE PLACED ON WARNING DEVICE AS DETERMINED BY THE FIELD ENGINEER. AT A MINIMUM, ONE SIGN IS REQUIRED IN APPROACH TO THE GRADE CROSSING FOR EACH DIRECTION OF VEHICULAR TRAVEL.
8. ALTERNATING RED FLASHING LIGHT UNITS (WHERE REQUIRED) SHALL BE 12" L.E.D. TYPE UNITS WITH 24" BACKGROUNDS.
9. ALL PARTS SHALL BE ALUMINUM IN COLOR EXCEPT FOR VISORS AND BACKGROUNDS WHICH SHALL BE FLAT BLACK IN COLOR.
10. INSTALL SHEAR BOLTS PER MANUFACTURER INSTRUCTIONS.

REV.	DATE	DESCRIPTION	DES.	ENG.

REVISIONS	DRAWN	PRE, INC.
	CHECKED	<i>EJR</i>
	E. ROE	
	RECOMMENDED	<i>BAS</i>
	B. SCHMITH	
	DATE	MARCH 18, 2017
	DESIGNER PE STAMP	

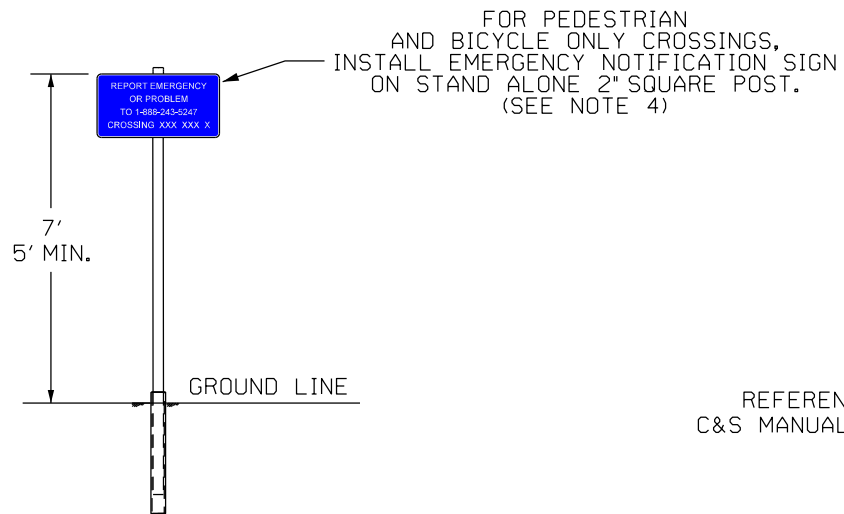
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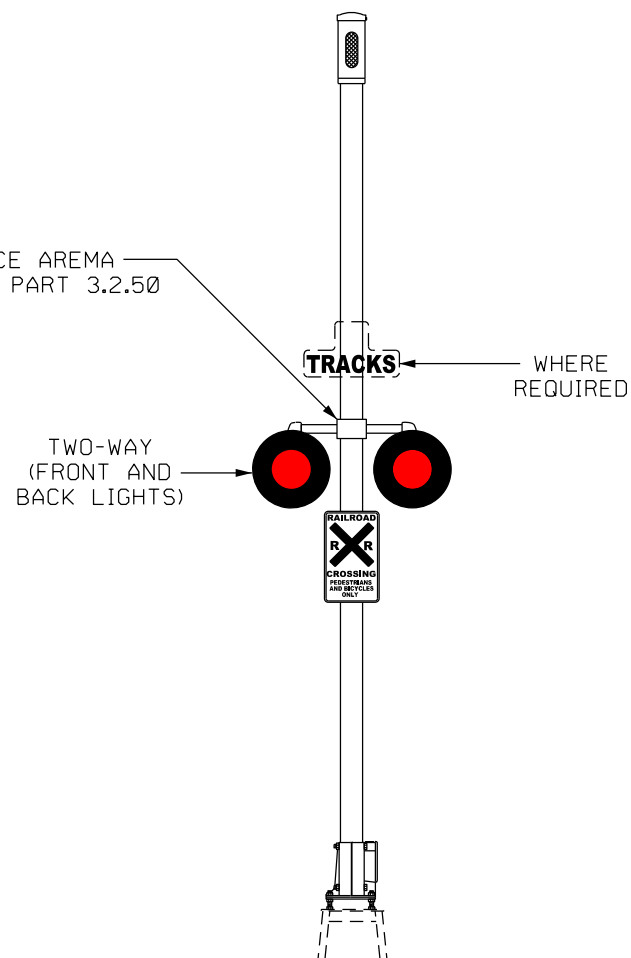
ENGINEERING STANDARD DRAWINGS	DRAWING NO. ESD-8300
FLASHING LIGHT SIGNAL ASSEMBLY WITH OR WITHOUT GATE	DRAWING SHEET NO. 1 OF 1
	SCALE: NONE
	CONTRACT SHEET NO.



EMERGENCY NOTIFICATION SIGN
SEE ESD-8270 FOR SIGN DETAIL

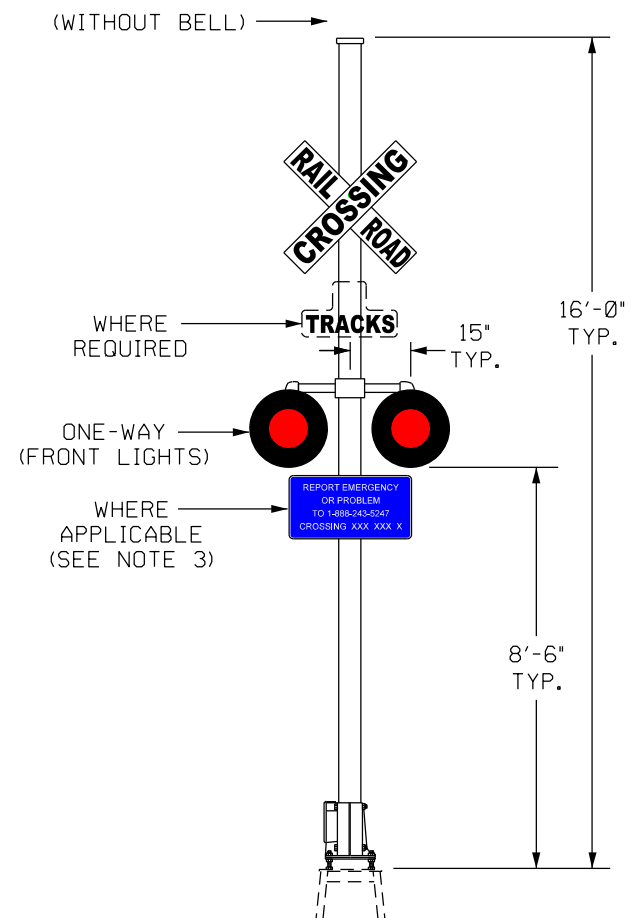


REFERENCE AREMA
C&S MANUAL PART 3.2.50



INCLUDES:
16'-0" MAST W/ JCT. BOX
2-WAY LED FLASHER ASSY
CROSSBUCKS
PED XING SIGN
ELECTRONIC BELL
HARDWARE

SITE SPECIFIC
ENS WITH SIGN MOUNTING
BRACKETS & HARDWARE



INCLUDES:
16'-0" MAST W/ JCT. BOX
1-WAY LED FLASHER ASSY
CROSSBUCKS
ELECTRONIC BELL
HARDWARE

SITE SPECIFIC
ENS WITH SIGN MOUNTING
BRACKETS & HARDWARE

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NOTES:

- FLASHING LIGHT SIGNAL UNITS SHALL BE 12" L.E.D. TYPE DESIGNED TO OPERATE WITH A SOLID STATE CROSSING CONTROLLER AND SHALL CONFORM TO AREMA C&S MANUAL RECOMMENDATIONS.
- 1-WAY AND 2-WAY LED FLASHER ASSEMBLIES SHALL INCLUDE JUNCTION BOX CROSS ARM AND LAMP MOUNTING BRACKETS PER AREMA C&S MANUAL PART 3.2.50, 12" LED LAMP UNITS, 24" STEEL BACKGROUNDS, STEEL HOODS AND ALL ASSOCIATED HARDWARE.
- FOR HIGHWAY-RAIL CROSSINGS, EMERGENCY NOTIFICATION SIGN SHALL BE PLACED ON WARNING DEVICE AS DETERMINED BY THE FIELD ENGINEER. AT A MINIMUM, ONE SIGN IS REQUIRED IN APPROACH TO THE GRADE CROSSING FOR EACH DIRECTION OF VEHICULAR TRAVEL.
- FOR PEDESTRIAN AND BICYCLE ONLY CROSSINGS, EMERGENCY NOTIFICATION SIGN SHALL BE PLACED ON STAND ALONE SQUARE POSTS AS DETERMINED BY THE FIELD ENGINEER. AT A MINIMUM, ONE SIGN IS REQUIRED TO BE VISIBLE TO THE APPROACHING PUBLIC FOR EACH DIRECTION OF TRAVEL.
- THE DIMENSIONS SHOWN ARE TYPICAL.

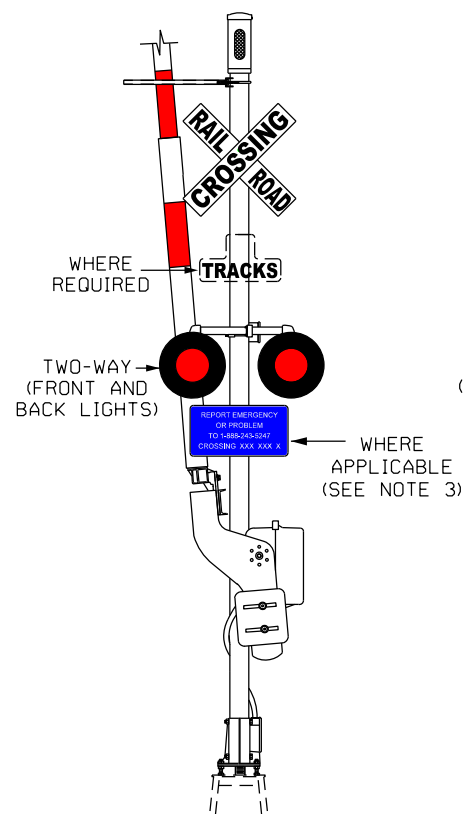
REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN	PRE, INC.
CHECKED	EJR
RECOMMENDED	WP
DATE	FEBRUARY 2015
DESIGNER PE STAMP	



ENGINEERING STANDARD DRAWINGS
FLASHING LIGHT SIGNAL
CONFIGURATIONS (CPUC No. 8)

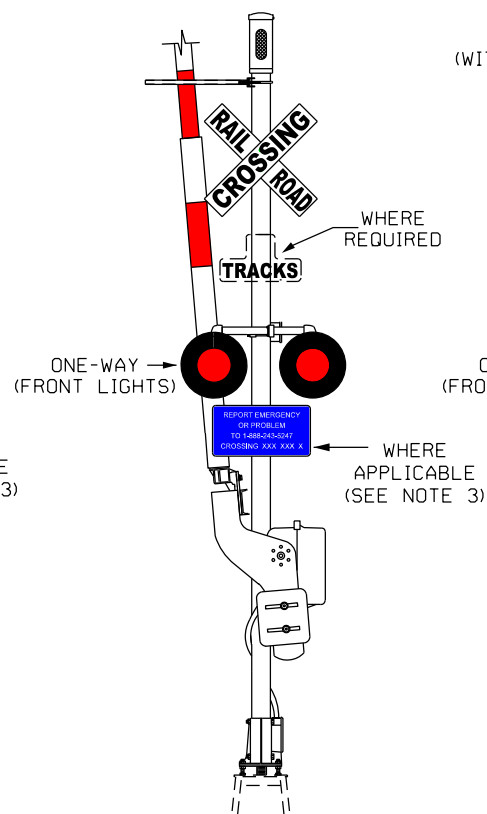
DRAWING NO.	ESD-8305
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	



CPUC STANDARD NO. 9
FLASHING LIGHT SIGNALS
WITH GATE ASSEMBLY,
TWO-WAY FLASHER APPLICATION

INCLUDES:
16'-0" MAST W/ JCT. BOX
2-WAY LED FLASHER ASSY
COMPLETE GATE ASSY
GATE ARM AND LAMPS
ELECTRONIC BELL
CROSSBUCKS
WIND SUPPORT BRACKET
HARDWARE

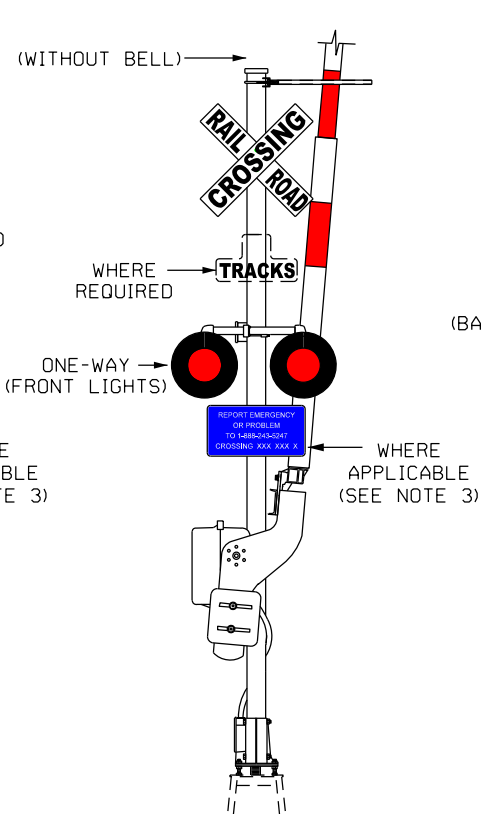
SITE SPECIFIC
ENS WITH SIGN MOUNTING
BRACKETS & HARDWARE



CPUC STANDARD NO. 9
FLASHING LIGHT SIGNALS
WITH GATE ASSEMBLY,
ONE-WAY FLASHER APPLICATION

INCLUDES:
16'-0" MAST W/ JCT. BOX
1-WAY LED FLASHER ASSY
COMPLETE GATE ASSY
GATE ARM AND LAMPS
ELECTRONIC BELL
CROSSBUCKS
WIND SUPPORT BRACKET
HARDWARE

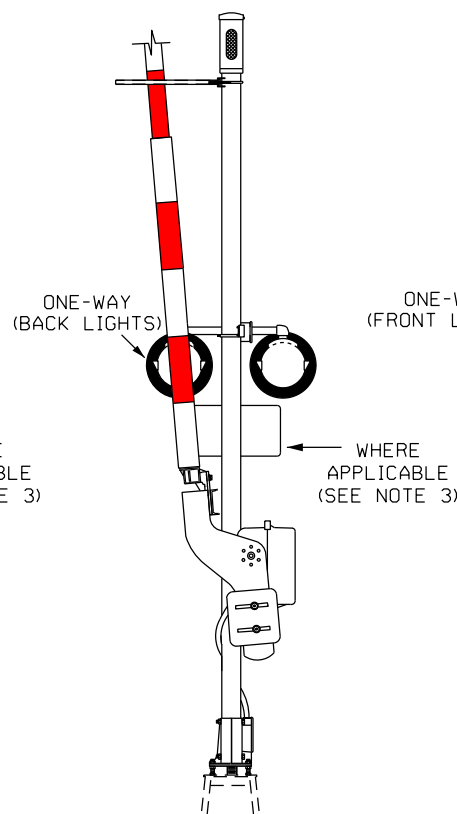
SITE SPECIFIC
ENS WITH SIGN MOUNTING
BRACKETS & HARDWARE



CPUC STANDARD MEDIAN NO. 9
FLASHING LIGHT SIGNALS WITH
GATE ASSEMBLY, BELL REMOVED
ONE-WAY FLASHER MEDIAN APPLICATION

INCLUDES:
16'-0" MAST W/ JCT. BOX
1-WAY LED FLASHER ASSY
COMPLETE GATE ASSY
GATE ARM AND LAMPS
(REMOVE ELECTRONIC BELL)
CROSSBUCKS
WIND SUPPORT BRACKET
HARDWARE

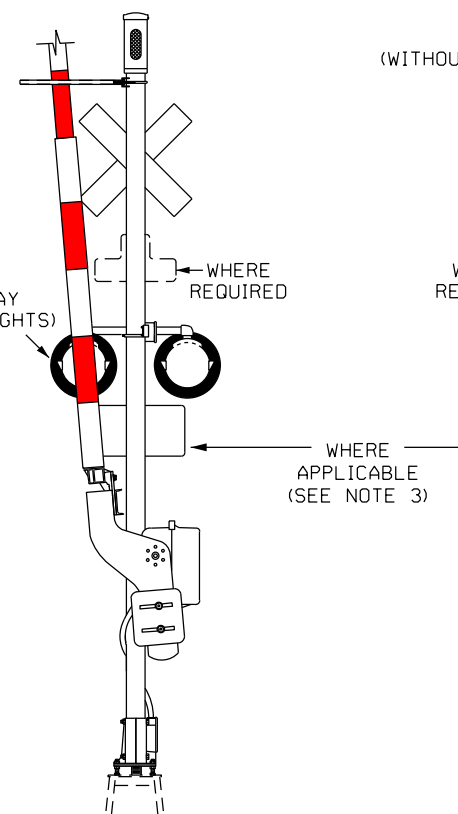
SITE SPECIFIC
ENS WITH SIGN MOUNTING
BRACKETS & HARDWARE



CPUC STANDARD NO. 9-A
GATE AND FLASHER ASSEMBLY
USED WITH CANTILEVER
FLASHING LIGHT SIGNALS.

INCLUDES:
16'-0" MAST W/ JCT. BOX
1-WAY LED FLASHER ASSY
COMPLETE GATE ASSY
GATE ARM AND LAMPS
ELECTRONIC BELL
WIND SUPPORT BRACKET
HARDWARE

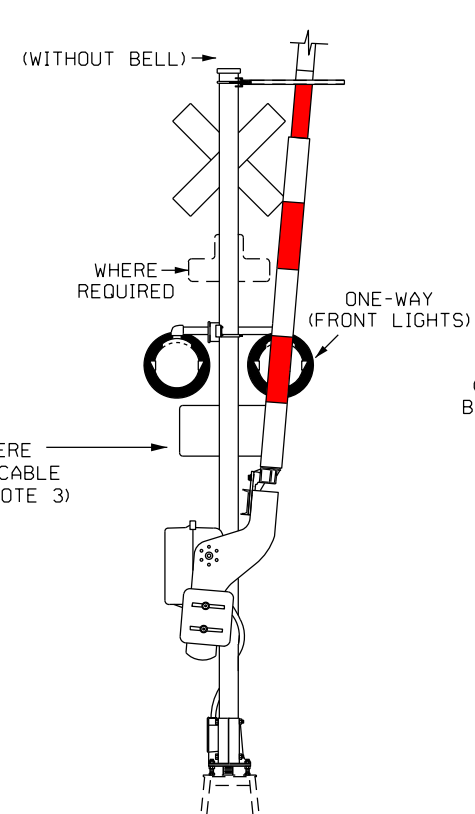
SITE SPECIFIC
ENS WITH SIGN MOUNTING
BRACKETS & HARDWARE



CPUC STANDARD NO. 9-E
FLASHING LIGHT SIGNALS
WITH EXIT GATE ASSEMBLY
ONE-WAY FLASHER APPLICATION

INCLUDES:
16'-0" MAST W/ JCT. BOX
1-WAY LED FLASHER ASSY
COMPLETE EXIT GATE ASSY
GATE ARM AND LAMPS
ELECTRONIC BELL
WIND SUPPORT BRACKET
HARDWARE

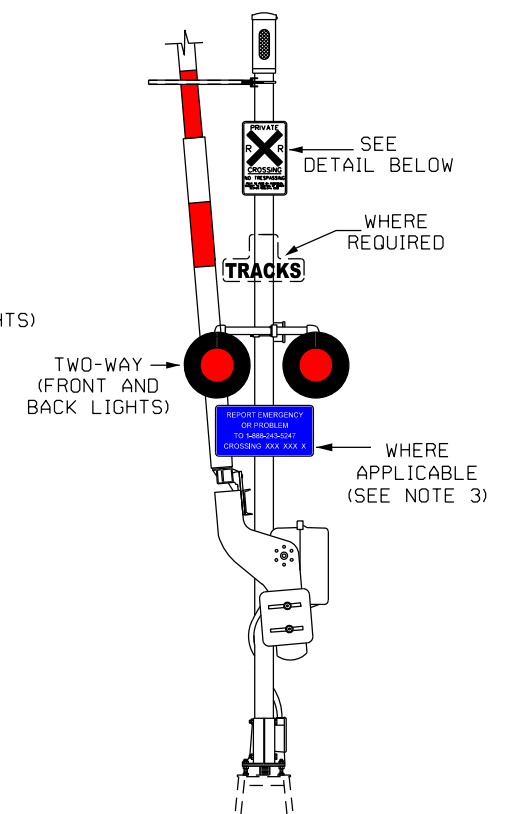
SITE SPECIFIC
ENS WITH SIGN MOUNTING
BRACKETS & HARDWARE



CPUC STANDARD MEDIAN NO. 9-E
FLASHING LIGHT SIGNALS WITH
EXIT GATE ASSEMBLY
BELL REMOVED ONE-WAY FLASHER
MEDIAN APPLICATION

INCLUDES:
16'-0" MAST W/ JCT. BOX
1-WAY LED FLASHER ASSY
COMPLETE EXIT GATE ASSY
GATE ARM AND LAMPS
(REMOVE ELECTRONIC BELL)
WIND SUPPORT BRACKET
HARDWARE

SITE SPECIFIC
ENS WITH SIGN MOUNTING
BRACKETS & HARDWARE



CPUC STANDARD NO. 9 AT
PRIVATE AT GRADE CROSSINGS
FLASHING LIGHT SIGNALS
WITH GATE ASSEMBLY,
TWO-WAY FLASHER APPLICATION

INCLUDES:
16'-0" MAST W/ JCT. BOX
2-WAY LED FLASHER ASSY
COMPLETE GATE ASSY
GATE ARM AND LAMPS
ELECTRONIC BELL
PRIVATE CROSSING SIGN
WIND SUPPORT BRACKET
HARDWARE

SITE SPECIFIC
ENS WITH SIGN MOUNTING
BRACKETS & HARDWARE

PUC STANDARD 1-X



EMERGENCY NOTIFICATION SIGN

SEE ESD-8270 FOR SIGN DETAIL



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NOTES:

- FLASHING LIGHT SIGNAL UNITS SHALL BE 12" L.E.D. TYPE DESIGNED TO OPERATE WITH A SOLID STATE CROSSING CONTROLLER AND SHALL CONFORM TO AREMA C&S MANUAL RECOMMENDATIONS.
- 1-WAY OR 2-WAY LED FLASHER ASSEMBLIES SHALL INCLUDE JUNCTION BOX CROSS ARM ASSEMBLY AND LAMP MOUNTING BRACKETS PER AREMA C&S MANUAL PART 3.2.51, 12" L.E.D. LAMP UNITS, 24" STEEL BACKGROUNDS, STEEL HOODS AND ALL ASSOCIATED HARDWARE.
- EMERGENCY NOTIFICATION SIGN SHALL BE PLACED ON WARNING DEVICE AS DETERMINED BY THE FIELD ENGINEER. AT A MINIMUM, ONE SIGN IS REQUIRED IN APPROACH TO THE GRADE CROSSING FOR EACH DIRECTION OF VEHICULAR TRAVEL.
- COMPLETE GATE ASSEMBLIES SHALL INCLUDE GATE MECHANISM, LEFT AND RIGHT COUNTERWEIGHT SUPPORT ARMS, (4) 50LB AND (2) 25LB COUNTERWEIGHTS AND RETAINER BRACKETS, TYPE B CONVERSION BRACKET, BREAKAWAY GATE ARM ADAPTER, 3 SHEAR PINS, KING PIN ASSEMBLY, 8'-0" LONG LIQUID TIGHT FLEX CONDUIT AND CONNECTORS, AND ALL ASSOCIATED HARDWARE.
- THE DIMENSIONS SHOWN ARE TYPICAL.
- GATE ARM LENGTHS SHALL BE DETERMINED BY SITE SPECIFIC CONDITIONS. GATE ARMS SHALL CONFORM TO AREMA C&S MANUAL PART 3.2.24

REV.	DATE	DESCRIPTION	DES.	ENG.

REVISIONS	DRAWN PRE, INC.
	CHECKED E. ROE
	RECOMMENDED W. PREY
	DATE FEBRUARY 2015
	DESIGNER PE STAMP

SAN DIEGO ASSOCIATION OF GOVERNMENTS
401 B Street, Suite 800
San Diego, CA. 92101
www.sandag.org

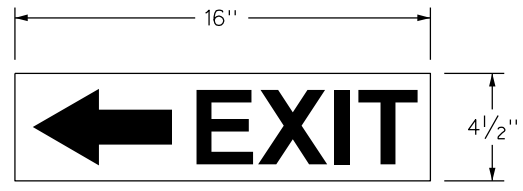
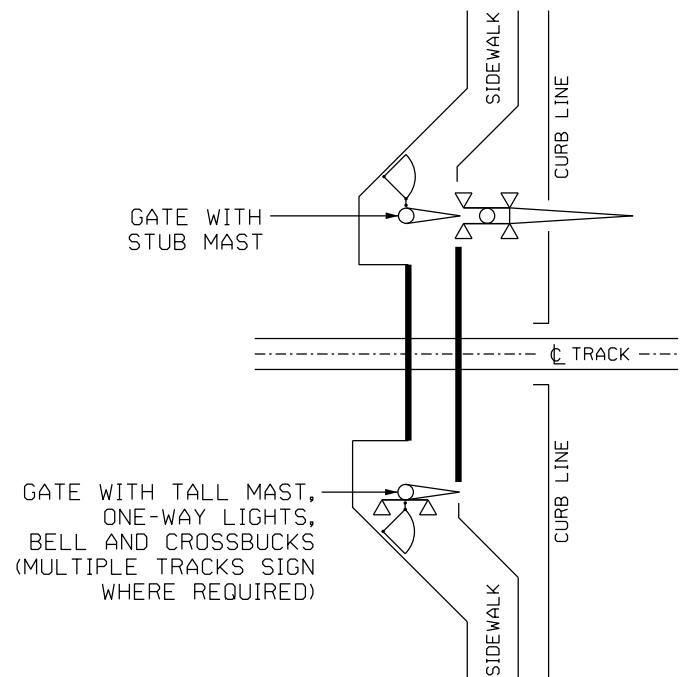
810 Mission Avenue
Oceanside, CA 92054
www.gonctd.com

ENGINEERING STANDARD DRAWINGS

FLASHING LIGHT SIGNAL
WITH GATE CONFIGURATIONS
(CPUC No. 9, 9-A, AND 9-E)

DRAWING NO.	ESD-8306
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	

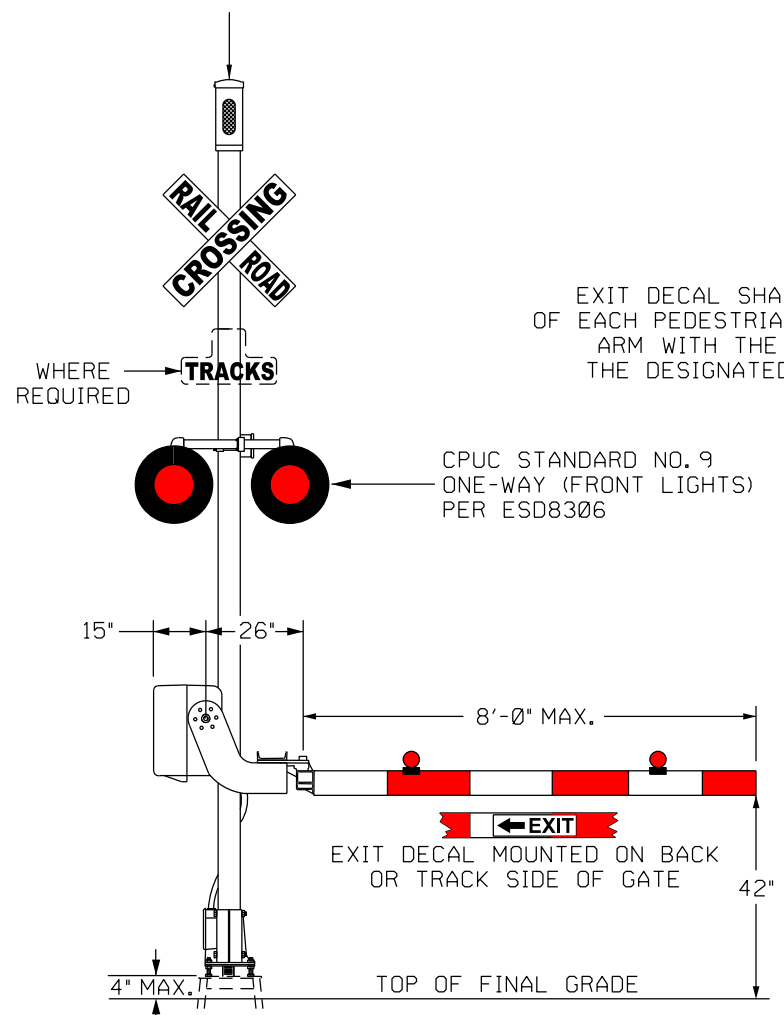
EXAMPLE OF PEDESTRIAN TREATMENT AT GRADE CROSSING WITH ENTRANCE GATE ONLY



EXIT DECAL SHALL BE ENGINEERING GRADE RETROREFLECTIVE MATERIAL, WHITE WITH 3 1/2" BLACK ARIAL BOLD LETTERS AND ARROW

EXIT DECAL

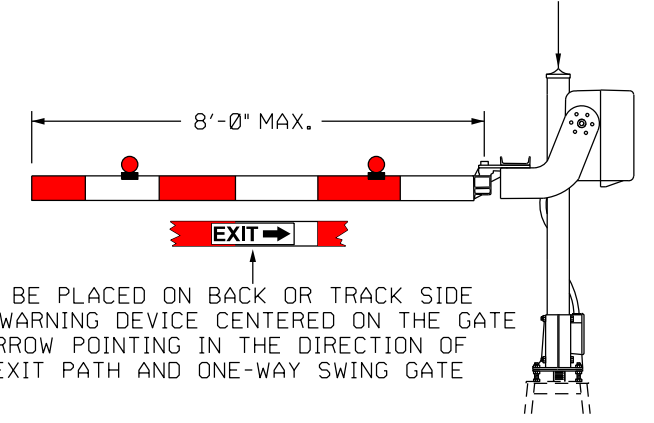
THIS TYPICAL ASSEMBLY SHALL BE USED IN QUADRANTS THAT DO NOT HAVE ROADWAY WARNING DEVICES INSTALLED.



PEDESTRIAN GATE ASSEMBLY FOR "OFF-QUADRANT" APPLICATIONS

INCLUDES:
16'-0" MAST W/JCT. BOX
GATE ALARM AND LAMPS
COMPLETE GATE ASSY
ELECTRONIC BELL
CROSSBUCKS
HARDWARE

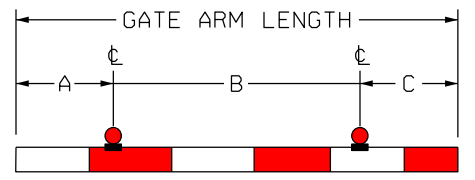
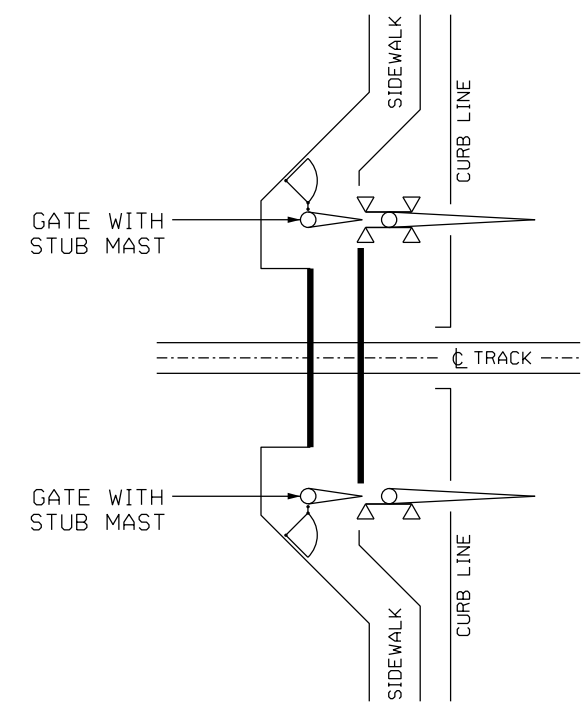
THIS TYPICAL ASSEMBLY SHALL BE USED IN QUADRANTS THAT HAVE ROADWAY WARNING DEVICES INSTALLED.



EXIT DECAL SHALL BE PLACED ON BACK OR TRACK SIDE OF EACH PEDESTRIAN WARNING DEVICE CENTERED ON THE GATE ARM WITH THE ARROW POINTING IN THE DIRECTION OF THE DESIGNATED EXIT PATH AND ONE-WAY SWING GATE

INCLUDES:
STUB MAST W/JCT. BOX
GATE ARM AND LAMPS
COMPLETE GATE ASSY
HARDWARE

EXAMPLE OF PEDESTRIAN TREATMENT AT GRADE CROSSING WITH ENTRANCE AND EXIT GATE



GATE ARM LENGTH	DIM. "A"	DIM. "B"	DIM. "C"
4'-0"	1'-0"	2'-0"	1'-0"
4'-6"	1'-1 1/2"	2'-3"	1'-1 1/2"
5'-0"	1'-3"	2'-6"	1'-3"
5'-6"	1'-4 1/2"	2'-9"	1'-4 1/2"
6'-0"	1'-6"	3'-0"	1'-6"
6'-6"	1'-7 1/2"	3'-3"	1'-7 1/2"
7'-0"	1'-9"	3'-6"	1'-9"
7'-6"	1'-10 1/2"	3'-9"	1'-10 1/2"
8'-0"	2'-0"	4'-0"	2'-0"

GATE ARM LAMP SPACING AND PLACEMENT

NOTES:

- ORIENTATION OF GATE ARM AND MECHANISM WILL VARY DEPENDING ON SITE SPECIFIC REQUIREMENTS. ORIENTATION AS SHOWN IN THIS STANDARD ARE FOR ILLUSTRATION PURPOSES ONLY.
- COMPLETE GATE ASSEMBLIES SHALL INCLUDE GATE MECHANISM, LEFT AND RIGHT SUPPORT ARMS, TYPE B CONVERSION BRACKET, BREAK-AWAY GATE ARM ADAPTER, 3 SHEAR PINS, KING PIN ASSEMBLY, GATE ARM AND LAMPS, 8'-0" LONG LIQUID TIGHT FLEX CONDUIT AND CONNECTORS, AND ALL ASSOCIATED HARDWARE.
- FOR GATE LAMP WIRING DETAILS, REFERENCE ESD-8300.

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REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN	PRE, INC.
CHECKED	EJR
RECOMMENDED	BAS
DATE	MARCH 18, 2017
DESIGNER PE STAMP	

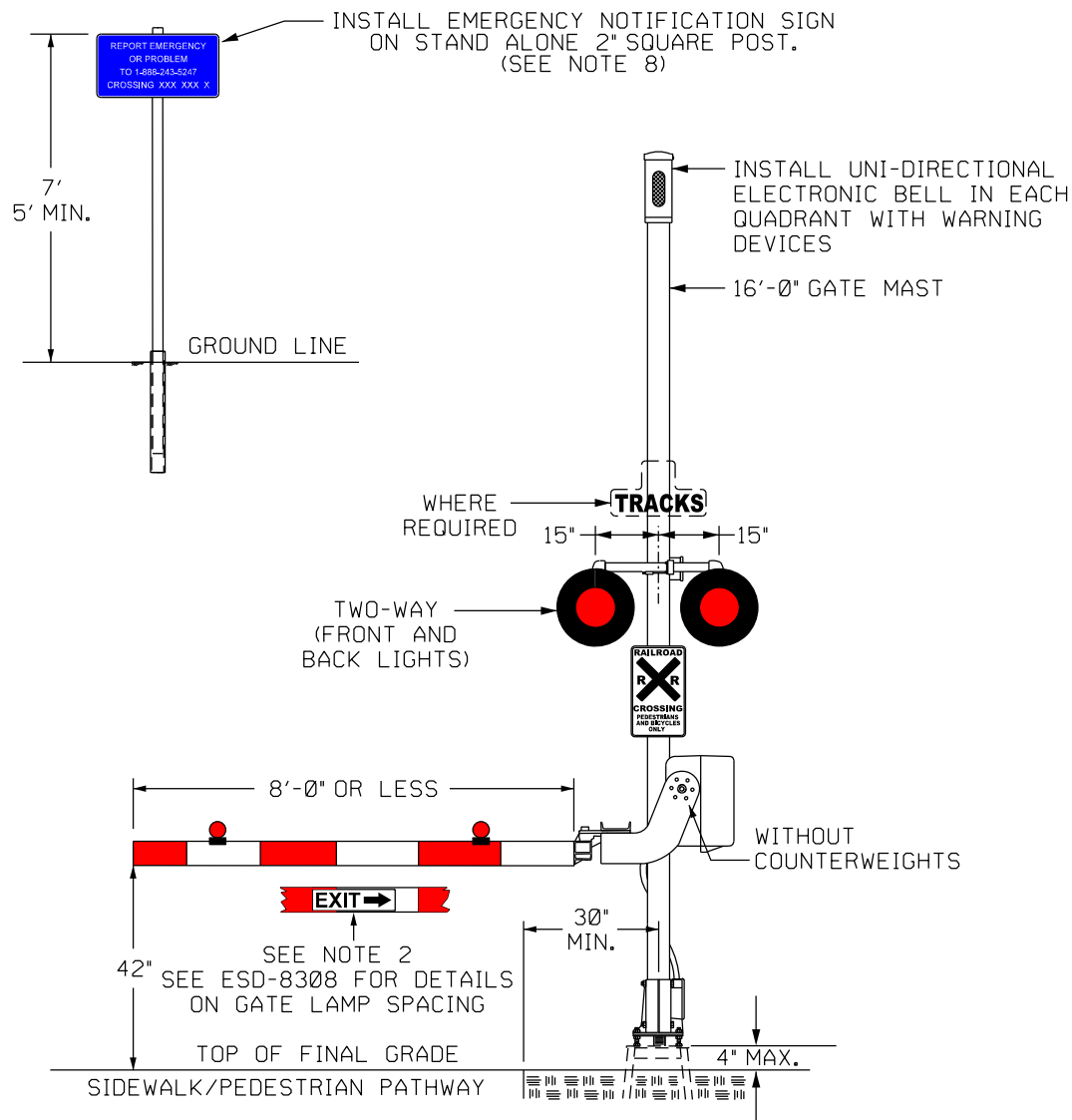
SAN DIEGO ASSOCIATION OF GOVERNMENTS
401 B Street, Suite 800
San Diego, CA. 92101
www.sandag.org

810 Mission Avenue
Oceanside, CA 92054
www.gonctd.com

ENGINEERING STANDARD DRAWINGS

TYPICAL GATE ASSEMBLIES FOR PEDESTRIAN TREATMENTS AT VEHICLE CROSSINGS

DRAWING NO.	ESD-8308
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	

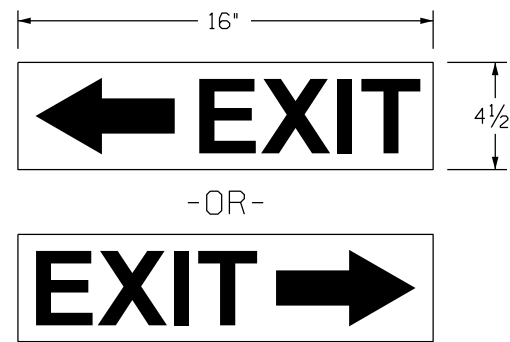


PEDESTRIAN FLASHING LIGHT SIGNALS WITH GATE ASSEMBLY
* FOR GATE ARMS UP TO 8'-0" LONG *



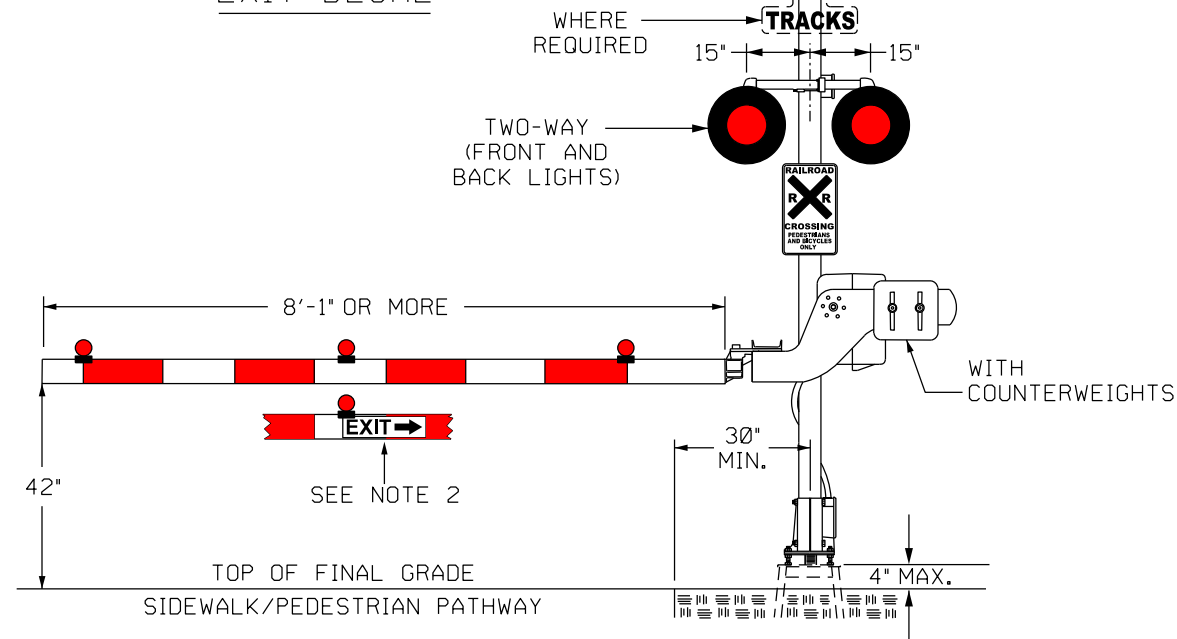
INCLUDES:
16'-0" MAST W/ JCT. BOX
2-WAY LED FLASHER ASSY
COMPLETE GATE ASSY
GATE ARM AND LAMPS
ELECTRONIC BELL
CROSSBUCKS
PED XING SIGN
HARDWARE

SITE SPECIFIC
ENS WITH SIGN MOUNTING
BRACKETS & HARDWARE



EXIT DECAL SHALL BE ENGINEERING GRADE RETROREFLECTIVE MATERIAL, WHITE WITH 3 1/2" BLACK ARIAL BOLD LETTERS AND ARROW

EXIT DECAL



EMERGENCY NOTIFICATION SIGN SEE ESD-8270 FOR SIGN DETAIL



SANDAG/NCTD ENGINEERING STANDARDS ARE INTENDED FOR SANDAG/NCTD APPROVED USES ONLY. FOR NON-SANDAG/NCTD APPROVED USES: SANDAG/NCTD SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF THE DATA OR INFORMATION CONTAINED HEREIN. THE SELECTION AND USE OF THESE STANDARDS IS THE SOLE RESPONSIBILITY OF THE USER AND SHOULD NOT BE USED WITHOUT CONSULTING A REGISTERED PROFESSIONAL ENGINEER. ALL WARRANTIES AND REPRESENTATIONS OF ANY KIND ARE DISCLAIMED. ANYONE MAKING USE OF THIS INFORMATION AGREES THAT IT ASSUMES ALL LIABILITY ARISING FROM SUCH USE. NO PART OF THESE STANDARDS SHOULD BE REPRODUCED OR DISTRIBUTED IN ANY FORM OR BY ANY MEANS WITHOUT THE PRIOR WRITTEN PERMISSION OF SANDAG/NCTD. ALL RIGHTS RESERVED.

PEDESTRIAN FLASHING LIGHT SIGNALS WITH GATE ASSEMBLY
* FOR GATE ARMS 8'-1" OR LONGER *

INCLUDES:
16'-0" MAST W/ JCT. BOX
2-WAY LED FLASHER ASSY
COMPLETE GATE ASSY
GATE ARM AND LAMPS
ELECTRONIC BELL
CROSSBUCKS
PED XING SIGN
HARDWARE

SITE SPECIFIC
ENS WITH SIGN MOUNTING
BRACKETS & HARDWARE

NOTES:

1. THIS CONFIGURATION SHALL BE USED AT PEDESTRIAN CROSSINGS THAT ARE NOT LOCATED ADJACENT TO A HIGHWAY-RAIL GRADE CROSSING.
2. WHEN PEDESTRIAN PATHWAY IS EQUIPPED WITH AN EXIT PATH AND ONE-WAY SWING GATE, AN EXIT DECAL SHALL BE PLACED ON THE TRACK SIDE OF EACH PEDESTRIAN WARNING DEVICE CENTERED ON THE GATE ARM WITH THE ARROW POINTING IN THE DIRECTION OF THE DESIGNATED EXIT PATH AND ONE-WAY SWING GATE
3. REFER TO ENGINEERING STANDARD ESD-8390 FOR INFORMATION REGARDING PLACEMENT OF PEDESTRIAN AND BICYCLE ONLY WARNING DEVICES.
4. LIGHT ASSEMBLIES SHALL BE PLACED SO AS TO NOT INTERFERE WITH GATE ARM MOVEMENT.
5. FLASHING LIGHT SIGNAL UNITS SHALL BE 12" L.E.D. TYPE DESIGNED TO OPERATE WITH A SOLID STATE CROSSING CONTROLLER AND SHALL CONFORM TO AREMA C&S MANUAL RECOMMENDATIONS.
6. 1-WAY OR 2-WAY LED FLASHER ASSEMBLIES SHALL INCLUDE JUNCTION BOX CROSS ARM ASSEMBLY AND LAMP MOUNTING BRACKETS PER AREMA C&S MANUAL PART 3.2.51, 12" L.E.D. LAMP UNITS, 24" STEEL BACKGROUNDS, STEEL HOODS AND ALL ASSOCIATED HARDWARE.
7. COMPLETE GATE ASSEMBLIES SHALL INCLUDE GATE MECHANISM, LEFT AND RIGHT SUPPORT ARMS (WITH OR WITHOUT COUNTERWEIGHT SUPPORT DEPENDING ON CONFIGURATION), (4) 50LB AND (2) 25LB COUNTERWEIGHTS AND RETAINER BRACKETS (IF REQUIRED), TYPE B CONVERSION BRACKET, BREAKAWAY GATE ARM ADAPTER, 3 SHEAR PINS, KING PIN ASSEMBLY, GATE ARM AND LAMP, 8'-0" LONG LIQUID TIGHT FLEX CONDUIT AND CONNECTORS, AND ALL ASSOCIATED HARDWARE.
8. EMERGENCY NOTIFICATION SIGN SHALL BE PLACED ON STAND ALONE SQUARE POSTS AS DETERMINED BY THE FIELD ENGINEER. AT A MINIMUM, ONE SIGN IS REQUIRED TO BE VISIBLE TO THE APPROACHING PUBLIC FOR EACH DIRECTION OF TRAVEL.
9. FOR GATE LAMP WIRING DETAILS, REFERENCE ESD-8300.
10. THE DIMENSIONS SHOWN ARE TYPICAL.

REV.	DATE	DESCRIPTION	DES.	ENG.

REVISIONS	DRAWN PRE, INC.
	CHECKED E. ROE <i>EJR</i>
	RECOMMENDED B. SCHMITH <i>BS</i>
	DATE MARCH 18, 2017
	DESIGNER PE STAMP

SAN DIEGO ASSOCIATION OF GOVERNMENTS
401 B Street, Suite 800
San Diego, CA. 92101
www.sandag.org

810 Mission Avenue
Oceanside, CA 92054
www.gonctd.com

ENGINEERING STANDARD DRAWINGS	DRAWING NO. ESD-8309
TYPICAL GATE ASSEMBLIES FOR PEDESTRIAN AND BICYCLE ONLY CROSSINGS	DRAWING SHEET NO. 1 OF 1
	SCALE: NONE
	CONTRACT SHEET NO.

EMERGENCY NOTIFICATION SIGN
SEE ESD-8270 FOR SIGN DETAIL

CPUC STANDARD NO. 9-A
CANTILEVER FLASHING
LIGHT SIGNALS
10' TO 30' ARM LENGTH



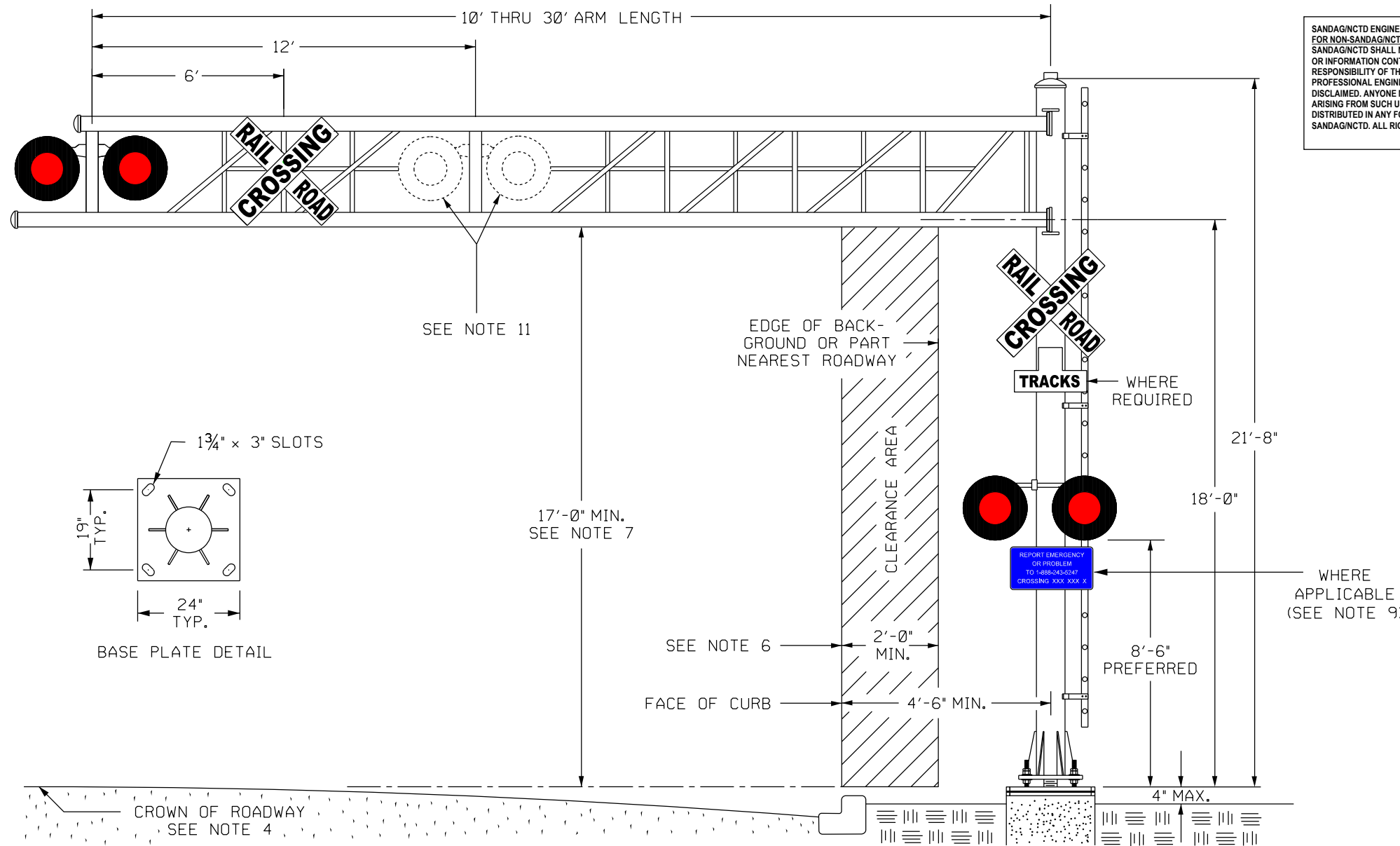
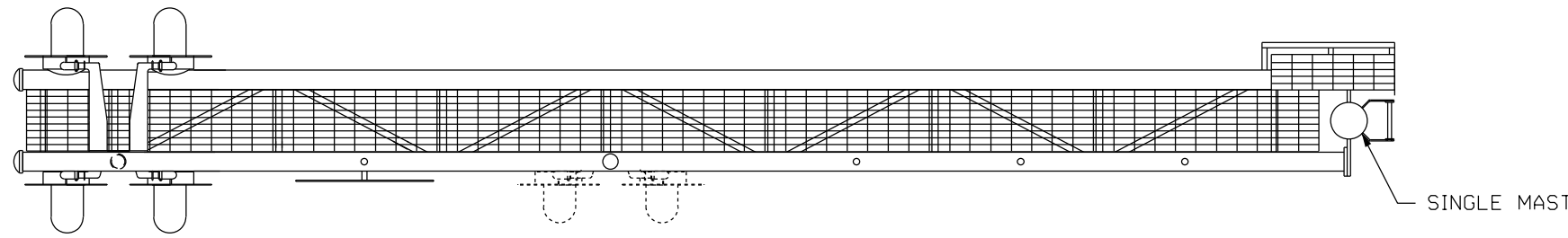
INCLUDES:
MAIN MAST
CANTILEVER ARM MAST
POLE-MOUNTED JCT BOX
1-WAY LED FLASHER ASSY
2-WAY LED FLASHER ASSY
CROSSBUCKS (MAIN MAST)
CROSSBUCKS (JURY MAST)
LADDER AND GUARD
HARDWARE

SITE SPECIFIC
ENS WITH SIGN MOUNTING
BRACKETS & HARDWARE

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NOTES:

1. THIS STANDARD SHALL APPLY TO ALL NEW CONSTRUCTION FOR GRADE CROSSING WARNING DEVICES EQUIPPED WITH CANTILEVER FLASHING LIGHT SIGNALS.
2. REFER TO STANDARD DRAWINGS ESD-8360, ESD-8365, ESD-8380 & ESD-8385 FOR INFORMATION REGARDING CANTILEVER PLACEMENT.
3. WHERE THERE IS NO CURB, A MINIMUM HORIZONTAL CLEARANCE OF 2' FROM EDGE OF A PAVED OR SURFACED SHOULDER SHALL BE PROVIDED WITH A MINIMUM CLEARANCE OF 6' FROM THE EDGE OF TRAVELED ROADWAY.
4. TOP OF FOUNDATION TO BE NO MORE THAN 4" ABOVE SURFACE OF THE GROUND. PROPER DRAINAGE SHOULD BE PROVIDED SO THAT THE ELECTRICAL CONNECTION JUNCTION BOX CAN NOT BE COMPROMISED BY RETAINED WATER.
5. FOUNDATION BOLTS TO EXTEND A MINIMUM OF 8" ABOVE THE TOP OF CONCRETE FOUNDATION.
6. TYPICAL MINIMUM CLEARANCE IS 2' FROM FACE OF CURB TO CLOSEST PART OF SIGNAL HOOD OR BACKGROUND.
7. MINIMUM CLEARANCE FROM CROWN OF ROAD TO CLOSEST PART OF CANTILEVER IS 17'-0".
8. ALTERNATING RED FLASHING LIGHT UNITS TO BE 12" L.E.D. TYPE UNIT, WITH 24" BACKGROUNDS.
9. EMERGENCY NOTIFICATION SIGN SHALL BE PLACED ON WARNING DEVICE AS DETERMINED BY THE FIELD ENGINEER. AT A MINIMUM, ONE SIGN IS REQUIRED IN APPROACH TO THE GRADE CROSSING FOR EACH DIRECTION OF VEHICULAR TRAVEL.
10. ALL PARTS SHALL BE ALUMINUM IN COLOR EXCEPT FOR VISORS AND BACKGROUNDS WHICH SHALL BE FLAT BLACK IN COLOR.
11. ADDITIONAL MAIN MAST LIGHTS AND LANE LIGHTS SHALL BE INSTALLED WHERE APPLICABLE.
12. SUPPORTS 500 LBS. LIVE LOAD AT THE END OF CANTILEVER ARM.



REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN	PRE, INC.
CHECKED	EJR
RECOMMENDED	WP
DATE	FEBRUARY 2015
DESIGNER PE STAMP	

SANDAG
SAN DIEGO ASSOCIATION OF GOVERNMENTS
401 B Street, Suite 800
San Diego, CA. 92101
www.sandag.org

NORTH COUNTY TRANSIT DISTRICT
810 Mission Avenue
Oceanside, CA 92054
www.gonctd.com

ENGINEERING STANDARD DRAWINGS	DRAWING NO. ESD-8320
SINGLE MAST CROSSING CANTILEVER ASSEMBLY 10' THRU 30' ARM LENGTH	DRAWING SHEET NO. 1 OF 1
	SCALE: NONE
	CONTRACT SHEET NO.

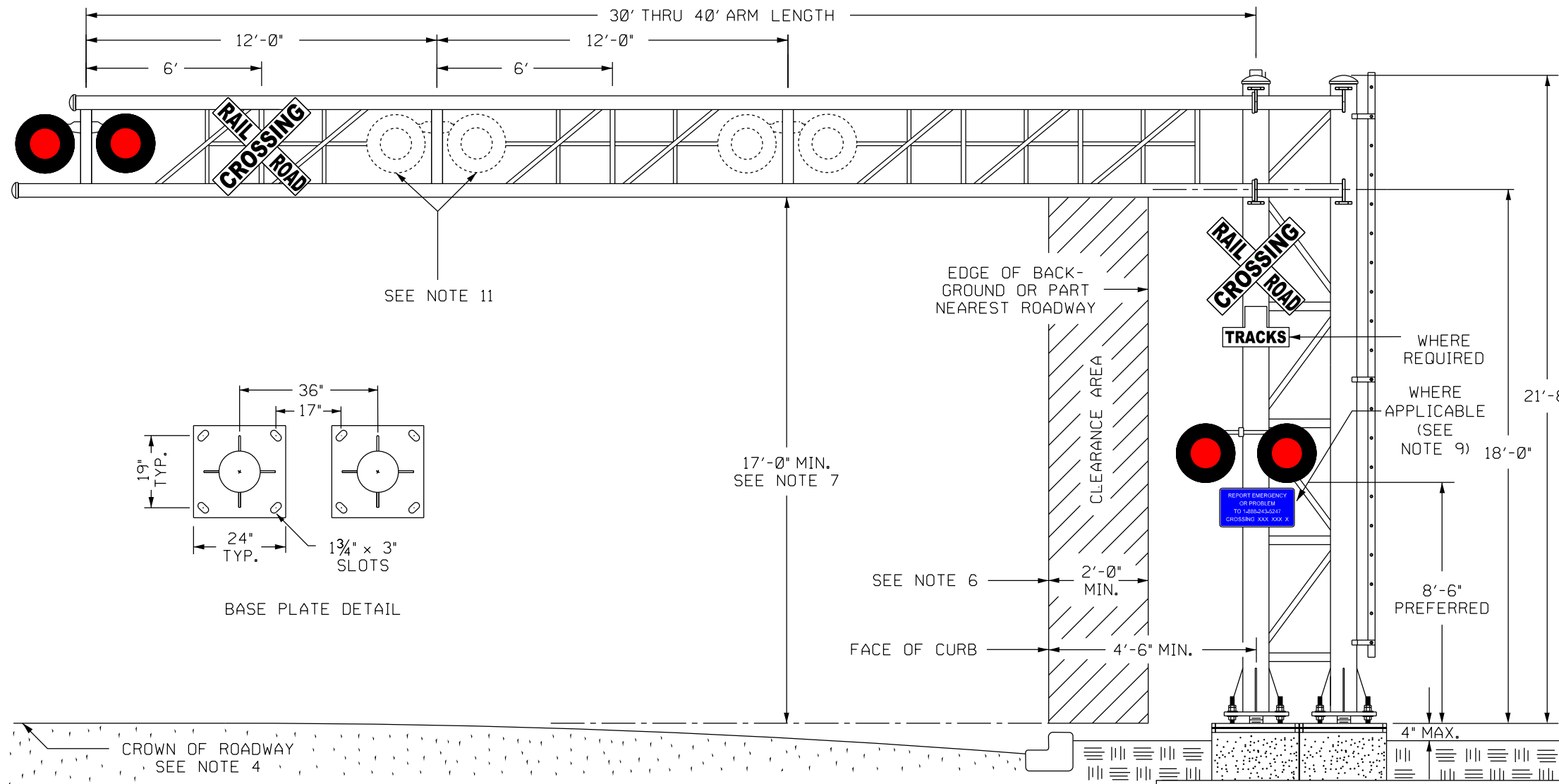
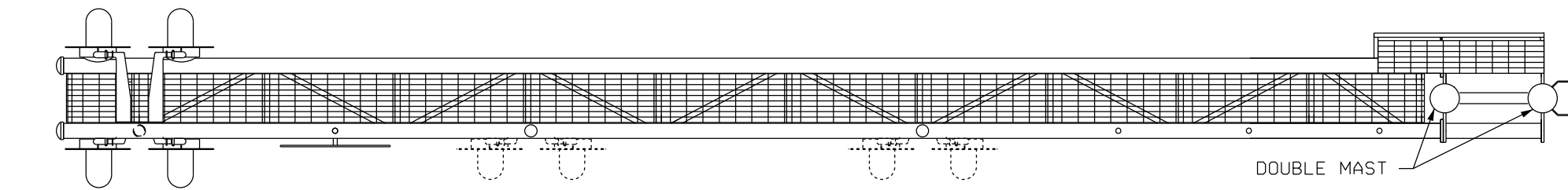
EMERGENCY NOTIFICATION SIGN
SEE ESD-8270 FOR SIGN DETAIL

CPUC STANDARD NO. 9-A
CANTILEVER FLASHING
LIGHT SIGNALS
30' TO 40' ARM LENGTH



INCLUDES:
MAIN MAST (DOUBLE)
CANTILEVER ARM MAST
POLE-MOUNTED JCT BOX
1-WAY LED FLASHER ASSY
2-WAY LED FLASHER ASSY
CROSSBUCKS (MAIN MAST)
CROSSBUCKS (JURY MAST)
LADDER AND GUARD
HARDWARE

SITE SPECIFIC
ENS WITH SIGN MOUNTING
BRACKETS & HARDWARE



NOTES:

1. THIS STANDARD SHALL APPLY TO ALL NEW CONSTRUCTION FOR GRADE CROSSING WARNING DEVICES EQUIPPED WITH CANTILEVER FLASHING LIGHT SIGNALS.
2. REFER TO STANDARD DRAWINGS ESD8360, ESD8365, ESD8380, & ESD8385 FOR INFORMATION REGARDING CANTILEVER PLACEMENT.
3. WHERE THERE IS NO CURB, A MINIMUM HORIZONTAL CLEARANCE OF 2' FROM EDGE OF A PAVED OR SURFACED SHOULDER SHALL BE PROVIDED WITH A MINIMUM CLEARANCE OF 6' FROM THE EDGE OF TRAVELED ROADWAY.
4. TOP OF FOUNDATION TO BE NO MORE THAN 4" ABOVE SURFACE OF THE GROUND. PROPER DRAINAGE SHOULD BE PROVIDED SO THAT THE ELECTRICAL CONNECTION JUNCTION BOX CAN NOT BE COMPROMISED BY RETAINED WATER.
5. FOUNDATION BOLTS TO EXTEND A MINIMUM OF 8" ABOVE THE TOP OF CONCRETE FOUNDATION.
6. TYPICAL MINIMUM CLEARANCE IS 2' FROM FACE OF CURB TO CLOSEST PART OF SIGNAL HOOD OR BACKGROUND.
7. MINIMUM CLEARANCE FROM CROWN OF ROAD TO CLOSEST PART OF CANTILEVER IS 17'-0".
8. ALTERNATING RED FLASHING LIGHT UNITS TO BE 12" L.E.D. TYPE UNITS, WITH 24" BACKGROUNDS.
9. EMERGENCY NOTIFICATION SIGN SHALL BE PLACED ON WARNING DEVICE AS DETERMINED BY THE FIELD ENGINEER. AT A MINIMUM, ONE SIGN IS REQUIRED IN APPROACH TO THE GRADE CROSSING FOR EACH DIRECTION OF VEHICULAR TRAVEL.
10. ALL PARTS SHALL BE ALUMINUM IN COLOR EXCEPT FOR VISORS AND BACKGROUNDS WHICH SHALL BE FLAT BLACK IN COLOR.
11. ADDITIONAL MAIN MAST LIGHTS AND LANE LIGHTS SHALL BE INSTALLED WHERE APPLICABLE.
12. SUPPORTS 500 LBS. LIVE LOAD AT THE END OF CANTILEVER ARM.

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REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN	PRE, INC.
CHECKED	EJR
RECOMMENDED	WP
DATE	FEBRUARY 2015
DESIGNER PE STAMP	

SAN DIEGO ASSOCIATION OF GOVERNMENTS
401 B Street, Suite 800
San Diego, CA. 92101
www.sandag.org

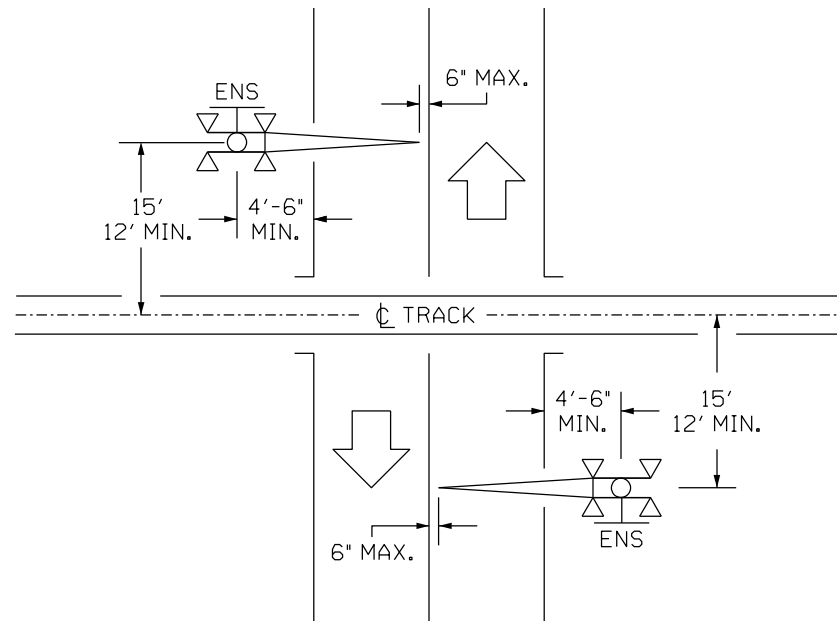
810 Mission Avenue
Oceanside, CA 92054
www.gonctd.com

ENGINEERING STANDARD DRAWINGS DOUBLE MAST CROSSING CANTILEVER ASSEMBLY 30' THRU 40' ARM LENGTH	DRAWING NO.	ESD-8325
	DRAWING SHEET NO.	1 OF 1
	SCALE:	NONE
	CONTRACT SHEET NO.	

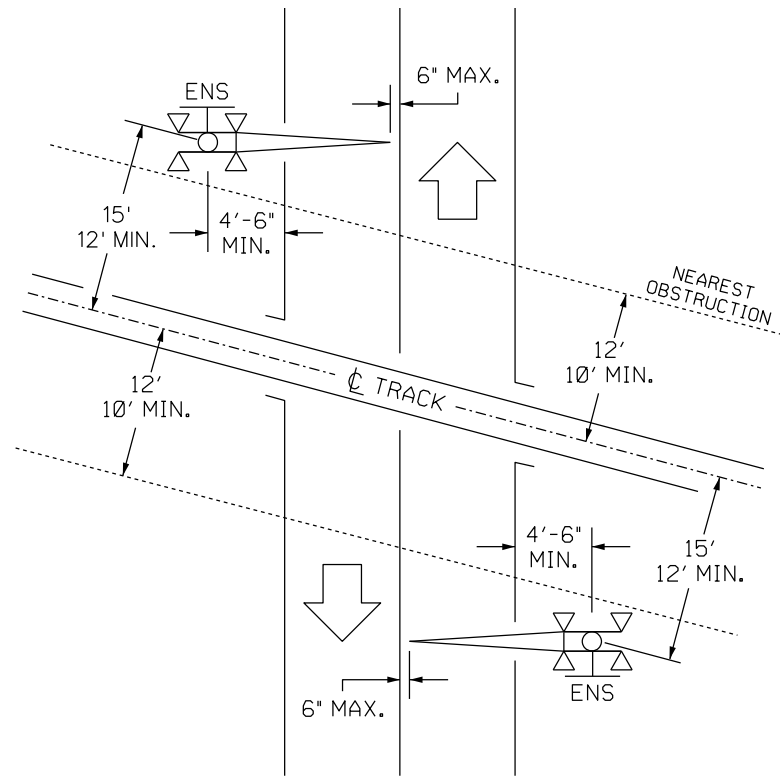
FLASHING LIGHT SIGNALS WITH ENTRANCE GATES:

ONE OR MORE TRACKS,
TWO-WAY VEHICULAR TRAFFIC,
ONE LANE EACH WAY.

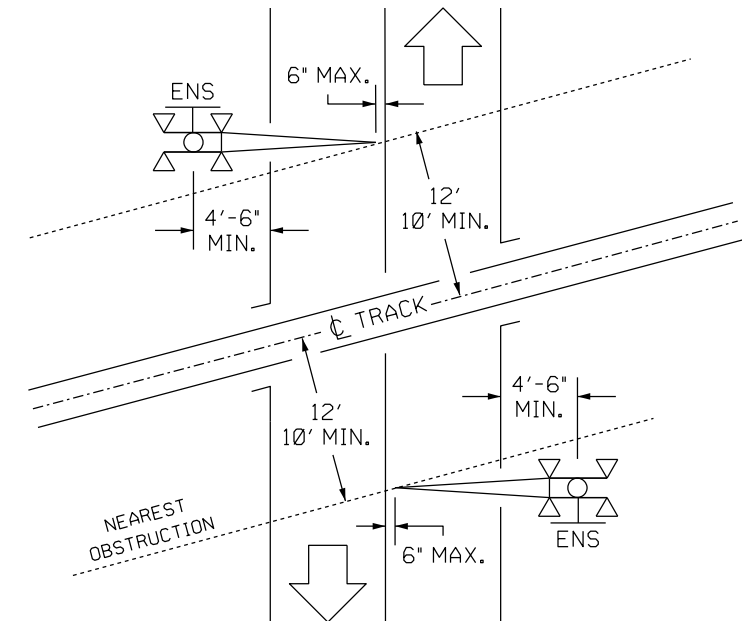
RIGHT ANGLE CROSSING



ACUTE ANGLE CROSSING



OBTUSE ANGLE CROSSING



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NOTES:

1. TYPICAL LOCATION PLAN MAY VARY AS CONDITIONS REQUIRE.
2. ALL DIMENSIONS ARE SHOWN IN FEET AND INCHES.
3. ROADWAY GATE ARM LENGTH SHALL NOT EXCEED 28' MEASURED FROM THE CENTER OF KINGPIN TO THE TIP OF GATE ARM.
4. SEE STANDARD DRAWINGS ESD-8300 THROUGH ESD-8308 FOR ADDITIONAL INFORMATION.

ENS = EMERGENCY NOTIFICATION SIGN

REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN	PRE, INC.
CHECKED	EJR
RECOMMENDED	WP
DATE	FEBRUARY 2015
DESIGNER PE STAMP	



ENGINEERING STANDARD DRAWINGS

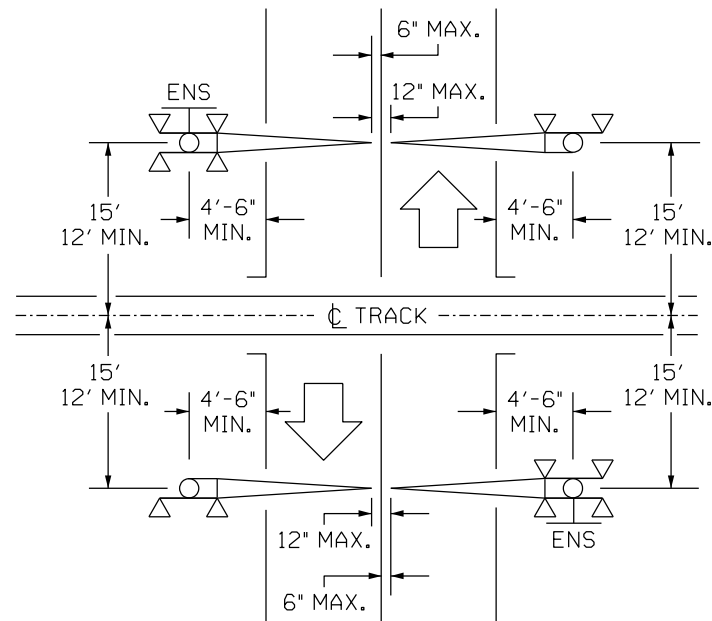
TYPICAL LOCATION PLAN
FLASHING LIGHT SIGNALS
WITH ENTRANCE GATES

DRAWING NO.	ESD-8350
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	

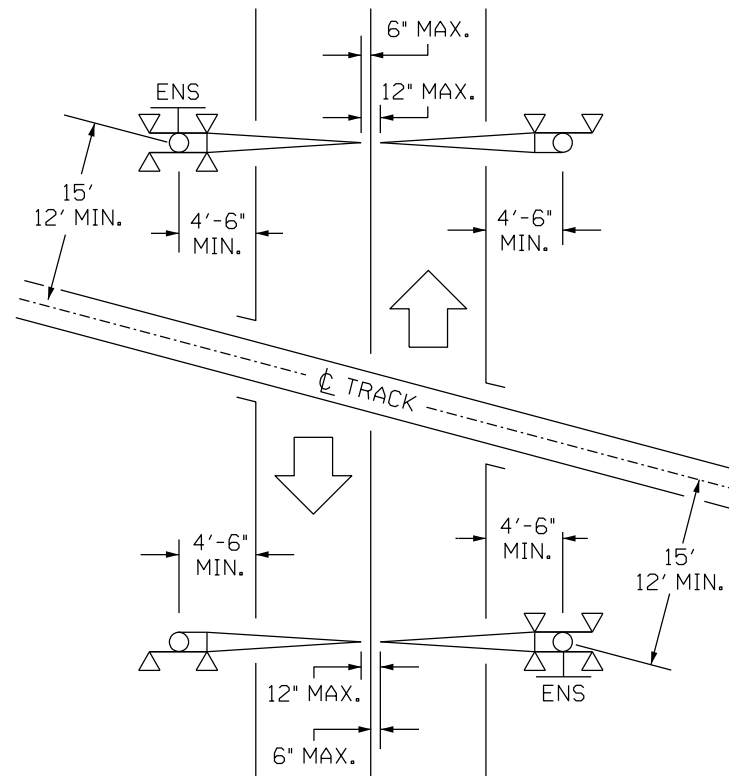
FLASHING LIGHT SIGNALS WITH ENTRANCE AND EXIT GATES:

ONE OR MORE TRACKS,
TWO-WAY VEHICULAR TRAFFIC,
ONE LANE EACH WAY.

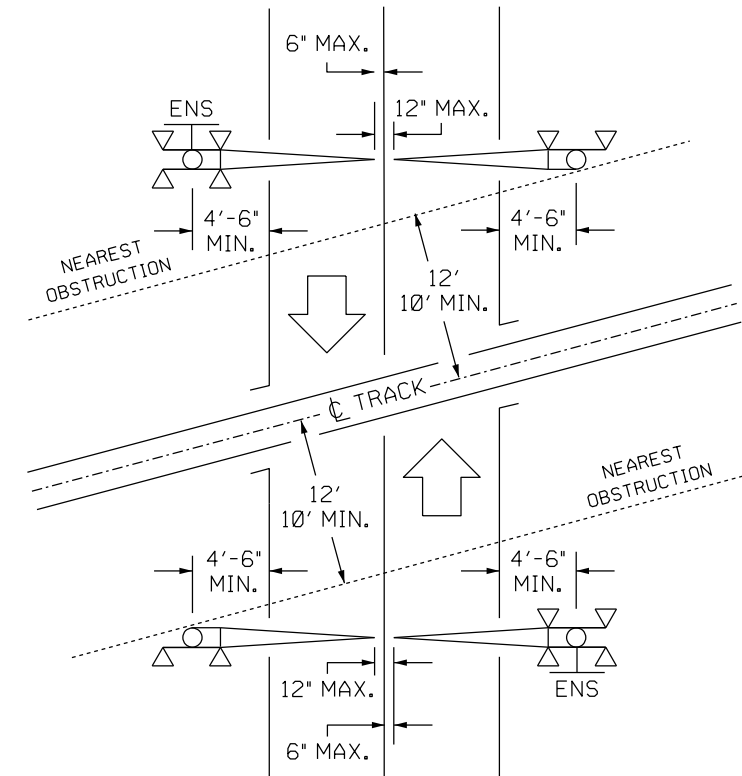
RIGHT ANGLE CROSSING



ACUTE ANGLE CROSSING



OBTUSE ANGLE CROSSING



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NOTES:

1. TYPICAL LOCATION PLAN MAY VARY AS CONDITIONS REQUIRE.
2. ALL DIMENSIONS ARE SHOWN IN FEET AND INCHES.
3. ROADWAY GATE ARM LENGTH SHALL NOT EXCEED 28' MEASURED FROM THE CENTER OF KINGPIN TO THE TIP OF GATE ARM.
4. SEE STANDARD DRAWINGS ESD-8300 THROUGH ESD-8308 FOR ADDITIONAL INFORMATION.

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REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN	PRE, INC.
CHECKED	EJR
RECOMMENDED	WP
DATE	FEBRUARY 2015
DESIGNER PE STAMP	

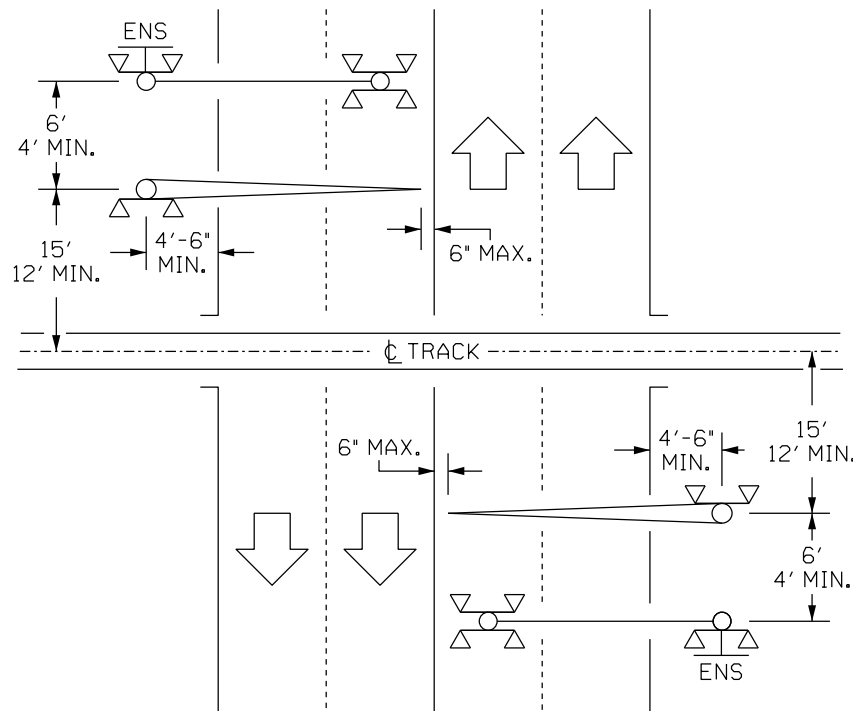


ENGINEERING STANDARD DRAWINGS TYPICAL LOCATION PLAN FLASHING LIGHT SIGNALS WITH ENTRANCE AND EXIT GATES	DRAWING NO.	ESD-8355
	DRAWING SHEET NO.	1 OF 1
	SCALE:	NONE
	CONTRACT SHEET NO.	

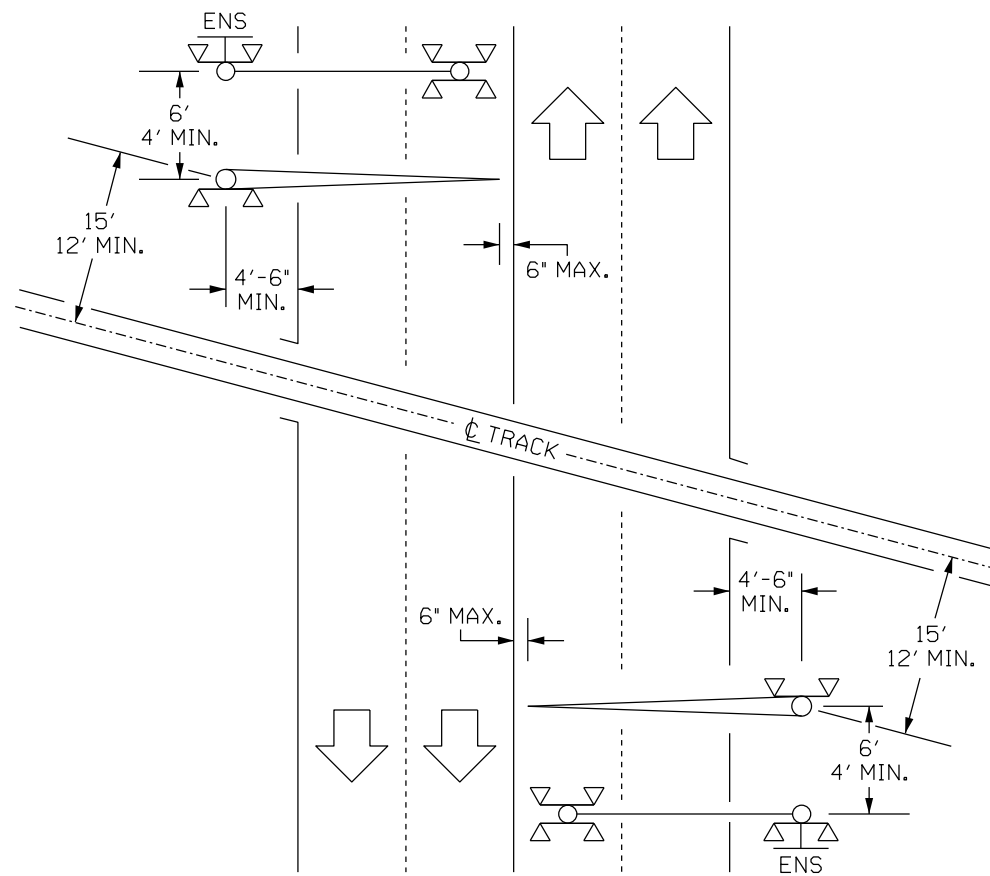
CANTILEVER FLASHERS WITH ENTRANCE GATES:

ONE OR MORE TRACKS,
TWO-WAY VEHICULAR TRAFFIC,
TWO LANES EACH WAY.

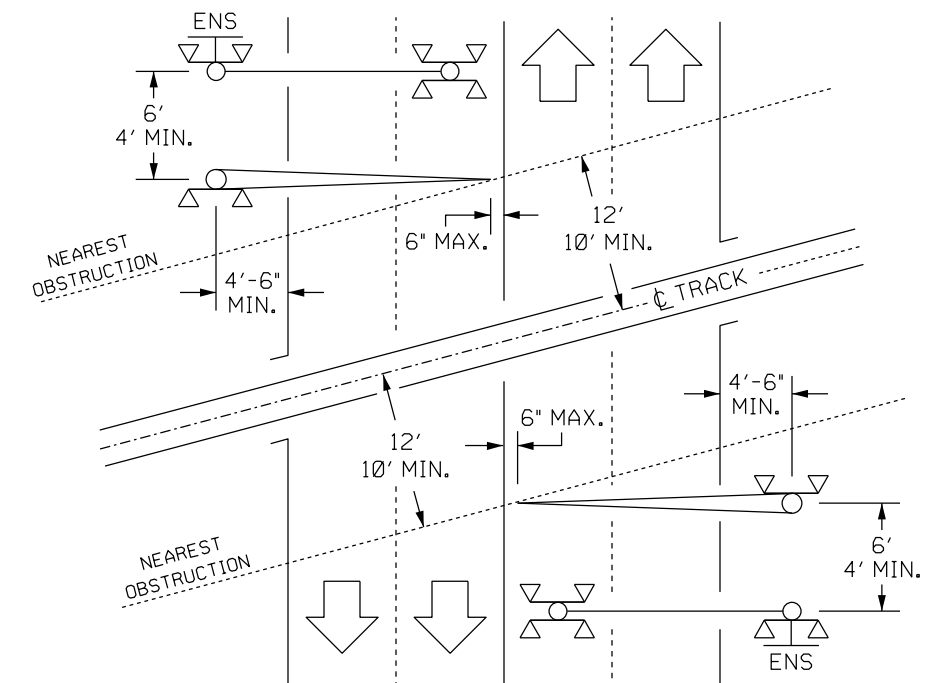
RIGHT ANGLE CROSSING



ACUTE ANGLE CROSSING



OBTUSE ANGLE CROSSING



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NOTES:

1. TYPICAL LOCATION PLAN MAY VARY AS CONDITIONS REQUIRE.
2. ALL DIMENSIONS ARE SHOWN IN FEET AND INCHES.
3. ROADWAY GATE ARM LENGTH SHALL NOT EXCEED 28' MEASURED FROM THE CENTER OF KINGPIN TO THE TIP OF GATE ARM.
4. SEE STANDARD DRAWINGS ESD-8300 THROUGH ESD-8308 FOR ADDITIONAL INFORMATION.

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REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN	PRE, INC.
CHECKED	EJR
RECOMMENDED	WP
DATE	FEBRUARY 2015
DESIGNER PE STAMP	

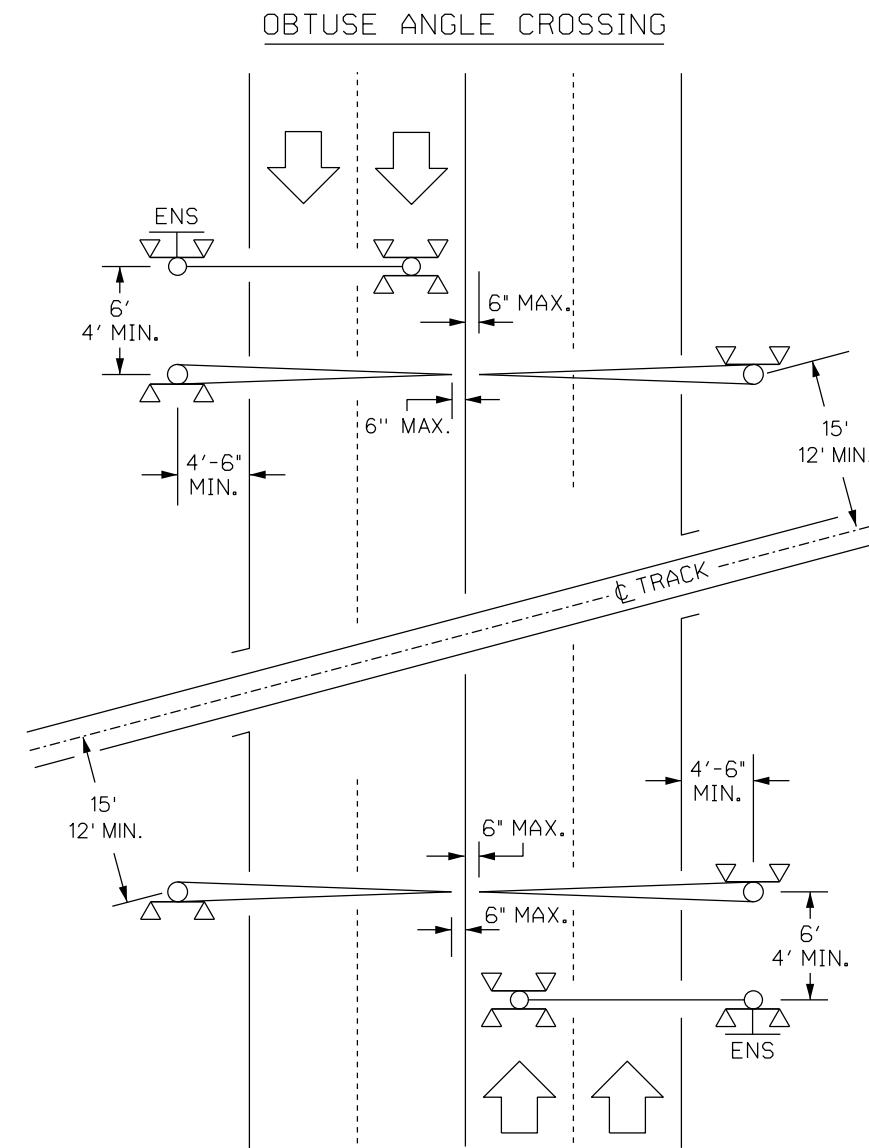
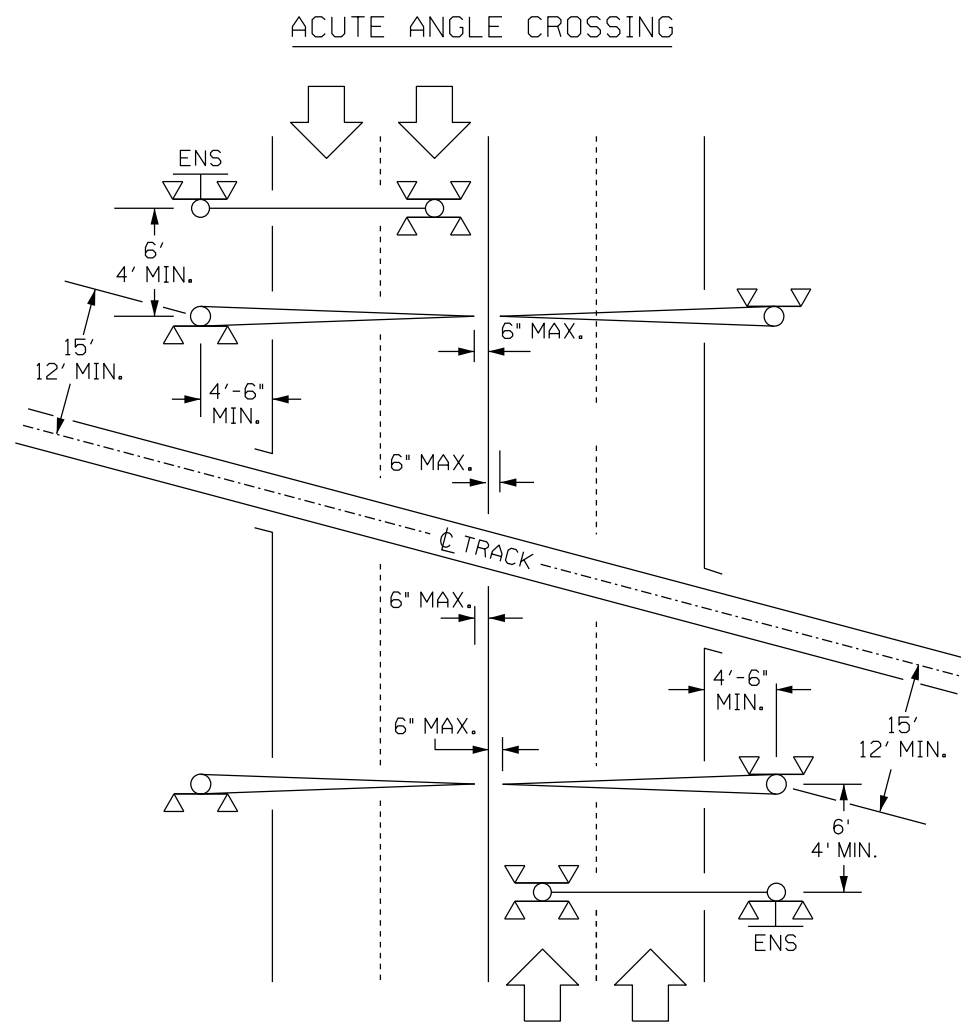
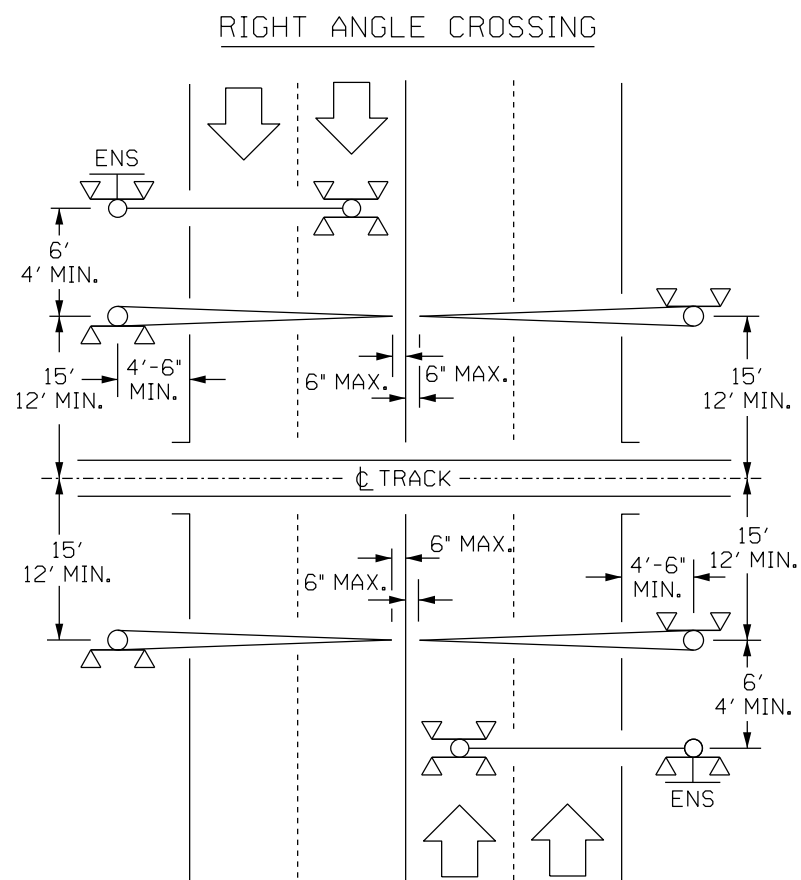


ENGINEERING STANDARD DRAWINGS
TYPICAL LOCATION PLAN
CANTILEVER FLASHERS WITH ENTRANCE GATES

DRAWING NO.	ESD-8360
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	

CANTILEVER FLASHERS WITH ENTRANCE AND EXIT GATES:

ONE OR MORE TRACKS,
TWO-WAY VEHICULAR TRAFFIC,
TWO LANES EACH WAY.



SANDAG/NCCTD ENGINEERING STANDARDS ARE INTENDED FOR SANDAG/NCCTD APPROVED USES ONLY. FOR NON-SANDAG/NCCTD APPROVED USES: SANDAG/NCCTD SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF THE DATA OR INFORMATION CONTAINED HEREIN. THE SELECTION AND USE OF THESE STANDARDS IS THE SOLE RESPONSIBILITY OF THE USER AND SHOULD NOT BE USED WITHOUT CONSULTING A REGISTERED PROFESSIONAL ENGINEER. ALL WARRANTIES AND REPRESENTATIONS OF ANY KIND ARE DISCLAIMED. ANYONE MAKING USE OF THIS INFORMATION AGREES THAT IT ASSUMES ALL LIABILITY ARISING FROM SUCH USE. NO PART OF THESE STANDARDS SHOULD BE REPRODUCED OR DISTRIBUTED IN ANY FORM OR BY ANY MEANS WITHOUT THE PRIOR WRITTEN PERMISSION OF SANDAG/NCCTD. ALL RIGHTS RESERVED.

NOTES:

1. TYPICAL LOCATION PLAN MAY VARY AS CONDITIONS REQUIRE.
2. ALL DIMENSIONS ARE SHOWN IN FEET AND INCHES.
3. ROADWAY GATE ARM LENGTH SHALL NOT EXCEED 28' MEASURED FROM THE CENTER OF KINGPIN TO THE TIP OF GATE ARM.
4. SEE STANDARD DRAWINGS ESD-8300 THROUGH ESD-8308 FOR ADDITIONAL INFORMATION.

ENS = EMERGENCY NOTIFICATION SIGN

REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN	PRE, INC.
CHECKED	EJR
RECOMMENDED	WP
DATE	FEBRUARY 2015
DESIGNER PE STAMP	



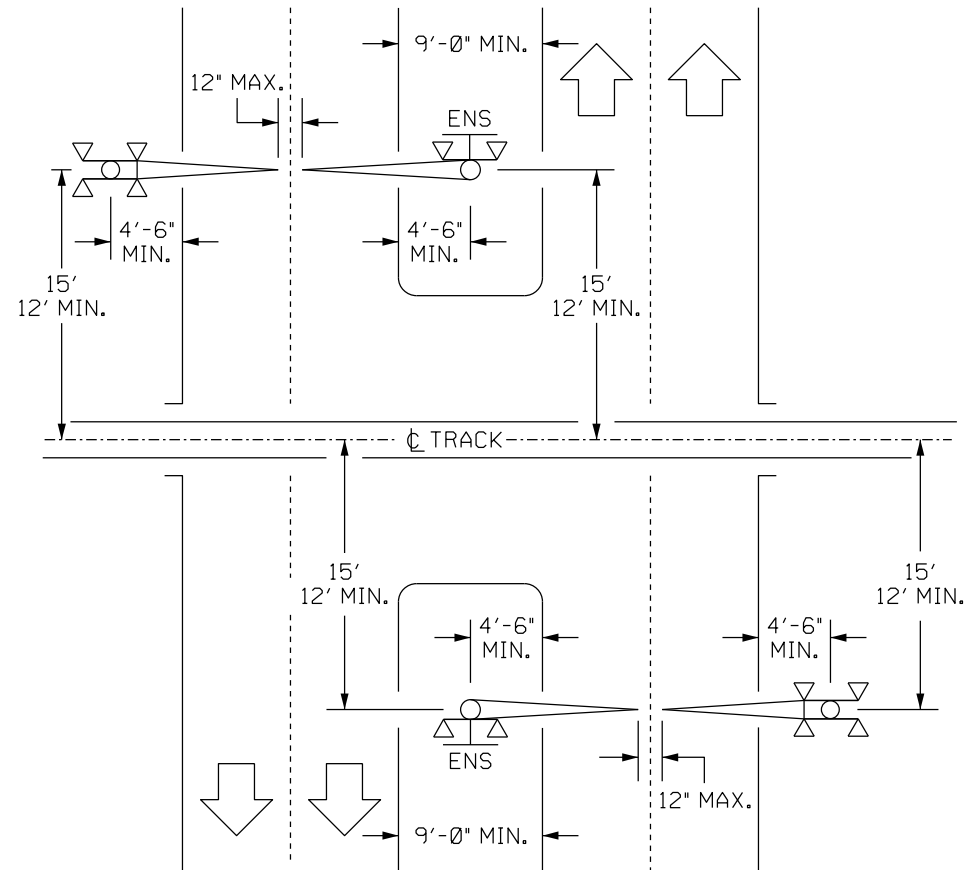
ENGINEERING STANDARD DRAWINGS
TYPICAL LOCATION PLAN
CANTILEVER FLASHERS WITH ENTRANCE
AND EXIT GATES

DRAWING NO. ESD-8365
DRAWING SHEET NO. 1 OF 1
SCALE: NONE
CONTRACT SHEET NO.

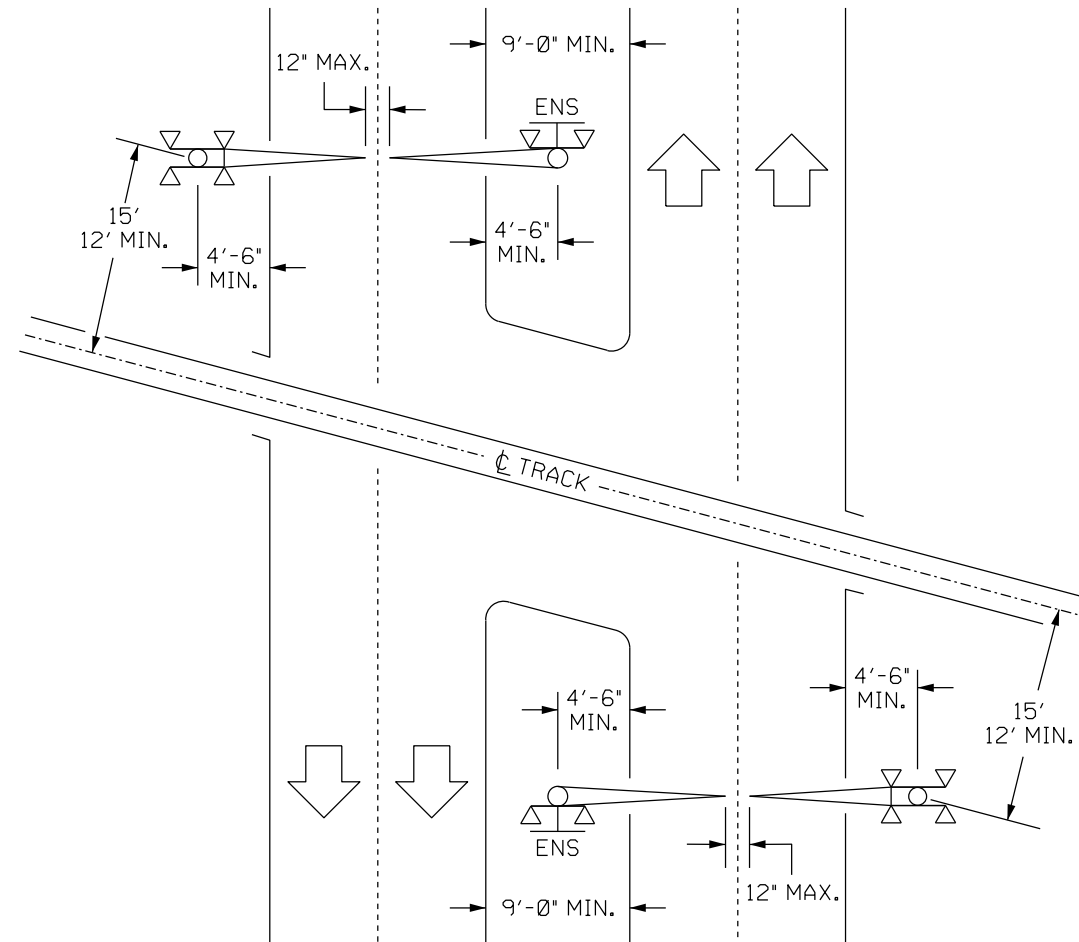
FLASHING LIGHT SIGNALS WITH GATES AND MEDIAN:

ONE OR MORE TRACKS,
TWO-WAY VEHICULAR TRAFFIC,
TWO LANES EACH WAY
WITH MEDIAN.

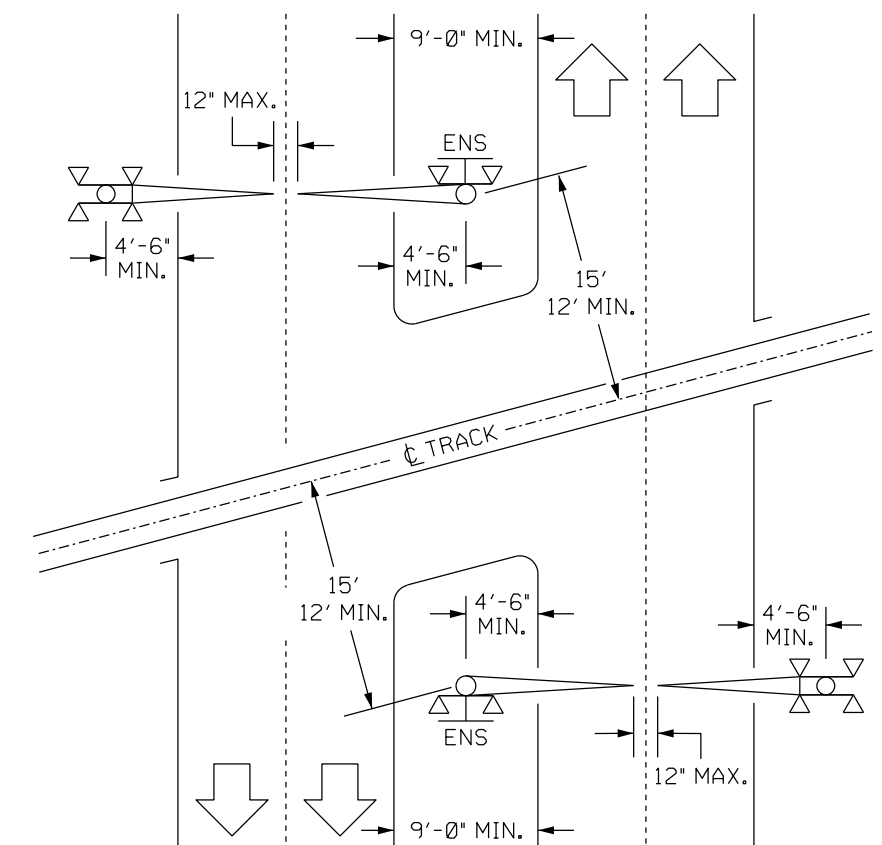
RIGHT ANGLE CROSSING



ACUTE ANGLE CROSSING



OBTUSE ANGLE CROSSING



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NOTES:

1. TYPICAL LOCATION PLAN MAY VARY AS CONDITIONS REQUIRE.
2. ALL DIMENSIONS ARE SHOWN IN FEET AND INCHES.
3. ADDITIONAL MEDIAN WIDTH MAY BE REQUIRED TO PROVIDE CLEARANCE FOR 24" BACKGROUNDS, WINDGUARD OR GATE COUNTERWEIGHTS.
4. BACKLIGHTS MAY BE ADDED AS CONDITIONS REQUIRE.
5. GATE ARM LENGTH SHALL NOT EXCEED 28' MEASURED FROM THE CENTER OF KINGPIN TO THE TIP OF GATE ARM.
6. SEE STANDARD DRAWINGS ESD-8300 THROUGH ESD-8308 FOR ADDITIONAL INFORMATION.

ENS = EMERGENCY NOTIFICATION SIGN

REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN PRE, INC.
CHECKED E. ROE
RECOMMENDED W. PREY
DATE FEBRUARY 2015
DESIGNER PE STAMP



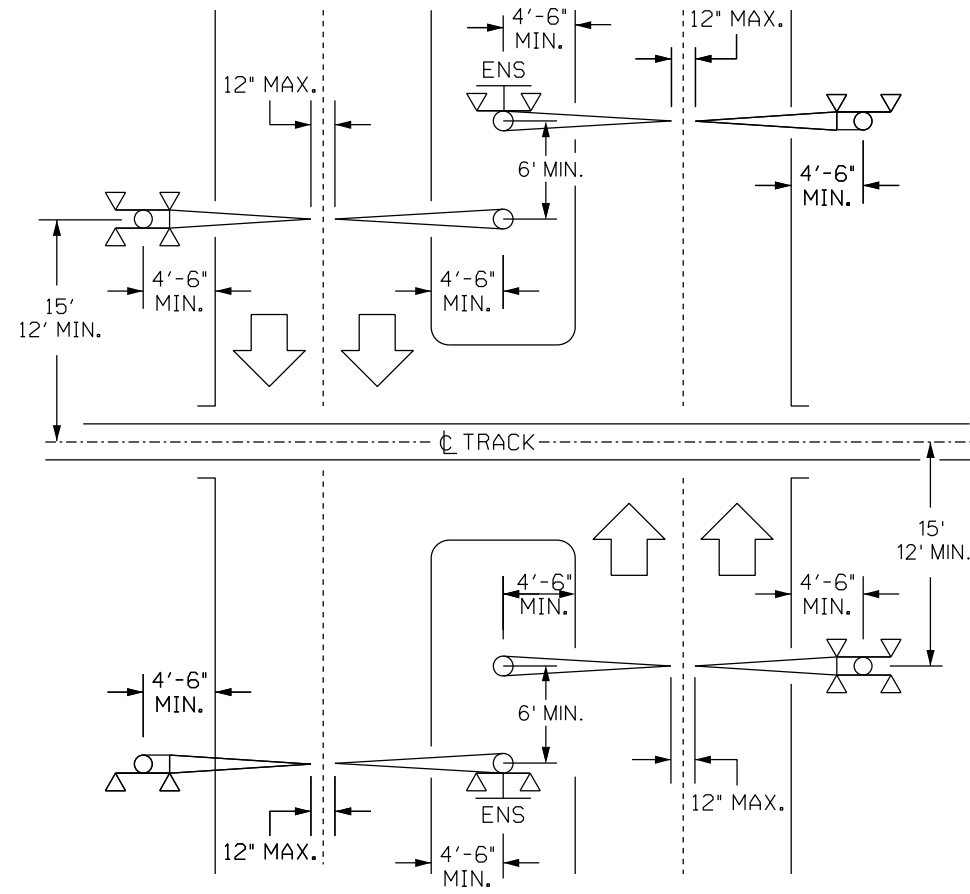
ENGINEERING STANDARD DRAWINGS
TYPICAL LOCATION PLAN
FLASHING LIGHT SIGNALS WITH GATES AND MEDIAN

DRAWING NO. ESD-8370
DRAWING SHEET NO. 1 OF 1
SCALE: NONE
CONTRACT SHEET NO.

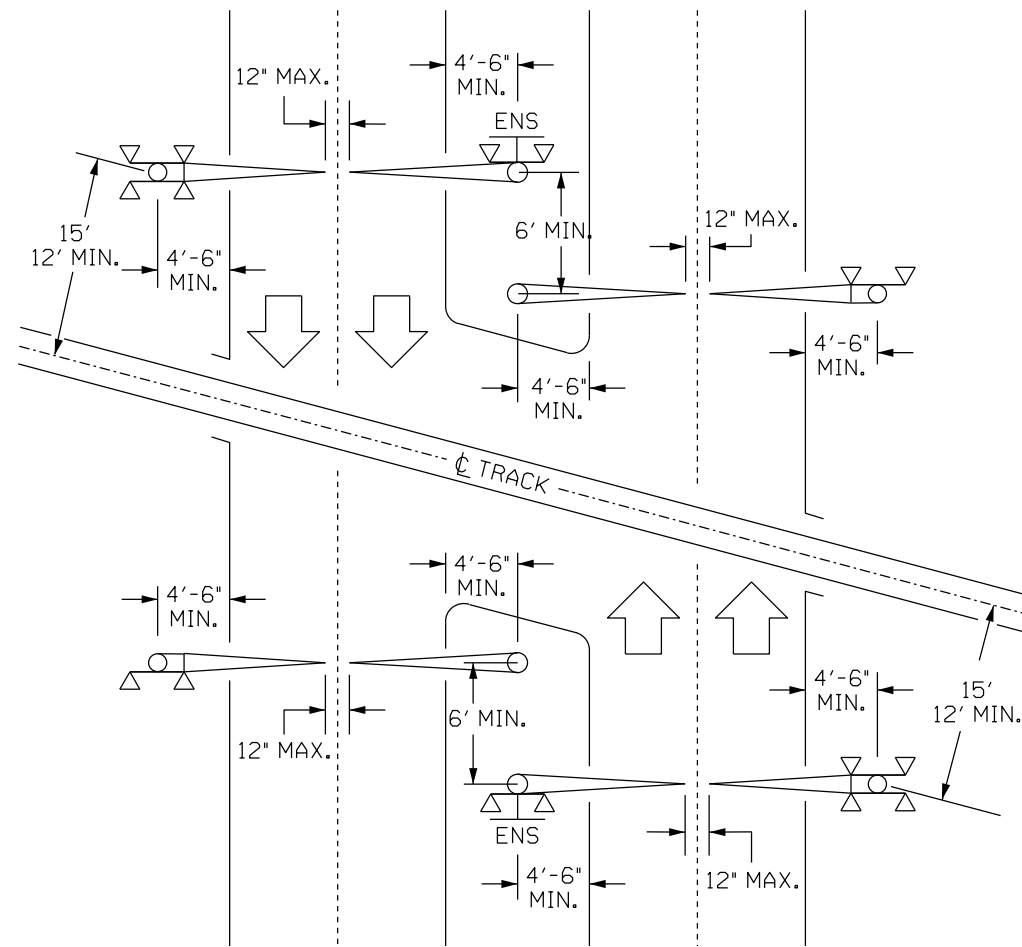
FLASHING LIGHT SIGNALS WITH ENTRANCE AND EXIT GATES AND MEDIAN:

ONE OR MORE TRACKS,
TWO-WAY VEHICULAR TRAFFIC,
TWO LANES EACH WAY
WITH MEDIAN.

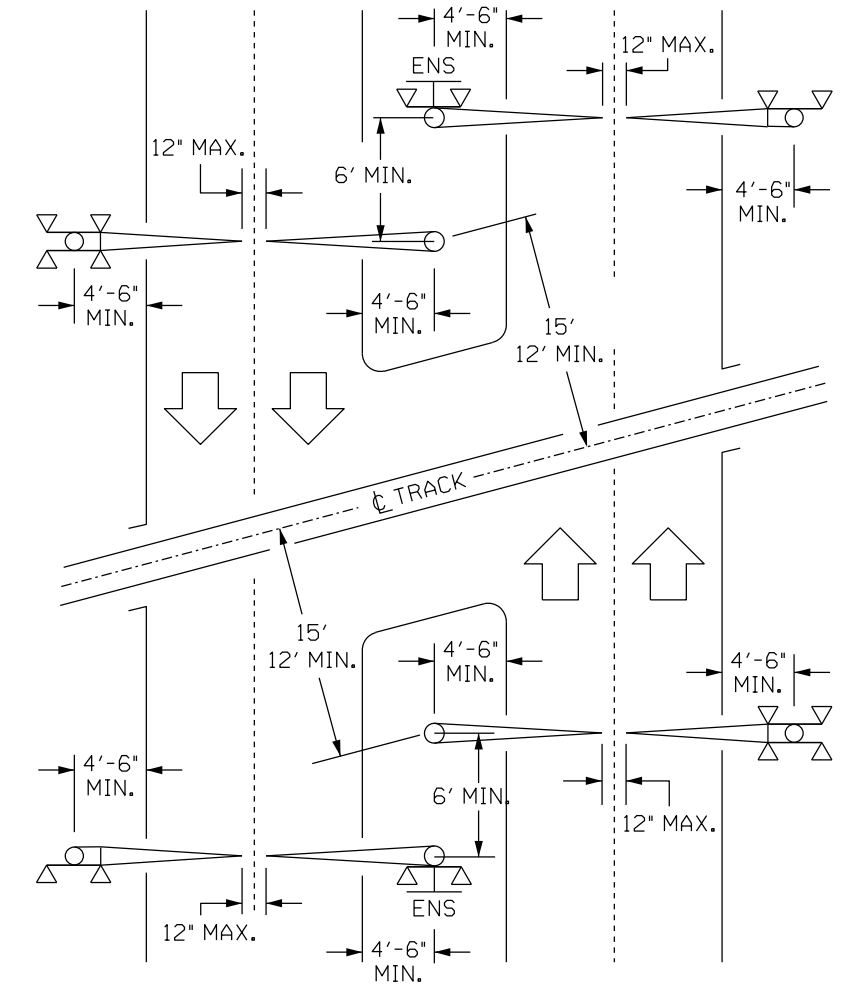
RIGHT ANGLE CROSSING



ACUTE ANGLE CROSSING



OBTUSE ANGLE CROSSING



ENS = EMERGENCY NOTIFICATION SIGN

NOTES:

1. TYPICAL LOCATION PLAN MAY VARY AS CONDITIONS REQUIRE.
2. ALL DIMENSIONS ARE SHOWN IN FEET AND INCHES.
3. ADDITIONAL MEDIAN WIDTH MAY BE REQUIRED TO PROVIDE CLEARANCE FOR 24" BACKGROUNDS, WINDGUARD OR GATE COUNTERWEIGHTS.
4. BACKLIGHTS MAY BE ADDED AS CONDITIONS REQUIRE.
5. ROADWAY GATE ARM LENGTH SHALL NOT EXCEED 28' MEASURED FROM THE CENTER OF KINGPIN TO THE TIP OF GATE ARM.
6. SEE STANDARD DRAWINGS ESD-8300 THROUGH ESD-8308 FOR ADDITIONAL INFORMATION.
7. WHERE BOTH ENTRANCE GATES AND EXIT GATES ARE ALIGNED ON A MEDIAN, FRONT LIGHTS SHALL BE INSTALLED ON THE ASSEMBLY CLOSEST TO TRAFFIC APPROACHING IN THE LAWFUL DIRECTION.

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REV.	DATE	DESCRIPTION	DES. ENG.

DRAWN	PRE, INC.		
CHECKED	E. ROE		
RECOMMENDED	W. PREY		
DATE	FEBRUARY 2015		DESIGNER PE STAMP

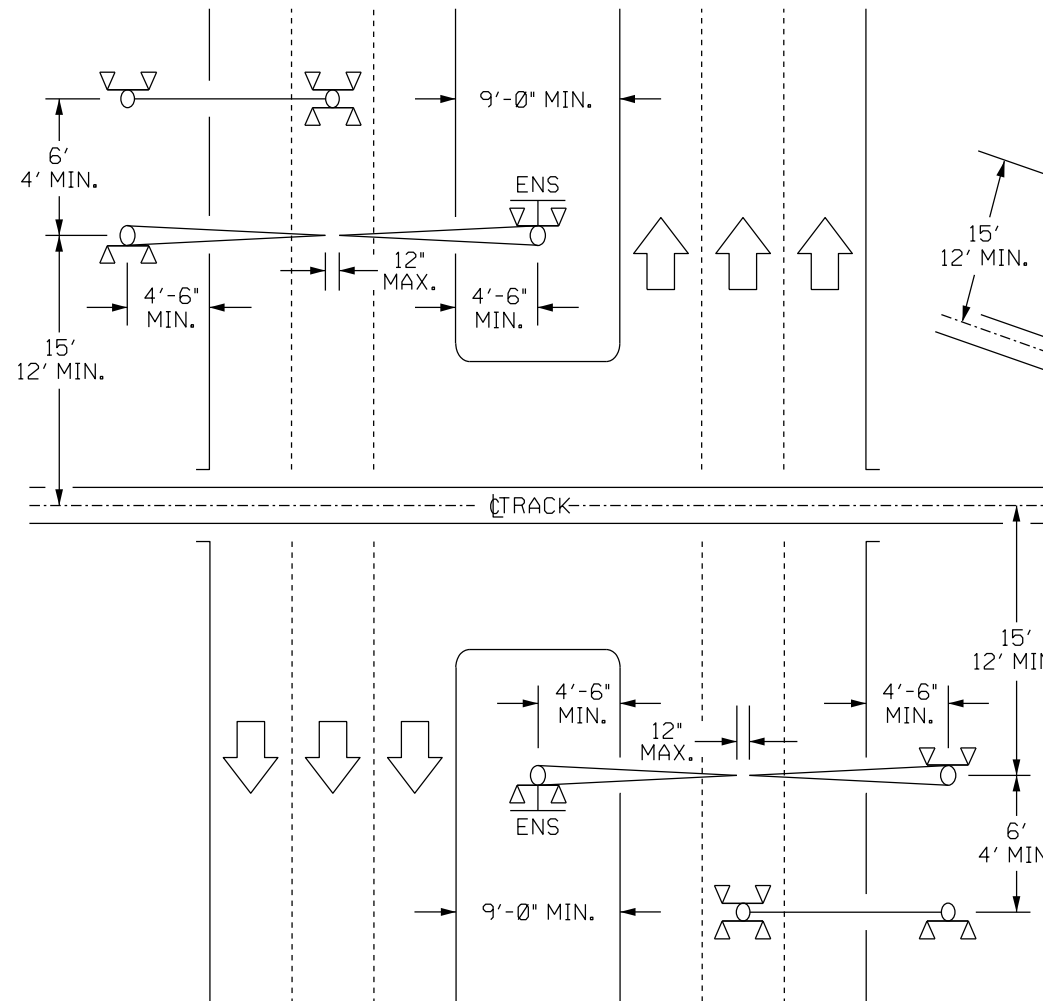


ENGINEERING STANDARD DRAWINGS TYPICAL LOCATION PLAN FLASHING LIGHT SIGNALS WITH ENTRANCE AND EXIT GATES AND MEDIAN	DRAWING NO. ESD-8375 DRAWING SHEET NO. 1 OF 1 SCALE: NONE CONTRACT SHEET NO.
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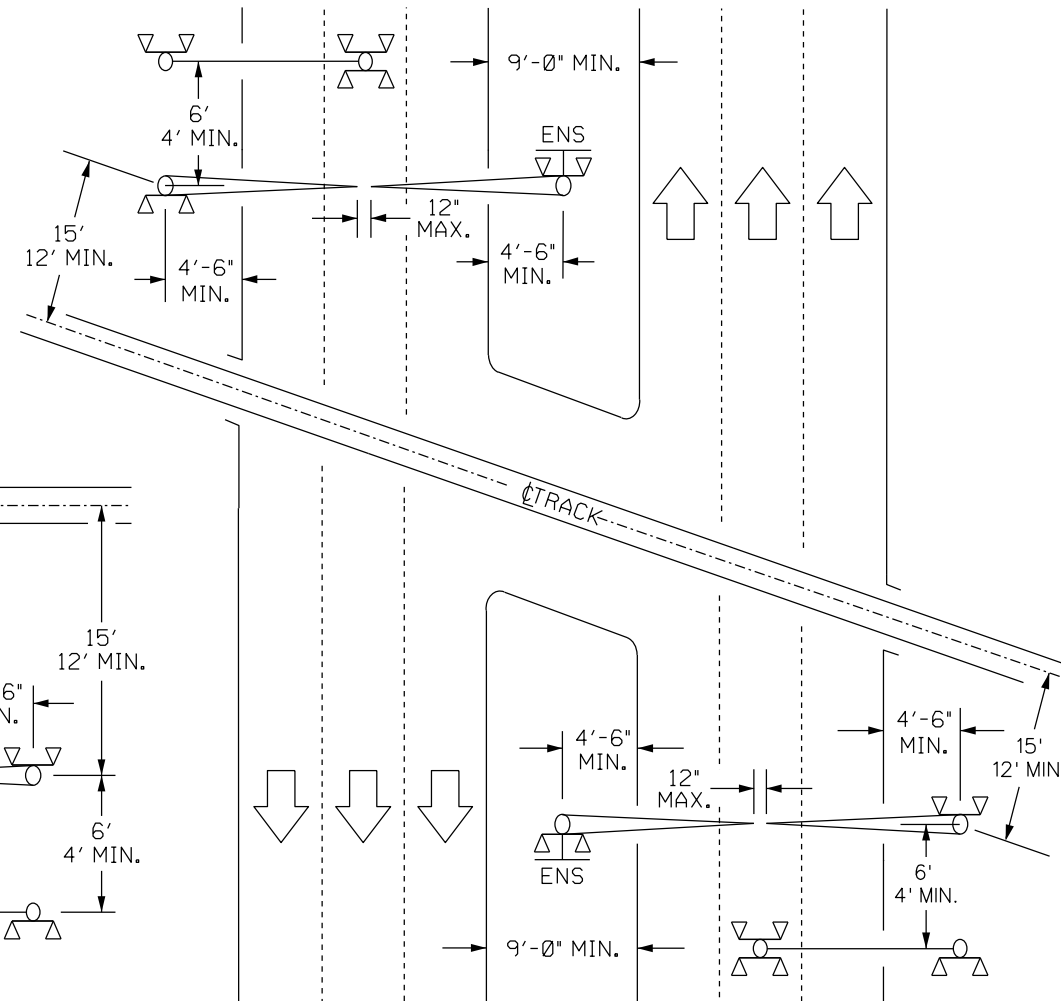
CANTILEVER FLASHERS WITH ENTRANCE GATES AND MEDIAN

ONE OR MORE TRACKS,
TWO-WAY VEHICULAR TRAFFIC,
THREE OR MORE LANES
EACH WAY WITH MEDIAN.

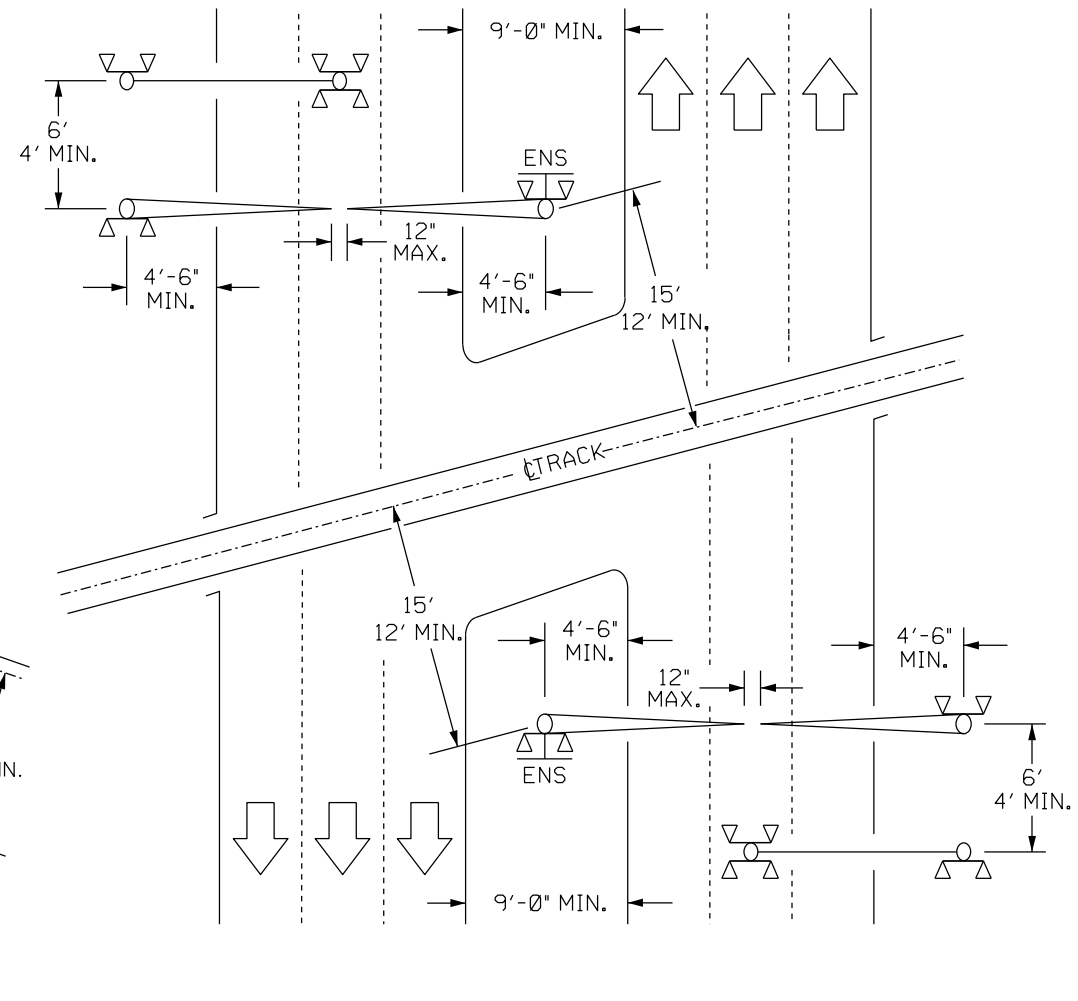
RIGHT ANGLE CROSSING



ACUTE ANGLE CROSSING



OBTUSE ANGLE CROSSING



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NOTES:


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2. ALL DIMENSIONS ARE SHOWN IN FEET AND INCHES.
3. ADDITIONAL MEDIAN WIDTH MAY BE REQUIRED TO PROVIDE CLEARANCE FOR 24" BACKGROUNDS, WINDGUARD OR GATE COUNTERWEIGHTS.
4. ROADWAY GATE ARM LENGTH SHALL NOT EXCEED 28' MEASURED FROM THE CENTER OF KINGPIN TO THE TIP OF GATE ARM.
5. SEE STANDARD DRAWINGS ESD-8300 THROUGH ESD-8308 FOR ADDITIONAL INFORMATION.

REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN	PRE, INC.
CHECKED	EJR
RECOMMENDED	WP
DATE	FEBRUARY 2015
DESIGNER PE STAMP	



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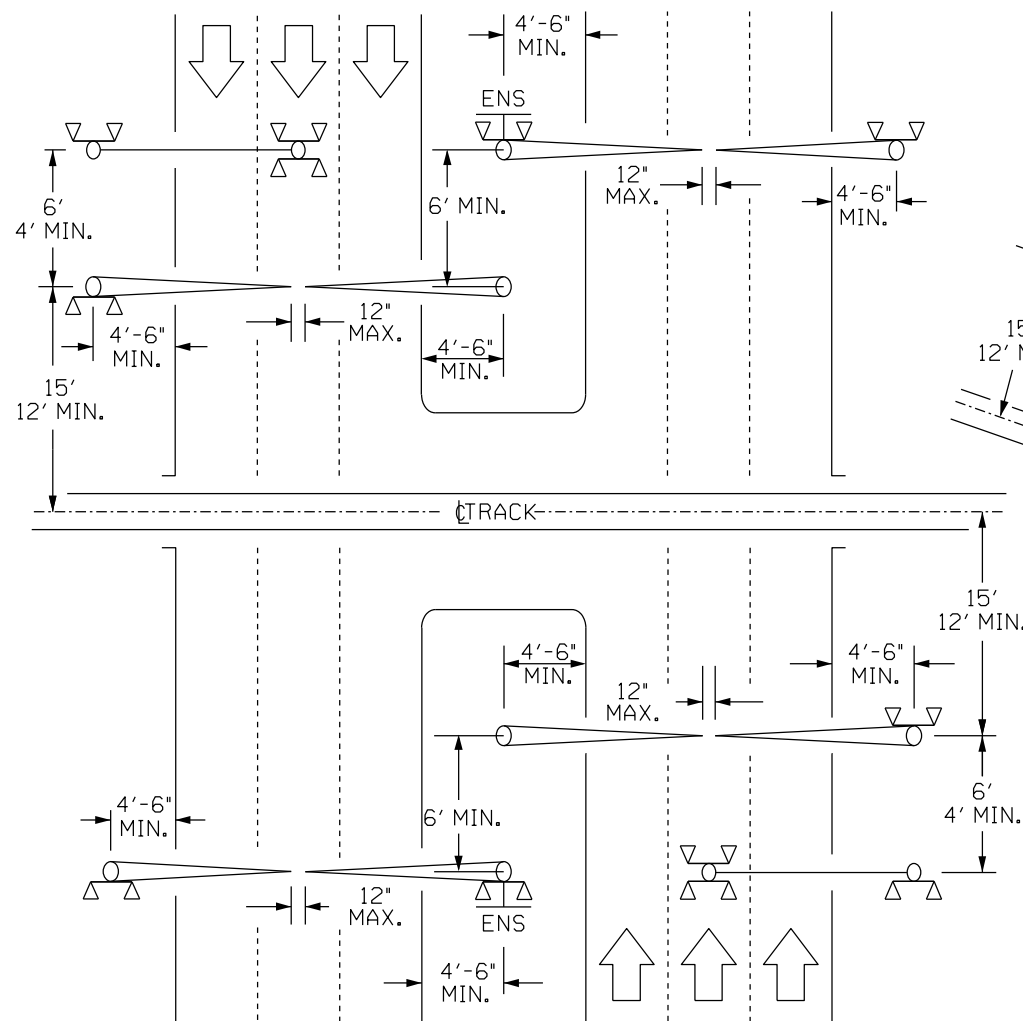
810 Mission Avenue
Oceanside, CA 92054
www.gonctd.com

ENGINEERING STANDARD DRAWINGS		DRAWING NO. ESD-8380
TYPICAL LOCATION PLAN CANTILEVER FLASHERS WITH ENTRANCE GATES AND MEDIAN		DRAWING SHEET NO. 1 OF 1
SCALE: NONE		CONTRACT SHEET NO.

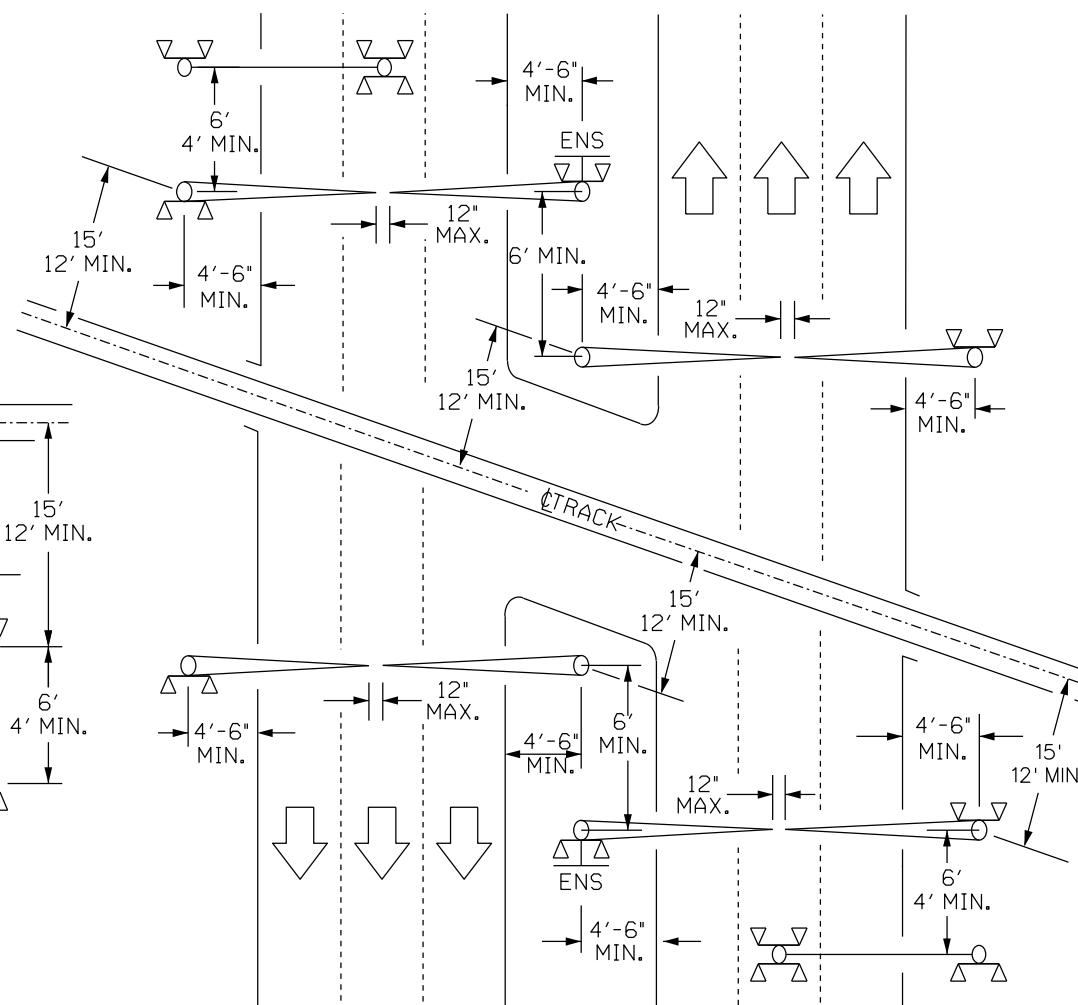
**CANTILEVER FLASHERS WITH
ENTRANCE AND EXIT GATES AND MEDIAN:**

ONE OR MORE TRACKS,
TWO-WAY VEHICULAR TRAFFIC,
THREE OR MORE LANES
EACH WAY WITH MEDIAN.

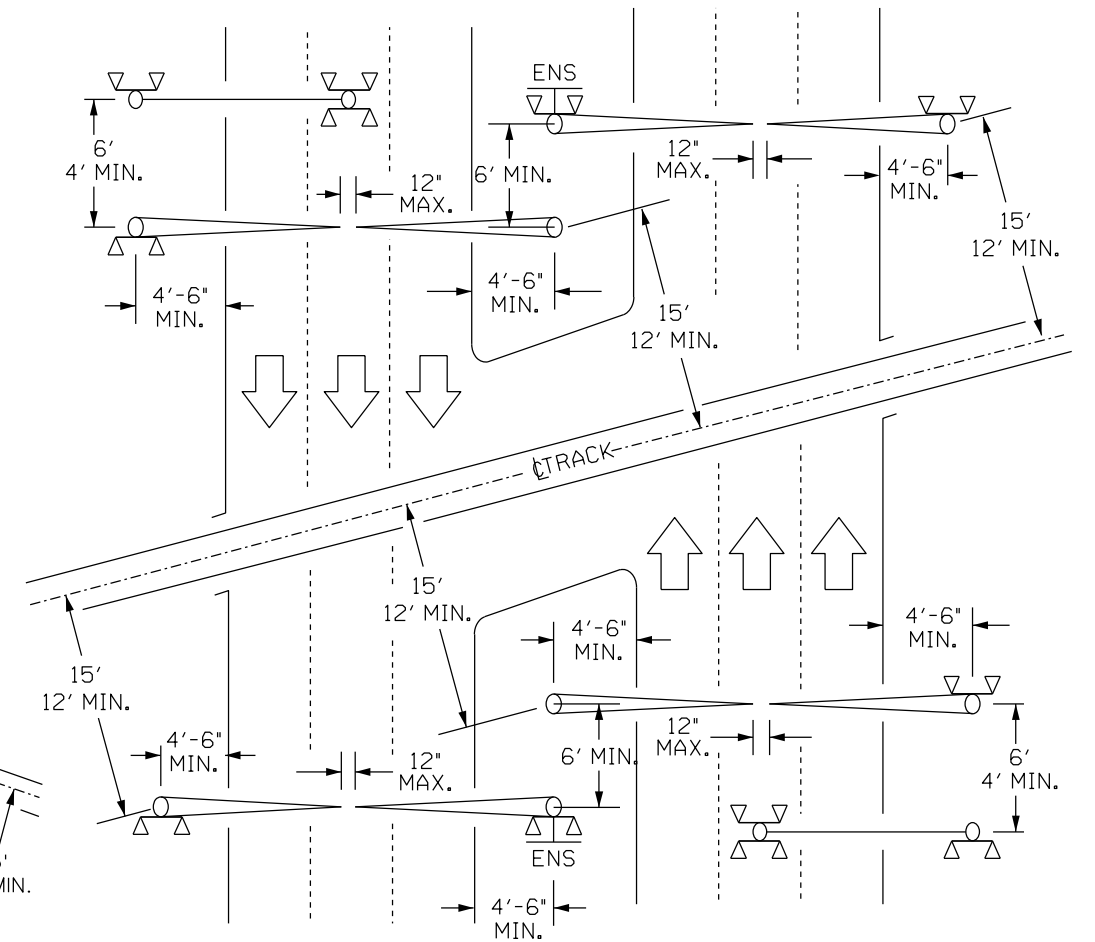
RIGHT ANGLE CROSSING



ACUTE ANGLE CROSSING



OBTUSE ANGLE CROSSING



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NOTES:

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2. ALL DIMENSIONS ARE SHOWN IN FEET AND INCHES.
3. ADDITIONAL MEDIAN WIDTH MAY BE REQUIRED TO PROVIDE CLEARANCE FOR 24" BACKGROUNDS, WINDGUARD OR GATE COUNTERWEIGHTS.
4. ROADWAY GATE ARM LENGTH SHALL NOT EXCEED 28' MEASURED FROM THE CENTER OF KINGPIN TO THE TIP OF GATE ARM.
5. SEE STANDARD DRAWINGS ESD-8300 THROUGH ESD-8308, ESD-8320 & ESD-8325 FOR ADDITIONAL INFORMATION.
6. WHERE BOTH ENTRANCE GATES AND EXIT GATES ARE ALIGNED ON A MEDIAN, FRONT LIGHTS SHALL BE INSTALLED ON THE ASSEMBLY CLOSEST TO TRAFFIC APPROACHING IN THE LAWFUL DIRECTION.

ENS = EMERGENCY NOTIFICATION SIGN

REV.	DATE	DESCRIPTION	DES.	ENG.

REVISIONS	DRAWN	PRE, INC.
	CHECKED	<i>EJR</i>
	E. ROE	
	RECOMMENDED	<i>WP</i>
	W. PREY	
	DATE	FEBRUARY 2015
	DESIGNER PE STAMP	

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SAN DIEGO ASSOCIATION OF GOVERNMENTS
401 B Street, Suite 800
San Diego, CA. 92101
www.sandag.org

**NORTH COUNTY
TRANSIT DISTRICT**
810 Mission Avenue
Oceanside, CA 92054
www.gonctd.com

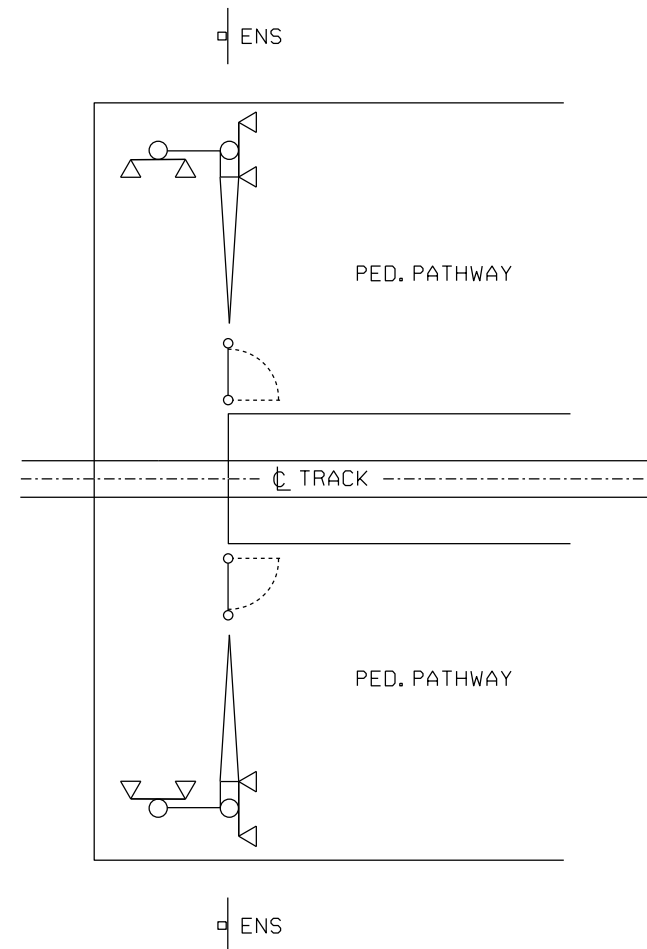
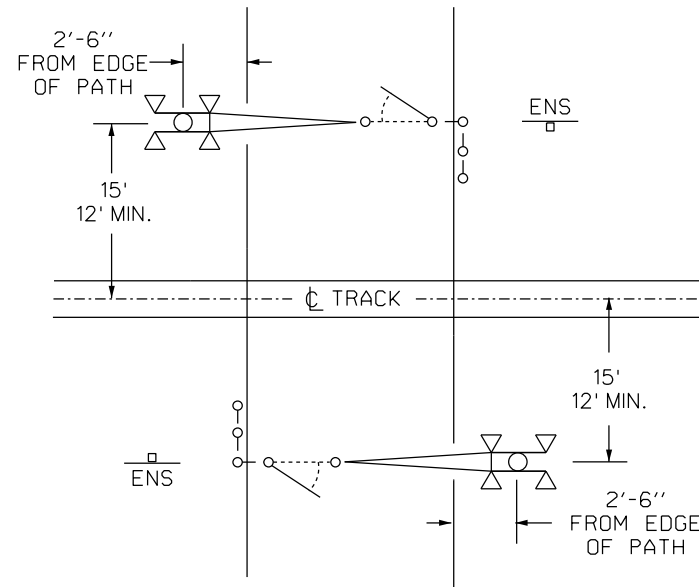
ENGINEERING STANDARD DRAWINGS		DRAWING NO. ESD-8385
TYPICAL LOCATION PLAN CANTILEVER FLASHERS WITH ENTRANCE AND EXIT GATES AND MEDIAN		DRAWING SHEET NO. 1 OF 1
SCALE: NONE		CONTRACT SHEET NO.

PED FLASHING LIGHT SIGNALS WITH GATES:

ONE OR MORE TRACKS,
TWO-WAY PEDESTRIAN TRAFFIC,

STATION-END OF
PLATFORM APPLICATION

PED PATHWAY APPLICATION



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NOTES:

1. TYPICAL LOCATION PLAN MAY VARY AS CONDITIONS REQUIRE.
2. ALL DIMENSIONS ARE SHOWN IN FEET AND INCHES.
3. GATE ARM LENGTH SHALL NOT EXCEED 8' MEASURED FROM THE CENTER OF KINGPIN TO THE TIP OF GATE ARM WITHOUT COUNTERWEIGHTS.
4. PEDESTRIAN GATE CONFIGURATIONS MUST HAVE CHANNELIZATION AND EXIT SWING GATES.
5. DISTANCE BETWEEN TIP OF GATE ARM AND POST TO BE BETWEEN 4½" AND 5" GATE TIP MUST BE FREE OF BURRS AND SHARP EDGES.

ENS = EMERGENCY NOTIFICATION SIGN

REV.	DATE	DESCRIPTION	DES.	ENG.

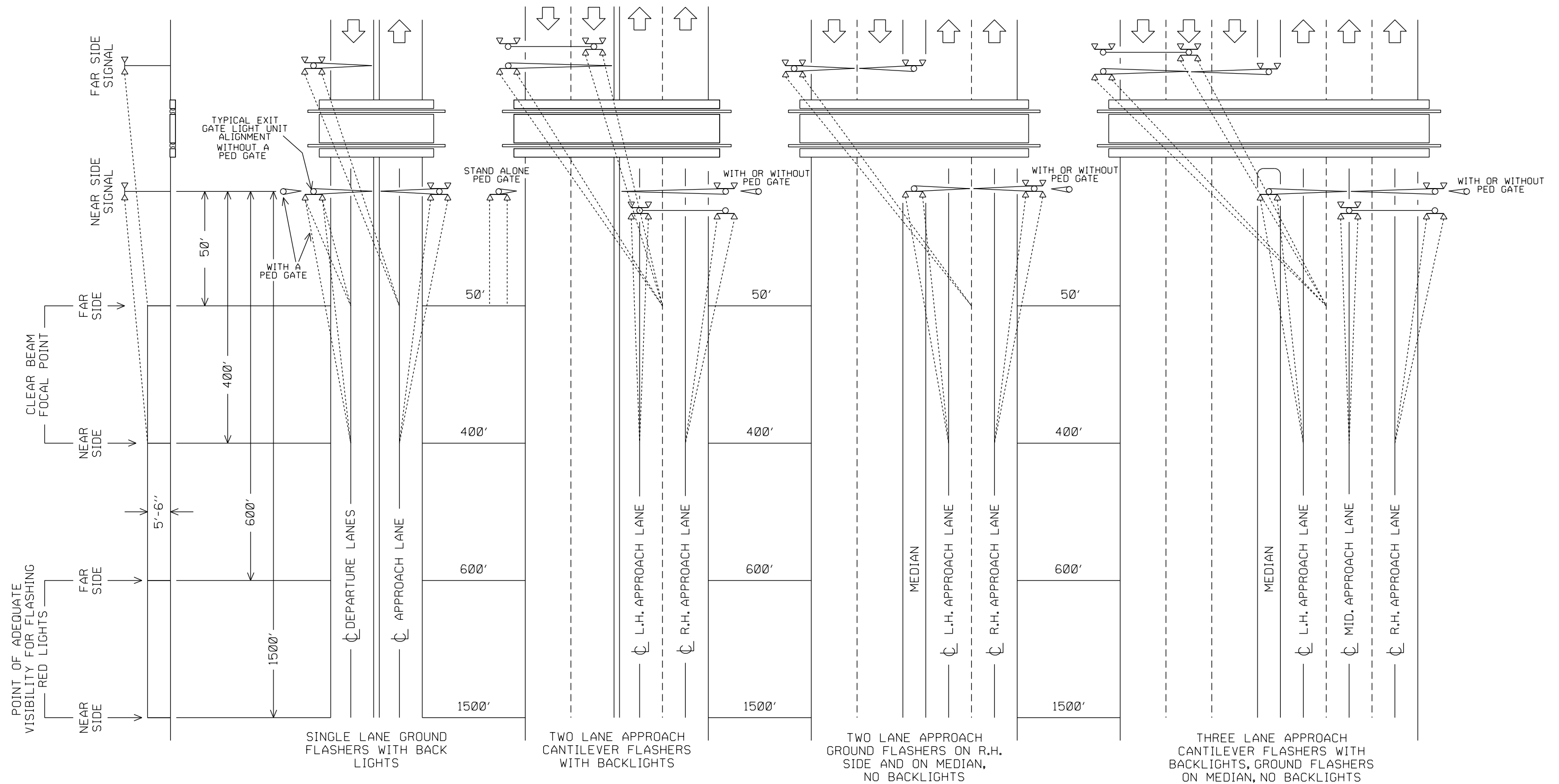
DRAWN	PRE, INC.
CHECKED	EJR
RECOMMENDED	WP
DATE	FEBRUARY 2015
DESIGNER PE STAMP	



ENGINEERING STANDARD DRAWINGS

TYPICAL LOCATION PLAN
PEDESTRIAN PATHWAYS
CROSSING CONFIGURATION

DRAWING NO.	ESD-8390
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	



LEGEND:

BACK LIGHTS FRONT LIGHTS	CANTILEVER LIGHTS FRONT LIGHTS	FRONT LIGHTS	FRONT LIGHTS	FRONT LIGHTS
CURB GATE	CANTILEVER	MEDIAN GATE	EXIT GATE	PED GATES

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- NOTES:**
- WHERE THERE ARE THREE LANES OR MORE, BACK LIGHTS SHALL BE REQUIRED IN MEDIAN. WHERE THERE ARE TWO LANES, BACK LIGHTS IN MEDIAN SHALL BE APPROVED ON A CASE BY CASE BASIS, TO BE DETERMINED BY A SITE SURVEY.

REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN	PRE, INC.
CHECKED	<i>EJR</i>
RECOMMENDED	<i>WP</i>
DATE	FEBRUARY 2015
DESIGNER PE STAMP	

SAN DIEGO ASSOCIATION OF GOVERNMENTS
401 B Street, Suite 800
San Diego, CA. 92101
www.sandag.org

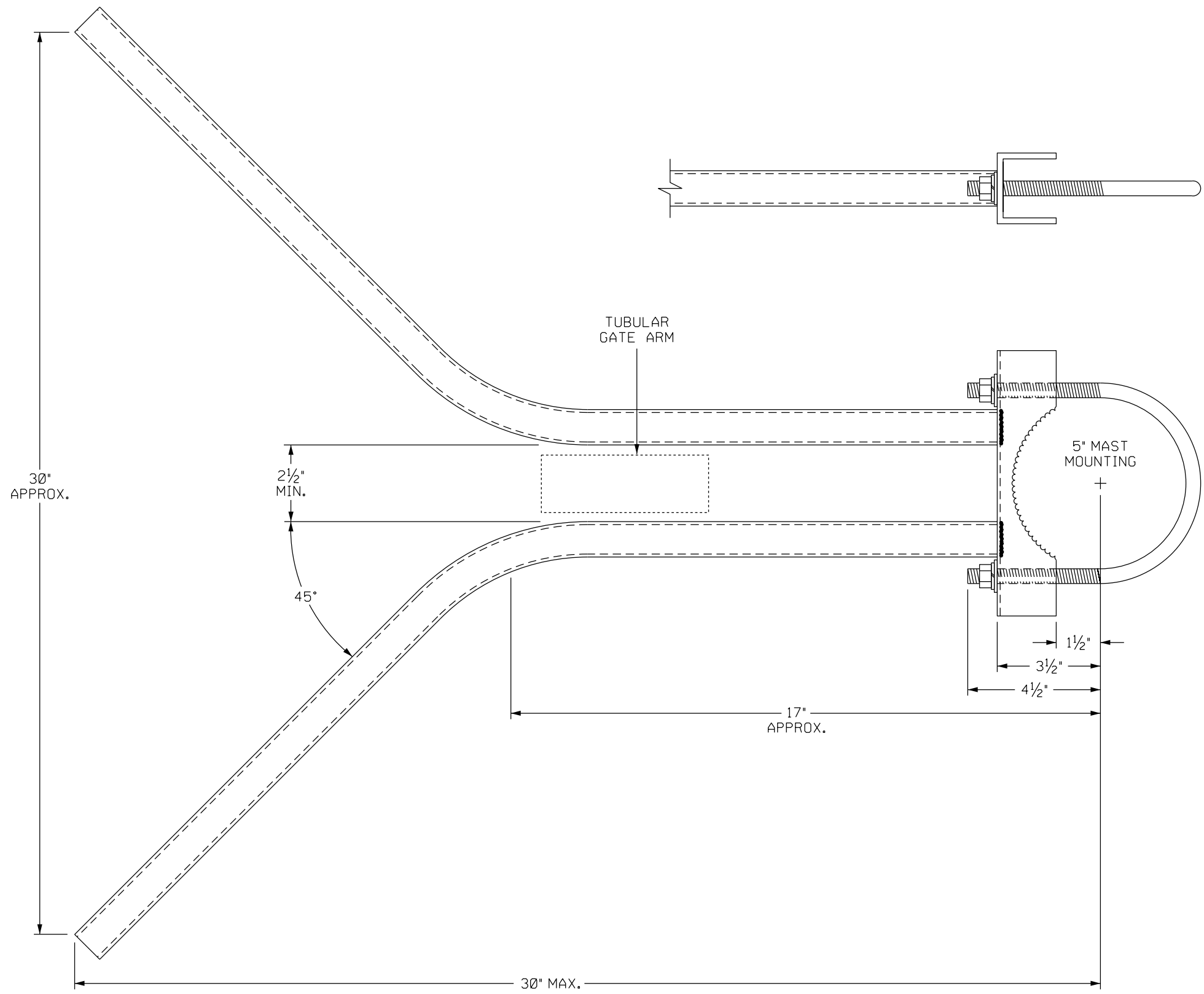
NORTH COUNTY TRANSIT DISTRICT

810 Mission Avenue
Oceanside, CA 92054
www.gonctd.com

ENGINEERING STANDARD DRAWINGS

TYPICAL LIGHT UNIT ALIGNMENT FOR FLASHING LIGHT SIGNALS AT GRADE CROSSING

DRAWING NO.	ESD-8400
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	



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- NOTES:
- WHERE INDICATED, DIMENSIONS SHOWN ARE APPROXIMATE. WIND SUPPORT LENGTH NOT TO EXCEED 30" FROM CENTER OF 5" MAST TO TIP OF BRACKET.

REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN	PRE, INC.
CHECKED	E. ROE <i>EJR</i>
RECOMMENDED	W. PREY <i>WP</i>
DATE	FEBRUARY 2015
DESIGNER PE STAMP	

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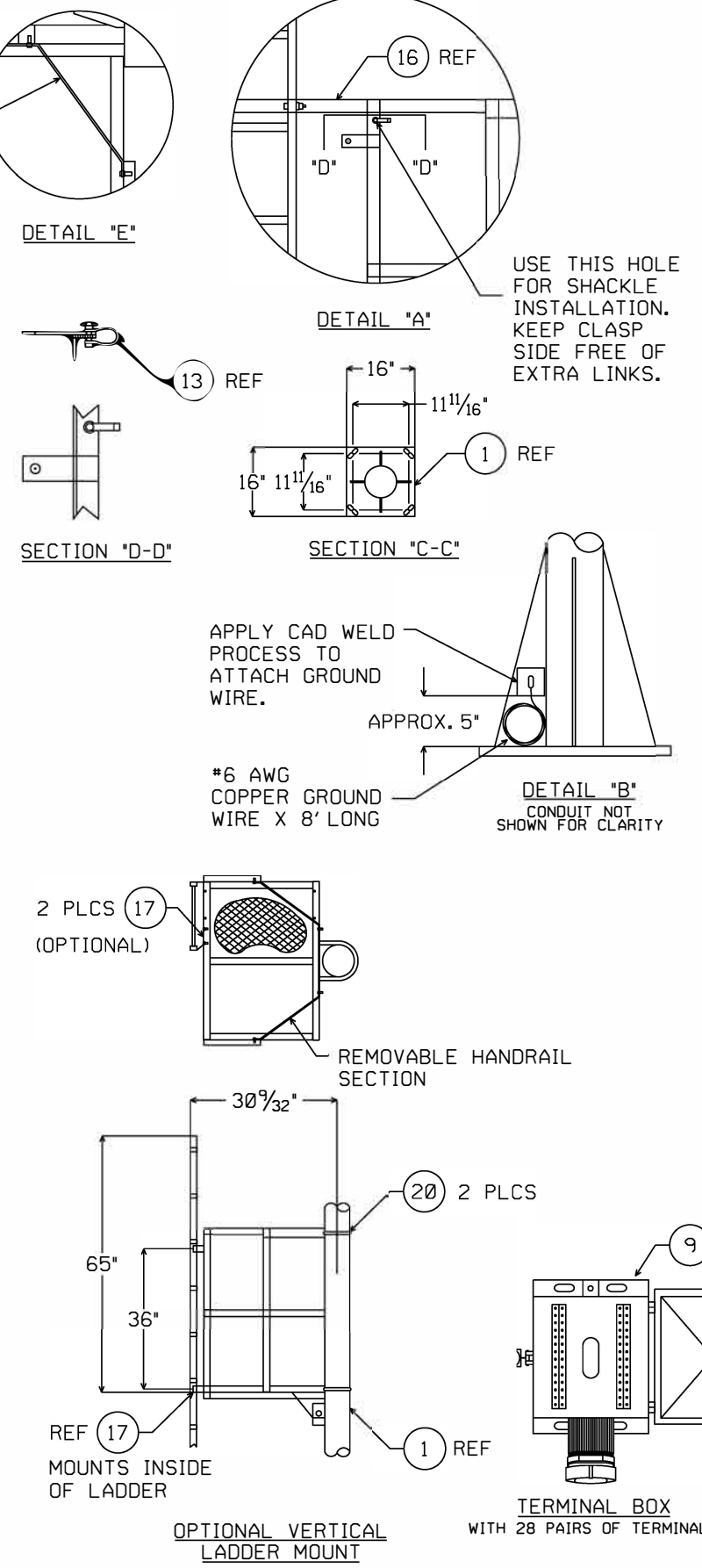
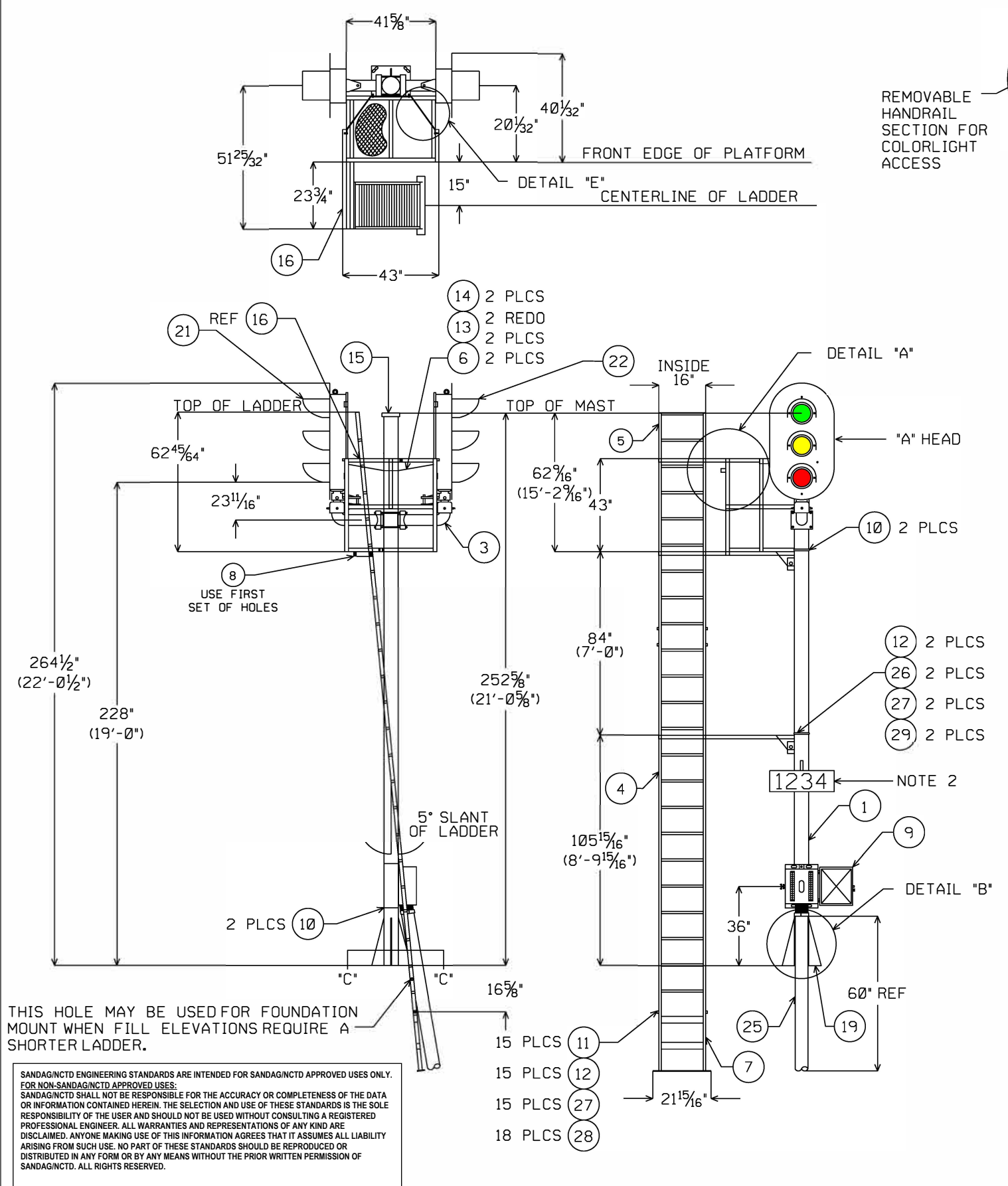
ENGINEERING STANDARD DRAWINGS

HIGH WIND SUPPORT FOR TUBULAR MAST

DRAWING NO.	ESD-8470
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	

BILL OF MATERIAL

ITEM	QTY.	DESCRIPTION
1	1	ALUMINUM MAST 2 POS. 21' LG.
2	2	ALUMINUM PLATFORM ASSEMBLY
3	2	C/L 5" MTG. KIT FOR B TO B SIGNALS
4	1	LADDER 16" X 14'-6 1/8" ALUMINUM
5	1	LADDER 16" X 7'-6" ALUMINUM
6	2	CLIP SPRING SS 5/16" PEAR SHAPE
7	1	LADDER FOUNDATION
8	2	LADDER SUPPORT BRACKET ASSEMBLY
9	1	JUNCTION BOX ASSY W/60" OF 4" CONDUIT
10	4	U-BOLT 1/2"-13NC X 5" SS LG.
11	18	BOLT 1/2"-13NC X 1 1/2" LG. HH C/S SS
12	20	NUT 1/2"-13 HEX SS
13	4	SHACKLE ANCHOR SS 1/4"
14	2	5/16" CHAIN SS X 40" LG.
15	1	PINNACLE 5"
16	1	LADDER SUPPORT BRACKET ASSEMBLY
17	2	BRKT F/FLAT LADDER MOUNT (OPTIONAL)
18	1	DGN FDR P/N 41785-01
19	1	MAST LADDER PLATFORM RODENT PLATE
20	2	U-BOLT 1/2"-13NC X 5" SS SHORT
21	1	WIRE HARNESS (C) X 21'-0" LG.
22	1	WIRE HARNESS (D) X 21'-0" LG.
23	1	WIRE HARNESS (A) X 14'-0" LG.
24	1	WIRE HARNESS (B) X 14'-0" LG.
25	1	CONDUIT 4" SEALTITE 60" LG.
26	2	BOLT 1/2"-13 X 1 3/4" HH CS SS
27	20	WASHER 1/2" FLAT SS
28	20	WASHER 1/2" LOCK SS



THIS HOLE MAY BE USED FOR FOUNDATION MOUNT WHEN FILL ELEVATIONS REQUIRE A SHORTER LADDER.

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REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN	PRE, INC.
CHECKED E. ROE	<i>EJR</i>
RECOMMENDED W. PREY	<i>WP</i>
DATE	FEBRUARY 2015

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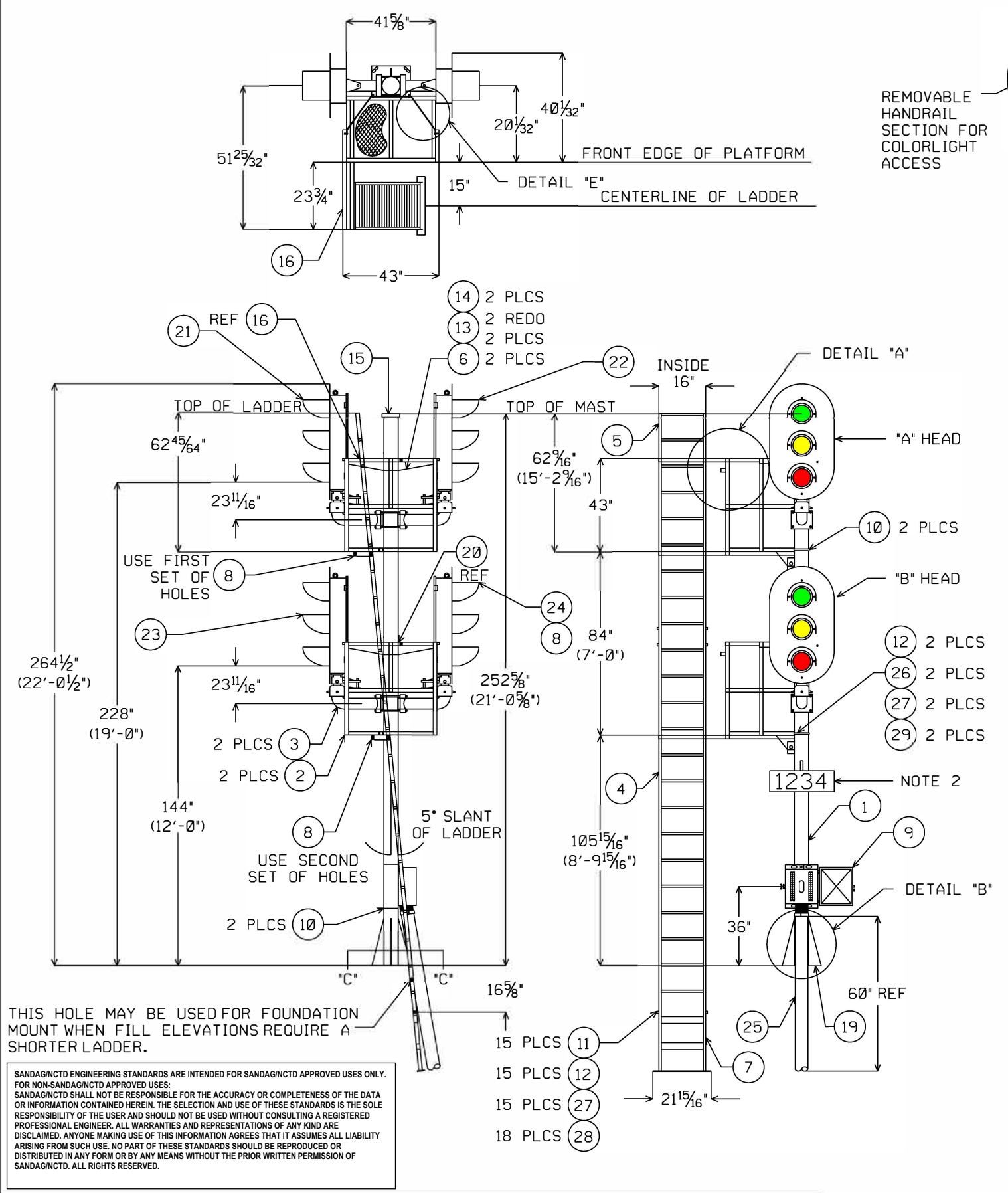
ENGINEERING STANDARD DRAWINGS

TYPICAL WAYSIDE SIGNAL ASSEMBLY
TWO UNIT BI-DIRECTIONAL

DRAWING NO. ESD-8500
DRAWING SHEET NO. 1 OF 1
SCALE: NONE
CONTRACT SHEET NO.

BILL OF MATERIAL

ITEM	QTY.	DESCRIPTION
1	1	ALUMINUM MAST 2 POS. 21' LG.
2	2	ALUMINUM PLATFORM ASSEMBLY
3	2	C/L 5" MTG. KIT FOR B TO B SIGNALS
4	1	LADDER 16" X 14'-6 1/8" ALUMINUM
5	1	LADDER 16" X 7'-6" ALUMINUM
6	2	CLIP SPRING SS 5/16" PEAR SHAPE
7	1	LADDER FOUNDATION
8	2	LADDER SUPPORT BRACKET ASSEMBLY
9	1	JUNCTION BOX ASSY W/60" OF 4" CONDUIT
10	4	U-BOLT 1/2"-13NC X 5" SS LG.
11	18	BOLT 1/2"-13NC X 1 1/2" LG. HH C/S SS
12	20	NUT 1/2"-13 HEX SS
13	4	SHACKLE ANCHOR SS 1/4"
14	2	5/16" CHAIN SS X 40" LG.
15	1	PINNACLE 5"
16	1	LADDER SUPPORT BRACKET ASSEMBLY
17	2	BRKT F/FLAT LADDER MOUNT (OPTIONAL)
18	1	DGN FDR P/N 41785-01
19	1	MAST LADDER PLATFORM RODENT PLATE
20	2	U-BOLT 1/2"-13NC X 5" SS SHDRT
21	1	WIRE HARNESS (C) X 21'-0" LG.
22	1	WIRE HARNESS (D) X 21'-0" LG.
23	1	WIRE HARNESS (A) X 14'-0" LG.
24	1	WIRE HARNESS (B) X 14'-0" LG.
25	1	CONDUIT 4" SEALTITE 60" LG.
26	2	BOLT 1/2"-13 X 1 3/4" HH CS SS
27	20	WASHER 1/2" FLAT SS
28	20	WASHER 1/2" LOCK SS



THIS HOLE MAY BE USED FOR FOUNDATION MOUNT WHEN FILL ELEVATIONS REQUIRE A SHORTER LADDER.

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- NOTES:
- DRAWING REFLECTS MATERIALS AND DIMENSIONS FOR G.E. TRANSPORTATION SYSTEMS GLOBAL SIGNALING SIGNAL. APPROVED EQUAL MUST CONFORM TO DRAWING.
 - ADD NUMBER BOARD, "P" SIGN, AND/OR "G" SIGN AS REQUIRED.
 - ALL ALUMINUM PARTS SHALL BE MARINE GRADE.
 - WAYSIDE SIGNAL ASSEMBLIES SHALL BE EQUIPPED WITH A LADDER GUARD TO PREVENT UNAUTHORIZED ACCESS TO THE LADDER.

REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN	PRE, INC.
CHECKED E. ROE	<i>EJR</i>
RECOMMENDED W. PREY	<i>WP</i>
DATE	FEBRUARY 2015



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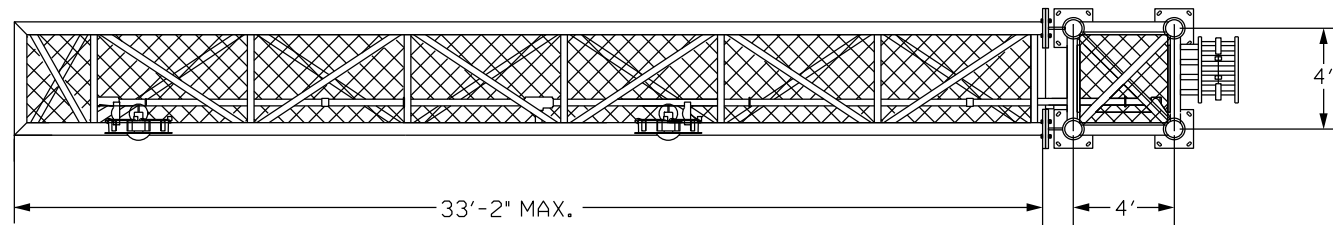
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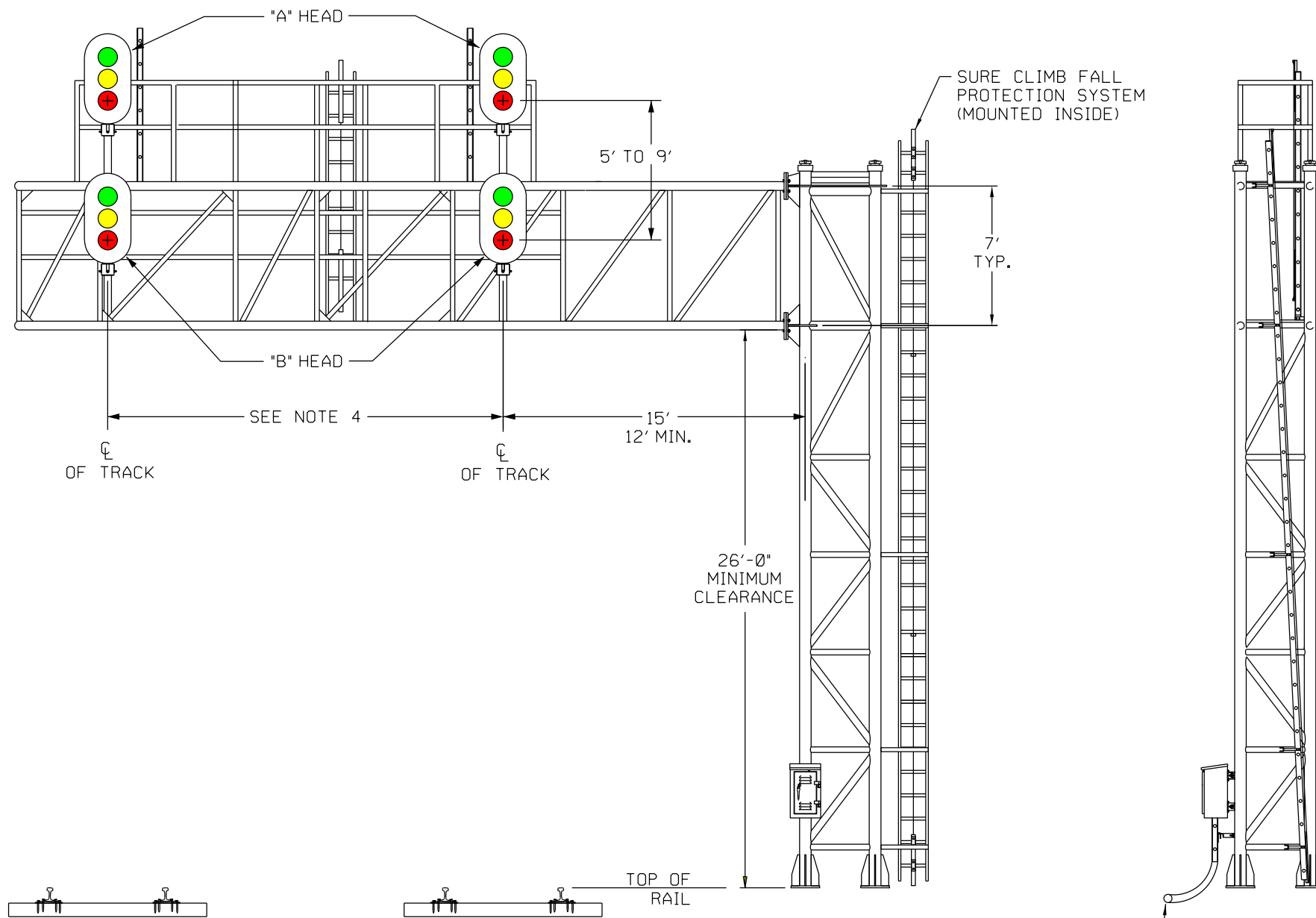
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ENGINEERING STANDARD DRAWINGS		DRAWING NO. ESD-8505
TYPICAL WAYSIDE SIGNAL ASSEMBLY FOUR UNIT BI-DIRECTIONAL		DRAWING SHEET NO. 1 OF 1
		SCALE: NONE
		CONTRACT SHEET NO.



TOP VIEW



FRONT VIEW

SIDE VIEW

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NOTES:

1. BASE OF BRIDGE MAST TO BE LEVEL WITH TOP OF HIGHEST RAIL.
2. 41" X 73³/₄" X 24" FREE STANDING POWDER COATED STEEL JUNCTION CASE REQUIRED WHERE MAST MOUNTED JUNCTION CASE DOES NOT HAVE SUFFICIENT CAPACITY.
3. BRIDGE LADDERS AND FALL ARREST SYSTEM SHALL MEET ALL OSHA REQUIREMENTS.
4. SPACING OF BRIDGE MOUNTED SIGNALS VARIES PER LOCATION AND WILL BE DETERMINED BASED ON ENGINEERING DESIGN.
5. ALL "A" HEADS SHALL BE INSTALLED AS SHOWN IN THIS DRAWING, EVEN WHEN THERE IS NO "B" HEAD REQUIRED. THIS WILL FACILITATE THE INSTALLATION OF "B" HEADS THAT MAY BE NEEDED BY OTHER SIGNAL IMPROVEMENT PROJECTS.
6. WAYSIDE SIGNAL ASSEMBLIES SHALL BE EQUIPPED WITH A LADDER GUARD TO PREVENT UNAUTHORIZED ACCESS TO THE LADDER.
7. CANTILEVER SIGNAL ASSEMBLY SHALL BE CAPABLE OF SUPPORTING A MINIMUM OF 500 LBS. LIVE LOAD AT THE END OF THE CANTILEVER ARM.
8. REFER ESD-2101 FOR CLEARANCES.

FOOTING REQUIREMENTS:

1. A LAYER OF WALKWAY ROCK SHALL BE PLACED AROUND STRUCTURE A MINIMUM DISTANCE OF 4'.

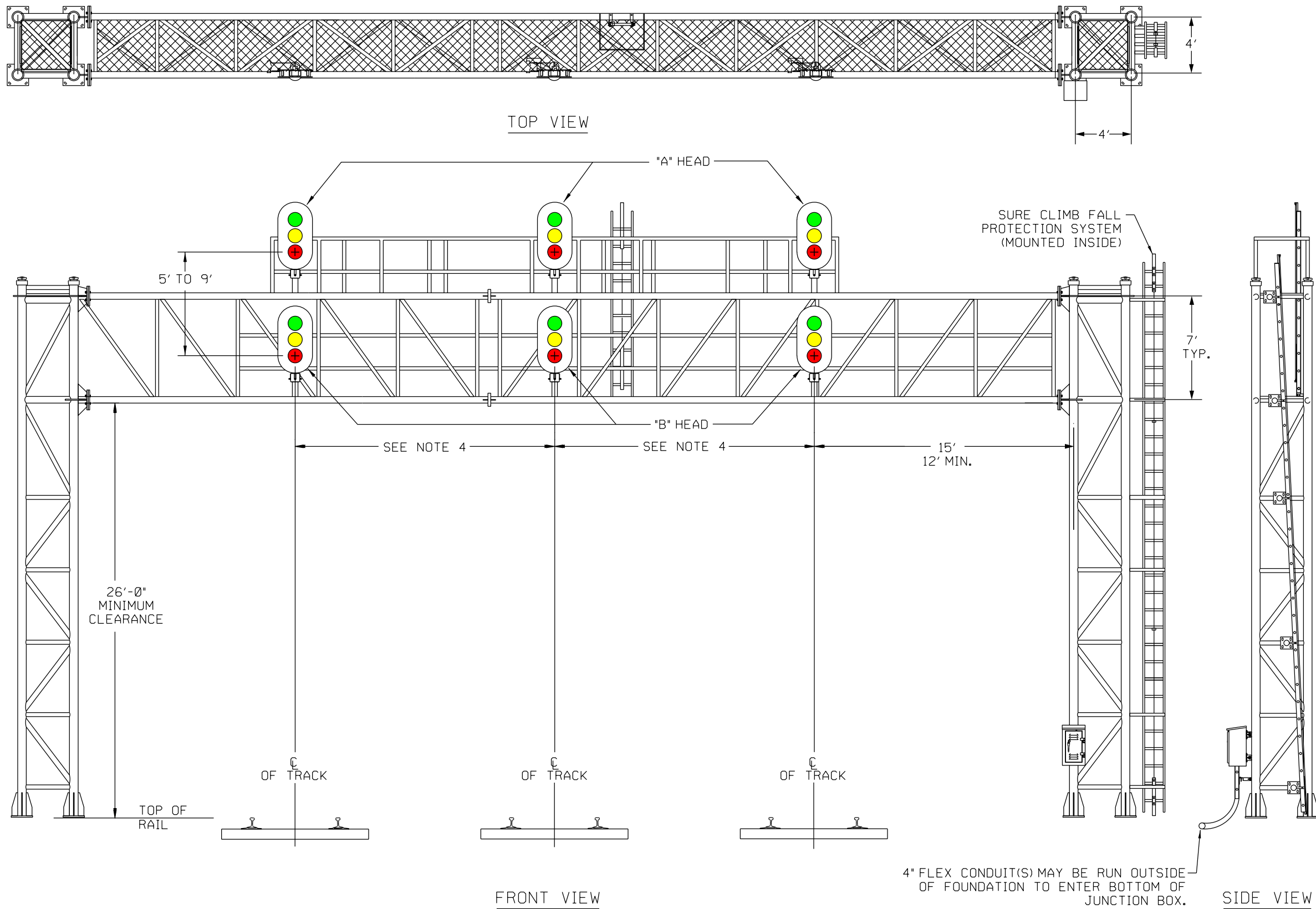
REV.	DATE	DESCRIPTION	DES.	ENG.

REVISIONS	DRAWN	PRE, INC.
	CHECKED	<i>EJR</i>
	RECOMMENDED	<i>WP</i>
	DATE	FEBRUARY 2015
DESIGNER PE STAMP		

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ENGINEERING STANDARD DRAWINGS	DRAWING NO. ESD-8510
WAYSIDE SIGNAL CANTILEVER STRUCTURE	DRAWING SHEET NO. 1 OF 1
	SCALE: NONE
	CONTRACT SHEET NO.




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- NOTES:
1. BASE OF BRIDGE MAST TO BE LEVEL WITH TOP OF HIGHEST RAIL.
 2. 41" X 73³/₄" X 24" FREE STANDING POWDER COATED STEEL JUNCTION CASE REQUIRED WHERE MAST MOUNTED JUNCTION CASE DOES NOT HAVE SUFFICIENT CAPACITY.
 3. BRIDGE LADDERS AND FALL ARREST SYSTEM SHALL MEET ALL OSHA REQUIREMENTS.
 4. SPACING OF BRIDGE MOUNTED SIGNALS VARIES PER LOCATION AND WILL BE DETERMINED BASED ON ENGINEERING DESIGN.
 5. ALL "A" HEADS SHALL BE INSTALLED AS SHOWN IN THIS DRAWING, EVEN WHEN THERE IS NO "B" HEAD REQUIRED. THIS WILL FACILITATE THE INSTALLATION OF "B" HEADS THAT MAY BE NEEDED BY OTHER SIGNAL IMPROVEMENT PROJECTS.
 6. WAYSIDE SIGNAL ASSEMBLIES SHALL BE EQUIPPED WITH A LADDER GUARD TO PREVENT UNAUTHORIZED ACCESS TO THE LADDER.
 7. REFER ESD-2101 FOR CLEARANCES.
- FOOTING REQUIREMENTS:
1. A LAYER OF WALKWAY ROCK SHALL BE PLACED AROUND STRUCTURE A MINIMUM DISTANCE OF 4'.

REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN	PRE, INC.
CHECKED	EJR
RECOMMENDED	WP
DATE	FEBRUARY 2015
DESIGNER PE STAMP	

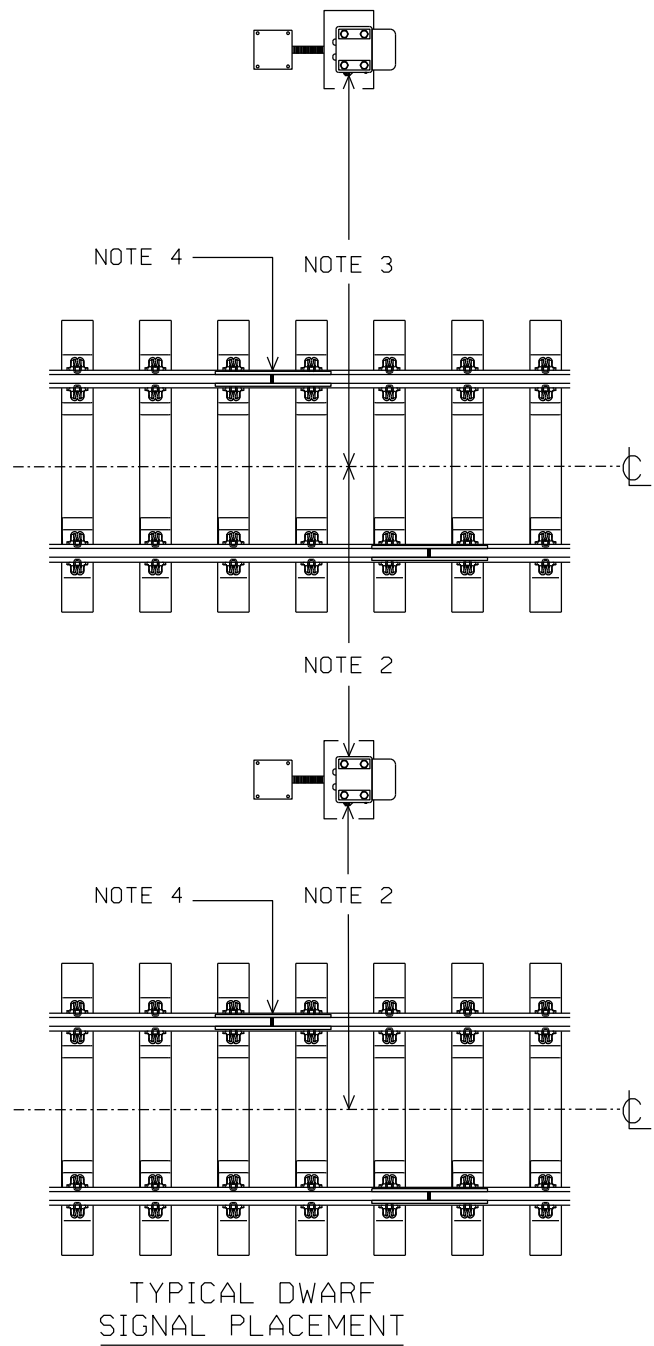


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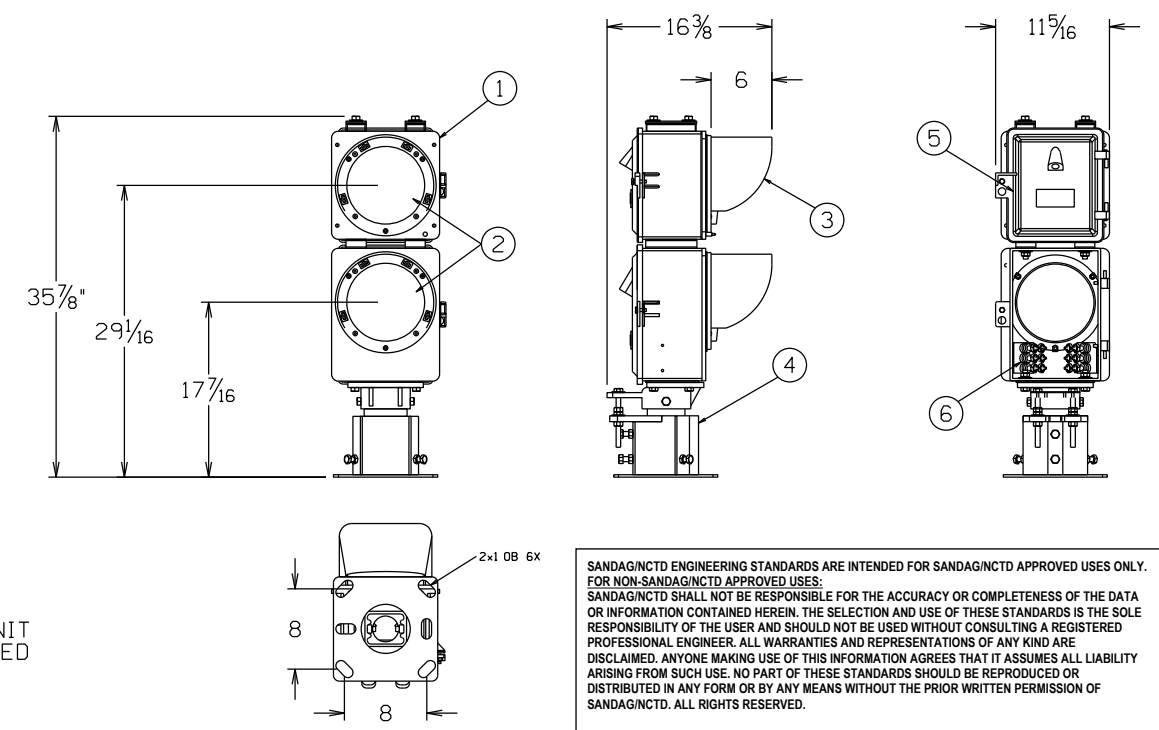
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<p>ENGINEERING STANDARD DRAWINGS</p> <p>WAYSIDE SIGNAL BRIDGE STRUCTURE</p>	<p>DRAWING NO. ESD-8515</p> <p>DRAWING SHEET NO. 1 OF 1</p> <p>SCALE: NONE</p> <p>CONTRACT SHEET NO.</p>
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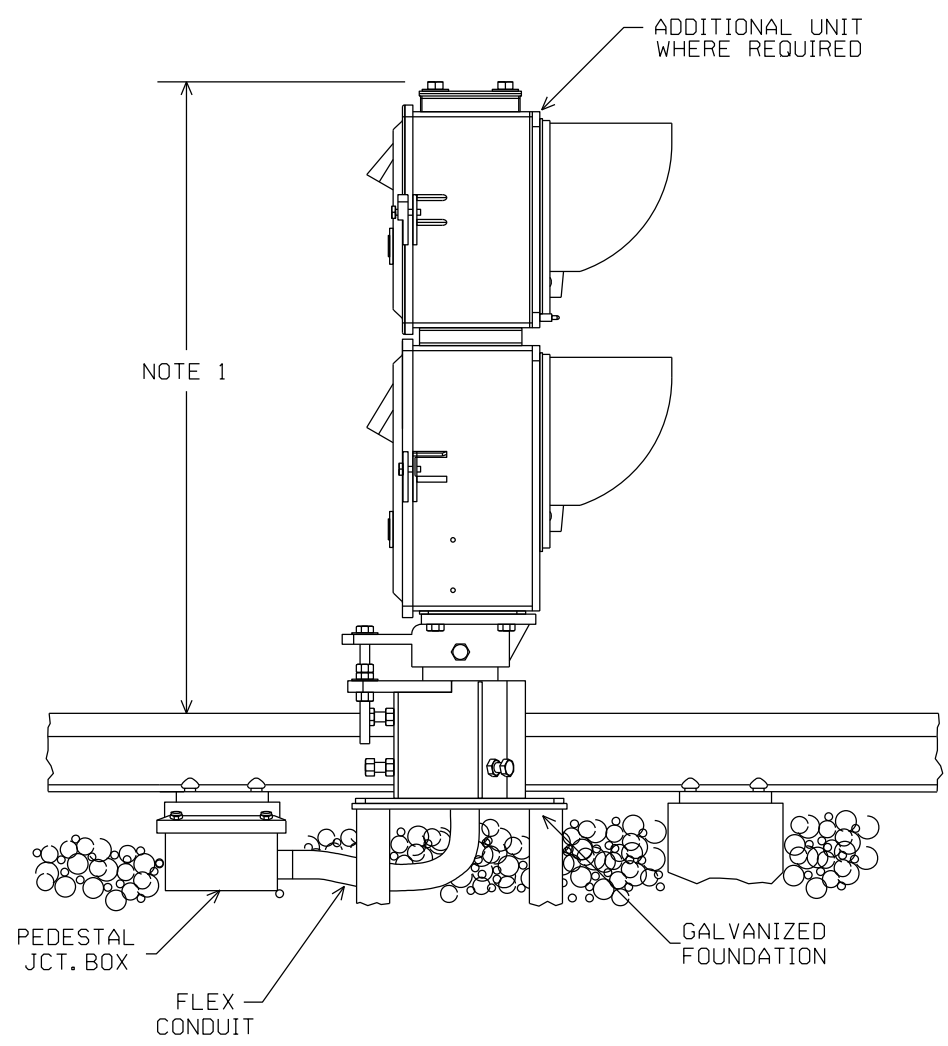


- ① CAST ALUMINUM COLORLIGHT HOUSING POWDER COATED FLAT BLACK.
- ② QTY. 2 GETS 8" LED TRI-COLOR
- ③ 6" ALUMINUM HOOD POWDER COATED FLAT BLACK
- ④ CAST ALUMINUM TEETER POWDER COATED FLAT BLACK WITH ALUMINUM MOUNTING PLATE.
- ⑤ CAST ALUMINUM DOOR WITH 3/4" VENT, PADLOCKABLE, POWDER COATED FLAT BLACK.
- ⑥ QTY. 2 2X3 TERMINAL BLOCKS WITH AAR HARDWARE.



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- NOTES:
1. THE VERTICAL HEIGHT OF A DWARF SIGNAL SHALL NOT BE GREATER THAN 34" ABOVE TOP OF ANY ADJACENT RAIL WHEN PLACED BETWEEN TRACKS AS DESCRIBED IN NOTE 2.
 2. NO PORTION OF THE DWARF SIGNAL THAT EXTENDS ABOVE THE TOP OF RAIL SHALL BE WITHIN 6'-0" OF THE CENTERLINE OF EITHER TRACK.
 3. WHEN DWARF SIGNAL IS PLACED ON THE FIELD SIDE OF A TRACK (NOT BETWEEN TRACKS) NO PORTION OF THE SIGNAL THAT EXTENDS ABOVE THE TOP OF RAIL SHALL BE WITHIN 8'-6" OF THE CENTERLINE OF THE TRACK WHERE TRACK IS TANGENT AND 9'-6" WHEN PLACED NEXT TO CURVED TRACK. CONFLICTS WITH RETAINING WALLS OR OTHER STRUCTURES DOES NOT RELIEVE NCTD FROM COMPLYING WITH THIS CPUC CLEARANCE REQUIREMENT.
 4. DWARF SIGNAL FOUNDATION (L&W P/N 8A20133-01X) SHALL BE CENTERED BETWEEN THE INSULATED JOINTS.
 5. DWARF SIGNAL SHALL BE L&W P/N 5B4851A-T-GE (1 HEAD), 5B4852A-T-GE (2 HEADS) OR APPROVED EQUAL EQUIPPED WITH GETS TRI-COLOR LED SIGNAL UNIT.
 6. DWARF SIGNALS (AS SHOWN) SHALL ONLY BE USED WHEN DIRECTED BY NCTD. A STACKED TYPE DWARF SIGNAL WITH LED LAMPS SHALL BE THE PREFERRED SIGNAL. REFER TO SIGNAL CIRCUIT DETAILS FOR LAMP ARRANGEMENTS.



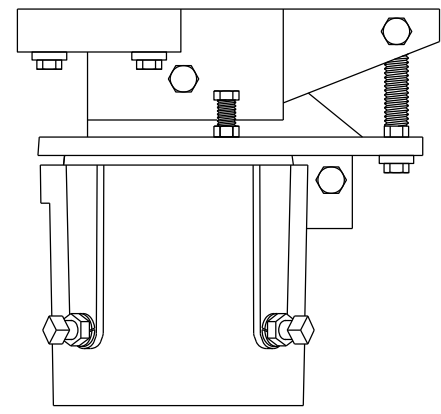
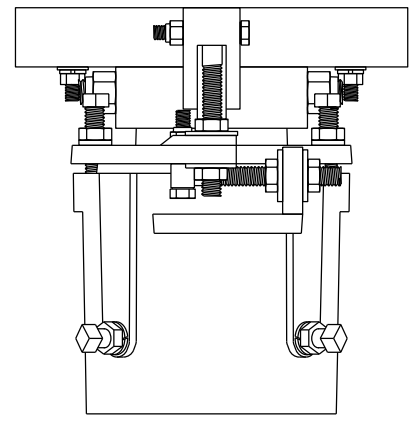
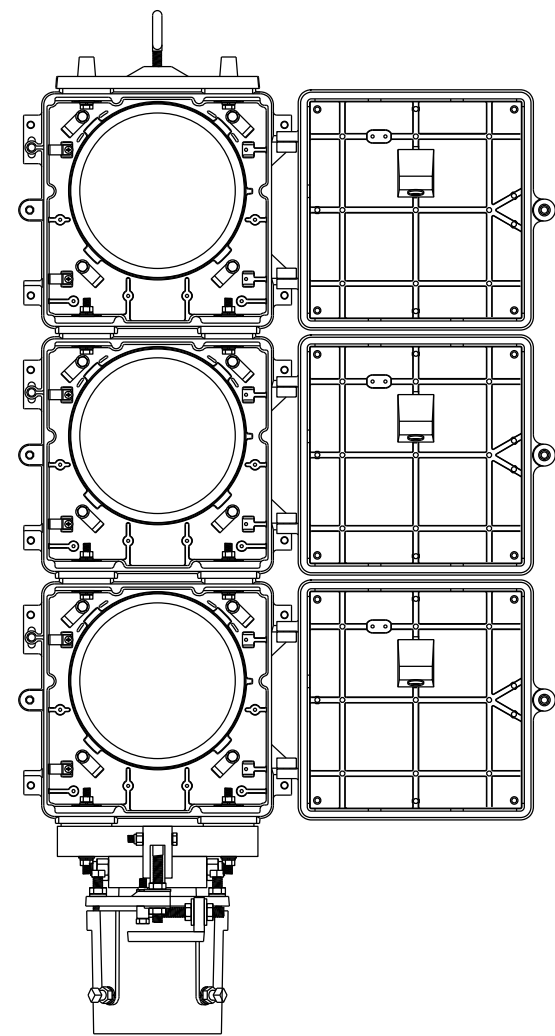
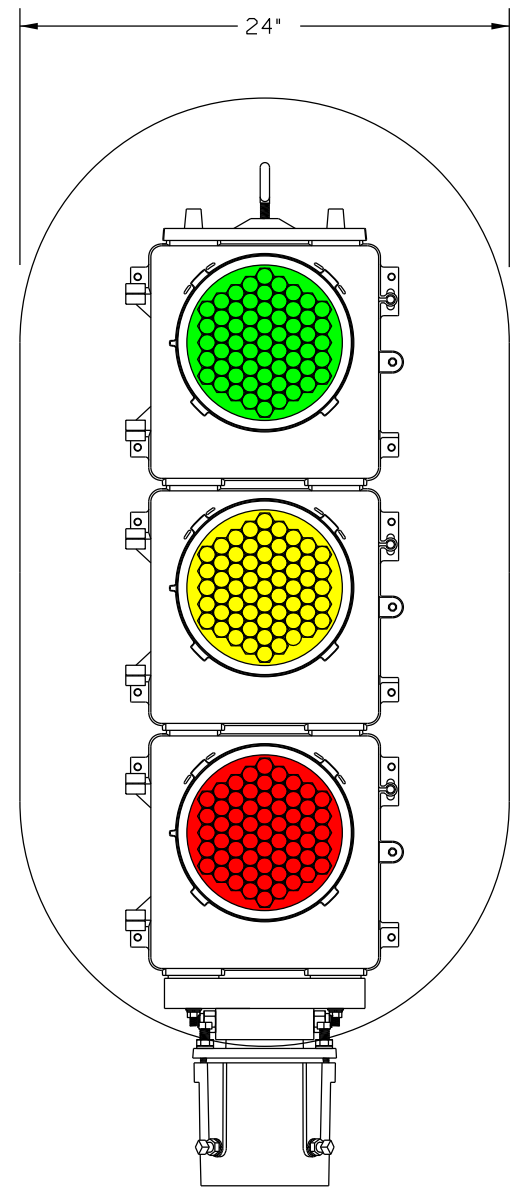
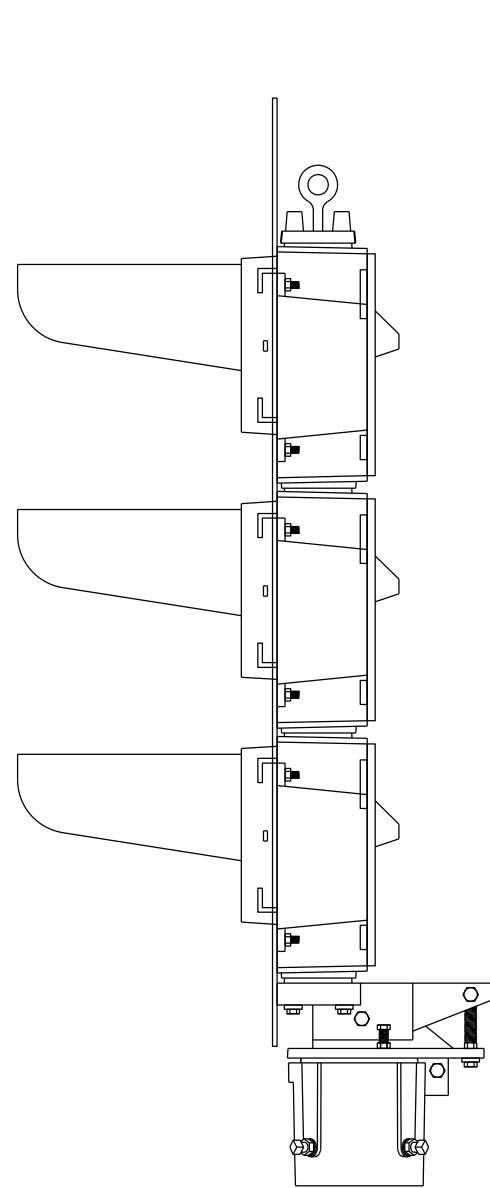
REV.	DATE	DESCRIPTION	DES. ENG.

DRAWN	PRE, INC.
CHECKED	EJR
RECOMMENDED	WP
DATE	FEBRUARY 2015
DESIGNER PE STAMP	

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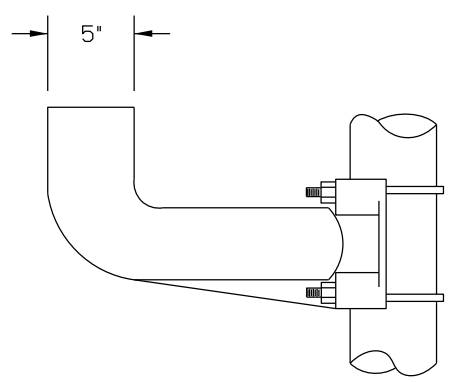
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ENGINEERING STANDARD DRAWINGS	DRAWING NO. ESD-8520
TYPICAL DWARF SIGNAL PLACEMENT	DRAWING SHEET NO. 1 OF 1
	SCALE: NONE
	CONTRACT SHEET NO.

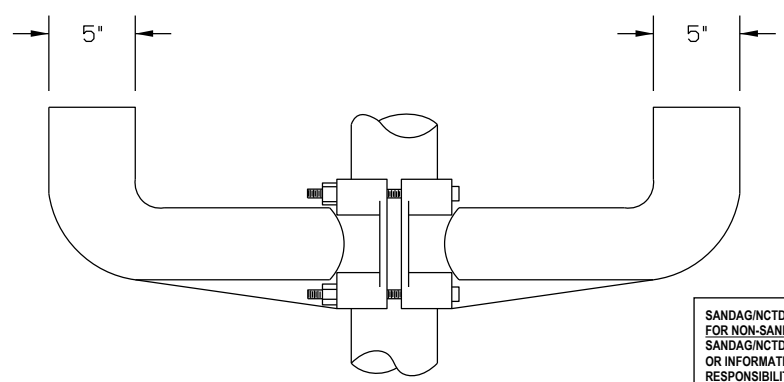


SIGNAL REAR VIEW

ADJUSTABLE BRACKET



TUBE TYPE SINGLE BRACKET



TUBE TYPE DOUBLE BRACKET

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NOTES:

- COLORLIGHT SIGNAL UNIT ASSEMBLY SHALL INCLUDE 3 L.E.D. LAMP UNITS (G/Y/R), 3 HOODS, BACKGROUND, ADJUSTABLE BRACKET, MOUNTING BRACKETS AND APPROPRIATE MOUNTING HARDWARE.
- SIGNAL UNIT SHALL BE DESIGNED TO ALLOW REMOVAL OF LAMP UNITS FROM THE REAR.
- L.E.D. LAMP UNITS SHALL MEET ALL REQUIREMENTS OF AREMA SIGNAL MANUAL PART 7.1.5.
- INSTALL BLANK COVER PLATE FOR UNUSED LAMP UNITS.

REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN	PRE, INC.
CHECKED	<i>EJR</i>
RECOMMENDED	<i>BS</i>
DATE	MARCH 18, 2017
DESIGNER PE STAMP	



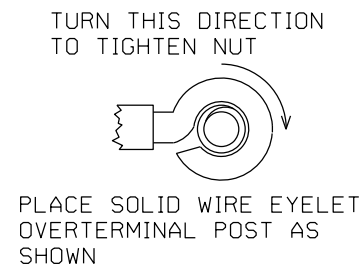
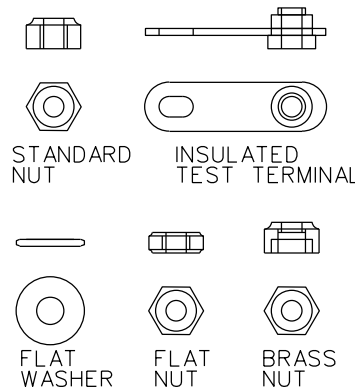
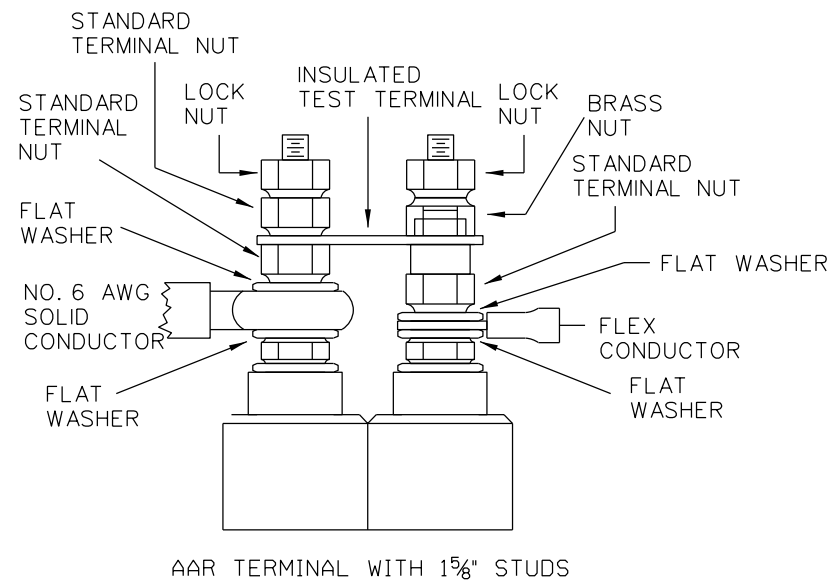
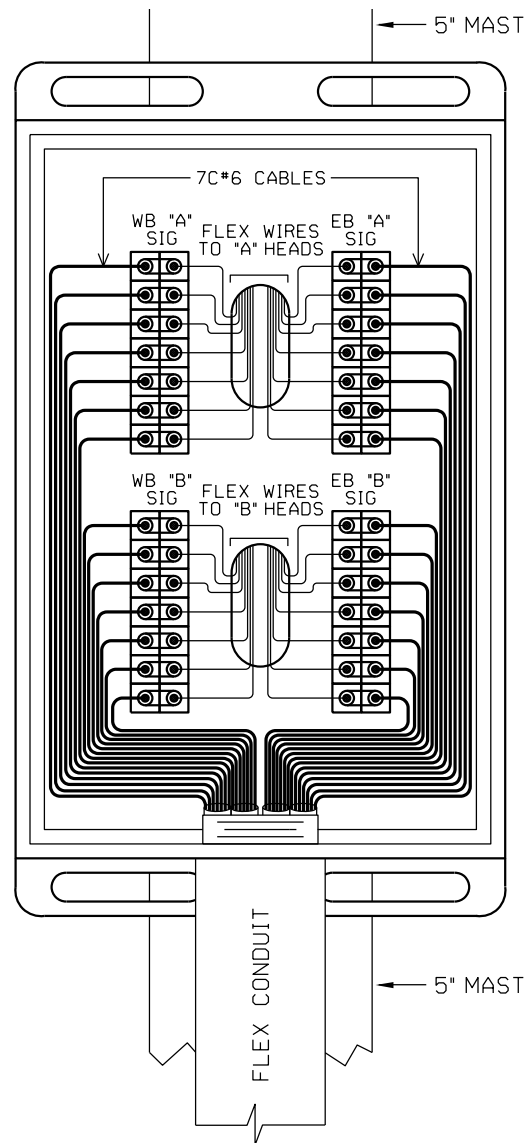
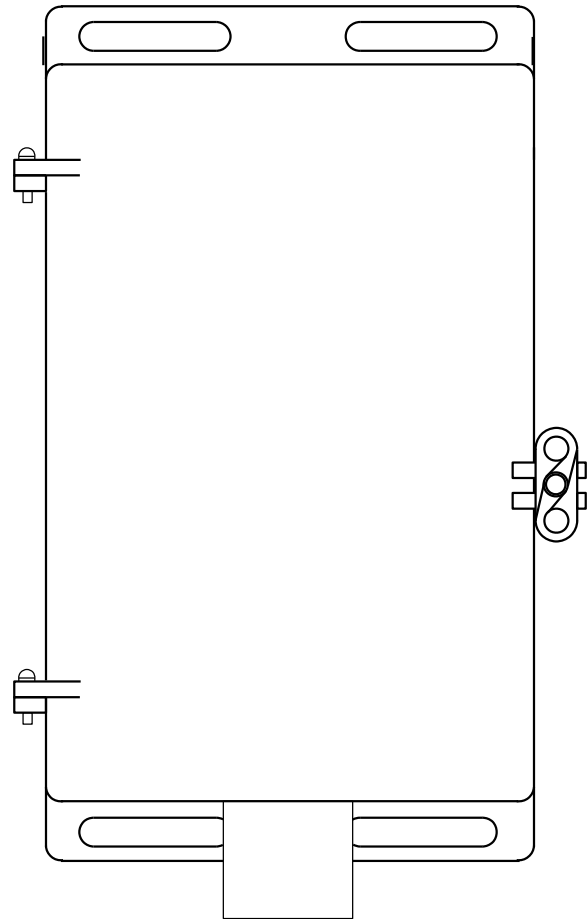
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ENGINEERING STANDARD DRAWINGS
TYPICAL L.E.D. COLOR LIGHT SIGNAL UNIT

DRAWING NO.	ESD-8525
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	



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NOTES:

1. TERMINAL BOX SHALL BE SAFETRAN MODEL 092494-BX OR APPROVED EQUAL.
2. TWENTY EIGHT INSULATED TEST TERMINALS, COMPLETE WITH NUTS AND WASHERS, (SAFETRAN TYPE 024620-1X OR APPROVED EQUAL) SHALL BE FURNISHED WITH EACH GROUND SIGNAL JUNCTION BOX.
3. ALL CONDUCTORS SHALL BE IDENTIFIED WITH SLEEVE TYPE TAGS AND SHALL DISPLAY NOMENCLATURE AS SHOWN IN THE CIRCUIT DRAWINGS.
4. EACH SPARE CABLE CONDUCTOR SHALL BE TERMINATED AND TAGGED ON AN AREMA C&S MANUAL PART 14.1.5 TERMINAL AND LOCKED DOWN TIGHTLY WITH TWO TERMINAL NUTS.
5. TERMINALS NOT USED WILL BE EQUIPPED WITH TWO WASHERS AND TWO CROWN NUTS.
6. CABLE AND FLEX WIRE INSULATION SHALL BE PROTECTED FROM THE SHARP EDGES OF THE CABLE ENTRANCE.
7. CABLE ENTRANCE SHALL BE SEALED TO PREVENT ACCESS BY RODENTS AND OTHER PESTS.
8. JUNCTION BOX SHALL BE SECURELY ATTACHED TO SIGNAL MAST USING STAINLESS STEEL HARDWARE.

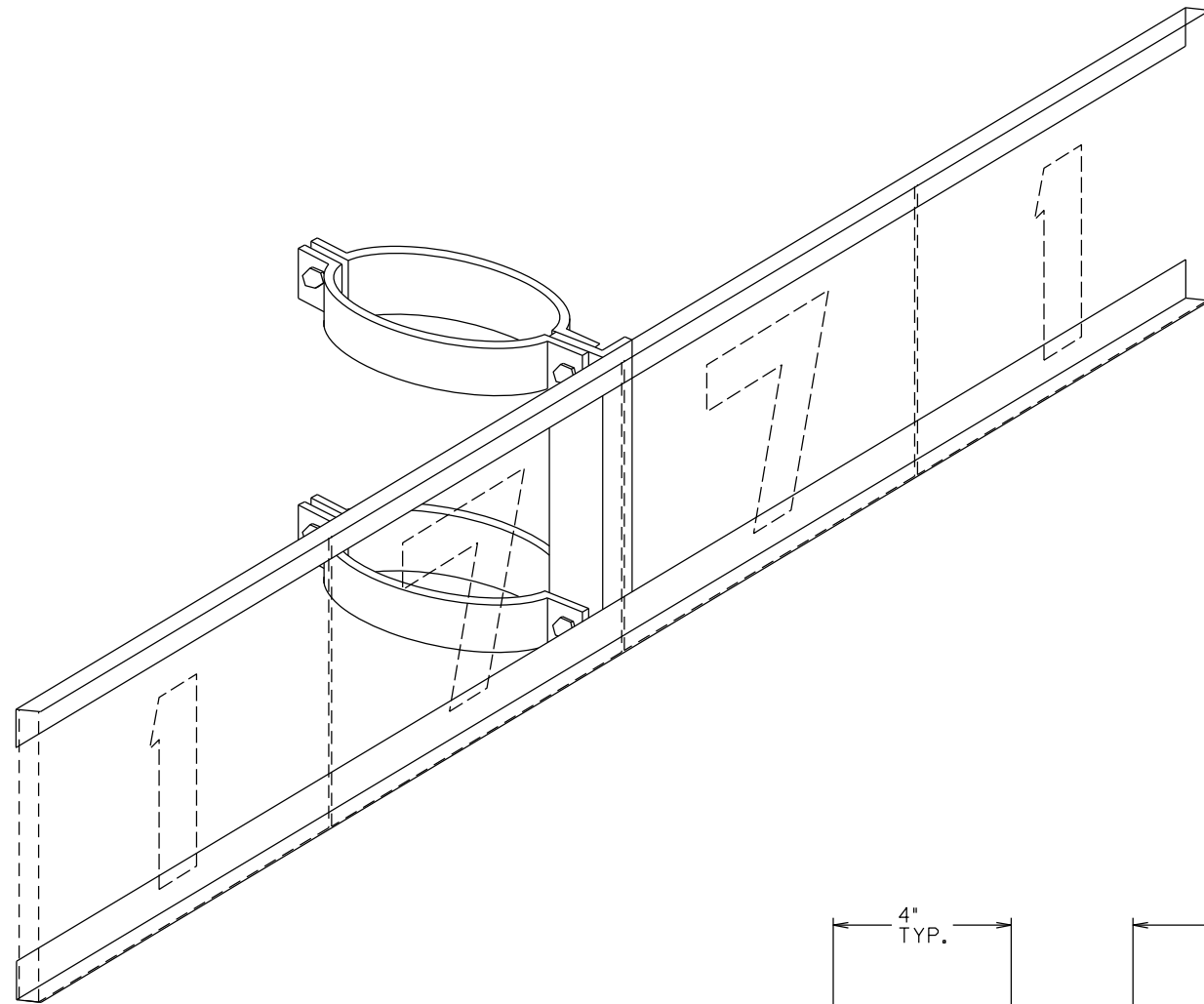
REV.	DATE	DESCRIPTION	DES.	ENG.

REVISIONS	DRAWN	PRE, INC.
	CHECKED	<i>EJR</i>
	RECOMMENDED	<i>WP</i>
	DATE	FEBRUARY 2015
	DESIGNER PE STAMP	

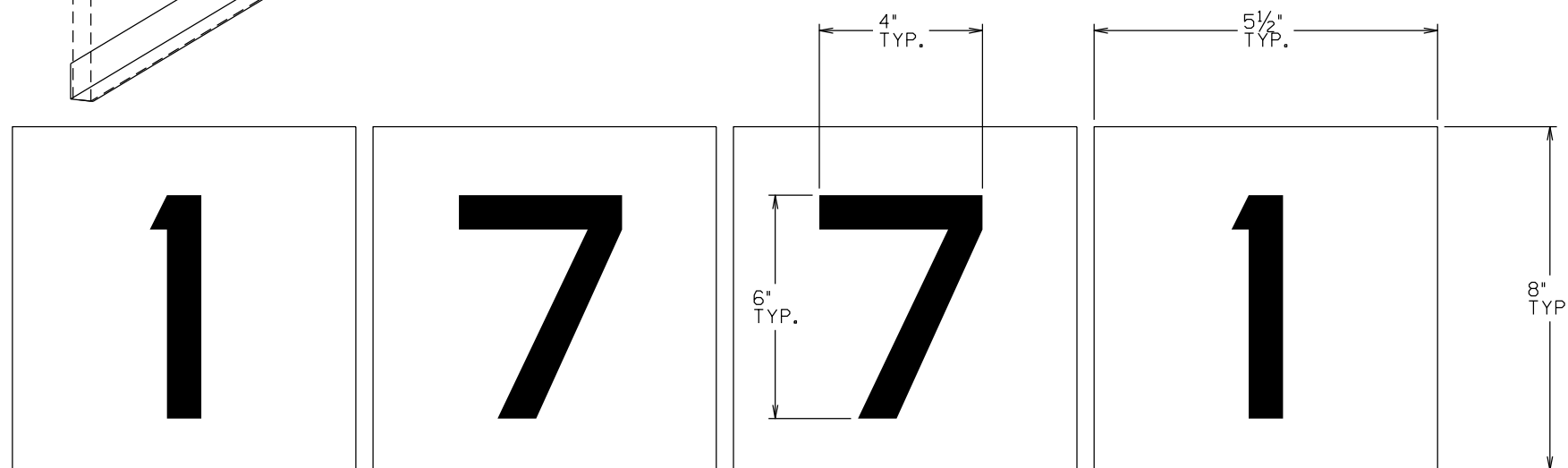


ENGINEERING STANDARD DRAWINGS
TYPICAL GROUND SIGNAL JUNCTION BOX

DRAWING NO.	ESD-8530
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	



NUMBER PLATES & MOUNTING BRACKET



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NOTES:

1. UNITYPE FRAMES SHALL BE MADE OF ALUMINUM AND COMPLETE WITH STAINLESS STEEL HARDWARE REQUIRED FOR MOUNTING TO 5" MAST. APPLY ANTI-SEIZE COMPOUND TO STAINLESS STEEL FASTNERS.
2. ALL NUMBER PLATES ARE TO BE BLACK IMAGE ON WHITE BACKGROUND.
3. SIGNAL NUMBER PLATES AND MOUNTING BRACKET SHALL BE SAFETRAN PART NO. 036117-584 - (NUMBER SEQUENCE) OR APPROVED EQUAL.
4. 1/8" THICK MILL FINISH ALUMINIUM PANEL, ALCOA 6016-T6 OR EQUAL.

REV.	DATE	DESCRIPTION	DES.	ENG.

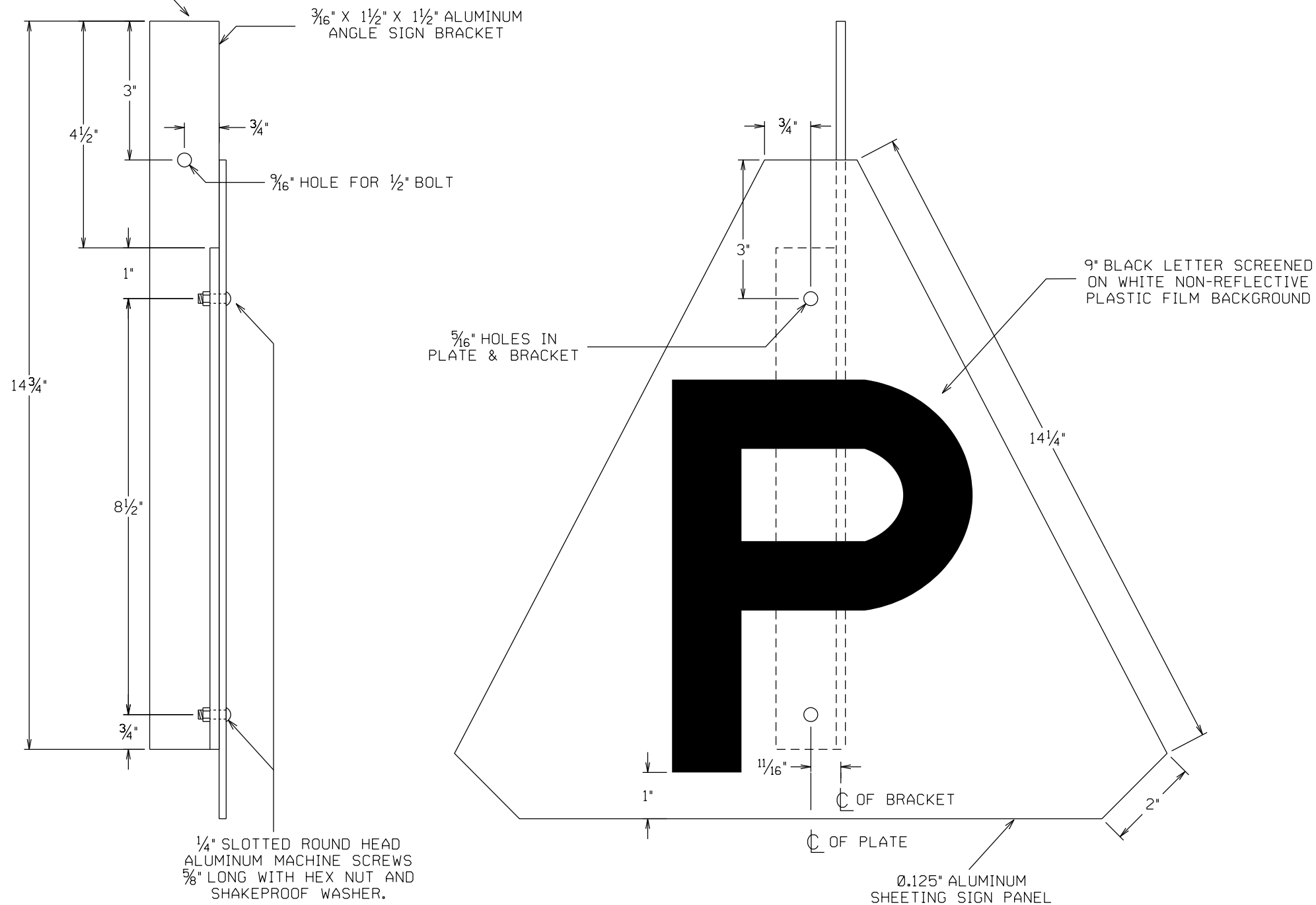
DRAWN	PRE, INC.
CHECKED	EJR
E. ROE	
RECOMMENDED	WP
W. PREY	
DATE	FEBRUARY 2015
DESIGNER PE STAMP	

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ENGINEERING STANDARD DRAWINGS SIGNAL NUMBER PLATE	DRAWING NO.	ESD-8540
	DRAWING SHEET NO.	1 OF 1
	SCALE:	NONE
	CONTRACT SHEET NO.	

WHEN INSTALLING ON SIGNAL,
APPLY PLASTIC TAPE TO ALUMINUM
SURFACES IN CONTACT WITH STEEL
SURFACES.



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- NOTES:
1. SIGNS: 1/8" THICK MILL FINISH ALUMINIUM PANEL, ALCOA 6016-T6 OR EQUAL.
 2. FONT STYLE SHALL BE IN ACCORDANCE WITH ESD-1212.

REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN	PRE, INC.
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RECOMMENDED	WP
DATE	FEBRUARY 2015
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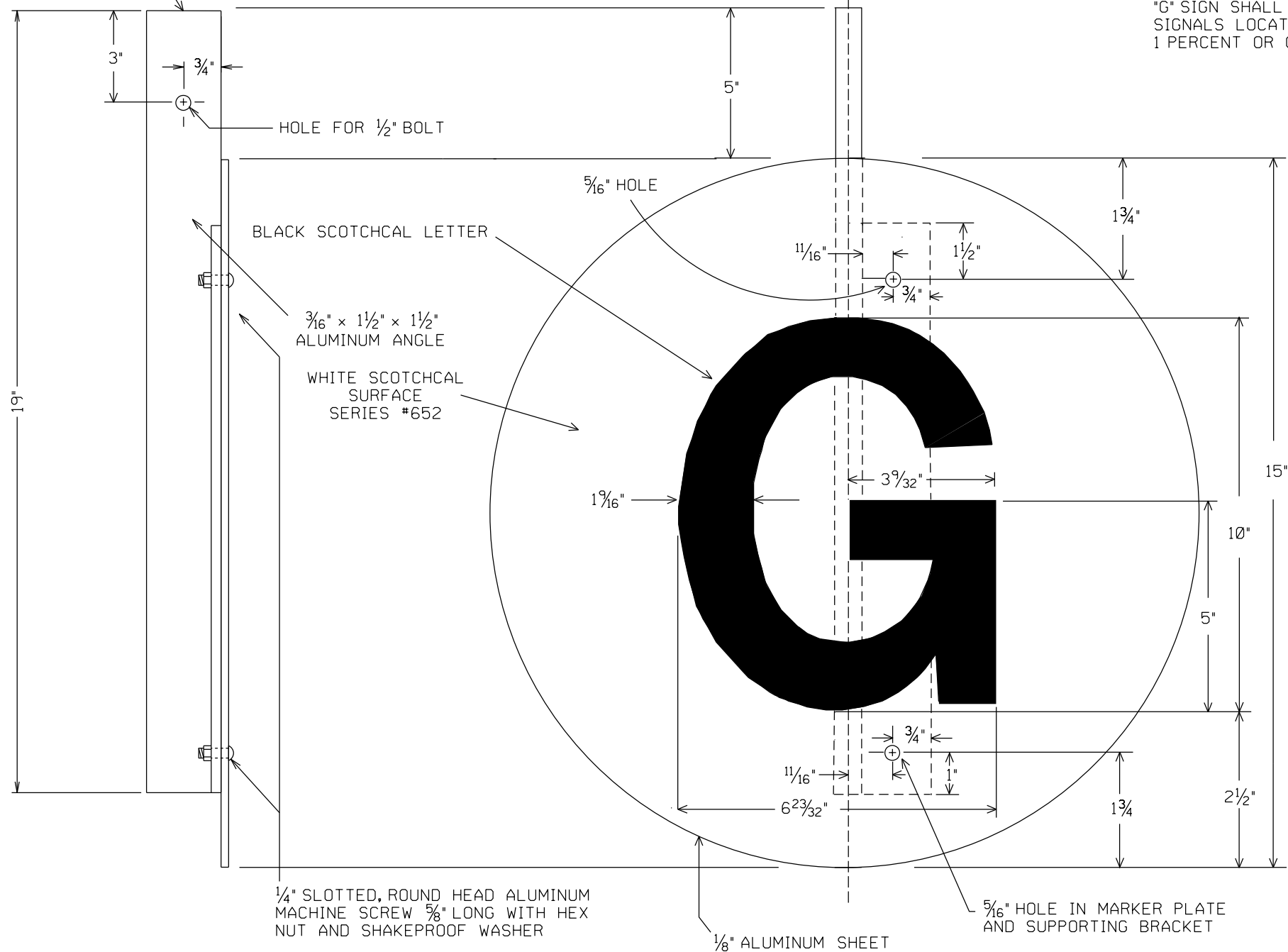
ENGINEERING STANDARD DRAWINGS
P SIGN

DRAWING NO.	ESD-8545
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	

WHEN INSTALLING ON SIGNAL, APPLY PLASTIC TAPE TO ALUMINUM SURFACE IN CONTACT WITH STEEL POLE CLAMP.

OF PLATE

NOTE:
"G" SIGN SHALL BE INSTALLED ON INTERMEDIATE SIGNALS LOCATED ON AN ASCENDING GRADE OF 1 PERCENT OR GREATER.



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NOTES:

1. SIGNS: 1/8" THICK MILL FINISH ALUMINIUM PANEL, ALCOA 6016-T6 OR EQUAL.
2. FONT STYLE SHALL BE IN ACCORDANCE WITH ESD-1212.

REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN	PRE, INC.
CHECKED	EJR
RECOMMENDED	WP
DATE	FEBRUARY 2015
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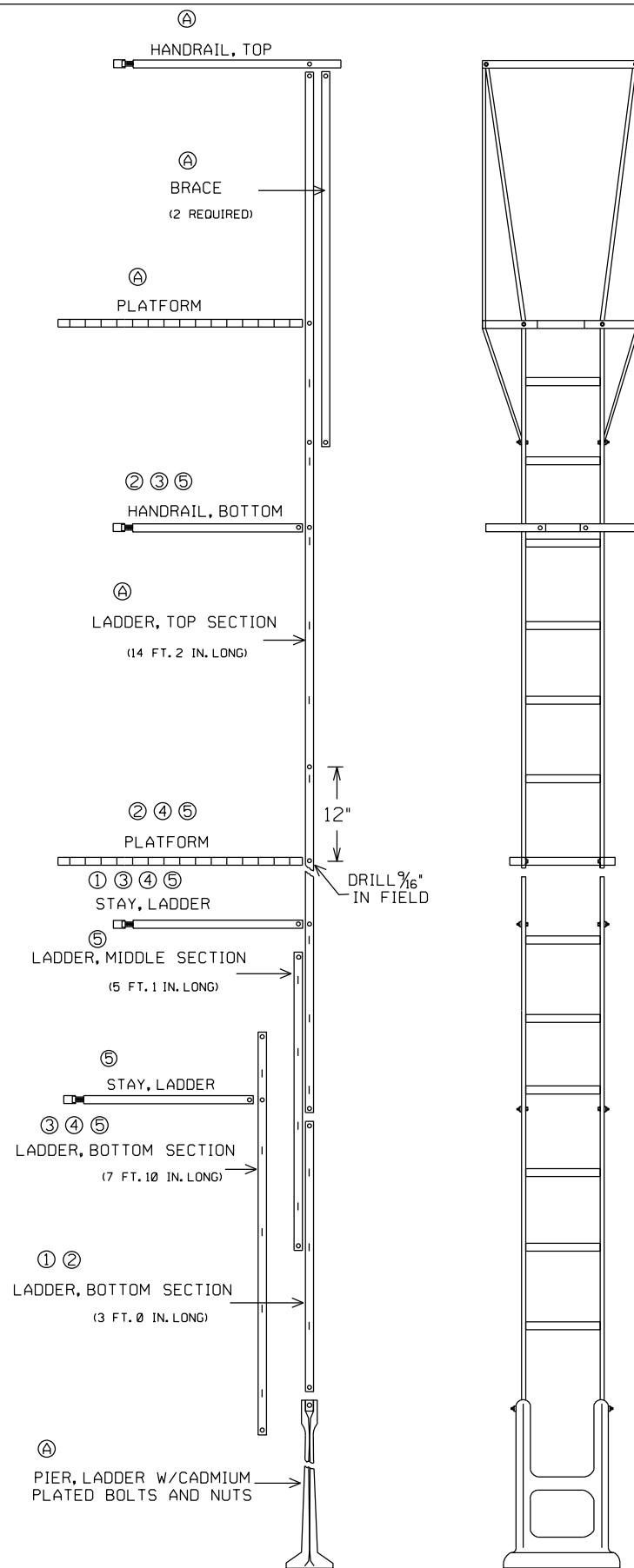
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ENGINEERING STANDARD DRAWINGS

G SIGN

DRAWING NO.	ESD-8550
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	



THIS LADDER ASSEMBLY SHALL ONLY BE USED WHERE PROPER CLEARANCE CANNOT BE MAINTAINED USING SIDE MOUNT LADDER ASSEMBLY. REQUIRES NCTD APPROVAL.

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NOTES:

1. ORDER ITEMS MARKED A FOR ALL LADDER ORDERS WHERE COMPLETE LADDER IS REQUIRED. ORDER ADDITIONAL ITEMS BELOW AS LISTED FOR SIGNAL HEIGHT AND TYPE.
 1. ORDER FOR 17' SINGLE UNIT SIGNAL
 2. ORDER FOR 17' TWO UNIT SIGNAL
 3. ORDER FOR 22' SINGLE UNIT SIGNAL
 4. ORDER FOR 22' TWO UNIT SIGNAL
 5. ORDER FOR 27' TWO UNIT SIGNAL
2. 22' SINGLE UNIT SIGNAL WILL REQUIRE TWO LADDER STAYS (*) PC. UN128591 WHEN ORDERING COMPLETE LADDER.
3. BOLTS SQUARE HEAD MACHINE, WITH NUTS (GALVANIZED) 1/2"x1-1/4". PLATFORMS AND STAYS TO BE FURNISHED COMPLETE WITH C-CLAMP AND BOLTS FOR FASTENING TO SIGNAL MAST.
4. WAYSIDE SIGNAL ASSEMBLIES SHALL BE EQUIPPED WITH A LADDER GUARD TO PREVENT UNAUTHORIZED ACCESS TO THE LADDER.
5. ALL SIGNAL LADDERS TO BE HOT DIPPED GALVANIZED OR ALUMINUM.

REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN	PRE, INC.
CHECKED	<i>EJR</i>
RECOMMENDED	<i>WP</i>
DATE	FEBRUARY 2015
DESIGNER PE STAMP	



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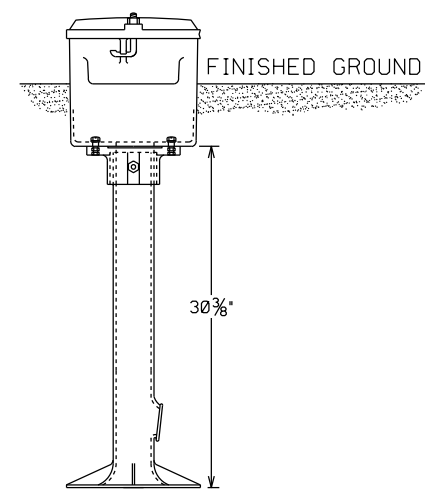
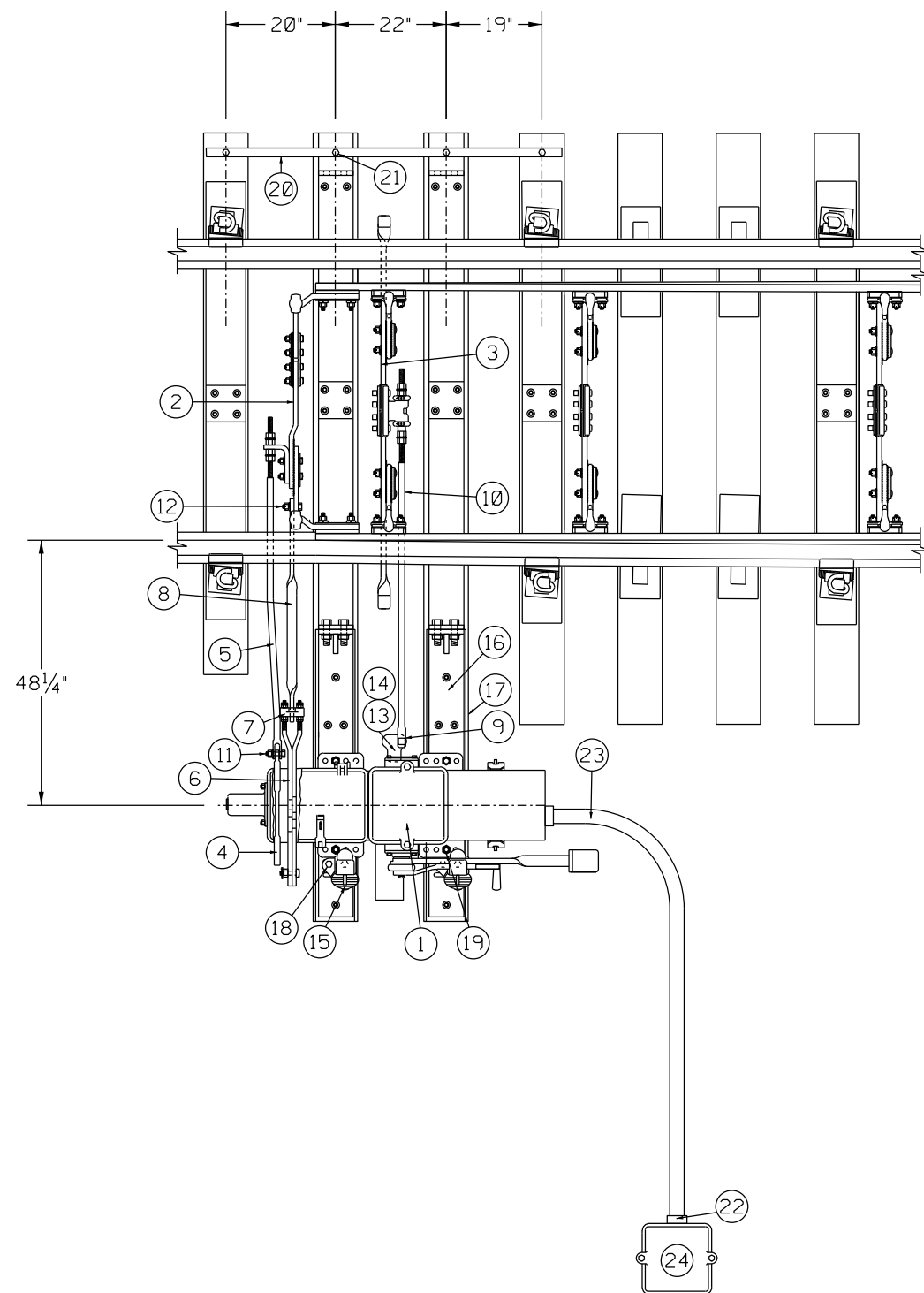
810 Mission Avenue
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ENGINEERING STANDARD DRAWINGS TYPICAL GALVANIZED SIGNAL LADDER	DRAWING NO.	ESD-8570
	DRAWING SHEET NO.	1 OF 1
	SCALE:	NONE
	CONTRACT SHEET NO.	

BILL OF MATERIAL

M23-A DUAL CONTROL SWITCH LAYOUT FOR #8, #10 & #14 R.H. TURNOUTS

ITEM	DESCRIPTION
①	MACHINE, SWITCH M23-A
②	ROD, MF INSULATED FRONT
③	ROD, #1 SMJ INSULATED WITH BASKET
④	BAR, POINT DETECTOR (INTERNAL)
⑤	ROD, POINT DETECTOR CONNECTING
⑥	ROD, ADJUSTABLE LOCK (INTERNAL)
⑦	LUG, LOCK ROD (BINOCULARS)
⑧	ROD, LOCK ROD CONNECTING (TWISTY ROD)
⑨	LUG, OPERATING ROD CONNECTION (BEAR CLAW)
⑩	ROD, SWITCH OPERATING
⑪	BOLT, ASSEMBLY 5/8"-11 X 2 5/8"
⑫	BOLT, ASSEMBLY 1"-8 X 2 3/4" DRILLED AT 2 1/2"
⑬	BOLT, ASSEMBLY 7/8"-9 X 3"
⑭	PIN, OPERATING BAR CONNECTING
⑮	STAND, UNIVERSAL LEVER LATCH
⑯	PLATE, SWITCH MACHINE MOUNTING
⑰	TIE, DAPPED TRAPEZOID 10" X 10" X 14"
⑱	ASSEMBLY, HEADLOCK BOLT 3/4"-10 X 11"
⑲	ASSEMBLY, HEADLOCK BOLT 7/8"-9 X 16"
⑳	STRAP, TIE 65"
㉑	SCREW, 3/4" X 6" LAG
㉒	CONNECTOR, 2" STRAIGHT LIQUIDTIGHT
㉓	CONDUIT, 2" FLEX LIQUIDTIGHT
㉔	BOX, PEDESTAL JUNCTION (SWITCH 36 TERMINAL)



JUNCTION BOX SHALL BE LOCATED OUTSIDE OF CPUC WALKWAY AREA. CONDUIT FROM SWITCH MACHINE TO JUNCTION BOX SHALL BE LOCATED BELOW WALKWAY BALLAST TO PREVENT TRIPPING.

JUNCTION BOX INSTALLATION DETAIL


SANDAG/NCTD ENGINEERING STANDARDS ARE INTENDED FOR SANDAG/NCTD APPROVED USES ONLY. FOR NON-SANDAG/NCTD APPROVED USES: SANDAG/NCTD SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF THE DATA OR INFORMATION CONTAINED HEREIN. THE SELECTION AND USE OF THESE STANDARDS IS THE SOLE RESPONSIBILITY OF THE USER AND SHOULD NOT BE USED WITHOUT CONSULTING A REGISTERED PROFESSIONAL ENGINEER. ALL WARRANTIES AND REPRESENTATIONS OF ANY KIND ARE DISCLAIMED. ANYONE MAKING USE OF THIS INFORMATION AGREES THAT IT ASSUMES ALL LIABILITY ARISING FROM SUCH USE. NO PART OF THESE STANDARDS SHOULD BE REPRODUCED OR DISTRIBUTED IN ANY FORM OR BY ANY MEANS WITHOUT THE PRIOR WRITTEN PERMISSION OF SANDAG/NCTD. ALL RIGHTS RESERVED.

NOTES:

1. APPLICATIONS FOR THIS DUAL CONTROL SWITCH LAYOUT ARE FOR RIGHT HAND #8, #10 OR #14 TURNOUTS.
2. TIE SPACING AS SHOWN IN THIS STANDARD IS NOMINAL FOR DUAL CONTROL SWITCH INSTALLATIONS.
3. THROW ROD CUT OFF TO 74" LENGTH. REMOVE ALEMITE FITTING TURNED BOLT, TO CLEAR COVER ON SWITCH MACHINE.
4. 1/2" x 2" STEEL STRAP CUT TO REQUIRED LENGTH AND DRILL FOR 3/4" LAG SCREW AS REQUIRED.

REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN	PRE, INC.
CHECKED	EJR
RECOMMENDED	WP
DATE	FEBRUARY 2015
DESIGNER PE STAMP	



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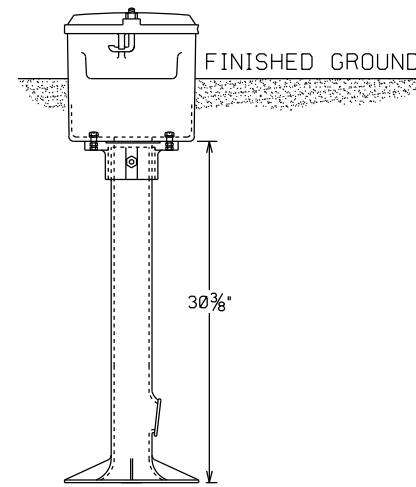
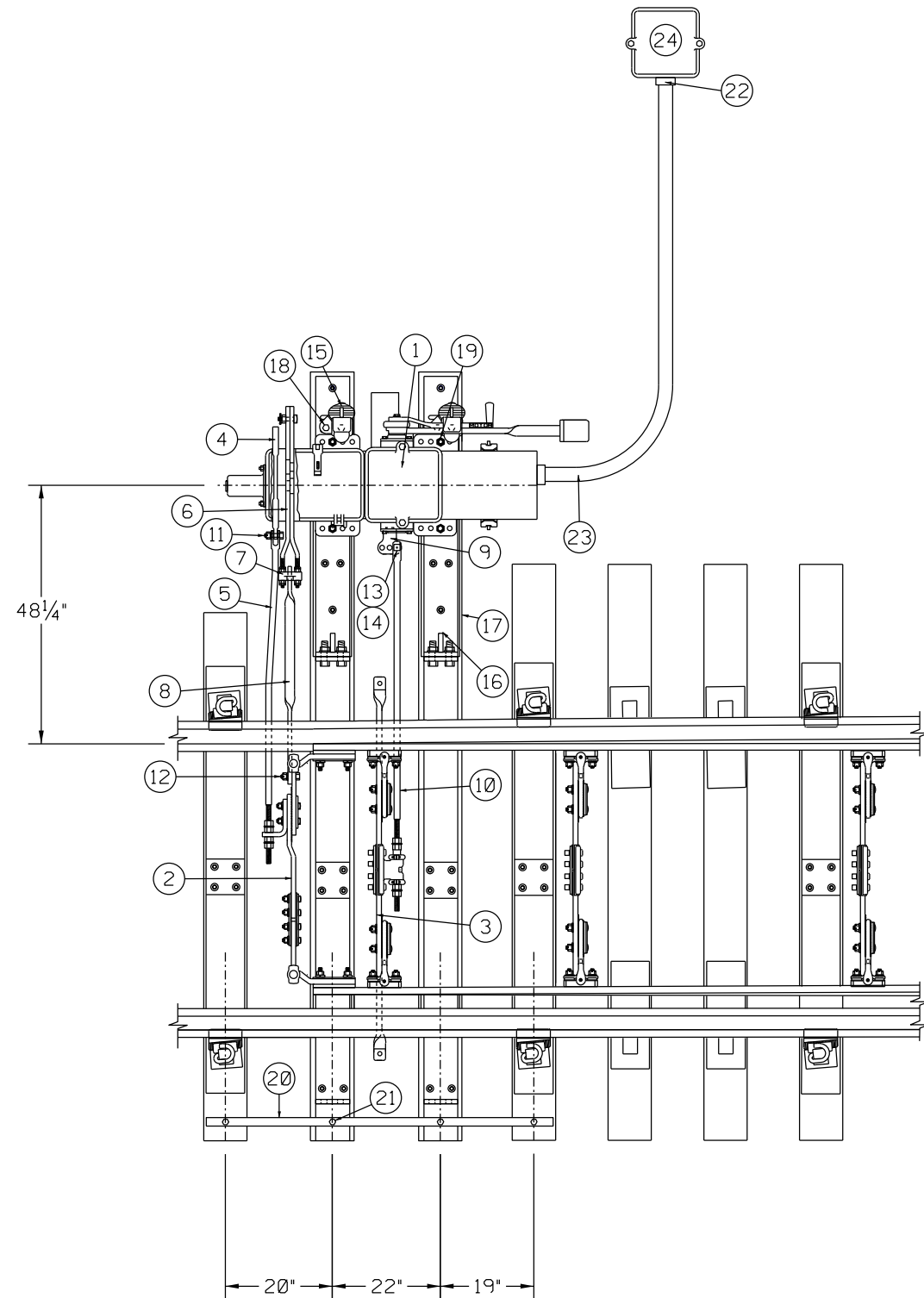
ENGINEERING STANDARD DRAWINGS	DRAWING NO. ESD-8605
M23-A DUAL CONTROL SWITCH LAYOUT FOR No. 8, No. 10 & No. 14 RIGHT HAND TURNOUTS	DRAWING SHEET NO. 1 OF 1
	SCALE: NONE
	CONTRACT SHEET NO.

BILL OF MATERIAL

M23-A DUAL CONTROL SWITCH LAYOUT FOR #8, #10 & #14 L. H. TURNOUTS

ITEM	DESCRIPTION
①	MACHINE, SWITCH M23-A
②	ROD, MF INSULATED FRONT
③	ROD, #1 SMJ INSULATED WITH BASKET
④	BAR, POINT DETECTOR (INTERNAL)
⑤	ROD, POINT DETECTOR CONNECTING
⑥	ROD, ADJUSTABLE LOCK (INTERNAL)
⑦	LUG, LOCK ROD (BINOCULARS)
⑧	ROD, LOCK ROD CONNECTING (TWISTY ROD)
⑨	LUG, OPERATING ROD CONNECTION (BEAR CLAW)
⑩	ROD, SWITCH OPERATING
⑪	BOLT, ASSEMBLY 5/8"-11 X 2 5/8"
⑫	BOLT, ASSEMBLY 1"-8 X 2 3/4" DRILLED AT 2 1/2"
⑬	BOLT, ASSEMBLY 7/8"-9 X 3"
⑭	PIN, OPERATING BAR CONNECTING
⑮	STAND, UNIVERSAL LEVER LATCH
⑯	PLATE, SWITCH MACHINE MOUNTING
⑰	TIE, DAPPED TRAPEZOID 10" X 10" X 14"
⑱	ASSEMBLY, HEADLOCK BOLT 3/4"-10 X 11"
⑲	ASSEMBLY, HEADLOCK BOLT 7/8"-9 X 16"
⑳	STRAP, TIE 65"
㉑	SCREW, 3/4" X 6" LAG
㉒	CONNECTOR, 2" STRAIGHT LIQUIDTIGHT
㉓	CONDUIT, 2" FLEX LIQUIDTIGHT
㉔	BOX, PEDESTAL JUNCTION (SWITCH 36 TERMINAL)

TOP OF JUNCTION BOX SHALL BE LEVEL WITH TOP OF TIE.



JUNCTION BOX SHALL BE LOCATED OUTSIDE OF CPUC WALKWAY AREA. CONDUIT FROM SWITCH MACHINE TO JUNCTION BOX SHALL BE LOCATED BELOW WALKWAY BALLAST TO PREVENT TRIPPING.

JUNCTION BOX INSTALLATION DETAIL

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NOTES:

1. APPLICATIONS FOR THIS DUAL CONTROL SWITCH LAYOUT ARE FOR LEFT HAND #8, #10 OR #14 TURNOUTS.
2. TIE SPACING AS SHOWN IN THIS STANDARD IS NOMINAL FOR DUAL CONTROL SWITCH INSTALLATIONS.
3. THROW ROD CUT OFF TO 74" LENGTH. REMOVE ALEMITE FITTING TURNED BOLT, TO CLEAR COVER ON SWITCH MACHINE.
4. 1/2" x 2" STEEL STRAP CUT TO REQUIRED LENGTH AND DRILL FOR 3/4" LAG SCREW AS REQUIRED.

REV.	DATE	DESCRIPTION	DES. ENG.	DATE	DESIGNER PE STAMP

DRAWN PRE, INC.
 CHECKED E. ROE *EJR*
 RECOMMENDED W. PREY *WP*
 DATE FEBRUARY 2015

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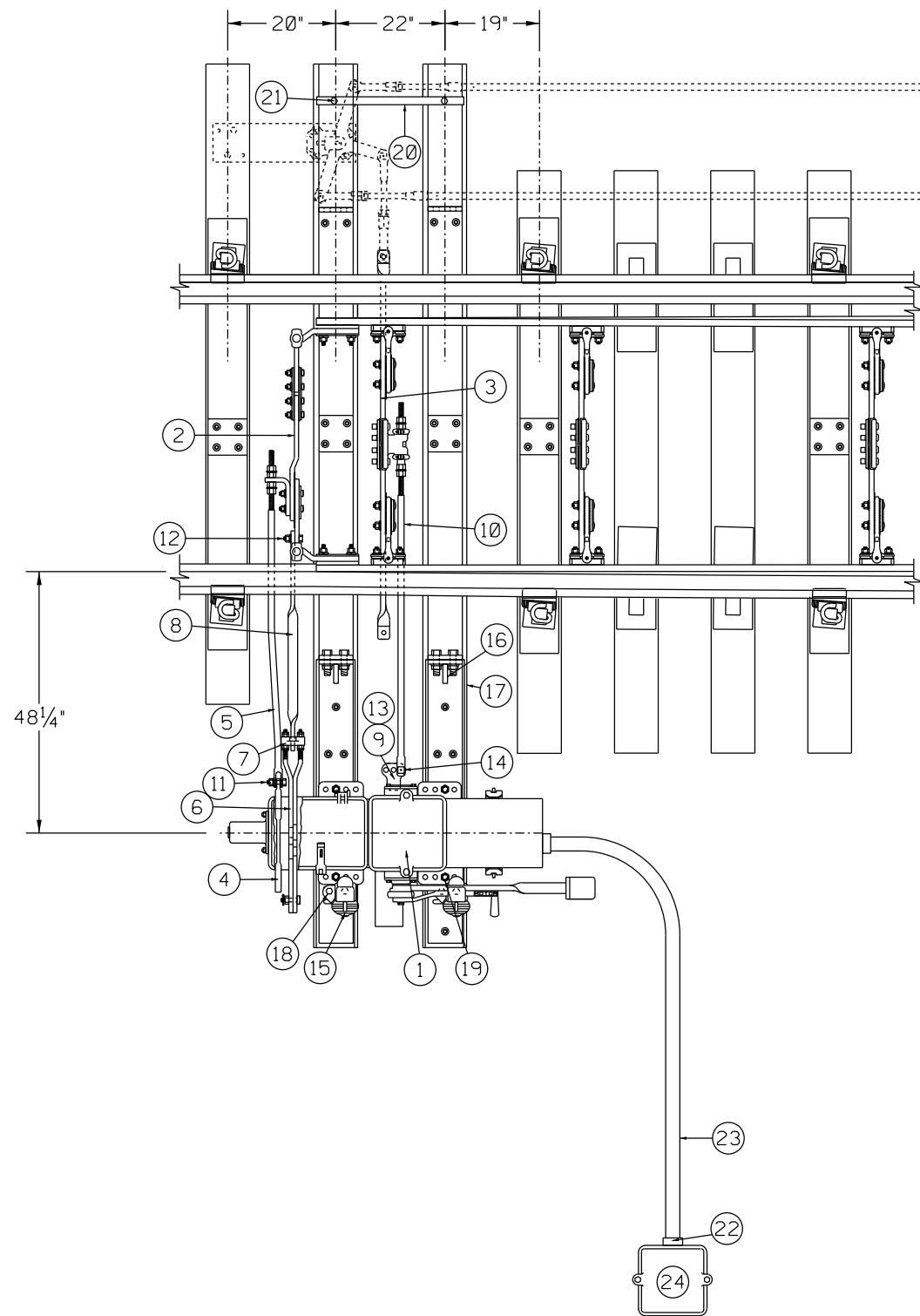
ENGINEERING STANDARD DRAWINGS
 M23-A DUAL CONTROL SWITCH LAYOUT
 FOR No. 8, No. 10 & No. 14
 LEFT HAND TURNOUTS

DRAWING NO. ESD-8610
 DRAWING SHEET NO. 1 OF 1
 SCALE: NONE
 CONTRACT SHEET NO.

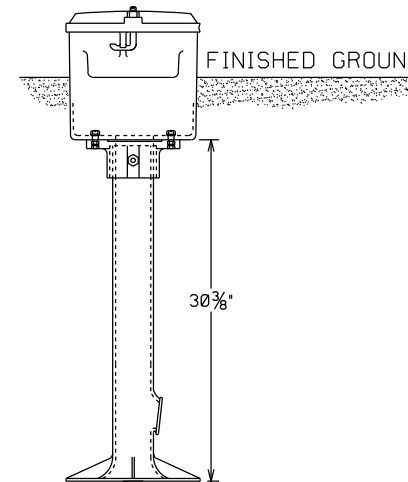
BILL OF MATERIAL

M23-A DUAL CONTROL SWITCH LAYOUT FOR #20 & #24 R.H. TURNOUTS

ITEM	DESCRIPTION
①	MACHINE, SWITCH M23-A
②	ROD, MF INSULATED FRONT
③	ROD, #1 SMJ INSULATED WITH BASKET
④	BAR, POINT DETECTOR (INTERNAL)
⑤	ROD, POINT DETECTOR CONNECTING
⑥	ROD, ADJUSTABLE LOCK (INTERNAL)
⑦	LUG, LOCK ROD (BINOCULARS)
⑧	ROD, LOCK ROD CONNECTING (TWISTY ROD)
⑨	LUG, OPERATING ROD CONNECTION (BEAR CLAW)
⑩	ROD, SWITCH OPERATING
⑪	BOLT, ASSEMBLY 5/8"-11 X 2 5/8"
⑫	BOLT, ASSEMBLY 1"-8 X 2 3/4" DRILLED AT 2 1/2"
⑬	BOLT, ASSEMBLY 7/8"-9 X 3"
⑭	PIN, OPERATING BAR CONNECTING
⑮	STAND, UNIVERSAL LEVER LATCH
⑯	PLATE, SWITCH MACHINE MOUNTING
⑰	TIE, DAPPED TRAPEZOID 9" X 10" X 16"
⑱	ASSEMBLY, HEADLOCK BOLT 3/4"-10 X 11"
⑲	ASSEMBLY, HEADLOCK BOLT 7/8"-9 X 16"
⑳	STRAP, TIE 26"
㉑	SCREW, 3/4" X 6" LAG
㉒	CONNECTOR, 2" STRAIGHT LIQUIDTIGHT
㉓	CONDUIT, 2" FLEX LIQUIDTIGHT
㉔	BOX, PEDESTAL JUNCTION (SWITCH 36 TERMINAL)



REFER TO ES8625 AND ES8630 FOR INFORMATION REGARDING HELPER ROD ASSEMBLIES FOR #20 AND #24 TURNOUTS



JUNCTION BOX SHALL BE LOCATED OUTSIDE OF CPUC WALKWAY AREA. CONDUIT FROM SWITCH MACHINE TO JUNCTION BOX SHALL BE LOCATED BELOW WALKWAY BALLAST TO PREVENT TRIPPING.

JUNCTION BOX INSTALLATION DETAIL

TOP OF JUNCTION BOX SHALL BE LEVEL WITH TOP OF TIE.

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NOTES:

1. APPLICATIONS FOR THIS DUAL CONTROL SWITCH LAYOUT ARE FOR RIGHT HAND #20 OR #24 TURNOUTS.
2. TIE SPACING AS SHOWN IN THIS STANDARD IS NOMINAL FOR POWER SWITCH INSTALLATIONS.
3. THROW ROD CUT OFF TO 74" LENGTH. REMOVE ALEMITE FITTING TURNED BOLT, TO CLEAR COVER ON SWITCH MACHINE.
4. 1/2" x 2" STEEL STRAP CUT TO REQUIRED LENGTH AND DRILL FOR 3/4" LAG SCREW AS REQUIRED.

REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN	PRE, INC.
CHECKED	EJR
RECOMMENDED	WP
DATE	FEBRUARY 2015
DESIGNER PE STAMP	



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ENGINEERING STANDARD DRAWINGS

M23-A DUAL CONTROL SWITCH LAYOUT
FOR No. 20 & No. 24
RIGHT HAND TURNOUTS

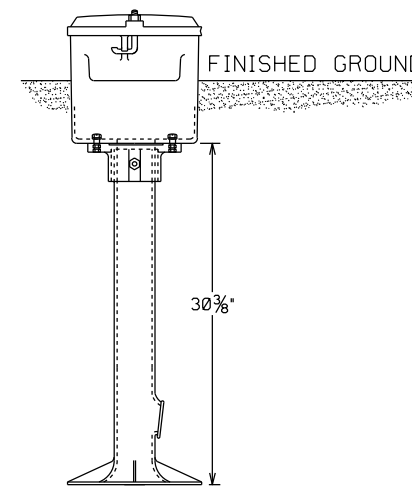
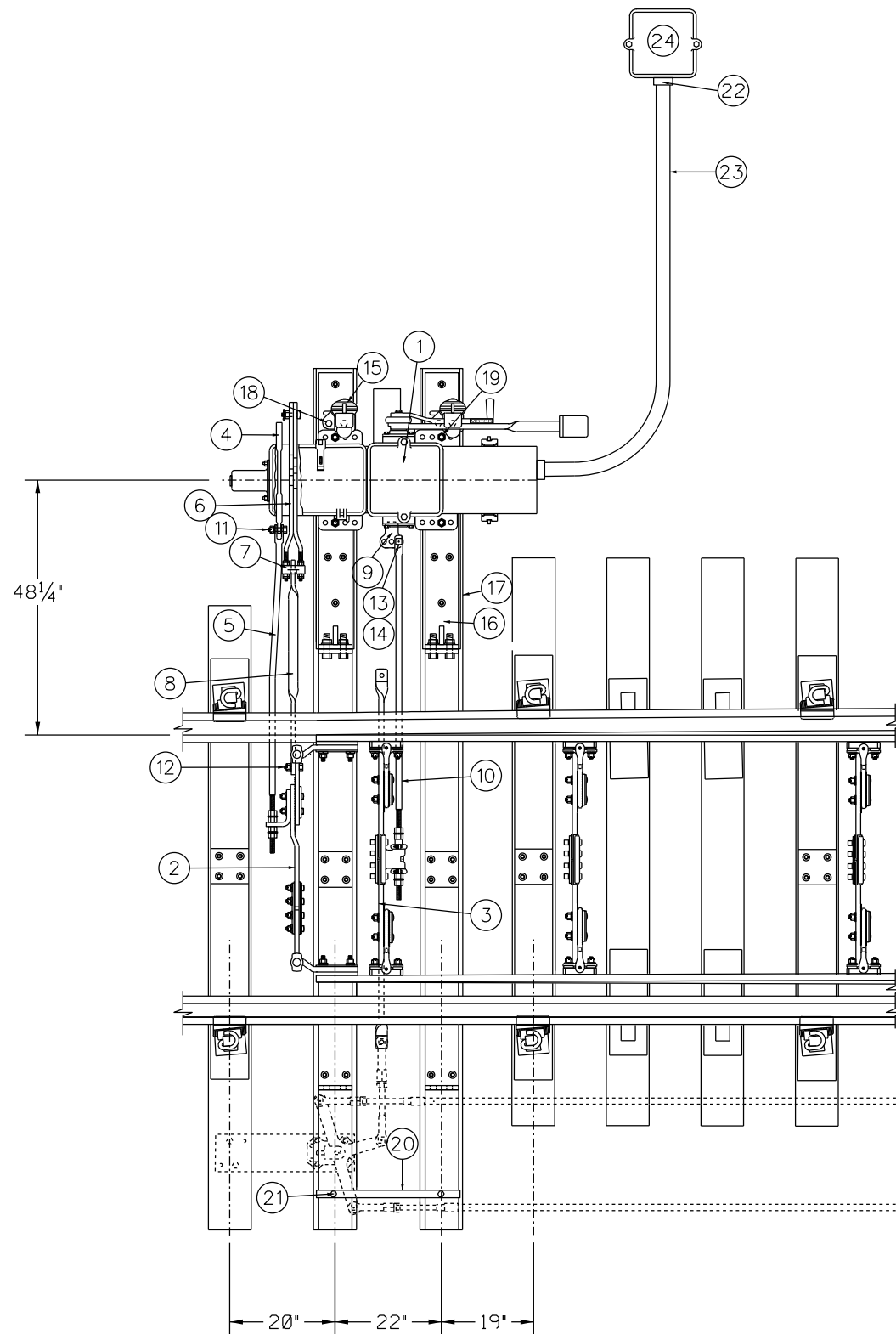
DRAWING NO.	ESD-8615
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	

BILL OF MATERIAL

M23-A DUAL CONTROL SWITCH LAYOUT FOR *20 & *24 L.H. TURNOUTS

ITEM	DESCRIPTION
(1)	MACHINE, SWITCH M23-A
(2)	ROD, MF INSULATED FRONT
(3)	ROD, #1 SMJ INSULATED WITH BASKET
(4)	BAR, POINT DETECTOR (INTERNAL)
(5)	ROD, POINT DETECTOR CONNECTING
(6)	ROD, ADJUSTABLE LOCK (INTERNAL)
(7)	LUG, LOCK ROD (BINOCULARS)
(8)	ROD, LOCK ROD CONNECTING (TWISTY ROD)
(9)	LUG, OPERATING ROD CONNECTION (BEAR CLAW)
(10)	ROD, SWITCH OPERATING
(11)	BOLT, ASSEMBLY 5/8"-11 X 2 5/8"
(12)	BOLT, ASSEMBLY 1"-8 X 2 3/4" DRILLED AT 2 1/2"
(13)	BOLT, ASSEMBLY 7/8"-9 X 3"
(14)	PIN, OPERATING BAR CONNECTING
(15)	STAND, UNIVERSAL LEVER LATCH
(16)	PLATE, SWITCH MACHINE MOUNTING
(17)	TIE, DAPPED TRAPEZOID 10" X 10" X 14"
(18)	ASSEMBLY, HEADLOCK BOLT 3/4"-10 X 11"
(19)	ASSEMBLY, HEADLOCK BOLT 7/8"-9 X 16"
(20)	STRAP, TIE 26"
(21)	SCREW, 3/4" X 6" LAG
(22)	CONNECTOR, 2" STRAIGHT LIQUDTIGHT
(23)	CONDUIT, 2" FLEX LIQUDTIGHT
(24)	BOX, PEDESTAL JUNCTION (SWITCH 36 TERMINAL)

TOP OF JUNCTION BOX SHALL BE LEVEL WITH TOP OF TIE.



JUNCTION BOX SHALL BE LOCATED OUTSIDE OF CPUC WALKWAY AREA. CONDUIT FROM SWITCH MACHINE TO JUNCTION BOX SHALL BE LOCATED BELOW WALKWAY BALLAST TO PREVENT TRIPPING.

JUNCTION BOX INSTALLATION DETAIL

REFER TO ES8625 AND ES8630 FOR INFORMATION REGARDING HELPER ROD ASSEMBLIES FOR *20 AND *24 TURNOUTS

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NOTES:

1. APPLICATIONS FOR THIS DUAL CONTROL SWITCH LAYOUT ARE FOR LEFT HAND *20 OR *24 TURNOUTS.
2. TIE SPACING AS SHOWN IN THIS STANDARD IS NOMINAL FOR POWER SWITCH INSTALLATIONS.
3. THROW ROD CUT OFF TO 74" LENGTH. REMOVE ALEMITE FITTING TURNED BOLT, TO CLEAR COVER ON SWITCH MACHINE.
4. 1/2" x 2" STEEL STRAP CUT TO REQUIRED LENGTH AND DRILL FOR 3/4" LAG SCREW AS REQUIRED.

REV.	DATE	DESCRIPTION	DES. ENG.

DRAWN	PRE, INC.
CHECKED	EJR
RECOMMENDED	WP
DATE	FEBRUARY 2015
DESIGNER PE STAMP	

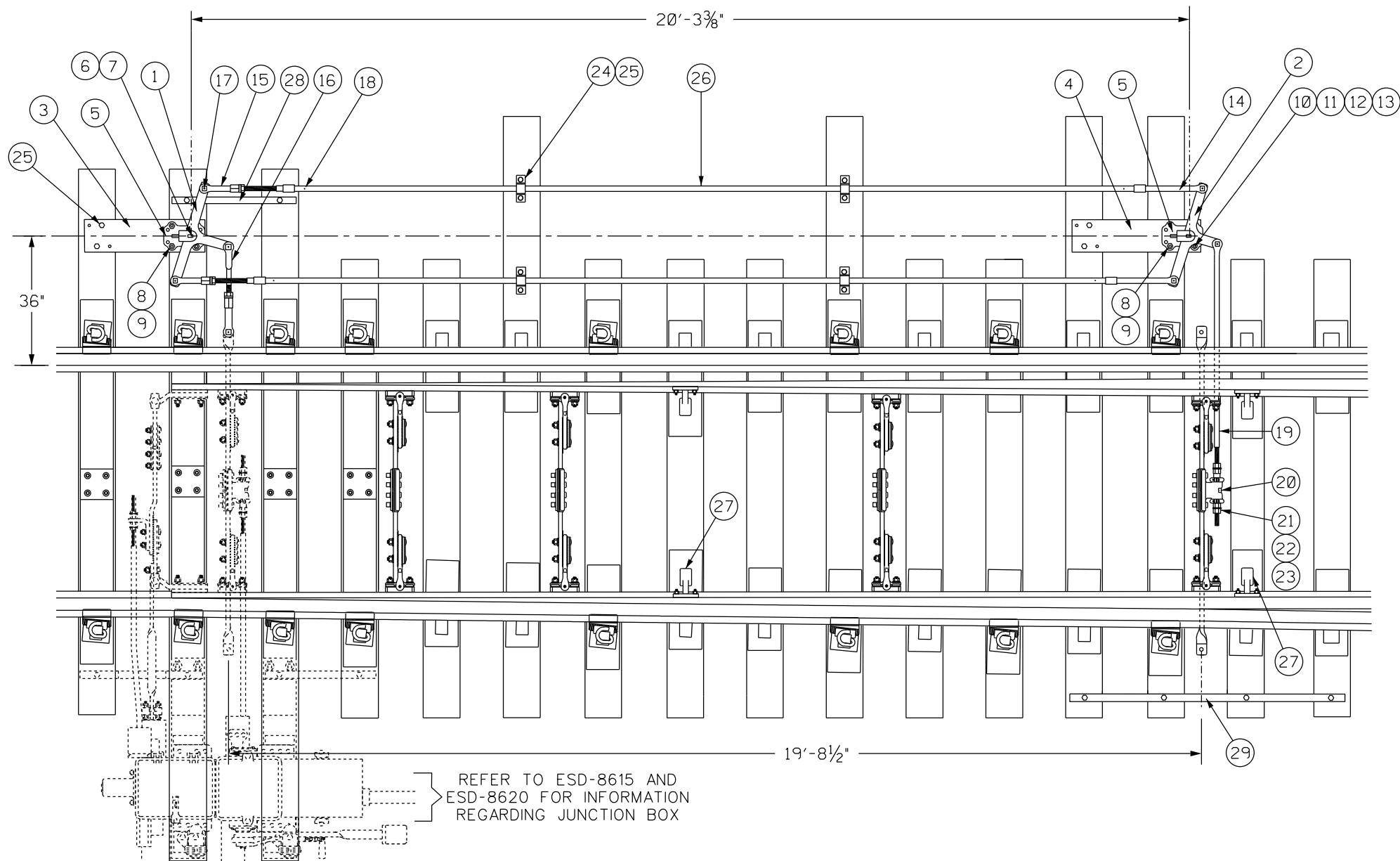
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ENGINEERING STANDARD DRAWINGS

M23-A DUAL CONTROL SWITCH LAYOUT
FOR No. 20 & No. 24
LEFT HAND TURNOUTS

DRAWING NO.	ESD-8620
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	



REFER TO ESD-8615 AND ESD-8620 FOR INFORMATION REGARDING JUNCTION BOX

BILL OF MATERIAL HELPER ROD ASSEMBLY FOR #20 T.O.


ITEM	QTY	DESCRIPTION
1	1	CRANK, 3 ARM, STAGE 1
2	1	CRANK, 3 ARM, STAGE 2
3	1	CRANK PLATE, STAGE 1
4	1	CRANK PLATE, STAGE 2
5	2	CRANK STAND BASE
6	2	CRANK STAND PIN
7	2	COTTER PIN
8	2	STUD, 3/4 x 13" w/3" 3/4-10 THREAD BOTH ENDS
9	4	ASSEMBLY, GRIP NUT & WASHER 3/4" HEADLOCK
10	4	BOLT, HEX HEAD 3/4"-10 X 2 1/2" (G-5)
11	8	NUT, HEX 3/4" -10 (G-5)
12	8	WASHER, FLAT 3/4" (G-5)
13	8	WASHER, LOCK 3/4" (G-5)
14	2	SOLID JAW
15	2	SCREW JAW ASSEMBLY
16	1	ADJUSTABLE LINK
17	7	CONNECTING PIN
18	4	RIVET, 1/4" X 1 1/2", ROUND, STEEL
19	1	ROD OPERATING - NO. 5 HELPER
20	1	SWITCH POINT ADJUSTER
21	2	CONE NUT, SWITCH POINT ADJUSTER
22	5	NUT, 1/4" - 7, HEAVY HEX, JAMB
23	5	LOCK WASHER, 1/4" HEAVY
24	4	ROLLER BRACKET
25	18	3/4 X 6 LG LAG BOLT
26	2	PIPE - SCHEDULE 80 X 2 1/2 LG
27	2	SWITCH POINT ROLLER
28	1	STRAP, TIE 2'
29	1	STRAP, TIE 6'

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- NOTES:
- HELPER ROD ASSEMBLY COMPONENTS SHALL MEET THE REQUIREMENTS OF AREMA C&S MANUAL PART 13 WHERE APPLICABLE.
 - THIS DRAWING IS PROVIDED TO ASSIST SIGNAL FORCES IN THE MAINTENANCE OF HELPER ROD ASSEMBLIES.

REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN	PRE, INC.
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RECOMMENDED	WP
DATE	FEBRUARY 2015
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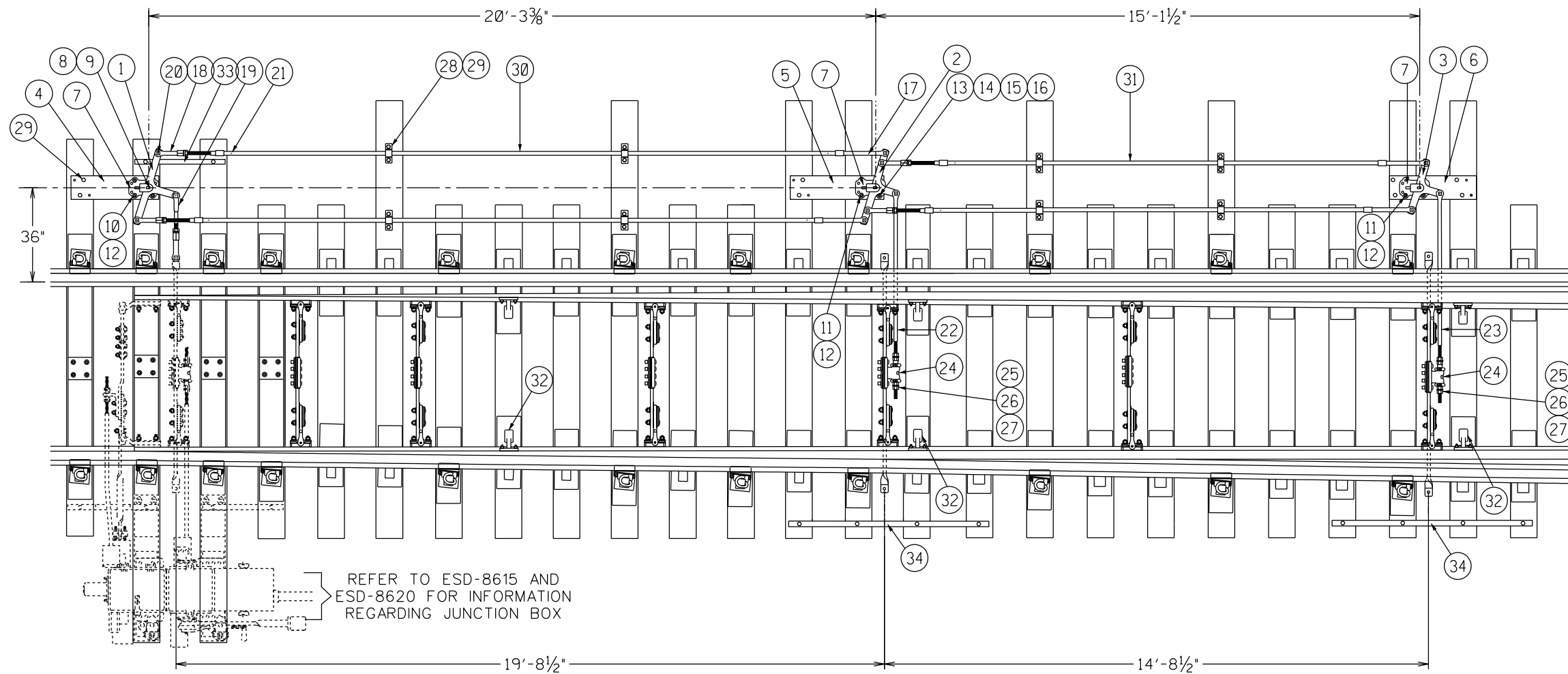


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ENGINEERING STANDARD DRAWINGS	DRAWING NO. ESD-8625
PUSH-PULL HELPER ROD ASSEMBLY FOR NO. 20 RIGHT OR LEFT HAND TURNOUTS	DRAWING SHEET NO. 1 OF 1
	SCALE: NONE
	CONTRACT SHEET NO.



REFER TO ESD-8615 AND ESD-8620 FOR INFORMATION REGARDING JUNCTION BOX

BILL OF MATERIAL HELPER ROD ASSEMBLY FOR #24 T.O.

ITEM	QTY	DESCRIPTION
1	1	CRANK, 3 ARM, STAGE 1
2	1	CRANK, 3 ARM, STAGE 2
3	1	CRANK, 3 ARM, STAGE 3
4	1	CRANK PLATE, STAGE 1
5	1	CRANK PLATE, STAGE 2
6	1	CRANK PLATE, STAGE 3
7	3	CRANK STAND BASE
8	3	CRANK STAND PIN
9	3	COTTER PIN
10	2	STUD, 3/4x13" w/3" 3/4-10 THREAD
11	4	STUD, 3/4x16" w/3" 3/4-10 THREAD
12	6	GRIP NUT & WASHER 3/4" HEADLOCK
13	6	BOLT, HEX HEAD 3/4"-10 x 2 1/2"
14	12	NUT, HEX 3/4" -10 (G-5)
15	12	WASHER, FLAT 3/4" (G-5)
16	12	WASHER, LOCK 3/4" (G-5)
17	4	SOLID JAW
18	4	SCREW JAW ASSEMBLY
19	1	ADJUSTABLE LINK
20	12	CONNECTING PIN
21	8	RIVET, 1/4" X 1 1/2, ROUND, STEEL
22	1	ROD OPERATING - NO. 5 HELPER
23	1	ROD OPERATING - NO. 7 HELPER
24	2	SWITCH POINT ADJUSTER
25	4	CONE NUT, SWITCH POINT ADJUSTER
26	9	NUT, 1 1/4- 7, HEAVY HEX, JAMB
27	9	LOCK WASHER, 1 1/4" HEAVY
28	8	ROLLER BRACKET
29	32	3/4 X 6 LG LAG BOLT
30	2	PIPE - SCHEDULE 80 X 212 7/8" LG
31	2	PIPE - SCHEDULE 80 X 148 7/8" LG
32	6	SWITCH POINT ROLLER (FRONT)
33	1	STRAP, TIE 2'
34	2	STRAP, TIE 6'

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- NOTES:
- HELPER ROD ASSEMBLY COMPONENTS SHALL MEET THE REQUIREMENTS OF AREMA C&S MANUAL PART 13 WHERE APPLICABLE.
 - THIS DRAWING IS PROVIDED TO ASSIST SIGNAL FORCES IN THE MAINTENANCE OF HELPER ROD ASSEMBLIES.

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DRAWN	PRE, INC.
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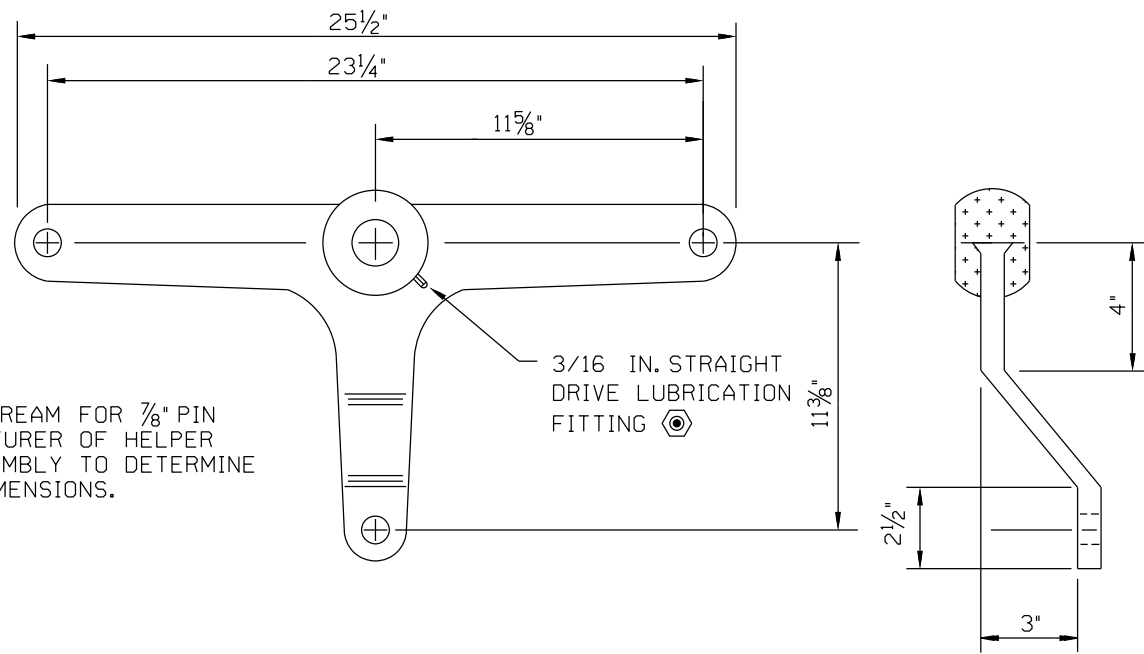
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ENGINEERING STANDARD DRAWINGS

PUSH-PULL HELPER ROD ASSEMBLY
FOR No. 24 RIGHT OR LEFT HAND TURNOUTS

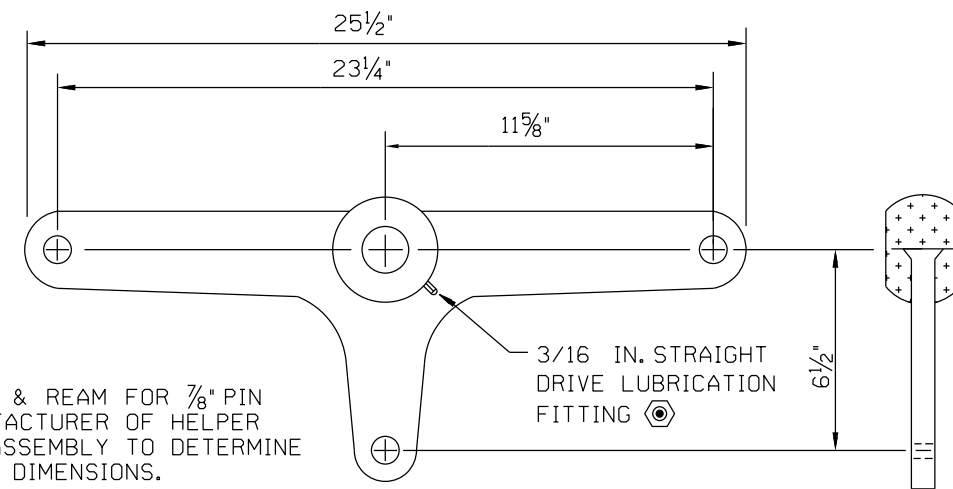
DRAWING NO. ESD-8630
DRAWING SHEET NO. 1 OF 1
SCALE: NONE
CONTRACT SHEET NO.



NOTE:

1. DRILL & REAM FOR 7/8" PIN MANUFACTURER OF HELPER ROD ASSEMBLY TO DETERMINE FINAL DIMENSIONS.

"T" CRANK (LONG)



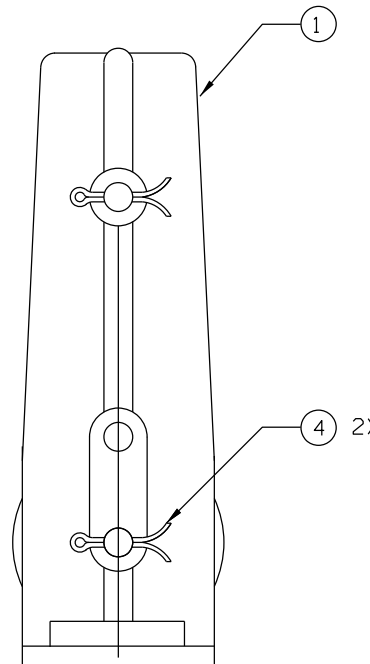
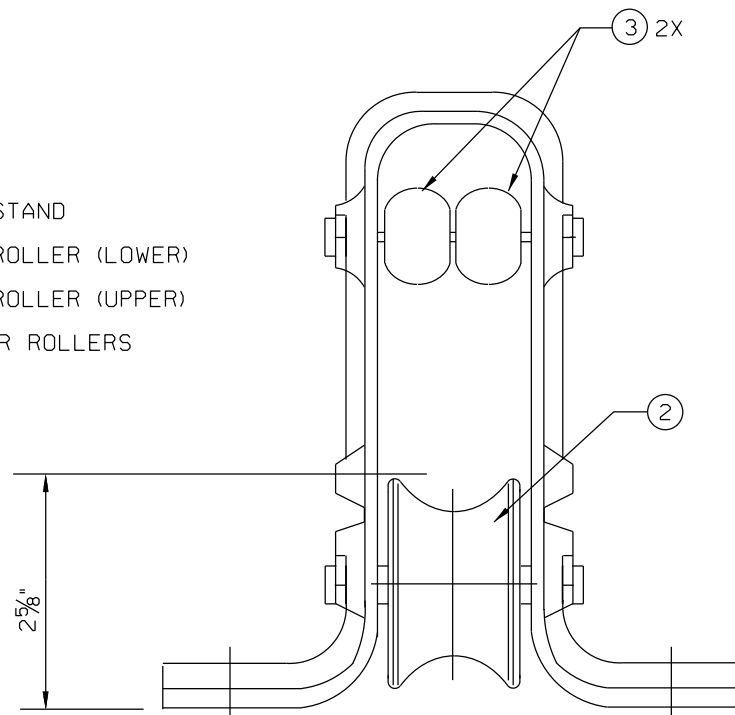
NOTE:

1. DRILL & REAM FOR 7/8" PIN MANUFACTURER OF HELPER ROD ASSEMBLY TO DETERMINE FINAL DIMENSIONS.

"T" CRANK (SHORT)

NOTES:

1. PIPE CARRIER STAND
2. PIPE CARRIER ROLLER (LOWER)
3. PIPE CARRIER ROLLER (UPPER)
4. COTTER PIN FOR ROLLERS



PIPE GUIDE

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GENERAL NOTE:

1. MATERIAL SHALL CONFORM TO AREMA C&S MANUAL PART 15.1.4

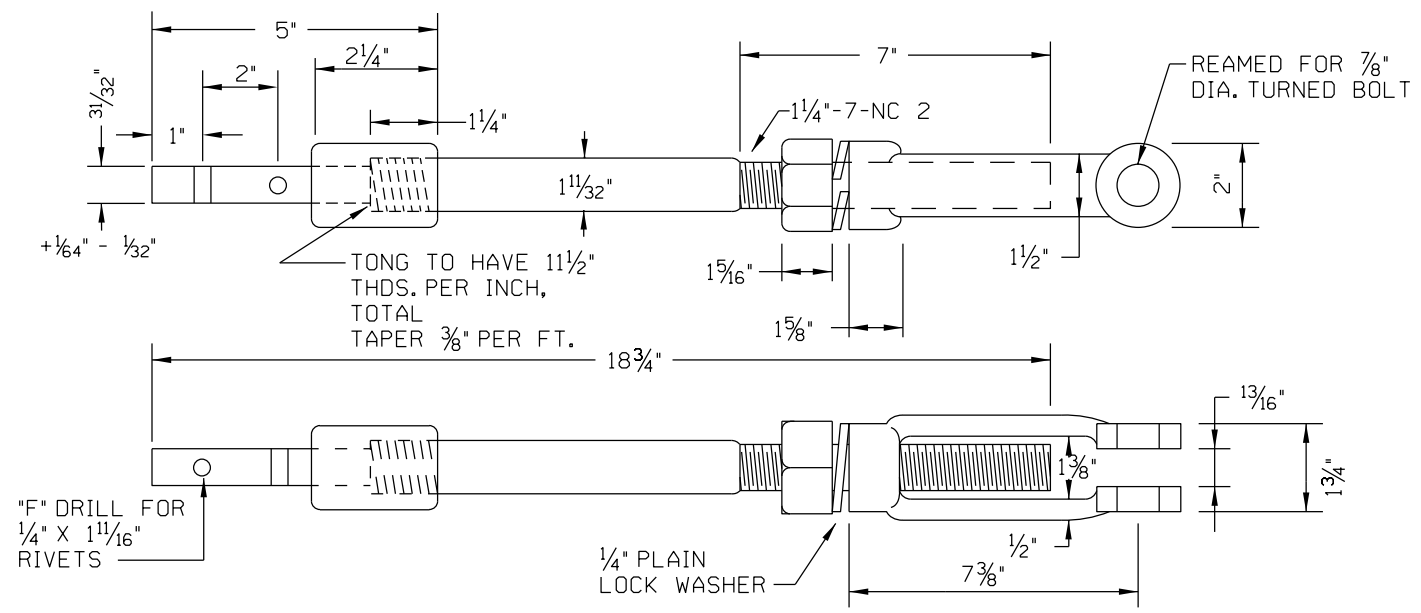
REVISIONS		DRAWN	PRE, INC.	DESIGNER PE STAMP
		CHECKED	<i>EJR</i>	
		RECOMMENDED	<i>WP</i>	
		DATE	FEBRUARY 2015	
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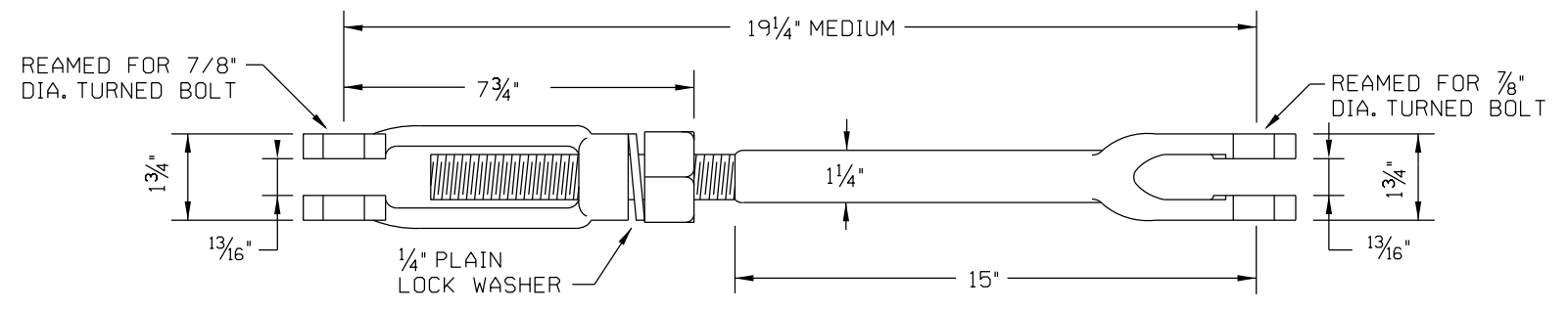
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ENGINEERING STANDARD DRAWINGS
 PUSH-PULL HELPER ROD ASSEMBLY DETAILS
 "T" CRANK & PIPE GUIDE AUX CONNECTION

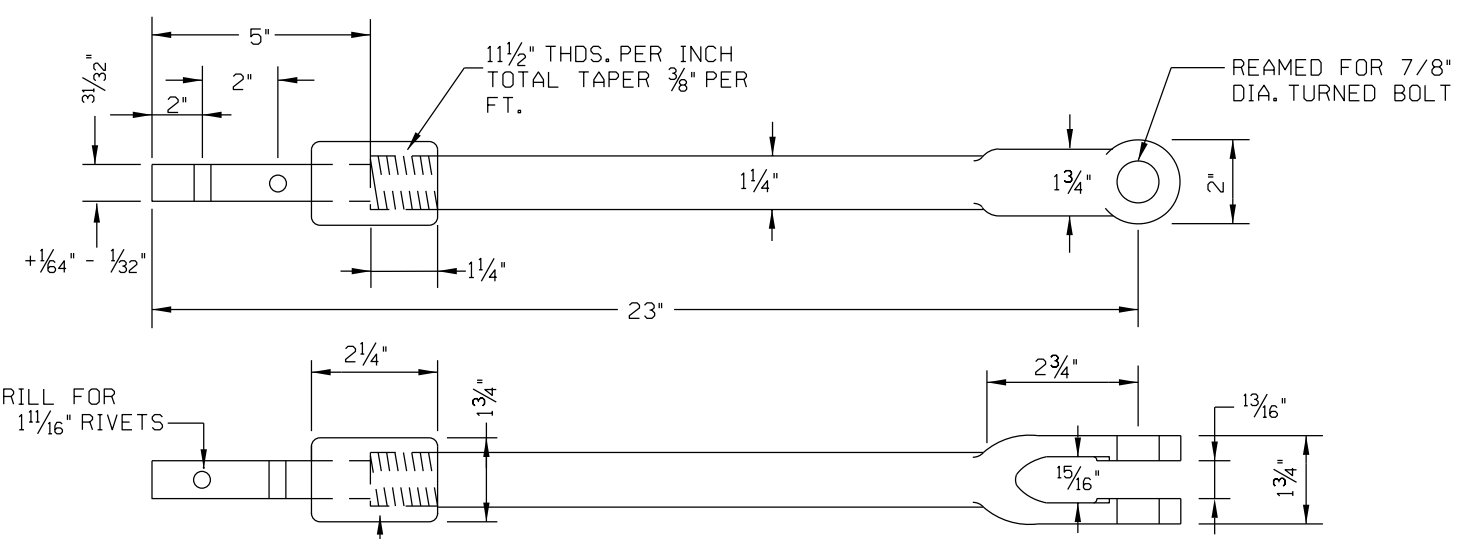
DRAWING NO.	ESD-8635-01
DRAWING SHEET NO.	1 OF 2
SCALE:	NONE
CONTRACT SHEET NO.	



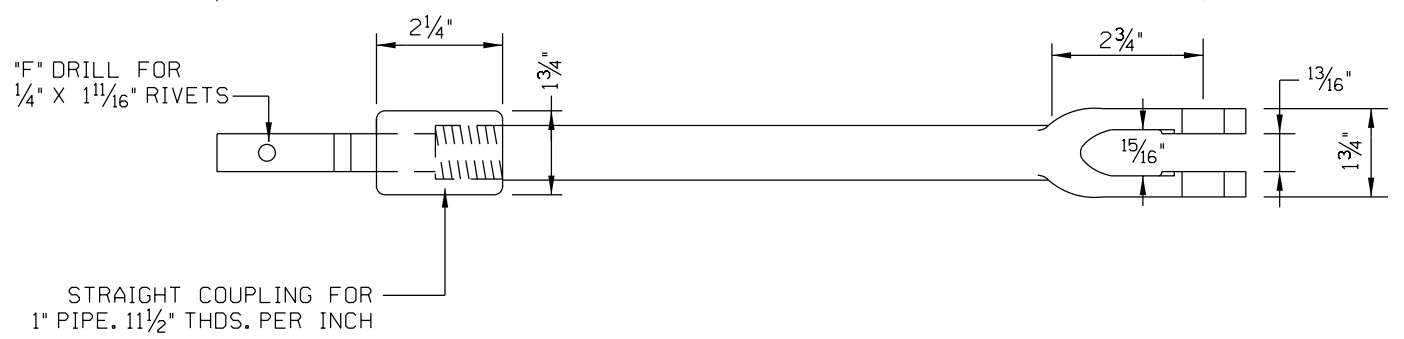
SCREW JAW



ADJUSTABLE LINK



SOLID JAW



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- NOTES:
1. GALVANIZED 1" PIPE SHALL BE SECURED TO SCREW JAW AND SOLID JAW WITH A MINIMUM OF TWO RIVETS.
 2. MATERIAL SHALL CONFORM TO AREMA C&S MANUAL PART 15.1.4

REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN	PRE, INC.
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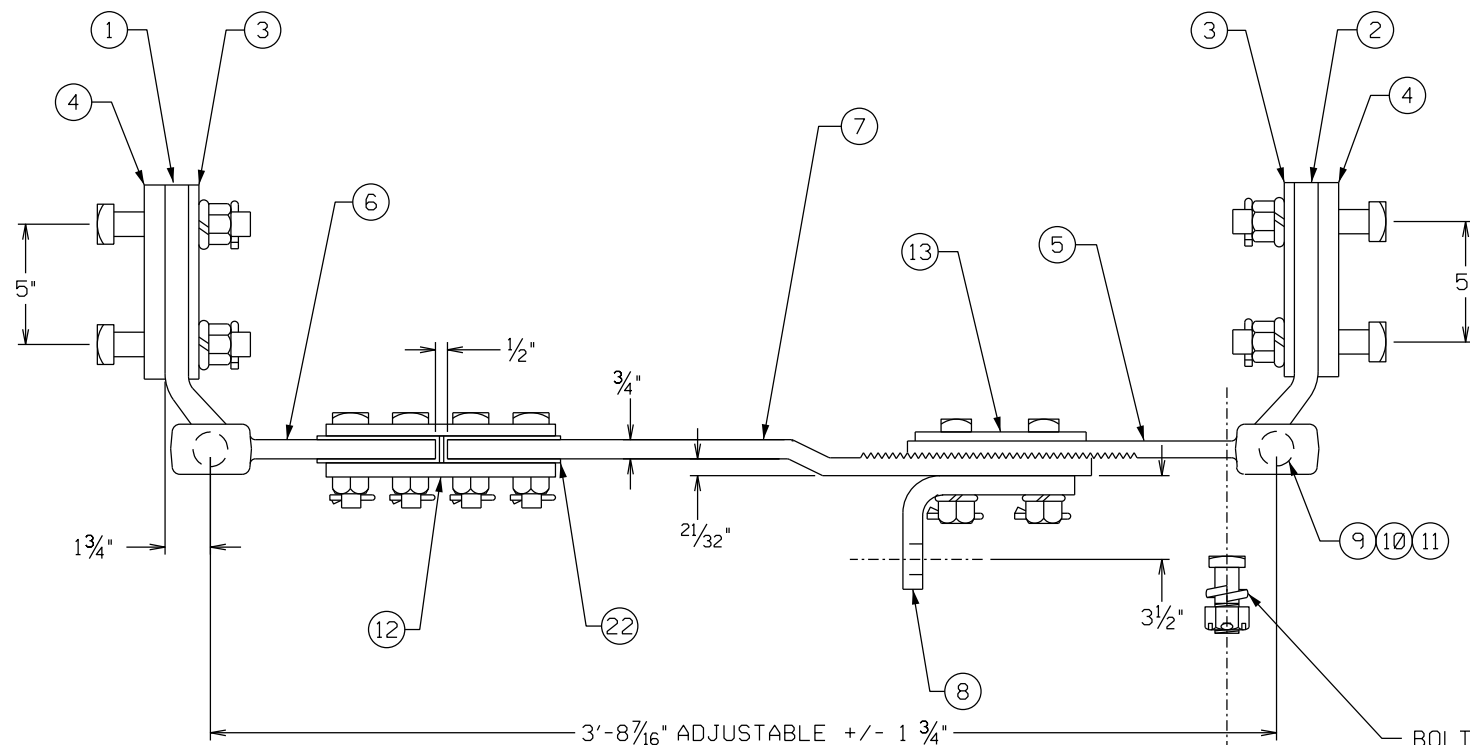


ENGINEERING STANDARD DRAWINGS
 PUSH-PULL HELPER ROD ASSEMBLY DETAILS
 SCREW JAW, SOLID JAW & ADJUSTABLE LINK

DRAWING NO.	ESD-8635-02
DRAWING SHEET NO.	2 OF 2
SCALE:	NONE
CONTRACT SHEET NO.	

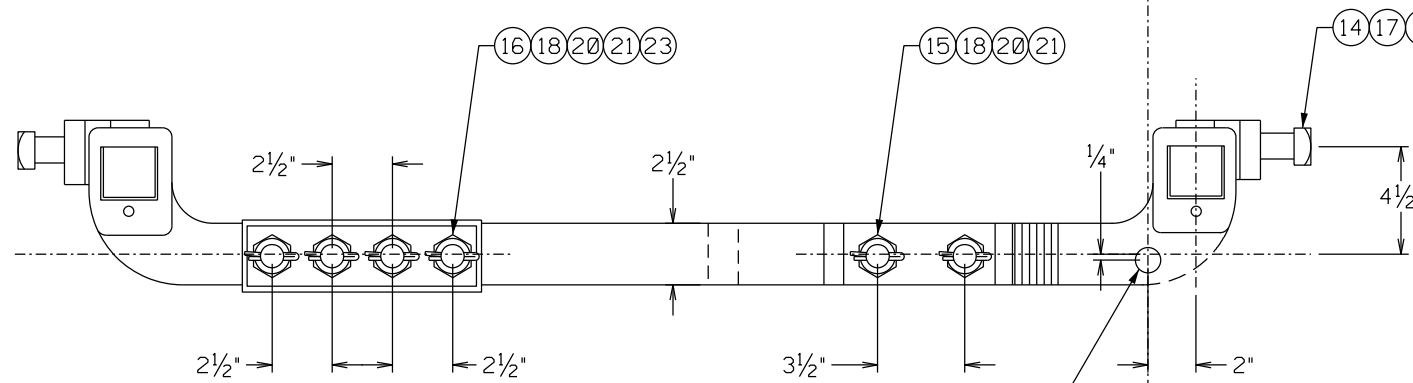
BILL OF MATERIAL
FRONT ROD ASSEMBLY FOR T.O.'s

ITEM	QTY	DESCRIPTION
①	1	LH POINT CLIP
②	1	RH POINT CLIP
③	2	POINT CLIP SHIM, 1/4" X 2 1/2" X 8"
④	2	POINT CLIP SHIM, 3/4" X 2 1/2" X 8"
⑤	1	PLAIN SWIVEL ROD
⑥	1	SERRATED SWIVEL ROD
⑦	1	SERRATED OFFSET ROD
⑧	1	POINT DETECTOR ROD BRACKET
⑨	2	INDUCTION HARDENED AND GROUND STEEL PIN
⑩	2	RAILITE BEARING
⑪	2	OILITE BEARING
⑫	2	SPLICE PLATE, 1/2" X 2 1/2" X 9 1/2"
⑬	1	SPLICE PLATE, 1/4" X 2 1/2" X 7"
⑭	4	BOLT, 1-8 X 5 3/4" LG THIN SQ HD DR @ 5 1/4" BOLT, 1-8 X 6 1/2" LG THIN SQ HD DR @ 6 3/8"
⑮	2	BOLT, 3/4"-10 X 3 3/4" LG SQ HD DR @ 3 5/16"
⑯	4	BOLT, 3/4"-10 X 3" LG SQ HD DR @ 2 5/8"
⑰	4	NUT, 1"-8 HVY HEX SLOTTED
⑱	6	NUT, 3/4"-10 HEAVY HEX SLOTTED
⑲	4	LOCK WASHER 1" HEAVY SPLIT
⑳	2	LOCK WASHER 3/4" HEAVY SPLIT
㉑	10	COTTER PIN, 1/4" X 1 1/2" LG
㉒	2	INSULATION, "U" CHANNEL
㉓	4	INSULATION, BUSHING



TOP VIEW

BOLT, 1-8 X 2 3/4" WITH 1-8 SLOTTED HVY HEX NUT, 1" HVY SPLIT LOCK WASHER AND 1/4" X 2" LG COTTER PIN SHALL BE INCLUDED WITH MF FRONT ROD ASSY.



PLAN VIEW

CLIP BOLT LENGTH IS 5 3/4" DR @ 5 1/4" FOR #8, #10 AND #14 TURNOUTS
CLIP BOLT LENGTH IS 6 1/2" DR @ 6 3/8" FOR #20 AND #24 TURNOUTS

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NOTES:

- FRONT ROD AS SHOWN IN THIS STANDARD IS FOR RIGHT HAND SWITCH APPLICATIONS. FOR LEFT HAND SWITCH APPLICATIONS, FRONT ROD SHALL BE OPPOSITE.
- RACOR TYPE MF INSULATED FRONT ROD SHALL CONFORM TO ALL APPLICABLE PARTS OF THE AREMA C&S MANUAL.

REV.	DATE	DESCRIPTION	DES.	ENG.

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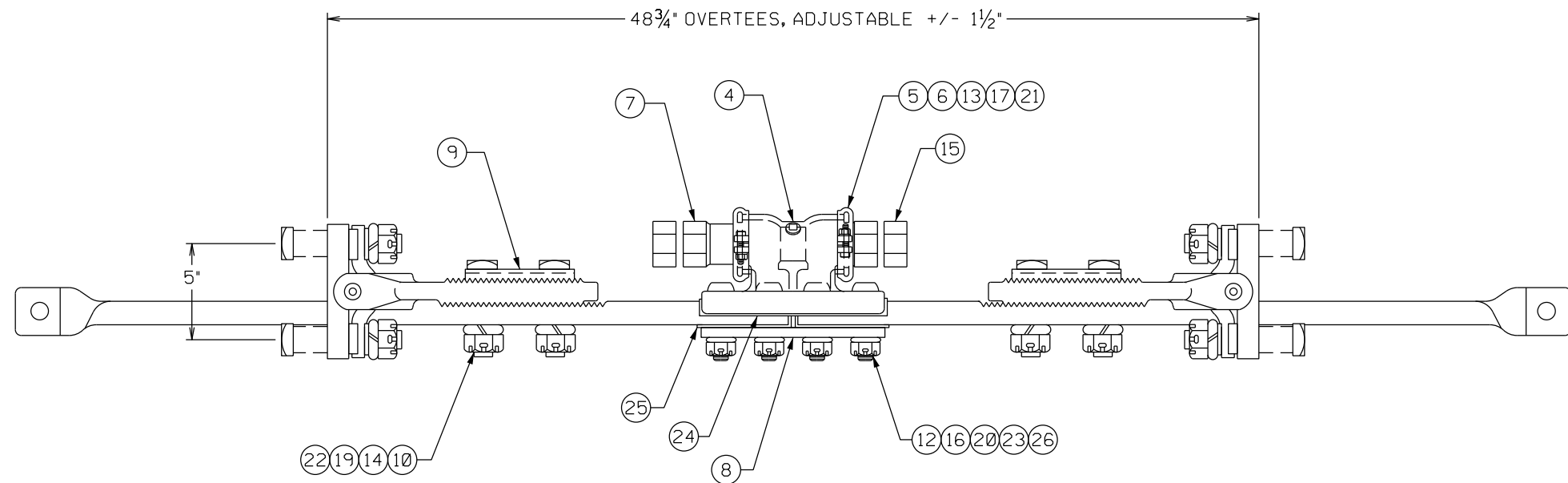


ENGINEERING STANDARD DRAWINGS
TYPICAL LEFT OR RIGHT HAND
RACOR TYPE "MF" INSULATED "FRONT" ROD
FOR USE ON TURNOUTS

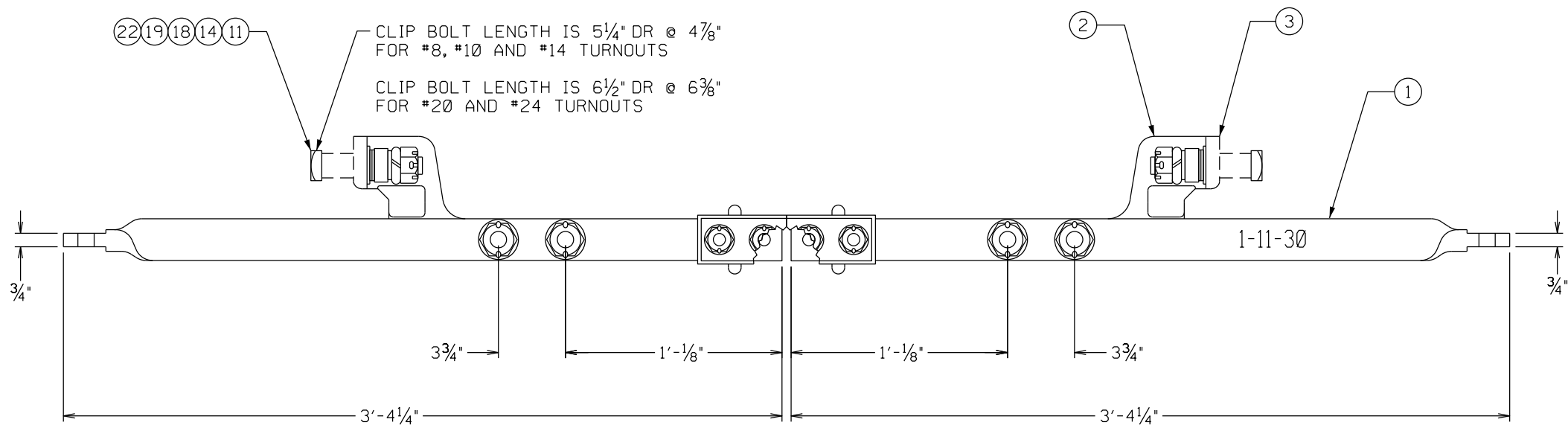
DRAWING NO.	ESD-8650
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	

BILL OF MATERIAL
BASKET ROD ASSEMBLY FOR T.O.'s

ITEM	QTY	DESCRIPTION
①	2	VERTICAL BAR, TWISTED END
②	2	ADJUSTABLE BEARING CLIP
③	2	BEARING PLATE SUB-ASSEMBLY
④	1	ADJUSTABLE BRACKET
⑤	2	DUST RING WASHER
⑥	4	ADJUSTABLE BRACKET CLAMP
⑦	2	ADJUSTING SLEEVE NUT
⑧	1	SPLICE PLATE
⑨	2	HEAD LOCK WASHER
⑩	4	BOLT, 1-8 X 4 1/2" LG SQ HD DR @ 4 1/16"
⑪	4	BOLT, 1-8 X 5 1/4" LG THIN SQ HD DR @ 4 7/8" BOLT, 1-8 X 6 1/2" LG THIN SQ HD DR @ 6 3/8"
⑫	4	BOLT, 3/4-10 X 4 1/2" LG SQ HD DR @ 3 15/16"
⑬	4	BOLT, 5/16-18 X 1 1/2" LG HEX HD
⑭	8	NUT, 1-8 HVY SLOTTED HEX
⑮	2	NUT, 1 1/4-7 HEAVY HEX
⑯	4	NUT, 3/4-10 HVY HEX HD SLOTTED
⑰	4	NUT 5/16-18 HEAVY HEX WITH NYLOC
⑱	4	FLAT WASHER 1" F-436 HARDENED
⑲	8	LOCK WASHER 1" HEAVY SPLIT
⑳	4	LOCK WASHER 3/4" HEAVY SPLIT
㉑	4	LOCK WASHER 5/16" MEDIUM SPLIT
㉒	8	COTTER PIN, 1/4 X 2" LG
㉓	4	COTTER PIN, 3/16 X 1 3/4" LG
㉔	1	INSULATION, L-SHAPE
㉕	1	INSULATION, C-CHANNEL
㉖	4	INSULATION, BUSHING



TOP VIEW



PLAN VIEW

- NOTES:
- ADJUSTMENT BRACKET (BASKET) SHALL BE IN ACCORDANCE WITH AREMA SIGNAL MANUAL PART 12.1.17.
 - FOR DETAILED SPECIFICATION INFORMATION, REFER TO THE FOLLOWING ENGINEERING STANDARDS DRAWINGS:
 ESD-2812-13 AND ESD-2812-14
 ESD-2911-13 AND ESD-2911-14
 ESD-2931-13 AND ESD-2931-14
 ESD-2941-13 AND ESD-2941-14
 ESD-2951-14 AND ESD-2951-15

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	RECOMMENDED	WP
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	DESIGNER PE STAMP	

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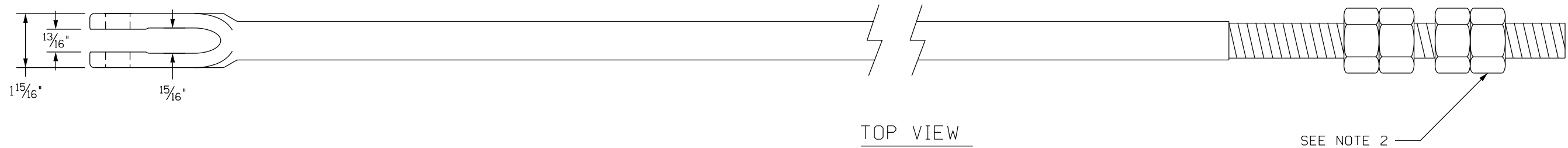
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ENGINEERING STANDARD DRAWINGS

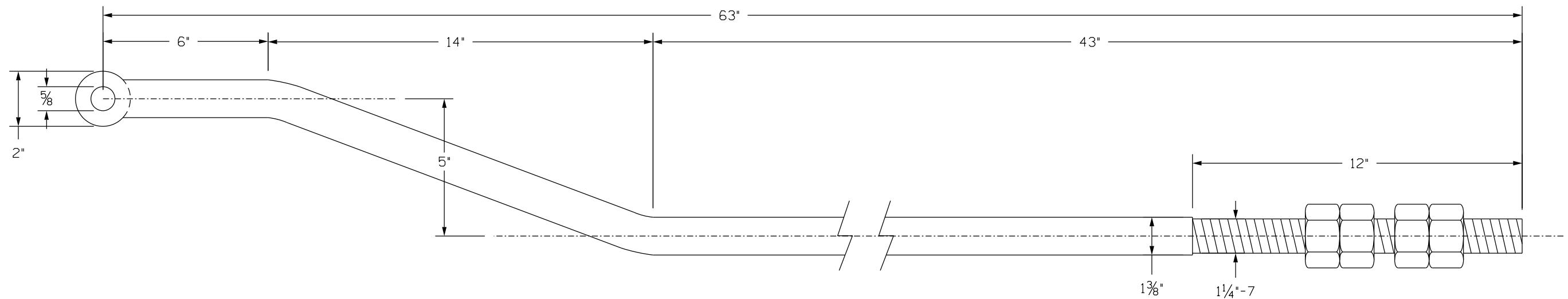
TYPICAL RACOR TYPE "SMJ"
No. 1 INSULATED "BASKET" ROD
FOR USE ON TURNOUTS

DRAWING NO.	ESD-8660
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	



TOP VIEW

SEE NOTE 2



PLAN VIEW

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NOTES:

1. POINT DETECTOR CONNECTING ROD SHALL CONFORM TO AREMA C&S MANUAL PART 15.1.4.
2. EACH ASSEMBLY SHALL BE FURNISHED WITH 4EA 1 1/4"-7 HVY HEX NUTS.
3. WHERE IT DOES NOT CONFLICT WITH THIS STANDARD, POINT DETECTOR CONNECTING ROD SHALL BE IN ACCORDANCE WITH ALL APPLICABLE AREMA C&S MANUAL PARTS.

REV.	DATE	DESCRIPTION	DES.	ENG.

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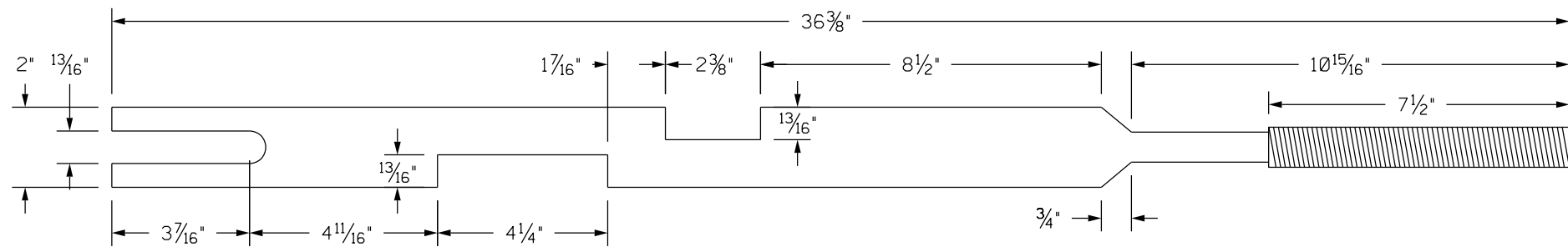


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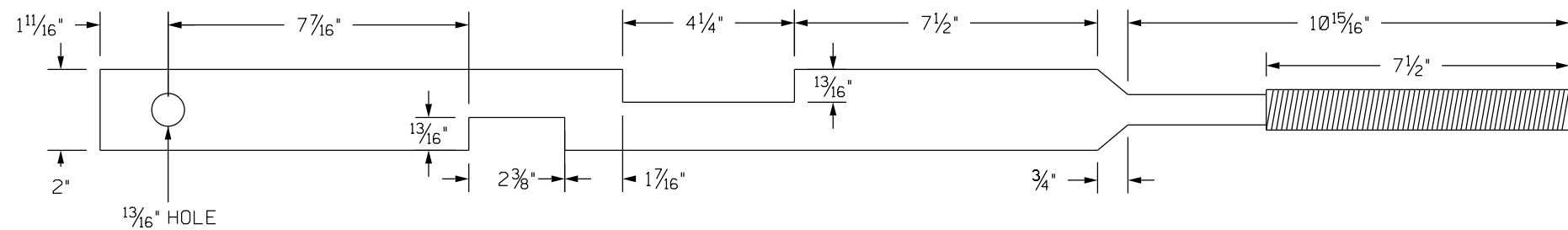
ENGINEERING STANDARD DRAWINGS

POINT DETECTOR CONNECTING ROD
FOR DUAL CONTROL SWITCH APPLICATIONS

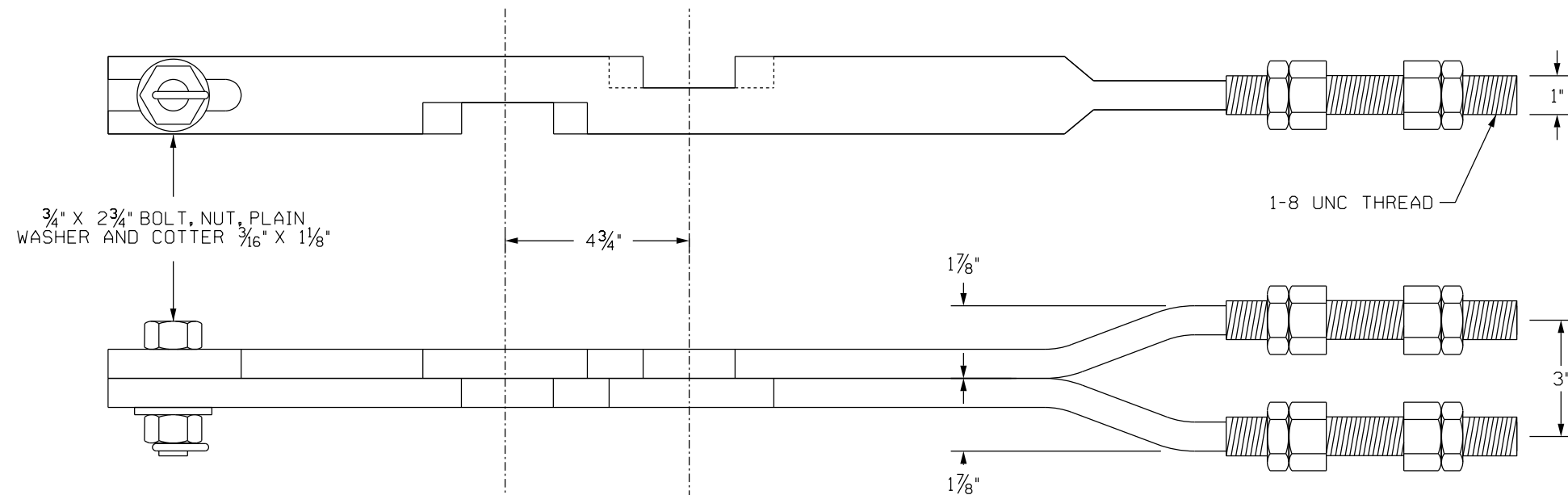
DRAWING NO.	ESD-8705
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	



NARROW NOTCH TOWARD THREADED END



WIDE NOTCH TOWARD THREADED END



COMPLETE ASSEMBLY

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NOTES:

1. WHERE IT DOES NOT CONFLICT WITH THIS STANDARD, INTERNAL LOCK ROD ASSEMBLY SHALL BE IN ACCORDANCE WITH AREMA C&S MANUAL PART 15.1.4. & 12.2.16.
2. INTERNAL LOCK ROD ASSEMBLY MAY BE USED ON BOTH M23-A AND M23-E POWER SWITCH MACHINES.
3. DOUBLE SLIP SWITCH TURNOUTS REQUIRE CUSTOM INTERNAL LOCK ROD ASSEMBLY.

REV.	DATE	DESCRIPTION	DES.	ENG.

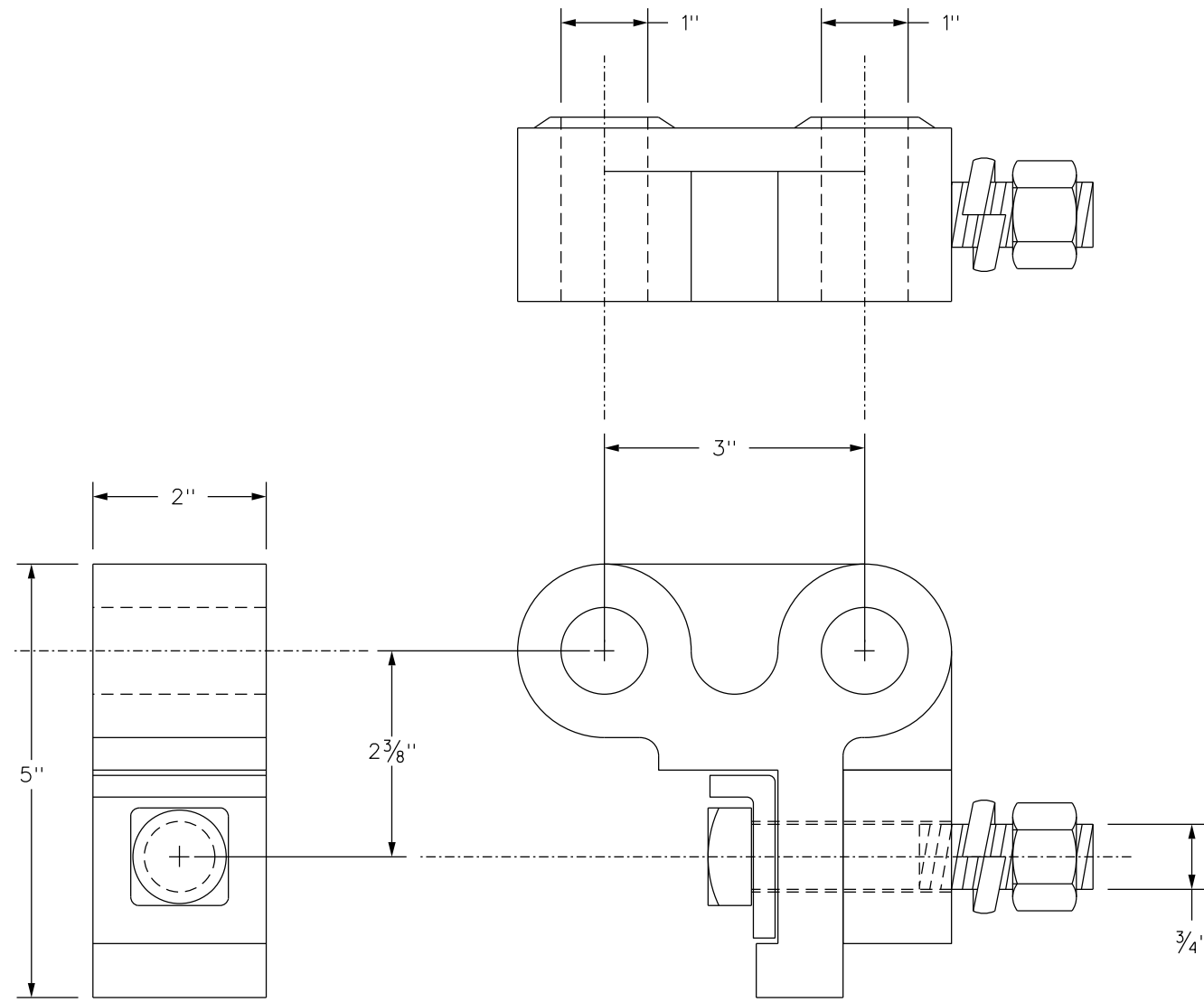
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ENGINEERING STANDARD DRAWINGS
INTERNAL LOCK ROD ASSEMBLY

DRAWING NO.	ESD-8710
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	



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- NOTES:
1. LOCK ROD DROP LUG SHALL COMFORM TO AREMA C&S MANUAL PART 15.1.4.
 2. WHERE IT DOES NOT CONFLICT WITH THIS STANDARD, LOCK ROD DROP LUG ASSEMBLY (BINOCULAR) SHALL BE IN ACCORDANCE WITH APPLICABLE AREMA C&S MANUAL PARTS.

REV.	DATE	DESCRIPTION	DES.	ENG.

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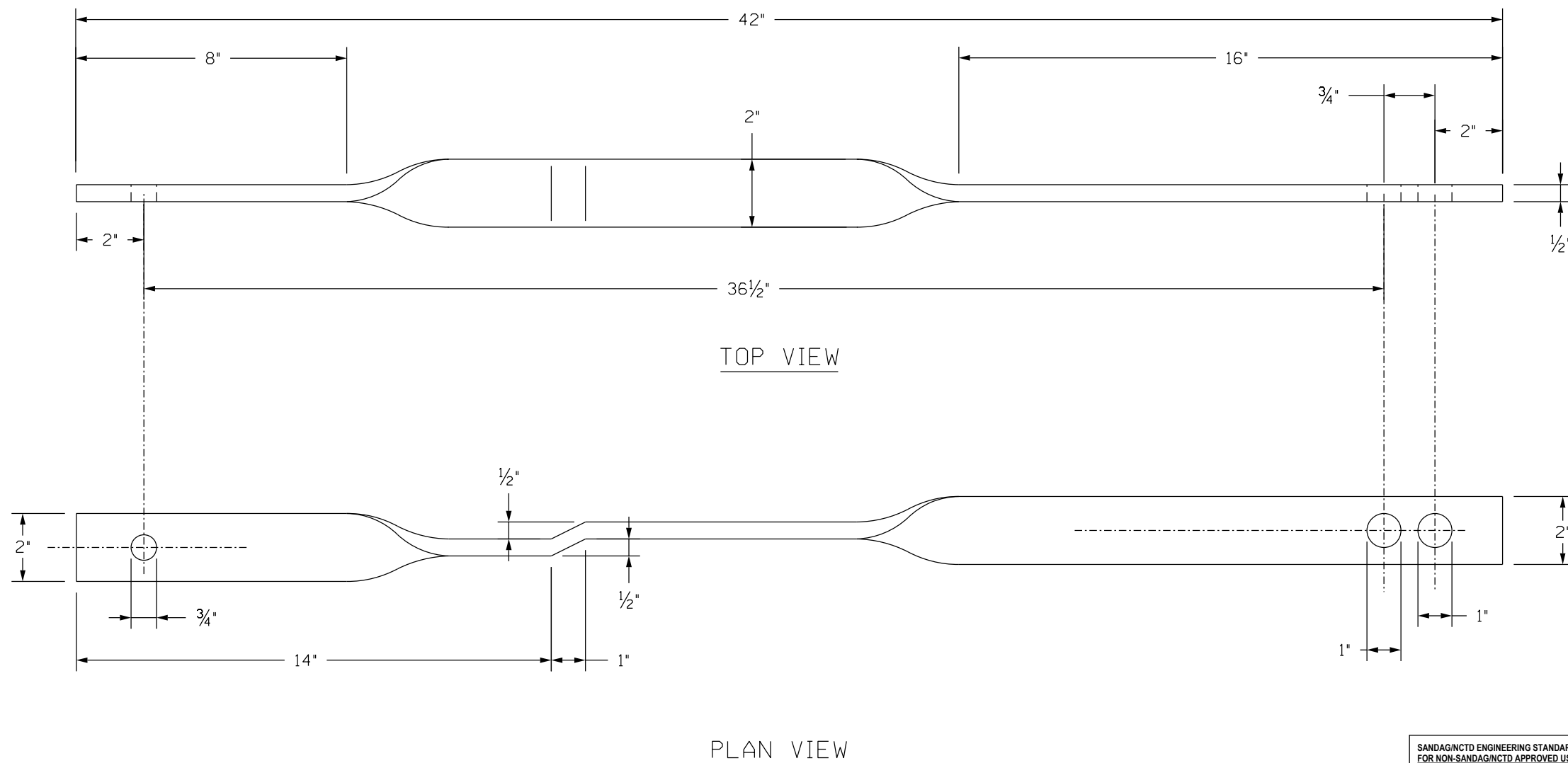
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ENGINEERING STANDARD DRAWINGS
LOCK ROD DROP LUG

DRAWING NO.	ESD-8715
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	



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- NOTES:
1. LOCK ROD CONNECTING ROD SHALL COMFORM TO AREMA C&S MANUAL PART 15.1.4.
 2. WHERE IT DOES NOT CONFLICT WITH THIS STANDARD, LOCK ROD CONNECTING ROD SHALL BE IN ACCORDANCE WITH ALL APPLICABLE AREMA C&S MANUAL PARTS.

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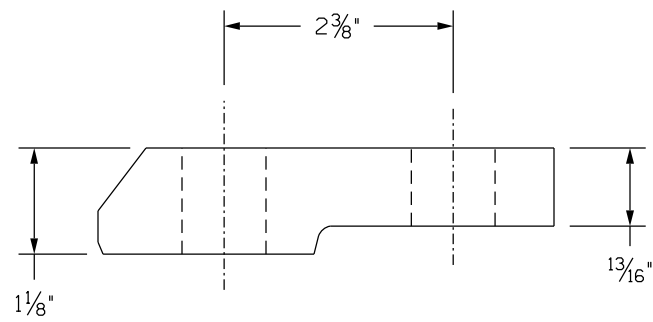
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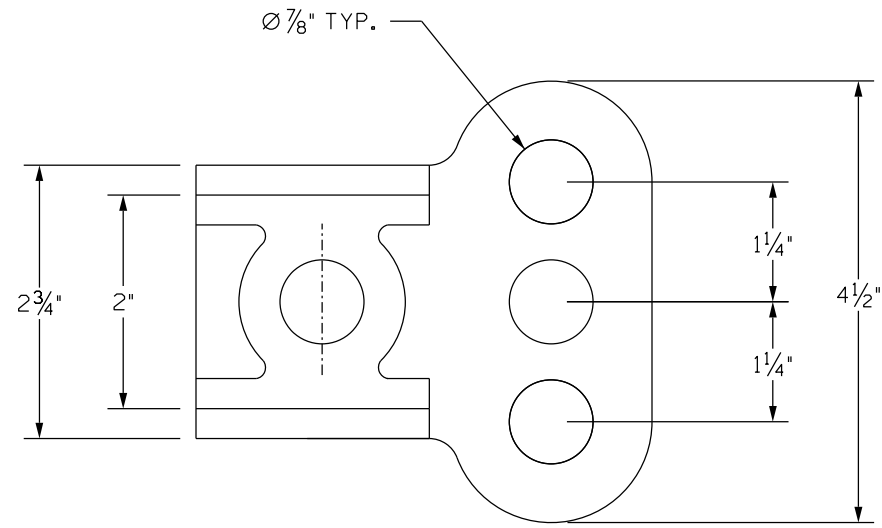
ENGINEERING STANDARD DRAWINGS

LOCK ROD CONNECTING ROD

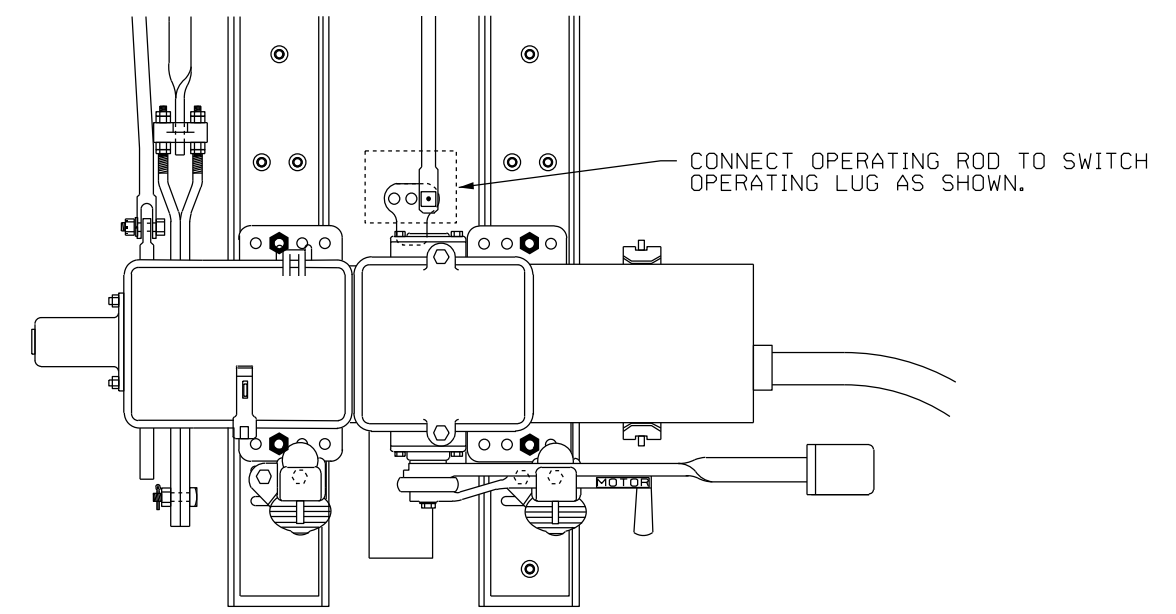
DRAWING NO.	ESD-8720
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	



PLAN VIEW



BOTTOM VIEW



INSTALLATION DETAIL

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- NOTES:
- SWITCH OPERATING LUG SHALL CONFORM TO AREMA C&S MANUAL PART 15.1.4.
 - WHERE IT DOES NOT CONFLICT WITH THIS STANDARD, SWITCH OPERATING LUG (BEAR CLAW) SHALL BE IN ACCORDANCE WITH ALL APPLICABLE AREMA C&S MANUAL PARTS.

REV.	DATE	DESCRIPTION	DES.	ENG.

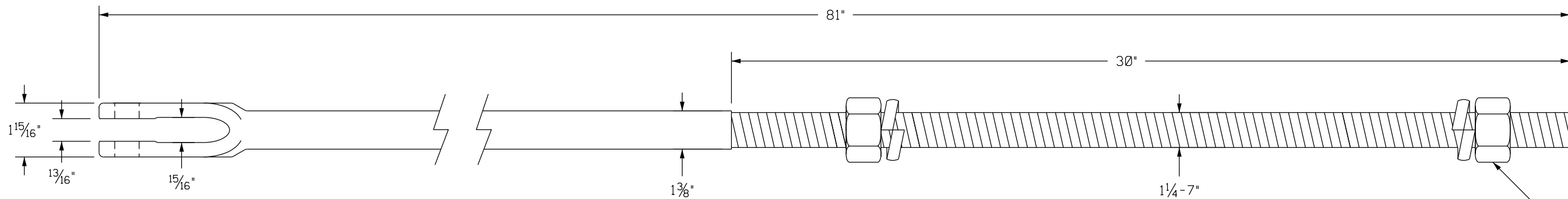
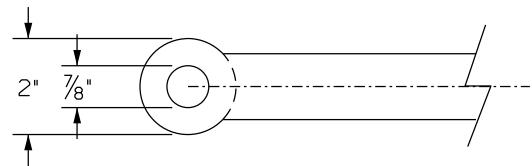
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ENGINEERING STANDARD DRAWINGS
SWITCH OPERATING LUG (BEAR CLAW)

DRAWING NO.	ESD-8725
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	



TOP VIEW

SEE NOTE 2

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- NOTES:
- SWITCH OPERATING ROD SHALL COMFORM TO AREMA C&S MANUAL PART 15.1.4.
 - EACH ASSEMBLY SHALL BE FURNISHED WITH 2 EA 1 1/4"-7 HVY HEX NUTS AND 2 EA 1 1/4" X 1/4" SPRING WASHERS.
 - WHERE IT DOES NOT CONFLICT WITH THIS STANDARD, SWITCH OPERATING ROD SHALL BE IN ACCORDANCE WITH ALL APPLICABLE AREMA C&S MANUAL PARTS.

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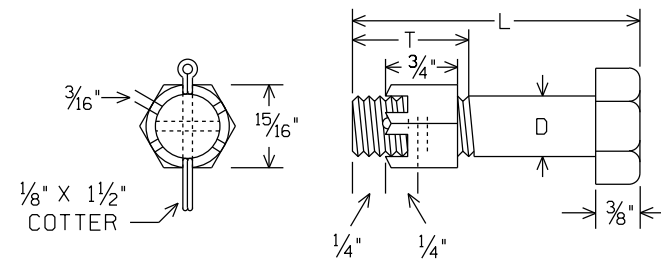
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ENGINEERING STANDARD DRAWINGS

SWITCH OPERATING ROD FOR
DUAL CONTROL SWITCH APPLICATIONS

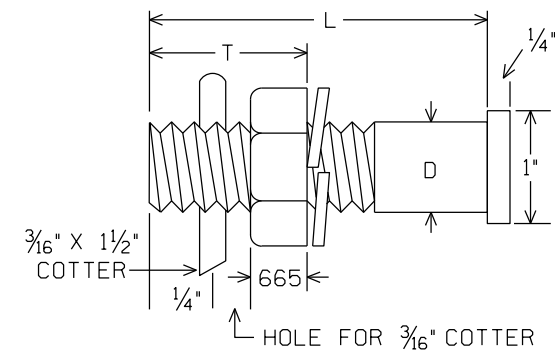
DRAWING NO.	ESD-8730
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	

FIG. 1



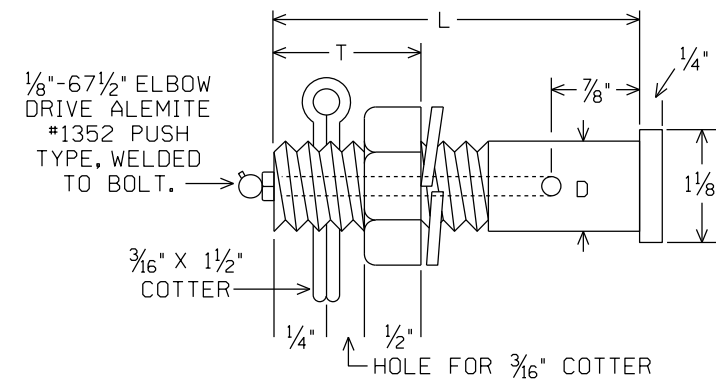
L	D	T	APPLICATION
2 5/8"	5/8"	1 1/4" 11-NC3	PT. DETECTOR-M23A

FIG. 2



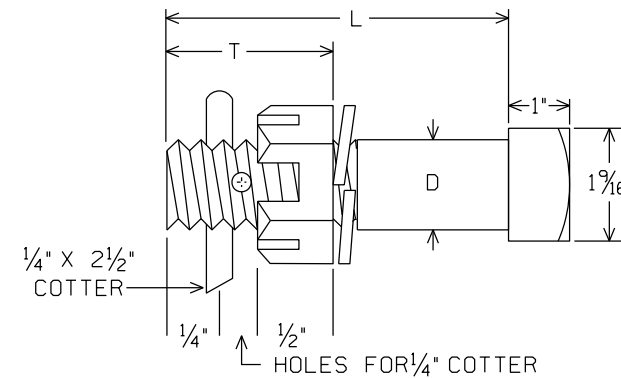
L	D	T	APPLICATION
2 1/2"	3/4"	1 1/2" 10-NC3	PT. DETECTOR-5A

FIG. 3



L	D	T	APPLICATION
3"	7/8"	1 1/2" 9-NC3	AUXILIARY CRANKS

FIG. 4



L	D	T	APPLICATION
3 1/2"	1"	2" 8-NC3	LOCK ROD LINK

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GENERAL NOTE:

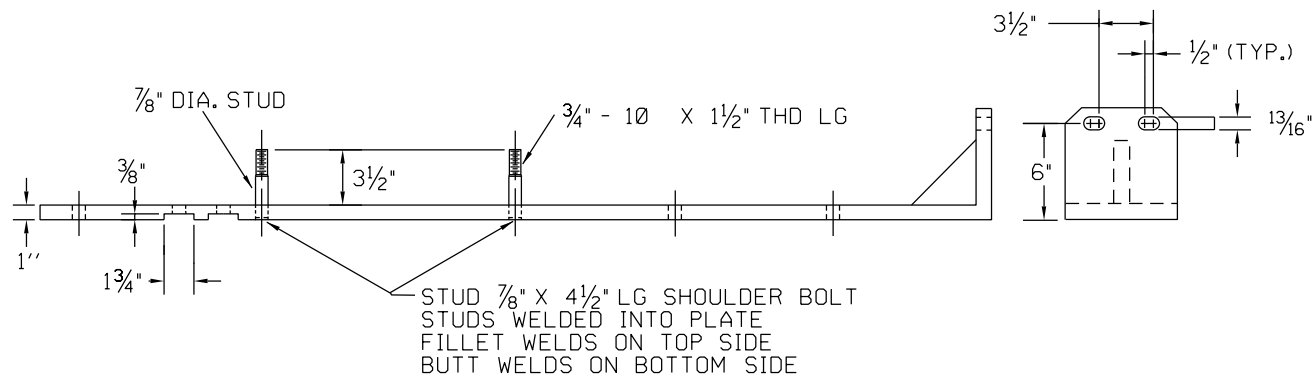
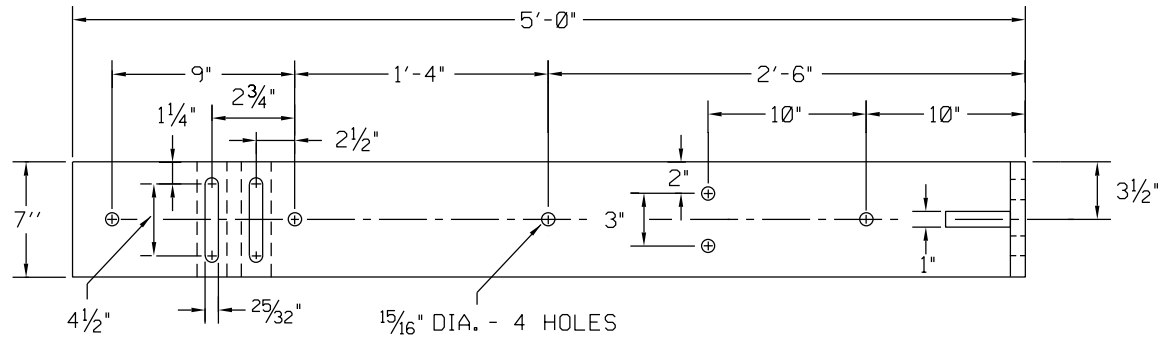
1. MATERIAL SHALL CONFORM TO AREMA C&S MANUAL PART 14.6.20 & 14.6.21

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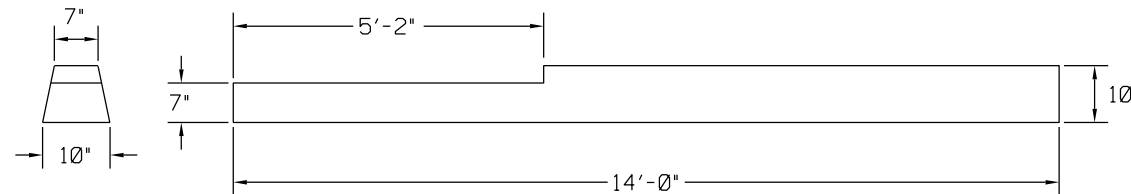
ENGINEERING STANDARD DRAWINGS	DRAWING NO. ESD-8732
BOLTS FOR SWITCH CONNECTIONS	DRAWING SHEET NO. 1 OF 1
	SCALE: NONE
	CONTRACT SHEET NO.



MOUNTING PLATE NOTES:

1. EMORY CLOTH SHALL BE INSTALLED TO PROVIDE ABRASIVE MATERIAL BETWEEN SWITCH MACHINE FRAME AND SWITCH PLATE.
2. ALL HOLES SHALL BE DRILLED NOT PUNCHED.
3. ALL CORNERS OF PLATE SHALL BE CHAMFERED 1" X 1".

ANSALDO M-23A SWITCH MACHINE MOUNTING PLATE



TRAPEZOID TIE NOTES:

1. TRAPEZOID TIES SHALL BE DOUGLAS FIR OR GUM.
2. TRAPEZOID TIES SHALL BE DAPPED AND TREATED AT THE MILL.
3. TIES SHALL BE STRAIGHT AND FREE OF CRACKS OR OTHER DEFECTS.

14 FT. DAPPED TRAPEZOID TIE

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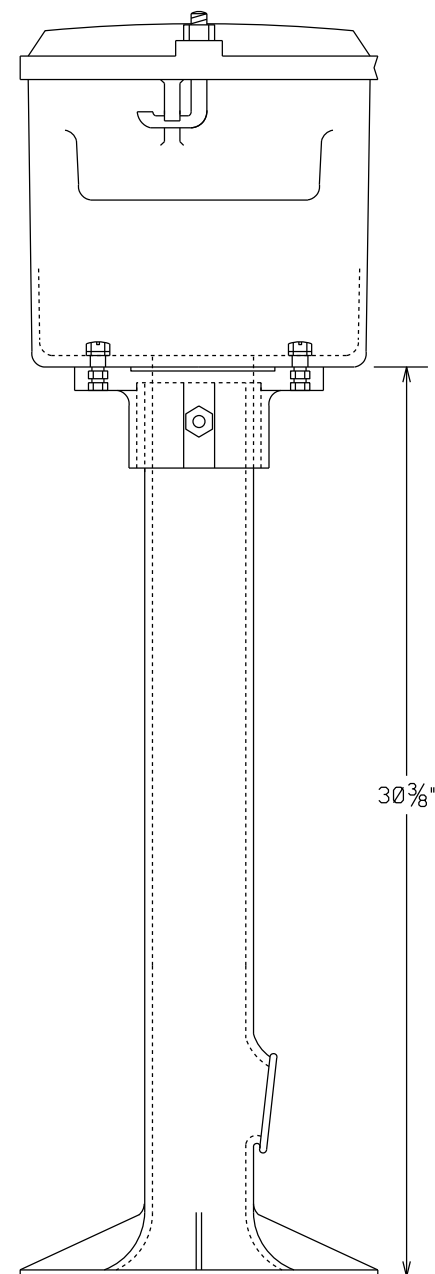
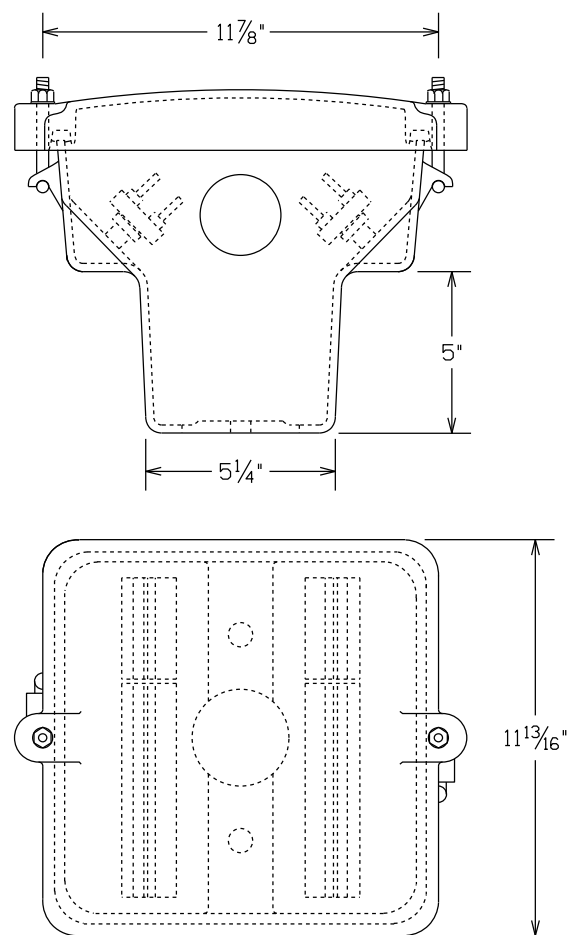
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ENGINEERING STANDARD DRAWINGS

M23-A DUAL CONTROL SWITCH MACHINE MOUNTING PLATES AND TIE REQUIREMENTS

DRAWING NO.	ESD-8735
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	



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NOTE:
 JUNCTION BOX TO CONTAIN A
 MINIMUM OF 38 AAR TERMINALS.

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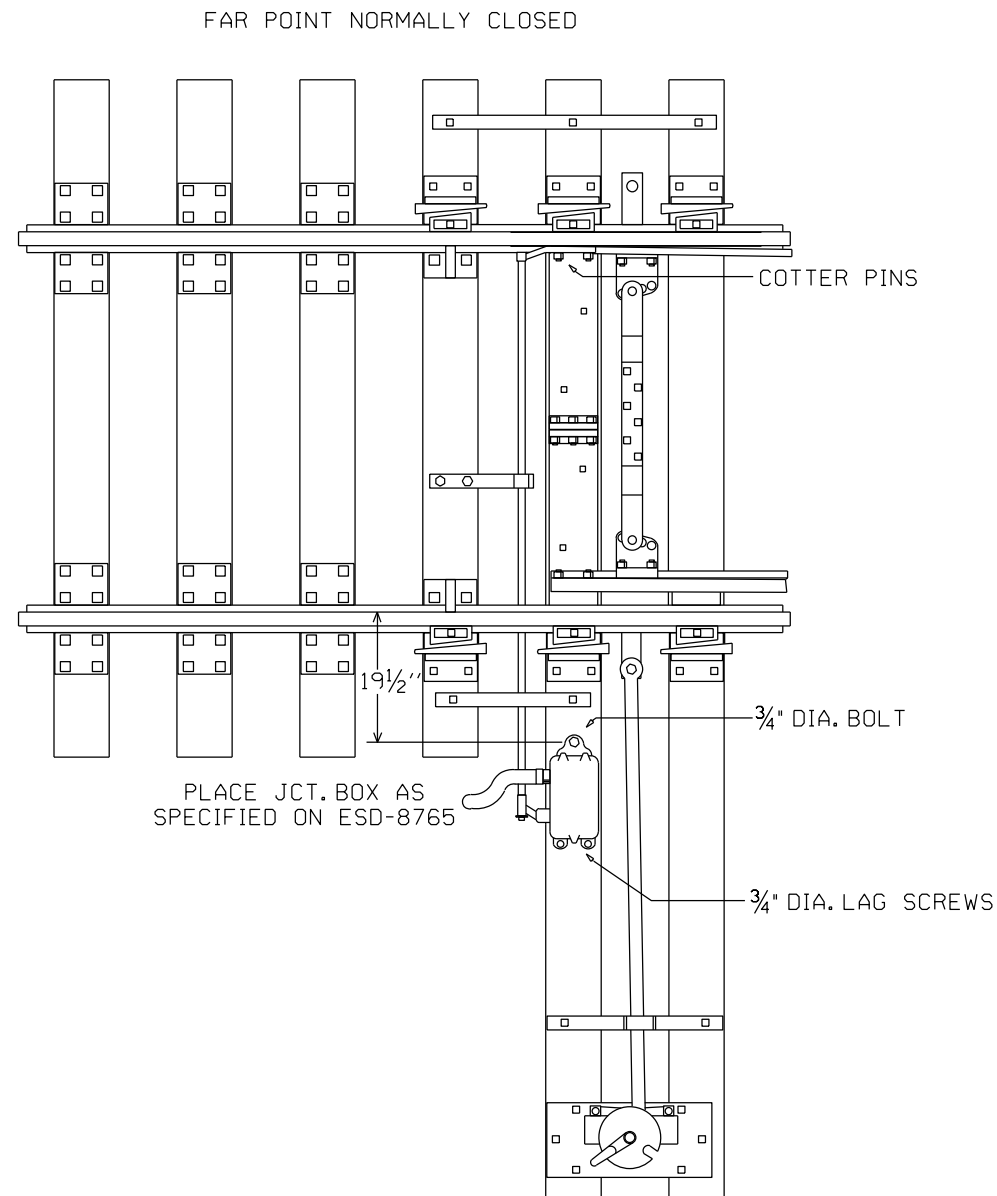
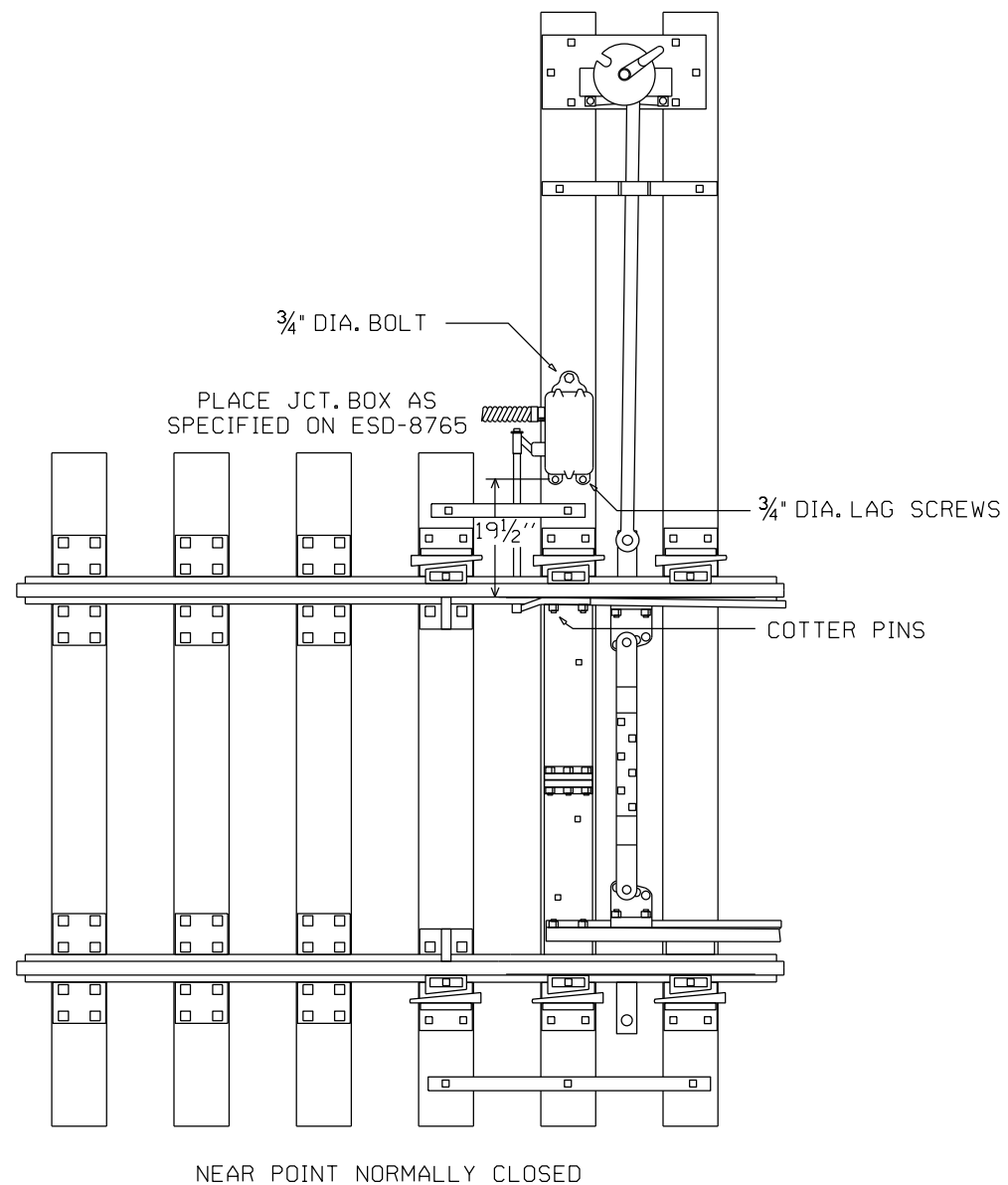
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ENGINEERING STANDARD DRAWINGS
 TYPICAL PEDESTAL JUNCTION BOX

DRAWING NO.	ESD-8755
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	



NOTES:

1. SWITCH CIRCUIT CONTROLLER TO BE US&S U-5, OR EQUIVALENT, EQUIPPED WITH RETURN SPRING.
2. PLACE CIRCUIT CONTROLLER AS SHOWN (i.e. BOLT AWAY FROM TRACK ON NEAR POINT AND BOLT TOWARDS TRACK ON FAR POINT).
3. PLACE 3/4" DIA. BOLT THROUGH TIE. HEAD OF BOLT WILL BE SECURED WITH BRIDGE WASHER ON BOTTOM OF TIE.
4. LAYOUT BASED ON USE OF HIGH SWITCH STAND. CONTRACTOR SHALL MAKE ADJUSTMENTS BASED ON SWITCH STAND USED.
5. TOP OF CIRCUIT CONTROLLER JUNCTION BOX SHALL BE A MAXIMUM OF 6" ABOVE FINAL GRADE BUT OF SUFFICIENT HEIGHT TO ENSURE WATER CANNOT ENTER BOX.

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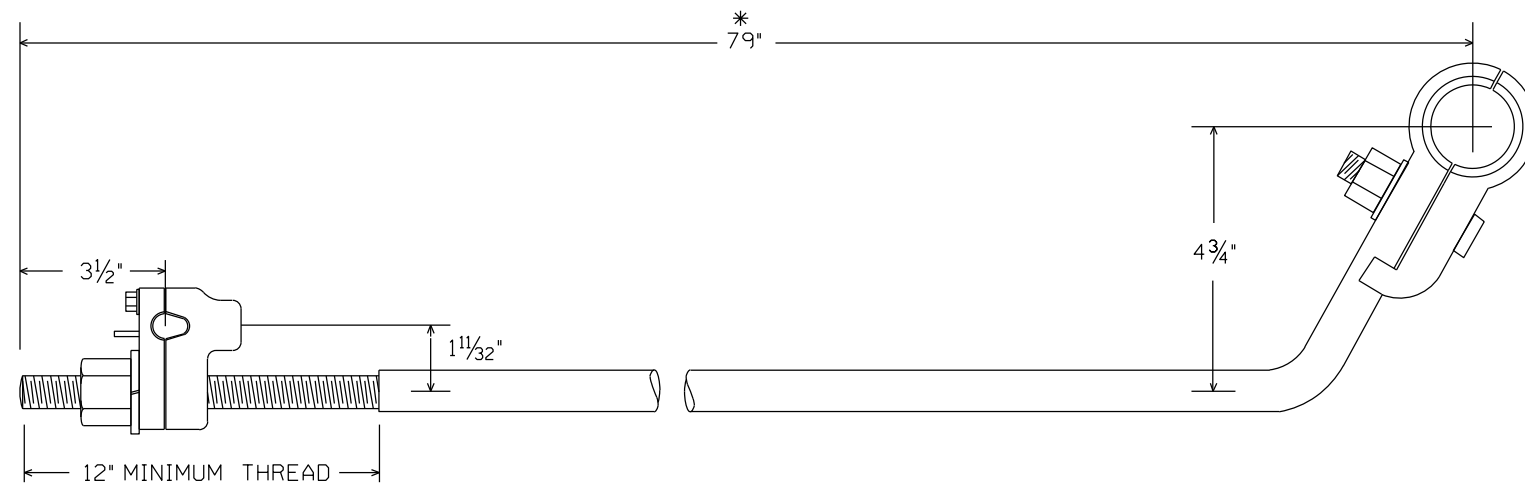
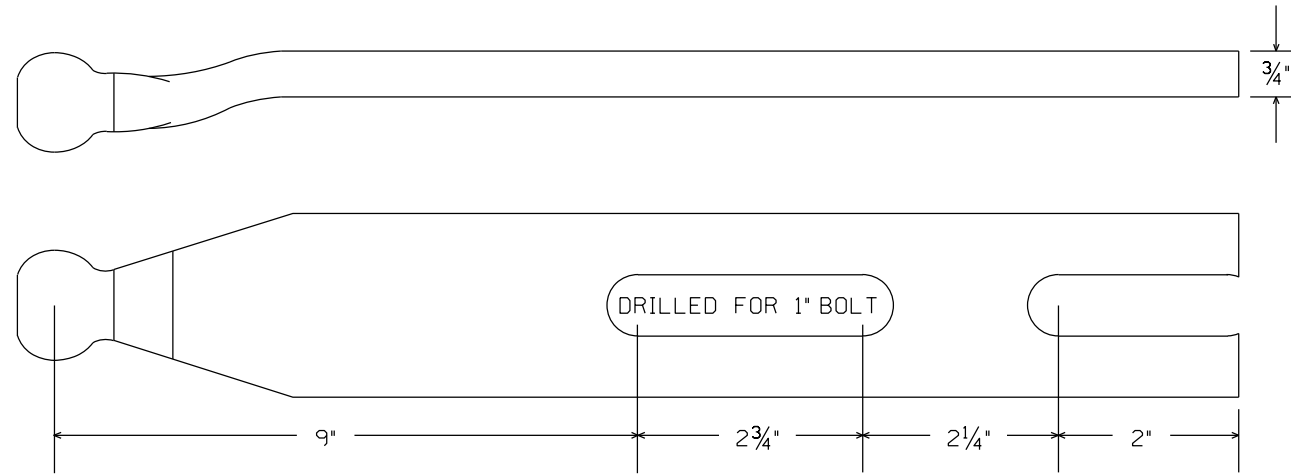
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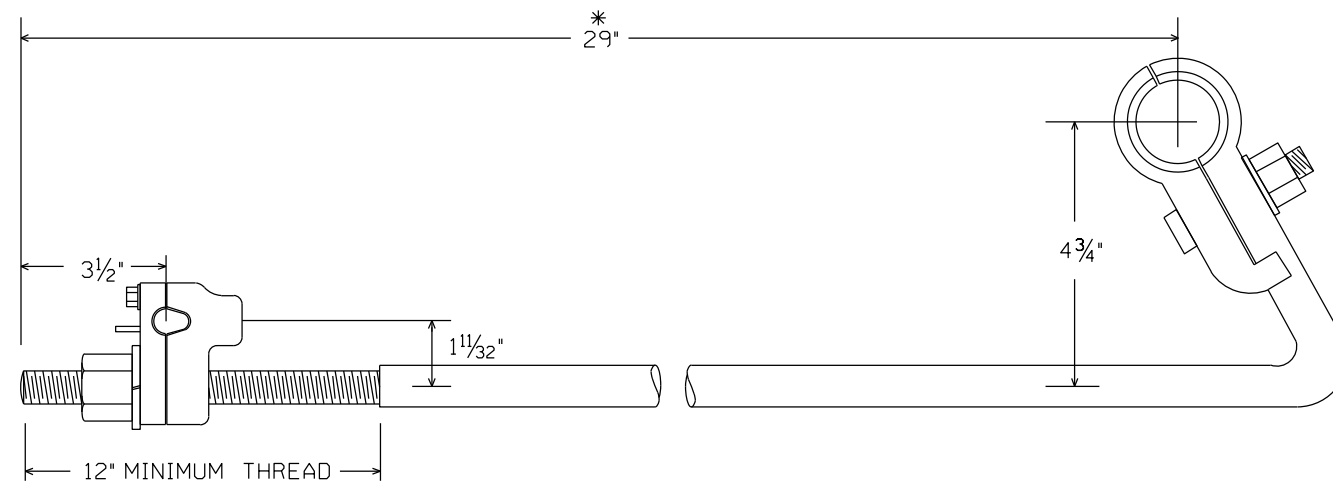
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ENGINEERING STANDARD DRAWINGS
CIRCUIT CONTROLLER PLACEMENT
AT HAND THROW SWITCHES

DRAWING NO.	ESD-8760
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	



* CONTRACTOR/MANUFACTURER SHALL VERIFY ROD LENGTHS PRIOR TO PROCUREMENT.



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NOTE:

1. BALL POINT LUG SHALL CONFORM TO AREMA C&S MANUAL PART 12.1.11

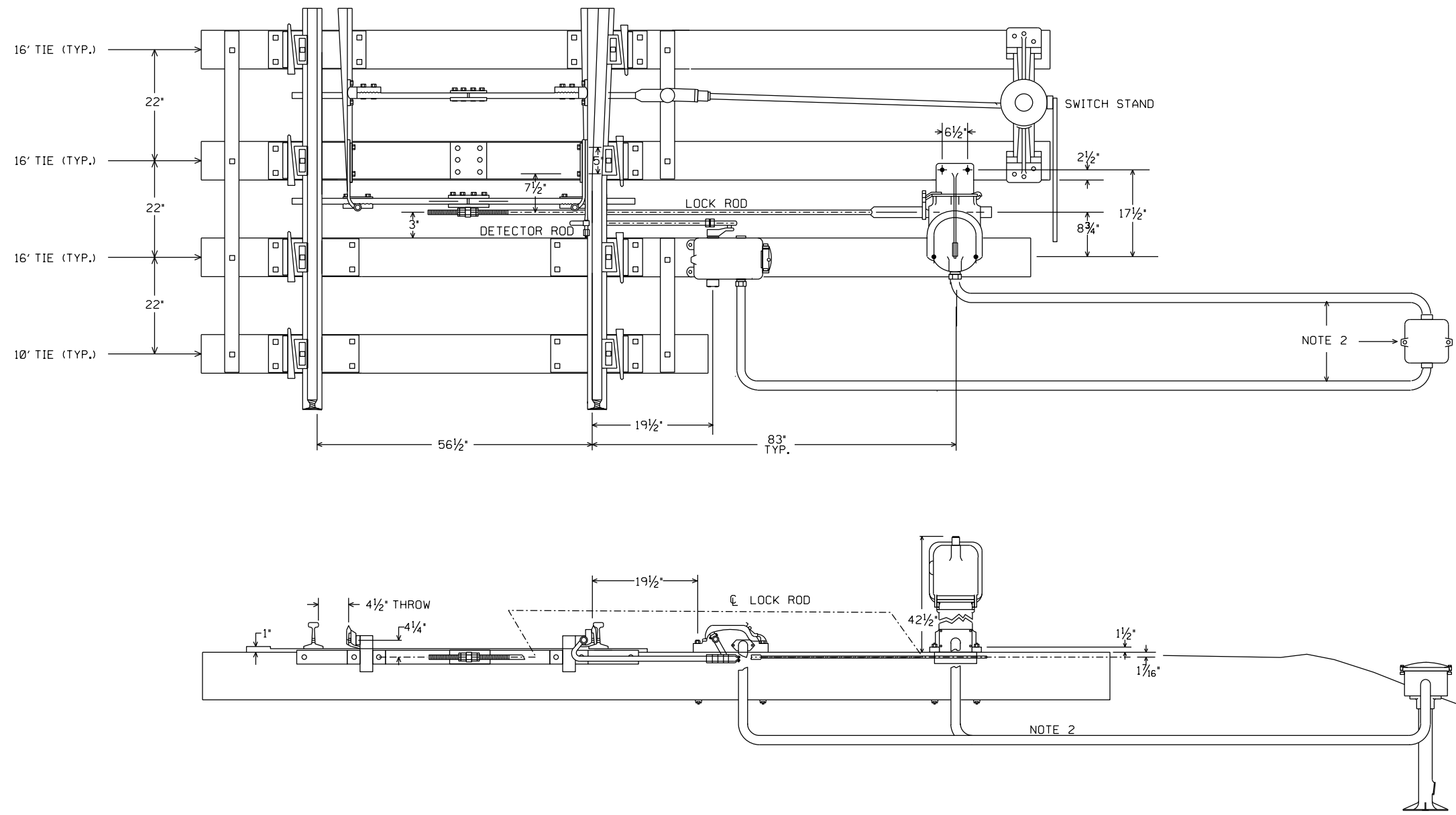
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RECOMMENDED	<i>WP</i>
DATE	FEBRUARY 2015
DESIGNER PE STAMP	



ENGINEERING STANDARD DRAWINGS
SWITCH CIRCUIT CONTROLLER
ROD & LUG

DRAWING NO.	ESD-8761
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	



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- NOTES:
1. PLACE CIRCUIT CONTROLLER AS PER ESD-8760.
 2. FOR PEDESTAL JUNCTION BOX DETAIL SEE ESD-8755. LOCATE JUNCTION BOX OUTSIDE CPUC WALKWAY AND BURY SEALTITE CONDUIT TO PREVENT TRIPPING HAZARD.

REV.	DATE	DESCRIPTION	DES.	ENG.

DRAWN	PRE, INC.
CHECKED	EJR
RECOMMENDED	WP
DATE	FEBRUARY 2015
DESIGNER PE STAMP	

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ENGINEERING STANDARD DRAWINGS
LOW 9B ELECTRIC LOCK
SWITCH LAYOUT

DRAWING NO.	ESD-8765
DRAWING SHEET NO.	1 OF 1
SCALE:	NONE
CONTRACT SHEET NO.	