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LOSSAN ENGINEERING STANDARD DRAWINGS

Section 1000

GENERAL
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<th>CURRENT DATE</th>
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<td>7/17/18</td>
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<td>ENGINEERING STANDARD INDEX (Page 2)</td>
<td>7/17/18</td>
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<td>ENGINEERING STANDARD INDEX (Page 3)</td>
<td>7/17/18</td>
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<td>7/17/18</td>
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**ENGINEERING STANDARD DRAWINGS**

**ENGINEERING STANDARD INDEX (PAGE 3)**

- **DATE:** 5/27/15
- **SCALE:** 3 OF 4
- **CONTRACT SHEET NO:** 07/17/18
<table>
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<tr>
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<td>Grade Crossing Warning Devices - Part 2</td>
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NOTES:
1. THE SELECTION AND USE OF THESE STANDARDS IS THE SOLE RESPONSIBILITY OF THE USER AND THEY SHOULD NOT BE USED WITHOUT CONSULTING A REGISTERED PROFESSIONAL ENGINEER.
2. ENGINEERING STANDARD DRAWINGS ARE PROVIDED TO ASSIST IN MAINTAINING MINIMUM ENGINEERING STANDARDS.
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.
4. ANYONE MAKING USE OF INFORMATION PROVIDED ON THE STANDARD DRAWINGS AGREES THAT THEY ASSUME ALL LIABILITY ARISING FROM SUCH USE.

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4. ANYONE MAKING USE OF INFORMATION PROVIDED ON THE STANDARD DRAWINGS AGREES THAT THEY ASSUME ALL LIABILITY ARISING FROM SUCH USE.
ALL LETTERS AND NUMERALS TO BE BLACK 3M 3650-12 "SCOTCHAL PLUS" NON-REFLECTIVE.

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 "T" AND THE NUMERAL "1" ARE IDENTICAL.
5. USE TEXT SPACING PATTERN ON THIS SHEET UNLESS OTHERWISE SPECIFIED ON SIGN STANDARD.
LOSSAN ENGINEERING STANDARD DRAWINGS

Section 2000

TRACK
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 equal to or 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 6'-0" 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 2'-0". 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 conditions shall be met.

9. Ballast shoulder width shall be at least 4'-0".

10. Where required to provide walkways at tie height per ESD 2108, use 5" max ballast if practical for top 4 inches of ballast section.

11. The grade profile on super-elevated 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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2. Rail / Highway Grade Separations may require provisions for maintenance road and/or additional track.

3. Moveable parts of doors, gates, windows, etc., must remain clear of this envelope.

4. Preferred vertical clearance is 26 feet per NCTD Shared Use Agreement. Grant Deed Pages 3 and 4-Reserved Freight Easement. Must also be submitted to BNSF for approval. Vertical clearances less than 24 feet are not allowed.

5. Minimum horizontal clearance is 10 ft from centerline of track per NCTD Shared Use Agreement Grant Deed Pages 3 and 4-Reserved Freight Easement. Erection over the Railroad’s track shall be planned such that it enables the tracks to remain open to traffic per Railroad requirements.

6. The Contractor must submit a proposed method of erosion and sediment control and have the methods approved by the Railroad prior to beginning any grading on the project site.

7. For railroad coordination please refer to the Railroad’s coordination requirements as part of the specifications or special provisions of the project.

8. Temporary construction clearances, including falsework clearances, shall comply with Figure 1.

9. All permanent clearances shall be verified before project closeout.

**Construction Notes:**

- Any structure 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 tracks to remain open to traffic per Railroad requirements.

- The elevation of the existing top-of-rail profile 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.

- Clearances and/or Vertical Clearances shall conform to California P.U.C. General Order No. 96 or Amendments thereto. See U.P.C. website: http://www.cpuc.ca.gov/ptc/docgen.htm.


- Rail / Highway Grade Separations may require provisions for maintenance road and/or additional track.

- New platforms to be constructed 15” above top of rail to comply with Federal Level Boarding Regulation 76 FR 57924 per NCTD Letter 5/8/2014.

- Ensure adequate drainage for ballast section is provided underneath platforms and around similar obstructions.

- Minimum construction clearance envelope (normal to railroad).

- No obstructions to be constructed within this envelope without prior approval of San Diego Director of Rail.

- No construction activities or other obstructions shall be placed within these limits.

**Pending Revisions:**

- 4/17/20

**Sandag Clearance Requirements for New Construction or Design:**

- Any exception to this requirement must be approved by the San Diego Director of Rail.

**San Diego Association of Governments**

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

**San Diego Transit District**
810 Mission Avenue
Oceanside, CA 92054
www.sandiego.com

**Railpros**

B. Smith
W. Prey
NOTES:
A. CLEARANCE LINE FOR SIGNALS OR SWITCH STAKES 3'-0" ON OR ABOVE TOP OF RAIL, AND LOCATED BETWEEN END OF TIE OR SLAB TO KEEP CLEAR FOR CURVE TRACK TO BE 1'-0" GREATER THAN THAT FOR TANGENT TRACK.

B. PLATFORMS 4'-0" OR LESS IN HEIGHT WITH MINIMUM CLEARANCE OF 7'-0" MAY BE EXTENDED AT EXISTING CLEARANCES IF SUCH EXTENSION IS IN CONNECTION WITH RECONSTRUCTION OF ORIGINAL PLATFORM.

C. MINIMUM CLEARANCES FOR HANDRAILS AND WATER BARRELS ON BRIDGES WITH WALKWAYS SHALL BE 7'-0".

D. HANDRAILS AND WATER BARRELS ON THROUGH BRIDGES WHERE WORK OF TRAINMEN OR YARDMEN REQUIRE THEM TO BE ON DECK OF BRIDGE FOR PURPOSES OF COUPLING OR UNCOUPLING CARS IN PERFORMING SWITCHING SERVICE ON A SWITCHING LEAD.

E. PLATFORMS 4'-0" OR LESS IN HEIGHT WITH MINIMUM CLEARANCE OF 7'-3" MAY BE EXTENDED AT EXISTING CLEARANCES IF SUCH EXTENSION IS IN CONNECTION WITH RECONSTRUCTION OF ORIGINAL PLATFORM.

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

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.
MINIMUM WALKWAY STANDARDS

- Standard No. 1 (B-B)
- Standard No. 6 (A-A)
- Typical Turnout

Note:
- The walkway is described on this standard.
- The minimums required by California Public Utilities Commission General Orders 280 and 118.
- Clear point is the location at which a 15'-0" clearance is provided between adjacent track centerlines.

Where practicable, 1" max. 5" ballast will be used for top 4' of ballast in walkway areas. However, standard ballast may be used and maintained.

- Any layout is described for the accuracy, but the layout is subject to change for the best possible arrangement.
- Clear point is the location at which a 15'-0" clearance is provided between adjacent track centerlines.

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
1. VERTICAL CURVES AS CALCULATED IN ITEM 6 BELOW SHOULD BE USED TO CONNECT ALL CHANGES IN GRADIENTS.

2. THE LENGTH OF VERTICAL CURVE IS DETERMINED BY CHANGES IN GRADIENT, VERTICAL ACCELERATION AND THE SPEED OF THE TRAIN.

3. THE PURPOSE OF THE VERTICAL CURVE IS TO EASE THE CHANGE OF THE GRADIENTS IN ORDER TO REDUCE COUPLER AND DIAPHRAGM BENDING AND ELIMINATE THE DANGERS OF BREAKING THE TRAIN IN TWO AS A DIRECT RESULT OF TRAIN ACTION. IN ADDITION, THE PROPER 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.

4. 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.

5. VERTICAL CURVE SHALL BE PARABOLIC.

6. THE MINIMUM LENGTH OF THE VERTICAL CURVE FOR BOTH SAGS AND SUMMITS IS DETERMINED BY THE FOLLOWING FORMULA,

$$ LVC = \frac{D \times V \times K}{A} $$

WHERE:
- A = VERTICAL ACCELERATION (FEET/SEC^2)
- K = 2.15 CONVERSION FACTOR TO GIVE LVC IN FEET
- V = DESIGN SPEED IN MILES PER HOUR
- D = ABSOLUTE VALUE OF THE DIFFERENCE IN RATES OF GRADES EXPRESSED AS A DECIMAL

7. 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.

8. 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.

9. 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.

10. THE MINIMUM DISTANCE BETWEEN VERTICAL CURVES SHALL BE 3V OR 100 FT, WHICHER IS GREATER.

11. TURNOUTS SHALL NOT BE PLACED WITHIN THE LIMITS OF A VERTICAL CURVE.

12. 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 20 FT.

13. THE DESIGN OF VERTICAL ALIGNMENT SHALL AIM TO MINIMIZE THE NUMBER OF VERTICAL CURVES, WHILE CONSISTENT WITH ENGINEERING ECONOMY AND SITE CONSTRAINTS.

14. VERTICAL CURVES SHALL BE DESIGNED USING THE FUTURE MAXIMUM DESIGN SPEED FOR PASSENGER AND FREIGHT TRAFFICS IN EFFECT. DESIGNERS SHALL CONSULT WITH SANDAG FOR THE FUTURE MAXIMUM PASSENGER SPEED AT EACH LOCATION. CURRENTLY THE MAXIMUM SPEEDS ARE 85 MPH PASSENGER AND 30 MPH FREIGHT.

15. SPEED RESTRICTIONS DUE TO SIGNAL/STOPPING DISTANCE OR PASSENGER STATIONS WILL NOT BE CONSIDERED.

16. PLANS FOR NEW CONSTRUCTION, REHABILITATION, AND TEMPORARY TRACK SHALL CLEARLY SHOW THE PERCENT GRADES, DESIGN SPEED, BEGINNING, END AND LENGTH OF VERTICAL CURVE.

17. VERTICAL PROFILES MUST SHOW CONSTRAINTS TO VERTICAL PROFILE SUCH AS EXISTING OR FUTURE BRIDGES, CROSSINGS, TURNOUTS AND STATION PLATFORMS.

18. VERTICAL CURVES WITHIN 100 FT OF A STATION PLATFORM SHALL BE AVOIDED.

EXAMPLE CALCULATION FOR FREIGHT OPERATIONS

CREST CURVE WITH 0.5% - ASCENDING GRADE MEETING A 0.5% - DESCENDING GRADE. MAXIMUM DESIGN SPEED IS 50 MPH.

$$ LVC = \frac{D \times V \times K}{A} $$

$$ A = 0.60 \text{ FEET/SEC/SEC} \text{ PASSENGER SPEED} $$

$$ A = 0.30 \text{ FEET/SEC/SEC} \text{ FREIGHT SPEED} $$

$$ V = 50 \text{ MPH DESIGN SPEED} $$

$$ D = \text{ABSOLUTE VALUE OF \((+0.005)\)-\((-0.005)\)} = 0.01 $$

EXAMPLE CALCULATION FOR PASSENGER OPERATIONS

CREST CURVE WITH 0.5% - ASCENDING GRADE MEETING A 0.5% DESCENDING GRADE. MAXIMUM DESIGN SPEED IS 75 MPH.

$$ LVC = \frac{D \times V \times K}{A} $$

$$ A = 0.10 \text{ FEET/SEC/SEC VERTICAL ACCELERATION (FREIGHT)} $$

$$ A = 0.05 \text{ FEET/SEC/SEC VERTICAL ACCELERATION (PASSENGER AND TRANSIT)} $$

$$ V = 75 \text{ MPH DESIGN SPEED} $$

$$ D = \text{ABSOLUTE VALUE OF \((+0.005)\)-\((-0.005)\)} = 0.01 $$

EXAMPLE CALCULATION FOR BOTH OR CONCURRENT OPERATIONS

ASSUMING SAME GRADES AND SPEEDS AS ABOVE EXAMPLES SELECTING LONGEST VALUE YIELDED, LVC WOULD BE 365 FT.

SUMMIT CURVES

<table>
<thead>
<tr>
<th>PVC</th>
<th>G1</th>
<th>PVI</th>
<th>LVC</th>
<th>PVT</th>
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SAG CURVES

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<tr>
<th>PVC</th>
<th>G2</th>
<th>PVI</th>
<th>LVC</th>
<th>PVT</th>
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</thead>
</table>

ABBREVIATIONS

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

RECOMMENDED METHOD FOR VERTICAL CURVE ANALYSIS

A = VERTICAL ACCELERATION
K = 2.15 CONVERSION FACTOR TO GIVE L IN FEET
V = DESIGN SPEED IN MILES PER HOUR
D = ABSOLUTE VALUE OF THE DIFFERENCE IN RATES OF GRADES EXPRESSED AS A DECIMAL
W. PREY

810 Mission Avenue
Oceanside, CA 92054
www.gonctd.com
1. Circular curves are defined by the chord definition (central angle subtended by a chord of 100 feet) of curvature and specified by degree.

2. 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.

3. 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.

4. All angles are in degrees, distances and lengths are in feet, except super-elevations are in inches and speeds are in miles per hour (mph).

**Abbreviations and Symbols**

- **CC**: Compound Curve
- **CS**: Curve to Spiral
- **¾**: Central Angle of Circular Curve
- **Dc**: Degree of Curve (Chord Definition)
- **EA**: Actual Super-elevation
- **EU**: Unbalanced Super-elevation (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
- **Ta**: Total Tangent Distance of a Spiral Curve
- **X**: Tangent Distance from TS to SC
- **Y**: Tangent Offset to the SC

**Key Formulas**

- \( R = \frac{50 \sin \left( \frac{Dc}{2} \right)}{I - 2 \left( \frac{T_s}{100} \right)} \)
- \( T = R \tan \left( \frac{I}{2} \right) \)
- \( L = X \times 100 \)
- \( LC = 2R \sin \left( \frac{I}{2} \right) \)
- \( LS = 200 \frac{T_s}{Dc} \)
- \( S = \frac{LS}{100} \)
- \( ST = Y \)
- \( \alpha_s = 0.1454 \frac{LS}{Dc} \)
- \( \omega_s = 0.003048 \sqrt{S} \)
- \( Y = 0.582 \sqrt{S} - 0.00001264 \omega_s \)
- \( k = -0.000508 \omega_s^6 \)

**Notes:**

1. Circular curves are defined by the chord definition (central angle subtended by a chord of 100 feet) of curvature and specified by degree.

2. 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.

3. 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.

4. All angles are in degrees, distances and lengths are in feet, except super-elevations are in inches and speeds are in miles per hour (mph).
### Track Geometry Data Table

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<th>Desc.</th>
<th>Bearing</th>
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<th>Easting</th>
<th>Input Data</th>
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#### 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 (FRT)" will remain blank. For passenger-only operations, column "V (FRF)" will remain blank.
5. In the event a designer must propose a curve that does not meet design requirements per SANDAG ESD-2001 and ESD-2002-01, 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. LS shall be selected to the nearest 0.000 feet.
8. E3 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.
DATABASE/ENGINEERING STANDARD DRAWINGS

CURVE SPEED, SUPERELEVATION, AND SPIRAL LENGTH

SAMPLE CURVE DESIGN PROBLEM

A CURRENT RAIL LANE OPERATES PASSenger SERVICE AT 70 MPH AND FREIGHT AT 85 MPH. A J T 0 3-6 MPH. CORTICAL CURVES DESIGN FOR THE OPERATION OF PASSENGER EQUIPMENT NORMALLY USED IN SANDAG AND AMTRAK TRAINS:

1. LOOK UP THE EX AND EA FOR A 0° 0 CURVE AT 70 MPH IN THE STANDARD SPAN LENGTH TABLE FOR PASSENGER OPERATIONS TABLE P3.5:

- Exa = 32° Exb = 32°
- Ea = 0° Lea = 10°
- Eb = 0° Lb = 10°

2. SELECT THE FREIGHT SPEED AND ACTUAL CURVE FOR A 2° 0° CURVE AT 70 MPH IN THE STANDARD SPAN LENGTH TABLE FOR FREIGHT OPERATIONS, TABLE F2.0:

- For 65 MPH: Ea = 32° Lea = 10°
- For 70 MPH: Ea = 32° Lea = 10°
- For 75 MPH: Ea = 32° Lea = 10°
- For 80 MPH: Ea = 32° Lea = 10°

3. 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 80 MPH OR BE INCREASED TO 100 MPH IF THIS CAN BE SUSTAINED FOR AT LEAST 2 MILES (CURVE DESIGN PROCEDURE NO. 14)

ENGINEERING STANDARD DRAWINGS

CURVE SPEED, SUPERELEVATION, AND SPIRAL LENGTH NOTES

CURRENT RAIL LANE OPERATES PASSENGER SERVICE AT 70 MPH AND FREIGHT AT 85 MPH. A J T 0 3-6 MPH. CORTICAL CURVES DESIGN FOR THE OPERATION OF PASSENGER EQUIPMENT NORMALLY USED IN SANDAG AND AMTRAK TRAINS:

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ENGINEERING STANDARD DRAWINGS

CURVE SPEED, SUPERELEVATION, AND SPIRAL LENGTH NOTES

CURRENT RAIL LANE OPERATES PASSENGER SERVICE AT 70 MPH AND FREIGHT AT 85 MPH. A J T 0 3-6 MPH. CORTICAL CURVES DESIGN FOR THE OPERATION OF PASSENGER EQUIPMENT NORMALLY USED IN SANDAG AND AMTRAK TRAINS:

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### Table P3.5: 3.5" Unbalanced Elevation Standard Spiral Lengths for Passenger Operations

<table>
<thead>
<tr>
<th>Spiral Length</th>
<th>Curvature, Degrees/Minutes</th>
</tr>
</thead>
<tbody>
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<tr>
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<td>12/18</td>
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</tbody>
</table>

**Notes:**
1. No spirals on Multiple Lines will be permitted to the right of Heavy Line without prior approval from SANDAG Director of Engineering.
2. Where curvature is more than 3 minutes than a listed figure, the next higher elevation and resulting spiral length will be used.

---

**Spiral Length, the Longest of:**
- B = 0.0077 x V
- L = 1.2 x V
- R = E x E

**Abbreviations:**
- **E** = Equivalent of Outside Rail (in)
- **L** = Unbalanced Elevation of Outside Rail (in)
- **R** = Actual Elevation of Outside Rail (in)
- **S** = Degree of Curvature (Degree, Minutes, Feet, in. *See Figure 1.3 for 3.5")
- **T** = Degree of Change of Level (Decimal Degrees, ft/in.)

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www.sandag.org

**North County Transit District**
810 Mission Avenue
Oceanside, CA 92054
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**Engineering Standard Drawings**

**Drawing No.:** ESD-2204-01
**Drawing Sheet No.:** 1 of 6
### TABLE F2.0 - 2.0 INCH UNBALANCED ELEVATION FOR FREIGHT OPERATIONS - STANDARD SPIRAL LENGTHS

<table>
<thead>
<tr>
<th>DRAWING NO.</th>
<th>SCALE:</th>
<th>DRAWING SHEET NO.</th>
<th>CONTRACT SHEET NO.</th>
<th>Vmax</th>
<th>MAXIMUM ALLOWABLE DESIGN SPEED (MPH)</th>
<th>SPIRAL LENGTH (FT)</th>
<th>D (°) DEGREE OF CURVATURE (DECIMAL DEGREES, DMS)</th>
<th>E = EQUILIBRIUM OF OUTSIDE RAIL (IN)</th>
<th>Eu = UNBALANCED ELEVATION OF OUTSIDE RAIL (IN)</th>
<th>Le = SPIRAL LENGTH (FT)</th>
<th>Ls = SPIRAL LENGTH (FT)</th>
<th>Lm = Ls (°)</th>
<th>Ls = Lm (°)</th>
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<tr>
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</table>

**NOTES:**

1. NO SPIRALS OR SUPERELEVATIONS WILL BE PERMITTED TO THE RIGHT OF HEAVY LINE WITHOUT PRIOR APPROVAL FROM SANDAG DESIGN ENGINEERING.

2. WHERE CURVATURE IS MORE THAN 5 MINUTES THAN A LISTED FIGURE, THE NEXT HIGHER ELEVATION AND RESULTING SPIRAL LENGTH WILL BE USED.
### TABLE P3.5M: 3.5" UNBALANCED ELEVATION FOR PASSENGER OPERATIONS - MINIMAL SPIRAL LENGTHS

<table>
<thead>
<tr>
<th>DRAWING NO.</th>
<th>SCALE:</th>
<th>SHEET NO.</th>
<th>CONTRACT NO.</th>
<th>REVISIONS</th>
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<td>1:4800</td>
<td>504</td>
<td>S65</td>
<td>NONE</td>
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</table>

**ENGINEERING STANDARD DRAWINGS**

**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

---

**RAILROADS:**

**B. SMITH**

**W. PREY**

---

**NOTES:**

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2. WHERE CURVATURE IS MORE THAN 5 MINUTES THAN A LISTED FIGURE, THE NEXT-HIGHER ELEVATION AND RESULTING SPIRAL LENGTH WILL BE USED.
3. THIS TABLE MAY ONLY BE USED ON TERRITORY AUTHORIZED BY SANDAG/CONTRACT WHERE STANDARD SPIRAL LENGTHS CANNOT BE OBTAINED DUE TO EXISTING FIELD CONDITIONS.

---

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3. THIS TABLE MAY ONLY BE USED ON TERRITORY AUTHORIZED BY SANDAG/CONTRACT WHERE STANDARD SPIRAL LENGTHS CANNOT BE OBTAINED DUE TO EXISTING FIELD CONDITIONS.
### TABLE F2.0M: 2.0" UNBALANCED ELEVATION FOR FREIGHT OPERATIONS - MINIMUM SPIRAL LENGTHS

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<th>REV.</th>
<th>DATE</th>
<th>DESCRIPTION</th>
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#### MAXIMUM UNBALANCED FREIGHT OPERATING SPEEDS - MILES PER HOUR

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<td>30</td>
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</tbody>
</table>

#### FORMULAS

- **E = EQUIVALENT OF OUTSIDE RAIL (IN)**
- **Ea = ACTUAL ELEVATION OF OUTSIDE RAIL (IN)**
- **D = DEGREE OF CURVATURE (DEGREES, DMS)**
- **ESD-2204-04**

**NOTES:**

1. **NO SPIRALS OR SUPERELEVATIONS WILL BE PERMITTED TO THE RIGHT OF HEAVY LANE WITHOUT PRIOR APPROVAL FROM SANDAG DIRECTOR OF ENGINEERING.**
2. **WHERE CURVATURE IS MORE THAN 5 MINUTES A LISTED FIGURE, THE NEXT HIGHER ELEVATION AND RESULTING SPIRAL LENGTH WILL BE USED.**
3. **THIS TABLE MAY ONLY BE USED ON TERRITORY AUTHORIZED BY SANDAG AND WHERE STANDARD SPIRAL LENGTHS CAN NOT BE OBTAINED DUE TO EXISTING FIELD CONDITIONS.**

### DESIGNER PE STAMP

RAILPROS
B. SMITH
W. PREY

### SAN DIEGO ASSOCIATION OF GOVERNMENTS

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### NORTH COUNTY TRANSIT DISTRICT

115 Mission Avenue
Oceanside, CA 92054
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### ENGINEERING STANDARD DRAWINGS

REV. DATE DESCRIPTION DES. ENG. DATE
2/2/15 DESIGNER'S STAMP

### REVISIONS

- [E]SD-2204-04
  - B. SMITH
  - W. PREY
# TABLE PML - 4.0 INCH UNBALANCED ELEVATION FOR PASSENGER OPERATIONS - MAINTENANCE LIMIT

<table>
<thead>
<tr>
<th>DRAWING SHEET NO.</th>
<th>CONTRACT SHEET NO.</th>
<th>REVISIONS</th>
<th>DATE</th>
<th>DESCRIPTION</th>
<th>DESIGNER PE STAMP</th>
</tr>
</thead>
<tbody>
<tr>
<td>2/2/15</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**NOTES**

1. AT ALL TIMES THE TRACK MUST BE IN CONFORMITY WITH ACCORDING TABLES P.5 AND P.5M DEFINE THE LIMITING DESIGN SPEED FOR PASSENGER TRAINS. TABLES P.5 AND P.5M DEFINE THE LIMITING DESIGN SPEED FOR PASSENGER TRAINS. THE DESIGN SPEEDS FOR PASSENGER TRAINS MAY BE USED FOR NON-PASSENGER TRAINS UNDER SPECIFIED CONDITIONS. THE LIMITING DESIGN SPEEDS FOR PASSENGER TRAINS MAY BE USED FOR NON-PASSENGER TRAINS UNDER SPECIFIED CONDITIONS. THE LIMITING DESIGN SPEEDS FOR PASSENGER TRAINS MAY BE USED FOR NON-PASSENGER TRAINS UNDER SPECIFIED CONDITIONS. THE LIMITING DESIGN SPEEDS FOR PASSENGER TRAINS MAY BE USED FOR NON-PASSENGER TRAINS UNDER SPECIFIED CONDITIONS.

2. THE SPREADS ARE DIFFERENT FOR PASSENGER TRAINS AND NON-PASSENGER TRAINS UNDER SPECIFIED CONDITIONS. THE LIMITING DESIGN SPEEDS FOR PASSENGER TRAINS MAY BE USED FOR NON-PASSENGER TRAINS UNDER SPECIFIED CONDITIONS. THE LIMITING DESIGN SPEEDS FOR PASSENGER TRAINS MAY BE USED FOR NON-PASSENGER TRAINS UNDER SPECIFIED CONDITIONS. THE LIMITING DESIGN SPEEDS FOR PASSENGER TRAINS MAY BE USED FOR NON-PASSENGER TRAINS UNDER SPECIFIED CONDITIONS.

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### TABLE FML - 3.0 INCH UNBALANCED ELEVATION FOR FREIGHT OPERATIONS - MAINTENANCE LIMIT

<table>
<thead>
<tr>
<th>REVISIONS</th>
<th>DRAWN</th>
<th>CHECKED</th>
<th>RECOMMENDED</th>
<th>DATE</th>
<th>DESCRIPTION</th>
<th>REV</th>
<th>W/ PREY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>B. SMITH</td>
<td>W. PREY</td>
<td>2/2/15</td>
<td>DESIGNER PE STAMP</td>
<td>76</td>
<td>RAIPROS</td>
</tr>
</tbody>
</table>

#### ABREVIATIONS
- **En** = EQUILIBRIUM OF OUTSIDE RAIL (IN)
- **Eu** = UNBALANCED ELEVATION OF OUTSIDE RAIL (IN)
- **Ls** = SPIRAL LENGTH (FT)
- **Es** = ACTUAL ELEVATION OF OUTSIDE RAIL (IN)
- **D** = DEGREE OF CURVATURE (DEGREE, DEGREES, DM)

#### FORMULAS
- \( V_{max} = \text{MAXIMUM ALLOWABLE DESIGN SPEED} \)
- \( En = 0.0007D/mile^2 \)
- \( Eu = En - Eu \)

#### MAXIMUM ALLOWABLE FREIGHT OPERATING SPEED - MILES PER HOUR

<table>
<thead>
<tr>
<th>DRAWING NO.</th>
<th>SCALE:</th>
<th>DRAWING SHEET NO.</th>
<th>CONTRACT SHEET NO.</th>
<th>REVISIONS</th>
<th>DATE</th>
<th>DESCRIPTION</th>
<th>REV</th>
<th>W/ PREY</th>
</tr>
</thead>
<tbody>
<tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### NOTES
1. AT ALL TIMES THE TRACK MUST BE IN COMPLIANCE WITH RAILROAD STANDARDS. TABLES P5.3 AND P5.3M DEFINE THE LIMITING DESIGN SPEED FOR PASSENGER TRAINS, TABLES P5.1 AND P5.1M DEFINE THE LIMITING DESIGN SPEED FOR FREIGHT TRAINS. OPERATION AT SPEEDS RESULTING IN 4 INCHES UNBALANCE IS PERMITTED FOR NCTO AND AMTRAK PASSENGER TRAINS EXCEPT WHEN ADVISED THAT SEVERE WIND CONDITIONS EXIST. 3 INCHES UNBALANCE IS THE LIMITING CONDITION FOR ALL FREIGHT TRAINS AND FOR PASSENGER TRAINS UNDER SEVERE WIND CONDITIONS. ANY COMBINATION OF CURVATURE OR ACTUAL ELEVATION THAT IS DISCOVERED OR CREATED THAT RESULTS IN THE OPERATING SPEED TO EXCEED THE SPEED PERMITTED BY THESE TABLES IS REQUIRING IMMEDIATE REMEDIAL ACTION.
2. SPIRAL LENGTHS MUST NOT BE INCREASED EXCEPT AS PART OF AN ENGINEERED REALIGNMENT OF A CURVE. THE SHARPNESS OF THE CURVE IN THE CENTRAL BODY WILL BE INCREASED IF THE SPIRALS ARE EXTENDED INTO THE BODY OF THE CURVE.
3. MANAGERS OF TRACK MAINTENANCE MUST RECEIVE AND FOLLOW THE POLICIES ON THIS SUBJECT.
5. MANAGERS OF TRACK MAINTENANCE MUST RECEIVE AND FOLLOW THE POLICIES ON THIS SUBJECT.
1. Tags shall be clear anodized aluminum, 16 gauge, with embossed lettering, as shown.
2. Tags shall indicate no super elevation of outside rail at the TS and the ST, and full super elevation of outside rail in inches at all SC and CS points.
3. Orient tags to be read while walking in the direction of increasing stationing.
4. Attach tags to concrete ties with manu-prene 65-A adhesive; to wood ties with galvanized 10 penny nails or approved equal.
5. Tags attached to any tie being replaced shall be removed and attached to the replacement tie by the contractor.
6. Curve information written on rail being replaced shall be written in the same location on the replacement rail by the contractor.
7. Super elevated curves must include spirals. Curves without spirals shall not be super elevated.
8. 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.

---

**Notes:**
RH Curve as shown, LH opposite
**SPACING OF TRACKS ON CURVES**

<table>
<thead>
<tr>
<th>DEGREE OF CURVE</th>
<th>MAIN TRACK TO MAIN TRACK</th>
<th>MAIN TRACK TO SIDE TRACK</th>
<th>INDUSTRY AND YARD TRACKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>TANGENT</td>
<td>15'-0&quot;</td>
<td>16'-0&quot;</td>
<td>15'-0&quot;</td>
</tr>
<tr>
<td>1</td>
<td>15'-2&quot;</td>
<td>16'-2&quot;</td>
<td>15'-2&quot;</td>
</tr>
<tr>
<td>2</td>
<td>16'-0&quot;</td>
<td>16'-4&quot;</td>
<td>15'-0&quot;</td>
</tr>
<tr>
<td>3</td>
<td>16'-4&quot;</td>
<td>16'-8&quot;</td>
<td>15'-0&quot;</td>
</tr>
<tr>
<td>4</td>
<td>16'-8&quot;</td>
<td>16'-8&quot;</td>
<td>15'-0&quot;</td>
</tr>
<tr>
<td>5</td>
<td>15'-10&quot;</td>
<td>16'-10&quot;</td>
<td>15'-0&quot;</td>
</tr>
<tr>
<td>6</td>
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<td>17'-0&quot;</td>
<td>15'-0&quot;</td>
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<td>7</td>
<td>16'-2&quot;</td>
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<td>15'-0&quot;</td>
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<td>16'-4&quot;</td>
<td>17'-4&quot;</td>
<td>15'-0&quot;</td>
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<td>11</td>
<td>16'-10&quot;</td>
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<td>17'-2&quot;</td>
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<td>15'-0&quot;</td>
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<td>14</td>
<td>17'-4&quot;</td>
<td>18'-4&quot;</td>
<td>15'-0&quot;</td>
</tr>
<tr>
<td>15</td>
<td>17'-6&quot;</td>
<td>18'-6&quot;</td>
<td>15'-0&quot;</td>
</tr>
<tr>
<td>OVER 15°</td>
<td>INCREASE 2 INCHES PER DEGREE OF CURVE</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**NOTES:**

1. **MINIMUM DISTANCE BETWEEN CENTER LINES OF ADJACENT STANDARD GAUGE TRACKS ON ALL NEW CONSTRUCTION SHALL BE AS FOLLOWS:**
   - MAIN TRACKS
   - MAIN SIDING, RUNNING AND DRILL TRACKS AND ADJACENT TRACK (EXCEPT YARD TRACK)
   - LADDER TRACK AND ADJACENT TRACK
   - INDUSTRY, YARD AND HOUSE TRACKS
   - YARD TRACK AND ADJACENT MAIN OR RUNNING TRACK
   - ON CURVES, TRACK CENTERS AS SHOWN ABOVE SHALL BE INCREASED AS FOLLOWS (SEE TABLE THIS SHEET):

   - **A. TRACKS PER NOTES A, B AND E** - INCREASE 1 INCH FOR EACH 30 MINUTES OF CURVE.
   - **B. TRACKS PER NOTE D (YARD TRACKS)** - INCREASE 1 INCH FOR EACH 30 MINUTES OF CURVE IN EXCESS OF 6 DEGREES.

2. **INCREASE DISTANCES BETWEEN TRACK CENTERS SHALL BE APPLIED IN 1/2 INCH INCREMENTS. INCREASES OF CURVATURE OF 0.5 DEGREES OR 15 MINUTES PER DEGREE OF CURVE SHALL BE ROUNDED UP TO THE NEXT GREATER 15 MINUTE INCREMENT.**

3. **WHERE ADJACENT TRACK IS ON THE OUTSIDE OF A CURVE AND ITS SUPERELEVATION IS MORE THAN THE INSIDE TRACK, DISTANCES BETWEEN TRACKS SHALL BE INCREASED AS FOLLOWS:**
   - DISTANCE BETWEEN TRACK CENTERS 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.
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.

1. DESIGNER TO VERIFY SAFE SPEED THROUGH TURNOUT

MAXIMUM SPEEDS THROUGH TURNOUTS

<table>
<thead>
<tr>
<th>TURNOUT NO.</th>
<th>TANGENTIAL</th>
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<th>EQUILATERAL</th>
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<tbody>
<tr>
<td></td>
<td>SWITCH POINT LENGTH</td>
<td>PASSENGER MAXIMUM SPEED MPH</td>
<td>FREIGHT MAXIMUM SPEED MPH</td>
</tr>
<tr>
<td>8</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>10</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>14</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>20</td>
<td>-</td>
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<td>-</td>
</tr>
<tr>
<td>24</td>
<td>61'-8&quot;</td>
<td>60</td>
<td>50</td>
</tr>
</tbody>
</table>

* DESIGNER TO DETERMINE SWITCH POINT LENGTH
1. **Design speed, signal spacing and circuits will govern at locations where insulated joints are required.**

2. **Any distance between facing points of switch less than the minimums given shall require the approval of SANDAG Director of Engineering.**

---

**Facing Turnouts of Opposite Hand**

<table>
<thead>
<tr>
<th>Prob No</th>
<th>Desirable X (ft)</th>
<th>Minimum X (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6, 10</td>
<td>82</td>
<td>46</td>
</tr>
<tr>
<td>14</td>
<td>122</td>
<td>66</td>
</tr>
<tr>
<td>20</td>
<td>N/A</td>
<td>118</td>
</tr>
<tr>
<td>24</td>
<td>N/A</td>
<td>150</td>
</tr>
</tbody>
</table>

**Facing Turnouts of Same Hand**

<table>
<thead>
<tr>
<th>Prob No</th>
<th>Desirable X (ft)</th>
<th>Minimum X (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6, 10</td>
<td>82</td>
<td>52</td>
</tr>
<tr>
<td>14</td>
<td>125</td>
<td>90</td>
</tr>
<tr>
<td>20</td>
<td>N/A</td>
<td>122</td>
</tr>
<tr>
<td>24</td>
<td>N/A</td>
<td>150</td>
</tr>
</tbody>
</table>
NOTES:

1. INNER GUARD RAILS ON BRIDGES SHALL BE REQUIRED IN ACCORDANCE WITH SAN DIEGO TRANSIT AUTHORITY DESIGN CRITERIA.

2. INNER GUARD RAILS MAY BE INSTALLED ON ANY OTHER BRIDGE AS DIRECTED BY THE DIRECTOR OF ENGINEERING.

3. INNER GUARD RAILS ARE NOT REQUIRED ON BRIDGES UNLESS BRIDGE OR BRIDGE DECK IS REPLACED OR RUNNING RAIL IS REPAIRED ACROSS BRIDGE UNLESS DIRECTED BY DIRECTOR OF ENGINEERING.

4. INNER GUARD RAILS MAY BE CONSTRUCTED USING SECOND-HAND RAILS NOT LESS THAN 25 LBS. LIGHTER OR NO LARGER THAN RUNNING RAILS. IF GUARD RAIL HAS 3½" BASE, USE MODIFIED PLATES FOR 3½" BASE (E02237/7).

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 RAILS.

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 THROUGH A CORE AS TWO SETS AND ARE TO BE ROTATED 180° ON opposed ENDS.

REFERENCE DRAWINGS:

FOR PLATES SEE ESD 2371
FOR CONCRETE TIE SEE ESD 2405 OR ESD 2407
FOR SCREW AND WASHERS SEE ESD 2355

18" INSIDE GUARD RAILS FOR CONCRETE TIES
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 DEPICTED 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. INNER 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 PRESENT, 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 OF THE GUARD RAIL. ON CURVED TRACK, SPIKE THE ENTIRE GUARD RAIL WITH THREE SPIKES PER PLATE ON EACH RAIL.
8. ON WOOD TIE BOX ANCHOR TWO TIES NEAR THE CENTER OF BRIDGE TO RESTRICT LONGITUDINAL MOVEMENT OF GUARD RAIL.

REFERENCE DRAWINGS:
FOR PLATES, SEE ESD-2371
FOR SCREW SPIKES, SEE ESD-2355
NO TIE PLATES LONGER THAN 14" SHALL BE USED ON WOOD TIES UNDER THE GUARD RAIL. PLATES TO BE REVERSED UNDER GUARD RAIL WITH SHORT END OF PLATE TOWARD RUNNING RAIL.

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ENGINEERING STANDARD DRAWINGS
DRAWING NO. ESD-2304
DRAWING SHEET NO. 1 OF 1
SCALE none
CONTRACT SHEET NO. none

REV. DESCRIPTION DATE DESIGNER STAMP

REVISIONS

DATE DESCRIPTION DESIGNER STAMP

11/18/16 DOUBLE INSIDE GUARDRAIL FOR WOOD TIES

B.S. SMITH

RAILPROS

B. SMITH

DESIGNER PE STAMP

RAILPROS

B. SMITH

DESIGNER PE STAMP
NOTES:

1. LABEL ALL THERMITE FIELD WELDS ON FIELD SIDE OF RAIL.

2. USE PAINT STICK OR PAINT MARKING PEN TO LABEL RAIL.

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 OVER END PATTERN CONCEPT FOR FIVE 39 FOOT RAIL LENGTHS, OR THE EQUIVALENT LENGTH OF 130 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.
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 350 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 240 ft. on each side of hot box detectors.

6. Epoxy bonded insulated joints do not require end pattern.

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

<table>
<thead>
<tr>
<th>LENGTH OF CWR</th>
<th>DISTANCE OF END PATTERN (FT)</th>
<th>EQUIVALENT NUMBER OF TIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000' OR MORE</td>
<td>200</td>
<td>120</td>
</tr>
<tr>
<td>800 TO 1000'</td>
<td>500</td>
<td>96</td>
</tr>
<tr>
<td>500 TO 600'</td>
<td>700</td>
<td>72</td>
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<tr>
<td>400 TO 500'</td>
<td>800</td>
<td>46</td>
</tr>
<tr>
<td>200 TO 400'</td>
<td>1200</td>
<td>24</td>
</tr>
</tbody>
</table>

NOTES:

- TYPICAL JOINTED RAIL PATTERN

- TYPICAL END PATTERN

- TYPICAL CENTER PATTERN

LOCATION OF RAIL ANCHOR (YY)

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

DESIGNER PE STAMP
RAILPROS
B. SMITH
W. PREY

ENGINEERING STANDARD DRAWINGS

APPLICATION OF ANCHORS TO CONTINUOUS WELDED RAIL

REV. DATE DESCRIPTION REV/ EDN DESIGNER RE STAMP

REVISIONS
DRAWN
CHECKED
RECOMMENDED
SANDAG ENGINEER
DATE
DES. ENG.
DATE
DRAWN
RECOMMENDED
CHECKED

MISCELLANEOUS ENGINEERING STANDARDS AND DRAWINGS FOR SANDAG ARE APPROVED ONLY FOR THE PURPOSE OF BID ESTIMATING PURPOSE.

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NONE

ENGINEERING STANDARD DRAWINGS

APPLICATION OF ANCHORS TO CONTINUOUS WELDED RAIL

REV. DATE DESCRIPTION REV/ EDN DESIGNER RE STAMP

REVISIONS
DRAWN
CHECKED
RECOMMENDED
SANDAG ENGINEER
DATE
DES. ENG.
DATE
DRAWN
RECOMMENDED
CHECKED

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NONE

ENGINEERING STANDARD DRAWINGS

APPLICATION OF ANCHORS TO CONTINUOUS WELDED RAIL

REV. DATE DESCRIPTION REV/ EDN DESIGNER RE STAMP

REVISIONS
DRAWN
CHECKED
RECOMMENDED
SANDAG ENGINEER
DATE
DES. ENG.
DATE
DRAWN
RECOMMENDED
CHECKED

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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 side 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.

**Diagram:**
- 200' wood ties
- 24 transition ties
- 10'-0" wood ties with tie plates @ 19 2/3 centers
- Concrete ties
- Box anchor application for continuously welded transition from wood to concrete ties

**Notes:**
- Anchors shall be applied at 10' centers.
- End pattern rail anchors

**Location of rail anchor (typ)"
**NOTES:**

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

### TRACK BOLT AND NUT

**OVAL NECK TRACK BOLTS**

| NUT | 35 | 64 | 1 | 25 | 64 | 33 | 64 | 1 | 7 | 32 | 1 | 3 | 16 | 1 | 2 | 1 | 16 | 2 | 1 | 18 | 2 |
|-----|----|----|---|----|----|----|----|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1  | 1/8 | 1/2 | 1  | 1/8 | 1/2 | 1  | 1/8 | 1/2 | 1  | 1/8 | 1/2 | 1  | 1/8 | 1/2 | 1  | 1/8 | 1/2 | 1  | 1/8 | 1/2 | 1  | 1/8 | 1/2 |
| 1  | 1/8 | 1/2 | 1  | 1/8 | 1/2 | 1  | 1/8 | 1/2 | 1  | 1/8 | 1/2 | 1  | 1/8 | 1/2 | 1  | 1/8 | 1/2 | 1  | 1/8 | 1/2 | 1  | 1/8 | 1/2 |
| 1  | 1/8 | 1/2 | 1  | 1/8 | 1/2 | 1  | 1/8 | 1/2 | 1  | 1/8 | 1/2 | 1  | 1/8 | 1/2 | 1  | 1/8 | 1/2 | 1  | 1/8 | 1/2 | 1  | 1/8 | 1/2 |
| 1  | 1/8 | 1/2 | 1  | 1/8 | 1/2 | 1  | 1/8 | 1/2 | 1  | 1/8 | 1/2 | 1  | 1/8 | 1/2 | 1  | 1/8 | 1/2 | 1  | 1/8 | 1/2 | 1  | 1/8 | 1/2 |
| 1  | 1/8 | 1/2 | 1  | 1/8 | 1/2 | 1  | 1/8 | 1/2 | 1  | 1/8 | 1/2 | 1  | 1/8 | 1/2 | 1  | 1/8 | 1/2 | 1  | 1/8 | 1/2 | 1  | 1/8 | 1/2 |

**DIMENSION TABLE (INCHES)**

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<thead>
<tr>
<th>WEIGHT AND SECTION OF RAIL</th>
<th>THREADS</th>
<th>BODY</th>
<th>HEAD</th>
<th>NECK</th>
<th>NUT</th>
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<tbody>
<tr>
<td></td>
<td>D1</td>
<td>L1</td>
<td>A1</td>
<td>N1</td>
<td>R1</td>
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<tr>
<td>80 lb. ASCE</td>
<td>3/4</td>
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<tr>
<td>75 lb. CS &amp; CS Rev.</td>
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<td>2</td>
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<td>1/4</td>
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<tr>
<td>95 lb. ASCE</td>
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<td>2</td>
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<tr>
<td>90 lb. ANA-B</td>
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<td>2</td>
<td>9</td>
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<td>110 lb. RE</td>
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<td>112 lb., 115 lb., 131 lb. RE</td>
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<td>2</td>
<td>9</td>
<td>1/4</td>
<td>1/4</td>
</tr>
<tr>
<td>115 lb. RE, 130 lb. RE</td>
<td>3/4</td>
<td>2</td>
<td>9</td>
<td>1/4</td>
<td>1/4</td>
</tr>
</tbody>
</table>

**NOTES:**

- WEIGHT AND SECTION OF RAIL
- FOR MATERIAL SPECIFICATIONS, COMPOSITION, AND TESTING SEE AREMA VOLUME 1, CHAPTER 5, PART 2.
**STANDARD DRAWINGS**

**ENGINEERING STANDARD DRAWINGS**

**SWITCH ROD CLIPS AND BOLTS**

---

**SPECIFICATIONS:**

- Cast steel clips
- Right and left-hand
- Right hand shown

**TRANSIT CLIP**

- Drill 2 - 5/8" Dia. holes
- 9/16" R
- Form here for 109G R.E.
- Drill 4 holes 1/8" O.A.

**OPEN SIDE JAW CLIP**

- Drill 1 - 1 3/8" Dia. hole
- Do not core

**TRANSIT CLIP**

- Drill 1 - 1 3/8" Dia. hole
- Do not core

**BOLTS FOR SWITCH RODS AND CLIPS**

- 1/4" X 1/2"
- 1/4" X 3/8"
- 1/4" X 1/2"
- 1/2" X 2"

**BOLTS FOR SWITCH POINTS AND CLIPS**

- 1/4" X 1/2"
- 1/4" X 3/8"
- 1/4" X 1/2"
- 1/2" X 2"

**NOTES:**

1. All bolts to be grade 8 turned bolts with cut threads.
2. Drill 5/8" Dia. hole for 5/8" spring cotters as shown.
3. Slotted nut shown to be American Standard Heavy Semi-Finished.

**NOTE:**

The bolt to be used for replacing loose rivets on switches formerly furnished with transit clips riveted to switch points.
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.
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 SPINE: 1.1 LBS.
5. SCREW SPIKES TO BE PACKED 10 TO A BAG.

INSTALLATION INSTRUCTIONS:
1. PRE-DRILL WOOD TIES WITH 5/16" DIA. DRILL BIT TO A DEPTH OF 5 1/2".
2. PRE-DRILLED HOLES MUST BE PERPENDICULAR WITH BASE PLATE.
3. USING A 5/16" SOCKET AND AN IMPACT WRENCH, SCREW IN UNTIL SNUG.
## Fastclip for Concrete Tie Assemblies for Various Rail Combinations

### Fastclip for Concrete Tie Assemblies

**Combination 116 Re Rail and 136 lb Rail**

<table>
<thead>
<tr>
<th>ITEM NO</th>
<th>PART NO</th>
<th>DESCRIPTION</th>
<th>COLOR</th>
<th>QTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>10216</td>
<td>Rail Clip Assy - FT003 Clip / 7695 Tie Insulator</td>
<td>BLUE</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>9086</td>
<td>FASTCLIP TWIN-STEM SHOULDER</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>11458</td>
<td>Side Post Insulator - 0.726&quot; Thick Post</td>
<td>BLUE</td>
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</tr>
<tr>
<td>4</td>
<td>11549</td>
<td>Rail Pad</td>
<td></td>
<td>1</td>
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<tr>
<td>5</td>
<td>11459</td>
<td>Side Post Insulator - 0.430&quot; Thin Post</td>
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<td>6</td>
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<td>3</td>
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<tr>
<td>7</td>
<td>7692</td>
<td>Standard Side Post Insulator</td>
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<tr>
<td>8</td>
<td>7083</td>
<td>Rail Pad Assembly</td>
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<td></td>
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</tbody>
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**Combination 136 Re Rail and 136 lb Rail Concrete Tie**

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<th>ITEM NO</th>
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<th>QTY</th>
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<td>Rail Clip Assy - FT003 Clip / 7695 Tie Insulator</td>
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<td>2</td>
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<td>FASTCLIP TWIN-STEM SHOULDER</td>
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<td>4</td>
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<tr>
<td>3</td>
<td>7692</td>
<td>Standard Side Post Insulator</td>
<td>NUETRAL</td>
<td>4</td>
</tr>
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<td>4</td>
<td>7083</td>
<td>Rail Pad Assembly</td>
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<td>2</td>
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</tbody>
</table>

**Combination 141 Lb Rail and 136 lb Rail Concrete Tie**

<table>
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<th>PART NO</th>
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<th>COLOR</th>
<th>QTY</th>
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<tr>
<td>1</td>
<td>10216</td>
<td>Rail Clip Assy - FT003 Clip / 7695 Tie Insulator</td>
<td>NUETRAL</td>
<td>4</td>
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<td>2</td>
<td>9086</td>
<td>FASTCLIP TWIN-STEM SHOULDER</td>
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<td>7692</td>
<td>Standard Side Post Insulator</td>
<td>NUETRAL</td>
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<tr>
<td>4</td>
<td>7083</td>
<td>Rail Pad Assembly</td>
<td></td>
<td>2</td>
</tr>
</tbody>
</table>

### Notes
1. For Rail Pad Details, see ESD-2366.
2. For Tie Insulator Details, see ESD-2366.
3. For Rail Clip Details, see ESD-2366.
4. For the Insulators Details, see ESD-2366.
5. All components for the Assemblies to be furnished, type or equivalent as approved by the Director of Engineering.
6. All Part Numbers Listed on the Drawing Correspond to Panel Brand Components and are Subject to Change.
7. For Concrete Tie Details and Finish Pattern, see ESD-2360.
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 3/4" 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.

ELEVATION

PLAN

JOINT "E" CLIP

NOTES:

3/8" S. GAP REQUIRED TO MAINTAIN ELECTRICAL ISOLATION AND PREVENT CLIP FROM ABRADING INSULATION AT INSULATED JOINTS.
RAIL CLIP SHALL BE PANDROL TYPE 2055 OR APPROVED EQUAL USED WITH "PANDROL" TYPE OR EQUIVALENT ROLLED STEEL TIE PLATES FOR RAIL WITH 5½ OR 6" BASE.

1. TWO CLIPS REQUIRED FOR INSTALLATION OF EACH TIE PLATE.
2. CLIPS SHALL BE DRIVEN TO FULLY INSERT STRAIGHT PART OF ANCHOR INTO PLATE, AND CURVED TO BE FULLY OUTSIDE PLATE.

NAME OR BRAND OF MANUFACTURER AND LAST TWO DIGITS OF YEAR MANUFACTURED TO BE ROLLED IN RAISED LETTERS.
CONCRETE TIE PADS FOR 5-1/2" & 6" RAIL BASE
SIDEPOST INSULATOR FOR FASTCLIP

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

SIDEPOST INSULATED FOR FASTCLIP

NTS

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

NOTES:
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SIDEPOST INSULATED FOR FASTCLIP

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

SIDEPOST INSULATED FOR FASTCLIP

NTS

1. SIDEPOST INSULATOR SHALL BE PANDROL TYPE OR APPROVED EQUAL.
2. APPROX WEIGHT 1.4 OZ.
1. RAIL FASTCLIP SHALL BE PANDROL TYPE FC 1601 OR APPROVED EQUAL.
NOTES:
1. APPROX. WEIGHT: 1 Lb 8 Ozs

FASTCLIP WITH TOE INSULATOR

NTS

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

NOTES:

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

- APPROXIMATE WEIGHT IS 24 LBS
- PLATE SHOULD BE MANUFACTURED FROM DUCTILE IRON

**Notes:**

1. APPROXIMATE WEIGHT IS 24 LBS
2. PLATE SHOULD BE MANUFACTURED FROM DUCTILE IRON
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: 0.58-0.90, MANGANESE: 0.7-1.1, SILICON: 0.5 MAXIMUM.

RAIL BASE SIZE

A

6"

5.625"

6.125"

MIN.

A +.125" ; - .000"

.587"  +.01" ; -.005"

5

1

2
### Engineering Standard Drawings

**8'-3" Bottom Pad Tie (FASTCLIP)**

**For Use on Bridge Decks**

**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

**Designer PE Stamp**

RAILPROS
B. SMITH
B. SCHMITH

**Notes:**

1. Concrete compressive strength using 4" cylinder or 28 day cube ≥ 2000 psi 3.0 ksi
   Transfer window ≥ 4300 psi 31.0 ksi

2. Any entrained concrete to be used in contact with the tie shall be 2000 psi 3.0 ksi

3. The rail seat shall be a flat smooth surface

4. Gaging points for placement and alignment between rail seat and tie not to exceed 1/16" between these points.

5. See appropriate rail pattern drawing for pipe and stressing details (ESD-2402)

6. End of prestressing wire to be cut off within 1/4" of the surrounding concrete to the tie ends.

7. Ties to be manufactured in accordance with customer supplied specifications and/or accepted practices

8. This tie is designed to provide track gauge using rail and the fastening components listed herein. The cut-off/slit gaging dimension is calculated to provide the gage retracted assuming normal dimensions for rail pads, insulators, and rail to determine if this is the case. Section and rail seat utilization are those found by experience to be achievable and satisfactory in practice.

9. Rail fastening information:

   - Cast in components
   - Gage dimensions:
   - End view:

10. Rail seat cast-in gage (0.144" ± 0.063")

11. Approximate weight of tie: 810 lbs

12. This tie to only be used on bridge decks with less than 1/8" of ballast

**Engineer Check and/or Construction Inspection Required**

**Drawing No.:** ESD-2403

**Scale:** 1:50

**Contract Sheet No.:** NONE

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**Revision History:**

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<tr>
<th>Rev</th>
<th>Date</th>
<th>Description</th>
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<td>5/5/16</td>
<td>Designer PE Stamp</td>
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**Engineering Standard Drawings**

**Drawing No.:** ESD-2403

**Scale:** 1:50

**Contract Sheet No.:** NONE
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

DESIGNER PE STAMP
RAILPROS
B. SMITH
B.SCHMITH

CONCRETE TIE - 18" INNER GUARD RAIL

NOTES:
1. CONCRETE STRENGTH (USING CYLINDER STRENGTH) 28 DAY SPECIFIED = 1000 PSI
   TRANSFER NUMBER = 4000, PSI
2. GAUGE LENGTH = 100 ± .5
3. THE ELEVATION SHALL BE A FLAT, SMOOTH SURFACE 20.04" (510mm)
4. APPROPRIATE WEIGHT OF THE TIE END USED IN TRANSFERMENT CONCRETE
5. FOR DIMENSIONS, ACCEPTABLE DIMENSIONS OR CONCRETE TIES SELECTED TO BE WITHIN 1/16" OF CALCULATED
   DIMENSION AT A HEIGHT OF 3/4" above the rail seat surface. Giving 0" of CONCRETE
   IS 3/4" & 0.01"
6. THE TIE IS DESIGNED FOR USE WITH 150 UB 53, RAIL. THE TIE WILL ALSO ACCOMMODATE
   THE 150 UB 53, 73, 101, LG 53, RB, LG 73, RB, WITH MINOR CHANGES TO ACHIEVE
   CORRECT GAGE (SEE ESD-2408 FOR DETAILS CONCERNING RAIL AND RAIL TIES)
7. PRECAST TIEMOUTH IS A 5/8" STEEL (DEF) STEEL TIE MOUTH, THE TIE MOUTH IS TIED WITH A STRENGTH CAPACITY OF 8500#
   (55KN) AND OTHER REQUIREMENTS CONFORMING WITH ASTM A-474 (STEEL TIE MOUTH RECOMMENDED FOR PRECASTED CONCRETE RAILING TIES)
8. THE TIE IS DESIGNED TO BE CUT OFF TO WITHIN 1/16" OF SURROUNDING CONCRETE
9. AN ENTRAINED CONCRETE TO BE USED, ANY CONTENT TO BE 5 1/4" 3/8" C-PLASTIC
   CONCRETE
10. TIES TO BE CUT OFF USING RADIUS DIMENSION FOR TIE IS CALCULATED TO PROVIDE
    THE GAUGE INDICATED. ALLOWABLE DIMENSIONS FOR RAIL PATHS, INJERTIONS AND
    RAIL TIES ARE SHOWN SPECIFIED AND GAUGE RAIL INFORMATION IS FOUND BY
    EXPERIENCE TO BE ACHIEVABLE AND SATISFACTORY IN PRACTICE
11. TIES TO BE MANUFACTURED IN ACCORDANCE WITH ACCEPTED PRECAST CONCRETE
    PRACTICE FOR PRECASTED CONCRETE
12. FASTENING SYSTEM TO BE APPROVED BY ENGINEER OF RECORD
13. GUARD RAIL FASTENINGS:
   PM 332 INSERT 8.5" - 4 UNC Thread
   VARIOUS TIE SPRING RAILS
   HEAVY HEAT 5/8" - 8 UNC D.B.T.
   CUT 1/8" D.R. EXCEPT FOR EQUIVALENT
14. FINISH PATTERN SHALL BE EASY TO USE TIES AND EMBOSSED INTO BOTTOM OF TIES.
15. GUARD RAIL MUST BE SLOPER THAN OR EQUAL TO RAIL HEIGHT TO RUNNING RAIL, DO NOT USE
   SMALLER THAN 150 UB 53, GUARD RAIL SECTION WITH 101 LG 53, LG RUNNING RAIL, DON'T USE
   SMALLER THAN 150 UB 53, GUARD RAIL SECTION WITH REF RAILING RAIL
16. ADD ALL NOTES TO DRAWING DETAILS ON DRAWING SHEET NO. 5, 000
17. SEE ESD-2407 FOR DETAILS ON INSIDE GUARD RAIL PLATES FOR CONCRETE TIES.

SHAPE LOCATION DETAIL

SECTION THROUGH RAIL TIE (PRECAST ARE NOT SHOWN)

SHOULDER LOCATION DETAIL

CONCRETE TIE - 18" INNER GUARD RAIL

ENGINEERING STANDARD DRAWINGS
DRAWING NO.: ESD-2406
DRAWING SHEET NO.: 1 OF 1

SCALE: NONE

CONTRACT SHEET NO.

REV. DATE DESCRIPTION REV. PUB.

DESIGNER PE STAMP

NORTH COUNTY TRANSIT DISTRICT
819 Mission Avenue
Carksdale, CA 92054
www.gonctd.com
NOTES:
1. ALL SQUARE SPIKE HOLES SHALL HAVE 30° FILLETS IN CORNERS.
2. ESTIMATED WEIGHTS:
   - PER FOOT: 31.04 lb.
   - PER 7 3⁄4" FAB 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.
NOTES:
1. ALL SQUARE SPIKE HOLES SHALL HAVE 3/8" FILLETS IN CORNERS.
2. ESTIMATED WEIGHTS:
   - PER FOOT 34.77 lb.
   - PER 1/2" 21.47 lb.
   - PUNCHED 8 SPIKE HOLES 20.65 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.

PLAN

ELEVATION
PLATE TO BE STANDARD PANDROL TYPE OR APPROVED EQUAL TIE PLATE MODIFIED FOR 1" DIA. HOLES.

PLATE TO BE INSTALLED WITH 2 EACH RAIL FASTENING CLIP PER ESD-2362.

PLATE TO BE INSTALLED WITH 4 EACH SCREW SPIKES PER PLATE PER ESD-2355-02.

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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3. PLATE TO BE INSTALLED WITH 4 EACH SCREW SPIKES PER PLATE PER ESD-2365-02.

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

NOTES:

SECTION

PLAN

FOR USE WITH SCREW SPIKES

STANDARD ROLLED STEEL TIE PLATE FOR 6" BASE RAIL

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

METHOD SEAL AND STAMP

RAILPROS
B. SMITH
W. PREY

WATERMARK DRAWING

ENGINEERING STANDARD DRAWINGS

DRAWING NO.
ESD-2454

DRAWING SHEET NO.
1 OF 1

SCALE.
NONE

CONTRACT SHEET NO.

REVISIONS

DRAW.

DATE

5/27/15

DES.

ENG.

RECOMMENDED

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CONTRACT SHEET NO.
NOTES:

1. TIE PLATE SPIKING FOR PLATES WITH HOLD-DOWN SPIKE HOLES.
   • FIGURE A - TANGENT AND CURVES TO 2º/0 - 4 SPIKES REQUIRED, 2 LINE AND
   2 HOLD-DOWN
   • FIGURE C - CURVES 2º/0 TO 4º/0 INCLUSIVE - 5 SPIKES REQUIRED, 3 LINE
   AND 2 HOLD-DOWN
   • FIGURE D - CORRIDORS OVER 4º/0 - 6 SPIKES REQUIRED, 4 LINE AND
   2 HOLD-DOWN

2. TIE PLATE SPIKING FOR PLATES WITHOUT HOLD-DOWN SPIKE HOLES.
   • FIGURE B - CURVES TO 4º/0 INCLUSIVE - 3 SPIKES REQUIRED
   • FIGURE E - CURVES OVER 4º/0 - 4 LINE SPIKES REQUIRED

3. TIE PLATE SPIKING FOR PANDROL TYPE FASTENING SYSTEMS FIGURE G,
   4 SCREW SPIKES REQUIRED

4. ANY VARIATIONS IN THE SPIKING PATTERNS ILLUSTRATED IN FIGURES A
   THRU F MUST BE APPROVED BY THE ENGINEER.

5. YARD AND INDUSTRY TRACK TO BE SPIKED WITH NOT LESS THAN TWO SPIKES
   TO EACH TIE PLATE.

6. 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.
1. RAILS, JOINT BARS AND TRACK BOLTS SHALL CONFORM TO AREMA'S CURRENT SPECIFICATION.
2. REQUISITIONS AND ORDERS FOR TRACK BOLTS SHALL DESIGNATE DIAMETER OF BOLT.
3. LENGTH OF TRACK BOLT SHALL PERMIT USE OF SPRING WASHER UP TO APPROXIMATELY 0.70" THICK.
4. ALL BOLT HOLES SHALL BE CHAMFERED.

NOTES:

- ALL BOLT HOLES SHALL BE CHAMFERED.
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NOTE: ALL BOLT HOLES SHALL BE CHAMFERED.
NOTES:
1. RAIL 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 0.170" THICK.
4. ALL BOLT HOLES SHALL BE CHAMFERED.

rail END DRILLING

DETAIL OF HEAD EASEMENT

LONGITUDINAL SECTION OF JOINT BAR

JOINT BAR PUNCHING

(FRONT VIEW)

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

AMERICAN STANDARD ROLLED THREADS
THE TYPE OF HOLES IN COMPROMISE BARS ARE AS SHOWN BELOW.

ON ACCOUNT OF VARIOUS RAIL DRILLINGS FOR SECTIONS OTHER THAN SHOWN, RECOMMENDATIONS AND ORDERS FOR COMPROMISE JOINTS FOR SUCH OTHER RAIL SMALL SHOW DIMENSIONS FOR R.E. (L.H. AND R.H. FOR HEAVIER RAIL AND D, G, L, M, N, AND P FOR THE LIGHTER RAIL.

BOLTS FOR COMPROMISE JOINTS ARE SAME AS FOR CORRESPONDING STANDARD JOINT BARS.

THE LEFT HAND SIDE, IT IS A LEFT HAND JOINT. ONE RIGHT HAND AND ONE RIGHT HAND SIDE, IT IS A RIGHT HAND JOINT AND WHEN HEAVIER RAIL IS ON VARIOUS RAIL DRILLINGS FOR SECTIONS OTHER THAN SHOWN, RECOMMENDATIONS AND ORDERS FOR COMPROMISE JOINTS FOR SUCH OTHER RAIL SMALL SHOW DIMENSIONS FOR R.E. (L.H. AND R.H. FOR HEAVIER RAIL AND D, G, L, M, N, AND P FOR THE LIGHTER RAIL.

THE LEFT HAND SIDE, IT IS A LEFT HAND JOINT. ONE RIGHT HAND AND ONE RIGHT HAND SIDE, IT IS A RIGHT HAND JOINT AND WHEN HEAVIER RAIL IS ON.

NOTES

1. THIS PLAN SHOWS GENERAL INFORMATION FOR COMPROMISE JOINTS THE ENGINEER WILL ALLOW FOR MAINTENANCE ONLY.

2. TO DETERMINE RIGHT HAND OR LEFT HAND JOINT STAND BETWEEN RAILS IN THE TRACK, FACING RAILS TO BE JOINED. WHEN HEAVIER RAIL IS ON THE RIGHT HAND SIDE, IT IS A RIGHT HAND JOINT AND WHEN HEAVIER RAIL IS ON THE LEFT HAND SIDE, IT IS A LEFT HAND JOINT. ONE RIGHT HAND AND ONE RIGHT HAND SIDE, IT IS A RIGHT HAND JOINT AND WHEN HEAVIER RAIL IS ON.

3. EACH BAR TO BE MARKED WITH THE FOLLOWING STAMPED IN DATA:

4. ON ACCOUNT OF VARIOUS RAIL DRILLINGS FOR SECTIONS OTHER THAN SHOWN, RECOMMENDATIONS AND ORDERS FOR COMPROMISE JOINTS FOR SUCH OTHER RAIL SMALL SHOW DIMENSIONS FOR R.E. (L.H. AND R.H. FOR HEAVIER RAIL AND D, G, L, M, N, AND P FOR THE LIGHTER RAIL.

5. BOLTS FOR COMPROMISE JOINTS ARE SAME AS FOR CORRESPONDING STANDARD JOINT BARS.

6. THE TYPE OF HOLES IN COMPROMISE BARS ARE AS SHOWN BELOW:

7. FOR NEW CONSTRUCTION TRANSITION RAILS ARE REQUIRED.
NOTES:

1. INSULATED JOINT PLUGS SHALL MEET OR EXCEED CURRENT AREMA SPECIFICATION. CHARTER
   PART 3. ONLY ALLEGHENY BONDED INSULATED JOINTS OR APPROVED EQUAL WILL BE
   ACCEPTED.

2. INSULATED JOINT PLUGS SHALL BE MANUFACTURED NEW HEAD HARDENED RAIL.
   INSULATED JOINTS SHALL BE INSTALLED AS SHOWN IN PLAN OR AS DIRECTED. GOOD
   USABLE SECOND-HAND HEAD HARDENED RAIL WITH MAXIMUM
   " HEADLOSS MAY BE USED
   FOR JOINTS MANUFACTURED FOR " HEADWEAR.

3. 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.

4. ALL HOLES SHALL BE CHAMFERED.

5. 1' ARM HUCK BOLTS WITH STAGGERED PATTERN SHALL BE FURNISHED.

6. WHEN NECESSARY, 1 3/8" GRADE 8 BOLTS WITH SECURITY LOCKNUTS, LUBRICATED AND
   TORQUED TO 850 FOOT LBS. MAY BE SUBSTITUTED FOR HUCK BOLTS.

7. INSULATED JOINT PLUGS TO BE MANUFACTURED AND CURLED IN A CONTROLLED ENVIRONMENT
   AT THE MANUFACTURER'S PLANT. NO FABRICATION OF INSULATED JOINT PLUGS IN THE FIELD
   WILL BE ACCEPTED. AFTER WORKING OR BOLTING, MANUFACTURED 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 (12) AND YEAR (20XX) WHERE JOINTS WERE FABRICATED.

8. MANUFACTURER SHALL MARK A BALANCE POINT ON THE HEAD OF RAIL FOR HANDLING.

9. INSULATED JOINT PLUGS SHALL BE CENTERED BETWEEN TIE CRIBS WHEN INSTALLED.

10. SUPPLIERS OF MATERIAL SHOWN ON TRACK STANDARD DRAWINGS SHALL FORMAL SUBMIT
    THEIR SHOP DRAWINGS TO THE ENGINEER FOR APPROVAL. MATERIAL SHIPPED WITHOUT
    WRITTEN APPROVAL FROM THE ENGINEER WILL NOT BE ACCEPTED.

11. PREFABRICATED JOINTS OF OTHER LENGTHS AS SPECIFIED MAY BE REQUIRED IN TURNOUTS.

12. ONLY TOELESS JOINT BARS ARE TO BE USED, FASTENED WITH SHAVED E-CLIPS FOR INSULATED
    JOINTS.
1. **ARRANGEMENT OF POINT DERAIL AND DEFLECTING RAILS**

**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 NO, AND OF FOREIGN LINE, CREATION, MOVING ENGINES OR CARS TO MOVE TOOLS OF MAIN TRACK, OR DINING OR OTHER TRACKS.
   - **(B)** INDUSTRY TRACKS, WHERE AN INDUSTRY CAN MOVE CARS TO CREATE A HAZARDOUS SITUATION.
   - **(C)** SPURS AND OTHER TRACKS ON WHICH CARS ARE LEFT UNATTENDED AND THE UNAUTHORIZED MOVEMENT OF SUCH CARS MAY FOUL MAIN TRACK OR SIGNS EXCEPT WHERE TRACK GRADE ASCENDS TOWARDS MAIN TRACK OR SIGNS AT GREATER THAN 2 DEGREES. GRADE, TO 4 DEGREES, GRADIENT.
   - **(D)** OTHER LOCATIONS, REGARDLESS OF GRADE, WHERE SPECIAL CONDITIONS REQUIRE DERAIL PROTECTION AND SUCH PROTECTION IS SPECIFIED IN THE ENGINEERING STANDARDS OF THE ENGINEER, OR WHERE THERE IS A POTENTIAL HAZARD TO THE ENVIRONMENT OR A POTENTIAL HAZARD TO 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 SPECIFIED IN THE ENGINEERING STANDARDS OF THE ENGINEER.
   - **(F)** ANY TRACK, USED FOR LOADING, UNLOADING OR STORAGE OF CARS CONTAINING HAZARDOUS MATERIALS, 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 OTHER MECHANICAL CLOSURES TO THE TRACK, USED FOR LOADING, UNLOADING OR STORAGE OF CARS CONTAINING HAZARDOUS MATERIALS, 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 OTHER MECHANICAL CLOSURES TO THE TRACK.

2. **ALL NEW INSTALLATIONS DERAILS AS OUTLINED ABOVE SHALL BE THE SINGLE POINT TYPE.** EXISTING HAYES TYPE DERAILS ARE AUTHORIZED EXCEPT:
   - **(A)** ON PIECES OF CURVES OVER 8 DEGREES.
   - **(B)** ON TRACKS WHERE AN UNCONTROLLED CAR COULD REACH EXCESSIVE SPEED (5 MPH).
   - **(C)** ON TRACKS WHERE A DERAIL MUST REMAIN INSTALLED TO PROTECT AGAINST THE MOVEMENT OF ENGINES OR TRAINS.
   - **(D)** AT OTHER LOCATIONS DESIGNATED BY THE ENGINEER.

3. **DOUBLE POINT DERAIL PER ESD-2604 ARE REQUIRED FOR:**
   - **(A)** LOCATIONS WHERE UNCONTROLLED MOVEMENT CAN EXCEED 20 MPH.
   - **(B)** LOCATIONS WHERE UNCONTROLLED MOVEMENT CAN EXCEED 15 MPH.
   - **(C)** LOCATIONS WHERE UNCONTROLLED MOVEMENT CAN EXCEED 10 MPH.
   - **(D)** AT OTHER LOCATIONS DESIGNATED BY THE ENGINEER.

4. **90° OR DOUBLE DIRECTION DERAILS ARE NOT AUTHORIZED EXCEPT:**
   - **(A)** LOCATIONS WHERE UNCONTROLLED MOVEMENT CAN EXCEED 20 MPH.
   - **(B)** LOCATIONS WHERE UNCONTROLLED MOVEMENT CAN EXCEED 15 MPH.
   - **(C)** LOCATIONS WHERE UNCONTROLLED MOVEMENT CAN EXCEED 10 MPH.
   - **(D)** AT OTHER LOCATIONS DESIGNATED BY THE ENGINEER.

5. **DEFLECTOR CASTINGS AND DEFLECTING RAILS ARE NOT REQUIRED WITH HAYES TYPE DERAILS EXCEPT AT LOCATIONS WHERE GRADE CONDITIONS MAY CAUSE CARS TO CONTINUE MOVEMENT AFTER BEING DERAILLED.**

6. **INSIDE DEFLECTING RAIL AND SHORT RAIL BEHIND DEFLECTOR CASTING WILL BE SINGLE SPIKED DUE TO PATH OF MOVEMENT OF A POTENTIAL HAZARD TO LIVE ENGINES AND WHERE AN UNAUTHORIZED MOVEMENT OF THE ENGINES COULD FOUL MAIN TRACK.**

7. **FOR DETAILS OF DEFLECTOR CASTING, STRAPS AND TIES SEE ESD-2603.**

8. **FOR DETAILS OF CONNECTING RODS FOR HAYES DERAIL AND ONE PIECE LINK FOR POINT DETAILS SEE ESD-2602.**

9. **SEE ESD-2610 FOR DERAIL SIGN WHERE REQUIRED.**

10. **EXPOSED ENDS OF STOCK RAIL AND DEFLECTING RAILS SHALL BE CUT AND WELDED TO END TAPER DETAILS PER ESD-2604.**

11. **HAND OPERATED DERAILS ARE ILLUSTRATED, HOWEVER POWER OPERATED DERAILS WILL BE INSTALLED AS DIRECTED.**
CONNECTING RODS FOR HAYES SLIDING DEPARTURES

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 DEPART.

SECTION A-A
OPEN

POSITION OF CONNECTING ROD WHEN DEPART IS IN THE OPEN POSITION

SECTION A-A
CLOSED

POSITION OF CONNECTING ROD WHEN DEPART IS IN THE CLOSED POSITION

ONE PIECE LINK BETWEEN POINT DEPART & CONNECTING ROD

CONNECTING RODS FOR HAYES SLIDING DEPARTS

ASSEMBLY

TRANSIT CLIP BOLT SQ. HD. HEX. NUT. SPRING WASHER AND SPRING COTTER

1/4" CLIP BOLT 3/4" 7/16" DIA. HOLE FOR 75lb. 80lb. & 90lb. RAIL

1/4" CLIP BOLT 1" DIA. HOLE FOR 110lb. TO 136lb. RAIL

TRANSIT CLIP BOLT SQ. HD. HEX. NUT. SPRING WASHER AND SPRING COTTER

1/4" CLIP BOLT 3/4" 7/16" DIA. HOLE FOR 75lb. 80lb. & 90lb. RAIL

1/4" CLIP BOLT 1" DIA. HOLE FOR 110lb. TO 136lb. RAIL

PROVIDE MINIMUM CLEARANCE OF 8'-6" FROM C.L. TRACK TO SWITCH STAND, PER CALIFORNIA PUBLIC UTILITIES COMMISSION.

REVISIONS

DRAWN
RAILROADS

CHECKED B. SMITH
RECOMMENDED W. PREY

DEPICTOR PE STAMP

RAILPROS

B. SMITH

W. PREY

ENGINEERING STANDARD DRAWINGS

DRAWING NO.: ESD-2602

SCAL: NONE

DRAWING SHEET NO.: 1

CONTRACT SHEET NO.

NORTH COUNTY TRANSIT DISTRICT
810 Mission Avenue
Oceanside, CA 92054
www.gonctd.com
DOUBLE POINT DERAIL LAYOUT

STEP 1

CUT RAIL BASE AND WEB AS SHOWN

STEP 2

HEAT AND BEND BALL OF RAIL AND WELD TO WEB

END TAPER FOR DERAILS

(Scale: None)

1. FOR DETAILS NOT SHOWN, REFER TO ESD-2921.
2. 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.
**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, an parallel to the gauge line of the rail.**

2. **The graduated teeth must be against the corner of the tie or tie plate. On the gauge 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 derail.**

---

**Incorrect Installation**

![Incorrect Installation Diagram]

**Correct Installation**

![Correct Installation Diagram]

**IF THE DERAIL HAS BEEN INVOLVED IN A DERAILMENT, DO NOT USE IT AGAIN.**
DERAILING SWITCH TARGET
(SEE NOTES)

1-3/8" " 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.

TARGET
11/32" DIA. HOLES (TYP.)
CENTERLINE OF HOLES
SAW CUT AT TOP

TARGET (ALTERNATE)

TUBULAR TARGET ROD

SQUARE TARGET ROD

DERAIL SWITCH TARGET

RED

1/4" X 3/4" BOLT (BOLT A)

1/4" TARGET ROD

LOCK WASHER

TARGET ROD (1/2" O.D., 1" I.D.)

1" X 1/4" TARGET ROD

CUTTER

LOCK WASHER

TARGET

SPECIAL SADDLE WASHER

3/4" RUBBER STRIP 1" WIDE

PLATE WASHER

FIBRE WASHER

TARGET PLATE WASHER

TARGET ROD

SPECIAL SADDLE WASHER

1/4" X 3/4" BOLT (BOLT A)

SPECIAL SADDLE WASHER

1/4" TARGET ROD

LOCK WASHER

TARGET

1" SQUARE

3/4" RUBBER STRIP 1" WIDE

PLATE WASHER

FIBRE WASHER

TARGET PLATE WASHER

TARGET ROD

SPECIAL SADDLE WASHER

1/4" X 3/4" BOLT (BOLT A)

SPECIAL SADDLE WASHER

1/4" TARGET ROD

LOCK WASHER

TARGET

1" SQUARE

3/4" RUBBER STRIP 1" WIDE

PLATE WASHER

FIBRE WASHER

TARGET PLATE WASHER

TARGET ROD

SPECIAL SADDLE WASHER

1/4" X 3/4" BOLT (BOLT A)

1/4" TARGET ROD

LOCK WASHER

TARGET

1" SQUARE

3/4" RUBBER STRIP 1" WIDE

PLATE WASHER

FIBRE WASHER

TARGET PLATE WASHER

TARGET ROD
DERAIL

MATERIAL SPECIFICATIONS:

SIGNS:
- For Mill Finish Aluminum Panel, Alcoa 6016-T6 or Equal
- Panel All Sides With Linear Polyurethane. Color face of panel with engineered-grade, pressure-sensitive retro-reflective white vinyl sheeting. Silk-screen legend with black ink. Finish with exterior grade pressure sensitive clear dope. 3M 1165 or Equal Exposed Portions of Panel to be Also Be Painted with M. T. Red and White Paint to Have a Coat of Coal Tar Applied Hot to 6" Above Ground.

STEEL POSTS:
- 12 Gauge (.105 thick) 2.42 lbs per Linear Foot Square Steel Tube (ASTM A-36) With 3/8" Mounting Holes, All Galvanized In Accordance With ASTM A-386.

STEEL ANCHORS:
- 12 Gauge (.105 thick) 2.42 lbs per Linear Foot Square Steel Tube (ASTM A-36) With 3/8" Mounting Holes, All Galvanized In Accordance With ASTM A-386.

TEXT STYLE:
- Text to be "Arial Bold" per Standard ESD 1212.

HARDWARE:
- All Hardware to Be Vandal Resistant.
- Bolts: 5/16" x 3 1/2" Long Aluminum Carriage Bolts, 2024-T4 Alloy, (For Sign)
- Bolts: 5/16" x 5 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.

ENGINEERING STANDARD DRAWINGS

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

DESIGNER PE STAMP
RAILPROS
B. SMITH
W. PREY

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

DERAIL SIGN

DERAIL

5/27/15

RAILROAD

CHECKED

W. PREY

RECOMMENDED

DES. ENG.

DATE

RECUR.

DESCRIPTION

DES. ENG.

DATE

RECUR.

DESCRIPTION

DES. ENG.

DATE

RECUR.

DESCRIPTION

DES. ENG.

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DESCRIPTION

DES. ENG.

DATE

RECUR.

DESCRIPTION

DES. ENG.

DATE

RECUR.

DESCRIPTION

DES. ENG.
MATERIAL SPECIFICATIONS:

SIGNS:
- 3" THICK MILL FINISH ALUMINUM PANEL, ALCOA 6016-T6 OR EQUAL.
- PAINT ALL SIDES WITH LINEAR POLYURETHANE COLOR FACE OF PANEL, WITH 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.

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.

ENGINEERING STANDARD DRAWINGS

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

NORTH COUNTY TRANSIT DISTRICT
511 Mission Avenue
Oceanside, CA 92054
www.goncatd.com

ENGINEERING STANDARD DRAWINGS

DRAWING NO.: ESD-2612
DRAWING SHEET NO.: 1 OF 1
SCALE: NONE

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

NORTH COUNTY TRANSIT DISTRICT 811 Mission Avenue Oceanside, CA 92054 www.goncatd.com

DESIGNER PE STAMP RAILPROS B. SMITH W. PREY

OF REV. DATE DESCRIPTION

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

NORTH COUNTY TRANSIT DISTRICT 811 Mission Avenue Oceanside, CA 92054 www.goncatd.com

DESIGNER PE STAMP RAILPROS B. SMITH W. PREY
INSTALLATION REQUIREMENT NOTES:
1. CROWDER WITH SLIDING DERRAIL SHOWN. WHEEL CROWDER STROKE IS 5/8" WITH 3/4" DIAMETER PINS.
2. PANTY-SAFETY YELLOW PAINT.
3. TIE PLATE SHOWN TO BE ATTACHED TO CROWDER, ADJUST SWITCH STAND AND CROWDER, OR USE CROWDER CROWDER POINT CONTACTS WITH THE RAIL.
4. MAKE SURE THAT YOUR CROWDER STAND IN HEAD BLOCKS TIES THAT THE CROWDER ARE HIGH QUALITY.
5. READ THE MANUFACTURER'S INSTRUCTIONS.
6. PLACE THE CROWDER TIGHTLY AGAINST THE RAIL.
7. SPAY BOTH RAILS TO THE TIES AT THE PROPER GAUGE.
8. FASTEN THE CROWDER AND CROWDER THROUGH ALL THE SCREW HOLE DRILL HOLES TO PREVENT THE TIES FROM BEING PULLED OUT.
9. HAVE GOOD DRAINAGE AND BALLAST, THE AREA UNDER THE CROWDER MUST BE PULLED TO PREVENT BINDING IN ADVERSE WEATHER CONDITIONS.

INSTALLATION OF CROWDER NOTES:
1. PLACE THE CROWDER TIGHTLY AGAINST THE WEB OF THE RAIL.
2. RAIL CROWDER MOUNTING BOLT HOLES TO BE MATCHED FROM THE RAIL CRUCIAL, AND BOLTED DOWN IN THE FIELDS.
3. USE THE WEB SET SCREWS TO ADJUST AND MAINTAIN PROPER HOLE CROWDER POINT CONTACTS WITH THE RAIL.
4. WITH BOTH RAIL AND WHEEL CROWDER SECURED AND IN DERRAILING POSITION. ATTACH THE CONNECTING ROD TO THE LEFT LUG ON THE CROWDER. THEN CONNECT TO THE CROWDER THROUGH THE REVERSING CRANK MECHANISM ON THE BOLTS 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 HANDBALLLUG ON THE CROWDER. ADJUST THE THROW ON YOUR THROW STAND TO A 5/8" THROW. A SHORTER THROW WILL GIVE YOU PRESSURE ON THE CONNECTING ROD OR SWITCH STAND. EYE EYE. PRESSURE ON THE EYE AND CONNECTING ROD CAN RESULT IN A FAILURE OF THAT CROWDER.
6. PLACE COTTER KEYS TO SECURE THE NUTS.
7. INSTALL A SWITCH LOCK.

BILL OF MATERIAL

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<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>HAVE DERRAIL HDG &amp; SS G/W CROWDER</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>36E SWITCH STAND WITH TARGET &amp; BALL HANDLE SCREW STANDARD TARGET</td>
</tr>
<tr>
<td>1</td>
<td>3</td>
<td>TIE HARDWOOD TREATED, 8&quot; x 12&quot; x 14'-0&quot;</td>
</tr>
<tr>
<td>1</td>
<td>4</td>
<td>TIE PLATE DP-158</td>
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<tr>
<td>1</td>
<td>5</td>
<td>SCREW SPIKE 1-1/4&quot; x 6&quot;</td>
</tr>
<tr>
<td>1</td>
<td>6</td>
<td>BOLT HEX 1&quot; x 4&quot; OR 8</td>
</tr>
<tr>
<td>1</td>
<td>7</td>
<td>NUT HEX HEV 1&quot; OR 8</td>
</tr>
<tr>
<td>1</td>
<td>8</td>
<td>WASHER SPING 1&quot;</td>
</tr>
<tr>
<td>1</td>
<td>9</td>
<td>CUP PANDROL 10250 RH GALVANIZED</td>
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NO. 8 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-2911-10.
3. ALL INSULATED JOINTS ARE TO BE ADHESIVE BONDED PREFABRICATED INSULATED JOINTS PER ESD-2359 UNLESS OTHERWISE SPECIFIED.
4. ALL MATERIALS REQUIRED FOR HAND-ON MACHINE OPERATED SWITCH OPERATION WILL BE FURNISHED PER REQUIREMENTS OF THE ENGINEER.
5. MATERIALS AND WORKMANSHIP, AS AND CONSTRUCTION DETAILS NOT SHOWN, SHALL BE PER CURRENT AREMA "TAMUH AND FORMITY" UNLESS OTHERWISE SPECIFIED.
6. WHERE REQUIRED, ALL IDENTIFICATION SYMBOLS TO BE PLAINLY STAMPED.
7. CAGE PLATES WILL BE FURNISHED INSULATED. SWITCH HOODS 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 THOSE 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 CROSSOVER IDENTIFICATION ON SHEET ESD-2911-10 MUST ALSO BE SUPPLIED. THE MATERIALS FOR A "CROSSOVER COMPLETE" IS IDENTIFIED ON SHEET ESD-2911-03.
10. THE PLATES SHALL CONFORM TO ENGINEERING STANDARD ESD-2911.
12. MANUFACTURER SHALL SUBMIT TWO COPIES OF SHOP DRAWINGS TO THE ENGINEER FOR APPROVAL PRIOR TO FABRICATION OF TURNOUT/SHOP DRAWINGS THAT CHANGE DETAILS OF THOSE STANDARDS MUST CLEARLY SPECIFY SUCH PROPOSED CHANGES.
13. 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 CROSSOVER IDENTIFICATION ON SHEET ESD-2911-10 MUST ALSO BE SUPPLIED. THE MATERIALS FOR A "CROSSOVER COMPLETE" IS IDENTIFIED ON SHEET ESD-2911-03.
14. FOR LOCATION OF INSULATED JOINTS FOR NO. 8 TURNOUT AND CROSSOVER, SEE DRAWING NO. ESD-2911-10.
15. THE 16" X 6" SWITCH POINTS, MADE FROM 60# RAIL, FABRICATED INSULATED JOINTS WILL BE SCRAPPED INTO WOOD (NOT DRIVED).
17. ALL INSULATED JOINTS ARE TO BE ADHESIVE BONDED PREFABRICATED INSULATED JOINTS PER ESD-2359 UNLESS OTHERWISE SPECIFIED.
18. THE TOLERANCE FOR SPACING OF SWITCH TIES 6 1/4" RELATIVE TO ADJACENT TIES AND 3 1/4" RELATIVE TO CONTINUOUS DIMENSION FROM THE POINT OF SWITCH (PS).
19. FOR SWITCH/MACHINE LAYOUT REFER TO ESD-2911-02.

BILL OF MATERIAL

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<td>1 EA</td>
<td>16'-0&quot; EXTENDED FILE-WELDED TYPE SWITCH POINTS 5/8&quot; X 2&quot;</td>
</tr>
</tbody>
</table>
SWITCH PLATES

1. EACH PLATE TO BE PLAINLY STAMPED WITH PLATE NO. AND 136 (WEIGHT OF RAIL) AND HAND OF TURNOUT (R.H. OR L.H.).

2. THE HEEL - ON PRESSURE STEEL SHOULDER, MADE FROM MILD STEEL, TO BE PURCHASED FROM SANDAG INTERNATIONAL OR APPROVED ALTERNATE MEETING FABRICATION SPECIFICATIONS.

3. SHOULDER AND STEPS ARE TO BE CAREFULLY WELDED TO PLATE. NO WELD SHALL PROJECT OUTSIDE THE AREA OF THE RAIL SEAT. ANY WELD PROJECTING BEYOND THE VERTICAL EDGE OF THE UNWELDED FOURTH SIDE OF THE STOP SHOULDER MUST BE MACHINED OUT TO PROVIDE A CLEAR RAIL SEAT DIMENSION AS CALLED FOR.

4. THE PRESSURE STEEL SHOULDER MUST BE CAREFULLY WELDED TO THE PLATE, AND WELD PROJECTING OUTSIDE THE VERTICAL EDGE OF THE 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. 8 RIGHT HAND TURNOUT FOR A 136 LB. R.H. T.O. THE PLATES AS SHOWN ARE ONLY AN EXAMPLE ONLY. USING SHEET ESD-2911-02 AS A GUIDE, PAINT EACH PLATE WITH AN ARROW Pointing Toward Switch Point.

6. DIRECTION OF ARROW SHOWN IS AN EXAMPLE ONLY. USING SHEET ESD-2911-02 AS A GUIDE, PAINT EACH PLATE WITH ARROW POINTING TOWARD SWITCH POINT.

7. DIMENSIONS AS CALLED FOR.

8. ELECTRODE 1 5/32 INCH, WELDING SPEC. 7018XLM.

9. END DETAIL - BOTH ENDS

10. HOLD DOWN CLIPS FOR PLATES P-10 THRU P-15

11. HOLD DOWN CLIPS FOR PLATES P-16 THRU P-26

12. END DETAIL - BOTH ENDS

13. DIMENSIONS AS CALLED FOR.

14. PRINT MARK ARROW SEE NOTE 6

15. PROVIDE CLEAR DIMENSION CALLED FOR.

16. SEE NOTE 6

17. SEE NOTE 5

18. WEIGH RAIL & GAGE PLATES FG-1P THRU FG-3P ARE TO BE OPPOSITE.

19. THE PRESSED STEEL SHOULDER MUST BE CAREFULLY WELDED TO THE PLATE.

20. 8" turnouts are to be used with 2 - S-7P PLATES REQUIRED AS SHOWN.

21. 16" turnouts are to be used with 4 - S-5P-RH PLATES REQUIRED AS SHOWN FOR R.H. T.O.

22. 3'-2" turnouts are to be used with 16 - S-4P PLATES REQUIRED AS SHOWN.

23. 4" turnouts are to be used with 8 - S-8P & S-9P PLATES REQUIRED AS SHOWN.

24. 6" turnouts are to be used with 4 - S-7P PLATES REQUIRED AS SHOWN.

WELDING SPECIFICATIONS:

1. SET PRESSURE STEEL SHOULDER FLUSH AGAINST SIDE OF RAIL OR SHOULDERS OF MOUNTED PLATE AS SHOWN AND WELD WITH 1 5/32" X 1" DIA. WELD.

2. STOP PLATE FOR ADJUSTABLE RAIL BRACE TO BE SET FLUSH WITH SHOULDER OF MOUNTED PLATE AS SHOWN AND WELD WITH 1 5/32" X 1" DIA. WELD.

3. SHOULDER AND STEPS ARE TO BE CAREFULLY WELDED TO PLATE. NO WELD SHALL PROJECT OUTSIDE THE AREA OF THE RAIL SEAT. ANY WELD PROJECTING BEYOND THE VERTICAL EDGE OF THE SHOULDER MUST BE MACHINED OFF TO PROVIDE CLEAR DIMENSION CALLED FOR.

4. FOR WELDING PRESSURE STEEL SHOULDER OR PLATES STOP ADJUSTABLE USE THE FOLLOWING:

   A. ELECTRODE 1 5/32 INCH WELDING SPEC. 7018XLM.

   B. ELECTRODE 2 1/8 INCH WELDING SPEC. 7018XLM.

   C. ELECTRODE 3 5/32 INCH WELDING SPEC. 7018XLM.

   D. ELECTRODE 4 3/16 INCH WELDING SPEC. 7018XLM.

   E. ELECTRODE 5 1/8 INCH WELDING SPEC. 7018XLM.

   F. ELECTRODE 6 5/32 INCH WELDING SPEC. 7018XLM.

   G. ELECTRODE 7 1/16 INCH WELDING SPEC. 7018XLM.

   H. ELECTRODE 8 1/4 INCH WELDING SPEC. 7018XLM.

   I. ELECTRODE 9 3/8 INCH WELDING SPEC. 7018XLM.

   J. ELECTRODE 10 1/2 INCH WELDING SPEC. 7018XLM.

   K. ELECTRODE 11 5/8 INCH WELDING SPEC. 7018XLM.

   L. ELECTRODE 12 3/4 INCH WELDING SPEC. 7018XLM.

   M. ELECTRODE 13 1 1/4 INCH WELDING SPEC. 7018XLM.

   N. ELECTRODE 14 1 3/4 INCH WELDING SPEC. 7018XLM.

   O. ELECTRODE 15 2 1/4 INCH WELDING SPEC. 7018XLM.

   P. ELECTRODE 16 2 3/4 INCH WELDING SPEC. 7018XLM.

   Q. ELECTRODE 17 4 1/2 INCH WELDING SPEC. 7018XLM.

   R. ELECTRODE 18 4 1/2 INCH WELDING SPEC. 7018XLM.

   S. ELECTRODE 19 6 1/2 INCH WELDING SPEC. 7018XLM.

   T. ELECTRODE 20 6 1/2 INCH WELDING SPEC. 7018XLM.

   U. ELECTRODE 21 8 1/2 INCH WELDING SPEC. 7018XLM.

   V. ELECTRODE 22 8 1/2 INCH WELDING SPEC. 7018XLM.

   W. ELECTRODE 23 10 1/2 INCH WELDING SPEC. 7018XLM.

   X. ELECTRODE 24 10 1/2 INCH WELDING SPEC. 7018XLM.

   Y. ELECTRODE 25 12 1/2 INCH WELDING SPEC. 7018XLM.

   Z. ELECTRODE 26 12 1/2 INCH WELDING SPEC. 7018XLM.

   AA. ELECTRODE 27 14 1/2 INCH WELDING SPEC. 7018XLM.

   BB. ELECTRODE 28 14 1/2 INCH WELDING SPEC. 7018XLM.

   CC. ELECTRODE 29 16 1/2 INCH WELDING SPEC. 7018XLM.

   DD. ELECTRODE 30 16 1/2 INCH WELDING SPEC. 7018XLM.

   EE. ELECTRODE 31 19 1/2 INCH WELDING SPEC. 7018XLM.

   FF. ELECTRODE 32 19 1/2 INCH WELDING SPEC. 7018XLM.

   GG. ELECTRODE 33 22 1/2 INCH WELDING SPEC. 7018XLM.

   HH. ELECTRODE 34 22 1/2 INCH WELDING SPEC. 7018XLM.

   JJ. ELECTRODE 35 25 1/2 INCH WELDING SPEC. 7018XLM.

   KK. ELECTRODE 36 25 1/2 INCH WELDING SPEC. 7018XLM.

   LL. ELECTRODE 37 28 1/2 INCH WELDING SPEC. 7018XLM.

   MM. ELECTRODE 38 28 1/2 INCH WELDING SPEC. 7018XLM.

   NN. ELECTRODE 39 31 1/2 INCH WELDING SPEC. 7018XLM.

   OO. ELECTRODE 40 31 1/2 INCH WELDING SPEC. 7018XLM.

   PP. ELECTRODE 41 34 1/2 INCH WELDING SPEC. 7018XLM.

   QQ. ELECTRODE 42 34 1/2 INCH WELDING SPEC. 7018XLM.

   RR. ELECTRODE 43 37 1/2 INCH WELDING SPEC. 7018XLM.

   SS. ELECTRODE 44 37 1/2 INCH WELDING SPEC. 7018XLM.

   TT. ELECTRODE 45 40 1/2 INCH WELDING SPEC. 7018XLM.

   UU. ELECTRODE 46 40 1/2 INCH WELDING SPEC. 7018XLM.

   VV. ELECTRODE 47 43 1/2 INCH WELDING SPEC. 7018XLM.
RAILBOUND MANGANESE STEEL FROG
WITH PANDROL® ED PLATES
R.H. TURNOUT SHOWN - LH OPPOSITE PLATE ORIENTATION.

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

SCALE: NONE

DETAIL OF FROG CASTING (REAL PT.)

RAIL END DRILLING

TYPICAL PLATE PUNCHING DETAIL

NOTES.

1. 45° ANGLE 7'-0"/10'.

2. RAIL USED TO FABRICATE FROG IS TO BE 136 LB. HIGH STRENGTH.


4. ALL FROG PLATES SHALL BE STAMPED IN 1" CHARACTERS TO INDICATE MFG., FROG NO., R.H., REAL SECTION AND PLATE NUMBER. MARK TO BE STAMPED ON SAME END OF ALL FROG PLATES.

5. FOR DETAILS OF FROG PLATES FP-1 THRU FP-4 AND PCP-1 THRU PCP-3 SEE SHEET ESD-2911-09. FOR PLATES P-21, P-22 AND P-27 THRU P-30 SEE SHEET ESD-2911-04.

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 PRACTICES.

8. FROG PLATES ARE DESIGNED TO BE INSTALLED PERPENDICULAR TO MAIN TRACK.

9. BODY BOLTS 1/2" 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. PLATES TO BE MADE OF MILD ROLLED STEEL.

12. 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.

13. THE WELD-ON PRESSURE STEEL SHOULDER, MADE OF MILD ROLLED STEEL, TO BE PURCHASED FROM FABRICATIONS INTERNATIONAL OR APPROVED ALTERNATE MANUFACTURING FACTORY MANUFACTURED. MUST BE MANUFACTURED IN ACCORDANCE WITH STANDARD PRACTICES AND SPECIFICATIONS AS CALLED FOR AND APPROVED BY GENERAL MANAGER.

14. MANUFACTURER OF FROG PLATES SHALL COMPLETE FROG TO VERIFY LOCATION OF ADJUSTABLE CLAMPS ON FROG PLATES FD-1, FD-2 AND FD-3 TO INSURE PROPER FIT. FROG PLATES WILL BE WELDED TO THE GAGE PLATES IN THE FIELD WITH A 3 PASS 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.

15. GUARD RAIL PLATES ARE TO BE INSTALLED AND WELDED TO THE FROG GAGE PLATES IN THE FIELD WITH A 3 PASS 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.

16. IDENTIFICATION TAG WITH RAISED METAL CHARACTERS TO BE APPLIED WHICH WILL STATE: WEIGHT OF RAIL, FROG NO., MANUFACTURER AND YEAR MANUFACTURED.

17. RAIL ENDS TO BE CUT AT 45° DEGREE ANGLE AT JOINT WITH FROG CASTING.

WELDING OF GAGE PLATE & GUARD RAIL:

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 BRACKETS AND SECURE TO FROG AND GUARD RAIL WITH PANDROL® CLIPS.

4. CHECK TRACK GAGE AND CORRECT IF NECESSARY.

5. CAREFULLY WELD FROG PLATE AND GUARD RAIL PLATE TO FROG GAGE PLATES WITH 2 PASS, 7/16" + FILLET WELD, FOR WELDING USE THE FOLLOWING: A. 3/16 INCH, WELDING SPEC. 7018XLM. C. WIRE, 3/32 INCH, WELDING ELECTRODE, 3/16" DIA. WELDING SPEC. 7118M. C. WIRE, 3/32" DIA. WELDING ELECTRODE. MUST HAVE 3/16" RADIUS OR BEVELLED 1/2" BACK, 3/16" DOven.

6. MANG. MUST BE GROUNDED TO FIT SLOE OF RAIL HEAD FOR THE ENTIRE LENGTH OF CASTING.

7. MARK TO BE STAMPED ON SAME END OF ALL FROG PLATES.

REFERENCE DWGS


2. FROG GAGE PLATES IN PANDROS - ESD-2911-04

3. RAISED GUARD RAIL PLATES - 136 lb. - ESD-2911-07
STAMP PLATE WITH PROPER PLATE NUMBER AND WEIGHT OF RAIL

1" DIA. (4) HOLES
WELD-ON SHOULDER (2 - TYP.)

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

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

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

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

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

DIMENSION TABLE

<table>
<thead>
<tr>
<th>PLATE</th>
<th>L&quot;</th>
<th>NO. REQ'D</th>
</tr>
</thead>
<tbody>
<tr>
<td>FCP-3</td>
<td>3/4&quot;</td>
<td>1</td>
</tr>
<tr>
<td>FCP-3</td>
<td>2/2&quot;</td>
<td>1</td>
</tr>
</tbody>
</table>

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

DESIGNER PE STAMP
RAILPROS
B. SMITH
W. PREY

ENGINEERING STANDARD DRAWINGS
NO. 8 STANDARD TURNOUT - FROG PLATES

drawing sheet no. 9 of 15

scale: N 1/15

contract sheet no. NONE

NOTES:

1. ENGINEERING STANDARD DRAWINGS ARE INTENDED FOR GUIDANCE ONLY. ALL WORK TO BE PERFORMED IN CONFORMITY WITH THE REQUIREMENTS OF THE CONTRACT DOCUMENTS. DRAWINGS ARE NOT TO BE REPRODUCED OR DISTRIBUTED IN ANY FORM OR MANNER WITHOUT THE PRIOR WRITTEN PERMISSION OF THE CONTRACTORS.

REV.
DATE
DESCRIPTION
DES. ENG.
DRAWN
RECOMMENDED
CHECKED

8/6/2012

2/2/15

RAILPROS
NOTES:
1. INFORMATION OR DIMENSIONS NOTED THUS "E", TO BE FURNISHED BY FIELD FOR CORRECT ORDERING OF REPLACEMENT STOCK RAILS.
2. "D" - 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.
5. BEND ANGLE IN BENT STOCK RAIL TO BE AS FOLLOWS:

<table>
<thead>
<tr>
<th>Se. Length</th>
<th>BEND ANGLE</th>
<th>V (Vertex Dist.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>16'-6&quot;</td>
<td>1° - 4° - 11 1/2° F - 2 1/2° F</td>
<td>15 5/16&quot;</td>
</tr>
</tbody>
</table>

STOCK RAILS ARE SHOWN FOR "RIGHT HAND TURNOUT"
SPECIFY WHETHER PLAIN POINT OR MANGANESE STEEL INSERT ARE TO BE FURNISHED.

SIDE VIEW SWITCH POINT

NOTES:

1. SWITCH POINTS TO BE MADE FROM NEW HIGH STRENGTH RAIL.

2. LEFT HAND POINT SHOWN, MAKE OPPOSITE HAND FOR RIGHT HAND SWITCH POINTS.

3. SIDE PLANING FIGURED ON GAGE LINE 7/8" BELOW TOP OF RAIL.

4. MATERIALS AND WORKMANSHIP, ALSO ANY CONSTRUCTION DETAILS NOT SHOWN, SHALL BE PER CURRENT A.A.E. MANUAL, AND PORT/FILE, UNLESS OTHERWISE SPECIFIED ON THIS PLAN.

5. 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 PUMP WITH CHIEFTAIN BRAND OR SIMILAR, ON EDGE OF BOLT HOLES TO BE CAREFULLY REMOVED BY GRINDING BEFORE PEENING.

6. THE FOLLOWING MATERIALS B. SMITH INCL. FOR THE TERMS SHOWN IF ANY PART IS TO BE OMITTED, REQUIREMENTS AND ORDERS SHALL STATE SEPARATELY WHAT IS OMITTED. "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".

7. THE CONTOUR PLANING SHALL BE ON THE GAGE SIDE BEGINNING AT A DISTANCE OF 3FT FROM THE POINT OF SWITCH AND SHALL BE SHAPED TO THE CONTOUR OF A NEW HIGH STRENGTH RAIL AND SHALL RUN OUT AT THE CENTER LINE OF THE RAIL.

8. 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" (17'-4") R. NO. 8. TAG TO BE FASTENED TO SWITCH POINT ON GAGE SIDE OF RAIL.

9. 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 HARD RAIL END.

10. UNLESS SWITCH POINT FRONT SPECIFICALLY CALLS FOR USE OF "1/8" RIVETS AND "1/8" STOP BOLTS, MANUFACTURER CAN SUBSTITUTE .5" RACK FASTENERS. BOLT PART NO. C-50-LR-BR2416 AND COLLAR PART NO. L3-2-R-24G FOR "1/8" RACK FASTENERS, BOLT PART NO. C-50-LR-BR2424 AND COLLAR PART NO. L3-2-R-24G.

11. TURNTOUTS ARE TO BE FASTENED WITH MANGANESE STEEL INSERT ON THE OUTWARD RADIUS (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.

2015

CONTRACT SHEET NO.

REVISIONS

CHECKED

B. SMITH

RECOMMENDED

W. PREY

ENGINEERING STANDARD DRAWINGS

DRAWING NO.

E-502-2011-12

SCALE

12 OF 15

CONTRACT SHEET NO.

NONE

DATE

2/2015

DESCRIPTION

DES. WRK.

SAN DIEGO ASSOCIATION OF GOVERNMENTS

410 Mission Avenue

Oceanview, CA 92054

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NO. 8 STANDARD TURNOUT - 16'-6" SPLIT SWITCH POINT
FILLET WELDS ON TOP SIDE
STUDS WELDED INTO PLATE
STUD 7/8'' X 4 1/2'' LG
SHOULDER BOLT
BETWEEN SWITCH MACHINE FRAME AND SWITCH PLATE.

EMORY CLOTH SHALL BE INSTALLED TO PROVIDE ABRASIVE MATERIAL
BUTT WELDS ON BOTTOM SIDE
3/4'' - 10 X 1 1/2'' THD LG
7''
7''
5'-2''
7/8'' DIA. STUD
3 1/2''
1/2'' (TYP.)
13/16''

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''.

TIES SHALL BE STRAIGHT AND FREE OF CRACKS OR OTHER DEFECTS.
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
US&S SWITCH MACHINE MUST BE FURNISHED WITH FINISHED MOUNTING LUGS

14 FT. DAPPED TRAPEZOID TIE
(2 PCS. REQ'D. AS SHOWN)
NOTE:
REFERENCE DRAWINGS:
SWITCH GAGE PLATE DETAILS-ESD-2911-05
(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-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.EM.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.

DRAWING INDEX
BILL OF MATERIAL

BILL OF MATERIALS AND GENERAL NOTES
LAYOUT
CROSSOVER LAYOUT AND BILL OF MATERIALS
SWITCH AND TURNOUT PLATES
GAGE PLATES
FROG GAGE PLATES
16'-6' GUARD RAIL
RAILBOUND MANGANESE STEEL FROG
FROG PLATES
INSULATED JOINT DIAGRAM
UNDERCUT STOCK RAIL
16'-6" SPLIT SWITCH POINT
SWITCH RODS AND MISC. DETAILS (1 OF 2)
SWITCH RODS AND MISC. DETAILS (2 OF 2)
EXTENSION PLATE AND DAP TIES FOR SWITCH MACHINE

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
1 EACH

L.H. SAMSON STOCK RAILS (40'-0")
NO. 1 SMJ TYPE SWITCH ROD W/BASKET

1 EACH
3 EACH

VERTICAL SWITCH ROD WITH SMJ CLIPS
GAGE PLATE No. P-P

1 EACH

GAGE PLATE No. G-1P

1 EACH

GAGE PLATE No. G-2P

6 EACH
4 EACH

SLIDE PLATE S-8P
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
2 EACH

HEEL PLATE P-5RH

1 EACH

PLATES P-22 THRU P-29
No.10 R.B.M. FROG - 22'-6"

1 EACH
1 EACH
1 EACH

ESD-2921-01
ESD-2921-02
ESD-2921-03
ESD-2921-04
ESD-2921-05
ESD-2921-06
ESD-2921-07
ESD-2921-08
ESD-2921-09
ESD-2921-10
ESD-2921-11
ESD-2921-12
ESD-2921-13
ESD-2921-14
ESD-2921-15

TURNOUT PLATES P-10 THRU P-21

10. TIE PLATES SHALL CONFORM TO ENGINEERING STANDARD ESD-2454.

TURNOUT DATA

FROG PLATES No. FP-1 THRU FP-9

BILL OF WOOD SWITCH TIES

FROG PLATES No. FCP-1 THRU FCP-3
FROG GAGE PLATES FG-1P THRU FG-3P

FROG NO.

2 EACH
5 EACH
2 EACH

16'-0" U-69 ADJUSTABLE GUARD RAIL W/PLATES

FROG LENGTH ON MAIN TRACK

22'-6"

D.I. RAIL HOLD DOWN CLIPS E-3706
D.I. RAIL HOLD DOWN CLIPS E-3707

FROG LENGTH ON TURNOUT TRACK

22'-6"

16

7" x 9"

LENGTH OF SWITCH POINT

16'-6"

2 EACH

D.I. RAIL HOLD DOWN CLIPS E-3708

11

7" x 9"

11'-0"

635.25

SWITCH ANGLE

8

7" x 9"

12'-0"

504.00

HEEL SPREAD OF SWITCH

6 1/4"

552 PCS.

ROLLED STEEL TIE PLATES
SCREW SPIKES 15 16" DIA. X 6" No. 5760

7

7" x 9"

13'-0"

477.75

276 PCS.

RAIL CLIP (GALVANIZED)(ESD-2362)

LEAD

80'-5"

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

17. ALL E-CLIPS SHALL BE GALVANIZED.

9

7" x 9"

17'-0"

803.25


1 EACH

138 PCS.

10

11. SCREW SPIKES (15 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 9 16" DIAMETER. SCREW SPIKES SHALL BE
SCREWED INTO WOOD (NOT DRIVEN).

FROG ANGLE

RADIUS OF TURNOUT CURVE

PIECES SIZE LENGTH

742.29'

10'-0"

BOARD
FEET
840.00

8 PCS.

"E"-CLIP (GALVANIZED)(ESD-2361)

12 PCS.
1 EACH

BOLTLESS ADJUSTABLE BRACE ASSEMBLY

1 EACH

23'-6" RAIL

RADIUS OF EQUIVALENT CURVE

1 EACH

30'-2" RAIL

DEGREE OF EQUIVALENT CURVE

4 EACH

39'-0" RAIL

LENGTH OF EQUIVALENT CURVE

94.04'

TOTAL

TOTAL

1 EACH

EPOXY BONDED PREFABRICATED INSULATED JOINT (30'-4")

STRAIGHT CLOSURE

56'-11"

71

4824.75

1 EACH

EPOXY BONDED PREFABRICATED INSULATED JOINT (46'-6")

CURVED CLOSURE

57-'1"

DEGREE OF TURNOUT CURVE
CENTRAL ANGLE OF TURNOUT CURVE

19'-6" RAIL

941.70'

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.

19.

1
2" RELATIVE TO ADJACENT TIES AND 1
TO CUMULATIVE DIMENSION FROM THE POINT OF SWITCH (PS).

1

4"

RELATIVE

20. FOR SWITCH MACHINE LAYOUT REFER TO ESD-8605 OR ESD-8610.
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
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REVISIONS

DRAWN
RAILPROS

ENGINEERING STANDARD DRAWINGS

RECOMMENDED
W. PREY
REV. DATE

DESCRIPTION

DES. ENG.

ESD-2921-01
DRAWING SHEET NO.

CHECKED
B. SMITH

DATE

DRAWING NO.

5/27/15

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
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NO. 10 STANDARD TURNOUT
BILL OF MATERIALS AND
GENERAL NOTES

1 OF 15
SCALE:

NONE
CONTRACT SHEET NO.


NOTES:

1. PLATES TO BE MADE OF MILD ROLLED STEEL.

2. THE PLATES AS SHOWN ARE FOR A 136 LB., NO. 10, RIGHT HANDED OPERATED TURNOUT. FOR A LEFT HANDED 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" FIELT 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" FIELT 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.
ASSEMBLED 16'-0" GUARD RAIL

COLLECTIVE DRILLING FROM END OF GUARD BAR MARKED "X"

LAYOUT & DRILL FROM END OF GUARD BAR

STENCIL "LIFT" POINTS AS SHOWN WITH WHITE MARKER ON TOP OF BAR.
NOTES:
1. FROG ANGLE 5°-43'-28".
2. RAIL USED IN FABRICATION OF FROG TO BE 136 LB. "HIGH STRENGTH".
4. ALL FROG PLATES SHALL BE STAMPED IN 3" CHARACTERS TO INDICATE MANUFACTURER, FROG NUMBER, HAND OF TURNOUT, RAIL SECTION AND PLATE NUMBER. MAIN TO BE STAMPED ON SAME END OF ALL FROG PLATES.
5. FOR DETAILS OF FROG PLATES SEE ESD-2921-08.
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 3/16" 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

SCALE: NONE

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

DETAIL OF FROG CASTING TAKEN PT.

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DESIGNER PE STAMP
RAILPROS
B. SMITH
W. PREY

ENGINEERING STANDARD DRAWINGS
DRAWING NO. ESD-2921-08
DRAWING SHEET NO. 8 OF 15
SCALE: NONE

NO. 10 RAILBOUND MANGANESE STEEL FROG

REV. DATE DESCRIPTION
A2S DATED
5/27/15 Designer in Charge
### Diagram Descriptions

**Frog Plate - FP-1**
- 3/8" x 1" COMP. FLAT - W/PANDROL CLIPS

**Frog Plate - FP-2 & FP-3**
- 3/8" x 1" COMP. FLAT - W/PANDROL CLIPS

**Frog Plate - FP-4**
- 3/8" x 1" COMP. FLAT - W/PANDROL CLIPS

**Frog Plate - FP-5 thru FP-9**
- 3/8" x 1" COMP. FLAT - W/PANDROL CLIPS

### Dimension Table

<table>
<thead>
<tr>
<th>PLATE</th>
<th>DIM. A</th>
<th>DIM. B</th>
<th>DIM. C</th>
<th>FIN. REG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>FP-1</td>
<td>2'-0&quot;</td>
<td>2'-0&quot;</td>
<td>2'-0&quot;</td>
<td>EA</td>
</tr>
<tr>
<td>FP-2</td>
<td>2'-0&quot;</td>
<td>2'-0&quot;</td>
<td>2'-0&quot;</td>
<td>EA</td>
</tr>
<tr>
<td>FP-3</td>
<td>2'-0&quot;</td>
<td>2'-0&quot;</td>
<td>2'-0&quot;</td>
<td>EA</td>
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<tr>
<td>FP-4</td>
<td>2'-0&quot;</td>
<td>2'-0&quot;</td>
<td>2'-0&quot;</td>
<td>EA</td>
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<tr>
<td>FP-5</td>
<td>2'-0&quot;</td>
<td>2'-0&quot;</td>
<td>2'-0&quot;</td>
<td>EA</td>
</tr>
<tr>
<td>FP-6</td>
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<td>2'-0&quot;</td>
<td>2'-0&quot;</td>
<td>EA</td>
</tr>
<tr>
<td>FP-7</td>
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<td>2'-0&quot;</td>
<td>EA</td>
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<tr>
<td>FP-8</td>
<td>2'-0&quot;</td>
<td>2'-0&quot;</td>
<td>2'-0&quot;</td>
<td>EA</td>
</tr>
<tr>
<td>FP-9</td>
<td>2'-0&quot;</td>
<td>2'-0&quot;</td>
<td>2'-0&quot;</td>
<td>EA</td>
</tr>
</tbody>
</table>

### Notes

1. For frog details and notes see sheet 8.
2. The weld-on pressed steel shoulder, made from mild steel, to be purchased from Pandrol International, or approved alternate meeting Pandrol’s design specifications.
3. Plates FP-1 thru FP-4 are to be laid out and properly spaced and marked off from under frog to insure location of Pandrol shoulders or approved equal.
4. 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-2921-09.
5. See sheet 4 for welding specifications.

### Instructions
- 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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**Engineering Standard Drawings**
- Drawing No.: ESD-2921-09
- Sheet No.: 9 of 15
- Scale: None
- Contract Sheet No.

**Revisions**
- By: W. PREY
- Date: 5/27/15

**Recommended**
- By: W. PREY
- Date: 5/27/15

**Recommended by: B. SMITH**
- Date: 5/27/15

**Engineer in Charge: B. SMITH**
- Date: 5/27/15

**Design PE Stamp: RAILPROS**
NOTES:

1. THE PERMISSIBLE VARIATION IN STANDARD LENGTHS OF RAILS, TRACKS AND SWITCH POINTS IS GREATERTHAN THE NORMAL EXPANSION GAPS AT RAIL JOINTS AND THE ATTACHMENT OF RFID END POST IN INSULATED JOINTS. NO ALLOWANCE HAS BEEN MADE FOR EXPANSION GAPS AND RFID END POSTS IN COMPUTING LENGTHS OF RAILS SHOWN IN DIMENSIONS OF TURNOUT AND ALL COMPONENTS ARE FOR A THERMAL, STRESS- ADJUSTED RAIL JOINT ASSEMBLY THAT PROPERLY BONDED INSULATED JOINTS SHOWN IN THIS SHEET FOR THE FIRST TIME. IF THE RAIL JOINTS ARE TO BE FIELD-ADJUSTED TO FILL OVERAL TURNOUT DIMENSIONS, THERMAL ADJUSTMENTS, THICKNESS OF INSULAND VARIATIONS IN COMPONENT LENGTHS AS TOLERANCES OF THE RESPECTIVE KILOMETER ARE TO BE MADE ACCORDING TO SPECIFICATIONS FOR THE DISCRETION OF THE CONTRACTOR OR ENGINEER RESPONSIBLE FOR THE WORK.

2. RAIL LAYOUT SHOWN FOR TURNOUT IS TO BE USED IN ALL CASES, EXCEPT WHERE COMPROMISE JOINTS ARE REQUIRED BETWEEN THE 40'0" AND 46'6" TRACKS. GLUT joints are used in all cases. When the field welded joints are used in the CROSSOVER TRACKS. FOR A CROSSOVER ON 10'-0" TRACK CENTERS, AT A LOCATION WHERE 12'-3" RAIL WILL BE CRIBBED WITHIN 6'-0" OF THE CROSSOVER "B," THE 19'-6" RAIL SHALL BE REPLACED WITH 30'-0" RAIL. IN ADDITION TO NOTE 1, NO ALLOWANCE HAS BEEN MADE IN RAIL LENGTHS TO PROVIDE GAPS NEEDED TO MAKE FIELD WELDS. IN ADDITION TO NOTE 1, NO ALLOWANCE HAS BEEN MADE IN RAIL LENGTHS TO PROVIDE GAPS NEEDED TO MAKE FIELD WELDS.

3. 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) RAILS 39'-0" OR SHORTER SHALL BE FURNISHED WITH BOTH ENDS DRILLED PER DETAIL "A".
(C) RAILS SHORTER THAN 30'-0" SHALL BE "HEAD HARDENED" EXCEPT GUARD RAILS.

4. LOCATIONS OF INSULATED JOINTS ARE SHOWN ON TURNOUT AND CROSSOVER SHEETS. NO TOLERANCES ARE PERMISSIBLE WITHIN 6'-0", 4'-0" OR 0'-0" ALL INSULATED JOINTS AND ARE TO BE PROPERLY SQUEEZED IN CRIB AREA BETWEEN TWO RAILS LOCATED 4'-0" FROM ONE END OF INSULATED JOINT. INSULATED JOINT MUST BE CENTERED BETWEEN TWELVE FEET. FIELD WELDED JOINTS DESIGNATED "FW" SHOULD BE IN CRIB AREA BETWEEN TWO TIES LOCATED 4'-0" FROM ONE END OF INSULATED JOINT. INSULATED JOINTS SHOWN IN THIS SHEET ARE CENTERED BETWEEN 12'-3" TRACKS, AND ARE TO BE IN CRIB AREA BETWEEN TWO TIES LOCATED 4'-0" FROM ONE END OF INSULATED JOINT. INSULATED JOINTS SHOWN IN THIS SHEET ARE CENTERED BETWEEN 12'-3" TRACKS, AND ARE TO BE IN CRIB AREA BETWEEN TWO TIES LOCATED 4'-0" FROM ONE END OF INSULATED JOINT. INSULATED JOINTS SHOWN IN THIS SHEET ARE CENTERED BETWEEN 12'-3" TRACKS, AND ARE TO BE IN CRIB AREA BETWEEN TWO TIES LOCATED 4'-0" FROM ONE END OF INSULATED JOINT. INSULATED JOINTS SHOWN IN THIS SHEET ARE CENTERED BETWEEN 12'-3" TRACKS, AND ARE TO BE IN CRIB AREA BETWEEN TWO TIES LOCATED 4'-0" FROM ONE END OF INSULATED JOINT. INSULATED JOINTS SHOWN IN THIS SHEET ARE CENTERED BETWEEN 12'-3" TRACKS, AND ARE TO BE IN CRIB AREA BETWEEN TWO TIES LOCATED 4'-0" FROM ONE END OF INSULATED JOINT. INSULATED JOINTS SHOWN IN THIS SHEET ARE CENTERED BETWEEN 12'-3" TRACKS, AND ARE TO BE IN CRIB AREA BETWEEN TWO TIES LOCATED 4'-0" FROM ONE END OF INSULATED JOINT. INSULATED JOINTS SHOWN IN THIS SHEET ARE CENTERED BETWEEN 12'-3" TRACKS, AND ARE TO BE IN CRIB AREA BETWEEN TWO TIES LOCATED 4'-0" FROM ONE END OF INSULATED JOINT. INSULATED JOINTS SHOWN IN THIS SHEET ARE CENTERED BETWEEN 12'-3" TRACKS, AND ARE TO BE IN CRIB AREA BETWEEN TWO TIES LOCATED 4'-0" FROM ONE END OF INSULATED JOINT.

5. ALL RAIL FURNISHED FOR CROSSOVERS SHALL BE "HEAD HARDENED" EXCEPT GUARD RAILS.

6. ALL GUARD RAILS SHOWN IN SOLID LINES ON THIS DRAWING ARE TO BE MADE OF 3" HEEL SPREAD. (SEE NOTE 6) BOTH ENDS SHALL BE LEFT BLANK FOR WELDING IN THE FIELD.

7. INSULATED JOINTS SHALL BE SQUARE SAWCUT.
STOCK RAIL
RAIL
STR.
D
C
B
C
D
52'-0"
BENT
9'-6"
9'-6"
LENGTH
SW. PT.
FOR REPLACE. ORDERS ONLY
FOR FIRST (NEW) INSTALL.
10
NO.
T.O.
40'-0"
10'-0"
16'-6"
40'-0"
10'-0"
16'-6"
52'-0"

SECTION "A-A"

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

<table>
<thead>
<tr>
<th>SW. LENGTH</th>
<th>BEND ANGLE</th>
<th>V (VERTEX DIST.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10'-0&quot;</td>
<td>1'-46-11&quot; OR 1&quot; IN 2-9/16&quot;</td>
<td>11/2°</td>
</tr>
</tbody>
</table>

TABLE FOR REPLACES ORDERS ONLY

<table>
<thead>
<tr>
<th>LENGTHS B, C, &amp; D FOR 136 LB. RAIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>SW. PT. NO.</td>
</tr>
<tr>
<td>-------------</td>
</tr>
<tr>
<td>10'-0&quot;</td>
</tr>
<tr>
<td>16'-6&quot;</td>
</tr>
</tbody>
</table>

**STOCK RAILS SHOWN ARE FOR "LEFT HAND TURNOUT"**
ADJUSTABLE BEARING CLIP - SMJ - 1

SHIM RETAINER - T-9

ADJUSTABLE SHIM - T-6

NOTES:
1. THIS PLAN SHOWS BEARING CLIPS ASSEMBLED TO SWITCH ROD. THIS CLIP ASSEMBLY MAY BE ASSEMBLED OR DISASSEMBLED AT ANY TIME. WHEN A BEARING CLIP ASSEMBLY IS DISASSEMBLED, WINTERFIELD HARD FASTENERS NO. H.L.C. 50LR-BR24-36, WITH COLLAR NUT & SPG. LOCK WASHER IS REQUIRED TO ASSEMBLE THIS CLIP TO THE SWITCH ROD.

2. WHEN COMPLETED RODS ARE DISASSEMBLED, THIS CLIP MAY BE ASSEMBLED OR DISASSEMBLED AT ANY TIME. WHEN A BEARING CLIP ASSEMBLY IS DISASSEMBLED, WINTERFIELD HARD FASTENERS NO. H.L.C. 50LR-BR24-36, WITH COLLAR NUT & SPG. LOCK WASHER IS REQUIRED TO ASSEMBLE THIS CLIP TO THE SWITCH ROD. THIS CLIP ASSEMBLY MAY BE ASSEMBLED OR DISASSEMBLED AT ANY TIME. WHEN A BEARING CLIP ASSEMBLY IS DISASSEMBLED, WINTERFIELD HARD FASTENERS NO. H.L.C. 50LR-BR24-36, WITH COLLAR NUT & SPG. LOCK WASHER IS REQUIRED TO ASSEMBLE THIS CLIP TO THE SWITCH ROD.

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4. WHEN COMPLETED RODS ARE DISASSEMBLED, THIS CLIP MAY BE ASSEMBLED OR DISASSEMBLED AT ANY TIME. WHEN A BEARING CLIP ASSEMBLY IS DISASSEMBLED, WINTERFIELD HARD FASTENERS NO. H.L.C. 50LR-BR24-36, WITH COLLAR NUT & SPG. LOCK WASHER IS REQUIRED TO ASSEMBLE THIS CLIP TO THE SWITCH ROD. THIS CLIP ASSEMBLY MAY BE ASSEMBLED OR DISASSEMBLED AT ANY TIME. WHEN A BEARING CLIP ASSEMBLY IS DISASSEMBLED, WINTERFIELD HARD FASTENERS NO. H.L.C. 50LR-BR24-36, WITH COLLAR NUT & SPG. LOCK WASHER IS REQUIRED TO ASSEMBLE THIS CLIP TO THE SWITCH ROD.
ELEVATION OF "SMJ" CLIP ASSEMBLY FOR 39' SWITCHES
(DRAWN FOR 136 LB. RAIL - SPRING WASHER AND NUT REMOVED)

BEARING-HE-1
SHIM RETAINER-T-9 AND
ADJUSTMENT SHAFT-T-6
WASHER-RP-1000-16M
OFFSET BEARING CAP-B-6
ADJUSTABLE BEARING CLIP-SMJ-1

THIS SURFACE MUST BE 90 TO ROD

OFFSET BEARING CAP-B-1

OFFSET BEARING CAP-B-6

Adhesive BEARING UP

SPICE PLATE-ST-684

FIBRE BUSHING-B-11

FIBRE CHANNEL-C-1

FIBRE ANGLE-AP-34

BEARING-HE-1

SHARP CORNER

1/8" DIA. HOLES

1/4" DIA. HOLES

NOTES: (CONTINUED FROM ESD-2921-13)

3. TWO WIDE 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'-0" SWITCHES THE 1/8" THICK SPRING WASHER SHOULD BE REPLACED WITH A 1/4" THICK SPRING WASHER BY THE STOREKEEPER OR FIELD FORCES, TO AVOID COTTER WITHIN THE LIMITS OF SLOT IN WEB BOLTS.

4. MATERIALS AND WORKMANSHIP SHALL MEET CURRENT A.R.E.M.A. SPECIFICATIONS FOR "SPECIAL TRACKWORK" UNLESS OTHERWISE SPECIFIED.

5. VERTICAL SWITCH RODS SHALL BE PLANED STAMPED TO INDICATE SWITCH THAT ROD ASSEMBLY CAN BE USED UPON. IDENTIFICATION MARKING WILL BE AS FOLLOWS: 1-36 FOR USE ON 39'-0" SWITCHES, 132 LB. AND 136 LB. RE RAIL SECTIONS, 1-15 FOR USE ON 1'-4" TO 30'-0" SWITCHES, 115 LB., 119 LB., 131 LB., 132 LB. AND 136 LB. RE RAIL SECTIONS.

SCALE: 1" = 1'-0"

DATE 5/27/15

DRAWING SHEET NO. 32

REVISIONS

CHECKED
B. SMITH

RECOMMENDED
W. PREY

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

BEARING-HE-1
SHIM RETAINER-T-9 AND
ADJUSTMENT SHAFT-T-6
WASHER-RP-1000-16M
OFFSET BEARING CAP-B-6
ADJUSTABLE BEARING CLIP-SMJ-1

THIS SURFACE MUST BE 90 TO ROD

OFFSET BEARING CAP-B-1

OFFSET BEARING CAP-B-6

Adhesive BEARING UP

SPICE PLATE-ST-684

FIBRE BUSHING-B-11

FIBRE CHANNEL-C-1

FIBRE ANGLE-AP-34

BEARING-HE-1

SHARP CORNER

1/8" DIA. HOLES

1/4" DIA. HOLES

NOTES: (CONTINUED FROM ESD-2921-13)

3. TWO WIDE 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'-0" SWITCHES THE 1/8" THICK SPRING WASHER SHOULD BE REPLACED WITH A 1/4" THICK SPRING WASHER BY THE STOREKEEPER OR FIELD FORCES, TO AVOID COTTER WITHIN THE LIMITS OF SLOT IN WEB BOLTS.

4. MATERIALS AND WORKMANSHIP SHALL MEET CURRENT A.R.E.M.A. SPECIFICATIONS FOR "SPECIAL TRACKWORK" UNLESS OTHERWISE SPECIFIED.

5. VERTICAL SWITCH RODS SHALL BE PLANED STAMPED TO INDICATE SWITCH THAT ROD ASSEMBLY CAN BE USED UPON. IDENTIFICATION MARKING WILL BE AS FOLLOWS: 1-36 FOR USE ON 39'-0" SWITCHES, 132 LB. AND 136 LB. RE RAIL SECTIONS, 1-15 FOR USE ON 1'-4" TO 30'-0" SWITCHES, 115 LB., 119 LB., 131 LB., 132 LB. AND 136 LB. RE RAIL SECTIONS.

SCALE: 1" = 1'-0"

DATE 5/27/15

DRAWING SHEET NO. 32

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ENGINEERING STANDARD DRAWINGS
NO. 10 STANDARD TURNOUT - SWITCH RODS AND MISC.
DETAILS (2 OF 2)
FILLET WELDS ON TOP SIDE
STUDS WELDED INTO PLATE
STUD 7/8'' X 4 1/2'' LG
SHOULDER BOLT BETWEEN SWITCH MACHINE FRAME AND SWITCH PLATE.
EMORY CLOTH SHALL BE INSTALLED TO PROVIDE ABRASIVE MATERIAL
BUTT WELDS ON BOTTOM SIDE
3/4'' - 10  X 1 1/2'' THD LG
7''
7''
5'-2''
7/8'' DIA. STUD
15/16'' DIA.
10''
10''
2 1/2''
3 1/2''
9''
1 - 4''
2 - 6''
3 1/2''
3 1/2''
2 3/4''
1 1/4''
2 1/2''
25/32''
3/4'' - 10 X 1 1/2" THD LG
6''
3/4'' - 10 X 1 1/2" THD LG
1/2'' (TYP.)
13/16''
3 1/2''
7/8'' DIA. STUD
3 1/2''
3 1/2''

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".

ANALDO SWITCH MACHINE MOUNTING PLATE

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

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

DAP TIE
14 FT. DAPPED TRAPEZOID TIE
# No. 10 Spring Rail Frog Turnout on Wood Ties

## Description

There are five images present in the document, which appear to be parts of a technical drawing related to a spring rail frog turnout on wood ties. The text is not legible enough from the image to provide a detailed transcription. However, it is clear that the document includes various specifications, notes, and tables that are typical of engineering drawings. The table format suggests detailed information about the components and dimensions involved.

### Bill of Material

<table>
<thead>
<tr>
<th>Qty.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
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### Drawing Index

<table>
<thead>
<tr>
<th>Note</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Notes

1. TURNOUT TO BE FABRICATED FROM 150 L/H HEAD HARDENED RAIL, FROM POINT END TO LAST LONG SWITCH TIE.

2. LOCATION OF INSULATED JOINTS IS DETERMINED BY DRAWING NUMBER ECD-2202-15. IT WILL BEмаркetable to insulate the insulated joint in the area of a rail area in which rail is subject to a maximum 120,000 psi vertical force.

3. ALL INSULATED JOINTS ARE TO BE ADHESIVE BONDED TO THE PRE-FABRICATED INSULATED JOINTS PER ECD-2204 UNLESS OTHERWISE SPECIFIED.

### TURNOUT DATA

<table>
<thead>
<tr>
<th>Item</th>
<th>Specification</th>
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<tbody>
<tr>
<td>Frogs</td>
<td></td>
</tr>
<tr>
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<td></td>
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### Bill of Wood Switch Ties

<table>
<thead>
<tr>
<th>Pieces</th>
<th>Size</th>
<th>Length</th>
<th>Board Feet</th>
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<tbody>
<tr>
<td>5</td>
<td>10</td>
<td>24</td>
<td>27</td>
</tr>
<tr>
<td>1</td>
<td>12</td>
<td>4</td>
<td>43</td>
</tr>
<tr>
<td>1</td>
<td>14</td>
<td>6</td>
<td>67</td>
</tr>
</tbody>
</table>

### Engineering Standard Drawings

The drawing refers to engineering standard drawings, but the specific details are not provided in the image.

### Recommendations

There are several recommendations regarding the installation and use of parts, which are standard in engineering documents to ensure proper assembly and functionality.

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**San Diego Association of Governments**
**North County Transit District**

---

**Engineer Standard Drawings**

**Drawing No.: ECD-2204-15**

**Scale: 1/12**

---

**Contract No.: X**
CROSSOVER DATA

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>QTY.</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 EACH</td>
<td>EPOXY BONDED PREFABRICATED INSULATED JOINT (46'-6&quot;)</td>
<td>2 EACH</td>
</tr>
<tr>
<td>1 EACH</td>
<td>EPOXY BONDED PREFABRICATED INSULATED JOINT (40'-6&quot;)</td>
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<tr>
<td>2 EACH</td>
<td>EPOXY BONDED PREFABRICATED INSULATED JOINT (28'-6&quot;)</td>
<td>2 EACH</td>
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</tbody>
</table>

NOTES:

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

<table>
<thead>
<tr>
<th>Plate Material</th>
<th>Dimensions</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>S-4P</td>
<td>1&quot; x 8&quot; x DIM &quot;L&quot;</td>
<td>Milled - with Pandrol clips</td>
</tr>
<tr>
<td>S-5P &amp; S-7P</td>
<td>1&quot; x 8&quot; x 2'-0&quot; LG.</td>
<td>Milled - Pandrol rail, brace</td>
</tr>
<tr>
<td>S-8P &amp; S-9P</td>
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<td>Milled - Pandrol clips</td>
</tr>
<tr>
<td>S-10P &amp; S-11P</td>
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<td>Milled - Pandrol clips</td>
</tr>
<tr>
<td>S-12P &amp; S-13P</td>
<td>1&quot; x 8&quot; x DIM &quot;L&quot;</td>
<td>Milled - Pandrol clips</td>
</tr>
<tr>
<td>S-14P &amp; S-15P</td>
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<td>Milled - Pandrol clips</td>
</tr>
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<td>S-16P &amp; S-17P</td>
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<td>Milled - Pandrol clips</td>
</tr>
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<td>Milled - Pandrol clips</td>
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<tr>
<td>S-20P &amp; S-21P</td>
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<td>Milled - Pandrol clips</td>
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<tr>
<td>S-22P &amp; S-23P</td>
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<td>Milled - Pandrol clips</td>
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<tr>
<td>S-24P &amp; S-25P</td>
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<td>Milled - Pandrol clips</td>
</tr>
<tr>
<td>S-26P &amp; S-27P</td>
<td>1&quot; x 8&quot; x DIM &quot;L&quot;</td>
<td>Milled - Pandrol clips</td>
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<tr>
<td>S-28P &amp; S-29P</td>
<td>1&quot; x 8&quot; x DIM &quot;L&quot;</td>
<td>Milled - Pandrol clips</td>
</tr>
<tr>
<td>S-30P &amp; S-31P</td>
<td>1&quot; x 8&quot; x DIM &quot;L&quot;</td>
<td>Milled - Pandrol clips</td>
</tr>
</tbody>
</table>

## Switch Plates

1. Plates to be made of mild rolled steel.
2. Each plate to be plainly stamped with plate no. and 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. All welds to be made to the vertical edge of the shoulder and to the face of the rail. Any welds projecting beyond the face of the shoulder shall be machined out to provide a clear dimension as called for.
5. The plates as shown for a 136 lb. No. 10 right hand turnout. For a left hand turnout, plates shall be reversed in inclusion and frog plates and bevel groove welds.
6. 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

1. Set pressed steel shoulder flush against line of base of rail, or shoulder of milled plate as shown and weld with 2 - 3/8" x 3" weld.
2. Stop plate for adjustable rail brace to be set flush with shoulder of milled plate as shown and weld with 2 - 3/8" x 3" weld.
3. Shoulders and stops are to be carefully welded to plate. No weld shall project beyond the vertical edge of the weld. The weld shall not fill the groove of the shoulder in the area of the rail seat. Any welds projecting beyond the face of the shoulder must be machined off to provide clear dimension called for.
4. For welding pressed steel shoulders or the stop plates use the following:
   - A. Electrode 1/8" INCH. WELDING SPEC. 7016W-LMB.
   - B. Electrode 3/16" INCH. WELDING SPEC. 7014XLM.
   - C. Wire, welding 3/32 inch, NR203, 1% nickel flux core.
   - D. Wire, welding 1/16 inch, NR204, 1% nickel flux core.
   - E. Wire, welding 1/8 inch, NR206, 1% nickel flux core.
5. For properly designed shoulders made from mild steel meeting specifications, as called for by the engineer, may be used.
1. Plates to be made of mild rolled steel.
2. The weld on pressed steel shoulder, made from mild steel, to be purchased from Pandrol. Alternate, or approved alternate meeting Pandrol's design specifications.
3. The pressed steel shoulder must be carefully field 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.
4. The plates as shown for a 136 lb. No. 10 right hand hand-operated turnout. For a left hand turnout, plates to be opposite.
5. For extension plate and tap die details see sheet ESD-2922-15.

**NOTES:**

- **Paint Mark Arrow Pointing to Point of Switch**
- **Weld-on Shoulder**
- **For Insulation See Detail "A" This Sheet**
- **Welded Gage Plate**
- **Insulated Joint Assembly GP-77**
- **Gage Plate**
- **PP-136**
- **GP-1 16-6 136**
- **GP-2 16-6 136**
- **25/32" Dia. Holes in Insulator Plates & 7/32" Dia. Holes in Steel Plate**

**REFERENCE DRAWINGS**

- SHEET ESD-2922-10
- SHEET ESD-2922-15

**ENGINEERING STANDARD DRAWINGS**

- NO. 10 SPRING RAIL FROG TURNOUT - GAGE PLATES

**DESIGNER PE STAMP**

- RAILPROS
- B. SMITH
- W. PREY

**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
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 1/8" + FILLET WELD CONTINUOUS ON BOTH ENDS OF THE PLATE. PLATES ARE TO BE 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 1/8" + FILLET WELD, CONTINUOUS ON BOTH ENDS OF THE PLATE. PLATES ARE TO BE SECURED IN THE PROPER LOCATION ON THE TIE WITH PROPER ALIGNMENT.

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DESIGNER PE STAMP
RAILPROS
B. SMITH
W. PREY

ENGINEERING STANDARD DRAWINGS
DRAWING NO. ESD-2922-06
DRAWING SHEET NO. 6 OF 15
SCALE: NONE

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

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

REV. DATE DESCRIPTION

NO. 10 SPRING RAIL FROG TURNOUT - FROG GAGE PLATES
NOTES:

1. FROG ANGLE 5°-43 1/2°
2. RAIL TO BE 161 LB. HIGH STRENGTH FOR ENTIRE TURNOUT.
3. SPRING RAIL FROG PER A R.E.M.A. PLAN NO. 451-62 MODIFIED FOR 100 FT. LENGTH, PLATES CLIP FASTENERS AND BODY BOLTING SPACED.
5. A WARRIOR PLATE SHALL BE PLACED ON THE RIGID-WING RAIL NEAR THE 1/2 POINT OF FROG IN BASED OR DEEPER RAIL, THE DIRECTION OF SPRING RAIL 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 DETAIL 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" DIAMETER.
11. BODY BOLTS TO BE 3/8" DIAMETER, HEAT TREATED CARBON STEEL, GRADE 8, WITH #3 SPRING WASHER AND BEVELED HEAD-LOCK.
12. SPRING RAIL BOLTS TO BE 1/8" DIAMETER, HEAT TREATED CARBON STEEL, GRADE 8 WITH SQUARE NUTS, #3 SPRING WASHER AND BEVELED HEAD-LOCK.
13. DURING MANUFACTURING OF FROG PLATES, SET STOPS, HOLD DOWN HORN AND RIGID SIDE FOR SPRING RAIL RAIL AT 90° FROM FROG PLATE. THE FROG PLATE TO BE CENTERED ON HORN WITH SPRING RAIL AT HALF OPEN POSITION, OTHER ITEMS TO BE APPROXIMATELY CENTERED ON CENTERLINE OF SWITCH Tie.
14. SPRING ASSEMBLY WITH BOLT THROUGH RIGID AND SPRING RAIL RAIL 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.
15. THE NUMBER OF BOLTS AND BOLT SPACING FOR HOLD DOWN HORN TO BE ADJUSTED AS REQUIRED TO ALLOW CLEARANCE FOR BODY BOLTS AND OTHER FROG COMPONENTS DURING MOVEMENT OF SPRING RAIL RAIL.
16. THE TOE BLOCK TO BE CAST STEEL PER A.R.E.M.A. PLAN NO. 451-62. JOINT BAR NEXT TO SPRING WING RAIL TO BE 136 LB. HIGH STRENGTH FOR ENTIRE TURNOUT. FROG TO BE INSTALLED WITH FIELD WELDS ON MAIN TRACK (STRAIGHT) SIDE IN ALL CASES. FIELD WELDS ARE USED ON TURNOUT (CURVED) SIDE.

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.

NOTE:

ON SPRING RAIL FROGS, BOLTS TO BE INSTALLED ON RIGID-WING RAIL SIDE. DISTANCE BETWEEN TERMINALS IS SHOWN WITH "1/2 DIAMETER" OF RAIL END TO BE DRILLED OUTSIDE TWO HOLES OF JOINT BAR. DRILLING WITH TWO HOLES IN RIGID RAIL TO BE USED INSTEAD OF SHOULDER BOLT. MANUFACTURER MAY SUBSTITUTE SPRING ASSEMBLY WITH BOLT THROUGH RIGID AND SPRING RAIL RAIL TO BE USED INSTEAD OF A R.E.M.A. SPRING BOX. SUBSTITUTE HOLD DOWN HORN FOR SPRING BOX. RAIL TO BE 136 LB. HIGH STRENGTH FOR ENTIRE TURNOUT. FROG TO BE INSTALLED WITH FIELD WELDS ON MAIN TRACK (STRAIGHT) SIDE IN ALL CASES. FIELD WELDS ARE USED ON TURNOUT (CURVED) SIDE.

NOTE: PER ESD-2502.

RAIL END TO BE DRILLED OUTSIDE TWO HOLES OF JOINT BAR OR ESD-2502. WHY DETERMINED. HOLD DOWN HORNS AND SPRING BOX FOR SPRING WING RAIL TO BE ADJUSTED AS REQUIRED TO ALLOW CLEARANCE FOR BODY BOLTS AND OTHER FROG COMPONENTS DURING MOVEMENT OF SPRING RAIL RAIL. HORN AND CAST STEEL, TOE BLACK BOLTS TO BE 1/2" DIAMETER, HEAT TREATED CARBON STEEL, GRADE 8 WITH SQUARE NUT, #3 SPRING WASHER AND BEVELED HEAD-LOCK.

DRAWING SHEET NO.

ENGINEERING STANDARD DRAWINGS

DRAWING NO.

SCALE

NOTES:

1. SPRING RAIL FROG PER A R.E.M.A. PLAN NO. 451-62 MODIFIED FOR 100 FT. LENGTH, PLATES CLIP FASTENERS AND BODY BOLTING SPACED.
3. FROG ANGLE 5°-43 1/2°
4. RAIL TO BE 161 LB. HIGH STRENGTH FOR ENTIRE TURNOUT.

CHECKED

SAND

ENGINEERING STANDARD DRAWINGS

DRAWING SHEET NO.

ENGINEERING STANDARD DRAWINGS

DRAWING NO.

SCALE

NOTES:

1. SPRING RAIL FROG PER A R.E.M.A. PLAN NO. 451-62 MODIFIED FOR 100 FT. LENGTH, PLATES CLIP FASTENERS AND BODY BOLTING SPACED.
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CHECKED

SAND

ENGINEERING STANDARD DRAWINGS

DRAWING SHEET NO.

ENGINEERING STANDARD DRAWINGS

DRAWING NO.

SCALE

NOTES:

1. SPRING RAIL FROG PER A R.E.M.A. PLAN NO. 451-62 MODIFIED FOR 100 FT. LENGTH, PLATES CLIP FASTENERS AND BODY BOLTING SPACED.
3. FROG ANGLE 5°-43 1/2°
4. RAIL TO BE 161 LB. HIGH STRENGTH FOR ENTIRE TURNOUT.
### Dimension Table

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<tr>
<th>Plate</th>
<th>Dim &quot;L&quot;</th>
<th>Dim &quot;M&quot;</th>
<th>Dim &quot;N&quot;</th>
<th>Dim &quot;PLTS REGD&quot;</th>
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</thead>
<tbody>
<tr>
<td>F-2</td>
<td>2'-8&quot;</td>
<td>2'-9&quot;</td>
<td>3'-6&quot;</td>
<td>8 EA.</td>
</tr>
<tr>
<td>F-3</td>
<td>2'-9&quot;</td>
<td>3'-1&quot;</td>
<td>6&quot;</td>
<td>8 EA.</td>
</tr>
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**Note:**
- FOR NOTES AND FROG LAYOUT SEE ESD-2922-08.
## Stock Rails for "Right Hand Turnout"

STOCK RAILS SHOWN ARE FOR "RIGHT HAND TURNOUT"

<table>
<thead>
<tr>
<th>SW. LENGTH</th>
<th>BEND ANGLE</th>
<th>V (VERTEX DIST.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10'-0&quot;</td>
<td>1' def-1 1/2&quot; or 1 3/8&quot;</td>
<td>10°/10°</td>
</tr>
</tbody>
</table>

## Stock Rails for "Left 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 "E", per Section "A-A", length "C" and "D" for new Samson switch installations or replacement orders see Table below.

<table>
<thead>
<tr>
<th>Sw. Pt. Length</th>
<th>T.O. No.</th>
<th>Stock Rail</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>End Drill for Replacement Only</th>
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</thead>
<tbody>
<tr>
<td>10'-0&quot;</td>
<td>10</td>
<td>STRT</td>
<td>9'-6&quot;</td>
<td>10'-0&quot;</td>
<td>40'-0&quot;</td>
<td>NONE</td>
</tr>
<tr>
<td>10'-0&quot;</td>
<td>10</td>
<td>BENT</td>
<td>9'-6&quot;</td>
<td>10'-0&quot;</td>
<td>34'-0&quot;</td>
<td>NONE</td>
</tr>
</tbody>
</table>

### Bend Angle in Bent Stock Rail to be as Follows:

**SECTION "A-A"**

- Paint mark on top of rail head to indicate location of point of switch.
- Paint mark on top of rail head to indicate location of point of switch.

---

**Undercut Stock Rails**

Undercut stock rails to be made of high strength rail with ends beveled per current A.R.E.M.A. Plan No. 1005.
FILLET WELDS ON TOP SIDE
STUDS WELDED INTO PLATE
STUD 7/8" X 4 1/2" LG SHOULDER BOLT
BETWEEN SWITCH MACHINE FRAME AND SWITCH PLATE.

EMORY CLOTH SHALL BE INSTALLED TO PROVIDE ABRASIVE MATERIAL
BUTT WELDS ON BOTTOM SIDE
3/4" - 10  X 1 1/2" THD LG
7"
7"
5'-2"
7/8" DIA. STUD
1 1/4"
10"
9"
2 1/2"
2 3/4"
3 1/2"
4 1/2"
3/8"
1 3/4"
3/4" - 10 X 1 1/2" THD LG
1/2" (TYP.)
13/16"
STUD 7/8" X 4 1/2" LG SHOULDER BOLT
STUDS WELDED INTO PLATE
Fillet Welds on Top Side
Butt Welds on Bottom Side

MOUNTING PLATE NOTES:
1. Emery 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

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

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.

NOTE:
SEE SHEET ESD-2922-05 FOR NOTES

REFERENCE DRAWINGS:
SWITCH GAGE PLATE DETAILS ESD-2922-05

14 FT. DAPPED TRAPEZOID TIE

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DESIGNER PE STAMP
RAILPROS
B. SMITH
W. PREY

NO. 10 SPRING RAIL FROG TURNOUT - EXTENSION PLATE AND DAP TIE FOR SWITCH MACHINE
## NO. 14 STANDARD TURNOUT ON WOOD TIES

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

### BILL OF MATERIAL

<table>
<thead>
<tr>
<th>QTY.</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 EA.</td>
<td>19'-0&quot; &quot;U-69&quot; ADJUSTABLE GUARD RAIL, R1 PLATES</td>
</tr>
<tr>
<td>1 EA.</td>
<td>R1 RAIL HOLD DOWN CLIPS E-3706</td>
</tr>
<tr>
<td>1 EA.</td>
<td>R1 RAIL HOLD DOWN CLIPS E-3710</td>
</tr>
<tr>
<td>1 EA.</td>
<td>26'-0&quot; EXTENDED FIELD SELECTED TYPE SWITCH POINTS (40'-0&quot; RAIL)</td>
</tr>
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### DRAWING INDEX

<table>
<thead>
<tr>
<th>DRAWING</th>
<th>PAGE NO.</th>
<th>TITLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESD2931-01</td>
<td>1</td>
<td>BILL OF MATERIAL AND GENERAL NOTES</td>
</tr>
<tr>
<td>ESD2931-02</td>
<td>2</td>
<td>LAYOUT</td>
</tr>
<tr>
<td>ESD2931-03</td>
<td>3</td>
<td>CROSSOVER LAYOUT AND BILL OF MATERIALS</td>
</tr>
<tr>
<td>ESD2931-04</td>
<td>4</td>
<td>SWITCH AND TurnOUT PLATES</td>
</tr>
<tr>
<td>ESD2931-05</td>
<td>5</td>
<td>RAILBOUND MANGANESE FROG DIMENSIONS AND NOTES</td>
</tr>
<tr>
<td>ESD2931-06</td>
<td>6</td>
<td>GAGE PLATES</td>
</tr>
<tr>
<td>ESD2931-07</td>
<td>7</td>
<td>TRACK PLATES</td>
</tr>
<tr>
<td>ESD2931-08</td>
<td>8</td>
<td>CENTRAL ANGLE - CLOSURE</td>
</tr>
<tr>
<td>ESD2931-09</td>
<td>9</td>
<td>CENTRAL ANGLE - TURNOUT</td>
</tr>
<tr>
<td>ESD2931-10</td>
<td>10</td>
<td>INSULATED JOINT DIAGRAM</td>
</tr>
<tr>
<td>ESD2931-11</td>
<td>11</td>
<td>STRAIGHT OR CURVED UNDERCUT STOCK RAIL</td>
</tr>
<tr>
<td>ESD2931-12</td>
<td>12</td>
<td>26&quot; SPILT SWITCH POINT</td>
</tr>
<tr>
<td>ESD2931-13</td>
<td>13</td>
<td>SWITCH RODS AND MISCELLANEOUS</td>
</tr>
<tr>
<td>ESD2931-14</td>
<td>14</td>
<td>SWITCH RODS AND MISCELLANEOUS</td>
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<tr>
<td>ESD2931-15</td>
<td>15</td>
<td>EXTENSION PLATE AND DAP TIE FOR SWITCH MACHINE</td>
</tr>
<tr>
<td>ESD2931-16</td>
<td>16</td>
<td>TURNOUT PLATES P-10 THRU P-22</td>
</tr>
<tr>
<td>ESD2931-17</td>
<td>17</td>
<td>TURNOUT PLATES P-23 THRU P-30</td>
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<td>ESD2931-18</td>
<td>18</td>
<td>TURNOUT PLATES P-31 THRU P-44</td>
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<td>19</td>
<td>SINGLE RAIL PLATES P-45 AND P-47</td>
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<td>ESD2931-20</td>
<td>20</td>
<td>RAILPLATES P-48 THRU P-51</td>
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<tr>
<td>ESD2931-21</td>
<td>21</td>
<td>FOGRPLATES P-52 THRU P-55</td>
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</tbody>
</table>

### BILL OF WOOD TIES SWITCHES

<table>
<thead>
<tr>
<th>PIECES</th>
<th>SI</th>
<th>E</th>
<th>LENGTH</th>
<th>BOARD FEET</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>F</td>
<td>12</td>
<td>10'-0&quot;</td>
<td>52.50</td>
</tr>
<tr>
<td>2</td>
<td>F</td>
<td>12</td>
<td>15'-0&quot;</td>
<td>118.50</td>
</tr>
<tr>
<td>15</td>
<td>F</td>
<td>12</td>
<td>15'-0&quot;</td>
<td>750.75</td>
</tr>
<tr>
<td>7</td>
<td>F</td>
<td>12</td>
<td>14'-0&quot;</td>
<td>197.00</td>
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<td>TOTAL</td>
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### NOTES:

1. **TURNOUT TO BE FABRICATED FROM 136LB HEAD HARDENED RAIL, FROM POINT END TO POINT END LONG SWITCH TIE.**
2. **LOCATION OF INSULATED JOINTS IS DETERMINED BY BILL OF MATERIAL NO. ESD2931-10. IT WILL BE SATISFACTORY TO LOCATE THE INSULATED JOINT IN THE FIELD UP TO 12".**
3. **D.I. RAIL HOLD DOWN CLIPS ARE TO BE ADHESIVE BONDED INSULATED JUXTAPOSED RAIL PER ESD-8504-10:**
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 WILL BE PER CURRENT A.R.E.M.A. "MANUAL AND PORTFOLIO" UNLESS OTHERWISE SPECIFIED.**
6. **WHERE REQUIRED, ALL IDENTIFICATION SYMBOLS TO BE PLANLY STAMPED.**
7. **GAGE PLATES WILL BE FURNISHED INSULATED. SWITCH RODS WILL BE FURNISHED UNLESS OTHERWISE SPECIFIED.**
8. **MANUFACTURER SHALL SUBMIT TWO COPIES OF SHOP DRAWINGS TO THE ENGINEER FOR APPROVAL PRIOR TO FABRICATION OF TURNOUT SWITCH 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 COMPLETE A COMPLETE UNIT OF SWITCH TIES.**
10. **FOR LOCATION OF INSULATED JOINTS FOR NO. 14 TURNOUT AND CROSSOVER, DRAWING NO. ESD2931-10.**
11. **ALL E-CLIPS SHALL BE GALVANIZED.**
12. **THE 26'-0" SWIFT POINT, MADE FROM 40'-0" RAIL PER ESD-2931-12 SHALL BE FURNISHED WITH SWIFT RODS NO. 1 AND NO. 2 PER ESD-2931-13 AND ESD-2931-14.**
13. **FOR LOCATION OF INSULATED JOINTS FOR No. 14 TURNOUT AND CROSSOVER, DRAWING NO. ESD2931-10.**
14. **GRAPHIC MATERIALS INCLUDED IN A "TURNOUT COMPLETE" IS EVERYTHING LISTED IN THE BILL OF MATERIALS TO COMPLETE A COMPLETE UNIT OF SWIFT TIES.**
15. **THE MATERIAL INCLUDED IN A "TURNOUT COMPLETE" IS EVERYTHING LISTED IN THE BILL OF MATERIALS TO COMPLETE A COMPLETE UNIT OF SWIFT TIES.**
16. **MANUFACTURER SHALL BEVEL RAIL ENDS PER CURRENT A.R.E.M.A. PLAN NO. 1005.**
17. **THE 26'-0" SWIFT POINT, MADE FROM 40'-0" RAIL PER ESD-2931-12 SHALL BE FURNISHED WITH SWIFT RODS NO. 1 AND NO. 2 PER ESD-2931-13 AND ESD-2931-14.**
18. **FOR LOCATION OF INSULATED JOINTS FOR NO. 14 TURNOUT AND CROSSOVER, DRAWING NO. ESD2931-10.**
19. **ALL E-CLIPS SHALL BE GALVANIZED.**
20. **SWIFT POINTS SHALL BE FABRICATED PER AREA SPECIFICATION NO. 9-29-82 and ESD-1501-12.**
21. **THE TOLERANCE FOR SPACING OF SWIFT TIES IS ± 1/2" RELATIVE TO ADJACENT TIES AND 1/4" RELATIVE TO CUMULATIVE DIMENSION FROM POINT OF SWITCH (P).**
22. **FOR SWIFT MACHINE LAYOUT REFER TO ESD-8305 OR ESD-8106.**
NOTES:

1. PLATES TO BE MADE OF R&T ROLLED STEEL.
2. EACH PLATE TO BE PUNCHED STamped WITH PLATE NO. AND 135 DEG OF RAIL AND HAND OF TURNOUT (RSA OR LPC).
3. THE WELDED PRESSURE STEEL SHOULDER MADE OF MILD STEEL TO BE PURCHASED FROM FABRICATION ENTERPRISE, UNPAINTED AS SHOWN ON DETAIL SHEET. THE PLATES TO BE WELDED WITH A MIG WELDING PROCESS, USING 5356 FILLER WIRE. ALL WELDS TO BE FULLY WELDED TO A 1/4" BEVELED EDGE OF THE SHOULDER, SEE WELD SPECIFICATIONS.
4. THE PLATES TO BE FULLY WELDED TO THE PLATE, WITH WELDED JOINTS FROM THE VERTICAL FACE OF SHOULDER IN THE AREA OF THE WELD, MUST BE WELDED TO PROVIDE A 1/4" BEVEL EDGE OF THE SHOULDER, SEE WELD SPECIFICATIONS.
5. THE PLATES AS SHOWN ARE FOR A 135 LB, NO. 16, RIGHT HAND, MACHINE OPERATED TURNOUT. FOR LEFT HAND, TURNOUT, PLATES TO BE REVERSED, AND FABRICATION PLATES TO BE USED AS SHOWN.
6. ARROW SHOWN ON DETAIL IS FOR EXAMPLE ONLY. (JANUARY 2019) NO. 135 AS A GUIDELINE, PART MARK EACH PLATE WITH AN ARROW POINTING TOWARDS SWITCH POINT.

WELDING SPECIFICATIONS:

1. WHEN FIELD WELDED SHOULDERS OR STOPS TO Ratings PLATES, THE BASE PLATES MUST BE PROPERLY POSITIONED AND SECURED IN PLACE BEFORE WELDING.
2. CHECK TRACK FOR CORRECT GAage.
3. START WELDING ON PLATE, PLACE PASSENGER SHOULDER TIGHT AGAINST BASE, AND WELD IN PLACE. SHOULDER SHALL BE CONTINUOUSLY WELDED ALONG TRACKING ARC.
4. EACH PLATE SHOULDER MUST BE FULLY WELDED TO THE PLATE WITH 1/2" FILLER WELD BEVEL EDGE WELD, ANY AREA OF THE WELD MUST BE FULLY WELDED TO PROVIDE A 1/4" BEVEL EDGE OF THE SHOULDER, SEE WELD SPECIFICATIONS.
5. THE PLATES TO BE FULLY WELDED TO THE PLATE, WITH WELDED JOINTS FROM THE VERTICAL FACE OF SHOULDER IN THE AREA OF THE WELD, MUST BE WELDED TO PROVIDE A 1/4" BEVEL EDGE OF THE SHOULDER, SEE WELD SPECIFICATIONS.
6. ARROW SHOWN ON DETAIL IS FOR EXAMPLE ONLY. (JANUARY 2019) NO. 135 AS A GUIDELINE, PART MARK EACH PLATE WITH AN ARROW POINTING TOWARDS SWITCH POINT.

BILL OF FROG PLATES AND DIMENSION TABLE

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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 shoulders and secure to frog and guard rail plates. 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.
4. Carefully weld frog plate and guard rail plate to frog gage plate with 2 pass 1/2" + fillet weld. For welding use the following:
   - A. Electrode, 3/16" inch, welding spec. 7018XLM.
   - B. Electrode, 3/32" inch, welding spec. 7018XLM.
   - C. Wire, 3/32 inch, welding spec. 7018XLM.
   - Other wire or electrodes meeting specifications as called for and approved by the designer may be used.

5. Carefully weld frog plate and guard rail plate to frog gage plate with 2 pass 1/2" + fillet weld. For welding use the following:
   - A. Electrode, 3/16 inch, welding spec. 7018XLM.
   - B. Electrode, 3/32 inch, welding spec. 7018XLM.
   - C. Wire, 3/32 inch, welding spec. 7018XLM.

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. Plates will be welded only after the gage plates are secured in the proper location on the tie with the frog plate in place and aligned.

7. Guard rail plates are to 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 plate in place and aligned.

REFERENCES

LAYOUT - NO. 14, R.H. TURNOUT - 136 LB. ----------------------------- ESD-2931-02

SHEET 6

3M INSULATION PER DETAIL "A" SHEET 6

OTHER WIRE OR ELECTRODES MEETING SPECIFICATIONS AS CALLED FOR AND APPROVED BY THE ENGINEER MAY BE USED.

NOTES:

1. PLATES TO BE MADE OF MILD ROLLED STEEL.
2. THE PLATES AS SHOWN ARE FOR A 3/8 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 MANUFACTURER. THE WELD-ON PRESSED STEEL SHOULDER IS TO BE WELDED ONLY AFTER THE GAGE PLATES 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 MUST BE MACHINED OUT TO PROVIDE A CLEAR RAIL SEAT DIMENSION AS CALLED FOR.
4. MANUFACTURERS 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 PLATE IN PLACE AND ALIGNED.
5. GUARD RAIL PLATES ARE TO BE INSTALLED AND WELDED TO THE FROG PLATE IN THE FIELD WITH A 3 PASS 1/2" + FILLET WELD. PLATES ARE TO BE WELDED ONLY AFTER THE GUARD RAIL PLATE AND THE FROG PLATES ARE SECURED IN THE PROPER LOCATION ON THE TIE WITH PROPER ALIGNMENT.

Drawing No. ESD-2931-07

Scale: NONE

Contract Sheet No. 7 of 15
LOCATION OF SWITCH POINT. FOR 26'-0" (SEE DET. B)

2464.55' RADIUS FOR FIRST (NEW) INSTALL.
CURVE TO RADIUS OF 2462.20'

STRAIGHT STOCK RAIL UNDERCUT 43'-0" 43'-0"
26'-0"

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

1. ANY UNNOTED DIMENSIONS TO BE FURNISHED BY FIELD 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 SWING INSTALLATIONS OR REPLACEMENT ORDERS SEE TABLE BELOW.
5. BEND ANGLE IN BENT STOCK RAIL TO BE AS FOLLOWS: 0'-50.7332 OR 1' IN 9'-5 1/2".
6. THE CURVED PORTION OF THE CURVED STOCK RAIL SHALL BE CURVED PER DETAIL "B".

LENGTHS B, C, & D FOR 136 LB. RAIL

<table>
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<th>SW. PT LENGTH</th>
<th>T.O. NO.</th>
<th>STOCK RAIL</th>
<th>B</th>
<th>C</th>
<th>D END DRILL SEE NO. 10</th>
<th>D END DRILL SEE NO. 10</th>
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<td>26'-0&quot;</td>
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<td>STR.</td>
<td>7'-3&quot;</td>
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<td>CURVED</td>
<td>7'-3&quot;</td>
<td>6'-0&quot;</td>
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<td>12'-0&quot;</td>
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18'-0" OVER 1 IN 3 PLANE OFF

SECTION "A-A"

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

SAN DIEGO ASSOCIATION OF GOVERNMENTS
411 B Street, Suite 600
San Diego, CA 92101
www.sandag.org

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

DESIGNER PE STAMP
RAILPROS
B. SMITH
W. PREY

DATE: 2/2/15
DESIGNER IN CHARGE:

REV. DATE DESCRIPTION DRAWN SHEET NO. CONTRACT SHEET NO. DRAWING NO.

8152-3931-11 11 OF 15 11 OF 15

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

1/4" = 1'-0"

REV.: 0

ENGINEERING STANDARD DRAWINGS
FILLET WELDS ON TOP SIDE
STUDS WELDED INTO PLATE
STUD 7/8'' X 4 1/2'' LG SHOULDER BOLT
BETWEEN SWITCH MACHINE FRAME AND SWITCH PLATE.

EMORY CLOTH SHALL BE INSTALLED TO PROVIDE ABRASIVE MATERIAL
BUTT WELDS ON BOTTOM SIDE
3/4'' - 10  X 1 1/2'' THD LG
7''
5'-2''
7/8'' DIA. STUD
10''
3 1/2''
2 1/2''
3 1/2''
10''
13/16''
2 3/4''
3/8''
14'-0''
2/2/15
ESD-2931-15
15
14 FT. DAPPED TRAPEZOID TIE

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 FRAME AND SWITCH PLATE.
2. ALL HOLES SHALL BE DRILLED NOT PUNCHED.
3. ALL CORNERS OF PLATE SHALL BE CHAMFERED 1'' X 1''.

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

ANSALDO SWITCH MACHINE MOUNTING PLATE

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

SAN DIEGO ASSOCIATION OF GOVERNMENTS
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810 Mission Avenue
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RAILPROS
B. SMITH
W. PREY

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

ENGINEERING STANDARD DRAWINGS
DRAWING NO.:
SCALE:
DRAWING SHEET NO.:
CONTRACT SHEET NO.:
NON-CONTRACT SHEET NO.:
REV.
DATE
DESCRIPTION
KMS
REV.
DATE
DESCRIPTION
KMS
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.:
SCALE:
DRAWING SHEET NO.:
CONTRACT SHEET NO.:
NON-CONTRACT SHEET NO.:
REV.
DATE
DESCRIPTION
KMS
REV.
DATE
DESCRIPTION
KMS

No additional information provided in the image.
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 RETRACT 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. MINIMUM DISTANCE OF 6'-0" FROM EDGE OF NEAREST TIE PLATE.

3. ALL INSULATED JOINTS ARE TO BE ADHESIVE BONDED PREFABRICATED INSULATED JOINTS AS PER ESD-2944, 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.E.A.M. "TYPICAL" AND "PORTFOLIO" UNLESS OTHERWISE SPECIFIED.

6. WHERE REQUIRED, ALL IDENTIFICATION SYMBOLS TO BE PLAINLY STAMPED.

7. GAGE PLATES WILL BE FURNISHED INSULATED. SWITCH ROGS 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 MODIFIED PROVISIONS.

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-2941-13.

10. TIE PLATES SHALL CONFORM TO ENGINEERING STANDARD ESD-4543.

11. SCREW SPINE (5/8" X 1 1/2") SHALL CONFORM TO ENGINEERING STANDARD ESD-4543. PLATE SIZES SHALL BE AS DESIGNATED IN THE DRAWING. SCREW SPINES SHALL BE SCREWED INTO WOOD (NOT DRIVER). SCREW SPINES SHALL BE PLAINLY STAMPED.

12. MANUFACTURER SHALL BEVEL RAIL ENDS PER CURRENT A.E.A.M. PLAN NO. 1010.

13. THE SWP SWITCH JOINT (PER ESD-2944-12) TO BE FURNISHED WITH A "J" NO. 3 & 5 SWITCH ROD AS PER DRAWINGS ESD-2944-13 AND ESD-2941-10, SWITCH ROD NO. 2, 3 & 4 SHALL BE SIMILAR TO NO. 1 SWITCH ROD AND WILL BE FURNISHED WITHOUT BASKET ADJUSTMENT.


15. GAGE PLATES FOR SWITCH AND FROG, SWITCH HOLE PLATE, (FOR BOTH R.H. AND L.H. TURNOUTS) AND PLATES MOUNTED AT 1'-0" ARE TO BE DESIGNED TO BE LONG ENOUGH TO RUN THROUGH THE EXCEPTION OF THE AREA BETWEEN TIES TO PERMISCUOUS TO TURNOUT SIDE OF TRACK.

16. UPON COMPLETION OF TURNOUT INSTALLATION, RUNNING RAIL MUST BE ADJUSTED TO NCTD NEUTRAL RAIL TEMPERATURE.

17. ALL-ECLIPS SHALL BE GALVANIZED.

18. SWITCH POINTS SHALL BE FABRICATED PER AREMA SPECIFICATION NO. 9-28-92 AND ESD-2941-12.

19. THE TOLERANCE FOR STAGGER OF SWITCH TIES IS ± 1'/4 RELATIVE TO ADJACENT TIES AND ± 1'/4 RELATIVE TO CUMULATIVE DIMENSION FROM THE POINT OF SWITCH (P).

20. SWITCH POINT ROLLER SHALL BE AS APPROVED BY THE ENGINEER. SUBMITTED AS SHOP DRAWINGS PER NOTE 8 ABOVE. SWITCH POINT ROLLER BEARINGS SHALL BE MOUNTED ABOVE PLATE AND WILL NOT BE LOCATED BETWEEN SWITCH TIES.

21. HELPER THROW ROD ASSEMBLIES SHALL CONFORM TO ESD-2941-12.

22. FOR SWITCH MACHINE LAYOUT REFER TO ESD-885 OR ESD-8801.

23. HEAVY POINT (HP) FROG, FROG POINT WIDTH 27/32".

ENGINEERING STANDARD DRAWINGS

NO. 20 STANDARD TURNOUT BILL OF MATERIALS AND GENERAL NOTES

DRAWING SHEET NO.

1 OF 14

SCALING: NONE

6/19/01

DESIRED REVISION

H. SMITH

SAN DIEGO COUNTY TRANSIT DISTRICT

515 Mission Avenue

Downtown, CA 92101

www.sdctd.com

NORTH COUNTY TRANSIT DISTRICT

DRAWING SHEET NO.

1 OF 14

SCALING: NONE

6/19/01

DESIRED REVISION

H. SMITH

SAN DIEGO COUNTY TRANSIT DISTRICT

515 Mission Avenue

Downtown, CA 92101

www.sdctd.com

ENGINEERING STANDARD DRAWINGS

NO. 20 STANDARD TURNOUT BILL OF MATERIALS AND GENERAL NOTES

DRAWING SHEET NO.

1 OF 14

SCALING: NONE

6/19/01

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ENGINEERING STANDARD DRAWINGS

NO. 20 STANDARD TURNOUT BILL OF MATERIALS AND GENERAL NOTES

DRAWING SHEET NO.

1 OF 14

SCALING: NONE

6/19/01

DESIRED REVISION

H. SMITH

SAN DIEGO COUNTY TRANSIT DISTRICT

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ENGINEERING STANDARD DRAWINGS

NO. 20 STANDARD TURNOUT BILL OF MATERIALS AND GENERAL NOTES

DRAWING SHEET NO.

1 OF 14

SCALING: NONE

6/19/01

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ENGINEERING STANDARD DRAWINGS

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DRAWING SHEET NO.

1 OF 14

SCALING: NONE

6/19/01

DESIRED REVISION

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ENGINEERING STANDARD DRAWINGS

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DRAWING SHEET NO.

1 OF 14

SCALING: NONE

6/19/01

DESIRED REVISION

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ENGINEERING STANDARD DRAWINGS

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DRAWING SHEET NO.

1 OF 14

SCALING: NONE

6/19/01

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ENGINEERING STANDARD DRAWINGS

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DRAWING SHEET NO.

1 OF 14

SCALING: NONE

6/19/01

DESIRED REVISION

H. SMITH

SAN DIEGO COUNTY TRANSIT DISTRICT

515 Mission Avenue

Downtown, CA 92101

www.sdctd.com

ENGINEERING STANDARD DRAWINGS

NO. 20 STANDARD TURNOUT BILL OF MATERIALS AND GENERAL NOTES

DRAWING SHEET NO.

1 OF 14

SCALING: NONE

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SAN D...
NO. 20 RIGHT HAND TURNOUT

NO. 20 STANDARD TURNOUT - LAYOUT

TURNOUT CONTINUED

NOTE:
- Concrete ties are installed ahead of switch point. Head block tie gage plate PP will not be installed.
- Standard rolled steel plates.
- Switch gage plates - 1" x 8" - milled (modified for clips).

SCALE: 1" = 20'-0"

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".

FOR DAP TIE DETAIL SEE SHEET 6
FOR CAP TIE DETAIL SEE SHEET 6
RISE & SLIDE PLATES WITH ROLLER BEARINGS AND SLIDE PLATES
SWITCH PLATES - 1" x 8" - MILLED (MODIFIED FOR CLIPS)
SWITCH GAGE PLATES - 1" x 8" - MILLED

TOE JOINTS WELDED

HELPER THROW ROD AND SWITCH ROLLERS

CHECKED [signature]
CHECKED [signature]

3. IF CONCRETE TIES ARE INSTALLED TIE PLATES
SW. PT. 39'-0" TIE PLATES
CONCRETE OR WOOD

2. SEE ESD-8625 OR ESD-8630 FOR SWITCH MACHINE LAYOUT.

1. SEE SHEET 1 FOR NOTES, BILL OF MATERIAL AND TURNOUT DATA.
FILLET WELDS ON TOP SIDE
STUDS WELDED INTO PLATE
STUD 7/8" X 4 1/2" LG SHOULDER BOLT
BETWEEN SWITCH MACHINE FRAME AND SWITCH PLATE.
EMORY CLOTH SHALL BE INSTALLED TO PROVIDE ABRASIVE MATERIAL
BUTT WELDS ON BOTTOM SIDE
3/4" - 10  X 1 1/2" THD LG
7"
7"
5'-2"
7/8" DIA. STUD
STUD 7/8" X 4 1/2" LG SHOULDER BOLT
STUDS WELDED INTO PLATE
FILLET WELDS ON TOP SIDE
BUTT WELDS ON BOTTOM SIDE
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
DAP TIE
(2 PCS. REQ'D. AS SHOWN)
US&S SWITCH MACHINE MUST BE FURNISHED WITH
FINISHED MOUNTING LUGS

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.

NOTE:
SEE SHEET ESD-2941-05 FOR NOTES
REFERENCE DRAWINGS:
SWITCH GAGE PLATE DETAILS-ESD-2941-05

NO. 20 STANDARD TURNOUT -
EXTENSION PLATE AND DAP TIE FOR
SWITCH MACHINE
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.
4. THE WELD-ON PRESSED STEEL SHOULDER MUST BE CAREFULLY WELDED TO ALL PLATES WITH A MINIMUM 2 PASS \(\frac{3}{8}\)" + 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 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 \(\frac{1}{2}\)" + FILLET WELD. 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.
6. GUARD RAIL PLATES ARE TO BE INSTALLED AND WELDED TO THE FROG GAGE PLATES IN THE FIELD WITH A 3 PASS \(\frac{1}{2}\)" + 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.
SIDE VIEW OF SWITCH POINT

- Switch point shown marked alloy steel tip.
- 3/4" long with centerline.
- Cotter (slotted hex nuts), furnished with switch rod.
- 3/8" diameter holes.
- 1/8" diameter holes.
- 1/4" diameter holes.
- 3/16" diameter holes.
- Centerline of roller bearing.
- Centerline of roller bearing.
- 39'-0" straight sw. pt.
- 39'-0" split switch point.
- 18'-0"-20'-0" (1 R.B. 24")
- 18'-0"-20'-0" (1 R.B. 24")
- 18'-0"-20'-0" (1 R.B. 24")
- Plane to P' point at 78". Groove 3/4" deep x 1 1/4" long from point.
- Plane to P' point at 78". Groove 3/4" deep x 1 1/4" long from point.
- Plane to P' point at 78". Groove 3/4" deep x 1 1/4" long from point.
- End view at 1-A-A*
- End view at 1-A-A*
- Section "B-B"*.
- Section "C-C"*
- Manganese or alloy steel tip.
- Cowling edge to bottom base planing.
- Centerline of roller bearing.
- Second top planing.
- First top planing.
- 5'-0" rise, in 5'-0".
- Second top planing.
- First top planing.
- 11'-8"
- 11'-8"
- 10'-0".
- 10'-0"
- 10'-0"
- 10'-0"
- 10'-0"
- 10'-0".
- 10'-0".
- 10'-0".
- 10'-0".
- Head separation.
- Head separation.
- 39'-0" split switch point.
- 39'-0" straight sw. pt. made from 56'-0" g. rail.
- 39'-0" split switch point.
- 39'-0" straight sw. pt. made from 56'-0" g. rail.
- 39'-0" split switch point.
- 39'-0" straight sw. pt. made from 56'-0" g. rail.
- 39'-0" split switch point.
- 39'-0" straight sw. pt. made from 56'-0" g. rail.
ADJUSTABLE BEARING CLIP - SMU - 1

NOTES:
1. 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 ORDERED REQUISITIONS AND ORDERS SHALL SPECIFY ROD 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.

2. WHEN COMPLETED RODS ARE ORDERED THEY SHALL BE ASSEMBLED AND INCLUDED ALL PARTS SHOWN IN BILL OF MATERIAL. REQUISITIONS AND ORDERS FOR 72'-9" CLIP ASSEMBLIES ONLY ARE PERMITTED IN THE FOLLOWING SIZES:

- 3'-12" 17
- 4'-12" 13
- 5'-12" 13
- 6'-12" 13
- 7'-12" 13
- 8'-12" 13
- 9'-12" 13

ADJUSTABLE BEARING CLIP - SMU - 1

NOTES CONTINUED ON SHEET 14
ELEVATION OF "SMJ" CLIP ASSEMBLY FOR 39' SWITCHES
(SHOWN FOR THE ROADSIDE WASHER AND NOT REMOVED)

NOTES: (CONTINUED FROM SHEET 13)
3. 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 3/16" THICK SPRING WASHER SHOULD BE REPLACED WITH A 3/8" THICK SPRING WASHER BY THE STOREKEEPER OR FIELD FORCES. TIGHTENING COTTER WITHIN THE LIMITS OF SLOT IN WEB BOLTS.
4. MATERIALS AND WORKMANSHIP SHALL MEET CURRENT A.R.E.M.A. SPECIFICATIONS FOR SPECIAL TRACKWORK UNLESS OTHERWISE SPECIFIED.
NO. 24 TANGENTIAL TURNOUT ON WOOD TIES
(136LB., RIGHT HAND WITH RAIL BOUND MANGANESE FROG)
24 TANGENTIAL TURNOUT GEOMETRY

SCALE: NONE

SPECIFICATIONS:
1. TURNOUT & FROG ANGLE: STD. No.24-2-25/12-
2. RAIL: 138.78 HEAD HARDENED
3. FLANGEWAYS: 1 7/8" WIDE x 1 7/8" DEEP (MIN. DEPTH)
4. RAIL ENDS SHALL BE UN-DRILLED. DROP IN FIELD.
5. EXCEPT INSULATED JOINTS: 3 1/2" x 8" x 1 1/8" DIA. - 3 3/32" A.B.
6. JOINT GAPS: 0" (MPH).
7. SWITCH POINTS: 61" LONG TANGENTIAL ALIGNMENT (78" LONG RAIL), POINT DETAIL PER A.R.E.M.A. 5100
8. STOCK RAILS: 78" SAWBOTH UNDERCUT
9. SWITCH RIDE: VERTICAL TYPE WITH "RAF" CLIPS - 1 1/4" x 1 1/2"
10. SWITCH PLATES: INSUL. GAGE PLATES - 1" x 8" MILLED WITH BOLTLESS ADJUSTABLE BRACE
11. SLIDE PLATES - 1" x 8" MILLED WITH PANDROL CLIPS
12. BRACE PLATES - 1/8" MILLED WITH BOLTLESS ADJUSTABLE BRACE
13. ROLLER ASYMM. PLATES - 1" x 8" MILLED WITH PANDROL CLIPS & ROLLER ASYMM.
14. TURNOUT PLATES: HP-6 & P-13 TO P-26 - 1" x 8" FLAT WITH PANDROL CLIPS & CLIP CLIPS (WHERE SHOWN)
15. TURNOUT PLATES: P-26 TO P-37 - 3/4" x 8" FLAT WITH PANDROL CLIPS
16. GUARD RAILS: H.T. UC-33 (4-6) - 20'-0" LONG ADJUSTABLE GUARD RAIL - 1/2" RAISED
17. GUARD RAIL PLATES: 3/4" x 8" FLAT WITH PANDROL CLIPS & WEARPLATES - PLT. "G"
18. STANDARD TIE PLATES: PANDROL ROLLED SHOULDER
19. FROG NO. 24 RACOR RAILBOUND MFGS. - 42'-0" LG. - HI-INTEGRITY - MITERED HEEL - EXPLOSION HARDENED - FROG POINT WIDTH 27/32"
20. FROG PLATES: TIE PLATES - 3/4" x 8" FLAT WITH PANDROL CLIPS

NOTES:
1. PLATES TO BE MADE OF MILD STEEL ROLLED.
2. EACH PLATE TO BE FLATLY STAMPED WITH PLATE NUMBER AND 138 (WEIGHT OF RAIL) AND HAND OF TURNOUT (R.H. OR L.H."
3. THE WEEL ON THE PRESS RIDDEN SHOULDER, MILE OF MILD STEEL, AND MEETING "PANDROL" DESIGN SPECIFICATIONS SHALL BE USED.
4. THE PRESSERED STEEL SHOULDER MUST BE CAREFULLY WELDED TO ALL PLATES WITH A MINIMUM 2 PASS 1/2" FILLER METAL ALONG THE SERRATED EDGE OF THE SHOULDER AND IT SHOULD PROJECT BEYOND THE VERTICAL FACE OF THE SHOULDER IN THE AREA OF THE RAIL SEAT, AND IT MUST BE MACHINED TO PROVIDE A CLEAR RAIL SEAT DIMENSION AS CALLED FOR.
5. THE PLATES AS SHOWN ARE FOR A 138 LB. NO. 24 RIGHT HAND TURNOUT, FOR A LEFT HAND TURNOUT PLATES TO-13 TO P-11 INCLUDE AND FROG PLATE TO-1 FLAT ARE TO BE OPAQUE.
6. 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:
1. SET PRESSERED STEEL SHOULDER FLUSH AGAINST LINE OF BASE OF RAIL OR SHOULDER OF MILED PLATE AS SHOWN AND WELD WITH 1 PASS 3/8" WELD.
2. STOP PLATE FOR ADJUSTABLE RAIL BRACE TO BE SET FLUSH WITH SHOULDER OF MILED PLATE AS SHOWN AND WELD WITH 1 PASS 3/8" FULL WELD.
3. SHOULDER ROUGH AND STOP ARE TO BE CAREFULLY WELDED TO PLATE. NO RAIL SHALL PROJECT BEYOND THE VERTICAL EDGE OF THE UNMILLED EDGED END OR THE STOP PLATE OR VERTICAL FACE OF SHOULDER IN THE AREA OF THE RAIL SEAT, ANY EXCESS PROTRUDING FROM THE FACE OF THE STOP OR SHOULDER MUST BE MACHINED OFF TO PROVIDE CLEAR DIMENSION CALLED FOR.
4. FOR WELDED PRESSERED STEEL SHOULDER OR PLATE STOPS

DRAWING NO. 24 TANGENTIAL TURNOUT - TURNOUT DATA AND SWITCH PLATES

ENGINEERING STANDARD DRAWINGS

DRAWING SHEET NO. 11 OF 15
SCALE: NONE
NOTES:
1. SEE COVER SHEET FOR NOTES AND BILL OF MATERIALS
2. SEE SHEET 2 FOR LAYOUT OF NO. 24 TURNOUT.
3. SEE SHEET 4 FOR LAYOUT OF NO. 24 CROSSOVER.
### BILL OF MATERIAL FOR HELPER ASSEMBLY (TWO REQUIRED)

<table>
<thead>
<tr>
<th>QTY</th>
<th>DESCRIPTION</th>
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<tbody>
<tr>
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</tbody>
</table>

1. SEE SHEET 2 FOR NO. 24 TURNOUT.
2. CROSSOVERS FOR 1/2" TRACK CENTER IS SHOWN. FOR 1/2" OR 1" GREATER TRACK CENTERS, USE TWO TURNOUTS PER SHEET 2, FOR OTHER TRACK CENTER SPACING, MANUFACTURER TO FURNISH SHOP DRAWINGS.
3. CROSSOVERS TO BE PRE-PLACED ON T.E.S., PEBBLE TIES TO 3/4" X 5/8" REINforcing Castings to suit EXPLOSION HARDENED STL 300 MINIMUM.

### BILL OF MATERIAL FOR CROSSOVER

<table>
<thead>
<tr>
<th>QTY</th>
<th>DESCRIPTION</th>
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</thead>
<tbody>
<tr>
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</tbody>
</table>

### NO. 24 CROSSOVER

<table>
<thead>
<tr>
<th>PIECES</th>
<th>SIZE</th>
<th>LENGTH</th>
<th>BOARD FEET</th>
</tr>
</thead>
<tbody>
<tr>
<td>74</td>
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<td>10'-0&quot;</td>
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<tr>
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<td>38</td>
<td>10'-0&quot; x 15'-0&quot;</td>
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</tr>
<tr>
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<td>15'-0&quot;</td>
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</tr>
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<td>36</td>
<td>15'-0&quot; x 25'-0&quot;</td>
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</tr>
<tr>
<td>26</td>
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<td>15'-0&quot;</td>
<td>1911.00</td>
</tr>
<tr>
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<tr>
<td>1</td>
<td>15'-0&quot; x 115'-0&quot;</td>
<td>15'-0&quot;</td>
<td>2351.00</td>
</tr>
</tbody>
</table>

### CROSSOVER DATA

- MAIN TRACKS: TANGENT AND PARALLEL CROSSOVER: TANGENT BETWEEN FROGS.
- DISTANCE BETWEEN #6 FROGS:
  - 14'-9" x 15'-0"
  - 15'-0" x 15'-0"
  - 15'-0" x 15'-0"
  - 15'-0" x 15'-0"
  - 15'-0" x 15'-0"
  - 15'-0" x 15'-0"
  - 15'-0" x 15'-0"
  - 15'-0" x 15'-0"

### BILL OF MATERIAL FOR HELPER ASSEMBLY

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</table>

- 1. SEE SHEET 2 FOR NO. 24 TURNOUT.
- 2. CROSSOVERS FOR 1/2" TRACK CENTER IS SHOWN. FOR 1/2" OR 1" GREATER TRACK CENTERS, USE TWO TURNOUTS PER SHEET 2, FOR OTHER TRACK CENTER SPACING, MANUFACTURER TO FURNISH SHOP DRAWINGS.
- 3. CROSSOVERS TO BE PRE-PLACED ON T.E.S., PEBBLE TIES TO 3/4" X 5/8" REINforcing Castings to suit EXPLOSION HARDENED STL 300 MINIMUM.
### Table:

<table>
<thead>
<tr>
<th>PLATE</th>
<th>L'</th>
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<tbody>
<tr>
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<td>2'</td>
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</tr>
<tr>
<td>F-28</td>
<td>2'</td>
<td>1</td>
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<td>F-29</td>
<td>2'</td>
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</tr>
<tr>
<td>F-30</td>
<td>2'</td>
<td>1</td>
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### Diagrams:

1. **Heel Plate H-5P**
   - Diagram showing details of the heel plate.

2. **Turnout Plates P-16 Thru P-22**
   - Diagram showing details of the turnout plates.

3. **Frog Plates F-3 Thru F-8 and F-37 Thru F-40**
   - Diagram showing details of the frog plates.

### 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. or L.)
3. The weld on pressed shoulder, made of mild steel, and meeting "Sandor's" design specifications shall be used.
4. The pressed steel shoulder must be carefully welded to all plates with a minimum head 3/8" (1/2" for use with the beveled grooves of the shoulder)~and any weld projecting beyond the vertical face of the shoulder in the area of the heel plate/shoulder 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. 24 right hand turnout.
6. Direction of arrow shown is only as guide, paint 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 rolled plate as shown and weld with 2 - 3/8" weld.
2. Stop plate for adjustable rail brace to be set flush with shoulder of rolled plate as shown and weld with 3 - 3/8" weld.
3. Shoulders and stops are to be carefully welded to plate. No weld shall project beyond the vertical edge of the unlabeled fourth side of the stop plate or vertical face of the stop plate. Shoulders or stops beyond the face of the stop or shoulder must be machined off to provide clear dimensions as called for.
4. For welding pressed steel shoulders or plate stops for adjustable rail braces, use the following:
   - Electrode 1: 5/32 INCH, WELDING SPEC. 7018XLM.
   - Electrode 2: 7/64 INCH, WELDING SPEC. 7018XLM.
   - Wire: WELD-ON, 332 INCH, 106363, 1 - NO. 6 FLUX CORE.
   - Other wire or electrodes meeting specifications as called for, approved by the engineer may be used.

### Additional Notes:

- "PANDROL'S" design specifications shall be used.
- The plates as shown are for a 136 lb. No. 24 right hand turnout.
- "PANDROL'S" BEVEL GROOVE WELD ON SHOULDER.
- "PANDROL'S" DESIGN SPECIFICATIONS SHALL BE USED.
- "PANDROL'S" PAINT MARK ARROW POINTING TOWARDS SWITCH POINT.
- "PANDROL'S" MANUFACTURER TO LOCATE SHOULDER FROM UNDER FROG ASSEMBLY AND WELD IN PLACE.
US&S SWITCH MACHINE MUST BE FURNISHED WITH FINISHED MOUNTING LUGS

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 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
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 GANGED TURNOUT. FOR A LEFT HAND TURNOUT, PLATES ARE TO BE REVERSED.
3. THE WELD-ON PRESSURED STEEL SHOULDER, MADE OF MILD STEEL, AND MEETING PANFORD DESIGN SPECIFICATIONS SHALL BE USED.
4. THE PRESSURED STEEL SHOULDER MUST BE CAREFULLY WELDED TO ALL PLATES WITH A MINIMUM 3 PASS, 3/16" FILLET WELD ALONG THE BEVELED GROOVES OF THE SHOULDER. ANY WELD PROJECTING FROM THE VERTICAL EDGE 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 FROGS TO VERIFY LOCATION OF SHOULders ON FROG PLATES FGP-1, FGP-2, AND FGP-3 AND TO ENSURE 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 PLATES 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. THE WELD-ON SHOULDER MUST BE CAREFULLY WELDED TO ALL PLATES WITH 3 PASS, 1/2" FILLET WELD. PLATES WILL BE WELDED ONLY AFTER THE GAGE PLATES AND THE FROG WRE SECURED IN THE PROPER LOCATION ON THE TIE WITH PROPER ALIGNMENT.

INSTRUCTIONS FOR WELDING GUARD RAIL PLATES TO FROG GAGE PLATES:

1. SET 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: E-80 INCH, WELDING SPEC. 7018M.
   B. ELECTRODE: 3/16 INCH, WELDING SPEC. 7018G.
   C. ELECTRODE: 3/32 INCH, WELDING SPEC. 7018H.
   D. WIRE: 3/32 INCH, NR203. 1% NICKEL FLUX CORE.
   E. WIRE: 3/32 STEEL CORE, 5% SILICON.
   F. WIRE: 3/32 INCH, E-7018 WITH 3% SILICON.
6. 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 - ESD-2951-02
   - NO. 24 R.H., RAIL BOUND MANGANESE FROG - 136 lb. ---- ESD-2951-06
   - NO. 24 R.H., RAIL BOUND MANGANESE FROG - 136 b. ---- ESD-2951-15

ENGINEERING STANDARD DRAWINGS

NO. 24 TANGENTIAL TURNOUT - FROG GAGE PLATES

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Oceanside, CA 92054
www.sandag.org

FROG GAGE PLATES

SAN DIEGO, CA. 92101
www.gonctd.com

401 B Street, Suite 800
Oceanside, CA 92054

401 B Street, Suite 800
SAN DIEGO, CA. 92101
www.gonctd.com

www.gonctd.com

SAN DIEGO ASSOCIATION OF GOVERNMENTS
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Oceanside, CA 92054
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W. PREY

2 PASS 3/16" + FILLET WELD (TYP.)

SEE NOTE 6.

2 PASS 3/16" + FILLET WELD (TYP.)

SEE NOTE 6.

2 PASS 3/16" + FILLET WELD (TYP.)

SEE NOTE 6.

2 PASS 3/16" + FILLET WELD (TYP.)

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SEE NOTE 6.

2 PASS 3/16" + FILLET WELD (TYP.)

SEE NOTE 6.
**ASSEMBLED 26'-0" GUARD RAIL**

**BILL OF MATERIAL**

<table>
<thead>
<tr>
<th>QTY</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>GUARD BAR, UIC 33 1200 SERIES x 26'-0&quot; LONG</td>
</tr>
<tr>
<td>14</td>
<td>GUARD RAIL PLATE ASSEMBLY, 136 LB RE RAISED, STRAIGHT</td>
</tr>
<tr>
<td>14</td>
<td>H-CLAMP CLIP, PANDROL E2055 OR EQUAL</td>
</tr>
<tr>
<td>14</td>
<td>LOCKING BLOCK</td>
</tr>
<tr>
<td>42</td>
<td>SHIM, 1/8&quot; x 3&quot; x 6&quot;</td>
</tr>
</tbody>
</table>

**NOTES:**

1. GUARD RAIL, SECTION U.I.C. 33 1200 SERIES (URC U69) UIC 860.0 GRADE 90A (GUARD FACE BRINELL 319 MIN.)
3. PANDROL H-CLAMP OR APPROVED EQUAL.
4. WELDING PER ANSI #AWS D1.1-92 OR LATEST REVISION.
5. PLATE SPACING IS SET FOR SHIPPING ONLY. FINAL PLATE SPACING IS TO BE DETERMINED BY TIE SPACING AT TIME OF INSTALLATION.
6. PANDROL SPRING CLIPS TO BE INCLUDED IN ASSEMBLY.
7. LIFT POINTS AND WEIGHT OF ASSEMBLY TO BE MARKED ON HEAD OF WEAR BAR WITH WHITE PAINT.
8. PLATE IS TO BE STAMPED WITH PLATE I.D. WITH 3 HIGH CHARACTERS AS SHOWN.
9. GRIND AWAY CORNER OF PANDROL SHOULDER TO CLEAR FOOT OF CHAIR ASSEMBLY.

**SCALE:** NONE

---

**FORGED SHOULDER WELDING DETAIL**

**PLAN VIEW:**

GUARD RAIL HARDWARE ASSEMBLY

**SECTION A-A:**

GUARD RAIL HARDWARE ASSEMBLY

**SECTION C-C:**

GUARD RAIL HARDWARE ASSEMBLY

---

**SCALE:** NONE

---

**DETAIL 1**

FORGED SHOULDER WELDING DETAIL

**SCALE:** NONE

---

**PLAN VIEW:**

GUARD RAIL HARDWARE ASSEMBLY

**SCALE:** NONE

---

**DRAWING NO.**

ESD-2951-09

**DRAWING SHEET NO.**

9 OF 15

---

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**ENGINEERING STANDARD DRAWINGS**

**NO. 24 TANGENTIAL TURNOUT - 26'-0" GUARD RAIL**

**REV. DATE DESCRIPTION**

---

**CONTRACT SHEET NO.**

---
NOTES:
1. FROG ANGLE: 2°-23'-13".
2. FROG PLATES TO BE INSTALLED WITH PALLETIZED STEEL FROG PLATES PER A.R.E.M.A. SPECIFICATIONS.
3. FROG PLATES TO BE INSTALLED WITH A R.H. TURNOUT. FOR A LEFT HAND TURNOUT, PLATES ARE TO BE OPPOSITE.
4. TOE AND HEEL BLOCKS AND BOLTS PER A.R.E.M.A. SPECIFICATIONS.
5. TOE AND HEEL BLOCKS TO BE FIELD WELDED.

REFERENCE DRAWINGS:
- No. 374, R.H. DELORES, 2'-8" KA-10
- No. 375, R.H. DELORES, 2'-8" KA-15
- No. 375, L.H. DELORES, 2'-8" KA-15
- No. 374, L.H. DELORES, 2'-8" KA-10

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

DATE: 11/20/15

STAMP: DESIGNER PE STAMP

DESCRIPTION: NO. 24 TANGENTIAL TURNOUT - RAILBOUND MANGANESE STEEL FROG

CONTRACT SHEET NO.: ESD-2951-10

DRAWING SHEET NO.: 10 OF 15

ENGINEERING STANDARD DRAWINGS

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REVISIONS

DRAWN BY: B. SMITH

CHECKED BY: B. SMITH

DATE: 11/20/15

DESIGNER IN CHARGE

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DRAWING NO.

SCALE:

NONE

CONTRACT SHEET NO.

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DRAWING NO.

SCALE:

NONE

CONTRACT SHEET NO.

NONE

CONTRACT SHEET NO.
**Quantities Shown for (1) Switch Point**

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<thead>
<tr>
<th>REIN. BARS</th>
<th>CLIPS</th>
<th>WEB BOLTS</th>
<th>ROD BOLTS</th>
<th>STOP BOLTS</th>
<th>REIN BAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-1/2&quot; x 3/4&quot; x 1 LBD</td>
<td>HEAD ROG TYPE A/F</td>
<td>HEAD ROG 1 LBD</td>
<td>11/32&quot; ROG</td>
<td>HUGS - BOLT TABLE</td>
<td>HUGS - BOLT TABLE</td>
</tr>
</tbody>
</table>

**Instructions**

- Rail to be 16" head hardened
- Switch Points to be made from new high-strength rail
- Curved left-hand switch point and straight switch hand rail to be made from straight head high-strength rail for right and left-hand switch points for left-hand turnouts
- Side bars furnished
- 90° act. cut - AT 1/8" DOWN
- Switch point stop blocks

**Bolt Table**

<table>
<thead>
<tr>
<th>BOLT #</th>
<th>BOLT DESCRIPTION</th>
<th>QTY</th>
<th>HOLE DIA.</th>
<th>A.B.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1/2&quot; x 1 1/8&quot;</td>
<td>1</td>
<td>1 1/8&quot;</td>
<td>2 1/8&quot;</td>
</tr>
<tr>
<td>2</td>
<td>1/2&quot; x 1 3/4&quot;</td>
<td>2</td>
<td>1 3/4&quot;</td>
<td>3 1/4&quot;</td>
</tr>
<tr>
<td>3</td>
<td>1/2&quot; x 2 1/2&quot;</td>
<td>3</td>
<td>2 1/2&quot;</td>
<td>3 1/2&quot;</td>
</tr>
<tr>
<td>4</td>
<td>1/2&quot; x 3 1/2&quot;</td>
<td>4</td>
<td>3 1/2&quot;</td>
<td>4 1/2&quot;</td>
</tr>
<tr>
<td>5</td>
<td>1/2&quot; x 4 1/2&quot;</td>
<td>5</td>
<td>4 1/2&quot;</td>
<td>5 1/2&quot;</td>
</tr>
<tr>
<td>6</td>
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<td>5 1/2&quot;</td>
<td>6 1/2&quot;</td>
</tr>
<tr>
<td>7</td>
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<td>7</td>
<td>6 1/2&quot;</td>
<td>7 1/2&quot;</td>
</tr>
</tbody>
</table>

**Notes**

1. Metal identification tag showing (1) design length of switch, (2) manufacturer's name, and (3) length of straight point rail, and (4) material number. (Note: Tag shall be fastened to switch point on base side of rail, at heel, near stirrup in locations such as a bending area. A second metal identification tag showing (1) switch point rail material number, and (2) manufacturer's name, shall be fastened to switch point at location shown.)

2. All switch points with switch rails furnished and made to be fastened to switch point at location shown.

3. All switch points with switch rails furnished and made to be fastened to switch point at location shown.

4. All switch points with switch rails furnished and made to be fastened to switch point at location shown.

5. All switch points with switch rails furnished and made to be fastened to switch point at location shown.

6. All switch points with switch rails furnished and made to be fastened to switch point at location shown.
ELEVATION OF "SMJ" CLIP ASSEMBLY FOR 3' SWITCHES
(DRAWN FOR 136 LB. RAIL; SPRING WASHER AND NUT REMOVED)

THIS SURFACE MUST BE 90° TO ROD

BEARING-HE-1

SHARP CORNER

STAMPED -HE-1

FIBRE ANGLE-AP-34

OFFSET BEARING CAP-B-1

OFFSET BEARING CAP-B-6

FIBRE CHANNEL-C-1

SCALE NONE

SCALE NONE

SCALE NONE

SCALE NONE

SCALE NONE

SCALE NONE

SCALE NONE

SCALE NONE

NOTES: (CONTINUED FROM SHEET 14)

1. 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'-0" SWITCHES THE 1" THICK SPRING WASHER SHOULD BE REPLACED WITH A 3" THICK SPRING WASHER BY THE STORNER DESIGNER TO REDUCE FORCES TO SPRING COTTER WITHIN THE LIMITS OF SLOT IN WEB BOLT NUT.

2. MATERIALS AND WORKMANSHIP SHALL MEET CURRENT A.R.E.M.A. SPECIFICATIONS FOR SPECIAL TRACKWORK UNLESS OTHERWISE SPECIFIED.

3. VERTICAL SWITCH ROD SHALL BE PLAINLY STAMPED TO INDICATE SWITCH THAT ROD ASSEMBLY CAN BE USED UPON. IDENTIFICATION MARKING WILL BE AS FOLLOWS:
   1-11 FOR USE ON 3'-0" SWITCHES, 120 LB. AND 125 LB. L.E. RAIL, SECTIONS
   1-15-30 FOR USE ON 11'-0" TO 30'-0" SWITCHES, 115 LB., 119 LB., 131 LB., 132 LB., 135 LB. L.E. RAIL, SECTIONS

4. MATERIALS AND WORKMANSHIP SHALL MEET CURRENT A.R.E.M.A. SPECIFICATIONS FOR SPECIAL TRACKWORK UNLESS OTHERWISE SPECIFIED.

5. VERTICAL SWITCH ROD SHALL BE PLAINLY STAMPED TO INDICATE SWITCH THAT ROD ASSEMBLY CAN BE USED UPON. IDENTIFICATION MARKING WILL BE AS FOLLOWS:
   1-11 FOR USE ON 3'-0" SWITCHES, 120 LB. AND 125 LB. L.E. RAIL, SECTIONS
   1-15-30 FOR USE ON 11'-0" TO 30'-0" SWITCHES, 115 LB., 119 LB., 131 LB., 132 LB., 135 LB. L.E. RAIL, SECTIONS
LOSSAN ENGINEERING STANDARD DRAWINGS

Section 3000

STATIONS
MINI-HIGH PLATFORM

MINI-HANDRAIL

REAR VIEW

FRONT VIEW

PLATFORM SCHEDULES

TYPE 1
SIDE PLATFORM (DOUBLE RAMP)

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.

TYPE 2
SIDE PLATFORM (SINGLE RAMP)

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.

TYPE 3
CENTER PLATFORM

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.
MINI HI CLEARANCES
STATION PLATFORM 15° ABOVE TOP OF RAIL

NOTE:
CLEARANCE SHOWN WILL ALSO APPLY TO HANDRAILS PARALLEL TO THE TRACK, E.G. APPROACH RAMPS TO THE ADA PLATFORM.

USE OF GUIDE RAIL IN LIEU OF 6" CURB

3" CURB IS REQUIRED UNLESS GUIDE RAIL IS USED AS SHOWN.
MINI-HIGH PLATFORM

STATION PLATFORM 8" ABOVE TOP OF RAIL
FOR MAINTENANCE ONLY

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.
MINI HI CLEARANCES
STATION PLATFORMS 8" ABOVE TOP OF RAIL
FOR MAINTENANCE ONLY

NOTE:
CLEARANCE SHOWN WILL ALSO APPLY TO HANDRAILS PARALLEL TO THE TRACK & APPROACH RAMPS TO THE ADA PLATFORM.
NOTE: FOR PLATFORMS 15" ABOVE TOP OF RAIL

1. CONCRETE SHALL DEVELOP 28-DAYS MIN. COMRESSIVE STRENGTH OF 6000 PSI AND 4000 PSI AT TRANSFER.
2. SURFACE TEXTURE TO BE COARSE AND ACHIEVED BY STIFF BRISTLED BROOM AND SPRING STEEL DEVICE OR BY METHODS THAT WOULD YIELD THE SAME RESULT.
3. ALL REINFORCED STEEL SHALL BE ASTM A706 GRADE 60 AND STEEL STRAND SHALL BE ASTM A416, GRADE 270 (LOW RELAXATION).
4. DOWEL BARS SHALL BE ASTM A615, GRADE 60. EPOXY COATED (IN GREEN COLOR).
5. REFER TO CONTRACT DRAWINGS, DETAILS AND SPECIFICATIONS FOR FINAL MINI-HIGH PLATFORM DESIGN, MATERIAL, FABRICATION AND INSTALLATION REQUIREMENTS.
6. REFER TO ESD-3203 FOR DETECTABLE WARNING TILE AND MARKING DETAILS.
NOTES:
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 END OF THE
   PLATFORM.
3. ALSO REFER TO E30-2101 AND E30-2102 FOR CLEARANCES.

SIDE PLATFORMS
TYPICAL SECTIONS

PENDING
REVISIONS
4/17/20

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

REVISIONS
DRAWN
CHECKED
RECOMMENDED
DATE
RAILPROS
B. SMITH
B. SCHMITH
04/25/17
DESIGNER PE STAMP

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

ENGINEERING STANDARD DRAWINGS
SIDE PLATFORMS
TYPICAL SECTIONS
DRAWING NO. E30-3001
DRAWING SHEET NO. 1 OF 1
SCALE 1:1

SIDE PLATFORM

6" PERFORATED SUBBALLAST

SEE NOTE ENGINEERING STANDARD ES-3001 FOR FOOTING DETAILS.

NOTES:
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 END OF THE
   PLATFORM.
3. ALSO REFER TO E30-2101 AND E30-2102 FOR CLEARANCES.

SIDE PLATFORMS
TYPICAL SECTIONS

PENDING
REVISIONS
4/17/20

810 Mission Avenue
Oceanside, CA 92054
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REVISIONS
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ENGINEERING STANDARD DRAWINGS
SIDE PLATFORMS
TYPICAL SECTIONS
DRAWING NO. E30-3001
DRAWING SHEET NO. 1 OF 1
SCALE 1:1

SIDE PLATFORM

6" PERFORATED SUBBALLAST

SEE NOTE ENGINEERING STANDARD ES-3001 FOR FOOTING DETAILS.

NOTES:
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 END OF THE
   PLATFORM.
3. ALSO REFER TO E30-2101 AND E30-2102 FOR CLEARANCES.
NOTE:
1. LIGHT POLE AND CANOPY SHOWN AS REFERENCE ONLY.
   ACTUAL DESIGN TO BE DETERMINED BY THE ARCHITECT.
2. STATION PLATFORM DESIGNER THEN RECOMMENDS
   SHALL BE PLACED AT THE CENTER OF THE PLATFORM.
3. SL PRISM RECOMMENDS CENTER PLATFORM
   WILL BE FOR CONSTRUCTION OF CENTER
   PLATFORM THE CONFIGURATION SHOWN ON THE
   DRAWING IS RECOMMENDED.
4. ALSO REFER TO ESD-2101 AND ESD-2102 FOR CLEARANCES.
**ENGINEERING STANDARD DRAWINGS**

**DRAWING NO.**

**SCALE:**

**DRAWING SHEET NO.**

**CONTRACT SHEET NO.:**

**REVISIONS:**

**DRAWN: RAILPROS**

**RECOMMENDED:**

**CHECKED:**

**DESIGNER PE STAMP:**

**RAILPROS**

**B. SMITH**

**B. SCHMITH**

**INFORMATION / RESTRICTIVE COPY LAYOUTS**

1. **ELEVATOR BRIDGE FOR ACCESS TO TRACK 2**
2. **ACCESS TO TRACKS 1 & 2**
3. **BRIDGE TO TRACK 2**
4. **EXIT SALIDA**

**NOTE:**

- **ELEVATORS & SIGNS:**
- **ACCESS:**
- **DATE:**
- **SCALE:**
- **DRAWING SHEET NO.:**
- **CONTRACT SHEET NO.:**
- **REVISIONS:**
- **DRAWN:**
- **RECOMMENDED:**
- **CHECKED:**
- **DESIGNER PE STAMP:**
- **RAILPROS**
- **B. SMITH**
- **B. SCHMITH**

**SAN DIEGO ASSOCIATION OF GOVERNMENTS**

**810 Mission Avenue**

**Oceanside, CA 92054**

**www.sandag.org**

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**INFORMATION / RESTRICTIVE COPY LAYOUTS**

1. **ELEVATOR BRIDGE FOR ACCESS TO TRACK 2**
2. **ACCESS TO TRACKS 1 & 2**
3. **BRIDGE TO TRACK 2**
4. **EXIT SALIDA**

**NOTE:**

- **ELEVATORS & SIGNS:**
- **ACCESS:**
- **DATE:**
- **SCALE:**
- **DRAWING SHEET NO.:**
- **CONTRACT SHEET NO.:**
- **REVISIONS:**
- **DRAWN:**
- **RECOMMENDED:**
- **CHECKED:**
- **DESIGNER PE STAMP:**
- **RAILPROS**
- **B. SMITH**
- **B. SCHMITH**
NOTES:

1. WHERE FENCE IS LOCATED LESS THAN 10'-2" FROM CENTERLINE OF TRACK, INSTALL PAUL 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 21019 AND B12191 FOR MINIMUM CLEARANCES.
TRAILBLZER SIGN:
PAINTED ALUM. SIGN PANELS ATTACHED TO EXISTING LIGHT STANDARD.

SIGNS:
1. SEE DRAWINGS ESD-3307 AND ESD-5210 FOR POST MOUNTING AND ANCHORAGE DETAILS.

MATERIAL:
1. 3/4" 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, SIL SCREEN LEGEND WITH BLACK INK.
3. FINISH WITH EXTERIOR PRESSURE SENSITIVE CLEAR NURITE, 3M-1105 OR EQUAL.
4. EXPOSED PORTIONS OF PLANK (TYPE A) TO BE PAINTED WITH METALIC AND LAMBLACK, MAKING A VERY DARK BROWN.
5. BASE OF PLANK TO HAVE A COAT OF COAL TAR APPLIED HOT TO 6' ABOVE GROUND.

NOTE:
SI.E 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 LIASON 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
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. 3/16" 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.

BACKGROUND COLOR: BLUE
COPY COLOR: WHITE

Unauthorized vehicles parked in designated accessible spaces not displaying distinguishing placards or license plates issued for persons with disabilities may be towed away at owner's expense. Towed vehicles may be reclaimed at (insert city) police or by telephoning (city police ph. number).

Vehículos no autorizados estacionados en espacios señalados como accesibles sin muestra de cartel o placas de estacionamiento para personas con discapacidades pueden ser remolcados al cargo del propietario. Vehículos remolcados pueden ser reclamados con la policía de (insert city) o llamando (insert city police ph. number).

NOTE: Project engineer to verify that the phone numbers are still current at time of issue of plans.
SIGN PANEL ATTACHED TO POST

SIGN PANEL ATTACHED TO POST WITH TAMPERPROOF FASTENER, TYP.

5" SILKSCREENED SYMBOL
COLOR: WHITE

PAINTED ALUM. PANEL
COLOR: ACCESSIBLE BLUE

COPY
COLOR: WHITE

EASED CORNERS (TYP.)

PAINTED ALUM. POST
COLOR: GREY

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.

1. LOCATE ON EXISTING FENCE OR POST AS AVAILABLE, OTHERWISE INSTALL NEW POST.

2. SEE DRAWINGS ESD-3307 AND ESD-3310 FOR POST/MOUNTING AND ANCHORAGE DETAILS.

MATERIAL:

1. 3" 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 FLAXCE, 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 AND MOUNTING:
1. Locate on existing fence or post as available, otherwise install new post.
2. See drawings ESD-3310 and ESD-5210 for post/column and anchorage details.

MATERIAL:
1. 3" 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 affair, 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 8" above ground.

SIGN 3310-02

COLOR: GREEN PMS 342
REFER TO MUTCD R32D (SIMILAR)

LOCATION:
These signs shall be located at each limited parking stall or zone. Time limit shall be verified by owner.

TYPICAL SIDEVIEW
SCALE: NONE

SIGN PANEL ATTACHED TO POST

SIGN PANEL ATTACHED TO POST WITH TAMPERPROOF FASTENER, TYP.

REV. DATE DESCRIPTION DES. ENG.

DATE 12/11/15 DESIGNER B. SMITH

ENGINEERING STANDARD DRAWINGS
DRAWING NO. ESD-3310-02
DRAWING SHEET NO. 2 OF 6
SCALE: NONE

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

DESIGNER PE STAMP
RAILPROS
B. SMITH
B. SCHMITH

RESTRICTIVE SIGN
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. 3" 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 red and lampblack, making a very dark brown.
5. Base of plank to have a coat of coal tar applied hot to 6" above ground.

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 red and lampblack, making a very dark brown.
5. Base of plank to have a coat of coal tar applied hot to 6" above ground.

SIGN 3310-03
TYPICAL SIDEVIEW
SCALE: NONE

PASSenger
LoaDing
OnLy
CARGA DE
PASAJEROS
SOLAMENTE

LOCATION:
These signs shall be located in existing segments along the passenger loading zone curb. A minimum of three will be required.

PANeL FrONT & EDGES
WHITE

4" GALVANIZED STEEL POST
COLOR: GREY

EASED CORNER, TYP.

PAINTED ALUMINUM SIGN PANEL
WITH SCREENED SYMBOLS & COPY

SIGN PANEL ATTACHED TO POST

SIGN PANEL ATTACHED TO POST WITH TAMPERPROOF FASTENER, TYP.

CL. OF PANEL & POST

SCALE: NONE

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

ENGINEERING STANDARD DRAWINGS
DRAWING NO.
DRAWING SHEET NO.
CONTRACT SHEET NO.
REV.
DATE
DESCRIPTION
DES.
ENG.
DATE
DRAWN
RECOMMENDED
CHECKED

DESIGNER PE STAMP
RAILPROS
B. SMITH
B. SCHMITH

RESTRICTIVE SIGN
ESD-3310-03
DRAWING SHEET NO.
3 OF 6

NONE
SIGN PANEL ATTACHED TO POST WITH TAMPERPROOF FASTENER, TYP.

LOCATIONS:
1. LOCATION ON EXISTING FENCE OR POST AS AVAILABLE, OTHERWISE INSTALL NEW POST.
2. SEE DRAWINGS ESD-007 AND ESD-010 FOR POST MOUNTING AND ANCHORAGE DETAILS.

MATERIAL:
1. 0.04 INCH THICK MILL FINISH ALUMINUM PANEL, ALCOA 6016-T6 OR EQUAL.

COATTINGS:
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 VARNISH, 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.

SE PROHIBA A TODAS LAS PERSONAS ENTRAR O ATRAVESAR LAS VÍAS EXCEPTO EN CRUCES DESIGNADOS
CA PENAL CODE 554, 555, 602, 369 TYP 99170

THIS SIGN SHALL BE LOCATED BETWEEN THE STATION TRACKS, AT AN INTERVAL OF NO MORE THAN 100 FEET, AND AT EACH END OF EACH PLATFORM, OR AS REQUIRED.

SIGN 3310-04
SCALE 1"=1'-0"

4/17/20
NO SMOKING ON NCTD PROPERTY
Per NCTD Ordinances 1 and 2; Penal Code sections 640(a) and 640(b)(3)

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. 1/4" 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 LAMPHI BLACK, MAKING A VERY DARK BROWN.
5. BASE OF PLANK TO HAVE A COAT OF COAL TAR APPLIED HOT TO 6" ABOVE GROUND.
No bicycling, rollerblading or skateboarding allowed on platform.
No se permiten bicicletas, patines o patinetas en la plataforma.
MOUNTING ELEVATION

SCALE: NONE

ALUMINUM PANEL W/ 3M EXTERIOR GRADE REFLECTIVE VINYL SHEETING

BACKGROUND COLOR: WHITE

1" HIGH FRISKET PAINTED COPY COLOR: BLACK

1' - 6"

2' - 0"

EASED CORNERS (TYP.)

2" SQUARE GALVANIZED STEEL POST ANCHORED INTO HARDSCAPE AS RECO:

NOTE: ISOLATE METALS W/ NEOPRENE SPACERS TO PREVENT ELECTROLYSIS.

LOCATION: THIS SIGN SHALL BE LOCATED AT ALL ENTRANCES TO STATION PARKING FACILITIES.

1. LOCATE ON EXISTING FENCE OR POST AS AVAILABLE, OTHERWISE INSTALL NEW POST.
2. SEE DRAWINGS ESD-3307 AND ESD-5210 FOR POSTMOUNTING AND ANCHORAGE DETAILS.

MATERIAL:
1. 3/4"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 & 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 NOT TO 6" ABOVE GROUND.

NOTE: PROJECT ENGINEER TO VERIFY THAT THE PHONE NUMBERS ARE STILL CURRENT AT TIME OF ISSUE OF PLANS.
**A. Elevation - Crossing Warning Sign**

- **Warning!**
- **Do Not Cross Tracks When Gates Are Down**
- **Trains Approach in Both Directions**

---

**B. Detail / Photograph**

- **NOTE:**
  - For warning instructions, see Engineering Standard ESD-3317.

---

**C. Caution Sign**

- **CAUTION!**
- **STAY BEHIND YELLOW LINE**
- **NOT ALL TRAINS STOP AT STATIONS**

---

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401 B Street, Suite 800
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www.sandag.org

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Oceanside, CA 92054
www.gonctd.com

**DESIGNER PE STAMP**
RAILPROS
B. SCHMITH

**ENG. DATE**
12/2/16

**DRAWING NO.**
ESD-3317

**SCALE:**
1:1

**CONTRACT SHEET NO.:**
NONE

**ENGINEERING STANDARD DRAWINGS**

**PEDESTRIAN WARNING SIGNS**

**AT STATION PLATFORMS**
**Push Gate To Open**

**Empuje para abrir**

**Pull Gate To Open**

**Jale para abrir**

**Exit Only**

**Salida Solamente**

**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 AND MOUNTING:**
1. Locate to 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. 0.125" thick mill finish aluminum panel, Alcoa 6061-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.

**PEDESTRIAN DIRECTIONAL LOOK SIGN POST MOUNTED SIGN**

- **LOOK**
- **Signs mount to 2" square painted aluminum post color: white**
- **(See attachment detail 4 ESD 3307-03)**
- **5' 6" from gate**
- **2' cap height**
- **R = 1/2" (typ.)**
- **Signs mount to 2' square painted aluminum post color: white**
- **(See attachment detail 4 ESD 3307-03)**
- **3/4" from gate**
- **5' 6" to center of st 18**
- **Concrete footing as required**

**ENGINEERING STANDARD DRAWINGS**

<table>
<thead>
<tr>
<th>DRAWING NO.</th>
<th>DRAWING SHEET NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESD-3319</td>
<td>2 of 2</td>
</tr>
</tbody>
</table>

**REV. DATE DESCRIPTION**

<table>
<thead>
<tr>
<th>REV</th>
<th>DATE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>12/11/15</td>
<td>DESIGNER'S STAMP</td>
</tr>
</tbody>
</table>

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401 B Street, Suite 800
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www.sandag.org

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

**NORTH COUNTY TRANSIT DISTRICT**
519 Mission Avenue
Oceanside, CA 92054
www.nctd.com
1. Signs to be placed at all stations, one sign every 85' on each platform.

2. Sign to be 3M silver 3M Engineer Grade background.

3. Letters to be Arial bold per drawing ESD-1212 white 3M.

4. 3650-12 "Scotchcal Plus" Series "C" non-reflective or 3M processed ink.

5. 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.

SCALE: NONE

NOTES:

- Variable with 4" min. and 8'-0" max. length of sign.
- Letters 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.

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ENGINEERING STANDARD DRAWINGS

SIGN 3320.1

COLOR: BLACK

SAMPLE TEXT ONLY; NAME OF STATION AS SPECIFIED ON PURCHASE ORDER

STATION NAME

OF RAIL

OF SIGN

OF PLATFORM

OF FENCE

8" X 8" SQUARE PIPE

8" X 8" SQUARE PIPE

8" X 8" SQUARE PIPE

12" X 4" DEEP SIGN

12" X 4" DEEP SIGN

12" X 4" DEEP SIGN

8" X 2" X 1' SPACER WELDED TO BLACK COLORED POST (TYP)

8" X 2" X 1' SPACER WELDED TO BLACK COLORED POST (TYP)

8" X 2" X 1' SPACER WELDED TO BLACK COLORED POST (TYP)

48" TOP OF PLATFORM TO TOP OF HANDRAIL

48" TOP OF PLATFORM TO TOP OF HANDRAIL

48" TOP OF PLATFORM TO TOP OF HANDRAIL

LOCATION DETAIL

PLATFORM PLAN VIEW- SIGN LOCATION
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 POSTING UNITING AND ANCHORAGE DETAILS.

MATERIAL:
1. 1/8" THICK MILL FINISH ALUMINUM PANEL, ALOOA 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 NOT 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.
**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.

**SIGNS**

- LOCATION AND MOUNTING:
  1. LOCATE ON EXISTING FENCE OR POST AS AVAILABLE, OTHERWISE INSTALL NEW POST.
  2. SEE DRAWINGS ESD-3307 AND ESD-4032 FOR POST/MOUNTING AND ANCHORAGE DETAILS.

- MATERIAL:
  1. 3/8" THICK 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, JM 1100 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 NOT TO EXCEED 1/4" ABOVE GROUND.

**DESCRIPTION:**

- FAKE PAID ZONE
  - IN THIS STATION YOU MUST HAVE A VALID TICKET OR PASS, OR BE IN THE PROCESS OF PURCHASING ONE.
  - CA PENAL CODE 640

- ZONA CON TARIFAS
  - DENTRO DE ESTA ESTACION DEBE USTED TENER UN BOLETO VALIDO. UN PASO O ESTAR EN DISPOSICIÓN DE COMPRAR UNO.
  - CA PENAL CODE 640

**SIGN 3324-01.1**

- WHITE PER NCTD STANDARDS
- BACKGROUND COLOR: WHITE
- COPY COLOR: BLACK

**SIGN 3324-01.2**

- WHITE PER NCTD STANDARDS
- BACKGROUND COLOR: WHITE
- COPY COLOR: BLACK
ADA EXTERIOR STATION IDENTIFICATION SIGNS

LOCATION AND MOUNTING:
1. Locate on existing fence or post as available. Otherwise install new post.
2. See drawings ESD-3325 and ESD-3326 for post mounting and anchorage details.

MATERIAL:
1. 3/8" thick mill finish aluminum panel, Alcoa 5052-H32 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. Finishes 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.

LIGHT STANDARD ELEVATION (WHERE OCCURS)

SIGN 3325.1

STATION NAME
STATION NAME LINE 2
VALID FARE
REQUIRED TO BOARD
TRAIN

EASED CORNERS, TYP.
GRADE 2 BRAILLE
COLOR: WHITE

BACKGROUND
COLOR: BLUE PMS 286

3/8" HIGH TACTILE COPY
COLOR: WHITE

3/8" THICK ETCHED PANEL
3/8" SIGN PANEL

MOUNTING AT CANOPY

DRAWING NO:
ENGINEERING STANDARD DRAWINGS
ADHERING TO 12/11/15
ESD-3325
DRAWING SHEET NO:
1 OF 1
SCALE:
NONE

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Oceanside, CA 92054
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DESIGNER PE STAMP
B. SMITH
RAILPROS

CHECKED
B. SMITH

RECOMMENDED
B. SMITH

REV DATE DESCRIPTION DEP W/H
12/11/15
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 CLEARCLEX 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.
NOTE:
CONTACT NCTD FOR LATEST PLACEMENT REQUIREMENTS.

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 POSTMOUNTING 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 "A" SIGNS

FACE SIGN 30-1

3" SQUARE PAINTED STEEL POST. (PAINT GRAY)

SPOT CAB SIGN

12'-0" TRACKSIDE INSTALLATION
10'-0" PLATFORM INSTALLATION

3" SQUARE PAINTED STEEL POST. (PAINT GRAY)

3" PANEL

1'-0" CLEARANCE REQUIRED

SCREENED COPY COLOR: BLACK (TYPE.)

TYPE "B" PLATFORM SECTION

FACED END OF PLANK (TYPE A)

SCREENED COPY COLOR: BLACK (TYPE.)

SIGN "A"

NOTE:
CONTACT NCTD FOR LATEST PLACEMENT REQUIREMENTS.

SIGN NUMBER DIRECTLY RELATED TO THE NUMBER OF CARS

ENGINEERING STANDARD DRAWINGS

DRAWING NO.

DRAWING SHEET NO.

CONTRACT SHEET NO.

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www.sandag.org

NORTH COUNTY TRANSIT DISTRICT
810 Mission Avenue
Oceanside, CA 92054
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REV. DATE DESCRIPTION REV. DES.

ENGINEER'S STAMP

RAILPROS
B. SMITH

OF

12/11/15

DES.
ENG.
DRAWN
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ENGINEERING STANDARD DRAWINGS

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B. SMITH

OF

12/11/15

DES.
ENG.
DRAWN
RECOMMENDED
CHECKED
NOTES:
1. SIGNS SHALL BE ORIENTED FACING TRAIN, AND AT RIGHT ANGLES TO THE TRACK.
2. CONTRACTOR TO FURNISH SHOP DRAWINGS FOR ACTUAL PLACEMENT AT EACH LOCATION.

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

LEGEND:
- TYPE "A"
- CENTERLINE OF TRACK
- ACCESSIBLE PLATFORM

FACE SIGN 30-1
FACE SIGN 30-2
FACE SIGN 30-3
FACE SIGN 30-4
FACE SIGN 30-5

SIGN ON PLATFORM TO BE VISIBLE TO INBOUND TRAINS ON BOTH SIGNS

FACE SIGN 30-6

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ENGINEERING STANDARD DRAWINGS
DRAWING NO. ESD-3330-02
DRAWING SHEET NO. 2 OF 2
SCALE NONE

CONTRACT SHEET NO.

DATE 12/11/15
DESIGNER IN CHARGE

SAN DIEGO ENGINEERING STAMP

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WWW.SANDAG.ORG

B.SCHMITH
B. SMITH
1. Hinge sleeve grade of steel to be ASTM A 441 hardened steel.

2. All hinge sleeve dimensions are in inches unless otherwise noted.

3. Hinge sleeve machining shall be precision to the nearest thousandth of an inch (0.001).

4. Rotating curved contact surfaces of hinge sleeve (curves surfaes "B" and "A") to be polished.

5. 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 hinge as necessary and repeat testing until gate operation is approved by engineer.

6. Force required to operate shall be 22N (5 lbs) max.
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**ENGINEERING STANDARD DRAWINGS**

**PEDESTRIAN BARRICADE AND METAL HAND RAILING DETAILS**

---

**NOTES:**

1. PEDESTRIAN BARRICADE SHALL BE AS PER CALTRANS PLAN 60P-55 AND AS MODIFIED HEREWITH.
2. USE POST TO RECEIVE 1 1/2" BACK FROM FACE OF CURB UNLESS OTHERWISE SPECIFIED.
3. STEEL HANGER TO BE CONSTRUCTED WITH A QUARTER OF 1/4" LARGER THAN POST WALL THICKNESS.  REMOVE BOLTS TO THE SAME AS POST OR LARGER.
4. CONTRACTOR MAY SUBMIT ALTERNATIVE DETAILS FOR APPROVAL BY SDG
5. FOR MINIMUM PIPE DIAMETERS AND WALL THICKNESS REFER TO SDG
6. THE LOCATION OF BARRICADE SHALL BE COORDINATED WITH LOCAL AUTHORITY.
7. THE POSTS SHALL BE CROSSES 3ACROSS FOR 10" X 10" CROSSWALK: DRAINAGE HOLE AS PER CALTRANS SHALL BE INSTALLED AT APPROPIATE LOCATIONS AS NEEDED.

---

**NOTES:**

1. METAL HAND RAILING SHALL BE AS PER APWA STANDARD PLAN 600-2, TYPE 3 AND 25 FEET LONGER.
2. HANGERS AND PICKETS SHALL BE GALVANIZED STEEL PIPE.
3. MAXIMUM SPACING OF POSTS SHALL BE BASED ON TRAFFIC ACHIEVEMENT AND MUST BE CORRECT ALIGNMENTS WITH LESS THAN 6" DEVIATION IN SPACING BETWEEN CHAINEERING ALIGNMENTS.
4. HAND RAILING SHALL BE SLIGHTLY LESS THAN THICKNESS OF PIPE TO BE USED AS MOUNTING STUD.
5. INSTALL HIGH VISIBILITY YELLOW REFLECTIVE TAPE 3" X 3/4".
PEDESTRIAN FACILITIES AT ACUTE ANGLE VEHICLE CROSSING - ENTRANCE / EXIT GATES

NOTES:
1. THESE STANDARDS ARE NOT INTENDED TO REPLACE EXISTING REGULATORY STANDARDS, NOR TO BE A SUBSTITUTE FOR ENGINEERING KNOWLEDGE, EXPERIENCE AND JUDGMENT, BUT ARE REQUIREMENTS, WHICH ARE MOST IMPORTANT FOR SAFE CONSTRUCTION, MAINTENANCE AND OPERATION OF PEDESTRIAN FACILITIES AT HIGHWAY-RAIL CROSSINGS, SINCE THE ACTUAL DESIGN WILL TYPICALLY BE SITE SPECIFIC. INFORMATION SHOWN ON THE DRAWING WILL BE MODIFIED AS NECESSARY IN CLOSE COLLABORATION WITH SANDAG/NCTD.

2. FOLLOW CALIFORNIA MUTCD FOR STRIPPING, SIGNING, AND OTHER TRAFFIC WARNING DEVICES.

3. REFER TO THE FOLLOWING FOR ADDITIONAL DESIGN INFORMATION:
   a. ENGINEERING STANDARD ESD-501 FOR CONCRETE PANELS AND PAVED END RAMP.
   b. ENGINEERING STANDARD ESD-5101 FOR INTER-TRACK FENCE.
   c. ENGINEERING STANDARD ESD-6107 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-4005 FOR PEDESTRIAN WARNING DEVICES.
   g. CALTRANS STANDARD PLANS A020 FOR TRAFFIC LINES (STRIPES) AND AREA FOR DETECTABLE WARNING SURFACE (STRIPE), SQUARE GRID PATTERN.
   h. CALTRANS STANDARD PLANS A028 DETAIL 27B AND A202 TYPE "C" FOR PAVEMENT MARKERS.
   i. AASHTO STANDARD PLAN 6026. TYPE "R" FOR STEEL TUBE RAIL, (ONE ADDITIONAL RAIL 4" FROM BOTTOM).

4. FENCING AND STEEL TUBE RAIL LOCATIONS SHALL BE ADJUSTED AS NEEDED TO PROVIDE MAINTENANCE VEHICLES ACCESS TO RIGHT-OF-WAY AND SIGNAL & TRACK FACILITIES WITH NCTD'S APPROVAL.

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

ENGINEERING STANDARD DRAWINGS

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1. STRUCTURAL STEEL SHALL CONFORM TO ASTM A36 SPECIFICATIONS. MELDING TO BE PER CODE.
2. ALL EXPOSED STEEL TO RECEIVE ONE COAT PRIMER.
3. END ANGLES AND GAGE PANELS TO RECEIVE ONE COAT OF PAINT TO IMPROVE SHUNT RESISTANCE.
4. REINFORCING STEEL AND CLADDING TO BE CONSTRUCTED TO MEET SHUNT REQUIREMENTS.
5. A NON-CONDUCTIVE SPACER TO BE ATTACHED TO GAGE FRAME CLADDING ON END PANELS SHOULD EXTEND BEYOND CONCRETE + 1'-7" FROM THE TIEFIELD.
6. REINFORCING STEEL SHALL CONFORM TO CURRENT ASTM A-615 SPECIFICATION Grade 60. If any rebar is being used for reinforcement, the material shall conform to ASTM A-616 specification.

CONCRETE MATERIALS, PLACING AND CURING TO BE IN ACCORDANCE WITH PCI MANUFACTURER'S INSTALLATION AND HANDLING MANUAL FOR INSTALLATION INSTRUCTIONS.

NOTES:
1. GAGE CROSSING GAGE PANELS SHALL BE SHUNT RESISTANT.
2. PANELS SHALL BE CLOD USING 3" X 3" ANGLE.
3. PANELS MUST BE MANUFACTURED FOR APPROPRIATE WEIGHT OF WELDED RAIL WITH OR WITHOUT BAR ANCHORS.
4. PANELS MUST BE INSTALLED ON 10 FT., FLAT, GOOD QUALITY TIMBER RAILROAD TIES.
5. MORTAR BAR ANCHORS, 5/8" DIA. X 4" LONG HEADED DEFORMED BAR ANCHORS TO BE INSTALLED TO THE FULL DEPTH OF THE TIE AND ONLY AT 19" SERIES TRANSITION TIES ON EITHER END OF THE CROSSING.
6. ALL HOLES AND BLOCKOUTS IN THE SIDEWALL AREA SHALL BE FILLED FLUSH WITH EPOXY AGENT AND REPAIR MATERIAL. SURFACE OF THE REPAIRED AREA IS TO MATCH THE COLOR OF THE SURROUNDING AREA.
7. No rail joints allowed in crossing unless approved by the engineer. All rail joints shall be of the same grade and shall be installed flush with the top of the rail in the crossing.
8. REFER TO MANUFACTURER'S INSTALLATION AND HANDLING MANUAL FOR INSTALLATION INSTRUCTIONS.
9. SIGNAL CROSSINGS AND SPACES BETWEEN CROSSINGS AT GAGE PANELS WHERE INDOOR ISLANDS ARE TO BE INSTALLED, ONE OF THE FOUR CONDUITS ON BOTH SIDES OF THE TRACKS IS TO BE CARRIED AND CARRIED IN THE CENTER OF THE CROSSING.
FLANGEWAY FILLER AND FIELD SIDE FILLER MUST COMPLY MINIMUM BLOCKOUT C\:\Users\karina.guevara\Desktop\BSmithSig.PNG EXCEPT WHERE NOTED.

DESIGNER PE STAMP DESIGNER PE STAMP

CONTRACT SHEET NO.

CURVED CONCRETE PANELS

DETAIL 6

EDGE OF GAGE PANEL

A. DESIGNER SHALL SUBMIT PRE-ATTACHED FLANGEWAY FILLER DESIGN AND DETAILS FOR REVIEW AND APPROVAL PRIOR TO FABRICATION.

B. SMART RESISTANT RUBBER FILLERS BOLTED TO STEEL FRAME ON 1/2" CENTERS.

C. LAG-DOWN CONCRETE PANELS WITH PRE-ATTACHED RUBBER FILLERS SHALL BE DESIGNED WITH A MINIMUM SAFETY FACTOR=4. PROFESSIONAL ENGINEERING STAMP REQUIRED. OR APPROVED DESIGN CALCULATIONS MUST BE SUBMITTED TO THE SANDAG DIRECTOR OF ENGINEERING AND CONSTRUCTION FOR REVIEW AND APPROVAL PRIOR TO FABRICATION.

TYPICAL SHUNT SPACER

DETAIL 9

LIFTING INSERTS SHALL BE DESIGNED WITH A MINIMUM SAFETY FACTOR=4. PROFESSIONAL ENGINEERING STAMP REQUIRED. DESIGN 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.

NOTE:

ALL DATA TO BE IN" EXCEPT WHERE NOTED.

CURVED CONCRETE PANELS

DETAIL 7

JOINT BETWEEN PANELS

NOTE:

SLOPE 8:1 MAX COMPLY WITH CPUC G.O. 118.

CURVED CONCRETE PANELS

DETAIL 8

PANEL TOP

DATTEN 133443 OR APPROVED INSERT

NOTE:

LIFTING DEVICES SHALL BE USABLE WITH BURKE OR DAYTON 5-TON CLUTCH SYSTEMS.

NOTE:

LIFTING DEVICES SHALL BE USABLE WITH BURKE OR DAYTON 5-TON CLUTCH SYSTEMS.

NOTE:

TYPICAL LIFTING DEVICE AND BLOCKOUT

DETAIL 10

LAG HOLE DETAIL

DETAIL 11

NOTE:

TYPICAL LIFTING DEVICE

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 STEELS.

B. CURVED PANELS USE STANDARD REINFORCEMENT SIMILAR TO TANGENT PANEL STANDARD REINFORCEMENT.

C. LAG HOLES MUST LINE UP WITH THE CENTERLINE OF TIES.

NOTES:

A. LIFTING DEVICES SHALL BE USABLE WITH BURKE OR DAYTON 5-TON CLUTCH SYSTEMS.

B. CURVED PANELS WITH FIXED ATTACHED SHUNT RESISTANT RUBBER FILLERS BOLTED TO STEEL FRAME.

C. LAG-DOWN CONCRETE PANELS WITH PRE-ATTACHED RUBBER FILLERS SHALL BE DESIGNED WITH A MINIMUM SAFETY FACTOR=4. PROFESSIONAL ENGINEERING STAMP REQUIRED. OR APPROVED DESIGN CALCULATIONS MUST BE SUBMITTED TO THE SANDAG DIRECTOR OF ENGINEERING AND CONSTRUCTION FOR REVIEW AND APPROVAL PRIOR TO FABRICATION.

TYPICAL LIFTING DEVICE AND BLOCKOUT

DETAIL 10

LAG HOLE DETAIL

DETAIL 11
INSTALLATION INSTRUCTIONS:
1. Insert pin on deflector shield through hole in the end block.
2. Hook eye bolt through hole in end block closest to rubber crossing material.
3. Extend eye bolt through hole in deflector shield and fasten with nuts.
4. Deflector shields shall not be situated for trainmen’s walkways per UPDC-GC-118.

THIS DRAWING TO BE USED FOR MAINTENANCE PURPOSES ONLY.
NOTICE TO 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.

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.

1. 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).

3. Flaggers shall account for advanced preemption, where applicable.

4. Flaggers shall account for advanced preemption, where applicable.

NOTES CONT.

ENGINEERING STANDARD DRAWINGS

REV. | DATE | DESCRIPTION | REV. | DATE | DESCRIPTION | REV. | DATE | DESCRIPTION | REV. | DATE | DESCRIPTION
--- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | ---
0 | 10/08/15 | DESIGNER PE STAMP | 0 | 10/08/15 | DESIGNER PE STAMP | 0 | 10/08/15 | DESIGNER PE STAMP | 0 | 10/08/15 | DESIGNER PE STAMP

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RAILPROS
B. SMITH
B. SCHMITH

OF

ENGINEERING STANDARD DRAWINGS
TIME SHEET NO.

REV. | DATE | DESCRIPTION | REV. | DATE | DESCRIPTION | REV. | DATE | DESCRIPTION | REV. | DATE | DESCRIPTION
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0 | 10/08/15 | DESIGNER PE STAMP | 0 | 10/08/15 | DESIGNER PE STAMP | 0 | 10/08/15 | DESIGNER PE STAMP | 0 | 10/08/15 | DESIGNER PE STAMP

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RAILPROS
B. SMITH
B. SCHMITH

OF
NOTES:

1. 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 SCAEF AND EFFICIENT MOVEMENT OF TRAINS, VEHICLES, BICYCLISTS AND PEDESTRIANS, THE ENGINEER MUST APPROVE ANY AND ALL TEMPORARY TRAFFIC CONTROL PLANS AND DEVICES.

2. 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).

3. 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; FOR THE FLAGGER QUALIFICATIONS, CLOTHING, HAND-SIGNAL DEVICES, FLAGGER PROCEDURES AND FLAGGER STATIONS DOES NOT MEET THE SANDAG/NCTD, CA MUTCD, OR CALTRANS REQUIREMENTS. THE TEMPORARY TRAFFIC CONTROL WILL BE TERMINATED INSTANTLY AND WORK WILL BE RESUMED AT A LATER DATE AFTER APPROVAL HAS BEEN GRANTED BY THE ENGINEER.

4. 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 ZONES. REFER TO THE ACCOMPANYING FLOW CHART THAT PROVIDES A QUICK REFERENCE TO THE RELATIONSHIP BETWEEN RAILROAD CROSSING CONDITIONS AND TRAFFIC CONTROL REQUIREMENTS.

5. 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 ZONE, LANE RESTRICTIONS, FLAGGING, OR OTHER OPERATIONS AND QUEUING OF VEHICLES ACROSS THE TRACK(S) CANNOT BE AVOIDED.
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.

**NOTES:**

- Asphalt pavement 2'-1'-0" thick stop bars (typical both sides)
- Existing ballast
- Double layer of geotextile
- Class 2 base 6" thick
- Ballast as per specifications
- 6" min. perforated CMP pipe
- E85 ground line
- Double layer of geotextile
- Black border and cross per material specifications
- Environment law shall be followed when disposing of the asphalt materials.
RAILROAD CROSSING CROSSBUCK

**RAILROAD CROSSING SIGN-COMPLETE**

1. **NO SCALE**
   - 16" X 16" "CLEAN" TREATED TIMBER POST
   - 2 BLADES PER SET

2. **4 x 4" GALVANIZED MACHINE BOLTS**
   - GALVANIZED HEX NUTS, TAMPER RESISTANT; 1/4" DIA., TAP.
   - GALVANIZED CUT CATCHERS FOR 4" O.D. BOLTS.

3. **ADJUST HEIGHT LENGTH TO BE USED ON OTHER THAN 6" TALL POST**

**RAILROAD CROSSING SIGN-COMPLETE (ALTERNATE)**

1. **NO SCALE**
   - 16" X 16" "CLEAN" TREATED TIMBER POST
   - 2 BLADES PER SET

2. **4 x 4" GALVANIZED MACHINE BOLTS**
   - GALVANIZED HEX NUTS, TAMPER RESISTANT; 1/4" DIA., TAP.
   - GALVANIZED CUT CATCHERS FOR 4" O.D. BOLTS.

**NOTES:**

1. SIGN NO. R15-1 WILL BE USED WHEN INSTALLATIONS AND FOR THE REPLACEMENT OF EXISTING RAILROAD HIGHWAY CROSSING SIGNS, ON UTILIZATION BASE AS RENEWALS ARE REQUIRED, EXISTING WOODEN CROSSBuck BLADES WILL BE REPLACED WITH EXTRUDED ALUMINUM ALLOY 6063T6 EXCEPT AS OTHERWISE PROVIDED.

2. TWO DOUBLE-FACED HIGHWAY CROSSING SIGNS SHALL BE PROVIDED AT EACH HIGHWAY CROSSING OF A TRACK OR TRACKS. ONE EACH SIDE OF THE TRACKS ON THE OUTSIDE OF MULTIPLE TRACK CROSSINGS EXCEPT AS OTHERWISE PROVIDED.

3. NUMBER OF TRACKS SIGN, MUTCD NO. R15-2 SHALL BE USED FOR THE REPLACEMENT OF EXISTING RAILROAD HIGHWAY CROSSING SIGN NO. R15-1 WILL BE USED ON NEW INSTALLATIONS AND EXISTING "CROSSBUCK" SIGN REFERENCE MUTCD R15-2 WHEN REQUIRED.

4. THE SIGN SHALL BE PLACED NO CLOSER THAN 12' FROM THE CENTER LINE OF TRACK TO THE CENTER OF POST EXCEPT AS OTHERWISE PROVIDED.

5. COMPLIES WITH MUTCD AND FEDERAL RAILROAD ADMINISTRATION REQUIREMENTS.

**MATERIAL SPECIFICATIONS:**

- **4" X 4" ALUMINUM CROSSBuck**: ALUMINIUM EXTRUDED SECTION NO. 83778, ALUMINUM ALLOY 6063T6, OR APPROVED EQUAL.

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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 flammable substance which, by 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 installed in a larger pipe or conduit called the casing pipe, as indicated in Figure 1. Design shall be based on superimposed load due to railroads (Cooper 8-60) loading with application of impact in combination with internal pressure, external loads, and installation loads and installation loads.  

b. Casing pipe may be omitted under the following conditions provided 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 10 psig, the casing pipe material shall safely withstand the combination of internal pressure and external loads. Joints shall be mechanically 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.

f. 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.

g. Pipelines laid longitudinally, on railroad rights-of-way shall be suitably located and installed to avoid any future impact or other important structures such as power lines, poles, conduits, and other installations. Where there is danger of damage from leakage to any bridge, building, or structure, the casing pipe shall be encased or of special design as approved by the engineer.

### 3. CARRIER PIPE

a. Carrier line and joints shall be of accepted material and construction as approved by the engineer. Carrier pipe material, under and adjacent to tracks, must be laid on a minimum of 36 inches of clean fill or clean fill under 6 inches of sand or gravelly material, and 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 HDPE high density polyethylene and minimum schedule 40, internal pressure not to exceed 100 psig.

c. Ductile iron pipe in a casing is acceptable as follows:

- Class 40 for diameters of 4" thru 10"  
- Class 52 for diameters of 12" thru 14"  
- Class 66 for diameters of 16" thru 18"  
- Class 36 for diameters of 20" thru 24"

### 4. CASING PIPE

Casing pipe and joints shall be of leak proof construction capable of withstanding railroad loading (Cooper 8-60). Minimum "S" is to be determined from Table 1. Table 1 indicates a minimum thickness based on 1 bored hole diameter and one banded pipe. Superimposed loads only and it is the responsibility of the installer to provide a casing which prevents the escape of any flammable substance. If additional tracks are constructed in the future, the casing shall be extended corresponding to the new number of railroad tracks.

Steel casing pipe to have a minimum yield stress of 30,000 psi. When casing stress is calculated, the yield stress of a protective coating shall be disregarded and the thickness shown in Table 1 shall be increased by 0.006" x 1000 psi, or a minimum of 0.002", whichever is greater than the thickness shown except for diameters less than 1/4" 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 in the case of steam, water, or any flammable substance which, by its nature or pressure, might cause damage if escaping on or in the vicinity of railroad property.

b. Installation by open trench methods shall comply with American National Standards for railroad engineering, installation of pipe culverts, Chapter 1, Part 4.

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 the bored diameter of either the inside or the outside diameter is greater than the 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 the boring diameter is less than 0.5 inch the space shall be filled by pressure grouting or by other approved methods which will provide sufficient support.

### 6. PROTECTION AT END OF CASING

The ends of the casings 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 shall not be less than 30 inches from the centerline of the nearest track. Minimum cover shall be at least 18 inches from the top of pipe where pipe is laid more than 4 feet from centerline of track.

### 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. 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 on approval prior to construction. Plans shall be drawn to scale showing relation of proposed pipeline to tracks, angle of crossing, right-of-way location, right-of-way and general layout of tracks and railroad facilities.

### 10. EXECUTION OF WORK

The pipeline agreement and contractors rights of entry agreement shall be fully executed before any work will be begun. All work shall be done by contractors. Right-of-way shall be determined by the engineer. The engineer/row manager is required to enter on right-of-way for construction.
1. SCOPE

PIPPLES INCLUDED UNDER THESE SPECIFICATIONS ARE THOSE INSTALLED TO CARRY OIL, GAS, PETROLEUM PRODUCTS OR OTHER FLAMMABLE OR HIGHLY VOLATILE OR HAZARDOUS SUBSTANCES UNDER PRESSURE.

2. GENERAL REQUIREMENTS

a. PIPELINES UNDER RAILROAD TRACKS SHALL BE ENSURENED 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 LOADING (COOPER E-80) LOADING WITH APPLICABLE IMPACT IN COMBINATION WITH INTERNAL PRESSURE, EXTERNAL PRESSURE, AND INSTALLATION LOADS.

b. PIPELINES SHALL BE INSTALLED UNDER DRY BORING OR JACKEING.


3. CARRIER PIPE

a. PIPELINES CARRYING LIQUID PETROLEUM GAS, NATURAL OR MANUFACTURED GAS AND OTHER FLAMMABLE PRODUCTS SHALL CONFORM TO THE REQUIREMENTS OF API 5L B31.3 AND B31.4 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 JIFICATION FACTORS OF THE API AS DEFINED IN THE CODE). b. STEEL WELDED PIPE UNDER RAILROAD TRACKS THAT IS PROTECTED WITH STEEL CASING. THE FOLLOWING PERCENTAGES APPLY TO THE SUM OF THE HOOP STRESS DUE TO THE MAXIMUM ANTICIPATED INTERNAL PRESSURE AND THE NOMINAL EXTERNAL PRESSURES DUE TO EXTERNAL LOADS: 1. SEVENTY PERCENT FOR INSTALLATION ON OIL PIPELINES. 2. SIXTY PERCENT FOR INSTALLATION ON GAS PIPELINES. 3. FORTY PERCENT FOR INSTALLATION ON OIL OR GAS PIPELINES.

b. STEEL PIPE WITHOUT A CASING UNDER INDUSTRY TRACKS (THE FOLLOWING PERCENTAGES APPLY TO THE SUM OF THE HOOP STRESS DUE TO THE MAXIMUM ANTICIPATED INTERNAL PRESSURE AND THE NOMINAL EXTERNAL PRESSURES DUE TO EXTERNAL LOADS): 1. SIXTY PERCENT FOR INSTALLATION ON OIL PIPELINES. 2. FORTY PERCENT FOR INSTALLATION ON GAS PIPELINES.

c. STEEL PIPE Laid Longitudinally ON RAILROAD RIGHT-OF-WAY WITHOUT THE PROTECTION OF A CASING. THE FOLLOWING PERCENTAGES APPLY TO THE SUM OF THE HOOP STRESS DUE TO EXTERNAL LOADS: 1. SIXTY PERCENT FOR INSTALLATION ON OIL PIPELINES. 2. FORTY PERCENT FOR INSTALLATION ON GAS PIPELINES.

3. SUPPORTS

ALL SUPPORTS, INSULATIONS OR CENTERING DEVICES FOR THE CARRIER PIPE SHALL BE SO DESIGNED AND INSTALLED AS TO TRANSFER LOADS TO THE CARRIER PIPE AND NOT TO PRODUCTS OR OTHER FLAMMABLE, HIGHLY VOLATILE OR HAZARDOUS SUBSTANCES UNDER PRESSURE.

4. VENTS

Casing pipe, unless otherwise authorized by the Engineer, shall be properly vented. Vents shall not be less than 10 feet above ground surface. Vents shall be provided with a suitably sized protective cover. Vents shall be at the nearest centerline of pipe when no access to the right-of-way is available. Vents shall be placed at the nearest centerline of pipe when no access to the right-of-way is available. Vents shall be placed at the nearest centerline of pipe when no access to the right-of-way is available.

5. CONSTRUCTION

a. CASING SHALL BE SO CONSTRUCTED AS TO PREVENT LEAKAGE OF ANY SUBSTANCE FROM THE CASING THROUGHOUT ITS LENGTH. EXCEPT AT THE ENDS, CASING SHALL BE INSTALLED WITH A LEAK-PROOF CONSTRUCTION, INCLUDING THE INSTALLATION OF A WATER-TIGHT END SEAL TO PREVENT THE FORMATION OF A WATERDeck UNDER THE RAILROAD, WITH AN EVEN BEARING THROUGH ITS LENGTH, AND SHALL SLOPE TO ONE END EXCEPT FOR LONGITUDINAL OCCUPANCY.

b. INSTALLATION BY OPEN-BORING METHODS SHALL COMPLY WITH AMENDMENT FOR RAILROAD ENGINEERING, INSTALLATION OF PIPE CAVITIES, CHAPTER 1, PART 4, 12.3.

6. INSPECTION AND TESTING

A FINAL INSPECTION BY THE ENGINEER AND / OR THE INSTALLER, AND A FINAL TEST MADE AS REQUIRED, SHALL BE MADE PRIOR TO CONSTRUCTION. PLANS SHALL BE DRAWN TO SCALE SHOWING RELATION OF PROPOSED INSTALLATION TO RAILROAD RIGHTS-OF-WAY AND GENERAL LAYOUT OF TRACKS AND RAILROAD FACILITIES. PLANS SHALL INCLUDE ALL APPURTEMENT FEATURES OF THE INSTALLATION, SUCH AS CASINGS, JOINTS, EMERGENCY OUTLET DEVICES, Etc. LOCATED ON RAILROAD PROPERTY, CROSSES OR PROFILE SHEET WILL BE PROVIDED LAYOUT AND APPURTENANT FEATURES AS TO HOI-R 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 HIGHER AUTHORITY. EXPEDITIOUS APPROVAL OF 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 INSTALLATION TO RAILROAD RIGHTS-OF-WAY AND GENERAL LAYOUT OF TRACKS AND RAILROAD FACILITIES. PLANS SHALL INCLUDE ALL APPURTENANT FEATURES OF THE INSTALLATION, SUCH AS CASINGS, JOINTS, EMERGENCY OUTLET DEVICES, ETC. LOCATED ON RAILROAD PROPERTY. CROSSES OR PROFILE SHEET WILL BE PROVIDED LAYOUT AND APPURTENANT FEATURES AS TO HOI-R 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 HIGHER AUTHORITY.
NOTES:
1. ALL STEEL TO BE H.D. GALVANIZED PER ASTM A123.
2. ALL CONCRETE FOOTINGS SHALL HAVE A MINIMUM 28 DAY COMPRESSION 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.

* NOTE: FENCE HEIGHT = 4' @ 150' FROM C OF GRADE CROSSINGS.

TYPICAL RAIL TO LINE POST CONNECION FOR INTERTRACK PICKET FENCE

INTERTRACK FENCE ELEVATION

EDGE FENCE ELEVATION

SECTION

ENGINEERING STANDARD DRAWINGS

SAN DIEGO ASSOCIATION OF GOVERNMENTS
810 Mission Avenue
Oceanside, CA 92054
www.sandag.org

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

ENGINEERING STANDARD DRAWINGS

DRAWING NO:

DRAWING SHEET NO:

CONTRACT SHEET NO:

REVISIONS

REV DATE DESCRIPTION REV

NONE

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EDGE FENCE ELEVATION

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TYPICAL RAIL TO LINE POST CONNECION FOR INTERTRACK PICKET FENCE

INTERTRACK FENCE ELEVATION

EDGE FENCE ELEVATION

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TYPICAL RAIL TO LINE POST CONNECION FOR INTERTRACK PICKET FENCE

INTERTRACK FENCE ELEVATION

EDGE FENCE ELEVATION

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TYPICAL RAIL TO LINE POST CONNECION FOR INTERTRACK PICKET FENCE

INTERTRACK FENCE ELEVATION

EDGE FENCE ELEVATION

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TYPICAL RAIL TO LINE POST CONNECION FOR INTERTRACK PICKET FENCE

INTERTRACK FENCE ELEVATION

EDGE FENCE ELEVATION

SECTION

ENGINEERING STANDARD DRAWINGS

DRAWING NO:

DRAWING SHEET NO:
MATERIAL SPECIFICATIONS:

A. PICKETS: 1" RND. SQUARE STEEL TUBULAR MEMBERS MANUFACTURED PER ASTM A-500 HAVING A YIELD STRENGTH OF 50,000 PS. 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" SQ. STEEL TUBULAR MEMBERS MANUFACTURED PER ASTM A-500 HAVING A YIELD STRENGTH OF 50,000 PS. WALL THICKNESS SHALL BE 14 GAUGE. ATTACH EACH RAIL TO POSTS BY WELDING WITH THE GAS METAL ARC METHOD.

C. POSTS: 3" SQ. STEEL TUBULAR MEMBERS MANUFACTURED PER ASTM A-500 HAVING A YIELD STRENGTH OF 50,000 PS. 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 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.
NOTES:

1. WELDED WIRE FENCE FABRIC TO BE 6 GAUGE HARDENED STEEL WIRE WELDED INTO A 2" X 3" RECTANGULAR PATTERN PER ASTM A795 CLASS C1. 1.2 OZ. PER SQUARE FOOT. HOT-DIP GALVANIZED ED 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 IRON PIPE PER ASTM A53 WITH A MINIMUM TYPICAL 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 ED 1.2 OZ. 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 2'-6" DEEP. ALL FOOTINGS TO BE CROWNED AT TOP FOR DRAINAGE.
### TYPICAL MEMBER DIMENSIONING (SEE NOTES)

<table>
<thead>
<tr>
<th>FENCE HEIGHT</th>
<th>LINE POSTS</th>
<th>END, LATCH &amp; CORNER POSTS</th>
<th>BRACKES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ROUND LD.</td>
<td>&quot;H&quot;</td>
<td>ROLL FORMED</td>
</tr>
<tr>
<td>6'-0&quot; LESS</td>
<td>1 3/4&quot; x 1 3/4&quot;</td>
<td>2&quot;</td>
<td>3 3/4&quot; x 3 3/4&quot;</td>
</tr>
<tr>
<td>OVER 6'-0&quot;</td>
<td>2&quot;</td>
<td>2&quot;</td>
<td>2&quot;</td>
</tr>
</tbody>
</table>

### FENCE LOCATION

1. End of Corner Post Assembly: 2'-0" for Fabric Less Than 60" High, 3'-0" for Fabric 60" and Over.
2. Brace to be Removed After All Other Fence Construction is Completed Unless Otherwise Directed by Contractor.
3. Gate Posts at 10'-0" Maximum Intervals.
4. Diagonal Brace with Truss Rods.
5. Line Posts at 10'-0" Maximum Intervals Braced and Trussed in Both Directions Except That This Bracing and Trussing May Be Omitted When the Fabric is Stretched by the Equipment.

### FABRIC TYPES:

- **Type CL-4**: 48" Fabric
- **Type CL-6**: 72" Fabric

### 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.
7. For Additional Information Refer to Sandag Std. Specifications General Provisions Section B.8, 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 Deadmans shall Be Produced From Commercial Quality Aggregates and Portland Cement and Shall Contain Not Less Than 275 Kg Per Cubic Meter.

### Gate Post 6'-0" and Less

<table>
<thead>
<tr>
<th>Gate Post Width</th>
<th>Nominal LD.</th>
<th>Weight Per LD.</th>
</tr>
</thead>
<tbody>
<tr>
<td>6'-0&quot; THRU 12&quot;</td>
<td>6'-0&quot;</td>
<td>10.79</td>
</tr>
<tr>
<td>12&quot; THRU 18&quot;</td>
<td>5'-0&quot;</td>
<td>14.62</td>
</tr>
<tr>
<td>18&quot; &amp; OVER</td>
<td>4'-0&quot;</td>
<td>18.97</td>
</tr>
</tbody>
</table>

### Gate Post Over 6'-0"

<table>
<thead>
<tr>
<th>Gate Post Width</th>
<th>Nominal LD.</th>
<th>Weight Per LD.</th>
</tr>
</thead>
<tbody>
<tr>
<td>6'-0&quot; THRU 12&quot;</td>
<td>3'-0&quot;</td>
<td>7.78</td>
</tr>
<tr>
<td>12&quot; THRU 18&quot;</td>
<td>2'-0&quot;</td>
<td>14.62</td>
</tr>
<tr>
<td>18&quot; &amp; OVER</td>
<td>1'-0&quot;</td>
<td>18.97</td>
</tr>
</tbody>
</table>

Above Post Dimensions and Weights are Minimum. Larger sizes May Be Used On Approval of Sandag.
1. 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 deterrents. If fence, wall or building is within 12 feet of the centerline of track, no barrier is required.

2. 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.

3. Security gates will be placed at least 25 feet from the roadway to allow authorized vehicles to stop clear of traffic to open/closed locked gates. The track side of the parking area is to be closed off with bollards, K-rail, or other barriers.

4. 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.

5. 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.

6. Security gates will be painted protect rust prevent enamel gloss safety yellow, SKU No. 01-0597101.

7. 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 six inches. Local grading or other work is needed to drain the secured area, it will be carried out as part of the installation.

8. 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.

---

**NOTES:**

1. 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 deterrents. If fence, wall or building is within 12 feet of the centerline of track, no barrier is required.

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8. 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.
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. "FTA 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.

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.
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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.

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

North County Transit District
811 Mission Avenue
Oceanside, CA 92054
www.gonctd.com

Funding Provided by:

ENGINEERING STANDARD DRAWINGS

REV.
DRAWN
CHECKED
RECOMMENDED
DATE
DESCRIPTION
REV.
DATE
SIGNATURE
STAMP

ENGINEERING STANDARD DRAWINGS

FUNDING SIGNS-NON TRANSNET

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

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

REVISIONS
DRAWN
RAILPROS
CHECKED
RECOMMENDED
DATE
DESCRIPTION
REV.

REV.

SCALE
SHEET NO.

NONE
1 OF 1
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.
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 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 KANZEL.
13. HOTLINE NUMBER TO BE ASSIGNED BY SANDAG/NCTD COMMUNICATIONS OFFICE.

NOTES:

TRANSNET SIGN DIMENSIONS (HORIZONTAL):

CONSTRUCTION DETAILS:

- 0.063" ANODIZED ALUMINUM PANELS
- AVERY-DENNISON T-6500 HIGH INTENSITY SERIES PRISMATIC REFLECTIVE SHEETING (1M TYPE IV), OR EQUIVALENT
- AVERY-DENNISON T-9500 OMNIVIEW SERIES™ PREMIUM PRISMATIC DIAMOND 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):

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 ELIZABETH COX, ELIZABETH.COX@SANDAG.ORG.
WARNING CONSTRUCTION TRAFFIC NEXT 5 MILES
"BEGIN DATE" THRU "END DATE"

SIGN 5203 - "WARNING CONSTRUCTION TRAFFIC" SIGN - FRONT VIEW
SCALE: NTS

WARNING CONSTRUCTION TRAFFIC
NEXT 5 MILES
"BEGIN DATE" THRU
"END DATE"

COLORS:
LEGEND, BORDER - BLACK
BACKGROUND - ORANGE
(RETROREFLECTIVE)

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

2" SQUARE GALVANIZED STEEL POST ANCHORED INTO HARDSCAPE AS REQUIRED.

TAMPERPROOF BOLTS
"BEGIN DATE" IN "MONTH YEAR" FORMAT
"END DATE" IN "MONTH YEAR" FORMAT

ORANGE PMS 152

DATA SHEET NO.
CONTRACT SHEET NO.
REV.
DRAWN
DRAFTER.
CHECKED
RECOMMENDED
DESIGNER PE STAMP
NOTES:
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.
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 "GREEN" (PMS 7727C), \( \frac{2}{3} \) THICK FOR TYPE 1 SIGN, \( \frac{1}{2} \) THICK FOR TYPE 2 SIGN NON-REFLECTIVE.
7. LETTER STYLE SHALL BE "ARRIAL - BOLD".
8. LETTER STYLE SHALL BE "ARRIAL - ITALICS".
9. REFER TO CALTRANS STANDARD PLANS RS1 AND RS3 FOR INSTALLATION DETAILS.
10. FOR MORE THAN TWO FUNDING LOGOS, SCALE LOGOS PROPORTIONALLY TO FIT AS NEEDED.
11. \( \frac{3}{4} \) 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 KANZEL.
13. HOTLINE NUMBER TO BE ASSIGNED BY SANDAG/NCTD COMMUNICATIONS OFFICE.

ENVIRONMENTAL MITIGATION PROGRAM
FUNDING SIGNS - TRANSNET

BUILD NCC HOTLINE: (619) 699-1900

SIGN 5204-VERTICAL TYPE

TRANSNET SIGN DIMENSIONS (VERTICAL):
40" W X 32" H - (3.33" W X 2.66" H)

CONSTRUCTION DETAILS:
- 0.032" 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 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.
MATERIAL SPECIFICATIONS:

SIGNS: AS INDICATED ON INDIVIDUAL SIGN STANDARD.

POSTS: 12 GAGE (.105" THICK) SQUARE STEEL TUBE (ASTM A-36) WITH 
3/8" DIA HOLES IN POST AND SIGN (TYP) 
2" SQUARE POST 

ANCHORS: 12 GAGE (.105" THICK) SQUARE STEEL TUBE (ASTM A-36) WITH 
3/8" DIA HOLES IN POST AND ANCHOR (TYP) 
2 1/2" SQUARE ANCHOR 

HARDWARE: GALVANIZED ALUMINUM. VANDAL RESISTANT. BOLTS: 5/6" 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 PERPENDICULAR 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.
**MILEPOST SIGN**

1. **TO PROVIDE THE MESSAGE IN BOTH DIRECTIONS ALONG THE TRACK, ONE DOUBLE-FACED ALUMINUM MILE BOARD PANEL WITH WHITE REFLECTORIZED ENGINEERING GRADE, PRESSURE SENSITIVE, RETRO-REFLECTIVE WHITE VINYL SHEETING, SILK SCREEN LEGEND WITH BLACK INK. FINISH WITH EXTERIOR MACHINE BOLT WITH ENGINEERING GRADE, PRESSURE SENSITIVE CLEAR MYLAR, 3M-1150 OR EQUAL.**

2. **TOP OF NEAR RAIL** **2" SQUARE POST AND SIGN** **SEE TYPICAL SECTION THIS SHEET**

3. **ANCHORS:** **1" DIA. x 1'-0" LONG ALUMINUM CARRIAGE BOLTS, 2024-T4 ALLOY. FOR MILE) WITH NUTS AND WASHERS (GALVANIZED) IN ACCORDANCE WITH ASTM A-386.**

4. **ANCHOR BOLTS WITH NUTS AND WASHERS (GALVANIZED)** **FOR SIGN** **NUTS: STAINLESS STEEL, A201 OR EQUAL. WASHERS: FLAT ALUMINUM WASHERS.**

5. **SCALE: 1" = 1'-0"** **MILE** **2" SQUARE STEEL POST 2'-2" x 2'-2" x 9'-0" LONG SQUARE POST FOR NO. 51-A SIGN**

6. **MILEPOST MARKER** **SEE TYPICAL SECTION THIS SHEET** **NO. 51-A MILEPOST SIGN**

7. **TEXT TO BE "ARIAL BOLD" PER SANDAG STANDARD ESD-1212, TEXT STYLE: ALL CAPITALS, BOLD PER SANDAG STANDARD ESD-1212.**

8. **PLASTIC MATERIAL SPECIFICATIONS):** **NO. 51-A DOUBLE-FACED MILE BOARD PANEL (SPECIFY REQUIREMENTS)** **TEXT TO BE VIEWED FROM BOTH SIDES OF PANEL.**

9. **STEEL POSTS:** **STEEL POSTS:** **1" DIA. x 1'-0" LONG ALUMINUM CARRIAGE BOLTS, 2024-T4 ALLOY. FOR MILE) WITH NUTS AND WASHERS (GALVANIZED) IN ACCORDANCE WITH ASTM A-386.**

10. **ANCHOR BOLTS WITH NUTS AND WASHERS (GALVANIZED)** **FOR SIGN** **NUTS: STAINLESS STEEL, A201 OR EQUAL. WASHERS: FLAT ALUMINUM WASHERS.**

11. **SCALE: 1" = 1'-0"** **MILE** **2" SQUARE POST 2'-2" x 2'-2" x 9'-0" LONG SQUARE POST FOR NO. 51-A SIGN**

12. **MILEPOST MARKER** **SEE TYPICAL SECTION THIS SHEET** **NO. 51-A MILEPOST SIGN**

13. **TEXT TO BE "ARIAL BOLD" PER SANDAG STANDARD ESD-1212, TEXT STYLE: ALL CAPITALS, BOLD PER SANDAG STANDARD ESD-1212.**

14. **PLASTIC MATERIAL SPECIFICATIONS):** **NO. 51-A DOUBLE-FACED MILE BOARD PANEL (SPECIFY REQUIREMENTS)** **TEXT TO BE VIEWED FROM BOTH SIDES OF PANEL.**

15. **STEEL POSTS:** **STEEL POSTS:** **1" DIA. x 1'-0" LONG ALUMINUM CARRIAGE BOLTS, 2024-T4 ALLOY. FOR MILE) WITH NUTS AND WASHERS (GALVANIZED) IN ACCORDANCE WITH ASTM A-386.**

16. **ANCHOR BOLTS WITH NUTS AND WASHERS (GALVANIZED)** **FOR SIGN** **NUTS: STAINLESS STEEL, A201 OR EQUAL. WASHERS: FLAT ALUMINUM WASHERS.**

**NOTE:** **ENGINEERING STANDARD DRAWINGS** **BILL OF MATERIAL** **SCALE:** **NONE** **CONTRACT SHEET NO:** **NONE** **DRAWING NO:** **ESD-5211** **DRAWING SHEET NO:** **1 OF 1**

**DESCRIPTION:** **MILEPOST SIGN** **DATE:** **10/08/15** **REVISIONS:** **B. SMITH** **CHECKED:** **B. SMITH** **RECOMMENDED:** **B. SMITH** **DATE:** **10/08/15** **DESIGNER:** **B. SMITH** **DRAWING NO:** **ESD-5211** **SCALE:** **NONE** **CONTRACT SHEET NO:** **NONE**

**SAN DIEGO ASSOCIATION OF GOVERNMENTS** **401 B Street, Suite 800** **San Diego, CA 92101**

**NORTH COUNTY TRANSIT DISTRICT** **819 Mission Avenue** **Oceanside, CA 92054**

**www.sandag.org** **www.gonctd.com**

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**Material Specifications:**

**1.** **TO PROVIDE THE MESSAGE IN BOTH DIRECTIONS ALONG THE TRACK, ONE DOUBLE-FACED ALUMINUM MILE BOARD PANEL WITH WHITE REFLECTORIZED ENGINEERING GRADE, PRESSURE SENSITIVE CLEAR MYLAR, 3M-1150 OR EQUAL.**

**2.** **TOP OF NEAR RAIL** **2" SQUARE POST AND SIGN** **SEE TYPICAL SECTION THIS SHEET**

**3.** **ANCHORS:** **1" DIA. x 1'-0" LONG ALUMINUM CARRIAGE BOLTS, 2024-T4 ALLOY. FOR MILE) WITH NUTS AND WASHERS (GALVANIZED) IN ACCORDANCE WITH ASTM A-386.**

**4.** **ANCHOR BOLTS WITH NUTS AND WASHERS (GALVANIZED)** **FOR SIGN** **NUTS: STAINLESS STEEL, A201 OR EQUAL. WASHERS: FLAT ALUMINUM WASHERS.**

**5.** **SCALE: 1" = 1'-0"** **MILE** **2" SQUARE POST 2'-2" x 2'-2" x 9'-0" LONG SQUARE POST FOR NO. 51-A SIGN**

**6.** **MILEPOST MARKER** **SEE TYPICAL SECTION THIS SHEET** **NO. 51-A MILEPOST SIGN**

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**10.** **ANCHOR BOLTS WITH NUTS AND WASHERS (GALVANIZED)** **FOR SIGN** **NUTS: STAINLESS STEEL, A201 OR EQUAL. WASHERS: FLAT ALUMINUM WASHERS.**

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**14.** **PLASTIC MATERIAL SPECIFICATIONS):** **NO. 51-A DOUBLE-FACED MILE BOARD PANEL (SPECIFY REQUIREMENTS)** **TEXT TO BE VIEWED FROM BOTH SIDES OF PANEL.**

**15.** **STEEL POSTS:** **STEEL POSTS:** **1" DIA. x 1'-0" LONG ALUMINUM CARRIAGE BOLTS, 2024-T4 ALLOY. FOR MILE) WITH NUTS AND WASHERS (GALVANIZED) IN ACCORDANCE WITH ASTM A-386.**

**16.** **ANCHOR BOLTS WITH NUTS AND WASHERS (GALVANIZED)** **FOR SIGN** **NUTS: STAINLESS STEEL, A201 OR EQUAL. WASHERS: FLAT ALUMINUM WASHERS.**
LOCATION PLAN

BLACK BANDS SCREENED TO BOTH SIDES OF WHITE PANEL (SEE MATERIAL SPECIFICATIONS)

ONE-QUARTER MILE INCREMENT SIGN

HALF-MILE INCREMENT SIGN

THREE-QUARTER MILE INCREMENT SIGN

INSTALLATION NOTES

1. QUARTER MILE INCREMENT SIGNS ALLOW TRAFFIC CREWS AND OTHERS TO ACCURATELY DETERMINE MILEPOST LOCATIONS BETWEEN WHOLE MILES AND DETERMINE TRACK BULLETIN LIMITS, TWISTABLE DEPARTURES, AND OTHER ITEMS DESCRIBED IN TERMS OF MILEPOST LOCATION. EACH BAND REPRESENTS A QUARTER MILE INTERVAL.

2. TO ALLOW SIGNS TO BE READ FROM BOTH DIRECTIONS, ONE DOUBLE FACED ALUMINUM PANEL WITH WHITE REFLECTIVE SHEETING BACKGROUND AND BLACK PLASTIC BANDS SHALL BE MOUNTED AT RIGHT ANGLES TO THE TRACK AT EACH LOCATION.

3. THE POST SHALL BE SET PER THE LOCATION PLAN ON THIS SHEET. EXCEPTIONS SHALL REQUIRE THE APPROVAL OF THE ENGINEER.

4. IN SINGLE TRACK TERRITORY, MILE POSTS SHALL BE SET ON RIGHT HAND SIDE OF THE TRACK AS ONE FACES IN THE DIRECTION OF INCREASING MILEPOSTS. IN MULTIPLE TRACK TERRITORY MARKERS SHALL BE SET ON THE FIELD SIDE OF THE TRACK FARTHEST TO THE RIGHT.

5. WHEN THE EXACT QUARTER MILE INCREMENT STATION FALLS WITHIN THE LIMITS OF A BRIDGE, GRADE CROSSING OR OTHER FEATURE WHERE IT WOULD BE IMPrACTICAL TO LOCATE A SIGN, THE MARKER SHALL INSTEAD BE SET AT THE END OF THE FEATURE NEAREST THE EXACT INCREMENT STATION.

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 6061-T6 OR EQUAL.

3. POSTS, ANCHORS, AND HARDWARE SHALL BE AS PER EDI-9210.

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 B OR GREATER. RETROREFLECTIVE SHEETING SHALL HAVE CLASS 1, 2, OR 4 ADHESIVE BACKING WHICH SHALL BE PRESSURE SENSITIVE AND FROG RESISTANT.

6. SCREENED-PROCESS COLORS AND NONREFLECTIVE CLEAR STRIP BLACK FILM SHALL HAVE EQUIVALENT OUTDOOR WEATHERABILITY CHARACTERISTICS AS THE RETROREFLECTIVE SHEETING.

NORTH COUNTY TRANSPORT DISTRICT
8135 Mision Avenue
Osceola, CA 92054
www.nctd.com
**SIGN 5213-ONE SPEED SIGN**

- **Dimensions:** 2' x 2' x 14' x 30" square post for speed sign
- **Material:** Machine bolt with nut and cut washer (All galvanized)
- **Colors:** Sign colors: PMS 116 yellow reflective

**SIGN 5213-TWO SPEED SIGN**

- **Dimensions:** 2' x 2' x 14' x 30" long square post for speed sign
- **Material:** Machine bolt with nut and cut washer (All galvanized)
- **Colors:** Sign colors: PMS 116 yellow reflective

**INSTALLATION NOTES:**
1. 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 gauge size of the nearest rail signs will be placed on outside of each track.
2. 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.
3. 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:**
- **Post:** 2" x 2" x 14' x 30" long square anchor for sign post
- **Anchor:** 1'-4" x 6" x 5'-0" x 3'-0" x 3'-0" x 7'-0" x 6'-0" x 2'-0" x 1'-0" galvanized anchor for speed sign

**STEEL MOUNTING POST AND INSTALLATION DETAIL:**
- **Hardware:** All hardware to be vandal resistant.
- **Bolts:** 5/16" x 2 3/16" long aluminum carriage bolts, 2024-T4 alloy for sign
- **Anchor:** 1'-0" x 4" x 3'-0" x 3'-0" x 7'-0" x 6'-0" x 2'-0" x 1'-0" galvanized anchor for sign post
- **Nuts:** Tamper resistant, Alcoa or equal
- **Washers:** Plain, flat aluminum washers

**Text:**
- **Text Style:** Text to be Arial bold per SANDAG Standard ESD-1212, size as indicated.
- **Color:** Lettering: Black
  - Sign reflective: PMS 116 yellow reflective
DANGER PELIGRO
RAILROAD PROPERTY
PROPIEDAD FERROVIARIA
NO TRESPASSING
PROHIBIDO
EL PASO

CA PENAL CODE 554, 555, 602, 369
PUC 99170

RED SYMBOL

18'

2" SQUARE GALVANIZED STEEL POST ANCHORED INTO HARDSCAPE AS REQUIRED.

EASED CORNERS (TYP.)

TAMPERPROOF BOLT

1" HIGH FRISKEt PAINTED COPY FUTURA BOLD CONDENSED, TYP. COLOR: BLACK

ALUMINUM PANEL W/ 3M EXTERIOR GRADE REFLECTIVE VINYL SHEETING, BACKGROUND COLOR: WHITE

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.

SIGN 5214-01.1 AND 5214-01.2 PLACED EVERY 500 FEET ALTERNATING SIDES OF R-O-W

SIGN 5214-01.1 AND 5214-01.2

1' - 0"

5' - 0"

6' - 8"

760-967-2883

RESTRICTIVE SIGN:
ALUMINUM SIGN PANEL W/ REFLECTIVE VINYL SHEETING & FRISKEt PAINTED COPY ATTACHED TO POST.

SIGNS:
3" THICK MILL FINISH ALUMINUM PANEL, ALCOA 5056-T6 OR EQUAL PAINT ALL SIDES WITH LINEAR POLYURETHANE COATING. ENGINEERING GRADE, PRESSURE SENSITIVE, RETRO-REFLECTIVE WHITE VINYL SHEETING, 1/8" 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 PLAN
NO SCALE

2" SQUARE GALVANIZED STEEL POST ANCHORED INTO HARDSCAPE AS REQUIRED.

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.

SIGN 5214-01.1 AND 5214-01.2 PLACED EVERY 500 FEET ALTERNATING SIDES OF R-O-W
MATERIAL SPECIFICATIONS:

- **REFLECTORIZED ALUMINUM PLATE**, SEE MATERIAL SPECIFICATIONS

TEXT STYLE:

- **TEXT TO BE "ARIAL BOLD"** PER DRAWING ESD-1212

HARDWARE:

- **ALL HARDWARE TO BE VANDAL RESISTANT**
- **BOLTS**: 5/16" 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-O-W**

**NOTE:** ORIENTATION OF SIGN WILL BE COORDINATED WITH SANDAG.
MATERIAL SPECIFICATIONS:

**SIGN**
- "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 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: 5/16" 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."

**OTHER**
- "SIGN LOCATION WILL BE COORDINATED WITH THE ENGINEER."
- "SEE DRAWING 5214-02 FOR MOUNTING DETAILS."
- "MATERIAL SPECIFICATIONS TO BE APPLIED TO TYPICAL POST AND ANCHOR."
- "MILE POST MARKER TO BE SET AT EXACT MILE POST LOCATION."
- "TYPICAL SECTION THRU POST AND ANCHOR."
- "TYPICAL SECTION THRU SIGN AND POST."

**ENGINEERING STANDARD DRAWINGS**
- "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

  DESIGNER PE STAMP
  B. SMITH
  12/2/16"
MATERIAL SPECIFICATIONS:

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

STEEL POSTS:

TEXT STYLE:
TEXT TO BE "ARIAL BOLD" PER SANDAG STANDARD ESD1212.

HARDWARE:
ALL HARDWARE TO BE VANDAL RESISTANT.

BOLTS:
5/16" X 3" LONG ALUMINUM CARRIAGE BOLTS, 2024-T4 ALLOY.

NUTS:
TAMPER RESISTANT, ALCOA OR EQUAL.

WASHERS:
PLAIN, FLAT ALUMINUM WASHERS.

ORIENTATION OF SIGN WILL BE COORDINATED WITH THE ENGINEER/NCTD MOUNT TO POST AS SHOWN OR IF AVAILABLE MOUNT TO INTER-TRACK RAIL OR PLATFORM FACE WITH APPROPRIATE TAMPER PROOF FASTERNERS.

NOTE:
DIRECTION OF SIGN WILL BE COORDINATED WITH THE ENGINEER.

SCALE: NONE

HIGH SPEED TRAIN WARNING SIGN
TRENES DE ALTA VELOCIDAD PASAN A TRAVÉS DE LA ESTACIÓN SIN PARAR

SIGN 0214-04
THRU POST AND ANCHOR

SECTION A-A
THRU SIGN AND POST

SECTION B-B
THRU POST AND ANCHOR

ANCHOR

SCALE: NONE

HIGH SPEED TRAINS PASS THRU STATION WITHOUT STOPPING

GROUND LINE

ANCHOR

2'-6" SQUARE TUBING

2'-2" SQUARE TUBING

DANGER

ENGINEERING STANDARD DRAWINGS

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.nctd.com

DESIGNER PE STAMP
RAILPROS
B. SMITH
B. SCHMITH

REV. DATE DESCRIPTION REV. NOTE
5/18/17 5/18/17

DRAWING NO.
ESD-0214-04

DRAWING SHEET NO.
4 OF 4

SCALE: NONE

CONTRACT SHEET NO.

SANDAG NOTE: ENGINEERING DRAWINGS ARE INTENDED FOR SANDAG'S APPROVED USES ONLY.

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NOTES:

1. SIGNS TO BE LOCATED ON ENGINEERS SIDE, FACING DIRECTION OF APPROACH POST TO BE SET 12 FEET FROM CENTER LINE OR TRACK, AND TO BE OUTSIDE OF OUTFIELD CUT.

2. WHISTLING BOARD TO BE LOCATED AS NEARLY AS PRACTICABLE ONE FOURTH MILE DISTANT FROM CROSSING OR OTHER OBSTRUCTION.

3. 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:

3' THICK MILL FINISH ALUMINUM PANEL. ALCOA 605-20 OR EQUAL. PAINT ALL SIDES WITH LINEAR POLYURETHANE. COVER 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 GAUGE (.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 GAUGE (.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 1/2" LONG ALUMINUM CARRIAGE BOLTS, 2024-T4 ALLOY. FOR SIGNS.

BOLTS: 5/16" X 3 3/4" LONG ALUMINUM CARRIAGE BOLTS, 2024-T4 ALLOY. FOR ANCHORS.

NUTS: TAMPER RESISTANT, ALCOA OR EQUAL.

WASHERS: PLAIN, FLAT ALUMINUM WASHERS.

COLOR:

BLACK LETTERING
WHITE REFLECTIVE BACKGROUND
YARD LIMIT SIGN FOR TERMINAL TRACKS

INSTALLATION NOTES:
1. SIGN SHALL BE INSTALLED TO INDICATE LIMIT OF TERRITORY OPERATED UNDER RULE 6.10.
2. THE POST SHALL BE SET PER THE LOCATION PLAN ON THIS SHEET. EXCEPTIONS SHALL REQUIRE THE APPROVAL OF NOTE 2.

MATERIAL NOTES:
1. SIGNS SHALL INCLUDE ALUMINUM PANEL, RETROREFLECTIVE SHEETING, POLYURETHANE PANEL, SCREENED-PROCESS COLORS OR FHA UV PROTECTION OVERLAY, ANTI-GRAFFITI OVERLAY, POSTS, ANCHORS AND HARDWARE.
2. ALUMINUM PANEL SHALL BE ALC0A 6063-T6 OR EQUIVALENT.
3. POSTS, ANCHORS, AND HARDWARE SHALL BE AS PER ENDS-1217.
4. PANEL SHALL BE PAINTED ON ALL SIDES WITH TWO PART ACRYLIC POLYURETHANE PAINT COATING.
5. SIGNS SHALL CONFORM TO THE REQUIREMENTS OF ASTM D4796, CLASS IX OR GREATER. RETROREFLECTIVE SHEETING SHALL HAVE CLASS 1, 3, OR 4 REFLECTIVE BACKING WHICH SHALL BE PRESSURE SENSITIVE AND FUNGUS RESISTANT.
PADDLE & HANDLE

TARGET PLATE TO BE .063 ALUMINUM WITH NON-REFLECTIVE WHITE VINYL APPLIED TO BOTH SIDES.

HANDLE TO BE SCHEDULE 40 PVC SLOTTED TO ACCOMMODATE TARGET PLATE.

HANDLE TO BE SECURED TO TARGET PLATE WITH TWO 1/4" X 3/8" X 3" PLATED HEX HEAD BOLTS. NUTS TO BE 1/4" X 3/8" ROUND BASE WELD NUTS.

A 1" BLACK BORDER SHALL BE SILK SCREENED TO BOTH SIDES OF TARGET PLATE WITH NO SPACE BETWEEN EDGE OF TARGET PLATE AND BORDER.

NOTES:
1. TARGET PLATE TO BE .063 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 1/4" X 3/8" X 3" PLATED HEX HEAD BOLTS. NUTS TO BE 1/4" X 3/8" 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.
**STOP, SLOW, AND RESUME SPEED FLAGS AND SIGN**

**LIST OF MATERIALS**

- **Flag Base Driver**
  - 1 each
- **Flag Base**
  - 1 each
- **Flag Holder**
  - 1 each
  - Includes 3 each 1/2" dia. bolt, nut, and washer, specify flag colors.

**Installation Notes**

A. Purpose: To assist train crews and others in accurately determining locations of speed restrictions and forms & track bulletins.

B. Where used: As specified by the GCOR.

C. Placement: All signs and flags are displayed in an appropriate direction of traffic movement. Actual location may be adjusted slightly to avoid obstructions. Care must be used in placement to ensure that signs do not obscure drainage outlets, site tracks, etc. In all cases placement must conform to the clearances specified in ADEC Q. C. 28-9. 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 615-T6 (61 ST).
  - Finish: sign plate to be coated with wide angle Scotchlite reflective white sheeting at exposed section of base.

**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 167
- Yellow: PMS 116

**Bill of Material**

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Piece Flag Holder</td>
</tr>
<tr>
<td>1</td>
<td>Piece Flag Holder</td>
</tr>
<tr>
<td></td>
<td>Steel R/T/ and Post With Sign</td>
</tr>
<tr>
<td></td>
<td>Steel R/T/ and Post Without Sign</td>
</tr>
</tbody>
</table>

**Recommended Checks**

- B. SMITH

**Bill of Material**

<table>
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</tr>
<tr>
<td></td>
<td>Steel R/T/ and Post Without Sign</td>
</tr>
</tbody>
</table>
ALL SIGNS:

NOTES:

1. SIGNS TO BE PLACED AT ALL STATIONS AND BUSINESS TRACKS LISTED ON TIME TABLE SCHEDULE PAGE.

2. AT TWC TERRITORY, ONE SIGN REQUIRED AT EACH END OF SIDING IN PLAIN VIEW FROM APPROACHING TRAINS. MOUNT SIGN ON ONE SIDE OF POST WITH 5/16" CARRIAGE BOLT AND 1/2 NYLOC CAP (5" LONG BOLT WHERE SIGNS ARE REQUIRED AT BOTH SIDES OF POST).

3. AT OTHER LOCATIONS IN TWC TERRITORY WHERE SIGNS ARE REQUIRED, ONE SIGN TO BE MOUNTED ON BOTH SIDES OF POST AT TIMETABLE STATION LOCATION.

4. IN OTHER THAN CTC OR TWC TERRITORY, ONE SIGN TO BE MOUNTED ON EACH SIDE OF POST AND LOCATED AT TIMETABLE STATION LOCATION.

5. SIGN TO BE 3M SILVER ENGINEER GRADE BACKGROUND ON EXTRUSION (REF. DIE NO. AY-0984).

6. LETTERS TO BE BLACK BOLD ON SIGN. (TYP.) BLACK 3M 3650-12 "SCOTCHCAL PLUS" SERIES "C" NON-REFLECTIVE OR 3M PROCESSED INK.

7. 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.

8. STATION SIGN SHOULD BE PLACED ON OPPOSITE SIDE OF SWITCH IF POSSIBLE. 10'-0" OUT AND 10'-0" AHEAD OF SWITCH POINTS.

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 5000 PSi (3.52 MPa).

TYPICAL SECTION - THRU SIGN AND POST

SCALE: NONE

SIGN DETAIL

SCALE: NONE

SAMPLE TEXT ONLY; NAME OF STATION AS SPECIFIED ON PURCHASE ORDER

NAME OF STATION AS SPECIFIED ON PURCHASE ORDER

 함께하는 다른 정보:

- 프로젝트: SAN DIEGO ASSOCIATION OF GOVERNMENTS
  - 주소: 401 B Street, Suite 800 San Diego, CA 92101
  - 웹사이트: www.sandag.org

- 공사사례: NORTH COUNTY TRANSIT DISTRICT
  - 주소: 810 Mission Avenue Oceanside, CA 92054
  - 웹사이트: www.gonctd.com

- 그림 명세:
  - 설계사: RAILPROS B. SMITH
  - 날짜: 10/06/15

- 표준도: ENGINEERING STANDARD DRAWINGS
  - 도면번호: ESD-5222
  - 도면표준: SCALE: NONE

- 주의사항:
  - 모든 사양 및 표준은 약관에 따라 적용됩니다. 이 사항들은 표준 도표의 확실성을 보장할 수 없습니다.
  - TWC 지역의 경우, 기호는 2'-6" 최대 길이에 따라 변환할 수 있습니다.

- 기타:
  - 이 문서는 어반 일정표 및 시설에 대한 정보를 제공합니다.
  - 이 기호는 정확한 위치와 정보를 제공하기 위해 사용됩니다.
INSTALLATION NOTES:
1. THE SIGNS SHOWN ON THIS SHEET ARE LOCATED AT THE TOP LEFT CORNER OF THE TRACK.
2. THEY ARE FACE TO FACE AND THE SIGNS SHALL BE SET BACK FROM THE EDGE OF THE TRACK.
3. THE SIGNS SHALL BE SET BACK FROM THE EDGE OF THE TRACK.
4. THE SIGNS SHALL BE SET BACK FROM THE EDGE OF THE TRACK.
5. THE SIGNS SHALL BE SET BACK FROM THE EDGE OF THE TRACK.
6. THE SIGNS SHALL BE SET BACK FROM THE EDGE OF THE TRACK.
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8. THE SIGNS SHALL BE SET BACK FROM THE EDGE OF THE TRACK.
9. THE SIGNS SHALL BE SET BACK FROM THE EDGE OF THE TRACK.
10. THE SIGNS SHALL BE SET BACK FROM THE EDGE OF THE TRACK.

MATERIAL NOTES:
1. SIGNS SHALL INCLUDE ALUMINUM PANEL, RETRO-REFLECTIVE SHEETING, POLYURETHANE PAINT, SCREENED-PROCESS COLORS OR OIL/SHELL IRRADIATION OF ZONE.
2. ZIP FASTENERS SHALL BE #4 X 2 WICKER CABINET SCREW 63-4 AS PER DOW-FR-102
3. PANELS SHALL BE PAINTED IN WHITE WITH TWO PINTS OF ACRYLIC POLYURETHANE PAINT.
4. RETRO-REFLECTIVE SHEETING SHALL CONFORM TO THE REQUIREMENTS OF ASTM D4959, CLASS 1 OR 2.
5. RETRO-REFLECTIVE SHEETING SHALL HAVE CLASS 1, 3, OR 4 ADHESIVE MOUNTING WHICH SHALL BE EQUALLY OUTSIDE WEATHERABILITY CHARACTERISTICS AS THE RETRO-REFLECTIVE SHEETING.
**ENGINEERING STANDARD DRAWINGS**

**UNDERGROUND CABLE SIGN AND FIBER OPTIC CABLE MARKER**

**DRAWING NO:** ESD-5229

**DRAWING SHEET NO:** 1 of 1

**SCALE:**

**CONTRACT SHEET NO:**

**DESIGNER & 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

**REV:**

**DATE:** 10/08/15

**REVISIONS**

**DRAWN BY:** RAILPROS

**CHECKED BY:** B. SMITH

**RECOMMENDED BY:** B. SMITH

**DESIGNER & STAMP**

**MATERIAL SPECIFICATIONS**

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>SYSTEM</th>
<th>MANUFACTURER AND PRODUCT</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIGH INTENSITY SHEETING</td>
<td>1</td>
<td>3W SCOTCHLITE HIGH INTENSITY PRismatic WHITE GRADE 3930 SHEETING</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>NYPON CARBIDE RETRO-REFLECTIVE SHEETING TYPE VI CRYSTAL GRADE</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>AVERY DENISON GLOW- VIEW T-9500 PRismatic HIGH INTENSITY SHEETING</td>
</tr>
<tr>
<td>COPY / GRAPHICS (BLACK)</td>
<td>1</td>
<td>3M PROCESS COLOR SERIES 8851N</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>NYPON CARBIDE ORANGE SHEETING RESISTANT 3803 INK</td>
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<tr>
<td></td>
<td>3</td>
<td>AVERY DENISON 4930 INK</td>
</tr>
<tr>
<td>ANTI- GRAFFITI OVERLAY</td>
<td>1</td>
<td>3M PREMIUM PROTECTIVE OVERLAY FILM 160</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>INKALITE BRAND H - SCALE T-40001</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>AVERY DENISON GL - 1000 PREMIUM ANTI- GRAFFITI FILM</td>
</tr>
<tr>
<td>PANEL</td>
<td>1</td>
<td>1/4&quot; THICK ALUMINUM, ALCOA 6061-T6 OR EQUAL</td>
</tr>
</tbody>
</table>

**INSTALLATION NOTES:**

1. SIGNS OR MARKERS SHALL BE PLACED ADJACENT TO ALL UNDERGROUND SIGNAL, COMMUNICATION AND ELECTRICAL CABLES.
2. SIGN FACE SHALL BE ORIENTED PARALLEL TO CABLE.
3. SIGNS OR MARKERS SHALL BE PLACED NO CLOSER THAN 5' FROM THE FIELD SIDE OF THE NEAREST PILL, EXCEPTED TO REQUIRE USE OF SIGN POST OR STRAP. INSTALLER SHALL AVOID DAMAGE TO EXISTING LIGHTS.
4. SIGNS OR MARKERS SHALL BE PLACED:
   a. NO MORE THAN 500' APART
   b. AT EVERY SPUR LOCATION OR CHANGE OF DIRECTION
   c. ON EACH SIDE OF BORE OR BRIDGE ATTACHMENT
   d. WITHIN 100' OF TOWARDS BEGINNING AND ENDING
   e. OFFSET FROM THE UNDERGROUND RUNNING LINE WHEREVER POSSIBLE.
   f. THE ACTUAL OFFSET SHALL BE PERMANENTLY NOTED ON THE SIGN OR MARKER.
5. MARKERS SHALL BE INDIVIDUALLY NUMBERED AND SHOWN ON THE AS-BUILT DRAWINGS.

**MATERIAL NOTES:**

1. SIGNS SHALL INCLUDE ALUMINUM PANEL, RETROREFLECTIVE SHEETING, POLYURETHANE PAINT, SCREENED-PROCESS COLORS OR FILM, OR PROTECTIVE OVERLAY, ANTI-GRAFFITI COATING, POSTS, ANCHORS, AND HARDWARE.
2. ALUMINUM PANEL SHALL BE ALCOA 6061-T6 OR EQUAL.
3. TEXT FONT SHALL BE 10" ARIBOело 100% AS PERMANENT MARKET SIZE AS INDICATED.
4. POSTS, ANCHORS AND HARDWARE SHALL BE AS PERMANENT MARKET.
5. PANELS SHALT BE PAINTED ON ALL SIDES WITH TWO PART ACRYLIC POLYURETHANE PAINT COATING.
6. RETROREFLECTIVE SHEETING SHALL CONFORM TO THE REQUIREMENTS OF ASTM D4956, CLASS I OR G Greater, RETROREFLECTIVE SHEETING SHALL MEET CLASS I OR 4 ADHESIVE BONDING WHICH SHALL BE PRESSURE SENSITIVE AND FOG RESISTANT.
7. SCREENED-PROCESS COLORS AND NON-RETROREFLECTIVE OPAQUE BLACK FILM SHALL MEET THE HARMONY CHARACTERSISTICS AS THE RETROREFLECTIVE SHEETING.

**WARNING UNDERGROUND CABLE**

**BEFORE DIGGING NOTIFY NCTD AT 760-967-2883**

**UNDERGROUND CABLE SIGN**

**FIBER OPTIC CABLE MARKER**

**GROUND ELEVATION**

**SCHEMATIC**

**NOTE:**

- **REV. DATE DESCRIPTION**
- **DES. ENG.**
- **DRAWN BY:** RAILPROS
- **CHECKED BY:** B. SMITH
- **RECOMMENDED BY:** B. SMITH
- **DESIGNER & STAMP**

**SAN DIEGO ASSOCIATION OF GOVERNMENTS**

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San Diego, CA. 92101

www.sandag.org

**810 Mission Avenue**

Oceanside, CA 92054

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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:**

**CONTRACT SHEET NO:**

**DESIGNER & 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**

**UNDERGROUND CABLE SIGN AND FIBER OPTIC CABLE MARKER**

**DRAWING NO:**

**DRAWING SHEET NO:** 1 of 1

**SCALE:**

**CONTRACT SHEET NO:**
MARKING FOR TRACK IDENTIFICATION

**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 OUTER EDGE OF THE CROSSING PANEL. LOCATED ON THE OUTER EDGE READABLE WHEN FACING AWAY FROM THE CENTER OF THE CROSSING.
7. MARKING TO BE MADE USING 2" CALIFORNIA 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.

**MARKING LOCATION PLAN**

- **SIDING IND**
- **MAIN TRK YARD TRK**

**STENCIL OPTIONS**

**TYPICAL MARKING ON WEB OF RAIL**
INSTALLATION NOTES

1. BRIDGE AND RAILROAD MARKER SHALL BE SET ON FIELD SIDE OF OUTSIDE TRACK AND USED ONLY AT SUCH LOCATIONS AS APPROVED BY RAILROAD.

2. CULVERT MARKER SHALL BE INSTALLED AT LOCATIONS WHERE HEABALL PORTAL OR CULVERT OPENING IS NOT VISIBLE FROM THE TANK ( SUCH AS CULVERTS IN HIGH FIELDS) MARKER SHALL BE PLACED ON RIGHT HAND SIDE WHEN FACING IN THE DIRECTION OF INCREASING MILE POSTS.

3. MARKER POST SHALL BE USED TO INDICATE STRUCTURES PROTECTED BY HIGH WATER DETECTOR. MARKERS SHALL BE PLACED AT EACH END OF STRUCTURE WHERE STRUCTURE HAS HARDWARE, MARKER MAY BE PLACED ON EXPOSED END OF HARDWARE.

MATERIAL NOTES:

1. MARKER POST SHALL INCLUDE ALUMINUM PANEL, RETROREFLECTIVE SHEETING, POLYURETHANE PAINT, SCREENED-PROCESS COLORS OR ENSO PROTECTION OVERLAY, ANTI-GRAFFITI OVERLAY, POSTS, MOUNTS AND HARDWARE.

2. ALUMINUM PANEL SHALL BE ALCOA 6060-T6 OR EQUIVALENT.

3. TEXT FONT SHALL BE 3/4" ARIEL BOLD 3/16" AS PER Dimensions ...

4. POLYURETHANE PAINT HARDWARE SHALL BE AS PER Dimensions ...

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 D4795, CLASS II OR GREATER. RETROREFLECTIVE SHEETING SHALL BE DURABLE AND IMPACT RESISTANT WHICH SHALL BE PRESSURE SENSITIVE AND FUNGUS RESISTANT.

7. SCREENED-PROCESS COLORS AND RETROREFLECTIVE GRADE BLACK SHEET SHALL HAVE EQUIVALENT OUTDOOR WEATHERABILITY CHARACTERISTICS AS THE RETROREFLECTIVE SHEETING.
## Bridge Standards

### Superstructure Type

<table>
<thead>
<tr>
<th>Superstructure Type</th>
<th>Common Span Range (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PC/PSC Concrete Slab (3' to 30' deep)</td>
<td>up to 24</td>
</tr>
<tr>
<td>32' deep PC/PSC Concrete Double Cell Box Beam</td>
<td>23-25</td>
</tr>
<tr>
<td>42' deep PC/PSC Concrete Double Cell Box Beam</td>
<td>33-40</td>
</tr>
<tr>
<td>5' deep PC/PSC Concrete Double Cell Box Beam</td>
<td>43-58</td>
</tr>
<tr>
<td>Rolled Steel Girder</td>
<td>31-49</td>
</tr>
<tr>
<td>Steel Deck Plate Girder</td>
<td>83-150</td>
</tr>
<tr>
<td>Steel Thru-Hole Plate Girder</td>
<td>70-200</td>
</tr>
</tbody>
</table>

### Drawing Schedule

<table>
<thead>
<tr>
<th>Drawing No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESD-6001</td>
<td>Bridge Standards Title Page/Drawing Schedule</td>
</tr>
</tbody>
</table>

### Notes

- For spans outside the common span range, additional detailed design will be required.
- *Span lengths are for tangent track only.

### Section 6000 Plans

- Section 6000 plans are provided for information only and are intended to show bridge types currently used on the Lassen 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.
ENGINEERING STANDARD DRAWINGS

DRAWING NO: ESD-6010
DRAWING SHEET NO: 1 OF 2
SCALE: NONE

PC/PS CONCRETE SLAB GIRDER BRIDGE TYPICAL PLAN
AND ELEVATION

NOTES:
1. FINISHES:
   A. (2) COLORS
2. GAP WIDTH TO BE DETERMINED BY HYDROSOFT.
3. BRIDGE TO BE SHOWN FROM APRON TO APRON.
4. PRECAST CONCRETE AND DESIGN AS PER ENGINEERING RECOMMENDATIONS.

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810 Mission Avenue
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30" DEEP PC/PS CONCRETE DOUBLE CELL BOX GIRDER BRIDGE TYPICAL CROSS SECTION AT BENT

NOTES:
1. POTENTIAL CONSTRUCTION JUN TO BE PROVIDED
   WHERE REQUIRED BY CONSTRUCTION SPECIFICATIONS
2. FILL TYPE SECTION NOT TO BE DONE PER
   TECHNICAL REQUIREMENTS
3. WIDTH VARIES BASES ON PROJECT REQUIREMENTS

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Oceanside, CA 92054
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DESIGNER PE STAMP
B. SMITH
W. PREY

TYPICAL SECTION
42" DEEP PC/PS CONCRETE DOUBLE CELL BOX GIRDER
BRIDGE TYPICAL CROSS SECTION AT BENT

NOTES:
1. POTENTIAL CONSTRUCTION JUNCTURE TO BE PROVIDED WHERE REQUIRED BY CONSTRUCTION SPECIFICATIONS.
2. PILE CAPS SELECTED AND DESIGNED TO BE CONCRETE FOR GEO-TECHNICAL RECOMMENDATIONS.
3. WIDTH VARIES BASED ON PROJECT REQUIREMENTS.

ENGINEERING STANDARD DRAWINGS

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DESIGNER PE STAMP
B. SMITH
W. PREY
51" DEEP PC/PS CONCRETE DOUBLE CELL BOX GIRDER BRIDGE TYPICAL CROSS SECTION AT BENT
**ENGINEERING STANDARD DRAWINGS**

**DRAWING NO.**

**SCALE:**

**REVISIONS**

**CHECKED**

**RECOMMENDED**

**DATE**

**DESIRED PE STAMP**

**DRAWING SHEET NO.**

**CONTRACT SHEET NO.**

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**NOTES:**

1. **INTERNATIONAL CONSTRUCTION LAW TO BE PROPOSED WHERE REQUIRED BY CONTRACT DOCUMENTS.**
2. **TYPICAL SELECTION AND DESIGN TO BE DONE FOR EACH CONCRETE RECOMMENDED.**
3. **WATERWAYS BASED ON PROJECT REQUIREMENTS.**

**TYPICAL SECTION**

**ROLLS STEEL GIRDER BRIDGE**

**TYPICAL CROSS SECTION**

**5/27/15**

**ESD-6051**

**2 OF 12**

**NONE**
NOTES:
1. POTENTIAL CONSTRUCTION DEPT TO BE PREPARED WHERE REQUIRED BY CONSTRUCTION SPECIFICATIONS.
2. FOR TYPE DESIGNATION AND COLORS TO BE DONE PER NORTH COUNTY TRANSIT DISTRICT
3. ETHNIC VARIATIONS BASED ON PROJECT REQUIREMENTS.

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DESIGNER PE STAMP
B. SMITH
W. PREY

TYPICAL CROSS SECTION
ENGINEERING STANDARD DRAWINGS

PC/PS CONCRETE BULB-TEE GIRDER BRIDGE TYPICAL PLAN AND ELEVATION

NOTES:
1. F-FIELD END
2. HANDBASES MUST HAVE VENTS TO BE DETERMINED BY HYDROGRDF
3. GAP TO BE DETERMINED FROM PAVEMENT PLAN
4. PILE TYPE SELECTION AND DESIGN TO BE DONE PER COTD LOCAL RECOMMENDATIONS

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DESIGNER PE STAMP
B. SMITH
W. PREY

PLAN

TYPICAL SECTION

ELEVATION

REV.
DATE
DESCRIPTION
DES.
DATE

DRAWING NO.
SCALE:

DRAWING SHEET NO.
CONTRACT SHEET NO.

REVISIONS
DRAWN
CHECKED
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DRAFTING NO.
DRAWING SHEET NO.
SCALE:

REV.
DATE
DESCRIPTION
DES.
DATE

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DATE
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DES.
DATE

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NORTH COUNTY TRANSIT DISTRICT

REV.
DATE
DESCRIPTION
DES.
DATE

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NORTH COUNTY TRANSIT DISTRICT
PC/PS CONCRETE SINGLE CELL BOX GIRDER BRIDGE
TYPICAL PLAN AND ELEVATION

NOTES:
1. F = Fixed End
2. EXP = Expansion End
3. CAP TO BE DETERMINED BY PHYSICAL CURVE.
4. CAP TO BE DETERMINED FROM ANALYSIS, 2' MIN
5. MILL TYPE SELECTION AND DESIGN TO BE DONE
   PER GUIDELINES RECOMMENDATIONS

ENGINEERING STANDARD DRAWINGS
DRAWING NO. ESD-60509
DRAWING SHEET NO. 9 OF 12
SCALE: NONE

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816 Mission Avenue
Oceanside, CA 92054
www.nsctd.com

DESIGNER PE STAMP
B. SMITH
W. PREY
**TABLE 1 - ROUND SMOOTH STEEL PIPE (SSP)**

<table>
<thead>
<tr>
<th>PIPE SIZE DIA (in)</th>
<th>THICKNESS (in)</th>
<th>WEIGHT (lbs/ft)</th>
<th>COVER *</th>
<th>20°F LENGTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>0.079</td>
<td>14</td>
<td>320</td>
<td>16</td>
</tr>
<tr>
<td>18</td>
<td>0.079</td>
<td>18</td>
<td>360</td>
<td>16</td>
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<tr>
<td>24</td>
<td>0.079</td>
<td>24</td>
<td>420</td>
<td>16</td>
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<tr>
<td>30</td>
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<td>20</td>
<td>620</td>
<td>16</td>
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<tr>
<td>36</td>
<td>0.079</td>
<td>44</td>
<td>820</td>
<td>16</td>
</tr>
<tr>
<td>42</td>
<td>0.079</td>
<td>47</td>
<td>940</td>
<td>16</td>
</tr>
<tr>
<td>60</td>
<td>0.109</td>
<td>24</td>
<td>1,480</td>
<td>16</td>
</tr>
<tr>
<td>72</td>
<td>0.138</td>
<td>160</td>
<td>2,800</td>
<td>12</td>
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* Cover to be measured from base of rail to top of pipe.

**CONSTRUCTION NOTES**

**GENERAL:**

There are structures designed for Cooper Ed C style load with impact and covered as shown in Table 1 and Table 2.

**TABLE:** 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 Engineers Manual for Railway Engineering, Chapter 1, Part 4, & Greater Lengths are to be based on standard mainline railroad sections.

**MATERIALS:**

Pipe shall be in accordance with ASTM A500, or SSP to be grade B and SSP. The pipe shall have a minimum yield strength of 30 ksi. A hydrostatic test is not required.

The ends of each section of pipe shall be square cut on one end. The ends shall be suitably heaved for field welding sections together.

**TABLE 2 - ROUND CORRUGATED STEEL PIPE (CCS)**

<table>
<thead>
<tr>
<th>PIPE SIZE DIA (in)</th>
<th>CASE</th>
<th>THICKNESS (in)</th>
<th>COVER (in)</th>
<th>20°F LENGTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>14</td>
<td>0.079</td>
<td>14</td>
<td>320</td>
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<tr>
<td>24</td>
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<td>360</td>
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<tr>
<td>36</td>
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<td>0.079</td>
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<td>0.079</td>
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<td>940</td>
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<tr>
<td>150</td>
<td>14</td>
<td>0.079</td>
<td>14</td>
<td>1,480</td>
</tr>
</tbody>
</table>

* Cover to be measured from base of rail to top of pipe.

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DESIGNER PE STAMP
B. SMITH
B. SCHMITH

CONSTRUCTION NOTES AND TABLE FOR SMOOTH AND CORRUGATED STEEL PIPE CULVERTS
Section 7000
MAINTENANCE AND LAYOVER FACILITIES
(Placeholder)
RELAY CONTACTS - TWO POSITION RELAYS

- FRONT CONTACT-RELAY NORMALLY ENERGIZED
- FRONT CONTACT-RELAY NORMALLY DE-ENERGIZED
- BACK CONTACT-RELAY NORMALLY ENERGIZED
- BACK CONTACT-RELAY NORMALLY DE-ENERGIZED
- FRONT AND BACK CONTACT-RELAY NORMALLY ENERGIZED
- FRONT AND BACK CONTACT-RELAY NORMALLY DE-ENERGIZED
- FLASHER RELAY

RELAY CONTACTS - THREE POSITION RELAYS

- D.C. POLAR RELAY CONTACT-RELAY NORMAL
- D.C. POLAR RELAY CONTACT-RELAY REVERSE

RELAY CONTACTS WITH SPECIAL CHARACTERISTICS

- INDEPENDENT FRONT AND BACK CONTACTS
- MAGNETIC BLOW-OUT
- HIGH CURRENT (HEAVY DUTY) FRONT CONTACT
- HIGH CURRENT (HEAVY DUTY) BACK CONTACT
- PUSH BUTTON-PUSH TO OPEN
- PUSH BUTTON-PUSH TO CLOSE
- SPRING RETURN PUSH BUTTON
- SWITCH LOCK CONTACT-CLOSED
- SWITCH LOCK CONTACT-OPEN
- KEY CIRCUIT CONTROLLER-NORMAL OPEN
- KEY CIRCUIT CONTROLLER-NORMAL CLOSED
- CHECKING CONTACT OF TIME ELEMENT
- RELAY USED TO CHECK THE RELAY NORMAL

TYPICAL CIRCUIT

![Typical Circuit Diagram](image-url)
WAYSIDE SIGNAL SYMBOLS

**Notes:**

1. 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.
2. Number plates will be mounted on all intermediate and automatic signals with the exception of hand throw switch leaving signals.
3. 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.
4. A "P" or protect sign will be mounted on the first signals in any approach to a hazard detector.
5. A "G" or grade sign will be mounted on intermediate signals located on an ascending grade equal to or greater than 1 percent.
6. All signals shall be colorlight unless otherwise noted.

**Legend:**

- "V" crossover
- Dwarf signal
- Intermediate signals
- CP Universal
- CP East End of Double Track
- CP West End of Double Track
- Ground signals
- Bridge signal

**Scale:**

1:1 (Full Scale)
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.
6. HAND THROW SWITCH POINT DERAIL WITH CIRCUIT CONTROLLER
7. HAND THROW SWITCH WITH ELECTRIC LOCK AND CIRCUIT CONTROLLER
8. POWER SWITCH AND CIRCUIT CONTROLLER HAND THROW SWITCH POINT DERAIL.
9. POWER SWITCH AND DIRECTIONAL LIFTING BLOCK DERAIL WITH CIRCUIT CONTROLLER.
10. POWER DOUBLE SLIP SWITCH WITH REVERSIBLE POINT FROG, SEE DETAIL ABOVE.

SWITCH AND DERAIL SYMBOLS
NOTES:

1. NORMAL POSITION OF SWITCH IS FOR MAIN TRACK.
TYPICAL WAGO CONFIGURATIONS

TYPICAL 12VDC BATTERY BUSS CONFIGURATION I
TYPICAL 12VDC BATTERY BUSS CONFIGURATION II
TYPICAL ELECTROLIGHTS I/O INTERFACE CONFIGURATION

REFER TO SITE SPECIFIC CIRCUIT PLANS FOR APPLICABLE WAGO CONFIGURATIONS

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 PIGS. NO. 8-12 AWG RING TERMINALS SHALL BE AMP #35110 WITH 1/4" STUD PIGS.
5. L&W INDUSTRIES, INC. TERMINAL POST INSULATING SHIELDS AND CABS SHALL BE INSTALLED ON ALL AC POWER TERMINALS. EQUIVALENT INSULATORS ARE ACCEPTABLE.

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 W IRED 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 TETRAFLUORODETHYLENE (ETFE) CONFORMING TO ASTM D3159 (I.E. OKOZEL MANUFACTURED BY DIONETE).
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 INSTALLED 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 CAB CONDUCTORS SHALL BE ATTACHED TO SPARE BINDING POSTS. NO MORE THAN ONE SOLID CONDUCTOR SHALL BE SECURED TO A POST.

ENGINEERING STANDARD DRAWINGS
NORTH COUNTY TRANSIT DISTRICT
INSTRUMENT HOUSE WIRING DETAILS
DRAWING NO. ESD-8150
DRAWING SHEET NO. 1 OF 1
SCALE: NONE
CONTRACT SHEET NO. ID
TERMINAL BOARD DETAIL

1. 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.

2. 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.

3. THE BARE WIRE SHALL BE FORMED TO PRODUCE AN EYELET WHICH SHALL BE PLACED OVER THE BINDING POST. THE EYELET SHALL BE SHAPED TO PROVIDE A TIGHT FITTING LOOP AROUND THE POST BUT LOOSE ENOUGH TO EASILY SLIDE ON AND OFF.

4. 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.

5. 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.

6. 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'S NUT SHALL BE APPLIED AND SECURELY TIGHTENED WITH A TERMINAL WRENCH.

7. 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.

8. FLEX CONDUCTORS SHALL BE TAGGED USING APPROVED TAGS.

9. 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.

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

CABLE TERMINATION DETAIL

NOTES:

1. CASE OPTION SIZE TO BE DETERMINED BY THE ENGINEER. CASE SHALL BE EQUIPPED WITH A PLYWOOD BACKBOARD SETUP WITH A MINIMUM OF 40 - 2 POST TERMINALS ARRANGED AS OUTLINED IN THE TERMINAL BOARD DETAIL ABOVE AND DISPLAYED IN THE CASE.

2. 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.

3. THE BARE WIRE SHALL BE FORMED TO PRODUCE AN EYELET WHICH SHALL BE PLACED OVER THE BINDING POST, THE EYELET SHALL BE SHAPED TO PROVIDE A TIGHT FITTING LOOP AROUND THE POST BUT LOOSE ENOUGH TO EASILY SLIDE ON AND OFF.

4. 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.

5. 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.

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7. 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.

8. FLEX CONDUCTORS SHALL BE TAGGED USING APPROVED TAGS.

9. 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.
1. Insulation on solid conductors shall be removed and the exposed bare wire thoroughly cleaned to provide high conductivity, taking care not to 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 and off.

3. Insulation on flex conductors shall be removed and the exposed bare wire thoroughly cleaned to provide high conductivity.

4. 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.

5. 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.

6. 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.

7. Flex conductors shall be tagged using approved tags.

8. 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.

9. Conductors are landed in numerical order with number one on top.
NOTES:
1. WHERE NOT INDICATED ON PLAN, PLACE EQUIPMENT ACCORDING TO THIS DRAWING UNLESS OTHERWISE AUTHORIZED BY NCTD.
2. TOP OF SIGNAL FOUNDATION SHALL BE LOCATED NO MORE THAN 12' ABOVE FINAL GRADE.
3. WALKWAY BALLAST SHALL BE PLACED AROUND INSTRUMENT SHELTER AND UP TO TOP OF TRACK SECTION.
4. STORM DRAINS AND DRAINAGE DITCH SHALL BE DIVERTED AROUND BERM OR APPROPRIATE DRAINAGE PIPE INSTALLED.
5. POWER OFF LIGHT SHALL BE INSTALLED ON INSTRUMENT SIGNAL, ON REMOTE CROSSING SHELTERS. LAMP SHALL BE VELCORP GEMS P/N LC2-001WB-W AND PLACED ON TRACK SIDE VISIBLE TO APPROACHING TRAINS.
6. INTERMEDIATE SIGNAL HOUSES ARE TYPICALLY 6'X6'. REMOTE CROSSING START HOUSES ARE TYPICALLY 6'X6'.
7. ORIENTATION OF INSTRUMENT HOUSE CAN BE ADJUSTED BASED ON SITE CONDITIONS AS REQUIRED SUBJECT TO APPROVAL BY NCTD.

DESCRIPTION:
- **Ballast**
- **Foundation**
- **Subgrade**
- **Cable Access**
- **Ladder Foundation**
- **Security Fence Detail**

**EQUIPMENT AND ACCESSORIES**
- **Security Fence**
- **Main Line Embankment**
- **Subgrade**
- **Ballast**
- **Foundation**

**DRAWING NO.**
E95-8215-01

**SCALE:**
NONE

**DATE:**
MARCH 18, 2017

**DESIGNER PE STAMP:**
PRE, INC.
E. Roe

**DISTRIBUTION:**
SANDAG
SAN DIEGO ASSOCIATION OF GOVERNMENTS
401 B Street, Suite 800
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gonctd.com

**ENGINEERING STANDARD DRAWINGS**
TYPICAL INTERMEDIATE SIGNAL/REMOTE START LOCATION AND BERM WITH SECURITY FENCE
1. Where not indicated on plan, place equipment according to this drawing unless otherwise authorized by NCTD.
2. Walkway ballast shall be placed around instrument shelter and up to toe of track section.
3. Storm drains and drainage ditch shall be sheeted around berm or appropriate drainage pipe installed.
4. Power off light shall be installed on grade crossing shelter. Lamp shall be Velcorp Gems P/N 122-3WH 4W-4 and placed on track side, visible to approaching trains.
5. Grade crossing houses are typically 10' x 8'.
6. Orientation of instrument house can be adjusted based on site conditions as required, subject to approval by NCTD.

NOTES:

- Security fence height shall be minimum 8'-0".
- Security fence shall be composed of wire mesh and driven into the ground to a minimum depth of 2'-0".
- Security fence shall be a combination of 10-gauge galvanized #12 barbed wire and 1" mesh wire mesh fencing.
- Security fence shall be installed within 8'-0" of track side, visible to approaching trains.
- Power off light shall be Velcorp Gems P/N 122-3WH 4W-4 and placed on track side, visible to approaching trains.
- Grade crossing houses are typically 10' x 8'.
- Orientation of instrument house can be adjusted based on site conditions as required, subject to approval by NCTD.
1. Where not indicated on plan, place equipment according to this drawing unless otherwise authorized by NCTD.

2. Walkway ballast shall be placed around instrument shelter and up to toe of track section.

3. Storm drains and drainage ditch shall be diverted around berm or appropriate drainpipe installed.

4. End of double track and single crossover houses are typically 10'x10'. Universal crossover houses are typically 14'x10'.

5. Orientation of instrument house can be adjusted based on site conditions as required, subject to approval by NCTD.
NOTES:
1. WHERE NOT INDICATED ON PLAN, PLACE EQUIPMENT ACCORDING TO THIS DRAWING UNLESS OTHERWISE AUTHORIZED BY NCTD.
2. WALKWAY BALLAST SHALL BE PLACED AROUND INSTRUMENT CASE AND UP TO TIE OF TRACK SECTION.
3. STORM DRAIN AND DRAINAGE DITCH SHALL BE DIVERTED AROUND BERM OR APPROPRIATE DRAINAGE PIPE INSTALLED.
4. 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.
5. SWITCH LOCK/LEAVING SIGNAL CASES ARE TYPICALLY SIZED AS SHOWN.
6. ORIENTATION OF INSTRUMENT CASE CAN BE ADJUSTED BASED ON SITE CONDITIONS AS REQUIRED SUBJECT TO APPROVAL BY NCTD.
NOTES:

1. WHERE NOT INDICATED ON PLAN, PLACE EQUIPMENT ACCORDING TO THIS DRAWING UNLESS OTHERWISE AUTHORIZED BY NCTD.

2. TOP OF SIGNAL FOUNDATION SHALL BE LOCATED NO MORE THAN 12" ABOVE FINAL GRADE.

3. WALKWAY BALLAST SHALL BE PLACED AROUND INSTRUMENT SHELTER AND UP TO TOE OF TRACK SECTION.

4. STORM DRAINS AND DRAINAGE DITCH SHALL BE DIVERTED AROUND BERMS OR APPROPRIATE DRAINAGE PIPE INSTALLED.
NOTES:
1. MAIN TRACK JOINT STAGGER MAY VARY FROM 3 TIE CRBS TO 0'-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 - 12' - 0'' TRACK CENTERS.
5. UNLESS OTHERWISE APPROVED BY NCTD, SIGNALS ON CANTILEVERS AND BRIDGES SHALL BE LOCATED DIRECTLY ABOVE CENTRELINE OF TRACK. CANTILEVER AND BRIDGE MUST SHALL BE CENTERED BETWEEN INSULATED JOINTS.
6. TURNOUT JOINT STAGGER MAY VARY FROM 1'-0'' TO 4'-0''. JOINTS SHALL BE LOCATED IN THE CENTER OF CROSSOVER 40'-0'' MINIMUM FROM EFFECTIVE INSULATED TURNOUT JOINT NEAR HEADBLOCKS.
1. Use NCOPRESS tool to compress connector sleeve.
2. Use 3M (810-20) rubber tape to insulate compressed sleeve.
3. Use a heatsink sleeve to seal each individual splice.

**DETAIL A - PULL BOX SPlice**

1. 6' BOND STRAND TWISTED TO TIE
2. CONNECTOR SLEEVE

**DETAIL B - RETAINING CLIPS**

1. retainer
2. UNDERNEATH
3. TOP
4. BOTTOM
5. WIRE CLAMP

**USE TO SECURE BOND STRAND TO TIE**

WOOD TIE APPLICATION

- Use to concrete the application
  - MIN. 3'
  - MIN. 6"
  - MIN. 3' WIRE CLAMP
  - UNDERNEATH
  - APPLY W/ 6" DIAMETER BEADS

**WOOD TIE APPLICATION**

1. 1'-10" END POSTS FOR INSULATED JOINTS SHALL BE CENTERED BETWEEN TIES
2. 1'-5" EACH TRACK WIRE CONNECTED TO WEB OF RAIL WITH ERICO WELD TYPE TRACK CONNECTOR
3. 1'-6" SEE DETAIL A FOR RETAINING CLIPS
4. 1'-5" SEE DETAIL A FOR RETAINING CLIPS
5. 1'-12" TIE FASTENING POINTS
6. 1'-12" BURIED 6" BELOW TOP OF BALLAST TO ALLOW REMOVAL AND REPLACEMENT DURING TRACK SURFACING ACTIVITIES
7. 6'-8" MINIMUM
8. 8" MAX CONCRETE PULL BOX

**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. WIPE-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 SPLICE.
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 SLEWED 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. ORABOND125 GLUED TO CONCRETE TIE APPLICATION

**ENGINEERING STANDARD DRAWINGS**

- 10"X17"X12" CONCRETE PULL BOX
- 1-INCH GALVANIZED ROOFING NAIL
- 1-CENT PERMANENT WIRE CLAMP
- 2C#6 TW. TRK. WIRE
- 6" MIN."虫PO# GC-HSC89
- 6" MIN."虫PO# GC-HSC89

**TRACK WIRE INSTALLATION**

- USE TO SECURE BOND STRAND TO TIE
- GLUED TO CONCRETE TIE APPLICATION
- WELD TYPE TRACK CONNECTIONS ARE TO BE INSTALLED PER MANUFACTURER'S RECOMMENDATION.
- WELD TYPE TRACK CONNECTOR TO WEB OF RAIL WITH ERICO PN GC-HSC89 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.
- WHERE POSSIBLE, ALL TRACK WIRES SHALL BE INSTALLED IN SUCH A MANNER THEY CAN BE VISUALLY INSPECTED FROM THE FIELD SIDE OF THE TRACK.
- FOR ATTACHING GLUED TIE CLIPS TO CONCRETE TIES, REFER TO MANUFACTURER'S INSTALLATION INSTRUCTION SHEET.

**NOTES:**

- 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.
- THERE SHALL BE A MAXIMUM OF ONE SPLICE PER TRACK. WIPE-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 SPLICE.
- 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.
- A SLEWED COIL SHALL BE PROVIDED IN EACH SOLID CONDUCTOR OF SUFFICIENT LENGTH TO ALLOW THE SPLICE TO BE PULLED ABOVE THE TOP OF PULL BOX.
- WIRES SHALL FOLLOW THE CONTOUR OF TIE AND RAIL WITH NO EXCESS SLACK.
- 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.
1. Trackside Installation of Termination Shunts as shown in this standard is the preferred method.

2. Multiple Shunt/TJC’s will utilize one track wire, multiple connector end plug or approved equal.

3. Track wire to be buried 12" below top of ballast to allow removal and replacement during track surfacing activities.

4. Shunt Enclosure Part Number 506465-80-04-Grey 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 Must be Painted Gray.
1. TO TIE LIKE STANDARD TRACK CONNECTION.

2. TERMINATION SHUNT INSTALLATION REQUIRES APPROVAL OF NCTD.

NOTES:
1. Wires from shunt or TJC attached to the like standard track connection.
2. THIS METHOD OF SHUNT/COUPLER INSTALLATION IS ONLY BE USED WHEN TRACK SIDE INSTALLATION IS NOT POSSIBLE. THIS INSTALLATION REQUIRES APPROVAL OF NCTD.
**Joint Bonding**

1. **joint bonding on this sheet**
2. **see note #2**
3. **see note #2**
4. **see note #2**

**Recommended Bonding for Typical Frogs**

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>WELDED BOND</td>
<td>BOND IN WEB OF RAIL</td>
<td>BOND IN WEB OF RAIL</td>
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</table>

**Spring Rail Frog**

**Rail Bound Manganese Frog**

**Self-Guarded Solid Manganese Frog**

**Joint Bonding**

- **Welded Railhead Bond**
- **Welded Web Bond**

**Switches with Heel Blocks Floating**

**Switches with Heel Blocks**

- **0 1/2" Heel Spread**

**Notes:**

1. 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.
2. Turnouts are to be double bonded using one web type bond and one railhead bond, with exception to joints marked with a "W". These joints only require railhead bond only when turnout terminates in a track relay.
3. All railhead bonds and web bonds shall be of the welded type.
4. All welded bonds are to be installed per manufacturer’s recommendations.

**Engineering Standard Drawings**

**Rail and Frog Bonding Details**

*See drawing ESD-8245*
FOULING BRIDLE CONFIGURATION

METHOD A: (TOP VIEW)
FOULING BRIDLES LOCATED IN SAME CEB

METHOD B: (TOP VIEW)
FOULING BRIDLES LOCATED ON SAME TIE

FRONT VIEW

INSULATED JOINTS

FOULING BRIDLES

DETAI VIEW

NOTE:
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 RECOMMENDATION.
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.

3" PIPE NIPPLE

TYPICAL ARRANGEMENT FOR LEVELING BOLTS

3" GALVANIZED COUPLING WELDED IN PLACE

3" GALVANIZED COUPLING WELDED IN PLACE

NOTES:

1. FOUNDATIONS TO BE HOT-DIPPED GALVANIZED.

2. FURNISHED WITH 4 EA 1" X 8" BOLTS WITH HEX HEADS, 12 NUTS AND 16 FLAT WASHERS.

3. BOLTS TO BE THREADED TO ALLOW FOR LEVELING.

4. BOLTS, WASHERS AND NUTS SHALL BE CADMIUM STEEL AND SHALL BE PACKAGED SEPARATELY IN A WATER-TIGHT CONTAINER SECURELY ATTACHED TO THE FOUNDATION.
SAE 1020 STEEL INDUCTOR BASE PLATE

WELD LEVELING NUT CLAMP NUT ASSEMBLED UNIT

SPECIAL 2 COND #9 U.G. CABLE

6" DRIVE SCREW

FLEX CONDUIT ATS JCT. BOX

50' MIN.

10' TIE

9' TIE

10' TIE

22.5° - 36°

25° - 36°

65° DRIVE SCREW

INDUCTOR BASE PLATE SAE 1020 STEEL

CLAMP NUT LEVELING NUT ASSEMBLED UNIT

2 EACH FLAT WASHERS

6" X 2" STRAP IRON CUT TO LENGTH

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.
AUTOMATIC TRAIN STOP LOCOMOTIVE
RECEIVER AND WAYSIDE INDUCTOR

JOURNAL BOX
BRACKET
HANGER
RECEIVER
WHEEL
TIE

RECEIVER AND WAYSIDE INDUCTOR
AUTOMATIC TRAIN STOP LOCOMOTIVE

ENGINEERING STANDARD DRAWINGS
AUTOMATIC TRAIN STOP (ATS)
PLACEMENT REQUIREMENTS

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DESIGNER PE STAMP
PRE, INC.
E. ROE
W. PREY
FEBRUARY 2015
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 NCTD.
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 NCTD.
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 XING 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 OMS P/N L22-BW56-4 AND PLACED ON TRACK SIDE, VISIBLE TO APPROACHING TRAINING.

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.

FACE OF CURB

AVG. METER SERVICE
(TYPICAL LOCATION)

10' MIN.

NOTE 8

7C#6 TO GATE #1

7C#6 TO HOUSE

TW. 2C#6 TO HOUSE

TW. 2C#6 TO TRK.

7C#6 TO GATE #2

4" SCH. 80 PVC

30' MIN.

7C#6 TO GATE #1

7C#6 TO HOUSE

TW. 2C#6 TO HOUSE

TW. 2C#6 TO TRK.

(TYPICAL LOCATION)

12XG:

HCREASE

NOTE 9

AO: 16 MAX. - 8 MIN.

TYPICAL LOCATION OF FOUR 4" SCH 80 PVC.
4'-6" MIN.

3 6" 16' MAX. - 6' MIN.

30' MIN.

1. XING HOUSE, CARE 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 NCTD.
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 NCTD.
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 XING HOUSE.
8. IS THE DESIRABLE CLEARANCE FROM CENTER LINE OF TRACK, MINIMUM OF IS 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.
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 NCTD.

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 NCTD.

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 curb house.

8. 15 Min. Desired clearance from centerline of track, minimum 12 must be maintained.

9. Power off light shall be installed on grade crossing shelters, lamp shall be Velcorp OMS P/N LE2-100-WI-W and placed on track side, visible to approaching trains.
NOTES:

1. Cable under track to be placed in 4" SCH 80 PVC.

2. Track connection to be made in accordance with ESD-8260.

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-8268-D.

5. If a communications link is needed to interconnect multiple control units, a #14 AWG cable, omni-cable P/N L41412, or approved equal shall be used to establish this link.

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ENGINEERING STANDARD DRAWINGS

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NORTH COUNTY TRANSIT DISTRICT
401 B Street, Suite 800
San Diego, CA. 92101
www.sandag.org

OCEANSIDE ASSOCIATION OF GOVERNMENTS
810 Mission Avenue
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1. Cable under track to be placed in 4" SCH 80 PVC.

2. Track connection to be made in accordance with ESD-8260.

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, immovable P/N L41412, or approved cable shall be used to establish this link.

NOTES:

1. Signal 4E:
   - 2EAT
   - 2E

2. Signal 2E:
   - 2WAT
   - 2W

3. Signal 4W:
   - 4WAT
   - 4W

4. Track 1AX:
   - 1T
   - 1BXT

5. Track 3AX:
   - 3T
   - 3BXT

6. Track 4WAT:
   - 4EAT

7. Track 2WAT:
   - 2EAT

8. Track 4EAT:
   - 4E

9. Each 7C #6 to 3C #9 to ATS inductor (when used)

10. Location of ATS Wayside Inductor:
    - To be determined by engineer.

11. Tw 2C #6 to Track 1AX:
    - 1T
    - 1BXT

12. Tw 2C #6 to Track 3AX:
    - 3T
    - 3BXT

13. Tw 2C #6 to Track 4WAT:
    - 4EAT

14. Tw 2C #6 to Track 2WAT:
    - 2EAT

15. Tw 2C #6 to Track 1AX:
    - 1T

16. 7C #6 & 12C #14 to Signal 4W
    - 2 each 7C #6 to Signal 4W

17. 7C #6 & 12C #14 to Signal 2E
    - 2 each 7C #6 to Signal 2E

18. 7C #6 & 12C #14 to Signal 2W
    - 2 each 7C #6 to Signal 2W

19. 7C #6 & 12C #14 to Signal 4E
    - 2 each 7C #6 to Signal 4E

20. Track Connection to be made in accordance with ESD-8260.

21. P/N L41412 or approved.

22. Tw 2C #6 to Track 4WAT:
    - 4EAT
    - 4E
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" X 6" POST SHALL EXTEND A MINIMUM OF 18" BELOW TOP OF FINAL GRADE.

4. OUTER EDGE OF 2" X 12" SIGN BOARD SHALL BE PAINTED BLACK.

11" 72" TREATED POST
6" X 6" GALVANIZED STEEL

2" 6" 6" BLACK BORDER
8" X 8" TREATED POST

2" 6" GALVANIZED STEEL

12" MIN. 15" MAX.

1" DECK SCREWS
2" X 12" TREATED LUMBER
SIGNS ATTACHED TO 1" VIEW SCREWS
2" X 2" GALVANIZED STEEL

1/8" ONLY, BOLT M/Z FLAT WASHERS, LOCK WASHER & NUT

1/8" X 2" GALVANIZED STEEL

WEB
**Typical Grounding for Signal Locations**

**NOTES:**

1. 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.

2. 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.

3. Do not make any sharp bends in the ground wire.

4. *Erco Products or Equivalent.*

---

**Grounding Bolt**

- INSTRUMENT CASE
- BACK OF HOUSE
- DOOR
- NO. 6 GREEN R.C. WIRE
- GROUNDING BOLT
- 3/8" X 10' COPPERWELD GROUND ROD
- 3/8" X 10' COPPERWELD GROUND ROD CONNECTION
- COPPERWELD GROUNDING BOLT
- COPPERWELD GROUND CLAMP
- BRONZE CAP SCREW
- 2 NUTS AND 4 COPPER WASHERS
- NO. 6 BARE COPPER WIRE
- SBB855C1G36 WELDED GROUND CONNECTION
- SB855E1G72 WELDED GROUND CONNECTION
- SBB01001 COPPERWELD ONE SHOT GROUND ROD CONNECTION

---

**General Information**

- **Drawing No.:** ESD-8280-01
- **Scale:** 1 OF 1
- **Control Sheet #:** None

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**San Diego Association of Governments**

810 Mission Avenue
Oceanside, CA 92054
www.gonctd.com
NDS STANDARD SERIES VALVE BOX #107BCH

NEXT GROUND ROD
GROUND WIRE TO HOUSE OR CASE
GROUND WIRE TO CASE OR HOUSE

GROUND ROD
TERMINAL BOARD

GROUNDING NOTES:
1. GROUND RODS SHALL BE 3/8" Dia., a minimum of 18' in length.
2. PLACE GROUND RODS IN GROUND THAT HAS PREVIOUSLY BEEN UNDISTURBED.
3. CLEAN GROUND ROD AND ROD WITH EVERY 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 DEGREES 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 VALVE BOX INSTALLED OVER GROUND RODS FOR EASY INSTALLATION. 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.

TYPICAL SIGNAL HOUSE GROUNDING
TYPICAL SIGNAL CASE GROUNDING
BILL OF MATERIAL
BEGIN/END CIRCUIT SIGN - COMPLETE

<table>
<thead>
<tr>
<th>ITEM</th>
</tr>
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<tbody>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>QTY</th>
<th>ITEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>2½&quot; x 2½&quot; x 30&quot; LONG SQUARE POST ANCHOR</td>
</tr>
<tr>
<td>2</td>
<td>¾&quot; OAL x 2½&quot; CARRIAGE BOLTS WITH NUT AND WASHER (ALL GALVANIZED)</td>
</tr>
</tbody>
</table>

SPECIFICATIONS

MATERIAL:
SIGN: ½" THICK MILL FINISH ALUMINUM PANEL, ALCOA 6016-T6 OR EQUAL. PAINT ALL SIDES WITH LINEAR POLYURETHANE. COLOR CODE 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 2½" SQUARE STEEL POST THRU SIGN AND POST AND … DIA. KNOCKOUT HOLES. ALL GALVANIZED IN ACCORDANCE WITH ASTM A-386.

HARDWARE: ALL HARDWARE TO BE VANDAL RESISTANT TAMPER RESISTANT, ALCOA OR EQUAL.
BOLTS: ¾" ALUMINUM CARRIAGE BOLTS, 2024-T4 ALLOY, LENGTHS AS SHOWN.
NUTS: TAMPER RESISTANT, ALCOA OR EQUAL.
WASHERS: FLAT ALUMINUM WASHERS.

NOTES:
LETTERS TO BE 4" HIGH, BLACK ON WHITE RETRO-REFLECTIVE SHEETING. LETTER STYLE SHALL BE "FUTURA BOLD"
**SPECIFICATIONS**

**MATERIALS:**
- Sheet 0.040" thick mill finish aluminum panel, Alcoa 6063-T6 or equal.
- Paint all sides with linear polyurethane.
- Color face of panel with engineering grade pressure sensitive, retro-reflective vinyl sheathing.
- Silk screen legend with black ink.
- Finish with exterior grade pressure sensitive clear mylar, 3M-1150 or equal.

**STEEL POSTS:**
- 12 gauge (0.105" thick) steel post (Alcoa A-36) with "9/32" Dia. knockout holes. All galvanized in accordance with ASTM A-386.
- Steel posts: 2.42 lbs. per linear foot.

**HARDWARE:**
- All hardware to be vandal resistant, tamper resistant, Alcoa or equal.
- Bolts shown are 2" and 3½" aluminum carriage bolts, 2024-T4 alloy, lengths as shown.
- Nuts: 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 rise a minimum of 8' above final grade.
- Post shall be of sufficient length that top of sign is a minimum of 9' above top of rail.

**TYPICAL SECTION THRU SIGN AND POST**

**TYPICAL SECTION THRU POST AND ANCHOR**

**REV.** | **DATE** | **DESCRIPTION** | **DES.** | **ENG.**
---|---|---|---|---
NEW | FEBRUARY 2015 | | | |

**LOCATION PLAN**

**NOTES:**
1. Begin CTC and End CTC signs may be mounted on a single post.
2. Obtain radio channel numbers from engineer.
3. Radio channel signs may be mounted on a single post.
REPORT EMERGENCY TO 1-888-243-5247 OR PROBLEM CROSSING XXX XXX X

INDEX

4. Clear Wind Brackets and Curb Lamp and Must be Centered Between Tip Lamp and Middle Lamp to Be Mounted 4'-6" Min. 3'-6" Min. See Note 3

5. Top of Foundation to Be No More Than 4" Above Surface of Crown of Roadway

6. Middle Lamp to Be Mounted 28" Min. 6" Max. 12" Min. See Note 3

7. Emergency Notification Sign shall Be Placed on Warning Device as Determined by the Field Engineer. 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.

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-8336 thru ESD-8339 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 Pavement 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 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.
REPORT EMERGENCY TO 1-888-243-5247 OR PROBLEM CROSSING XXX XXX X

RAILROAD CROSSING
PEDESTRIANS AND BICYCLES ONLY

EMERGENCY NOTIFICATION SIGN
SEE ESD-8270 FOR SIGN DETAIL

REPORT EMERGENCY OR PROBLEM TO 1-888-243-5247 CROSSING XXX XXX X

CPRC STANDARD NO. 8
FLASHING LIGHT SIGNALS
*PEDESTRIAN CROSSING APPLICATION*

INCLUDES:
16"-24" MAST W/ JCT. BOX
2-WAY LED FLASHER ASSY CROSSBUCKS
PED XING SIGN
ELECTRONIC BELL HARDWARE
SITE SPECIFIC ENS WITH SIGN MOUNTING BRACKETS & HARDWARE

CPUC STANDARD NO. 8
FLASHING LIGHT SIGNALS
*MEDIAN APPLICATION*

INCLUDES:
16"-24" MAST W/ JCT. BOX
1-WAY LED FLASHER ASSY CROSSBUCKS
ELECTRONIC BELL HARDWARE
SITE SPECIFIC ENS WITH SIGN MOUNTING BRACKETS & HARDWARE

NOTES:
1. FLASHING LIGHT SIGNAL UNITS SHALL BE 12" LED TYPE DESIGNED TO OPERATE WITH A SOLID STATE CROSSING CONTROLLER AND SHALL CONFORM TO AREMA C&S MANUAL RECOMMENDATIONS.

2. 1-WAY AND 2-WAY LED FLASHER ASSEMBLIES SMALL 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.

3. 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.

4. 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 TRUCK FOR EACH DIRECTION OF TRAVEL.

5. THE DIMENSIONS SHOWN ARE TYPICAL.

REVISIONS
DRAWN
PREP. INC.
CHECKED
RECOMMENDED
DATE
REV.
DESCRIPTION
DES.
ENG.

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
FLAShING LIGHT SIGNAL CONFIGURATIONS (CPUC No. 8)

DRAWING NO. ESD-8265
DRAWING SHEET NO. 1 OF 1
SCALE: 1:1
"CONTROL" SHEET NO.

SANDAG PRE, INC.
E. ROE
FEBRUARY 2015
CPUC STANDARD No. 9
Track Crossing

PRIVATE CROSSING

REPORT EMERGENCY OR PROBLEM TO 1-888-243-5247 CROSSING XXX XXX X

NOTES:
1. Flashing light signal units shall be 16"LED, type designed to operate with a solid state controller and shall conform to Arema C&S Manual recommendations.
2. One-way or two-way LED flasher assemblies shall include junction box, cross arm assembly and lamp mounting brackets. Use Arema C&S Manual Part 5.2.5.1, LED lamp units, 24" steel backgrounds, steel weights and all associated hardware.
3. 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.
4. Complete gate assemblies shall include gate mechanism, left or right counterweight support arms, 14.5" and 25.5" counterweights and return brackets. Type B conversion bracket assembly. Gate arm adapter, 3 smooth pins, king pin assembly, 8" long liquid tight flexible conduit and connectors and all associated hardware.
5. The dimensions shown are typical.
6. Gate arm lengths shall be determined by site specific conditions. Gate arms shall conform to Arema C&S Manual Part 5.2.5.4.

INFORMATION SHOWN ON THIS SHEET IS APPROVED FOR CONTRACT PREPARATION ONLY. NOT TO BE USED AS A SUBSTITUTE FOR DESIGN. DRAWINGS ARE NOT INTENDED TO SHOW THE PRECISE DETAILS OR TO SPECIFY THE PRODUCTS TO BE USED.

SANDAG
NORTH COUNTY TRANSIT DISTRICT

ENGINEERING STANDARD DRAWINGS
FLASHING LIGHT SIGNAL WITH CROSS ARM CONFIGURATIONS (CPUC No. 9, 9-A, AND 9-E)

DRAWING NO: ESD-8306
DRAWING SHEET NO: 1 OF 1
SCALE: 1:1
CONTROL SHEET: NONE

SAN DIEGO ASSOCIATION OF GOVERNMENTS
451 S Street, Suite 200
San Diego, CA 92101
www.sandag.org

NORTH COUNTY TRANSIT DISTRICT
1500 Mission Avenue
Oceanside, CA 92054 www.nctd.com

www.sandag.org
REPORT EMERGENCY
TO 1-888-243-5247
OR PROBLEM CROSSING XXX XXX X

1. THIS STANDARD SHALL APPLY TO ALL NEW CONSTRUCTION FOR
DEVELOPMENT CROSSING WARNING DEVICES EQUIPPED WITH CANTILEVER
FLASHING LIGHT SIGNALS.

2. REFER TO STANDARD DRAWINGS ESD-8360, ESD-8365, ESD-8388 & ESD-8389
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 CROWN. FOUNDATION SHOULD BE BOLTED TO EXISTING CONCRETE
FOUNDATION WHERE APPLICABLE.

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 SIGNAL HOOD 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 SHALL BE LIVE LOAD AT THE END OF CANTILEVER ARM,
REPORT EMERGENCY OR PROBLEM TO 1-888-243-5247 CROSSING XXX XXX X

NOTE:
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 ESD8325, ESD8330, 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 WOOD 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" LED TYPE UNITS. WITH 2'-0" BACKGROUND.
9. EMERGENCY NOTIFICATION SIGN SHALL BE PLACED ON WARNING DEVICE AS DETERMINED BY THE FIELD ENGINEER. 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 BACKGROUND WHICH SHALL BE 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.

SEE ESD-8270 FOR SIGN DETAIL
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

ENS = EMERGENCY NOTIFICATION SIGN

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 FEET FROM THE CENTER OF KINGPIN TO THE TIP OF GATE ARM.
4. SEE STANDARD DRAWINGS ESD-8300 THROUGH ESD-8308 FOR ADDITIONAL INFORMATION.
FLAS&NG 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

**ENS = EMERGENCY NOTIFICATION SIGN**

**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.
CANTILEVER FLASHERS WITH ENTRANCE AND EXIT GATES:

ONE OR MORE TRACKS,
TWO-WAY VEHICULAR TRAFFIC,
TWO LANES EACH WAY.

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. ROADWAY GATE ARM LENGTH SHALL NOT EXCEED 28 FEET MEASURED FROM THE CENTER OF KINGPIN TO THE TIP OF GATE ARM.
4. SEE STANDARD DRAWINGS ESD-8300 THROUGH ESD-8308 FOR ADDITIONAL INFORMATION.
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

COUNTERWEIGHTS.
CLEARANCE FOR 24" BACKROUNDS, WINDGUARD OR GATE
ADDITIONAL MEDIAN WIDTH MAY BE REQUIRED TO PROVIDE
BACKLIGHTS MAY BE ADDED AS CONDITIONS REQUIRE.

NOTES:
1. TYPICAL LOCATION PLAN MAY VARY AS CONDITIONS REQUIRE.
2. ALL DIMENSIONS ARE ShOWN IN FEET AND INCHES.
3. ADDITIONAL MEDIAN WIDThS MAY BE REQUIRED TO PROVIDE
   CLEArANCES FOR 24" BACKROUNDS, WINDGUARD OR GATE
   COUNTERWEIGHTS.
4. BACKLIGHTS MAY BE ADDED AS CONDITIONS REQUIRE.
5. GATE Arm LENGTH SHALL NOT EXCEED 29' MEASURED FROM
   THE CENTER OF KINGPIN TO THE TIP OF GATE ARM.
6. SEE STANDARD DRAWINGS ESD-8309 THROUGH ESD-8308
   FOR ADDITIONAL INFORMATION.

ENS = EMERGENCY NOTIFICATION SIGN
FLAShING LIGHT SIGNALS WITH ENTRANCE AND EXIT GATES AND MEDIAN:
ONE OR MORE TRACKS,
TWO-WAY VEHICULAR TRAFFIC,
TWO LANES EACH WAY
WITH Median.

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" BACKROUNDS, WINDGUARD, OR GATE BACKLIGHTS.
4. BACKLIGHTS MAY BE ADDED AS CONDITIONS REQUIRE.
5. ROADWAY GATE ARM LENGTH SHALL NOT EXCEED 20' MEASURED FROM THE CENTER OF KINGPIN TO THE TIP OF GATE ARM.
6. SEE STANDARD DRAWINGS ESD-8388 THROUGH ESD-8388 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.

ENS = EMERGENCY NOTIFICATION SIGN

NOTES:

12' MIN.
15'
12' MIN.
15'
6' MIN.
6' MIN.
6' MIN.
6' MIN.
6' MIN.
6' MIN.
6' MIN.
6' MIN.
6' MIN.

TYPICAL LOCATION PLAN

ENGINEERING STANDARD DRAWINGS

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.gocvt.com
CANTILEVER FLASHERS WITH ENTRANCE GATES AND MEDIAN

ONE OR MORE TRACKS,
TWO-WAY VEHICULAR TRAFFIC,
THREE OR MORE LINES 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" BACKROUNDS, 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.
CANTILEVER FLASHERS WITH
ENTRANCE AND EXIT GATES AND MEDIAN

RIGHT ANGLE CROSSING

4'-6" MIN.

12' MIN.

6' MIN.

OBTUSE ANGLE CROSSING

4'-6" MIN.

12' MIN.

6' MIN.

ACUTE ANGLE CROSSING

4'-6" MIN.

12' MIN.

6' MIN.

NOTES:
1. TYPICAL LOCATION PLAN MAY VARY AS CONDITIONS REQUIRE.
2. ALL DIMENSIONS ARE SHOWN IN FEET AND INCHES.
3. ADDITIONAL MEDIUM WIDTHS MAY BE REQUIRED TO PROVIDE CLEARANCE FOR 24" BACKGROUND, WINDWARD OR GATE COUNTERT WIGHTS.
4. BROADWAY GATE ARM LENGTH SHALL NOT EXCEED 28" MEASURED FROM THE CENTER OF KINGPIN TO THE TIP OF GATE ARM.
5. SEE STANDARD DRAWINGS ESD-8320 THROUGH ESD-8328, ESD-8328 
6. WHERE BOTH ENTRANCE GATES AND EXIT GATES ARE ALIGNED ON A MEDIAN, FRONT LIGHTS SHALL BE INSTALLED ON THE ASSEMBLY CLOSED TO TRAFFIC APPROACHING THE LAWFUL DIRECTION.
TWO-WAY PEDESTRIAN TRAFFIC,
ONE OR MORE TRACKS,
TWO-WAY PEDESTRIAN TRAFFIC,

PED. PATHWAY

PED PATHWAY APPLICATION

1. 12' MIN.
2. 15'

STATION-END OF
PLATFORM APPLICATION

PED FLASHING LIGHT SIGNALS WITH GATES:

ENS = EMERGENCY NOTIFICATION SIGN

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.

ENGINEERING STANDARD DRAWINGS
DRAWING NO. ESD-8390
DRAWING SHEET 1 OF 1
SCALE: NONE

SAN DIEGO ASSOCIATION OF GOVERNMENTS
810 8th Avenue
Oceanside, CA 92054
www.gonctd.com

NORTH COUNTY TRANSIT DISTRICT
821 Walnut Avenue
Oceanside, CA 92054
www.sandag.org

DESIGNER PE STAMP
PRE, INC.
E. ROE
FEBRUARY 2015

REVISIONS
DRAWN
PRE, INC.
CHECKED
W. PREY
RECOMMENDED
DATE
FEBRUARY 2015
PROD. IDENT.
SANDAG IN HOUSE
LEGEND:

<table>
<thead>
<tr>
<th>BACK LIGHTS</th>
<th>FRONT LIGHTS</th>
<th>CANTILEVER LIGHTS</th>
<th>MEDIAN GATE</th>
<th>EXIT GATE</th>
<th>PED GATE</th>
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<tr>
<td>CURB GATE</td>
<td>CANTILEVER</td>
<td>MEDIAN GATE</td>
<td>EXIT GATE</td>
<td>PED GATE</td>
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NOTES:

1. Where there are three lanes or more, back lights shall be required in median.

2. 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.
1. Where indicated, dimensions shown are approximate. Wind support length not to exceed 30" from center of 5" mast to tip of bracket.
<table>
<thead>
<tr>
<th>ITEM</th>
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<tr>
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<td>ALUMINUM PLATFORM ASSEMBLY</td>
</tr>
<tr>
<td>3</td>
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<td>C/L 5' MTG. KIT FOR B TO B SIGNALS</td>
</tr>
<tr>
<td>4</td>
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<td>LADDER 16&quot; X 14'-6&quot; ALUMINUM</td>
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<tr>
<td>5</td>
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<td>LADDER 16&quot; X 7'-6&quot; ALUMINUM</td>
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<tr>
<td>6</td>
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<td>CLIP SPRING SS 3/8&quot; PEAR SHAPE</td>
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<td>LADDER FOUNDATION</td>
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<td>LADDER SUPPORT BRACKET ASSEMBLY</td>
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<td>9</td>
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<td>JUNCTION BOX ASSY W/60&quot; OF 4&quot; CONDUIT</td>
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<td>NUT 1/2&quot;-13 HEX SS</td>
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<td>SHACKLE ANCHOR SS 1/4&quot;</td>
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<td>CHAIN SS X 8'-0&quot; LG.</td>
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<td>BRKT F/FLAT LADDER MOUNT OPTIONAL</td>
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<td>20</td>
<td>2</td>
<td>U-BOLT 1/2&quot;-13NC X 5' SS SHORT</td>
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<tr>
<td>21</td>
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<td>WIRE HARNESS 1/2' X 21'-0&quot; LG.</td>
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<tr>
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<td>BOLT 1/2&quot;-13 X 1'-0&quot; HH CS SS</td>
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<tr>
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<td>WASHER 1/2&quot; LOCK SS</td>
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**NOTES:**
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2. ADD NUMBER BOARD, "P" SIGN, AND/OR "G" SIGN AS REQUIRED.
3. ALL ALUMINUM PARTS SHALL BE MARINE GRADE.
4. WAYSIDE SIGNAL ASSEMBLIES SHALL BE EQUIPPED WITH A LADDER GUARD TO PREVENT UNAUTHORIZED ACCESS TO THE LADDER.
**BILL OF MATERIAL**

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2. ADD NUMBER BOARD, "P" SIGN, AND/OR "G" SIGN AS REQUIRED.
3. ALL ALUMINUM PARTS SHALL BE MARINE GRADE.
4. WAYSIDE SIGNAL ASSEMBLIES SHALL BE EQUIPPED WITH A LADDER GUARD TO PREVENT UNAUTHORIZED ACCESS TO THE LADDER.
FOOTING REQUIREMENTS:

1. BASE OF BRIDGE MAST TO BE LEVEL WITH TOP OF HIGHEST RAIL.
2. 4" X 30" X .032" THICK 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 "A" 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.

NOTES:

1. *A* HEADS TO BE NEEDED BY OTHER SIGNAL IMPROVEMENT PROJECTS.
2. "B" HEADS THAT MAY BE NEEDED BY OTHER SIGNAL IMPROVEMENT PROJECTS.
3. SEE NOTE 4
4. "B" HEADS TO BE NEEDED BY OTHER SIGNAL IMPROVEMENT PROJECTS.
5. CLEARANCE MINIMUM 26'-0"
FOOTING REQUIREMENTS:

1. BASE OF BRIDGE MAST TO BE LEVEL WITH TOP OF HIGHEST RAIL.
2. 4" X 8" X 10" X 10" 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.
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7. REFER ESD-2101 FOR CLEARANCES.

NOTES:

1. BASE OF BRIDGE MAST TO BE LEVEL WITH TOP OF HIGHEST RAIL.
2. 4" X 8" X 10" X 10" 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.
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7. REFER ESD-2101 FOR CLEARANCES.

ENGINEERING STANDARD DRAWINGS
WAYSIDE SIGNAL BRIDGE STRUCTURE

San Diego Association of Governments
411 Sixth Street, Suite 800
San Diego, CA 92101
www.sandag.org

North County Transit District
810 Mission Avenue
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NOTE 2

1. CAST ALUMINUM COLORLIGHT HOUSING, POWDER COATED FLAT BLACK.
2. QTY. 2 GETS 8" LED TRI-COLOR
3. ALUMINUM HOOD, POWDER COATED FLAT BLACK
4. CAST ALUMINUM TEETER, POWDER COATED FLAT BLACK
5. CAST ALUMINUM COVER WITH 3/4" VENT, PADLOCKABLE, POWDER COATED FLAT BLACK.
6. QTY. 2 2"3" TERMINAL BLOCKS WITH AAR HARDWARE.

SIGNAL PLACEMENT

TYPICAL DWARF SIGNAL PLACEMENT

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 ACT BETWEEN TRACKS, NO PORTION OF THE SIGNAL THAT EXTENDS ABOVE THE TOP OF RAIL SHALL BE WITHIN 8'-2" OF THE CENTERLINE OF THE TRACK WHERE TRACK IS TANGENT AND 9'-0" WHEN PLACED NEXT TO CURVED TRACK, CONFLICTS WITH RETAINING WALLS OR OTHER STRUCTURES DOES NOT RELIEVE NCTD FROM COMPLYING WITH THIS CLEARANCE REQUIREMENT.
4. DWARF SIGNAL FOUNDATION (L&W P/N 5B4851A-T-GE OR APPROVED EQUAL) SHALL BE CENTERED BETWEEN THE INSULATED JOINTS.
5. DWARF SIGNAL SHALL BE LAW P/N 5B4851A-T-GE 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 DWARF SIGNAL (AS SHOWN) SHALL ONLY BE USED WHEN DIRECTED BY NCTD.
7. CLEARANCE REQUIREMENT.
TYPICAL L.E.D. COLOR LIGHT SIGNAL UNIT

- UNITS FROM THE REAR.
- SIGNAL UNIT SHALL BE DESIGNED TO ALLOW REMOVAL OF LAMP MOUNTING BRACKETS AND APPROPRIATE MOUNTING HARDWARE.
- LAMP UNITS (G/Y/R), 3 HOODS, BACKGROUND, ADJUSTABLE BRACKET, COLORLIGHT SIGNAL UNIT ASSEMBLY SHALL INCLUDE 3 L.E.D.
- INSTALL BLANK COVER PLATE FOR UNUSED LAMP UNITS.

NOTES:
1. 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.
2. SIGNAL UNIT SHALL BE DESIGNED TO ALLOW REMOVAL OF LAMP UNITS FROM THE REAR.
3. L.E.D. LAMP UNITS SHALL MEET ALL REQUIREMENTS OF AREMA SIGNAL MANUAL PART 7.1.5.
4. INSTALL BLANK COVER PLATE FOR UNUSED LAMP UNITS.
1. TERMINAL BOX SHALL BE SAFETRAN MODEL 92414-6X OR APPROVED EQUAL.

2. TWENTY-EIGHT INSULATED TEST TERMINALS, COMPLETE WITH NUTS AND WASHERS, GROUPTYPE TYPE 0248620-1X OR APPROVED EQUAL, SHALL BE FURNISHED WITH EACH 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.

NOTES:

1. TERMINAL BOX SHALL BE SAFETRAN MODEL 92414-6X OR APPROVED EQUAL.

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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.
ALL NUMBER PLATES ARE TO BE BLACK IMAGE ON WHITE BACKGROUND.

PART NO. 036117-584 - (NUMBER SEQUENCE) OR APPROVED EQUAL.

SIGNAL NUMBER PLATES AND MOUNTING BRACKET SHALL BE SAFETRAN UNITYPE FRAMES SHALL BE MADE OF ALUMINUM AND COMPLETE WITH APPLY ANTI-SEIZE COMPOUND TO STAINLESS STEEL FASTNERS.

NOTES:
1. UNITYPE FRAMES SHALL BE MADE OF ALUMINUM AND COMPLETE WITH STAINLESS STEEL HARDWARE REQUIRED FOR MOUNTING TO 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 SEQUENCED) OR APPROVED EQUAL.
4. 1/8 THICK MILL FINISH ALUMINUM PANEL, ALCOA 6061-T6 OR EQUAL.
WHEN INSTALLING ON SIGNAL, APPLY PLASTIC TAPE TO ALUMINUM SURFACES IN CONTACT WITH STEEL SURFACES.

1/4" X 1/2" X 1/8" ALUMINUM ANGLE SIGN BRACKET

1/8" HOLE FOR 1/8" BOLT

1/8" HOLE IN PLATE & BRACKET

3/32" ALUMINUM SHEETING SIGN PANEL

9" BLACK LETTER SCREENED ON WHITE NON-REFLECTIVE PLASTIC FILM BACKGROUND

1/8" SLOTTED ROUND HEAD ALUMINUM MACHINE SCREWS 3/4" LONG WITH HEX NUT AND SHAKPROOF WASHER.
NOTE:
G SIGN SHALL BE INSTALLED ON INTERIMATE SIGNALS LOCATED ON AN ASCENDING GRADE OF 1 PERCENT OR GREATER.

1. SIGNS 1/4" THICK MILL FINISH ALUMINUM PANEL, ACCORDING TO OR EQUAL.
2. FONT STYLE SHALL BE IN ACCORDANCE WITH ESO-212.

MACHINE SCREW 1\(\frac{1}{2}\)" LONG WITH HEX NUT AND SHAKED-PROOF WASHER

1/4" SLOTTED, ROUND HEAD ALUMINUM MACHINE SCREW 3 1/2" LONG WITH HEX NUT AND SHAKED-PROOF WASHER

BLACK SCOTCHCAL LETTER

WHITE SCOTCHCAL SURFACE SERIES 662

ALUMINUM ANGLE

ALUMINUM SHEET
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 (*) IN FIELD WHEN ORDERING COMPLETE LADDER.

3. BOLTS SQUARE HEAD MACHINE, WITH NUTS (GALVANIZED) CLAMP AND BOLTS FOR FASTENING TO SIGNAL MAST.

4. PLATFORMS AND STAYS TO BE FURNISHED COMPLETE WITH C-WAYS TO PREVENT UNAUTHORIZED ACCESS TO THE LADDER.

5. ALL SIGNAL LADDERS TO BE HOT DIPPED GALVANIZED OR ALUMINUM.

6. PLATFORMS AND STAYS TO BE FURNISHED COMPLETE WITH C-WAYS TO PREVENT UNAUTHORIZED ACCESS TO THE LADDER.

7. ALL SIGNAL LADDERS TO BE HOT DIPPED GALVANIZED OR ALUMINUM.

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10. PLATFORMS AND STAYS TO BE FURNISHED COMPLETE WITH C-WAYS TO PREVENT UNAUTHORIZED ACCESS TO THE LADDER.

11. ALL SIGNAL LADDERS TO BE HOT DIPPED GALVANIZED OR ALUMINUM.

12. PLATFORMS AND STAYS TO BE FURNISHED COMPLETE WITH C-WAYS TO PREVENT UNAUTHORIZED ACCESS TO THE LADDER.

13. ALL SIGNAL LADDERS TO BE HOT DIPPED GALVANIZED OR ALUMINUM.

14. PLATFORMS AND STAYS TO BE FURNISHED COMPLETE WITH C-WAYS TO PREVENT UNAUTHORIZED ACCESS TO THE LADDER.

15. ALL SIGNAL LADDERS TO BE HOT DIPPED GALVANIZED OR ALUMINUM.

16. PLATFORMS AND STAYS TO BE FURNISHED COMPLETE WITH C-WAYS TO PREVENT UNAUTHORIZED ACCESS TO THE LADDER.

17. ALL SIGNAL LADDERS TO BE HOT DIPPED GALVANIZED OR ALUMINUM.

18. PLATFORMS AND STAYS TO BE FURNISHED COMPLETE WITH C-WAYS TO PREVENT UNAUTHORIZED ACCESS TO THE LADDER.

19. ALL SIGNAL LADDERS TO BE HOT DIPPED GALVANIZED OR ALUMINUM.

20. PLATFORMS AND STAYS TO BE FURNISHED COMPLETE WITH C-WAYS TO PREVENT UNAUTHORIZED ACCESS TO THE LADDER.
**M23-A DUAL CONTROL SWITCH LAYOUT FOR #8, #10 & #14 RIGHT HAND TURNOUTS**

**BILLC OF MATERIAL**

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>MACHINE, SWITCH M23-A</td>
</tr>
<tr>
<td>2</td>
<td>ROD, MF INSULATED FRONT</td>
</tr>
<tr>
<td>3</td>
<td>ROD, #1 SMJ INSULATED WITH BASKET</td>
</tr>
<tr>
<td>4</td>
<td>BAR, POINT DETECTOR (INTERNAL)</td>
</tr>
<tr>
<td>5</td>
<td>ROD, POINT DETECTOR CONNECTING</td>
</tr>
<tr>
<td>6</td>
<td>ROD, ADJUSTABLE LOCK (INTERNAL)</td>
</tr>
<tr>
<td>7</td>
<td>LUG, LOCK ROD (INCORPORAL)</td>
</tr>
<tr>
<td>8</td>
<td>ROD, LOCK ROD CONNECTING (TWISTY ROD)</td>
</tr>
<tr>
<td>9</td>
<td>LUG, OPERATING ROD CONNECTION (BEAR CLAW)</td>
</tr>
<tr>
<td>10</td>
<td>ROD, SWITCH OPERATING</td>
</tr>
<tr>
<td>11</td>
<td>BOLT, ASSEMBLY 3/16&quot; X 21/2&quot;</td>
</tr>
<tr>
<td>12</td>
<td>BOLT, ASSEMBLY 5/8&quot; X 21/2&quot; DRILLED AT 21/2&quot;</td>
</tr>
<tr>
<td>13</td>
<td>BOLT, ASSEMBLY 3/8&quot; X 3&quot;</td>
</tr>
<tr>
<td>14</td>
<td>PIN, OPERATING BAR CONNECTING</td>
</tr>
<tr>
<td>15</td>
<td>STAND, UNIVERSAL LEVER LATCH</td>
</tr>
<tr>
<td>16</td>
<td>PLATE, SWITCH MACHINE MOUNTING</td>
</tr>
<tr>
<td>17</td>
<td>TIE, DAPPED TRAPEZOID 10&quot; X 10&quot; X 14&quot;</td>
</tr>
<tr>
<td>18</td>
<td>ASSEMBLY, HEAD LOCK BOLT 5/16&quot; X 1/4&quot;</td>
</tr>
<tr>
<td>19</td>
<td>ASSEMBLY, HEAD LOCK BOLT 5/16&quot; X 1/4&quot;</td>
</tr>
<tr>
<td>20</td>
<td>STRAP, TIE 65&quot;</td>
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<tr>
<td>21</td>
<td>SCREW, 3/16&quot; X 1/2&quot;</td>
</tr>
<tr>
<td>22</td>
<td>CONNECTOR, 2&quot; STRAIGHT LIQUIDTIGHT</td>
</tr>
<tr>
<td>23</td>
<td>CONDUIT, 2&quot; FLEX LIQUIDTIGHT</td>
</tr>
<tr>
<td>24</td>
<td>BOX, PEDESTAL JUNCTION (SWITCH 36 TERMINAL)</td>
</tr>
</tbody>
</table>

**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. 1/4" X 2" STEEL STRAP CUT TO REQUIRED LENGTH AND SHALL FOR 7/16" SCREW AS REQUIRED.
**BILL OF MATERIAL**

**M23-A DUAL CONTROL SWITCH LAYOUT FOR #20 & #24 R.H. TURNOUTS**

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
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<tbody>
<tr>
<td>1</td>
<td>MACHINE, SWITCH M23-A</td>
</tr>
<tr>
<td>2</td>
<td>ROD, MF INSULATED PRINT</td>
</tr>
<tr>
<td>3</td>
<td>ROD, #2 SM INSULATED WITH BASKET</td>
</tr>
<tr>
<td>4</td>
<td>BAR, POINT DETECTOR INTERNAL</td>
</tr>
<tr>
<td>5</td>
<td>ROD, POINT DETECTOR CONNECTING</td>
</tr>
<tr>
<td>6</td>
<td>ROD, ADJUSTABLE LOCK (INTERNAL)</td>
</tr>
<tr>
<td>7</td>
<td>LUG, LOCK ROD (BINOCULARS)</td>
</tr>
<tr>
<td>8</td>
<td>ROD, LOCK ROD CONNECTING (TWISTY ROD)</td>
</tr>
<tr>
<td>9</td>
<td>LUG, OPERATING ROD CONNECTION (BEAR CLAW)</td>
</tr>
<tr>
<td>10</td>
<td>ROD, SWITCH OPERATING</td>
</tr>
<tr>
<td>11</td>
<td>BOLT, ASSEMBLY #10 X 2&quot;</td>
</tr>
<tr>
<td>12</td>
<td>BOLT, ASSEMBLY #8 X 2.5&quot; DRILLED AT 24&quot;</td>
</tr>
<tr>
<td>13</td>
<td>PIN, OPERATING BAR CONNECTING</td>
</tr>
<tr>
<td>14</td>
<td>STAND, UNIVERSAL LEVER LATCH</td>
</tr>
<tr>
<td>15</td>
<td>PLATE, SWING MACHINE MOUNTING</td>
</tr>
<tr>
<td>16</td>
<td>TIE, DAPPED TRAPEZOID 4&quot; X 10&quot; X 16&quot;</td>
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<tr>
<td>17</td>
<td>ASSEMBLY, HEADLOCK BOLT 3/8&quot;-10 X 16&quot;</td>
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<tr>
<td>18</td>
<td>ASSEMBLY, HEADLOCK BOLT 3/8&quot;-11 X 16&quot;</td>
</tr>
<tr>
<td>19</td>
<td>STRAP, TIE 26&quot;</td>
</tr>
<tr>
<td>20</td>
<td>SCREW, #10 X 6&quot; LAG</td>
</tr>
<tr>
<td>21</td>
<td>CONNECTOR, 2&quot; STRAIGHT LIQUIDTIGHT</td>
</tr>
<tr>
<td>22</td>
<td>CONDUIT, 2&quot; FLEX LIQUIDTIGHT</td>
</tr>
<tr>
<td>23</td>
<td>BOX, PEDESTAL JUNCTION (SWITCH 36 TERMINAL)</td>
</tr>
</tbody>
</table>

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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 ALIEN FITTING TURNED BOLT, TO CLEAR COVER ON SWITCH MACHINE.
4. 3/16" X 2" STEEL STRAP CUT TO REQUIRED LENGTH AND DRILL FOR 1/4" LAG SCREW AS REQUIRED.
JUNCTION BOX INSTALLATION DETAIL

TOP OF JUNCTION BOX SHALL BE LEVEL WITH TOP OF TIE.

REFER TO ES8625 AND ES8630 FOR INFORMATION REGARDING HELIX ROD ASSEMBLIES FOR #20 AND #24 TURNOUTS

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. 3/8" X 2" STEEL STRAP CUT OUT TO REQUIRED LENGTH AND DRILL FOR 1/8" LAG SCREW AS REQUIRED.

BILL OF MATERIAL
M23-A DUAL CONTROL SWITCH LAYOUT FOR #20 & #24 L.H. TURNOUTS

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
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<tbody>
<tr>
<td>1</td>
<td>MACHINE, SWITCH M23-A</td>
</tr>
<tr>
<td>2</td>
<td>ROD, MF INSULATED FRONT</td>
</tr>
<tr>
<td>3</td>
<td>ROD, *1 SM INSULATED WITH BASKET</td>
</tr>
<tr>
<td>4</td>
<td>BAR POINT DETECTOR INTERNAL</td>
</tr>
<tr>
<td>5</td>
<td>ROD, POINT DETECTOR CONNECTING</td>
</tr>
<tr>
<td>6</td>
<td>ROD, ADJUSTABLE LOCK (INTERNAL)</td>
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<tr>
<td>7</td>
<td>LUG, LOCK ROD (BROOCH)</td>
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<tr>
<td>8</td>
<td>ROD, LOCK ROD CONNECTING (TWISTY ROD)</td>
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<tr>
<td>9</td>
<td>LUG, OPERATING ROD CONNECTION (BEAR CLAW)</td>
</tr>
<tr>
<td>10</td>
<td>ROD, SWITCH OPERATING</td>
</tr>
<tr>
<td>11</td>
<td>BOLT, ASSEMBLY 3/8&quot;-11 X 2 3/8&quot;</td>
</tr>
<tr>
<td>12</td>
<td>BOLT, ASSEMBLY 1/4&quot;-20 X 2 3/4&quot; DRILLED AT 2 1/2&quot;</td>
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<tr>
<td>13</td>
<td>BOLT, ASSEMBLY 3/8&quot;-9 X 3&quot;</td>
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<tr>
<td>14</td>
<td>PIN, OPERATING BAR CONNECTING</td>
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<tr>
<td>15</td>
<td>STAND, UNIVERSAL LEVER LATCH</td>
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<tr>
<td>16</td>
<td>PLATE, SWITCH MACHINE MOUNTING</td>
</tr>
<tr>
<td>17</td>
<td>TIE, DAPPED TRAPEZOID 10&quot; X 10&quot; X 14&quot;</td>
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<tr>
<td>18</td>
<td>ASSEMBLY, HEADLOCK BOLT 3/8&quot;-10 X 11&quot;</td>
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<td>19</td>
<td>ASSEMBLY, HEADLOCK BOLT 3/8&quot;-9 X 16&quot;</td>
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<td>20</td>
<td>STRAP, TIE 2&quot;</td>
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<td>21</td>
<td>SCREW, 3/8&quot; X 6&quot; LAG</td>
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<td>22</td>
<td>CONNECTOR, 2&quot; STRAIGHT LIQUIDTIGHT</td>
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<td>23</td>
<td>CONDUIT, 2&quot; FLEX LIQUIDTIGHT</td>
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<td>BOX, PEDESTAL JUNCTION (SWITCH 36 TERMINAL)</td>
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<tr>
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<td>29</td>
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</tr>
</tbody>
</table>

**NOTES:**

1. HELPER ROD ASSEMBLY COMPONENTS SHALL MEET THE REQUIREMENTS OF AREMA C&S 95-32.1 WHERE APPLICABLE.

2. THIS DRAWING IS PROVIDED TO ASSIST SIGNAL FORCES IN THE MAINTENANCE OF HELPER ROD ASSEMBLIES.
BILL OF MATERIAL
HELPER ROD ASSEMBLY FOR #24 TJ.

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, 3/8" x 3/4" - 10 THREAD
11 | 4 | STUD, 3/8" x 1/2" - 10 THREAD
12 | 6 | CROP NUT & WASHER 3/8" HEADLOCK
13 | 6 | BOLT, HEX HEAD, 3/8-16 x 2 1/2"
14 | 12 | NUT, HEX, 3/8-16 x 1/2"
15 | 12 | WASHER, FLAT 3/8-16 x 1/2"
16 | 12 | WASHER, LOCK 3/8-16 x 1/2"
17 | 4 | SOLDER JAW
18 | 4 | SCREW JAW ASSEMBLY
19 | 1 | ADJUSTABLE LINK
20 | 12 | CONNECTING PIN
21 | 8 | RIVET, 3/8" 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 | 3 | LOCK WASHER, 3/8" HEAVY HEX JAM
27 | 4 | NUT, 1/4-7, HEAVY HEX JAMB
28 | 8 | HULLER BRACKET
29 | 32 | 3/8" X 6 LG LAG BOLT
30 | 2 | PIPE - SCHEDULE 80 X 2 1/2" LG
31 | 2 | PIPE - SCHEDULE 80 X 1 1/4" LG
32 | 6 | SWITCH POINT ROLLER (FRONT)
33 | 1 | STRAP, 1/2" X 1"
34 | 2 | STRAP, 1/2" X 6"

NOTES:
1. HELPER ROD ASSEMBLY COMPONENTS SHALL MEET THE REQUIREMENTS OF AREMA C&S MANUAL PART 13 WHERE APPLICABLE.
2. THIS DRAWING IS PROVIDED TO ASSIST SIGNAL FORCES IN THE MAINTENANCE OF HELPER ROD ASSEMBLIES.

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

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

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: 1:1
"CONTROL" SHEET NO.
**Pipe Guide**

**T Crane (Long)**

1. Drill & Ream for 3/16\* Pin
2. Pipe Carrier Stand
3. Pipe Carrier Roller (Lower)
4. Cotter Pin for Rollers

**T Crane (Short)**

1. Drill & Ream for 3/16\* Pin
2. Pipe Carrier Stand
3. Pipe Carrier Roller (Upper)
4. Cotter Pin for Rollers

*Notes:

- Drill & Ream for 3/16\* Pin
- Pipe Carrier Stand
- Pipe Carrier Roller (Lower)
- Pipe Carrier Roller (Upper)
- Cotter Pin for Rollers

**Specifications:**

- 3/16 in. straight drive lubrication fitting

---

**General Note:**

1. Material shall conform to AREMA C&S Manual Part 15.1.4

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**Drawing Information:**

- **Scale:** None
- **Control Sheet:** 1 of 2
- **San Diego Association of Governments**
- **San Diego Transit District**
- **San Diego, CA 92101**
- **Oceanside, CA 92054**
- **810 Mission Avenue**
- **www.sandag.org**
- **www.gonctd.com**
- **February 2015**
ADJUSTABLE LINK

SCREW JAW

SOLID JAW

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
BILL OF MATERIAL
FRONT ROD ASSEMBLY FOR T.O.'s

<table>
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<tr>
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<td>LH POINT CLIP</td>
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<td>RN POINT CLIP</td>
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<td>2</td>
<td>POINT CLIP SHIM, 1/4&quot; x 1/2&quot; x 8&quot;</td>
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<td>4</td>
<td>2</td>
<td>POINT CLIP SHIM, 1/4&quot; x 1/2&quot; x 8&quot;</td>
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<td>PLAIN SWIVEL ROD</td>
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<td>SERRATED SWIVEL ROD</td>
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<td>POINT DETECTOR ROD BRACKET</td>
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<td>INDUCTION HARDENED AND GROUND STEEL PIN</td>
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<td>13</td>
<td>1</td>
<td>SPLICE PLATE, 1/4&quot; x 2 1/2&quot; x 7&quot;</td>
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<tr>
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<td>4</td>
<td>BOLT, 1/8 X 5/32&quot; LG THIN SG HD OR 6 1/2&quot;</td>
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<td>15</td>
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<td>BOLT, 1/8 X 5/32&quot; LG THIN SG HD OR 6 1/2&quot;</td>
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<tr>
<td>16</td>
<td>4</td>
<td>BOLT, 3/4 X 3 3/4&quot; LG SG HD OR 3 5/16&quot;</td>
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<td>BOLT, 3/4 X 3 3/4&quot; LG SG HD OR 3 5/16&quot;</td>
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<tr>
<td>18</td>
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<td>NUT, 1/8-8 HVY HEX SLOTTED</td>
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<td>4</td>
<td>LOCK WASHER THERMO SPLIT</td>
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<td>21</td>
<td>2</td>
<td>LOCK WASHER 3/4-HEAVY SPLIT</td>
</tr>
<tr>
<td>22</td>
<td>10</td>
<td>COTTER PIN, 1/4&quot; X 1 1/2&quot; LG</td>
</tr>
<tr>
<td>23</td>
<td>2</td>
<td>INSULATION, &quot;CHR&quot; CHANNEL</td>
</tr>
<tr>
<td>24</td>
<td>4</td>
<td>INSULATION, BUFFER</td>
</tr>
</tbody>
</table>

NOTES:

1. FRONT ROD AS SHOWN IN THIS STANDARD IS FOR RIGHT HAND SWITCH APPLICATIONS. FOR LEFT HAND SWITCH APPLICATIONS, FRONT ROD SHALL BE OPPOSITE.

2. RACOR TYPE MF INSULATED FRONT ROD SHALL CONFORM TO ALL APPLICABLE PARTS OF THE AREMA LEGISLATION.
BILL OF MATERIAL

<table>
<thead>
<tr>
<th>ITEM</th>
<th>QTY</th>
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</thead>
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<td>SPLICE PLATE</td>
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<td>HEAD LOCK WASHER</td>
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<td>BOLT, 1/8 X 5/8&quot; THIN SG HD OR 1/4&quot;/16&quot;</td>
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<td>BOLT, 5/16 X 1 1/2&quot; LG HD</td>
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<td>NUT, 1/8 MEDIUM SPLIT</td>
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<td>NUT, 1/4-7 HEAVY HEX</td>
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<td>4</td>
<td>NUT, 3/64-14 MEDIUM HEX HD SPLIT</td>
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<td>PLAIN WASHER 172-436 HARDENED</td>
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<td>4</td>
<td>LOCK WASHER 3/4&quot; MEDIUM SPLIT</td>
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<td>4</td>
<td>LOCK WASHER 5/16&quot; MEDIUM SPLIT</td>
</tr>
<tr>
<td>11</td>
<td>4</td>
<td>COTTER PIN 3/4 X 2 1/4&quot;</td>
</tr>
<tr>
<td>12</td>
<td>4</td>
<td>COTTER PIN 3/4 X 1 3/4&quot;</td>
</tr>
<tr>
<td>13</td>
<td>4</td>
<td>INSULATION, S-CHANNEL</td>
</tr>
<tr>
<td>14</td>
<td>4</td>
<td>INSULATION, L-SHAPE</td>
</tr>
<tr>
<td>15</td>
<td>4</td>
<td>INSULATION, C-CHANNEL</td>
</tr>
<tr>
<td>16</td>
<td>2</td>
<td>BOLT, 1/8 X 4 1/2&quot; LG THIN SQ HD DR @ 4 1/16&quot;</td>
</tr>
<tr>
<td>17</td>
<td>2</td>
<td>BOLT, 1/8 X 6 1/2&quot; LG THIN SQ HD DR @ 6 1/16&quot;</td>
</tr>
<tr>
<td>18</td>
<td>2</td>
<td>BOLT, 5/16 X 1 1/2&quot; LG SQ HD OR 1/8 X 1 3/4&quot;</td>
</tr>
<tr>
<td>19</td>
<td>2</td>
<td>BOLT, 5/16 X 5 3/8&quot; THIN SQ HD OR 1/4&quot;/16&quot;</td>
</tr>
<tr>
<td>20</td>
<td>2</td>
<td>BOLT, 5/16 X 6 1/2&quot; LG THIN SQ HD OR 1/4&quot;/16&quot;</td>
</tr>
<tr>
<td>21</td>
<td>2</td>
<td>BOLT, 5/16 X 8 1/2&quot; LG SQ HD OR 3 1/16&quot;</td>
</tr>
<tr>
<td>22</td>
<td>2</td>
<td>BOLT, 5/16-18 X 1 1/2&quot; LG SQ HD</td>
</tr>
<tr>
<td>23</td>
<td>2</td>
<td>BOLT, 1/8-18 X 4 1/2&quot; LG SQ HD DR @ 4 1/16&quot;</td>
</tr>
<tr>
<td>24</td>
<td>2</td>
<td>BOLT, 1/8-18 X 6 1/2&quot; LG SQ HD DR @ 6 1/16&quot;</td>
</tr>
<tr>
<td>25</td>
<td>2</td>
<td>BOLT, 1/8-18 X 8 1/2&quot; LG SQ HD DR @ 3 1/16&quot;</td>
</tr>
</tbody>
</table>

NOTES:
1. ADJUSTMENT BRACKET (BASKET) SHALL BE IN ACCORDANCE WITH AREMA SIGNAL MANUAL PART 12.1.17.
2. FOR DETAILED SPECIFICATION INFORMATION, REFER TO THE FOLLOWING ENGINEERING STANDARDS DRAWINGS:
   - ESD-2812-13 AND ESD-2911-14
   - ESD-2911-13 AND ESD-2941-14
   - ESD-2931-13 AND ESD-2941-14
   - ESD-2941-13 AND ESD-2941-14
   - ESD-2941-14 AND ESD-2941-15
   - ESD-2951-14 AND ESD-2951-15

ENGINEERING STANDARD DRAWINGS

TYPICAL RACOR TYPE "SMJ" No. 1 INSULATED "BASKET" ROD FOR USE ON TURNOUTS
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 .134-.7 HVY HEX NUT.

3. WHERE IT DOES NOT CONFLICT WITH THIS STANDARDS, POINT DETECTOR CONNECTING ROD SHALL BE IN ACCORDANCE WITH ALL APPLICABLE AREMA C&S MANUAL PARTS.
OF INTERNAL LOCK ROD ASSEMBLY

COMPLETE ASSEMBLY

NARROW NOTCH TOWARD THREADED END

WIDE NOTCH TOWARD THREADED END

NOTES:
1. WHERE IT DOES NOT CONFLICT WITH THIS STANDARD, INTERNAL LOCK ROD ASSEMBLY SHALL BE IN ACCORDANCE WITH AREMA C&S MANUAL PART 15.3.4.1 & 15.3.4.2.
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.
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.

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.
NOTES:
1. SWITCH OPERATING LUG SHALL CONFORM TO AREMA C&S MANUAL PART 15.1.4.
2. 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.
DUAL CONTROL SWITCH APPLICATIONS

SWITCH OPERATING ROD FOR DUAL CONTROL SWITCH APPLICATIONS

2. Each assembly shall be furnished with 2 ea 1 1/4 x 7" hex nuts and 2 ea 1 1/4 x 7" spring washers.
3. Where it does not conflict with this standard, switch operating rod shall be in accordance with all applicable AREMA C&S Manual Parts.

SEE NOTE 2
FILLET WELDS ON TOP SIDE
STUDS WELDED INTO PLATE BETWEEN SWITCH MACHINE FRAME AND SWITCH PLATE.

EMORY CLOTH SHALL BE INSTALLED TO PROVIDE ABRASIVE MATERIAL
BUTT WELDS ON BOTTOM SIDE

TIES SHALL BE STRAIGHT AND FREE OF CRACKS OR OTHER DEFECTS.

TRAPEZOID TIES SHALL BE DOUGLAS FIR OR GUM.

TRAPEZOID TIE NOTES:
1. TRAPEZOID TIES SHALL BE DAPPED AND TREATED AT THE MILL,
2. TIES SHALL BE STRAIGHT AND FREE OF CRACKS OR OTHER DEFECTS.
3. ALL HOLES SHALL BE DRILLED NOT PUNCHED.
4. ALL CORNERS OF PLATE SHALL BE CHAMFERED 1" X 1/2"

ANSALDO M-23A SWITCH MACHINE MOUNTING PLATE

14 FT. DAPPED TRAPEZOID TIE
NEAR POINT NORMALLY CLOSED

FAR POINT NORMALLY CLOSED

1. SWITCH CIRCUIT CONTROLLER TO BE USAG U-5, OR EQUIVALENT. EQUIPPED WITH RETURN SPRING.

2. PLACE CIRCUIT CONTROLLER AS SHOWN ON BOLT AWAY FROM TRACK ON NEAR POINT AND BOLT TOWARDS TRACK ON FAR POINT.

3. PLACE 3/8" 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.
NOTE:
1. BALL POINT LUG SHALL CONFORM TO AREMA CSS MANUAL PART 12.1.1

2. CONTRACTOR/MANUFACTURER SHALL VERIFY ROD LENGTHS PRIOR TO PROCUREMENT.

REV. DATE DESCRIPTION
PRE, INC. E. ROE FEBRUARY 2015

DRAWING SHEET NO. 1 OF 1
SCALE: NONE
"CONTROL" SHEET NO.
1. PLACE CIRCUIT CONTROLLER AS PER ESD-8788.
2. FOR PEDESTAL JUNCTION BOX DETAIL SEE ESD-8775. LOCATE JUNCTION BOX OUTSIDE CPER WALKWAY AND BURY SEALITE CONDUIT TO PREVENT TRIPPING HAZARD.