

# INFORMATION HANDOUT

For Contract No. 10-0Y6204

At 10-Mer-99-Var

Identified by

Project ID 1013000246

## MATERIALS INFORMATION

District Preliminary Geotechnical Report dated 09/04/2015

List of Existing Traffic Management System Elements

SKT-SP-MGS Terminal System manufacturer's drawing

SKT-W-MGS Terminal System manufacturer's drawing

X-Lite Guard Rail End Terminal manufacturer's drawing

31" X-Tension Guard Rail End Terminal manufacturer's drawing

SOFT-STOP Terminal System manufacturer's drawing

FLEAT-SP-MGS Terminal System manufacturer's drawing

FLEAT-W-MGS Terminal System manufacturer's drawing

Thrie-Beam Rail Adaptor manufacturer's drawing

## Memorandum

*Serious drought.  
Help Save Water!*

**To:** NICHOLAS CHAN  
Senior Transportation Engineer, Branch P  
Project Development Design IV

**Date:** September 4, 2015

**File:** 10-Sta,Mer-99  
Various  
EA 10-0Y6200  
ID 1013000246

**From:** DEPARTMENT OF TRANSPORTATION  
DIVISION OF ENGINEERING SERVICES  
GEOTECHNICAL SERVICES – MS 5

**Subject:** District Preliminary Geotechnical Report for Thirteen Overhead Sign Structures

### **Introduction**

This District Preliminary Geotechnical Report (PFR) has been prepared to provide recommendations for thirteen overhead sign structures (OH) to be constructed as part a safety project on State Route (SR) 99 near the cities of Merced and Atwater in Merced County and near the city of Modesto in Stanislaus County.

### **Existing Facilities and Proposed Improvements**

Within the project limits, SR 99 is a four lane divided highway that travels in a north/south direction. There are several existing structures in proximity of the proposed signs for this project. The structures are listed in **Table 1** below with proposed location and distance from existing structure to proposed sign location.

**Table 1: Location of Proposed and Existing Structures**

PROPOSED			EXISTING			
Location	CO/RT/PM	Direction	LOTB used from Structure	Structure No.	CO/RT/PM	Distance
1	Sta/99/15.14	NB	Tuolumne River Bridge	Br.No.38 0078	Sta/99/14.93	0.21mi
2	Sta/99/14.34	NB	Crows Landing Rd. OC	Br.No.38 0077	Sta/99/14.47	0.13mi
3	Mer/99/21.42	NB	East Atwater OH	Br.No.39 0126	Mer/99/21.61	0.19mi
4	Mer/99/14.55	NB	G Street UC	Br.No.39 0142	Mer/99/14.42	0.13mi
5	Mer/99/14.31	NB	15th Street UC	Br.No.39 0139	Mer/99/14.22	0.09mi
6	Mer/99/13.92	NB	Childs Avenue OC	Br.No.39 0143	Mer/99/13.09	0.93mi
7	Mer/99/13.77	NB	Route 99/140 Separation	Br.No.39 0140	Mer/99/13.86	0.09mi
8	Sta/99/14.57	SB	Crows Landing Rd. OC	Br.No.38 0077	Sta/99/14.47	0.10mi
9	Sta/99/13.61	SB	Hatch Road OC	Br.No.38 0081	Sta/99/13.28	0.33mi
10	Mer/99/17.17	SB	Black Rascal Canal	Br.No.39 0010	Mer/99/17.30	0.13mi
11	Mer/99/14.79	SB	L Street UC	Br.No.39 0133	Mer/99/14.87	0.08mi
12	Mer/99/14.03	SB	East Merced OH	Br.No.39 0130	Mer/99/14.08	0.05mi
13	Mer/99/13.31	SB	Childs Avenue OC	Br.No.39 0143	Mer/99/13.09	0.22mi

### Pertinent Reports and Investigations

The following publications were reviewed to assist in the assessment of site conditions:

- Project Plans and Details, District Design.
- As-Built Log-of-Test-Borings for the structures in **Table 1**.
- California Department of Water Resources (DWR) Water Well Data.

- United States Department of Agriculture (USDA), Web Soil Survey (WSS).
- United States Geological Survey (USGS), Geologic Map of the San Francisco-San Jose Quadrangle 1991.

## Site Geology

The project area was mapped by Wagner, D.L., Bortugno, E.J. and McJunkin, R.D.. The “Geologic Map of the San Francisco-San Jose Quadrangle 1991” covers the project sites. The proposed sites are mapped as Modesto Formation (Qm).

## Geotechnical Conditions

### Subsurface Soils

Subsurface conditions were evaluated from the As-Built LOTB’s for the nearest structure to the proposed OH locations. In general, the subsurface soils consist of dense to compact silts and sands in Stanislaus County (locations 1, 2, 8, and 9). In Merced County (locations 3-7 and 10-13), the soil is comprised of subsurface soil ranging from dense sandy clays to compact sandy silts.

### Groundwater

Groundwater data was determined from the As-Built LOTBs for the nearest structure to the proposed OH locations and DWR water well records. Refer to **Table 2** for occurrence of groundwater and depth to groundwater. According to DWR data the groundwater from 2004 to 2014 has dropped approximately 10 feet in Stanislaus County and dropped approximately 25 feet in Merced County. Groundwater is not anticipated during drilling of the CIDH piles. However, groundwater conditions can be expected to fluctuate in response to seasons, storm events, and other factors. Localized saturated conditions or perched groundwater conditions near the ground surface should be anticipated during and following periods of heavy precipitation.

**Table 2: Groundwater Elevation and Depth**

Location	GROUNDWATER (AVG)		GROUNDWATER (AVG)	
	LOTB Elev.	DWR Elev.	LOTB Depth	DWR Depth
1	36 ft. asl	45 ft. asl	13 ft	40 ft
2	46 ft. asl	45 ft. asl	32 ft	40 ft
3	138 ft. asl	75 ft. asl	11 ft	85 ft
4	159 ft. asl	92 ft. asl	8 ft	81 ft
5	163 ft. asl	93 ft. asl	6 ft	81 ft
6	169 ft. asl	91 ft. asl	5 ft	82 ft
7	164 ft. asl	93 ft. asl	6 ft	80 ft
8	45 ft. asl	45 ft. asl	29 ft	40 ft
9	56 ft. asl	45 ft. asl	45 ft	42 ft
10	146 ft. asl	85 ft. asl	11 ft	78 ft
11	154 ft. asl	91 ft. asl	10 ft	80 ft
12	164 ft. asl	90 ft. asl	4 ft	82 ft
13	169 ft. asl	91 ft. asl	5 ft	82 ft

NOTE: 1) asl is above sea level  
 2) Depth is approximate below ground surface

Liquefaction

Based on seismic evaluation and considering the depth of groundwater and soil conditions, the liquefaction potential impact is deemed insignificant.

Soil Corrosion

The soil corrosion potential for each location was evaluated from a 10 pound bag sample from the top foot of native soil. When in areas of fill, samples were taken from the toe of the slope to minimize effort to attain native soil samples. There were 2 locations that sampling proved to be impossible they were location 5 (Mer/NB99/14.31) and location 12 (Mer/SB99/14.79). Given the data available from LOTB and retrievable samples it is my opinion that these locations are non-corrosive.

**Table 3: Corrosion Study Results**

CORROSION STUDY	
Location	Corrosive
1	NO
2	NO
3	NO
4	NO
5	ND
6	NO
7	NO
8	NO
9	NO
10	NO
11	NO
12	ND
13	NO

### **Geotechnical Recommendations**

The following recommendations are based on project plans provided by District Design, a review of existing structures within the project area, and a review and analysis of subsurface conditions as determined from As-Built boring data for existing structures within the project area.

A review of the as-built boring data indicates that the soil conditions satisfy the current standard plan requirements for the proposed OH signs.

Based on the reviews described above, it is recommended that the proposed OH signs be constructed on standard plan CIDH foundations per Caltrans Standard Plans.

### **Construction Considerations**

1. All earthwork should conform to current CT Standard Specifications.
2. According to As-Built boring data, layers of loose granular material may be encountered while drilling the CIDH piles. As such, temporary casing may be needed

to control caving. To develop the required pile capacity, the temporary must be removed during concrete placement.

3. Per groundwater data, groundwater is not anticipated during construction. Therefore, dry specs may be used.

### Project Information

The recommendations contained in this report are based upon subsurface conditions determined from As-Built borings and our current understanding of proposed project. We have judged that the information is representative of subsurface conditions at the sign location. If the scope of the proposed project changes from that described in this report, the recommendations should be re-evaluated by this Office.

If there are any questions or comments in regards to this report, please contact Chuck Carlson at 916-227-1049.



CHUCK CARLSON, PE  
Transportation Engineer-Civil  
Office of Geotechnical Design-North

Attachments:  
As-Built LOTBs

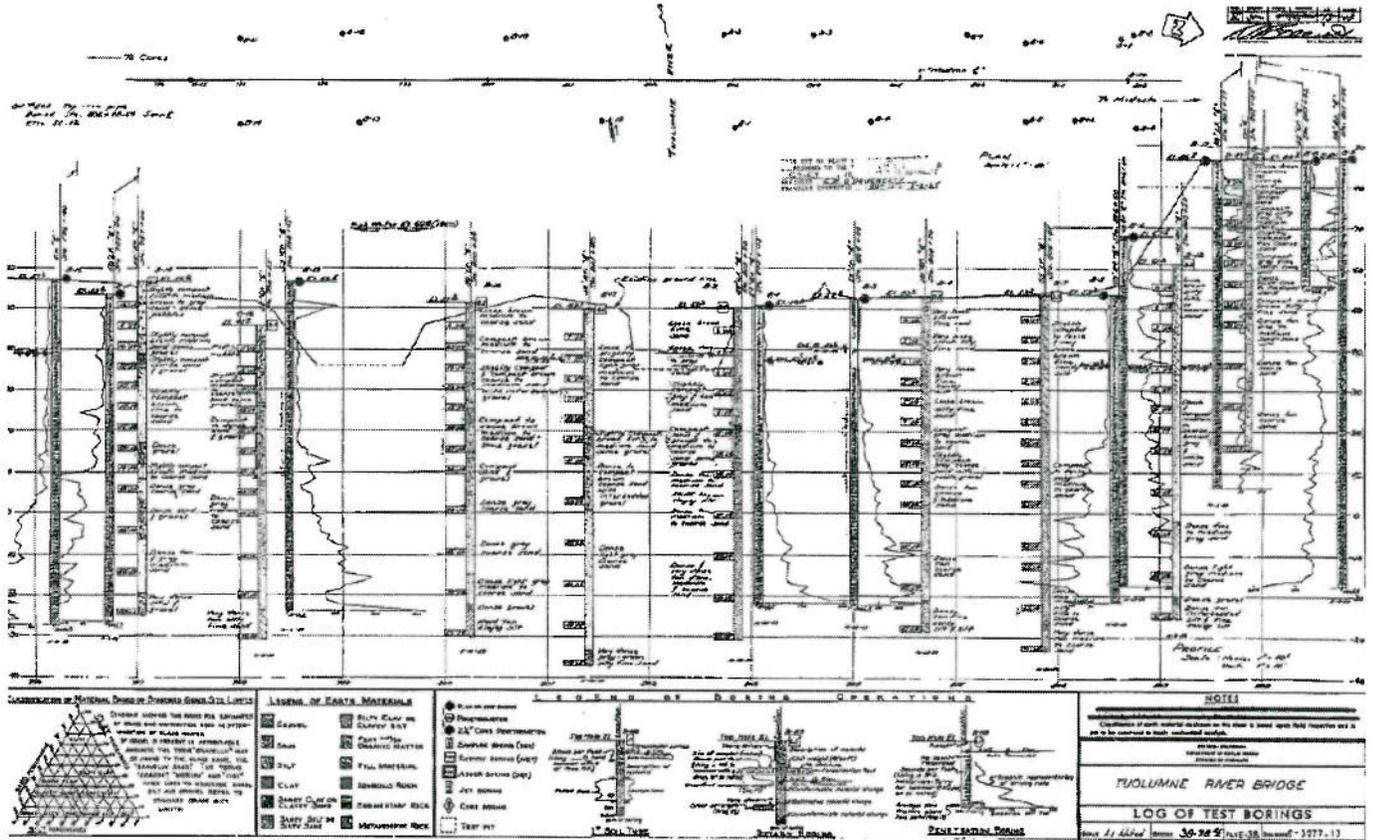
Nicholas Chan  
September 4, 2015  
Page 7

Preliminary Foundation Report  
10-Sta/Mer-99 PM Var  
EA 10-0Y6200, ID 1013000246

Distribution:

cc: Sam Sherman

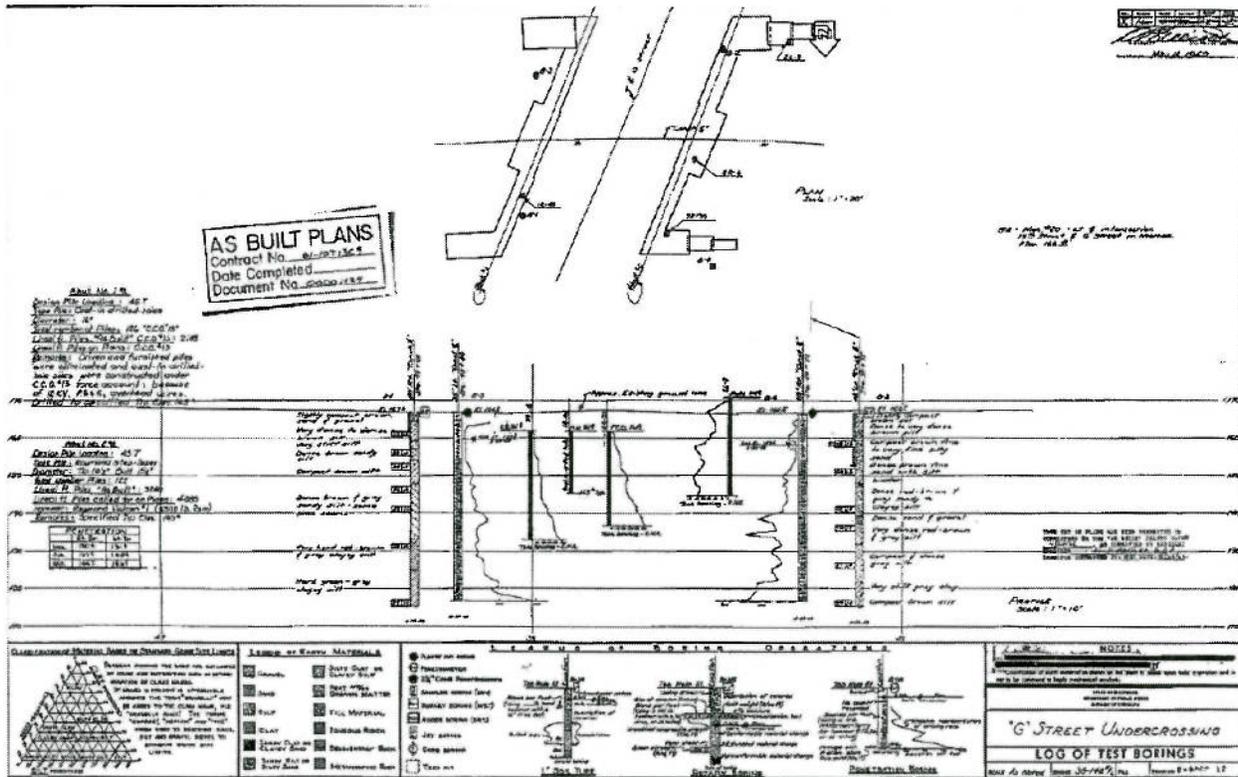
LOCATION #1



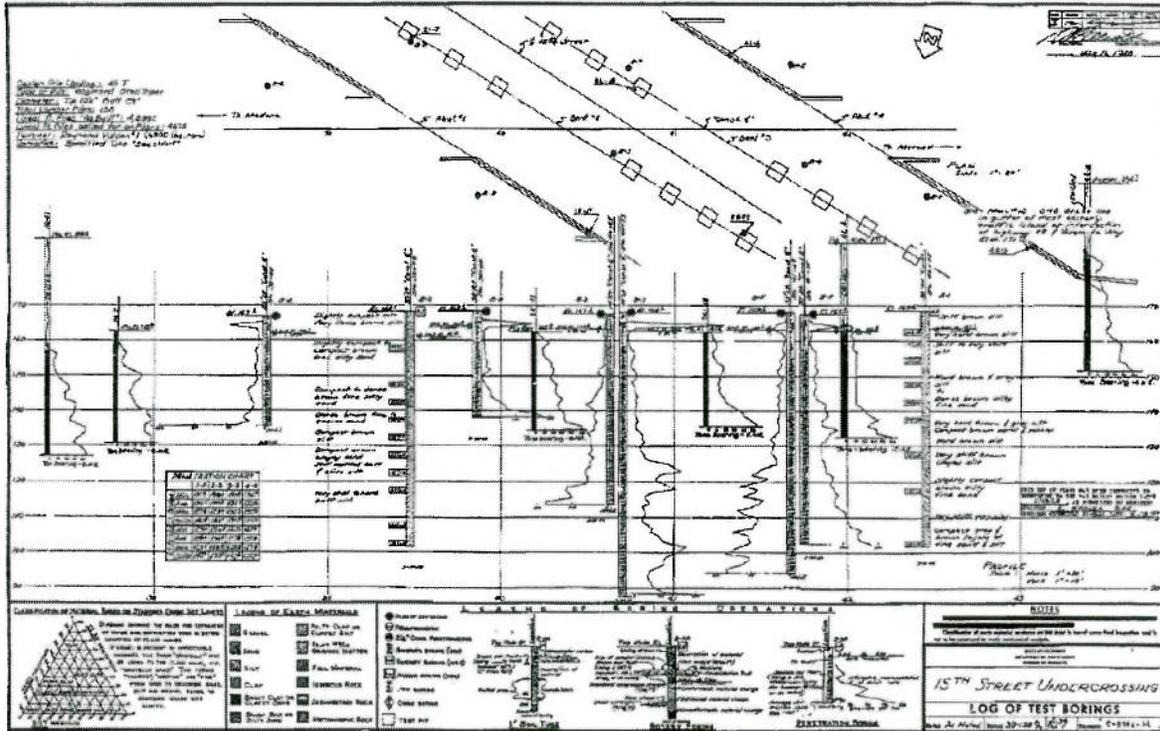




LOCATION #4



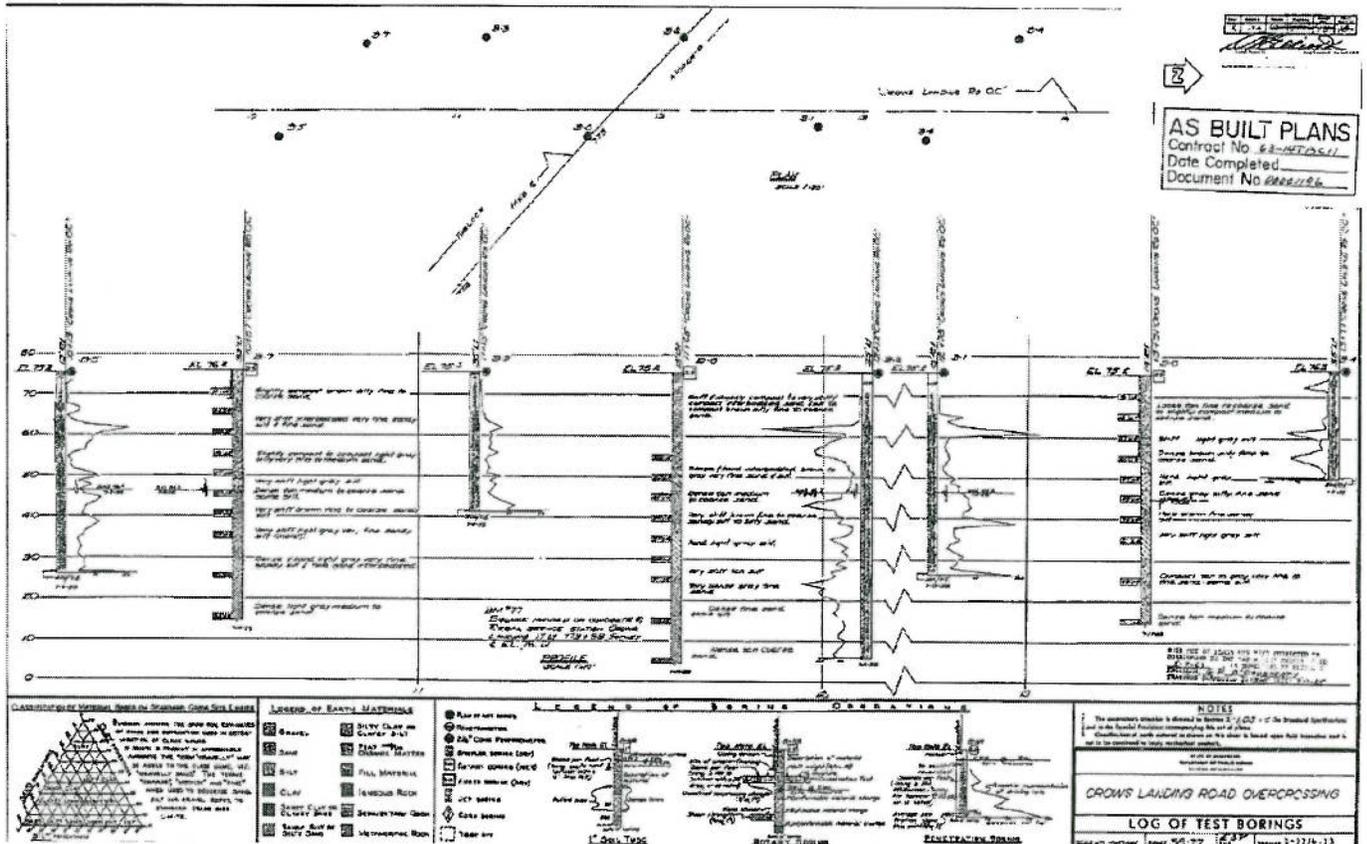
LOCATION #5





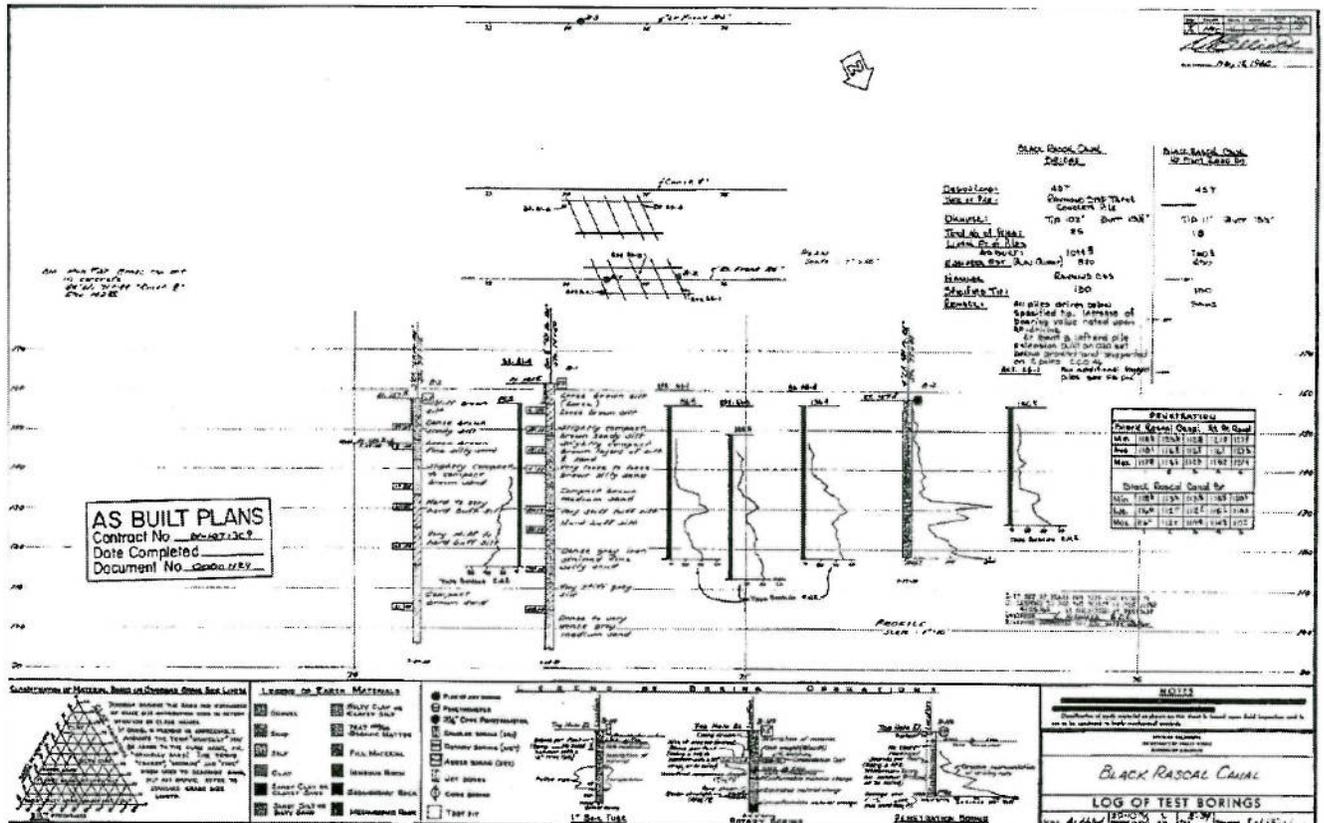


LOCATION #8

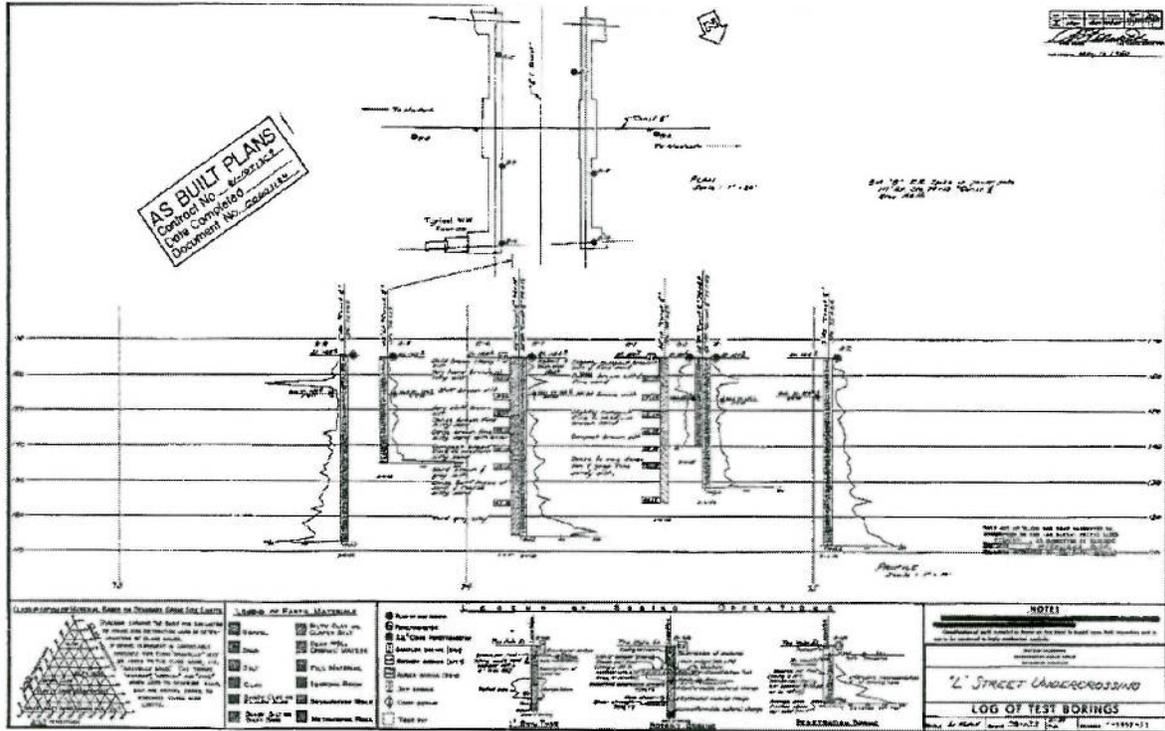




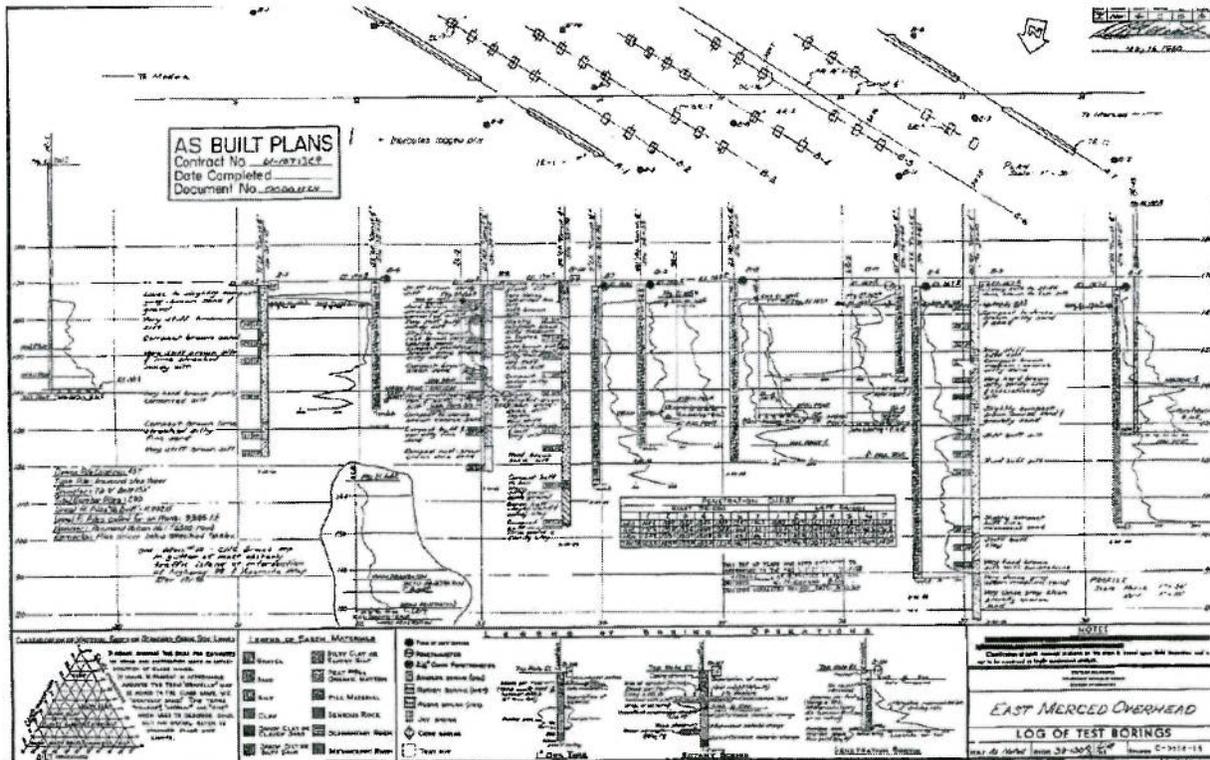
LOCATION #10



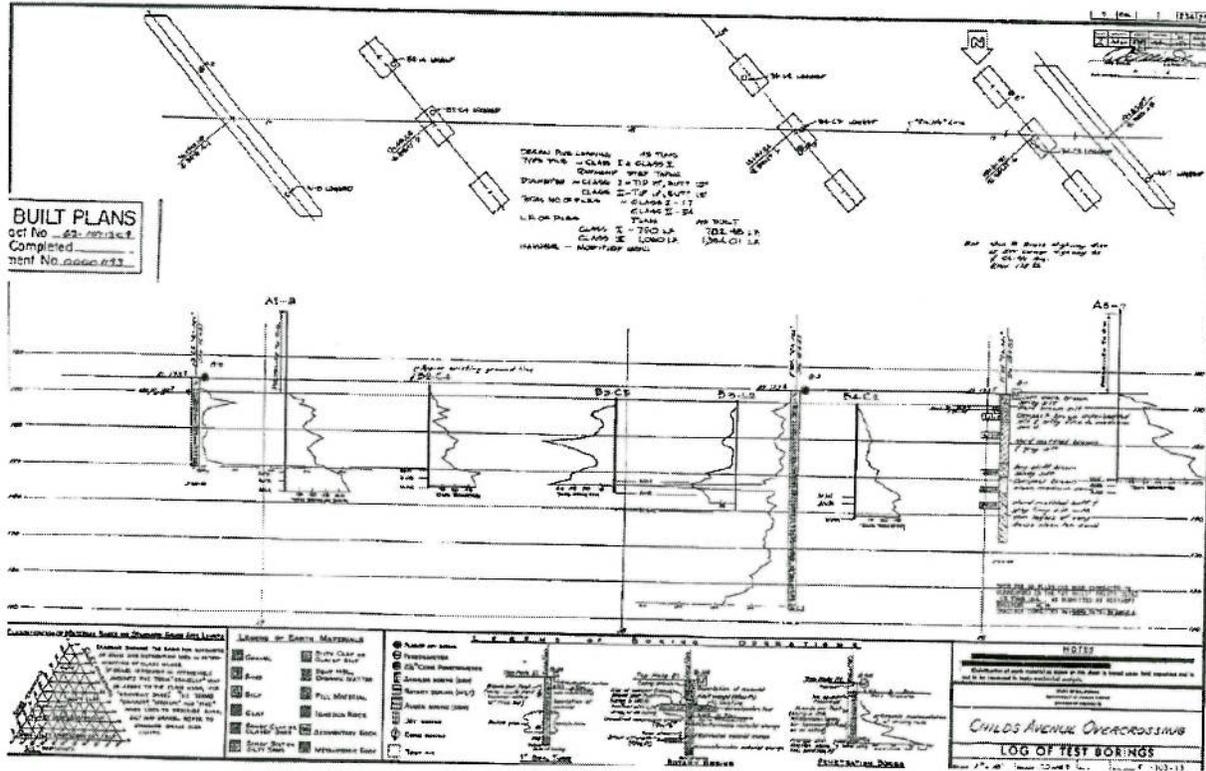
LOCATION #11



LOCATION #12



LOCATION #13



CO	RTE	PREFIX	POSTMILE	DIR	LOCATION	ELEMENT	DETECTION TYPE	NOTE
STA	99	R	015.140					Location 1 No existing ITS
STA	99	R	014.340					Location 2 No existing ITS
MER	99		021.413	N	S/O Off Ramp to Atwater Blvd	TMS	MVDS	Location 3
MER	99		021.413	N	Off Ramp to Atwater Blvd	TMS	MVDS	Location 3
MER	99		014.557	N	S/O Off Ramp to Rte 59/J St	TMS	MVDS	Location 4
MER	99		014.557	N	Off Ramp to Rte 59/J St	TMS	MVDS	Location 4
MER	99		014.297	N	S/O Off Ramp to G St	TMS	MVDS	Location 5 Google map showed loops
MER	99		014.297	N	Off Ramp to G St	TMS	MVDS	Location 5 Google map showed loops
MER	99		013.928	N	N/O Off Ramp to 16th St	TMS	MVDS	Location 6
MER	99		013.928	N	Off Ramp to 16th St	TMS	MVDS	Location 6
MER	99		013.767	N	S/O Off Ramp to Rte 140	TMS	MVDS	Location 7
MER	99		013.767	N	Off Ramp to Rte 140	TMS	MVDS	Location 7
STA	99	R	014.548	S	N/O Crows Landing Rd OC	TMS	MVDS	Location 8
STA	99	R	013.610					Location 9 No existing ITS
MER	99		017.175	S	N/O Off Ramp to 16th St	TMS	MVDS	Location 10
MER	99		017.175	S	Off Ramp to 16th St	TMS	MVDS	Location 10
MER	99		014.700	S	Off Ramp to Rte 59	EMS	N/A	Location 11
MER	99		014.030	S	N/O Off Ramp to EB Rte 140	TMS	MVDS	Location 12
MER	99		014.030	S	Off Ramp to EB Rte 140	TMS	MVDS	Location 12
MER	99		013.309	S	N/O Off Ramp to Childs Ave	TMS	MVDS	Location 13
MER	99		013.309	S	Off Ramp to Childs Ave	TMS	MVDS	Location 13

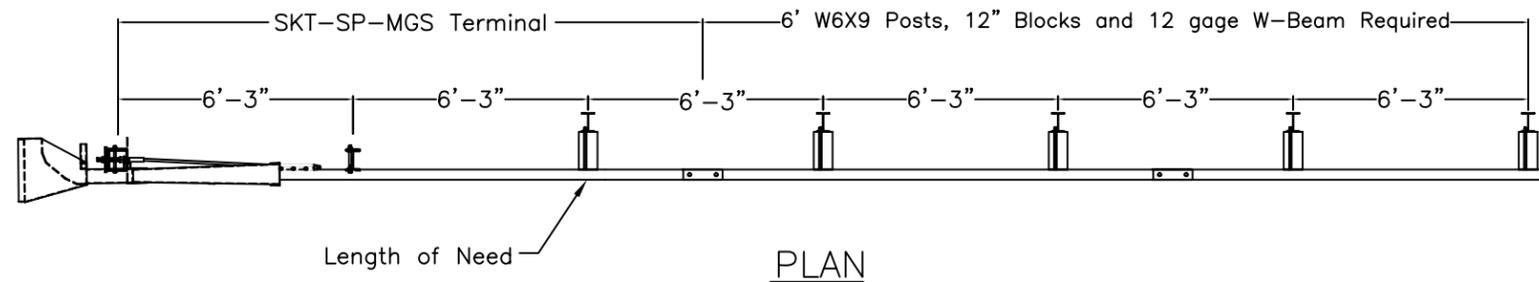
Postmiles listed are approximate.

Abbreviations:

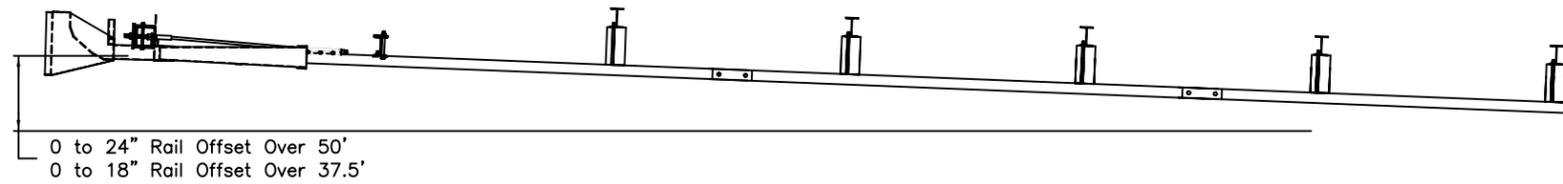
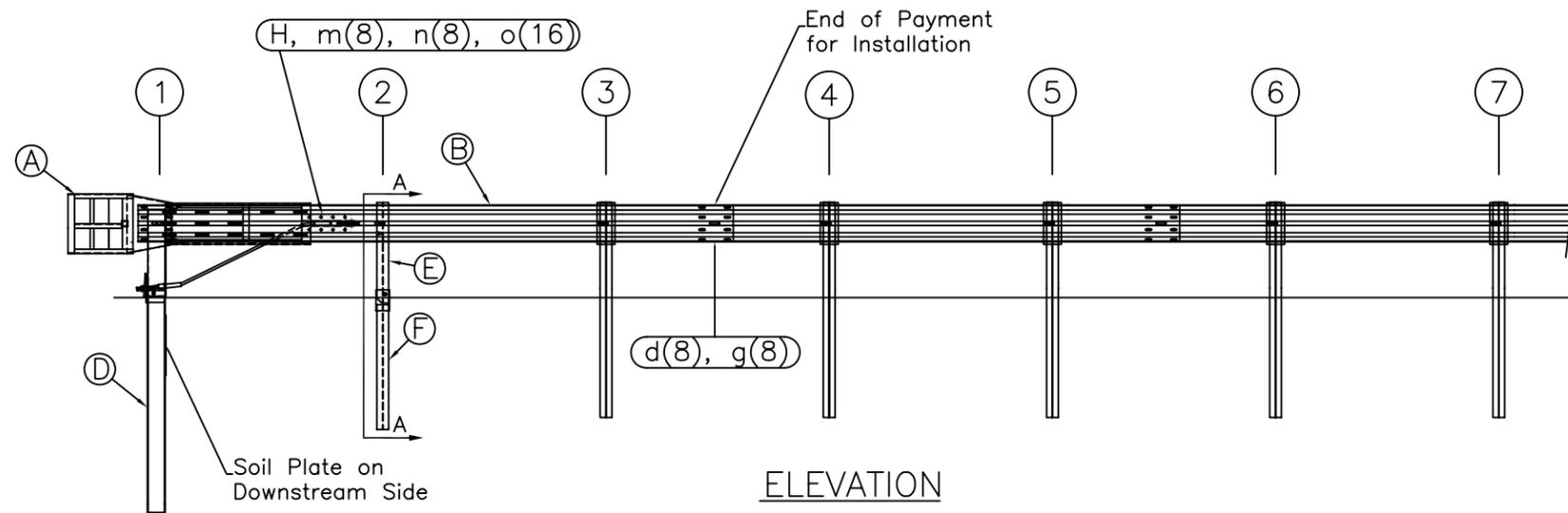
TMS: Traffic Monitoring Station

EMS: Extinguishable Message Sign

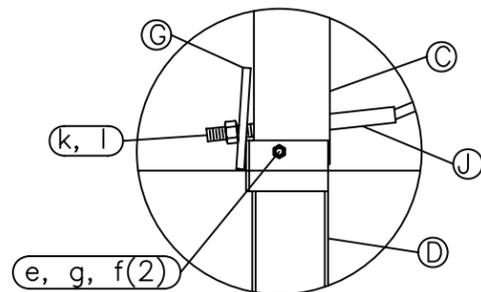
MVDS: Microwave Vehicle Detection System



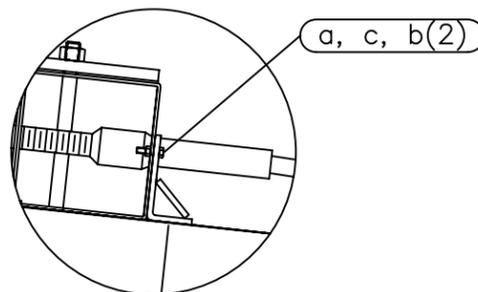
TRAFFIC →



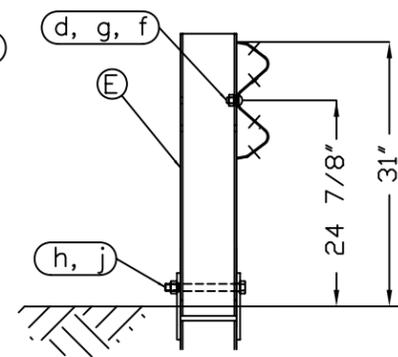
OPTIONAL FLARED INSTALLATION  
25:1 maximum flare rate



Post #1 Connection Detail



Impact Head Connection Detail



SECTION A-A  
Post #2

ITEM	QTY	BILL OF MATERIALS	ITEM NO.
A	1	IMPACT HEAD	S3000
B	1	W-BEAM GUARDRAIL END SECTION, 12 Ga.	MGS-SF1303
C	1	FIRST POST TOP (6X6X $\frac{1}{2}$ Tube)	TPHP1A
D	1	FIRST POST BOTTOM (6' W6X15)	TPHP1B
E	1	SECOND POST ASSEMBLY TOP	UHP2A
F	1	SECOND POST ASSEMBLY BOTTOM	HP3B
G	1	BEARING PLATE	E750
H	1	CABLE ANCHOR BOX	S760
J	1	BCT CABLE ANCHOR ASSEMBLY	E770

HARDWARE (ALL DIMENSIONS IN INCHES)			
a	2	5/16 x 1 HEX BOLT GRD 5	B5160104A
b	4	5/16 WASHER	W0516
c	2	5/16 HEX NUT	N0516
d	9	5/8 Dia. x 1 1/4 SPLICE BOLT (POST #2)	B580122
e	1	5/8 Dia. x 9 HEX BOLT GRD 5	B580904A
f	3	5/8 WASHER	W050
g	10	5/8 Dia. H.G.R NUT	N050
h	1	3/4 Dia. x 8 1/2 HEX BOLT GRD A449	B340854A
j	1	3/4 Dia. HEX NUT	N030
k	2	1 ANCHOR CABLE HEX NUT	N100
l	2	1 ANCHOR CABLE WASHER	W100
m	8	CABLE ANCHOR BOX SHOULDER BOLT	SB58A
n	8	1/2 A325 STRUCTURAL NUT	N055A
o	16	1 1/16 OD x 9/16 ID A325 STR. WASHER	W050A

GENERAL NOTES:

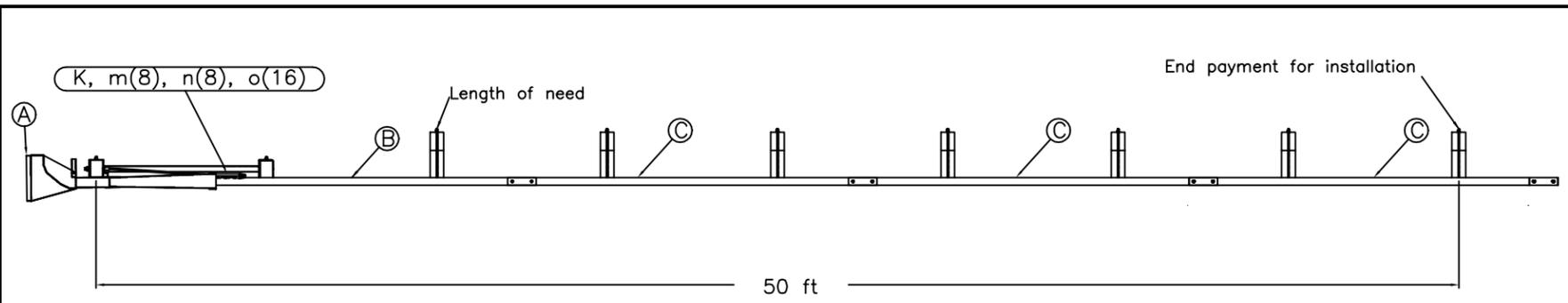
- All bolts, nuts, cable assemblies, cable anchors and bearing plates shall be galvanized.
- The lower sections of the Posts 1&2 shall not protrude more than 4 in above the ground (measured along a 5' cord). Site grading may be necessary to meet this requirement.
- The lower sections of the hinged posts should not be driven with the upper post attached. If the post is placed in a drilled hole, the backfill material must be satisfactorily compacted to prevent settlement.
- When competent rock is encountered, a 12"  $\varnothing$  post hole, 20 in. deep cored into the rock surface may be used if approved by the engineer for post 1. Granular material will be placed in the bottom of the hole, approximately 2.5" deep to provide drainage. The first post can be field cut to length, placed in the hole and backfilled with suitable backfill. The soil plate may be trimmed if required.
- A site evaluation should be considered if there is less than 25' between the outlet side of the terminal and any adjacent driving lane.
- The breakaway cable assembly must be taut. A locking device (vice grips or channel lock pliers) should be used to prevent the cable from twisting when tightening nuts.



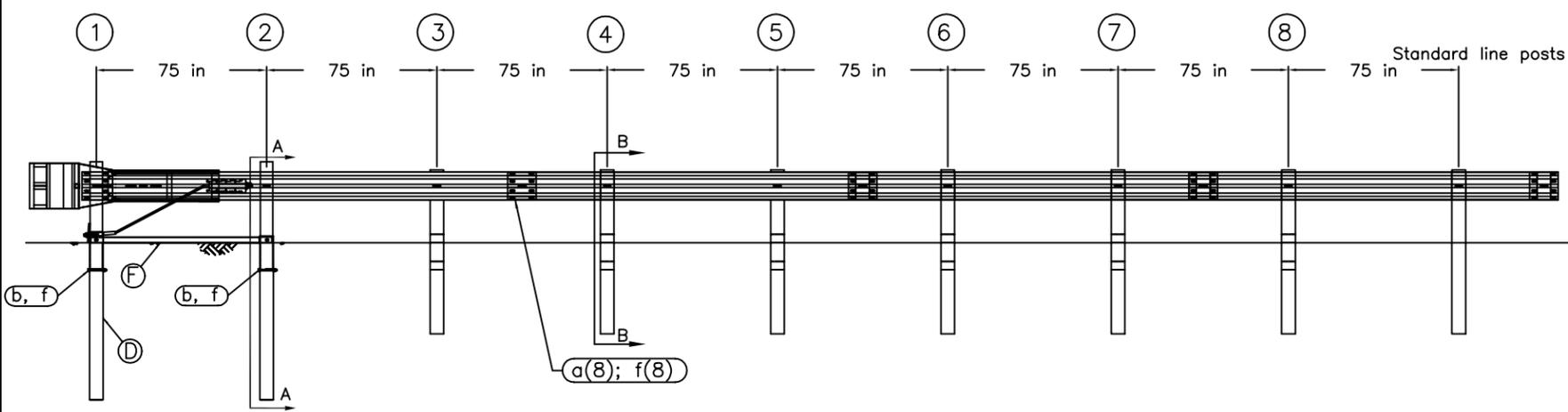
SKT-SP-MGS Terminal  
Midwest Guardrail System  
31" Top of Rail

Drawing Name: SKT-SP-S-MGS  
Scale: None

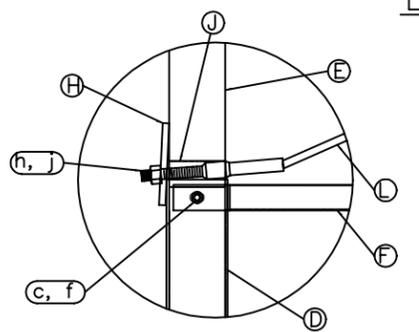
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By: JRR  
Rev: 0



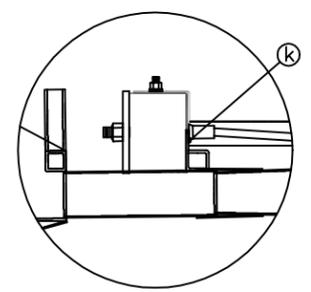
TRAFFIC → PLAN



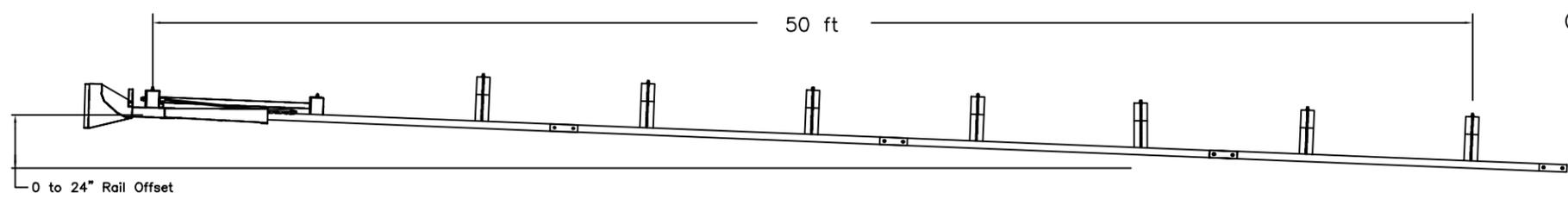
ELEVATION



POST #1 CONNECTION DETAIL



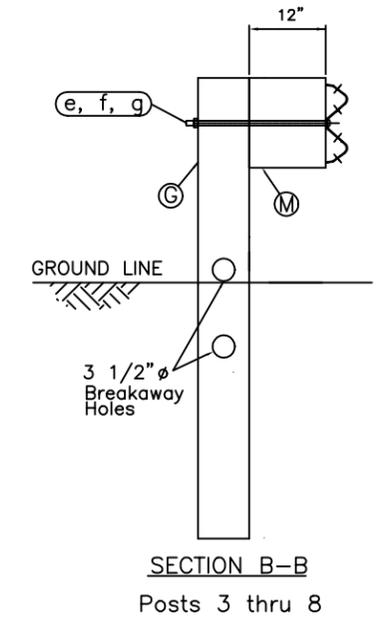
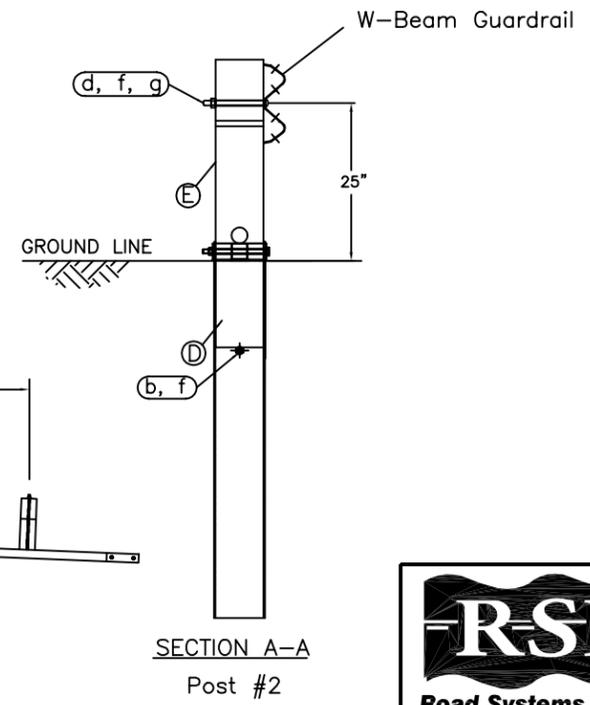
IMPACT HEAD CONNECTION DETAIL



OPTIONAL FLARED INSTALLATION  
25:1 maximum flare rate

- GENERAL NOTES:
1. Breakaway posts are required with the SKT.
  2. All bolts, nuts, cable assemblies, cable anchors and bearing plates shall be galvanized.
  3. The SKT can be flared at a rate of up to 25:1 to prevent the impact head from encroaching on the shoulder.
  4. The foundation tubes shall not protrude more than 4" above the ground (measured along a 5' cord). Site grading may be necessary to meet this requirement.
  5. When rock is encountered, a 12" Ø post hole, 20" into the rock surface may be used if approved by the engineer. Granular material will be placed in the bottom of the hole, approximately 2.5" deep to provide drainage. The first two posts can be field cut to length, placed in the hole and backfilled with adequately compacted material excavated from the hole.
  6. The breakaway cable assembly must be taut. A locking device (vice grips or channel lock pliers) should be used to prevent the cable from twisting when tightening nuts.
  7. A site evaluation should be considered if there is less than 25' between the outlet side of the terminal and any adjacent driving lane.
  8. The soil tubes may be driven with an approved driving head. They shall not be driven with the post in the tube.
  9. The wood blockouts should be "toe-nailed" to the rectangular wood posts to prevent them from turning when the wood shrinks.

ITEM	QTY	BILL OF MATERIALS	ITEM NO.
A	1	IMPACT HEAD	S3000
B	1	W-BEAM GUARDRAIL END SECTION, 12 Ga.	S1303 MGS
C	3	W-BEAM GUARDRAIL, 12 Ga.	G1203 MGS
D	2	FOUNDATION TUBE	E731
E	2	BCT WOOD POST	P650 MGS
F	1	GROUND STRUT	E780
G	6	CRT WOOD POST	P671 MGS
H	1	BEARING PLATE	E750
J	1	PIPE SLEEVE	E740
K	1	CABLE ANCHOR BOX	S760
L	1	BCT CABLE ANCHOR ASSEMBLY	E770
M	6	MGS TIMBER BLOCKOUT OR EQUIV.	P618
HARDWARE (ALL DIMENSIONS IN INCHES)			
a	24	5/8Ø x 1 1/4 SPLICE BOLT	B580122
b	2	5/8Ø x 7 1/2 HEX BOLT	B580754
c	2	5/8Ø x 10 HEX BOLT	B581004
d	1	5/8Ø x 10 H.G.R. BOLT	B581002
e	6	5/8Ø x 22 H.G.R. BOLT	B582202
f	35	5/8Ø H.G.R. NUT	N050
g	7	H.G.R. WASHER	W050
h	2	1 ANCHOR CABLE HEX NUT	N100
j	2	1 ANCHOR CABLE WASHER	W100
k	2	3/8 x 3 LAG SCREW	E350
m	8	CABLE ANCHOR BOX SHOULDER BOLT	SB58A
n	8	1/2 A325 STRUCTURAL NUT	N055A
o	16	1 1/16 OD x 9/16 ID A325 STR. WASHER	W050A



**RSI**  
Road Systems, Inc.  
Big Spring, TX  
Phone: 432-263-2435  
or Phone: 330-346-0721

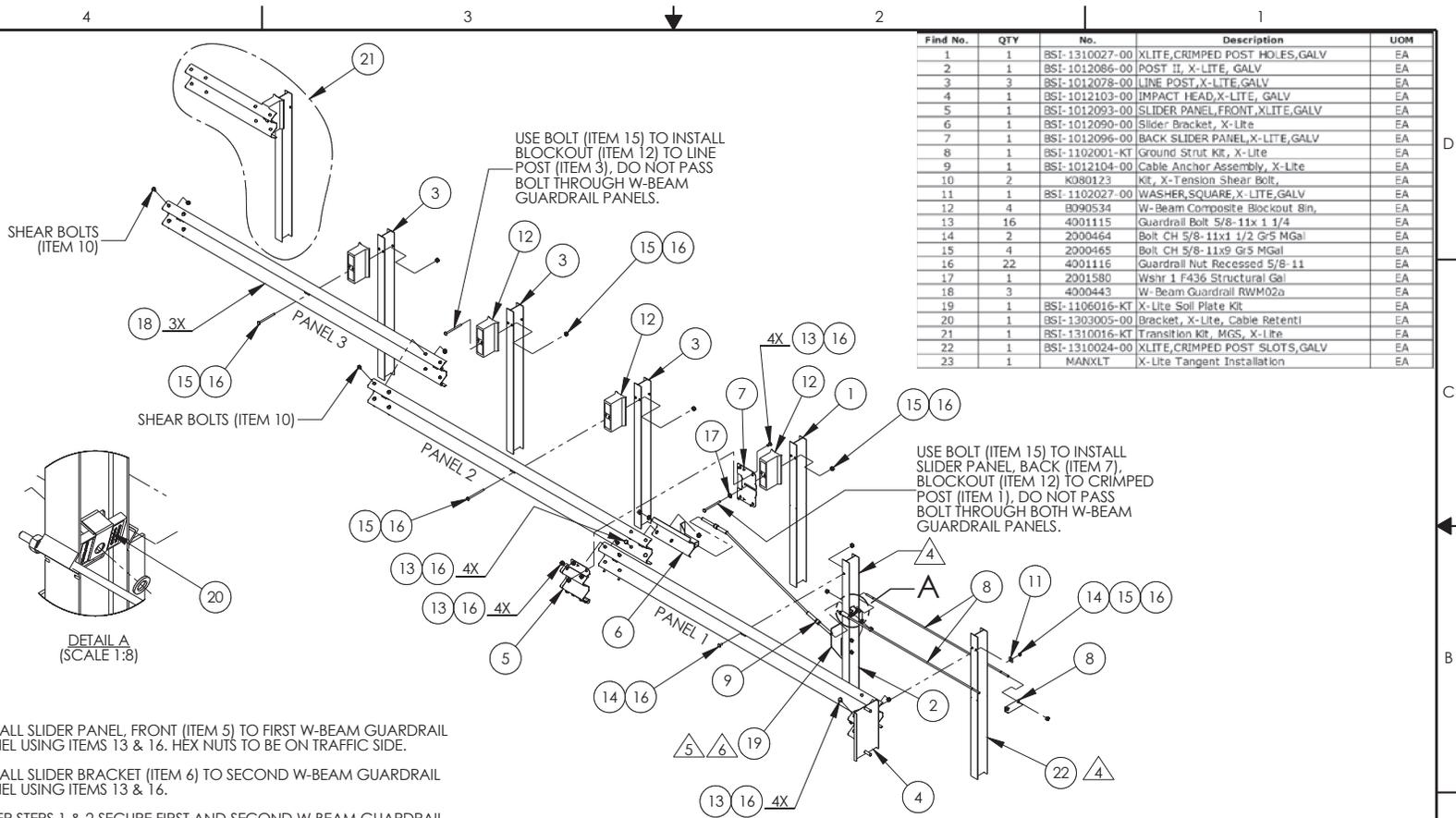
Sequential Kinking Terminal  
SKT - Assembly

Midwest Guardrail System  
Wood Post System

Drawing Name: SKT-MGS-W-US Scale: NONE

Sheet: A1  
Date: 12/01/04  
By: JRR  
Rev: 0

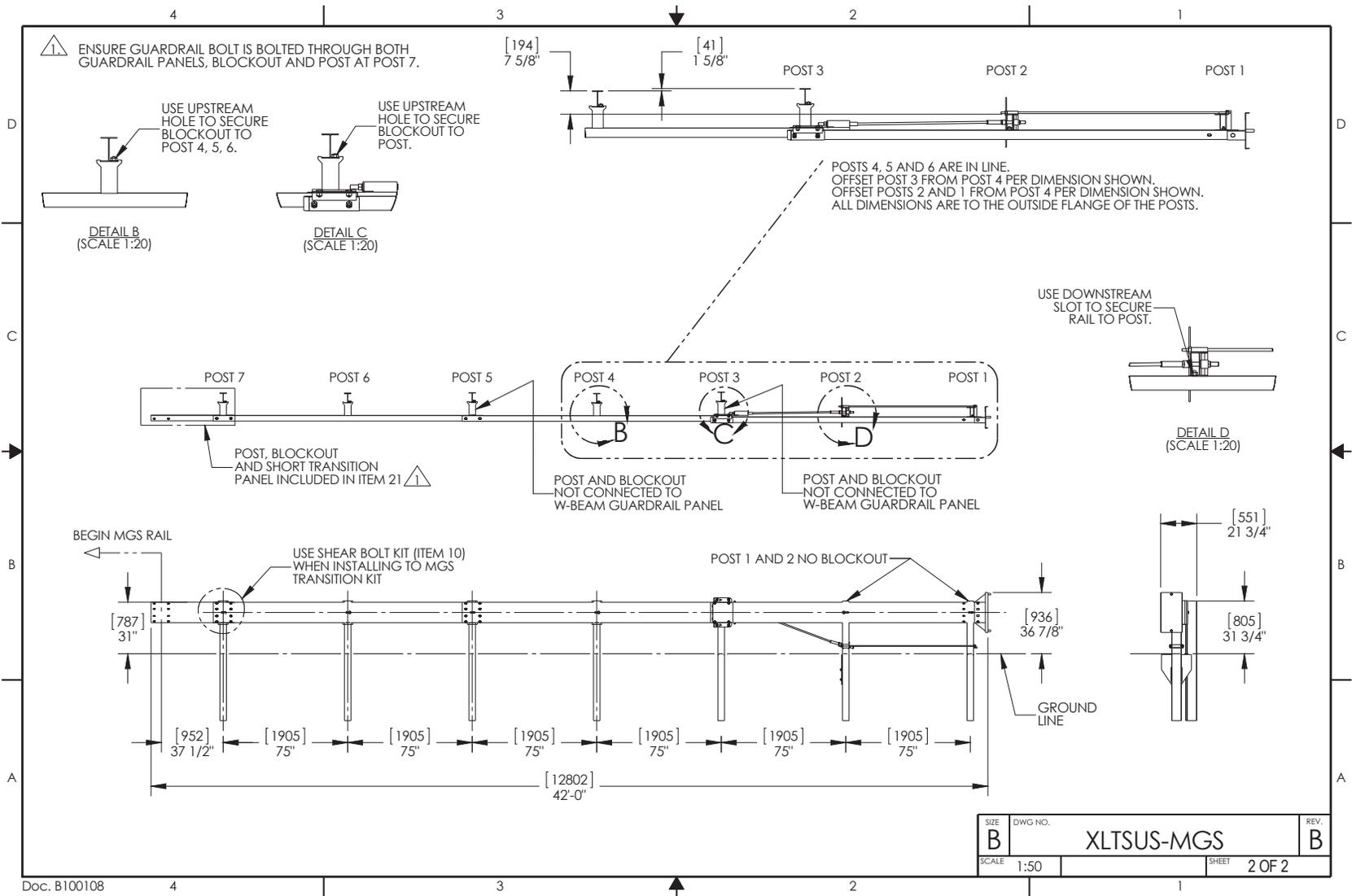
Find No.	QTY	No.	Description	UOM
1	1	BSI-1310027-00	XLITE, CRIMPED POST HOLES, GALV	EA
2	1	BSI-1012066-00	POST II, X-LITE, GALV	EA
3	3	BSI-1012078-00	LINE POST, X-LITE, GALV	EA
4	1	BSI-1012103-00	IMPACT HEAD, X-LITE, GALV	EA
5	1	BSI-1012093-00	SLIDER PANEL, FRONT, X-LITE, GALV	EA
6	1	BSI-1012090-00	Slider Bracket, X-Lite	EA
7	1	BSI-1012096-00	BACK SLIDER PANEL, X-LITE, GALV	EA
8	1	BSI-1102001-KT	Ground Strut Kit, X-Lite	EA
9	1	BSI-1012104-00	Cable Anchor Assembly, X-Lite	EA
10	2	KD80123	Kit, X-Tension Shear Bolt,	EA
11	1	BSI-1102027-00	WASHER, SQUARE, X-LITE, GALV	EA
12	4	B090534	W-Beam Composite Blockout Bin,	EA
13	16	4001115	Guardrail Bolt 5/8-11x 1 1/4	EA
14	2	2000464	Bolt CH 5/8-11x1 1/2 Gr5 MGal	EA
15	4	2000465	Bolt CH 5/8-11x9 Gr5 MGal	EA
16	22	4001116	Guardrail Nut Recessed 5/8-11	EA
17	1	2001580	Wshr 1 F436 Structural Gal	EA
18	3	4000443	W-Beam Guardrail RWM02a	EA
19	1	BSI-1106016-KT	X-Lite Soil Plate Kit	EA
20	1	BSI-1303005-00	Bracket, X-Lite, Cable Retenti	EA
21	1	BSI-1310016-KT	Transition Kit, MGS, X-Lite	EA
22	1	BSI-1310024-00	XLITE, CRIMPED POST SLOTS, GALV	EA
23	1	MANXLT	X-Lite Tangent Installation	EA



- INSTALL SLIDER PANEL, FRONT (ITEM 5) TO FIRST W-BEAM GUARDRAIL PANEL USING ITEMS 13 & 16. HEX NUTS TO BE ON TRAFFIC SIDE.
- INSTALL SLIDER BRACKET (ITEM 6) TO SECOND W-BEAM GUARDRAIL PANEL USING ITEMS 13 & 16.
- AFTER STEPS 1 & 2 SECURE FIRST AND SECOND W-BEAM GUARDRAIL PANEL USING ITEMS 7, 13 & 16. HEX NUTS TO BE ON TRAFFIC SIDE.
- SLOT ON POSTS 1 AND 2 TO FACE GUARDRAIL PANEL.
- IF ROCK OR STIFF SOIL IS ENCOUNTERED, THE POST AND SOIL PLATE MAY BE INSTALLED BY AUGERING AND BACKFILLING THE HOLE. EXTRA CARE MUST BE TAKEN TO PREVENT SETTLEMENT OR LATERAL DISPLACEMENT OF THE POST. BACKFILL MATERIAL SHALL BE COMPACTED TO OPTIMUM COMPACTION.
- IF ROCK IS ENCOUNTERED, THE SOIL PLATE MAY BE MODIFIED IF APPROVED BY THE PROJECT ENGINEER.

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<b>APPROVALS</b> DRAWN BY: JMT DRAWN DATE: 10/09/2013 APPRD BY: GAD APPRD DATE: 10/09/13		INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5-1994 THIRD ANGLE PROJECTION DO NOT SCALE DRAWING		TITLE: X-LITE SYSTEM ASSEMBLY, TANGENT, TRANSITION TO MGS SIZE: B DWG NO.: XLTSUS-MGS SCALE: 1:40 SHEET: 1 OF 2	
REV	ECN#	DATE	DATE	REV	REV
		01/23/14	11/13/13		B
		10/09/13			

Appendix A - System Configuration, 37' 6" MGS



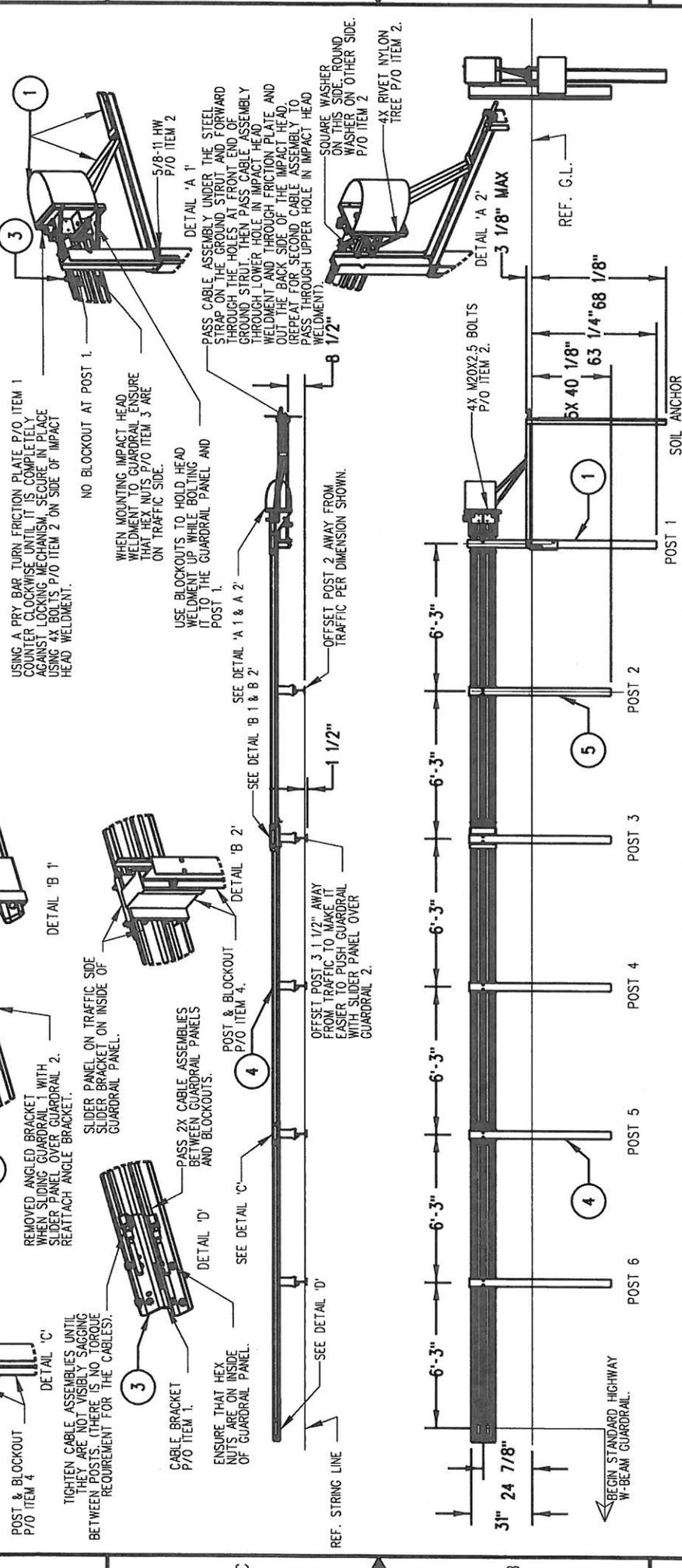
SIZE	DWG. NO.	REV.
B	XLTSUS-MGS	B
SCALE	SHEET	
1:50	2 OF 2	

Doc. B100108

## Appendix A -Bill of Materials - X-Lite Tangent, MGS 37' 6"

Item	Description	Full System	Kit Only
BSI-1310024-00	XLITE,CRIMPED POST SLOTS,GALV	1.00	1.00
BSI-1310027-00	XLITE,CRIMPED POST HOLES,GALV	1.00	1.00
BSI-1012086-00	POST II, X-LITE, GALV	1.00	1.00
BSI-1012078-00	LINE POST,X-LITE,GALV	3.00	-
BSI-1012103-00	IMPACT HEAD,X-LITE, GALV	1.00	1.00
BSI-1012093-00	SLIDER PANEL,FRONT,XLITE,GALV	1.00	1.00
BSI-1012090-00	Slider Bracket, X-Lite	1.00	1.00
BSI-1012096-00	BACK SLIDER PANEL,X-LITE,GALV	1.00	1.00
BSI-1012097-00	Ground Strut, X-Lite	2.00	2.00
BSI-1012098-00	Ground Strut Angle	1.00	1.00
BSI-1012104-00	Cable Anchor Assembly, X-Lite	1.00	1.00
K080123	Kit, X-Tension Shear Bolt,	2.00	2.00
BSI-1102027-00	WASHER,SQUARE,X-LITE,GALV	1.00	1.00
B090534	W-Beam Composite Blockout 8in,	4.00	-
4001115	Guardrail Bolt 5/8-11x 1 1/4	16.00	-
2000464	Bolt CH 5/8-11x1 1/2 Gr5 MGal	2.00	-
2000465	Bolt CH 5/8-11x9 Gr5 MGal	4.00	-
4001116	Guardrail Nut Recessed 5/8-11	26.00	-
2001580	Wshr 1" F436 Structural	1.00	-
4000443	W-Beam Guardrail RWM02a	3.00	-
BSI-1312100-00	Soil Plate	1.00	1.00
2000220	C-Scr HH 5/8-11x3 1/2 Gr5 MGal	2.00	2.00
2001636	Wshr 5/8 F436 Struct MGal	4.00	4.00
2000312	Nut HX 5/8-11 Gr5 Mgal	2.00	1.00
BSI-1303005-00	Bracket, X-Lite, Cable Retenti	1.00	1.00
BSI-1310016-KT	Transition Kit, MGS, X-Lite	1.00	1.00

ITEM NO.	PART NUMBER	DESCRIPTION	QTY	UOM
1	BSI-1307252-K1	X-Tension Terminal Comp, 31 in	1	EACH
2	K070202	X-Tension Hardware Kit, GT	1	EACH
3	K070206	X-Tension System Hardware Kit, EACH	1	EACH
4	K070210	X-Tension GT Guardrail	1	EACH
5	B061100	BSI I-Beam Post, Middle, X350	1	EACH
6	MANXT1	X-TENSION Installation Manual	1	EACH



**LINDSAY**  
TRANSPORTATIONAL SOLUTIONS

BARBER SYSTEMS INC.  
3333 Voca Valley Parkway, Ste 800  
Voca, TX 75793-5959  
Tel: 281.660.5959  
www.barbersystems.com

TITLE: X-TENSION GUARDRAIL TERMINAL SYSTEM STEEL POST WITH COMPOSITE BLOCKOUT 31" RAIL HEIGHT

REV. B

SIZE: DWG NO. B

DATE: 2/08/13

SCALE: 1:50

SHEET: 1 OF 1

PROJECT: XGTSS5

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES. TOLERANCES ARE: FRACTIONS: ± 1/16 DECIMALS: ± .005 ANGLES: ± 1/2° INTERFERE DIMENSIONS AND TOLERANCES PER ASME Y14.5-2004

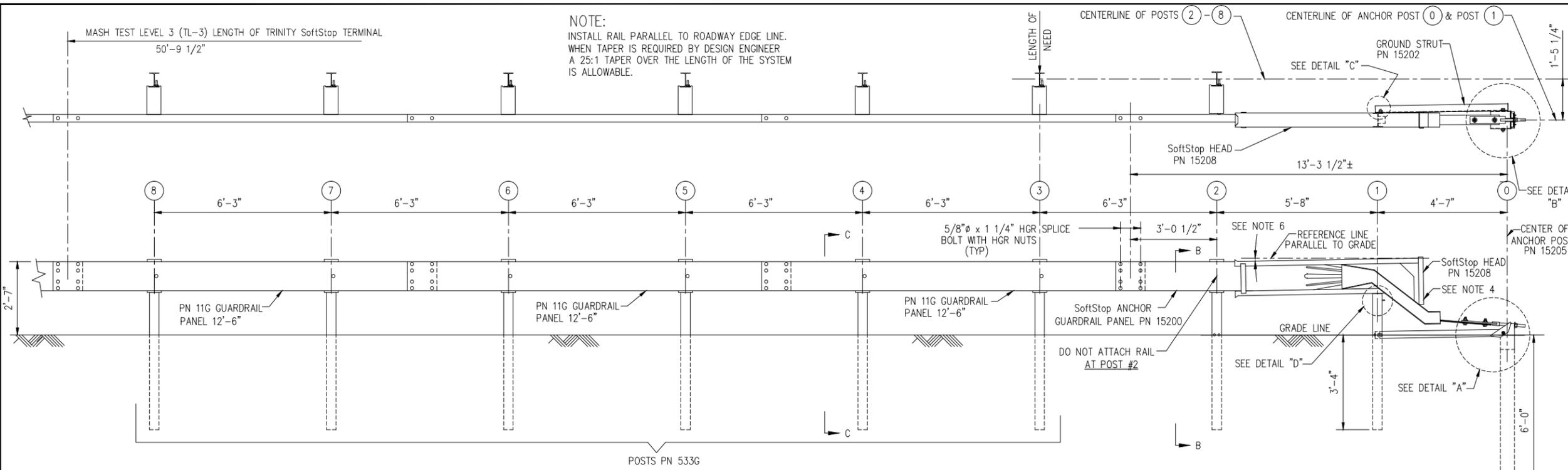
THIRD ANGLE PROJECTION

DO NOT SCALE DRAWING

APPROVALS: NMV (2/08/13), JMT (2/08/13)

DRAWN BY: NMV  
DRAWN DATE: 2/08/13  
APPROD BY: JMT  
APPROD DATE: 2/08/13

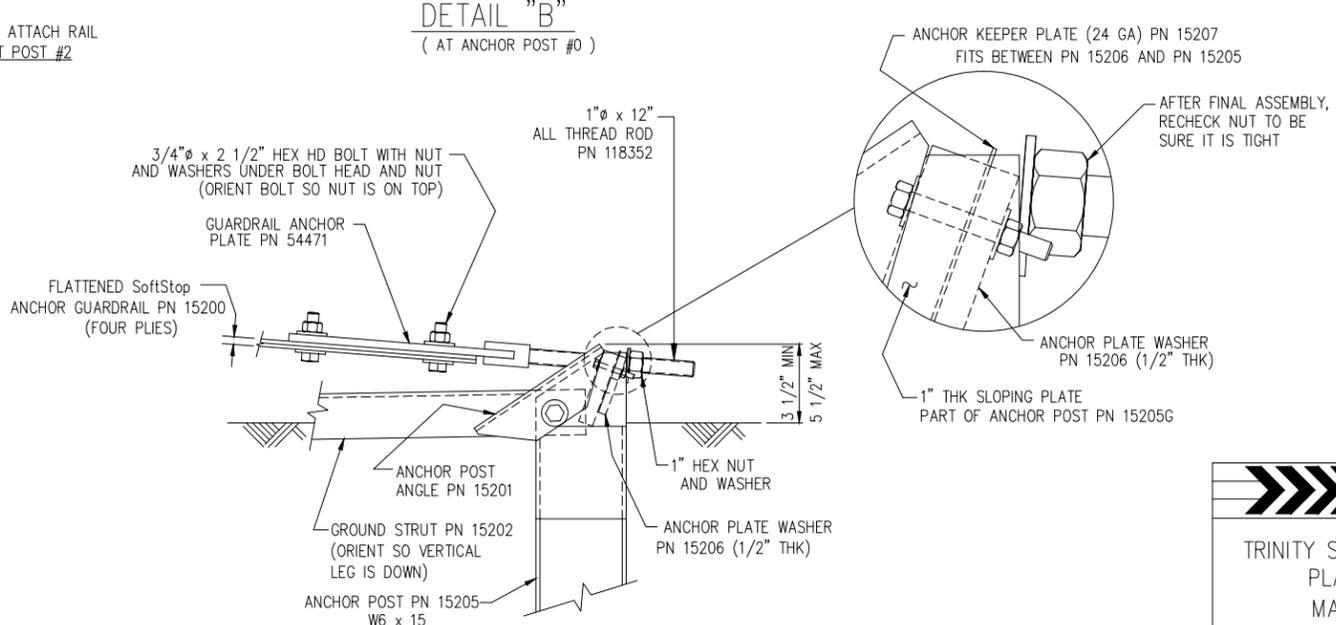
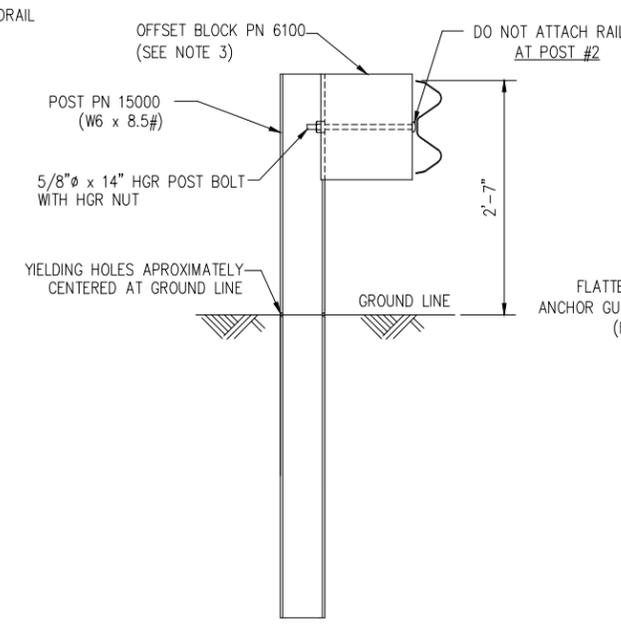
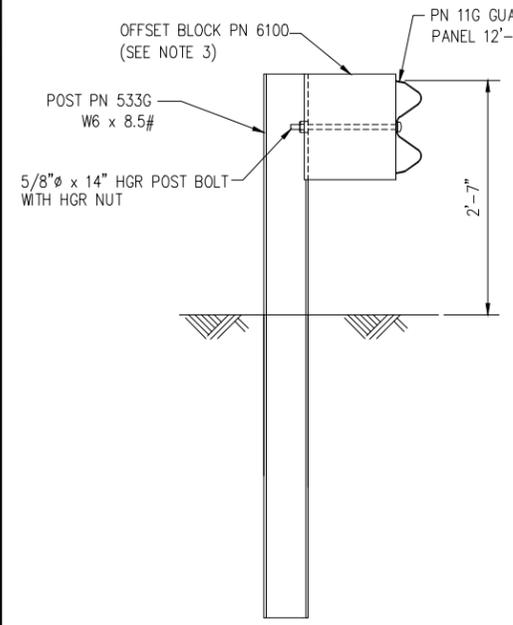
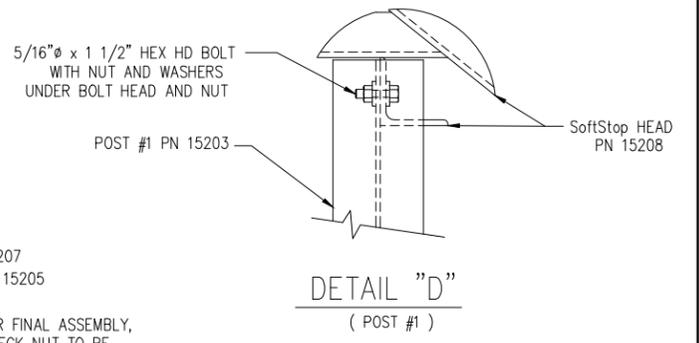
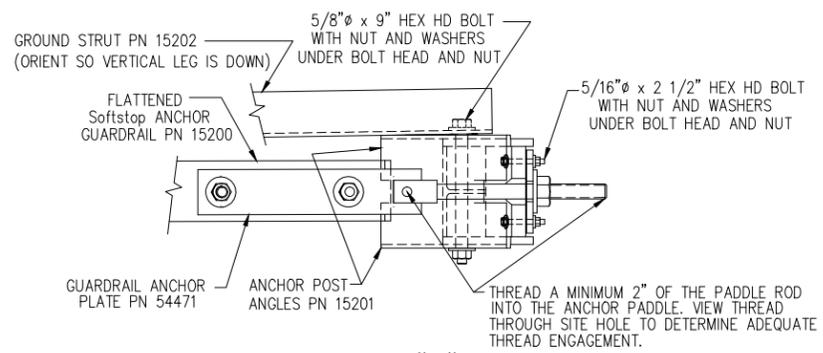
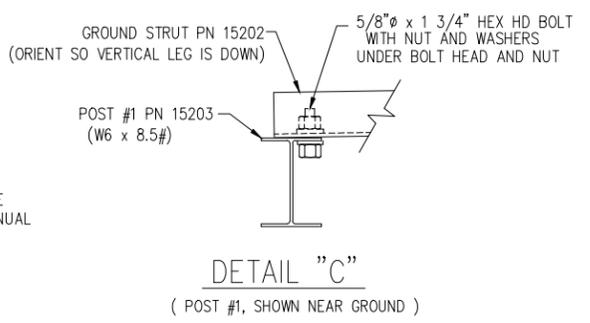
NOTES: UNLESS OTHERWISE SPECIFIED.  
1. SYSTEM TO BE INSTALLED PER MANUFACTURER SPECIFICATIONS.  
2. ONLY TIGHTEN THE CABLE ASSEMBLIES USING THE NUTS AT THE CABLE BRACKET (SEE DETAIL 'D'). DO NOT TIGHTEN THE CABLES AT THE FRONT OF THE GROUND ANCHOR.  
3. WHEN DRIVING STEEL POST, ENSURE THAT A DRIVING CAP WITH TIMBER OR PLASTIC INSERT IS USED TO PREVENT DAMAGE TO THE GALVANIZING TO THE TOP OF THE POST.



**NOTE:**  
 INSTALL RAIL PARALLEL TO ROADWAY EDGE LINE.  
 WHEN TAPER IS REQUIRED BY DESIGN ENGINEER  
 A 25:1 TAPER OVER THE LENGTH OF THE SYSTEM  
 IS ALLOWABLE.

BILL OF MATERIAL			
PART NUMBER	QTY	DESCRIPTION	
11G	3	12/12'6/3'1.5/S GUARDRAIL (12GA)	
15200G	1	SoftStop ANCHOR GUARDRAIL (12GA)	
15208A	1	SoftStop HEAD	
15203G	1	POST #1 4'-9 1/2" (SYTP)	
15000G	1	POST #2 6'-0" (SYTP)	
6100B	7	OFFSET BLOCK 6 x 12 x 14	
54471G	1	GUARDRAIL ANCHOR PLATE	
15205A	1	ANCHOR POST #0	
15201G	2	ANCHOR POST ANGLE 10" LG	
15207G	1	ANCHOR KEEPER PLATE (24 GA)	
15206G	1	ANCHOR PLATE WASHER (1/2" THK)	
15202G	1	GROUND STRUT x 4'-8 1/4"	
533G	6	POST #3-#8 6'-0"	
HARDWARE		GR	
4902G	1	1" WASHER	F-436
3908G	1	1" HEX NUT	A563 DH
3717G	2	3/4" x 2 1/2" HEX HD BOLT	A-325
3701G	4	3/4" WASHER	F-436
3704G	2	3/4" HEX NUT	A563 DH
3360G	32	5/8" x 1 1/4" HGR SPLICE BOLT	A-307
3540G	7	5/8" x 14" HGR POST BOLT	A-307
3391G	1	5/8" x 1 3/4" HEX HD BOLT	A-325
4489G	1	5/8" x 9" HEX HD BOLT	A-325
4372G	4	5/8" WASHER	F-436
3340G	41	5/8" HGR HEX NUT	A563 A
105285G	2	5/16" x 2 1/2" HEX HD BOLT	GR-5
105286G	1	5/16" x 1 1/2" HEX HD BOLT	GR-5
118352G	1	1" x 12" ALL THREAD ROD	A193 B7
3240G	6	5/16" WASHER	
3245G	3	5/16" HEX NUT	A563 A

- NOTES:**
- REFER TO SoftStop ASSEMBLY MANUAL.
  - SoftStop IS A MASH TEST LEVEL 3 (TL-3) END TREATMENT.
  - 12" NOMINAL DEEP PLASTIC OFFSET BLOCKS (ROUTED) ARE ACCEPTABLE ALTERNATES.
  - MANUFACTURER SUGGESTS CUSTOMER TO PROVIDE REFLECTORIZATION OF THE TERMINAL.
  - 25' GUARDRAIL PANELS (12GA) ARE AN ACCEPTABLE ALTERNATE TO SHOWN 12'-6" PANELS.
  - IT IS ACCEPTABLE TO INSTALL THE SoftStop HEAD PARALLEL TO THE GRADE LINE OR WITH AN UPWARD TILT. SEE SoftStop ASSEMBLY MANUAL FOR SPECIFIC DETAILS.

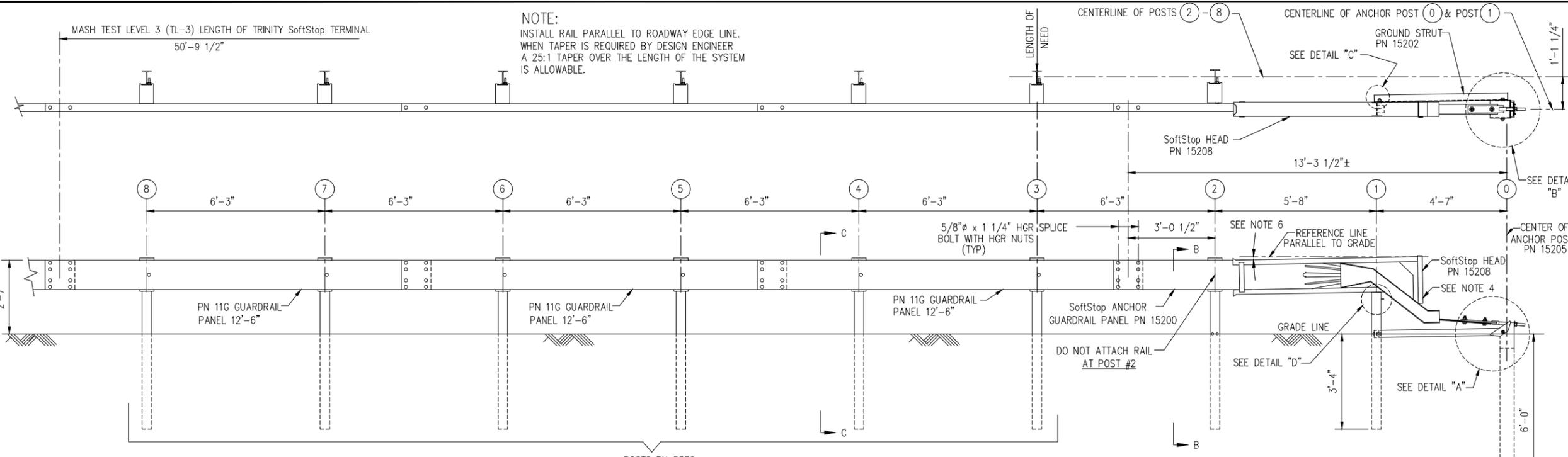


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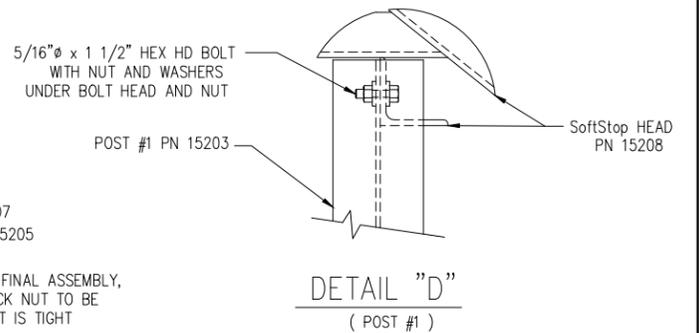
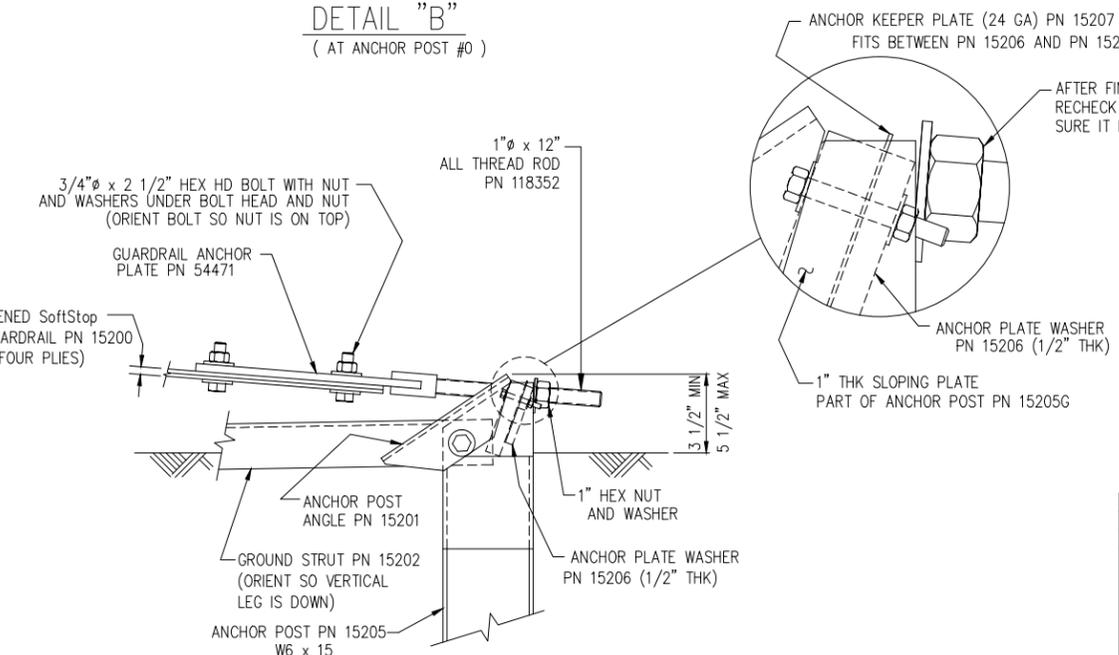
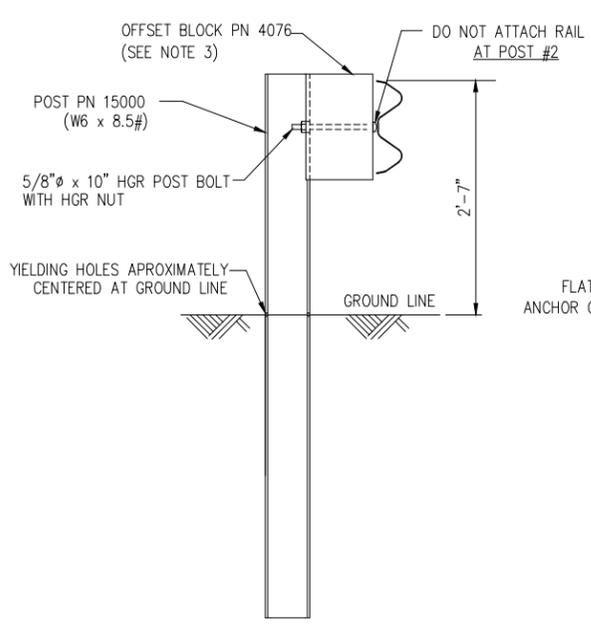
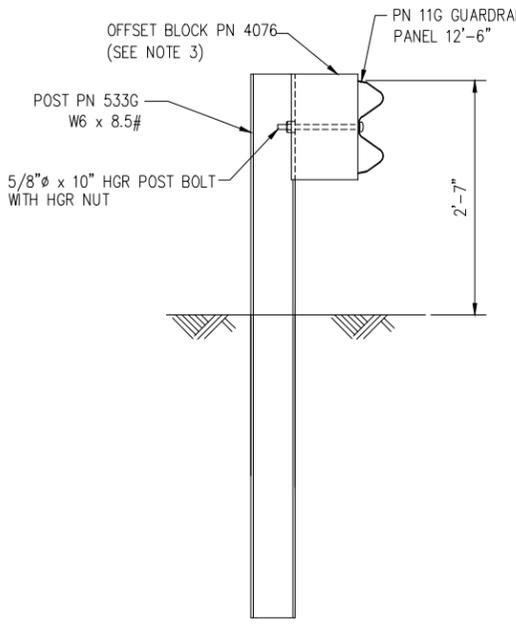
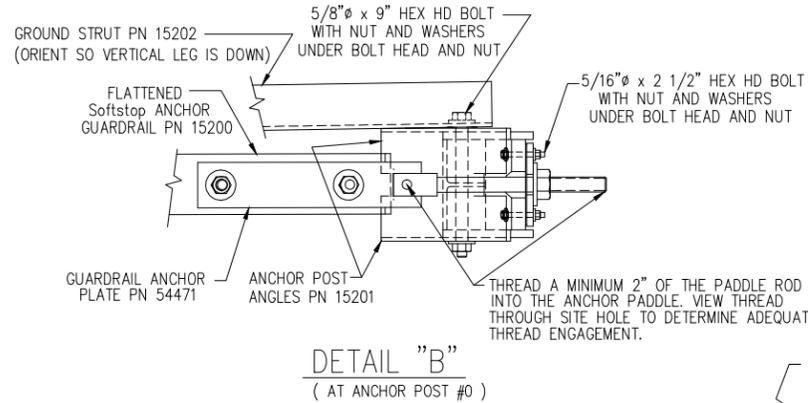
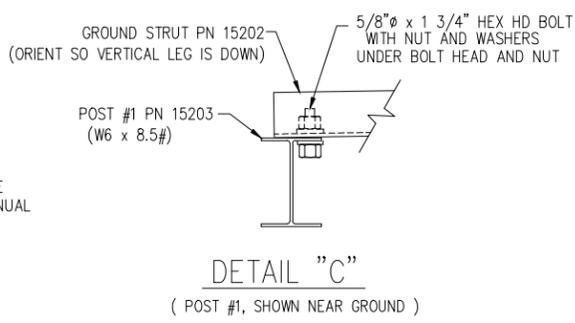
TRINITY SoftStop TERMINAL (12" BLOCKS)  
 PLAN, ELEVATION & SECTION  
 MASH TEST LEVEL 3 (TL-3)

DRAWN	BT
CHECKED	BS
SCALE	N.T.S.
DATE	01/10/12
ENG. FILE #	SS 645-01EM
SHT.No.	E1 OF 1
DRAWING NO.	SS 645

**TRINITY HIGHWAY PRODUCTS, LLC.**  
 2525 STEMMONS FREEWAY  
 DALLAS, TX 75207



- NOTES:
- 1) REFER TO SoftStop ASSEMBLY MANUAL.
  - 2) SoftStop IS A MASH TEST LEVEL 3 (TL-3) END TREATMENT.
  - 3) 8" NOMINAL DEEP PLASTIC OFFSET BLOCKS (ROUTED) ARE ACCEPTABLE ALTERNATES.
  - 4) MANUFACTURER SUGGESTS CUSTOMER TO PROVIDE REFLECTORIZATION OF THE TERMINAL.
  - 5) 25' GUARDRAIL PANELS (12GA) ARE AN ACCEPTABLE ALTERNATE TO SHOWN 12'-6" PANELS.
  - 6) IT IS ACCEPTABLE TO INSTALL THE SoftStop HEAD PARALLEL TO THE GRADE LINE OR WITH AN UPWARD TILT. SEE SoftStop ASSEMBLY MANUAL FOR SPECIFIC DETAILS.



BILL OF MATERIAL			
PART NUMBER	QTY	DESCRIPTION	
11G	3	12/12'6/3'1.5/S GUARDRAIL (12GA)	
15200G	1	SoftStop ANCHOR GUARDRAIL (12GA)	
15208A	1	SoftStop HEAD	
15203G	1	POST #1 4'-9 1/2" (SYTP)	
15000G	1	POST #2 6'-0" (SYTP)	
4076B	7	OFFSET BLOCK 6 x 8 x 14	
54471G	1	GUARDRAIL ANCHOR PLATE	
15205A	1	ANCHOR POST #0	
15201G	2	ANCHOR POST ANGLE 10" LG	
15207G	1	ANCHOR KEEPER PLATE (24 GA)	
15206G	1	ANCHOR PLATE WASHER (1/2" THK)	
15202G	1	GROUND STRUT x 4'-8 1/4"	
533G	6	POST #3-#8 6'-0"	
HARDWARE			GR
4902G	1	1" WASHER	F-436
3908G	1	1" HEX NUT	A563 DH
3717G	2	3/4" x 2 1/2" HEX HD BOLT	A-325
3701G	4	3/4" WASHER	F-436
3704G	2	3/4" HEX NUT	A563 DH
3360G	32	5/8" x 1 1/4" HGR SPLICE BOLT	A-307
3500G	7	5/8" x 10" HGR POST BOLT	A-307
3391G	1	5/8" x 1 3/4" HEX HD BOLT	A-325
4489G	1	5/8" x 9" HEX HD BOLT	A-325
4372G	4	5/8" WASHER	F-436
118352G	1	1" x 12" ALL THREAD ROD	A193 B7
3340G	41	5/8" HGR HEX NUT	A563 A
105285G	2	5/16" x 2 1/2" HEX HD BOLT	GR-5
105286G	1	5/16" x 1 1/2" HEX HD BOLT	GR-5
3240G	6	5/16" WASHER	
3245G	3	5/16" HEX NUT	A563 A

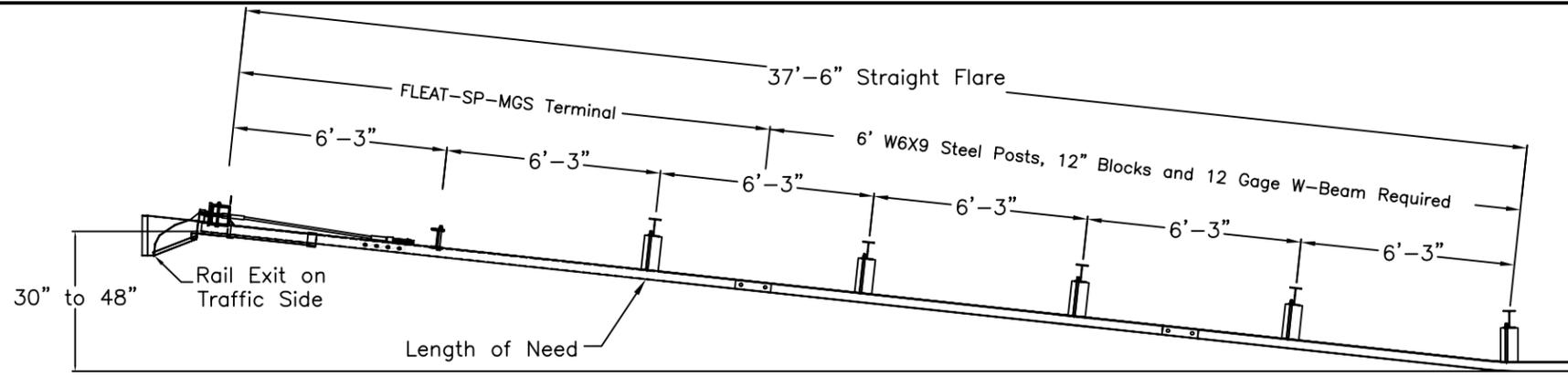
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**SoftStop**

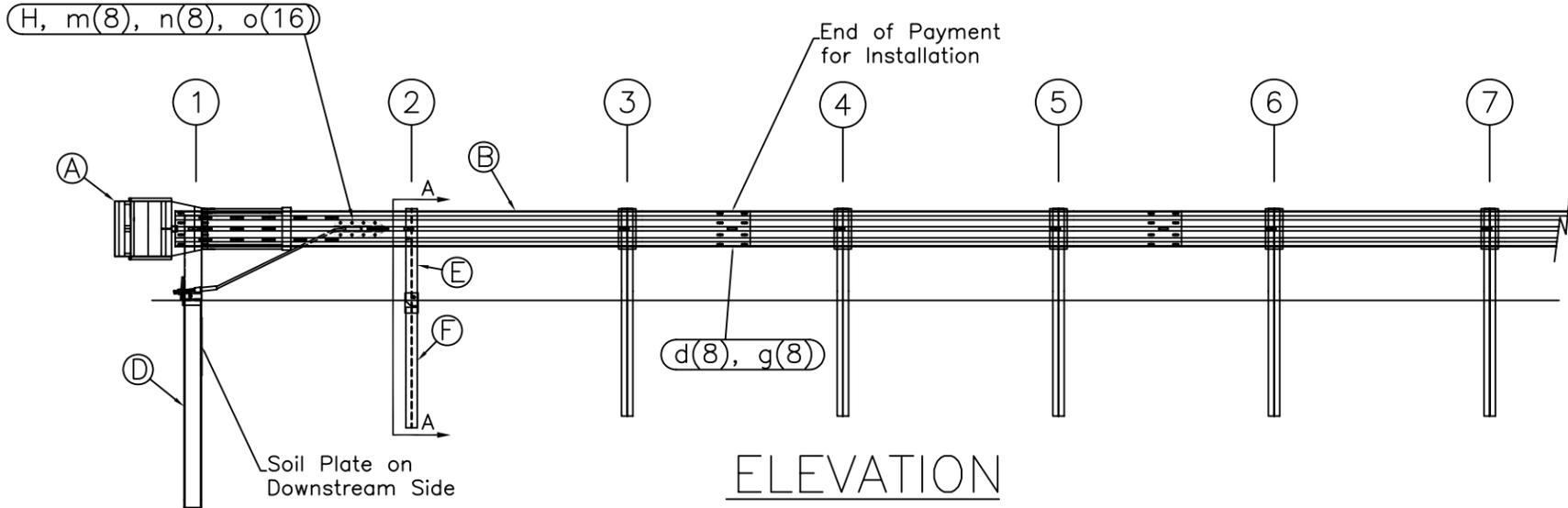
TRINITY SoftStop TERMINAL (8" BLOCKS)  
PLAN, ELEVATION & SECTION  
MASH TEST LEVEL 3 (TL-3)

DRAWN	BT
CHECKED	BS
SCALE	N.T.S.
DATE	11/14/12
ENG. FILE #	SS 646-01EM
SHT.No.	E1 OF 1
DRAWING NO.	SS 646

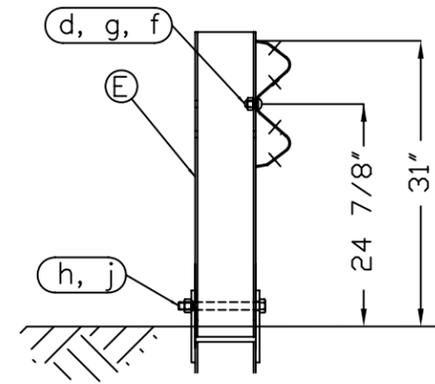
**TRINITY HIGHWAY PRODUCTS, LLC.**  
2525 STEMMONS FREEWAY  
DALLAS, TX 75207



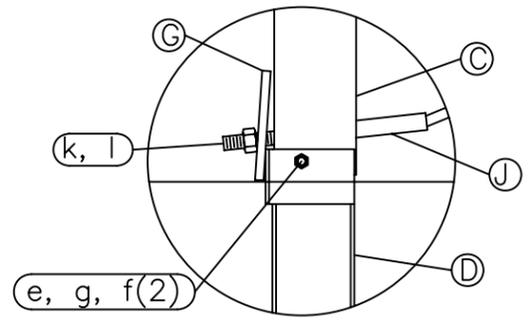
PLAN



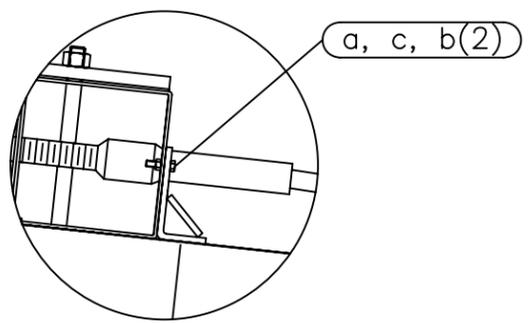
ELEVATION



SECTION A-A  
Post #2



Post #1 Connection Detail



Impact Head Connection Detail

ITEM	QTY	BILL OF MATERIALS	ITEM NO.
A	1	IMPACT HEAD	F3000
B	1	W-BEAM GUARDRAIL END SECTION, 12 Ga.	MGS-SF1303
C	1	FIRST POST TOP (6X6X $\frac{1}{8}$ " Tube)	TPHP1A
D	1	FIRST POST BOTTOM (6' W6X15)	TPHP1B
E	1	SECOND POST ASSEMBLY TOP	UHP2A
F	1	SECOND POST ASSEMBLY BOTTOM	HP3B
G	1	BEARING PLATE	E750
H	1	CABLE ANCHOR BOX	S760
J	1	BCT CABLE ANCHOR ASSEMBLY	E770

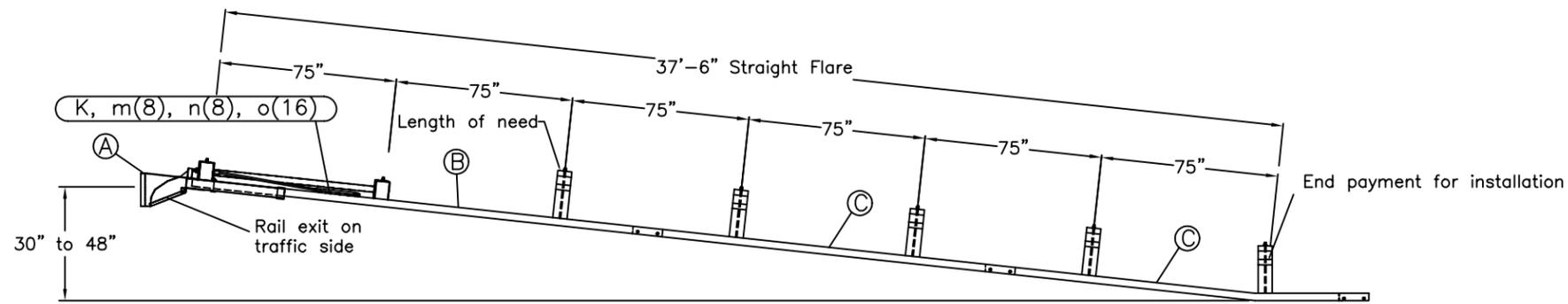
HARDWARE (ALL DIMENSIONS IN INCHES)			
a	2	5/16 x 1 HEX BOLT GRD 5	B5160104A
b	4	5/16 WASHER	W0516
c	2	5/16 HEX NUT	N0516
d	9	5/8 Dia. x 1 1/4 SPLICE BOLT (POST #2)	B580122
e	1	5/8 Dia. x 9 HEX BOLT GRD 5	B580904A
f	3	5/8 WASHER	W050
g	10	5/8 Dia. H.G.R NUT	N050
h	1	3/4 Dia. x 8 1/2 HEX BOLT GRD A449	B340854A
j	1	3/4 Dia. HEX NUT	N030
k	2	1 ANCHOR CABLE HEX NUT	N100
l	2	1 ANCHOR CABLE WASHER	W100
m	8	CABLE ANCHOR BOX SHOULDER BOLT	SB58A
n	8	1/2 A325 STRUCTURAL NUT	N055A
o	16	1 1/16 OD x 9/16 ID A325 STR. WASHER	W050A

GENERAL NOTES:

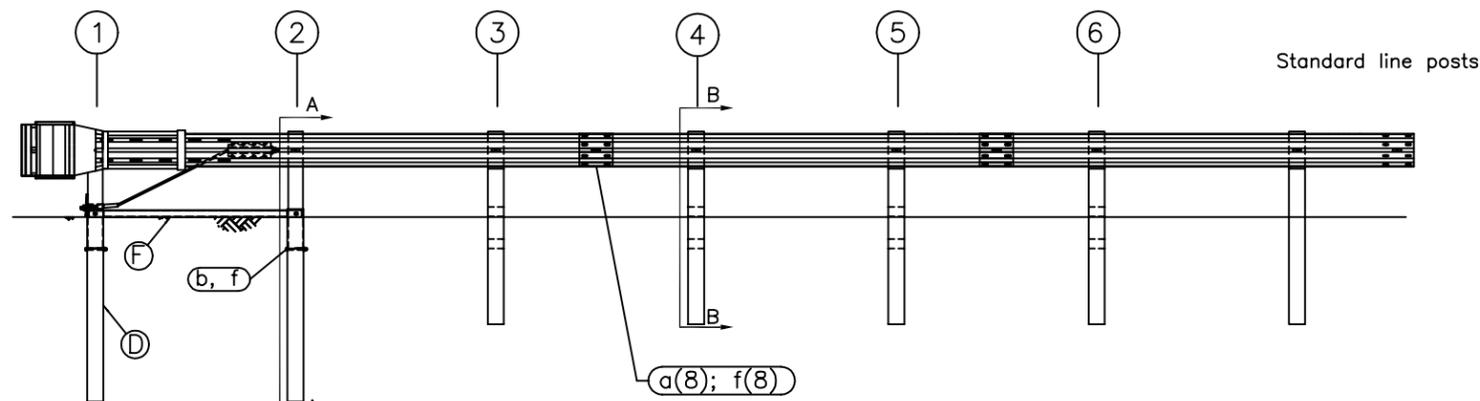
- All bolts, nuts, cable assemblies, cable anchors and bearing plates shall be galvanized.
- The lower sections of the Posts 1&2 shall not protrude more than 4 in above the ground (measured along a 5' cord). Site grading may be necessary to meet this requirement.
- The lower sections of the hinged posts should not be driven with the upper post attached. If the post is placed in a drilled hole, the backfill material must be satisfactorily compacted to prevent settlement.
- When competent rock is encountered, a 12" Ø post hole, 20 in. deep cored into the rock surface may be used if approved by the engineer for post 1. Granular material will be placed in the bottom of the hole, approximately 2.5" deep to provide drainage. The first post can be field cut to length, placed in the hole and backfilled with suitable backfill. The soil plate may be trimmed if required.
- The breakaway cable assembly must be taut. A locking device (vice grips or channel lock pliers) should be used to prevent the cable from twisting when tightening nuts.

Big Spring, TX  
Phone: 432-263-2435  
or Phone: 330-346-0721

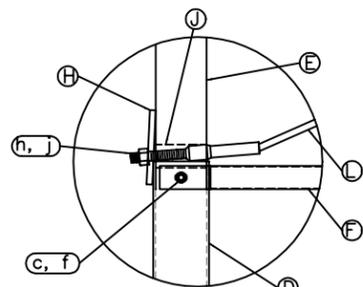
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		Date:	02/24/10
Drawing Name: <b>FLT-SP-S-MGS</b>		By:	JRR
		Scale:	None
		Rev:	0



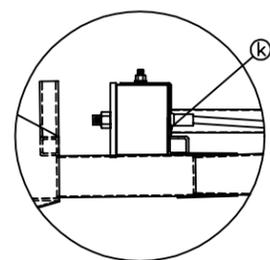
TRAFFIC → PLAN



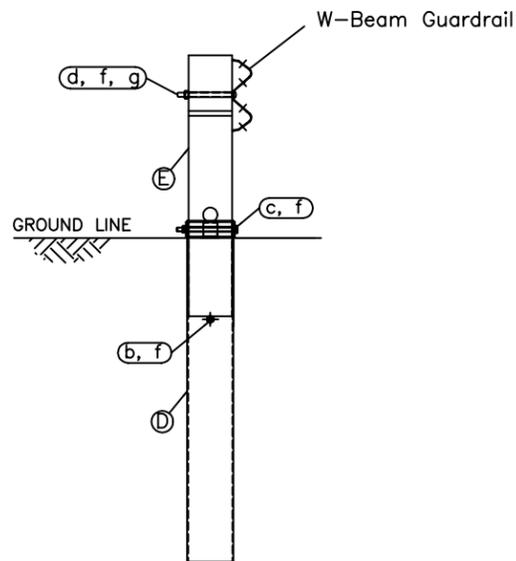
ELEVATION



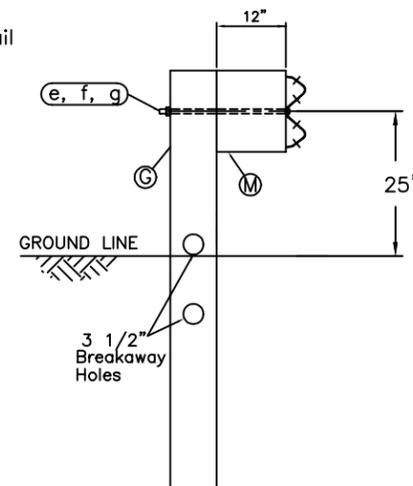
POST #1 CONNECTION DETAILS



IMPACT HEAD CONNECTION DETAIL



SECTION A-A  
Post #2



SECTION B-B  
Posts 3 thru 6

ITEM	QTY	BILL OF MATERIALS	ITEM NO.
A	1	IMPACT HEAD	F3000
B	1	W-BEAM GUARDRAIL END SECTION, 12 Ga.	F1303 MGS
C	2	W-BEAM GUARDRAIL, 12 Ga.	G1203 MGS
D	2	FOUNDATION TUBE	E731
E	2	BCT WOOD POST	P650 MGS
F	1	GROUND STRUT	E780
G	4	CRT WOOD POST	P671 MGS
H	1	BEARING PLATE	E750
J	1	PIPE SLEEVE	E740
K	1	CABLE ANCHOR BOX	S760
L	1	BCT CABLE ANCHOR ASSEMBLY	E770
M	4	MGS TIMBER BLOCKOUT OR RECYC. EQUIV.	P618
HARDWARE (ALL DIMENSIONS IN INCHES)			
a	16	5/8 $\phi$ x 1 1/4 SPLICE BOLT	B580122
b	2	5/8 $\phi$ x 7 1/2 HEX BOLT	B580754
c	2	5/8 $\phi$ x 10 HEX BOLT	B581004
d	1	5/8 $\phi$ x 10 H.G.R. BOLT	B581002
e	4	5/8 $\phi$ x 22 H.G.R. BOLT	B582202
f	25	5/8 $\phi$ H.G.R. NUT	N050
g	5	H.G.R. WASHER	W050
h	2	1 ANCHOR CABLE HEX NUT	N100
j	2	1 ANCHOR CABLE WASHER	W100
k	2	3/8 x 3 LAG SCREW	E350
m	8	CABLE ANCHOR BOX SHOULDER BOLT	SB58A
n	8	1/2 A325 STRUCTURAL NUT	N055A
o	16	1 1/16 OD x 9/16 ID A325 STR. WASHER	W050A

GENERAL NOTES:

1. Breakaway posts are required with the FLEAT.
2. All bolts, nuts, cable assemblies, cable anchors and bearing plates shall be galvanized.
3. The foundation tubes shall not protrude more than 4 in above the ground (measured along a 5' cord). Site grading may be necessary to meet this requirement.
4. When rock is encountered, a 12"  $\phi$  post hole, 20 in into the rock surface may be used if approved by the engineer. Granular material will be placed in the bottom of the hole, approximately 2.5" deep to provide drainage. The first two posts can be field cut to length, placed in the hole and backfilled with adequately compacted material excavated from the hole.
5. The breakaway cable assembly must be taut. A locking device (vice grips or channel lock pliers) should be used to prevent the cable from twisting when tightening nuts.
6. The soil tubes may be driven with an approved driving head. They shall not be driven with the post in the tube.
7. The wood blockouts should be "toe-nailed" to the rectangular wood posts to prevent them from turning when the wood shrinks.



**Road Systems, Inc.**

Big Spring, TX  
Phone: 432-263-2435  
or Phone: 330-346-0721

Flared Energy Absorbing  
Terminal - FLEAT Assembly  
Midwest Guardrail System

Wood Post System

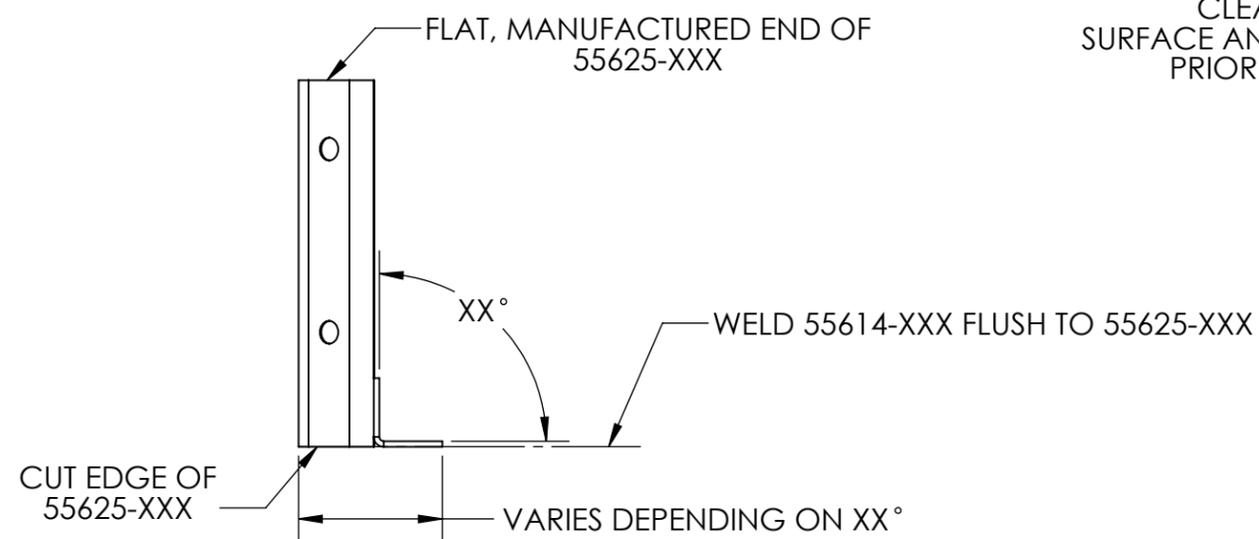
Drawing Name:  
FLT-MGS-W-US

Scale:  
None

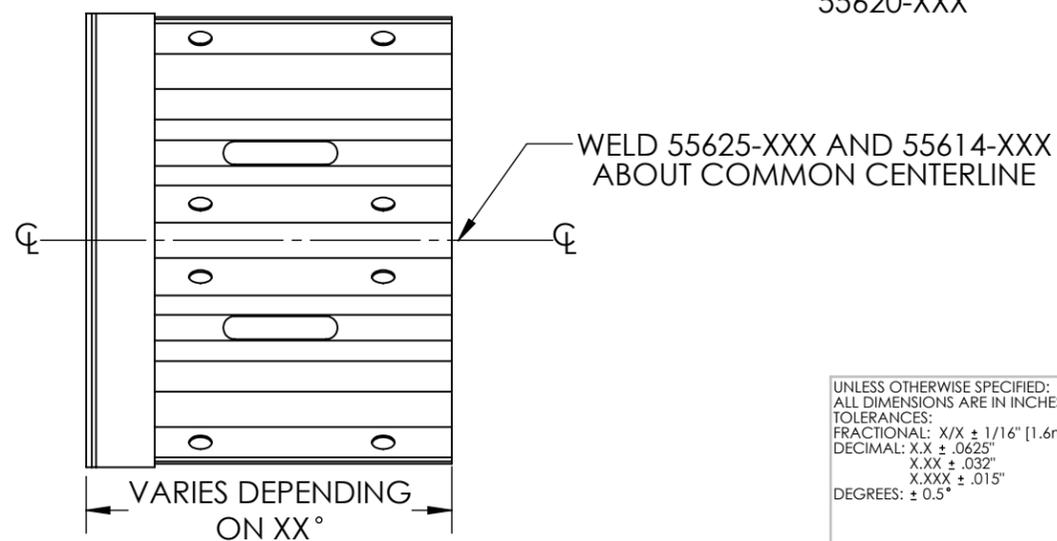
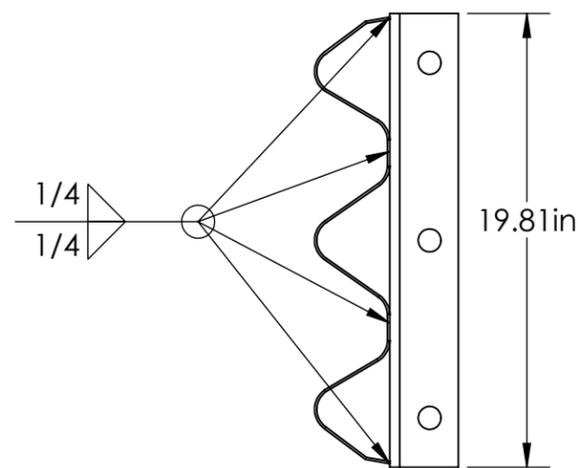
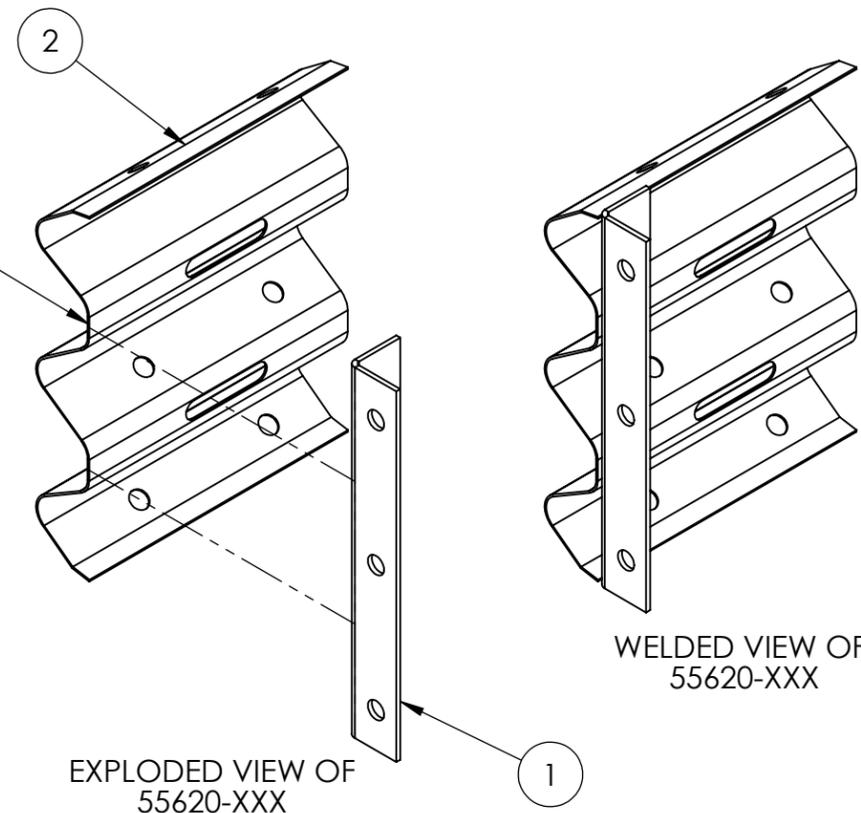
Sheet:  
A1  
Date:  
12/01/2004  
By:  
JRR  
Rev:  
0

ASSEMBLY CONFIGURATIONS				
ASSEMBLY	CONSISTS OF THESE PARTS		TRANSITION APPLICATION	ANGLE (XX°)
55620-XXX	55614-XXX	55625-XXX		
55620-C10	55614-C10	55625-C10	CONVERGING	10
55620-D06	55614-D06	55625-D06	DIVERGING	6
55620-D08	55614-D08	55625-D08	DIVERGING	8
55620-D10	55614-D10	55625-D10	DIVERGING	10

REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED
A	INITIAL RELEASE	9/20/2013	JS



CLEAN MATING SURFACE AND WELDING AREAS PRIOR TO WELDING



UNLESS OTHERWISE SPECIFIED:  
ALL DIMENSIONS ARE IN INCHES[mm].  
TOLERANCES:  
FRACTIONAL: X/X ± 1/16" [1.6mm]  
DECIMAL: X.X ± .0625"  
X.XX ± .032"  
X.XXX ± .015"  
DEGREES: ± 0.5°

**Traffix Devices Inc.**  
160 Avenida La Pata  
San Clemente, CA 92673  
(949) 361-5663  
FAX (949) 361-9205  
www.traffixdevices.com

TITLE:  
**SHORT THRIE BEAM ADAPTOR**

- 5. Units: Inches
  - 4. Use Welding Rod: AWS E70C-6MH4
  - 3. Weld Process: AWS GMAW
  - 2. Weld Per: AWS A5.18
  - 1. Finish: HOT DIP GALVANIZE AND ZINC SPRAY PAINT
- NOTES: UNLESS OTHERWISE SPECIFIED**

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	55614-XXX	COMPRESSOR TRANSITION FENDER PANEL FLANGE	1
2	55625-XXX	THRIE BEAM PANEL FOR TRANSITION	1

DRAWN BY: JEREMY SMITH	DATE: 09/20/13
CHECKED BY: FA	DATE: 09/20/13
APPROVED BY: FA	DATE: 09/20/13

SIZE <b>B</b>	DWG. NO. <b>55620-XXX</b>	REV <b>A</b>
		SHEET 1 OF 1