INFORMATION HANDOUT

For Contract No. 06-0S6504
At 06-Ker-5-36.1/41.2

Identified by
Project ID 0614000207

MATERIALS INFORMATION

1. Geotechnical Soil Information for High Tension Cable Barrier
2. High Tension Cable Barrier System Information
3. Alternative Crash Cushion System Information

State of California
Department of Transportation

California State Transportation Agency

Memorandum

Serious drought.
Help Save Water!

To: MR. SEAN PLEDGER
Senior Transportation Engineer
Design IV, Branch K
Project Management

Attn: Mr. Randy Bowles

Date: October 1, 2015

File: 06-KER-5-PM36.1/41.2
HTCB
EA# 06-0S650
EFIS ID# 0614000207

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

Subject: Geotechnical Soil Information and Recommendation

Per request, the Office of Geotechnical Design North (OGDN) has prepared this memorandum to provide geotechnical soil information and recommendation for the subject project.

We understand that proposed project will install high tension cable barrier (HTCB) in the median on I-5 from PM 36.1 to PM 41.2 between Buena Vista Canal Road OC and I-5/SR43 Separation in Kern County. We understand that the HTCB will require foundations/anchors with embedment on the order of 3 feet below ground surface.

Work performed by OGDN for this memo includes reviewing available publications and specific project information pertaining to design and installation of the HTCB, performing site reconnaissance, collecting and testing representative soil samples and preparing this memo.

Site Reconnaissance, Soil Sample Collection and Laboratory Testing

OGDN performed a site reconnaissance on August 31 and September 1, 2015. Five soil samples were collected, by using hand auger, at five discrete locations along the proposed HTCB alignment, with one sample at each location. The samples were taken typically at depths of 2 to 4 feet below the existing ground surface. A general summary of the sample/hand auger locations is provided in Table 1 below.

The collected soil samples were submitted to Caltrans Geotechnical Laboratory for Particle Size Analysis of Soils (ASTM D422). Test results are provided in the attachment. Based on the results, the materials are classified as silty sands (SM) in accordance with Caltrans Soil and Rock Logging, Classification, and Presentation Manual, 2010 Edition.

Table 1 Sample/Hand Auger Locations

Location No.	Location Description
1	I-5 median, south of I-5/SR43 Separation
2	I-5 median, in the middle between I-5/SR43 Separation and I-5/SR119 Separation
3	I-5 median, south of I-5/SR119 Separation
4	I-5 median, in the middle between I-5/SR119 Separation and Buena Vista Canal Rd OC
5	I-5 median, north of Buena Vista Canal Rd OC

Conclusion and Recommendation

Soil Parameters

It is our opinion that the subsurface soils within the anticipated HTCB foundation depths (0 to 5 feet) can be generally described as cohesionless materials consisting predominantly of sands, silts and their mixture, with minor amounts (5% or less) of gravels at depths near ground surface. We judge that the apparent densities of the materials vary from loose to medium dense. The following soil parameters are considered suitable at the site.

Unit Weight, γ (pcf)	120	pcf
Internal Friction Angel, ϕ	30	degree

Groundwater

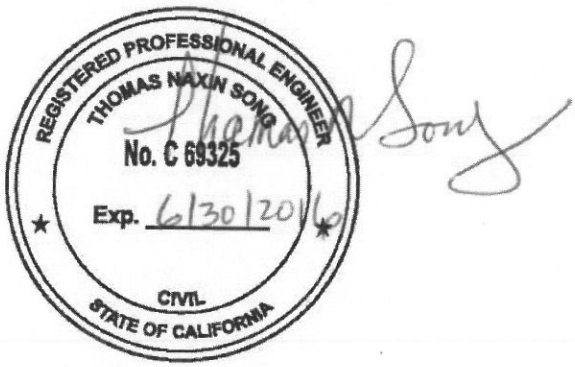
Groundwater was not encountered during our site reconnaissance. California Department of Water Resource (DWR) have several wells in the vicinity of the project site. Data collected in these wells are summarized in Table 2 below.

Table 2 Historical Data of Groundwater Levels Measured in DWR Wells

Well ID	Location		Measured GW Level (ft)	Measuring Date
	Latitude	Longitude		
30S25E26H001M	35.2886	-119.2546	66 - 103	1/28/1965 to 9/19/1969
30S25E25G001M	35.2908	-119.2437	75 - 159	8/24/1979 to 3/11/2015
30S25E36F001M	35.2786	-119.2476	60 - 85	10/28/1997 to 10/23/2011
30S26E31P001M	35.2675	-119.2282	4 - 56	11/27/1949 to 9/24/1965
31S26E06R001M	35.2561	-119.2181	4 - 39	12/10/1936 to 1/21/1966
31S26E08G001M	35.2453	-119.2087	70 - 186	8/23/1979 to 3/3/2015

As shown in Table 2, groundwater levels that were measured after 1970 are all deeper than 60 feet below ground surface. Although there were shallow groundwater levels measured in two of the wells, the related measurements were all performed before 1966. With considerations of the passing of time and the recent statewide severe drought, it is our opinion that groundwater is unlikely to affect the proposed HTCB foundation design and construction.

If you have any questions regarding this memorandum, please contact me at (916) 227-1057.



Thomas N. Song, PE 69325
Transportation Engineer - Civil
Office of Geotechnical Design - North

c: District Project Engineer
District Material Engineer
Geotechnical Archive

DIVISION OF
ENGINEERING SERVICES
OFFICE OF GEOTECHNICAL SUPPORT
GEOTECHNICAL LABORATORY
5900 Folsom Boulevard
Sacramento, CA 95819

Date: 9/30/2015

To: Thomas Song / GDN

From: Lilibeth C. Purta / (916) 227-5239

RE: Laboratory Test Report -- EA: 06-0S6501
Project: 0614000207
GL 15-041

Final test results.

Note: All remaining test specimens will be disposed of in 30 calendar days from the release date of the final test results.

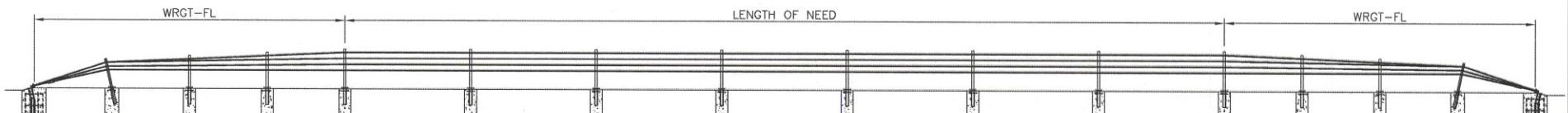
AASHTO R18

CALIFORNIA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL LABORATORY

GL TRACKING NO : 15-041
Dist - EA: 06-0S6501
Report Date: September 30, 2015
Page: 1/1

CLASSIFICATION TEST SUMMARY

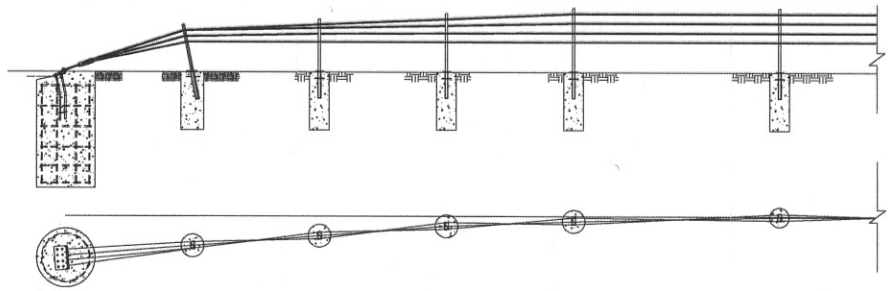
SAMPLE ID	% FINER THAN																	ATTERBERG LIMITS		AS RECEIVED		Gs
	3"	2 1/2"	2"	1 1/2"	1"	3/4"	1/2"	3/8"	No. 4	No. 8	No. 16	No. 30	No. 50	No. 100	No. 200	5μ	1μ	LL	PI	γd (pcf)	%m	
B_1										100	99	89	60	34	18	6	4				3.8	
B_2							100	99	99	99	97	83	51	30	19	8	4				1.9	
B_3					100	99	98	98	97	96	94	90	80	59	40	15	8				1.5	
B_4										100	98	91	79	64	47	16	9				6.1	
B_5										100	99	94	77	54	33	9	6				6.4	



ELEVATION

PLAN

WRGT–FL END ANCHOR



* SEE SHEET 3 OF 3 FOR FURTHER INFORMATION

ROPE TENSION TABLE		
ROPE TEMP. (F°)	TENSION (LBS)	TENSION (kN)
0	5700	25.4
5	5550	24.7
10	5400	24.0
15	5250	23.4
20	5100	22.7
25	4950	22.0
30	4800	21.4
35	4650	20.74
40	4500	20.0
45	4350	19.3
50	4200	18.7
55	4050	18.0
60	3900	17.3
65	3750	16.7
70	3600	16.0
75	3450	15.3
80	3300	14.7
85	3150	14.0
90	3000	13.3
95	2850	12.7
100	2700	12.0
105	2550	11.3
110	2400	10.7
115	2250	10.0
120	2100	9.3
125	1950	8.7
130	1800	8.0
135	1650	7.3
140	1500	6.7

* ROPE TENSION: ±20% AFTER 2–WEEK INTERVAL

GENERAL NOTES:

1. BRIFEN DRAWINGS, SPECIFICATIONS, AND PRODUCT MANUAL SHOULD BE REVIEWED PRIOR TO STARTING AN INSTALLATION. FOR ADDITIONAL INFORMATION OR QUESTIONS, CONTACT BRIFEN USA, INC. AT 1–866–427–4336.
2. THE BRIFEN WRSF HAS BEEN SUCCESSFULLY TESTED TO NCHRP 350 TL–4 CONDITIONS ON SLOPES 6:1 OR FLATTER AND NCHRP 350 TL–3 CONDITIONS ON SLOPES 4:1 TO 6:1.
3. THE POST SPACING SHALL BE DETERMINED BY THE SPECIFYING AGENCY. POST SPACING MAY BE DECREASED TO AVOID OBSTRUCTIONS OR UTILITIES. IN NO EVENT SHALL THE POST SPACING EXCEED 21'–0".
4. BRIFEN WRSF SHALL BE PLACED ON A SMOOTH SURFACE, WITHOUT HUMPS, DROP–OFFS, HOLES, ETC THAT WOULD INTERFERE WITH THE STABILITY OF THE ERRANT VEHICLE. GRADING, FILL AND COMPACT MAY BE REQUIRED TO ASSURE THAT ROPES ARE INSTALLED AT THE DESIGN HEIGHT.
5. THE WRGT–FL END ANCHOR HAS BEEN SUCCESSFULLY TESTED TO NCHRP 350 TL–3 CONDITIONS. THE LENGTH OF NEED BEGINS 31'–0" FROM THE END ANCHOR. POSTS A THROUGH POST B3, SPACED 6'–6" APART, HAVE WEAKENED CUTS AT THE GROUND THAT SHALL FACE THE ANCHOR.
6. ANCHOR AND LINE POST DIMENSIONS AND STEEL REINFORCEMENT WILL BE DETERMINED ON PROJECT SPECIFIC SOIL CLASSIFICATION, PROPERTIES AND TEMPERATURE EXTREMES. CONTACT BRIFEN USA, INC. FOR ADDITIONAL INFORMATION.
7. ALL REINFORCEMENT AND CONCRETE FOR THE ANCHORS AND LINE POSTS PROVIDED BY OTHERS.
8. REINFORCEMENT AND CONCRETE PROPERTIES SHALL MEET AGENCY SPECIFICATIONS.
9. FOR PLACEMENT NEAR GUARDRAIL OR OTHER OBSTACLES CONTACT BRIFEN USA, INC. FOR ADDITIONAL DRAWINGS AND SUPPORT.
10. TAPER RATES FOR THE BRIFEN WRSF ARE AS FOLLOWS:
    HORIZONTAL: 25:1 MAXIMUM, 50:1 PREFERABLE
    VERTICAL: 25:1 MAXIMUM, 50:1 PREFERABLE

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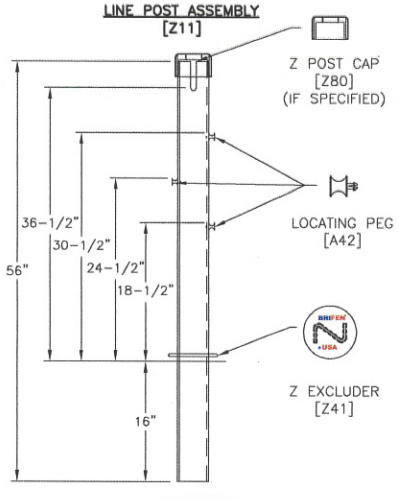
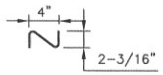
BRIFEN ★ USA INC.

Revision			BRIFEN WRSF NCHRP 350 TL–4 INSTALLATION & LAYOUT DETAILS		
No.	Date	By			
1.			Date 6.27.12	Drawn By Manita Elizondo	Scale None
2.					
3.			VERSION 12.1		Sheet No 1 OF 3
4.			Dwg. No.	WRGTFL–11–001b	
5.					

LINE POST ASSEMBLY [Z11]



ELEVATION

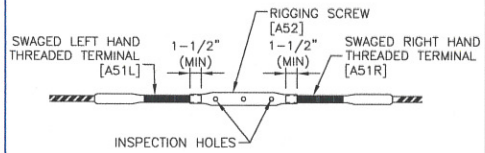


PLAN

NOTES SPECIFIC TO LINE POST ASSEMBLY

1. ROPE HEIGHTS SHALL BE ±1" TO GROUND LINE.
2. POST SHALL BE ±4" FROM VERTICAL PLUMB.
3. POST CAPS SHALL BE USED IF SPECIFIED.
4. REFLECTORS SHALL BE SPACED ACCORDING TO AGENCY SPECIFICATIONS.
5. REFLECTORS CAN BE PLACED ON THE POST CAP OR POST.

ROPE CONNECTION DETAIL

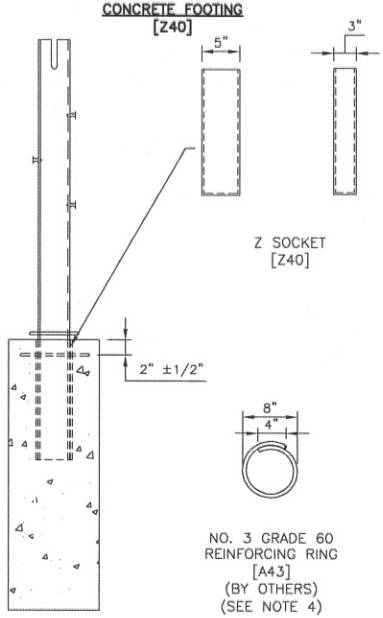


NOTES SPECIFIC TO ROPE CONNECTION DETAIL

1. THE WIRE ROPE TERMINALS SHALL BE THREADED A MINIMUM OF 1-1/2" INTO RIGGING SCREW.
2. AFTER FINAL TENSIONING, THE TERMINALS SHALL BE VISIBLE IN THE INSPECTION HOLES.

SOCKET ASSEMBLY

CONCRETE FOOTING [Z40]



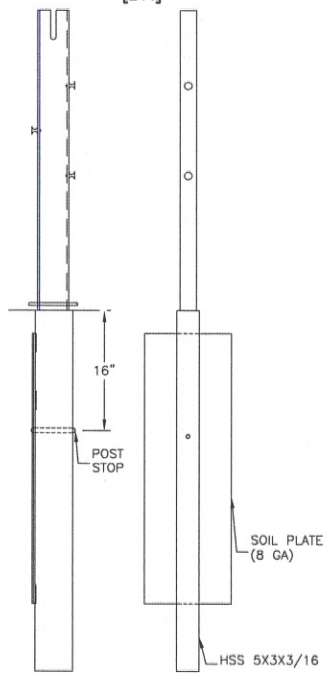
ELEVATION

PLAN

NOTES SPECIFIC TO CONCRETE FOOTING

1. SIZE OF FOOTING WILL BE DETERMINED BY SOIL CONDITIONS, FOUNDATION TYPE AND PROJECT CONDITIONS.
2. CONCRETE BASED ON AGENCY SPECIFICATIONS.
3. CONCRETE BY OTHERS.
4. REINFORCING RING (BY OTHERS) WILL BE USED ACCORDING TO FOUNDATION SIZE AND TYPE. THE REINFORCING RING MAY BE OMITTED IF THE FOOTING IS PLACED IN A CONTINUOUS CONCRETE MOW STRIP.
5. FOOTING SHALL BE FLUSH WITH THE GROUND LINE, TO A MAXIMUM OF 1 INCH BELOW OR ABOVE GROUND LINE.
6. SOCKET SHALL BE ±2° OF VERTICAL PLUMB.

DRIVE SOCKET [Z44]



ELEVATION SIDE

PLAN

NOTES SPECIFIC TO DRIVE SOCKETS

1. SIZE OF SOIL PLATE WILL BE DETERMINED BY SOIL CONDITIONS AND PROJECT CONDITIONS.
2. THE SOIL PLATE SHALL BE PARALLEL TO ROADWAY AND CAN FACE TOWARD OR AWAY FROM THE TRAVEL LANE.
3. FOOTING SHALL BE FLUSH WITH THE GROUND LINE, TO A MAXIMUM OF 1 INCH BELOW OR ABOVE GROUND LINE.
4. SOCKET SHALL BE ±2° OF VERTICAL PLUM.
5. SOCKETS SHALL BE DRIVEN IN A MANNER TO NOT DISTORT OR DESTROY THE TOP OF SOCKET TO A DEGREE THAT PLACES THE SOCKET OR LINE POST OUT OF CONSTRUCTION TOLERANCES.

GENERAL NOTES:

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2. THE BRIFEN WRSF HAS BEEN SUCCESSFULLY TESTED TO NCHRP 350 TL-4 CONDITIONS ON SLOPES 6:1 OR FLATTER AND NCHRP 350 TL-3 CONDITIONS ON SLOPES 4:1 TO 6:1.
3. THE POST SPACING SHALL BE DETERMINED BY THE SPECIFYING AGENCY. POST SPACING MAY BE DECREASED TO AVOID OBSTRUCTIONS OR UTILITIES. IN NO EVENT SHALL THE POST SPACING EXCEED 21'-0".
4. BRIFEN WRSF SHALL BE PLACED ON A SMOOTH SURFACE, WITHOUT HUMPS, DROP-OFFS, HOLES, ETC THAT WOULD INTERFERE WITH THE STABILITY OF THE ERRANT VEHICLE. GRADING, FILL AND COMPACTION MAY BE REQUIRED TO ASSURE THAT ROPES ARE INSTALLED AT THE DESIGN HEIGHT.

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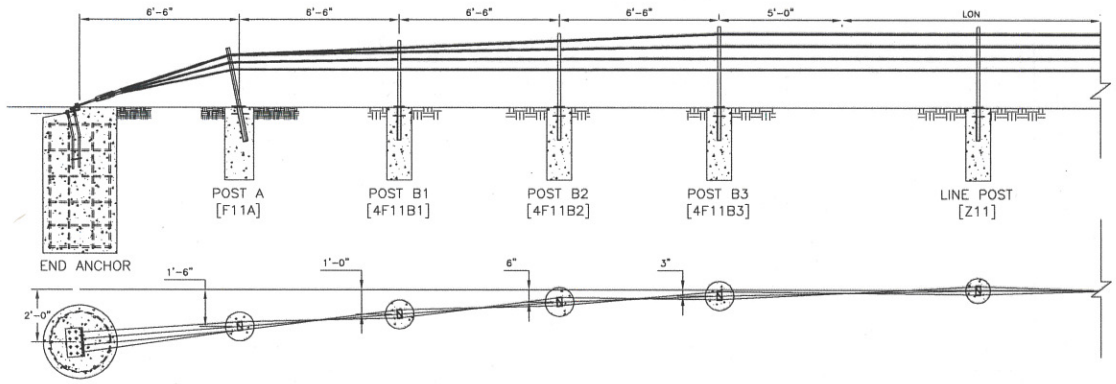
Revision			BRIFEN WRSF NCHRP 350 TL-4 LENGTH OF NEED COMPONENTS		
No.	Date	By			
1.					
2.			Date 6.27.12	Drawn By Manita Elizondo	Scale None
3.					
4.			VERSION 12.1		Sheet No 2 OF 3
5.			Dwg. No.	WRGTFL-11-002b	

WRGT–FL END ANCHOR LAYOUT



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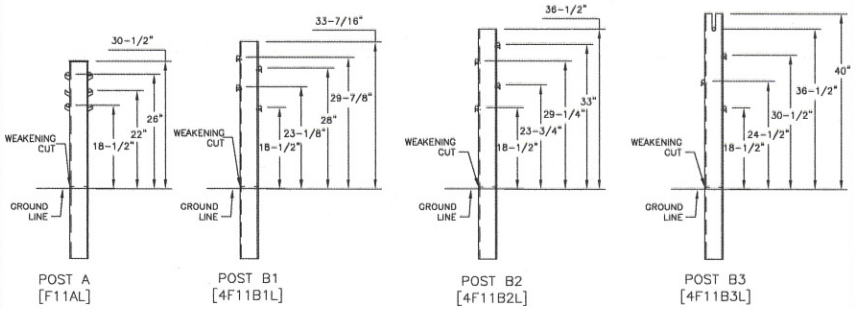
2. THE WRGT–FL END ANCHOR HAS BEEN SUCCESSFULLY TESTED TO NCHRP 350 TL–3 CONDITIONS. THE LENGTH OF NEED BEGINS 31'–0" FROM THE END ANCHOR. POSTS A THROUGH POST B3, SPACED 6'–6" APART, HAVE WEAKENED CUTS AT THE GROUND THAT SHALL FACE THE ANCHOR.
3. ANCHOR AND LINE POST DIMENSIONS AND STEEL REINFORCEMENT WILL BE DETERMINED ON PROJECT SPECIFIC SOIL CLASSIFICATION, PROPERTIES AND TEMPERATURE EXTREMES. CONTACT BRIFEN USA, INC. FOR ADDITIONAL INFORMATION.
4. ALL REINFORCEMENT AND CONCRETE FOR THE ANCHORS AND LINE POSTS PROVIDED BY OTHERS.
5. REINFORCEMENT AND CONCRETE PROPERTIES SHALL MEET AGENCY SPECIFICATIONS.
6. FOR PLACEMENT NEAR GUARDRAIL OR OTHER OBSTACLES CONTACT BRIFEN USA, INC. FOR ADDITIONAL DRAWINGS AND SUPPORT.

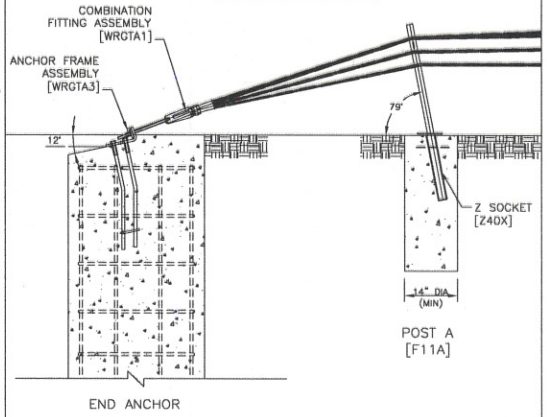
WRGT–FL POST DETAILS



NOTES SPECIFIC TO WRGT–FL POST DETAIL

1. ROPE HEIGHTS SHALL BE ±1" TO GROUND LINE.
2. POST SHALL BE ±4" FROM VERTICAL PLUMB.
3. POST CAPS SHALL BE USED IF SPECIFIED.
4. REFLECTORS SHALL BE SPACED ACCORDING TO AGENCY SPECIFICATIONS.
5. REFLECTORS CAN BE PLACED ON THE POST CAP OR POST.
6. Z EXCLUDER (Z41) SHALL BE USED.
7. POST A & SOCKET SHALL BE PLACED 79° (±4°) TOWARD END ANCHOR FROM THE HORIZONTAL PLANE.
8. POST A SOCKET SHALL BE PLACED IN 14" (MIN) CONCRETE FOUNDATION. DEPTH TO BE DETERMINED FROM SOIL CONDITIONS AND PROJECT CONDITIONS.
9. FOUNDATIONS FOR POST B1 THRU B3 SHALL BE THE SAME AS THE LINE POST ASSEMBLY'S FOR THE PROJECT.
10. WEAKENED CUTS SHALL FACE END ANCHOR.

END ANCHOR DETAILS

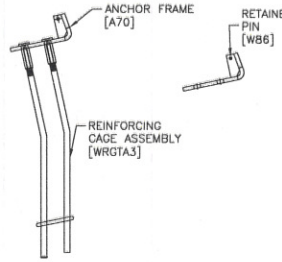


NOTES SPECIFIC TO END ANCHOR DETAIL

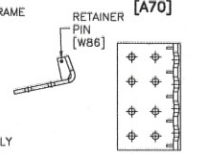
1. THE END ANCHOR ASSEMBLY SHALL BE PLACED 12° (+3°, −1°) BELOW HORIZONTAL PLANE.
2. POST A & SOCKET SHALL BE PLACED 79° (±4°) TOWARD END ANCHOR FROM THE HORIZONTAL PLANE.
3. POST A SOCKET SHALL BE PLACED IN 14" (MIN) CONCRETE FOUNDATION. DEPTH TO BE DETERMINED FROM SOIL CONDITIONS AND PROJECT CONDITIONS.

END ANCHOR COMPONENTS

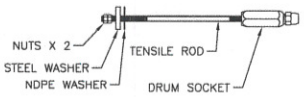
ANCHOR FRAME ASSEMBLY



ANCHOR FRAME [A70]



COMBINATION FITTING [WRGTA1]



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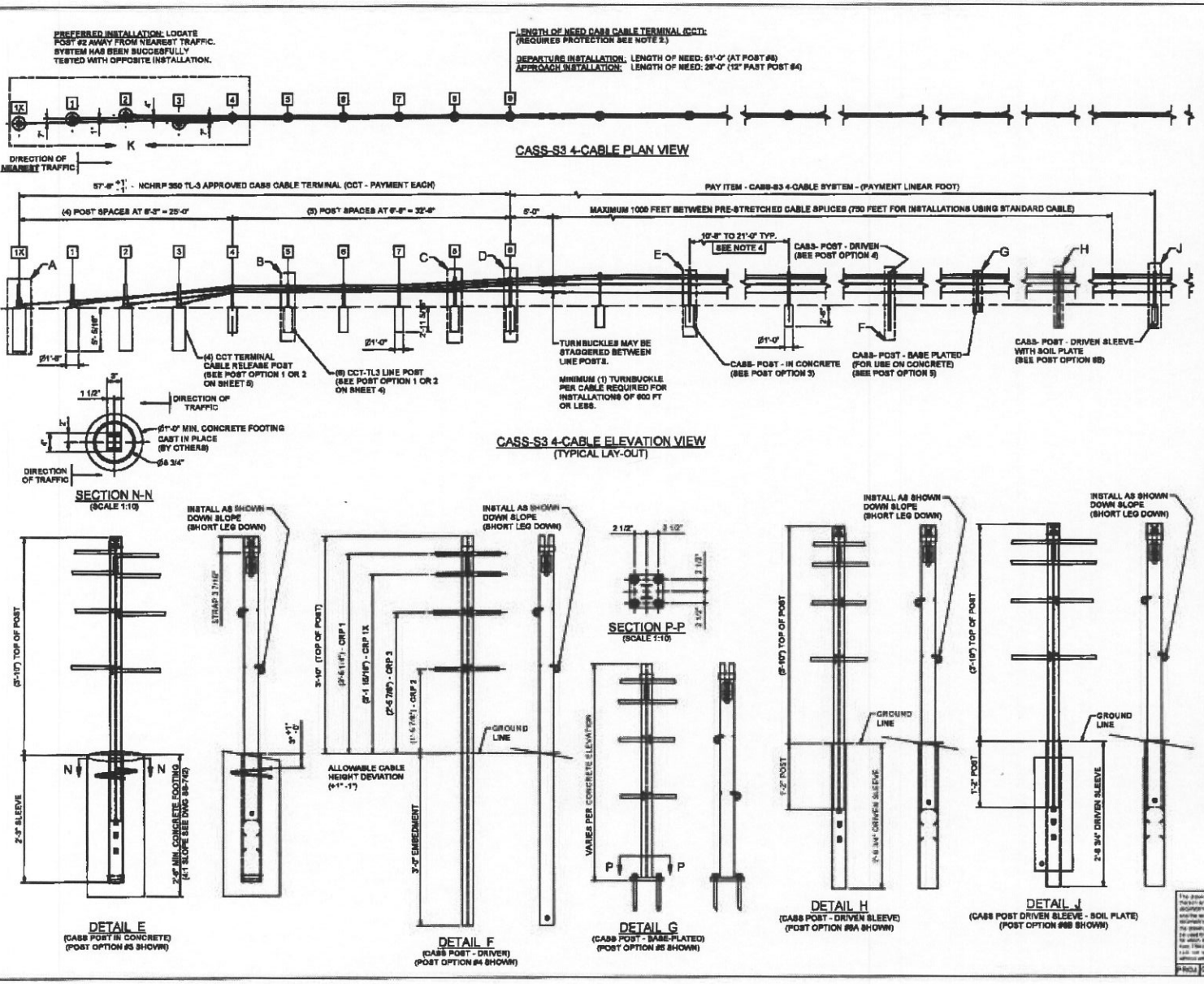
BRIFEN ★ USA INC.

Revision		
No.	Date	By
1.		
2.		
3.		
4.		
5.		

BRIFEN WRGT–FL END TERMINAL INSTALLATION & LAYOUT DETAILS

Date	Drawn By	Scale
6.27.12	Manita Elizondo	None
VERSION 12.1		Sheet No 3 OF 3
Dwg. No.	WRGTFL–11–003b	



NOTES:

1. CASS-S3 4-CABLE (4:1) HAS BEEN SUCCESSFULLY TESTED AND ACCEPTED TO NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM REPORT 350 TEST LEVEL 3 (NCHRP 350 TL3) FOR VARIOUS POST SPACING WHEN INSTALLED ON A 4:1 OR FLATTER SLOPE. CASS-S3 4-CABLE (4:1) HAS BEEN SUCCESSFULLY TESTED AND ACCEPTED TO NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM REPORT 350 TEST LEVEL 4 (NCHRP 350 TL4) FOR VARIOUS POST SPACING WHEN INSTALLED ON A 4:1 OR FLATTER SLOPE. ADDITIONAL INFORMATION CAN BE FOUND IN FHWA ACCEPTANCE LETTER B-141F.

2. CASS CABLE TERMINAL (CCT) HAS BEEN SUCCESSFULLY TESTED AND ACCEPTED TO NCHRP TL3. AN NCHRP 350 TL3 APPROVED TERMINAL (CCT) OR CASS-S3 4-CABLE (4:1) TRANSITION (VARIOUS) SHALL BE USED ON APPROACH AND DEPARTURE TERMINATIONS WHEN CASS-S3 4-CABLE (4:1) IS INSTALLED ON THE NATIONAL HIGHWAY SYSTEM (NHS). IF A NON-CRASHWORTHY ANCHOR (CCA) IS USED TO TERMINATE THE CABLE SYSTEM, THE NON-CRASHWORTHY ANCHOR MUST BE EITHER SHIELDED OR LOCATED SO THAT A VEHICLE IMPACTING THE CABLE CAN NOT IMPACT THE NON-CRASHWORTHY ANCHOR.

3. CASS-S3 4-CABLE (4:1) SHALL BE INSTALLED ON SHOULDERS OR MEDIANS WITH SLOPES OF 4:1 OR FLATTER WITHOUT OBSTRUCTIONS, DEPRESSIONS, ETC. THAT MAY SIGNIFICANTLY AFFECT THE STABILITY OF AN ERRANT VEHICLE. CASS-S3 4-CABLE (4:1) MUST BE INSTALLED A MAXIMUM OF FOUR (4) FEET FROM THE BREAK POINT. GRADING OF SITE AND/OR APPROPRIATE FILL MATERIALS MAY BE REQUIRED. THE DESIGNER/INSTALLER SHALL "FLATTEN" OR "ROUND" VARIOUS TOPOGRAPHICAL INCONSISTENCIES THAT COULD INTERFERE WITH THE ABILITY OF THE INSTALLER TO CONSISTENTLY MAINTAIN THE DESIGN HEIGHT (IN RELATION TO THE TERRAIN) OF THE CABLES. PLEASE CONSULT THE CASS MANUAL(S) FOR INSTALLATIONS IN "DITCH SECTIONS".

4. CASS-S3 4-CABLE (4:1) POST SPACING MAY BE MODIFIED TO AVOID OBSTACLES THAT CONFLICT WITH THE INSTALLATION OF CASS-S3 4-CABLE (4:1) LINE POSTS. NO POST SPACE CAN EXCEED THE MAXIMUM POST SPACE LIMIT OF 21'-0", OR MAXIMUM POST SPACING ALLOWED BY PROJECT ENGINEER - WHICHEVER IS LESS. REDUCING OR INCREASING POST SPACING AFFECTS DEFLECTION. CASS-S3 4-CABLE (4:1) MAY BE LATERALLY TRANSFERRED AT A RATE NOT TO EXCEED 30:1.

5. POST FOUNDATIONS MAY BE DRILLED THROUGH EXISTING PAVEMENT. TRINITY MAY ALLOW THE USE OF ALTERNATE LINE POST FOOTINGS IF SYSTEM IS INSTALLED WITH AN ACCEPTABLE MOWSTRIP APPLICATION - PLEASE CONTACT TRINITY.

6. FOR AESTHETIC PURPOSES TRINITY RECOMMENDS ALL SLEEVES, DRIVEN POSTS, AND LOWER CABLE RELEASE POSTS TO BE INSTALLED REASONABLY PLUMB (APPROXIMATELY 1/8" PER FOOT).

7. ALL CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3,000 P.S.I. PRIOR TO TENSIONING THE SYSTEM. TRINITY RECOMMENDS THE CONCRETE TO BE VIBRATED IN ACCORDANCE WITH THE LATEST APPLICABLE AGENCY SPECIFICATION.

8. CASS-S3 4-CABLE (4:1) SHALL BE INSTALLED IN WELL-DRAINED, COMPACTED, NCHRP REPORT 350 STANDARD SOILS. IF SOIL DOESN'T MEET THIS CLASSIFICATION, IF SOLID ROCK/CONCRETE IS ENCOUNTERED BELOW GRADE OR IF SOIL IS SUCEPTABLE TO REVERSE FREEZE/THAW CYCLES, PLEASE CONTACT TRINITY ABOUT ALTERNATE FOOTING DESIGN(S). TRINITY SUGGESTS THE USE OF "MOW STRIPS" FOR EROSION PREVENTION AND EASE OF MAINTENANCE / INSTALLATION.

9. WHEN THE SYSTEM & TERMINAL IS INSTALLED ENTIRELY ON A 4:1 OR FLATTER SLOPE, THE DEPTH OF THE CONCRETE FOOTINGS SHALL BE INCREASED BY 6". (SEE DRAWING SS-743) ALL OTHER DIMENSIONS, VARIOUS SPECIFICATIONS AND SOIL QUALIFICATIONS REMAIN IN PLACE AND MUST BE FOLLOWED.

10. PLEASE SEE SPECIFYING AGENCY (OR MUTCD) FOR PROPER "BARRIER" DELINEATION

11. PLEASE CONTACT TRINITY OR CONSULT THE DESIGN, INSTALLATION, OR REPAIR MANUAL(S) FOR ADDITIONAL INFORMATION.

TRINITY HIGHWAY PRODUCTS, LLC. EMAIL:
2525 STEMMONS FREEWAY PRODUCT.INFO@TRIN.NET
DALLAS, TX 75207 PHONE: (800) 644-7976

OPTION	CASS-TL3-S3 POST OPTIONS
1	CCT - TERMINAL POST 1 - 8 - IN CONCRETE
2	CCT - TERMINAL POST 1 - 8 - WITH SOIL PLATE
3	CASS-S3 POST - IN CONCRETE
4	CASS-S3 POST - DRIVEN
5	CASS-S3 POST - BASE PLATED
6A	CASS-S3 POST - IN DRIVEN SLEEVE
6B	SLEEVE - DRIVEN SLEEVE - WITH NOTCH
6B	SLEEVE - DRIVEN SLEEVE - WITH SOIL PLATE

CASS-S3 (6:1 SLOPE) 4-CABLE GUARDRAIL SAFETY SYSTEM

TRINITY HIGHWAY PRODUCTS, LLC

PROJ CASS-S3_6:1

SHT 1 OF 9

SS-743

REV D

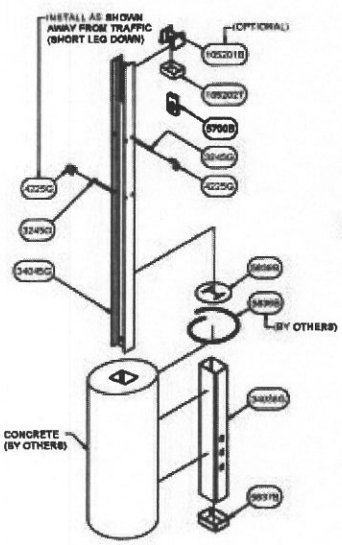
PARTS LIST - CASS-S3 POST - IN CONCRETE - POST OPTION #3			
QTY	PART No	TITLE	Lbs / Each
2	32450	5/16 DIA. HEX NUT (A563)	0.01
2	42250	CABLE LOCK BOLT (A307)	0.09
1	57000	CASS & TL3 CABLE SPACER	0.11
1	58360	CONCRETE REINFORCING RING	0.88
1	34378	SLEEVE CAP - CASS-TERMINAL POST	0.12
1	34339	SLEEVE COVER - S3 POST	0.11
1	34039G	27" POST SLEEVE - IN CONCRETE	12.15
1	34045G	CASS-S3 POST - SHORT	26.06
1	1052018	CASS-S3 POST CAP	0.13
1	1052019	CASS-S3 - POST STRAP	0.19

PARTS LIST - CASS-S3 POST DRIVEN - OPTION #4			
QTY	PART No	TITLE	Lbs / Each
2	32450	5/16 DIA. HEX NUT (A563)	0.01
2	42250	CABLE LOCK BOLT (A307)	0.09
1	57000	CASS & TL3 CABLE SPACER	0.11
1	34039G	CASS-S3 POST - LONG	38.51
1	1052018	CASS-S3 POST CAP	0.13
1	1052019	CASS-S3 - POST STRAP	0.19

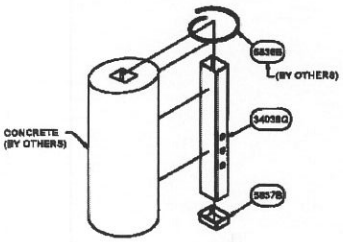
PARTS LIST - CASS-S3 POST BASE-PLATED - OPTION #5			
QTY	PART No	TITLE	Lbs / Each
3	32450	5/16 DIA. HEX NUT (A563)	0.01
4	33000	5/8" PLAIN WASHER - TYPE B - R - (F844)	0.06
4	33100	5/8 LOCK WASHER	0.06
4	33110	1.5" HEX NUT (A563 Gr DH)	0.01
2	42250	CABLE LOCK BOLT (A307)	0.09
4	32250	5/8 x 7 1/2" HAS SUPER ROD CHSL PT (A193 B7)	0.83
0.6	34488	HIT HY 150 MAX EPOXY (HILTI - 0026348)	
1	57000	CASS & TL3 CABLE SPACER	0.11
1	34037A	CASS-TL3 POST BASE-PLATED	29.60
1	1052018	CASS-S3 POST CAP	0.13
1	1052019T	CASS-S3 - POST STRAP	0.19

PARTS LIST - CASS-S3 POST - IN DRIVEN SLEEVE - POST OPTION #6A			
QTY	PART No	TITLE	Lbs / Each
2	32450	5/16 DIA. HEX NUT (A563)	0.01
2	42250	CABLE LOCK BOLT (A307)	0.09
1	57000	CASS & TL3 CABLE SPACER	0.11
1	34339	SLEEVE COVER - S3 POST	0.11
1	34006G	27" POST SLEEVE - DRIVEN	13.87
1	34045G	CASS-S3 POST - SHORT	26.06
1	1052018	CASS-S3 POST CAP	0.13
1	1052019T	CASS-S3 - POST STRAP	0.19

PARTS LIST - PRE-STRETCHED CABLE ASSEMBLIES						
QTY	PART No	TITLE	LENGTH	TERM-1	TERM-2	Lbs / Each
1	56917	CST CABLE ASSEMBLY, TOP	54'-4"	H.H.	H.H.	58.3
1	56918	CST CABLE ASSEMBLY, MID	48'-7"	H.H.	H.H.	52.2
1	56919	CST CABLE ASSEMBLY, BOT	41'-10"	H.H.	H.H.	46.0
1	56921	CST CABLE ASSEMBLY	25'-2"	H.H.	H.H.	30.1
1	56922	CABLE ASSEMBLY, SPLICE	100ft	H.H.	H.H.	907.2
1	56923	CABLE ASSEMBLY, SPLICE	100ft	R.H.	HORIZ	999.3
1	57001	CABLE ASSEMBLY, SPLICE SECTION	100ft	R.H.	HORIZ	918.9
1	57002	CABLE ASSEMBLY, SPLICE SECTION	100ft	R.H.	HORIZ	903.6
1	57003	CABLE ASSEMBLY, SPLICE SECTION	97ft	R.H.	HORIZ	880.9
1	57004	CABLE ASSEMBLY, SPLICE SECTION	95ft	R.H.	HORIZ	916.9
1	57005	CABLE ASSEMBLY, SPLICE SECTION	93ft	R.H.	HORIZ	907.8
1	57006	CABLE ASSEMBLY, SPLICE SECTION	90ft	R.H.	HORIZ	888.8
1	57007	CABLE ASSEMBLY, SPLICE SECTION	87ft	R.H.	HORIZ	848.7
1	57008	CABLE ASSEMBLY, SPLICE SECTION	85ft	R.H.	HORIZ	790.2
1	57009	CABLE ASSEMBLY, SPLICE SECTION	83ft	R.H.	HORIZ	798.6
1	57010	CABLE ASSEMBLY, SPLICE SECTION	80ft	R.H.	HORIZ	772.6
1	57011	CABLE ASSEMBLY, SPLICE SECTION	77ft	R.H.	HORIZ	748.5
1	57012	CABLE ASSEMBLY, SPLICE SECTION	75ft	R.H.	HORIZ	724.5
1	57013	CABLE ASSEMBLY, SPLICE SECTION	73ft	R.H.	HORIZ	702.4
1	57014	CABLE ASSEMBLY, SPLICE SECTION	70ft	R.H.	HORIZ	678.4
1	57015	CABLE ASSEMBLY, SPLICE SECTION	67ft	R.H.	HORIZ	652.3
1	57016	CABLE ASSEMBLY, SPLICE SECTION	65ft	R.H.	HORIZ	628.3
1	57017	CABLE ASSEMBLY, SPLICE SECTION	63ft	R.H.	HORIZ	624.2
1	57018	CABLE ASSEMBLY, SPLICE SECTION	60ft	R.H.	HORIZ	580.2
1	57019	CABLE ASSEMBLY, SPLICE SECTION	57ft	R.H.	HORIZ	558.1
1	57020	CABLE ASSEMBLY, SPLICE SECTION	55ft	R.H.	HORIZ	532.1
1	57021	CABLE ASSEMBLY, SPLICE SECTION	53ft	R.H.	HORIZ	508.1
1	57022	CABLE ASSEMBLY, SPLICE SECTION	50ft	R.H.	HORIZ	484.0
1	57023	CABLE ASSEMBLY, SPLICE SECTION	47ft	R.H.	HORIZ	458.0
1	57024	CABLE ASSEMBLY, SPLICE SECTION	45ft	R.H.	HORIZ	439.9
1	57025	CABLE ASSEMBLY, SPLICE SECTION	42ft	R.H.	HORIZ	415.9
1	57026	CABLE ASSEMBLY, SPLICE SECTION	40ft	R.H.	HORIZ	387.8
1	57027	CABLE ASSEMBLY, SPLICE SECTION	37ft	R.H.	HORIZ	363.7
1	57028	CABLE ASSEMBLY, SPLICE SECTION	35ft	R.H.	HORIZ	339.7
1	57029	CABLE ASSEMBLY, SPLICE SECTION	32ft	R.H.	HORIZ	315.7
1	57030	CABLE ASSEMBLY, SPLICE SECTION	30ft	R.H.	HORIZ	291.6
1	57031	CABLE ASSEMBLY, SPLICE SECTION	27ft	R.H.	HORIZ	267.5
1	57032	CABLE ASSEMBLY, SPLICE SECTION	25ft	R.H.	HORIZ	243.5
1	57033	CABLE ASSEMBLY, SPLICE SECTION	22ft	R.H.	HORIZ	219.5
1	57034	CABLE ASSEMBLY, SPLICE SECTION	20ft	R.H.	HORIZ	195.4
1	57035	CABLE ASSEMBLY, SPLICE SECTION	17ft	R.H.	HORIZ	171.4
1	57036	CABLE ASSEMBLY, SPLICE SECTION	15ft	R.H.	HORIZ	147.3
1	57037	CABLE ASSEMBLY, SPLICE SECTION	12ft	R.H.	HORIZ	123.3
1	57038	CABLE ASSEMBLY, SPLICE SECTION	10ft	R.H.	HORIZ	99.2
1	57039	CABLE ASSEMBLY, SPLICE SECTION	7ft	R.H.	HORIZ	75.2
1	57040	CABLE ASSEMBLY, SPLICE SECTION	5ft	R.H.	HORIZ	51.1
1	57041	CABLE ASSEMBLY, SPLICE SECTION	2ft	R.H.	HORIZ	27.1
1	56948	CABLE ASSEMBLY, SPLICE SECTION	1ft	R.H.	HORIZ	19.0

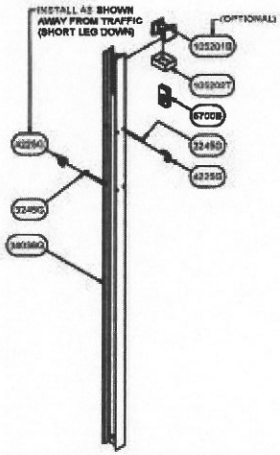


CASS-S3 POST - IN CONCRETE
(POST OPTION #3 - CAST IN PLACE)

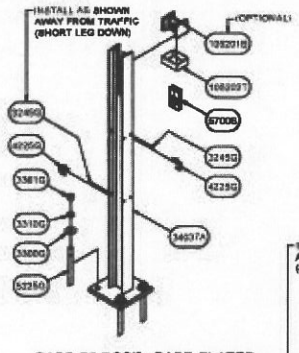


CONCRETE FOOTING ASSEMBLY
(POST OPTION #3 - PRE-CAST OPTION)

PARTS LIST - PRE-CAST CONCRETE FOOTING - OPTION #3			
QTY	PART No	TITLE	Lbs / Each
1	58366	CONCRETE REINFORCING RING	0.88
1	56378	SLEEVE CAP - CASS TERMINAL POST	0.12
1	34039G	27" POST SLEEVE - IN CONCRETE	12.15



CASS-S3 POST - DRIVEN
(POST OPTION #4 - DRIVEN)



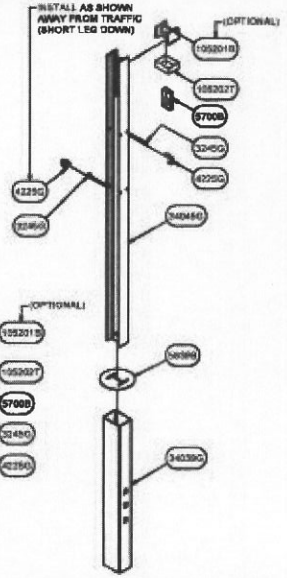
CASS-S3 POST - BASE-PLATED
(POST OPTION #5 - BASE-PLATED)

ANCHOR OPTIONS:
MIN. EMBEDMENT IN 3,000 P.S.I. CONCRETE = 8".
MIN. PULLOUT STRENGTH = 10,000 lbs.

1: 5/8 ADHESIVE ANCHORING SYSTEM.
(4 EACH 58606, 35160, 33810 & 32250) & 0.6 EACH 54488

2: 5/8 x 8" ALL THREADED ROD (A449) WITH EPOXY.
(4 EACH 33600, 35160, 33810 & 97220) & 0.6 EACH 54488

3: 5/8 MECHANICAL ANCHOR. (BY OTHERS)



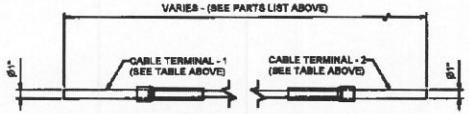
CASS-S3 POST - IN DRIVEN SLEEVE
(POST OPTION #6B - DRIVEN SLEEVE - SOIL PLATE)

PARTS LIST - CASS-S3 POST - IN DRIVEN SLEEVE - POST OPTION #6B			
QTY	PART No	TITLE	Lbs / Each
2	32450	5/16 DIA. HEX NUT (A563)	0.01
2	42250	CABLE LOCK BOLT (A307)	0.09
1	57000	CASS & TL3 CABLE SPACER	0.11
1	58366	SLEEVE COVER - S3 POST	0.11
1	34045G	CASS-S3 POST - SHORT	26.06
1	34047A	30.75" CASS-S3 POST SLEEVE w/ SOIL PLATE	27.47
1	1052018	CASS-S3 POST CAP	0.13
1	1052019T	CASS-S3 - POST STRAP	0.19

CASS-S3 POST - IN DRIVEN SLEEVE
(POST OPTION #6A - DRIVEN SLEEVE - NOTCH)

NOTE:

FOR THE STANDARD FIELD SPLICE SECTIONS ABOVE, SUPPLY (1) RIGHT HAND THREADED STUD ASSEMBLY 59100 EACH.



PRE-STRETCHED CABLE ASSEMBLY

NOTES:

1. IN LIEU OF BLACK SPACER 57008 SUPPLY YELLOW REFLECTIVE SPACER 57015 OR WHITE REFLECTIVE SPACER 57021. (AS REQUIRED PER PROJECT PLANS)
2. IF INTERFERENCE OCCURS BETWEEN THE CABLE SPLICE AND CASS-TL3 POST, SUPPLY A SPLICE INTERFERENCE POST.
   LONG SPLICE POST 34081G IN LIEU OF LONG CASS-S3 POST 34039G
   SHORT SPLICE POST 34049G IN LIEU OF SHORT CASS-S3 POST 34045G
3. IF REQUIRED PER PROJECT PLANS SUPPLY:
   CABLE PULLING TOOL 58928
   CABLE TENSION METER 58798
   CABLE THERMOMETER 57088

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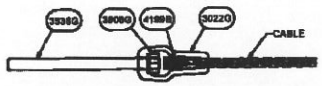
CASS-S3 (6:1 SLOPE)
4-CABLE GUARDRAIL
SAFETY SYSTEM

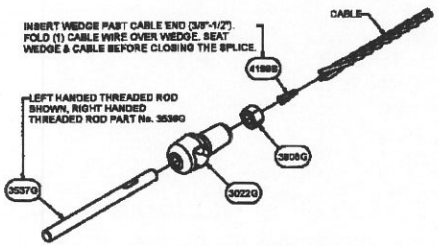
TRINITY HIGHWAY PRODUCTS, LLC

DWG No: SS-743
REV: 0



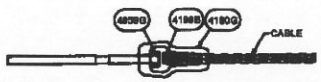
1" CABLE FIELD SPLICE - 5909G & 5910G
(5910G SHOWN, 5909G SIMILAR)

PARTS LIST - 5910G			
QTY	PART No	TITLE	Lbs / Each
1	3022G	1" CABLE END CASTING	0.59
1	3539G	1" STUD FLATTENED - R.H.T.	2.86
1	3809G	1" HEAVY HEX NUT (A563 DH)	0.47
1	4199B	3/4" CABLE WEDGE (3 x 7)	0.06



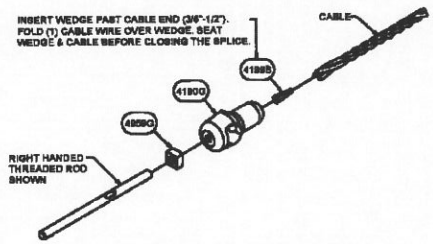
ASSEMBLY - 1" CABLE FIELD SPLICE - 5909G
(5909G SHOWN, 5910G SIMILAR)

PARTS LIST - 5909G			
QTY	PART No	TITLE	Lbs / Each
1	3022G	1" CABLE END CASTING	0.59
1	3537G	1" STUD FLATTENED - L.H.T.	2.86
1	3809G	1" HEAVY HEX NUT (A563 DH)	0.47
1	4199B	3/4" CABLE WEDGE (3 x 7)	0.06



3/4" CABLE FIELD SPLICE - 5634G & 5635G
(5634G SHOWN, 5635G SIMILAR)

PARTS LIST - 5634G			
QTY	PART No	TITLE	Lbs / Each
1	109204G	3/4" STUD FLATTENED - L.H.T.	1.62
1	4199G	CABLE END CASTING	3.76
1	4199B	3/4" CABLE WEDGE (3 x 7)	0.06
1	4959G	3/4" HEAVY SQUARE NUT (A563)	0.29

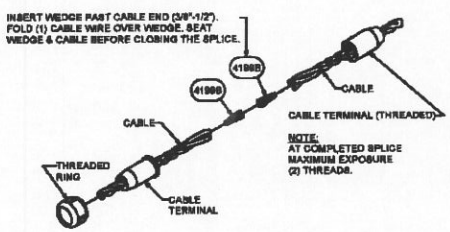


ASSEMBLY - 3/4" CABLE FIELD SPLICE - 5635G
(5635G SHOWN, 5634G SIMILAR)

PARTS LIST - 5635G			
QTY	PART No	TITLE	Lbs / Each
1	109205G	3/4" STUD FLATTENED - R.H.T.	1.62
1	4199G	CABLE END CASTING	3.76
1	4199B	3/4" CABLE WEDGE (3 x 7)	0.06
1	4959G	3/4" HEAVY SQUARE NUT (A563)	0.29

TORPEDO CABLE SPLICE - 4099G

PARTS LIST - 4099G			
QTY	PART No	TITLE	Lbs / Each
1		CABLE TERMINAL - THREADED	1.78
1		CABLE TERMINAL	1.52
1		RING - THREADED	-0.06
2	4199B	3/4" CABLE WEDGE (3 x 7)	0.06



ASSEMBLY - TORPEDO CABLE SPLICE 4099G

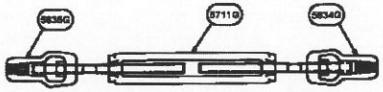
CASS TEMPERATURE & TENSION CHART (NEAREST 100 lbf)		
FAHRENHEIT DEGREES	STD. CABLE LB/FORCE	PRE-STRETCHED LB/FORCE
<= -15	8600	7300
-10	8500	7200
-5	8400	7100
0	8300	7000
5	8200	6900
10	8100	6800
15	7900	6700
20	7800	6600
25	7700	6500
30	7600	6400
35	7500	6300
40	7400	6200
45	7300	6100
50	7200	6000
55	7000	5900
60	6900	5800
65	6800	5700
70	6700	5600
75	6600	5500
80	6500	5400
85	6400	5300
90	6300	5200
95	6200	5100
100	6100	5000
105	6000	4900
110	5900	4800
115	5800	4700
120	5700	4600
125	5600	4500
130	5500	4400
135	5400	4300
140	5300	4200
145	5200	4100
150	5200	4100
155	5100	4000
160	5000	3900
170	4900	3800
180	4800	3700
190	4700	3600
200	4600	3500

ALLOWABLE DEVIATION FROM CHART IN TANGENT SECTIONS: +600, -200 POUNDS/FORCE.

CABLE TENSION READINGS ARE TYPICALLY HIGHER IN CURVED CABLE SECTIONS.

1" CABLE SPLICE - 5633G
(CLOSED BODY STYLE)

PARTS LIST - 5633G			
QTY	PART No	TITLE	Lbs / Each
1	5826G	1" CASS TURNBUCKLE CLOSED BODY STYLE	4.81
1	5909G	1" STUD ASSEMBLY L.H.T.	3.86
1	5910G	1" STUD ASSEMBLY R.H.T.	3.86



3/4" CABLE SPLICE - 5696G
(OPEN BODY STYLE)

PARTS LIST - 5696G			
QTY	PART No	TITLE	Lbs / Each
1	5634G	3/4" STUD ASSEMBLY L.H.T.	5.74
1	5635G	3/4" STUD ASSEMBLY R.H.T.	5.74
1	5711G	3/4" TURNBUCKLE OPEN BODY STYLE	10.89

1" TURNBUCKLE - 5828G
(CLOSED BODY STYLE)

PARTS LIST - 5828G			
QTY	PART No	TITLE	Lbs / Each
1	5828G	1" CASS TURNBUCKLE CLOSED BODY STYLE	4.81

NOTE:

1. TURNBUCKLES SHALL BE INSTALLED WITH A MINIMUM OF 1-1/2" THREAD ENGAGEMENT. TO ALLOW FOR MAINTENANCE/REPAIR ADJUSTMENTS AT A LATER DATE, TRINITY SUGGESTS INSTALLER UTILIZE NO MORE THAN 4" THREAD ENGAGEMENT.

2. WHEN CUTTING CABLE LENGTHS IN THE FIELD FROM CABLE REELS, IT MAY BE PERMISSIBLE TO UTILIZE A CABLE TORPEDO SPLICE (4099G) BETWEEN TURNBUCKLES. DO NOT USE FOR CABLE LENGTH SHORTER THAN 100'. PLEASE CONTACT TRINITY, CONSULT TRINITY'S MANUAL OR SPECIFYING AGENCY TO DETERMINE IF APPROPRIATE FOR SPECIFIC APPLICATION.

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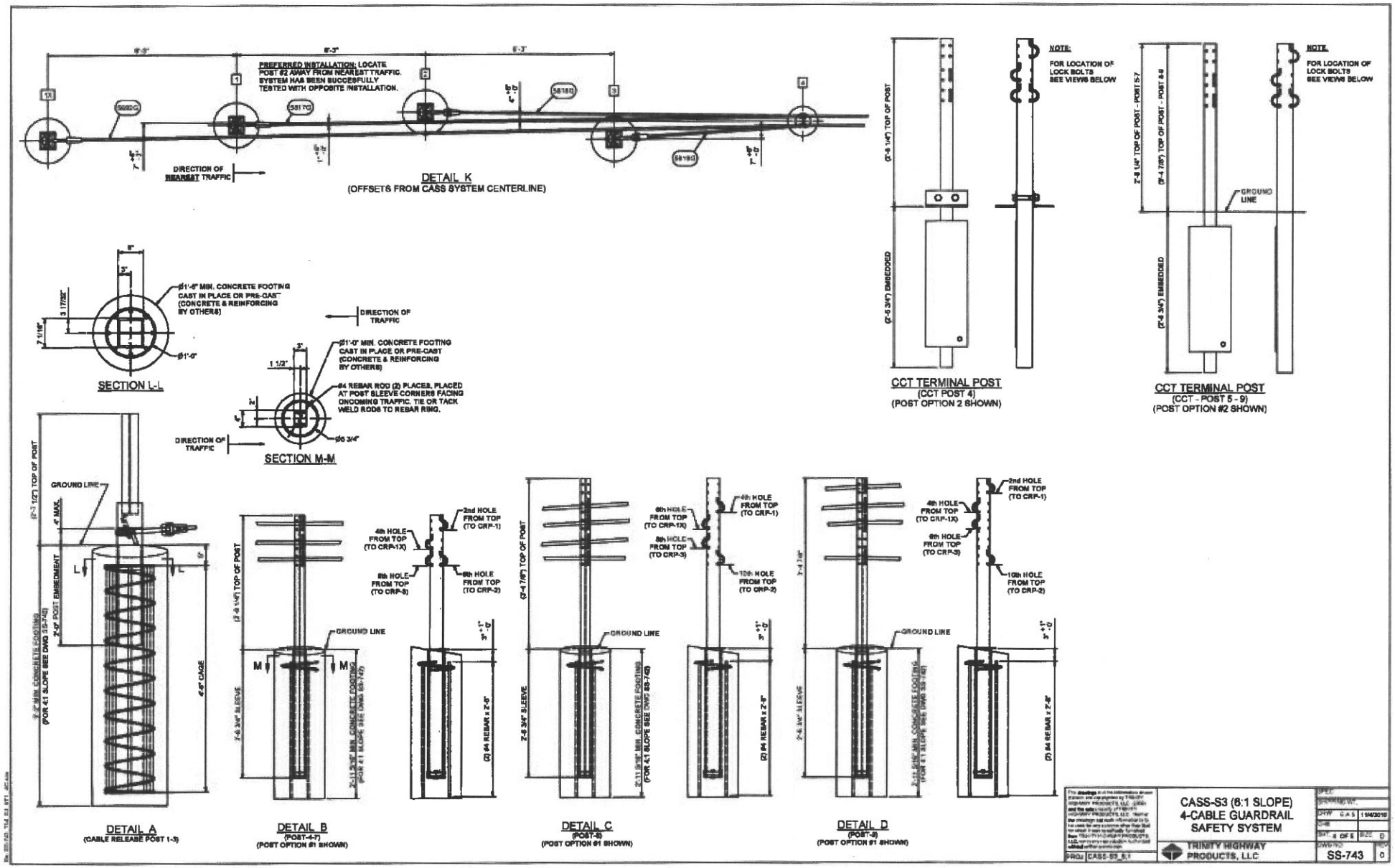
PROJ CASS-S3_6:1

CASS-S3 (6:1 SLOPE) 4-CABLE GUARDRAIL SAFETY SYSTEM

TRINITY HIGHWAY PRODUCTS, LLC

SPEC
SHIPPING WT.
DRW E.A.R. 11/4/2014
CHK
SHT 3 OF 5 SIZE D
DWG NO SS-743 REV 0

Rev 03-743_TL4_S3_6FT_4C.dgn



PREFERRED INSTALLATION: LOCATE POST #2 AWAY FROM NEAREST TRAFFIC. SYSTEM HAS BEEN SUCCESFULLY TESTED WITH OPPOSITE INSTALLATION.
DIRECTION OF NEAREST TRAFFIC
DETAIL K
(OFFSETS FROM CASS SYSTEM CENTERLINE)
Ø1'-6" MIN. CONCRETE FOOTING CAST IN PLACE OR PRE-CAST (CONCRETE & REINFORCING BY OTHERS)
SECTION L-L
DIRECTION OF TRAFFIC
Ø1'-0" MIN. CONCRETE FOOTING CAST IN PLACE OR PRE-CAST (CONCRETE & REINFORCING BY OTHERS)
#4 REBAR ROD (2) PLACES, PLACED AT POST SLEEVE CORNERS FACING ONCOMING TRAFFIC. TIE OR TACK WELD RODS TO REBAR RING.
SECTION M-M
NOTE:
FOR LOCATION OF LOCK BOLTS SEE VIEWS BELOW
CCT TERMINAL POST
(CCT POST 4)
(POST OPTION 2 SHOWN)
GROUND LINE
CCT TERMINAL POST
(CCT - POST 5 - 9)
(POST OPTION #2 SHOWN)
GROUND LINE
4'-6" CAGE
DETAIL A
(CABLE RELEASE POST 1-3)
DETAIL B
(POST-4-7)
(POST OPTION #1 SHOWN)
DETAIL C
(POST-5)
(POST OPTION #1 SHOWN)
DETAIL D
(POST-8)
(POST OPTION #1 SHOWN)
CASS-S3 (6:1 SLOPE)
4-CABLE GUARDRAIL
SAFETY SYSTEM
TRINITY HIGHWAY PRODUCTS, LLC
SS-743

PARTS LIST - CCT CABLE RELEASE POST No. 1X-3 - IN CONCRETE			
QTY	PART No	TITLE	Lbs / Each
2	3245G	5/16 FLAT WASHER (F844)	0.00
2	3245G	5/16 HEX NUT (A563)	0.01
2	4211G	5/16 HEX BOLT x 1 3/4" (A307)	0.05
1	58518	REFLECTOR - MEDIAN - YELLOW	0.10
1	33909G	CASS CABLE BRACKET	1.92
1	33918B	REINFORCING CAGE - CRP POST	88.20
1	33934A	CRP - LOWER POST	81.60
1	33935A	CRP - UPPER POST	31.57

PARTS LIST - CCT TERMINAL POST No. 4-7 - IN CONCRETE			
QTY	PART No	TITLE	Lbs / Each
4	3245G	5/16 DIA. HEX NUT (A563)	0.01
4	5825G	CABLE LOCK BOLT (A307)	0.13
1	58588	CONCRETE REINFORCING RING	0.88
1	58578	SLEEVE CAP - CASS-TERMINAL POST	0.13
1	58588	SLEEVE COVER - S3 POST	0.11
2	58118B	#4 REBAR - TERMINAL POST	1.78
1	33908B	SLEEVE - TERMINAL LINE POST	13.80
1	33910G	350-TL3 TERMINAL POST	38.83

PARTS LIST - CCT CABLE RELEASE POST No. 1X-3 - DRIVEN			
QTY	PART No	TITLE	Lbs / Each
2	3245G	5/16 FLAT WASHER (F844)	0.00
2	3245G	5/16 HEX NUT (A563)	0.01
2	4211G	5/16 HEX BOLTS x 1 3/4" (A307)	0.05
1	58518	REFLECTOR - MEDIAN - YELLOW	0.10
1	33909G	CASS CABLE BRACKET	1.92
1	33935A	CRP - UPPER POST	31.57
1	33936A	CRP - LOWER POST	176.57

PARTS LIST - CCT TERMINAL POST No. 4-7 WITH SOIL PLATE			
QTY	PART No	TITLE	Lbs / Each
4	3245G	5/16 DIA. HEX NUT (A563)	0.01
2	3725G	5/16 FLAT WASHER (F436)	0.01
2	3711G	5/8 HEX NUT (A194 2H)	0.62
2	4778G	5/8 HEX BOLT x 4 1/2" (A325)	0.09
4	5825G	CABLE LOCK BOLT (A307)	0.13
3	9021G	BEARING ANGLE (A36)	3.81
1	33903A	350-TL3 TERMINAL POST w/ SOIL PLATE	42.25

PARTS LIST - CCT TERMINAL POST No. 8-9 - WITH SOIL PLATE			
QTY	PART No	TITLE	Lbs / Each
4	3245G	5/16 DIA. HEX NUT (A563)	0.01
4	5825G	CABLE LOCK BOLT (A307)	0.13
1	33904A	350-TL4 TERMINAL POST w/ SOIL PLATE	46.60

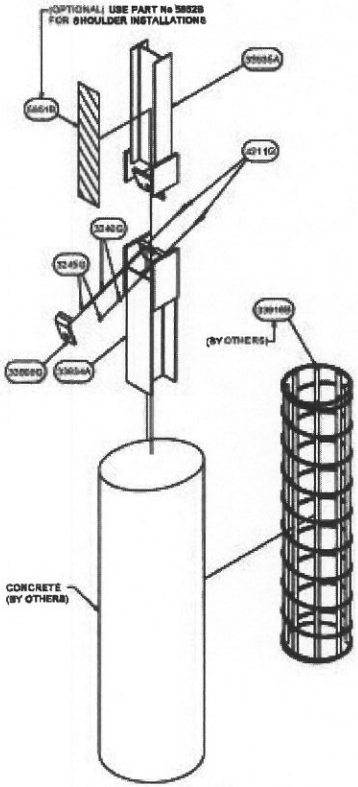
PARTS LIST - CCT TERMINAL POST No. 8-9 - IN CONCRETE			
QTY	PART No	TITLE	Lbs / Each
4	3245G	5/16 DIA. HEX NUT (A563)	0.01
4	5825G	CABLE LOCK BOLT (A307)	0.13
1	58588	CONCRETE REINFORCING RING	0.88
1	58578	SLEEVE CAP - CASS-TERMINAL POST	0.13
1	58588	SLEEVE COVER - S3 POST	0.11
2	58118B	#4 REBAR - TERMINAL POST	1.78
1	33908B	SLEEVE - TERMINAL LINE POST	13.80
1	33905G	350-TL4 TERMINAL POST	32.40

HARDWARE CASS CABLE TERMINAL - CCT			
QTY	PART No	TITLE	Lbs / Each
4	4923G	1" FLAT WASHER (F436)	0.11
6	4903G	1" HEX NUT (A194 2H)	0.33
1	58620	CRP - 4th CABLE ASSEMBLY [60'-6"]	116.80
1	58170	CRP - TOP CABLE ASSEMBLY [54'-3"]	107.58
1	58180	CRP - MIDDLE CABLE ASSEMBLY [48'-0"]	98.07
1	58190	CRP - BOTTOM CABLE ASSEMBLY [41'-9"]	88.82
4	33909G	CASS CABLE BRACKET	1.92

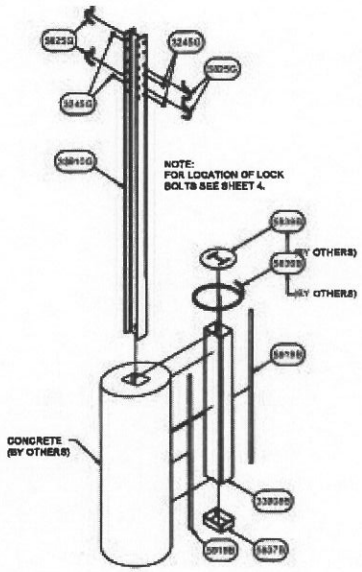
ALL HARDWARE FOR THE CCT CAN BE ORDERED AS ONE PACKAGE:

PART No. 335869 (1) SET OF TERMINAL HARDWARE FOR 1" CABLE FITTINGS.
PART No. 335869 (1) SET OF TERMINAL HARDWARE FOR 3/4" CABLE FITTINGS

(OPTIONAL) USE PART No 58528 FOR SHOULDER INSTALLATIONS

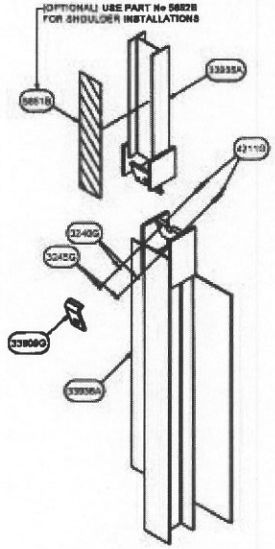


CRP TERMINAL POST - IN CONCRETE
(CCT TERMINAL POST 1X - 3)
(POST OPTION #1 SHOWN)

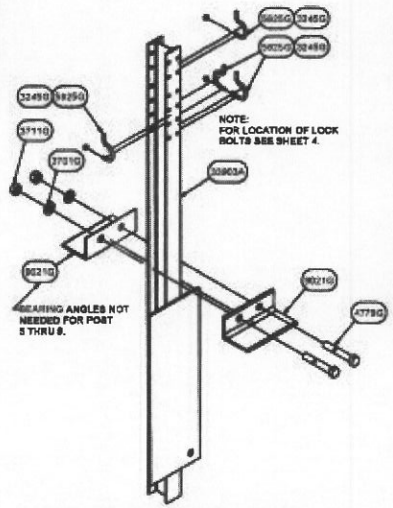


TERMINAL POST - IN CONCRETE
(CCT TERMINAL POST 4 - 7)
(POST OPTION #1 SHOWN)

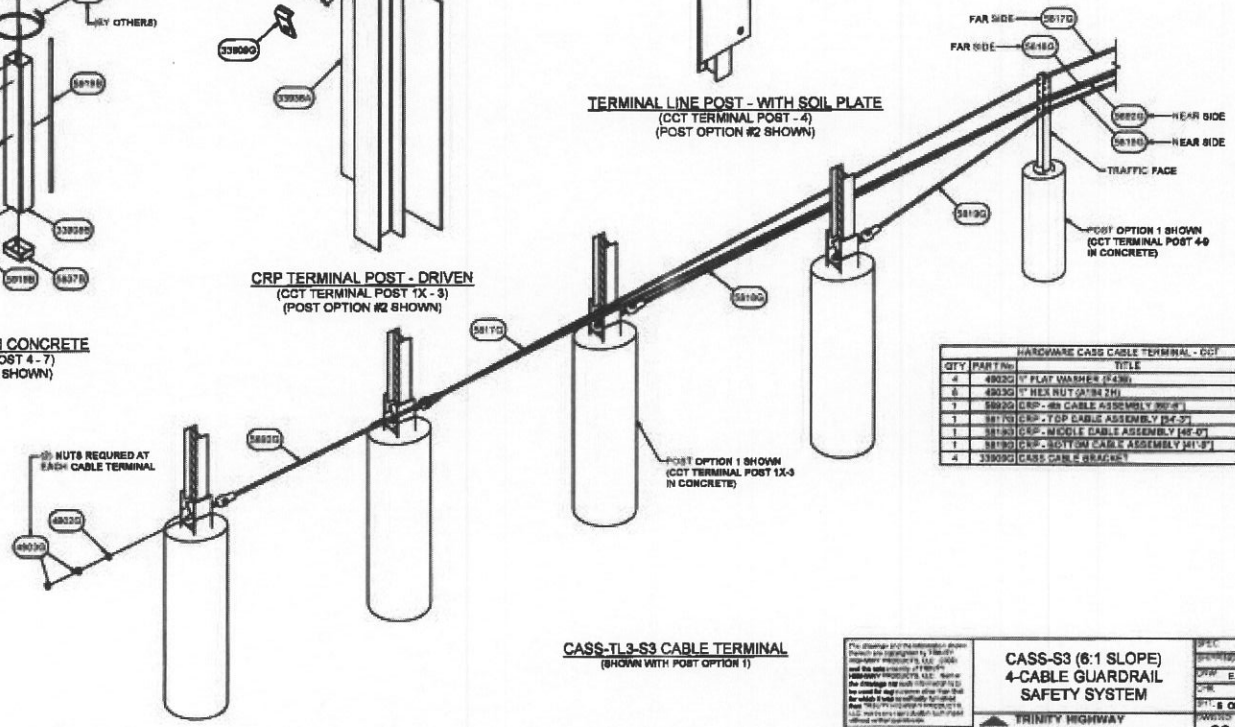
(OPTIONAL) USE PART No 58528 FOR SHOULDER INSTALLATIONS



CRP TERMINAL POST - DRIVEN
(CCT TERMINAL POST 1X - 3)
(POST OPTION #2 SHOWN)



TERMINAL LINE POST - WITH SOIL PLATE
(CCT TERMINAL POST - 4)
(POST OPTION #2 SHOWN)

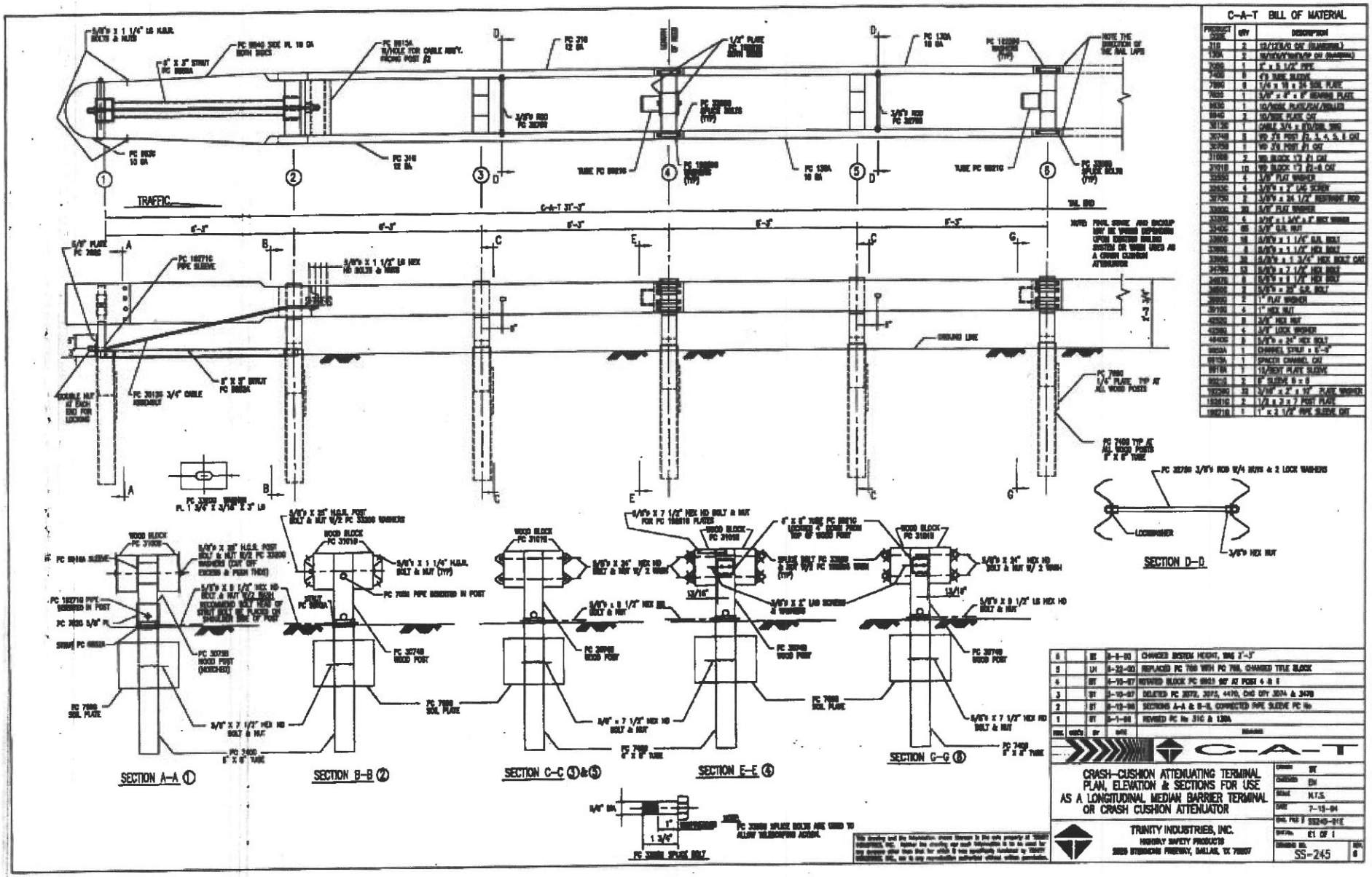


CASS-TL3-S3 CABLE TERMINAL
(SHOWN WITH POST OPTION 1)

CASS-S3 (6:1 SLOPE)
4-CABLE GUARDRAIL
SAFETY SYSTEM

TRINITY HIGHWAY PRODUCTS, LLC

SPEC:
DRAW: EA.E 11/4/2010
CHK:
SHT: 5 OF 5 REV: D
PROJECT: SS-743 REV: 0
PRO.: CASS-S3_6-1



C-A-T BILL OF MATERIAL

PRODUCT CODE	QTY	DESCRIPTION
7110	2	12/12SB3/0 GAT (SLANTED)
7306	2	18/6SB3/6"WEB/0 GAT (SLANTED)
7400	1	6" x 6 1/2" PIPE
7450	6	12 GAGE SLEEVE
7500	6	1/4 x 10 x 20 SOIL PLATE
7505	1	3/8" x 8" x 8" BEARING PLATE
8030	1	10/GAGE PLATE/FAT/ROLLED
8040	2	10/GAGE PLATE CAT
30136	1	CABLE 3/4 x 675'/DR 3X6
30748	6	WD 7/8 POST @ 3, 4, 5, & 6 CAT
30750	10	WD 7/8 POST @1 CAT
31008	2	WD BLOCK 12 @1 CAT
31010	10	WD BLOCK 12 @2-6 CAT
33500	4	3/8" FLAT WASHER
33636	4	3/8"D x 2" LAG SCREW
33750	2	3/8"D x 24 1/2" RESTRAINT ROD
33800	20	3/4" FLAT WASHER
33900	6	3/4"D x 1 3/4" x 3" HEX WASHER
34400	66	5/8" D.H. BOLT
35000	16	5/8"D x 1 1/4" D.H. BOLT
35001	8	5/8"D x 1 1/2" HEX BOLT
35002	30	5/8"D x 1 3/4" HEX BOLT CAT
35700	12	5/8"D x 2 1/2" HEX BOLT
36000	8	5/8"D x 1 1/2" HEX BOLT
36400	2	5/8"D x 22" D.H. BOLT
36500	2	1" FLAT WASHER
36700	4	1" HEX NUT
42000	8	3/4" HEX NUT
42500	8	5/8" LOCK WASHER
46400	2	3/4"D x 24" HEX BOLT
50020	1	CHANNEL STRUT x 5'-0"
60100	1	SPACER CHANNEL CAT
70100	1	12/FOOT PLATE SLEEVE
70500	2	6" SLEEVE 8 x 8
70550	12	1/16" x 2" x 2" PLATE WASHER
100410	2	1/2 x 2 x 7 POST PLATE
100710	1	1" x 2 1/2" PIPE SLEEVE CAT

6		SK	5-5-00	CHANGED DESIGN HEIGHT, 39" 3'-3"
5		LH	5-22-00	REPLACED PC 700 WITH PC 700, CHANGED TITLE BLOCK
4		SK	4-10-97	REVISED BLOCK PC 8923 867 AT POSN 4 & 5
3		SK	3-10-97	DELETED PC 3072, 3073, 4470, CHG QTY 3004 & 3478
2		SK	3-10-96	SECTIONS A-A & B-B, CONNECTED PIPE SLEEVE PC No
1		SK	3-1-96	REVISED PC No 310 & 1304
REV.	INITS	BY	DATE	REMARKS

C-A-T

CRASH-CUSHION ATTENUATING TERMINAL
PLAN, ELEVATION & SECTIONS FOR USE
AS A LONGITUDINAL MEDIAN BARRIER TERMINAL
OR CRASH CUSHION ATTENUATOR

DRAWN SK
CHECKED EH
SCALE N.T.S.
DATE 7-15-94
DWG. FILE SS240-SHT
SHEET 01 OF 1
DRAWING NO. SS-245
REV. 6

TRINITY INDUSTRIES, INC.
HIGHWAY SAFETY PRODUCTS
2525 STEMMONS FREEWAY, DALLAS, TX 75207

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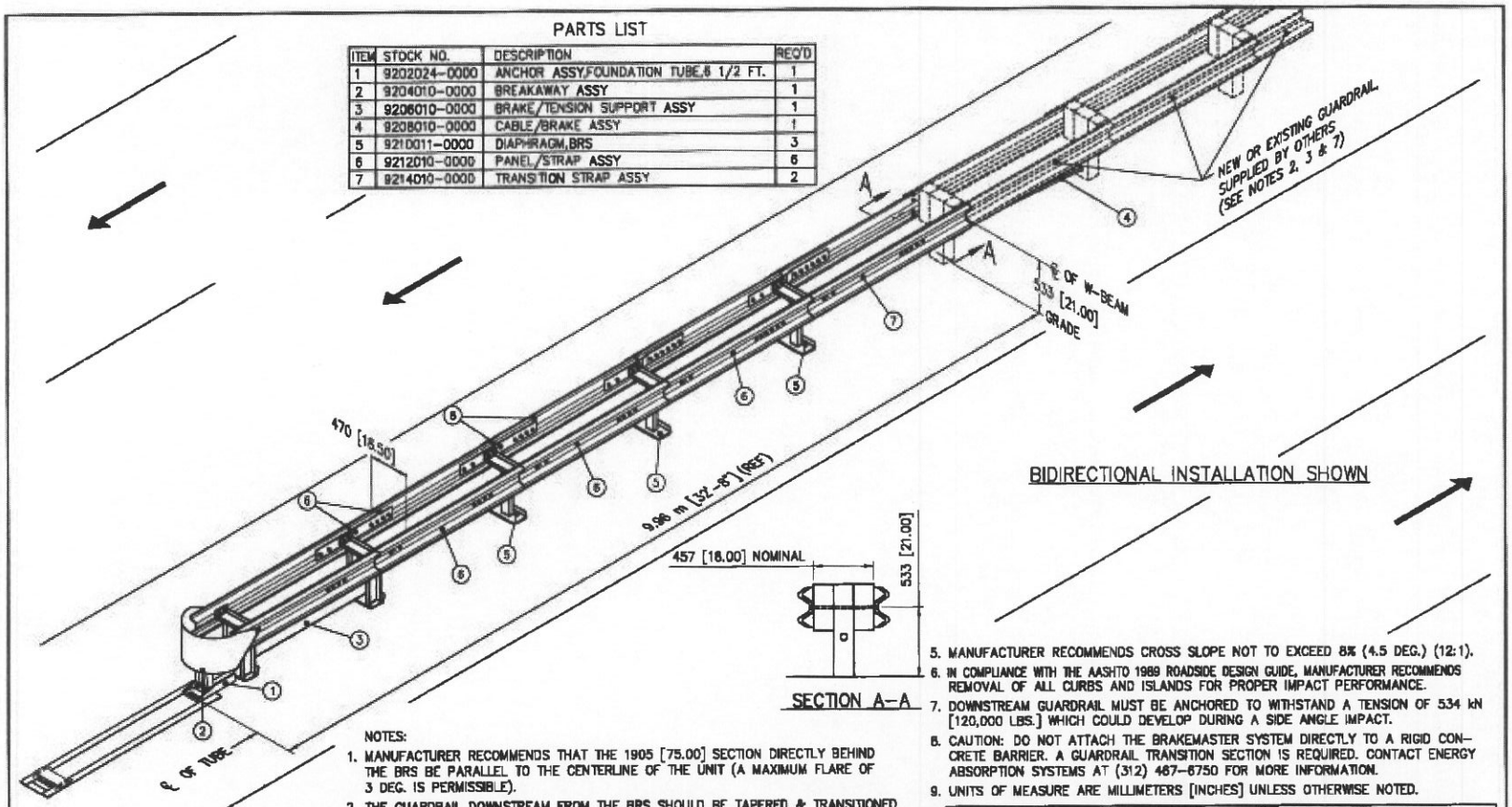
PARTS LIST

ITEM	STOCK NO.	DESCRIPTION	REQ'D
1	9202024-0000	ANCHOR ASSY,FOUNDATION TUBE,8 1/2 FT.	1
2	9204010-0000	BREAKAWAY ASSY	1
3	9206010-0000	BRAKE/TENSION SUPPORT ASSY	1
4	9208010-0000	CABLE/BRAKE ASSY	1
5	9210011-0000	DIAPHRAGM,BRS	3
6	9212010-0000	PANEL/STRAP ASSY	6
7	9214010-0000	TRANSITION STRAP ASSY	2



NOTES:

1. MANUFACTURER RECOMMENDS THAT THE 1905 [75.00] SECTION DIRECTLY BEHIND THE BRS BE PARALLEL TO THE CENTERLINE OF THE UNIT (A MAXIMUM FLARE OF 3 DEG. IS PERMISSIBLE).
2. THE GUARDRAIL DOWNSTREAM FROM THE BRS SHOULD BE TAPERED & TRANSITIONED AS NECESSARY TO MEET BRS ATTACHMENT REQUIREMENTS AS SHOWN IN SECTION A-A AND NOTE 1 ABOVE.
3. THE BRAKEMASTER SYSTEM MUST BE ATTACHED TO A 3810 [150.00] MIN. SECTION OF TRAFFIC BARRIER WITH PANEL ON BOTH SIDES OF 152 [6.00] MIN. STEEL OR WOODEN POSTS & BLOCKOUTS FOR PROPER IMPACT PERFORMANCE.
4. DURING AN IMPACT, THE FENDER PANELS MAY FLARE OUT AS MUCH AS 1220 [48.00] ON BOTH SIDES.
5. MANUFACTURER RECOMMENDS CROSS SLOPE NOT TO EXCEED 8% (4.5 DEG.) (12:1).
6. IN COMPLIANCE WITH THE AASHTO 1989 ROADSIDE DESIGN GUIDE, MANUFACTURER RECOMMENDS REMOVAL OF ALL CURBS AND ISLANDS FOR PROPER IMPACT PERFORMANCE.
7. DOWNSTREAM GUARDRAIL MUST BE ANCHORED TO WITHSTAND A TENSION OF 534 kN [120,000 LBS.] WHICH COULD DEVELOP DURING A SIDE ANGLE IMPACT.
8. CAUTION: DO NOT ATTACH THE BRAKEMASTER SYSTEM DIRECTLY TO A RIGID CONCRETE BARRIER. A GUARDRAIL TRANSITION SECTION IS REQUIRED. CONTACT ENERGY ABSORPTION SYSTEMS AT (312) 467-6750 FOR MORE INFORMATION.
9. UNITS OF MEASURE ARE MILLIMETERS [INCHES] UNLESS OTHERWISE NOTED.
10. SEE THE "BRAKEMASTER SYSTEM DESIGN MANUAL" CODED ENE 704-1091 FOR A DESCRIPTION OF ITS IMPACT PERFORMANCE CHARACTERISTICS AND DESIGN LIMITATIONS BEFORE PLACING A SYSTEM AT A GIVEN SITE. INFORMATION AND ADDITIONAL COPIES OF ABOVE MANUAL ARE AVAILABLE BY CALLING THE CUSTOMER SERVICE DEPARTMENT AT (312) 467-6750.

BIDIRECTIONAL
MODEL NO. 106106BRS5

Revisions	Date	Rev.	By	Ckd.	App.
ADDED NOTES	1/25/88	A	DLS	SPT	WGK
ADDED NOTES	4/28/88	B	ST	SPT	BDS
ATTACHMENT REF. WAS 92-00-08	11/7/88	C	JF	SPT	BDS
ADDED METRIC & DESIGN MANUAL NOTE	2/28/89	D	DLS	BB	SPT
NEW NOTES	7/13/89	E	TB	ST	SPT
ADDED STEEL OR WOODEN TO NOTE 3	7/17/89	F	JF	ST	SPT
ADDED SHEET 2	1/23/90	G	DLS	BB	SPT
CHGD TO METRIC	4/27/90	H	DLS	BB	SPT
ADDED DESIGN SPEED	8/28/90	I	DLS	SM	SPT
REV'D TO SHOW FOUND. TUBE ANCHOR	2/24/97	J	STT	KM	WGK
REV'S FOUND. TUBE ANCHOR ASSY	3/19/97	K	STT	KM	WGK
ADDED 350 TO TITLE & NOTE 9	5/28/98	L	DDS	KM	SPT

DESIGN SPEED 97 KPH [60 M.P.H.]		
AVERAGE G's		
EST. FORCE ON BACKUP STRUCTURE _____ KIPS		
Designed		Date
Drawn	J.B. Welch	9/22/89
Checked	G.B.A.	12/13/89
Approved	W. G. Krage	3/1/90

NEXT ASSEMBLY

REFERENCES

Project No. _____ Sales Order No. _____
Serial No. _____ Color _____

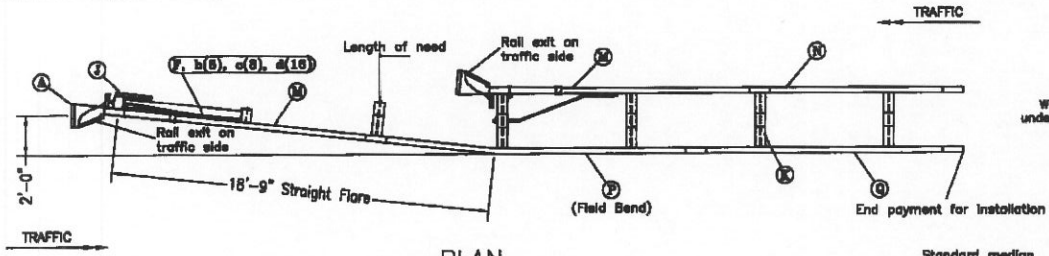
NOSE SECTION	92-00-14
FRONT SECTION	92-00-15
MIDDLE SECTION	92-00-16
REAR SECTION	92-00-17
ANCHOR ASSY	9202024-0000
ATTACHMENTS	92-03-09

REGISTERED PROFESSIONAL ENGINEER WILLIAM G. KRAGE No. M18132 Exp. 6/30/97 MECHANICAL STATE OF CALIFORNIA

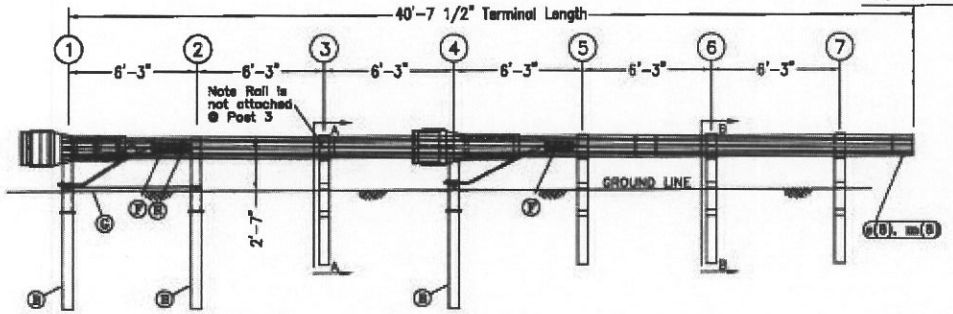
ENERGY ABSORPTION SYSTEMS, INC.
ENGINEERING AND RESEARCH DEPARTMENT

BRAKEMASTER® 350 SYSTEM (BRS)
GENERAL ASSEMBLY

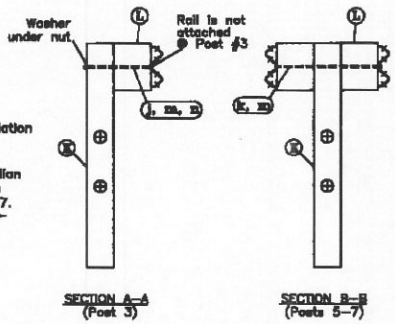
SCALE	SIZE	DWG. NUMBER	SHEET	REV
(1:32) 3/8"=1'-0"	C	92-00-02	1 of 2	L



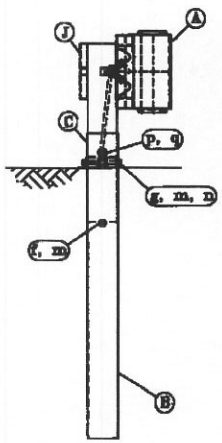
PLAN



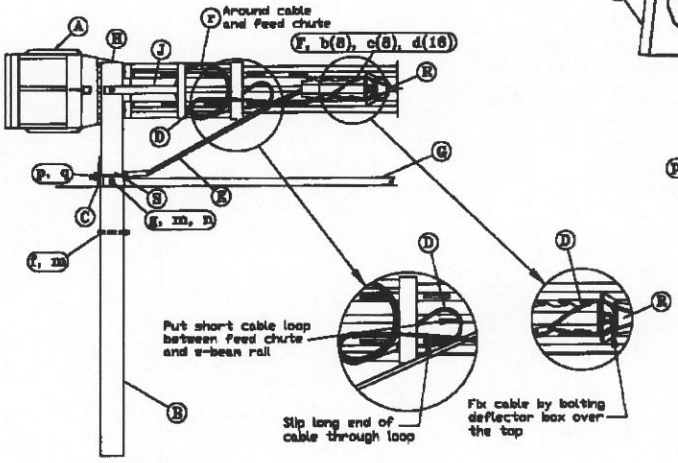
ELEVATION



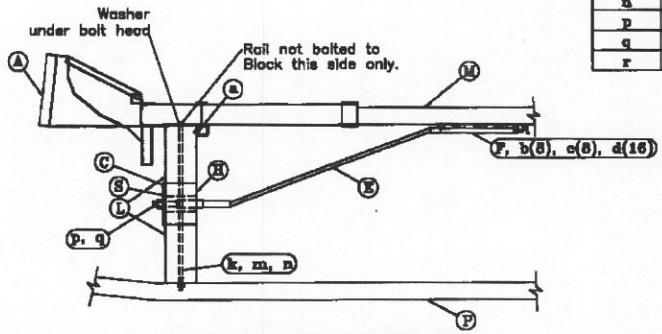
ITEM	QTY	DESCRIPTION	PART #
A	2	FLEAT IMPACT HEAD	F3000
B	3	SOIL TUBE, 6" x 8" x 6'-0"	S730
C	2	BEARING PLATE	E750
D	1	3/8" GALV Cable 20'-0"	C3820
E	2	BCT CABLE ANCHOR ASSEMBLY	E770
F	2	CABLE ANCHOR BOX	S760
G	1	GROUND STRUT	E780
H	3	UNIVERSAL BCT POST	UP850
J	1	POST BREAKER	PBMT
K	4	UNIVERSAL CRT POST	UP671
L	9	MGS TIMBER BLOCKOUT OR RECYCLED EQUIV	P676
M	2	W-BEAM END SECTION, 12 GA. 12.5'	SF1303
N	1	MGS W-BEAM SECTION, 12 GA. 9'-4 1/4"	G1202A
P	1	MGS W-BEAM GUARDRAIL, 12 GA. 15'-7 1/2"	G1204A
Q	1	MGS W-BEAM GUARDRAIL, 12 GA. 12'-6"	G1203A
R	1	DEFLECTOR BOX	D8MT
S	2	PIPE SLEEVE	E740
		HARDWARE	
a	6	3/8" DIA. x 3" LAG SCREW	E350
b	16	CABLE ANCHOR BOX SHOULDER BOLT	SB58A
c	16	1/2" A325 STRUCTURAL NUT	N055A
d	32	1 1/16" OD x 9/16" ID A325 WASHER	W050A
e	40	5/8" DIA. X 1 1/4" SPLICE BOLT	B580122
f	3	5/8" DIA. x 7 1/2" HEX BOLT	B580754
g	3	5/8" DIA. x 10" HEX BOLT	B581004
h	1	5/8" DIA. x 10" H.G.R. BOLT (POST 2)	B581002
j	1	5/8" DIA. x 22" H.G.R. BOLT (POST 3)	B582202
k	4	5/8" DIA. x 33" H.G.R. BOLT (POSTS 4-7)	B583302
m	52	5/8" H.G.R. NUT	N050
n	6	5/8" H.G.R. WASHER	W050
p	4	1" ANCHOR CABLE HEX NUT	N100
q	4	1" ANCHOR CABLE WASHER	W100
r	1	Cable Tie	CT100ST



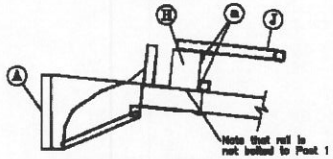
END VIEW OF POST 1



BACK VIEW OF POST 1



SECOND IMPACT HEAD CONNECTING DETAIL (Post 4)



IMPACT HEAD CONNECTING DETAIL (Post 1)

GENERAL NOTES:

1. Breakaway posts are required with the FLEAT-MT.
2. All bolts, nuts, cable assemblies, cable anchors and plates shall be galvanized.
3. The soil tubes shall not protrude more than 4" above the ground (measured along a 5' cord). Site grading may be necessary to meet this requirement.
4. The soil tubes may be driven with an approved driving head. Soil tubes should not be driven with the post in the tube. If the tubes are placed in drilled holes, the backfill material must be satisfactorily compacted to prevent settlement.
5. When rock is encountered during excavation, a 12" Dia. post hole, 20" deep may be used if approved by the engineer. Granular material will be placed in the bottom of the hole approx. 2 1/2" deep to provide drainage. The soil tubes will 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.

RSI Road Systems, Inc.
Big Spring, TX
Phone: 432-853-8435
or Phone: 800-346-0721

Median FLEAT Terminal
Midwest Guardrail System
Wood Post

Sheet: S1

Date: 08/22/11

Drawing Name: MEDFLT-W-MGS

Scale: NONE

By: JRR

Rev: 0