



1200 New Jersey Avenue, SE.
Washington, DC 20590

April 8, 2009

In Reply Refer To: HSSD/B-141E

Mr. Brian Smith
Trinity Highway Products, LLC
P.O. Box 568887
Dallas, TX 75356-8887

Dear Mr. Smith:

This letter is in response to your request for the Federal Highway Administration (FHWA) acceptance of a roadside safety system for use on the National Highway System (NHS).

Name of system: Trinity CASS
Type of system: Cable Barrier
Test Level: NCHRP Report 350 TL-3
Testing conducted by: Texas Transportation Institute
Date of request: November 25, 2008
Date of completed package: February 26, 2009

You requested that we find this system acceptable for use on the NHS under the provisions of the National Cooperative Highway Research Program (NCHRP) Report 350 "Recommended Procedures for the Safety Performance Evaluation of Highway Features."

Requirements

Roadside safety systems should meet the guidelines contained in the NCHRP Report 350. The FHWA Memorandum "Identifying Acceptable Highway Safety Features" of July 25, 1997, provides further guidance on crash testing requirements of longitudinal barriers.

Description

In our FHWA Acceptance Letters B-119 dated May 13, 2003, and B-119B dated August 28, 2003, we accepted Trinity Highway Products' 3-cable CASS Cable Safety System with c-channel posts at 2.0m (6'6"), 3.0m (10'0") and 5.0m (16'5") post spacing for use on the NHS under the NCHRP Report 350 Test Level 3 (TL-3) criteria.

Your present request is for acceptance of a modified, 4-cable CASS system with c-channel posts. The original 3 cables of the CASS system with c-channel posts remain at the same heights. The modification is the addition of a fourth cable located at a height of 585mm (23"), midway between the bottom and middle cables of the 3-cable CASS system with c-channel posts, and separated by plastic spacers as shown in the enclosed drawings.



You correctly noted that terminating the fourth cable must be properly addressed, and you did so by modifying the NCHRP TL-3 compliant terminal that was accepted in the FHWA letter CC-76 dated July 29, 2002. The modification includes increasing the length of the CASS Cable Terminal through the addition of a fourth Cable Release Post as shown in the enclosed drawing. The fourth cable remains at the 585mm (23") height on the traffic side of the terminal from Post #9 through Post #4, at which point it begins its descent towards its termination at Cable Release Post #1X.

Findings

Because the spread of the four cables is within the limits of the 3-cable system tested with c-channel posts, we consider this system to be similarly crashworthy. In addition, the modified, 4-cable CASS system with c-channel posts are acceptable for use on the NHS under the NCHRP Report 350 TL-3 conditions at all previously accepted post spacing and embedment types (driven post, post set in driven tube sleeve, and post set in tube sleeve encased in a concrete footing) under the range of conditions tested and discussed above, when such use is acceptable to a highway agency.

Please note the following standard provisions that apply to the FHWA letters of acceptance:

- This acceptance is limited to the crashworthiness characteristics of the systems and does not cover their structural features, nor conformity with the Manual on Uniform Traffic Control Devices.
- Any changes that may adversely influence the crashworthiness of the system will require a new acceptance letter.
- Should the FHWA discover that the qualification testing was flawed, that in-service performance reveals unacceptable safety problems, or that the system being marketed is significantly different from the version that was crash tested, we reserve the right to modify or revoke our acceptance.
- You will be expected to supply potential users with sufficient information on design and installation requirements to ensure proper performance.
- You will be expected to certify to potential users that the hardware furnished has essentially the same chemistry, mechanical properties, and geometry as that submitted for acceptance, and that it will meet the crashworthiness requirements of the FHWA and the NCHRP Report 350.
- To prevent misunderstanding by others, this letter of acceptance is designated as number B-141E and shall not be reproduced except in full. This letter and the test documentation upon which it is based are public information. All such letters and documentation may be reviewed at our office upon request.
- The Trinity CASS barriers are patented products and considered proprietary. If proprietary systems are specified by a highway agency for use on Federal-aid projects, except exempt, non-NHS projects, (a) they must be supplied through competitive bidding with equally suitable unpatented items; (b) the highway agency must certify that they are essential for synchronization with the existing highway facilities or that no equally suitable alternative exists; or (c) they must be used for research or for a distinctive type of construction on relatively short sections of road for experimental purposes. Our regulations concerning proprietary products are contained in Title 23, Code of Federal Regulations, Section 635.411.

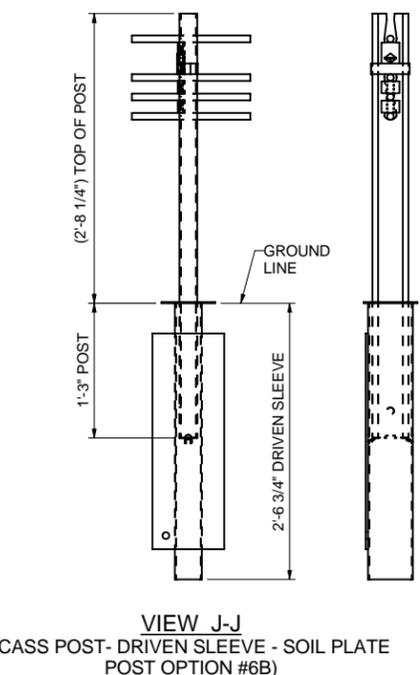
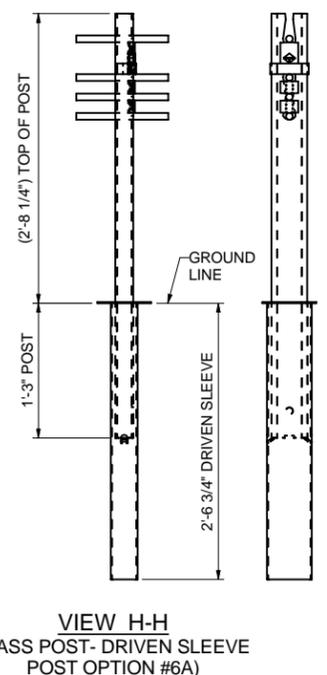
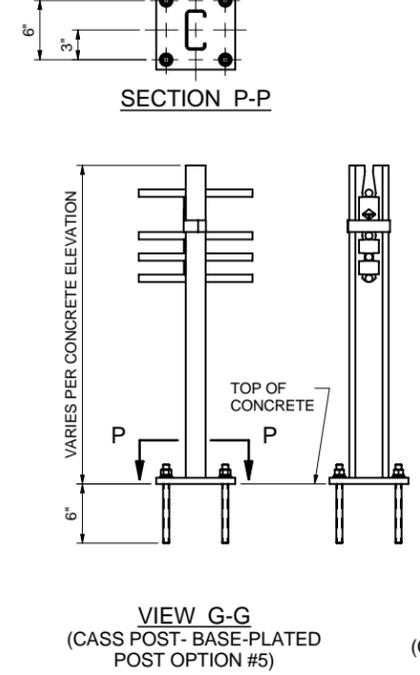
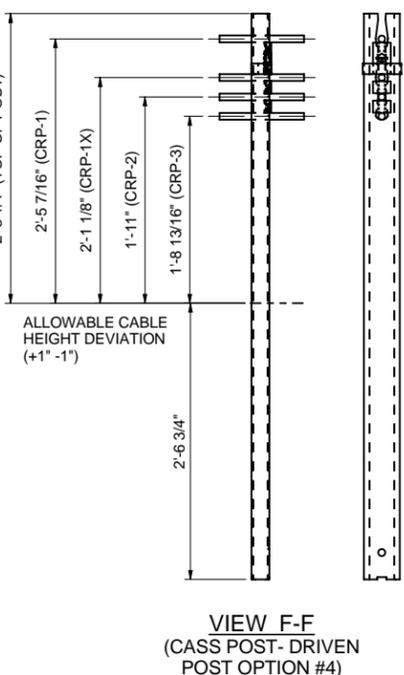
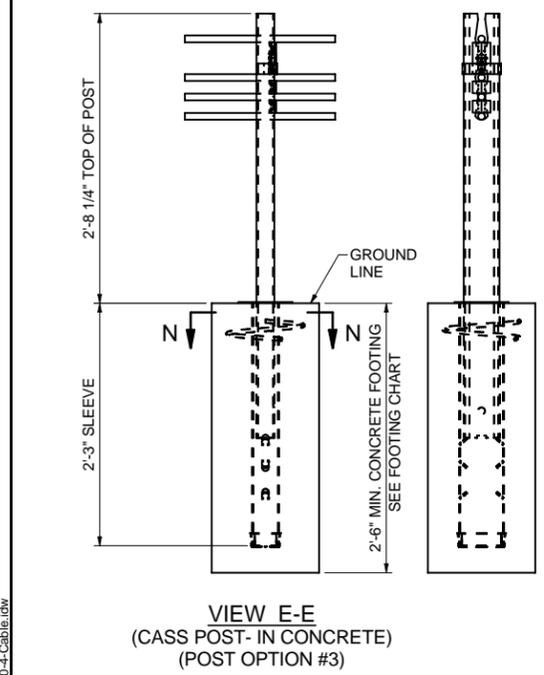
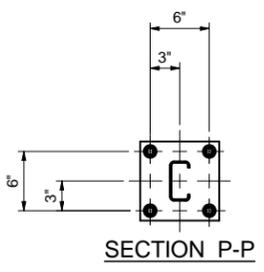
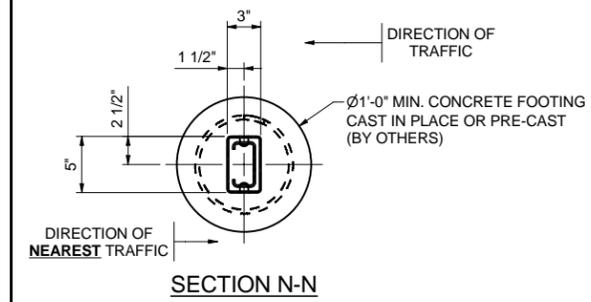
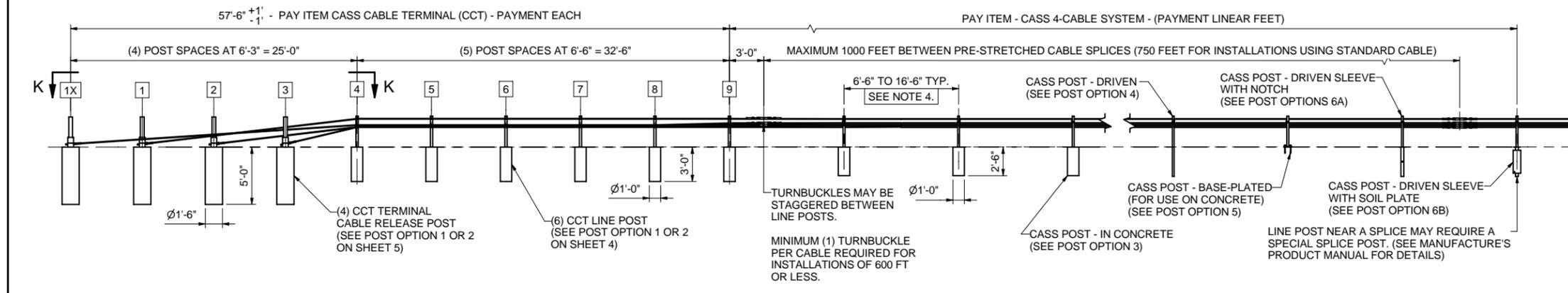
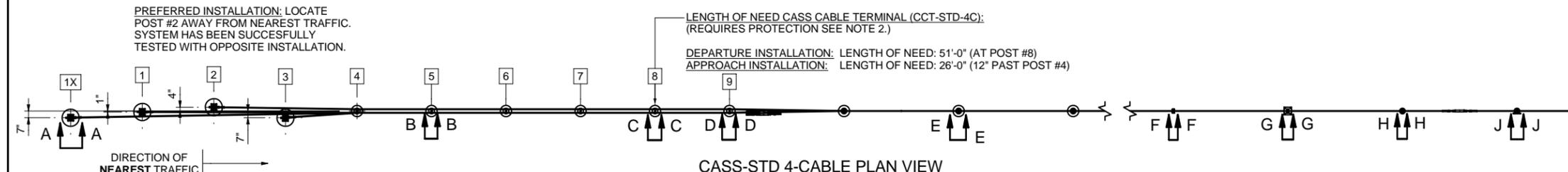
- This acceptance letter shall not be construed as authorization or consent by the FHWA to use, manufacture, or sell any patented system for which the applicant is not the patent holder. The acceptance letter is limited to the crashworthiness characteristics of the candidate system, and the FHWA is neither prepared nor required to become involved in issues concerning patent law. Patent issues, if any, are to be resolved by the applicant.

Sincerely yours,



David A. Nicol, P.E.
Director, Office of Safety Design
Office of Safety

Enclosures



- NOTES:**
- CASS HAS BEEN SUCCESSFULLY TESTED TO NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM REPORT 350 TEST LEVEL 3 (NCHRP 350 TL3) AND ACCEPTED BY FHWA FOR VARIOUS POST SPACINGS. CASS CABLE TERMINAL (CCT) HAS BEEN SUCCESSFULLY TESTED AND APPROVED TO NCHRP TL3.
 - AN NCHRP 350 TL3 APPROVED TERMINAL (CCT) OR CASS TRANSITION (VARIOUS) SHALL BE USED ON APPROACH AND DEPARTURE TERMINATIONS WHEN CASS IS INSTALLED ON THE NATIONAL HIGHWAY SYSTEM (NHS). IF THE TERMINATION POINT IS LOCATED OUTSIDE THE CLEAR ZONE AND/OR PROTECTED BY OTHER MEANS (CRASHWORTHY BARRIER, TERMINALS, ETC.), A NON-NCHRP 350 TL3 ANCHOR (CCA) MAY BE USED ON APPROACH AND DEPARTURE TERMINATIONS.
 - CASS SHALL BE INSTALLED ON SHOULDERS OR MEDIANS WITH SLOPES OF 6:1 OR FLATTER WITHOUT OBSTRUCTIONS, DEPRESSIONS, ETC. THAT MAY SIGNIFICANTLY AFFECT THE STABILITY OF AN ERRANT VEHICLE. 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".
 - CASS POST SPACING MAY BE MODIFIED TO AVOID OBSTACLES THAT CONFLICT WITH THE INSTALLATION OF CASS LINE POSTS. NO POST SPACE CAN EXCEED THE MAXIMUM POST SPACE LIMIT OF 16'-6", OR MAXIMUM POST SPACING ALLOWED BY PROJECT ENGINEER - WHICHEVER IS LESS. REDUCING OR INCREASING POST SPACING AFFECTS DEFLECTION. CASS MAY BE LATERALLY TRANSFERRED AT A RATE NOT TO EXCEED 30:1.
 - 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.
 - FOR AESTHETIC PURPOSES** TRINITY RECOMMENDS ALL SLEEVES, DRIVEN POSTS, AND LOWER CABLE RELEASE POSTS TO BE INSTALLED REASONABLY PLUMB (APPROXIMATELY 1/8" PER FOOT).
 - 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.
 - CASS 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 SUSCEPTIBLE TO SEVERE 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.
 - PLEASE SEE SPECIFYING AGENCY (OR MUTCD) FOR PROPER "BARRIER" DELINEATION.
 - CASS POSTS SHALL BE ALTERNATELY ROTATED 180 DEGREES. CASS MAY BE INSTALLED IN MEDIAN OR SHOULDER APPLICATIONS.
 - 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

| MOW STRIP DETAIL* | | CONCRETE FOOTING CHART | | | |
|-------------------|---------|------------------------|---------|-------------|------------|
| MOW STRIP | DEPTH | WIDTH | FOOTING | TUBE SLEEVE | REBAR RING |
| NONE | | | 30" MIN | 27" MIN. | YES |
| HMA | 6" MIN. | 3' MIN. | 27" MIN | 15" MIN. | NO |
| HMA | 8" MIN. | 3' MIN. | 24" MIN | 15" MIN. | NO |
| RC | 3" MIN. | 3' MIN. | 24" MIN | 15" MIN. | NO |

CHART DOES NOT APPLY TO TERMINAL POSTS 1 THRU 9
 * MOW STRIP OR PAVEMENT
 HMA = HOT MIX ASPHALT (NOT RECYCLED ASPHALT PAVEMENT)
 RC = REINFORCED CONCRETE (3,000 P.S.I. MINIMUM)

| No. | CASS POST OPTIONS |
|-----|---|
| 1 | CCT - TERMINAL POST 1 - 9 - IN CONCRETE |
| 2 | CCT - TERMINAL POST 1 - 9 - WITH SOIL PLATE |
| 3 | CASS POST - IN CONCRETE |
| 4 | CASS POST - DRIVEN |
| 5 | CASS POST - BASE-PLATED |
| 6 | CASS POST - IN DRIVEN SLEEVE |
| | 6A - DRIVEN SLEEVE - WITH NOTCH |
| | 6B - DRIVEN SLEEVE - WITH SOIL PLATE |

file: SS-720-4-Cable.dwg

PROJ: CASS-STANDARD

CASS-STD 4-CABLE GUARDRAIL SAFETY SYSTEM

TRINITY HIGHWAY PRODUCTS, LLC

GALV SPEC: SHIPPING WT: DRW: E.A.S. 10/10/2008 CHK: G.N. 10/10/2008 SHT: 1 OF 5 SIZE: D DWG NO: SS-720-4 REV: 1

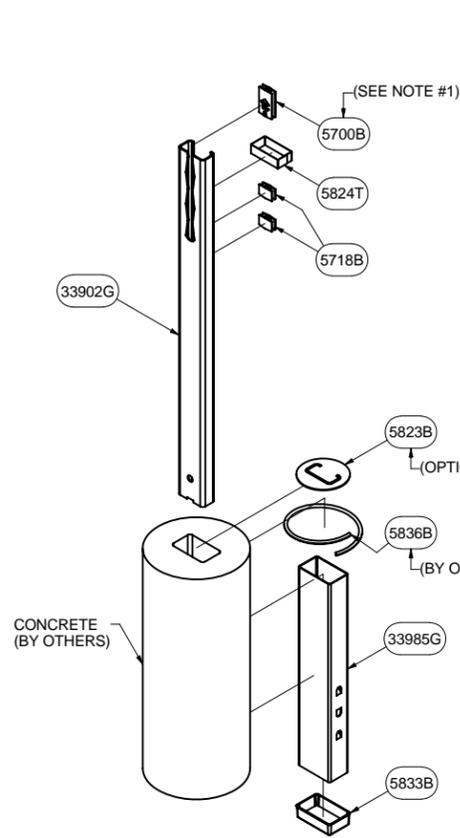
| PARTS LIST - CASS POST - IN CONCRETE - POST OPTION #3 | | | |
|---|---------|---------------------------------|------------|
| QTY | PART No | TITLE | Lbs / Each |
| 1 | 5700B | CASS & TL3 CABLE SPACER | 0.11 |
| 2 | 5718B | CASS & TL3 CABLE SPACER-4-CABLE | 0.05 |
| 1 | 5823B | SLEEVE COVER - CASS POST | 0.11 |
| 1 | 5824T | CASS POST STRAP | 0.19 |
| 1 | 5833B | SLEEVE CAP - CASS-STD POST | 0.15 |
| 1 | 5836B | CONCRETE REINFORCING RING | 0.88 |
| 1 | 33902G | CASS-STD POST - SHORT | 16.75 |
| 1 | 33985G | 27" POST SLEEVE - IN CONCRETE | 14.02 |

| PARTS LIST - CASS POST - DRIVEN POST - OPTION #4 | | | |
|--|---------|---------------------------------|------------|
| QTY | PART No | TITLE | Lbs / Each |
| 1 | 5700B | CASS & TL3 CABLE SPACER | 0.11 |
| 2 | 5718B | CASS & TL3 CABLE SPACER-4-CABLE | 0.05 |
| 1 | 5824T | CASS POST STRAP | 0.19 |
| 1 | 33901G | CASS-STD POST - LONG | 22.54 |

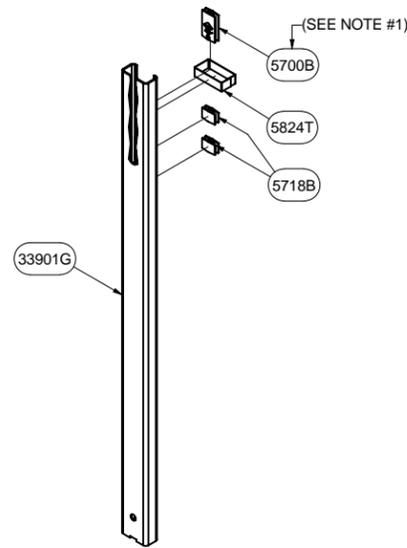
| PARTS LIST - CASS POST - BASE PLATED - POST OPTION #5 | | | |
|---|---------|--|------------|
| QTY | PART No | TITLE | Lbs / Each |
| 4 | 3310G | 5/8 LOCK WASHER | 0.00 |
| 4 | 3361G | 5/8" HEX NUT (A563 Gr DH) | 0.01 |
| 4 | 4372G | 5/8" FLAT WASHER (F436) | 0.00 |
| 1 | 5700B | CASS & TL3 CABLE SPACER | 0.11 |
| 2 | 5718B | CASS & TL3 CABLE SPACER-4-CABLE | 0.05 |
| 1 | 5824T | CASS POST STRAP | 0.19 |
| 4 | 6722G | 5/8 ALL THREADED ROD CHISEL POINT (A449) | 0.69 |
| 1 | 33915A | CASS SHORT POST | 22.08 |

| PARTS LIST - CASS POST - IN DRIVEN SLEEVE - POST OPTION #6A | | | |
|---|---------|--|------------|
| QTY | PART No | TITLE | Lbs / Each |
| 1 | 5700B | CASS & TL3 CABLE SPACER | 0.11 |
| 2 | 5718B | CASS & TL3 CABLE SPACER-4-CABLE | 0.05 |
| 1 | 5823B | SLEEVE COVER - CASS POST | 0.11 |
| 1 | 5824T | CASS POST STRAP | 0.19 |
| 1 | 33902G | CASS-STD POST - SHORT | 16.75 |
| 1 | 33950G | 30.75" POST SLEEVE - DRIVEN SHORT POST | 15.90 |

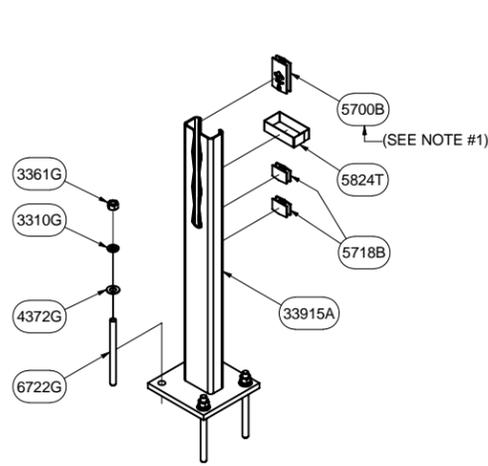
| PARTS LIST - PRE-STRETCHED CABLE ASSEMBLIES | | | | | | |
|---|---------|----------------------------|---------|--------|--------|------------|
| QTY | PART No | TITLE | LENGTH | TERM-1 | TERM-2 | Lbs / Each |
| 1 | 5817 | CCT CABLE ASSEMBLY-TOP | 54'-4" | R.H.T. | L.H.T. | 58.3 |
| 1 | 5818 | CCT CABLE ASSEMBLY-MID | 48'-1" | R.H.T. | L.H.T. | 52.3 |
| 1 | 5819 | CCT CABLE ASSEMBLY-BOT | 41'-10" | R.H.T. | L.H.T. | 46.3 |
| 1 | 5867 | CCA CABLE ASSEMBLY | 25'-0" | R.H.T. | L.H.T. | 30.9 |
| 1 | 5816 | CABLE ASSEMBLY-INTERIOR | 1000' | R.H.T. | L.H.T. | 967.0 |
| 1 | 5753 | CABLE FIELD SPLICE SECTION | 1025' | R.H.T. | NONE | 989.0 |
| 1 | 5752 | CABLE FIELD SPLICE SECTION | 1000' | R.H.T. | NONE | 965.0 |
| 1 | 5798 | CABLE FIELD SPLICE SECTION | 975' | R.H.T. | NONE | 940.9 |
| 1 | 5797 | CABLE FIELD SPLICE SECTION | 950' | R.H.T. | NONE | 916.9 |
| 1 | 5796 | CABLE FIELD SPLICE SECTION | 925' | R.H.T. | NONE | 892.8 |
| 1 | 5795 | CABLE FIELD SPLICE SECTION | 900' | R.H.T. | NONE | 868.8 |
| 1 | 5794 | CABLE FIELD SPLICE SECTION | 875' | R.H.T. | NONE | 844.7 |
| 1 | 5793 | CABLE FIELD SPLICE SECTION | 850' | R.H.T. | NONE | 820.7 |
| 1 | 5792 | CABLE FIELD SPLICE SECTION | 825' | R.H.T. | NONE | 796.6 |
| 1 | 5791 | CABLE FIELD SPLICE SECTION | 800' | R.H.T. | NONE | 772.6 |
| 1 | 5790 | CABLE FIELD SPLICE SECTION | 775' | R.H.T. | NONE | 748.5 |
| 1 | 5789 | CABLE FIELD SPLICE SECTION | 750' | R.H.T. | NONE | 724.5 |
| 1 | 5788 | CABLE FIELD SPLICE SECTION | 725' | R.H.T. | NONE | 700.4 |
| 1 | 5787 | CABLE FIELD SPLICE SECTION | 700' | R.H.T. | NONE | 676.4 |
| 1 | 5786 | CABLE FIELD SPLICE SECTION | 675' | R.H.T. | NONE | 652.3 |
| 1 | 5785 | CABLE FIELD SPLICE SECTION | 650' | R.H.T. | NONE | 628.3 |
| 1 | 5784 | CABLE FIELD SPLICE SECTION | 625' | R.H.T. | NONE | 604.2 |
| 1 | 5783 | CABLE FIELD SPLICE SECTION | 600' | R.H.T. | NONE | 580.2 |
| 1 | 5782 | CABLE FIELD SPLICE SECTION | 575' | R.H.T. | NONE | 556.1 |
| 1 | 5781 | CABLE FIELD SPLICE SECTION | 550' | R.H.T. | NONE | 532.1 |
| 1 | 5780 | CABLE FIELD SPLICE SECTION | 525' | R.H.T. | NONE | 508.0 |
| 1 | 5779 | CABLE FIELD SPLICE SECTION | 500' | R.H.T. | NONE | 484.0 |
| 1 | 5778 | CABLE FIELD SPLICE SECTION | 475' | R.H.T. | NONE | 459.9 |
| 1 | 5776 | CABLE FIELD SPLICE SECTION | 450' | R.H.T. | NONE | 435.9 |
| 1 | 5775 | CABLE FIELD SPLICE SECTION | 425' | R.H.T. | NONE | 411.8 |
| 1 | 5769 | CABLE FIELD SPLICE SECTION | 400' | R.H.T. | NONE | 387.8 |
| 1 | 5768 | CABLE FIELD SPLICE SECTION | 375' | R.H.T. | NONE | 363.7 |
| 1 | 5767 | CABLE FIELD SPLICE SECTION | 350' | R.H.T. | NONE | 339.7 |
| 1 | 5766 | CABLE FIELD SPLICE SECTION | 325' | R.H.T. | NONE | 315.7 |
| 1 | 5765 | CABLE FIELD SPLICE SECTION | 300' | R.H.T. | NONE | 291.6 |
| 1 | 5764 | CABLE FIELD SPLICE SECTION | 275' | R.H.T. | NONE | 267.6 |
| 1 | 5763 | CABLE FIELD SPLICE SECTION | 250' | R.H.T. | NONE | 243.5 |
| 1 | 5762 | CABLE FIELD SPLICE SECTION | 225' | R.H.T. | NONE | 219.5 |
| 1 | 5761 | CABLE FIELD SPLICE SECTION | 200' | R.H.T. | NONE | 195.4 |
| 1 | 5760 | CABLE FIELD SPLICE SECTION | 175' | R.H.T. | NONE | 171.4 |
| 1 | 5759 | CABLE FIELD SPLICE SECTION | 150' | R.H.T. | NONE | 147.3 |
| 1 | 5758 | CABLE FIELD SPLICE SECTION | 125' | R.H.T. | NONE | 123.3 |
| 1 | 5757 | CABLE FIELD SPLICE SECTION | 100' | R.H.T. | NONE | 99.2 |
| 1 | 5756 | CABLE FIELD SPLICE SECTION | 75' | R.H.T. | NONE | 75.2 |
| 1 | 5755 | CABLE FIELD SPLICE SECTION | 50' | R.H.T. | NONE | 51.1 |
| 1 | 5754 | CABLE FIELD SPLICE SECTION | 25' | R.H.T. | NONE | 27.1 |
| 1 | 5840 | CABLE FIELD REPAIR SECTION | 5' | R.H.T. | L.H.T. | 10.8 |



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



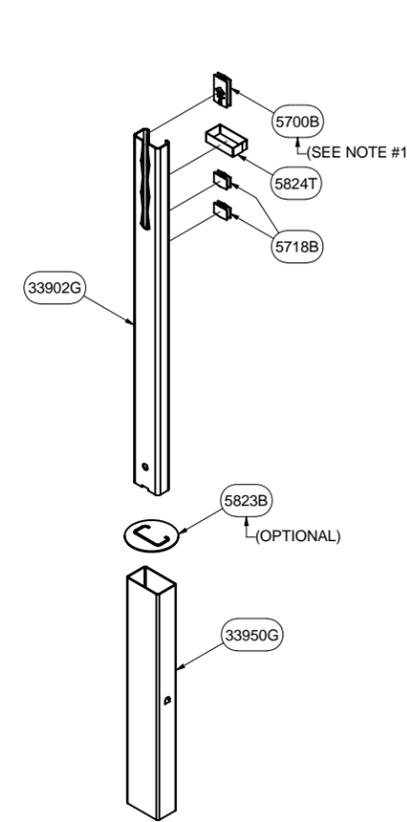
CASS POST - DRIVEN
(POST OPTION #4 - DRIVEN)



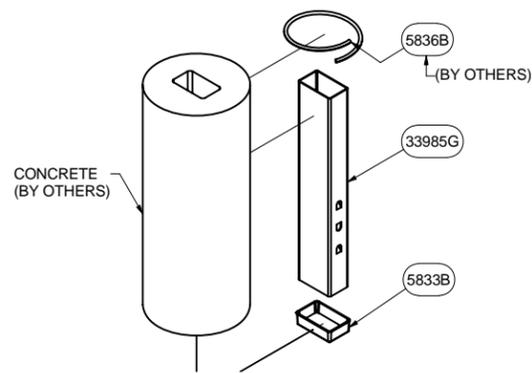
CASS POST - BASE-PLATED
(POST OPTION #5 - BASE-PLATED)

ANCHOR OPTIONS:
MIN. EMBEDMENT IN 3,000 P.S.I. CONCRETE = 6".
MIN. PULLOUT STRENGTH = 10,000 lbs.

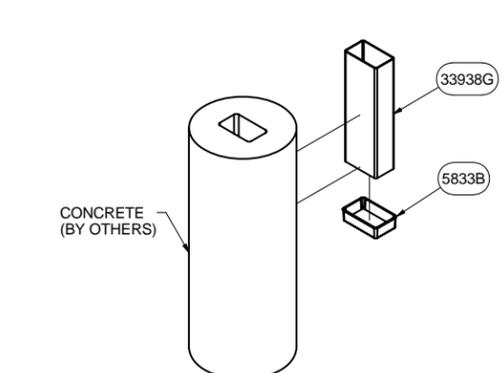
- 5/8 ADHESIVE ANCHORING SYSTEM.
(4 EACH 3300G, 3310G, 3361G & 5225G) & 0.6 EACH 5448B
- 5/8 x 8" ALL THREADED ROD (A449) WITH EPOXY.
(4 EACH 3300G, 3310G, 3361G & 6722G) & 0.6 EACH 5448B
- 5/8 MECHANICAL ANCHOR. (BY OTHERS)



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



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



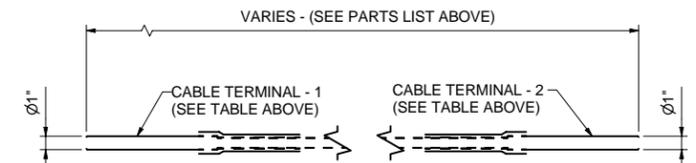
CONCRETE FOOTING ASSEMBLY
(INSTALLED IN QUALIFYING MOW STRIP SEE CHART SHEET 1)

| PARTS LIST - PRECAST CONCRETE FOOTING - POST OPTION #3 | | | |
|--|---------|-------------------------------|------------|
| QTY | PART No | TITLE | Lbs / Each |
| 1 | 5833B | SLEEVE CAP - CASS-STD POST | 0.15 |
| 1 | 5836B | CONCRETE REINFORCING RING | 0.88 |
| 1 | 33985G | 27" POST SLEEVE - IN CONCRETE | 14.02 |

| PARTS LIST - CONCRETE FOOTING IN MOW STRIP OR PAVEMENT | | | |
|--|---------|---------------------------------|------------|
| QTY | PART No | TITLE | Lbs / Each |
| 1 | 5833B | SLEEVE CAP - CASS-STD POST | 0.15 |
| 1 | 33938G | 15" POST SLEEVE - CONCRETE POST | 7.75 |

| PARTS LIST - CASS POST - IN DRIVEN SLEEVE - POST OPTION #6B | | | |
|---|---------|---------------------------------------|------------|
| QTY | PART No | TITLE | Lbs / Each |
| 1 | 5700B | CASS & TL3 CABLE SPACER | 0.11 |
| 2 | 5718B | CASS & TL3 CABLE SPACER-4-CABLE | 0.05 |
| 1 | 5823B | SLEEVE COVER - CASS POST | 0.11 |
| 1 | 5824T | CASS POST STRAP | 0.19 |
| 1 | 33902G | CASS-STD POST - SHORT | 16.75 |
| 1 | 33951A | 30.75" CASS POST SLEEVE W/ SOIL PLATE | 29.50 |

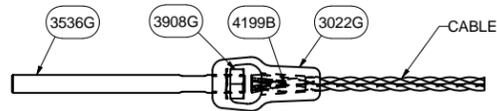
NOTE:
FOR THE STANDARD FIELD SPLICE SECTIONS ABOVE,
SUPPLY (1) RIGHT HAND THREADED STUD ASSEMBLY
5910G EACH.



PRE-STRETCHED CABLE ASSEMBLIES

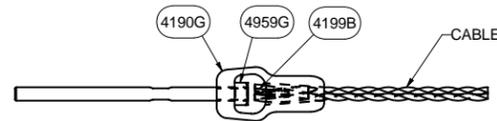
- NOTES:
- IN LIEU OF BLACK SPACER 5700B SUPPLY YELLOW REFLECTIVE SPACER 5701B (TOP SPACE), 5719B (MIDDLE & BOTTOM SPACE) OR WHITE REFLECTIVE SPACER 5702B (TOP SPACE), 5720B (MIDDLE & BOTTOM SPACE). (AS REQUIRED PER PROJECT PLANS)
 - AT CASS POST LOCATION NEAREST TO A CABLE SPLICE, SUPPLY A SPLICE INTERFERENCE POST.
LONG SPLICE POST 33911G IN LIEU OF LONG CASS POST 33901G
SHORT SPLICE POST 33912G IN LIEU OF SHORT CASS POST 33902G
 - IF REQUIRED PER PROJECT PLANS SUPPLY:
CABLE PULLING TOOL 5850B
CABLE TENSION METER 5878B
CABLE THERMOMETER 5709B

| | | | |
|---|--|--------------|------------|
| CASS-STD 4-CABLE GUARDRAIL SAFETY SYSTEM | | GALV SPEC: | |
| | | SHIPPING WT: | |
| | | DRW: E.A.S. | 10/10/2008 |
| | | CHK: G.N. | 10/10/2008 |
| | | SHT: 2 OF 5 | SIZE: D |
| | | DWG NO: | REV |
| | | SS-720-4 | 1 |



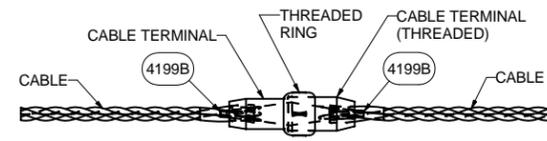
1" CABLE FIELD SPLICE - 5909G & 5910G
(5910G SHOWN, 5909G SIMILAR)

| PARTS LIST - 5910G | | | |
|--------------------|---------|----------------------------|------------|
| QTY | PART No | TITLE | Lbs / Each |
| 1 | 3022G | 1" CABLE END CASTING | 0.56 |
| 1 | 3536G | 1" STUD FLATTENED - R.H.T. | 2.88 |
| 1 | 3908G | 1" HEAVY HEX NUT (A563 DH) | 0.47 |
| 1 | 4199B | 3/4" CABLE WEDGE (3 x 7) | 0.08 |



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

| PARTS LIST 5634G | | | | |
|------------------|---------|------|------------------------------|------------|
| QTY | PART No | ITEM | TITLE | Lbs / Each |
| 1 | | 1 | 3/4" STUD FLATTENED - L.H.T. | 1.62 |
| 1 | 4190G | 2 | CABLE END CASTING | 3.78 |
| 1 | 4199B | 3 | 3/4" CABLE WEDGE (3 x 7) | 0.08 |
| 1 | 4959G | 4 | 3/4" HEAVY SQUARE NUT (A563) | 0.26 |

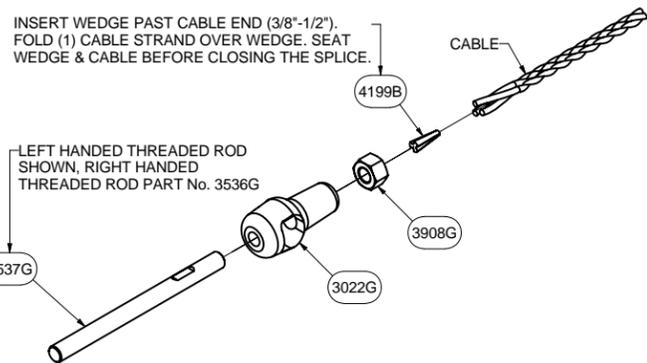


TORPEDO CABLE SPLICE - 4099G

| PARTS LIST - 4099G | | | |
|--------------------|---------|---------------------------|------------|
| QTY | PART No | TITLE | Lbs / Each |
| 1 | | RING - THREADED | 0.00 |
| 1 | | CABLE TERMINAL | 1.52 |
| 1 | | CABLE TERMINAL - THREADED | 1.78 |
| 2 | 4199B | 3/4" CABLE WEDGE (3 x 7) | 0.08 |

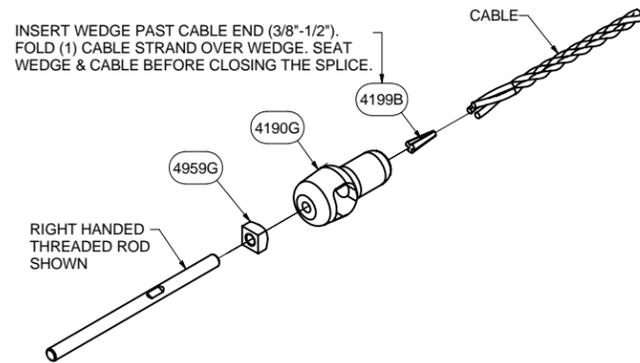
| CASS TEMPERATURE & TENSION CHART (NEAREST 100 lb/F) | | |
|---|---------------------|------------------------|
| FAHRENHEIT DEGREES | STD. CABLE LB/FORCE | PRE-STRETCHED LB/FORCE |
| <= -15 | 8800 | 7500 |
| -10 | 8600 | 7300 |
| -5 | 8400 | 7100 |
| 0 | 8200 | 7000 |
| 5 | 8000 | 6800 |
| 10 | 7800 | 6600 |
| 15 | 7600 | 6500 |
| 20 | 7400 | 6300 |
| 25 | 7200 | 6100 |
| 30 | 7000 | 6000 |
| 35 | 6800 | 5800 |
| 40 | 6600 | 5600 |
| 45 | 6400 | 5500 |
| 50 | 6200 | 5300 |
| 55 | 6000 | 5100 |
| 60 | 5800 | 5000 |
| 65 | 5600 | 4800 |
| 70 | 5400 | 4600 |
| 75 | 5200 | 4500 |
| 80 | 5000 | 4300 |
| 85 | 4800 | 4100 |
| 90 | 4600 | 4000 |
| 95 | 4400 | 3800 |
| 100 | 4200 | 3600 |
| 105 | 4000 | 3500 |
| 110 | 3800 | 3300 |
| 115 | 3600 | 3100 |
| 120 | 3400 | 3000 |
| 125 | 3200 | 2800 |
| 130 | 3000 | 2700 |
| 135 | 2900 | 2600 |
| 140 | 2700 | 2500 |
| 145 | 2500 | 2400 |
| 150 | 2400 | 2300 |
| 160 | 2200 | 2100 |
| 170 | 2000 | 1900 |
| 180 | 1800 | 1700 |
| 190 | 1600 | 1500 |
| 200 | 1400 | 1300 |

ALLOWABLE DEVIATION FROM CHART: 200 POUNDS/FORCE.



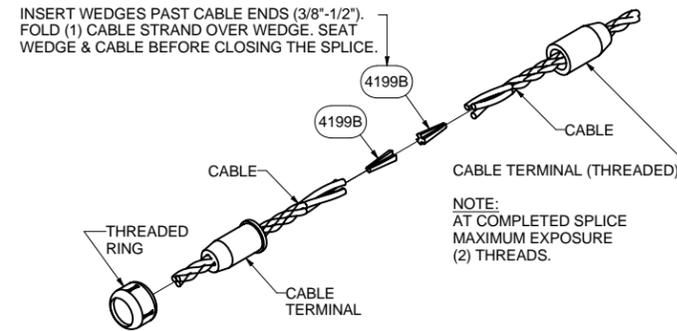
ASSEMBLY - 1" CABLE FIELD SPLICE - 5909G
(5909G SHOWN, 5910G SIMILAR)

| PARTS LIST - 5909G | | | |
|--------------------|---------|----------------------------|------------|
| QTY | PART No | TITLE | Lbs / Each |
| 1 | 3022G | 1" CABLE END CASTING | 0.56 |
| 1 | 3537G | 1" STUD FLATTENED - L.H.T. | 2.88 |
| 1 | 3908G | 1" HEAVY HEX NUT (A563 DH) | 0.47 |
| 1 | 4199B | 3/4" CABLE WEDGE (3 x 7) | 0.08 |



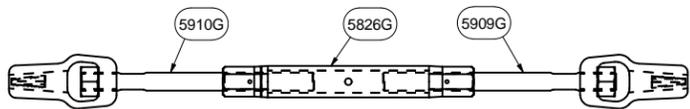
ASSEMBLY - 3/4" CABLE FIELD SPLICE - 5635G
(5635G SHOWN, 5634G SIMILAR)

| PARTS LIST - 5635G | | | |
|--------------------|---------|------------------------------|------------|
| QTY | PART No | TITLE | Lbs / Each |
| 1 | | 3/4" STUD FLATTENED - R.H.T. | 1.62 |
| 1 | 4190G | CABLE END CASTING | 3.78 |
| 1 | 4199B | 3/4" CABLE WEDGE (3 x 7) | 0.08 |
| 1 | 4959G | 3/4" HEAVY SQUARE NUT (A563) | 0.26 |



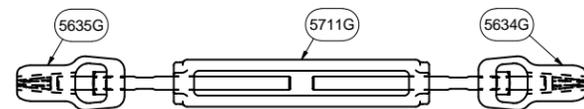
ASSEMBLY - TORPEDO CABLE SPLICE 4099G

NOTE:
AT COMPLETED SPLICE
MAXIMUM EXPOSURE
(2) THREADS.



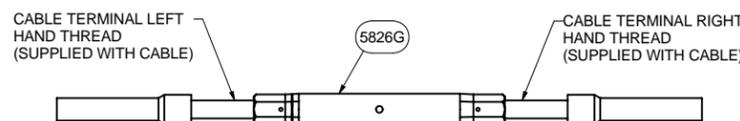
1" CABLE SPLICE - 5633G
(CLOSED BODY STYLE)

| 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. | 3.99 |
| 1 | 5910G | 1" STUD ASSEMBLY R.H.T. | 3.99 |



3/4" CABLE SPLICE - 5698G
(OPEN BODY STYLE)

| PARTS LIST - 5698G | | | |
|--------------------|---------|---------------------------------|------------|
| 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 | 10.69 |

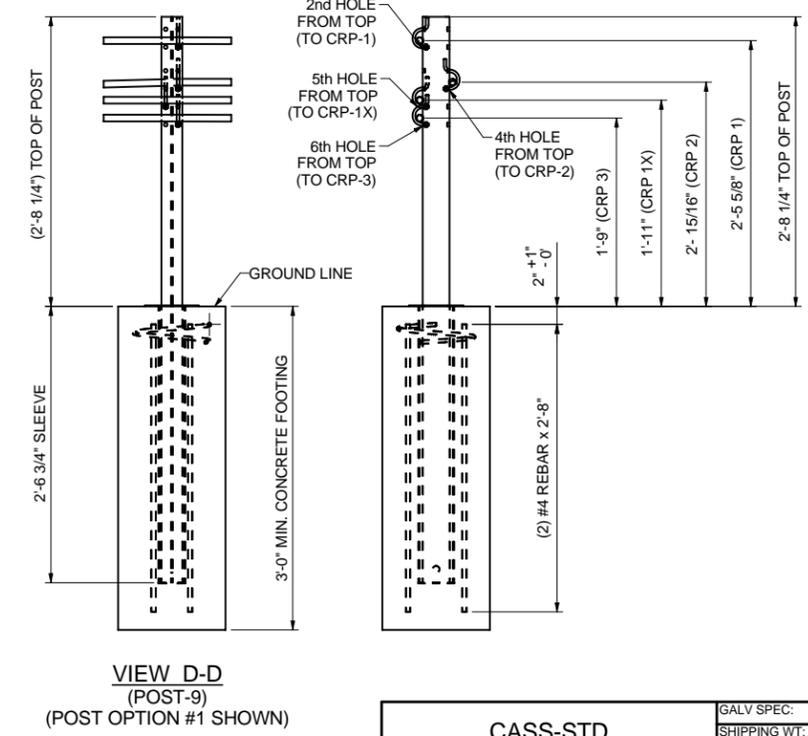
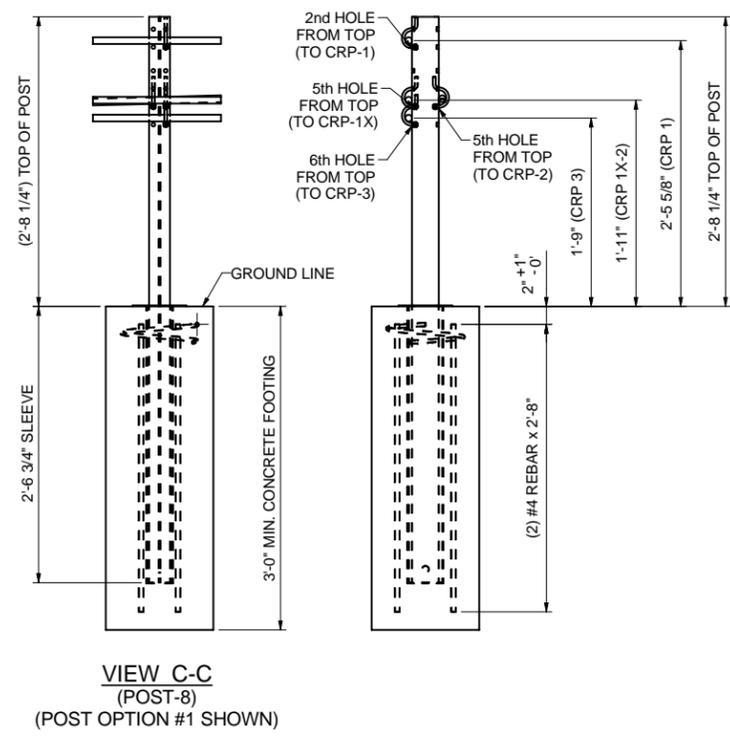
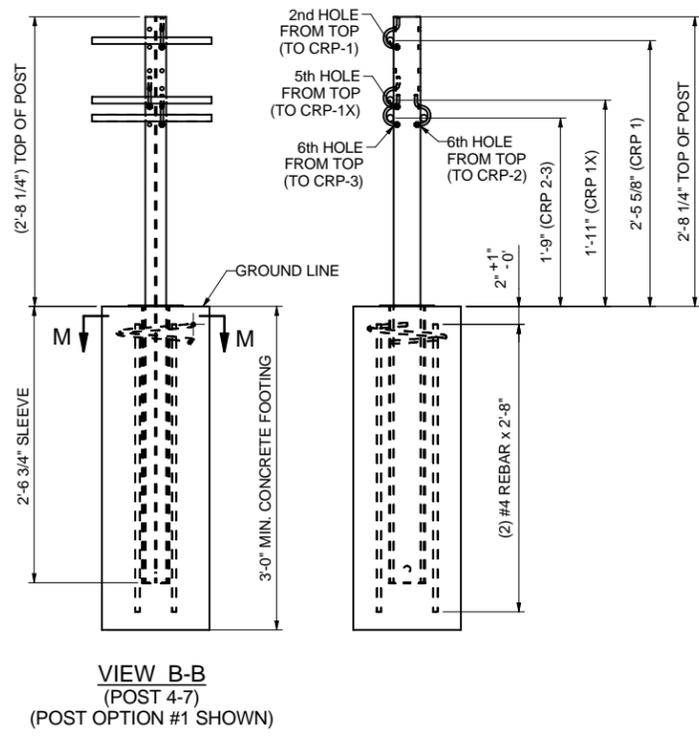
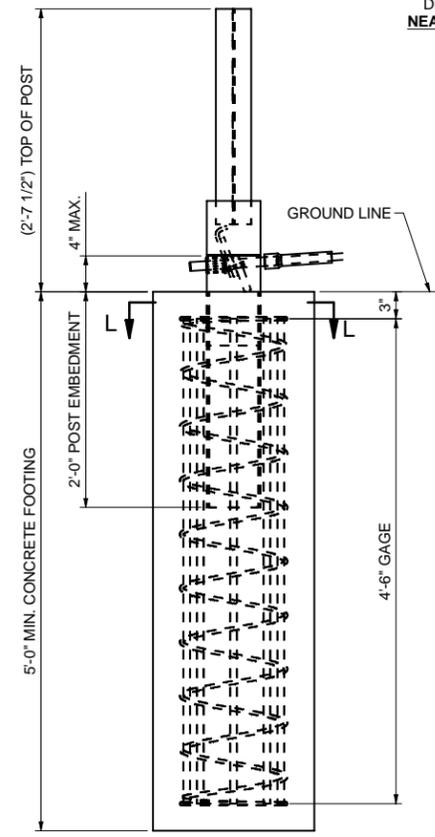
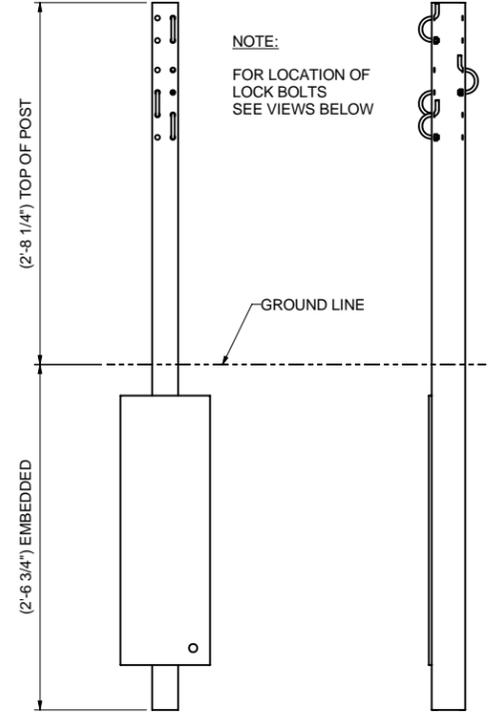
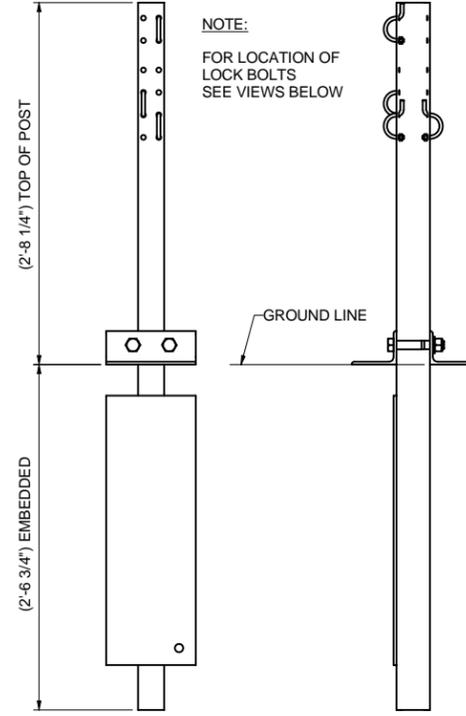
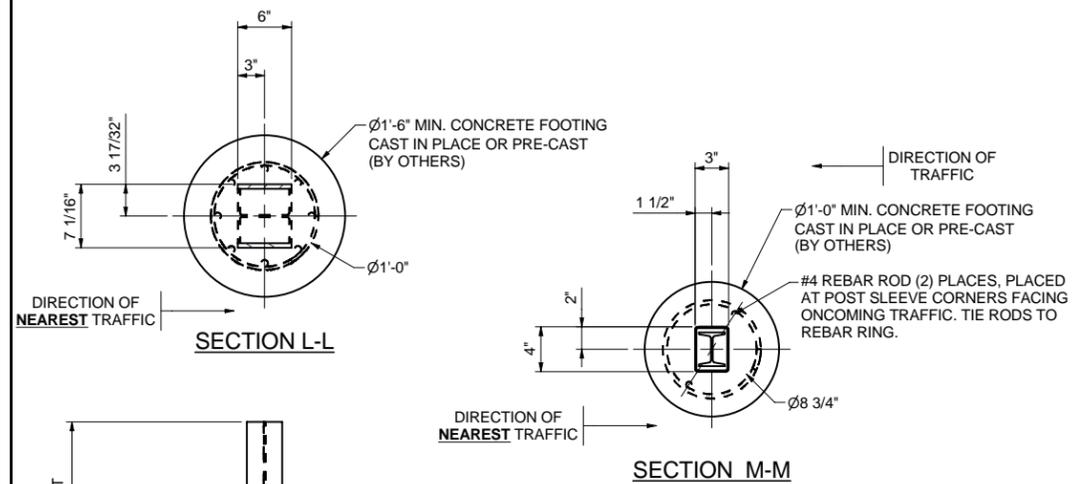
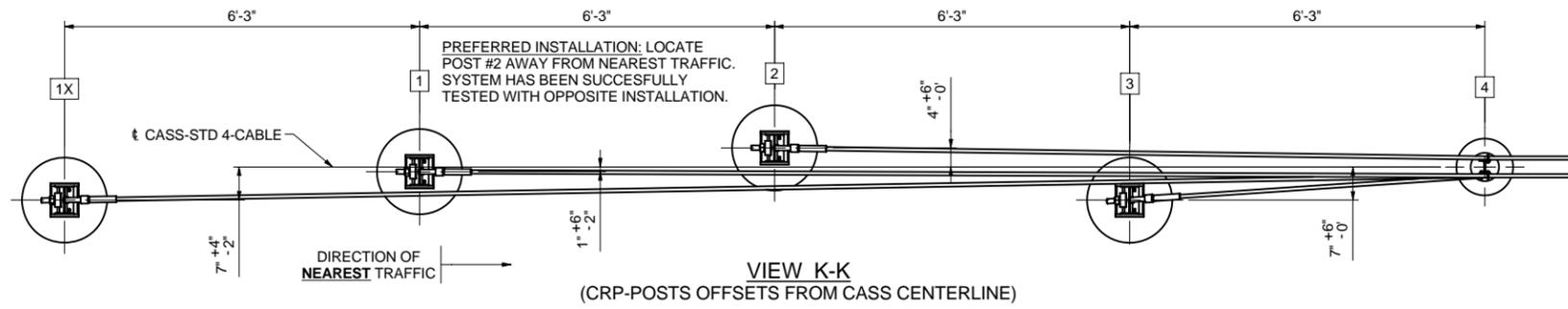


1" TURNBUCKLE - 5826G
(CLOSED BODY STYLE)

| PARTS LIST - 5826G | | | |
|--------------------|---------|--------------------------------------|------------|
| QTY | PART No | TITLE | Lbs / Each |
| 1 | 5826G | 1" CASS TURNBUCKLE CLOSED BODY STYLE | 4.81 |

- NOTE:
- 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.
 - 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.

| | | | |
|---|--|----------------------|-----|
| CASS-STD 4-CABLE GUARDRAIL SAFETY SYSTEM | | GALV SPEC: | |
| | | SHIPPING WT: | |
| DRW: E.A.S. 10/10/2008 | | CHK: G.N. 10/10/2008 | |
| SHT: 3 OF 5 | | SIZE: D | |
| | | DWG NO: | REV |
| TRINITY HIGHWAY PRODUCTS, LLC | | SS-720-4 | 1 |



file: SS-720-4-Cable.dwg

| | | | |
|---|--|----------------------|--|
| CASS-STD 4-CABLE GUARDRAIL SAFETY SYSTEM | | GALV SPEC: | |
| | | SHIPPING WT: | |
| DRW: E.A.S. 10/10/2008 | | CHK: G.N. 10/10/2008 | |
| SHT: 4 OF 5 | | SIZE: D | |
| DWG NO: SS-720-4 | | REV: 1 | |

PROJ: CASS-STANDARD

**TRINITY HIGHWAY
PRODUCTS, LLC**

| PARTS LIST - CCT CABLE RELEASE POST No. 1-3 - IN CONCRETE | | | |
|---|---------|-------------------------------|------------|
| QTY | PART No | TITLE | Lbs / Each |
| 1 | 5851B | REFLECTOR - MEDIAN - YELLOW | 0.10 |
| 1 | 33909G | CASS CABLE BRACKET | 1.92 |
| 1 | 33916B | REINFORCING CAGE - CRP POST | 68.07 |
| 1 | 33934A | CRP - LOWER POST | 51.80 |
| 1 | 33935A | CRP - UPPER POST | 31.57 |
| 2 | 4211G | 5/16 HEX BOLT x 1 3/4" (A307) | 0.05 |
| 2 | 3245G | 5/16 HEX NUT (A563) | 0.01 |
| 2 | 3240G | 5/16 FLAT WASHER (F844) | 0.00 |

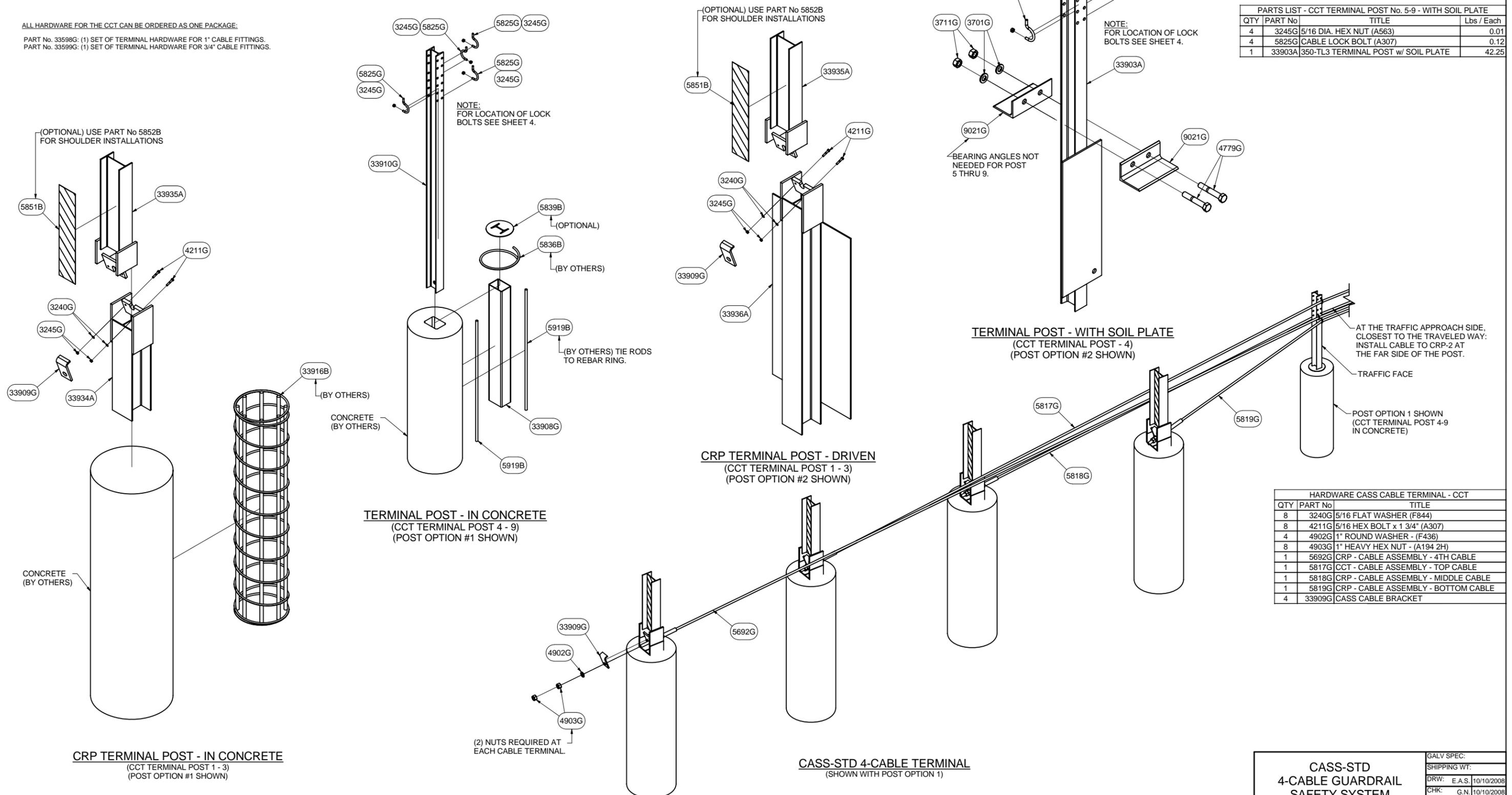
| PARTS LIST - CCT TERMINAL POST No. 4-9 - IN CONCRETE | | | |
|--|---------|-------------------------------|------------|
| QTY | PART No | TITLE | Lbs / Each |
| 4 | 3245G | 5/16 DIA. HEX NUT (A563) | 0.01 |
| 4 | 5825G | CABLE LOCK BOLT (A307) | 0.12 |
| 1 | 5836B | CONCRETE REINFORCING RING | 0.88 |
| 1 | 5839B | SLEEVE COVER - S3 ANCHOR POST | 0.11 |
| 2 | 5919B | #4 REBAR - TERMINAL POST | 1.78 |
| 1 | 33908G | SLEEVE - TERMINAL LINE POST | 13.80 |
| 1 | 33910G | 350-TL3 TERMINAL POST | 28.63 |

| PARTS LIST - CCT CABLE RELEASE POST No. 1-3 - DRIVEN | | | |
|--|---------|-------------------------------|------------|
| QTY | PART No | TITLE | Lbs / Each |
| 1 | 33909G | CASS CABLE BRACKET | 1.92 |
| 1 | 33935A | CRP - UPPER POST | 31.57 |
| 1 | 33936A | CRP - LOWER POST | 178.57 |
| 2 | 3240G | 5/16 FLAT WASHER (F844) | 0.00 |
| 2 | 4211G | 5/16 HEX BOLT x 1 3/4" (A307) | 0.05 |
| 2 | 3245G | 5/16 HEX NUT (A563) | 0.01 |
| 1 | 5851B | REFLECTOR - MEDIAN - YELLOW | 0.10 |

| PARTS LIST - CCT TERMINAL POST No. 4 - WITH SOIL PLATE | | | |
|--|---------|-------------------------------------|------------|
| QTY | PART No | TITLE | Lbs / Each |
| 4 | 3245G | 5/16 DIA. HEX NUT (A563) | 0.01 |
| 2 | 3701G | 3/4 FLAT WASHER (F436) | 0.01 |
| 2 | 3711G | 3/4 HEX NUT (A194 2H) | 0.02 |
| 2 | 4779G | 3/4 HEX BOLT x 4 1/2" (A325) | 0.09 |
| 4 | 5825G | CABLE LOCK BOLT (A307) | 0.12 |
| 2 | 9021G | BEARING ANGLE (A36) | 3.81 |
| 1 | 33903A | 350-TL3 TERMINAL POST w/ SOIL PLATE | 42.25 |

| PARTS LIST - CCT TERMINAL POST No. 5-9 - 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) | 0.12 |
| 1 | 33903A | 350-TL3 TERMINAL POST w/ SOIL PLATE | 42.25 |

ALL HARDWARE FOR THE CCT CAN BE ORDERED AS ONE PACKAGE:
 PART No. 33598G: (1) SET OF TERMINAL HARDWARE FOR 1" CABLE FITTINGS.
 PART No. 33599G: (1) SET OF TERMINAL HARDWARE FOR 3/4" CABLE FITTINGS.



| HARDWARE CASS CABLE TERMINAL - CCT | | | |
|------------------------------------|---------|-------------------------------------|--|
| QTY | PART No | TITLE | |
| 8 | 3240G | 5/16 FLAT WASHER (F844) | |
| 8 | 4211G | 5/16 HEX BOLT x 1 3/4" (A307) | |
| 4 | 4902G | 1" ROUND WASHER - (F436) | |
| 8 | 4903G | 1" HEAVY HEX NUT - (A194 2H) | |
| 1 | 5692G | CRP - CABLE ASSEMBLY - 4TH CABLE | |
| 1 | 5817G | CCT - CABLE ASSEMBLY - TOP CABLE | |
| 1 | 5818G | CRP - CABLE ASSEMBLY - MIDDLE CABLE | |
| 1 | 5819G | CRP - CABLE ASSEMBLY - BOTTOM CABLE | |
| 4 | 33909G | CASS CABLE BRACKET | |

file: SS-720-4-Cable.ltw

| | | | |
|--|--|------------------------|--|
| CASS-STD 4-CABLE GUARDRAIL SAFETY SYSTEM | | GALV SPEC: | |
| TRINITY HIGHWAY PRODUCTS, LLC | | SHIPPING WT: | |
| PROJ: CASS-STANDARD | | DRW: E.A.S. 10/10/2008 | |
| SS-720-4 | | CHK: G.N. 10/10/2008 | |
| 1 | | SHT: 5 OF 5 | |
| | | SIZE: D | |
| | | DWG NO: | |
| | | REV | |