U.S. Department
of Transportation
Federal Highway
Administration

1200 New Jersey Ave., SE
Washington, D.C. 20590

December 22, 2010

In Reply Refer To:
HSSI/CC-111

Dean L. Sicking, Ph.D., P.E.
Director
Midwest Roadside Safety Facility
130 Whittier Bldg.
220 Vine Street
Lincoln, NE 68583-0583

Dear Dr. Sicking:

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

Name of device:	Low Tension Cable Guardrail End Terminal
Type of device:	End Terminal
Test Level:	NCHRP Report 350 Test Level 3 (TL-3)
Testing conducted by:	Midwest Roadside Safety Facility (MwRSF)
System Designator:	SEC10
Date of request:	August 1, 2010

You requested that we find this device acceptable for use on the NHS under the provisions of the National Cooperative Highway Research Program (NCHRP) Report 350 testing guidelines.

Requirements
Roadside safety devices should meet the guidelines contained in the NCHRP Report 350. The FHWA memorandum "ACTION: Identifying Acceptable Highway Safety Features" of July 24, 1997, provides further guidance on crash testing requirements of longitudinal barriers.

Description
Per the submitted crash test report, the Low Tension Cable Guardrail End Terminal system is designed for low tension cable guardrail systems. The total length of the installation was 254 feet and consisted of four major structural components: (1) Wire ropes; (2) posts; (3) cable compensator assemblies, and (4) anchor assemblies. The design details of this system are included as an enclosure to this correspondence. Three 3/4-inch diameter cables comprised of 3 x 7 wire rope used for the rail elements. The cable rails were supported by nineteen posts with an upper cable mounting height of 30 inches, a middle mounting height of 27 inches, and a lower mounting height of 24 inches. The cables were tightened through the use of cable compensators. The ends of the cables were threaded rods that terminated in the cable anchor. The threaded rods were attached to the cable anchor by three 2-inch diameter galvanized washers and two 3/4-inch

diameter galvanized Grade 5 heavy hex nuts. The anchor bracket posts, post number 1 and 19, were 96-inch long W6 x 25 sections with a 24-inch x 24-inch soil plate welded along the downstream flange of the post. The anchor post was embedded to a depth of 96-inches. A 141/2-inch x 9-inch x 1/2 –inch plate was welded to the top of the anchor post to which the cable anchor bracket was bolted with four 2/4-in x 2-1/2-inch Grade 5 hex head bolts. Post Numbers 2 and 18 were configured with S3 x 5.7 sections measuring 30 inches long for the slip post and W6 x 9 sections measuring 72 inches long for the foundation posts. The foundation post was embedded to a depth of 70 inches. A slip base plate was welded to the bottom of the skip post and the top of the foundation post. Four 1/2-inch x 2-inch ASTM A307 bolts with nuts and washers were used to form the slip base configuration. Post Numbers 3 through 7 were configured with S3 x 5.7 sections measuring 30 inches long for the slip post and W6 x 9 sections measuring 72 inches long for the foundation posts. The foundation post was embedded to a depth of 70 inches. A slip base plate was welded to the bottom of the slip post and the top of the foundation post. Four 1/2-inches x 2-inch ASTM A307 bolts with nuts and washers were used to form the slip base configuration. The line posts, post numbers 8 through 17, consisted of 63-inch long S3 x 5.7 sections, with 30-inch embedment depth and a 8-inch x 24-inch x 1/4-inch soil plate welded along the back flange of the post. These line posts were spaced 16-ft. on center with a soil plate embedment depth of 30 inches. The top cable hook was located 3-1/2 inches down from the top of the post with the middle and lower cable hooks 6 ½-inches and 9-1/2-inches for the top of the post, respectively.

A steel cable anchor bracket was bolted to the top base plate of the steel anchor post. The steel cable anchor bracket was modified from existing designs in order to accept a new, fabricated steel cable release lever device. The cable release lever consisted of a pair of 17-inch long 1-1/4-inch x 1-1/4-inch x 3/16-inch vertical tubes mounted 2 inches apart on a 9-inch x 3-inch x 1/2-inch steel plate. The cable release lever was implemented in order to dislodge and release the wire rope cables during end-on vehicular impacts with the end terminal system. The steel cable anchor bracket was designed to accept the ends of the three 3/4-in. diameter by 3 x 7 wire rope cables. A 0.375-inch diameter, 32-inch long 7 x 19 galvanized aircraft cable was added to retain the cable release lever to the anchor bracket upon impact.

Crash Testing

Per the submitted crash test report, the following physical crash testing was conducted:

A. **Test 3-30 (820C/ 100km/hr. / 0 degrees with 1/4-point offset).**

B. **Test 3-35 (2000P/ 100 km/hr. / 20 degrees).**

In addition, the following tests are requested to be waived per the following comparisons:

Test Number	Test Level	Requested Comparison
3-31	TL-3	Not necessary since Test 3-30 is considered worst case.
3-32	TL-3	Not necessary since Test 3-30 is considered worst case; and similar to prior successful Crash Test No. 104 on New York Department of Transportation (NYDOT) terminal design.
3-33	TL-3	Not necessary since Test 3-30 is considered worst case.
3-34	TL-3	Not necessary due to equivalence to a prior successful crash testing of similar NYDOT terminal design tested at 20 degrees.
3-39	TL-3	Not necessary due to equivalence to prior successful crash testing of two small car tests (Tests No. 98 and 404211-6) performed on the reverse direction of similar NYDOT design.

Findings

The FHWA concurs to the submitted physical crash testing and to requested comparisons relating to the proposed TL-3 Low Tension Cable Guardrail End Terminal. Therefore, the TL-3 Low Tension Cable Guardrail End Terminal System meets the TL-3 impact conditions and evaluation criteria for a NCHRP 350 Terminals, and is acceptable for use on the NHS when requested by a highway agency.

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

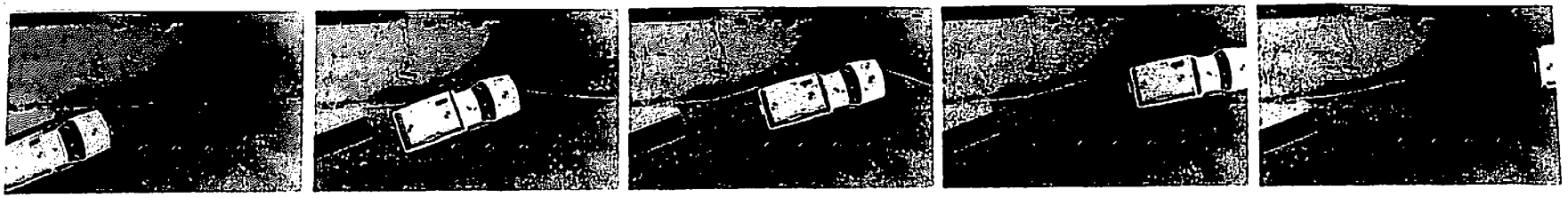
- This acceptance is limited to the crashworthiness characteristics of the devices and does not cover their structural features, nor conformity with the Manual on Uniform Traffic Control Devices.
- Any changes that may adversely influence the crashworthiness of the device will require a new acceptance letter.
- Should the FHWA discover that the qualification testing was flawed, that in-service performance reveals unacceptable safety problems, or that the device 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 Manual for Assessing Safety Hardware.
- To prevent misunderstanding by others, this letter of acceptance is designated as number CC-111 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 TL-3 Low Tension Cable Guardrail End Terminal system is non-proprietary. Therefore FHWA regulations concerning proprietary products are contained in Title 23, Code of Federal Regulations, Section 635.411 are non-applicable.
- This acceptance letter shall not be construed as authorization or consent by the FHWA to use, manufacture, or sell any patented device for which the applicant is not the patent holder. The acceptance letter is limited to the crashworthiness characteristics of the candidate device, 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,

Michael S. Griffith
Director, Office of Safety Technologies
Office of Safety

2 Enclosures



- Test Agency ..... MwRSF
- Test Number CT-1
- Date 7/3/2002
- NCHRP 350 Test Designation 3-35
- Appurtenance ..... Cable Guardrail End Terminal System
- Total Length ..... 254 ft
- Key Elements - Wire Rope
  - Diameter ..... 0.75 in.
  - Size 7x19
  - Top Mounting Height ..... 30 in.
  - Spacing ..... 3 in.
- Key Elements - Cable Anchor Post
  - Post Nos. 1 and 19 ..... W6x25 by 96 in. long
  - Post Nos. 2 and 18 ..... S3x5.7 by 30 in. long with W6x9 by 72 in. long
- Key Elements - Line Post
  - Post Nos. 3-17 ..... S3x5.7 by 63 in. long
  - Post Spacing ..... 16 ft
- Test Vehicle
  - Type/Designation 2000P
  - Make and Model ..... 1996 GMC 2500 ¾-ton pickup
  - Curb ..... 4,363 lb
  - Test Inertial ..... 4,448 lb
  - Gross Static ..... 4,448 lb
- Impact Conditions
  - Speed ..... 63.3 mph
  - Angle ..... 20.7 degrees
  - Impact Location ..... Centerline of Post No. 2
- Exit Conditions
  - Speed ..... 59.6 mph
  - Angle ..... 4 degrees
  - Exit Box Criterion ..... Pass
- Post-Impact Trajectory
  - Vehicle Stability ..... Satisfactory
  - Stopping Distance ..... 464 ft-1 in. downstream 32 ft-9 in. traffic-side face
- Occupant Impact Velocity
  - Longitudinal ..... 6.04 ft/s < 39.37 ft/s
  - Lateral (not requried) ..... 9.45 ft/s < 39.37 ft/s
- Occupant Ridedown Deceleration
  - Longitudinal ..... 4.55 Gs < 20 Gs
  - Lateral (not required) ..... 7.00 Gs < 20 Gs
- Test Article Damage ..... Moderate
- Test Article Deflections
  - Permanent Set ..... 23.0 in.
  - Dynamic ..... 25.8 in.
  - Working Width ..... 84.1 in.
- Vehicle Damage ..... Minimal
  - VDS[7] 11-LFQ-2/11-LD-2
  - CDC[8] 11-LDES3
  - Maximum Deformation ..... 0.25 in.

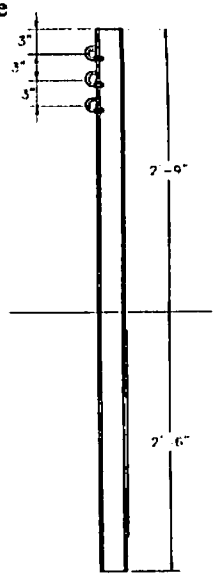
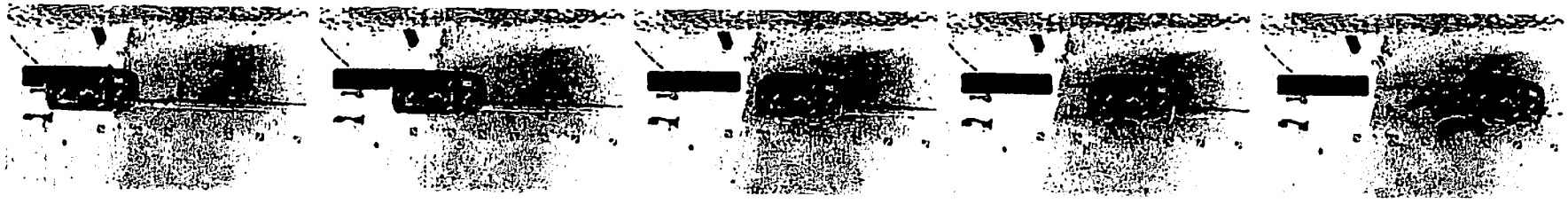
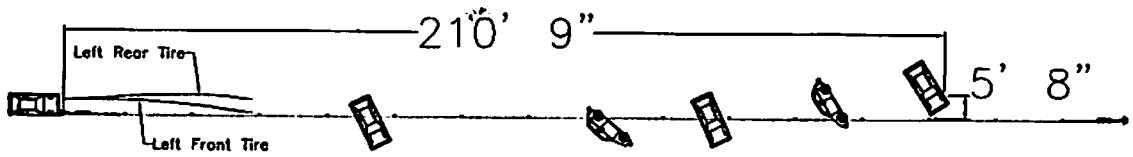


Figure B-1. Summary of Test Results and Sequential Photographs (English), Test No. CT-1

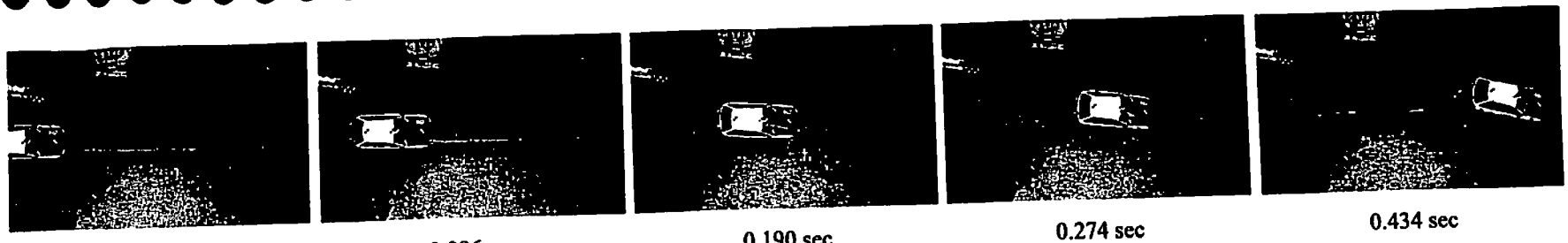


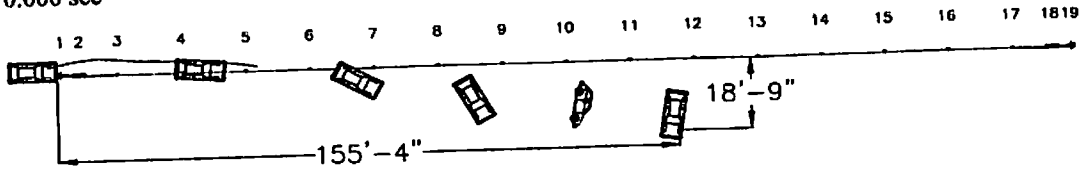
0.000 sec 0.054 sec 0.132 sec 0.166 sec 0.259 sec

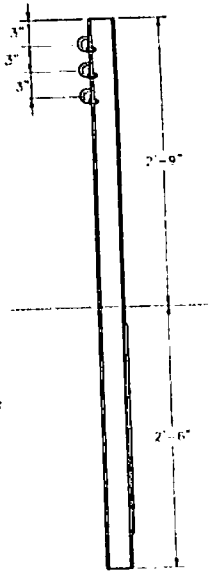


- Test Agency ..... MwRSF
- Test Number CT-2
- Date 7/16/2002
- NCHRP 350 Test Designation 3-30
- Appurtenance ..... Cable Guardrail End Terminal
- Total Length ..... 254 ft
- Key Elements - Wire Rope
  - Diameter ..... 0.75 in.
  - Size 7x19
  - Top Mounting Height ..... 30 in.
  - Spacing ..... 3 in.
- Key Elements - Cable Anchor Post
  - Post Nos. 1 and 19 ..... W6x25 by 96 in. long
  - Post Nos. 2 and 18 ..... S3x5.7 by 30 in. long with W6x9 by 72 in. long
- Key Elements - Line Post
  - Post Nos. 3-17 ..... S3x5.7 by 63 in. long
  - Post Spacing ..... 16 ft
- Test Vehicle
  - Type/Designation 820C
  - Make and Model ..... 1995 Geo Metro
  - Curb ..... 1,553 lb
  - Test Inertial ..... 1,799 lb
  - Gross Static ..... 1,965 lb
- Impact Conditions
  - Speed ..... 62.1 mph
  - Angle ..... 1.5 degrees
  - Impact Location ..... Centerline of Post No. 1
- Exit Conditions
  - Speed ..... N/A
  - Angle ..... N/A
  - Exit Box Criterion ..... N/A
- Post-Impact Trajectory
  - Vehicle Stability ..... Unsatisfactory
  - Stopping Distance ..... 210 ft - 9 in. downstream 5 ft - 8 in. traffic-side face
- Occupant Impact Velocity
  - Longitudinal ..... 9.81 ft/s < 39.37 ft/s
  - Lateral ..... -0.39 ft/s < 39.37 ft/s
- Occupant Ridedown Deceleration
  - Longitudinal ..... 5.37 Gs < 20 Gs
  - Lateral ..... 3.99 Gs < 20 Gs
- Test Article Damage ..... Moderate
- Test Article Deflections
  - Permanent Set ..... N/A
  - Dynamic ..... N/A
  - Working Width ..... N/A
- Vehicle Damage ..... Extensive
  - VDS[7] ..... 12-L&D-6
  - CDC[8] 12-TDD08
  - Maximum Deformation ..... N/A

Figure B-2. Summary of Test Results and Sequential Photographs (English), Test No. CT-2

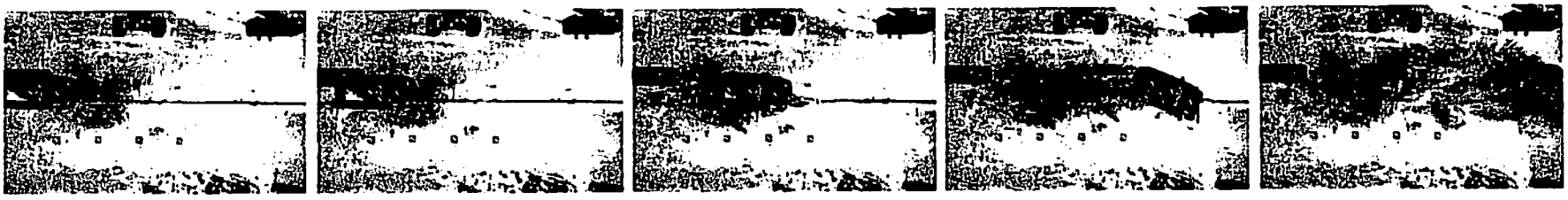






- Test Agency ..... MwRSF
- Test Number CT-3
- Date 10/10/2003
- NCHRP 350 Test Designation 3-30
- Appurtenance ..... Cable Guardrail End Terminal
- Total Length ..... 254 ft
- Key Elements - Wire Rope
  - Diameter ..... 0.75 in.
  - Size 7x19
  - Top Mounting Height ..... 30 in.
  - Spacing ..... 3 in.
- Key Elements - Cable Anchor Post
  - Post Nos. 1 and 19 ..... W6x25 by 96 in. long
  - Post Nos. 2 and 18 ..... S3x5.7 by 30 in. long with W6x9 by 72 in. long
- Key Elements - Line Post
  - Post Nos. 3-17 ..... S3x5.7 by 63 in. long
  - Post Spacing ..... 16 ft
- Test Vehicle
  - Type/Designation 820C
  - Make and Model ..... 1998 Geo Metro
  - Curb ..... 1,532 lb
  - Test Inertial ..... 1,786 lb
  - Gross Static ..... 1,952 lb
- Impact Conditions
  - Speed ..... 58.9 mph
  - Angle ..... 0.1 degrees
  - Impact Location ..... Centerline of Post No. 1
- Exit Conditions
  - Speed ..... N/A
  - Angle ..... N/A
  - Exit Box Criterion ..... N/A
- Post-Impact Trajectory
  - Vehicle Stability ..... Unsatisfactory
  - Stopping Distance ..... 154 ft-10.5 in. downstream 18 ft-10 in. traffic-side face
- Occupant Impact Velocity
  - Longitudinal ..... 11.03 ft/s < 39.37 ft/s
  - Lateral ..... -0.71 m/s < 39.37 ft/s
- Occupant Ridedown Deceleration
  - Longitudinal ..... 9.56 Gs < 20 Gs
  - Lateral ..... -13.72 Gs < 20 Gs
- Test Article Damage ..... Moderate
- Test Article Deflections
  - Permanent Set ..... N/A
  - Dynamic ..... N/A
  - Working Width ..... N/A
- Vehicle Damage ..... Extensive
  - VDS[7] ..... 12-L&T-6
  - CDC[8] 12-TDD08
  - Maximum Deformation ..... N/A

Figure B-3. Summary of Test Results and Sequential Photographs, Test No. CT-3



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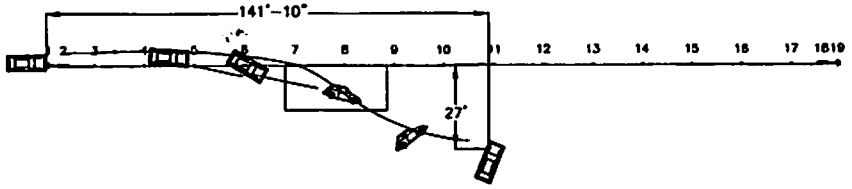
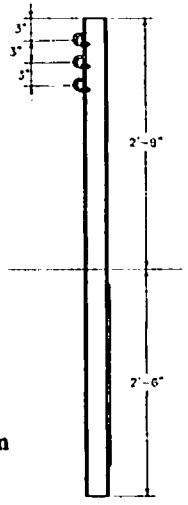
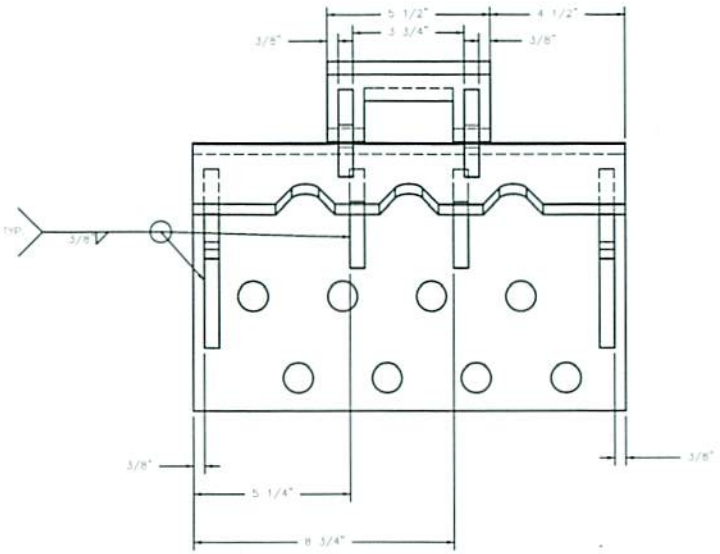


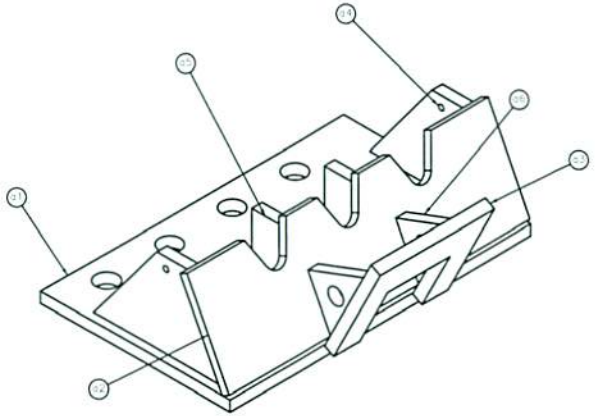


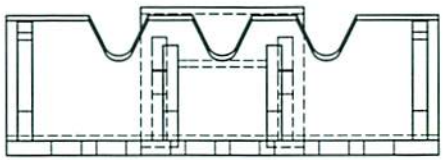
- Test Agency ..... MwRSF
- Test Number CT-4
- Date 6/8/2005
- NCHRP 350 Test Designation 3-30
- Appurtenance ..... Cable Guardrail End Terminal
- Total Length ..... 254 ft
- Key Elements - Wire Rope
  - Diameter ..... 0.75 in.
  - Size 7x19
  - Top Mounting Height ..... 30 in.
  - Spacing ..... 3 in.
- Key Elements - Cable Anchor Post
  - Post Nos. 1 and 19 ..... W6x25 by 96 in. long
  - Post Nos. 2 and 18 ..... S3x5.7 by 30 in. long with W6x9 by 96 in. long
- Key Elements - Line Post
  - Post Nos. 11-17 ..... S3x5.7 by 63 in. long
  - Post Spacing ..... 16 ft
- Test Vehicle
  - Type/Designation 820C
  - Make and Model ..... 1998 Geo Metro
  - Curb ..... 1,720 lb
  - Test Inertial ..... 1,795 lb
  - Gross Static ..... 1,961 lb
- Impact Conditions
  - Speed ..... 61.1 mph
  - Angle ..... 0.1 degrees
  - Impact Location ..... Centerline of Post No. 1
- Exit Conditions
  - Speed ..... 46.4 mph
  - Angle ..... 13 degrees
  - Exit Box Criterion ..... Fail
- Post-Impact Trajectory
  - Vehicle Stability ..... Satisfactory
  - Stopping Distance ..... 141 ft - 10 in. downstream 27 ft traffic-side face
- Occupant Impact Velocity
  - Longitudinal ..... 11.41 ft/s < 39.37 ft/s
  - Lateral ..... -2.54 ft/s < 39.37 ft/s
- Occupant Ridedown Deceleration
  - Longitudinal ..... 7.85 Gs < 20 Gs
  - Lateral ..... -3.48 Gs < 20 Gs
- Test Article Damage ..... Moderate
- Test Article Deflections
  - Permanent Set ..... N/A
  - Dynamic ..... N/A
  - Working Width ..... 254.8 in.
- Vehicle Damage ..... Minimal
  - VDS[7] 12-FD-1
  - CDC[8] 12-FDEN-9
  - Maximum Deformation ..... 0.25 in.

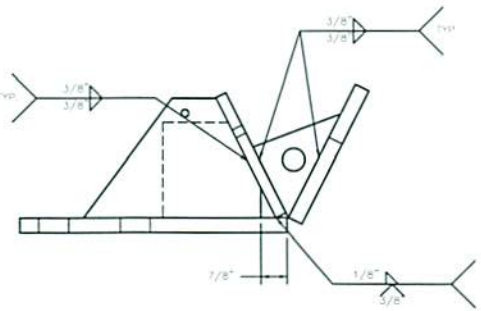
Figure B-4. Summary of Test Results and Sequential Photographs (English), Test No. CT-4

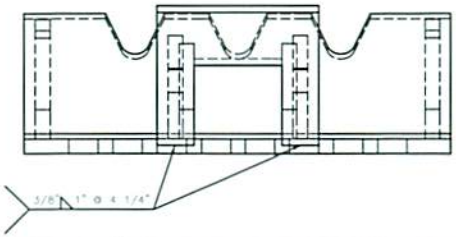
Low Tension CAble Release Bracket					
Item No.	Description	QTY.	Material Spec	Comment	File Name
a1	Anchor Bracket Plate	1	A36	-	LT_Cable_Term_Anchor_Bracket_Plate
a2	Cable Plate	1	A36	-	LT_Cable_Term_Cable_Plate
a3	Release Lever Plate	1	A36	-	LT_Cable_Term_Release_Lever_Plate
a4	Exterior Cable Plate Gusset	2	A36	-	LT_Cable_Term_exterior_gusset
a5	Cable Plate Interior Gusset	2	A36	-	LT_Cable_Term_interior_gusset
a6	Release Lever Plate Gusset	2	A36	-	LT_Cable_Term_Release_Lever_Plate_Gusset











Midwest Roadside Safety Facility

Low Tension Cable Bracket – CT-4

Assembled Bracket

SHEET: 1 of 2

DATE: 4/29/2015

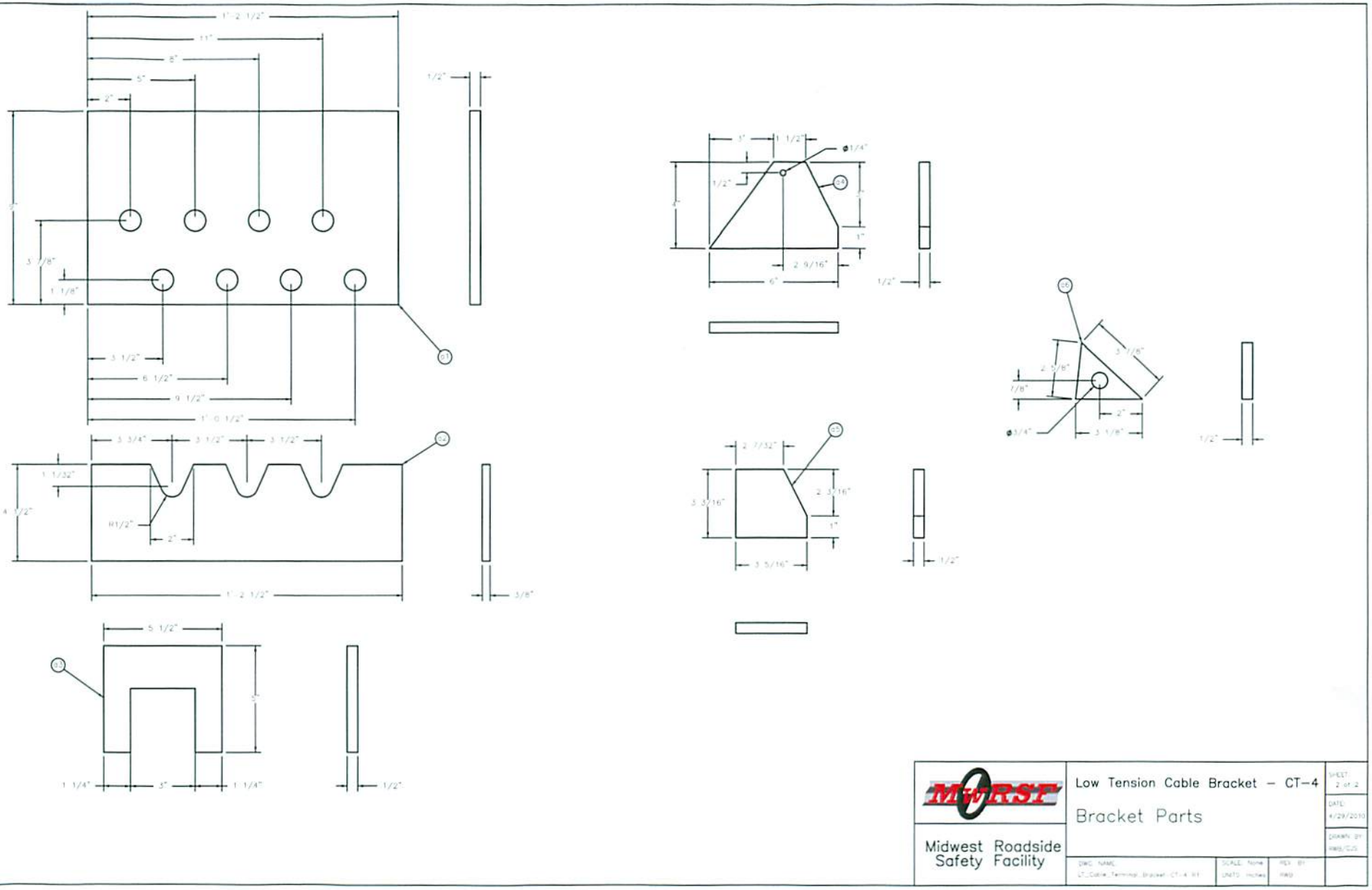
DRAWN BY: RWB/CJS

DWG. NAME: LT_Cable_Terminal_Bracket-CT-4_R1

SCALE: None

UNITS: Inches

REV. BY: RWB



Midwest Roadside Safety Facility

Low Tension Cable Bracket – CT-4

Bracket Parts

SHEET: 2 of 2

DATE: 4/29/2010

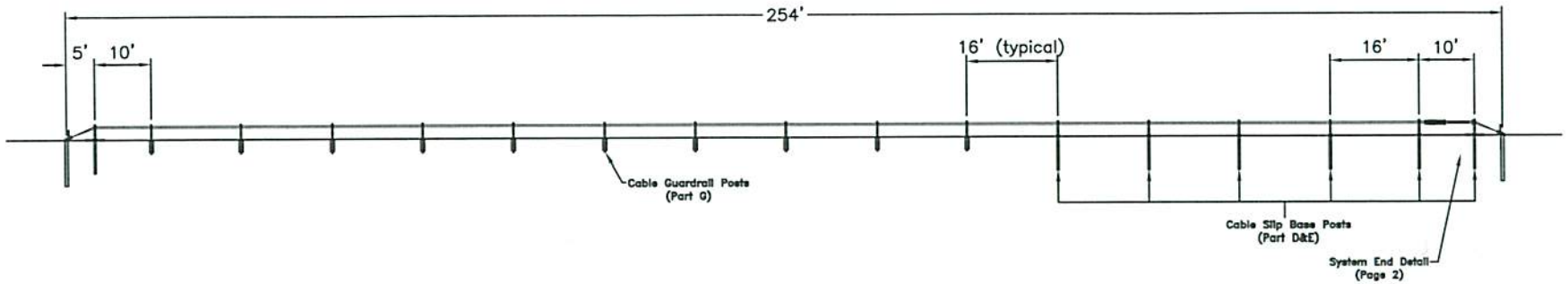
DRAWN BY: RWB/CJS

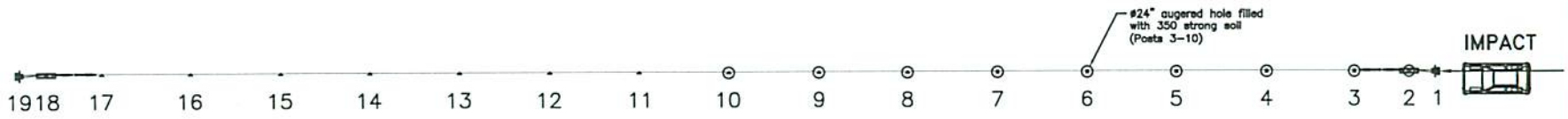
DWG. NAME: CT_Cable_Terminal_Bracket_CT-4_R1

SCALE: None

UNITS: Inches

REV. BY: RWB





Midwest Roadside Safety Facility

Cable Guardrail End Terminal
CT-4

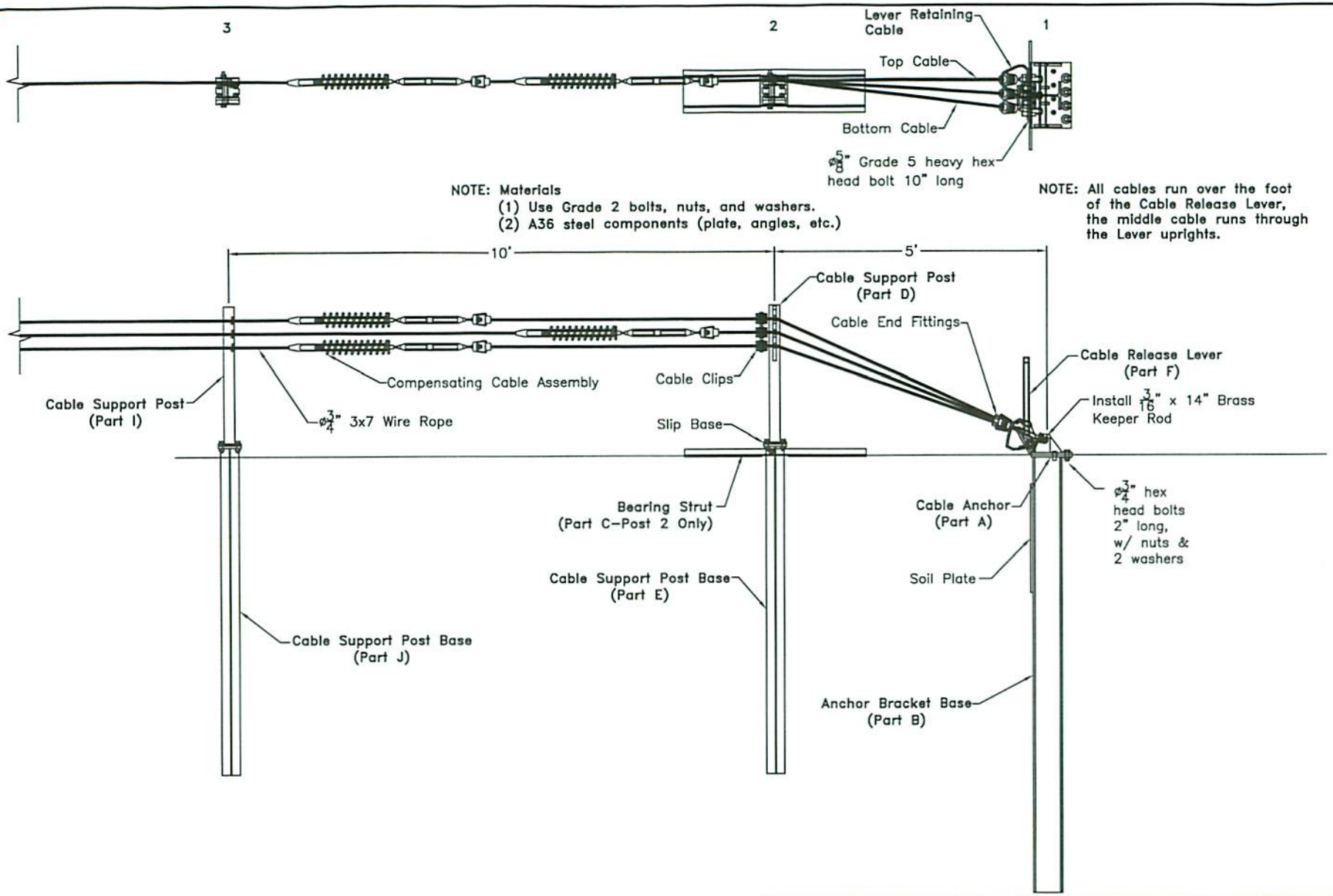
System Layout

Drawing Name: CT-4 R6.dwg	Scale: None	Rev: KAP/JCH

Sheet: 1 of 16

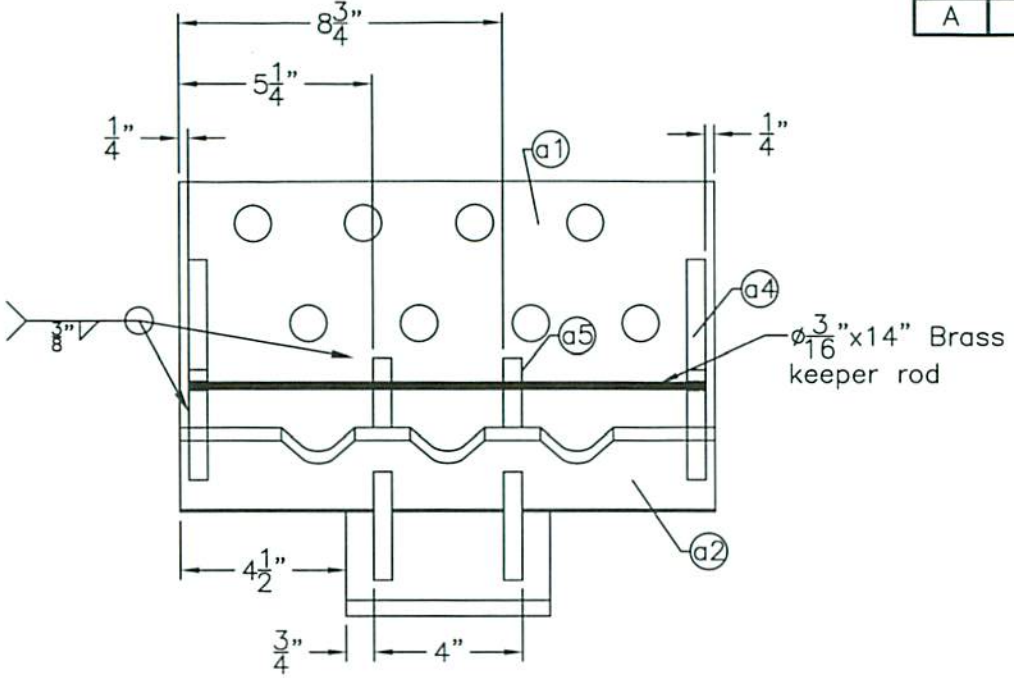
Date: 7/18/2007

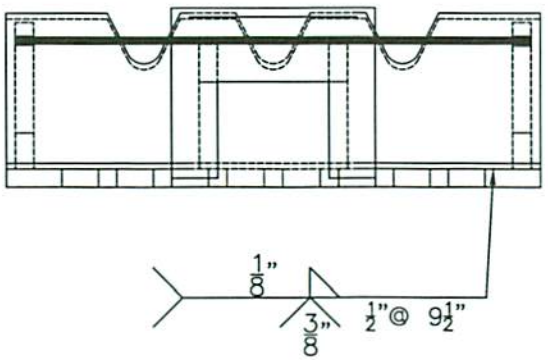
By: GEP



Midwest Roadside Safety Facility	Cable Guardrail End Terminal CT-4 System End		Sheet: 2 of 16 Date: 7/18/2007 By: GEP
	Drawing Name: CT-4 R6.dwg	Scale: 1=30	Rev: KAP/JCH

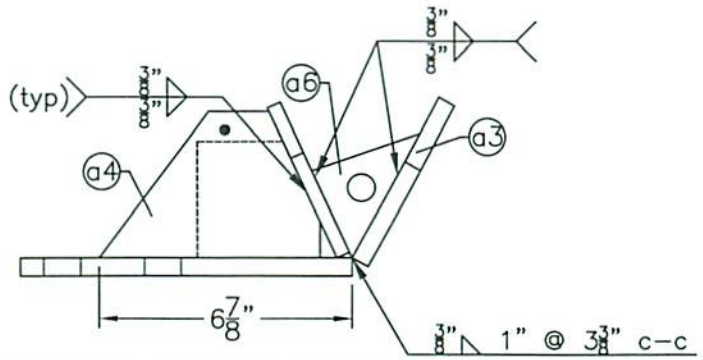
ITEM	QTY	DESCRIPTION	MATERIAL
A	2	Cable Anchor Bracket	XXX





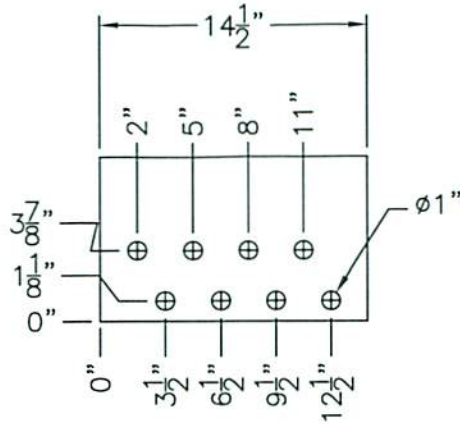
Cable Anchor Bracket (Part A)

Note: The lever retaining cable used was ø3/8", 7x19 galvanized aircraft cable, 36" long with 3" long loops and 1" long clip.

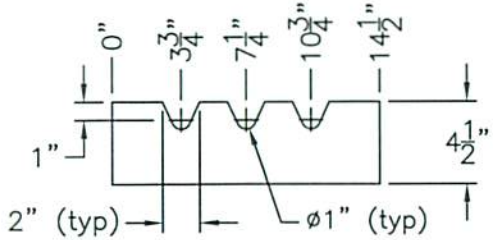


Midwest Roadside Safety Facility	Cable Guardrail End Terminal CT-4 Cable Anchor Bracket		Sheet: 3 of 16 Date: 7/18/2007 By: GEP
	Drawing Name: CT-4 R6.dwg	Scale: 1=10	Rev: KAP/JCH

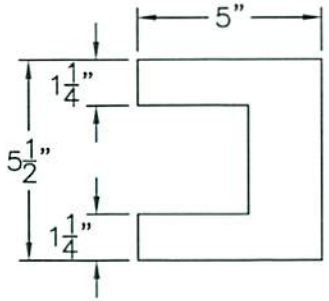
ITEM	QTY	DESCRIPTION	MATERIAL
a1	2	Anchor Plate	A36 13mm Plate
a2	2	Cable Plate	A36 9.5mm Plate
a3	2	Release Lever Plate	A36 13mm Plate
a4	4	Ext. Cable Plt Gusset	A36 13mm Plate
a5	6	Int. Cable Plt Gusset	A36 13mm Plate
a6	2	Release Lever Plt Gusset	A36 13mm Plate



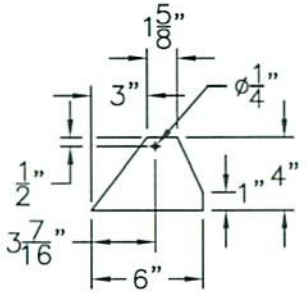
Anchor Bracket Plate
(Part a1)



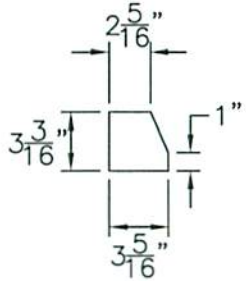
Cable Plate
(Part a2)



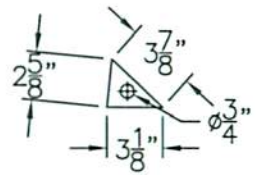
Release Lever Plate
(Part a3)
Scale: 1"=5"



Exterior Cable Plate Gusset
(Part a4)



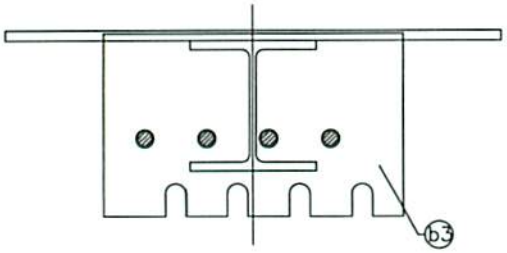
Interior Cable Plate Gusset
(Part a5)



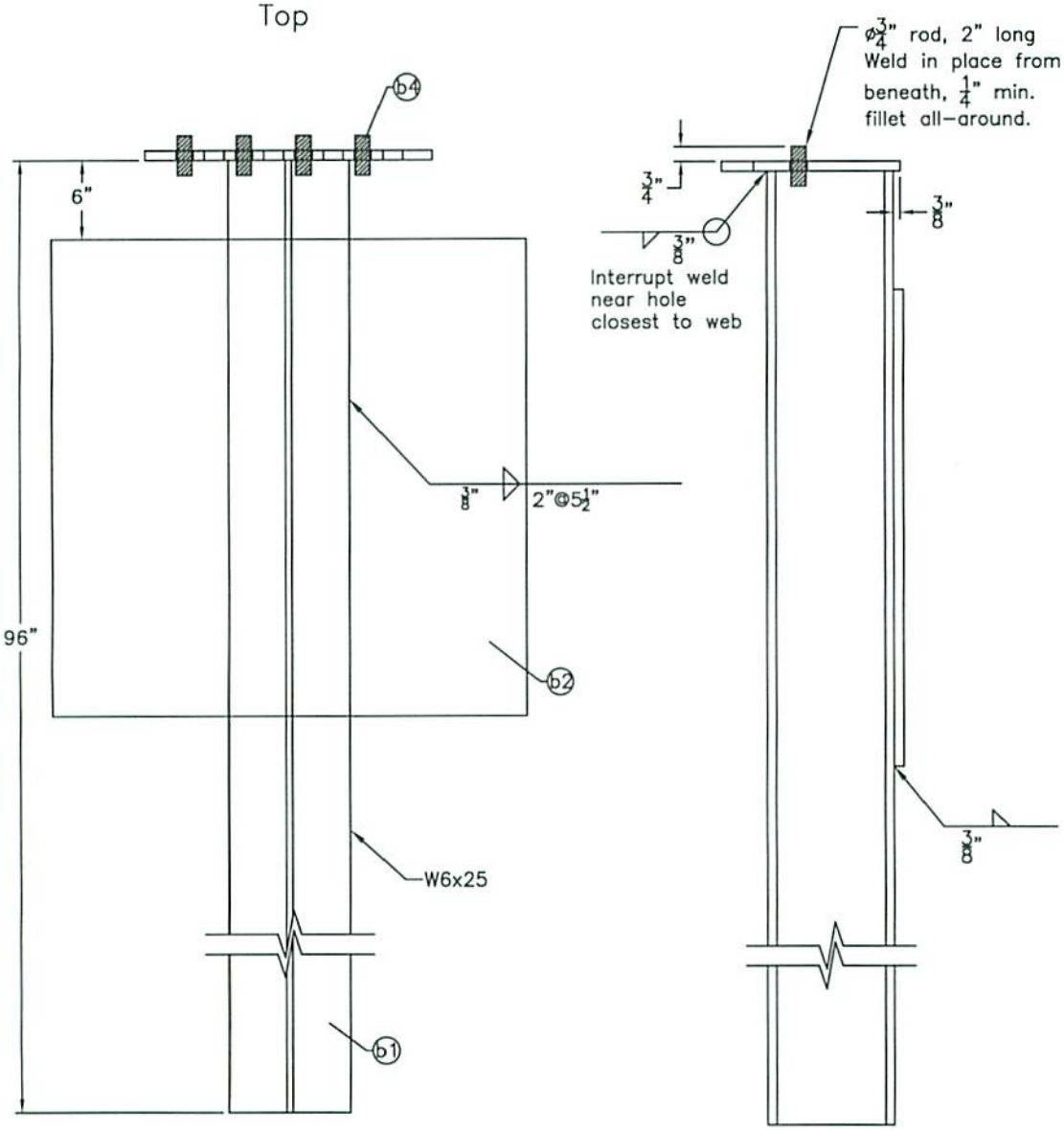
Release Lever Plate Gusset
(Part a6)

Midwest Roadside Safety Facility	Cable Guardrail End Terminal CT-4 Cable Anchor Bracket Parts		Sheet: 4 of 16 Date: 7/18/2007 By: GEP
	Drawing Name: CT-4 R6.dwg	Scale: 1=10	Rev: KAP/JCH

ITEM	QTY	DESCRIPTION	MATERIAL
B	2	Anchor Bracket Base	XXX



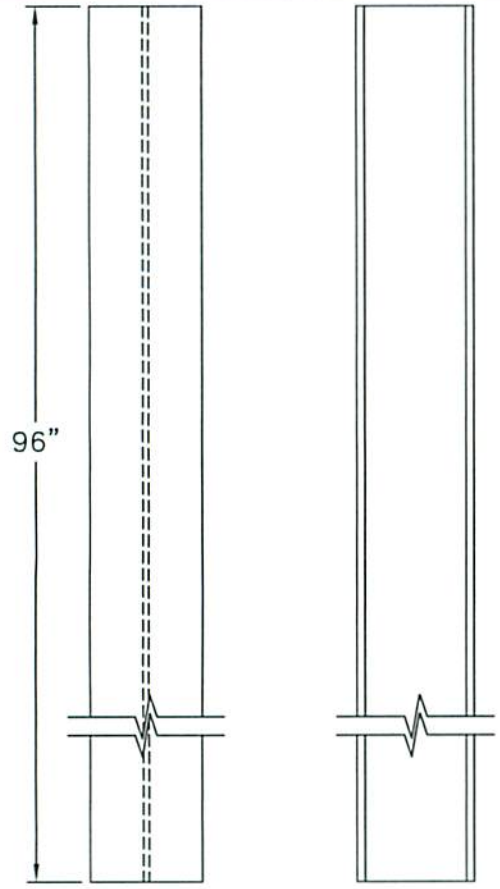
Top



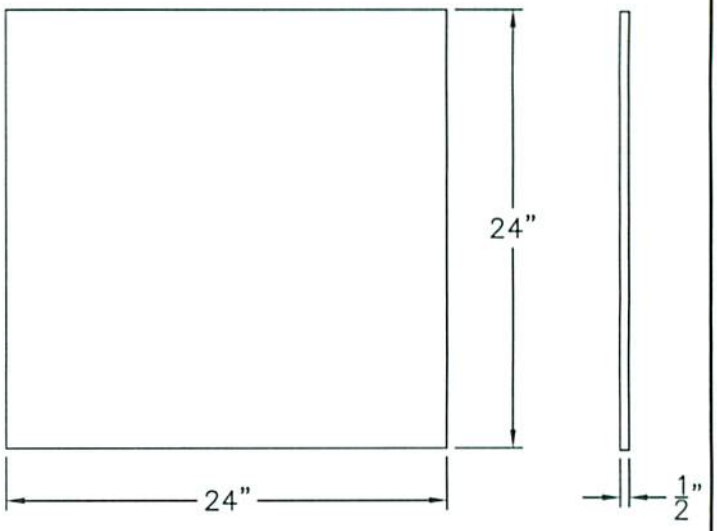
Anchor Bracket Base
(Part B)

Midwest Roadside Safety Facility	Cable Guardrail End Terminal CT-4 Anchor Bracket Base		Sheet: 5 of 16 Date: 7/18/2007 By: GEP
	Drawing Name: CT-4 R6.dwg	Scale: None	Rev: KAP/JCH

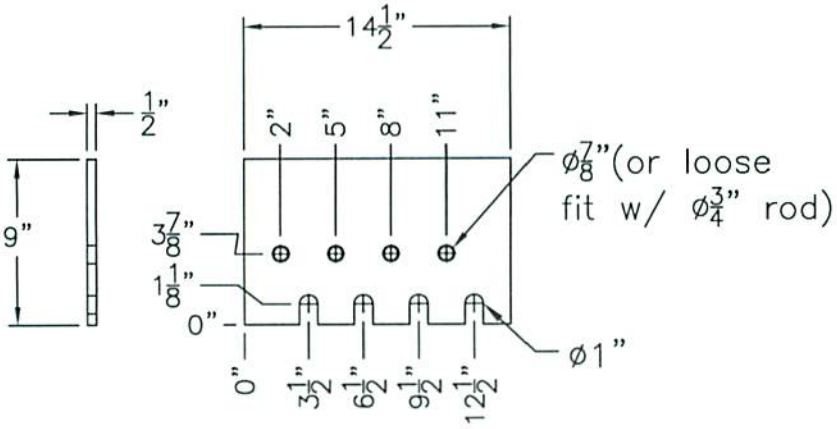
ITEM	QTY	DESCRIPTION	MATERIAL
b1	2	W152x37.2 Post	XXX
b2	2	Soil Plate	XXX
b3	2	Anchor Base Plate	XXX
b4	8	19mm Dia. Rod	XXX



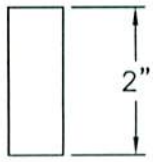
W6x25 Post
(Part b1)



Soil Plate
(Part b2)



Anchor Base Plate
(Part b3)

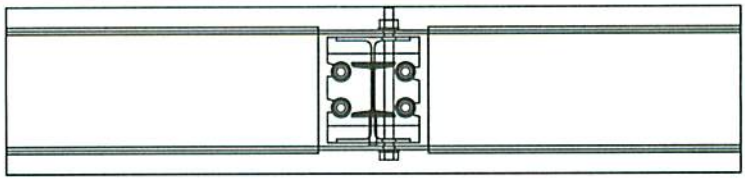


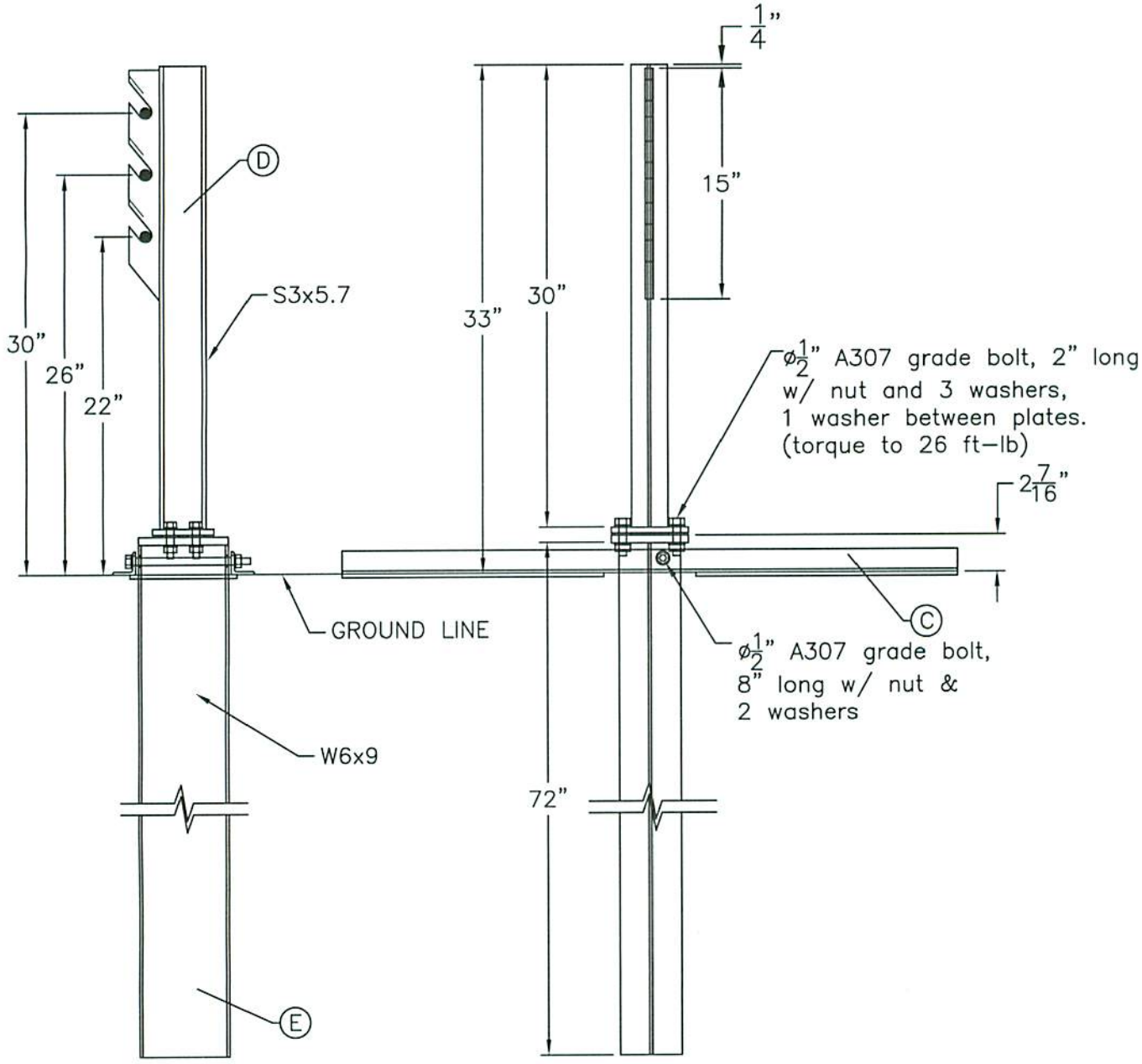
Side View

Ø3/4" Rod
(Part b4)

Scale: 1"=4"

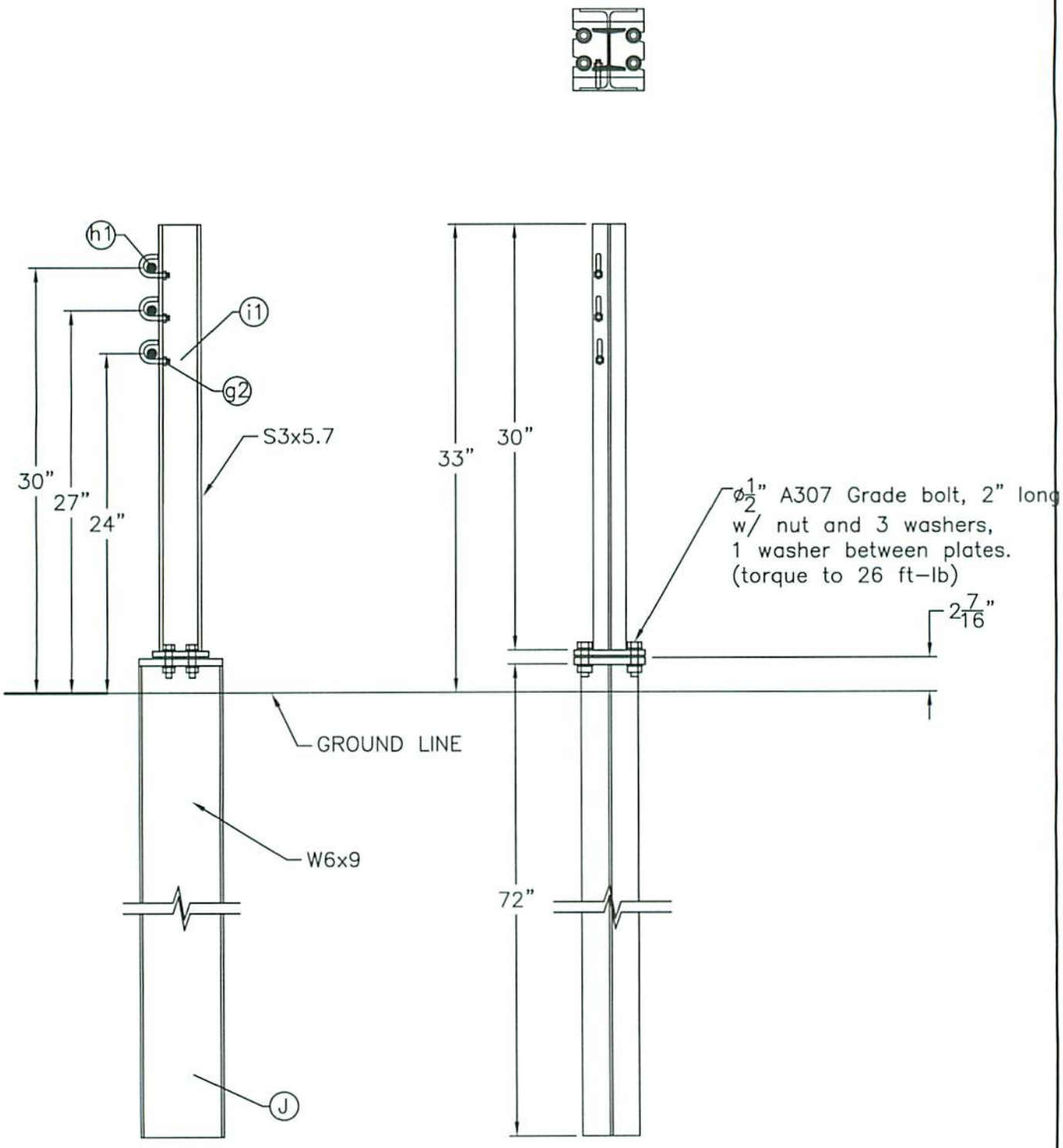
Midwest Roadside Safety Facility	Cable Guardrail End Terminal CT-4 Anchor Bracket Base Parts		Sheet: 6 of 16 Date: 7/18/2007 By: GEP
	Drawing Name: CT-4 R6.dwg	Scale: 1=10	Rev: KAP/JCH





Base and Bearing Strut
Assembly with Cable Support Post
Post 2

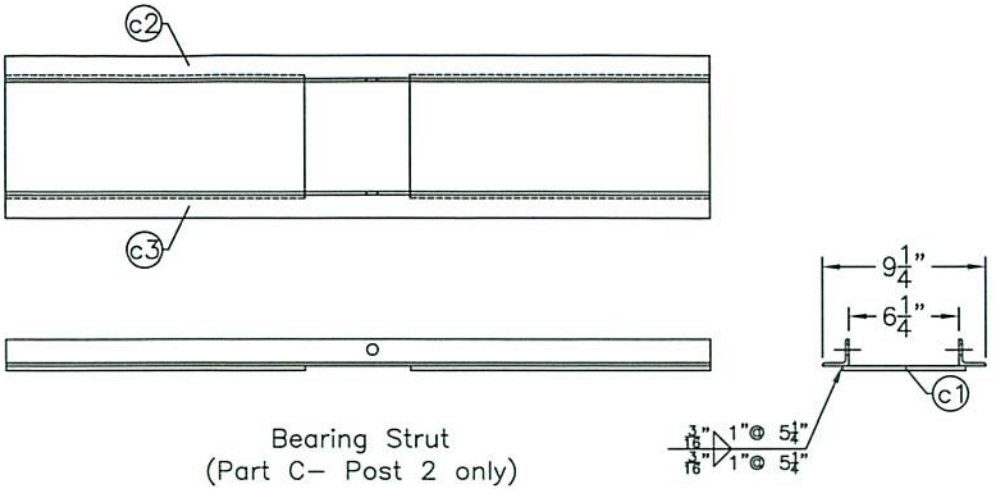
Midwest Roadside Safety Facility	Cable Guardrail End Terminal CT-4 Cable Support Post Assembly Post 2		Sheet: 7 of 16 Date: 7/18/2007 By: GEP
	Drawing Name: CT-4 R6.dwg	Scale: 1=10	Rev: KAP/JCH



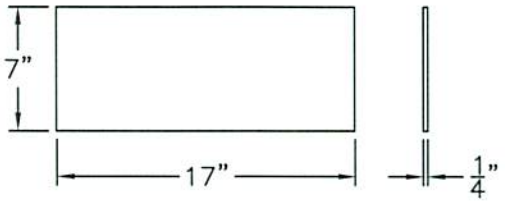
Base and Bearing Strut
Assembly with Cable Support Post
Posts 3-7

MwRSF Midwest Roadside Safety Facility	Cable Guardrail End Terminal CT-4 Cable Support Post Assembly Posts 3-7		Sheet: 8 of 16 Date: 7/18/2007 By: GEP
	Drawing Name: CT-4 R6.dwg	Scale: 1=10	Rev: KAP/JCH

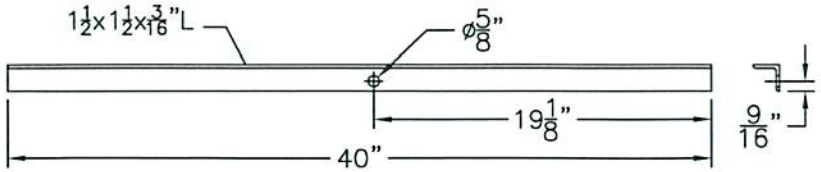
ITEM	QTY	DESCRIPTION	MATERIAL
C	2	Bearing Strut	XXX
c1	2	Bearing Plate	XXX
c2	2	Bearing Plate Brace	XXX
c3	2	Bearing Plate Brace	XXX



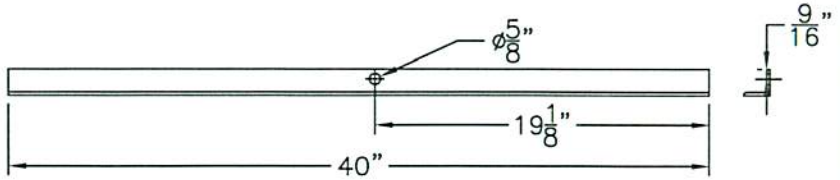
Bearing Strut
(Part C– Post 2 only)



Bearing Plate
(Part c1)



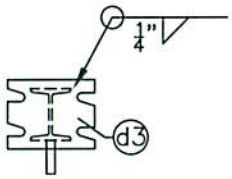
Bearing Plate Brace
(Part c2)

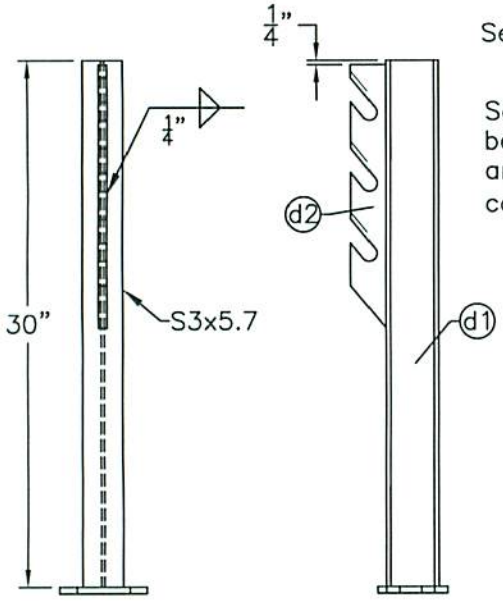


Bearing Plate Brace
(Part c3)

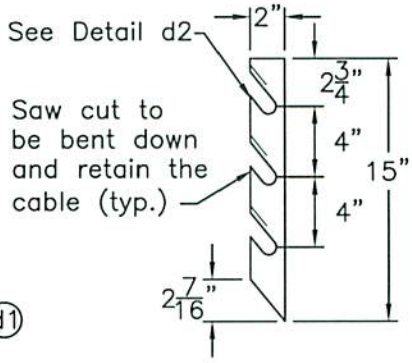
Midwest Roadside Safety Facility	Cable Guardrail End Terminal CT-4 Bearing Strut		Sheet: 9 of 16 Date: 7/18/2007 By: GEP
	Drawing Name: CT-4 R6.dwg	Scale: 1=10	Rev: KAP/JCH

ITEM	QTY	DESCRIPTION	MATERIAL
D	2	Cable Support Post	XXX
d1	2	S76x8.5 Post	XXX
d2	2	Cable Bracket	A36 13mm Plate
d3	7	Slip Plate	A36 9.5mm Plate

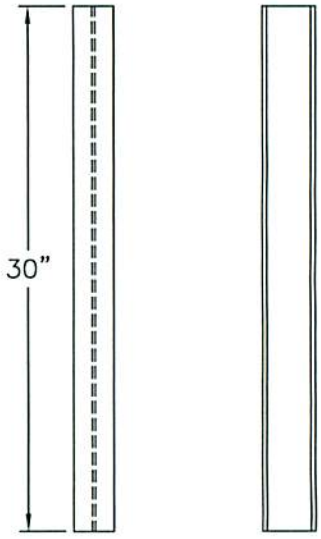




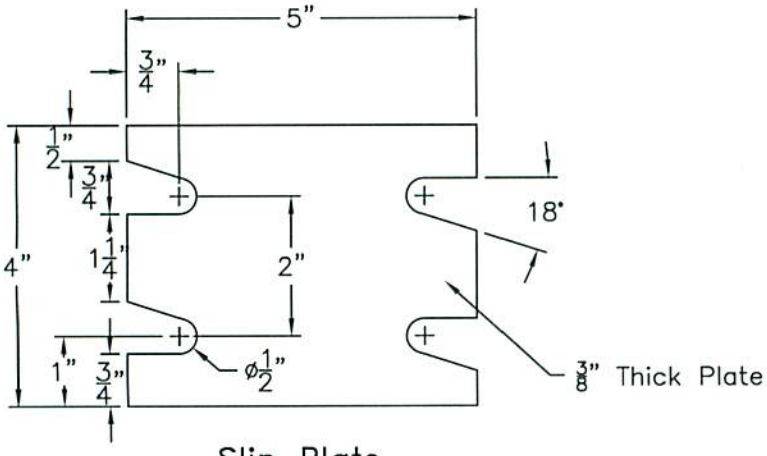
Cable Support Post
(Part D)



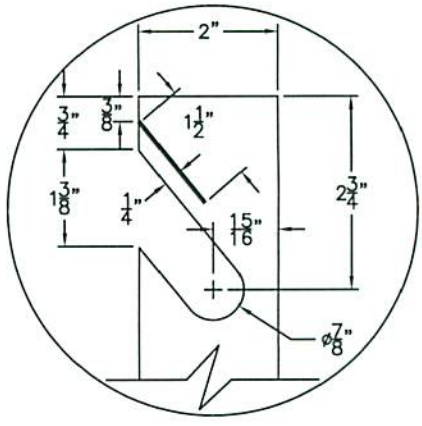
Cable Bracket
(Part d2)



S3x5.7 Post
(Part d1)



Slip Plate
for S3x5.7 Post
(Part d3)
Scale: 1"=4"

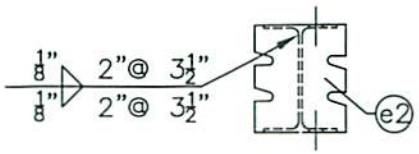


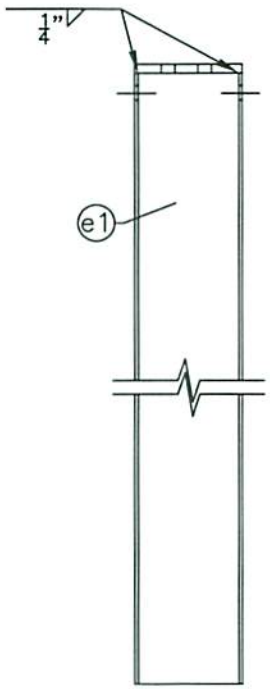
Detail d2
Scale: 1"=5"

Midwest Roadside Safety Facility

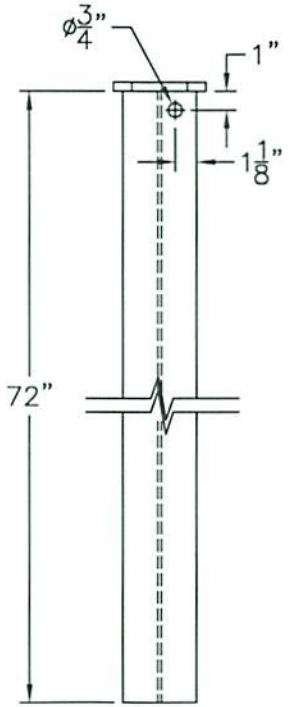
Cable Guardrail End Terminal CT-4 Cable Support Post Post 2		Sheet: 10 of 16 Date: 7/18/2007 By: GEP
Drawing Name: CT-4 R6.dwg	Scale: 1=10	Rev: KAP/JCH

ITEM	QTY	DESCRIPTION	MATERIAL
E	2	Cable Support Base	XXX
e1	2	W152x13.4 Post	XXX
e2	7	Base Slip Plate	A36 13mm Plate

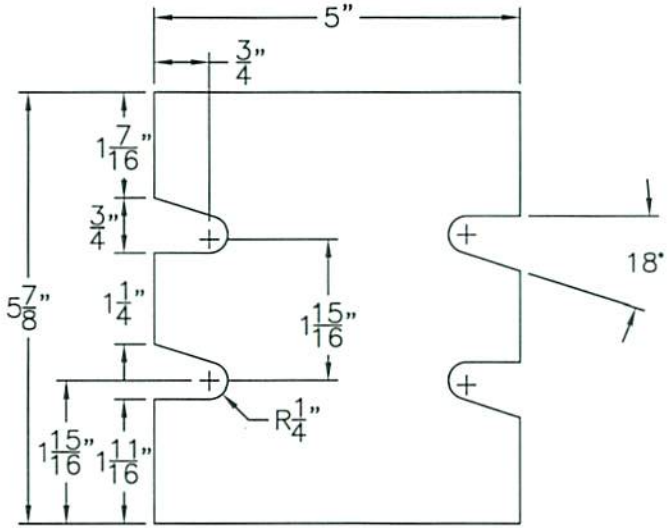




W6x9 Cable
Support Base
(Part E)



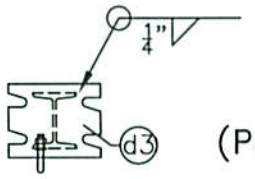
W6x9
Post (Part e1)



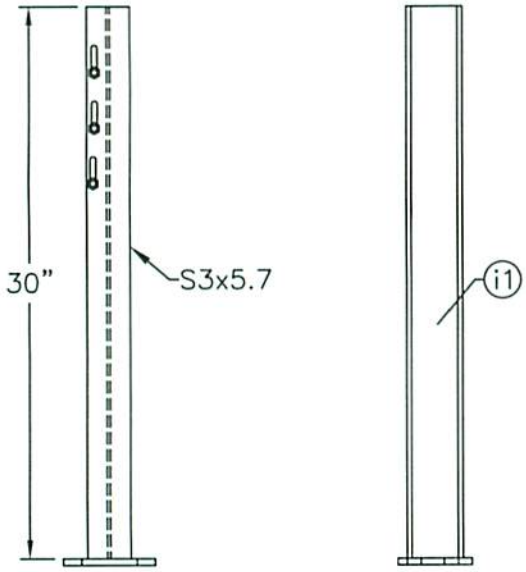
Slip Plate
for W6x9 Base
(Part e2)
Scale: 1"=4"

Midwest Roadside Safety Facility	Cable Guardrail End Terminal CT-4 Cable Support Base Post 2		Sheet: 11 of 16
			Date: 7/18/2007
			By: GEP
	Drawing Name: CT-4 R6.dwg	Scale: 1=10	Rev: KAP/JCH

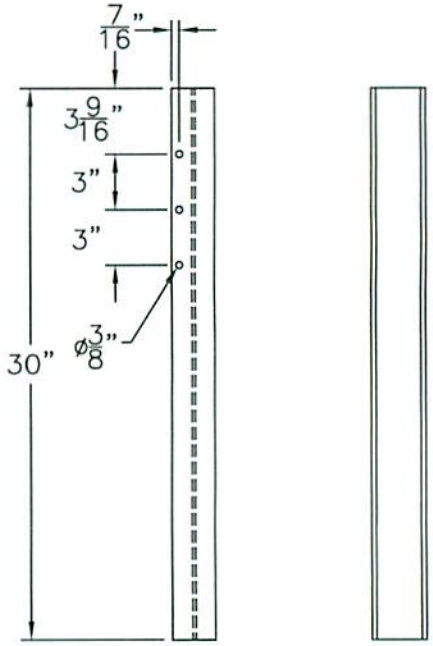
ITEM	QTY	DESCRIPTION	MATERIAL
1	5	Cable Support Post	XXX
i1	5	S76x8.5 Post	XXX



(Part d3–Page 10)



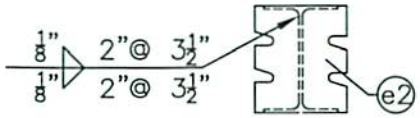
Cable Support Post
(Part 1)



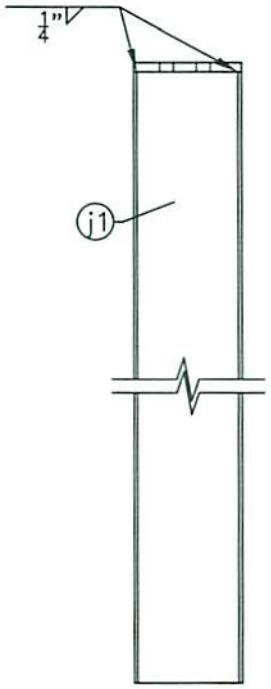
S3x5.7 Post
(Part i1)

Midwest Roadside Safety Facility	Cable Guardrail End Terminal CT-4 Cable Support Post Posts 3-7		Sheet: 12 of 16
			Date: 7/18/2007
			By: GEP
	Drawing Name: CT-4 R6.dwg	Scale: 1=10	Rev: KAP/JCH

ITEM	QTY	DESCRIPTION	MATERIAL
J	5	Cable Support Base	XXX
j1	5	W152x13.4 Post	XXX



(Part e2–Page 11)



W6x9 Cable Support Base (Part J)

W6x9 Post (Part j1)

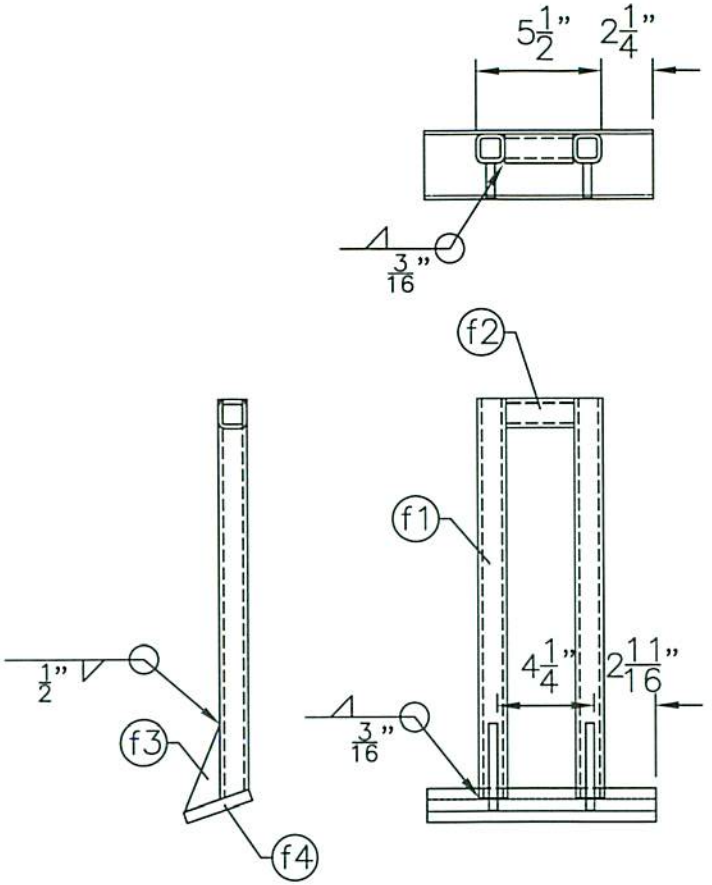
Midwest Roadside Safety Facility

Cable Guardrail End Terminal
CT-4

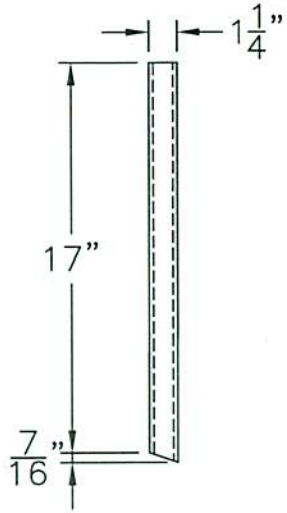
Cable Support Base
Posts 3-7

Sheet: 13 of 16
Date: 7/18/2007
By: GEP
Drawing Name: CT-4 R6.dwg
Scale: 1=10
Rev: KAP/JCH

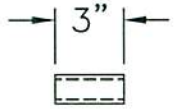
ITEM	QTY	DESCRIPTION	MATERIAL
F	2	Cable Release Lever	
f1	4	Kicker Lever	A36 32x32x5mm Plate
f2	2	Connecting Tube	A36 32x32x5mm Plate
f3	4	Kicker Plate Gusset	A36 13mm Plate
f4	2	Kicker Plate	A36 13mm Plate



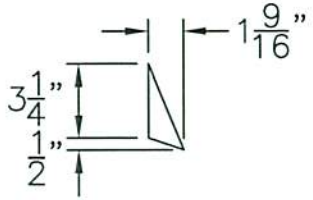
Cable Release Lever
(complete details, weld all interfaces as required 1/4")
(Part F)



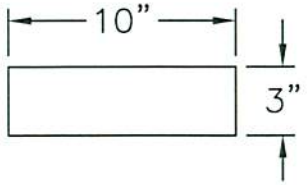
Kicker Lever
(Part f1)



Connecting Tube
(Part f2)

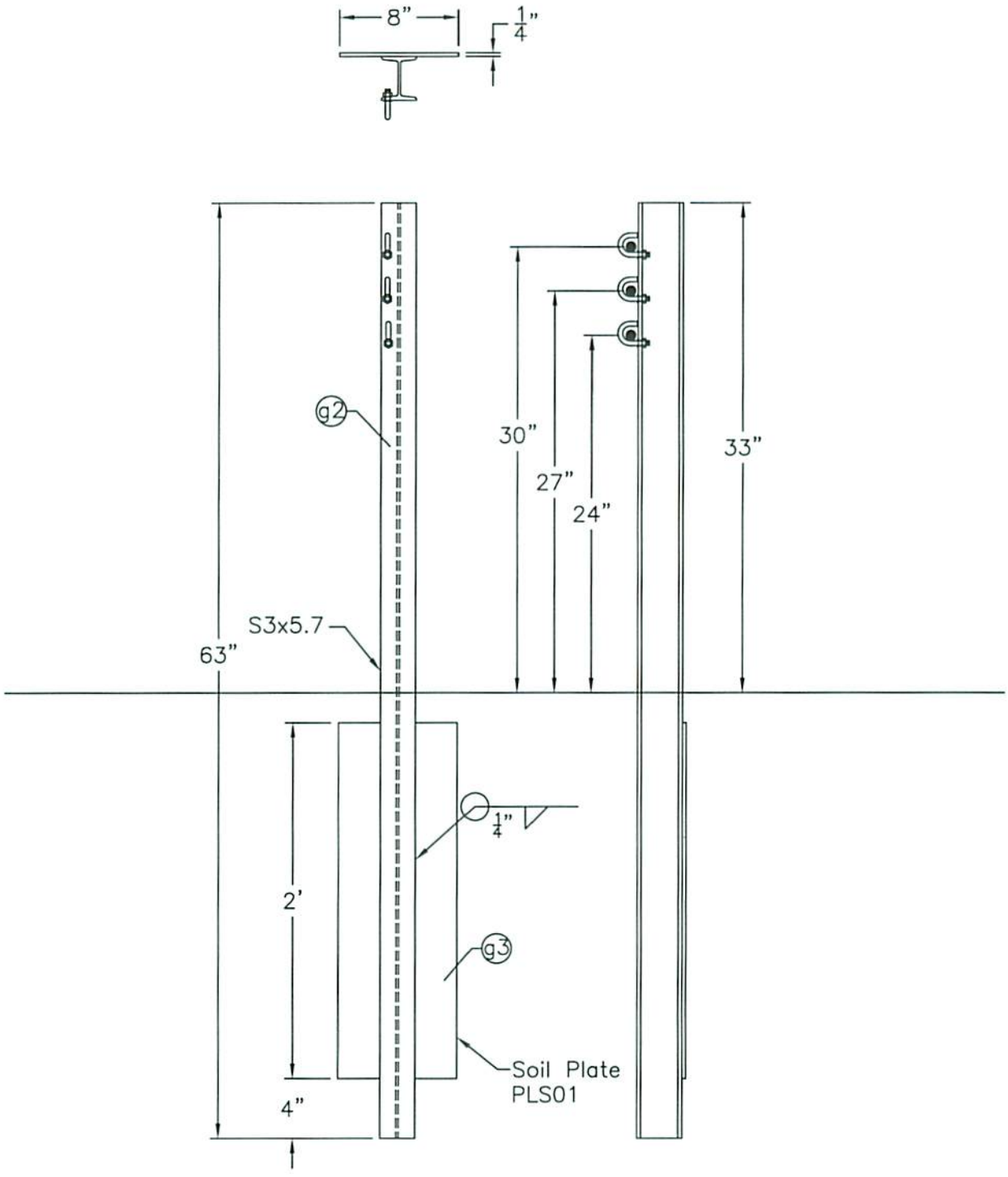


Kicker Plate Gusset
(Part f3)



Kicker Plate
(Part f4)

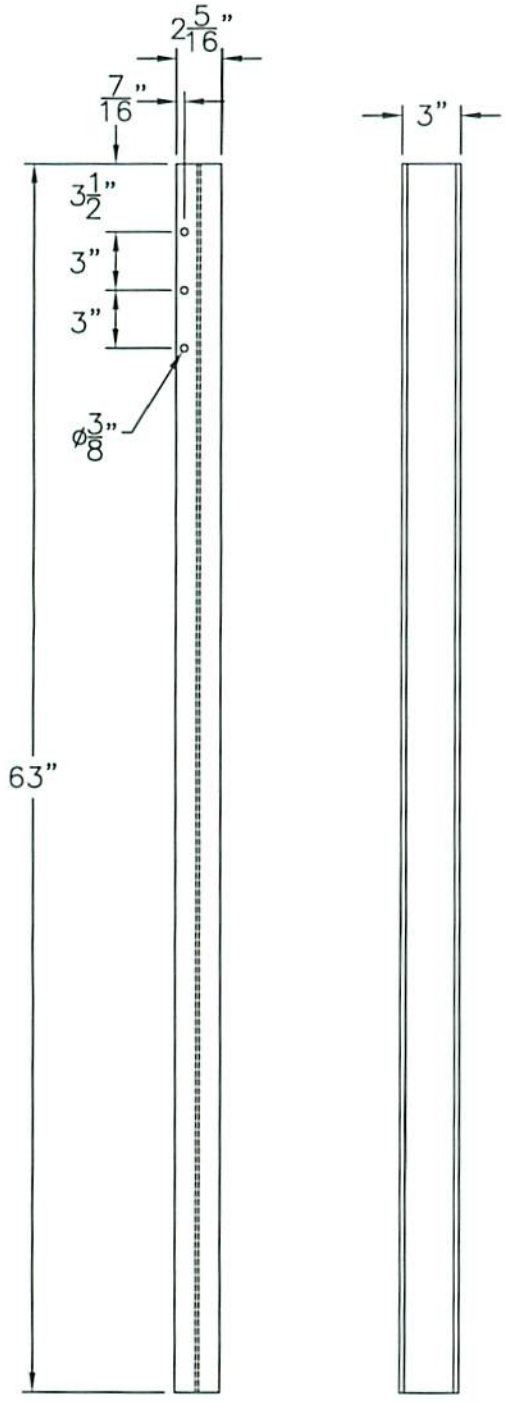
Midwest Roadside Safety Facility	Cable Guardrail End Terminal CT-4 Cable Release Lever		Sheet: 14 of 16 Date: 7/18/2007 By: GEP
	Drawing Name: CT-4 R6.dwg	Scale: 1=8	Rev: KAP/JCH



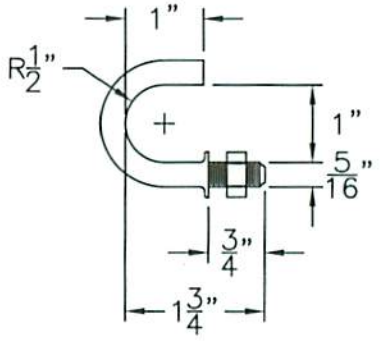
Cable Guardrail Post
(Part G)

Midwest Roadside Safety Facility	Cable Guardrail End Terminal CT-4 Cable Guardrail Post & Cable Heights		Sheet: 15 of 16 Date: 7/18/2007 By: GEP
	Drawing Name: CT-4 R6.dwg	Scale: 1=10	Rev: KAP/JCH

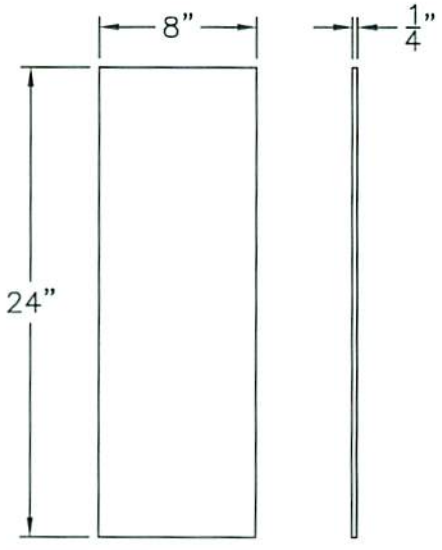
ITEM	QTY	DESCRIPTION	MATERIAL
g1	10	S76x8.5 Post	XXX
g2	45	Cable Hook Bolts	XXX
g3	10	Soil Plate	A36 6mm Plate
h1	4	Cable– 77.42m	ø19mm 3x7 Wire rope



S3x5.7 Post
(Part g1)



Shouldered Cable
Hook Bolt, FBH04
(Part g2)



Soil Plate, PLS01
(Part g3)

Midwest Roadside Safety Facility	Cable Guardrail End Terminal CT-4 Cable Guardrail Post Parts		Sheet: 16 of 16 Date: 7/18/2007 By: GEP
	Drawing Name: CT-4 R6.dwg	Scale: 1=10	Rev: KAP/JCH