

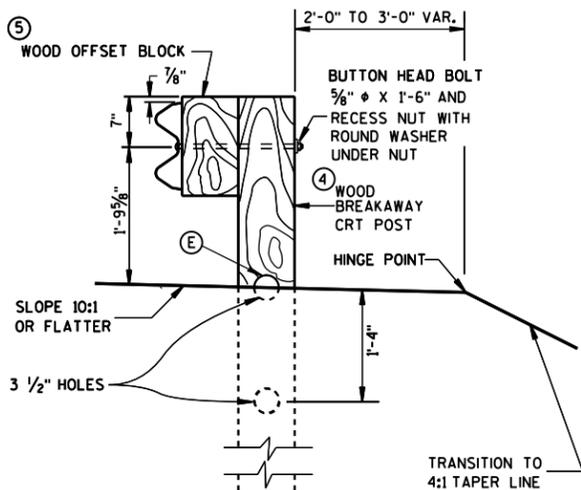
# 14B24 sheet a: Steel Plate Beam Guard Energy Absorbing Terminal

## BILL OF MATERIALS

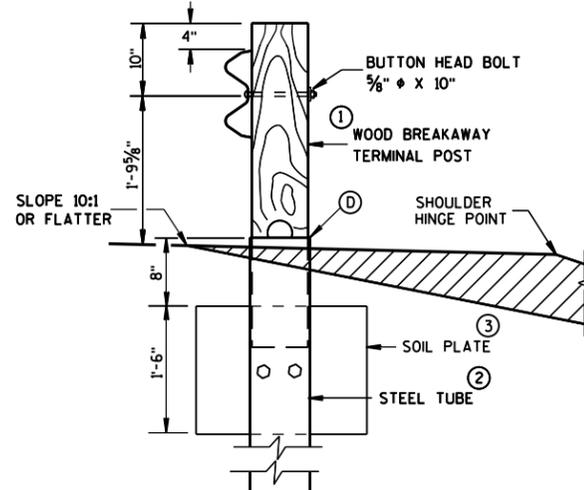
NOTE NO.	QTY.	DESCRIPTION
①	4	WOOD BREAKAWAY TERMINAL POST: 5 1/2" x 7 1/2" x 3'-9"
②	**	STEEL TUBE: OPTION 1 - QUANTITY OF 4 TS 8" x 6" x 0.188", 4'-6" LONG OR OPTION 2 - QUANTITY OF 2 TS 8" x 6" x 0.188", 6'-0" AND 2 TS 8" x 6" x 0.188", 4'-6" LONG
③	2	SOIL PLATE: 2'-0" x 1'-6" x 1/4" **
④	4	WOOD BREAKAWAY CRT POST: 6" x 8" x 6'-0"
⑤	6	WOOD OFFSET BLOCKS: 6' x 8" x 1'-2"
⑥	1	PIPE SLEEVE: 2" x 5 1/2" STANDARD PIPE
⑦	1	BEARING PLATE
⑧	1	BCT CABLE ASSEMBLY
⑨	1	CABLE ANCHOR BOX
⑩	1	STRUT & YOKE
⑪	1	STEEL PLATE BEAM, END PANEL 12 GA. 13'-6 1/2" LONG FOR SKT-350, ET-2000 AND ET-2000 PLUS
⑫	3	STEEL PLATE BEAM: 12 GA. 13'-6 1/2"
⑬	1	ET-2000/ET-2000 PLUS GUARDRAIL EXTRUDER OR SKT-350 IMPACT HEAD: AS FURNISHED BY MANUFACTURER
⑭	1	0.040" ALUMINUM SHEET WITH REFLECTIVE SHEETING TYPE F PER SECTION 637 OF THE STANDARD SPECIFICATIONS
⑮	1	E.A.T. MARKER POST

## GENERAL NOTES

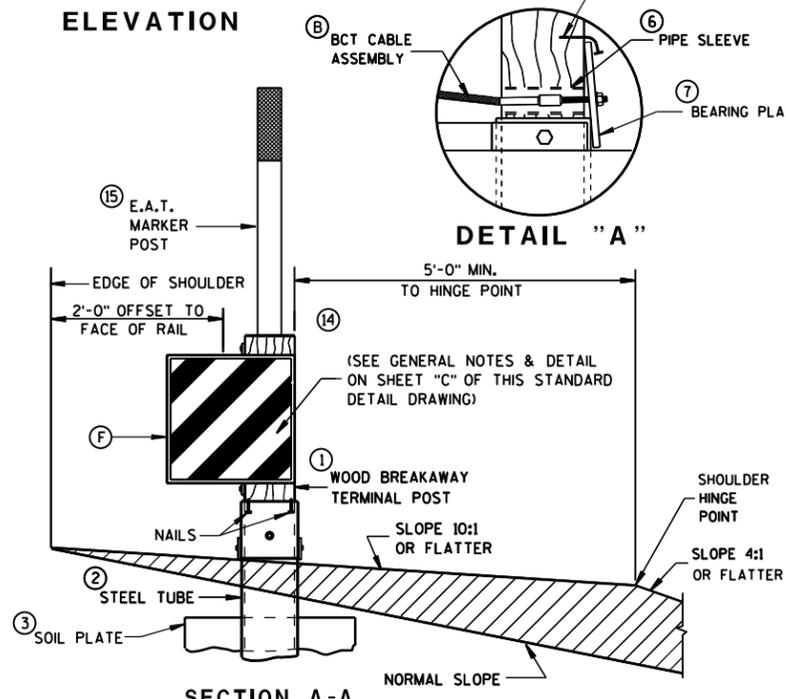
- FOLLOW MANUFACTURE'S BOLTING RECOMMENDATIONS, IF NONE ARE AVAILABLE, INSTALL 3/8"  $\phi$  x 1'-6" BUTTON HEAD BOLTS AT ALL POSTS EXCEPT FOR POST 1.
- (A) THE SLOPE IN THE AREA BOUNDED BY THE GRADELINE, THE HINGE POINT LINE (HPL), AND THE CLEAR ZONE LIMITS (CZL) SHALL BE 4:1 OR FLATTER.
- (B) AFTER FINAL ASSEMBLY, RECHECK CABLE TO BE SURE IT IS TAUT AND HAS NOT RELAXED.
- (C) THE 13 SLOT FIRST RAIL PANEL MAY BE USED IN LIEU OF THE 3 SLOT RAIL PANEL ON SKT-350 ONLY.
- (D) THE TOP OF THE STEEL TUBE ON POSTS 1 THROUGH 4 SHALL NOT BE MORE THAN 3" ABOVE THE FINISH GROUND ELEVATION.
- (E) THE CENTER OF THE UPPER 3/2" DIAMETER HOLE ON POST 5 THROUGH 8 SHALL BE 3/4" ABOVE THE FINISHED GROUND LINE.
- (F) ATTACH ALUMINUM SHEET TO E.A.T. HEAD USING 4 STAINLESS STEEL SELF-TAPPING SCREWS, ONE SCREW PER CORNER.
- STEEL POSTS SHALL NOT BE ALLOWED FOR USE WITH ENERGY ABSORBING TERMINALS.
- DO NOT INSTALL REFLECTORS ON THE FIRST 50 FEET OF THE APPROACH END OF THE ENERGY ABSORBING TERMINAL.
- \* DO NOT ATTACH BLOCKOUTS TO POSTS 1 AND 2.
- \*\* SDD SHOWS 4 - 54 INCH STEEL TUBES WITH SOIL PLATES INSTALLED ON POST 1 AND POST 2. POST 3 AND 4 DO NOT NEED SOIL PLATES. AN ALTERNATIVE INSTALLATION WOULD CONSIST OF 2 - 72 INCH STEEL TUBES ON POST 1 AND POST 2 AND 54 INCH SOIL TUBES ON POSTS 3 AND 4. THE ALTERNATIVE INSTALLATION DOES NOT REQUIRE SOIL PLATES.



SECTION C-C  
TYPICAL AT POST NOS. 6, 8

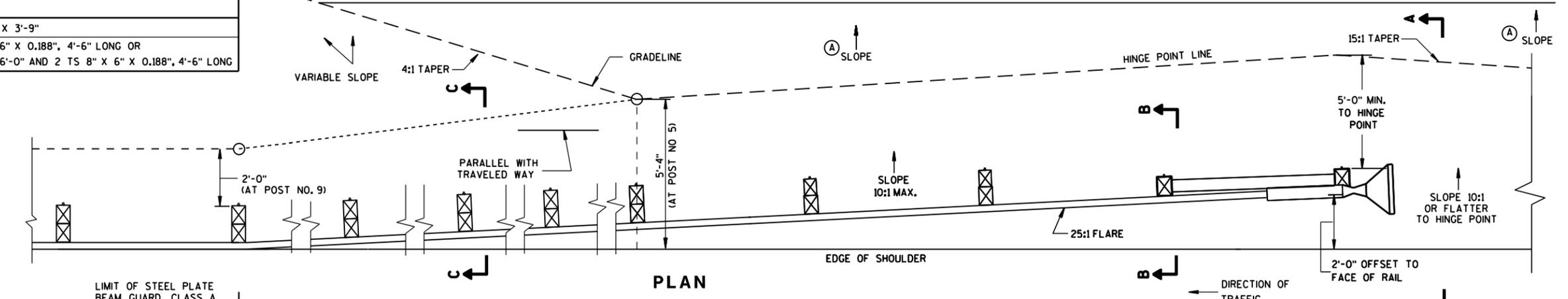


SECTION B-B  
TYPICAL AT POST NO. 2 \*

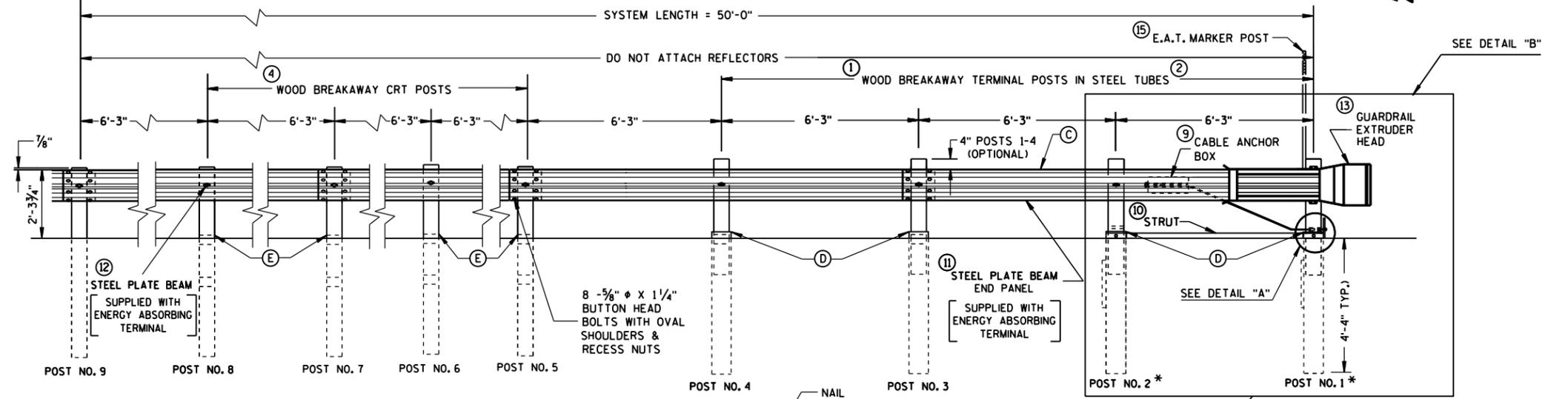


SECTION A-A  
TYPICAL AT POST NO. 1 \*

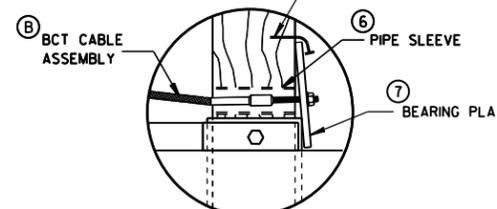
CLEAR ZONE LIMITS, EITHER AS SHOWN ELSEWHERE IN THE PLANS OR, IF NOT SHOWN ELSEWHERE IN THE PLANS, 15 FEET BEYOND THE HINGE POINT LINE



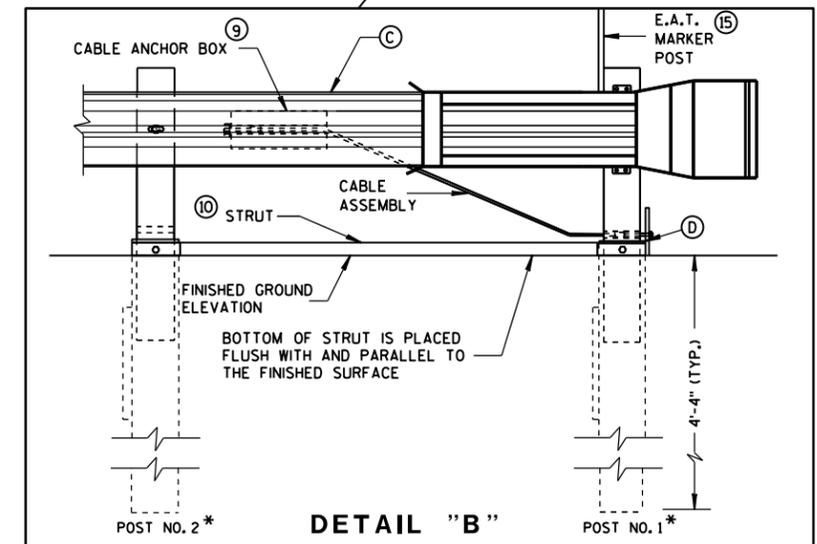
PLAN



ELEVATION



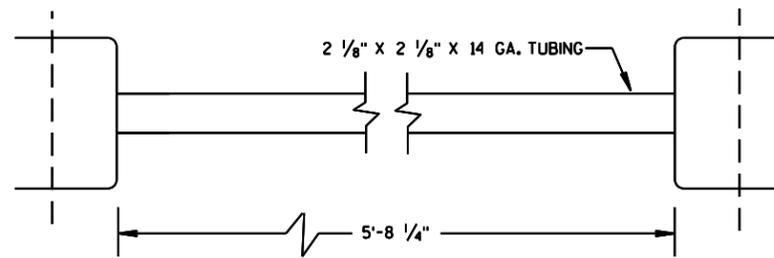
DETAIL "A"



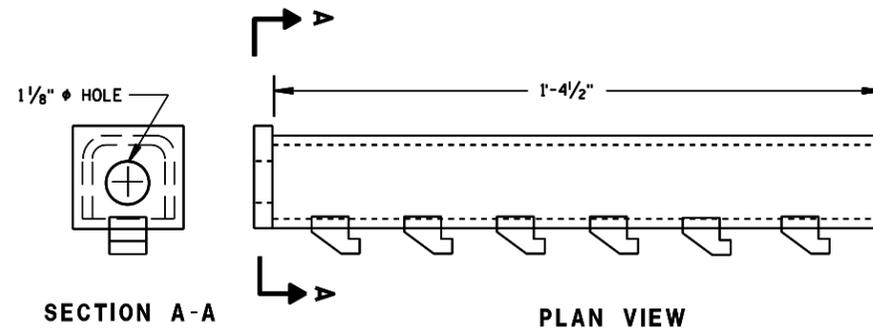
DETAIL "B"

STEEL PLATE BEAM GUARD  
ENERGY ABSORBING TERMINAL

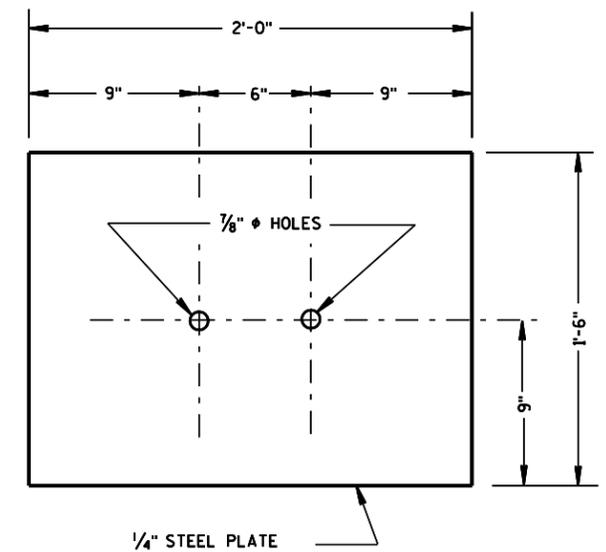
STATE OF WISCONSIN  
DEPARTMENT OF TRANSPORTATION



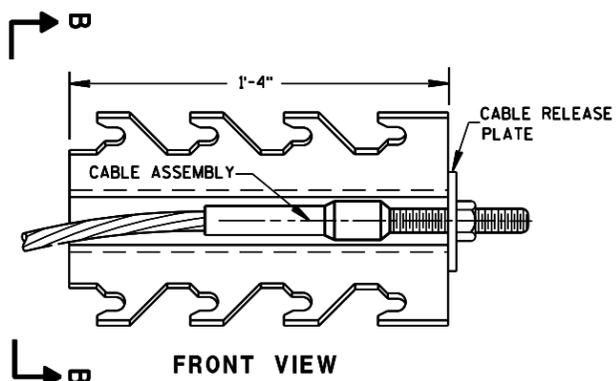
⑩ STRUT DETAIL (SKT-350)



⑨ CABLE ANCHOR BOX (ET-2000/ET-2000 PLUS)

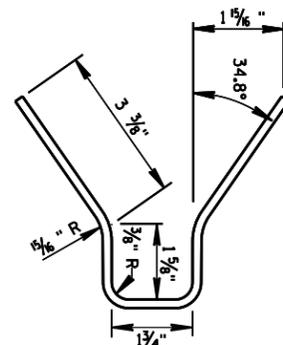


③ SOIL PLATE  
(SKT-350, ET-2000/ET-2000 PLUS)

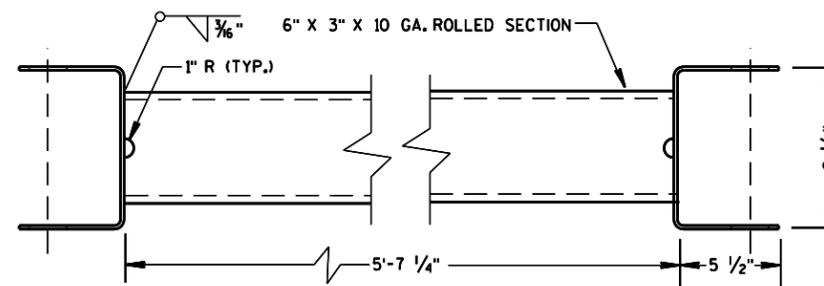


⑨ CABLE ANCHOR BOX (SKT-350)

(SKT-350)

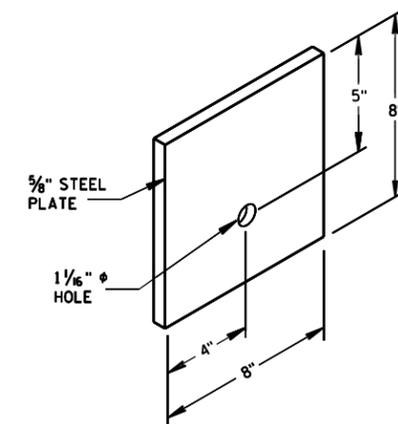


SECTION B-B



⑩ STRUT DETAIL (ET-2000/ET-2000 PLUS)

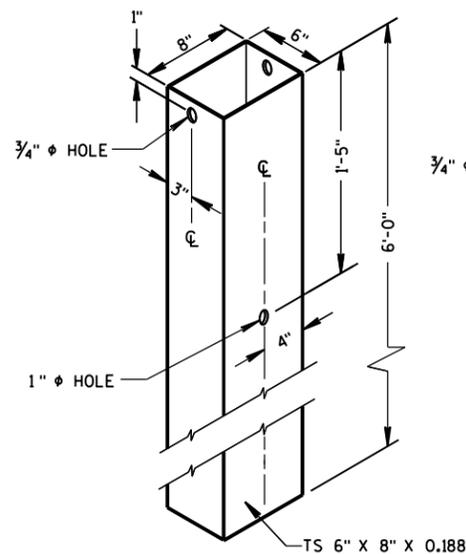
(ET-2000/ET-2000 PLUS)



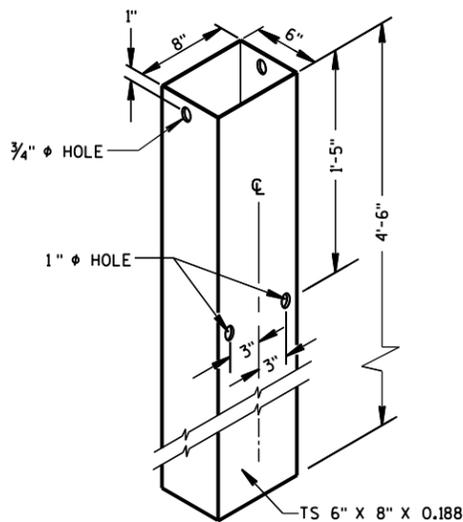
⑦ STEEL BEARING PLATE  
(SKT-350, ET-2000/ET-2000 PLUS)

6

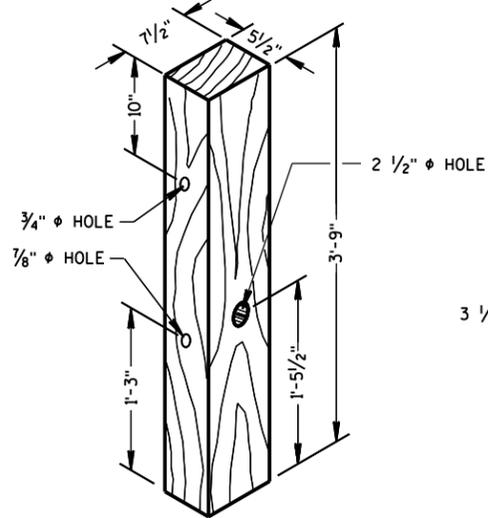
6



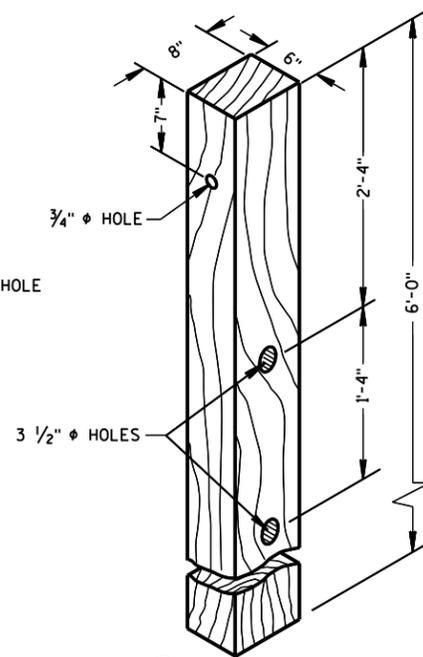
② 72" STEEL TUBE  
(POSTS NO. 1-4)



② 54" STEEL TUBE  
(POSTS NO. 1-4)



① TERMINAL POST  
(POSTS NO. 1-4)



④ CRT POST  
(POSTS NO'S 5-8)

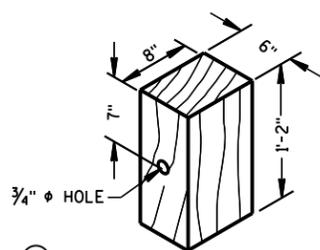
WOOD BREAKAWAY POSTS

GENERAL NOTES

WHEN ROCK IS ENCOUNTERED DURING EXCAVATION, A 12 INCH DIA. POST HOLE EXTENDING 20 INCHES DEEP INTO THE ROCK MAY BE USED IF APPROVED BY THE ENGINEER. GRANULAR MATERIAL SHALL BE PLACED IN THE BOTTOM OF THE HOLE APPROXIMATELY 2 1/2" INCHES DEEP TO PROVIDE DRAINAGE. THE SOIL TUBES SHALL BE FIELD CUT TO LENGTH, PLACED IN THE HOLE AND BACKFILLED WITH ADEQUATELY COMPACTED MATERIAL EXCAVATED FROM THE HOLE.

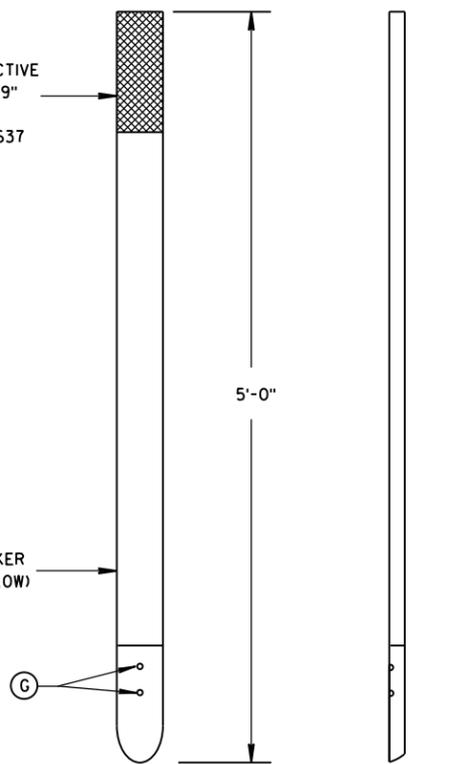
SEE APPROVED PRODUCTS LIST FOR ACCEPTABLE E. A. T. MARKER POST.

ⓐ 1/2" DIA. X 3" LAG BOLT WITH WASHER.

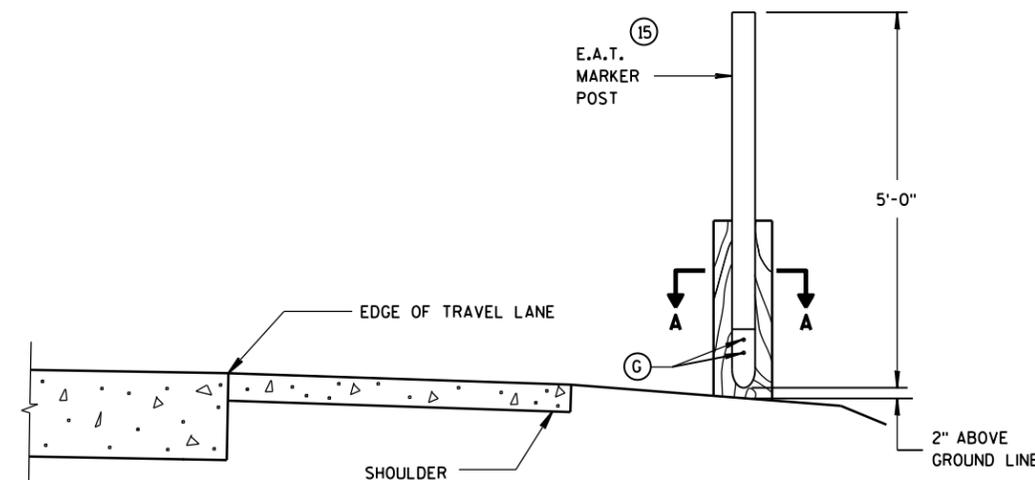


⑤ WOOD OFFSET BLOCK  
REQ'D. AT ALL POSTS EXCEPT POST NO'S 1 & 2

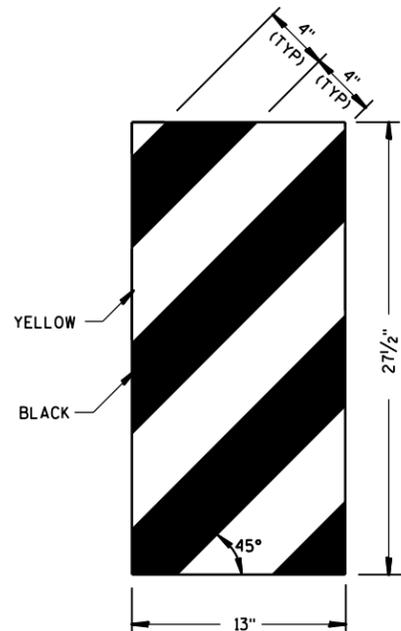
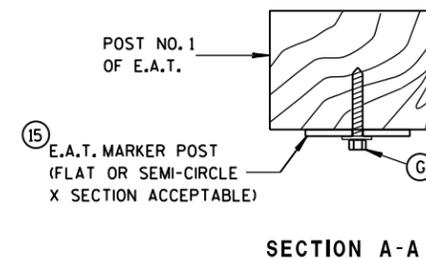
TYPE H  
YELLOW REFLECTIVE  
SHEETING 3" X 9"  
SEE STANDARD  
SPECIFICATION 637



FRONT VIEW SIDE VIEW  
⑮ E.A.T. MARKER POST

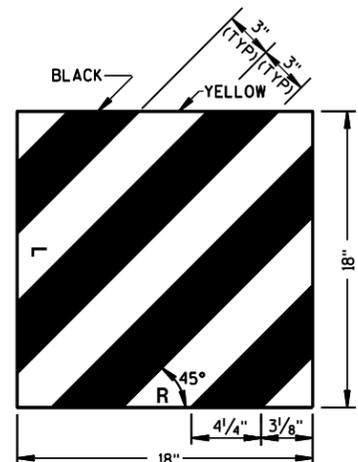


TYPICAL INSTALLATION OF E.A.T. MARKER POST BACKSIDE OF POST NO. 1  
(E.A.T. AND RAIL REMOVED FOR CLARITY)



ET-2000 PLUS ONLY

⑭ REFLECTIVE SHEETING DETAILS



ET-2000 AND SKT-350

STEEL PLATE BEAM GUARD  
ENERGY ABSORBING TERMINAL

STATE OF WISCONSIN  
DEPARTMENT OF TRANSPORTATION

APPROVED  
June 2014 /S/ Jerry H. Zogg  
DATE ROADWAY STANDARDS DEVELOPMENT  
ENGINEER  
FHWA

## Steel Plate Beam Guard Energy Absorbing Terminal

**References:**[FDM 11-45-1](#)

AASHTO Roadside Design Guide

**Bid items associated with this drawing:**

<u>ITEM NUMBER</u>	<u>DESCRIPTION</u>	<u>UNIT</u>
614.0200	Steel Thrie Beam Structure Approach .....	LF
614.0300 - 0339	Steel Plate Beam Guard, Class A.....	LF
614.0370	Steel Plate Beam Guard, Energy Absorbing Terminal .....	EACH
614.0010	Barrier System Grading Shaping Finishing.....	EACH

## For Grading Project With Beam Guard:

<u>ITEM NUMBER</u>	<u>DESCRIPTION</u>	<u>UNIT</u>
205.0100	Excavation Common .....	CY
208.0100	Borrow .....	CY
614.0010	Barrier System Grading Shaping Finishing.....	EACH
627.0250	Mulching.....	TON
629.0205	Fertilizer Type A .....	CWT
625.0500	Salvaged Topsoil .....	SY
629.0210	Fertilizer Type B .....	CWT
627.0200	Mulching.....	SY
630.0100-0199	Seeding (mixture).....	LB

## For Non-Grading Project With Beam Guard - (Resurfacing plus Beam Guard or Separate Beam Guard Project):

<u>ITEM NUMBER</u>	<u>DESCRIPTION</u>	<u>UNIT</u>
614.0010	Barrier System Grading Shaping Finishing.....	EACH

**Standardized Special Provisions associated with this drawing:**

<u>STSP NUMBER</u>	<u>TITLE</u>
NONE	

**Other SDDs associated with this drawing:**SDD 14b24 Steel Plate Beam Guard Energy Absorbing Terminal **all sheets** are required.

Caution: The flexibility that the FDM provides for grading EAT terminals is being reviewed. Designers are encouraged to provide recommended grading, the alternative grading provided for in the Roadside Design Guide, or add length to the beam guard run prior to adjusting the grading of the EAT terminal.

**Design Notes:**

Projects with PSE due August 2011 or later are required to install MGS beam guard (MGS) for new beam guard installations. Some exceptions allowing the installation of new non-MGS beam guard may be granted by Bureau of Project Development (BPD). A few of these exceptions require minimum documentation (e.g. there is no short radius version of MGS designer would need to install non-MGS beam guard). Other exceptions require more documentation and discussion with Bureau of Project Development. Projects on the NHS or subject to FHWA oversight are to review the use of MGS with FHWA.

Use SDD 14b24 sheets "a", "b" and "c" as the standard on new construction and reconstruction projects. Identify the station of the EAT Post No. 1 on the plans. Review drainage and Right-of-Way near EAT early in the design process. Insert cross sections at Posts 1, 5, 9 and at the beginning of approach taper into plan set to make the designer's intent clear to contractor.

Remove Type 1 Terminals, BCT Terminals and Turn-down-end Terminals on improvement projects.

In the area bounded by Roadside Clear Zone, hinge point between posts 1 through 5 of the EAT and Extended Vehicle Runout Path must conform to Clear Zone Requirements in [FDM 11-15-1](#). If it is necessary a 3:1 slope is permissible, but a Clear Runout area beyond the 3:1 slope must be provided.

If it is not possible to get the preferred grading or alternative grading in Figure 8.2 of the 2006 AASHTO Roadside Design Guide, extend Class A Beam Guard beyond the length of need calculations to a location where the preferred or alternative grading for the EAT can be provided.

Eliminating or reducing the amount of earthwork associated with this Standard Detail Drawing may have a significant impact on performance of the system (see caution note above). The earthwork behind the beam

guard posts to the hinge point may be reduced or eliminated on minor 3R, NHS and non-NHS projects, but only if the desirable lateral clearances and tapers cannot be practically achieved because of existing conditions. Provide a 10:1 or flatter slope from the edge of the shoulder to the back of the beam guard posts. When practical, extend the 10:1 slope to the hinge point. On minor 3R, NHS and non-NHS projects the 5-feet to the hinge point at Post 1 may be reduced or eliminated, and the 15:1 taper may be steepened to 4:1, but only if existing conditions preclude using standard design. If the lateral clearances and tapers are nonstandard, provide a special detail showing the proposed non-standard earthwork requirements.

Review Curbed Roadways section of [FDM 11-45-1](#) for installing EAT system near curb. Place note on plans indicating location of driveway curb in front of EAT.

List all items of work and round up the quantities for individual items and note them as "For Bid Information Only." The table below is the suggested format for the Miscellaneous Quantities Sheet:

**Barrier System Grading Shaping Finishing, Item 614.0010**

Station Location (Anchorage Post # 1)	Excavation Common*	* Borrow	* Salv. Topsoil	* Fert. Type -- -	* Seeding	* Mulching	Each
	C.Y.	C.Y.	S.Y.	CWT.	L.B.	S.Y.	
Sta. _____							
Totals							

\* Items & Quantities listed for Bid Information Only. Show the quantities and units clearly in the table.

**Contact Person:**

Erik Emerson (608) 266-2842