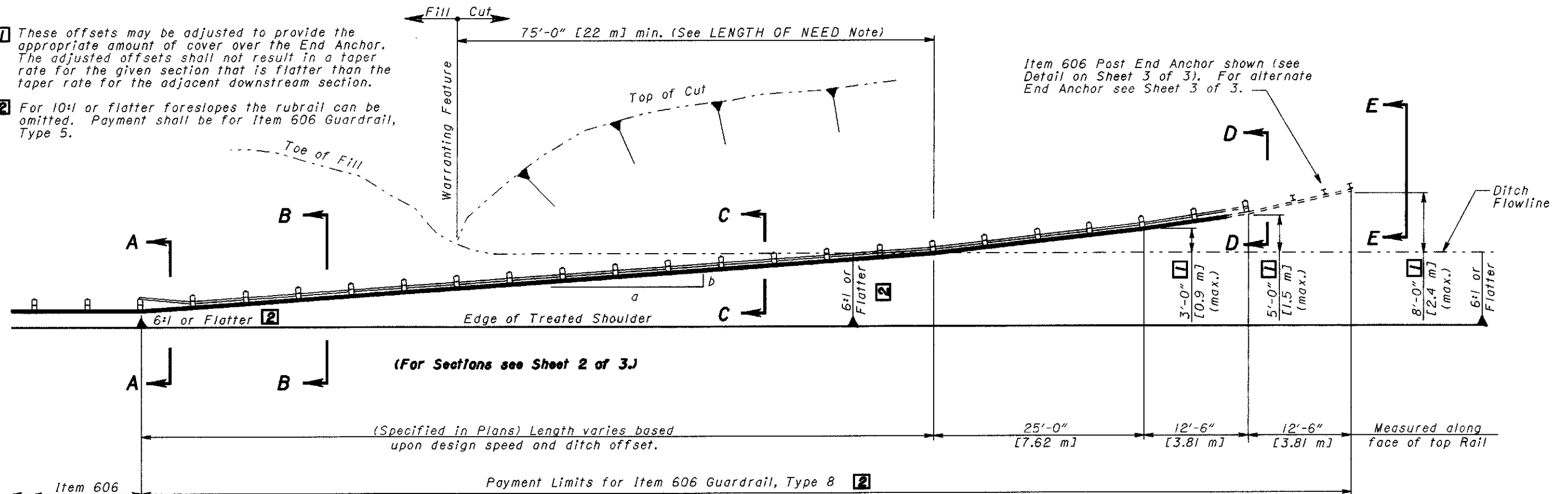
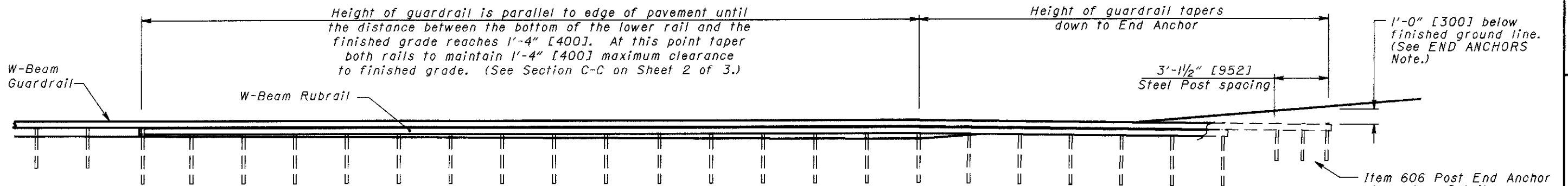


- 1 These offsets may be adjusted to provide the appropriate amount of cover over the End Anchor. The adjusted offsets shall not result in a taper rate for the given section that is flatter than the taper rate for the adjacent downstream section.
- 2 For 10:1 or flatter foreslopes the rubrail can be omitted. Payment shall be for Item 606 Guardrail, Type 5.



PLAN VIEW



ELEVATION VIEW (Profile Along Rail)

NOTES

POSTS & BLOCKOUTS: Shall comply with Guardrail Type 5 (See SCD 6R-2J) except posts shall be 8'-0" [2440] long unless otherwise specified.

LENGTH OF NEED: Where backslopes along the length of the terminal to the warranting feature are 2:1 or flatter, at least 75'-0" [22 m] of guardrail must be provided upstream from the warranting feature before the guardrail crosses the ditch line. (The warranting feature is often the intersection of the Fill/Cut slopes as shown, but may be at some other point.) Where Backslopes are steeper than 2:1, this minimum distance is not applicable.

PAYMENT: Item 606 Guardrail, Type 8, shall be in Linear Feet [Meters] for the length specified in the plans and shall include rails, 8'-0" [2440] posts, grading, excavation, embankment and all other hardware, materials and labor required to construct the guardrail as shown except for the End Anchor. Payment for Item 606 - Post End Anchor (or Concrete Block End Anchor), Each, shall include the extra cost of concrete blocks or steel posts and all other hardware, materials and labor required to construct the End Anchor.

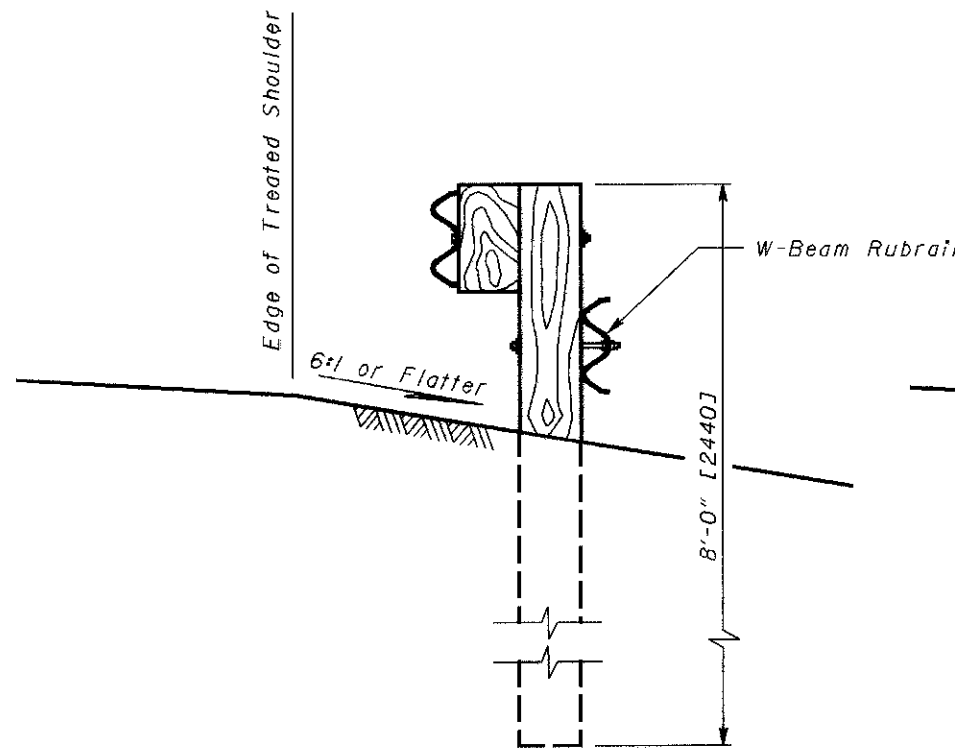
END ANCHORS: A Post End Anchor is the preferred end treatment. A Concrete Block End Anchor may be installed in any location that does not permit the installation of posts. Concrete Blocks may be either pre-cast or cast-in-place and shall meet the requirements of CMS 606.02. The guardrail panel in the end anchors shall be pre-drilled and then galvanized per CMS 606.02. The finished ground line over the end anchor should be smooth and consistent with the surrounding topography, i.e. embankment shall not be mounded over the end anchor to achieve the proper amount of cover.

MISCELLANEOUS: For details not shown see SCD 6R-2.I.

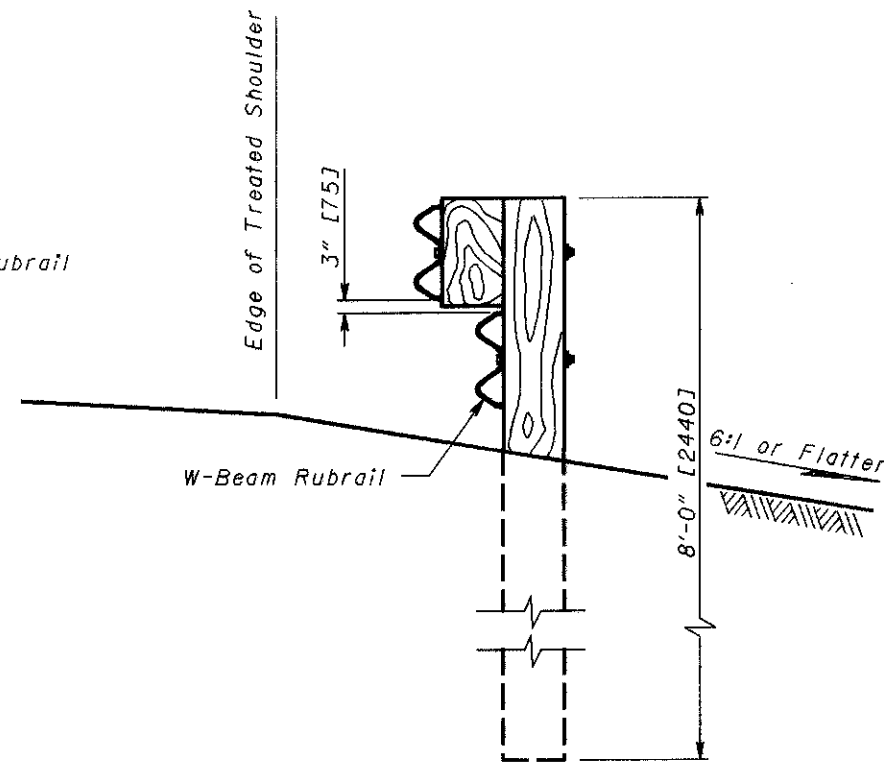
| DESIGN SPEED | a/b |
|---------------------|-------|
| 60 mph [100 km/h] | 13:1* |
| 55 mph [90 km/h] | 12:1 |
| 50 mph [80 km/h] | 11:1 |
| 45 mph [70 km/h] | 10:1 |
| 35-40 mph [60 km/h] | 9:1 |

* All installations on the National Highway System shall be installed with this maximum flare rate regardless of design speed.

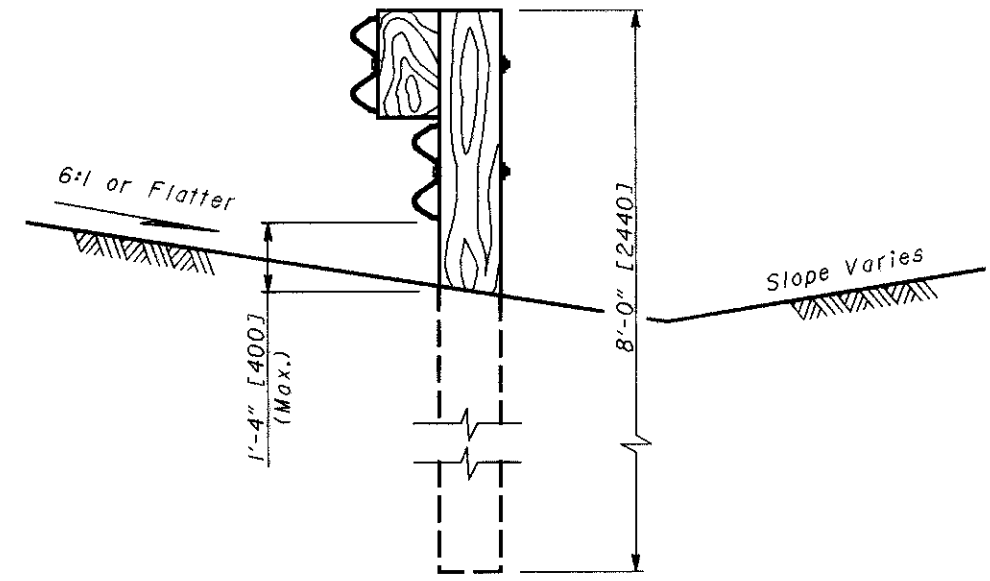
OHIO DEPARTMENT OF TRANSPORTATION
 DATE: 4-29-99
 REVISIONS: [Blank]
 STD. ENGR. M. EVANS
 DRAWN D. FOCKE
 ALL metric dimensions (in brackets []) are in millimeters unless otherwise noted.
 DESIGN AGENCY: OFFICE OF PLANNING
 STANDARD ROADWAY CONSTRUCTION DRAWING
 GUARDRAIL TYPE 8 BURIED IN BACKSLOPE
 NUMBER: 6R-4.5
 1 / 3



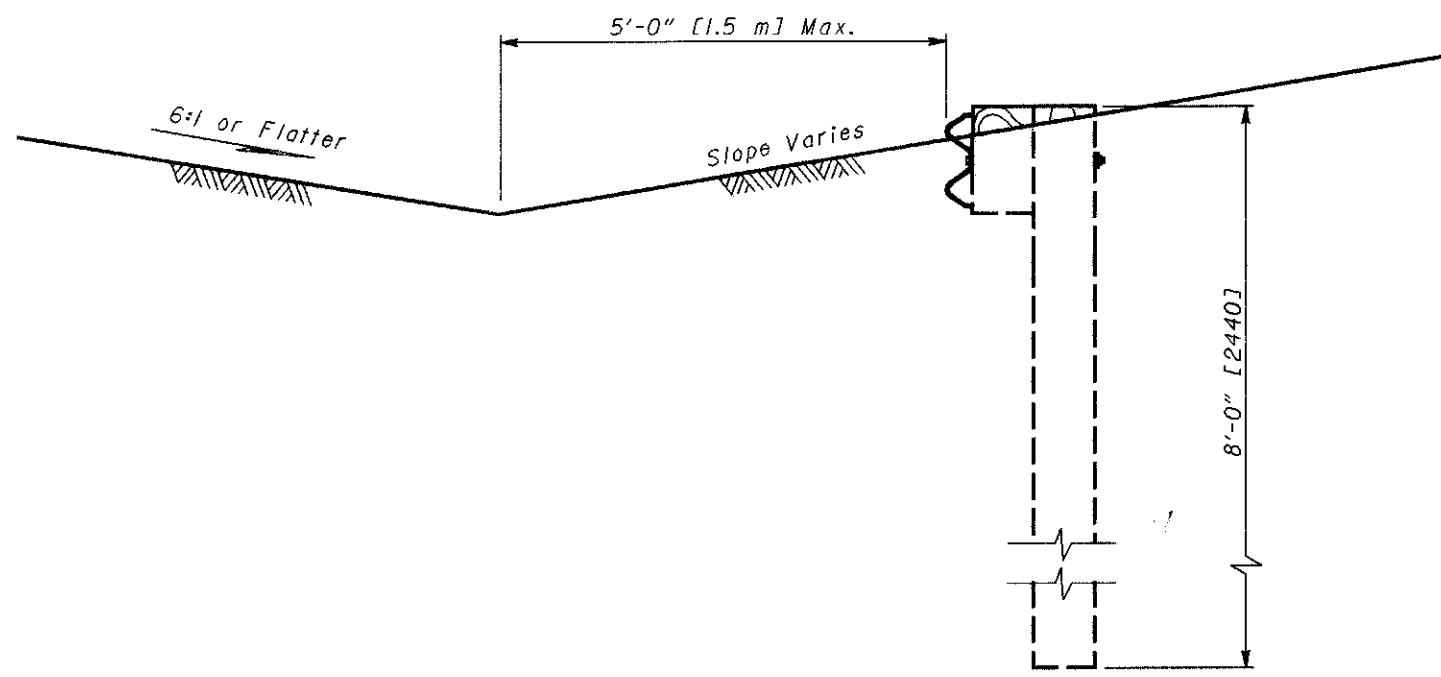
SECTION A-A
(See Sheet 1 of 3)



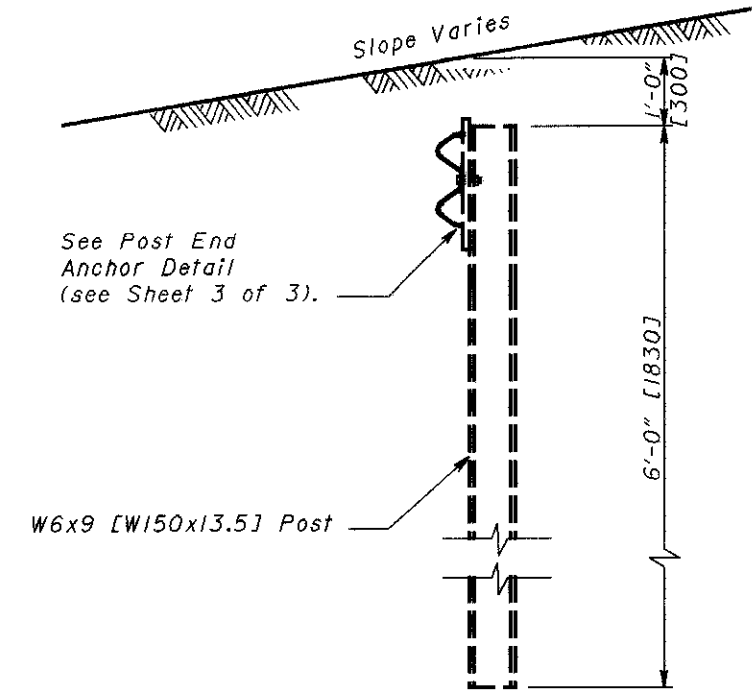
SECTION B-B
(See Sheet 1 of 3)



SECTION C-C
(See Sheet 1 of 3)

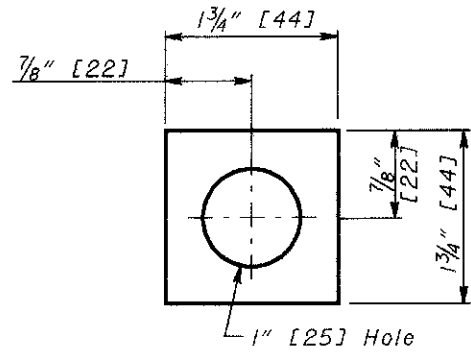


SECTION D-D
(See Sheet 1 of 3)



SECTION E-E
(See Sheet 1 of 3)

| | | | | | | |
|-------------------------|--|--|--|-------------------------|-----------|---|
| NUMBER 6R-4.5 | STANDARD ROADWAY CONSTRUCTION DRAWING GUARDRAIL TYPE 8 BURIED IN BACKSLOPE | DESIGN AGENCY OFFICE OF PLANNING | All metric dimensions [] are in millimeters unless otherwise noted. | STDS. ENGR. M. EVANS | REVISIONS | DATE 4-29-99 |
| | | | | DRAWN D. FOCKE | | |
| 2 | 3 | | | | | OHIO DEPARTMENT OF TRANSPORTATION Larry T. Stottelund ROADWAY DESIGN ENGINEER |



WASHER DETAIL
3/16" [5] THICK SQUARE WASHER

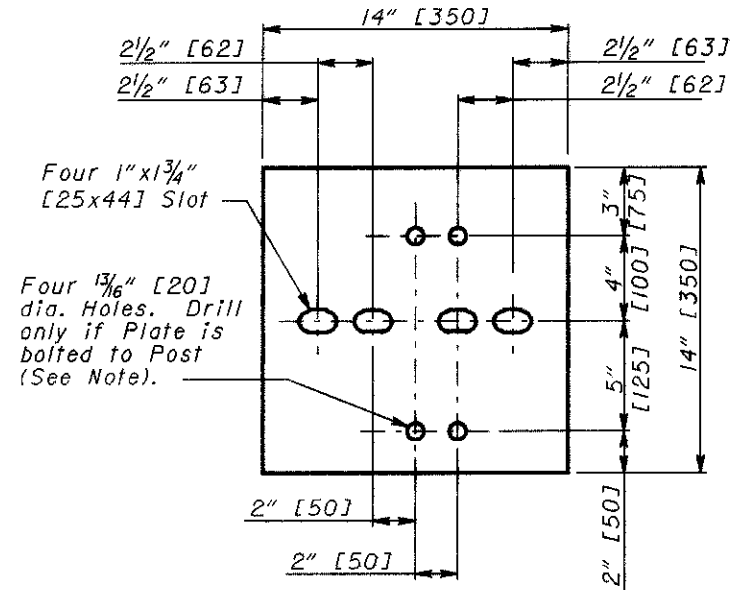
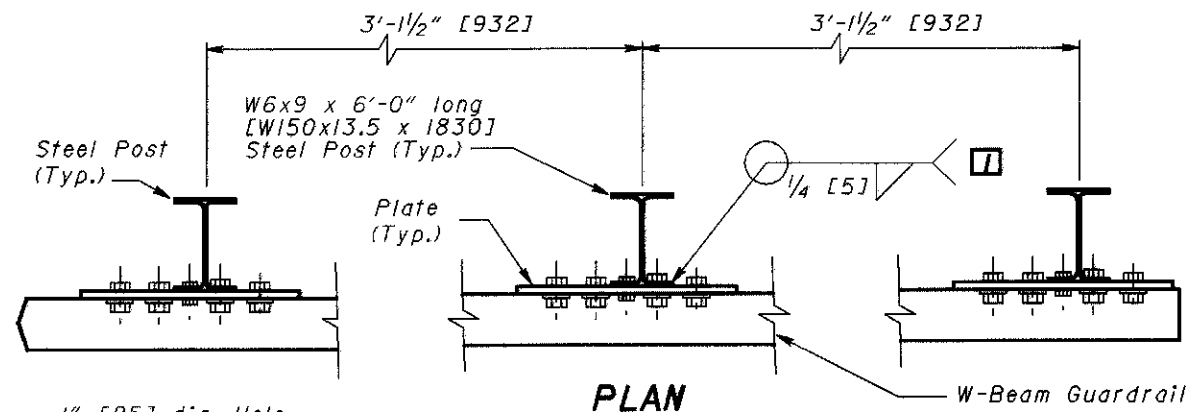


PLATE DETAIL
1/2" [13] THICK STEEL PLATE



PLAN

1" [25] dia. Hole drilled through W-Beam and attached to plate with 7/8"x2" [M22x50] Hex Bolt, Square Washer and Nut.

W-Beam Guardrail

1" [25] dia. hole drilled through W-Beam and Post flange. Attached to plate with 7/8"x2" [M22x50] Hex Bolt, Square Washer and Nut.

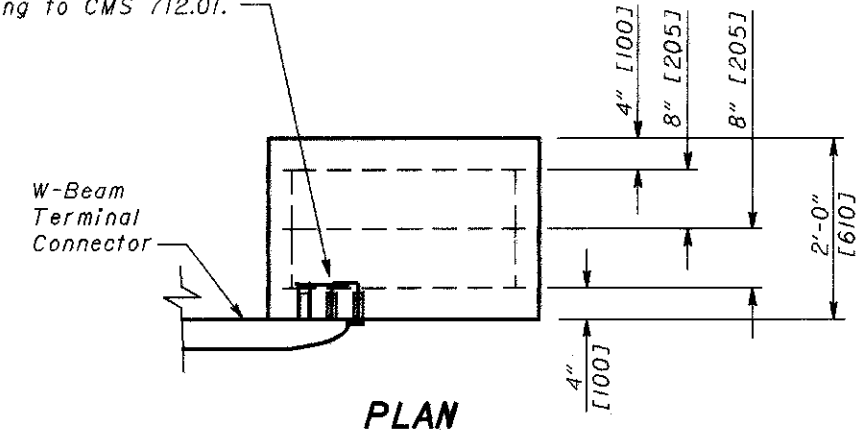
Drill four 1 3/16" [20] dia. Holes in Post Flange.

Steel Post

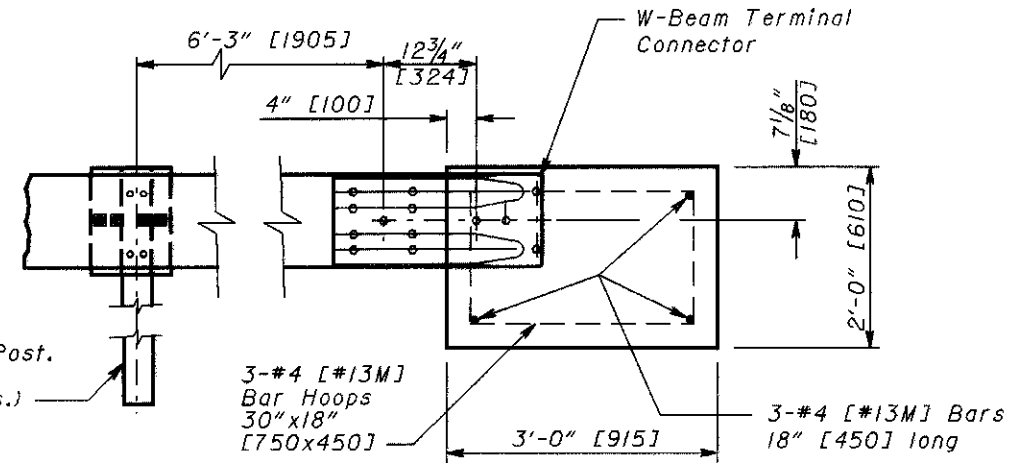
ELEVATION
POST END ANCHOR

Use either: 1) Concrete Insert Anchor Assembly (See Detail on **(SCD 6R-IJ)**, or 2) four 7/8" [22] Anchor Bolts with washers, or 3) Expansion Shield Anchors conforming to CMS 712.01.

Bolts shall be either mechanical or set in epoxy adhesive. Length of bolt and size of hole to be determined by manufacturer's recommendation.



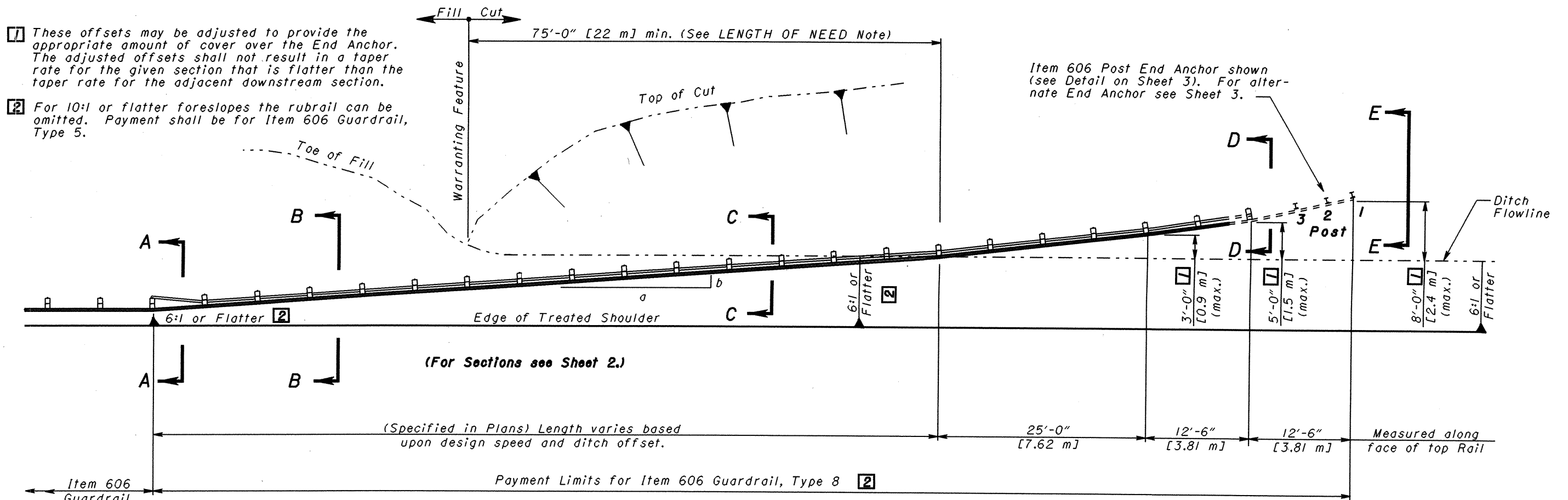
PLAN



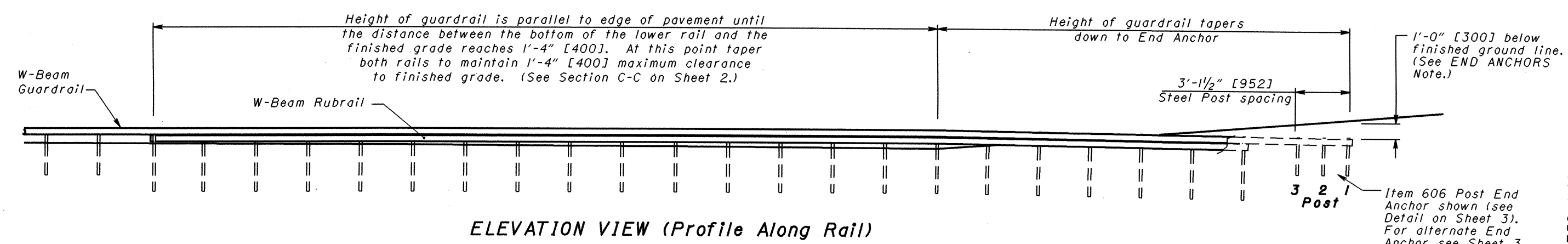
ELEVATION
CONCRETE BLOCK END ANCHOR

[1] The 1/2" [13] Steel Plate may be welded or bolted to the Post. If the Plate is bolted to the Post use four 5/8"x1 1/2" long [16x44] Hex Head Bolts with Hex Nuts. If the Plate is welded to the Post do not drill 1 3/16" [20] Holes in the Plate or the Post flanges.

- 1 These offsets may be adjusted to provide the appropriate amount of cover over the End Anchor. The adjusted offsets shall not result in a taper rate for the given section that is flatter than the taper rate for the adjacent downstream section.
- 2 For 10:1 or flatter foreslopes the rubrail can be omitted. Payment shall be for Item 606 Guardrail, Type 5.



PLAN VIEW



ELEVATION VIEW (Profile Along Rail)

NOTES

POSTS & BLOCKOUTS: Shall comply with Guardrail Type 5 (See SCD GR-2.1) except posts shall be 8'-0" [2440] long unless otherwise specified.

LENGTH OF NEED: Where backslopes along the length of the terminal to the warranting feature are 2:1 or flatter, at least 75'-0" [22 m] of guardrail must be provided upstream from the warranting feature before the guardrail crosses the ditch line. (The warranting feature is often the intersection of the Fill/Cut slopes as shown, but may be at some other point.) Where Backslopes are steeper than 2:1, this minimum distance is not applicable.

PAYMENT: Item 606 Guardrail, Type 8, shall be in Linear Feet [Meters] for the length specified in the plans and shall include rails, 8'-0" [2440] posts, grading, excavation, embankment and all other hardware, materials and labor required to construct the guardrail as shown except for the End Anchor. Payment for Item 606 - Post End Anchor (or Concrete Block End Anchor), Each, shall include the extra cost of concrete blocks or steel posts and all other hardware, materials and labor required to construct the End Anchor.

END ANCHORS: A Post End Anchor is the preferred end treatment. A Concrete Block End Anchor may be installed in any location that does not permit the installation of posts. Concrete Blocks may be either pre-cast or cast-in-place and shall meet the requirements of CMS 606.02. The guardrail panel in the end anchors shall be pre-drilled and then galvanized per CMS 606.02. The finished ground line over the end anchor should be smooth and consistent with the surrounding topography, i.e. embankment shall not be mounded over the end anchor to achieve the proper amount of cover.

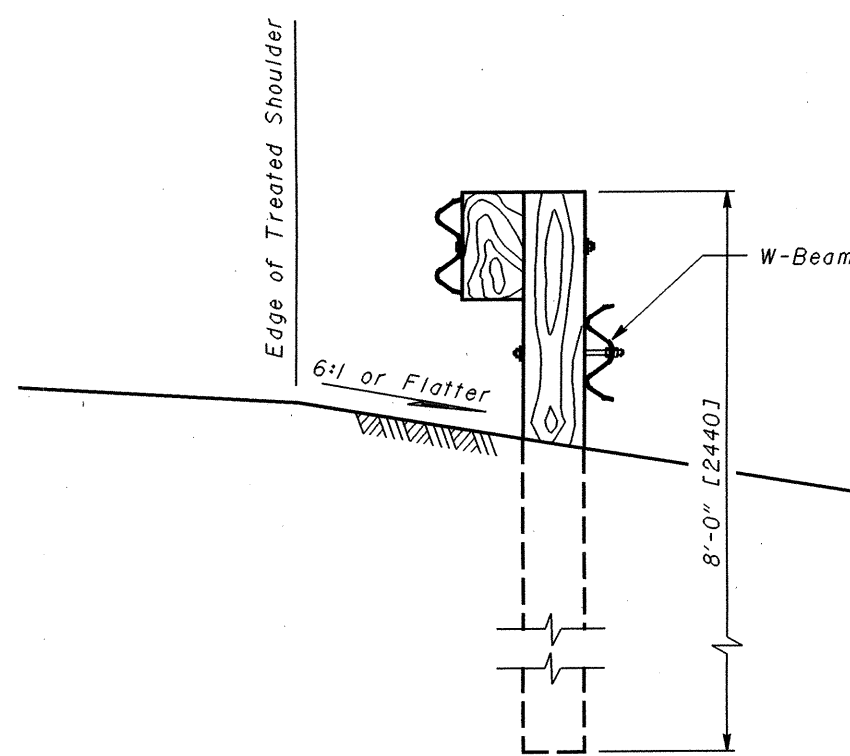
MISCELLANEOUS: For details not shown see SCD GR-2.1.

| DESIGN SPEED | a:b |
|---------------------|-------|
| 60 mph [100 km/h] | 13:1* |
| 55 mph [90 km/h] | 12:1 |
| 50 mph [80 km/h] | 11:1 |
| 45 mph [70 km/h] | 10:1 |
| 35-40 mph [60 km/h] | 9:1 |

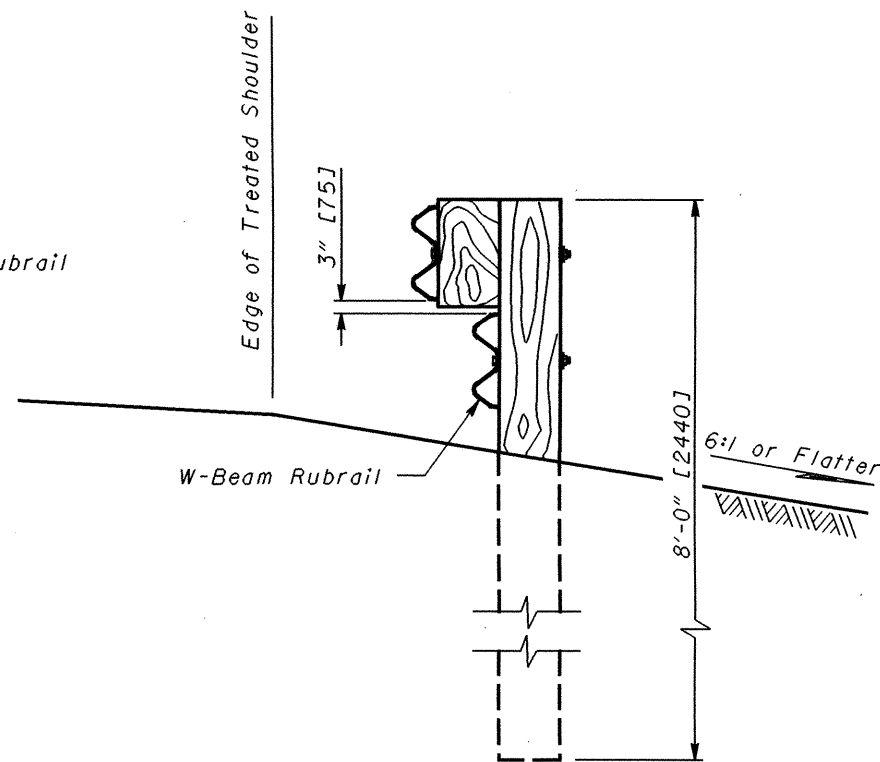
* All installations on the National Highway System shall be installed with this maximum flare rate regardless of design speed.

THIS DRAWING REPLACES GR-4.5 DATED 4-29-99.

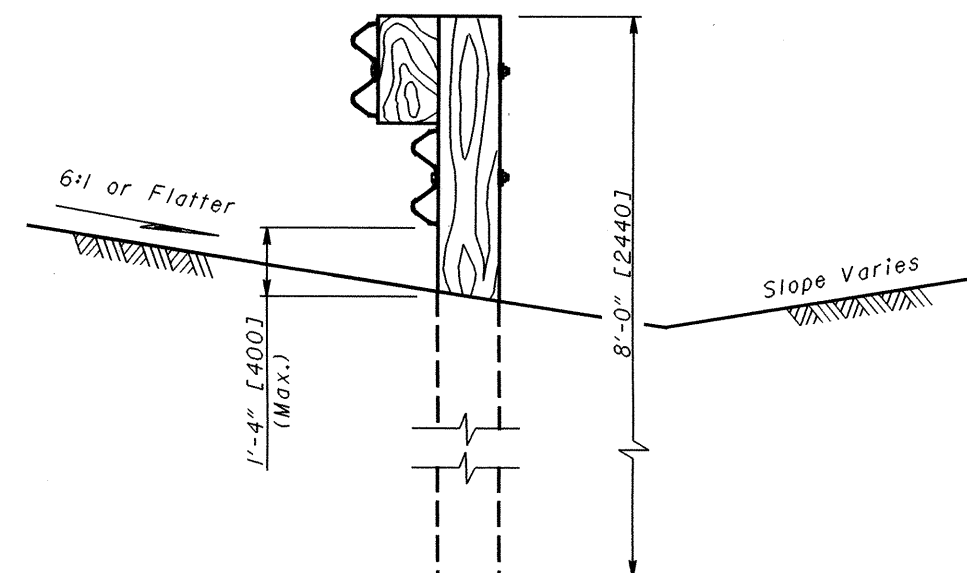
STANDARD ROADWAY CONSTRUCTION DRAWING
GUARDRAIL TYPE 8 BURIED IN BACKSLOPE
 ROADWAY ENGINEERING SERVICES
 STDS. ENGR. D. Focke
 CIVIL ENGINEER OF TRANSPORTATION
 DATE 4-18-03
 1/3



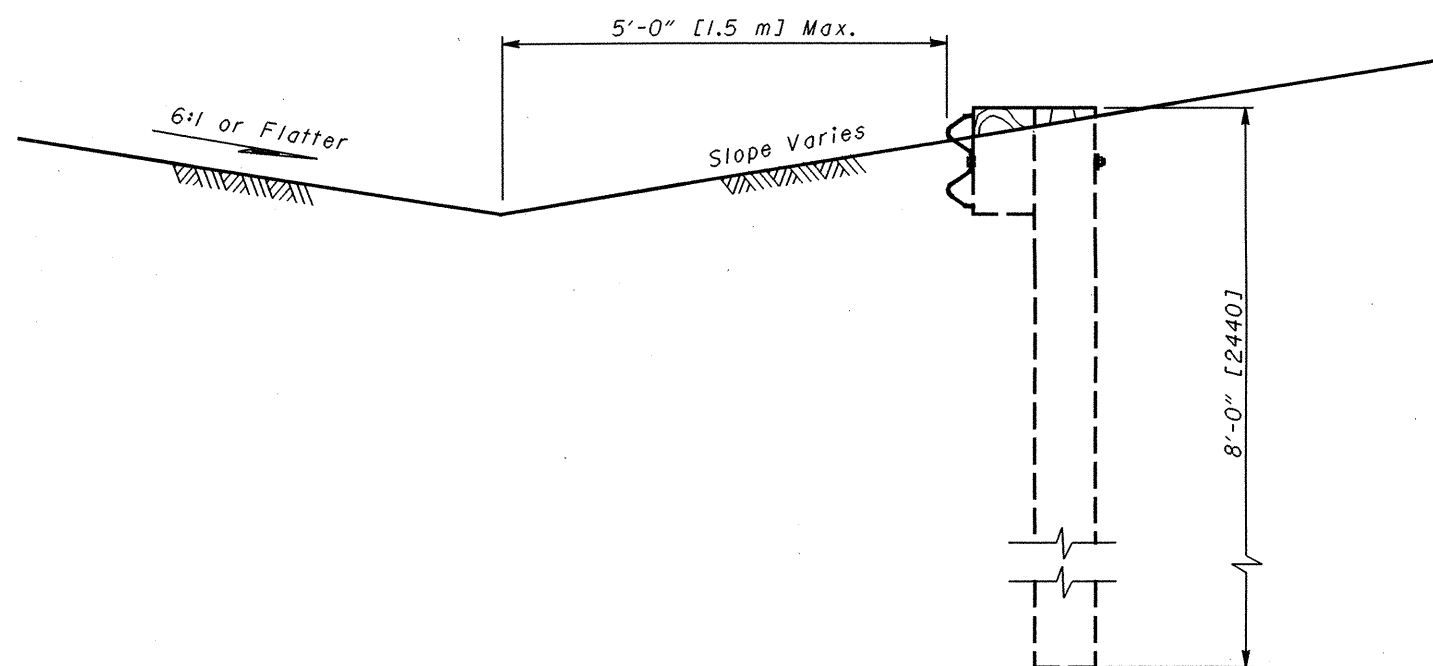
SECTION A-A
(See Sheet 1)



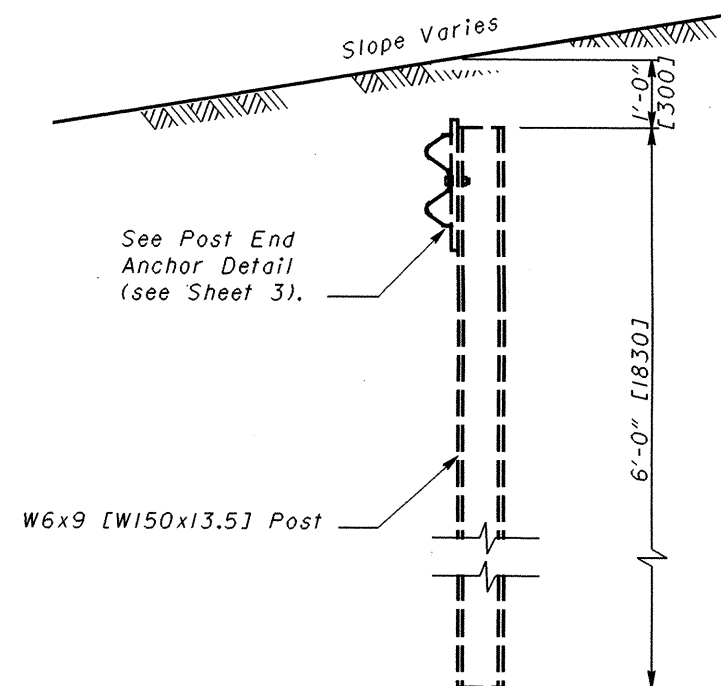
SECTION B-B
(See Sheet 1)



SECTION C-C
(See Sheet 1)



SECTION D-D
(See Sheet 1)



SECTION E-E
(See Sheet 1)

THIS DRAWING REPLACES GR-4.5 DATED 4-29-99.

STANDARD ROADWAY CONSTRUCTION DRAWING
GUARDRAIL TYPE 8
BURIED IN BACKSLOPE

NUMBER
GR-4.5

2/3

All metric dimensions
(in brackets []) are
in millimeters unless
otherwise noted.

**ROADWAY
ENGINEERING
SERVICES**

STDS. ENGR.

D. Focke

HIO DEPARTMENT OF TRANSPORTATION

4-18-03

DATE

Ray T. Sauerbald
ROADWAY DESIGN ENGINEER

WASHER DETAIL
3/16" [5] THICK SQUARE WASHER

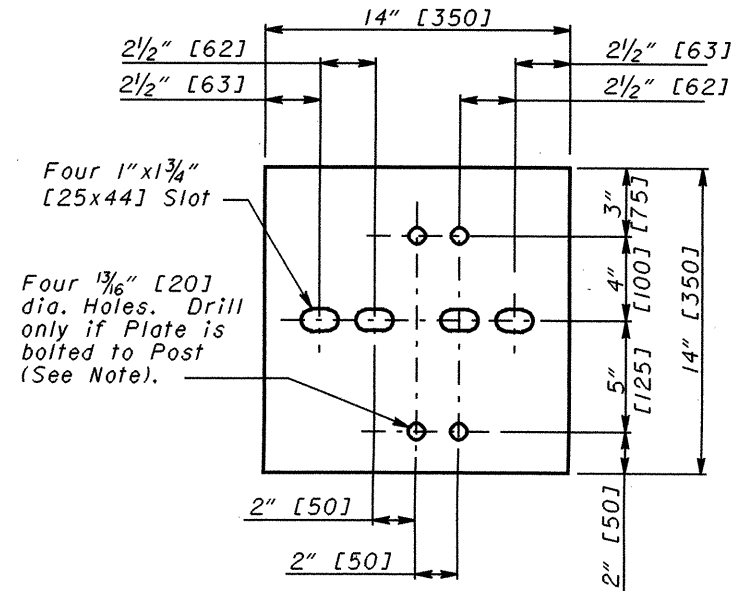
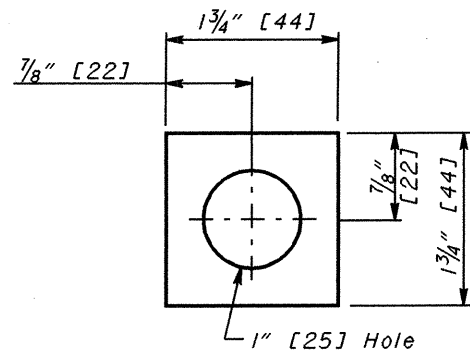
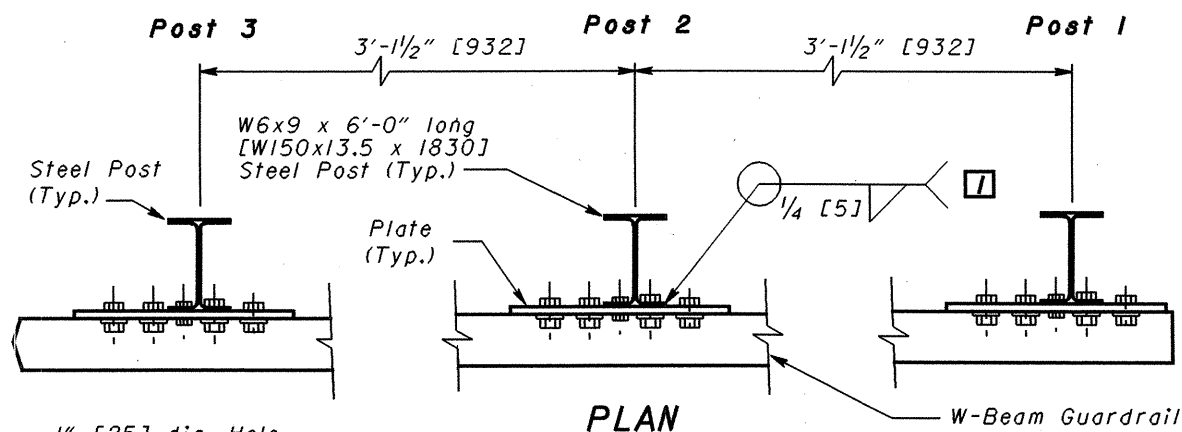
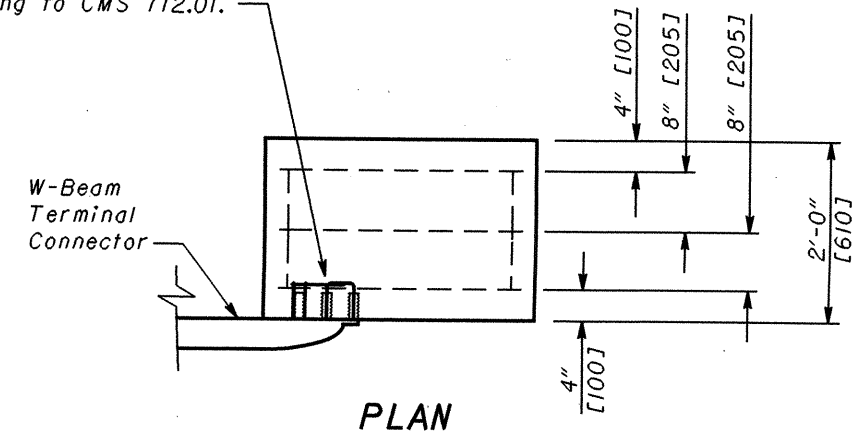


PLATE DETAIL
1/2" [13] THICK STEEL PLATE

Use either: 1) Concrete Insert Anchor Assembly (See Detail on (SCD GR-1.1), or 2) four 7/8" [22] Anchor Bolts with washers, or 3) Expansion Shield Anchors conforming to CMS 712.01.

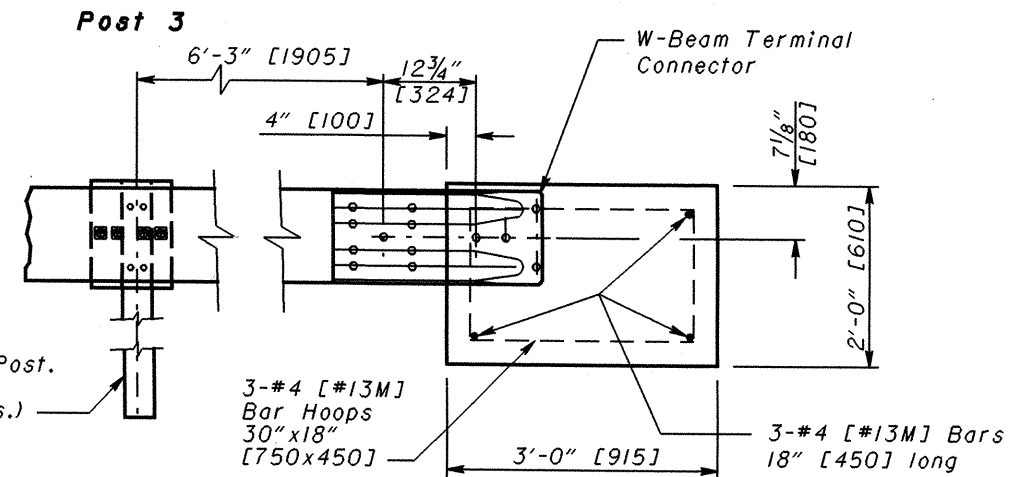
Bolts shall be either mechanical or set in epoxy adhesive. Length of bolt and size of hole to be determined by manufacturer's recommendation.



1" [25] dia. Hole drilled through W-Beam and attached to plate with 7/8"x2" [M22x50] Hex Bolt, Square Washer and Nut.

PLAN

W6x9 by 6'-0" long [W150x13.5 by 1830] Post. (See Post End Anchor for Attachment Details.)



ELEVATION

CONCRETE BLOCK END ANCHOR

Posts 1 and 2 are not used in concrete option.

Drill four 1 3/16" [20] dia. Holes in Post Flange.

W-Beam Guardrail

1" [25] dia. hole drilled through W-Beam and Post flange. Attached to plate with 7/8"x2" [M22x50] Hex Bolt, Square Washer and Nut.

ELEVATION
POST END ANCHOR

1 The 1/2" [13] Steel Plate may be welded or bolted to the Post. If the Plate is bolted to the Post use four 5/8"x1 1/2" long [16x44] Hex Head Bolts with Hex Nuts. If the Plate is welded to the Post do not drill 1 3/16" [20] Holes in the Plate or the Post flanges.

THIS DRAWING REPLACES GR-4.5 DATED 4-29-99.

STANDARD ROADWAY CONSTRUCTION DRAWING
GUARDRAIL TYPE 8
BURIED IN BACKSLOPE

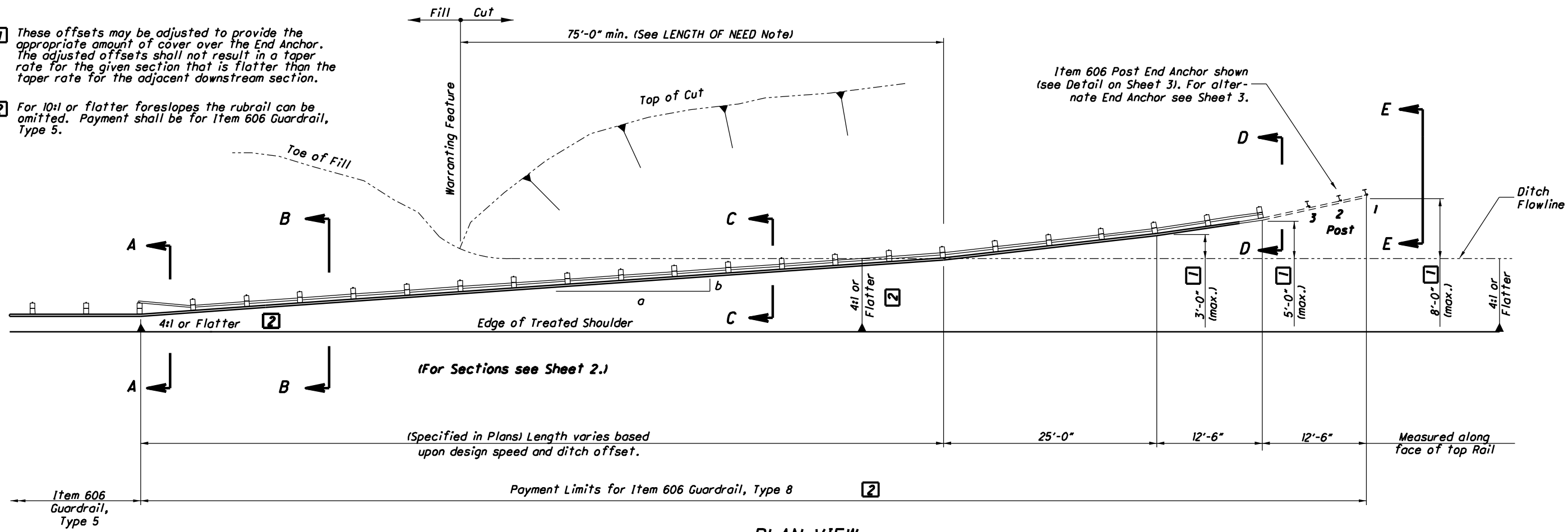
OHIO DEPARTMENT OF TRANSPORTATION
 ROADWAY DESIGN ENGINEER
 D. Focke
 4-18-03
 DATE

ROADWAY ENGINEERING SERVICES

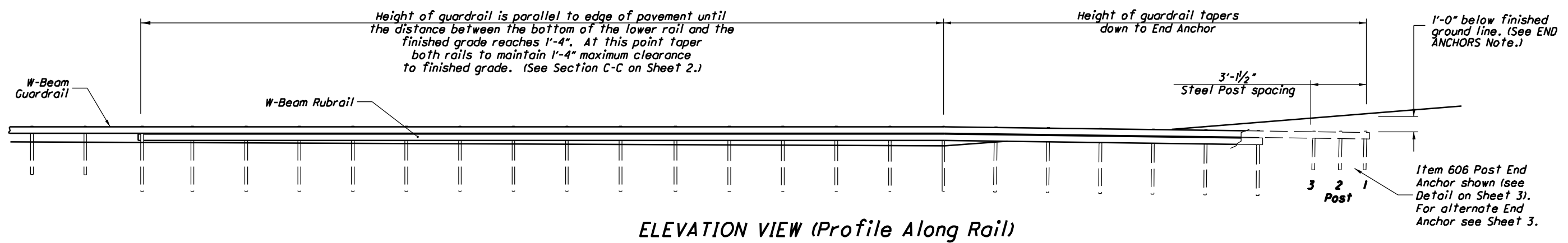
NUMBER
GR-4.5

3/3

- 1 These offsets may be adjusted to provide the appropriate amount of cover over the End Anchor. The adjusted offsets shall not result in a taper rate for the given section that is flatter than the taper rate for the adjacent downstream section.
- 2 For 10:1 or flatter foreslopes the rubrail can be omitted. Payment shall be for Item 606 Guardrail, Type 5.



PLAN VIEW



ELEVATION VIEW (Profile Along Rail)

NOTES

POSTS & BLOCKOUTS: Shall comply with Guardrail, Type 5 (See SCD GR-2.1) except posts shall be 8'-0" long unless otherwise specified.

LENGTH OF NEED: Where backslopes along the length of the terminal to the warranting feature are 2:1 or flatter, at least 75'-0" of guardrail must be provided upstream from the warranting feature before the guardrail crosses the ditch line. (The warranting feature is often the intersection of the Fill/Cut slopes as shown, but may be at some other point.) Where backslopes are steeper than 2:1, this minimum distance is not applicable.

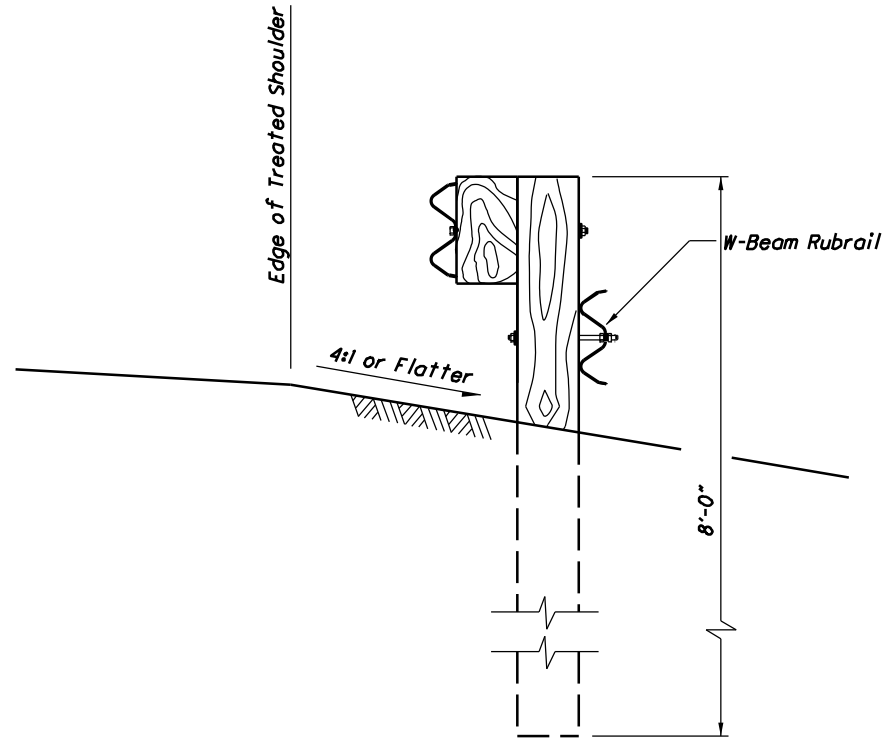
PAYMENT: Item 606 Guardrail, Type 8, shall be in Linear Feet for the length specified in the plans and shall include rails, 8'-0" posts, grading, excavation, embankment and all other hardware, materials and labor required to construct the guardrail as shown except for the End Anchor. Payment for Item 606 - Post End Anchor (or Concrete Block End Anchor), Each, shall include the extra cost of concrete blocks or steel posts and all other hardware, materials and labor required to construct the End Anchor.

END ANCHORS: A Post End Anchor is the preferred end treatment. A Concrete Block End Anchor may be installed in any location that does not permit the installation of posts. Concrete Blocks may be either pre-cast or cast-in-place and shall meet the requirements of CMS 606.02. The guardrail panel in the end anchors shall be pre-drilled and then galvanized per CMS 606.02. The finished ground line over the end anchor should be smooth and consistent with the surrounding topography, i.e. embankment shall not be mounded over the end anchor to achieve the proper amount of cover.

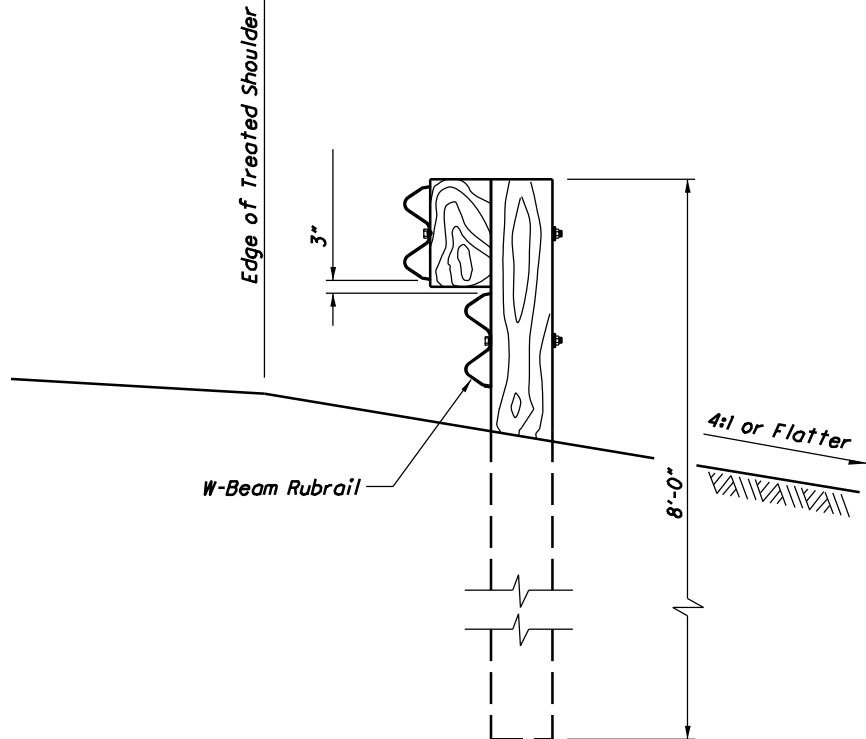
MISCELLANEOUS: For details not shown see SCD GR-2.1.

| DESIGN SPEED | oob |
|--------------|-------|
| 60 mph | 13:1* |
| 55 mph | 12:1 |
| 50 mph | 11:1 |
| 45 mph | 10:1 |
| 35-40 mph | 9:1 |

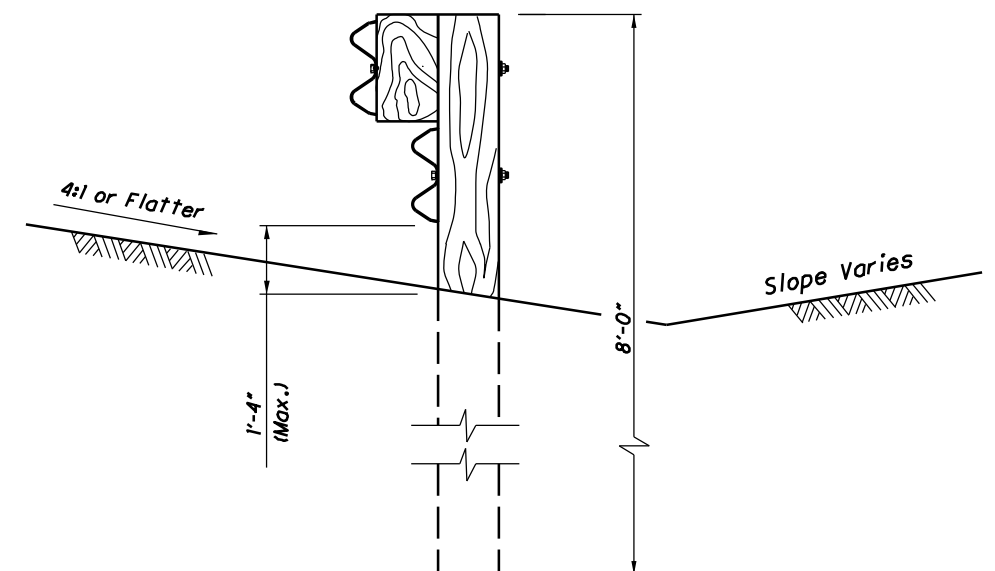
* All installations on the National Highway System shall be installed with this maximum flare rate regardless of design speed.



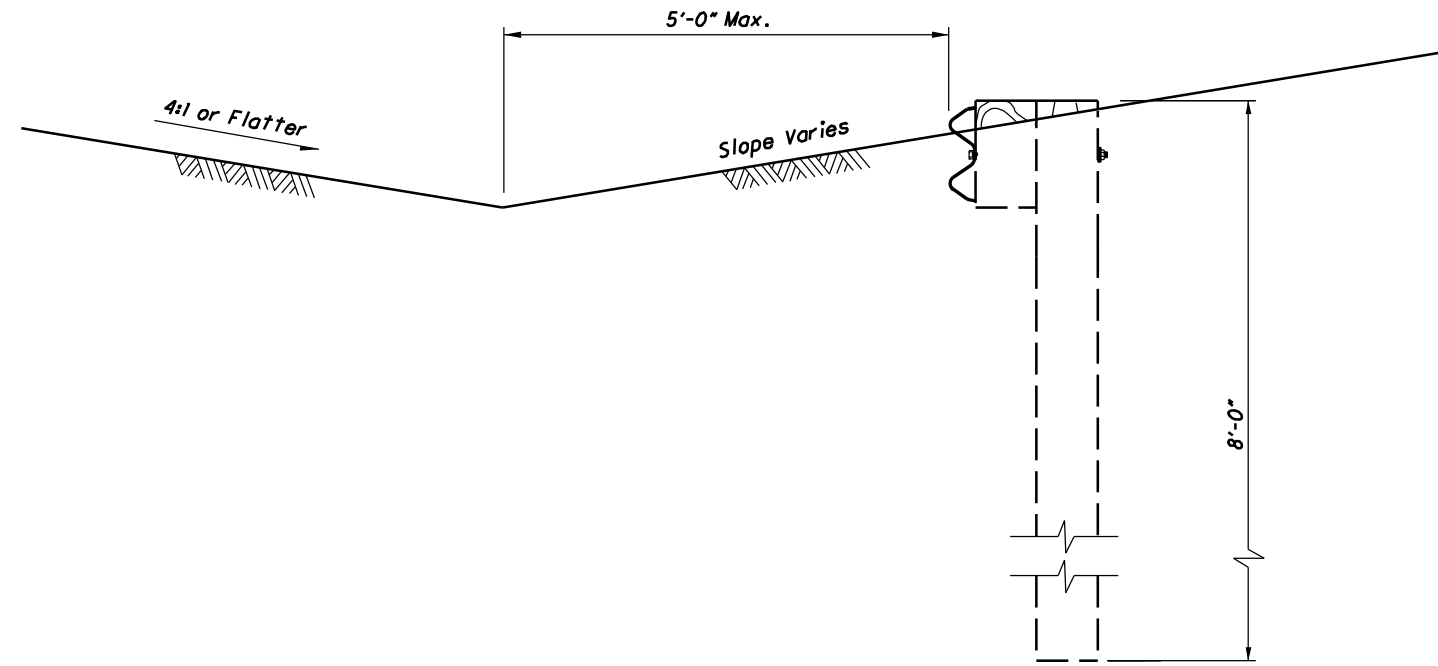
SECTION A-A
(See Sheet 1)



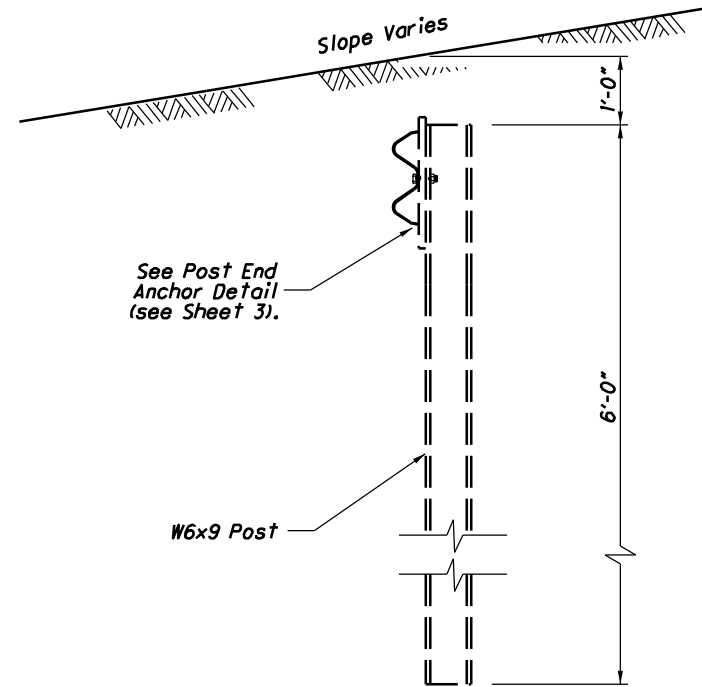
SECTION B-B
(See Sheet 1)



SECTION C-C
(See Sheet 1)



SECTION D-D
(See Sheet 1)



SECTION E-E
(See Sheet 1)

THIS DRAWING REPLACES GR-4.5 DATED 4-18-03.

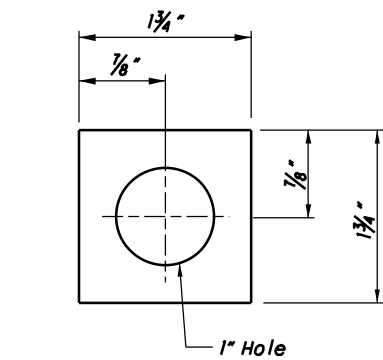
SD NUMBER
GR-4.5

STANDARD ROADWAY CONSTRUCTION DRAWING
**GUARDRAIL TYPE 8
BURIED IN BACKSLOPE**

OFFICE OF
**ROADWAY
ENGINEERING**

SDS
ENGINEER
M. Ruppe

STATE OF OHIO DEPARTMENT OF TRANSPORTATION
Dick B. Swan
ADMINISTRATOR
DATE
01-20-12



WASHER DETAIL
3/16" THICK SQUARE WASHER

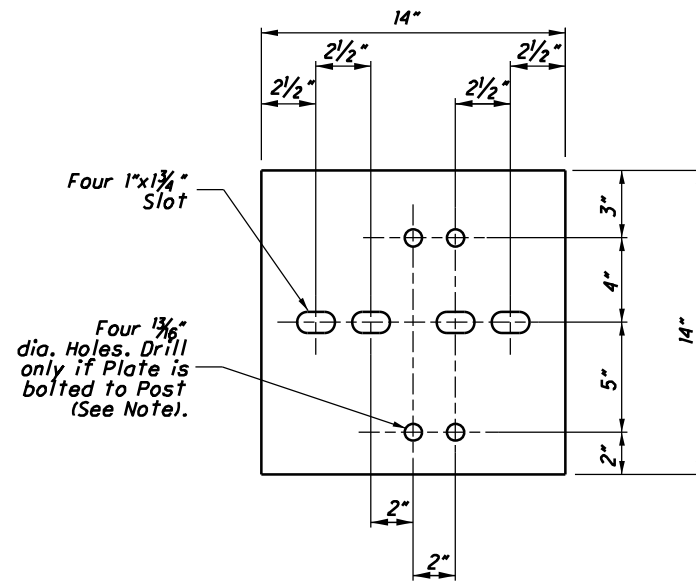
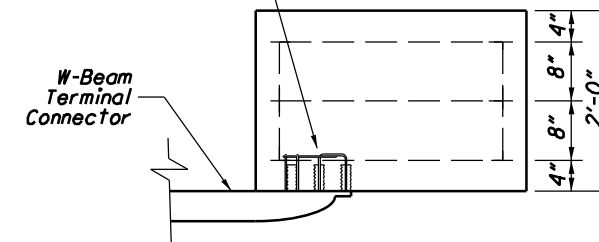


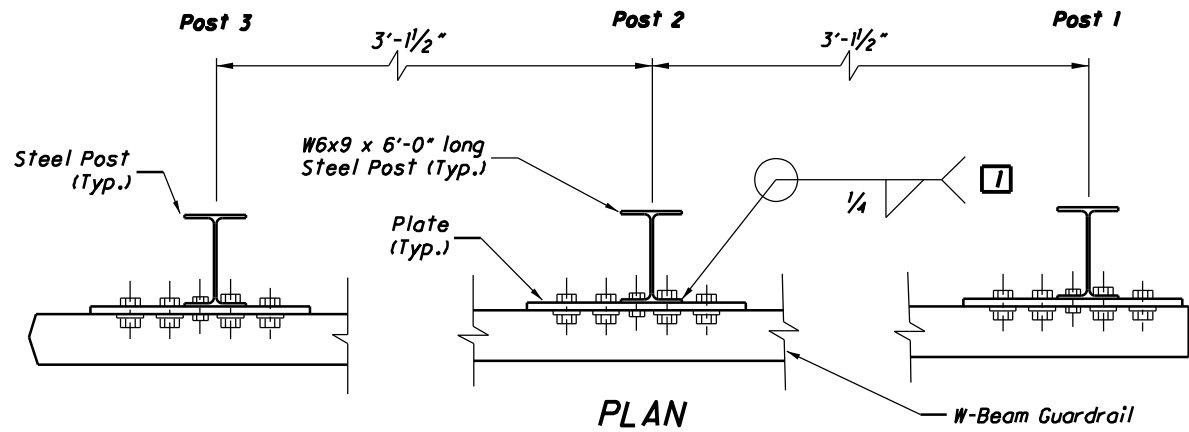
PLATE DETAIL
1/2" THICK STEEL PLATE

Use either: 1) Concrete Insert Anchor Assembly (See Detail on TSCD GR-1.1), or 2) four 3/8" Anchor Bolts with washers, or 3) Expansion Shield Anchors conforming to CMS 712.01.

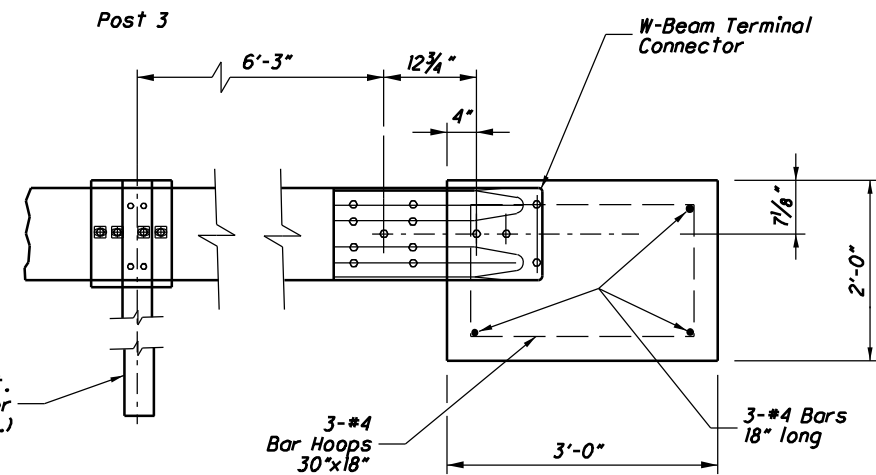
Bolts shall be either mechanical or set in epoxy adhesive. Length of bolt and size of hole to be determined by manufacturer's recommendation.



PLAN

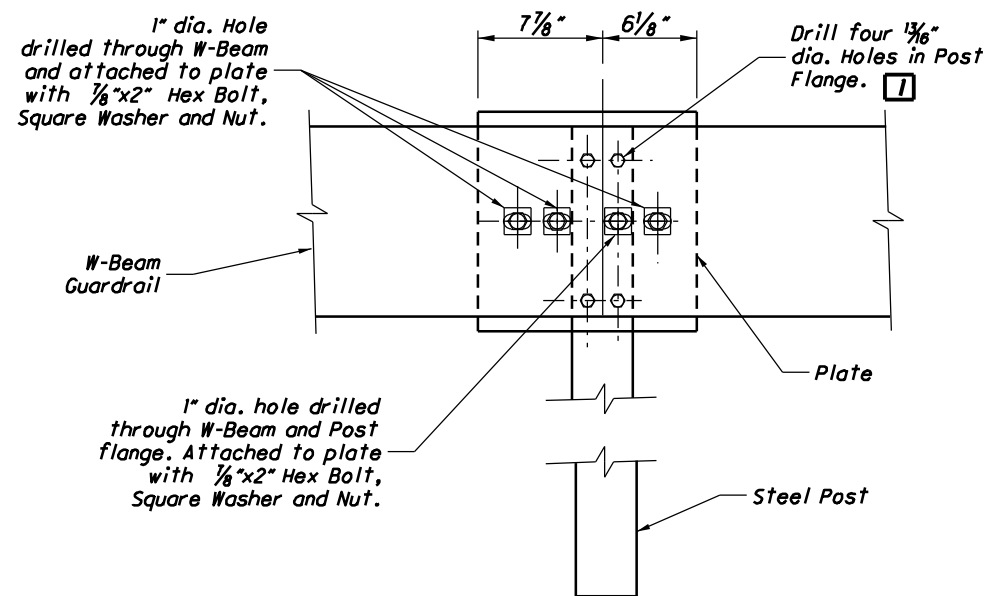


PLAN



ELEVATION
CONCRETE BLOCK END ANCHOR

Posts 1 and 2 are not used in concrete option.



ELEVATION
POST END ANCHOR

W6x9 by 6'-0" long Post. (See Post End Anchor for Attachment Details.)

1 The 1/2" Steel Plate may be welded or bolted to the Post. If the Plate is bolted to the Post use four 3/8"x1 1/2" long Hex Head Bolts with Hex Nuts. If the Plate is welded to the Post do not drill 1/8" Holes in the Plate or the Post flanges.