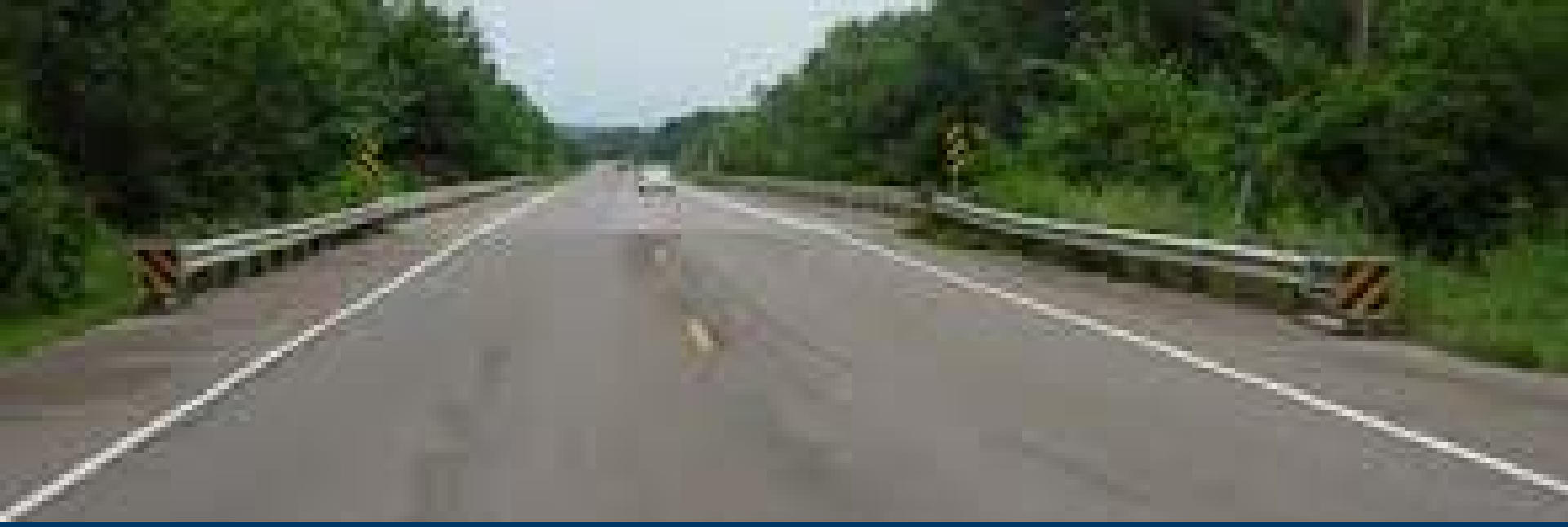


GUARDRAIL

Project Design Services Unit

September 2018

DEPARTMENT OF TRANSPORTATION

http://ihub/projectdelivery/design/index.html

GUARDRAIL

If you EVER have any questions regarding guardrail, end treatments and/or pay items please contact the Project Design Services Engineer or the Design Standards Engineer. It is much easier having the plan come in with the correct information than to try and correct it later.

GUARDRAIL – SITE VISIT

- The Designer should make a site visit for each guardrail location and pay attention to:
  - Was the original installation done correctly?
  - Existing geometry, especially entrance slopes
  - Condition of material, is there considerable erosion?
  - Will the existing conditions allow installation without grading work?
  - Will grading/regrading affect drainage? Will it require culvert extensions?
  - Are there existing utilities in the area?
  - What type of end treatments are present and their condition.
- It is recommended that pictures be taken to help recall information later.
- When revising existing profile grade elevations consider guardrail heights (28” to 31”). Adjust guardrail height if necessary.

GUARDRAIL - TABULATIONS

- Column headings match the SEQ descriptions

TRAFFIC BARRIER									
SITE NO.	STATION TO STATION	LOCATION	REMOVE GUARDRAIL-PLATE BEAM	REMOVE ANCHORAGE ASSEMBLY-PLATE BEAM	REMOVE ECCENTRIC LOADER BCT	TRAFFIC BARRIER DESIGN TYPE 31	ANCHORAGE ASSEMBLY-TYPE 31	END TREATMENT-TANGENT TERMINAL	T-BARRIER BRIDGE CONN DES 8318
			LIN FT	EACH	EACH	LIN FT	EACH	EACH	EACH
	SP 1111-11								
1	828+56 TO 831+05	LT	175		2	125		1	
2	829+59 TO 831+04	RT	138	1	1	100	1	1	
3	81+51 TO 82+38	RT				87.5			1
	SP 1111-11 Sub-Total		313	1	3	312.5	1	2	1
	SP 2222-22								
4	93+12 TO 93+88	RT				75			1
5	89+45 TO 90+32	LT		1		87.5			
6	99+80 TO 101+20	RT	275			200			2
7	100+06 TO 101+72	LT	112.5	1	1				
	SP 2222-22 Sub-Total		387.5	2	1	362.5			3
	TABULATION TOTAL		**700.5**	**3**	**4**	**675**	**1**	**2**	**4**

Abbreviations can be used but the words and their order should match the SEQ.

GUARDRAIL - TABULATIONS

- Both ends of the guardrail are accounted for

TRAFFIC BARRIER									
SITE NO.	STATION TO STATION	LOCATION	REMOVE GUARDRAIL-PLATE BEAM	REMOVE ANCHORAGE ASSEMBLY-PLATE BEAM	REMOVE ECCENTRIC LOADER BCT	TRAFFIC BARRIER DESIGN TYPE 31	ANCHORAGE ASSEMBLY-TYPE 31	END TREATMENT-TANGENT TERMINAL	T-BARRIER BRIDGE CONN DES 8318
			LIN FT	EACH	EACH	LIN FT	EACH	EACH	EACH
	SP 1111-11								
1	828+56 TO 831+05	LT	175		2	125		1	
2	829+59 TO 831+04	RT	138	1	1	100	1	1	
3	81+51 TO 82+38	RT				87.5			1
	SP 1111-11 Sub-Total		313	1	3	312.5	1	2	1
	SP 2222-22								
4	93+12 TO 93+88	RT				75			1
5	89+45 TO 90+32	LT		1		87.5			
6	99+80 TO 101+20	RT	275			200			2
7	100+06 TO 101+72	LT	112.5	1	1				
	SP 2222-22 Sub-Total		387.5	2	1	362.5			3
	TABULATION TOTAL		**700.5**	**3**	**4**	**675**	**1**	**2**	**4**

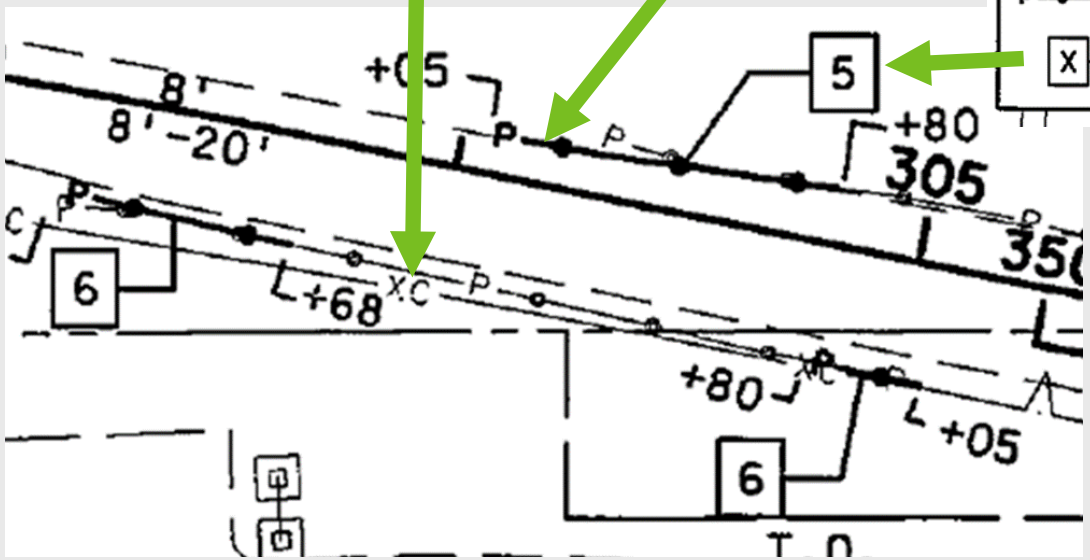
GUARDRAIL - TABULATIONS

- All notes are accounted for and make sense
- SP/Funding splits are shown (if necessary)

SITE NO.	STATION TO STATION	LOCATION	REMOVE GUARDRAIL-PLATE BEAM	REMOVE ANCHORAGE ASSEMBLY-PLATE BEAM	REMOVE ECCENTRIC LOADER BCT	TRAFFIC BARRIER DESIGN TYPE 31	ANCHORAGE ASSEMBLY-TYPE 31	END TREATMENT-TANGENT TERMINAL	T-BARRIER BRIDGE CONN DES 8318
			LIN FT	EACH	EACH	LIN FT	EACH	EACH	EACH
	SP 1111-11								
1	828+56 TO 831+05	LT	175		2	125		1	
2	829+59 TO 831+04	RT	138	1	1	100	1	1	
3	81+51 TO 82+38	RT				87.5			1
	SP 1111-11 Sub-Total		313	1	3	312.5	1	2	1
	SP 2222-22								
4	93+12 TO 93+88	RT				75			1
5	89+45 TO 90+32	LT		1		87.5			
6	99+80 TO 101+20	RT	275			200			2
7	100+06 TO 101+72	LT	112.5	1	1				
	SP 2222-22 Sub-Total		387.5	2	1	362.5			3
	TABULATION TOTAL		**700.5**	**3**	**4**	**675**	**1**	**2**	**4**

GUARDRAIL – PLAN VIEW

- The way it is shown in the legend should match how it is shown in the plan view.

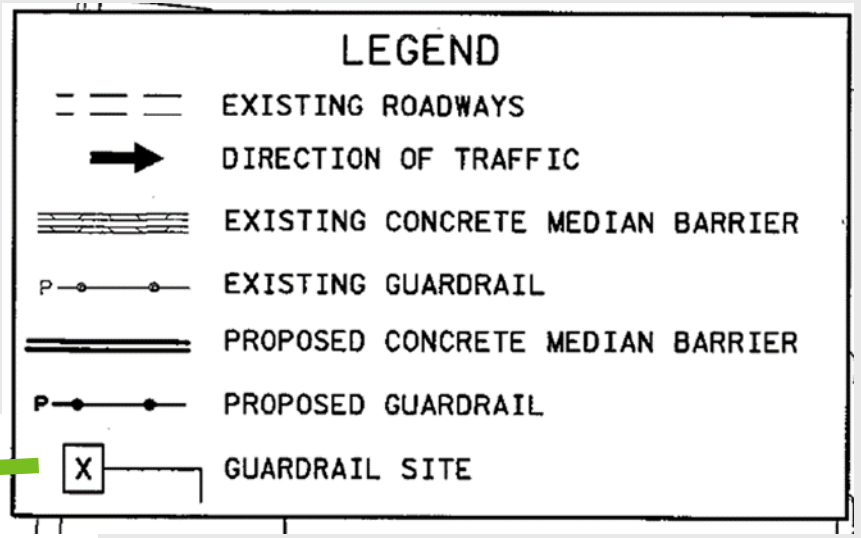


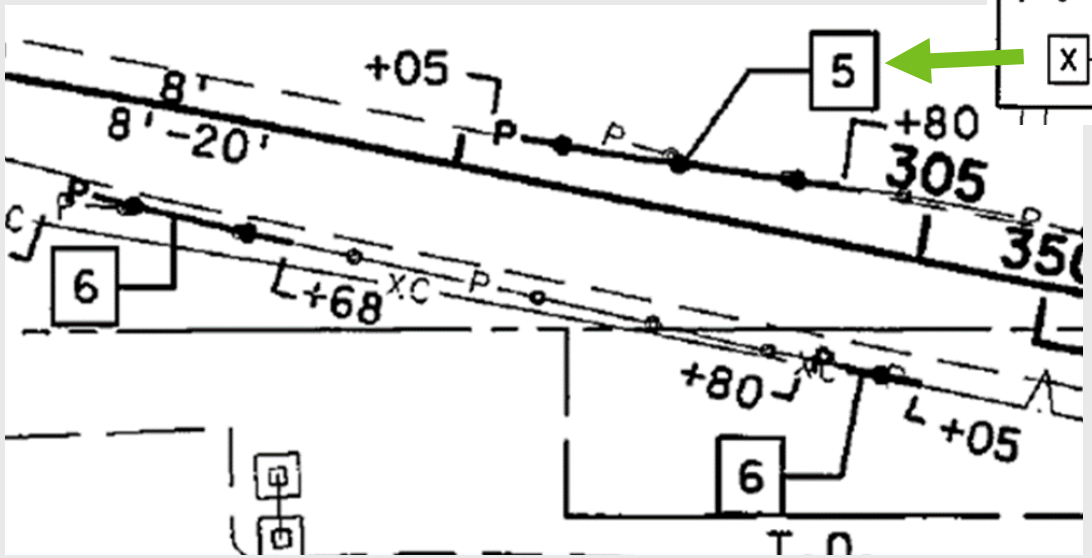
LEGEND

- EXISTING ROADWAYS
- DIRECTION OF TRAFFIC
- EXISTING CONCRETE MEDIAN BARRIER
- P — EXISTING GUARDRAIL
- PROPOSED CONCRETE MEDIAN BARRIER
- P — PROPOSED GUARDRAIL
- X — GUARDRAIL SITE

GUARDRAIL – PLAN VIEW

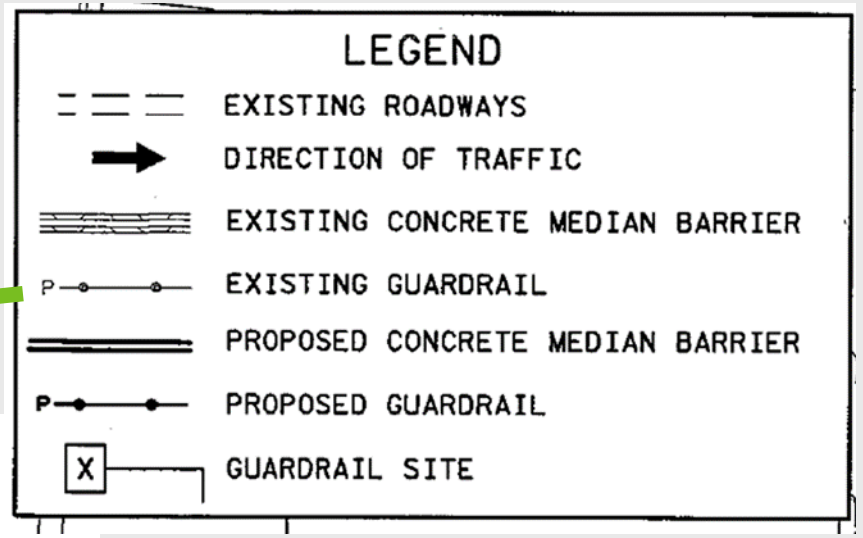
- Show the guardrail site/location (optional)

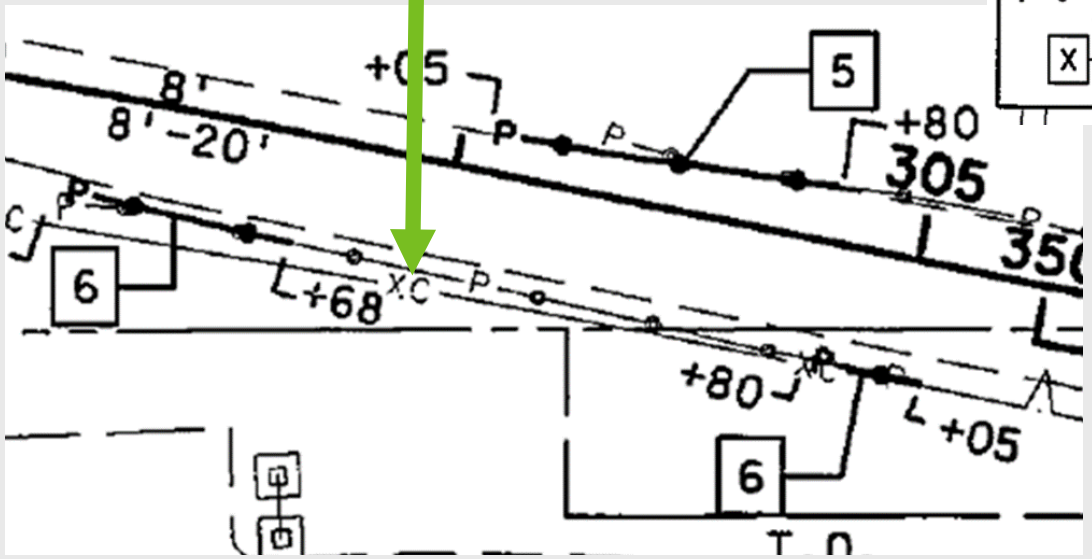




GUARDRAIL – PLAN VIEW

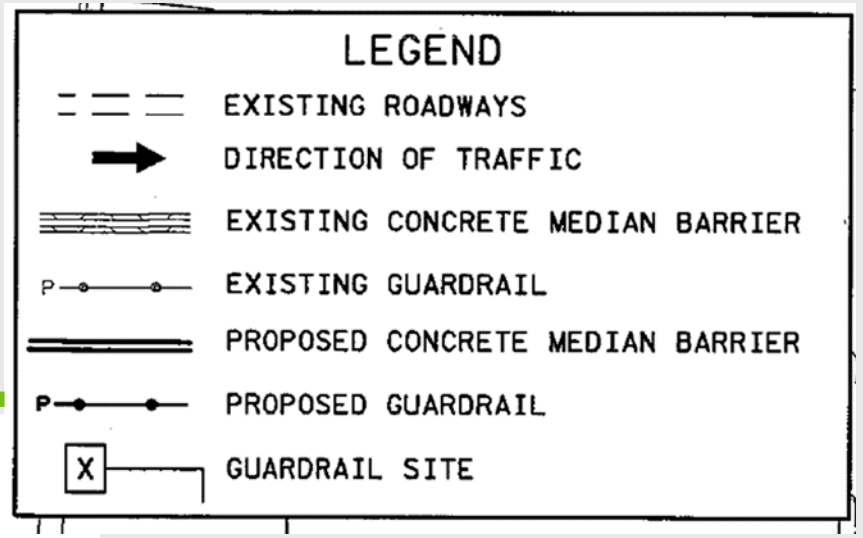
- Show the inplace guardrail
  - Use a lighter line weight for inplace

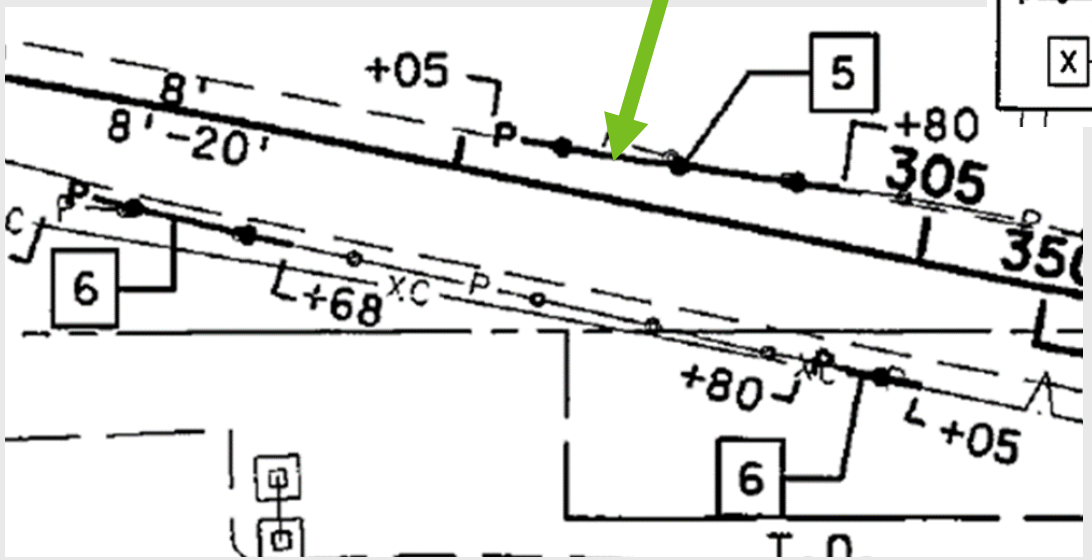




GUARDRAIL – PLAN VIEW

- Show the proposed guardrail
  - This should be a heavier line weight/bold to stand out more





REMOVING PLATE BEAM GUARDRAIL (B8338/B8307) REMOVE COMPLETE SYSTEM

When removing plate beam guardrail (including posts and end treatment) and will not be reusing the guardrail but replace the existing system with new, use the following items:

- 2104.502 REMOVE ANCHORAGE ASSEMBLY – PLATE BEAM by EACH (providing there is one inplace)
- 2104.502 REMOVE *specify end treatment* (e.g. twisted end, energy absorbing, etc…) by EACH (see section on end treatments)
- 2104.503 REMOVE GUARDRAIL – PLATE BEAM by LIN FT
- 2554.502 END TREATMENT – *specify* (see section on end treatments)
- 2554.503 TRAFFIC BARRIER DESIGN B8338 by LIN FT for steel posts
- 2554.503 TRAFFIC BARRIER DESIGN B8307 by LIN FT for wood posts

REMOVING PLATE BEAM GUARDRAIL (B8338) REMOVE POSTS ONLY

When there is a run of plate beam guardrail with wood posts and the rail is in good condition, the District may opt for salvaging the rail and replace the wood posts with steel posts, if this is the case use the following items:

- 2104.502 REMOVE ANCHORAGE ASSEMBLY – PLATE BEAM by EACH (providing there is one inplace)
- 2104.503 SALVAGE GUARDRAIL by LIN FT , add note to SEQ or TABULATION… *INCLUDES THE REMOVAL OF THE WOOD POSTS*.
- 2554.502 ANCHORAGE ASSEMBLY – PLATE BEAM by EACH (if required)
- 2554.603 INSTALL GUARDRAIL by LIN FT, add note to SEQ or TABULATION: *INCLUDES THE FURNISH AND INSTALL OF STEEL POSTS.*

REMOVING PLATE BEAM GUARDRAIL (B8338/B8307) REMOVE RAIL ONLY

When removing plate beam rail only (posts remain) and will not reuse the rail (this is used if the rail was hit or in poor condition and the District has decided that the posts are in good condition and would like to keep the post system), use the following items:

- 2104.502 REMOVE ANCHORAGE ASSEMBLY by EACH (providing there is one inplace)
- 2104.503 REMOVE GUARDRAIL by LIN FT
- 2554.502 ANCHORAGE ASSEMBLY – PLATE BEAM by EACH (if required)
- 2554.602 GUARDRAIL POST by EACH (if required)
- 2554.603 PLATE BEAM RAIL by LIN FT

SALVAGE 3 – CABLE GUARDRAIL REMOVE POSTS ONLY

On the rare occasions when you want to salvage 3-cable guardrail (Low Tension Systems Only) and replace the wood posts. It should be paid for as:

- 2104.503 SALVAGE GUARDRAIL – CABLE by LIN FT, add note to SEQ or TABULATION: *INCLUDES THE REMOVAL OF THE WOOD POSTS.*

- 2554.603 INSTALL 3 - CABLE GUARDRAIL by LIN FT, add note to SEQ or TABULATION: *INCLUDES THE FURNISH AND INSTALL OF STEEL POSTS.*

FURNISH & INSTALL (NEW) GUARDRAIL COMPLETE SYSTEM

When furnishing and installing new guardrail. This includes a complete system of both rail/cable and posts. This does NOT include the end treatments (see end treatment section).
Use the following items:

- 2554.503 TRAFFIC BARRIER DESIGN TYPE 31 by LIN FT …plate beam with steel posts
- 2554.503 TRAFFIC BARRIER DESIGN B8338 by LIN FT … plate beam with steel posts
- 2554.503 TRAFFIC BARRIER DESIGN B8307 by LIN FT … plate beam with wood posts
- 2554.503 TRAFFIC BARRIER DESIGN BULLNOSE by LIN FT
- 2554.503 TRAFFIC BARRIER DESIGN 8330 by LIN FT … cable with wood posts
- 2554.503 TRAFFIC BARRIER DESIGN 8331 by LIN FT … cable with steel posts

GUARDRAIL - END TREATMENTS

Guardrail must be in tension to work…

Must have tension at both ends!

Tools of tension are…

- Design Special
- Approach Guardrail Transition (AGT)
- End Treatment (e.g. Tangent terminal, Flared terminal, etc.)
- Anchorage Assembly

GUARDRAIL - END TREATMENT

- There are details available on the server for the following end treatments, which should be placed into the plans. These details are proprietary end treatments and should not be modified or signed.
  - B8338 Tangent Terminal - (SKT-350 and ET-PLUS)
  - B8338 Flared Terminal - (SRT-350 and FLEAT-350)
  - TYPE 31 Tangent Terminal – (MSKT and SOFTSTOP)
- Wood posts can NOT be replaced with steel posts on end treatments. If that is desired then it would have to be a new system with steel posts not an install.
- Design Specials and/or AGTs are needed on all approaches to fixed objects within the clear zone.
- Consideration should be made to protect fixed objects during staging. This could be by End Treatments, Design Specials, AGTs, Barrels, Impact Attenuators, etc..

GUARDRAIL END TREATMENTS REMOVALS

When removing end treatments use the following items (all by the EACH):

- 2104.502 REMOVE ENERGY ABSORBING TERMINAL, note in the SEQ or TABULATION what it is (e.g. ET-2000, SKT-350, etc.)
- 2104.502 REMOVE TWISTED END TREATMENT, note if it includes the removal of anchorage blocks.
- 2104.502 REMOVE ECCENTRIC LOADER BCT
- 2104.502 REMOVE SLOTTED RAIL TERMINAL
- 2104.502 REMOVE ANCHORAGE ASSEMBLY – TYPE 31
- 2104.502 REMOVE ANCHORAGE ASSEMBLY – PLATE BEAM
- 2104.502 REMOVE ANCHORAGE ASSEMBLY – CABLE

GUARDRAIL END TREATMENTS FURNISH & INSTALL (NEW)

When placing new end treatments use the following items:

- 2554.502 ANCHORAGE ASSEMBLY – CABLE by EACH
- 2554.502 ANCHORAGE ASSEMBLY – PLATE BEAM by EACH
- 2554.502 ANCHORAGE ASSEMBLY – TYPE 31 by EACH
- 2554.502 END TREATMENT - TANGENT TERMINAL by EACH
  - Include details in plan
  - Note in the SEQ or TABULATION…
    - *SHALL BE EITHER SKT-350 or ET-PLUS* for 8338 or
    - *SHALL BE EITHER MSKT or SOFTSTOP* for TYPE 31
- 2554.502 END TREATMENT - FLARED TERMINAL by EACH
  - This is only used for B8338 guardrail
  - Include details in plan
  - Note in the SEQ or TABULATION… *SHALL BE EITHER SRT-350 or FLEAT-350*
- Include Standard Plan 5-297.601

- *See next slide for exception to this….*

TYPE 31 GUARDRAIL END TREATMENTS HOW TO SHOW IN THE PLAN

The TYPE 31 Tangent end treatments are of different lengths so they need to be shown in a standard way in the plan.

- In the PLAN VIEW
  - show a "+" station where the Type 31 guardrail ends and the end treatment begins.
  - This may not necessarily be the length of need as a portion of the length of need is covered in the end treatment pay items (approximately 34'-4.5").
  - It is desirable to show the end treatment in the plan view with a different icon than is used for the guardrail.
- In the TABULATION a note should be added… *STATIONING DOES NOT INCLUDE END TREATMENT.*

GUARDRAIL END TREATMENTS
STEEL POSTS – FLARED TERMINAL ONLY

- The SRT-350 with wood posts, is the only SRT terminal currently approved. The FLEAT-350 is the only approved flared treatment that has steel posts, and is energy absorbing. So, if the District wants to have an energy absorbing flared terminal with steel posts, then the following pay item should be used:

  - 2554.502 END TREATMENT – ENERGY ABSORBING TERMINAL by EACH…add a note to SEQ or *TABULATION…SHALL BE FLARED AND HAVE STEEL POSTS.*

- If this situation is used alone (no other end treatments) in your plan then **Do NOT** include the detail in the plan for a flared terminal. If you are using this item along with the End Treatment – Flared Terminal pay item then the details for the flared terminals should be included in the plan.

GUARDRAIL END TREATMENTS SALVAGE EXISTING (Known)

When salvaging an existing guardrail end treatment then use the following items (all by the EACH):

- 2104.502 SALVAGE ANCHORAGE ASSEMBLY – CABLE
- 2104.502 SALVAGE ANCHORAGE ASSEMBLY – TYPE 31
- 2104.502 SALVAGE ANCHORAGE ASSEMBLY – PLATE BEAM
- 2104.502 SALVAGE ENERGY ABSORBING TERMINAL. This is used on existing treatments. Add a note to the SEQ or TABULATION stating what it is (e.g. 4=FLEAT 350 & 3=SKT 350).
- 2104.502 SALVAGE SLOTTED RAIL TERMINAL
- 2104.502 SALVAGE ECCENTRIC LOADER BCT, This can only be salvaged for parts, it cannot be re-installed.

❖ *See Design Special/AGTs slides for Design Special/AGT information*.

GUARDRAIL END TREATMENTS INSTALL EXISTING (Known)

When installing an existing guardrail end treatment (salvaged or supplied) then use the following items (all by the EACH):

- 2554.602 INSTALL ANCHOR ASSEMBLY – 3 CABLE
- 2554.602 INSTALL ANCHOR ASSEMBLY – TYPE 31
- 2554.602 INSTALL ANCHOR ASSEMBLY – PLATE BEAM
- 2554.602 INSTALL ENERGY ABSORBING TERMINAL. This is used on existing treatments. Add a note to the SEQ or TABULATION stating what it is (e.g. 4=FLEAT 350 & 3=SKT 350).
- 2554.602 INSTALL SLOTTED RAIL TERMINAL

❖ *See Design Special/AGT slides for Design Special/AGT information.*

GUARDRAIL END TREATMENTS SALVAGE & INSTALL STAGING GUARDRAIL

The instance where the contractor will be salvaging a guardrail end treatment as a result of staging cross traffic. Then use the following items (all by the EACH):

- 2104.502 SALVAGE TANGENT TERMINAL*
- 2104.502 SALVAGE FLARED TERMINAL**
- 2554.602 INSTALL TANGENT TERMINAL*
- 2554.602 INSTALL FLARED TERMINAL**

*Note in the SEQ or TABULATION that is shall be either (depending on type of guardrail used)

  - SKT-350 or ET-PLUS, or
  - MSKT or SOFTSTOP

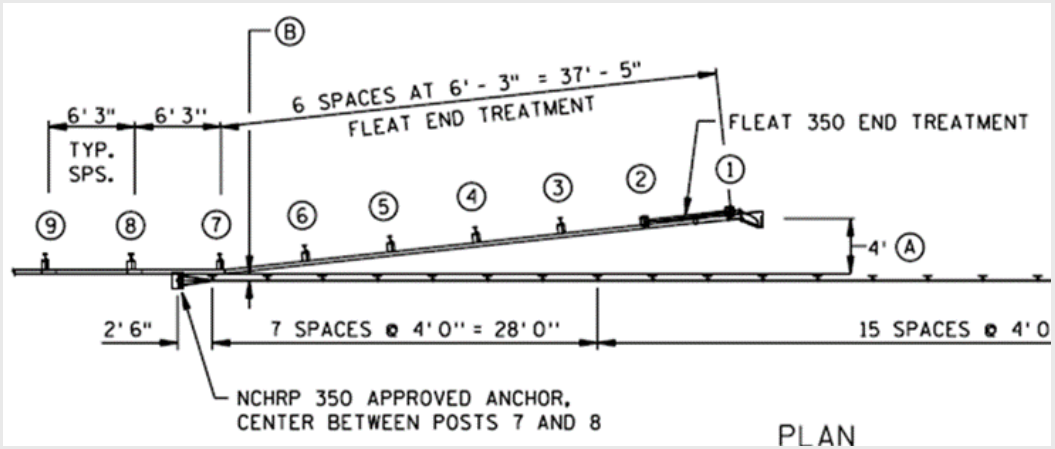
**Note in the SEQ or TABULATION that it shall be either SRT-350 or FLEAT-350.

- Include a detail in the plan for possible options.
- Salvaged End Treatment MUST remain the property of the contractor unless re-used as permanent placement on the project.

GUARDRAIL END TREATMENTS
PLATE BEAM BEHIND 3-CABLE
(Low Tension Systems Only)

When plate beam guardrail meets 3-cable (low tension) guardrail the plate beam end is typically placed behind the 3 cable. When this occurs the designer needs to:

- Use FLEAT-350 as the plate beam end treatment behind the cable.
- Include standard plate 8340 in the standard plate table
- Add the FLEAT-350 detail to the plan.
- Pay for it as 2554.502 END TREATMENT-FLARED TERMINAL by EACH, add a note to the SEQ or TABULATION… *Fleat-350 End Terminal is the only option permitted.*



B8338 GUARDRAIL – DESIGN SPECIAL

- When removing design special pay for it as 2104.503 REMOVE GUARD RAIL – PLATE BEAM by LIN FT and you could add the *note…Includes Design Special*.

- Design Special can only be installed on the same structure it was salvaged from and only if it is up to present standards. This would be paid for as:

  - 2104.503 SALVAGE GUARDRAIL – PLATE BEAM by LIN FT, and
  - 2554.503 INSTALL TRAFFIC BARRIER DESIGN B8338 by LIN FT.
  - *Note that it is a design special for both cases.*

- When placing a new design special use 2554.503 TRAFFIC BARRIER DESIGN SPECIAL by LIN FT.
  - This includes the bridge connection 8318 so that does not need to be paid for separately.
  - Make sure you reference the standard plate 8318 in the standard plate table.

TYPE 31 GUARDRAIL – APPROACH GUARDRAIL TRANSITION (AGT) REMOVE OR SALVAGE

- When removing AGT pay for it as 2104.503 REMOVE GUARD RAIL – PLATE BEAM by LIN FT and you could add the *note…Includes AGT*.

- AGT can only be installed on the same structure it was salvaged from and only if it is up to present standards. This would be paid for as:

  - 2104.503 SALVAGE GUARDRAIL – PLATE BEAM by LIN FT
  - 2554.503 INSTALL TRAFFIC BARRIER DESIGN TYPE 31 by LIN FT.
  - *Note that it is an AGT for both cases.*

TYPE 31 GUARDRAIL – APPROACH GUARDRAIL TRANSITION (AGT) FURNISH & INSTALL on SINGLE SLOPE BARRIER

When placing a new AGT

- Can only be connected to a single slope barrier.

- Use 2554.503 TRAFFIC BARRIER DESIGN TRANS TYPE 31 by LIN FT. This includes the bridge anchorage plate 8350 and the wedge plate 8352 so they do not need to be paid for separately.

- Include in the Standard Plate Table
  - 8350
  - 8352

- Include Standard Plan
  - 5-297.694
  - 5-297.695

TYPE 31 GUARDRAIL – APPROACH GUARDRAIL TRANSITION (AGT) FURNISH & INSTALL on F-SHAPE BARRIER

- The TYPE 31 AGT cannot be connected directly to an F-Barrier, instead use 2554.503 TRAFFIC BARRIER DESIGN SPECIAL by LIN FT. This includes the bridge connection 8318 so that does not need to be paid for separately.

- Include in the Standard Plate Table…
  - 8318
  - 8338

- Include Standard Plan 5-297.603

- Include a 25’ long, Type 31 to 28” Height Transition guardrail in front of the Design Special (design detail TYPE31TRANSITION28)
  - If using the Type 31 to 28” Height Transition, it should be paid for as Type 31 guardrail, and noted in the tabulation.

TYPE 31 GUARDRAIL – APPROACH GUARDRAIL TRANSITION (AGT) FURNISH & INSTALL on J-SHAPE BARRIER

- The TYPE 31 AGT cannot be connected directly to an J-Barrier, instead use 2554.503 TRAFFIC BARRIER DESIGN SPECIAL by LIN FT. This includes the bridge connection 8318 so that does not need to be paid for separately.

- Include in the Standard Plate Table…
  - 8318
  - 8338

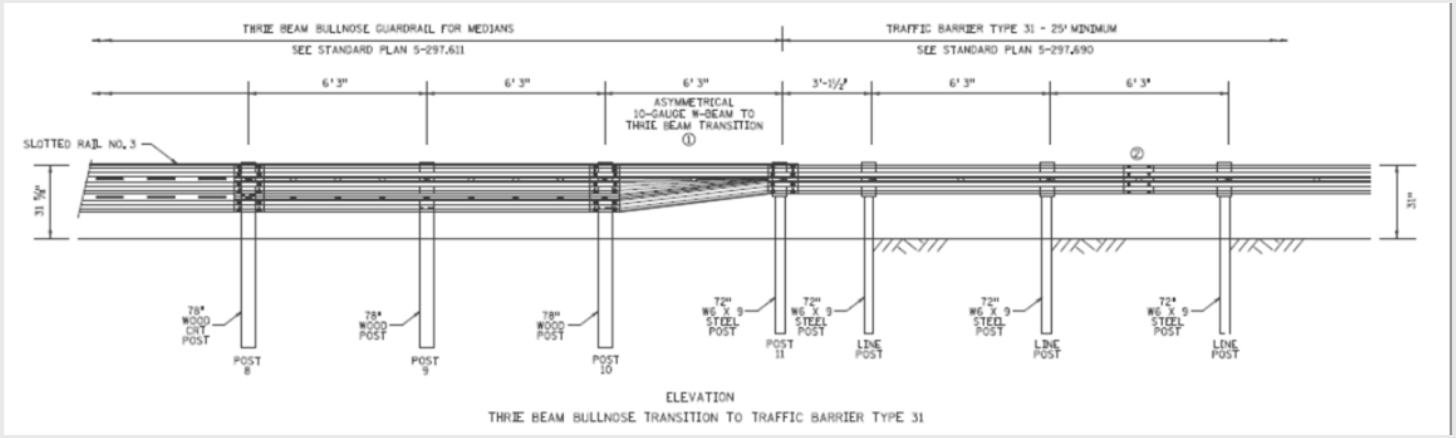
- Include Standard Plan 5-297.618

- Include a 25’ long, Type 31 to 28” Height Transition guardrail in front of the Design Special (design detail TYPE31TRANSITION28)
  - If using the Type 31 to 28” Height Transition, it should be paid for as Type 31 guardrail, and noted in the Plan.

TYPE 31 GUARDRAIL – CONNECTION TO BULLNOSE

When connecting TYPE 31 guardrail to Bullnose use….

- Thrie Beam Transition to Traffic Barrier Type 31 design detail (BULLNOSETOTYPE31).
- The 6’3” transition section between posts 10 & 11 are paid for as BULLNOSE.
- Include Standard Plan 5-297.695
- Include Standard Plan 5-297.614 and modify it to reflect the asymmetrical (Std. Plan 5-297.695) transition.



ELEVATION
THRIE BEAM BULLNOSE TRANSITION TO TRAFFIC BARRIER TYPE 31

GUARDRAIL - END TREATMENTS
T-BARRIER BRIDGE CONNECTION

The T-Barrier Bridge Connection is used when connecting guardrail to a bridge rail or concrete structure.

- It is included in the pay item for Traffic Barrier Design Special (Std. Plate 8318) or AGT (Std. Plate 8350) and should not be paid for separately in those cases.

- If there is guardrail on the downstream end of a bridge
  - For B8338…it is not a design special attachment. The pay item 2554.602 T-BARRIER BRIDGE CONN DES 8318 by EACH should be included in the TABULATION and SEQ.
  - For TYPE 31…it will have to be an AGT attachment.

- For B8338 the standard plate table should reference 8318 or for TYPE 31 reference 8350.

GUARDRAIL
FLAT WALL or SINGLE LINE RAIL

Check with the bridge office EARLY in the design process… do you need a bridge design concrete end section?

- If yes, make sure you include the correct design special detail.
- For flat face rail include Standard Plan 5-297.619
- If a detail is needed have the bridge office supply you with one to put in the plan.
- Paid for as part of the F barrier

GUARDRAIL – POST SEAT

- Use when you can't go deep (e.g. over culverts).
- Designer needs to determine if using steel or wood posts
  - If Wood posts then reference Standard Plate 8316
  - If Steel posts then include a detail in the plan.
- Pay for it as 2554.602 GUARDRAIL POST SEAT by the EACH
- TYPE 31 Guardrail
  - Allows for longer gaps and Post Seat may not be needed.
  - If not using POST SEAT then include Standard Plan 5-297.696

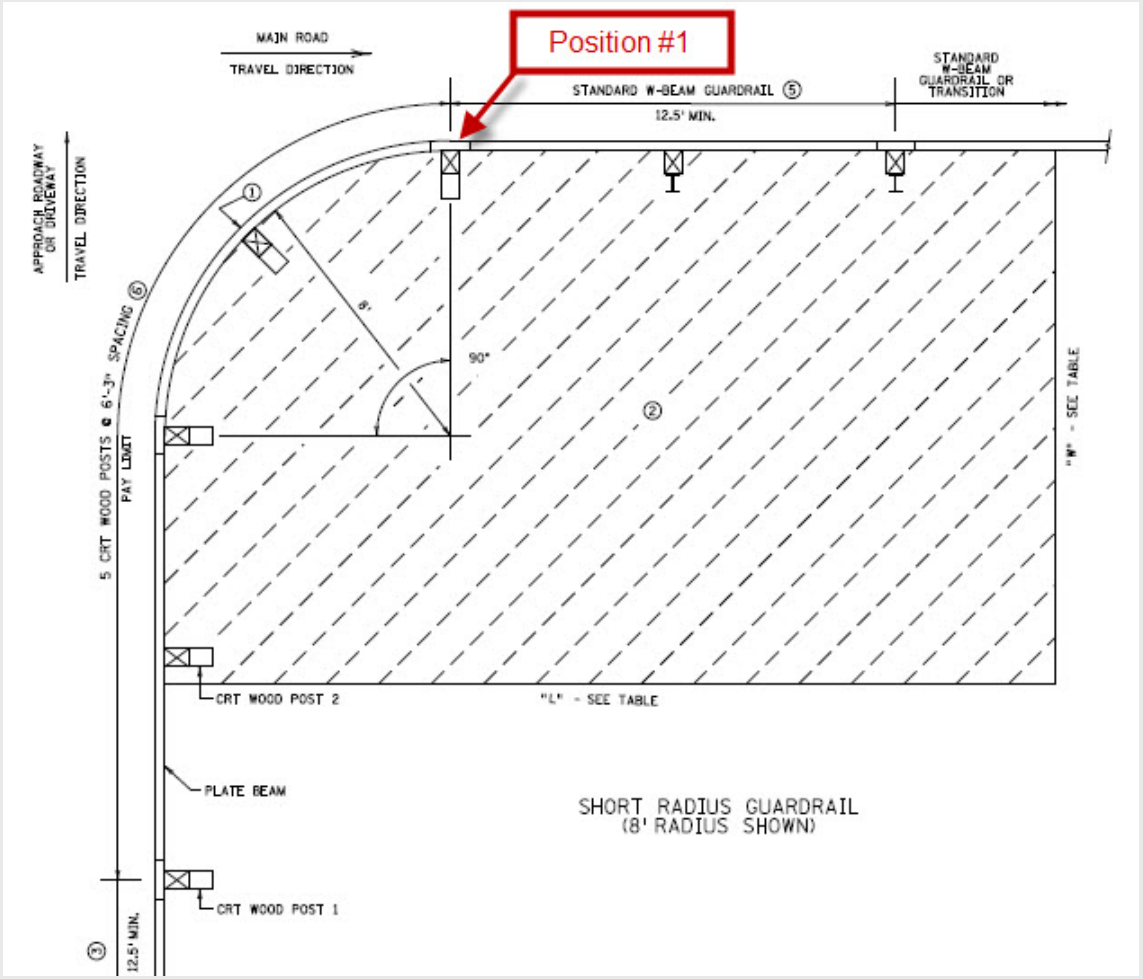
GUARDRAIL – SHORT RADIUS

This is used when there is a curve in the guardrail such as driveways, entrances, side roads, etc.

- Only wood posts may be used, NO steel posts.
- Include the short radius detail (SHORTRG)
- Pay for it as either…
  - 2554.503 TRAFFIC BARRIER DESIGN B8307 by the LIN FT or
  - 2554.503 TRAFFIC BARRIER DESIGN A8307 by LIN FT.

TYPE 31 GUARDRAIL – SHORT RADIUS

This cannot be TYPE 31 guardrail but can be connected to it with a Type 31 to 28” Height Transition guardrail (design detail TYPE31TRANSITION28) at Position 1.



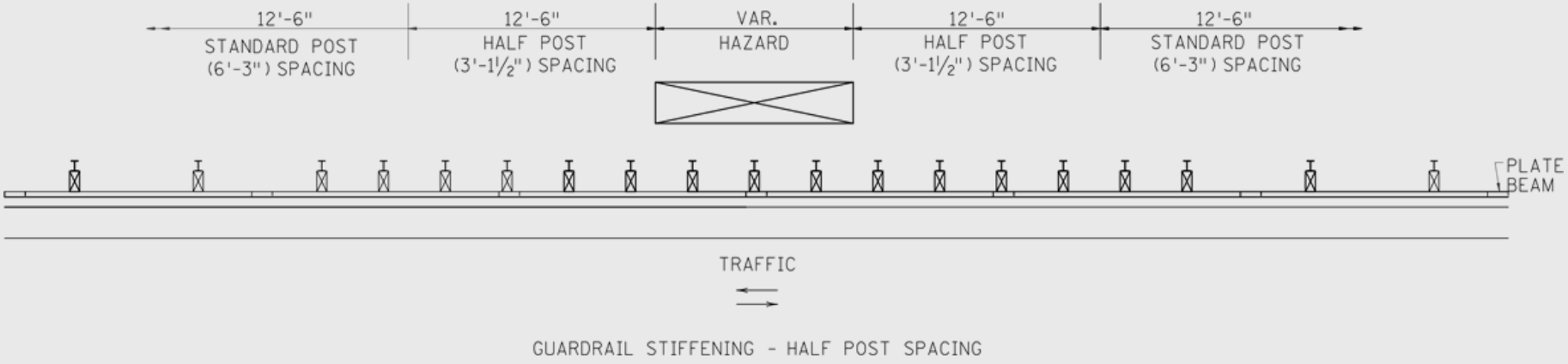
STIFFENED GUARDRAIL

This is used when there is nested rail and/or half or quarter post spacing.

- Use standard pay item but add a note to the SEQ or TABULATION…

  ITEM INCLUDES ADDITIONAL POSTS AND/OR NESTED RAIL FROM STATION XX+XXXX TO STATION XX+XXX.

- Nesting is NOT an option for TYPE 31 guardrail.



GUARDRAIL STIFFENING - HALF POST SPACING

HIGH TENSION CABLE GUARDRAIL (HTCB)

All designers should read the HTCB Technical Memorandum before doing any HTCB final design. In addition, we suggest that you reference the following information related to HTCB in your plan as needed:

‡ Standard Plate for HTCB/Line Post Foundation/Concrete Design 8342

‡ Standard Plate for HTCB/Line Post Foundation/Steel Design 8343

‡ Standard Plan 5-297.688

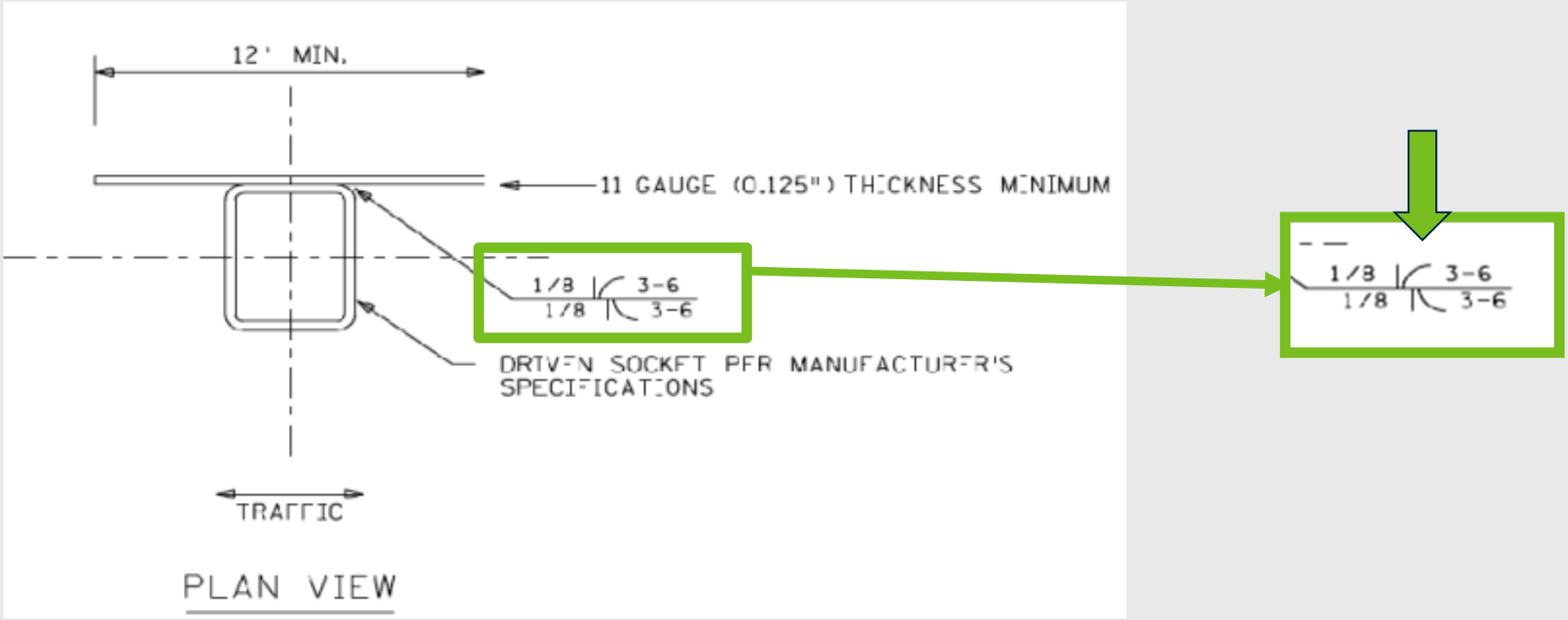
‡ Do NOT place in ditch bottom!

HIGH TENSION CABLE GUARDRAIL (HTCB)

- ‡ 2554.502 ANCHORAGE ASSEMBLY-TENSION CABLE by EACH
- ‡ 2104.502 REMOVE ANCHORAGE ASSEMBLY-TENSION CABLE by EACH
- ‡ 2104.503 SALVAGE TENSION CABLE GUARDRAIL by LIN FT
- ‡ 2104.503 REMOVE TENSION CABLE GUARDRAIL by LIN FT
- ‡ 2554.603 RECONSTRUCT TENSION CABLE GUARDRAIL by LIN FT
- ‡ 2554.603 TENSION CABLE GUARDRAIL by LIN FT
- ‡ 2554.603 INSTALL TENSION CABLE GUARDRAIL by LIN FT

HIGH TENSION CABLE GUARDRAIL (HTCB) WELD

Make sure that the HTCB weld is shown properly in the plan. Different welds have different patterns, make sure it has this one.



BARRIER – IMPACT ATTENUATORS

- The plan should contain a note stating if it is a temporary or permanent installation.

- The Designer needs to specify whether the impact attenuators are TL3 or TL2 (test level) instead of the posted speed. All impact attenuators that are to be place on roads with the speeds of:
  - 50 mph or greater will now be TL3.
  - 45 mph or less shall be TL2.

- The test level will be noted on the SEQ or TABULATION.

- If the project requires both TL3 and TL2 attenuation, then they should be labeled on the plan sheets for clarification.

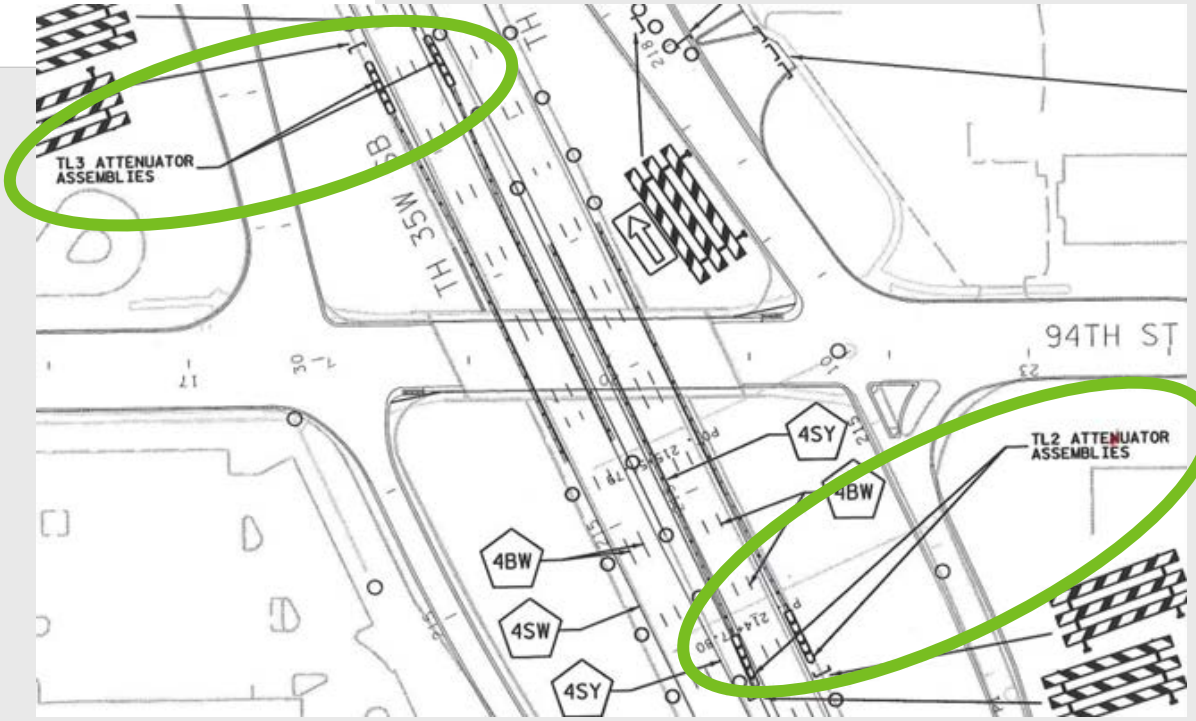
BARRIER - IMPACT ATTENUATORS

	PAY ITEM TABULATION		TC
	PAY ITEM	UNIT	TOTAL
(1)	IMPACT ATTENUATOR	ASSEMBLY	2
(2)	IMPACT ATTENUATOR NO 1	ASSEMBLY	2
(3)	TRAFFIC CONTROL	LUMP SUM	1
	MEDIAN BARRIER DELINEATOR	EACH	40

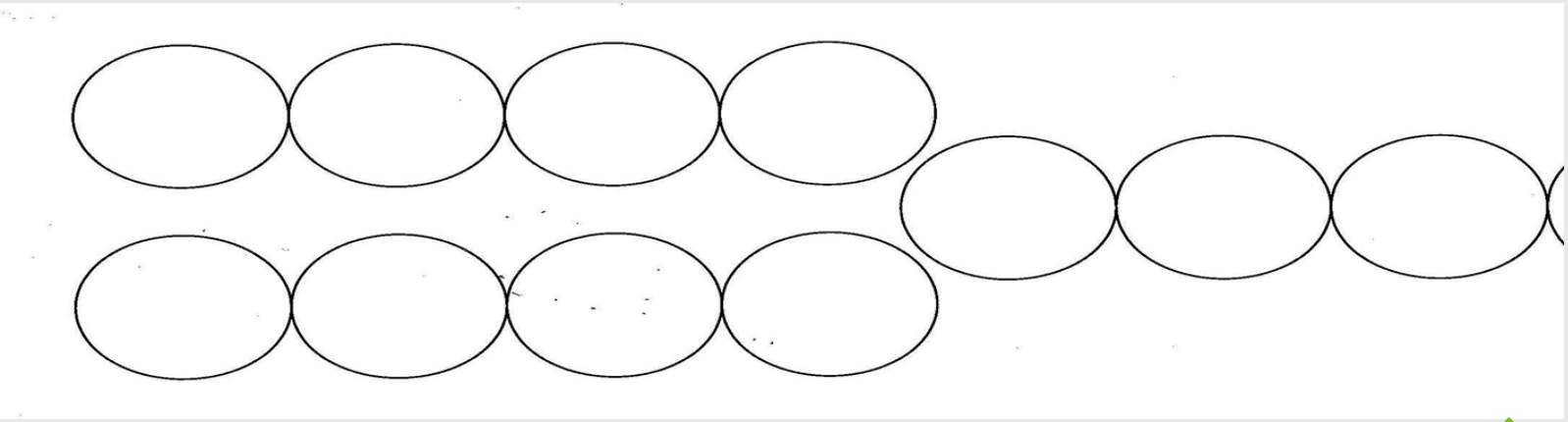
(1) TL-3, PERMANENT
(2) TL-2, PERMANENT
(3) 20 WHITE, 20 YELLOW - ALL ONE WAY

➔ An example of how to show impact attenuators when more than one test level:

➔ When they are temporary attenuators they can all be lumped together as one item (e.g. IMPACT ATTENUATOR).

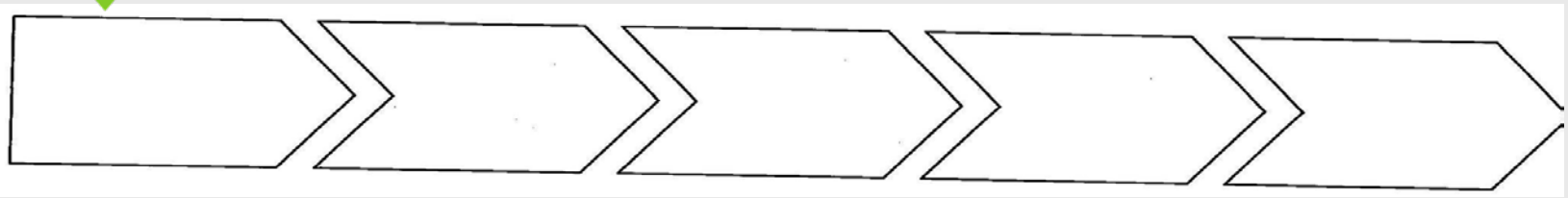


BARRIER
BARREL vs ATTENUATOR



This is how we show IMPACT ATTENUATOR BARRELS on the plan. They are paid for by the EACH, we do not pay for barrels as assemblies.

This is how we show IMPACT ATTENUATORS on the plan. They are paid for by the ASSEMBLY.



DEPARTMENT OF TRANSPORTATION

QUESTIONS????

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