

DESIGN SUPPORT



GUIDANCE
AND
INFORMATION
FOR
DESIGNERS

INTRODUCTIONS



QUESTIONS

Any questions call ANYTIME:

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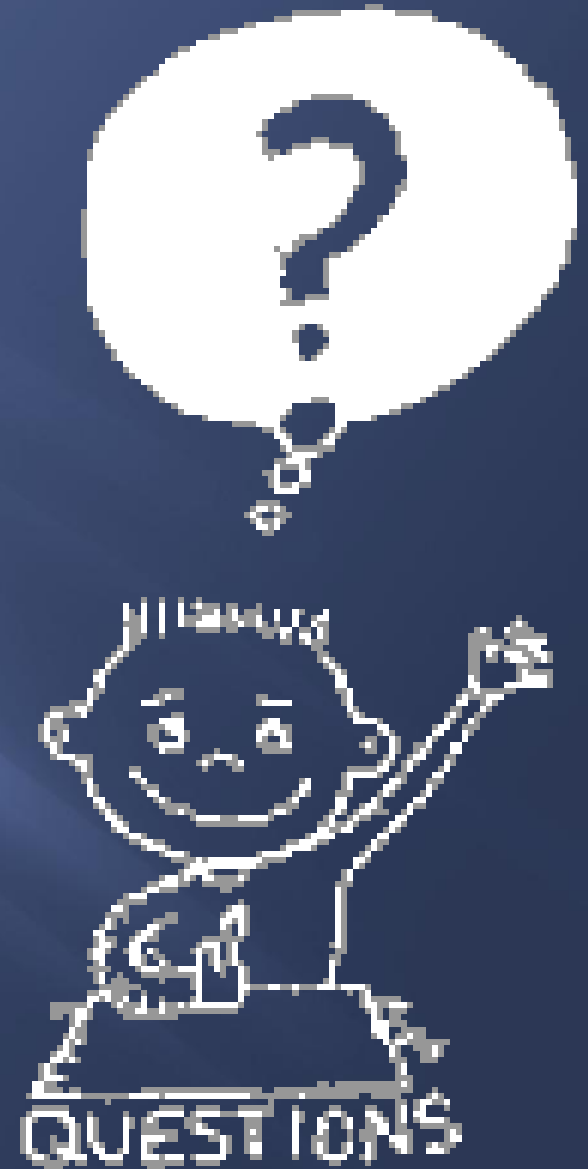
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CHANGES TO BE AWARE OF

Other Changes coming....

- Checking earthwork and other quantities
- ADA Improvements & Pay items
- Wet Reflective/Refractive pay items (WR)
- Quality Management Process
- Plan Ratings



EARTHWORK

- ✓ Check closer that all areas are covered. Muck is the most common area of error.
- ✓ Check a few key areas by plowing as computers are not always correct.
- ✓ Check that the areas in Geopack are labeled correctly.



PLAN RATING CHANGES

PROJECT REVIEW (Process B)

July 2012

PLAN REVIEW BY: _____

SPEC. PROV. REVIEW BY: _____

DIST:

CONSULTANT COMPANY: _____

PRIME SP # (TH): _____

ASSOCIATED SP'S (TH): _____

FUNDING

PLAN TOTAL # SHEETS: _____

CONSTRUCT FOR: ALTBID UNBONDED CONC CONC SURF CPR BIT SURF BIT MILL & OVERLAY
 DRAINAGE GUARDRAIL BR APPR ROUNDABOUT RUMBLE STRIPE ADA IMP BUILDING REMOVAL
 LANDSCAPING LIGHTING SIGNING SIGNAL OTHER

SUBMITTAL DATE: _____

ORIG. LET DATE.: _____

FINAL LET DATE: _____

OF MOVES: _____

MOVE REASONS: _____

RATING OF SUBMITTED PLAN AND DOCUMENTS

CHOOSE THE ANSWER THAT APPLIES FOR EACH CATEGORY....

COMMENTS:

PROJECT DOCUMENTS RATINGS

TIME & TRAFFIC SUBMITTAL

SPECIAL PROVISIONS SUBMITTAL

COOP. AGR. TIMELY SUBMITTAL

COOP. AGR. COMPLETE SUBMITTAL

QM/QC COMPLETENESS

PROJECT PLAN RATINGS

PAY ITEMS & SPEC BOOK COMPL.

TYPICAL SECTIONS

PLAN DETAILS

CONFORMS TO DESIGN STDS

TABULATIONS

PLAN CROSS REFERENCE

PLAN & PROFILE COMPOSITION

PLAN REVISIONS

DESIGN ADDENDUMS

PLAN RATING OVERALL

COMMENTS: _____

RATING CRITERIA CHANGES

	<u>POOR</u>	<u>TRANSITIONAL</u>	<u>EXCEPTIONAL</u>
➤ PAY ITEMS & SPEC BOOK	Over 8 6%	5-8 3-6% Corr.	0-4 0-2% Corr.
➤ TYPICAL SECT.	Over 8 5	0-8 1-5 Corr.	No Corr.
➤ PLAN DETAILS	Over 8 5	0-8 1-5 Corr.	No Corr.
➤ DESIGN STDS	Over 6 4	3-6 2-4	3 0-1 Corr.
➤ TABULATIONS	Over 8 5%	5-8 3-5% Corr.	0-4 0-2% Corr.
➤ PLAN CROSS REF.	Over 1	1 Corr.	No Corr.
➤ PLAN & PROFILE	Over 2	1-2 Corr.	No Corr.
➤ LEGIBILITY	This item was removed from the ratings.		



NEW RATING CRITERIA

POOR TRANSITIONAL EXCEPTIONAL

➤ **PLAN REVISIONS**

Over 3

1-3 Corr.

No Corr.

How many times do revised sheets come in once the original has been submitted for review.

➤ **DESIGN ADDENDUMS**

Over 1

1 Corr.

No Corr.

How many Addendums are written before letting due to Design related revisions (i.e. not things out of their control).

TRACKING ADDENDUMS

ADDENDUMS FROM OUTSIDE DESIGNS CONTROL (ADD # OF ADDENDUMS AFTER DASH):

WAGE RATES - _____ SPEC CHANGE - _____ BR PLAN - _____

ADDENDUMS DUE TO DISTRICT (ADD # OF ADDENDUMS AFTER DASH):

PAY ITEMS DUE TO.... ADD/DELETE PAY ITEMS- _____ REVISION - _____

PLAN SHEETS DUE TO... ERRORS - _____ REVISION - _____

ADDENDUM IN SECTION: DRAINAGE ENVIRONMENTAL TRAFFIC EARTHWORK OTHER _____

PROJECT RATING OVERALL

COMMENTS: _____



PLAN REVIEW DATA COLLECTION

Reviewed by _____

S.P. _____ - _____ T.H. _____ TOTAL SHEETS _____ LETTING DATE _____

DISTRICT _____

DESIGN ENGINEER _____ TOTAL WORK DAYS REVIEWED _____

BEGIN PLAN REVIEW DATE _____

PLAN SIGNED DATE _____

FUNDING (CIRCLE) PS&E FED. FUNDS STATE FUNDS OTHER _____

MAJOR CONST. _____ DISTRICT _____

RECONDITION _____ CONSULT _____

CATEGORY SURFACING _____ PLAN PREPARED BY TRAFFIC _____

MISC. HWY. _____ OTHER _____

RATING OF SUBMITTED PLAN

	<u>POOR</u>	<u>TRANSITIONAL</u>	<u>EXCEPTIONAL</u>
PLAN SUBMITTED ON TIME	___	___	___
PAY ITEMS	___	___	___
SPEC. BOOK COMPLIANCE	___	___	___
TYPICAL SECTIONS	___	___	___
PLAN DETAILS	___	___	___
CONFORMS TO DESIGN STANDARDS ETC,	___	___	___
TABULATIONS	___	___	___
PLAN CROSS REFERENCE	___	___	___
PLAN & PROFILE COMPOSITION	___	___	___
LEGIBILITY (PRINT & READ ABILITY)	___	___	___
PLAN RATING OVERALL	___	___	___

COMMENTS: _____

PRF6
JAN 02

THE OLD RATING FORM



TIMELY SUBMITTAL

All sheets submitted with plan .
(12 wks complex)

POOR

Less Than 9 wks
(12 wks PS & E/Complex)

EXCEPTIONAL

Prior to 9 wks
(Prior to 12 wks)

Fiscal Year 2011 Project Pre-Letting					
		Acceptable Turn In		Turn In Deadline	
		Plan	Special Provisions	Plan	Special Provisions
Weeks Before Letting	Full Federal Oversight Agreement	14 weeks	12 Weeks	12 Weeks	11.5 Weeks
	Complex Process B	11 weeks	10 Weeks	11 Weeks	9 Weeks
	Typical Process B	9 weeks	8 Weeks	9 Weeks	7 Weeks
	Process A	6.5 weeks	8 Weeks	7 Weeks	7 Weeks
			6.5 weeks	6.5 Weeks	5.5 Weeks
Letting	Project Type	Pre-Letti			
7/23/2010	Full Federal Oversight Agreement	4/15/2010	4/29/2010	4/29/2010	5/3/2010
	Complex Process B	5/6/2010	5/13/2010	5/6/2010	5/20/2010
	Typical Process B	5/20/2010	5/27/2010	5/20/2010	6/3/2010
	Process A	6/7/2010	5/27/2010	6/3/2010	6/3/2010
			6/7/2010	6/7/2010	6/14/2010

<http://ihub/ots/pre-letting/files/intro/append/2011.pdf>

Submittal Changes coming...

- Revised sheets coming in after plan is submitted
- Complex plans (> 500) coming in on typical B deadline



PAY ITEMS

Conformance to pay items as shown in the Spec Book and on TRNS*PORT list.

POOR
Over 8% (6%)

TRANSITIONAL
5-8% (3-6%) Corr.

EXCEPTIONAL
0-4% (0-2%) Corr.

Things to watch for....

- ✓ Descriptions need to match transport EXACTLY, even abbreviations
- ✓ 2104 Remove bit or concrete items need to state depth, reinforcement
- ✓ All special and modified items need to have a note or reference a detail
- ✓ Item numbers need to match spec and usage
- ✓ Quantities rounding
- ✓ Prorated items for tied projects
- ✓ Missing multiple SP and/or funding columns
- ✓ Lump Sum items must equal one



PAY ITEMS (cont.)



- ✓ Cannot have both 2105 and 2106 items
- ✓ Trucks, backhoes need to have a note stating what they are used for
- ✓ 2231 Bituminous patching mixture should note what is being used
- ✓ 2501 CMP vs CSP
- ✓ 2501 CS vs GS aprons
- ✓ 2501 Safety aprons and grates, place in clear zone only
- ✓ 2506 manholes and catch basins will be paid as drainage structures
- ✓ Guardrail end treatments
- ✓ Are the correct pay items used for specified work
- ✓ 2511 riprap, is there filter material or is it incidental
- ✓ 2575 fertilizer needs to state analysis somewhere in the plan

SPEC BOOK COMPLIANCE

The Specifications and Basis of Payment are complied with.

POOR
Over 8% (6%)

TRANSITIONAL
5-8% (3-6%) Corr.

EXCEPTIONAL
0-4% (0-2%) Corr.

Common Errors....

- ✓ Not using the proper spec numbers for pay items
- ✓ Not using the correct units for pay items
- ✓ Descriptions don't match transport exactly, even abbreviations and they must
- ✓ The 0.6XX numbers don't have the correct units
- ✓ The 0.6XX numbers don't include a special provisions write-up

	English
0.601	Lump Sum
0.602	Each
0.603	Lin ft
0.604	Sq Yd
0.605	Acre
0.606	Gallon
0.607	Cu Yd
0.608	Pound
0.609	Ton
0.610	Hour
0.611	Day
0.612	Week
0.613	Unit Day
0.614	Structure
0.615	Assembly
0.616	System
0.617	Sq Ft/Day
0.618	Sq Ft
0.619	Road Sta
0.620	Yard
0.621	Dollar
0.622	MBM

SEQ EXAMPLE...

Lump Sum with Multiple SPs

Item No.	Description	Unit	TOTAL	SP 1111-11	SP 2222-22	SP 3333-33	
2021.501	MOBILIZATION	LUMP SUM	3	1	1	1	WRONG - must equal 1 not 3
2021.501	MOBILIZATION	LUMP SUM	1	0.45	0.45	0.1	ACCEPTABLE
2021.501	MOBILIZATION	LUMP SUM	1	1			ACCEPTABLE
2021.501	MOBILIZATION	LUMP SUM	1				ACCEPTABLE-PREFERRED

SEQ EXAMPLES...

% Prorated item on tied plans -
with all SPs the same funding

Item No.	Description	Unit	PLAN A		PLAN B			
			TOTAL A	SP 1111-11	TOTAL B	SP 2222-22	SP 3333-33	
2021.501	MOBILIZATION	LUMP SUM	1		1			WRONG - plans added together cannot exceed 1
2021.501	MOBILIZATION	LUMP SUM	0.22	0.22	0.88	0.22	0.66	WRONG - don't split when funding is the same for all SPs
2021.501	MOBILIZATION	LUMP SUM	1	1				ACCEPTABLE
2021.501	MOBILIZATION	LUMP SUM						ACCEPTABLE - PREFERRED

SEQ EXAMPLES...

**% Prorated item on tied plans -
with at least one SP is different funds**

Item No.	Description	Unit	PLAN A		PLAN B			
			TOTAL A	SP 1111-11	TOTAL B	SP 2222-22	SP 3333-33	
2021.501	MOBILIZATION	LUMP SUM	1		1	0.45	0.55	WRONG - plans added together cannot exceed 1
2021.501	MOBILIZATION	LUMP SUM	1	1				WRONG - must split between all SPs
2021.501	MOBILIZATION	LUMP SUM	1					
2021.501	MOBILIZATION	LUMP SUM	0.25	0.25	0.75	0.35	0.40	ACCEPTABLE - PREFERRED

SEQ EXAMPLES...

Common Errors

Item No.	Description	Unit	TOTAL	
2757.505	SODDING TYPE EROSION	SQ YD	123,456	WRONG - don't use commas
2757.505	SODDING TYPE EROSION	SQ YD	123456	ACCEPTABLE
2757.505	SODDING TYPE EROSION	SQ YD	123 456	ACCEPTABLE
2021.501	MOB.	LS	1	WRONG - bad abbreviations
2021.501/00010	MOBILIZATION	LUMP SUM	1	WRONG - item number too long

SEQ EXAMPLES...

Prorated (non %) items on tied plans

FUNDING IS DIFFERENT FOR AT LEAST ONE SP - non prorated item

Item No.	Description	Unit	TOTAL	SP 1111-11	SP 2222-22	SP 3333-33	
2101.511	CLEARING AND GRUBBING	LUMP SUM	1	0.5	0.5		WRONG - don't prorate lump sum items
2101.511	CLEARING AND GRUBBING	LUMP SUM	1	1			ACCEPTABLE - PREFERRED

TYPICAL SECTIONS

Are they complete and of sufficient detail to accomplish the intent of the plan?

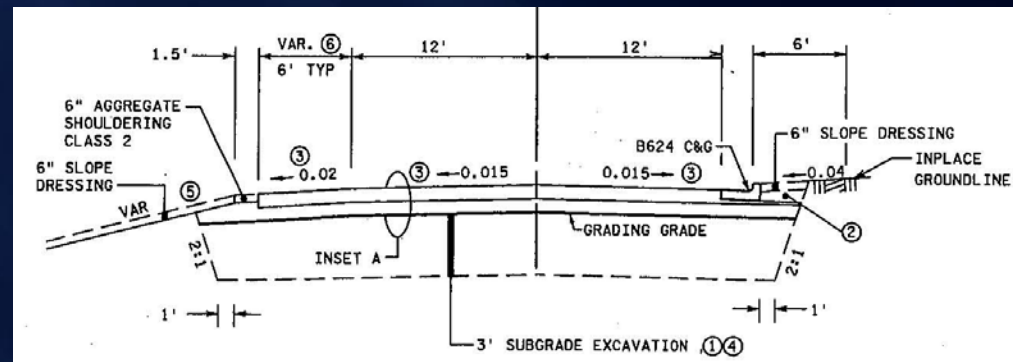
POOR
Over 8 (5)

TRANSITIONAL
1-8 (1-5) Corr.

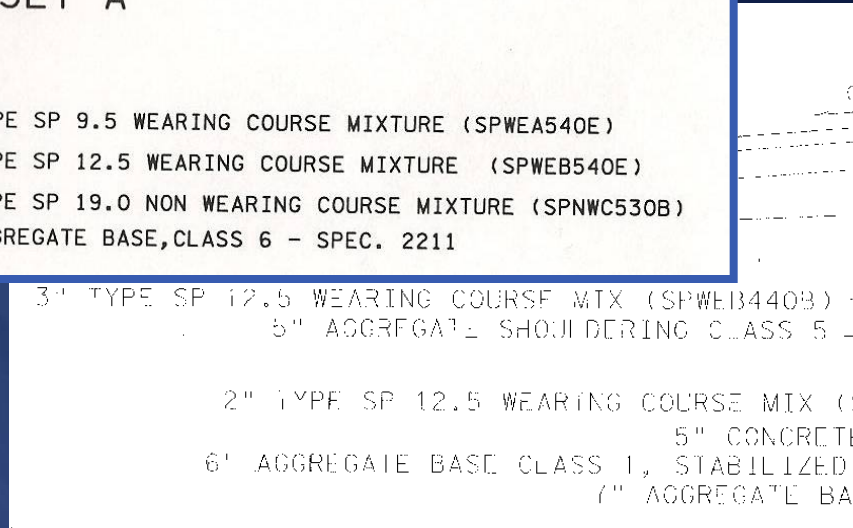
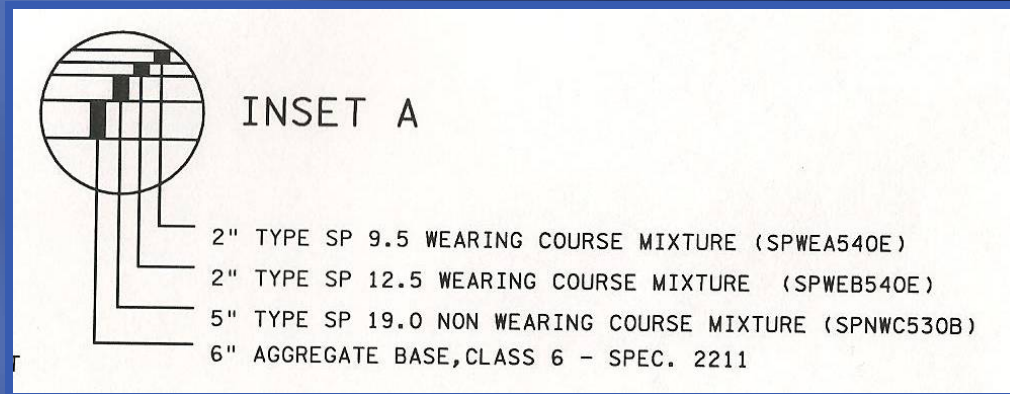
EXCEPTIONAL
No Corr.

Make sure the....

- ✓ Typicals agree with the soils letter
- ✓ Bituminous is listed correctly...Type SP 12.5 Wearing Course Mixture (SPWEB440B) and/or Type SP 12.5 Wearing Course Mixtures (SPWEB440B) 2" Thick...need to include the mix designation number
- ✓ The bituminous thickness refers to the layer placed not the total depth of bit



METHOD OF MIX LABELING



There are several correct ways to show this...

- ✓ Make sure the mix is spelled out (i.e. TYPE SP....)
- ✓ Make sure the mix designation is shown in full & in parenthesis
- ✓ For non wearing make sure there is a space not a dash between the words "non" and "wearing"

PLAN DETAILS

Do the details tell enough, are complete and relevant to the plan?

POOR
Over 8 (5)

TRANSITIONAL
1-8 (1-5) Corr.

EXCEPTIONAL
Had All

Check that...

- ✓ All unapproved details are signed, except end treatments
- ✓ All pertinent details are in the plan
- ✓ All materials are paid for or designated as incidental
- ✓ All details labeled, clear what they are
- ✓ The details understandable
- ✓ All notes are accounted for



CONFORMS TO DESIGN STANDARDS

Conformance with Standard Plans and Plates, Alignment, Profiles, slopes,
Taper Lengths, Br. Width, Clear Zones, Sight Distances.

POOR
Over 6 (4)

TRANSITIONAL
3-6 (2-4) Corr

EXCEPTIONAL
3 (0-1) Corr.

Check for...

- ✓ All pertinent std plates & plan sheets are included ...pay items, notes, traffic shts
- ✓ Standard plate letter is most recent, standard plan sheet is most recent approved
- ✓ Only reference standard plates that apply to project
- ✓ Assure that all pertinent cross reference notes on std plan sheets are filled in
- ✓ Modification to standard plan sheets are shown in the method required (see standard plan sheet website and/or design scene).
- ✓ Only show the Standard Plate letter in the table...NO WHERE ELSE!

TABULATIONS

Is there an orderly arrangement of Tables of Items and are Tabulations provided for items difficult to total.

POOR
Over 8 (5) %

TRANSITIONAL
5-8 (3-5) % Corr.

EXCEPTIONAL
0-4 (0-2) % Corr.

Check for...

- ✓ Standard abbreviations, description matches pay item, consistency
- ✓ Spec numbers (if listed) can only be first four number, not decimals
- ✓ Most quantities should be covered by tabs, except lump sum & incidental
- ✓ Quantities should agree with SEQ, may be rounded off
- ✓ Group items by work type
- ✓ Stationing should be within project limits
- ✓ Are all notes accounted for, sheet referencing correct
- ✓ Do the math, do the columns add up
- ✓ Column totals not project totals if more than one tab



PLAN CROSS REFERENCE

Do the Plans show sheet Reference from Estimate to Tabulations?

POOR
Over 1

TRANSITIONAL
1 Corr.

EXCEPTIONAL
Has All

Are the...

- ✓ Tab references correct... letter and page
- ✓ Quantities in the SEQ the same as the quantities in the tabs
- ✓ Note references correct, do they go to the correct sheet
- ✓ Note cross references throughout the plan correct

PLAN & PROFILE COMPOSITION

Composite of all Trunk Highway features complete to make accurate pictorial views

POOR
Over 2

TRANSITIONAL
1-2 Corr.

EXCEPTIONAL
No Corr.

Make sure

- ✓ To label begin/end SP and stationing, they agree with title sheet
- ✓ To label begin/end construction and stationing, they agree with title sheet
- ✓ The north arrow is present and in the correct direction
- ✓ The scale has units, use bar scales only!
- ✓ To label the mainline and side roads, do they agree with the title sheet
- ✓ To label all bridges and exceptions
- ✓ The items agree with SEQ and tabs, all items are paid for

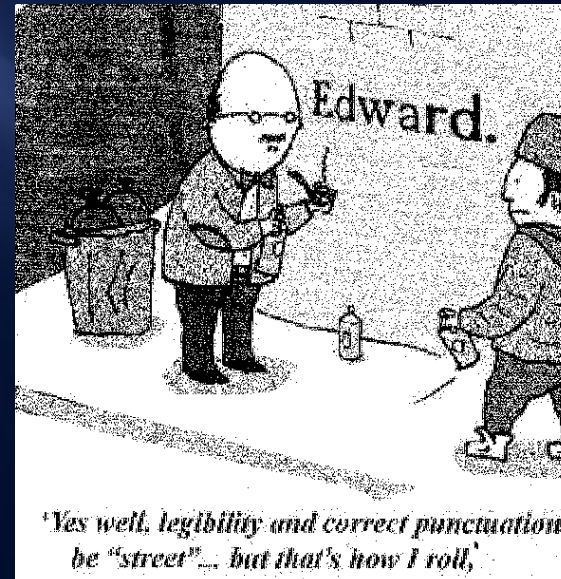
LEGIBILITY

Can the Plan be printed without losing visibility? Are there letters large enough & dark enough, do lines overlap?

Common Errors....

<u>POOR</u>	<u>TRANSITIONAL</u>	<u>EXCEPTIONAL</u>
Over 2	1-2 Corr.	No Corr.

- ✓ Sheet is too busy, can't make out everything, especially utility sheets
- ✓ Symbols are too similar, can't tell them apart
- ✓ Typos
- ✓ Overwriting
- ✓ Print too small
- ✓ Strange font
- ✓ Too light, too dark, distorted



PLAN RATING OVERALL

Composite of all ratings...The overall acceptability of plan.
Based on above questions and subject to subjective scrutiny.

This takes into account the previous sections and the following common errors...

- ✓ Do all sheet have the correct SP and TH number on them
- ✓ Other section sheets are well done (i.e. signing, striping, hydraulics, etc)
- ✓ Total Sheets are correct in bottom right corner of each sheet
- ✓ All necessary notes are there...combo lab/office, haul salvaged mat'l,
- ✓ Are all the sheets signed
- ✓ Level D note is included in plan
- ✓ Do NOT sign cross section sheets
- ✓ Do NOT use the words...FOR INFORMATION ONLY

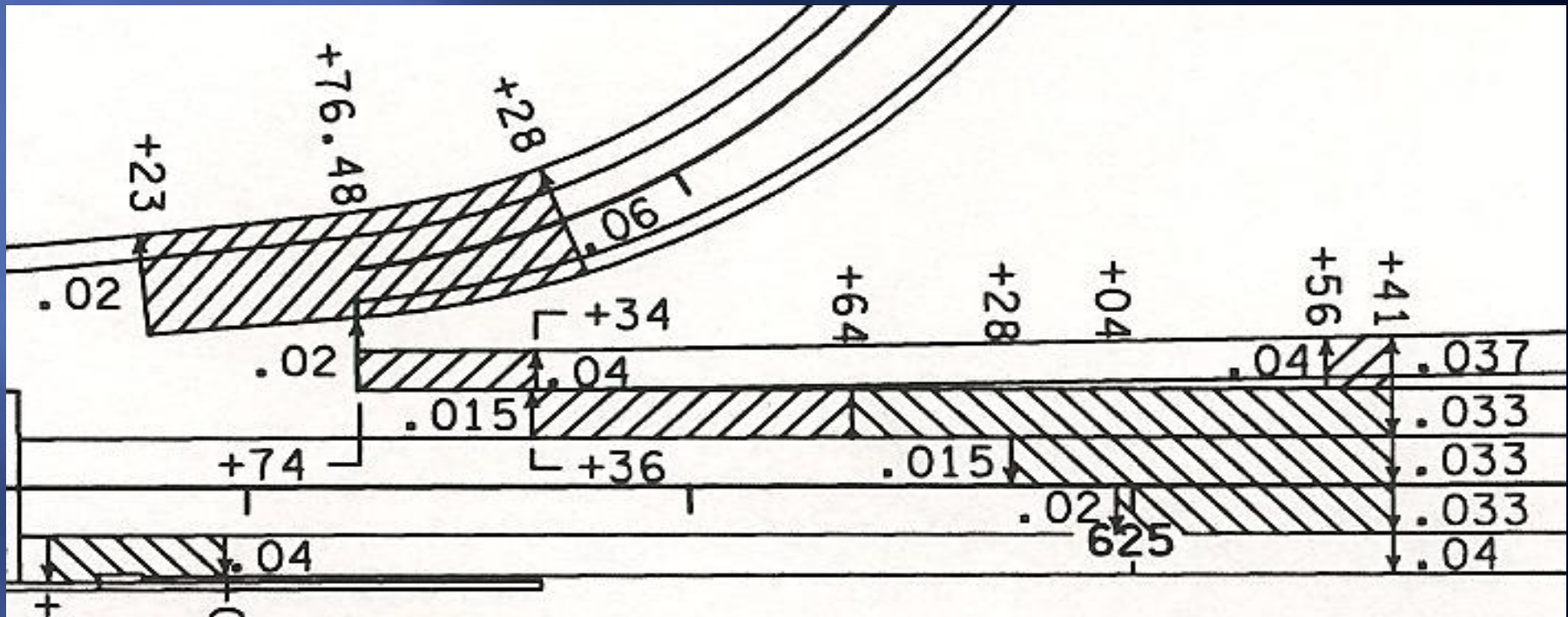


OTHER COMMON ERRORS



- ✓ No repeat SP Numbers
- ✓ Signature block states “Licensed” not “Registered”, has printed name,
- ✓ Signatures need a printed name if not the lead engineer
- ✓ Only one signature per name per sheet
- ✓ “Construction Plan For” uses correct labels...Grading, Bit, Conc, etc.
- ✓ Length block needs to add up, does it have note for divided roadways
- ✓ Don’t use INSTALL alone unless the material is being supplied
- ✓ Incidental vs included in
- ✓ No repeat note numbers/letters on the same sheet
- ✓ Legends reflect what is on the sheets, don’t need to note if in legend
- ✓ Don’t show quantities for incidental and/or lump sum items

SUPERELEVATIONS



- ✓ Proper engineering connotation would be to have zero's in front of the empty decimal numbers (i.e. 0.015 ft/ft)
- ✓ Make sure the sheet references the units for the supers.

REBAR NUMBERS

New Rebar Designation	Diameter (mm)	Diameter (in)	Old "English" Name
No. 10	9.5	0.375	No. 3
No. 13	12.7	0.500	No. 4
No. 16	15.9	0.625	No. 5
No. 19	19.1	0.750	No. 6
No. 22	22.2	0.875	No. 7
No. 25	25.4	1.000	No. 8
No. 29	28.7	1.128	No. 9
No. 32	32.3	1.270	No. 10
No. 36	35.8	1.410	No. 11
No. 43	43.0	1.693	No. 14
No. 57	57.3	2.257	No. 18

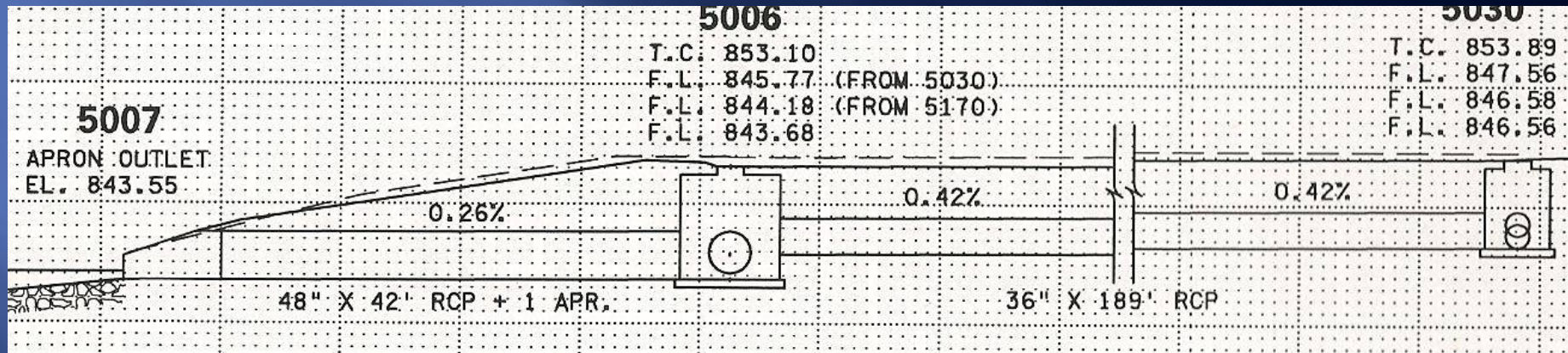
No longer use the old English numbers....
make sure your plan uses the New Rebar Numbers

DRAINAGE - GENERAL



- ✓ CSP vs CMP
- ✓ Connection...incidental vs payment
- ✓ Trash guards vs safety grate, maintenance
- ✓ The tabs need to agree with the profiles, plan views, and cross sections...such as size, material, apron style, location/stationing
- ✓ 2506 Construct Drainage Structure by Each...includes casting assembly, by the lin ft pay for casting assembly separately
- ✓ 2506 Reconstruct Drainage structure
 - Only used when changing the height more than 2 feet
 - Prefer by the lin ft, if paid for by the each must note lin ft somewhere in the plan
- ✓ 2506 Reconstruct manhole vs reconstruct drainage structure
- ✓ When it contains both apron and catch basin...what is it

When it contains both apron and catch basin...what is it




- ✓ In this situation it would be paid for as 2503 Storm Sewer
- ✓ Use 2503 CONNECT TO EXISTING STORM SEWER when connecting into the storm sewer pipe..
- ✓ Use 2506 CONNECT INTO EXISTING DRAINAGE STRUCTURE when connecting into the structure.

2501- Generic Culvert Item

- ✓ Culverts do **NOT** need to have the plastic pipe option unless they are entrance pipes. Then they **MUST** give the options or have a good reason why not.
- ✓ When giving the plastic pipe option they must use the generic items....
 - 2501.602 X" SAFETY APRON by the EACH with the note...Apron material shall be the same as pipe material except that the apron for CP pipe shall be CS.
 - 2501.602 X" PIPE APRON by the EACH with the note... Apron material shall be the same as pipe material except that the apron for CP and CS pipe shall be GS.
 - 2501.603 X" PIPE CULVERT by the LIN FT with the note...CS, CP, RC may be used as acceptable pipe options. CS was used to determine the pipe lengths.

Lining Pipe Culvert

- 
- ✓ Must state the size of pipe to be lined.
 - ✓ 2501.603 LINING CULVET PIPE (X") by the LIN FT, when using this pay item they also need to include either...
 - 2519.607 CLSM LOW DENSITY by the CU YD or
 - 2519.607 CLSM HIGH DENSITY by the CU YD or
 - A note stating the use of cured in place plastic.

Aprons

The Culvert sheets are a common area where errors occur, such as...

- ✓ Safety aprons and/or grates in the clear zone
- ✓ Standard plate 3022 for
 - Concrete safety aprons up to 36"
 - No standard detail for grate
- ✓ Standard plate 3132 for concrete safety aprons & grate greater than 36"
- ✓ Standard plate 3128 for CS safety apron and grate
- ✓ Standard plate 3148 for GS safety apron and grate



Cross-Drainage (Centerline Pipes)

✓ Grates required when...

- Flared apron is
 - ❖ Greater than 15"
 - ❖ Is a span apron
 - ❖ All multiple aprons
- Safety apron is
 - ❖ Greater than 36"
 - ❖ Multiple apron is greater than 30"
 - ❖ Span safety aprons greater than 36"
 - ❖ Span multiple apron is greater than 28"



Note: Pipe sizes are based on concrete pipe.

Parallel Pipes (Entrance pipes)

- ✓ It is recommended...
 - Use safety aprons within the clear zone.
 - Grate is required when safety apron...
 - ❖ Is greater than 24"
 - ❖ Span is greater than 24"
 - ❖ There are multiple aprons

Note: Pipe sizes are based on CS pipe



Parallel Median Aprons

Details found under

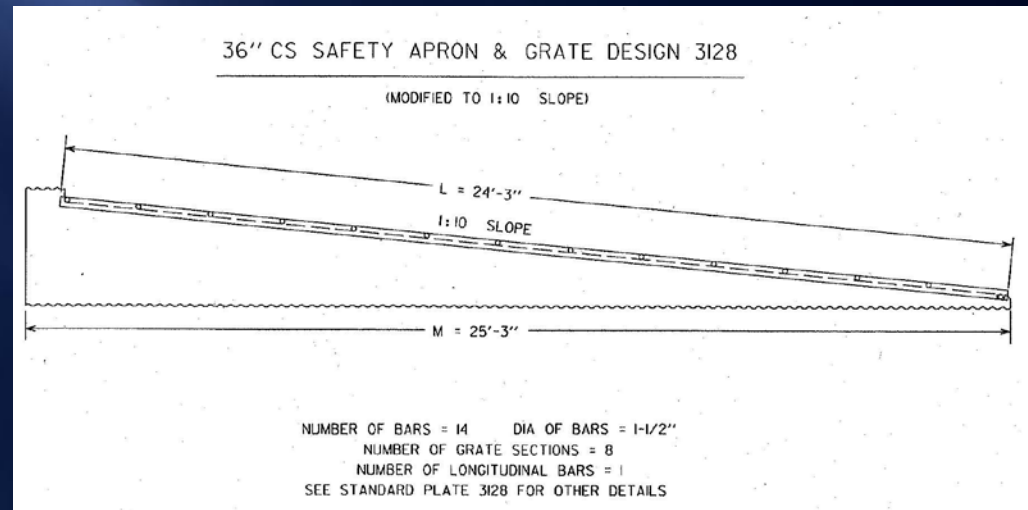
ProjectWise...OTS\DesignStandards\DesignDetails

SafeAprn1_10b_dd.dgn and

SafeAprn1_10sm_dd.dgn

- ✓ Must be at a 1:10
- ✓ Must be metal safety aprons
- ✓ Must have safety grate
- ✓ Must have detail
- ✓ Standard plate 3128 shows

the connection to concrete pipe



Drainage – 2503 Storm Sewer

- ✓ These use the 2501 aprons so those comments apply here as well
- ✓ Generic...
 - Must have this option or a good reason why not
 - Use standard concrete pipe pay items
 - Must add note...Plastic pipe may be used as an option for xx lin ft, see tab for locations.
- ✓ Lining, must state size.
- ✓ Lining...grout is incidental unless otherwise noted.



GUARDRAIL

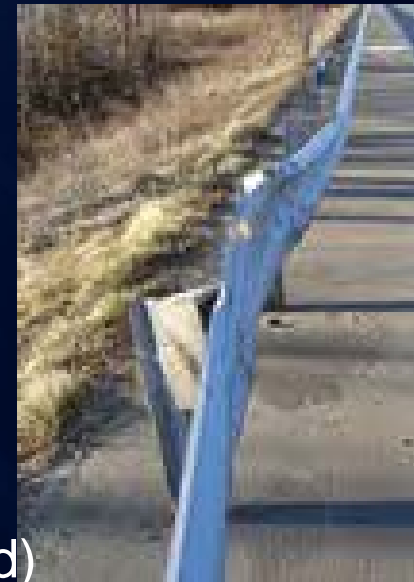
Common Guardrail Errors....

- ✓ When Salvaging Guardrail need to pay attention to the pay item and what is actually being salvaged.
- ✓ Earthwork, do NOT make it incidental
- ✓ Tab needs to agree with removal and construction plan views...
work, stationing, part
- ✓ End Treatments
- ✓ Unique Connections



When removing plate beam guardrail

- ✓ 2104.501 Remove Guard Rail – Plate Beam
- ✓ 2104.509 Remove Anchorage Assembly – Plate Beam (providing there is one in place)
- ✓ 2104.509 Remove specify end treatment
(i.e. twisted end, energy absorbing, etc...)
- ✓ 2554.501 Traffic Barrier Design B8338 (steel posts)
- ✓ 2554.501 Traffic Barrier Design B8307 (wood posts)
- ✓ 2554.521 Anchorage Assembly – Plate Beam (if required)
- ✓ 2554.523 End Treatment – specify



When removing plate beam rail only

- ✓ 2104.501 Remove Guard Rail
- ✓ 2104.509 Remove Anchorage Assembly
(providing there is one inplace)
- ✓ 2554.521 Anchorage Assembly – Plate B
- ✓ 2554.602 Guardrail Post (if required)
- ✓ 2554.603 Plate Beam Rail



When removing posts only

- ✓ 2104.509 Remove Anchorage Assembly
(providing there is one in place)
- ✓ 2104.521 Salvage Guard Rail (add note to estimate:
Includes the removal of the wood posts.)
- ✓ 2554.521 Anchorage Assembly- Plate Beam
(if required)
- ✓ 2554.603 Install Guard Rail (add note to estimate:
Includes the Furnish and Install of steel posts)



Removing or Salvaging a Known End Treatment

When removing or salvaging an existing guardrail end treatment (you know what it is) then use

✓ 2104.509 Remove or 2104.523 Salvage...Energy Absorbing Terminal ...*Make sure you add a note of what they are.*

✓ 2104.509 Remove or 2104.523 Salvage...
Breakaway Cable Terminal

✓ 2104.509 Remove or 2104.523 Salvage...
Slotted Rail Terminal

✓ 2104.509 Remove or 2104.523 Salvage...Eccentric Loader BCT



Installing a Known End Treatment

When Installing an existing guardrail end treatment (you know what it is) then use

- ✓ 2554.602 Install Energy Absorbing Terminal (1)
(1) Add a note of what they are.
- ✓ 2554. 602 Install Breakaway Cable Terminal
- ✓ 2554. 602 Install Slotted Rail Terminal
- ✓ 2554. 602 Install Eccentric Loader BCT



Salvaging and Installing an Unknown End Treatment

If, however it is an instance where the contractor will be salvaging a guardrail end treatment as a result of staging cross traffic. Then use...

- ✓ 2104.523 Salvage Tangent Terminal
- ✓ 2104.523 Salvage Flared Terminal
- ✓ 2554.602 Install Tangent Terminal
- ✓ 2554.602 Install Flared Terminal

Depending on the pay item note...

Tangent Terminal - (ET-2000 and SKT-350)

Flared Terminal - (SRT-350 and FLEAT-350)

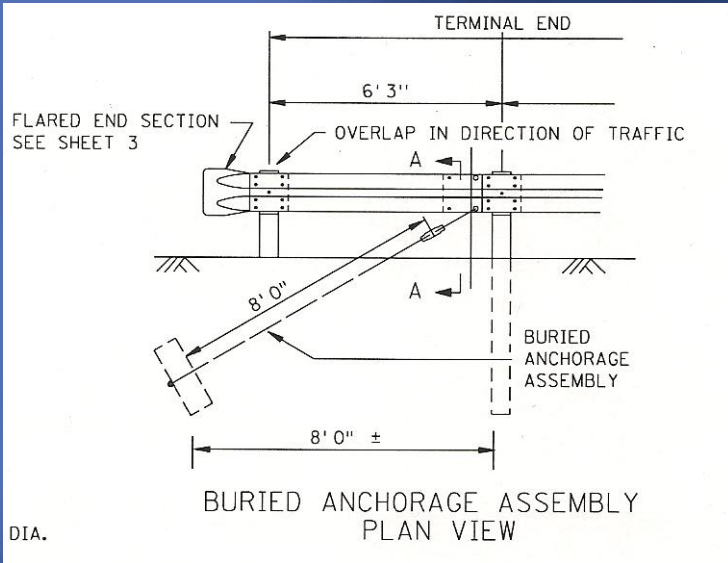


Guardrail End Treatments

- ✓ Twisted Ends
- ✓ Don't sign proprietary details
- ✓ Design Specials
- ✓ Design Special attachment to Flat wall & single line rails
Standard Plan 5-297.619
- ✓ Short Radius Detail
- ✓ End Treatments in Tension
- ✓ Unique Connections



Guardrail in Tension



Guardrail must be in tension to work....

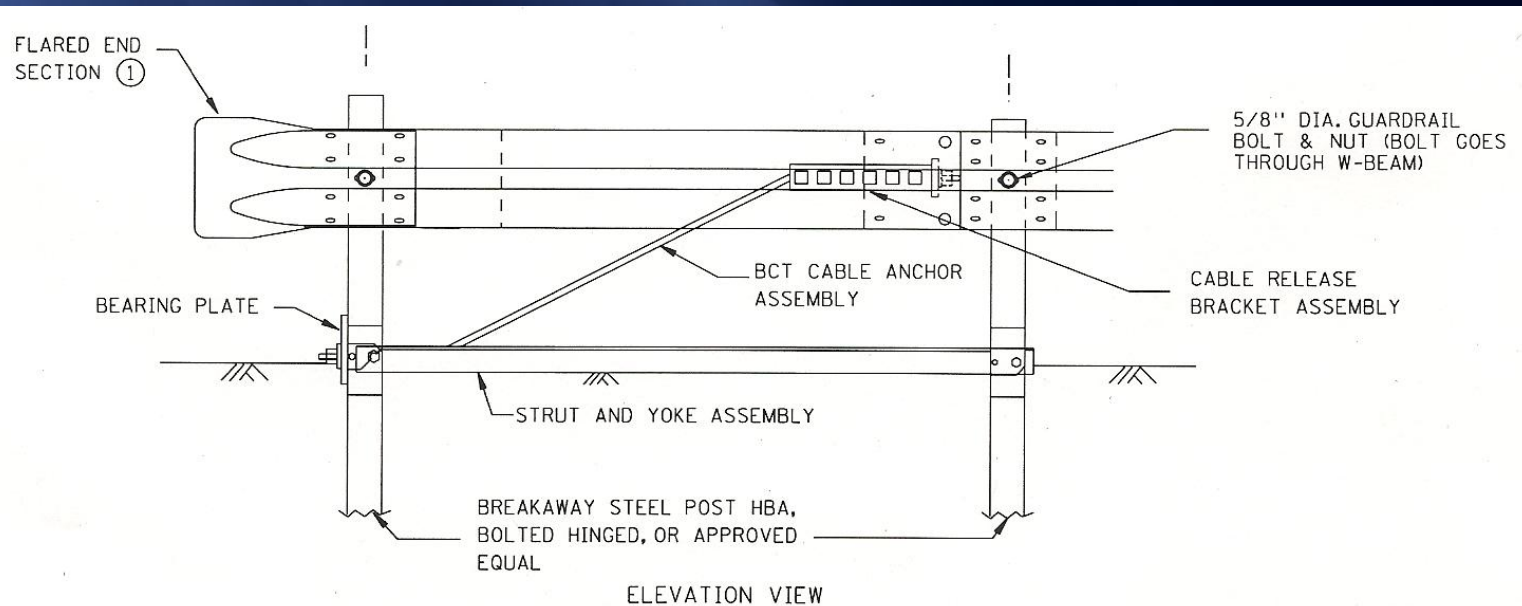
✓ Must have tension on both ends.

Tools of tension are....

✓ Design Special

✓ End Treatment

✓ Anchorage Assembly



Design Special attachment to Flat wall & single line rails Std PI 5-297.619

Check with the bridge office...
Do you need the concrete end
post?

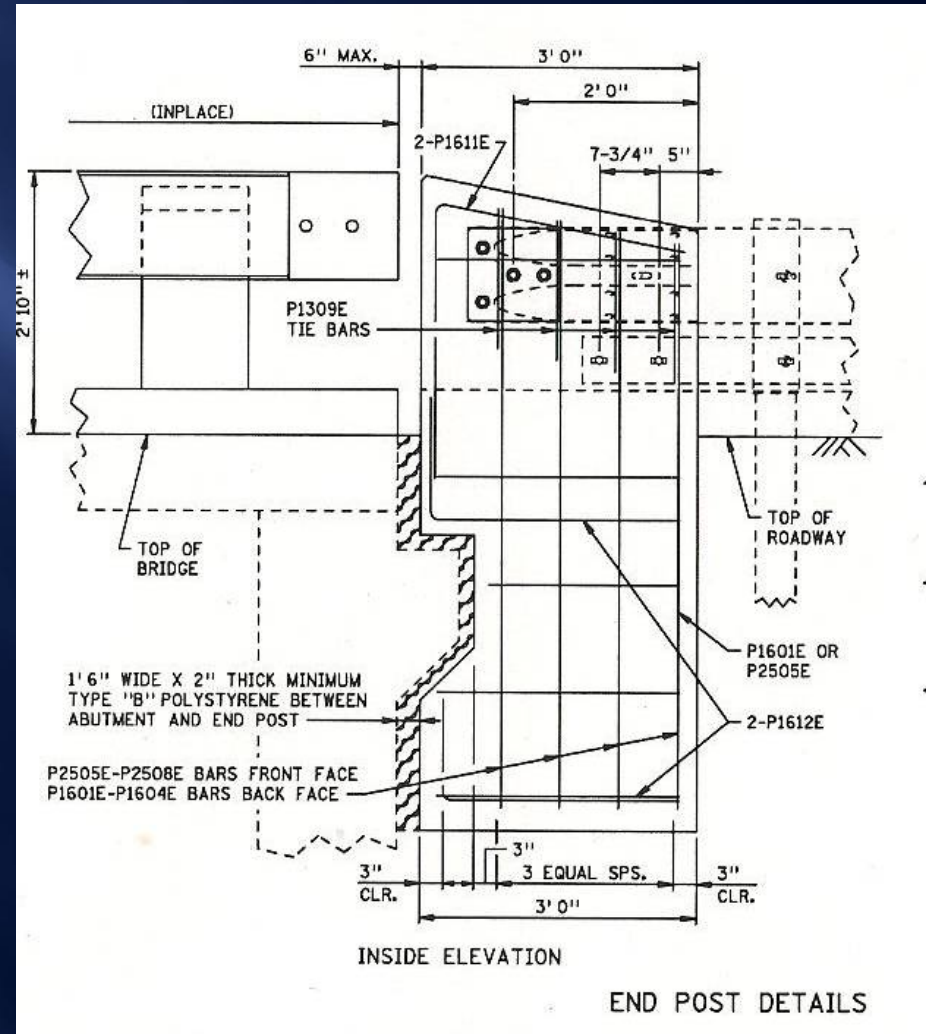
If not...add a note to the SEQ
and/or tab...

NO POST REQUIRED

If you do...add the pay item...

**2411.507 CONCRETE END
POST** by the EACH

Do not use 2401 items for this.
And add a detail in the plan.

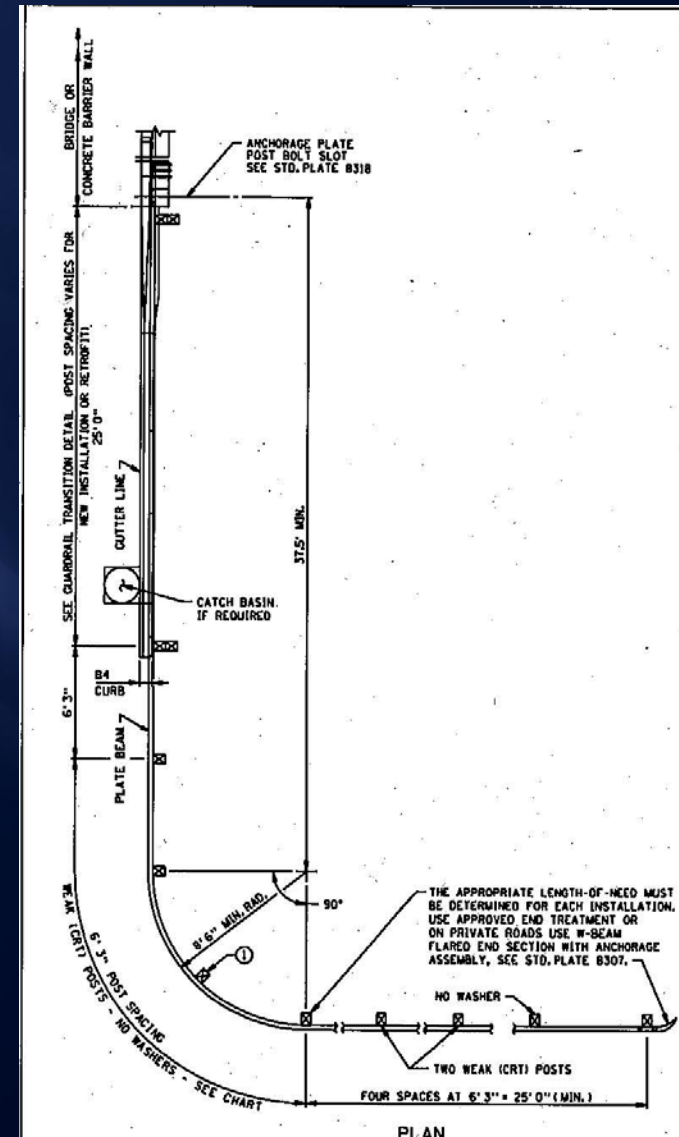


Short Radius Detail

This detail is paid for as 2554.501 TRAFFIC BARRIER DESIGN B8307...wood posts

If steel posts are desired ...

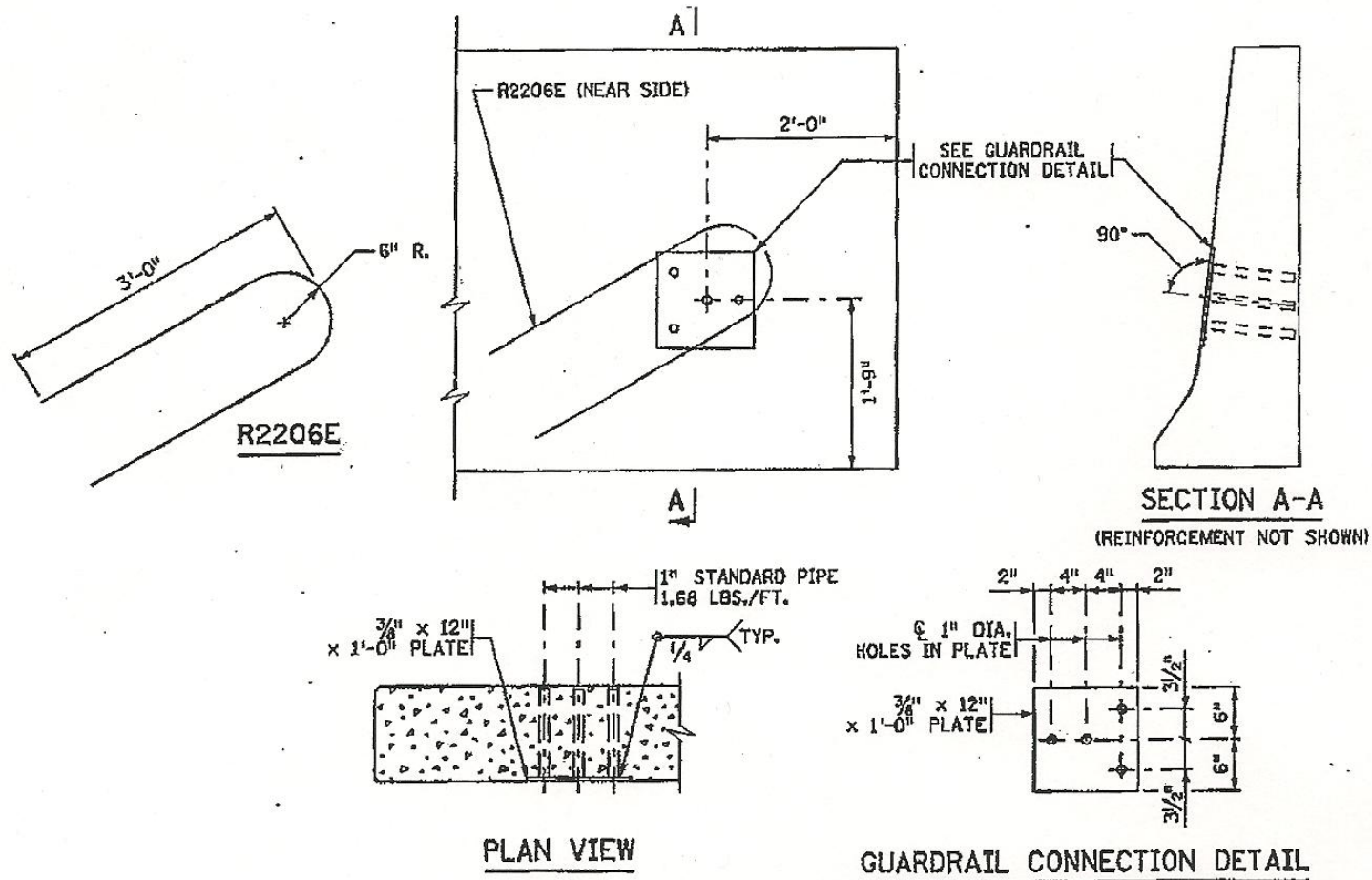
- ✓ Then it would be paid for as 2554.501 TRAFFIC BARRIER DESIGN B8338
- ✓ Need to add the following notes to the detail...
 - All posts shall be steel
 - All weak (CRT) posts shall be bolted hinged posts (steel plug welded posts may be used as an option).



Unique Guardrail Connections

Guardrail Attachment to Barrier

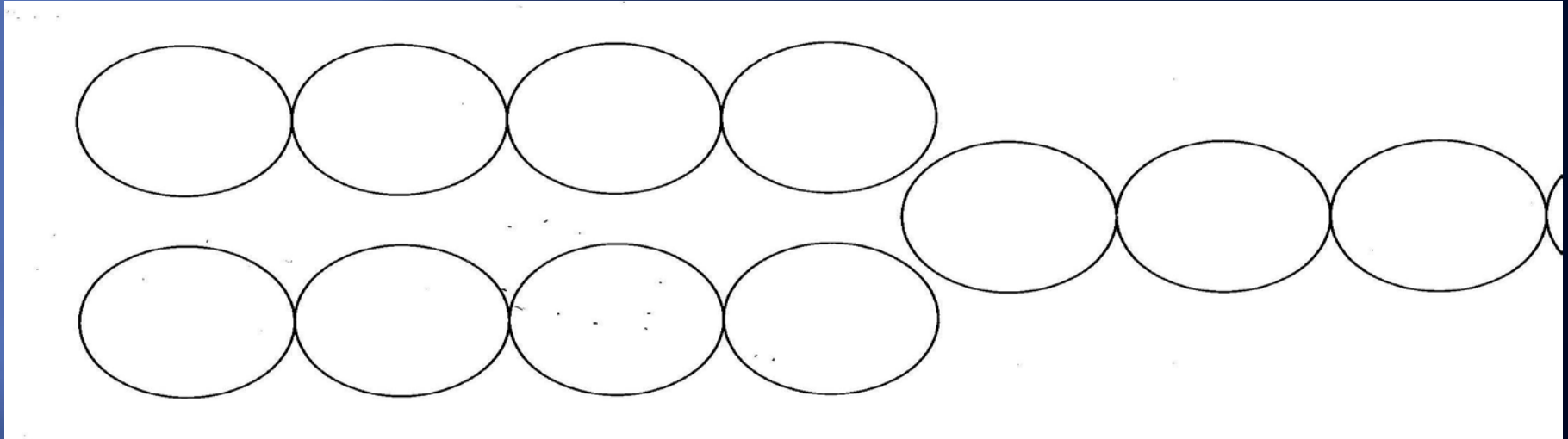
When attaching guardrail to concrete barrier you need to take into account the connection to the barrier. The detail below is an example of one such detail you would need to add to the plan....



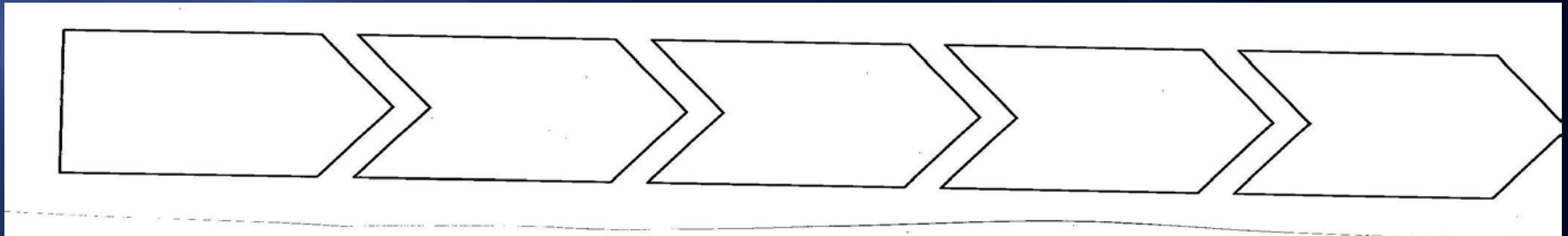
NOTE: GUARDRAIL CONNECTION TO BE STRUCTURAL STEEL, SPEC. 3306.

GALVANIZE AFTER FABRICATION PER Mn/DOT SPEC. 3394
ESTIMATED WEIGHT = 22 LBS

Barrels vs. Impact Attenuators



↑ This is paid for as IMPACT ATTENUATOR BARRELS by the EACH



↑ This is paid for as IMPACT ATTENUATOR by the ASSEMBLY

QUESTIONS

Any questions contact us ANYTIME:

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Design Scene @

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