

# OVERALL PLAN CHECKLIST

The following list of items is a good place to start for reviewing plans. This is not all inclusive and some things may not apply to each plan....

## ALL SHEETS

- Readability – If you can't read it then chances are the contractor can't either.
  - Is the print large enough?
  - No overwriting.
  - Understandable font.
  - Dark enough lines?
  
- Signatures –
  - Is the sheet signed according to board requirements?
  - Is there a license number and does it belong to the engineer signing?
  - If different than the designer on the title sheet is there a printed name?
  
- Prime SP number in the bottom right corner
  - Followed by roadway in parenthesis (TH XX).
  - State Aid number if one on the project.
  
- Sheet Total number
  - Is it the same as the last numeral on the index?
  - Does it match other sheets? You would be surprised how many times this is wrong.
  
- Notes
  - Don't repeat notes. If it is noted in the SEQ it should NOT be noted in the tabulations.
  - Make sure the plan contains the UTILITY QUALITY LEVEL note.
  - Make sure they make sense to you. If you don't understand them chances are the contractor won't either.
  - If they reference a pay item make sure the pay item exists (e.g. is in the SEQ) and that it is the correct one. Use only the first four digits of the Spec (e.g.2104).
  - Check all sheet cross references.
  - Check all math, district should do this. Plan review spot checks only.
  - All slope references should be Vertical: Horizontal.
  - Do not note the compaction method for bituminous. It should be covered in the Special Provisions only. If this is in the plan then delete it.
  - Watch out for INCIDENTAL TO ITEM comments. An item is either INCIDENTAL ...PERIOD...it is not being paid for. Or it is INCLUDED IN PAYMENT FOR AN ITEM in which case the cost is wrapped up into a certain item.
  - If an item is likely to cost more than \$1000 it shouldn't be incidental.
  - If the plan already has a pay item then that item should not be incidental elsewhere in the plan (e.g. if base aggregate material is paid for under the mainline it should not be incidental under the walks and/or curb and gutter).
  - Don't allow repeat note numbers/letters. There should only be ONE note one, one note two, etc. per sheet. Either renumber or box the tabulation/detail.

- Make sure there are zero's in front of any decimal numbers (e.g. 0.01 not .01).
- Standard Plates – only show first four digits (no letter) other than standard plate table.
- Watch out for the word “INSTALL” by itself. It is preferred to use “PLACE” as the word install by itself implies that materials will be supplied and that is usually not the case.
- If an item is not listed as “By Others” make sure a pay item covers it.

If a certain vendor or product name /part is mentioned this is proprietary. The plan would have to list at least 2 manufacturers or suppliers otherwise contact the Special Provision Engineer about this ASAP!

## **TITLE SHEET**

- Bottom right corner
  - All SP numbers are listed
    - Do the SP number(s) agree with all SP number(s) on the index map?
  - No repeat SP number - the control section numbers can't be listed twice in the same plan. For example, 2702-100 & 2702-102 should not be in the same plan. However, they may be in separate tied plans.
  - Does each SP number include a TH and Legislative number and is the legislative number correct... check it against what is listed at...  
[http://www.dot.state.mn.us/roadway/data/reports/control\\_sections.pdf](http://www.dot.state.mn.us/roadway/data/reports/control_sections.pdf)
  - Does the sheet total agree with the last numeral in the index?
- Top right corner is the funding correct, check this at...  
<http://www.dot.state.mn.us/bidlet/misfiles/pdf/schedule.pdf>
- Check to see that all required signatures are there and that the designer has a printed name and date with his signature and it says LICENSED PROFESSIONAL ENGINEER.
  - If there is a state aid number are there two state aid signature blocks and are they signed? Sometimes only one signature is required, check with the State Aid office for signature requirements.
- Check GOVERNING SPECIFICATION to make sure they are the most current -  
*The 20## Edition of the Minnesota Department of Transportation “Standard Specifications for Construction” shall govern.*
- Check the index
  - Make sure the sheets agree with what the description is.
  - Check the total number of sheets...this may not be the same as the number in the bottom right corner because of A, B, sheets and deleted sheets and letter sheets (e.g. TC, X, etc.).
- Check the title...CONSTRUCTION PLAN FOR ...if being paid for it should list...
  - Grading

- Bituminous and/or Concrete Surfacing
- Mill, Overlay, Surfacing, CPR, Reclamation, Ultrathin Bonded Wearing Course (UTBWC)
- Roundabout
- Lighting, signals, TMS, RWIS
- Retaining Walls, Noise Walls
- ADA Improvements
- Bridge no. if they apply, this includes larger culverts (ones with box culvert sheets listed in the index).
- It does NOT include things like...
  - Drainage, signing, striping, sidewalks, culverts repair, guardrail, landscaping, rumble stripes, traffic control unless these are the ONLY things being done on the plan.
  
- Check for north arrow and scale
  
- Check the little Minnesota map to see if district and ALL counties the project is in are listed. Do NOT accept VARIOUS COUNTIES...LIST all counties.
  
- Check the location...
  - Is the correct roadway listed?
  - Does the project actually begin/end where it says?
  - Must use physical references like road names or rivers...not bridge number, reference points, or stationing.
  
- Check the length block...
  - Do the numbers add up (may not be exact but should be close)? Usually based on stationing not reference points. Make sure the equations are included in the length.
  - If there are bridges are the lengths shown?
  - Are the bridges exceptions, if so make sure they are included in the exception lengths?
  - Make sure the length and reference points agree with the index map (if shown)
  - Correct reference point format (XXX+XX.XXX)...use RPMA for this information. It can be found at .... <http://www.dot.state.mn.us/roadway/data/rpma.html>
  - If a divided roadway make sure they add the note....LENGTH AND DESCRIPTION IS BASED ON XX ALIGNMENT.
  
- Check the index map to...
  - Make sure it is readable and understandable.
  - All bridges and roadways are labeled.
  - Beginning and ending SP are labeled.
  
- Scales – shown with correct units.

## **GENERAL LAYOUT SHEETS**

- Check the Begin/End station and number to make sure they agree with the title sheet.
- Show Proposed/Revised signal systems.
- Show all equations

- Back to the left, ahead to the right.
- Is there a north arrow and is it pointing in the correct direction?
- Is there a scale or stationing? If there is a scale does it have units?  
NO numeric scales (e.g. 1"-100')?
- Is the mainline labeled and does it agree with the title sheet?
- Are the cross streets labeled and do they agree with the title sheet?
- Are all bridges labeled?
- Are all exceptions shown/labeled? This must be shown here and in the CONSTRUCTION PLAN VIEWS. Optional on other sheets.
- For non-SP label begin/end construction with stationing.
- Check all sheet references. When checking references also check SP # and stationing to make sure they all agree (EXACTLY).
- Show new turn lanes
- Show Temporary connections & Bypasses
- Show City/Corporate/County limits and names
- Sometimes the general layout is like construction plan views. If this is the case check everything shown (e.g. drainage, guardrail) against the tabulations to make sure they agree.

## **STATEMENT OF ESTIMATED QUANTITIES (SEQ) SHEETS**

- Check Funding
  - Column for each SP number
    - Same Funding for all columns
      - For all prorated and lump sum item the quantity of one goes under the Prime SP.
    - Different funding
      - Each funding type gets its own column.
      - Lump Sum items either go under Prime SP or if split then to the tenths place.
- The following four items are the only ones that can go to two decimal places....  
MOBILIZATION, FIELD OFFICE, FIELD LABORATORY, TRAFFIC CONTROL. There are rare exceptions for signals and lighting when there is an agreement.
- If there are multiple SP's make sure that the PROJECT TOTAL column comes before the SP columns.
- TRNS\*PRT List – check to match EXACTLY
  - Item Number
  - Description – can use either long or short but can't mix per item
  - Units – use standard abbreviations (SQ YD not SY).

- Check SEQ against Tabulations and Details
  - Quantities – can be rounded to whole numbers in the SEQ, or they can only go to tenths place (except four prorated items Mobilization, Field Office, Field Laboratory, and Traffic Control).
  - Sheet Reference
  - Tab Letter
  - Modified and/or Special detail sheet reference
  
- If federally funded,
  - Shows the funding splits in the column headings (i.e. 80% federal/20% state funds) or
  - As a LETTERED note.
  
- Make sure all Lump Sum items have a total quantity of ONE. Don't let them equal more than that.
  
- If there is an item COMBINATION FIELD/LAB it must have a note stating...*CONSIST OF TYPE?? SERVICE*...fill in the type.
  
- Make sure all salvaged items have an install of equal value. If not, is there the item HAUL SALVAGED MATERIAL or a note stating what happens to the extra salvaged material.
  
- If there is an item 2104.601 HAUL SALVAGED MATERIAL is there a LETTERED note ...*100% STATE FUNDS* ...if it is a federally funded job.
  
- If there is an item REMOVE BITUMINOUS PAVEMENT it should have a note somewhere in the plan which states what the depth of removal is.
  
- If there is an item REMOVE CONCRETE PAVEMENT it should have a note somewhere in the plan which states what the depth of removal is and if it is reinforced or non-reinforced.
  
- If there is an item REMOVE PAVEMENT...this is ALWAYS used when removing bituminous over concrete. Then it should have a note that consists of both the notes as stated above (e.g. XX “of bit over X” of reinf. conc.).
  
- Cannot have both 2105 and 2106 items...watch for this. There are rare exceptions contact Tim Swanson if you have both in the plan.
  
- Spec 2123 Trucks, backhoes, etc... is there a note what they are being used for?
  
- If there is an item for patching mixture and more than one bit mix listed in the SEQ it should be noted what the patching mix is (e.g. Type SP 12.5 Wearing Course Mixture (SPWEB340C)).
  
- Dowel Bars
  - Only include the size if different than the diameter shown in the table on Standard Plan 5-297.221

- If standard size use
  - 2301.502 DOWEL BAR by EACH for new pavement
  - 2302.602 DOWEL BAR by EACH for CPR
- Drainage...See section below labeled “Drainage Checklist”.
- Traffic Barrier...See section below labeled “Guardrail Checklist”
- Riprap...
  - Check for geotextile filter material (2511 not 2105).
  - Granular Filter is incidental unless it exceeds the limits shown in the Standard Plates 3133 and 3134.
- Fertilizer...make sure the plan states somewhere what the rate and analysis are (i.e. 10-10-20 at 300 pounds per acre).
- If seeding is < 2.5 acres then it can be paid as TURF ESTABLISHMENT by Lump Sum. But it will need to include a note stating what it consists of.
- Application rates for turf establishment and erosion control items should only be shown if different than the spec book.
- Check all notes that they make sense. Check all sheet referencing.
- Dewatering
  - Location given for each use
  - Schematic (detail) in the plan
  - Flow rates for each location (temporary two year flow rate)

## **STANDARD PLATES TABULATION (SPT)**

- The following standard note at the top of the tabulation should be present: *THE FOLLOWING STANDARD PLATES, APPROVED BY THE FEDERAL HIGHWAY ADMINISTRATION SHALL APPLY ON THIS PROJECT.*
- Make sure that all pay items that pertain to standard plates have a standard plate referenced (e.g. Pipe design 3006, Concrete barrier 8337, etc.)
- Check all standard plate letters for most recent letter. Look them up at MnDOT A to Z under Standard plates.... <https://standardplates.dot.state.mn.us/StdPlate.aspx>
- Make sure they all apply, sometimes there is one in that doesn't.
- Check any notes or sheet references for accuracy.

- Additional locations – if standard plates are listed elsewhere as in traffic sheets add a note...SEE SHEET XX FOR ADDITIONAL STANDARD PLATES THAT APPLY ON THIS PROJECT.

## **SOILS AND CONSTRUCTION NOTES**

- Are complete and consistent
- Incidental Tack Coat note
- Excess material note (e.g. *ANY MATERIAL NOT UTILIZED ON THE PROJECT...*)

## **TABULATIONS**

- CHECK quantities against the SEQ. They don't have to be exact as they are sometimes rounded up or down on the SEQ.
- Check to make sure units agree with the units shown on SEQ ...this is a common error. It is preferred that the standard abbreviation as used in the SEQ is used.
- If spec numbers are listed only list the first four numbers. The decimal numbers are only shown in the SEQ nowhere else. Make sure these are correct.
- Make sure column headings match the SEQ descriptions as closely as possible.
- Check stationing/ref. pt. numbers & format to make sure they're within project limits.
- DO NOT reference topsoil quantities for 2106 items.
- Spot check a column or two to see if they add up. If they do...great. If not, check them all.
- Utility Tab note ...*ALL UTILITY WORK TO BE DONE BY OTHERS UNLESS OTHERWISE NOTED.*

## **TYPICAL SHEETS**

- Check against MDR to make sure they agree...if not, ask designer to double check with the soils office to make sure they are ok with the design.
- Check stationing to make sure it is within the project limits and continuous.
- Check bit mixes to make sure there are pay items and that the mix designations agree with tabulations.

- Check to make sure all items are paid for and noted as the correct pay item and spec if applicable.
- Check slopes 1:x
- For high speed TH's the Curb is 4"
- Make sure cross slopes have a zero in front of decimal points less than 1 (e.g. 0.1). Also note (if not labeled) that...*ALL CROSS SLOPES ARE IN FT/FT.*
- Check that all insets are accounted for and are correct.
- Are there typicals for Side Roads?
- Are there typicals for Bypasses?
- Are there typicals for Temporary Construction?
- Are there typicals for Misc. situations?

## **DETAIL SHEETS**

- If unapproved details make sure they are signed and that the dates are the most recent.
- Proprietary items such as SKT-350, FLEAT-350, SRT-350, SOFTSTOP, and MSKT should not be signed. If they are then remove the signature.
- Review detail to see if it is understandable.
- Make sure any/all pay items mentioned are correct and covered in the SEQ.
- Make sure the details are labeled to match the pay item as stated in the SEQ.
- Are there ADA/Intersections details (if applicable)?

## **STANDARD PLAN SHEETS**

- Check all dates to make sure they match. One place to check that should have all the dates is at MnDOT A to Z under Standard Plans..... <https://standardplans.dot.state.mn.us/>
- Check to make sure all blanks are filled in that can be. Sometimes the notes don't apply so the blanks stay blank. This is not a modification.
- If modified, make sure they are signed and the date/number are crossed out and a big MODIFIED is written above the number. Crossing off IS a modification but filling in blanks is NOT. Follow the modification guidelines as outlined on the website.
- If details are crossed out make sure appropriate notes are crossed out too.

- Make sure all necessary details are included, such as the erosion control and guardrail items.

## **DRAINAGE & GUARDRAIL (see sections below)**

### **CONSTRUCTION, REMOVAL, EROSION CONTROL, SIGNING, STRIPING, TRAFFIC CONTROL, LIGHTING, ETC.** (all plan view type sheets)

- Check the Begin/end station and number to make sure they agree with the title sheet - This is required on the title sheet, general layouts and construction plan views. It is not required on the other sheets but if they are included they need to be correct.
- Show Proposed/Revised signal systems on traffic sheets
- Show all equations - This is not required on these sheets but if they are included they need to be correct.
  - Back to the left, Ahead to the right
- Is there a north arrow and is it pointing in the correct direction?
- Is there a scale or stationing to aid in determining lengths? If there is a scale does it have units? NO numeric scales (e.g. 1"=100')?
- Is the mainline labeled and does it agree with the title sheet?
- Are the cross streets labeled and do they agree with the title sheet?
- Are all bridges labeled?
- Are all exceptions shown/labeled? - This is not required on these sheets but if they are included they need to be correct.
- Check all sheet references.
- City/Corporate/County limits and Names.
- Details
  - Review detail to see if it is understandable.
  - Make sure any/all pay items mentioned are correct and covered in the SEQ.
- If there is a legend make sure that all items are shown, match the pay item, and make sense.
  - Standard Plates - If there is a tabulation of standard plates other than the SPT
    - Check that they are not already included in the SPT.
      - Check for note on SPT... *SEE SHEET X FOR ADDITIONAL STANDARD PLATES.*
      - Check to make sure the letters are the most current.
    - If they are already in the SPT then take the letter off the end.
- Construction Plan Views – follow “General Layout” checklist.
- Drainage Sheets – see “Drainage Checklist”

- Signing – check for note... *ALL SIGN DIMENSIONS ARE IN INCHES.*

## **CROSS SECTION SHEETS**

- These sheets do NOT require a signature.
- Check slopes 1:X
- If drainage is shown check to make sure it matches the tabulations.
  - Size
  - Material
  - Apron type
  - Length
  - Removal
- Right of Way/Easement limits
- Utilities
- Matchlines

## **DRAINAGE CHECKLIST**

(Much of this information can be found in the Culvert Apron Guidance Sheet found in the General section of the Design Scene and Guidance website)

- Check to see if the aprons are in the clear zone. Then follow Chapter 8-4.03.02 of the Road Design manual which states....

### ***DEFINITIONS***

***Safety Aprons:*** An apron for the end of pipe culverts or pipe sewers that has mitered sides.

*The width of safety apron = the pipe diameter. Standard Plates 3022, 3128 and 3148.*

***Safety Grate:*** A bar system used over the culvert or sewer apron opening to allow vehicles to pass over the opening safely. Standard Plates 3128, 3132, 3148 and an unapproved detail available from the Standards Server.

***Trash Guard:*** A bar system used over the culvert or sewer apron opening to keep out trash, and in some cases, mammals that seek shelter. This bar system is not childproof if the spacing of the bars exceeds 6 in. This bar system is not considered a safety grate.

***Critical Clear Opening:*** The clear distance a culvert or sewer apron opening that a vehicle can safely transverse before a safety grate is required.

### ***CLEAR ZONE***

*Any culvert end outside of the clear zone does not need a safety apron or safety grate.*

*The following criteria are for culverts within the clear zone.*

*A. Cross-Drainage Structures (Centerline Pipes)*

*Critical clear opening = 30 in. pipe placed perpendicular to the roadway*

***Without Safety Apron (Flared End)***

*Round Pipe*

*15 in. or less - no safety grate required*

*18 in. or greater - safety grate required*

*Span Pipe*

*All sizes - safety grate required*

*All multiple pipes - safety grate required*

***With Safety Apron (Mitered End)***

*Round Pipe*

*36 in. or less - no safety grate required*

*42 in. to 72 in. - safety grate required*

*78 in. or greater - no safety apron available, use flared end with grate*

*Span Pipe*

*36 in. span or less - no safety grate required. Equivalent round = 30 in.*

*44 in. span to 102 in. - no safety apron available, use flared end with safety grate.*

*Equivalent round = 36 in. to 84 in.*

*115 in. or greater - use Standard Plate 3114 with safety grate. Equivalent round = 90 in.*

*Multiple Pipe*

*Round 30 in. or less - no safety grate required*

*Span 28 in. or less - no safety grate required. Equivalent round = 24 in.*

*Note: Pipe sizes are based on concrete pipe.*

***New Construction***

- ❖ *Use safety aprons whenever possible.*
- ❖ *Concrete safety aprons (Standard Plate 3022) can be used for concrete pipe. There are safety grates available for 42 in. to 72 in. size pipe. Standards is developing a grate for the 1:6 designs.*
- ❖ *Whenever the apron on Standard Plate 3022 is considered for use, Hydraulics should review each location to determine if it will work hydraulically.*

***Retrofit:***

- ❖ *Replacement of in-place flared aprons with safety aprons may not work because of limited right-of-way, etc. Each location should be checked to determine if a safety apron will fit. Where the flared apron is used or left in-place, follow the guidance about the use of safety grates.*

*B. Parallel - Drainage Structures (Parallel Pipes)*

*Pipe placed parallel to the roadway for entrances and median crossovers.*

*Without Safety Aprons (Flared End)*

*It is recommended that flared end aprons not be used on parallel pipes within the clear zone.*

*With Safety Aprons (Mitered End)*

*Round Pipe*

*24 in. or less - no safety grate required*

*27 in. or greater - safety grate required*

*Span Pipe*

*24 in. span or less - no safety grate required*

*28 in. span or greater - safety grate required*

*All Multiple Pipes - safety grate required*

*Note: Pipe sizes are based on CS pipe*

*Median crossovers require 1:10 slopes and all safety aprons require a safety grate.*

*Entrances require 1:6 slopes.*

***New Construction***

- ❖ *Use safety aprons whenever possible.*
- ❖ *Metal safety aprons (Standard Plate 3128 and 3148) can be used on both concrete and metal pipes. It is recommended that Standard Plate 3128 be used and that Standard Plate 3148 be included in the list of plates as an available option.*

***Retrofit***

- ❖ *Replacement of in-place flared aprons with safety aprons may not work because of limited right-of-way, etc. Each location should be checked to determine if a safety apron will fit. Where the flared apron is used or left in-place, follow the guidance about the use of safety grates.*

- Make sure that safety aprons and/or grates are used whenever necessary according to above criteria.*
- If culverts are being lined it is recommended that the aprons are up to current standards as stated above. If not they should either be brought up to current standards or make sure that the district management supports the decision to leave them as is.*
- Use Standard Plate 3022 for safety aprons up to 36", use Standard Plate 3132 for safety aprons larger than 36" but less than 72".*

- Parallel median aprons must be at a 1:10. Cannot use concrete aprons for this but must use metal safety aprons. Use the Standard Plate 3128, this shows the connection to concrete pipe. Must also include a detail for these. Examples of this detail can be found at the standard plans website at the bottom of the main menu....  
<http://ihub/designsupport/standards/design.html> under SAFEAPRN1\_10B andSAFEAPRN1\_10SM
- Check the tabs to make sure they agree with the profiles and with the construction/drainage/general layout sheets (where ever drainage is shown). Check the size, material, apron style, stationing.
- Culverts (2501 items) ...generic culverts are generally used for entrance pipes. 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 AND PP 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, PP AND CS PIPE SHALL BE GS.*
  - ❖ 2501.603 X" PIPE CULVERT by the LIN FT with the note...*CS, CP, PP, RC MAY BE USED AS ACCEPTABLE PIPE OPTIONS. CS WAS USED TO DETERMINE THE PIPE LENGTHS.*
    - ✦ The note does not have to list PP if it isn't wanted.
- Storm Sewer (2503 Items) may give the plastic pipe option. When giving the plastic pipe option the standard concrete pipe pay items must be used and a note added similar to...*PLASTIC PIPE MAY BE USED AS AN OPTION FOR XX LIN. FT.. SEE TABULATION FOR LOCATIONS...*the locations must be listed in the drainage table.
- Lining pipes must state the size of the pipe being lined....
  - ❖ 2503.603 LINING SEWER PIPE X" by the LIN FT...grout is incidental unless otherwise noted.
- 2507.503 LINING CULVERT PIPE (X") by the LIN FT, when using this pay item it will also need to include either...
  - ❖ 2519.507 CLSM LOW DENSITY by the CU YD or
  - ❖ 2519.507 CLSM HIGH DENSITY by the CU YD or
  - ❖ If using cured in place plastic (CIPP) then
    - ✦ Pay for it as 2507.603 LINING CULVERT PIPE (X") SPECIAL by the LIN FT.
    - ✦ Note that is it cured in place plastic.
- Bedding
  - Storm Sewer (2503)
    - Bedding , excavation, backfill are part of storm sewer and not paid for separately
    - Include Standard plan sheet 5-297.442

- Culverts (2501)
  - With Treatments (centerline)
    - Bedding quantities in the SEQ and Tabulations
    - Excavation quantities in the SEQ and Tabulations
    - Identify the treatment type in the Tabulations
    - Detail included in the plan
      - ❖ RIGID detail for concrete pipes
      - ❖ FLEXIBLE detail for metal and/or plastic pipes
  - Without Treatments (centerline, local roads)
    - Bedding quantities in the SEQ and Tabulations
    - Standard plan included in the plan
      - ❖ 5-297.441 STANDARD CULVERT BEDDING FOR RIGID PIPE for concrete pipes
      - ❖ 5-297.440 STANDARD CULVERT BEDDING FOR FLEXIBLE PIPE for metal and/or plastic pipes
  - Entrance Culvert (agricultural, residential, commercial) with special bedding
    - Bedding quantities in the SEQ and Tabulations
    - Standard plan included in the plan
      - ❖ 5-297.441 STANDARD CULVERT BEDDING FOR RIGID PIPE for concrete pipes
      - ❖ 5-297.440 STANDARD CULVERT BEDDING FOR FLEXIBLE PIPE for metal and/or plastic pipes
  - Box Culvert,
    - Bedding quantities in the SEQ and Tabulations
    - Detail included in the plan, BOX CULV BEDDING
- The connections can go either way, either use the pay item for connection or make it incidental as long as it is clear and consistent in the plan how it is being handled.
- Make sure to use “CS” for CM pipes, Cm is no longer used for pipes. Only existing ones can be called CM.
- Make sure to use “GS” for CS aprons unless they are safety aprons then they are CS.
- 2506.502 CONSTRUCT DRAINAGE STRUCTURE by the EACH...It includes the CASTING ASSEMBLY. Don't have a separate pay item for casting assemblies!
- 2506 RECONSTRUCT DRAINAGE STRUCTURE...Only use when changing the height of the drainage structure more than 6 inches...this includes the removal of the casting but does NOT include the salvaging or furnishing and installing of the casting.
- 2506 RECONSTRUCT MANHOLE...Don't use this pay item. Page 546 of the spec book states to use 2506 RECONSTRUCT DRAINAGE STRUCTURE.
- Standard plate 3128 is for CS aprons less than 36”, this is a round pipe that they cut off for the apron slope. Only one used for 1:10 median slopes.
- Standard plate 3132 is for RC aprons 42” to 72”

- Standard plate 3148 is for all GS aprons and they are made with the slope. These are NOT used for 1:10 median slopes...EVER.

## **GUARDRAIL CHECKLIST**

(Most of this information can be found in the Design Scene - Chapter 14 and in the Guardrail Cheat Sheet found in the General section of the Design Scene and Guidance website)

### **B8338 GUARDRAIL**

#### *DESIGN SPECIAL (DS)-connection to bridge rails, walls, barriers...*

##### Furnishing & Installing DS

- 2554.503 TRAFFIC BARRIER DESIGN SPECIAL by LIN FT
- Reference Standard Plate 8318 for all connection types
- Reference Standard Plate 8338 for all connection types
- Reference Standard Plate 8360 for all connection types
- Do NOT pay for 8318 separately
- Include Standard Plan 5-297.601 for all connection types
- Type F shape safety rail
  - Include Standard Plan 5-297.603 or
  - Include Standard Plan 5-297.635 for retaining wall connection
- Type J shape safety rail
  - Include Standard Plan 5-297.618
- Flat face or one line rail
  - Include Standard Plan 5-297.619 if single line rail or
  - Include Standard Plan 5-297.633 if P-1 retaining wall or
  - Include Standard Plan 5-297.634 if P-4 retaining wall or
  - Include Standard Plan 5-297.684 if flat wall
- If more than one type of connection note which applies for each location in tab

##### Salvaging & Installing DS

- Is existing DS up to present standards
- Can only be installed on same structure, if it is up to standards
- 2104.503 SALVAGE GUARDRAIL – PLATE BEAM by LIN FT
- 2554.503 INSTALL TRAFFIC BARRIER DESIGN B8338 by LIN FT
- Note that it is DS for both cases.

##### Removing DS

- 2104.503 REMOVE GUARDRAIL – PLATE BEAM by LIN FT

#### *END TREATMENTS (ET) – the non-DS end of the guardrail.*

- Include Standard Plan 5-297.601
- Reference Standard Plate 8360
- Furnishing and Installing ET
  - 2554.502 ANCHORAGE ASSEMBLY – CABLE by EACH
  - 2554.502 ANCHORAGE ASSEMBLY – PLATE BEAM by EACH

- 2554.502 END TREATMENT - TANGENT TERMINAL by EACH
  - Details in plan
  - Note ...*SHALL BE EITHER SKT-350 or ET-PLUS*
- 2554.502 END TREATMENT - FLARED TERMINAL by EACH
  - Details in plan
  - Note ...*SHALL BE EITHER SRT-350 or FLEAT-350*
- Salvaging and Installing ET
  - Wood posts CANNOT be replaced with steel posts on ETs. If desired, need new system.
  - 2104.502 SALVAGE ANCHORAGE ASSEMBLY – CABLE by EACH
  - 2104.502 SALVAGE ANCHORAGE ASSEMBLY – PLATE BEAM by EACH
  - 2104.502 SALVAGE ENERGY ABSORBING TERMINAL by EACH. This is used on existing treatments.
    - Add a note to the SEQ or TAB stating what it is (e.g. 4=*FLEAT 350* & 3=*SKT 350*).
  - 2104.502 SALVAGE SLOTTED RAIL TERMINAL by EACH
  - 2104.502 SALVAGE ECCENTRIC LOADER BCT by EACH, This can only be salvaged for parts, it cannot be re-installed.
  - 2554.602 INSTALL ANCHOR ASSEMBLY – 3 CABLE by EACH
  - 2554.602 INSTALL ANCHOR ASSEMBLY – PLATE BEAM by EACH
  - 2554.602 INSTALL ENERGY ABSORBING TERMINAL by EACH. This is used on existing treatments.
    - Add a note to the SEQ or TAB stating what it is (e.g. 4=*FLEAT 350* & 3=*SKT 350*).
  - 2554.602 INSTALL SLOTTED RAIL TERMINAL by EACH
- Removing ET
  - 2104.502 REMOVE ENERGY ABSORBING TERMINAL by EACH
    - Note what it is (e.g. *ET-2000, SKT-350*, etc)
  - 2104.502 REMOVE TWISTED END TREATMENT by EACH
    - Note if it includes the removal of anchorage blocks.
  - 2104.502 REMOVE ECCENTRIC LOADER BCT by EACH
  - 2104.502 REMOVE SLOTTED RAIL TERMINAL by EACH
  - 2104.502 REMOVE ANCHORAGE ASSEMBLY – PLATE BEAM by EACH
  - 2104.502 REMOVE ANCHORAGE ASSEMBLY – CABLE by EACH
- BYPASS GUARDRAIL*
  - 2104.502 SALVAGE TANGENT TERMINAL by EACH \*
  - 2104.502 SALVAGE FLARED TERMINAL by EACH \*\*
  - 2554.602 INSTALL TANGENT TERMINAL by EACH \*
  - 2554.602 INSTALL FLARED TERMINAL by EACH \*\*
    - \*Note...*SHALL BE EITHER SKT-350 or ET-PLUS*
    - \*\* Note ...*SHALL BE EITHER SRT-350 or FLEAT-350*.
  - Include a detail in the plan for possible options.
- REMOVING POSTS ONLY*
  - 2104.502 REMOVE ANCHORAGE ASSEMBLY – PLATE BEAM by EACH  
(providing there is one in place)
  - 2104.503 SALVAGE GUARDRAIL by LIN FT

- Add note to SEQ or tab: *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 tab: *INCLUDES THE FURNISH AND INSTALL OF STEEL POSTS.*
- 2554.603 INSTALL GUARDRAIL by LIN FT
  - Add note to SEQ or tab: *INCLUDES THE FURNISH AND INSTALL OF STEEL POSTS.*
  
- REMOVING RAIL ONLY**
  - 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
  
- REMOVING COMPLETE SYSTEM**
  - 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 ANCHORAGE ASSEMBLY – PLATE BEAM by EACH (if required)
  - 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
  
- TYPE 31 GUARDRAIL**
  - Include Standard Plan 5-297.601 for all types
  - Center (non-end treatment) section
    - Reference Standard Plate 8360
    - Reference Standard Plate 8361
    - Reference Standard Plate 8369
    - Include Standard Plan 5-297.690
    - If over culvert may need to include Standard Plan 5-297.696
  
- APPROACH GUARDRAIL TRANSITION (AGT)**
  - Furnish & Install
    - Single Slope barrier is the only one AGT can attach to
      - Include Standard Plan 5-297.636 for single slope or
      - Include Standard Plan 5-297.693 for vertical end post
      - Include Standard Plan 5-297.694
      - Reference Standard Plate 8350
      - Reference Standard Plate 8352
      - Reference Standard Plate 8356
      - Reference Standard Plate 8357
      - Reference Standard Plate 8360

- Reference Standard Plate 8361
- Reference Standard Plate 8369
- Paid for as 2554.503 TRAFFIC BARRIER DESIGN TRANS TYPE 31
- F shape safety rail
  - Paid for as 2554.503 TRAFFIC BARRIER DESIGN SPECIAL
  - Include Standard Plan 5-297.603 for rail or
  - Include Standard Plan 5-297.635 for retaining wall
  - Reference Standard Plate 8338
  - Reference Standard Plate 8318
  - Reference Standard Plate 8360
  - TYPE31TRANSITION28 detail
  - Paid as part of TYPE 31 Guardrail
- J shape safety rail
  - Paid for as 2554.503 TRAFFIC BARRIER DESIGN SPECIAL
  - Include Standard Plan 5-297.618
  - Reference Standard Plate 8338
  - Reference Standard Plate 8318
  - Reference Standard Plate 8360
  - TYPE31TRANSITION28 detail
  - Paid as part of TYPE 31 Guardrail
- Flat Face or Single Line Rail
  - Paid for as 2554.503 TRAFFIC BARRIER DESIGN SPECIAL
  - Include Standard Plan 5-297.619 if single line rail or
  - Include Standard Plan 5-297.633 if P-1 retaining wall or
  - Include Standard Plan 5-297.634 if P-4 retaining wall or
  - Include Standard Plan 5-297.684 if flat wall
  - Reference Standard Plate 8338
  - Reference Standard Plate 8318
  - Reference Standard Plate 8360
  - TYPE31TRANSITION28 detail
  - Paid as part of TYPE 31 Guardrail
- Removal
  - 2104.503 REMOVE GUARDRAIL – PLATE BEAM by LIN FT
  - Add the note: Includes AGT.
- BULLNOSE*
  - Paid for as 2554.503 TRAFFIC BARRIER DESIGN BULLNOSE
  - Reference Standard Plate 8356
  - Reference Standard Plate 8357
  - Reference Standard Plate 8360
  - Include Standard Plan 5-297.601
  - Include Standard Plan 5-297.611
  - Include Standard Plan 5-297.614, cross out top right detail and reference Standard Plate 8356
  - Include BULLNOSETOTYPE31 detail
    - Paid as part of Bullnose.
    - Revise note ① to read....SEE STANDARD PLATE 8356

- END TREATMENTS (ET)**
  - Include Standard Plan 5-297.601
  - Reference Standard Plate 8360
  - Furnish & Install ET
    - 2554.502 ANCHORAGE ASSEMBLY – TYPE 31 by EACH
    - 2554.502 END TREATMENT - TANGENT TERMINAL by EACH
      - Details in plan
      - Note ...*SHALL BE EITHER SOFTSTOP or MSKT*
  - Salvage & Install ET
    - 2104.502 SALVAGE ANCHORAGE ASSEMBLY – TYPE 31 by EACH
    - 2104.502 SALVAGE ENERGY ABSORBING TERMINAL by EACH. This is used on existing treatments.
      - Add a note to the SEQ or TAB stating what it is (e.g. 4=*SOFTSTOP* & 3=*MSKT*).
    - 2554.602 INSTALL ENERGY ABSORBING TERMINAL by EACH. This is used on existing treatments.
      - Add a note to the SEQ or TAB stating what it is (e.g. 4=*SOFTSTOP* & 3=*MSKT*).
  - Remove ET
    - 2104.502 REMOVE ENERGY ABSORBING TERMINAL by EACH
      - Note what it is (e.g. *SOFTSTOP*, *MSKT*, etc.)
    - 2104.502 REMOVE ANCHORAGE ASSEMBLY – TYPE 31 by EACH
- BYPASS GUARDRAIL**
  - 2104.502 SALVAGE TANGENT TERMINAL by EACH \*
  - 2554.602 INSTALL TANGENT TERMINAL by EACH \*
    - \*Note ...*SHALL BE EITHER SOFTSTOP or MSKT*
  - Include a detail in the plan for possible options.
- POST SEAT**-when posts can't go deep due to culvert depth...
  - B8338
    - Reference standard plate 8316 which must use wood posts, or
    - Add a detail for the post seat using steel posts.
    - Paid for as 2554.602 GUARDRAIL POST SEAT by the EACH.
  - TYPE 31
    - Include Standard Plan 5-297.696, may not need posts seat, if it does follow B8338 items.
- SHORT RADIUS**
  - The Short Radius includes wood posts, use 2554.503 TRAFFIC BARRIER DESIGN B8307 by the LIN FT for the weak posts. Steel posts CANNOT be used for these.
  - For TYPE 31 guardrail use TYPE31TRANSITION28
- IMPACT ATTENUATOR**
  - Barrel assemblies are paid for as 2554.602 IMPACT ATTENUATOR BARRELS by the EACH.
  - Note Test Level

Note Permanent or Temporary placement.

**CABLE GUARDRAIL**

Salvage & install

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

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

**HIGH TENSION CABLE**

Standard Plan 5-297.688

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

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

Weld is shown properly on detail