DESIGN SCENE

DEPARTMENT OF TRANSPORTATION

OFFICE OF PROJECT MANAGEMENT & TECHNICAL SUPPORT
PROJECT DESIGN SERVICES UNIT

CHAPTER 1 – LOCATED ON….

This section is revised as shown in the highlight below…

The description of the project location should reflect the beginning and ending location of the project. This should include the TH number, a cross road or water feature name of where the project begins and where the project ends. The referenced location should be shown on the index map. If there is more than one TH then more than one line of information should be included. It should not use reference points, bridge numbers, or city limits as location descriptions.

CHAPTER 2 – 2014 SPEC BOOK CHANGES - REMOVED

CHAPTER 2 - LUMP SUM ON MULTIPLE COLUMN OR TIED PLANS

There has been some confusion on how to show quantities for Lump Sum (non-prorated) (see PRORATA ITEMS article in this chapter) on multiple column plans and tied plans.
For multi column plans and/or tied plans

- A quantity of 1 should be placed under the total column and the prime S.P. column. All the other S.P. columns should be left blank, or
- If it only applies to a column (not the prime S.P.) then the 1 should go in that column, or
- If the designer feels it is absolutely necessary to split the item then it can be divided between the various columns or tied plan, based on the amount of work needed for that work not based on cost. The decimal for these items can only go to the tenths place.

Examples can be found at….
http://www.dot.state.mn.us/pre-letting/scene/docs/seq-tabs-multi-sp-funds-guidance.pdf

CHAPTER 2 - 2112 SHOULDER PREPARATION

There has been some confusion on how to determine the quantity for 2112 Shoulder Preparation in the plans. *This needs to be further clarified so this section is revised as follows….*

When the shoulder preparation work is not continuous (random) it should be paid for by the LIN FT and each shoulder is counted separately. By that I mean that for a 100 foot stretch of roadway if the project is prepping only one side of the road (one shoulder) it is only 100 linear feet. But if the project is prepping both shoulders then the quantity would be 200 linear feet. Use 2112.603 SHOULDER PREPARATION by LIN FT the measurement will be made by the linear foot along the shoulder of the roadway where shoulder preparation is performed as specified.

When the shoulder preparation work is a continuous length of work (left and right sides roughly equal start and stop locations for both sides of the road) it should be paid for by the ROAD

STATION and the measurement includes both shoulders of the roadway, do NOT double the quantity for this. By that I mean that for a 100 foot stretch of roadway the quantity would be 1 road station. Use 2112.619 SHOULDER PREPARATION by ROAD STA the measurement will be made by length in road stations of 100 feet along the centerline of the roadway where shoulder preparation is performed as specified.

CHAPTER 2 – PLAN QUANTITIES (P)

This section is replaced with the following….

The "P" designation on individual Contract Items or specific portions of Contract Items in the Statement of Estimated Quantities on the Plan means that Plan dimensions will be used to calculate the pay quantity for that Contract Item. The purpose of the use of "P" designated quantities is to avoid the expense of measuring dimensions in the field, if original Plan dimensions remain valid. The use of "P" designated quantities is limited to Contract Items with specified dimensions that can be controlled by field checks during, or after construction. Items with the "P" designation must have quantities that are calculated using dimensions in the plan.

Some examples of Items where a "P" designation might be appropriate include the following:

2101.501	CLEARING	Acre
2101.506	GRUBBING	Acre
2104.501	REMOVE	Lin. Ft.
2104.503	REMOVE	Sq. Ft.
2104.505	REMOVE	Sq. Yd.
2105.501	COMMON EXCAVATION	Cu. Yd.
2105.503	ROCK EXCAVATION	Cu. Yd.
2105.505	MUCK EXCAVATION	Cu. Yd.
2105.507	SUBGRADE EXCAVATION	Cu. Yd.
2105.511	CHANNEL AND POND EXCAVATION	Cu. Yd.
2105.513	ROCK CHANNEL EXCAVATION	Cu. Yd.
2106.501	EXCAVATION – COMMON	Cu. Yd.
2106.507	EXCAVATION – SUBGRADE	Cu. Yd.
2106.503	EXCAVATION – ROCK	Cu. Yd.
2106.505	EXCAVATION – MUCK	Cu. Yd.
2211.503	AGGREGATE BASE (CV), CLASS _	Cu. Yd.
2221.502	SHOULDER BASE AGGREGATE (_V) CLASS _	Cu. Yd.
2232.501	MILL BITUMINOUS SURFACE (__")	Sq. Yd.
2301.504	CONCRETE PAVEMENT _"	Sq. Yd.

2301.504	PLACE CONCRETE PAVEMENT _"	Sq. Yd.
2301.508	SUPPLEMENTAL PAVEMENT REINFORCEMENT	Pound
2360.503	TYPE _# _COURSE MIX (_) _" THICK	Sq. Yd.
2360.504	TYPE _#_ COURSE MIX (_)	Sq. Yd.
2401.501	STRUCTURAL CONCRETE (MIX NO.)	Cu. Yd.
2401.521	STRUCTURE EXCAVATION, CLASS _	Cu. Yd.
2401.541	REINFORCEMENT BARS	Pound
2401.541	REINFORCEMENT BARS (EPOXY COATED)	Pound
2401.542	STEEL FABRIC	Pound
2401.543	SPIRAL REINFORCEMENT	Pound
2401.543	SPIRAL REINFORCEMENT, (EPOXY COATED)	Pound
2402.583	ORNAMENTAL METAL RAILING	Lin. Ft.
2402.585	PIPE RAILING	Lin. Ft.
2411.501	STRUCTURAL CONCRETE (MIX NO.)	Cu. Yd.
2411.503	CONCRETE FOOTING	Sq. Yd.
2411.511	STRUCTURE EXCAVATION, CLASS _	Cu. Yd.
2411.521	GRANULAR BACKFILL (CV)	Cu. Yd.
2411.523	AGGREGATE BACKFILL (CV)	Cu. Yd.
2411.541	REINFORCEMENT BARS	Pound
2411.541	REINFORCEMENT BARS (EPOXY COATED)	Pound
2451.501	STRUCTURE EXCAVATION, CLASS _	Cu. Yd.
2451.503	GRANULAR BACKFILL (CV)	Cu. Yd.
2451.505	AGGREGATE BACKFILL (CV)	Cu. Yd.
2451.507	GRANULAR BEDDING (CV)	Cu. Yd.
2451.509	AGGREGATE BEDDING (CV)	Cu. Yd.
2451.511	COURSE FILTER AGGREGATE (CV)	Cu. Yd.
2451.513	FINE FILTER AGGREGATE (CV)	Cu. Yd.
2461.501	CONCRETE, MIX NO.___	Cu. Yd.
2501.501	CULVERT EXCAVATION, CLASS _	Cu. Yd.
2575.501	SEEDING	Acre
2575.519	DISK ANCHORING	Acre

Some examples of Items where a "P" designation is **not** appropriate include the following:

2118.501	AGGREGATE SURFACING, CLASS ___	Ton
2130.501	WATER	M Gallon
2131.501	CALCIUM CHLORIDE, TYPE___	Ton
2131.502	CALCIUM CHLORIDE SOLUTION	Gallon
2211.501	AGGREGATE BASE, CLASS___	Ton
2301.513	STRUCTURAL CONCRETE HIGH EARLY	Cu. Yd.
2301.511	STRUCTURAL CONCRETE	Cu. Yd.

2331.509	BITUMINOUS MATERIAL FOR MIXTURE	Ton
2355.502	BITUMINOUS MATERIAL FOR FOG SEAL	Gallon
2360.501	TYPE SP __ WEARING COURSE MIXTURE __	Ton
2360.502	TYPE SP __ NON-WEARING COURSE MIXTURE __	Ton

If only a portion of the quantity for an Item can be calculated using dimensions in the plan, then only that portion can have the "P" designation and can be shown as follows with a footnote:

2105.501 COMMON EXCAVATION (5) Cu.Yd. 1,289,582 (985 956.4) (P)

(5) This is a partial "P" quantity. The quantity is a "P" quantity except for the area between Sta. 842 to 851 which will be field measured.

CHAPTER 3 - ADA COMPLIANT GRATES

The section below has been revised as follows…

If a grate is within the Pedestrian Access Route it needs to follow the spacing requirements of a ½" diameter. For new construction the catch basins should be placed 10 feet (minimum) from the curb ramp due to decrease in hydraulic capacity compared to standard or bike safe grates.

For ADA compliant grates use the pay item 2506.~~602 GRATE CASTING SPECIAL by EACH and note…REPLACE EXISTING GRATE CASTING WITH ADA COMPLIANT GRATE CASTING. OPENINGS SHALL NOT PERMIT PASSAGE OF A SPHERE MORE THAN 0.5 INCHES IN DIAMETER. ELONGATED OPENINGS SHALL BE PLACED SO THAT THE LONG DIMENSION IS PERPENDICULAR TO THE DOMINANT DIRECTION OF TRAVEL.~~.516 CASTING ASSEMBLY by EACH. Where we typically reference what standard plate you would use we will add ADA instead.
You will also need to include the detail for it in the plan which can be found at http://www.dot.state.mn.us/ada/design.html
Look under the section called "Standard plans and details" and click on the bullet "ADA Safe Grate Detail (DGN)".
They are in the process of getting a standard plate but until then we will just reference it and add the detail in the plan.

~~The following should be added to the special provisions when using this pay item…. (2506) GRATE CASTING SPECIAL~~

~~This work consists of furnishing and installing grate castings at locations shown in the Plan in compliance with the Public Rights-of-Way Accessibility Guidelines (PROWAG). This work shall be performed in accordance with the applicable Mn/DOT Standard Specifications, these Special Provisions, and the following:~~

~~The Contractor shall furnish and install grate castings that are compliant with the Americans with~~

~~Disabilities Act (ADA). Openings in the casting shall not permit passage of a sphere more than 0.5 inches in diameter. Elongated openings shall be placed so that the long dimension is perpendicular to the dominant direction of travel.~~

~~Measurement will be made by the number of grate castings furnished and installed as specified. Payment will be made under Item 2506.602 (Grate Casting Special) at the Contract bid price per each, which shall be compensation in full for all costs incidental thereto, including but not limited to, all materials and labor necessary to install proposed grate casting. Any damage caused to the existing drainage structure or frame casting shall be repaired at the Contractor's expense to the satisfaction of the Engineer.~~

CHAPTER 3 - RUMBLE STRIP/STRIPE

This section is revised as highlighted below…

Technical Memorandum No. 14-07-T-01 Rumble Strips and Stripes on Rural Trunk Highways was issued on May 21, 2014. (to be updated soon) As a result the standard plan sheets for the rumble strips are in the process of being updated and no longer accessible. While these standard plan sheets are being revised the unapproved details for the rumble strips and rumble stripes can be found at…

pw:\\PW8i.ad.dot.state.mn.us:cadp\Documents\OTS\DesignStandards\DesignDetails\rumbles_dd.dgn

Do not use all the details but only those that apply to your project. For non-MnDOT designers you will need to contact your project manager to get a copy of the details.

The designer needs to modify the details to reflect their specific project (e.g. shoulder widths should be labeled, remove option labels).

The designer should follow the Informal Design Exceptions guidelines as outlined in the Road Design Manual Chapter 2-6.03.02 for their design decisions in the lenient areas.

CHAPTER 3 - STANDARD PLAN 5-297.219

There is an error on standard plan sheet 5-297-219 dated February 16, 2016. Until this is corrected the designer will need to cross out the last sentence on note 2…*DR4 JOINTS SHALL BE SEALED*…as this does not apply.

This will be considered a modification and will therefore require that the sheet be signed.

CHAPTER 4 – 2411 & 2451 STRUCTURE EXCAVATION CLASS

Whenever 2411 & 2451 STRUCTURE EXCAVATION CLASS __ is included for structure excavation a note should be added stating something like…THIS MATERIAL MAY NOT BE SUITABLE AS EMBANKMENT AND SHALL BE DISPOSED OF BY THE CONTRACTOR OFF THE PROJECT RIGHT OF WAY…or…IS SUITABLE AS EMBANKMENT MATERIAL….which ever applies to the projects situation.

CHAPTER 4 – SUBGRADE EXCAVATION

In the 2005 Spec Book it stated that …."***Common excavation shall consist of all excavation materials not classified herein as ….and shall include the excavations classified as subgrade excavation when a separate item therefore is not included in the Proposal."***

The 2016 Spec book does not state anything regarding this. Therefore, if that is the intent of the project a note should be included in either the soils notes, estimated quantity table, or tab sheet. It should state something like…"All excavation shall be paid for as excavation-common."

CHAPTER 10 - AGGREGATE BEDDING

The current Spec Book has redefined aggregate bedding. Therefore, plans will no longer be using 2451.509 AGGREGATE BEDDING. This item is being replaced with one of three possible items…

2451.514 FINE AGGREGATE BEDDING (_V) by CU YD
2451.515 COARSE AGGREGATE BEDDING (_V) by CU YD
2451.516 CONDUIT AGGREGATE BEDDING (_V) by CU YD

Refer to page 548 of the 2016 Spec book for material specifications.

CHAPTER 10 - POLYMER MODIFIED BINDER (PMB) - REMOVED

CHAPTER 10 – QUALITY MANAGEMENT

Please see chapter 7 for information regarding Quality Management and Quality Management Special.

CHAPTER 12 – PIPE BEDDING

The 2016 Spec book Section 2451.3C.2 no longer references the various bedding classes (e.g. B, C) but just refers to it as bedding. Therefore, we can no longer call out the pipe bedding class in the plans, it should just be referred to as "bedding". The pipe bedding details could reference Spec 2451 for bedding requirements.

CHAPTER 14 - TYPE 31 GUARDRAIL

There has been much confusion regarding the design/use of the TYPE 31 guardrail. Hopefully the following will help to alleviate some of that confusion.

Tangent terminal

The preferred MnDOT terminal is the tangent terminal. MnDOT now has two design details and associated approvals on the APL web page. MnDOT has a state wide PIF (also available on the APL web page) for the Tangent Terminals so both need to be listed in the plan. If you only choose one of the terminals it will require a project specific PIF.

Flared terminal

MnDOT only has one flared terminal for the TYPE 31 at this time. Each project will need a project specific PIF if using this terminal.

- A District can still proceed with a project specific PIF for the flared terminal if desired.

Projectwise Design Detail Locations
Tangent terminal design details:
SoftStop_dd.dgn
MSKT_dd.dgn
Flared terminal design details:
SRT_M10_dd.dgn

Connecting to barriers other than single slope

The Approach Guardrail Transition Type 31 (Standard Plan .694) is currently only available for connection to the new single slope barrier (Standard Plan .681).

- Note: The Approach Guardrail Transition (AGT) is a new name for what has been historically called a Design Special by MnDOT. The new name better represents the system's purpose and also brings MnDOT nomenclature in line with other States.

The decision for an AGT upgrade is dependent on the scope of the preservation project and on the future plans for any bridge or barrier work planned for in the STIP within the project limits. The overall goal is to upgrade the AGTs within the project limits to the current Design Special or AGT Type 31 Standards, unless there is a bridge or barrier project in the near future (as identified in the STIP) which will accomplish that goal. The options are as follows for roadway preservation projects:

Option 1: Preservation Project with Concurrent Bridge or Concrete Barrier Work:

When a roadway preservation project, includes bridge or concrete barrier work but does not change the shape of the bridge barrier, and a new AGT Type 31 cannot be constructed, then the following options may be considered:

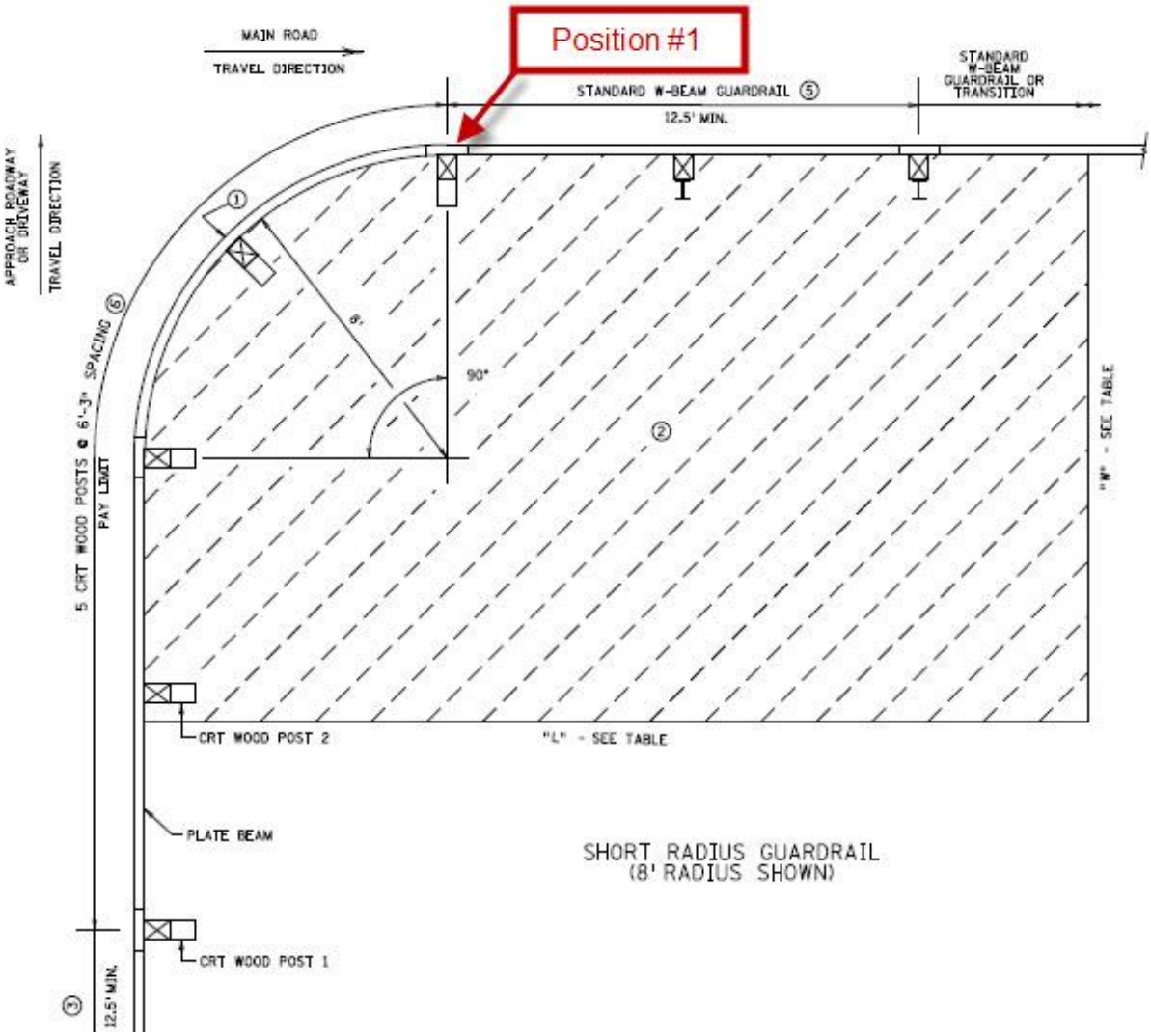
- If the project requires a new AGT (Design Special) and it has to connect to an F-shape barrier, then use the design special (Standard Plan .603) followed with either 8338 guardrail (Standard Plate 8338) and an NCHRP 350 end terminal, or the 25' long, Type 31 to 28" Height Transition guardrail in front of the AGT (design detail TYPE31TRANSITION28) with a Type 31 (MASH) end terminal. If using the Type 31 to 28" Height Transition, it should be paid for as Type 31 guardrail, and noted in the Plan.
- If the project requires a new transition (design special) and it has to connect to an J-shape barrier, then use the design special (Standard Plan .618) followed with either 8338 guardrail (Standard Plate 8338) and an NCHRP 350 end terminal, or the 25' long, Type 31 to 28" Height Transition guardrail in front of the AGT (design detail TYPE31TRANSITION28) with a Type 31 (MASH) end terminal. If using the Type 31 to 28" Height Transition, it should be paid for as Type 31 guardrail, and noted in the Plan.
- In either of these cases, consult with the Bridge Office as early as possible to coordinate bridge barrier repair or replacement work that may be driven by the guardrail connection. Additionally, bridge and roadway designers will need to coordinate for guardrail connections to any other bridge barrier type.

Option 2: Preservation Project with Non-Concurrent Bridge or Concrete Barrier Work:
When a roadway preservation project includes an existing bridge or concrete connection within the projects limit, but does not include bridge or concrete barrier work, then the following guidance will apply:

- If there is a separate bridge (or barrier) project programmed in the near future (as identified in the STIP) concerning the connection (AGT) point in question, then the guardrail can be reconnected to the end post or bridge rail with the original design standard in place at the time of its construction. This option can be used if the connection system is fully inspected and that it's found to be in an acceptable condition.
- If there is not a bridge (or barrier) project programmed in the STIP, or if the system elements are in disrepair, then the Bridge Office will need to be consulted early on in the project scoping process to investigate alternative design variations.

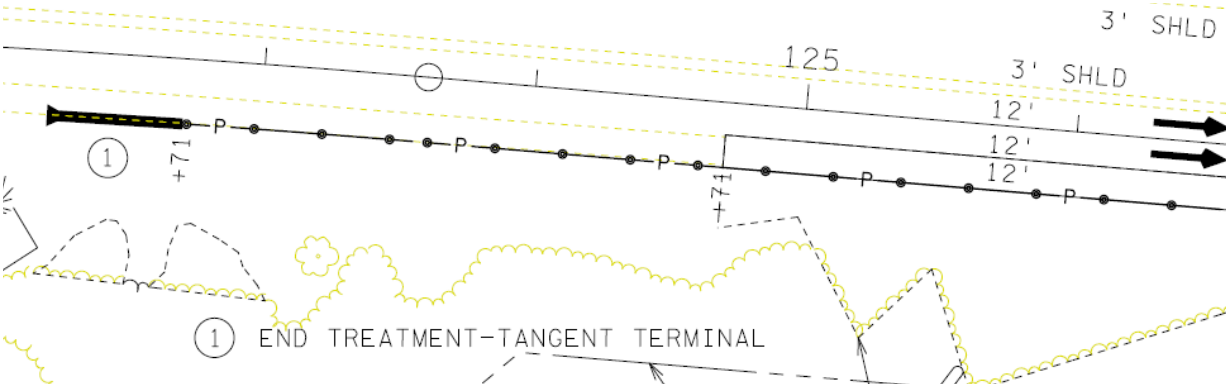
Connecting to other barrier systems
Standards have not been established yet for connecting Type 31 to bullnose installations. The current design with 8338 guardrail (Standard Plate 8338) should be used.

Designers can only attach Type 31 to the short radius after the vertical transition at position #1, as indicated on the drawing below (where the curved section ends, on the main roadway side of the short radius detail).



Proposed solution for tangent terminals of different lengths (Stationing of guardrail length).

Show a + station in the plan where the Type 31 guardrail ends. Extend the GR line type to the end of the terminal +50’ and label it the End Treatment – tangent terminal. Do not include the end terminal in the guardrail pay length.



How to determine where to start double post spacing of guardrail. (Nesting is not an option for Type 31 guardrail)

- Half post spacing (posts every 3'3")
  - Start half post spacing 12.5' before hazard
  - End half post spacing – 12.5' past hazard
- Quarter spacing (posts every 1'6.5")
  - Start half post spacing 25' before hazard
  - Start quarter post spacing 12.5' before hazard
  - End quarter post spacing – 12.5' past hazard
  - End half post spacing – 25' past hazard

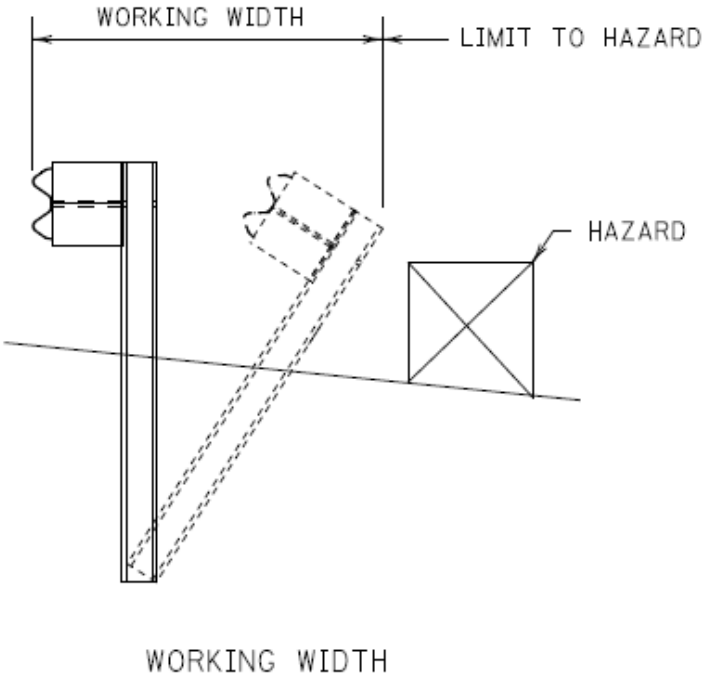
How far to take the guardrail beyond the hazard?

There is currently no statewide consensus on this. The guidance is different for 8338 vs. Type 31. For regular post spacing it is Metro's practice to use 12'-6". For the interim we would recommend that 12'-6" be used as a minimum for type 8338, and that 16'-2" be used for Type 31 (12'-6" + 3'-8").

Minimum working widths for Type 31 guardrail are shown in the table below.

Type 31 Guardrail Post Spacing Options	Minimum working width
6 ft-3in. post spacing	5 ft.
Modified 3 ft-1½ in. post spacing	3 ft-7 in.
Modified 1 ft-6 ¼ in. post spacing	3 ft.
6 ft-3 in. post spacing, 9 ft long posts, 1:2 back slope at post	5 ft-5 in.

Working width is used to determine the lateral distance from the face of the guardrail to the hazard. Working width is defined in MASH as the distance between the traffic face of the test article before impact and the maximum lateral position of any major part of the system or vehicle after the impact (see detail).



Pay Items for Type 31 Guardrail

Item Number	Description	Unit
2104.501	REMOVE GUARDRAIL – TYPE 31	LIN FT
2104.509	REMOVE ANCHORAGE ASSEMBLY – TYPE 31	EACH
2104.521	SALVAGE GUARDRAIL – TYPE 31	LIN FT
2104.523	SALVAGE ANCHORAGE ASSEMBLY – TYPE 31	EACH
2554.501	TRAFFIC BARRIER DESIGN TYPE 31	LIN FT
2554.501	TRAFFIC BARRIER DESIGN TRANSITION TYPE 31	LIN FT
2554.511	INSTALL TRAFFIC BARRIER DESIGN TYPE 31	LIN FT
2554.521	ANCHORAGE ASSEMBLY – TYPE 31	EACH
2554.602	INSTALL ANCHORAGE ASSEMBLY – TYPE 31	EACH

Type 31 Standard Plans with notes

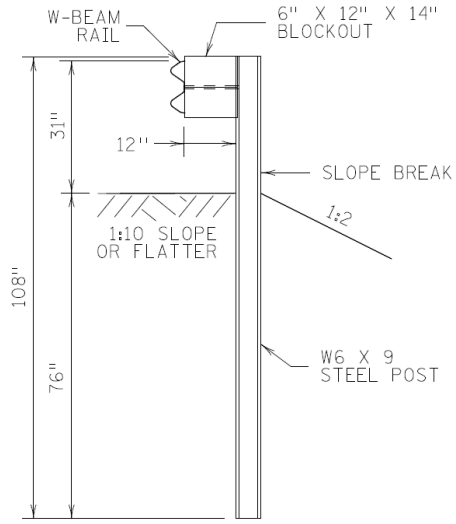
Guardrail Installations At Medians and End Treatments – Standard Plan 5-297.601

Concrete Median Barrier Single Slope - Standard Plan 5-297.681

- 36" – Minimum height to meet new crash standards
- 42" – Use this if a built in height for a future mill and overlay is desired (Note to coordinate with bridge off is the project has a bridge, or a retaining wall with barriers).
- 54" – Glare screen option.

Traffic Barrier Type 31 - Standard Plan 5-297.690

- 31" height
- 12" block out
- Splices between posts
- Same 6' length post just not pounded so far in the ground
- 9' posts if on adjacent to 1:2 backslope



TYPE 31 GUARDRAIL WITH 1:2 BACK SLOPE AT POST

Traffic Barrier Type 31 End Anchorage - Standard Plan 5-297.692

- Guardrail extends beyond the last post by 3'-8"
- End anchorage utilizes BCT timber posts.

Approach Guardrail Transition (AGT) Type 31 - Standard Plan 5-297.694

- 25' thrie beam guardrail, 12'6+6'3" thrie beam + 6'3" transition to w-beam
- New thrie beam connection to bridge rail - see Standard Plate 8350 and 8352 (8318 does not work with Type 31)
- New transition post spacing
- Increased distance between end post and first transition post

Steel Plate Beam Guardrail Details - Standard Plan 5-297.695

- Transition from thrie beam to plate beam guardrail.

Traffic Barrier Type 31 Long span - Standard Plan 5-297.696

- Details for one missing post, and 2-3 missing posts
- When 2-3 post are missing, use 3 CRT wood posts on both sides of span.
- Minimum distance of regular guardrail run on both sides of the missing post
- Increases working width to 8'

Post set in concrete - Standard Plan 5-297.601 (page 2 of 3)

- Will be updated for Type 31. The current guidance of 7" minimum behind the post and an 18" wide cutout will still be required. The post options will remain the same. The blockout depth will be updated to include the 12" option.

CHAPTER 16 - PAVEMENT MESSAGES

There was an error in chapter 14 of the design scene under….**PAVEMENT MESSAGES.** This should be replaced with….

Pavement messages are now paid for by the square foot. Individual messages (placing and removing) should be listed in a tab. The following chart shows square areas for both removal of messages, which includes a larger area around the marking, and installation, which only includes the area of material installed. The chart can be found at…

http://www.dot.state.mn.us/trafficeng/pavement/typicaldetail/index.html

The reason that the removal areas are larger than the placement areas is because the removal is a rectangular area.

- It is easier for the contractor to grind out a rectangle than the shape.
- When the shape is removed at night it can still look like the message.

CHAPTER 16 - PAVEMENT MARKING TYPICALS

The standard details for the pavement markings have been created and are located at….

http://www.dot.state.mn.us/trafficeng/pavement/typicaldetail/index.html

It is recommended that designers start using these typicals in their plans as soon as possible. They will be required for all plans starting January 27, 2017 letting. They will be included in the plans typical border with signature.

If the designer modifies the typical follow the same procedures as those outlined for standard plan sheets. Also fill in the modified date and designer initial in the bottom corner of the typical.

When clarifying a typical the designer does not need to follow the modification procedure.

The designer should be aware that when adding some of these typicals in the .DGN file it may look as though there is some overwriting occurring. It will self-correct when loaded into ProjectWise with MnDOT fonts. This will also self-correct when printed with MnDOT print cues so do not be concerned about it.

The designer notes and asterisk are on the "CAPT BLK" level. If they turn off that level all of that should disappear.

CHAPTER 16 - INTERIM STRIPING TYPICAL

A signature block has been added to the Interim Striping typical. Make sure that this sheet is signed when used in the plan.

The interim striping typical can go in either the Traffic control section or the permanent pavement marking section. It should only be in one section and must be the typical as shown on the striping typical website. Make sure that the pay item is included in the Statement of Estimated Quantity.

CHAPTER 16 – REMOVABLE PAVEMENT MESSAGES

The various message items 2581.602 PAVEMENT MESSAGE (_____) REMOVABLE POLY PREFORM by the EACH have been changed to one item 2581.618 REMOVABLE PREFORMED PAVEMENT MESSAGE TAPE by the SQ FT to match the permanent message items.