Design Scene Part 2 – Plan Conventions

Chapter 1 Title Sheet and General Layout

11/15/2023

Contents

Purpose of this Document

The purpose of this document is to provide guidance in the application of statewide conventions used in the development of MnDOT construction plans. This document also includes clarification on the latest design standards, policies and procedures. Standardized plan conventions ensure that information is presented in a clear and consistent format; easy to understand by both the department and industry.

This document is organized by plan section as listed on the title sheet index.

Chapter 1 Title Sheet and General Layout

Area of Environmental Sensitivity

Wetlands and Areas of Environmental Sensitivity in the project area should be shown on the General Layout. If the areas are not legible, add a note indicating the sheets where they are shown, for instance on the Construction Plan sheets.

Bridge and Approach Plans

When bridge work is planned and there is work to be done outside the bridge structure limits, that work is placed into a separate road/grading plan. This includes but is not limited to road work, guardrail, signing, traffic control, striping, drainage, lighting, etc.

When a separate grading plan is developed, the designer requests a SP number and the plan is developed with its own sheet numbering, title sheet, SEQ, tabulations, etc.

If no work is planned outside the bridge structure limits a separate road/grading plan is not be required. When only a traffic control plan has been developed for a bridge, then these sheets can be included in the bridge plan. If striping, signing, or lighting is needed only on the bridge, those sheets can also be incorporated into the bridge plan.

Construction Plan For

This description reflects major work types and work that requires a separate subcontractor such as: GRADING, BITUMINOUS AND/OR CONCRETE SURFACING, ULTRATHIN BONDED WEARING COURSE, CPR, FULL DEPTH RECLAMATION, ALTERNATE BITUMINOUS OR CONCRETE SURFACING, HIGH TENSION CABLE GUARDRAIL, ADA IMPROVEMENTS, RETAINING WALLS, NOISE WALLS, SIGNAL, LIGHTING, TMS, BOX CULVERT, BRIDGE, etc. Items such as sidewalks, drainage, turn lanes, widening, utilities, etc. should not be included in the title.

If the only work type is a work type not typically listed such as SIGNING, STRIPING, GUARDRAIL, EROSION CONTROL, DRAINAGE, then it should be in the title.

Exceptions

A project typically runs from point A to point B along a specified alignment. Sometimes there are gaps where no work is being done. These gaps are typically considered an EXCEPTION if they are over 50 feet long. For

example, there is a 2-mile overlay section but there is a 500-foot section where no work is being done. If in the 500-foot gap there is only…

Striping then it is NOT considered an exception.

Signing then it IS considered an exception.

Culvert then it is NOT considered an exception.

Guardrail then it is NOT considered an exception.

Sometimes a standalone project does not run along a continuous line but is sporadic such as a signal or culvert replacement project. In these cases, no length is stated in the length block, and no exceptions are listed. Rather the index map will show each location with a reference point.

Exception limits should be shown in the plan, as a minimum, on the index map, general layout, and construction plan views.

Exception Clarification for Bridges

A bridge is NOT an exception if there are bridge sheets either in the plan or submitted separately to be advertised with the plan. This typically requires a bridge sub-contractor to perform the work.

When there is work on the bridge such as guardrail or striping only, the bridge would be considered an exception as it does do not require a bridge contractor to perform this work.

When the work is primarily off the roadway such as high-tension cable, signing, snow fence, landscaping, etc. and it skips the bridge. The bridge would NOT be shown as an exception.

A box culvert is not considered a bridge when it comes to the length block and/or exceptions.

Governing Specifications

The Governing Specifications in the top right corner of the Title Sheet should state the current spec book utilized for the plan and special provisions. Projects let on January 27, 2023, or later should read: THE 2020 EDITION OF THE MINNESOTA DEPARTMENT OF TRANSPORTATION “STANDARD SPECIFICATIONS FOR CONSTRUCTION” SHALL GOVERN.

Index Map

The index map size is summarized in the Technical Manual Section 5-292.606 A1: “*Judgment should be exercised regarding the project map size. In many cases the maps are too small in scale, while on others, too much area not related to the project is shown. By limiting the project map to the project itself and adjacent area, larger scale maps can often be utilized*”.

Label cities, major roadways and all cross streets described in the project location “FROM” and “TO” on the title sheet in a legible font.

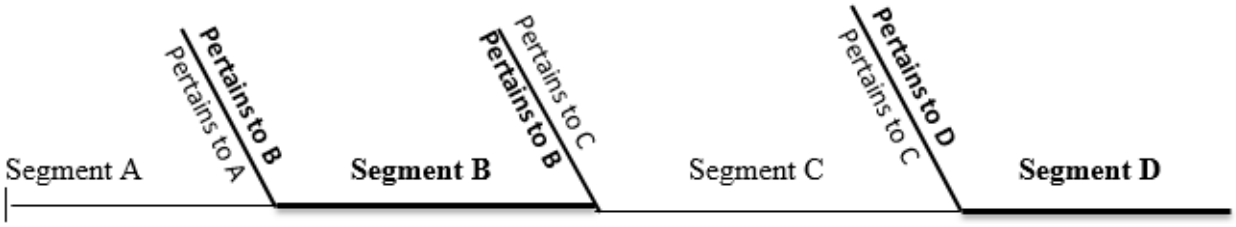
Project limits should be labelled with begin and end SP number and stationing and include bridge numbers and locations. In cases where the work is in a spot location (bridge replacement, intersection, etc) the project could be circled and labelled as “Project Location” with the SP number, reference point and stationing.

Leader Lines

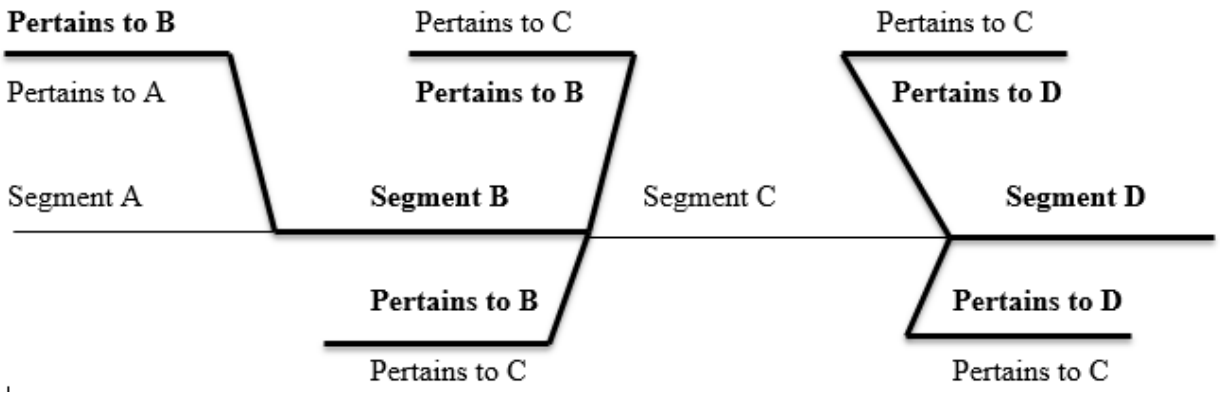
The information placed on the leader line should reference the side of the leader line that it applies to. Sometimes this may appear awkward but if you imagine the leader line as a dividing line it divides the information on either segment of the roadway.

The beginning and ending of an SP number and/or an exception should be on the correct side of the leader line. The stationing and roadway name is not as critical as it typically pertains to both sides of the leader line.

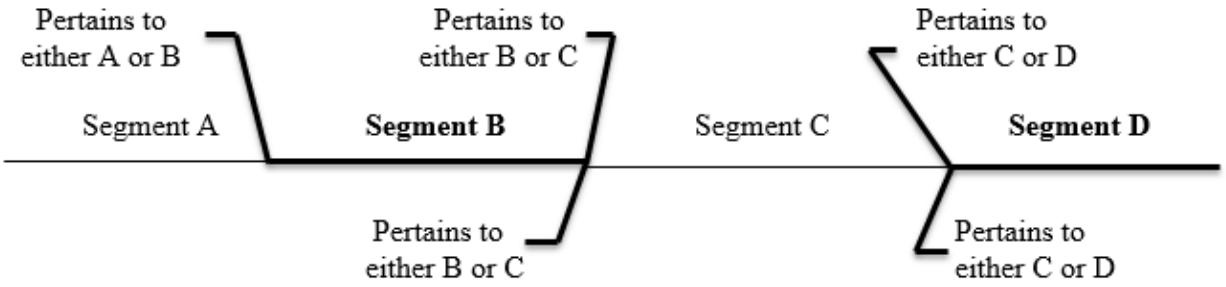
The following diagram shows an example:



Below is a more complex example:



Below is an example without the horizontal line:



Length Blocks

Each SP should contain a length block. The length block should include the SP number and if more than one roadway applies then the TH should also be listed with the SP in parenthesis.

If the roadway is divided it should include a note which states…THE PROJECT LENGTH AND DESCRIPTION IS BASED ON XX ROADWAY ALIGNMENT OR ROADWAY.

The gross length is calculated using the stationing (including the equations) not the reference points as these are not always true miles. If stationing is not available then reference points can be used to determine the lengths.

It should also include all bridge lengths on the project. This does NOT include culverts. If a divided roadway it would only be the bridges on the alignment or roadway stated above.

It should include the exception length, if any. If a bridge is an exception then it should be included in both the bridge length AND the exception length.

The net length is the difference between the gross length and the exception(s).

The beginning and ending reference points also need to be included at the end of the length block.

In some cases a standalone project does not run along a continuous line but rather is sporadic as in a landscaping, signals, lighting, signing, traffic management system and traffic control plans. These plans may NOT require a length block to be filled in with lengths. But at a minimum the length block should contain begin and end reference points.

Located On

"Located On" should accurately reflect the TH and the beginning and ending of the project. The "From…To…" describes the nearest cross road, water feature or county limits (rather than a Ref Pt, bridge number or city limits). Clearly label the TH and cross road or water feature on the index map. Also label cities and counties on the index map rather than including in them in the location description.

It's recommended that "Located On" lines are concise since they are used throughout bid documents.

If the project includes more than one TH, include a "Located On" line for each.

Participation Projects

On projects where there is participation with municipalities (city, county, etc.) and different funding. The "General Layout" would be a good place to show where the splits occur if they don't show up on the title sheet. In addition, the tabulations & estimate are to show the splits.

See Chapter 18 of the Design Scene…"MUNICIPAL AGREEMENTS FOR STATE LET PROJECTS" for more information.

Project Contacts for Bidders

Please do not include the designer's contact information on the title sheet or within the plan. No names, phone numbers, email addresses or websites should be included in the plan (SWPPP sheets are the only exception).

Contact information for the Resident Engineer is included in the special provisions for bidders to contact during project advertisement.

Project Numbers

The Prime S.P. number should be shown on the Project Submittal Memo.

For many years MnDOT has used the Low S.P. number method to identify projects. But this sometimes resulted in the Low S.P. changing with the addition or deletion of work. Therefore, this method (Prime S.P. number) will replace the past method of Low S.P. number.

Selection of the Prime S.P. number should be based on the purpose and need for the project, the main reason why this project is being undertaken. The selection of the Prime S. P. number should be based primarily on the segment of roadway most likely to remain as part of the project in case adjustments become necessary to the project termini. The Prime S.P. number is most likely to be the identifier that will show as the Letting project.

Any other S.P. numbers that are part of the overall project are identified as Associated S.P. numbers.

Project numbers should be left to a minimum on a construction plan. Designers should review their design work authorities to see if any can be dropped. Any time we have at least 2 with the same control section (such as S.P. 4911-xx) for a proposed contract, all but the low SP should be dropped. For example, you have on the plan SP 4911-01, SP 4911-02, and SP 4911-03. Use only SP 4911-01 to cover all the areas for control section 4911. Construction and future record keeping for the project will be simplified.

Occasionally there are projects that are district-wide or state-wide in nature. These projects are 8XXX series S.P. numbers and are considered the Prime S.P. number.

If you do not know what your Prime S.P. number is you should contact your PUMA (Project Unification Management Application) Coordinator for assistance.

A frequent question on plan sheets is the need for T.H. number for identity purposes. The T.H. number, followed by the primary statutory route number, (T.H. 94=392) should only be shown in the bottom right corner on the title sheet. The T.H. number, (T.H. 94) is required in the lower right-hand corner on all the other plan sheets, after the S.P. number. This simply identifies the sheet better.

When there are multiple SP's be consistent and use, at a minimum, the prime SP and TH on every sheet. You can list all SP's and TH as long as you are consistent throughout the plan.

When there is more than one SP on the title sheet the entire T.H. number, followed by the primary statutory route number, (T.H. 94=392) should be shown for all SP's even if the TH and Legislative numbers are the same.

Sometimes there are multiple Legislative Routes on the same roadway. These can change over the course of a route and over time. When in doubt use the statutory route number that represents the greatest extent of the highway route or the lower number.

Reference Posts

For a number of years, designers have been tying road plan stationing to Reference Posts on the title sheets with the length of projects tabulations. The terms Mile Point and Mile Post are outdated and are now called Reference Points and Reference Posts.

The green numbered Reference Posts are set on the roadway shoulder from road stationing and are used by Road Inventory, Traffic Engineering, Accident Data, Pavement Management, Soils and Preliminary Engineering.

These Reference Posts are approximately 1 mile apart (but can be more or less than a mile apart) and allow a person to relate physical roadway features to plan or highway stationing. Our present trunk highway system has an established Reference Post system. Once set, a Reference Post stays at the same station for the life of that highway alignment. On divided highways, Reference Posts are set on the northbound or eastbound alignment, with another post at right angles on the other roadbed.

Reference Points are based on Reference Posts. They are used to locate features between reference posts. A Reference Point has the format of PPP+xx.xxx where PPP is the number of the previous post and the +xx.xxx is the distance past the post to the feature of interest. If that distance becomes greater than a mile before the next post is reached, the "+" part of the reference point looks like this "+01.xxx" and so on. A Reference Point exactly at a reference post (e.g. mile marker post 104) would be shown as 104+00.000 do not write it as 104.000 as that can lead to confusion on whether it is a Reference Point or a true mile point.

This type of referencing allows for a maximum of 99.999 miles between posts. The last digit has an accuracy of 5.28 ft. Measurements are made in an increasing route mileage direction Reference Posts. For example, Reference Point 104+00.231. This Reference Point represents a point that is 0.231 miles past post number 104 (or 0.231 x 5280' = 1219.68 feet past post 104). Whenever Reference Posts are used, they should be prefixed with Reference Post, (R.P.) to prevent confusion with alignment data. In other words, Reference Post 104 is shown as: R.P. 104 = Sta. 327 + 78. Roadway stationing is shown to an even foot.

The method utilized a set of numbered Reference Posts that are physically placed along a roadway. The first post (post 0) is not usually placed along the roadway but is assumed to exist at the beginning of the route. The remaining posts are numbered consecutively and are usually placed one mile apart. Any point along a roadway can be located by providing (1) a reference post number, (2) the distance from that reference post, and (3) an indication of the direction from the reference post.

Examples:
200 + 00.000 a location exactly at Reference Post 200.
350 + 00.500 a location half a mile from reference post 350. The location is half a mile beyond post 350 (towards the end of the route).
423 + 00.250 a location a quarter mile beyond reference post 423.

Roadway Project Mapping Application (RPMA) for Reference Points

The Roadway Project Mapping Application (RPMA) should be used to determine the beginning and ending Reference Points of a project. They should be shown on the title sheet within the length block, in addition to the traditional stationing information. Reference Points are shown in the standard format of XXX+XX.XXX.

The log point listing and videolog use the old, frozen TIS data from 2014 and should no longer be used. By using these systems there is the risk of corrupting data, and the project location data could be inaccurate.

RPMA can be found: http://www.dot.state.mn.us/roadway/data/rpma.html

RPMA vs Reference Posts

Since the start of using the Roadway Project Mapping Application (RPMA) in our plans there have been some cases where RPMA does not agree with where the reference posts are in the field.

This is because RPMA is based on a straight horizontal line and does not take into account hills and valleys as the old systems did. Therefore, the reference point values as shown in the field could be substantially different than those shown in RPMA. How do you handle this in the plan as it could be confusing for contractors using it in the field?

If they disagree the designer needs to request a RACER update the RPMA information. To do this go MnDOT A to Z under RACER and click on "application". This will place it in the LRS which will be updated into RPMA every 18-20 months. Until it is updated you may use it in the plan as long as the RACER request has been made.

Stationing vs Reference Point

If stationing is available it should be used to calculate the project length and throughout the plan. If stationing is not available then reference points can be used to help define the project limits and locations of the work within the plan.

If desired both stationing and reference points may be used to define the project. However the plan views and tabulated charts should be consistent to either show all as reference points or stationing.

Title Sheet Microstation file

Title sheets in Microstation format can be accessed (internal MnDOT): ProjectWise Standard Drawings

This file includes title sheets for Process A and Process B plans as well as State Aid and Building Removals.

Title Sheet Signature Block

Effective August 15, 2020, MnDOT will require only the signature of the engineer certifying the design on the title page of a plan set, consistent with Minnesota statute and rule.

Roadway plans also require signatures from the State Design Engineer and the Office of Land Management Director.

In addition, the practice of having city or county engineers sign the title page is a practice that MnDOT will continue for the time being. The signature of the local agency indicates support for the project and that the local agency agrees to the engineering details that impact their system within the plan set. Their signature is not a certification and does not replace the certification block by the certifying engineer.

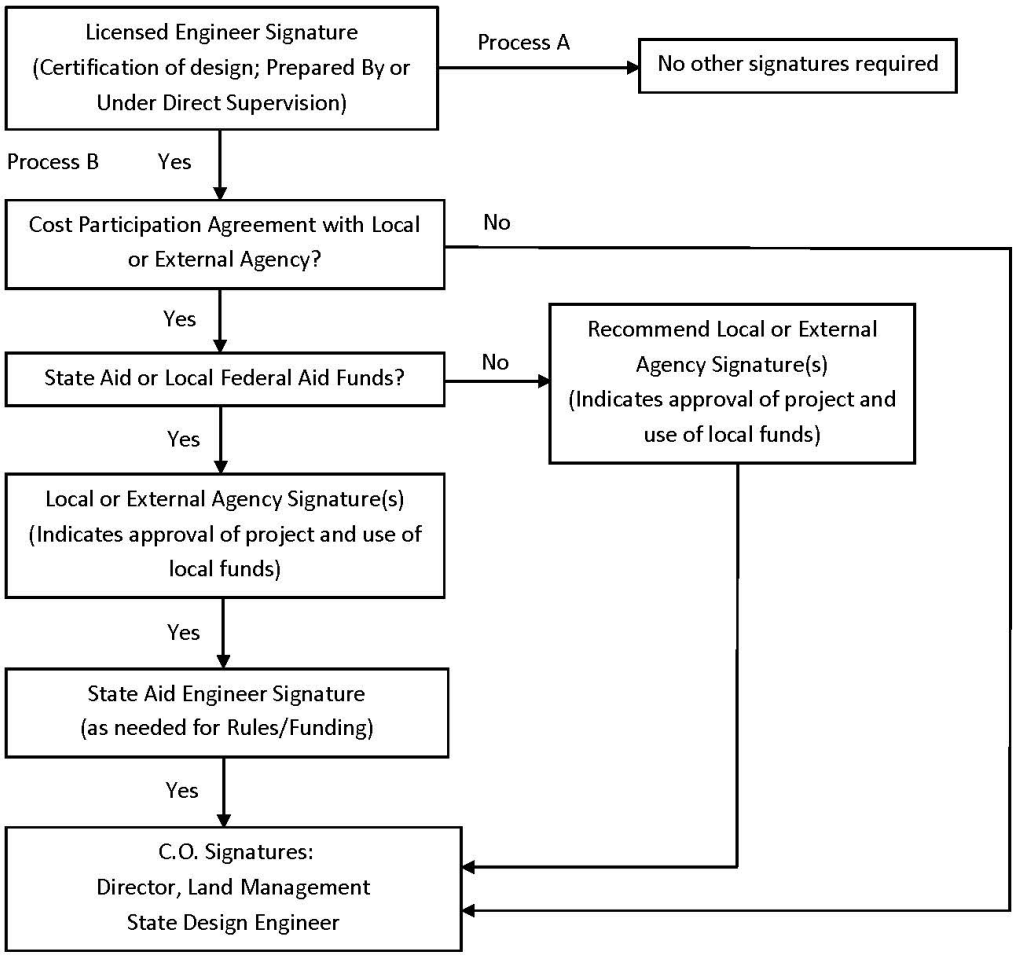
The design engineer's signature must include the printed name as required by the Minnesota Board of Architecture, Engineering, Land Surveying, Landscape Architecture, Geoscience and Interior Design (AELSLAGID). An example can be found: Minnesota Licensure Board Stamps and Seals

See following flow chart for the required signatures:

DEPARTMENT OF TRANSPORTATION

Project Design Services
Effective Date: 10/5/2021

Required Title Sheet Signatures for Roadway Plans with MnDOT Trunk Highway Funding



Note:
Electronic plans turned in for review and processing require only an active signature by the Licensed Engineer. All other District and Local signatures required on the title sheet will be acquired by the District prior to final processing. The Project Delivery Section will acquire the CO signatures.
All efforts should be made to have active signatures on the title sheet.

Tribal Lands

If applicable, all federally recognized tribal land boundaries should be identified on the Index Map and/or the General Layout.

When another SP number is needed

The general rule of thumb is that work extending greater than 1/3 mile into a new control section requires an SP number with the appropriate control section. There are exceptions to this - contact the Project Design Services Engineer for assistance.