



PROJECT DESIGN SERVICES (PLAN REVIEW)

Tim Swanson, Project Design Services Engineer

05-24-18

WHAT DO WE DO???

- Assist with the development and implementation of new design standards, policies, and procedures.
- Provide engineering and design expertise as a liaison to Districts to assist with development of Trunk Highway construction plans.
- Provide feedback, education and information to support continuous improvement of Trunk Highway construction plans including preparation and distribution of the Design Scene.
- Assist with research of archived construction plans.
- Review and approve construction plans for completeness and consistency with State design standards, details, policies, rules, laws, statutes, and format.

Assist with the development and implementation of new design standards, policies, and procedures.

- Members of the Design Advisory Committee (DAC)
- Members of Metro's Sample Plan Committee
- Member of Signatures on Construction Plans at MnDOT Committee
- Technical resource group for functional areas (e.g. Materials, Traffic, Water Resources, Site Development, etc.)
- Review ALL standards and documents for statewide consistency

Provide engineering and design expertise as a liaison to Districts to assist with development of Trunk Highway construction plans.

- Review Title Sheets
- Review preliminary plans
- Funding
- Give advise on pay items – both new and existing
- How to use and pay for standards, plates, and design details
- Design guidance presentations

Provide feedback, education and information to support continuous improvement of Trunk Highway construction plans including preparation and distribution of the Design Scene.

- Website (Design Scene and Guidance)

- ❖ Design Guidance

- ❖ Design Scene

- ❖ Project Ratings

- ❖ Links to related design resources

Design Scene and Guidance

[Design Scene Home](#) | [Contact Us](#)

Design guidance

General

- [Common Errors](#) (PDF)
- [SDG & Tolerances Guidance](#) (PDF)
- [Earthwork Guidance](#) (PDF)
- [Drainage Guidance](#) (PDF)
- [Subgrade Guidance](#) (PDF)
- [Roadway Checklist](#) (PDF)
- [ADA Design Checklist and Guidance](#) (PDF)

Design Scene

Design Scene is a guidance document for designers, technicians and engineers to help them in their everyday work. Feel free to [share ideas](#) with us that you've developed to help improve the quality and reduce cost and time of plan preparation. Please note the [disclaimer](#) before downloading files.

- [Index](#) (PDF) Updated 12-5-17
- [Chapter 1-13 - Entire Design Scene Document](#) (PDF) Updated 12-5-17
 - [Chapter 1 - The Street and General Layout](#) (PDF) Updated 12-5-17
 - [Chapter 2 - Gradients and Tolerances](#) (PDF) Updated 12-5-17
 - [Chapter 3 - Curb and ADA](#) (PDF) Updated 12-5-17
 - [Chapter 4 - Earthwork](#) (PDF) Updated 12-5-17
 - [Chapter 5 - Utilities](#) (PDF) Updated 12-5-17
 - [Chapter 6 - Grading and Erosion](#) (PDF) Updated 12-5-17
 - [Chapter 7 - Alignment](#) (PDF) Updated 12-5-17
 - [Chapter 8 - In-place Topography and Retention](#) (PDF) Updated 12-5-17
 - [Chapter 9 - Pavement and Structures](#) (PDF) Updated 12-5-17
 - [Chapter 10 - Lighting](#) (PDF) Updated 12-5-17
 - [Chapter 11 - Signs](#) (PDF) Updated 12-5-17
 - [Chapter 12 - Drainage](#) (PDF) Updated 12-5-17
 - [Chapter 13 - Full Engineering](#) (PDF) Updated 12-5-17
 - [Chapter 14 - Quick Plan and Section](#) (PDF) Updated 12-5-17
 - [Chapter 15 - Planning](#) (PDF) Updated 12-5-17
 - [Chapter 16 - Traffic](#) (PDF) Updated 12-5-17
 - [Chapter 17 - Cross Section](#) (PDF) Updated 12-5-17
 - [Chapter 18 - General Notes and Miscellaneous](#) (PDF) Updated 12-5-17

Design Scene newsletter

- [December 2017 Design Scene news](#) (PDF)
- [October 2017 Design Scene news](#) (PDF)
- [July 2017 Design Scene news](#) (PDF)
- [February 2017 Design Scene news - 1.3.18](#) (PDF)
- [February 2017 Design Scene news - 1.1.18](#) (PDF)

Project rating

- [Benefits and Other Critical Plan Review Checklist](#) (PDF)
- [Plan Review - Data Collection](#) (Excel)
- [Plan Review - Rating Scheme](#) (PDF)

Related resources

- [Construction Tools](#)
- [Design Tools](#)
- [North Arrow](#)
- [Roadway JEP](#)
- [Roadway Plan](#)
- [Roadway Profile](#)
- [Technical Drawing](#)

Master Search - 09-20-2004

Profile Search | Easy Search | Content Search | Custom Search

Doc. Name Doc. #

Category Doc. Type

Originator

Doc. Date Doc. Status

Effective Date

Publisher

Ext. Author

From:

To:

Cc:

User Label

Keywords

Description

Storage Type Days

Content Searching (Word or Phrase Search)

Search for in: Document contents

Document Properties

Created by Date Created

Last Edited by Edit Date

Application Profile Edited

Group-Specific Properties

Comm. Order No. Condemnation No.

Plat or Map No. Geodetic Proj. ID

Site Number Geodetic Proj. No.

Aerial SP No. NGS Ref. No.

Pub./D. S. No. Bridge No.

Intersection State Building No.

MnDOT Contract/Agreement/Work Ord No.

Permit #/MAPS #/Req #/ID #

MnDOT Grant Number

SWIFT Vendor/Customer ID

PLS Info

Township Range Section

QQ/Gov. Lot Area Value

Corner Type/corner No. Point

Datum

Horizontal Vertical

Sub-Division

Sub-division Lot Block

Enable Workflow ☐

Contract Form

Stewardship

Location Function Unit

S.P./S.A.P. No. Inter. Proj. No.

Location Info

District County

City/Township Control Section

Parcel Number 900 Number

Trunk Highway Leg. Route No.

Begin Ref. Point End Ref. Point

Master Search

OK Cancel

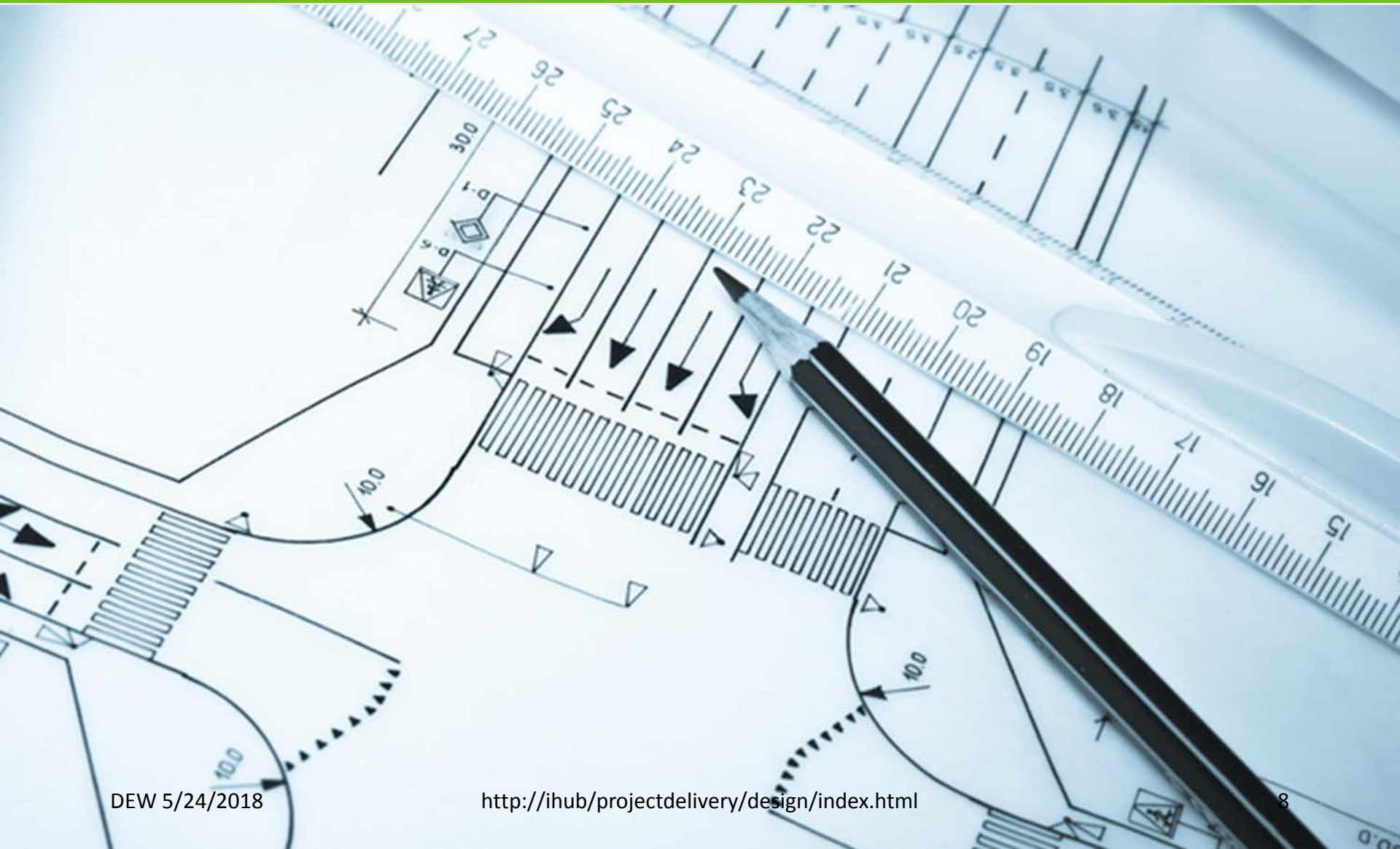
Assist with
research of
archived
construction
plans.

Review and approve construction plans for completeness and consistency with State design standards, details, policies, rules, laws, statutes, and format.

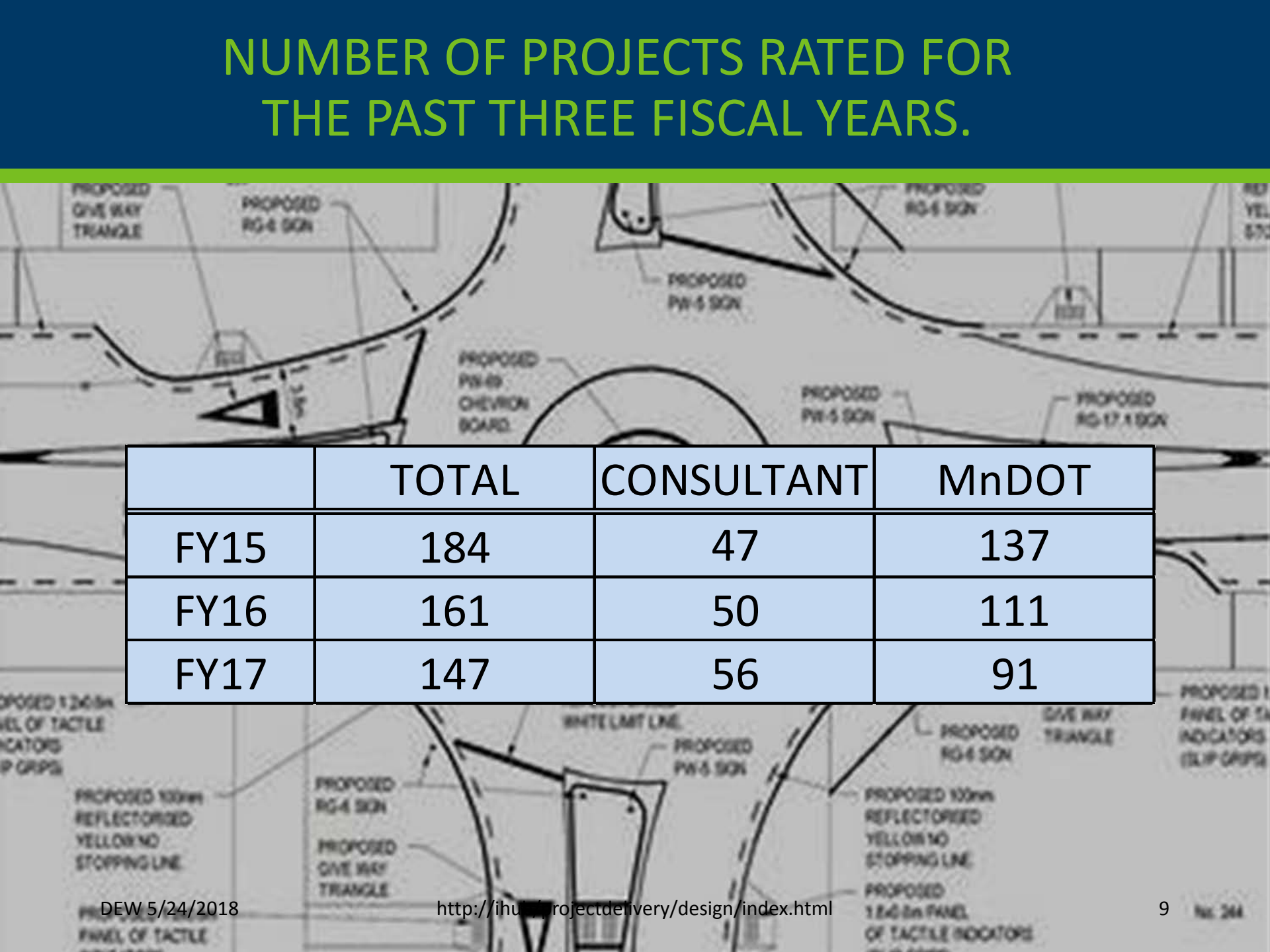
- Our plan comments are based on:
 - ❖ Correct use of pay items
 - ❖ Statewide consistency
 - ❖ Understanding the intent of the project - are we confused, then contractor may be as well?
 - ❖ Standards set by functional areas
 - ❖ Interpretation of Spec book and Special Provisions

STATEWIDE PROJECT RATINGS

FISCAL YEAR 2017



NUMBER OF PROJECTS RATED FOR THE PAST THREE FISCAL YEARS.

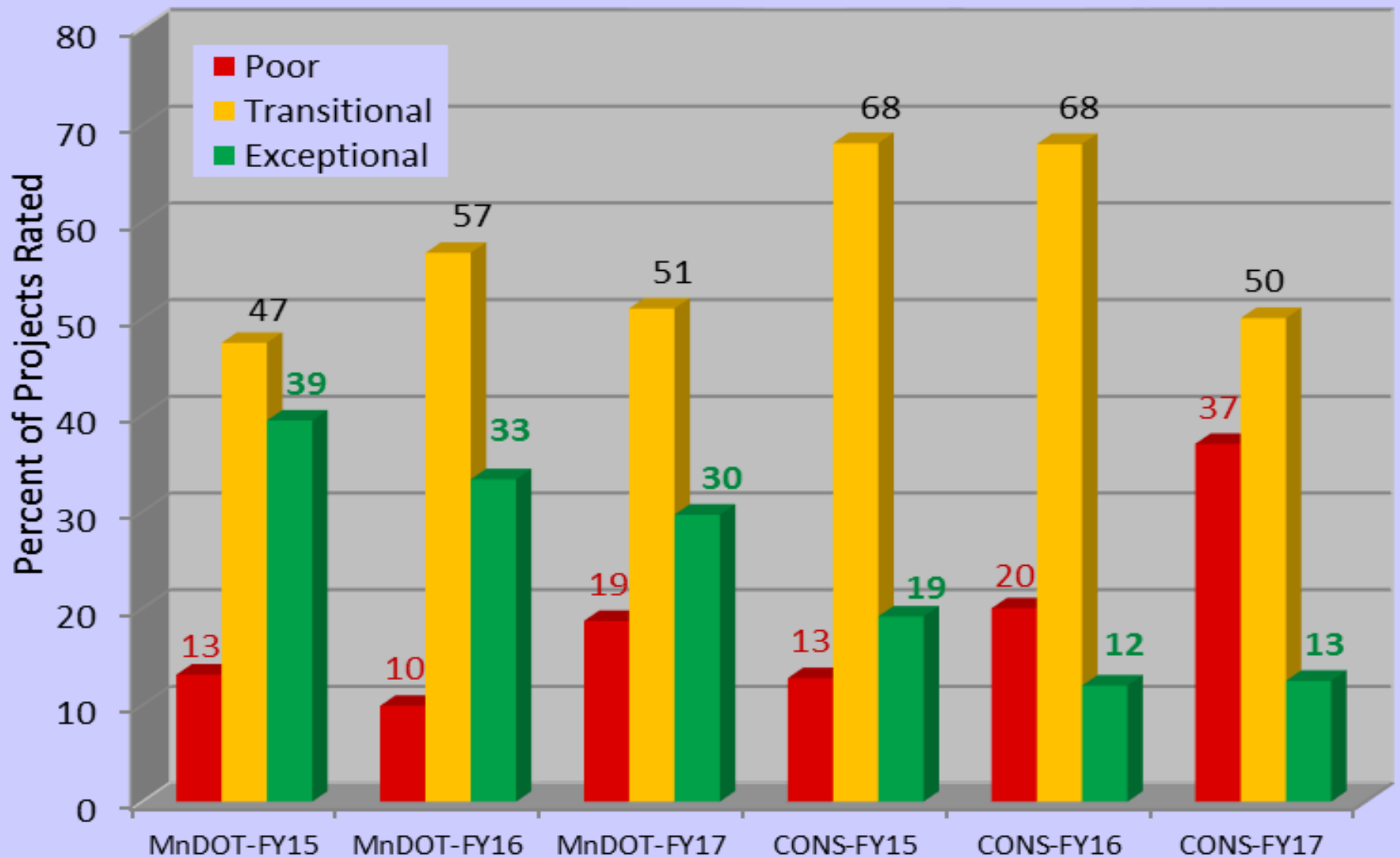


	TOTAL	CONSULTANT	MnDOT
FY15	184	47	137
FY16	161	50	111
FY17	147	56	91

PLAN RATING CRITERIA

	<u>POOR</u>	<u>TRANSITIONAL</u>	<u>EXCEPTIONAL</u>
➤ PAY ITEMS & SPEC BOOK	Over 6%	3-6% Corr.	0-2% Corr.
➤ TYPICAL SECT.	Over 5	1-5 Corr.	No Corr.
➤ PLAN DETAILS	Over 5%	1-5% Corr.	No Corr.
➤ DESIGN STDS	Over 4	2-4 Corr.	0-1 Corr.
➤ TABULATIONS	Over 5%	3-5% Corr.	0-2% Corr.
➤ PLAN CROSS REF.	Over 1	1 Corr.	No Corr.
➤ PLAN & PROFILE	Over 2	1-2 Corr.	No Corr.
➤ PLAN REVISIONS	Over 3	1-3 Revisions	No Revisions
➤ DES. ADDENDUMS	Over 1	1 Corr.	No Corr.

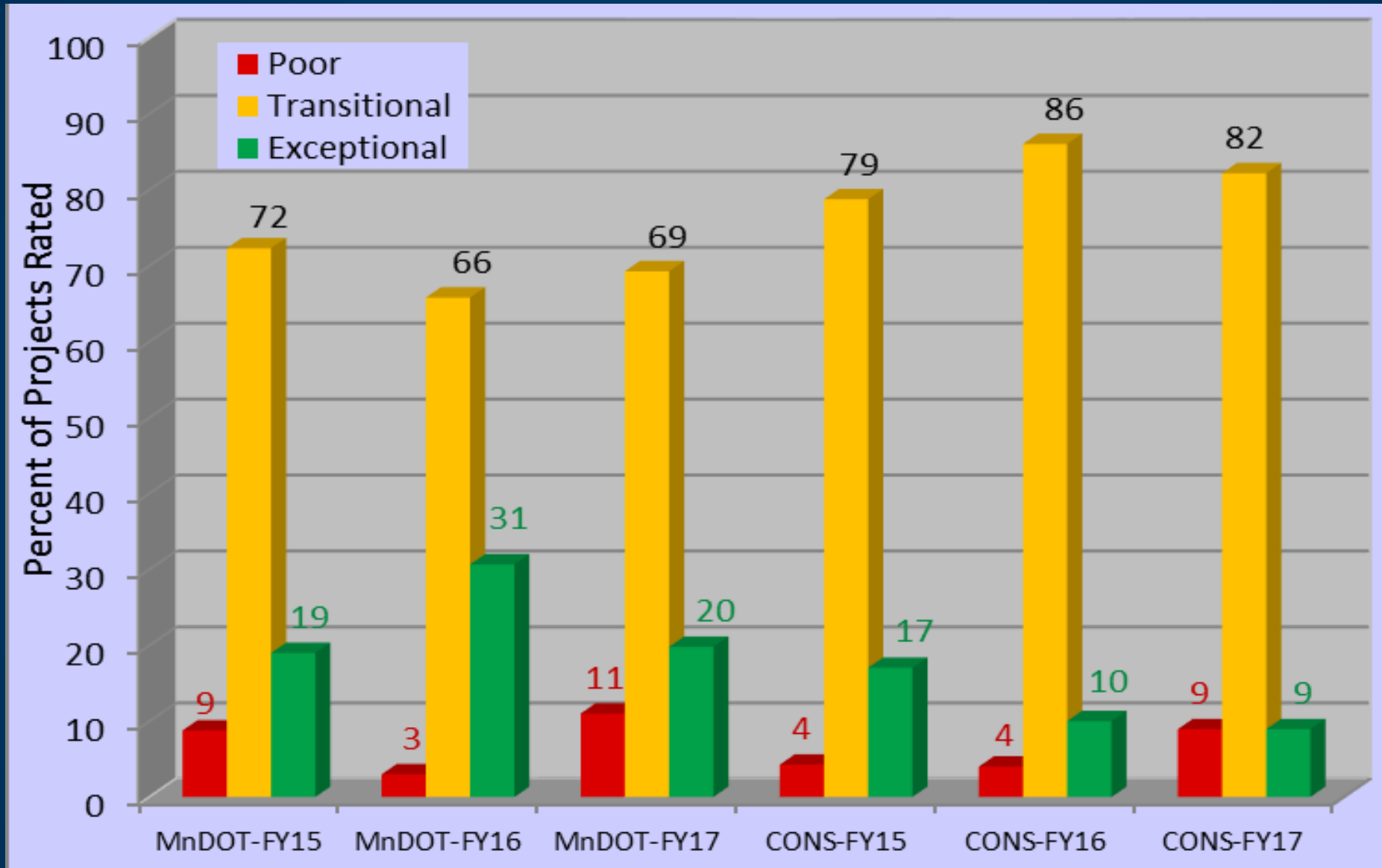
PLAN RATING CHART



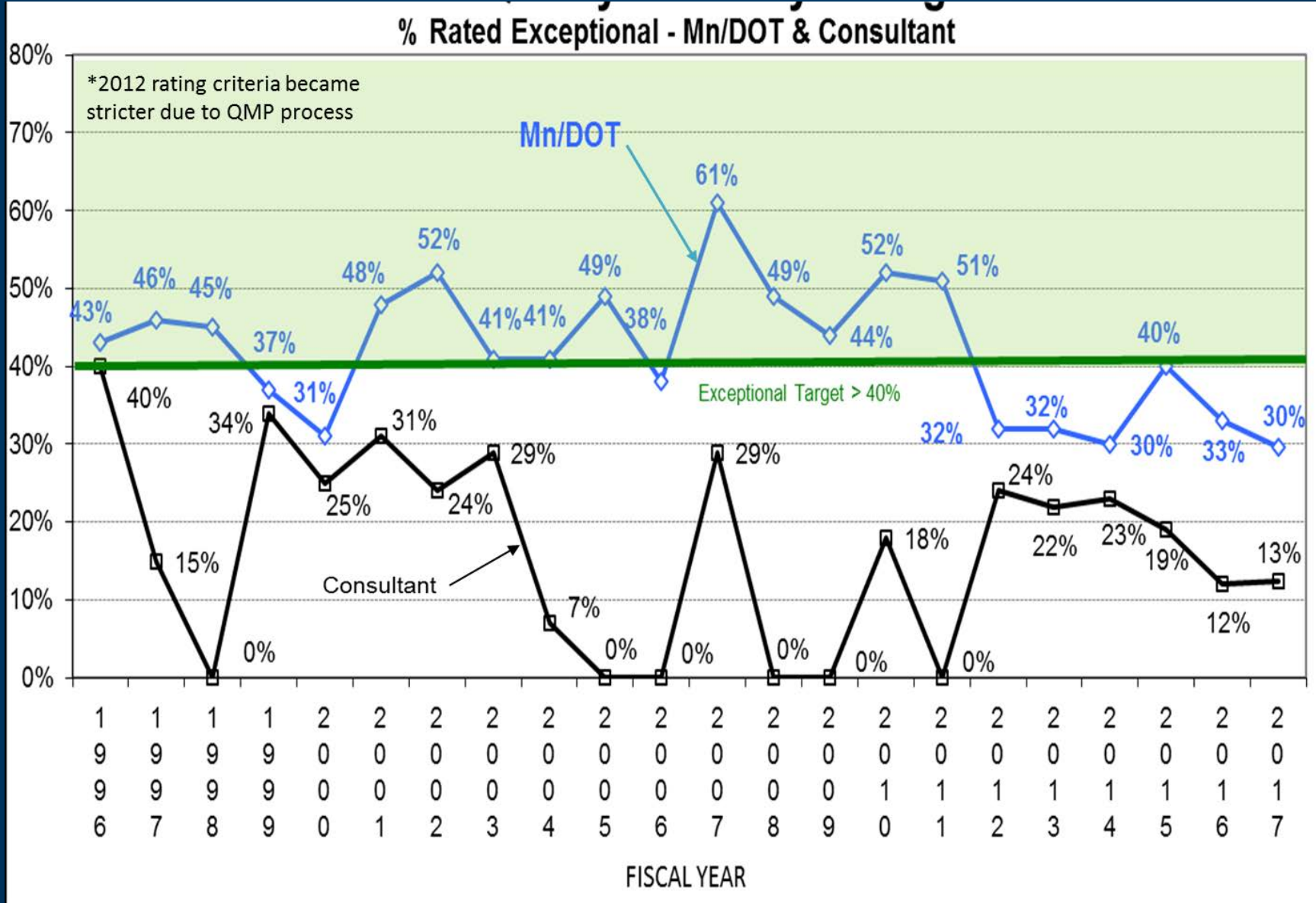
PROJECT RATING CRITERIA

	<u>POOR</u>	<u>TRANSITIONAL</u>	<u>EXCEPTIONAL</u>
➤ QM/QC COMPLETE	NO FORM OR INCOMPLETE	NA	COMPLETELY SIGNED
➤ LETTING DATE MOVE REASON	DISTRICT REASON	NA	NON-DISTRICT REASON
➤ TIME & TRAFFIC SUBMITTAL	< 9 WEEKS (< 12 WEEKS)	NA (PS&E/COMPLEX)	≥ 9 WEEKS (≥12 WEEKS)
➤ SPECIAL PROV SUBMITTAL	< 9 WEEKS (< 12 WEEKS)	NA (PS&E/COMPLEX)	≥ 9 WEEKS (≥12 WEEKS)
➤ COOP. AGR. SUBMITTAL	< 11 WEEKS	NA	≥ 11 WEEKS
➤ COOP. AGR. COMPLETE	INCOMPLETE OR LATE CHANGES	ENOUGH TO GET STARTED BUT NOT FINISH	COMPLETE PACKAGE
➤ PLAN RATING (SEE PREVIOUS SLIDE)			

PROJECT RATING CHART



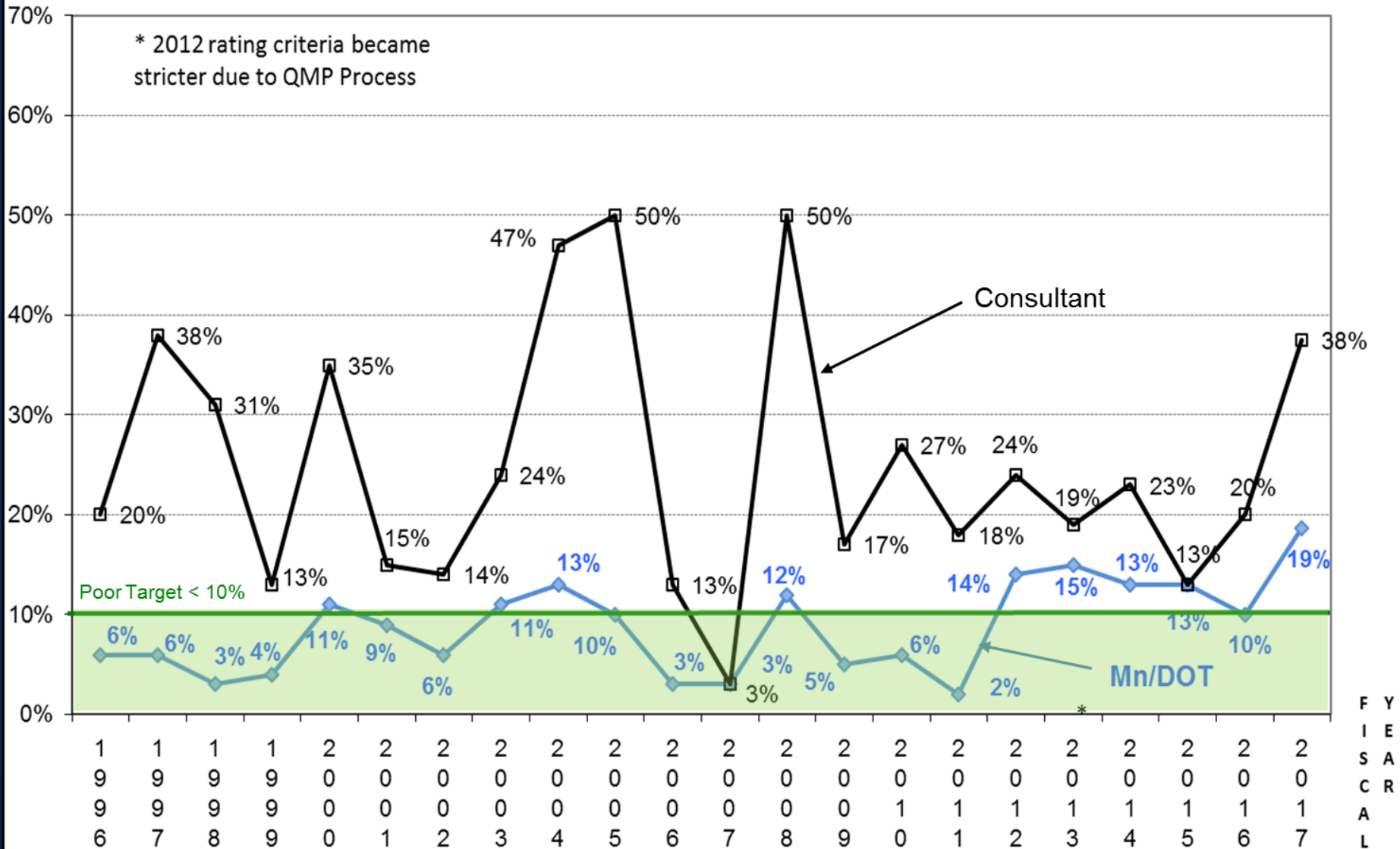
PLAN QUALITY BIDABILITY RATINGS



PLAN QUALITY BIDABILITY RATINGS

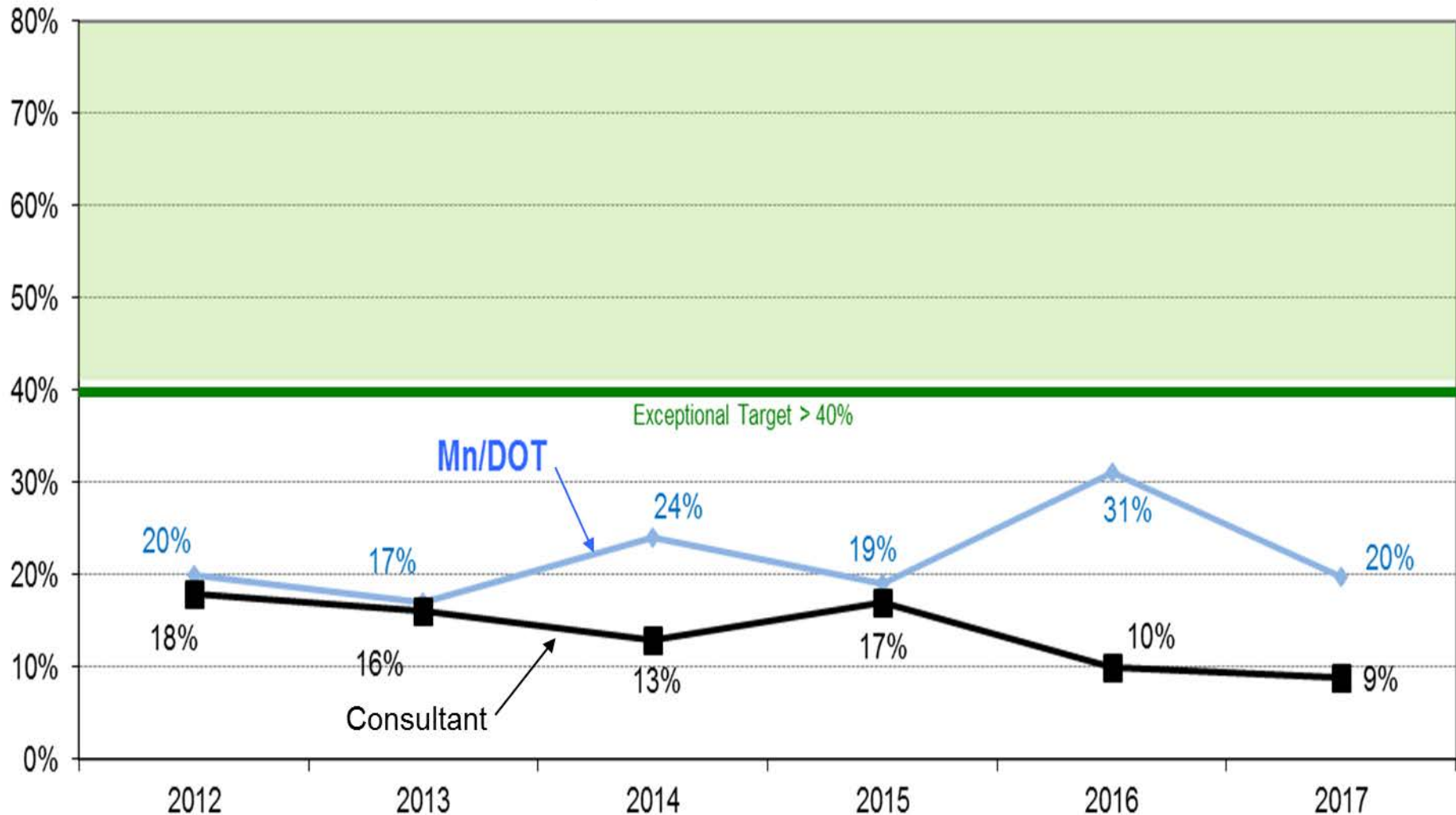
% Rated Poor - Mn/DOT & Consultants

* 2012 rating criteria became stricter due to QMP Process



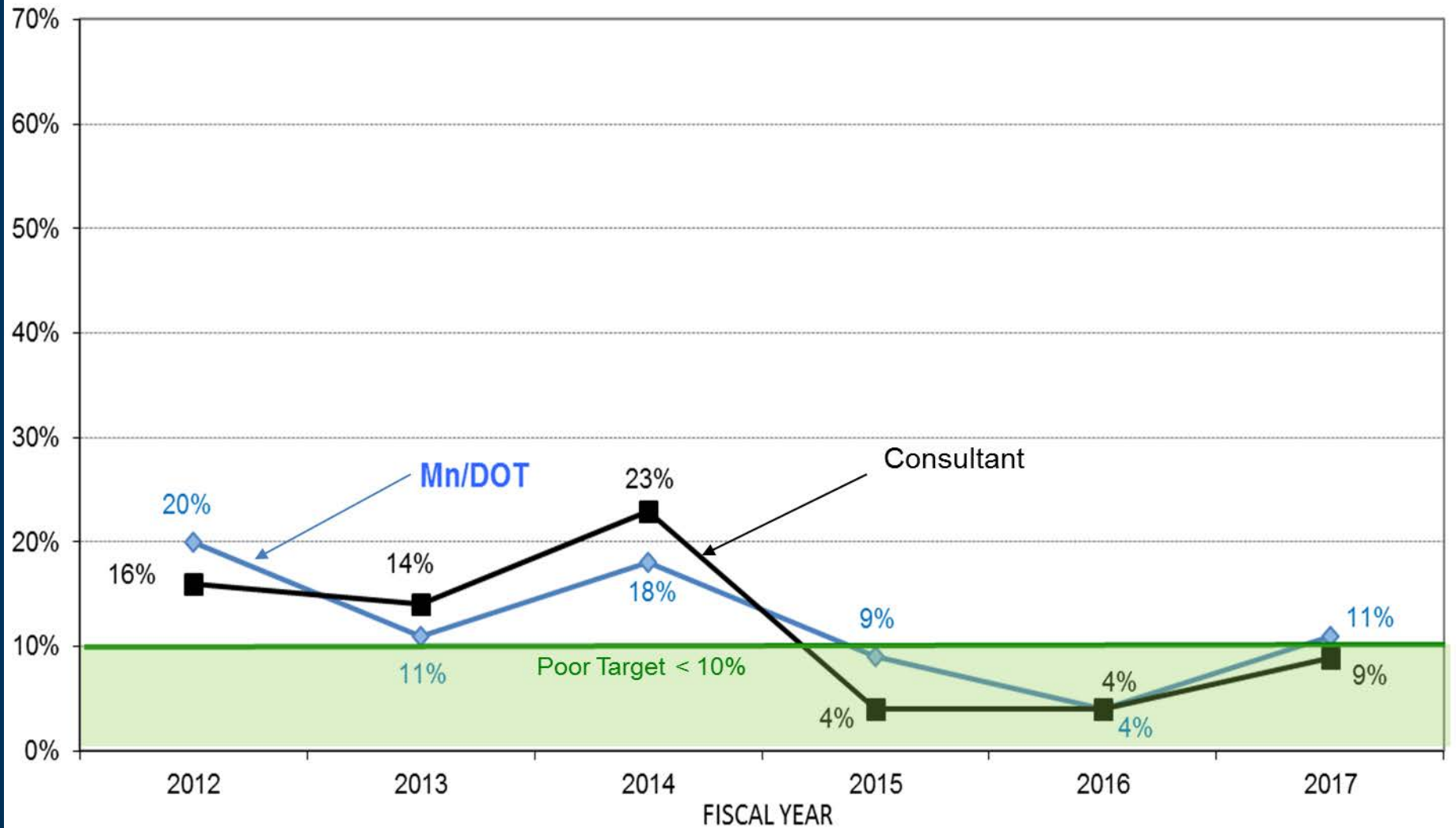
PROJECT QUALITY BIDABILITY RATINGS

% Rated Exceptional - Mn/DOT & Consultant



PROJECT QUALITY BIDABILITY RATINGS

% Rated Poor - Mn/DOT & Consultants



The Roadway Project Mapping Application (RPMA) references a frozen subset of LRS, which is the Highway Performance Monitoring System (HPMS) data that is sent to FHWA on an annual basis.

- RPMA should be used to determine the begin and end points of a project.
- RPMA should be used when segmentation of a project components is needed for the different federal fund types on a project as is required for federal authorization.
- The Logpoint Listing is using old, frozen TIS data (from 2014) and should no longer be used. If True Miles for the Logpoint listing continue to be used, there is the risk that you will be corrupting data, and project location data could be inaccurate.
- The Videolog is using old, frozen TIS data (from 2014) and should no longer be used. If True Miles for the Videolog continue to be used, there is the risk that you will be corrupting data, and project location data could be inaccurate.
- Any other documents, tools, etc. that reference old, frozen TIS data (from 2014) continue to be used, there is the risk that you will be corrupting data, and project location data could be inaccurate.

ROADWAY PROJECT MAPPING APPLICATION (RPMA)

The screenshot displays the Roadway Project Mapping Application (RPMA) interface. The top navigation bar includes the Minnesota Department of Transportation logo, the application title "Roadway Project Mapping Application HPMS Year 2016", and a search bar containing "bemidji". The left sidebar contains a "Layers" panel and a "Route Info Tool" section with instructions: "Click within 10 meters of a road." and a green "Tool Started" button. The main map area shows a network of roads in Bemidji, MN, with a specific road segment highlighted in green. A "Roadway Information" popup window is open, displaying the following details:

Roadway Information	
Route ID:	0200000000000002-D
Carto Mile:	112.497
Ref Post/Offset:	112+00.361
Street Name:	USTH 2
City:	No Data Found
County:	Beltrami
Const District:	2-BEMIDJI
Control Section:	0406
Bridge Number:	See label on map
Functional Class:	Principal Arterial - Other Freeways and Expressways
NHS Name:	Mainline NHS
Facility Type:	Non Inventory Direction
Fed Urban Code:	99998-Small Urban

The map also shows various road labels such as "R0205", "04030", "0406", "04007", "04006", "04005", "04518", "04512", "04520", "04019", "04522", "04012", "04016", "04018", "04017", "04026", "0408", "110", "119", "50", "46", "12", "14", "7", "9", "89", "93710", and "96196". A scale bar indicates 3km and 2mi. The Esri logo is visible in the bottom right corner.

HOW TO GET TO RPMA

- This can only be accessed internally.
- Go to “MnDOT A to Z”
- Go to “R”
- Go to “Roadway Data”
- Go to “Roadway Project Mapping Application (RPMA)”
- Go to “Launch Roadway Project Mapping Application”

DRAFT PIPE BEDDING PLAN PREP. GUIDANCE

5/1/18

Culvert and Storm Drain Bedding Plan Preparation

There has been confusion on plan preparation and payments associated with installing culvert and storm drain pipe. Bedding details should be included in the plan for all projects with culvert or storm drain pipe except where noted below. There are separate bedding details for rigid (concrete) and flexible (metal or plastic) pipe. Applicable bedding details are required for all pipe materials allowed as options in the plan.

Bedding is defined for the purposes of plan preparation as the bedding material under the pipe that provides a foundation, and the outer bedding which includes the material under the haunches and for flexible pipe materials surrounding the pipe. The strength of the pipe and its ability to carry the design load is dependent on the quality of the bedding installation.

Storm Drain Pipes

Construct, measure and pay per Specification 2503 PIPE SEWERS. Include Design Detail *Storm Drain Bedding for Rigid Pipe and Flexible Pipe*. There is no need to edit these bedding details.

Payment for bedding quantities should be computed and listed as separate bid items in the plan per 2451.5. Excavation and backfill do not need to be tabulated separately but are considered to be included in the cost of the storm drain pipe.

Culverts

Construct, measure and pay per Specification 2501 PIPE CULVERT. Where bedding is used include Design Details for all allowable pipe material types (rigid and/or flexible) in the plan. The Design Details are available for *Culvert Bedding for Flexible Pipe* and *Culvert Bedding for Rigid Pipe*. These include details for Treatment Types 1, 2 and 3, Standard Pipe Bedding, Construction Sequence and Notes.

Culverts with Treatments

Culverts with treatments are most likely to be centerline culverts in soils or areas prone to frost heave. This determination is based on the recommendation of the District Materials Engineer. Edit the details according to the District Materials Engineer's recommendation. Identify Treatment Type in the plan.

Payment for excavation, bedding and special backfill (such as select granular material) quantities should be computed and included in the Culvert Tabulation.

Culverts without Treatments

Culverts without treatments are used for some centerline culverts and side culverts for local roadways but do not typically apply to entrance culverts. Only the Pipe Bedding, Construction Sequence and Notes apply. Bedding details are not modified unless an alternative bedding design is used.

Payment for bedding quantities should be computed and listed in the Culvert Tabulation. Excavation and backfill are not tabulated separately and are included in the cost of the culvert pipe unless special backfill materials is required. When special backfill is required both excavation and backfill should be computed and included in the Culvert Tabulation.

Entrance Culverts

Entrance culverts are agricultural, residential or commercial entrances. Entrance culverts are typically installed using "Select Grading Material" as backfill without bedding unless shown in the plans per 2501.3.B. No detail is needed unless special bedding or special backfill is recommended by the District Materials Engineer.

If bedding is required include bedding design detail and tabulate bedding quantities in the plan. Use the rigid pipe bedding detail to compute bedding and embedment material if rigid pipe is one of the options. Otherwise use the flexible pipe bedding detail. Excavation and backfill are not tabulated separately but are considered to be included in the cost of the culvert pipe.

When plastic pipe is allowed as an option additional costs associated with using an alternative such as differences in deflection testing, embedment material specifications or quantities and installation requirements are included in the price of the pipe.

Use of Alternative Pipe Materials

Include pipe bedding details for all materials allowed as options in the plan. When alternative pipe options are identified in the plan and RC pipe is listed as the Pay item, the estimated bedding quantities should be based on the rigid pipe bedding detail. If the pipe Pay item is plastic or metal pipe estimated bedding quantities should be based on the flexible pipe bedding detail.

Any cost difference from using an alternative pipe material such as differences in installation requirements including, but not limited to, dewatering, trench width, embedment material and differences in quantities, are the responsibility of the contractor.

Locations limited to repairing existing pipe installations:

- When only resetting aprons fine aggregate bedding is optional.
- When extending pipe, replacing pipe segments or installing new appurtenances use new bedding recommendations listed above.

Site conditions may require modified bedding designs. Provide details, quantities and special provisions needed to bid, build and inspect modified bedding options such as:

- Flooded Compaction
- Coarse filter aggregate with Geotextile wrap

Plan should clearly identify locations, quantities and types of aggregate bedding.

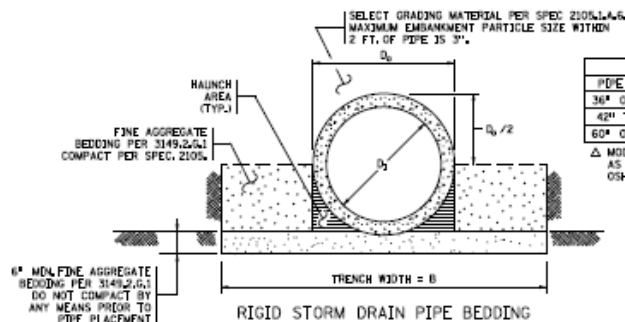
Plans for Future Updates

Use new bedding details in Plans let after October 31, 2018. Plans let prior to that can use old culvert and storm drain details if the plan quantities have already been estimated and changing the detail is not practical.

Culverts with treatments will remain as Design Details where the District Materials Engineer recommends treatment option and modifications for site conditions.

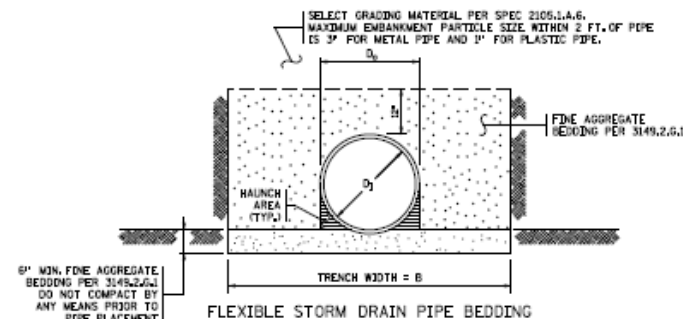
Pursuing option to add bedding details for storm drains and culverts without treatments to the standard plans instead of leaving as Design Details.

STORM DRAIN BEDDING DETAIL



PIPE DIA. D_1	TRENCH WIDTH B
36" OR LESS	$D_2 + 24"$
42" TO 54"	$1.5 \times D_2$
60" OR OVER	$D_2 + 36"$

Δ MODIFY TRENCH WIDTH & SLOPE AS NECESSARY TO COMPLY WITH OSHA REQUIREMENTS.



PIPE DIA. D_1	TRENCH WIDTH B
36" OR LESS	$D_2 + 24"$
42" TO 48"	$1.5 \times D_2$

Δ MODIFY TRENCH WIDTH & SLOPE AS NECESSARY TO COMPLY WITH OSHA REQUIREMENTS.

CONSTRUCTION SEQUENCE

1. LOOSELY PLACE 6" OF FINE AGGREGATE BEDDING MATERIAL TO GRADE. DO NOT COMPACT PRIOR TO PIPE PLACEMENT.
2. FOR PIPES WITH BELL, REMOVE MATERIAL IN BELL AREA PRIOR TO PLACEMENT.
3. FINISH AND INSTALL PIPE TO GRADE.
4. AFTER INSTALLATION OF PIPE, PLACE ADDITIONAL FINE AGGREGATE BEDDING AND COMPACT THE FULL LENGTH ON BOTH SIDES OF THE PIPE UNDERNEATH THE HAUNCH AREA BY FIRST SHOVEL SLIDING MANUALLY SHOVE THE BLADE END OF SHOVEL AT AN ANGLE DOWN THE ENTIRE LENGTH OF HAUNCH UNDER PIPE THEN COMPACT THE HAUNCH AT AN ANGLE USING A POWERED MECHANICAL OR PNEUMATIC DEVICE (I.E. POLE TAMPER, JUMPING JACK OR SIMILAR). COMPACT THE REMAINING MATERIAL OUTSIDE THE HAUNCH AREA TO THE REQUIREMENTS OF SPEC 2105, ENSURING THAT THE ENTIRE LENGTH OF PIPE IS SUPPORTED UNIFORMLY BY BEDDING.
5. PLACE AND COMPACT BACKFILL EVENLY AND SIMULTANEOUSLY IN 6" LIFTS ON EACH SIDE OF THE PIPE UP TO THE MID-HEIGHT WHEN COMPACTED.
6. COMPLETE REMAINING BACKFILL.

NOTES

EXCAVATE & CONSTRUCT ALL TRENCHES AND SLOPES PER OSHA REQUIREMENTS.
PIPE SIZE IS BASED ON THE NOMINAL INSIDE DIAMETER.
PROTECT ALL PIPE DURING CONSTRUCTION PER SPEC 2501 OR 2503.

CONSTRUCTION SEQUENCE

1. LOOSELY PLACE 6" OF FINE AGGREGATE BEDDING MATERIAL TO GRADE. DO NOT COMPACT PRIOR TO PIPE PLACEMENT.
2. FOR PIPES WITH BELL, REMOVE MATERIAL IN BELL AREA PRIOR TO PLACEMENT.
3. FINISH AND INSTALL PIPE TO GRADE.
4. AFTER INSTALLATION OF PIPE, PLACE ADDITIONAL FINE AGGREGATE BEDDING AND COMPACT THE FULL LENGTH ON BOTH SIDES OF THE PIPE UNDERNEATH THE HAUNCH AREA BY FIRST SHOVEL SLIDING MANUALLY SHOVE THE BLADE END OF SHOVEL AT AN ANGLE DOWN THE ENTIRE LENGTH OF HAUNCH UNDER PIPE THEN COMPACT THE HAUNCH AT AN ANGLE USING A POWERED MECHANICAL OR PNEUMATIC DEVICE (I.E. POLE TAMPER, JUMPING JACK OR SIMILAR). COMPACT THE REMAINING MATERIAL OUTSIDE THE HAUNCH AREA TO THE REQUIREMENTS OF SPEC 2105, ENSURING THAT THE ENTIRE LENGTH OF PIPE IS SUPPORTED UNIFORMLY BY BEDDING.
5. PLACE AND COMPACT BACKFILL EVENLY AND SIMULTANEOUSLY IN 6" LIFTS ON EACH SIDE OF THE PIPE UP TO 12" ABOVE THE PIPE WHEN COMPACTED.
6. COMPLETE REMAINING BACKFILL.

NOTES

EXCAVATE & CONSTRUCT ALL TRENCHES AND SLOPES PER OSHA REQUIREMENTS.
PIPE SIZE IS BASED ON THE NOMINAL INSIDE DIAMETER.
PROTECT ALL PIPE DURING CONSTRUCTION PER SPEC 2501 OR 2503.

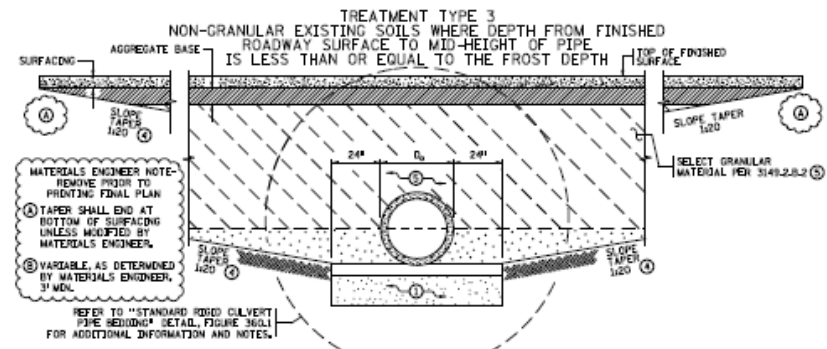
DESIGNED BY _____ LICENSE NO. _____ DATE _____

REFERENCE DATE
4-11-2017

STORM DRAIN BEDDING
FOR RIGID AND FLEXIBLE PIPE

STATE PROJ. NO. _____ (TH) _____ SHEET NO. _____ OF _____ SHEETS

FILE NAME: mutv_bedding



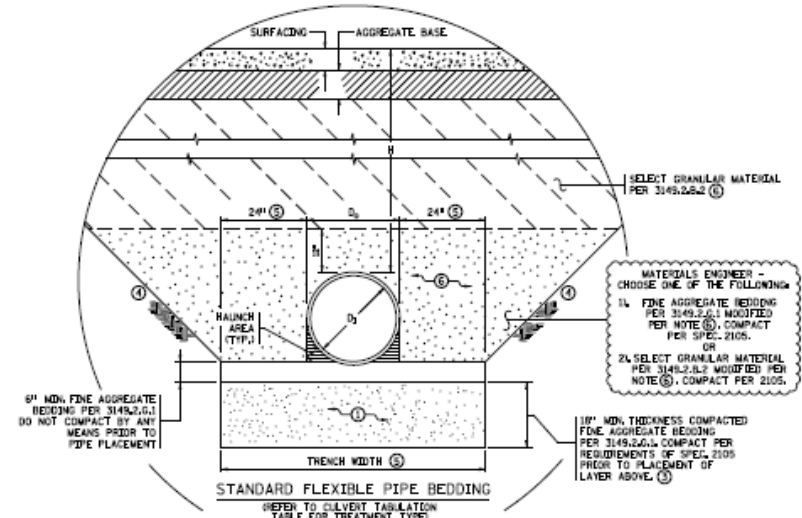
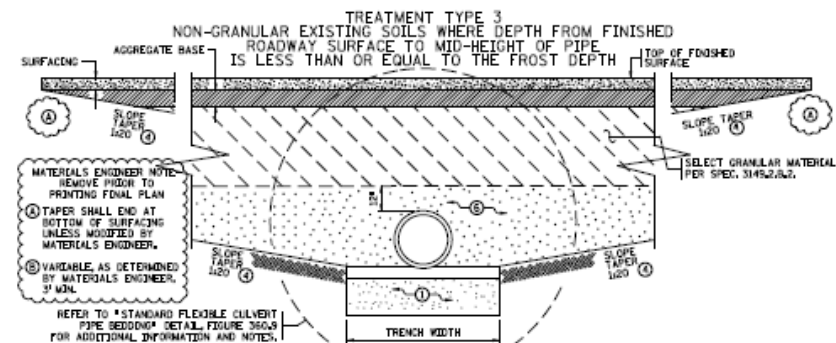
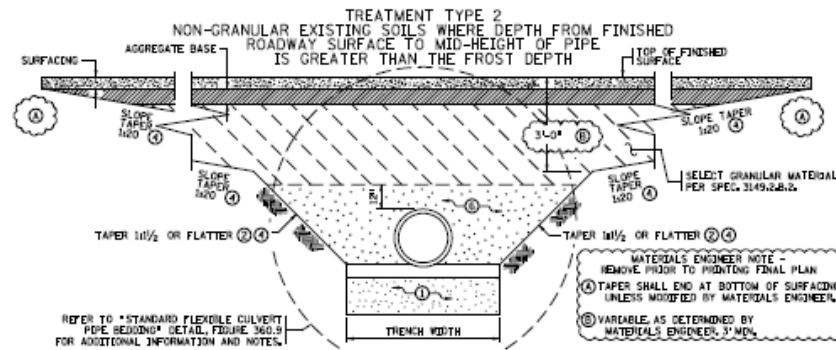
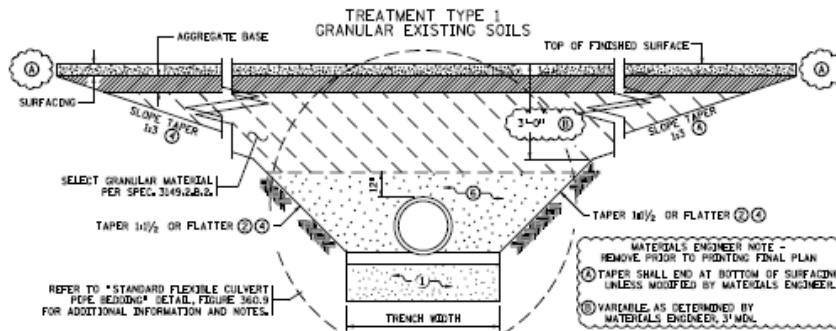
S

CULVERT BEDDING FLEXIBLE PIPE DETAIL

PLOTTED/REVISED
25-MAY-2017 03:57

DISTRICT 1, Design Standards
USER NAME: revision
PATH & FILENAME: J:\P\PA\340205\new_designing_Air_Ac.dgn

FILE NAME:
civl_designing_Air.dgn



CONSTRUCTION SEQUENCE

1. PLACE AND COMPACT 18" OF FINE AGGREGATE BEDDING TO THE REQUIREMENTS OF SPEC. 2105.
2. LOOSELY PLACE 6" OF FINE AGGREGATE BEDDING MATERIAL TO GRADE, DO NOT COMPACT PRIOR TO PIPE PLACEMENT.
3. FOR PIPES WITH BELL, REMOVE MATERIAL IN BELL AREA PRIOR TO PLACEMENT.
4. FURROW AND DETAIL PIPE TO GRADE.
5. AFTER PLACEMENT OF THE PIPE, PLACE ADDITIONAL BEDDING AND COMPACT THE FULL LENGTH ON BOTH SIDES OF THE PIPE UNDERNEATH THE RAUNCH AREA BY FIRST SHOVEL SLIDING MANUALLY SHOVE THE BLADE END OF A SHOVEL AT AN ANGLE DOWN THE ENTIRE LENGTH OF THE RAUNCH UNDER THE PIPE THEN COMPACT THE RAUNCH WITH A POWERED MECHANICAL OR PNEUMATIC DEVICE (E.G. POLE TAMPER, JUMPING JACK, OR SIMILAR) COMPACT THE REMAINING MATERIAL OUTSIDE THE RAUNCH AREA TO THE REQUIREMENTS OF THE APPLICABLE MATERIAL TYPE ENSURING THAT THE ENTIRE LENGTH OF PIPE IS SUPPORTED UNIFORMLY BY BEDDING.
6. PLACE AND COMPACT BACKFILL EVENLY AND SIMULTANEOUSLY IN 6" LIFTS ON EACH SIDE OF THE PIPE TO 12" ABOVE TOP OF PIPE WHEN COMPACTED.
7. COMPLETE REMAINING BACKFILL PER THE APPROPRIATE TREATMENT REQUIREMENTS.
8. PIPE INSTALLATION MAY REQUIRE THE USE OF RESTRAINTS, WEIGHTING OR OTHER APPROVED METHODS IN ORDER TO HELP MAINTAIN GRADE AND ALIGNMENT.

NOTES

- EXCAVATE & CONSTRUCT ALL TRENCHES AND SLOPES PER OSHA REQUIREMENTS.
ALL SLOPES SHOWN AS (H) (V) H:1
- PIPE SIZE IS BASED ON THE NOMINAL INSIDE DIAMETER.
- (1) IF APPROVED BY THE ENGINEER IN WET CONDITIONS THE CONTRACTOR MAY SUBSTITUTE 18" OF COARSE FILTER AGGREGATE PER 3145.2&2.2 COMPACTED TO THE QUALITY COMPACTED REQUIREMENTS OF SPEC. 2105. WRAP WITH GEOTEXTILE FABRIC TYPE JV PER SPEC. 3733. SEAM ALL FABRIC SIDES AND ENDS PER SPEC. TABLE 3733-1 INCLUDING FOOTNOTE (a) OR OVERLAP A MINIMUM OF 3 FT. ALL AT NO ADDITIONAL COST.
- (2) FOR FILL HEIGHTS 4" LESS THAN 3 FT., OMIT 1 1/2" TAPER.
- (3) FOR INSTALLATIONS ON EXISTING BEDDING, OMIT THIS LAYER.
- (4) OVER EXCAVATION DEPTH TAPERS IS NOT PERMITTED UNLESS REQUIRED BY OSHA (TYP.).
- (5) SEE TABLE 18.0 FOR THICKNESS REQUIREMENTS FOR THERMOPLASTIC PIPES WITH MORE THAN 10 FT. OF FILL OVER THE PIPE.
- (6) MAXIMUM ENHANCEMENT PARTICLE SIZE WITHIN 2 FT. OF PIPE IS 3" FOR METAL PIPES AND 1" FOR PLASTIC PIPES.
- (7) PROTECT ALL PIPE DURING CONSTRUCTION PER SPEC. 2501 OR 2503.
- (8) PLACE MULTIPLE PIPE CULVERTS WITH A MIN. CLEARANCE OF 24 INCHES OR GREATER BETWEEN STRINGS OF PIPE.
- DESIGNED NOTE: SLOPING AND BENCHING FOR EXCAVATIONS GREATER THAN 20 FT. DEEP SHALL BE DESIGNED BY A REGISTERED ENGINEER.

TERMOPLASTIC PIPE WITH FILL > 10 FT.

PIPE DIA.	TRENCH WIDTH (FEET)
12"	5'-0"
15"	5'-6"
18"	5'-8"
24"	6'-0"
30"	6'-6"
36"	7'-0"
42"	7'-6"
48"	8'-0"

LEGEND

- 18" = NOMINAL INSIDE DIAMETER OR SPAN OF PIPE
 24" = OUTSIDE DIAMETER OF ROUND PIPE, OR OUTSIDE SPAN OF PIPE-ARCH
 H = FILL COVER HEIGHT OVER PIPE (FEET)
 UNDISTURBED SOIL

NOTES INSIDE BUBBLE ARE DESIGNER NOTES, MODIFY OR REMOVE BEFORE PRINTING FINAL PLAN.

CULVERT BEDDING
FOR FLEXIBLE PIPE

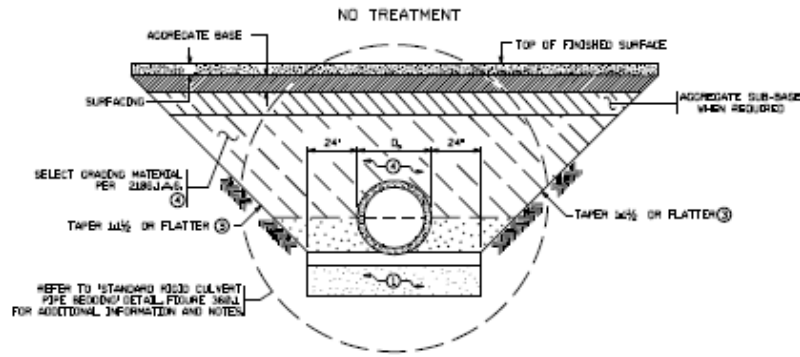
CERTIFIED BY: _____ LICENSE NO. _____ DATE _____
LICENSED PROFESSIONAL ENGINEER

REFERENCE DATE
4-11-2017

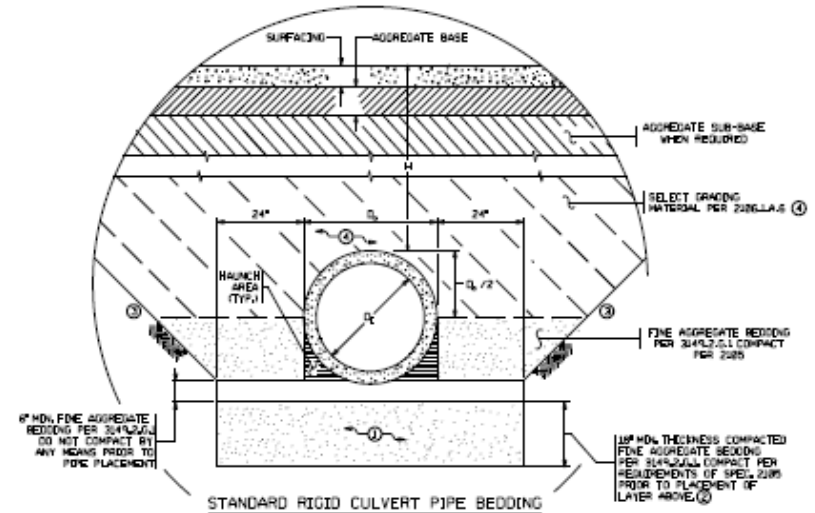
STATE PROJ. NO. (TH) SHEET NO. OF SHEETS

CULVERT BEDDING RIGID PIPE – NO TREATMENT DETAIL

PROJECT/REVISED
#000000000000



REFER TO STANDARD RIGID CULVERT PIPE BEDDING DETAIL FIGURE 300.1 FOR ADDITIONAL INFORMATION AND NOTES



CONSTRUCTION SEQUENCE

1. PLACE AND COMPACT UP TO 12\"/>

NOTES

EXCAVATE & CONSTRUCT ALL TRENCHES AND SLOPES PER OSHA REQUIREMENTS.

ALL SLOPES SHOWN AS 3:1 MIN.

PIPE SIZE IS BASED ON THE NOMINAL INSIDE DIAMETER.

IF APPROVED BY THE ENGINEER IN WET CONDITIONS THE CONTRACTOR MAY SUBSTITUTE UP TO 12\"/>

FOR INSTALLATIONS ON INTACT BEDROCK, OMIT THIS LAYER.

OVER EXCAVATION BENEATH TRENCH IS NOT PERMITTED UNLESS REQUIRED BY OSHA (TYPE J).

MAXIMUM EMBANKMENT PARTICLE SIZE WITHIN 2 FT. OF PIPE IS 3\"/>

PROTECT ALL PIPE DURING CONSTRUCTION PER SPEC. 250.0 OR 250.3.

PLACE MULTIPLE PIPE CULVERTS WITH A MIN. CLEARANCE OF 24 INCHES OR GREATER BETWEEN STRONGS OF PIPE.

DESIGNER NOTE: SLOPES AND BEDDING FOR EXCAVATIONS GREATER THAN 30 FT. DEEP SHALL BE DESIGNED BY A REGISTERED GEOTECHNICAL ENGINEER.

LEGEND

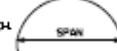
D_i = NOMINAL INSIDE DIAMETER OR SPAN OF PIPE

D_o = OUTSIDE DIAMETER OF ROUND PIPE OR OUTSIDE SPAN OF PIPE-ARCH

H = FULL COVER HEIGHT OVER PIPE (FEET)

UNDISTURBED SOIL

NOTE: DOUBLE BUBBLE HAS DESIGNER NOTES, MODIFY OR REMOVE BEFORE PRINTING FINAL PLAN.



CULVERT BEDDING
FOR RIGID PIPE

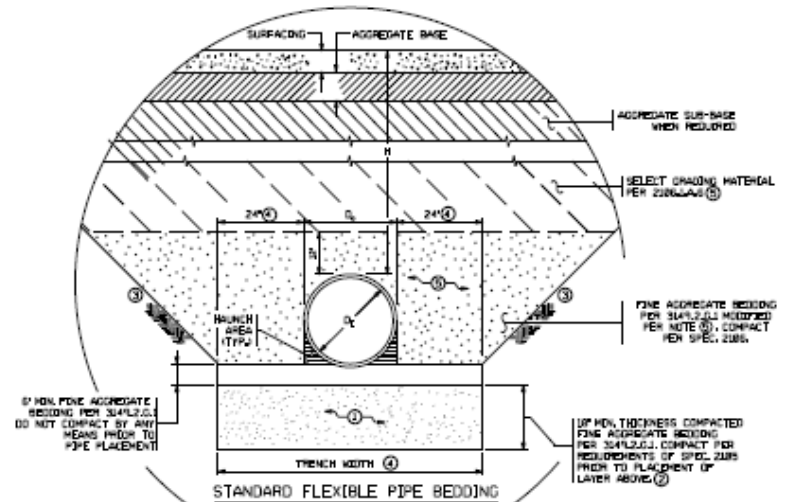
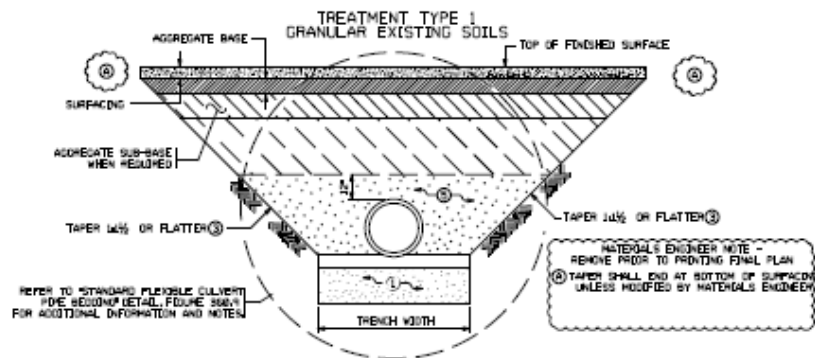
CERTIFIED BY _____ LICENSE NO. _____ DATE _____

REVISION DATE
4-12-2007

STATE PROJ. NO.

(TH) SHEET NO. OF

SHEETS



CONSTRUCTION SEQUENCE

1. PLACE AND COMPACT JSP OF FINE AGGREGATE BEDDING TO THE REQUIREMENTS OF SPEC 2005.
2. LOOSELY PLACE JSP OF FINE AGGREGATE BEDDING MATERIAL TO GRADE, DO NOT COMPACT PRIOR TO PIPE PLACEMENT.
3. FOR PIPES WITH BELL, REMOVE MATERIAL IN BELL AREA PRIOR TO PLACEMENT.
4. REMOVE AND INSTALL PIPE TO GRADE.
5. AFTER PLACEMENT OF THE PIPE, PLACE ADDITIONAL BEDDING AND COMPACT THE FULL LENGTH ON BOTH SIDES OF THE PIPE UNDERNEATH THE HAUNCH AREA FOR FIRST SHOULDER. SLIDING MANUALLY SHAKE THE HAUNCH END OF A SHOVEL AT AN ANGLE DOWN THE ENTIRE LENGTH OF THE HAUNCH AFTER THE PIPE IS PLACED. THE SHOVEL SHOULD BE PLACED AT THE HAUNCH END OF THE PIPE AND THE SHOVEL SHOULD BE TURNED, JUMPING JACK OF SHOULDER, COMPACT THE REMAINING MATERIAL OUTSIDE THE HAUNCH AREA TO THE REQUIREMENTS OF THE APPLICABLE MATERIAL TYPE ENSURING THAT THE ENTIRE LENGTH OF PIPE IS SUPPORTED UNIFORMLY BY BEDDING.
6. PLACE AND COMPACT BACKFILL EVENLY AND SIMULTANEOUSLY ON BOTH SIDES OF THE PIPE TO 12" ABOVE TOP OF PIPE WHEN COMPLETED.
7. COMPLETE REMAINING BACKFILL PER THE APPROPRIATE TREATMENT REQUIREMENTS.
8. PIPE INSTALLATION MAY REQUIRE THE USE OF RESTRAINTS, WEIGHTING OR OTHER APPROVED METHODS IN ORDER TO HELP MAINTAIN

NOTES

EXCAVATE & CONSTRUCT ALL TRENCHES AND SLOPES PER OSHA REQUIREMENTS.
ALL SLOPES SHOWN AS (V) (H)

PDE SIZE IS BASED ON THE NOMINAL INSIDE DIAMETER.

- ④ APPROVED BY THE ENGINEER IN WET CONDITIONS THE CONTRACTOR MAY SUBSTITUTE UP OF COARSE FILTER AGGREGATE PER 344.2.4 COMPACTED TO THE QUALITY COMPACTION REQUIREMENTS OF SPEC. 2005. WAP WITH GEOTEXTILE FABRIC TYPE 3V PER SPEC. 3753.584M ALL FABRIC SEAMS AND ENDS PER SPEC. TABLE 3753-3 INCLUDING FOOTNOTE (a) OR OVERLAP A MINIMUM OF 3 FT. ALL AT NO ADDITIONAL COST.

- ② FOR INSTALLATIONS ON INTACT BEDROCK, OMIT THIS LAYER.

- ③ OVER EXCAVATION BENEATH TAPERS IS NOT PERMITTED UNLESS REQUIRED BY OSHA (TYP.)

- ④ SEE TABLE BELOW FOR TRENCH WIDTHS FOR THERMOPLASTIC PIPES WITH MORE THAN 48 IN. OF FILL OVER THE PIPE.

- ⑤ MAXIMUM DRAINAGE PARTICLE SIZE WITHIN 2 FT. OF PDE IS 3" FOR METAL PDES AND 2" FOR PLASTIC PDES.

- PROTECT ALL PIPE DURING CONSTRUCTION PER SPEC. 2582 OR 2583

PLACE MULTIPLE PDE CULVERTS WITH A MIN. CLEARANCE OF 24 INCHES OR GREATER BETWEEN STRONGS OF PDE.

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### DESIGNER NOTE

SLOPING AND BENCHING FOR EXCAVATIONS GREATER THAN 20 FT. DEEP SHALL BE DESIGNED BY A REGISTERED ENGINEER.

THERMOPLASTIC FIBRE  
 2000-2001

| Pipe (O.D.) | Trench Width (Feet) |
|-------------|---------------------|
| 12"         | 5'-2"               |
| 15"         | 5'-6"               |
| 18"         | 5'-7"               |
| 24"         | 6'-6"               |
| 30"         | 8'-6"               |
| 36"         | 9'-6"               |
| 42"         | 11'-0"              |
| 48"         | 12'-6"              |

-LEGEND-

$D_r$  = NOMINAL INSIDE DIAMETER OR SPAN OF PIPE

D<sub>o</sub> = OUTSIDE COAMETER OF ROUND PIPE, OR OUTSIDE SPAN OF PIPE-ARCH.

H = FULL COVER HEIGHT OVER POLE (FEET)

~~XXXXXXXXXX~~ = UNDISTURBED SOIL



NOTES INSIDE BUBBLE ARE DESIGNER NOTES. MODIFY OR REMOVE BEFORE PRINTING FINAL PLAN.

CULVERT BEDDING  
FOR FLEXIBLE PIPE

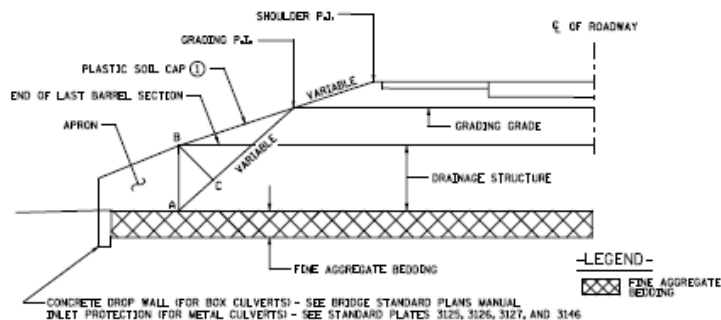
DESIGNED BY \_\_\_\_\_ LICENSE NO. \_\_\_\_\_ DATE \_\_\_\_\_  
 LICENSED PROFESSIONAL ENGINEER

REFERENCE DATE  
4-11-2017

STATE PROJ. NO. (TH ) SHEET NO. OF SHEETS

# BOX CULVERT BEDDING DETAIL

PLOTTED/REVISED  
25-MAY-2017 JDS



## LEGEND

FINE AGGREGATE BEDDING

- ① PLASTIC SOIL CAP CONSIST OF 50% MIN. PASSING THE NO. 200 SIEVE AND 20% MIN. CLAY SIZE PARTICLES
- OR
- PLASTIC SOIL CAP CONSIST OF SOILS IDENTIFIED BY PRESSING A MOIST SAMPLE BETWEEN THE THUMB AND INDEX FINGER TO FORM A THIN RIBBON UNTIL IT BREAKS UNDER ITS OWN WEIGHT IN A HORIZONTAL POSITION, THE MINIMUM LENGTH OF RIBBON IS 1 INCH.

MATERIALS ENGINEER NOTE - SELECT ONE MATERIAL TYPE AND REMOVE THE OTHER MATERIAL TYPE PRIOR TO PRINTING THE FINAL PLAN

## NOTES

THE TREATMENT WILL BE RECOMMENDED BY THE DISTRICT MATERIALS/SOILS ENGINEER.

WIDTH OF PLASTIC SOIL CAP:

- A) FOR PLASTIC SOIL EMBANKMENT - FULL WIDTH OF THE GRANULAR TREATMENT PLUS 2' ON EACH END.
- B) FOR GRANULAR SOIL EMBANKMENT - A MINIMUM OF ONE DIAMETER OR WIDTH OF STRUCTURE ON EITHER SIDE OF THE STRUCTURE.

THE TREATMENT IS NORMALLY REQUIRED ON THE INLET END.

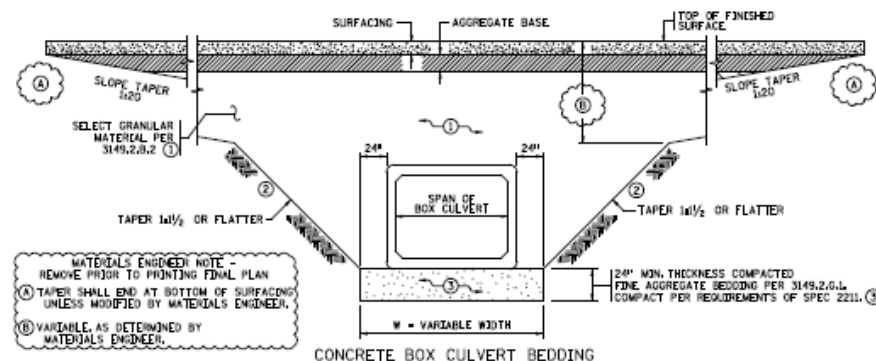
THE THICKNESS OF THE PLASTIC SOILS CAP (B-C) IS 3" MINIMUM AND 6" MAXIMUM.

A) FILL HEIGHTS LESS THAN 15':

- NORMALLY EXTEND THE LINE THRU (A-C) TO GRADING P.I. HOWEVER, IF THIS RESULTS IN A THICKNESS (B-C) GREATER THAN 6", REDUCE B-C TO 6" OR LESS AND INTERSECTION THE FILL SLOPE RATHER THAN THE P.I..

B) FILL HEIGHTS GREATER THAN 15':

- THE LINE THRU A-C NEED NOT INTERSECT THE GRADING P.I. INSTEAD INTERSECT THE FILL SLOPE AT A POINT NOT LESS THAN 5' ABOVE THE STRUCTURE MAINTAINING AT LEAST A MINIMUM THICKNESS (B-C) OF 3'.



## NOTES

EXCAVATE & CONSTRUCT ALL TRENCHES AND SLOPES PER OSHA REQUIREMENTS.

ALL SLOPES SHOWN AS 1:1 H:V

① MAXIMUM EMBANKMENT PARTICLE SIZE WITHIN 2 FT. OF CULVERT IS 3" PER SPEC. TABLE 2105-4

② OVER EXCAVATION BENEATH TAPERS IS NOT PERMITTED UNLESS REQUIRED BY OSHA, TYP.

③ IF APPROVED BY THE ENGINEER IN WET CONDITIONS THE CONTRACTOR MAY SUBSTITUTE 18" OF COARSE FILTER AGGREGATE PER SPEC. TABLE 2211.5.2.2.2. WRAP WITH GEOTEXTILE FABRIC TYPE IV PER SPEC 3733. SEAM ALL FABRIC SIDES AND ENDS PER SPEC TABLE 3733-1 INCLUDING FOOTNOTE (a) OR OVERLAP A MINIMUM OF 3 FT. ALL AT NO ADDITIONAL COST.

## DESIGNER'S NOTE

SLOPING AND BENCHING FOR EXCAVATIONS GREATER THAN 20 FT. DEEP SHALL BE DESIGNED BY A REGISTERED ENGINEER.

## CONCRETE BOX CULVERT BEDDING

DISTRICT \* Design Standards  
USER NAME: revision  
PATH & FILENAME: D:\PMP\2017\2017-05-25\Box\_Culvert\_Bedding.dgn  
FILE NAME: BOX\_CULVERT\_BEDDING.dgn

CERTIFIED BY: \_\_\_\_\_ LICENSE NO. \_\_\_\_\_ DATE: \_\_\_\_\_  
LICENSED PROFESSIONAL ENGINEER

REFERENCE DATE  
4-11-2017

## BOX CULVERT BEDDING AND PLASTIC SOIL CAP

STATE PROJ. NO. (TH) SHEET NO. OF SHEETS



# 100% STATE FUNDS

- When only state funds do not note this in the SEQ and tabulations.
- When both federal and state funds then DO show it in the SEQ and tabulations.



# QUESTIONS????

Any questions contact us ANYTIME:

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**Jane Krebsbach @ 651-366-3183**  
**[jane.krebsbach@state.mn.us](mailto:jane.krebsbach@state.mn.us)**