PROJECT DESIGN SERVICES (PLAN REVIEW)

Tim Swanson, Project Design Services Engineer

05-24-18

DEPARTMENT OF TRANSPORTATION

http://ihub/projectdelivery/design/index.html

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.

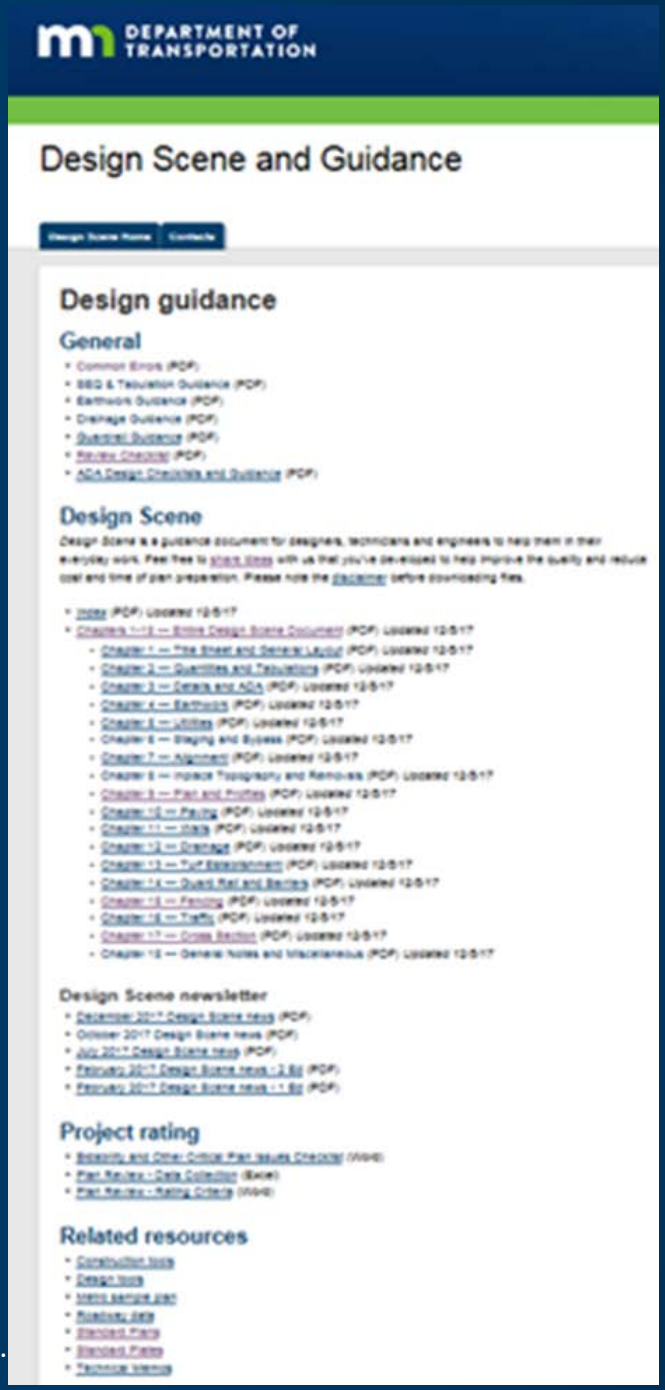
- Members of the Design Advisory Committee (DAC)
- Members of Metro's Sample Plan Committee
- Member of Signatures on Construction Plans at MnDOT Committee
- Technical resource group for functional areas (e.g. Materials, Traffic, Water Resources, Site Development, etc.)
- Review ALL standards and documents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

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

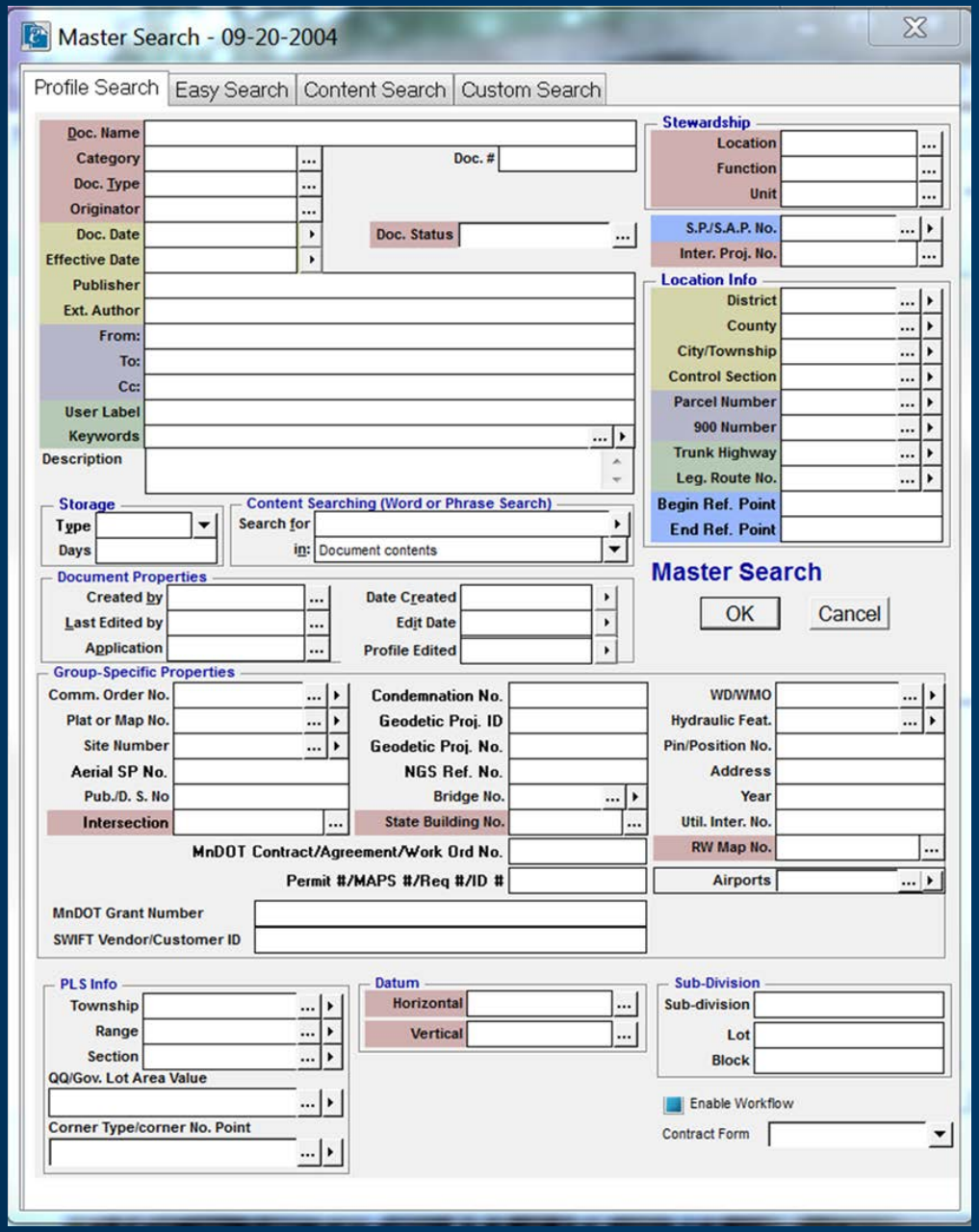
- Review Title Sheets
- Review preliminary plans
- Funding
- Give advise on pay items – both new and existing
- How to use and pay for standards, plates, and design details
- Design guidance presentations

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



http://ihub/projectdelivery/design/index.

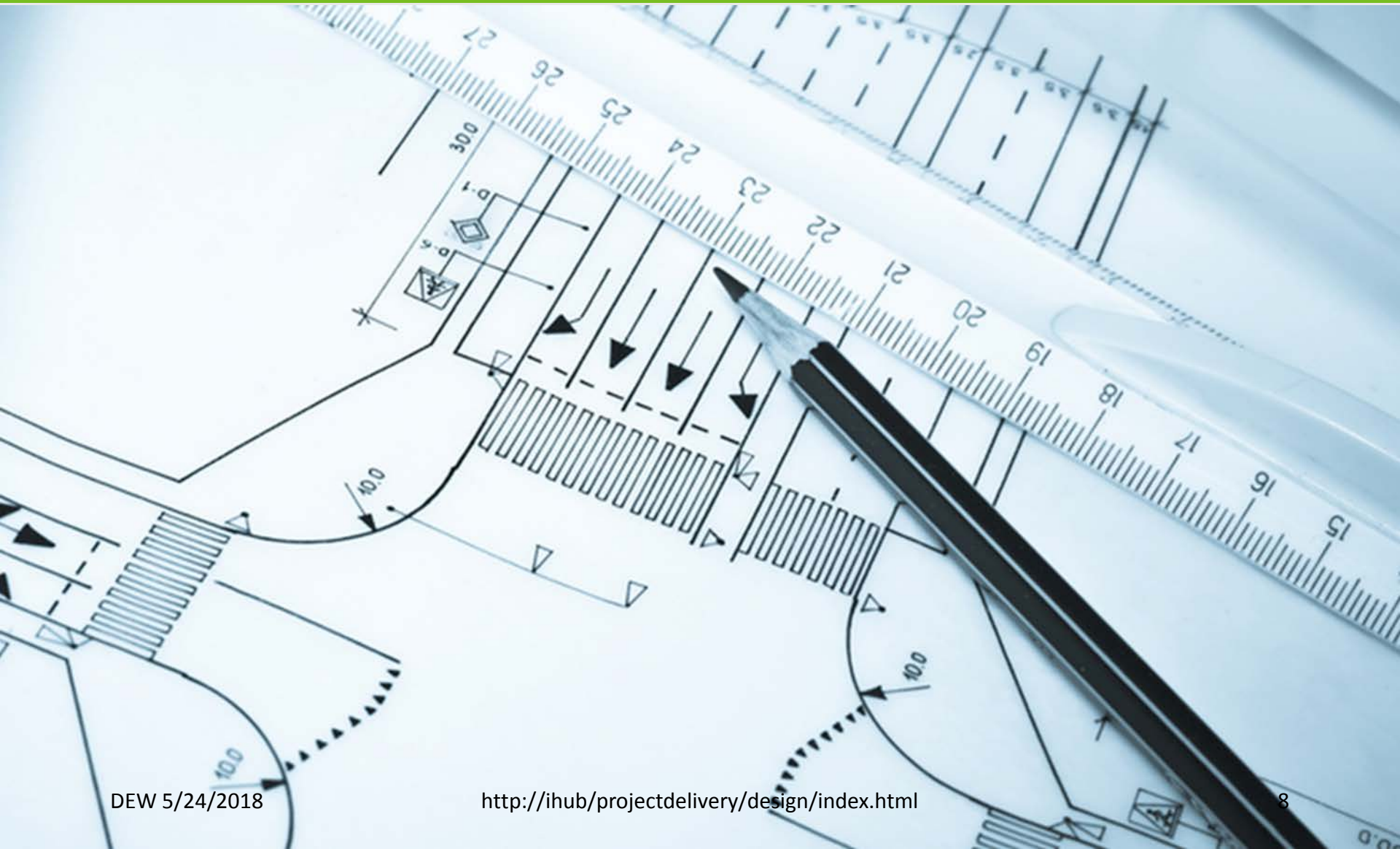


Assist with research of archived construction plans.

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



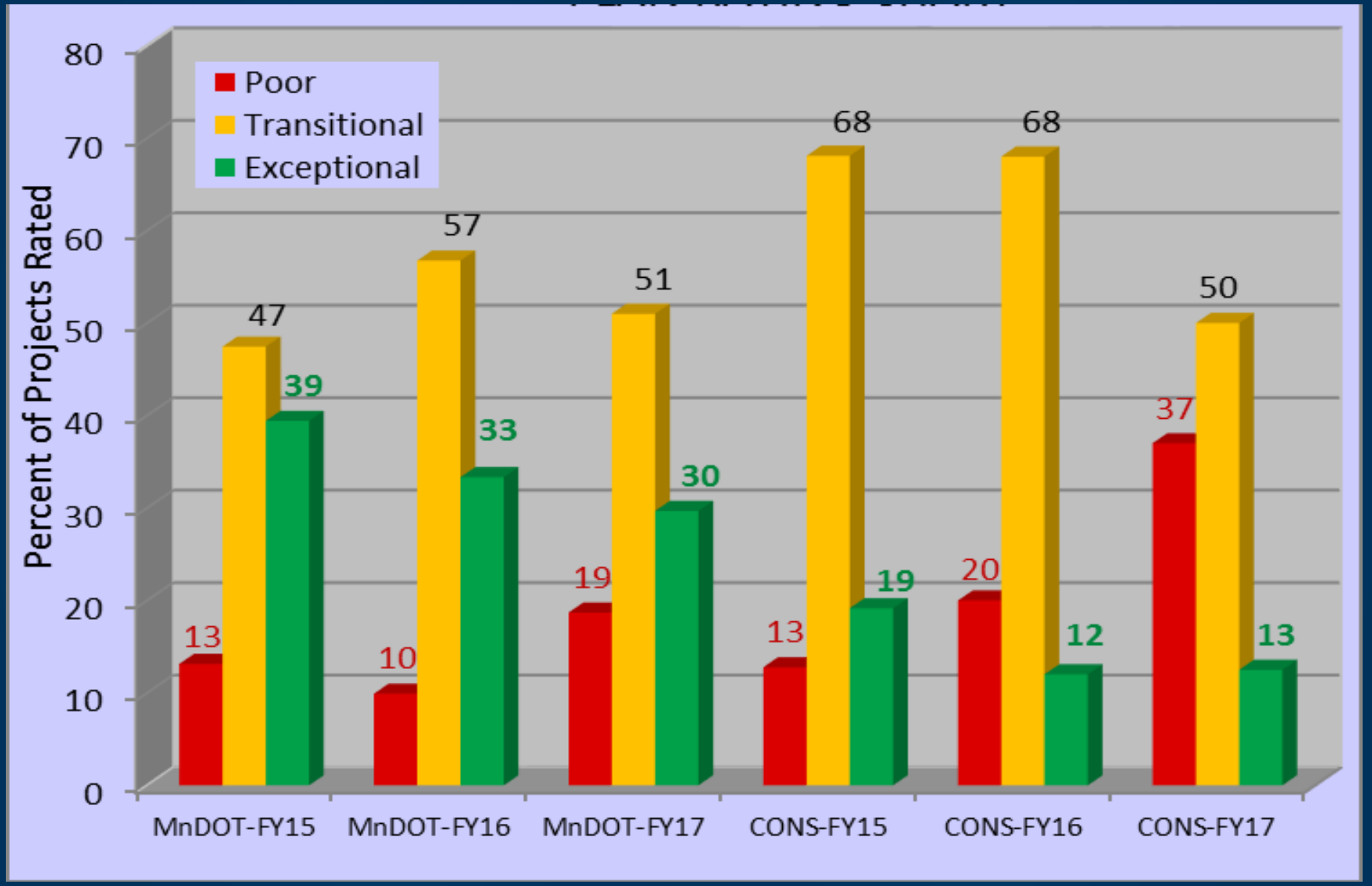
NUMBER OF PROJECTS RATED FOR THE PAST THREE FISCAL YEARS.

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

PLAN RATING CRITERIA

	POOR	TRANSITIONAL	EXCEPTIONAL
➢ 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

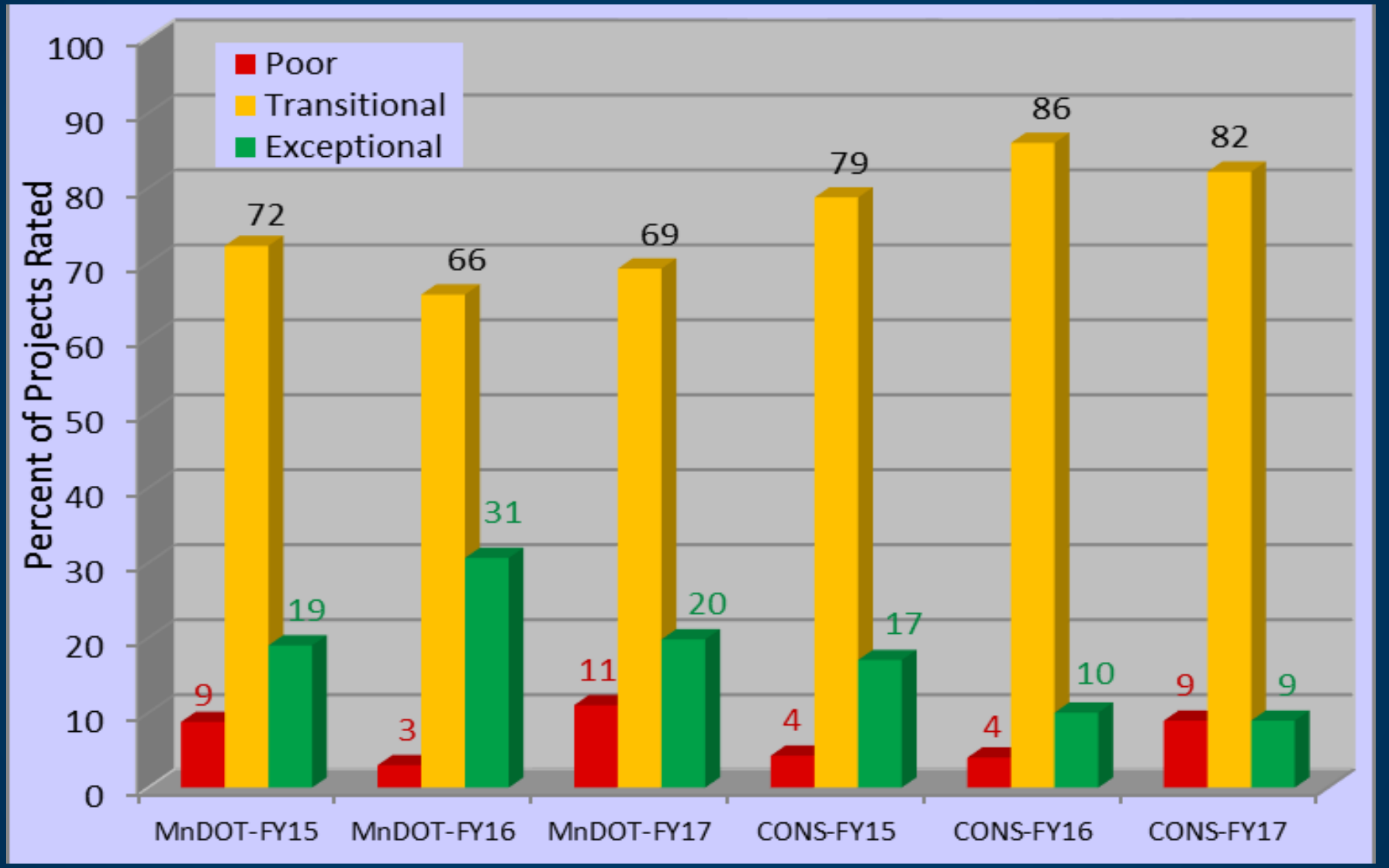


PROJECT RATING CRITERIA

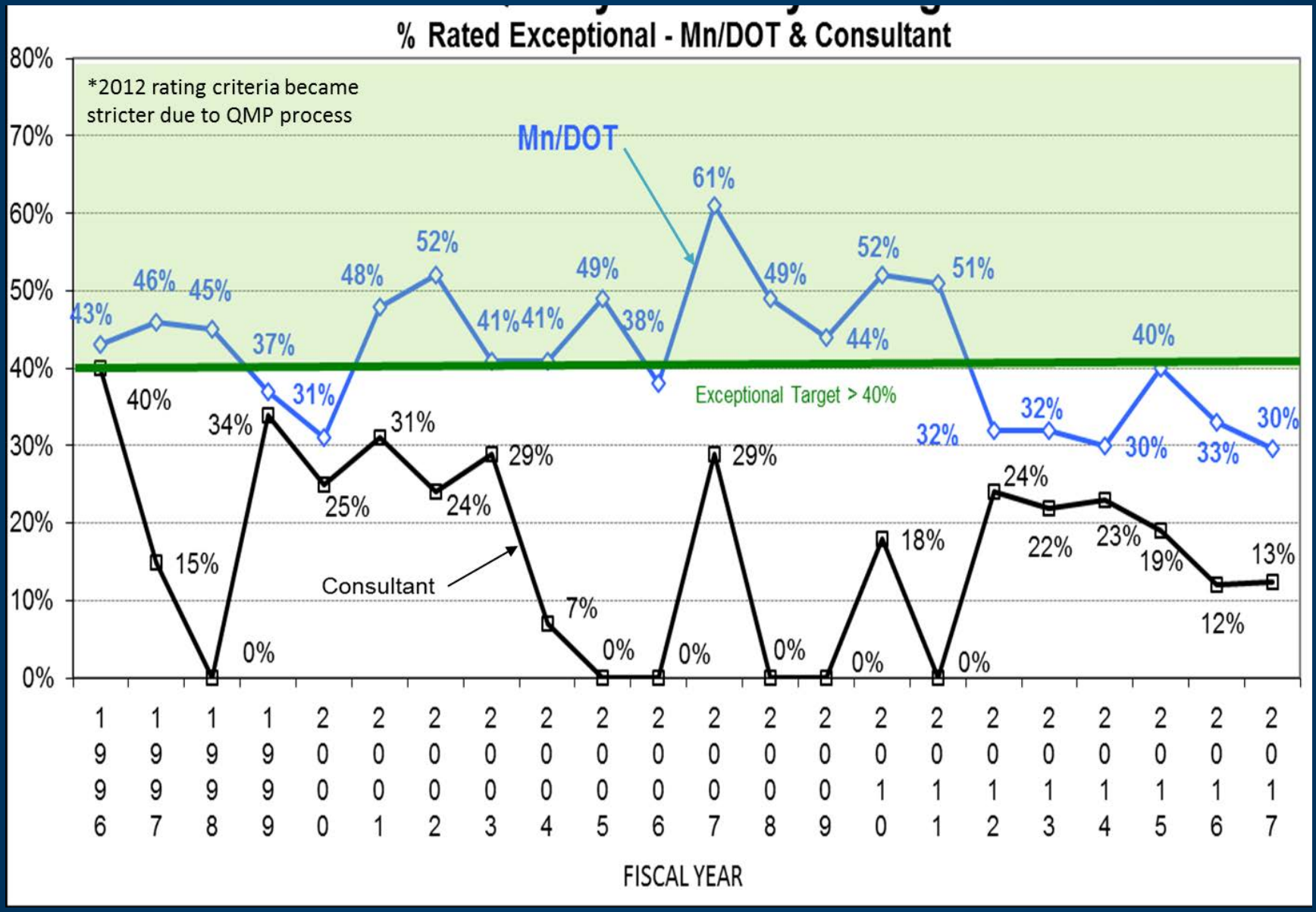
	POOR	TRANSITIONAL	EXCEPTIONAL
➢ QM/QC COMPLETE	NO FORM OR INCOMPLETE	NA	COMPLETELY SIGNED
➢ LETTING DATE MOVE REASON	DISTRICT REASON	NA	NON-DISTRICT REASON
➢ TIME & TRAFFIC SUBMITTAL	< 9 WEEKS (< 12 WEEKS)	NA (PS&E/COMPLEX)	≥ 9 WEEKS (≥12 WEEKS)
➢ SPECIAL PROV SUBMITTAL	< 9 WEEKS (< 12 WEEKS)	NA (PS&E/COMPLEX)	≥ 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)

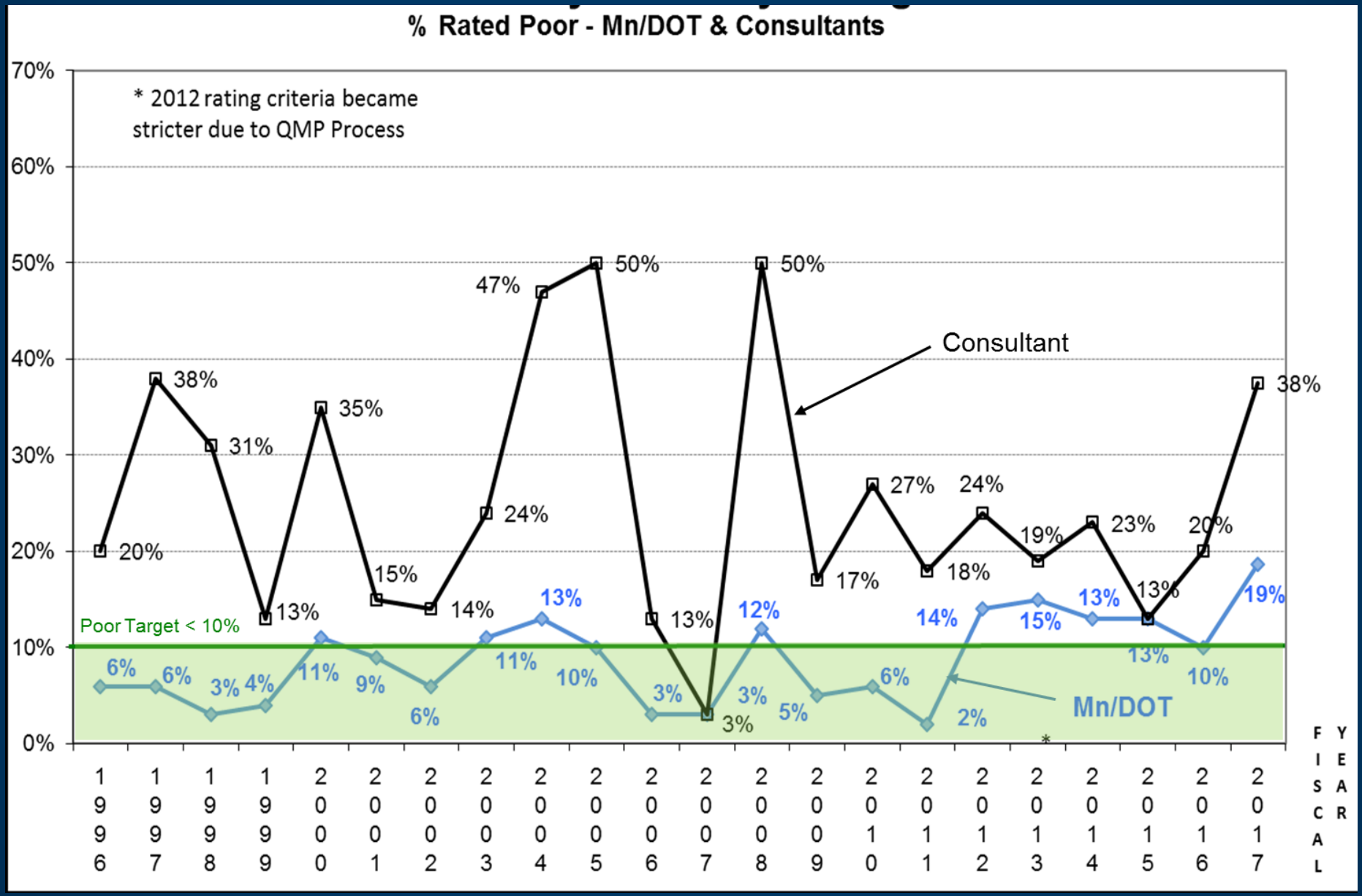
PROJECT RATING CHART



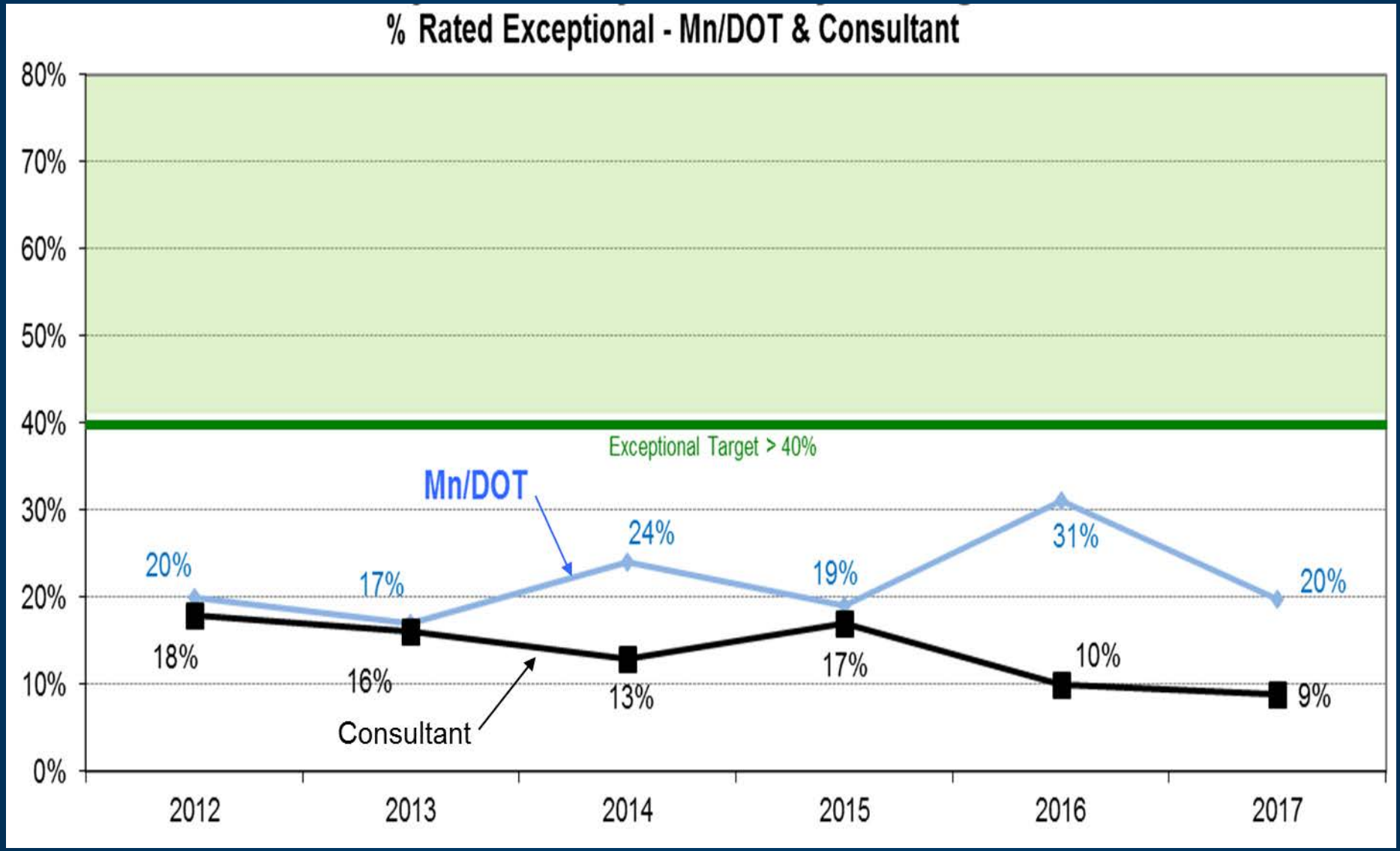
PLAN QUALITY BIDABILITY RATINGS



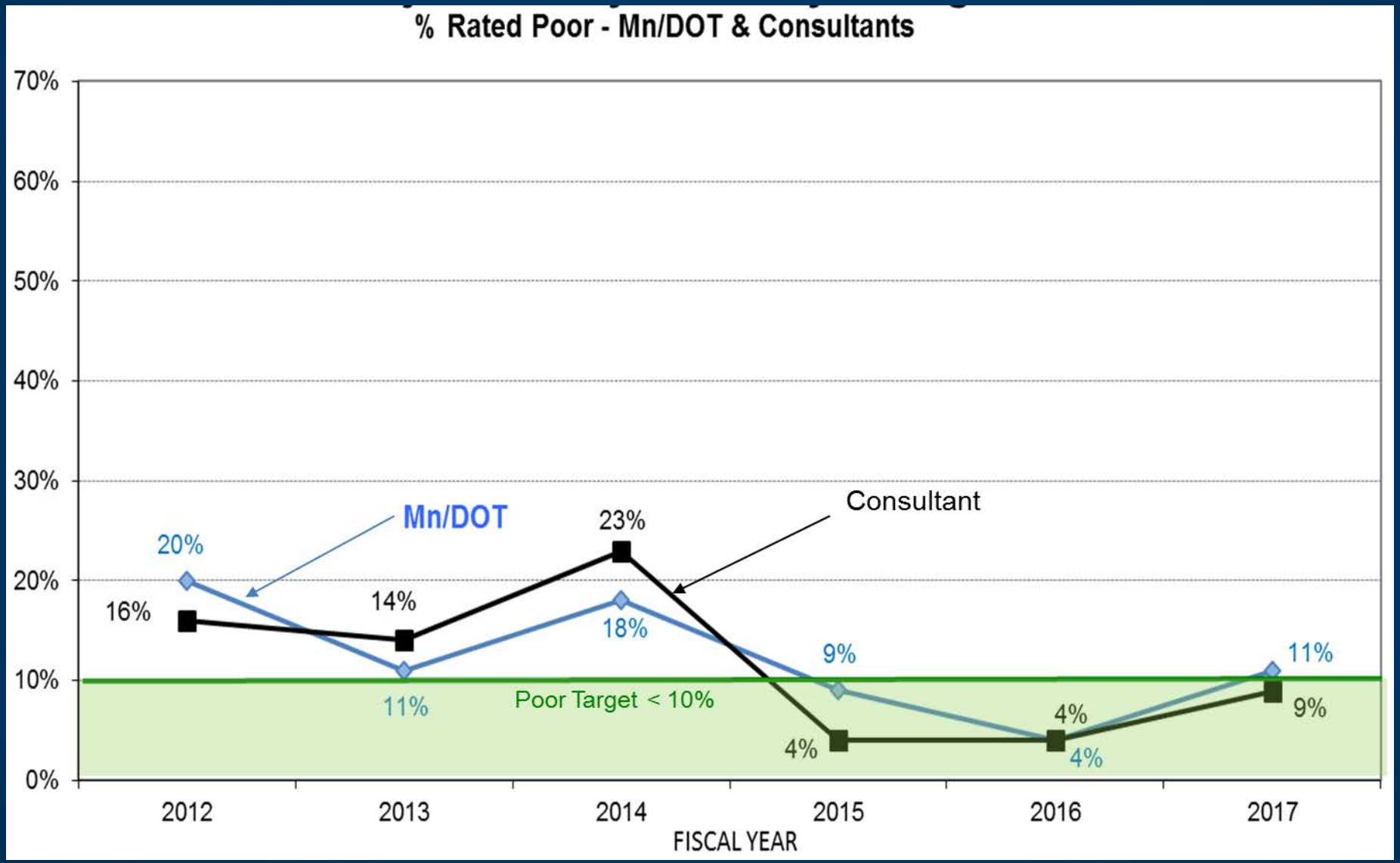
PLAN QUALITY BIDABILITY RATINGS



PROJECT QUALITY BIDABILITY RATINGS



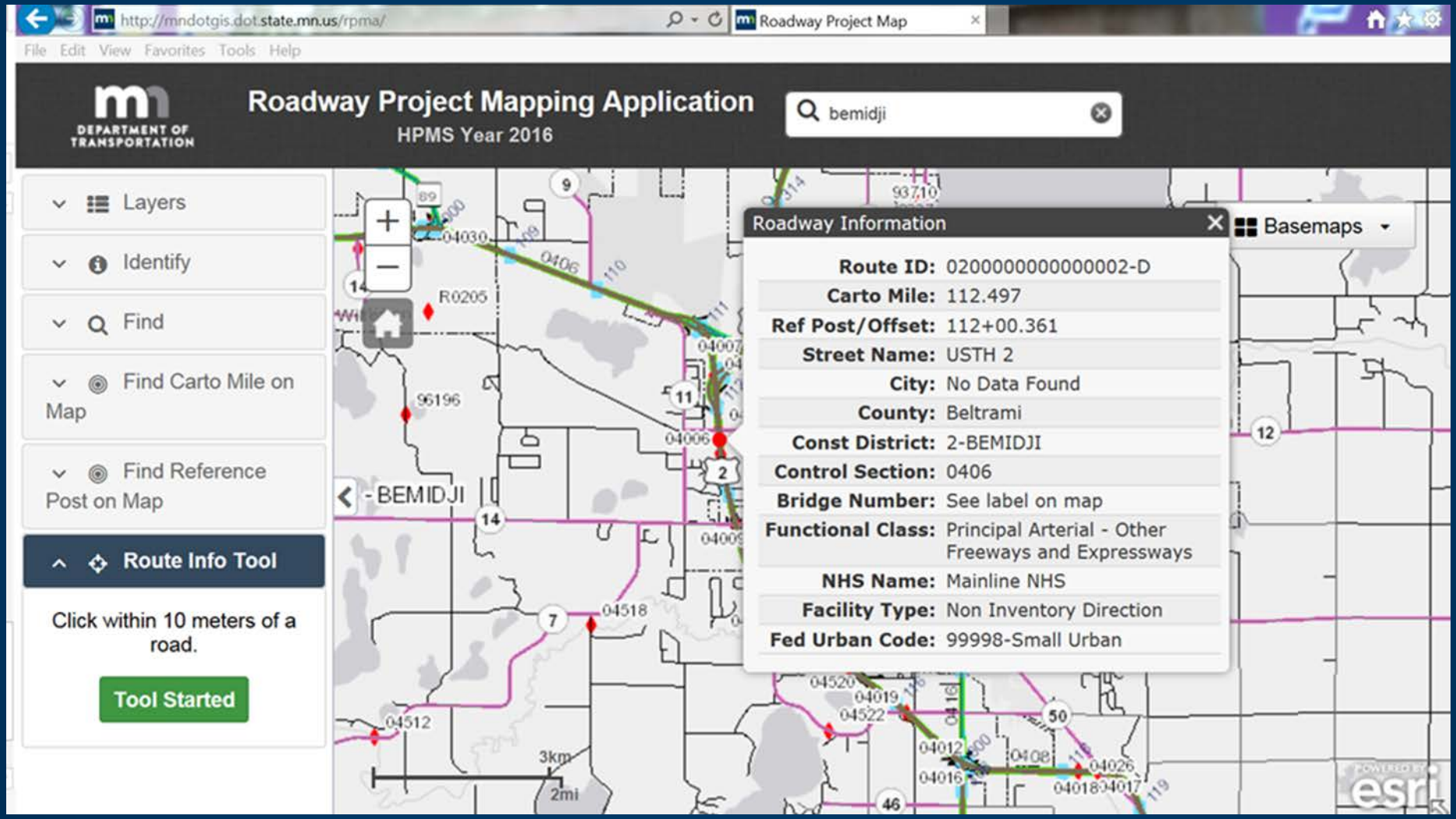
PROJECT QUALITY BIDABILITY RATINGS



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)



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.

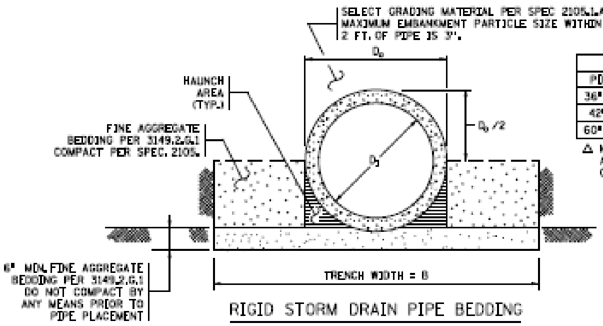
Plans for Future Updates

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



RIGID STORM DRAIN PIPE BEDDING

TRENCH BASE WIDTH △	
PIPE DIA. D_I	TRENCH WIDTH B
36" OR LESS	D_o + 24"
42" TO 54"	1.5 × D_o
60" OR OVER	D_o + 36"

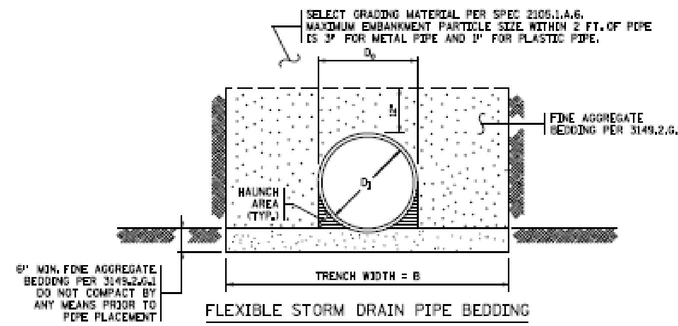
△ MODIFY TRENCH WIDTH & SLOPE AS NECESSARY TO COMPLY WITH OSHA REQUIREMENTS.

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 SLICING (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.



FLEXIBLE STORM DRAIN PIPE BEDDING

TRENCH BASE WIDTH △	
PIPE DIA. D_I	TRENCH WIDTH B
36" OR LESS	D_o + 24"
42" TO 48"	1.5 × D_o

△ 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. FURNISH 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 SLICING (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.

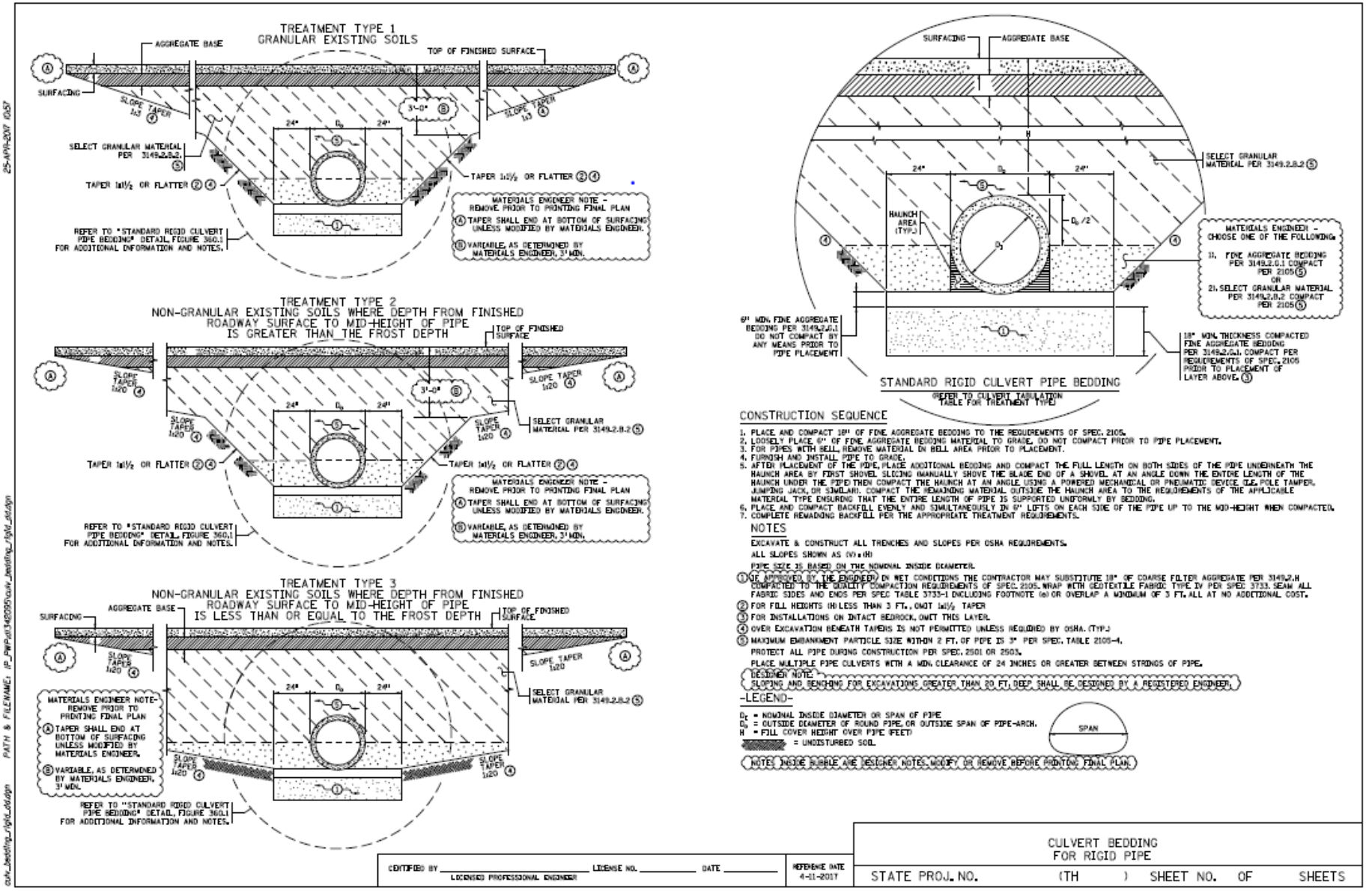
CERTIFIED BY ______ LICENSED PROFESSIONAL ENGINEER LICENSE NO. ______ DATE ______

REFERENCE DATE 4-11-2017

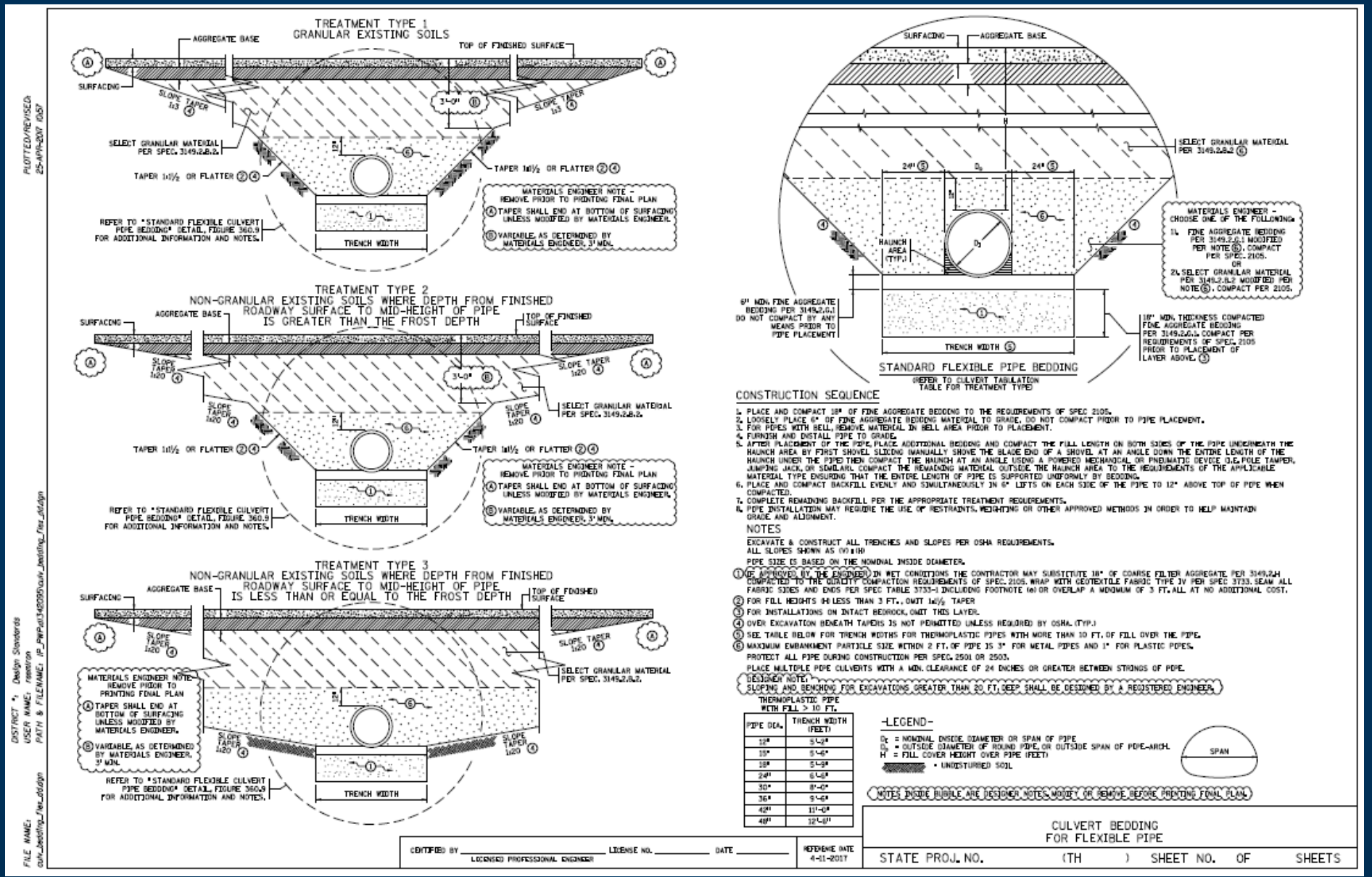
STORM DRAIN BEDDING
FOR RIGID AND FLEXIBLE PIPE

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

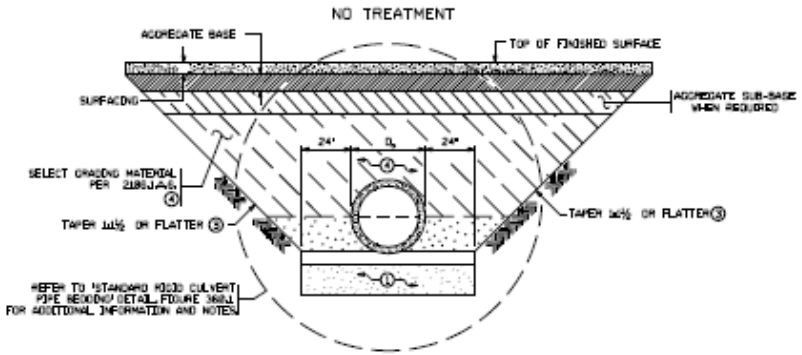
CULVERT BEDDING RIGID DETAIL

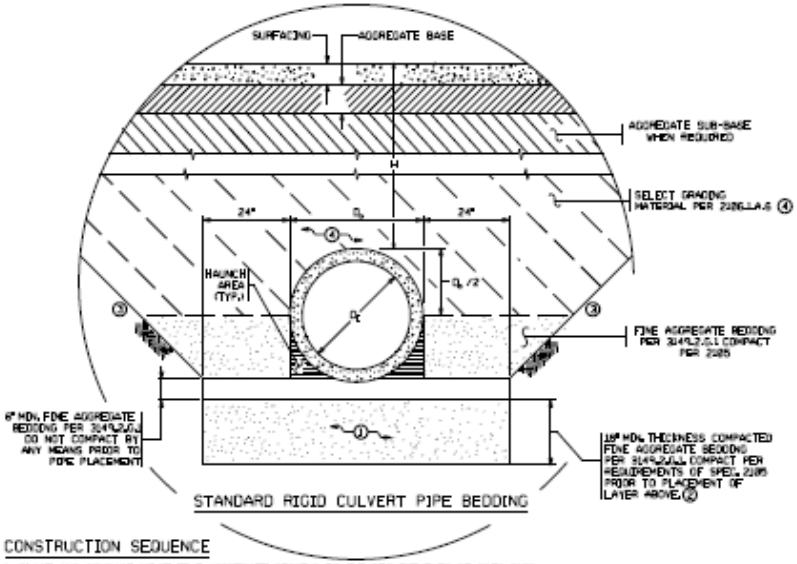


CULVERT BEDDING FLEXIBLE PIPE DETAIL



CULVERT BEDDING RIGID PIPE – NO TREATMENT DETAIL





STANDARD RIGID CULVERT PIPE BEDDING

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. FURNISH 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 BY FIRST SHOVEL SLICING MANUALLY SHOVE THE BLADE END OF A SHOVEL AT AN ANGLE DOWN THE ENTIRE LENGTH OF THE HAUNCH UNDER THE PIPE) THEN COMPACT THE HAUNCH AT AN ANGLE USING A POWERED MECHANICAL OR PNEUMATIC DEVICE (I.E. FOLE TAMPER, JUMPING JACK, OR SIMILAR). COMPACT THE BEDDING 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 IN 6" LIFTS ON EACH SIDE OF THE PIPE UP TO THE MID-HEIGHT WHEN COMPACTED.
7. COMPLETE BEDDING BACKFILL PER THE APPROPRIATE TREATMENT REQUIREMENTS.

NOTES

EXCAVATE & CONSTRUCT ALL TRENCHES AND SLOPES PER OSHA REQUIREMENTS.

ALL SLOPES SHOWN AS (H):1-V

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 3149.2.H COMPACTED TO THE QUALITY COMPACTION REQUIREMENTS OF SPEC. 2105. 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.

② FOR INSTALLATIONS ON INTACT BEDROCK, OMIT THIS LAYER.

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

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

PROTECT ALL PIPE DURING CONSTRUCTION PER SPEC. 2503 OR 2523.

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

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

-LEGEND-

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

SPAN

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

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

REFERENCE DATE 4-12-2017

CULVERT BEDDING FOR RIGID PIPE

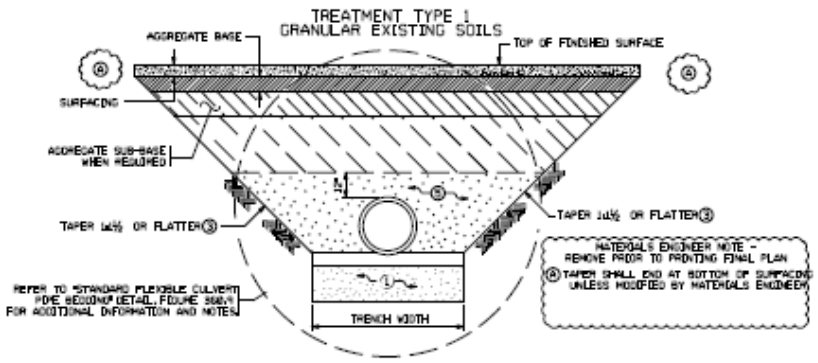
STATE PROJ. NO. (TH) SHEET NO. OF SHEETS

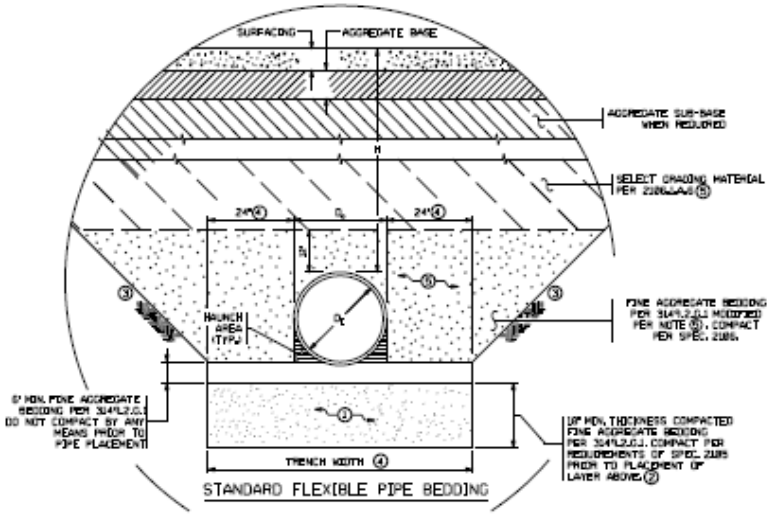
PLOTTED/REVISED: ####DATE#####

DISTRICT #: #DISTRICT## USER NAME: ######NAME##### PATH & FILENAME: ######PATH\FILENAME#####

FILE NAME: @FILENAME@

CULVERT BEDDING FLEXIBLE PIPE – NO TREATMENT DETAIL





CONSTRUCTION SEQUENCE

1. PLACE AND COMPACT 12" 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. FURNISH 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 BY FIRST SHOVEL SLICING (MANUALLY SHOVE THE BLADE END OF A SHOVEL AT AN ANGLE DOWN THE ENTIRE LENGTH OF THE HAUNCH UNDER THE PIPE) THEN COMPACT THE HAUNCH AT AN ANGLE USING A POWERED MECHANICAL OR PNEUMATIC DEVICE (E.G. POLE TAMPER, JUMPING JACK, OR SIMILAR). 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 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 IV:1H
PIPE SIZE IS BASED ON THE NOMINAL INSIDE DIAMETER.

① IF APPROVED BY THE ENGINEER IN WET CONDITIONS THE CONTRACTOR MAY SUBSTITUTE 12" OF COARSE FILTER AGGREGATE PER 3149.2.H COMPACTED TO THE QUALITY COMPACTION REQUIREMENTS OF SPEC. 2105. WRAP WITH GEOTEXTILE FABRIC TYPE IV PER SPEC. 3733, SEAM ALL FABRIC SIDES AND ENDS PER SPEC TABLE 3733-1 INCLUDING FOOTNOTE 1a) 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 10 FT. OF FILL OVER THE PIPE.

⑤ MAXIMUM EMBANKMENT PARTICLE SIZE WITHIN 2 FT. OF PIPE IS 3" FOR METAL PIPES AND ¾" FOR PLASTIC PIPES.

PROTECT ALL PIPE DURING CONSTRUCTION PER SPEC. 2521 OR 2523.

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

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

THERMOPLASTIC PIPE WITH FILL > 10 FT.

PIPE DIA.	TRENCH WIDTH (FEET)
12"	6'-3"
15"	5'-9"
18"	5'-3"
24"	6'-6"
30"	8'-6"
36"	9'-6"
42"	11'-0"
48"	12'-6"

-LEGEND-
D_i = NOMINAL INSIDE DIAMETER OR SPAN OF PIPE
D_o = OUTSIDE DIAMETER OF ROUND PIPE, OR OUTSIDE SPAN OF PIPE-ARCH.
H = FILL COVER HEIGHT OVER PIPE (FEET)
= UNDISTURBED SOIL

SPAN

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

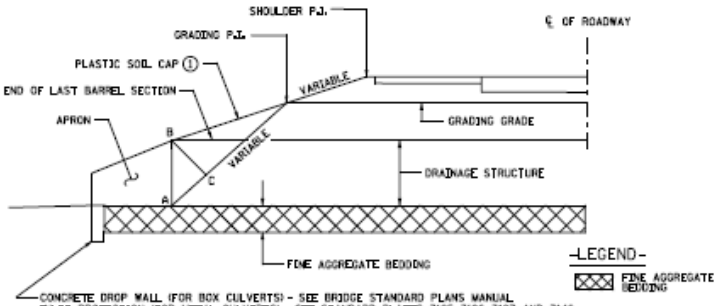
CERTIFIED BY _____ LICENSED PROFESSIONAL ENGINEER LICENSE NO. _____ DATE _____
REVISION DATE 4-11-2017

CULVERT BEDDING
FOR FLEXIBLE PIPE

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

PLOTTED/REVISED: ########
DISTRICT ⅁ ##DISTRICT##
USER NAME: ##USERNAME##
PATH & FILENAME: ##PATHFILENAME##
FILE NAME: @FILENAME@

BOX CULVERT BEDDING DETAIL



CONCRETE DROP WALL (FOR BOX CULVERTS) - SEE BRIDGE STANDARD PLANS MANUAL.
INLET PROTECTION (FOR METAL CULVERTS) - SEE STANDARD PLATES 3125, 3126, 3127, AND 3146

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

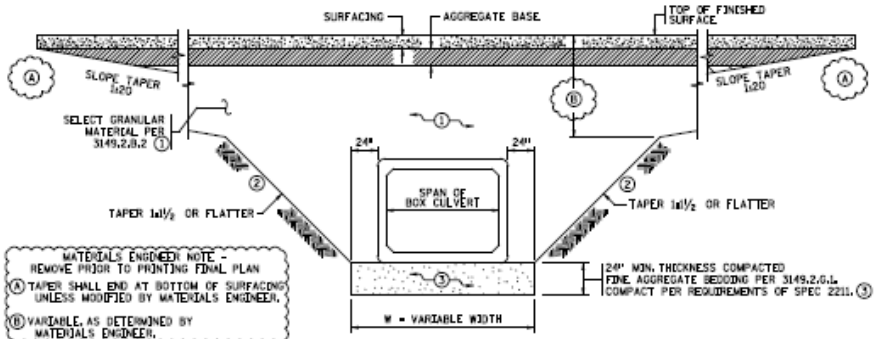
NOTES:
THE TREATMENT WILL BE RECOMMENDED BY THE DISTRICT MATERIALS/SOILS ENGINEER.

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 THAT 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'.



MATERIALS ENGINEER NOTE -
REMOVE PRIOR TO PRINTING FINAL PLAN
Ⓐ TAPER SHALL END AT BOTTOM OF SURFACING UNLESS MODIFIED BY MATERIALS ENGINEER.
Ⓑ VARIABLE, AS DETERMINED BY MATERIALS ENGINEER.

CONCRETE BOX CULVERT BEDDING

NOTES

EXCAVATE & CONSTRUCT ALL TRENCHES AND SLOPES PER OSHA REQUIREMENTS.

ALL SLOPES SHOWN AS (V):1 (H)

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 3149.2.H COMPACTED TO THE QUALITY COMPACTION REQUIREMENTS OF SPEC. 2211.3.D.2.b. WRAP WITH GEOTEXTILE FABRIC TYPE IV PER SPEC 3733. SEAM ALL FABRIC SIDES AND ENDS PER SPEC TABLE 3733-1 INCLUDING FOOTNOTE (e) OR OVERLAP A MINIMUM OF 3 FT. ALL AT NO ADDITIONAL COST.

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

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

PLOTTED/REVISED: 25-APR-2017 10:57
DISTRICT *, Design Standards
USER NAME: rsmitron
PATH & FILENAME: i:\P_PW\pw134005\dsn\box_culv_bedding_std.dgn
FILE NAME: box_culv_bedding_std.dgn

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.

DEPARTMENT OF TRANSPORTATION

QUESTIONS????

Any questions contact us ANYTIME:

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