Project Insights and Best Practices

for

MaineDOT Highway Design

Session 1: June 26, 2018

ACEC
American Council of Engineering Companies of Maine

MaineDOT

Purpose

To provide a learning opportunity for designers to share their own project specific and general experiences, and receive clarification and answers to questions related to MaineDOT Policies, Engineering Instructions (EI's), and Design Guidance, with the intent of improving the overall quality and consistency of the Highway Design process, submissions received from consultants and internal MaineDOT Highway design teams.

Process (1 of 5)

- Idea originally raised during a Highway Subcommittee Meeting regarding:
  - potential lack of consistency of design submissions *(including different submissions from the same consultant)*
  - passing down/sharing of information with newer staff
  - sharing of information between consultants
- The subcommittee felt this warranted further exploration and took it on as a goal.
- Subcommittee members involved in initial discussions:
  - Tony Grande – VHB
  - Don Ettinger – Gorrill Palmer
  - Dale Mitchell – HNTB
  - Kevin Ducharme – T.Y. LIN

Process (2 of 5)

- Topics Covered were mainly based on the Highway Design Guide:

1. Pre-Scoping or General Policy Discussion Points
2. Typical Sections
3. Alignment (H/V)
4. Geometric Layout
5. Drainage
6. *Cross Sections*
7. *Guardrail*
8. *Quantities/Estimating*
9. *Geotechnical*

Process (3 of 5)

- With this list as the focus, polled our own internal design teams, for:
  - Project-specific experiences worth sharing
  - Design questions or areas where clarification would be helpful
  - Any other topics that may not be listed
- Lists from all four firms were then combined
- Held several meetings, included our experienced designers, shared some project experiences, and vetted through each item on the combined list
- Results were then compressed, and refined for discussion with MaineDOT

Process (4 of 5)

- (3) meetings with MaineDOT, and included our experienced designers
  - September 28, 2017
  - October 20, 2017
  - November 1, 2017
- MaineDOT Highway Program involved in discussions:
  - Brad Foley
  - Steve Bodge
  - Andy MacDonald
  - Atlee Mousseau
  - Shawn Smith
  - Denis Lovely

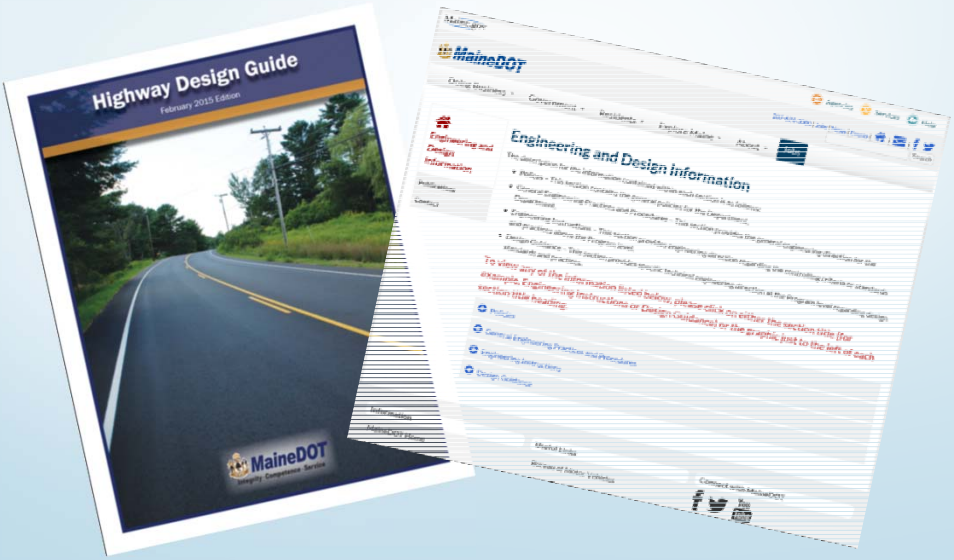
Process (5 of 5)

- Meetings were very interactive, discussions included:
  - project specific examples,
  - policy discussion points
  - general design issues
  - other issues that came about as a result of discussion

Today's Meeting

- Review the results
- Interactive discussion
- Meeting feedback included in final document
- Final document available on MaineDOT Highway webpage.

Presentation of Results



Pre-Scoping and General Policy

1. Pre-Scoping and General Policy (1 of 11)

A. HDR Forms: Is MaineDOT providing the initial HDR Forms already filled out for all projects?

- *To be discussed at the Initial Team Meeting*
- *Any special situations regarding design criteria should be brought up during the meeting.*

1. Pre-Scoping and General Policy (2 of 11)

B. Signing and Striping Plans: included as part of the consultant's scope, or determined on a project by project basis?

- *Determined on a project by project basis, discuss at Pre-Scoping Meeting*
- *Detour plans may also need to be considered and included*
- *At a minimum, should include labels for all striping*

1. Pre-Scoping and General Policy (3 of 11)

C. Development of 3D Model: should this be assumed for every project? Delivery with Final PSE package, or after advertise?

- *Assume 3D Model is required (unless told otherwise)*
- *3D Model delivered with the Final PSE package*
- *3D Models currently being considered for Paving projects*
- *Published Plans are the "controlling" document where 3D model differs*

1. Pre-Scoping and General Policy (4 of 11)

D. Right of Way: what level of effort is required for property owner review and coordination?

- *At a minimum, Property Owner Reports (POR's) provided by MaineDOT should be reviewed, and any special considerations noted*
- *May require meetings with select individual property owners to review the project (this would be on a case by case basis – coordinated with MaineDOT PM)*
- *Combined MaineDOT/Consultant Team site reviews are typically very helpful, when possible*

1. Pre-Scoping and General Policy (5 of 11)

E. EI/Design Guidance: at what point in the design should a recent update be incorporated into a project, and at what point is it considered too late to change?

- *Any new guidance should be incorporated, up to PDR*
- *Beyond PDR, check with the PM*
- *Decisions should be based on the nature of the update and the significance of the changes*

1. Pre-Scoping and General Policy (6 of 11)

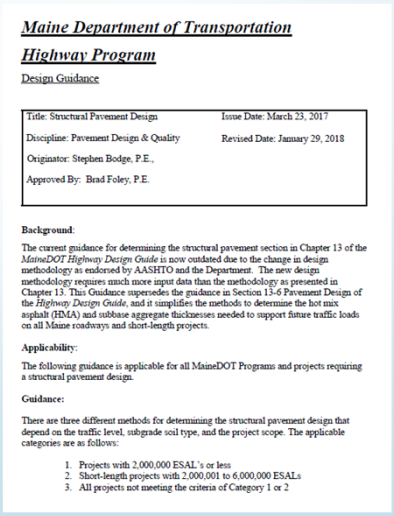
F. Truck Climbing Lane Analysis: should be identified early on if this analysis will be included in a project, or not.

- *Project dependent*
- *Assume Truck Analysis will be required*
- *Confirm at Initial Team Meeting*

1. Pre-Scoping and General Policy (7 of 11)

G. Pavement Design:

- *See Design Guidance – check tables provided based on ESAL's*
- *Most pavement designs generally completed by MaineDOT (ME Design)*
- *Preferably prior to HVAC to save time and redesign efforts.*



Maine Department of Transportation

Highway Program

Design Guidance

Title: Structural Pavement Design	Issue Date: March 23, 2017
Discipline: Pavement Design & Quality	Revised Date: January 29, 2018
Originator: Stephen Bodge, P.E.,	
Approved By: Brad Foley, P.E.	

Background:

The current guidance for determining the structural pavement section in Chapter 13 of the *MaineDOT Highway Design Guide* is now outdated due to the change in design methodology as endorsed by AASHTO and the Department. The new design methodology requires much more input data than the methodology as presented in Chapter 13. This Guidance supersedes the guidance in Section 13-6 Pavement Design of the *Highway Design Guide*, and it simplifies the methods to determine the hot mix asphalt (HMA) and subbase aggregate thicknesses needed to support future traffic loads on all Maine roadways and short-length projects.

Applicability:

The following guidance is applicable for all MaineDOT Programs and projects requiring a structural pavement design.

Guidance:

There are three different methods for determining the structural pavement design that depend on the traffic level, subgrade soil type, and the project scope. The applicable categories are as follows:

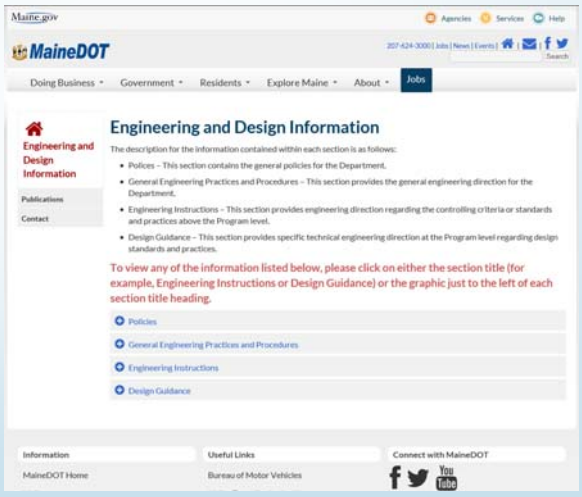
1. Projects with 2,000,000 ESAL's or less
2. Short-length projects with 2,000,001 to 6,000,000 ESALs
3. All projects not meeting the criteria of Category 1 or 2

1. Pre-Scoping and General Policy (8 of 11)

H. Engineering and Design Information page on MaineDOT's website:

http://www.maine.gov/mdot/edi/

- *Good resources on this page*
- *Check for recent updates*
- *MaineDOT emails updates to each Highway GCA contact(s)*

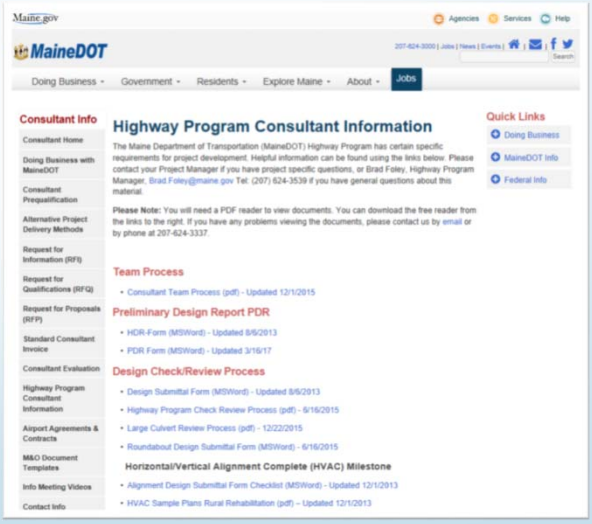


1. Pre-Scoping and General Policy (9 of 11)

H. Highway Program Consultant Information page on MaineDOT's website:

http://www.maine.gov/mdot/cpo/highway/

- *Checklists/Forms*
- *Check for recent updates*
- *MaineDOT emails updates to each Highway GCA contact(s)*



1. Pre-Scoping and General Policy (10 of 11)

I. Design Exceptions:

- *DE's should be considered as a tool for Practical Design*
- *They should include a good definition of "mitigation" options*
- *MaineDOT will provide copy of the final signed DE to consultant, including any approved mitigation, check with PM*

1. Pre-Scoping and General Policy (11 of 11)

A. Has there been any discussions with contractors to see if they need/use all the information we are currently providing on the typical sections?

- *This question could really be asked about all types of sheets, not just the Typical Section sheets*
- *Is it possible for some information to be reduced or changed*
- *MaineDOT is trying to be consistent between Regions for projects*
- *MaineDOT is going to take a closer look to see what's really needed*
- *More info to follow as MaineDOT moves towards electronic submissions*

Pre-Scoping and General Policy

Any Additional Questions or Comments?

Typical Sections

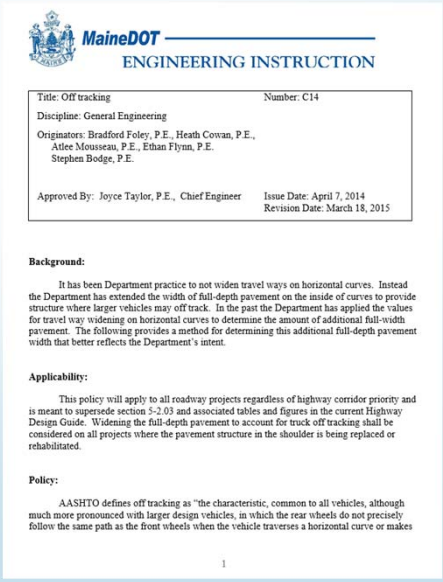
2. Typical Sections (1 of 7)

B. <u>Station Ranges</u>: should transitions be included or leave gaps in between?

- *Gaps in between stations are acceptable*
- *Don't try to depict entire project with "Typical" Sections*

2. Typical Sections (2 of 7)

C. **Full Depth Shoulder Pavement: used with off-tracking and through intersections (see EI-C14)**



MaineDOT
ENGINEERING INSTRUCTION

Title: Off tracking — Number: C14

Discipline: General Engineering

Originators: Bradford Foley, P.E., Heath Cowan, P.E., Atlee Mousseau, P.E., Ethan Flynn, P.E., Stephen Bodge, P.E.

Approved By: Joyce Taylor, P.E., Chief Engineer — Issue Date: April 7, 2014; Revision Date: March 18, 2015

Background:

It has been Department practice to not widen travel ways on horizontal curves. Instead the Department has extended the width of full-depth pavement on the inside of curves to provide structure where larger vehicles may off track. In the past the Department has applied the values for travel way widening on horizontal curves to determine the amount of additional full-width pavement. The following provides a method for determining this additional full-depth pavement width that better reflects the Department's intent.

Applicability:

This policy will apply to all roadway projects regardless of highway corridor priority and is meant to supersede section 5-2.03 and associated tables and figures in the current Highway Design Guide. Widening the full-depth pavement to account for truck off tracking shall be considered on all projects where the pavement structure in the shoulder is being replaced or rehabilitated.

Policy:

AASHTO defines off tracking as "the characteristic, common to all vehicles, although much more pronounced with larger design vehicles, in which the rear wheels do not precisely follow the same path as the front wheels when the vehicle traverses a horizontal curve or makes

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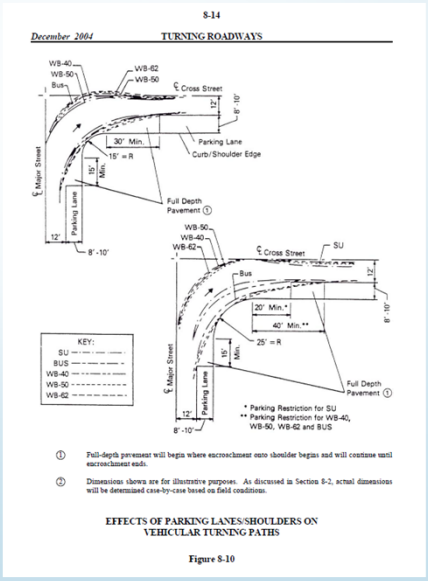
2. Typical Sections (3 of 7)

C. **Full Depth Shoulder Pavement: used with off-tracking and through intersections (see HDG – Figure 8-10)**



8-14

December 2004 TURNING ROADWAYS

① Full-depth pavement will begin where encroachment onto shoulder begins and will continue until encroachment ends.

② Dimensions shown are for illustrative purposes. As discussed in Section 8-2, actual dimensions will be determined case-by-case based on field conditions.

EFFECTS OF PARKING LANES/SHOULDERS ON VEHICULAR TURNING PATHS

Figure 8-10

2. Typical Sections (4 of 7)

C. Full Depth Shoulder Pavement: used with off-tracking and through intersections (see HDG – Section 13-8.2)

13-18

December 2007 FLEXIBLE PAVEMENT DESIGN

13-8.2 Shoulder Design

Full-depth shoulders are HMA shoulders that have the same cross-sectional thickness and material types as the adjacent travel lane and are designed to have the same design life as the mainline. Full depth shoulders are often an economical alternative if shoulder widths are 4' wide or less. From a constructability standpoint, these shoulders can be paved concurrently with the mainline, resulting in some potential savings and ease of construction. If shoulder widths are greater than 4', the recommended thickness of HMA is 3".

Partial-depth shoulders are HMA shoulders that have an HMA thickness less than the adjacent travel lane thickness. For new construction/reconstruction projects, the shoulder surface and intermediate HMA courses correspond to the travel lane HMA course thicknesses. To account for heavy truck wander, the full-depth section should be extended 24 inches into the shoulder.

2. Typical Sections (5 of 7)

C. Full Depth Shoulder Pavement: used with off-tracking and through intersections (see HDG – Section 13-8.2 cont'd)

Some shoulders are subjected to above normal traffic use, such as across from commercial entrances, the inside of curves, including ramps, in intersections, or opposite the leg of "T" intersections. To prevent the HMA on the shoulders from deteriorating prematurely, these locations should have full-depth shoulders even if the traffic information warrants partial-depth shoulders.

Full-depth shoulders should be used for intersections with safety widenings and should begin 20 feet before the Point of Curve (P.C.) and terminate 10 feet beyond the Point of Tangent (P.T.). When safety widenings are not provided, full-depth shoulders should be used 50 feet in advance of the P.C. and end 10 feet beyond the P.T.

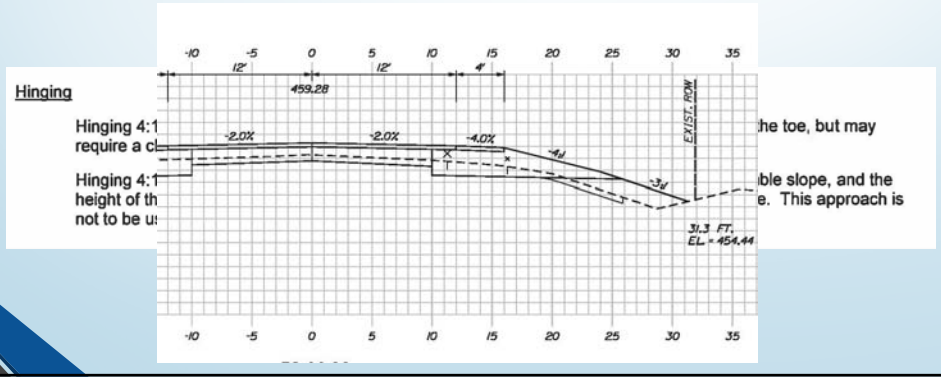
Where right-turning traffic may illegally use the shoulder as a turn lane, full-depth shoulders should begin 165 feet in advance of the P.C.

Where large vehicles will have trouble negotiating curves and corners without encroaching onto the shoulders, the designer should use truck templates to determine whether full-depth shoulders should extend beyond the limits given above.

2. Typical Sections (6 of 7)

D. Hinged Slopes: Design Guidance for Sideslopes and Backslopes

- *See "Sideslopes and Backslopes" Design Guidance 5/16/17 (i.e., 4:1 slope to CZ then hinged to 3:1 slope beyond CZ)*



2. Typical Sections (7 of 7)

D. Hinged Slopes: Design Guidance for Sideslopes and Backslopes

- *See EI–C2.1 on Clear Zone (Design Guidelines) 10/17 – information reduced to 2 tables*
- *Confirm GR fill height - "Sideslopes and Backslopes" Design Guidance 5/16/17 – 20 ft. or greater*

All Interstate roadways shall have a 30' minimum clear zone

Clear Zone Offset Table for Corridor Priority 1 and 2
New Construction/Reconstruction/Rehabilitation

Speed	25-30 #	35-40 #	45-50	55+
AADT 0-2000	10'	10'	12'	15'
2001-6000	10'	12'	14'	18'
>6000	10'	12'	18'	20'

Clear Zone Offset Table for Corridor Priority 3, 4, 6
New Construction/Reconstruction/Rehabilitation

Speed	25-30 #	35-40 #	45-50	55+
AADT 0-2000	10'	10'	10'	15'
2001-6000	10'	10'	10'	15'
>6000	10'	10'	15'	15'

Note: offset measurement is from the edge of travelway

Typical Sections

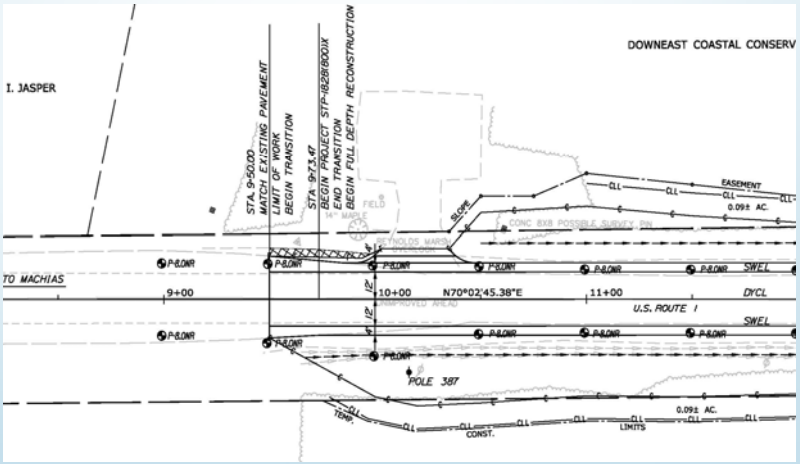
Any Additional Questions or Comments?

Alignment (Horizontal/Vertical)

3. Alignment (H/V) (1 of 10)

A. <u>Project Length determination (Title Sheet)</u>:

- *Based on major construction limits only (begin and end project limits)*
- *Does not include transitions, or other incidental work*



3. Alignment (H/V) (2 of 10)

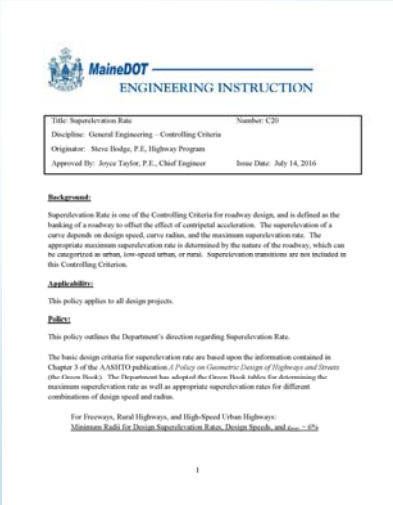
B. <u>Transitions</u>:

- *Gravel section transitions*
- *20:1 Taper with Gravel Layer or 50' Transition (25' for culvert projects)*
- *Butt Joints/Surface Layer transition, only at begin/end 25'-50'*
- *Matching into wheel ruts can be an issue*
- *Horizontal/Vertical layout transitions*

3. Alignment (H/V) (3 of 10)

C. Superelevation:

- *EI-C20 (Superelevation Rate) references use of AASHTO for determination of Superelevation rate*
- *Use MaineDOT HDG or AASHTO for Superelevation transitions*



MaineDOT
ENGINEERING INSTRUCTION

Title: Superelevation Rate — Number: C20
Discipline: General Engineering – Controlling Criteria
Originator: Steve Dodge, P.E., Highway Program
Approved By: Joyce Taylor, P.E., Chief Engineer — Issue Date: July 14, 2016

Background:

Superelevation Rate is one of the Controlling Criteria for roadway design, and is defined as the banking of a roadway to offset the effect of centripetal acceleration. The superelevation of a curve depends on design speed, curve radius, and the maximum superelevation rate. The appropriate maximum superelevation rate is determined by the nature of the roadway, which can be categorized as urban, low-speed urban, or rural. Superelevation transitions are not included in this Controlling Criterion.

Applicability:

This policy applies to all design projects.

Policy:

This policy outlines the Department's direction regarding Superelevation Rate.

The basic design criteria for superelevation rate are based upon the information contained in Chapter 3 of the AASHTO publication *A Policy on Geometric Design of Highways and Streets* (the Green Book). The Department has adopted the Green Book tables for determining the maximum superelevation rate as well as appropriate superelevation rates for different combinations of design speed and radius.

For Freeways, Rural Highways, and High-Speed Urban Highways:
Minimum Radii for Design Superelevation Rates, Design Speeds, and e_{max} = 6%

1

3. Alignment (H/V) (4 of 10)

C. Superelevation:

- *Super Transition Rule of thumb – max. of 2% in 50'*
- *Could also use AASHTO for max. relative gradient*
  (need to provide explanation)

Table 2: Maximum relative gradients.

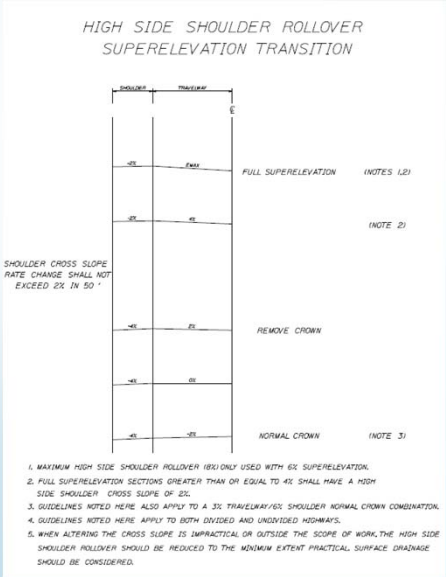
Design Speed (mph)	Maximum Relative Gradient, %, (and Equivalent Maximum Relative Slopes) for profiles between the edge of a two-lane roadway and the axis of rotation	
	Maximum Relative Gradient (G)	Equivalent Maximum Relative Slope
15	0.78	1:128
20	0.74	1:135
25	0.70	1:143
30	0.66	1:152
35	0.62	1:161
40	0.58	1:172
45	0.54	1:185
50	0.50	1:200
55	0.47	1:213
60	0.45	1:222
65	0.43	1:233
70	0.40	1:250
75	0.38	1:263
80	0.35	1:286

Source: AASHTO Greenbook 2011 Table 3-15.

3. Alignment (H/V) (5 of 10)

C. Superelevation:

- *Design Guidance for "High Side Shoulder Rollover" transition*
- *Transition from normal shoulder cross slope of -4% to -2% must be completed as the superelevated section reaches +4%*

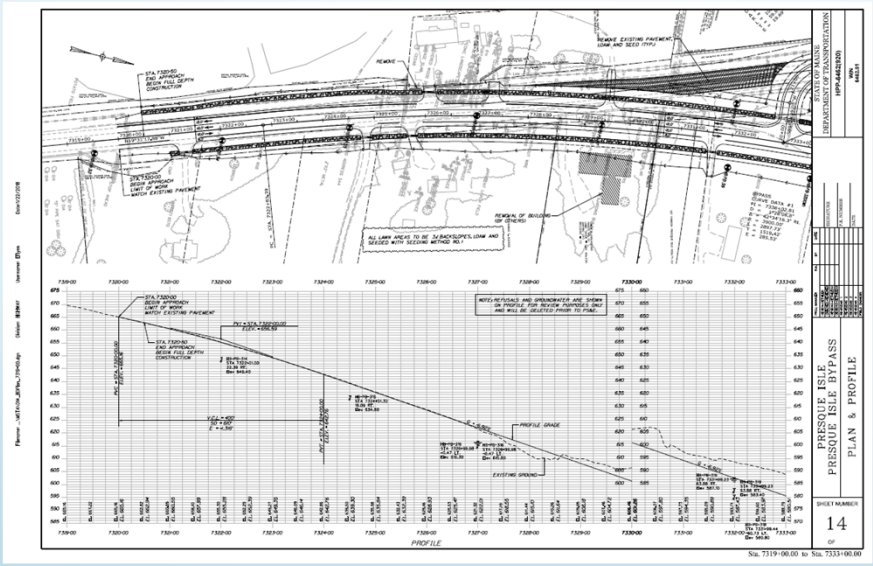


3. Alignment (H/V) (6 of 10)

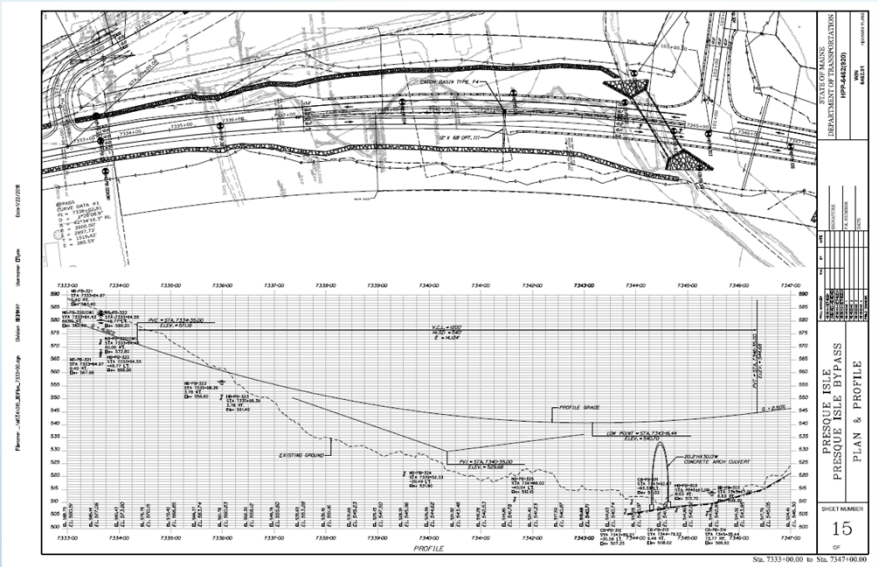
D. Vertical Design:

- *Consider matching steeper grades on projects where matching back to existing conditions, to reduce work limits.*
- *PI Bypass example: lowered fill amount required at southerly limit, by reducing freeway standards with Design Exception for vertical grade.*

3. Alignment (H/V) (7 of 10)



3. Alignment (H/V) (8 of 10)



3. Alignment (H/V) (9 of 10)

E. Pavement Rehab options:

- *Type of treatment could affect the vertical alignment*
- *Need to consider (fluff) inflation on rehabs (spline fit profiles okay)*
- *Timing of when changes are brought to the Team (i.e., if type of treatment changes at or beyond PIC…and this affects the vertical profile…that is much more significant than having it change at HVAC)*
- *"Selecting Rehab Options" Memo/Guidance coming soon*

3. Alignment (H/V) (10 of 10)

F. Vertical Design:

- *Preference to NOT use angle points in profiles at the match point for side roads – try to limit this work to 50'-100'*
- *Expectations and potential project limitations*
- *Existing side road Superelevation can sometimes play a role in extending project limits beyond the profile match point for a smooth transition.*
- *DOT may provide additional guidelines*
- *Follow up with Highway Program (PM, Reviewer, etc.) prior to submission*

Alignment (Horizontal/Vertical)

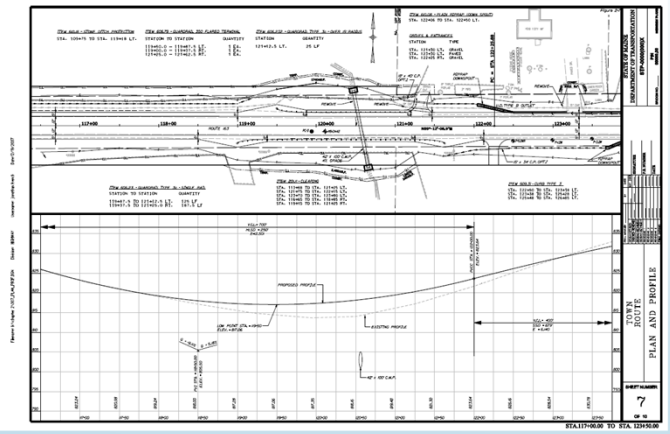
Any Additional Questions or Comments?

Geometric Layout

4. Geometric Layout (1 of 17)

A. Construction Notes Sheets vs. Notes on Plan sheets

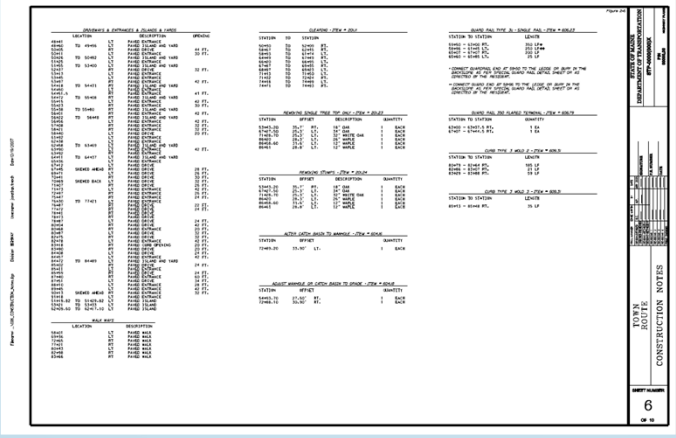
- *Notes on Plan Sheets*



4. Geometric Layout (2 of 17)

A. Construction Notes Sheets vs. Notes on Plan sheets

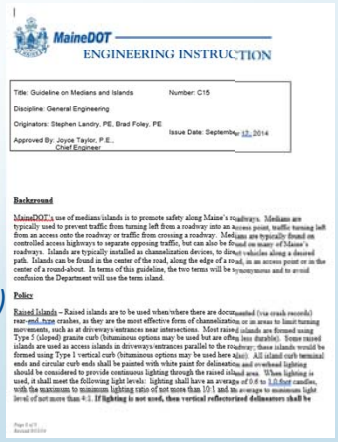
- *Separate Notes Sheets preferred*



4. Geometric Layout (3 of 17)

B. Tapers:

- *Taper Rates based on standard formulas –* ***see EI-C15 Guideline on Medians and Islands***
  - *40 mph and under $WS^2/60$ and*
  - *45 mph and above WS*
    where W is the width of the shift and S is the posted speed
- *Straight line tapers vs. reverse curves (Left-turn tapers)*
  Case by case basis



MaineDOT
ENGINEERING INSTRUCTION

Title: Guideline on Medians and Islands Number: C15
Discipline: General Engineering
Originators: Stephen Landry, PE, Brad Foley, PE Issue Date: September 12, 2014
Approved By: Joyce Taylor, P.E., Chief Engineer

Background

MaineDOT's use of medians/islands is to promote safety along Maine's roadways. Medians are typically used to prevent traffic from turning left from a roadway into an access point, traffic turning left from an access onto the roadway or traffic from crossing a roadway. Medians are typically found on controlled access highways to separate opposing traffic, but can also be found on many of Maine's roadways. Islands are typically installed as channelization devices, to direct vehicles along a desired path. Islands can be found in the center of the road, along the edge of a road, in an access point or in the center of a round-about. In terms of this guideline, the two terms will be synonymous and to avoid confusion the Department will use the term island.

Policy

Raised Islands – Raised islands are to be used when/where there are documented (via crash records) rear-end type crashes, as they are the most effective form of channelization or in areas to limit turning movements, such as at driveways/entrances near intersections. Most raised islands are formed using Type 5 (sloped) granite curb (bituminous options may be used but are often less durable). Some raised islands are used as access islands in driveways/entrances parallel to the roadway; these islands would be formed using Type 1 vertical curb (bituminous options may be used here also). All island curb terminal ends and circular curb ends shall be painted with white paint for delineation and overhead lighting should be considered to provide continuous lighting through the raised island area. When lighting is used, it shall meet the following light levels: lighting shall have an average of 0.6 to 1.0 foot candles, with the maximum to minimum lighting ratio of not more than 10:1 and its average to minimum light level of not more than 4:1. If lighting is not used, then vertical reflectorized delineators shall be

4. Geometric Layout (4 of 17)

C. Lateral Offset to objects behind curb:

- *1.5' behind face of curb is allowed for traffic signals, utility poles, etc.*
- *If Utility Rules are met, DE not required*
- *Check Clear Zone guidance in* ***EI-C2.1 Clear Zone (Design Guidelines)***

4. Geometric Layout (5 of 17)

D. Minimum Curb length (granite); Spec Book and Standard Detail

- *Curb lengths are not discussed in the HDG.*
- *Curb lengths are discussed in the standard specifications (Division 700 Materials, 712.04) - 4' minimum length for Type 1 curb*
- *Curb lengths are discussed in the standard details – 609(01)*

4. Geometric Layout (6 of 17)

D. Minimum Curb length (granite); Spec Book and Standard Detail

CURB TYPES 1, 2 & 5 ON CURVES

TYPE	RADIUS OF CURVE	LENGTH	PAID FOR AS	STONE IS CUT OR CAST
1 & 2	0 to 60' incl.	4' min.	Circular	Arc to Fit Curve
	Over 60' to 160'	4' to 6'	Straight	Straight Pieces
5	0 to 8' incl.	2' min.	Circular	To Fit Curve
	Over 8' to 30' incl.	12" min. Chord	Circular	Str. Pieces, Radial Ends
	Over 30' & Under 160'	2' to 3'	Straight	Straight Pieces
	160' and Over	3' to 6'	Straight	Straight Pieces

4. Geometric Layout (7 of 17)

E. Lane and Shoulder widths:

- *Road Diets - narrower lane widths and less lanes could provide more width for multimodal activities (See Road Diet Guidelines)*

Title: MaineDOT Guidelines to Implement a Road Diet or Other Features Involving Traffic Calming

Issue Date: May 12, 2016

Discipline: General Engineering

Originators: Matt Philbrick and Stephen Landry

Approved By: Joyce Taylor, Chief Engineer

4. Geometric Layout (8 of 17)

E. Lane and Shoulder widths:

Update Coming Soon

Start with Engineering Instruction C2 – Bridge and Roadway Widths

For Priority 1 & 2 Corridors:

Travel lanes full depth pavement for 12', striping 11' to 12'
Shoulders 4' to 10'
Bridge width should equal full roadway width

For Priority 3, 4, & 5 Corridors:

Travel lanes 10' to 12'
Shoulders 2' to 6'
Bridge width minimum is 24', strive for full roadway width

For Priority 6 Corridors and very low volume roadways (< 400 ADT)

Travel lanes 10' to 12'
Shoulders 0' to 4'
Bridge width consider one lane 14' curb to curb if appropriate, strive for full roadway width

4. Geometric Layout (9 of 17)

E. Lane and Shoulder widths:

- *Generally using narrower lane and shoulder widths now*
- *Consider winter maintenance, bicycles, and high truck volumes*
- *Prefer 12' CTWLTL*
- *Try for 4' minimum shoulder width – discuss with PM/Team*
- *Truck Lanes – use 11' or 12' travel lane widths with 4' preferred shoulders*

4. Geometric Layout (10 of 17)

F. Roadway width (travel way + shoulder to face of guardrail or curb) (see new EI…coming soon)

- *General Guidelines (unwritten)*
- *Provide 16' from CL to face of GR - locations with GR on one side.*
- *Provide 17' from CL to face of GR – locations with GR on both sides.*
- *Lots of discussion on this topic at regional DOT offices. Information continues to evolve.*

4. Geometric Layout (11 of 17)

G. ADA improvements:

- *Generally limited to within the project limits*
- *See MaineDOT ADA **Policy**; and **Design Guidance** for curb ramps*

Maine Department of Transportation

Highway Program

Design Guidance

Title: Minimum ADA Requirements for Pedestrian Facilities	Issue Date: November 1, 2017
Discipline: General Engineering	Revised Date: January 24, 2018
Originator: Highway Program	
Approved By: Bradford Foley, P.E.	

Title: MaineDOT ADA Compliance Policy for Construction and Maintenance	
Discipline: General Engineering	
Originators: Theresa Savoy and Stephen Landry	Issue Date: April 2014
Revised: Bill Pulver	Revised Date: August 11, 2016
Approved By: Joyce Taylor, Chief Engineer	

4. Geometric Layout (12 of 17)

G. ADA improvements:

- *MaineDOT ADA Compliance **Policy***

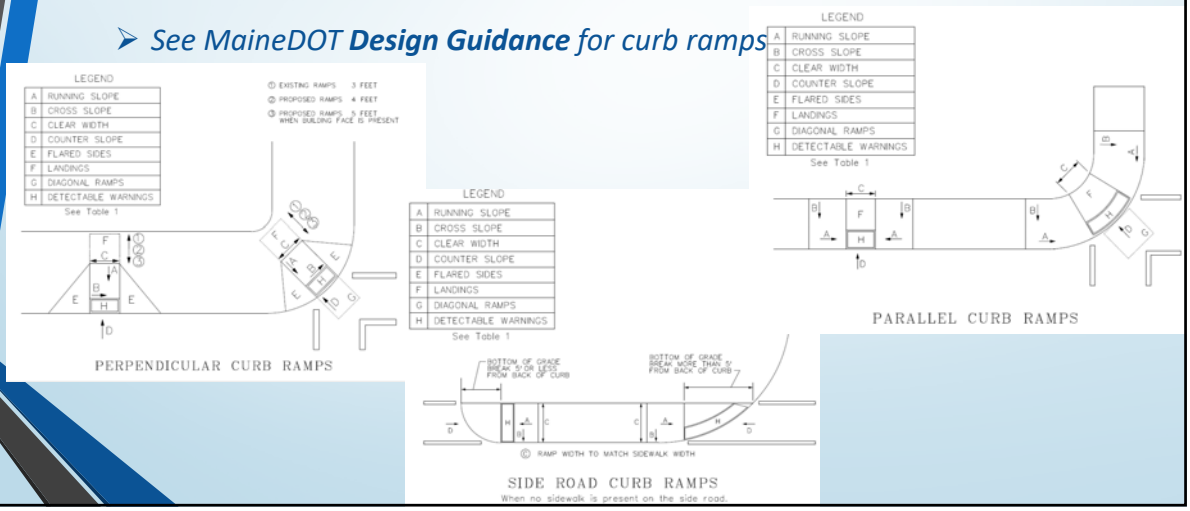
TABLE 1
Required ADA improvements by scope of work

Type of Work (Scope)	ADA IMPROVEMENTS NEEDED	MINIMUM IMPROVEMENTS
New Construction, Reconstruction, or Rehabilitation–	YES	Pedestrian facilities constructed or upgraded to meet current ADA requirements within the project limits.
Paving Treatments, including: Mill and fill, Overlays, Micro-surfacing, Light Capital Paving, Ultra-Thin Bonded Wearing Course, Hot or Cold In-Place Recycling, PMRAP,	YES	Upgrade curb ramps where treatment crosses or impacts existing pedestrian elements or routes within the project limits. If a crosswalk is altered at an intersection, all corners will be upgraded even if outside the project limits. Upgrade pedestrian signals to current ADA standard if the improvement affects the accessibility of the system.
Signal – new location, that warrant pedestrian facilities	YES	Install or upgrade intersection pedestrian facilities to meet current ADA standards including curb ramps and pedestrian signal systems.
Signal Replace in Kind	YES-	Upgrade intersection pedestrian facilities to meet current ADA standards including curb ramps and pedestrian signal systems.
Signal – modification involving excavation or ROW that warrant pedestrian facilities	YES	Upgrade intersection pedestrian facilities to meet current ADA standards including curb ramps and pedestrian signal systems.
Lighting	NO	
Striping	NO	
Maintenance Activities – Chip Seals, Crack filling and Sealing, Dowel Bar Retrofit, Fog Seals, Joint Crack Seals, Joint Repair, Pavement Patching, Scrub Sealing, Slurry Seals, Spot High-Friction Treatments, Surface Sealing.	NO	Note some combinations of these may require ADA upgrades.

4. Geometric Layout (13 of 17)

G. <u>ADA improvements</u>:

- *See MaineDOT **Design Guidance** for curb ramps*



4. Geometric Layout (14 of 17)

G. <u>ADA improvements</u>: Sidewalk width, does or does not include curb width. MaineDOT Standard vs. ADA

- *Current DOT Policy – 5' sidewalk width measured from face of curb (includes curb width). Minimum sidewalk width is 4'. Provide 5' by 5' passing spaces every 200' if sidewalk less than 5'. (see Design Guidance – min. ADA requirements for pedestrian facilities)*
- *PROWAG – Calls for 4' minimum sidewalk width measured from back of curb (excludes curb width). Not adopted by FHWA yet.*
- *Consider sidewalk maintenance and maintenance equipment size when determining sidewalk widths and minimum widths with utilities.*

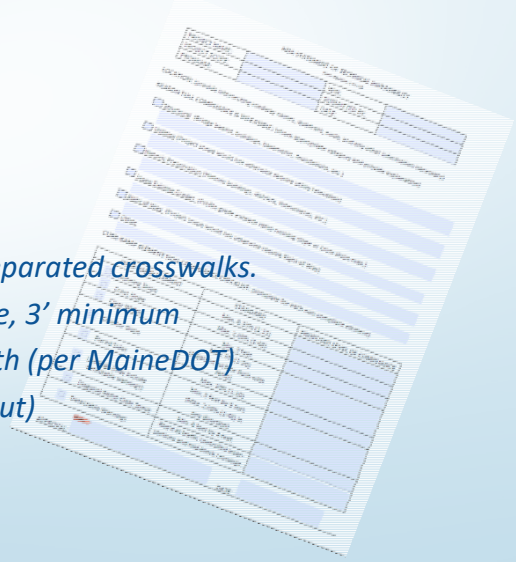
4. Geometric Layout (15 of 17)

G. ADA improvements: Sidewalk width, does or does not include curb width. MaineDOT Standard vs. ADA *(See MaineDOT ADA Design Guidance for Pedestrian Facilities)*

		Minimum Requirements for EXISTING Pedestrian Facilities COLUMN A	Minimum Requirements for NEW or RECONSTRUCTED Pedestrian Facilities COLUMN B
		SIDEWALKS	
Cross Slope		Max. 2.08% (1:48)	Max. 2% (1:50)
Clear Width		Min. 3 feet Width may be reduced to 32 inches for a 24-inch length. Widths less than 5 feet require 5 foot by 5 foot passing spaces at least every 200 feet.	Min. 5 feet (standard) Width may be reduced to 4 feet. Widths less than 5 feet require 5 foot by 5 foot passing spaces at least every 200 feet.
	*	**CURB RAMPS**	
		Max. 8.33% (1:12)	

4. Geometric Layout (16 of 17)

G. ADA improvements: Retrofit scenarios



- *Room for interpretation.*
- *Balance of pedestrian desire lines and separated crosswalks.*
- *Sidewalk widths 5’ preferred, 4’ desirable, 3’ minimum*
- *Curb is included within the sidewalk width (per MaineDOT)*
- *Technical Infeasibility (form to be filled out)*

4. Geometric Layout (17 of 17)

		Minimum Requirements for EXISTING Pedestrian Facilities COLUMN A	Minimum Requirements for NEW or RECONSTRUCTED Pedestrian Facilities COLUMN B
		SIDEWALKS	
Cross Slope		Max. 2.08% (1:48)	Max. 2% (1:50)
Clear Width		Min. 3 feet Width may be reduced to 32 inches for a 24-inch length. Widths less than 5 feet require 5 foot by 5 foot passing spaces at least every 200 feet.	Min. 5 feet (standard) Width may be reduced to 4 feet. Widths less than 5 feet require 5 foot by 5 foot passing spaces at least every 200 feet.
	*	**CURB RAMPS**	
Running Slope	A	Max. 8.33% (1:12) Max. 10.0% (1:10), with maximum 6" Rise Max. 12.5% (1:8), with maximum 3" Rise	Max. 8.33% (1:12)
Cross Slope	B	Max. 2.08% (1:48)	Max. 2% (1:50)
Clear Width	C	Min. 3 feet	Min. 6 feet
Counter Slope	D	Max. 5% (1:20) Adjacent surface must be flush with the ramp.	Max. 5% (1:20) Adjacent surface must be flush with the ramp.
Flared Sides	E	Max. 10% (1:10)	Max. 10% (1:10)
Landings *(Turning Space is less than 24 inches in any direction)*	F	A turning space 3 feet long and as wide as the ramp must be present to be compliant. *Detectable Warnings may be included within the landing.* Ramps constructed or altered prior to March 15, 2012 are compliant without turning spaces if the flared sides do not exceed 8.33% (1:12).	A turning space 4 feet long and as wide as the ramp must be present to be compliant. *Detectable Warnings may be included within the landing.*
Diagonal Ramp Clear Space *(Ramps on a radius)*	G	A 4-foot square clear space must be present at the bottom of the ramp outside active travel lanes.	A 4-foot square clear space must be present at the bottom of the ramp outside active travel lanes.
Detectable Warnings	H	Required at traffic controlled intersections and mid-block crossings.	Required at traffic controlled intersections and mid-block crossings, full ramp width.

*Letters designate elements in the Figures.

Table 1. Minimum Requirements for Pedestrian Facilities

CONFIRM LATEST UPDATE!!! 1/24/2018 MaineDOT ADA Design Guidance for Pedestrian Facilities

Geometric Layout

Any Additional Questions or Comments?

Drainage

5. Drainage (1 of 17)

A. Drainage analysis and pipe sizing completed by MaineDOT or by consultant; varies by project.

- *Confirm up front*

5. Drainage (2 of 17)

B. All drainage pipes crossing side roads should be Opt III or RCP, not underdrain…please confirm.

- *UD is okay, confirm with PM and Reviewer*

5. Drainage (3 of 17)

C. Underdrain pipe runs from 12” to 30” can be designed to curve with the roadway. Maximum deflection angle, up to 10 degrees per pipe section along curve (confirm with pipe manufacturer specifications). Need to confirm when to have pipe follow curved curb line and when to show straight line pipe connection.

- *Show along curb line where possible*
- *If UD cannot follow curb then consider alternatives, i.e., extend subbase*
- *Straight line pipe may have ROW impacts*

5. Drainage (4 of 17)

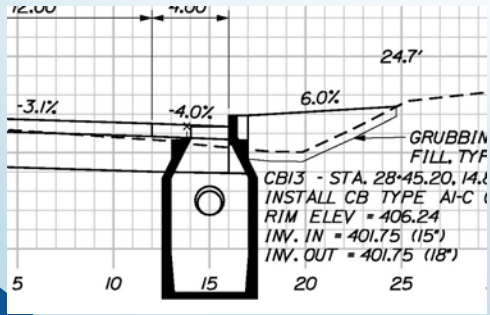
D. Consider extending roadway subbase materials further out to eliminate conflicts between proposed UD and existing or proposed utilities, possibly in sharper radius curves also.

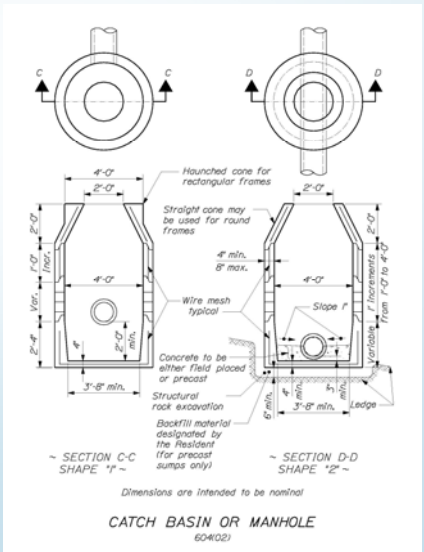
- *UD could also be moved into the roadway to avoid conflicts, subbase needs to grade towards UD location.*
- *Coordinate with Team and Utilities <u>before</u> designing around utilities.*

5. Drainage (5 of 17)

E. Shallow pipes still use 8' CB; show sumps deeper than 2' if basin could be less than 8'?

Details show 4' cone, could call for 2' offset cone or flat top with appropriate notes





5. Drainage (6 of 17)

F. F-Basins used in roadway?

- *Not preferred*
- *Can be used in the shoulder*
- *Use F5 min. for frost*

5. Drainage (7 of 17)

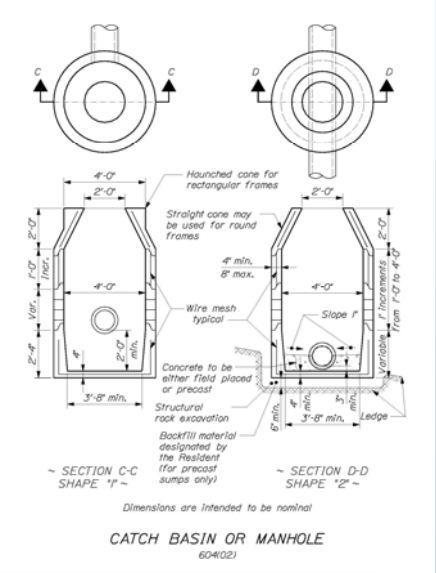
G. Cross culvert sizing: 18" min. or location specific? Could be smaller, i.e. on side roads. Closed system could also be < 18"?

Yes to both

5. Drainage (8 of 17)

H. Drainage Structure Type - MH vs. CB B1 w/solid cover

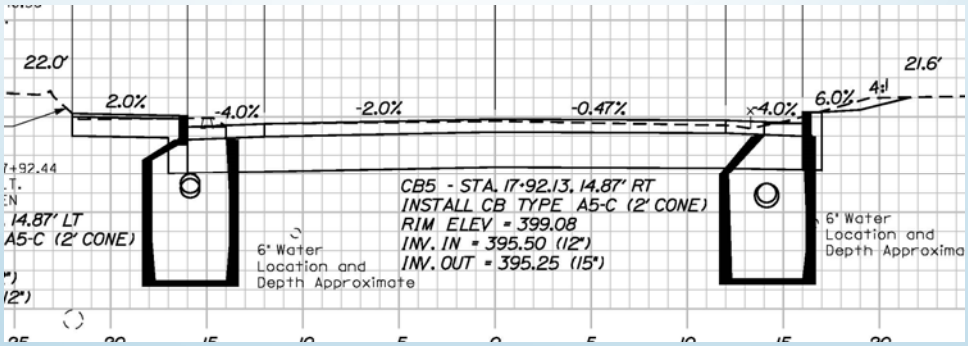
- *Manhole & Catch Basin definitions*
- *CB B1 w/solid cover is preferred wording, check wording in specification*



5. Drainage (9 of 17)

I. 3" drop for pipes at CB vs. matching crowns (top of pipes)

- *Both are okay*
- *Try to avoid "Nesting Pipes"*



5. Drainage (10 of 17)

J. Pipe Ties:

- *Use on RCP only.*
- *Last two joints shall be tied.*
- *Shallow cover or other site specific conditions.*
- *Pipe ties used for all extensions.*

5. Drainage (11 of 17)

K. Culvert ends > 36” on 3:1 slopes, considered a hazard?

36” and below not a hazard; no beveled ends

5. Drainage (12 of 17)

L. Riprap driveway ends; Riprap downspouts at end of curb run.

- *Riprap at driveway ends: Not required unless needed for grade or stream*
- *Riprap Downspouts: Only if needed/ based on conditions*

5. Drainage (13 of 17)

M. Consideration of "snow basins"; CB at low point in non-curbed areas.

- *Possible use in high snow areas; Aroostook County, Western Maine (confirm with PM)*

5. Drainage (14 of 17)

N. Design of RCP pipes is rounded to 8' lengths for design. To avoid the need to cut to shorter lengths in the field.

- *4' sections are okay to use but need a note that states why you need to use it and the 4' section should be placed in the middle third of the pipe.*
- *Must be precast 4' section (not cut in field).*
- *Consider Maintenance of Traffic needs when determining pipe lengths.*

5. Drainage (15 of 17)

O. In long stretches of open ditch roads (i.e., PI Bypass), consider adding more, smaller culvert crossings to minimize major culvert crossings ultimately reducing the size of culverts at low points in watersheds.

- *Within reason*

5. Drainage (16 of 17)

P. Large Culvert Designs: Fish passage or wildlife crossing expectations. Box Culvert embedment generally required, fill material varies.

- *Work in progress, changes coming from ENV, trying to replicate the existing stream bed*
- *Habitat Connectivity Training*

5. Drainage (17 of 17)

Q. Any max length of UD run?

- *No, based on hydraulic review*

Drainage

Any Additional Questions or Comments?

Next Steps

Next Steps

- Conduct Session 2…
- Document input/feedback received during these sessions.
- Update the list of topics
- Include additional questions/clarifications
- Confirm answers with MaineDOT
- Provide updated document to all GCA consultants and make available on MaineDOT Highway Design web page.

Questions

ACEC
American Council of Engineering Companies of Maine

MaineDOT

Send any additional questions or comments to:
Tony Grande** at agrande@vhb.com **(207) 889-3115