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Bridge Design Guide : July 2004 Update

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- Inspection/Maintenance - How will the bridge be inspected and repaired? Refer to Section 2.9.6 Maintainability.
- Bollards – Bollards may be used to control or limit access. Bollards are usually timber or steel posts spaced at about 5 foot spacing that prevent large vehicles from going onto a bridge. The spacing of the bollards can be reduced to 3 feet clear to prevent virtually all motorized vehicles from using the bridge. Removable bollards should be considered if emergency or maintenance vehicles will occasionally use the bridge.
- Rail - Bridges that may be used by snowmobiles should use at least a 54" bicycle height bridge rail. The use of a rub rail is highly recommended to prevent bicycle handlebars from catching on the bridge rail. The center of the rub rail should be 3'-6" above the riding surface.

The Structural Designer should also consider the use of security fencing, lighting, and attached utilities on the bridge. The load capacity of the bridge should be clearly posted on or near the bridge in accordance with MUTCD.

1.7 Aesthetics

1.7.1 General

Aesthetics involves more than just surface features such as color and texture. It includes the visual and perceptual effect made by the bridge as a total structure, as well as the effect made by its individual parts. Bridges affect their surroundings by virtue of their size, shape, line, color, and texture. All structures should be designed with consideration of site-specific features to create designs that provide function as well as a pleasing appearance. The key is to create a distinguished structure without spending excessive resources.

Bridges are usually viewed from one of two places, either from the roadway as a user, or from the side. For those bridges rarely seen from the side, aesthetic considerations are limited to the appearance of the rail, sidewalk, curb, and wearing surface. For other bridges, the view of the bridge from the side should be considered in the design. The nature of the surroundings may influence the aesthetic design choices, whether the location is urban, rural, industrial, or coastal.

1.7.2 Design Considerations

Consistency in the use of flares and tapers in bridge components will result in a more harmonic structure. For example, if a column is flared to be wider at

- *Stream data from other agencies* - Stream flow and flood related data are sometimes available from other agencies in the State. The major sources are:

U.S. Geological Survey: The U.S.G.S. has numerous gage stations on rivers and streams that collect hydrologic information. Through the use of formulae, this information can be transformed to other locations on the same water course. The Bridge Program's Hydraulic Library has copies of U.S.G.S. annual reports and a computer analysis summary of each gage site, which can be used to determine the existence of a gage location. Real time data from USGS gages is available at the following website:

<http://waterdata.usgs.gov/me/nwis/rt>. If more information is required than can be obtained from these sources, the U.S.G.S. office in Augusta should be contacted.

Natural Resources Conservation Service (NRCS): The NRCS, formerly known as the Soil Conservation Service (SCS), has studies for many flood control projects that contain information on the hydrology and hydraulics of the involved stream. The Hydraulic Library has a location map indicating completed and planned studies. The NRCS office in Bangor should be contacted for detailed information for each site for which information is desired.

Maine State Planning Office – Maine Flood Plain Management Program: The Maine Floodplain Management Program has gathered flood information for communities with unnumbered "A" zones on their Flood Insurance Rate Map or Flood Hazard Boundary Map. The information is available at the following website:
<http://www.maine.gov/spo/flood/bad/>

Utilities: Various utility companies have control of many dams in the State, and for most of the larger dams, they maintain flow records and capacity data. The Hydraulic Library has a listing of all known dams in the State with a brief description of the dam and the name of the dam owner.

- *Hydraulic Library* - The Bridge Program's Hydraulic Library has copies of many different Flood Study Reports, such as Corps of Engineer Studies, HUD Flood Insurance Studies, SCS Watershed Studies, and other miscellaneous information pertaining to specific rivers and streams. The Preliminary Engineering Studies and PDRs that have been developed for MaineDOT bridge structures over the years are electronically filed in MaineDOT's TEDOCS document

management system. PDRs with hydrology and hydraulic information are generally available for projects starting in about the year 1975.

- *Local newspapers* - Local newspaper files may have stories on previous floods.
- *Flood insurance studies* - River cross sections used to develop Flood Insurance Rate Maps (FIRM) can be obtained through the Maine Floodplain Management Program in the Department of Economic and Community Development. These cross sections can be used in a hydraulic model such as HEC-RAS. The Bridge Program's Hydraulic Library has paper copies of the FEMA Flood Insurance Studies and Flood Insurance Rate Maps. Flood Insurance Rate Maps can also be viewed / printed on-line as well. If you are interested, the Maine State Planning Office – Maine Flood Plain Management Program web site has some instructions posted to help you through this process at: <http://www.state.me.us/spo/flood/map/>.

All of the above sources of information may provide valuable assistance and supplementary information that can be used advantageously; however, discrepancies sometimes are revealed when these data are compared. This indicates the need for verification and proper evaluation of the flood data, regardless of the source.

2.3.5 Vertical Datum

Since January 2000, all new projects, with a few exceptions, are referenced to the North American Vertical Datum (NAVD) of 1988.

Commentary: If there is any doubt about which vertical datum was used for a project, please contact the Survey Coordinator.

Many of MaineDOT's existing plans, existing flood studies, historical flood information, and U.S.G.S. topographic maps are based on the National Geodetic Vertical Datum (NGVD) of 1929. The elevations based on this older datum must be converted to the newer NAVD of 1988. The elevations are adjusted using the following equation:

$$\text{Elevation xxx.xxx (NGVD 1929) - datum shift} = \text{Elevation xxx.xxx (NAVD 1988)}$$

The datum shift ranges between 0.591 feet and 0.722 feet. The exact datum shift for a specific location in Maine can be found at the following website:

http://www.ngs.noaa.gov/cgi-bin/VERTCON/vert_con.prl

The following data must be entered on the web page:

- North Latitude (required)
- West Longitude (required)
- Orthometric Height (optional)

Latitude and Longitude may be entered in any of the following three formats, including blank spaces:

Degrees, minutes, and decimal seconds (xxx xx xx.xxx)

Degrees and decimal minutes (xxx xx.xxx)

Decimal degrees (xxx.xxxxx)

The following example illustrates how to apply the datum shift:

MLLW
MLW
MTL
MHW
MHHW
Predicted High Tide Elevation for 2003

Step 1 through **Step 4**: See Example 2-3 for the Eastport location.

Step 5: Obtain the values for the mean range, spring range, and MTL for the West Quoddy Head location (subordinate station) from the following website:

<http://tidesandcurrents.noaa.gov/tides03/tab2ec1a.html#7>

West Quoddy Head
Mean range = 15.7 ft
Spring range = 17.9 ft
MTL = 8.2 ft

Step 6: Compute tide levels at West Quoddy Head

MTL Eastport = MTL West Quoddy Head

MHW West Quoddy Head = MTL Eastport + Mean Range @ West Quoddy Head/2
 $-0.318 \text{ ft} + 15.7 \text{ ft}/2 = 7.5 \text{ ft}$

MLW West Quoddy Head = MTL Eastport - Mean Range @ West Quoddy Head/2
 $-0.318 \text{ ft} - 15.7 \text{ ft}/2 = -8.2 \text{ ft}$

MLLW West Quoddy Head = MTL Eastport - Mean Tide Level @ West Quoddy Head
 $-0.318 \text{ ft} - 8.2 \text{ ft} = -8.5 \text{ ft}$

MHHW West Quoddy Head = MLLW @ West Quoddy Head + Spring Range @ West Quoddy Head
 $-8.5 \text{ ft} + 17.9 \text{ ft} = 9.4 \text{ ft}$

Step 7: Determine the highest predicted tide for the current year at West Quoddy Head.

Go to the following web site:

<http://tidesandcurrents.noaa.gov/tides03/tab2ec1a.html#7>

Click on the Eastport site, which is the closest reference station. Review the data for the entire year and find the date with largest height.

April 19, 2003 12:09 am 22.3 ft (datum is MLLW)

Get the following reference from the MaineDOT Library:

Tide Tables 2003, High and Low Water Predictions, East Coast of North and South America including Greenland

In Table 2 of the Tide Tables book under West Quoddy Head, find the ratio of height differences at high water.

discharge, is a hydraulic "load" on the structure and the determination of its magnitude is as important as the determination of proper structural loads. These guidelines give a recommended approach to the hydrologic analysis of bridge drainage structures. The guidelines are not all-inclusive, nor are they intended to require strict compliance, but they are presented as a guide. Hydrology is not an exact science, and it requires the use of good engineering judgment to evaluate the available information and arrive at logical and suitable conclusions.

2.3.9.2 Discharge Rate Policy

The following discharge rates need to be computed for the hydraulic design of bridges and minor spans:

- Q1.1 – ordinary high water (OHW) discharge
- Q50 - design discharge
- Q100 or flood of record - check discharge

Other discharge rates may need to be computed as follows:

- Flows less than Q1.1 - discharges used to check for fish passage in culvert-type structures
- Q10 - discharge used in designing temporary bridges
- Q500 - discharge used in evaluating scour

The determination of the design and check discharges are accomplished through the application of one or more discharge formulae given in this text, combined with the information obtained through information sources and/or through hydraulic analysis of existing structures. Discharge adjustment factors are found in Appendix C Hydrology/Hydraulics.

2.3.9.3 Discharge Formulae

Drainage studies for most projects are requested from the Hydrology Unit in the Environmental Office. The unit provides the Designer with a spreadsheet based upon the U.S.G.S. full regression equations discussed in Appendix C Hydrology/Hydraulics, and Section 2.3.9.4 Rural Watersheds, which follows. Unless gaged data is applicable to the project, dams are present on the section of waterway of interest, or if the U.S.G.S. full regression equation is not applicable, the spreadsheet provided is all that is required for hydrologic analysis. For cases where the spreadsheet provided by the Hydrology Unit is not adequate, refer to the following Sections 2.3.9.4 through 2.3.9.4B.

2.3.9.4 Rural Watersheds

Most watersheds for bridges in Maine are rural in nature. A rural area can generally be defined as one having a high percentage of woods, mixed cover, or fields, and is essentially an undeveloped area with respect to commercial sites and residences. The best source of flow data for rural watersheds is gaged data from the U.S.G.S. gaging station network. Methods for transposing gaged data are including on the following pages. If gaged data is not available, the U.S.G.S. full regression equation can be used. Appendix C contains this equation, as well as a hydrology tabulation form for use with the equation. A copy of the report that explains the 1999 USGS full regression equation titled “Estimating the Magnitude of Peak Flows for Streams in Maine for Selected Recurrence Intervals” is available at the following website <http://me.water.usgs.gov/99-4008.pdf>.

A. Urban Watersheds

The U.S.G.S. full regression equation does not apply to urbanized drainage basins or small drainage basins that may experience future development and land use changes. An urban area can generally be defined as one having a very low percentage of woods, mixed cover, or fields, and is essentially a developed area with commercial sites and residences. Potential future development in the watershed should be considered when determining the design flow.

The following methods can be used for small, urbanized drainage basins:

Size of Drainage Area	Hydrologic Method
Greater than 3200 acres	NRCS TR-20 or HEC-1 Method
Greater than 20 acres	Sauer and others (1983)

NRCS TR-20 and HEC-1 Methods are explained in the “Urban & Arterial Highway Design Guide.” Sauer and others (1983) is an urban regression equation (Hodgkins, 1999).

B. Hydraulic Analysis

Flows based on observed and recorded high waters at or near bridges may be determined by performing a hydraulic analysis using the methods discussed in 2.3.10.2 Hydraulic Analysis. For culverts, Bodhaine, 1968, can be used.

All of the applicable methods that may be used for the watershed in question should be utilized. However, large variations in answers may

2.3.10.6 Fish Passage

MaineDOT's fish passage policy and design guide is available at the following website: <http://www.state.me.us/mdot/finalfishpassage5.pdf>. Designers should refer to this guide to insure that fish passage is maintained.

2.3.11 Scour

Commentary: Flooding is the most common cause of bridge failure, with the scouring of bridge foundations being the most common failure mechanism. The catastrophic collapse of the Interstate 90 crossing of Schoharie Creek near Amsterdam, NY on April 5, 1987, is one of the most severe bridge failures in the U.S. Two spans fell into the water after a pier supporting the spans was undermined by scour. Five vehicles plunged into the creek killing 10 people. The National Transportation Safety Board concluded that the bridge footings were vulnerable to scour because of inadequate riprap around the base of the piers and a relatively shallow foundation. The I-90 collapse focused national attention on the vulnerability of bridges to failure from scour and resulted in revisions to design, maintenance, and inspection guidelines.

MaineDOT initiated a scour-screening program in 1987 in response to FHWA Technical Advisory TA 5140.20 (succeeded by TA 5140.21 and TA 5140.23). The advisories ultimately require that a master list be generated of all bridges that require underwater inspection, and that all applicable bridge foundations be evaluated and prioritized according to their vulnerability to scour damage. Reliable equations to compute local scour depths are available for piers. A report by the USGS titled "Observed and Predicted Scour in Maine" is available at the following website <http://me.water.usgs.gov/wrir02-4229.pdf>. The report confirms that the local pier scour predicted by the latest version of the CSU equation in the Hydraulic Engineering Circular 18 Fourth Edition May 2001 on page 6.2 are reasonable.

2.3.11.1 New Bridges

Bridges over waterways with scourable beds should be designed to withstand the effects of scour from a superflood (a flood exceeding Q100) without experiencing foundation movement of a magnitude that requires corrective action. A scour analysis will be performed for all bridge-type structures using the methods in the latest version of HEC-18. The design flood for scour is the lesser of Q100 or the overtopping flood. Maximum scour depths will be produced by the overtopping flood. Scour should also be computed for the superflood, defined as Q500 or the overtopping flood if it is between Q100 and Q500. Q500 can be estimated as 1.18 times the magnitude of the Q100, if Q500 cannot be computed by other means.

The bridge foundation should be designed for the normal factor of safety as specified in AASHTO Standard Specifications below the scour depths estimated for Q100. The bridge foundation should have a factor of safety of 1.0 for scour produced by the superflood. The footings should be placed a minimum of 2 feet below the design flood scour level. Where pile bents are used, the design friction or point bearing should be achieved below the

depth of the design scour. There must be sufficient pile penetration below the scour line to provide lateral stability and structural capacity to support the calculated loads.

concrete wearing surface should be treated with protective coating for concrete surfaces.

4.7 Membranes

Standard waterproofing membrane should be used under bituminous wearing surfaces on most bridge structures. The prequalified list of standard and high performance waterproofing membrane systems can be found on the MaineDOT website at: <http://www.maine.gov/mdot/transportation-research/approved-products/waterproof-membrane-systems.php>. Membrane should also be used on concrete buried structures, placed directly on top of the concrete, and wrapped down one foot along the vertical wall.

High performance membrane should be used in the following situations:

- Butted precast concrete structures without leveling slabs.
- Major structures with high volumes of traffic where maintenance of traffic issues will result in a difficult wearing surface replacement.
- Wearing surface replacements where a rough surface is anticipated (refer to Section 10.2.2 Wearing Surface Replacement/Rehab).

4.8 Deck Joints and Expansion Devices

4.8.1 General

Deck joints add cost to the structure, increase maintenance requirements, and should be avoided whenever possible. Integral abutments should be used (refer to Section 5.4.2, Integral Abutments) or the slab should be carried over the backwall (refer to Section 6.2.2 Decks) whenever possible. The Designer must become familiar with the Standard Details (520 and 521), as well as applicable manufacturer's product information, before specifying an expansion device for a particular project.

In all other cases, deck joints with appropriate expansion devices will be necessary. The choice of which expansion device to use depends upon the movement rating, which is the magnitude of expected expansion and contraction of the structure due to temperature change. The movement rating is the maximum movement from extreme cold to extreme hot, and is calculated as 1-1/4" per 100 feet of bridge expansion length from a fixed bearing. Compression seals are used for a movement rating up to 2-1/2". Gland seals are used for a movement rating up to 3 inches. Finger joints are used up to about 12 inches. Extrapolation of finger joint dimensions or modular joints may be used for larger movement ratings.

Commentary: The expansion rate of 1-1/4" per 100 feet of bridge is based upon the coefficient of expansion for steel. The rate may be used for the determination of the movement rating on all bridge structures either steel or concrete. If a more precise determination of the movement rating for a concrete structure is required, the movement rating may be calculated using the coefficient of expansion for concrete from AASHTO LRFD.

For movement ratings approaching 2-1/2", either a compression seal or gland seal may be used. Whether or not a gland seal can be used will depend upon the minimum opening supplied by the manufacturer.

Special design consideration is required for skews between 30° and 50° back on the right (skewed either way on the Interstate) because of the hazard of a snowplow blade catching in the joint.

4.8.2 Preformed Elastomeric Joint Seals

Preformed Elastomeric Joint Seals (Compression Seals) should be specified on the plans in accordance with the Standard Details 520 (08-14) and Appendix D Standard Notes Superstructures.

The Designer will calculate the movement rating, and then specify the expansion device based upon that rating to the nearest 1/8". At fixed bearings that require a deck joint (i.e. non-slab over backwall), a movement rating of 1/2" should be specified, unless an engineering evaluation of the joint geometry indicates the need for a larger value. The maximum opening of any joint is limited to 3-1/2" in the direction of the centerline of the roadway. The Designer should verify that the opening associated with the specified movement rating would not exceed the seal size. Refer to Example 4-1.

Listed in Table 4-7 are the compression seals prequalified for the movement ratings indicated.

Commentary: Table 4-7 was developed based on pressure-deflection tests performed by the University of Maine on samples furnished by the manufacturers. The tested samples were also evaluated for their ability to absorb racking movement. The skews shown in the table are based on that evaluation. This table may also be found at the MaineDOT product approval web page at the following web address:
<http://www.maine.gov/mdot/transportation-research/approved-products/compression-seals.php>

For additional guidance, the Designer should consult Bridge Maintenance, the Utility Coordinator, and the Maine Utility Accommodation Policy located at the following link: <http://www.maine.gov/mdot/utilities/uap.php>.

4.11 Bearings

4.11.1 General

Bridge bearings should accommodate the movements of the superstructure and transfer the superstructure loads to the substructure. The type of bearing is dependent upon the magnitude/type of movement and the size of the applied loads.

Generally, the movements of the superstructure and the loads transferred to the substructure can be accommodated by elastomeric bearings. The Department's policy for bearings on new superstructures is to use elastomeric bearings wherever possible.

In some cases, structures with large bearing loads and/or multi-directional movements may require the use of pot or disc-type bearings, also known as floating bearings. Plans should direct which of these types to use, or whether interchanging types is intended. The use of spherical bearings may be necessary in more unique situations.

All elements of the bridge seat and bearing areas should be designed with maintenance in mind. In general, the vicinity of the bearing should be designed such that debris will not collect easily and provisions are made for bearing cleaning, repair, and replacement. Bearing repairs can be facilitated by using a bearing-to-masonry plate connection that can be readily removed, such as a weld or separate pin screw. The bearing area should be designed to allow inspection with reasonable effort.

Hold downs should be used when there is a concern for uplift revealed from the seismic analysis, or where stream or ice forces may act on the superstructure. Seismic sensitivity alone is not a requirement for hold downs.

The Structural Designer should become familiar with the Standard Specifications Section 523 - Bearings, as well as applicable manufacturer's product information, before specifying bearings for a particular project.

In addition to AASHTO LRFD Bridge Design Specifications, the NSBA references listed at the end of this chapter should be used as applicable.

Anchors set by drilling and anchoring have been divided into three general types:

- Type I - Anchor bolts size one inch or greater
- Type II - Anchor bolts smaller than one inch
- Type III - Reinforcing steel anchors

A list of prequalified anchoring materials for each type of anchor is available at <http://www.maine.gov/mdot/utilities/uap.php>. Appropriate notes from Appendix D Standard Notes Drilled and Anchored Bolts and Reinforcing Steel should be included on the plans.

The minimum embedment depth given on the plans is based on the depth required to achieve adequate concrete strength. Additional depth above Table 6-8 requirements may be specified, if the Structural Designer feels it is required, as the added cost of increased embedment depth is minimal. However, the embedment should not be less than shown in Table 6-8 without a more precise analysis or a proof load test.

When available concrete thickness is not adequate to provide unconfined pullout strength equal to the yield of the anchor, or the condition of the concrete is a concern, a proof load test may be specified. This can be done by including Supplemental Specification, Section 502 (Proof Load Testing) in the contract book and including the appropriate pay items.

Because of limitations of readily available testing equipment, proof load tests should not be specified for unconfined pullouts in excess of 50 kips. If an unconfined pullout test greater than 50 kips is needed, the Structural Designer should consult with MaineDOT's Transportation Research Division to determine the availability and practicability of specifying a proof load test.

A. Type I Anchors

Bearing plate anchor bolts sizes 1" and 1-1/2" are specified in the Standard Details. For other sizes of bearing anchor bolts, specify the minimum embedment depth and anchor bolt size.

For all other anchor bolts, specify the anchor bolt as a Type I anchor and include the appropriate notes found in Appendix D Standard Notes. Specify the bolt size, spacing, minimum embedment depth (from Table 6-8), and the unconfined pullout requirements.

Grade 3 with either straight or spiral butt-welded seams. Lap welded seams are not allowed.

7.2.2 Higher Strength Bridge Steel

This section will be written in the future.

7.2.3 Coatings

7.2.3.1 New Steel

In areas where the basic design criteria restricts the use of unpainted ASTM A709 Grade 50W steel, or in cases where a painted steel system is desired, a shop-applied, three-coat, zinc-rich coating system should be used with some field touch-up to repair any erection damage. The MaineDOT Standard Specifications do not address painting of structural steel; therefore, a Supplemental Specification needs to be provided in the PS&E package when a painted steel system is to be used.

If a painted steel system is desired, the Structural Designer should specify Type 1 bolts galvanized in accordance with ASTM A153. When unpainted weathering steel is used, only Type 3 bolts should be used, which are always plain.

The Contractor must select a coating system from the Northeast Protective Coating Committee (NEPCOAT) Qualified Products List (QPL). This list may be found through MaineDOT's QPL website:
<http://www.maine.gov/mdot/transportation-research/approved-products.php>.
The Structural Designer should consult with the coatings technical resource personnel to discuss the appropriate use of the specification.

7.2.3.2 Existing Steel

When developing a field paint project, the Structural Designer must bear in mind certain environmental and safety considerations that will require the containment of the blast medium used to remove the existing coatings and blasted material. These situations may result in a decrease in underclearance, requiring that provisions for maintenance of traffic and/or sequencing of operations be described in a Special Provision. Existing utility companies should be contacted through the Utility Coordinator to determine if there is a need for protecting any utility during construction. As with new steel, a NEPCOAT pre-qualified system must be used.

bearing systems, as discussed in Section 10.9 Seismic Retrofit. A widened structure should be fitted with the same bearing type as that installed on the remaining structure for each substructure unit.

10.4 Expansion Devices

On a wearing surface replacement or deck rehabilitation project, the bridge expansion devices (joints) should be examined to determine their condition. The joint armor may be damaged, or the seal may be gone. The value of replacing the seal, repairing the joint armor, or replacing the entire joint should be assessed for each project. The Designer must consider the potential damage to the structure below if repairs or modifications are not made, as well as the expected life of the structure before full bridge replacement is warranted.

Often the joint must be modified or raised to accommodate the increase in grade created by additional pavement. If the joint armor is not damaged beyond repair, and a compression seal can be used, the joint should be modified by welding a round bar to the top of the joint armor. If the joint armor is damaged, the affected steel can be cut out and replaced with a new piece. Keeper bars should be added to the joint armor if not part of the existing joint configuration.

To select a new seal, field measurements must be taken to determine which manufacturer's seal will fit. The existing joint opening should be measured, along with the temperature and the location of the keeper bars if applicable. With this information, the maximum and minimum expected joint opening can be determined. The Designer should then use the manufacturer's literature from the two suppliers listed in Table 4-7 to determine the minimum installation opening and seal depth. A seal can be selected to fit within the given parameters (depth of seal, minimum installation opening, and movement rating) by using Table 4-7 Elastomeric Joint Seal Movement Ratings or the following link: <http://www.maine.gov/mdot/transportation-research/approved-products/compression-seals.php>. The depth from top of new joint to top of seal should comply as closely as possible with the Standard Detail 520(10) minimum of 1/2".

For bridges with differential movement, excessive rotation at the joint, or if the joint space is measured and found to be uneven from one side of the bridge to the other, a gland seal may be selected instead of a compression seal.

In some cases, the existing seal type may be changed without modification of the existing joint armor. Prequalified seals listed in Section 4.8 Deck Joints and Expansion Devices should be evaluated for use inside existing joint armor.

If a prefabricated seal cannot be found to fit the existing joint armor, self-leveling joints can be considered. For the approved list of self-leveling joints refer to the following link to the MaineDOT product approval web page:

<http://www.maine.gov/mdot/transportation-research/approved-products/pour-in-place-joints.php>. These seals are a temporary solution, with a service life of only six to seven years.

Modifications and replacement of existing joints should be specified in accordance with Table 10-1. The descriptions of these joint modifications are not meant to be all-inclusive but merely a broad description. The Designer should use good judgment in determining which type of modification to specify. These requirements are specified in Special Provision Section 520 Expansion Devices. The Designer must verify that the PS&E package contains this Special Provision.

Table 10-1 Bridge Joint Modification Types

Item Number	Modification	Seal Type	Scope of Work	Examples of Work Scope
520.241	Type I	Compression or Gland	Minor	<ul style="list-style-type: none"> • Raising profile grade by adding bar or plate • Adding retention bars to existing joint armor
520.242	Type II	Compression	Minor	<ul style="list-style-type: none"> • Cutting/modifying existing steel plate • Welding retention bars to existing steel plates
520.243	Type III	Compression	Major	Concrete removal on one or both sides of the joint.
520.244	Type IV	Gland	Minor	<ul style="list-style-type: none"> • Cutting/modifying existing steel plate • Welding extrusions to existing steel plates
520.245	Type V	Gland	Major	Concrete removal on one or both sides of the joint.

10.5 Bridge Rail and Connections

10.5.1 General

Bridge rehabilitation projects and resurfacing projects should consider the need for the replacement, retrofitting, or retention of existing bridge rails. In general, bridge rails should be replaced or retrofitted to meet AASHTO LRFD standards. Refer to Section 4.4 Bridge Rail for further guidance.

For rehabilitations where it is desirable to leave the existing end posts in place and the bridge transition is in question, it is acceptable to use Bridge Transition Type 2 as shown in Standard Detail 606(26).

APPENDICES

13. Modified eccentric loader terminals shall be installed concurrently with the placement of each section of beam guardrail.

(The following note is used when Cable Guardrail is to be removed and retained by MaineDOT as part of the contract. The Designer should check with Bridge Maintenance to determine the need for retention.)

14. All hardware used on Cable Guardrail which is to be removed shall be carefully salvaged by the Contractor and will remain the property of the Department. Associated guardrail cable and posts shall become the property of the Contractor.
15. Extended-use erosion control blanket, seeded gutters, riprap downspouts, and other gutters lined with stone ditch protection shall be constructed after paving and shoulder work is completed, where it is apparent that runoff will cause continual erosion. Payment will be made under appropriate Contract items.

(The following note is used for Reduced Berm Offsets.)

16. Guardrail post length and embedment as shown in the Standard Details shall be modified from the indicated 6 foot length to 7 feet, with 4'-6" of embedment.
17. Protective coating for concrete surfaces shall be applied to the following areas:

All exposed surfaces of concrete curbs and sidewalks,
Fascia down to drip notch,
All exposed surfaces of concrete transition barriers,
Concrete wearing surfaces,
Concrete barrier railing,
Top of abutment backwalls and to one foot below the top of
backwalls on the back side.

18. Erosion Control Mix may be substituted in those areas normally receiving loam and seed as directed by the Resident. Placement shall be in accordance with Standard Specification 619 Mulch. Payment will be made under Item 619.1401 Erosion Control Mix.

(The following two notes are used in conjunction with Standard Detail 610(2-4).)

19. Place riprap on sideslopes up to elevation XX.
20. Construct the riprap shelf at each abutment at elevation XX.

(The following five notes are used as needed.)

21. Bidders and Contractors may obtain a copy of the existing bridge plans by contacting the Project Manager. The plans are reproductions of the original drawings as prepared for the construction of the bridge. It is very

unlikely that the plans will show any construction field changes or any alterations, which may have been made to the bridge during its life span.

22. Bidders and Contractors may obtain a copy of the hydrologic report of the bridge site by contacting the Project Manager. The hydrologic report is based on the Department's interpretation of information obtained for the subject site. No assurance is given that the information or the conclusions of the report will be representative of actual conditions at the time of construction.
23. Bidders and Contractors may obtain a copy of the bridge deck evaluation report of the existing bridge by contacting the Project Manager. The report contains visual inspection information and deck core data of the bridge. There is no assurance that the information or data is a true representation of the conditions of the entire deck.
24. Bidders and Contractors may obtain a copy of the project geotechnical report(s), Name of Report(s), MDOT Soils Report Number(s), date(s), by contacting the Project Manager.
25. Geotechnical Information furnished or referred to in this plan set is for the Bidder's and Contractor's use. No assurance is given that the information or interpretations will be representative of actual subsurface conditions at the time of construction. The Department shall not be responsible for the Bidder's and Contractor's interpretations of, or conclusions drawn from, the Geotechnical Information. The boring logs contained in the plan set present factual and interpretive subsurface information collected at discrete locations. Data provided may not be representative of the subsurface conditions between boring locations.

(The following note is to be used when removing an existing aluminum bridge rail.)

26. All aluminum bridge rail, rail posts, and associated hardware which are to be removed shall be carefully salvaged by the Contractor and will remain the property of the Department. Payment shall be incidental to related Contract items.

D.13 Standard Notes Drilled & Anchored Bolts and Reinforcing Steel

(The following note is used for Type 1 anchors when bolts are size 7/8" or greater.)

1. For drilling and anchoring bolts size 7/8" or greater, the anchor material chosen from the prequalified list shall be submitted to the Resident for approval.

(The following note is used for Type 3 anchors when reinforcing bars are size #9 or greater.)

2. For drilling and anchoring reinforcing bars size #9 or greater, the anchor material chosen from the prequalified list shall be submitted to the Resident for approval.