CHAPTER 3 – ROAD DESIGN

3-01 ROAD CIRCULATION

See Standard Drawings 3-040, 3-050, 3-066, 3-150

A. General

Road circulation is important in road system design for the following reasons:

1. Operation of the arterial road system is improved by dispersing local traffic onto multiple roads and access points;
2. Response time for emergency services is reduced;
3. Time and mileage traveled by individuals and service providers, including school bus transportation, mail delivery, utilities, etc. are reduced; and
4. Use of transit systems, and pedestrian and bicycle facilities, is promoted.

B. Layout and Design

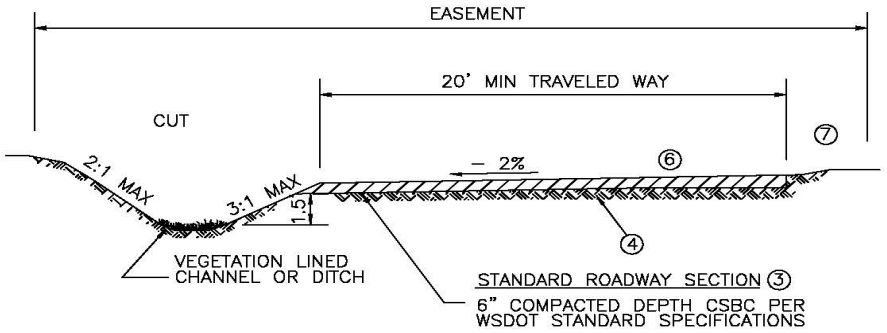
The following criteria for circulation shall be used in the layout and design of the county road network:

1. The road network shall be designed to promote a connected and convenient circulation of traffic without reliance on the arterial road system. Circulation and connectivity shall be provided in a manner, where possible, that will allow subsequent developments to meet these standards.
2. The road network is made up of the following road network elements, described further in EDDS Sections 3-04 and 3-05:

   - Public roads
   - Private roads
   - Drive aisles
   - Shared courts
   - Shared driveways
   - Alleys
   - Driveways

   County Code requirements for roads and access are contained in Chapter 30.24 SCC.
3. The road network should be designed so that the maximum separation between public roads is approximately 330 to 660 feet in urban areas or approximately 2,640 to 5,280 feet in rural areas. With the Engineer's approval, exceptions to the approximate road separation requirements may be granted when meeting them would be infeasible or impractical due to topography, critical areas, the surrounding road network, soils, hydrology, abutting protected lands, or other constraints. The public roads defining a block shall comply with the minimum centerline offset standards of EDDS Section 3-09. Access points within a block shall comply with the separation and corner clearance requirements of EDDS Sections 2-04 and 2-05.
4. Pursuant to SCC 30.24.010(4), public roads shall be constructed to the boundary of adjacent parcels to create an interconnected road network unless the Engineer, based on the best available information, determines that unique circumstances of the site or adjacent parcels make it impractical or infeasible.

90 ADT OR LESS

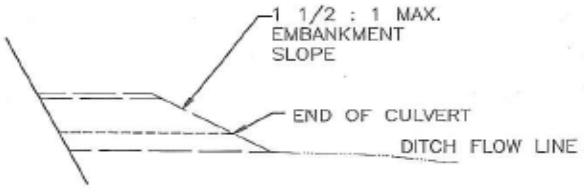


NOTES:

1. ROAD SHALL BE PRIVATELY MAINTAINED BY A HOMEOWNERS ASSOCIATION.
2. REFER TO STD DWG 3–060 FOR GEOMETRIC STANDARDS.
3. ROADWAY SECTION MAY BE ADJUSTED WITH THE APPROVAL OF THE ENGINEER UPON SUBMISSION OF SUBSTANTIATING ENGINEERING DATA (SOILS TESTS, ETC.)
4. SUBGRADE SHALL BE PLACED AND COMPACTED IN ACCORDANCE WITH SECTION 2–03.3(14)C OF THE WSDOT/APWA SPECIFICATIONS (METHOD B). SURFACING MATERIALS SHALL BE COMPACTED TO 95% OF MAXIMUM DENSITY (MODIFIED PROCTOR).
5. PRIVATE ROAD INTERSECTIONS SHALL COMPLY WITH STD DWG 3–100.
6. IF THE ROAD IS PAVED A MINIMUM 3" OF HMA IS REQUIRED. MATERIAL MAY BE RECYCLED ASPHALT PRODUCTS MIXED IN HMA IF IN ACCORDANCE WITH EDDS 4-09.
7. SEE SCC 30.24.080 TO DETERMINE IF PEDESTRIAN FACILITIES ARE REQUIRED. IF REQUIRED THE WIDTH OF THE PEDESTRIAN FACILITIES IS IN ADDITION TO THE MINIMUM TRAVELED WAY WIDTH.

SEE TEXT SECTION 3–05

	SNOHOMISH COUNTY PUBLIC WORKS	APPROVED BY: Douglas W McCormick 5/1/2020
	3–080 PRIVATE LOW VOLUME ACCESS ROAD (RURAL)	COUNTY ROAD ENGINEER DATE



DETAIL FOR SECTION A
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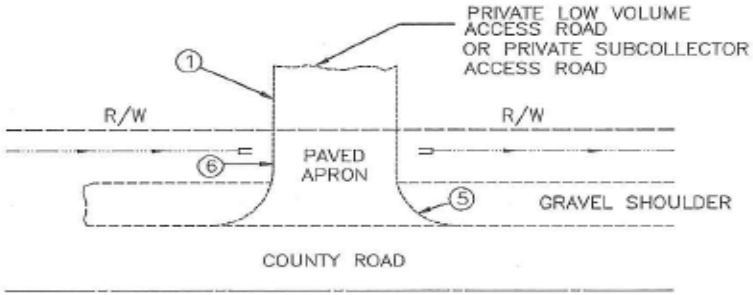
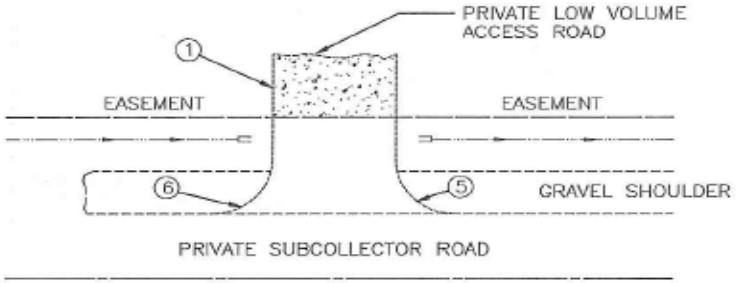


SECTION A
INTERSECTION WITH COUNTY ROAD



SECTION B
INTERSECTION WITH PRIVATE SUBCOLLECTOR ACCESS ROAD

NOTES:

1. ALL SURFACE DRAINAGE FROM THE PRIVATE ROAD MUST BE DIRECTED FROM THE ROAD TO THE THE OPEN DITCH. NO SURFACE DRAINAGE SHALL FLOW ONTO THE COUNTY ROAD.

2. CULVERT PIPE SHALL BE 12 INCHES MINIMUM DIAMETER AND LARGER IF DRAINAGE REQUIRES. BEVEL CULVERT ENDS TO MATCH SIDESLOPES.

3. COVER DEPTHS LESS THAN 12" REQUIRE APPROVAL BY THE ENGINEER.

4. A DRIVEWAY CULVERT HEADWALL, SUBJECT TO APPROVAL BY THE ENGINEER, MAY BE USED IN LIEU OF THE 1–1/2 : 1 MAX. SIDESLOPE.

5. MINIMUM RADII VARY. SEE STANDARD DRAWING 2–010.

6. A PAVED APRON IS REQUIRED AT ALL INTERSECTIONS WITH COUNTY ROADS. PAVED APRON SECTION SHALL BE EQUIVALENT TO STANDARD ROADWAY SECTION FOR PRIVATE SUBCOLLECTOR ROAD OR BETTER.

7. ADDITIONAL PAVEMENT THICKNESS MAY BE REQUIRED FOR HEAVY VEHICLE TRAFFIC.

SEE TEXT SECTION 3–05 & 5–05.L

	SNOHOMISH COUNTY PUBLIC WORKS	APPROVED BY: 1/7/13
	3–100 PRIVATE ROAD INTERSECTIONS (RURAL)	COUNTY ROAD ENGINEER DATE

CHAPTER 4 – ROAD ELEMENTS AND FEATURES

4-03 SURVEY MONUMENTS AND CORNERS

See Standard Drawing 4-130

A. Permit for Removal

In accordance with Chapter 332-120 Washington Administrative Code (WAC), no survey monument as defined therein shall be removed or destroyed without first obtaining a permit from the Department of Natural Resources. Any party causing the removal or destruction of a survey monument shall be responsible for ensuring that the original survey point is perpetuated.

B. Responsibility for Replacement

All existing survey control monuments that are disturbed, lost, or destroyed during surveying or construction shall be replaced, at the expense of the responsible party, by a land surveyor registered in the State of Washington.

C. New Survey Monuments

New survey monuments shall be installed in accordance with the provisions of this section 4-03 or as determined by the Engineer. Standard steel reinforcing bars shall be at least 1/2 inch in diameter; steel pipes shall be at least 3/4 inch inside diameter, typical minimum length is 24 inches. Pipe or rebar shall be permanently tagged with the land surveyor's registration number. Specifications for roadway monuments are provided in Standard Drawing 4-130.

D. Boundary Establishment

Boundaries of subdivisions shall be marked with standard steel reinforcing bars, steel pipes, or monuments in accordance with Standard Drawing 4-130 permanently marked with the land surveyor's registration number. The same materials shall be used to mark the corners of lots, tracts, NGPA easement and Critical Area Protection Area/Easement (CAPA/E) boundaries. Monuments that represent section or quarter-section corners shall be marked according to the current Bureau of Land Management (BLM) manual.

E. Offset Monuments

If a property corner is occupied by an obstruction, an offset monument shall be installed along one of the boundary lines. Monuments shall be set and marked according to the current BLM manual when witnessing section and quarter-section corners.

F. Road Monument Setting & Placement

All new roads shall have monuments set in accordance with Standard Drawing 4-130 at all points of curvature (PC), points of tangent (PT), center of cul-de-sac, road centerline intersection points, intersections of new road centerlines with the centerline of an existing county road right-of-way, at the end of road stubs, and at such intermediate points as determined by the Engineer.

The point of intersection (PI) will be acceptable in lieu of a PC and PT for road curves, provided the PI falls within the paved roadway and approval is granted by the Engineer prior to installing the monument.

Monuments at intersections with state highways are subject to the requirements and approval of the Washington State Department of Transportation, or as directed by the Engineer.

G. Install Monumentation Prior to Recording

All required monumentation shall be installed prior to the recording of a subdivision, road establishment record of survey, or the final of any right-of-way permit for all other types of development. The delayed installation of required monuments shall not be allowed.

H. Private to Public Road Conversion

If a private road is constructed with the intent to be converted to a public road or a condition is placed on the development to not protest the conversion of the private road to a public road, monumentation shall be required in accordance with sub sections F & G above.

I. Aquatic Boundaries

If any land in a subdivision is contiguous to an aquatic boundary, reference monuments shall be set along the parcel boundary line(s) which shall be established along the shore at such distance back from the aquatic boundary as to reasonably ensure against damage and destruction by flooding or erosion, bank caving, ice shoving, or wave action. Reference monuments or witness corner monuments will be established as near to the aquatic boundary as practicable. The purpose of the boundary side line reference monuments is to preserve the alignment of and the distance along the parcel boundary. Property lying beyond the reference monuments shall be defined by distance along the side property lines extended to the aquatic boundary.

iii. On roads that allow parking, the width of combined parking lanes and bike lane shall be 12 feet.

3. Signed Shared Roadway

   A shared roadway designated by signing as a preferred route for bicycle use. Appropriate bike route signs shall be installed to indicate that improvements, such as widened shoulders, have been provided.

4. Shared Roadway

   All roadways open to both bicycle and motor vehicle traffic. Delineated bicycle facilities are not provided.

4-09 SURFACING REQUIREMENTS

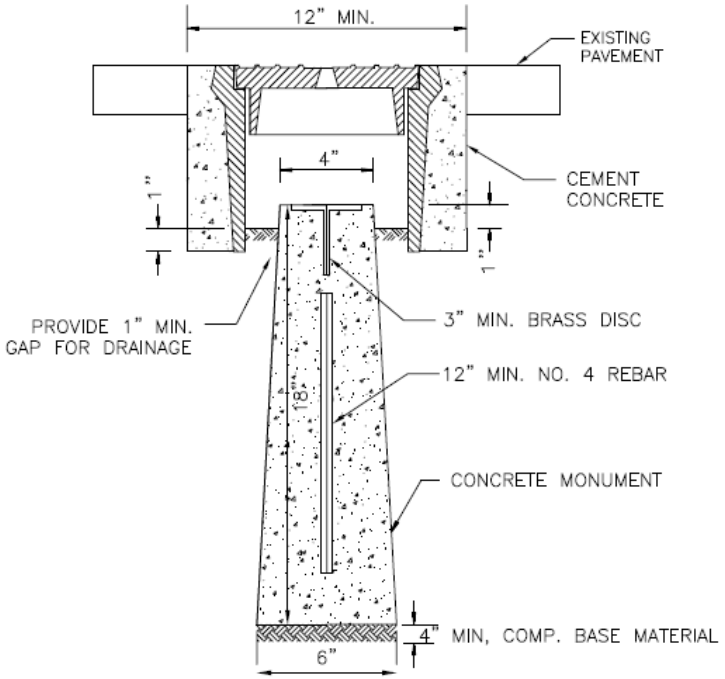
A. Design

1. All materials and workmanship shall be in accordance with the WSDOT Standard Specifications, or as approved by the Engineer.
2. Arterial roads shall be designed in accordance with WSDOT and AASHTO methods. The structural cross-section shall take into account the load-bearing capacity of the soil, the traffic volume and load requirements of the roadway. Plans shall be accompanied by the soil and traffic analyses on which the design is based. Paved shoulders or bikeways that are part of a new arterial road section shall be constructed to the same structural section as the road.
3. When pavement is added to an existing arterial road, the structural section of the improvements shall meet one of the following criteria, whichever is greater:
   i. The structural section of the "Typical Non-Arterial Road – Rural Areas" (Standard Drawing 3-040) or "Typical Non-Arterial Road – Urban Areas" (Standard Drawing 3-050), or
   ii. The structural section of the existing arterial road to which improvements are being made. The existing road structural section shall be determined by:
      a) core samples, or
      b) visual inspection by the design engineer at the time the road edge is cut for construction. Certification of the existing and constructed road sections shall be provided by the design engineer in a signed memo or statement on the project's engineering record drawings.
4. Hot mix asphalt (HMA), Class 1/2-inch, is the preferred road surfacing material except where permeable pavement is feasible and required for installation by Chapter 30.63A SCC. HMA pavement design shall be based on a design life of 20 years with a growth factor of 4% unless otherwise specified by the Engineer. As an option, Portland cement concrete (PCC) may be used under circumstances described in Section 3-04.B.
5. Where permeable pavement is installed, it shall not be paved over with conventional asphalt, concrete or other impermeable material. Paving over permeable pavement invalidates prior stormwater design assumptions, creates the potential for runoff to exceed a conveyance or infiltration system, and shall not be allowed unless approved by the Engineer.
6. All pavement markings and channelization shall comply with the guidelines of the MUTCD. Refer to Chapter 7 of these Standards.

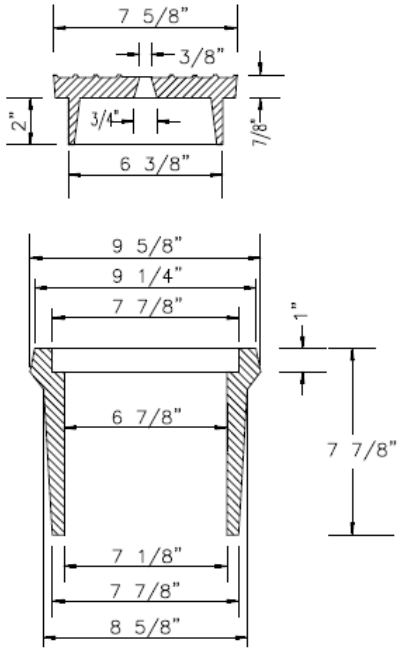
7. The minimum surfacing requirements for specific facilities described in these Standards are:

Table 4-1 Minimum Surfacing Requirements

MINIMUM SURFACING REQUIREMENTS	
FACILITY	**SURFACING REQUIREMENTS**
ARTERIALS	Per specific WSDOT and/or AASHTO design.
NON-ARTERIALS HOT MIX ASPHALT (HMA)	3 inches HMA class 1/2-inch over 3 inches asphalt-treated based (ATB) or HMA class 1-inch over 6 inches gravel borrow. Refer to Standard Drawings 3-040 and 3-050.
PORTLAND CEMENT CONCRETE	Collector roads: 8 inches over 6-inch compacted subgrade. All other non-arterials: 7 inches concrete over 6-inch compacted subgrade. Refer to Section 3-04.B.
PERMEABLE PAVEMENT	Engineered design consistent with Section 11-02.
RECYCLED ASPHALT PRODUCTS MIXED IN HMA	Private Local Access roads only that could not be converted to a public road. Per WSDOT Standard Specifications Division 5 & 9, or as approved by the Engineer.
SIDEWALKS PORTLAND CEMENT CONCRETE	Vertical curb section - 4 inches Rolled curb section: adjacent to curb – 5 inches separated from curb - 4 inches Driveway cuts - 6 inches See Standard Drawing 4-150.
PERMEABLE PAVEMENT	Engineered design consistent with Section 11-02.
SHOULDERS	Same as Arterials or Non-Arterials above depending on road classification. See Section 4-09.A.
WALKWAYS HOT MIX ASPHALT (HMA)	2.5 inches HMA class 1/2-inch over 4 inches crushed surfacing top course (CSTC).
PERMEABLE PAVEMENT	Engineered design consistent with Section 11-02.
SHARED-USE PATHS HOT MIX ASPHALT (HMA)	2.5 inches HMA class 1/2-inch over 4 inches CSTC.
PERMEABLE PAVEMENT	Engineered design consistent with Section 11-02.
BIKEWAYS	Same as Arterials or Non-Arterials above depending on road classification. See Section 4-09.0.A.



PLAN



SECTION

NOTES:

1. MONUMENT CASE AND COVER SHALL BE CAST IRON.
2. BRASS DISCS SHALL BEAR THE REGISTRATION NUMBER OF THE LAND SURVEYOR RESPONSIBLE FOR SETTING THE MONUMENT.

SEE TEXT SECTION 4-03

	SNOHOMISH COUNTY PUBLIC WORKS	APPROVED BY:
4-130	MONUMENT CASE AND COVER	COUNTY ROAD ENGINEER DATE

CHAPTER 6 - BRIDGES AND BURIED STRUCTURES

6-01 GENERAL

A. Standards for New Bridges

Except as modified below, new public and private road bridges and associated structures in Snohomish County shall be designed and constructed to meet the minimum requirements set forth in the latest edition, including all interim addenda, of the AASHTO LRFD (Load Resistance Factor Design) Bridge Design Specifications and the WSDOT Bridge Design Manual.

B. Standards for Older Bridges

The AASHTO Standard Specifications for Highway Bridges, 17th edition, may be used for the maintenance and rehabilitation design of older, existing public and private road bridges and structures.

C. Pre-Design for Private Bridges

Designers of private bridges are encouraged to schedule a pre-design meeting with the Departments of Planning and Development Services and Public Works to discuss design proposals.

D. Buried Structures

Buried Structure is a generic term for a structure built or assembled inside an excavation employing embankment or trench methods. Buried Structure types considered herein consist of metal structural plate pipes, arches, and boxes, along with cast-in-place and precast reinforced concrete arch, box, split box, and three-sided structures.

6-02 BRIDGE AND BURIED STRUCTURE INFORMATION

A. Required Submittals

The following items must be submitted to the Engineer for approval prior to the County accepting a bridge or buried structure that has a span or opening greater than 20 feet. Items 1, 2, and 3 shall be prepared and stamped by a Professional Engineer licensed in the State of Washington.

1. Bridge Load Rating – The load rating shall follow guidance in the current WSDOT Bridge Design Manual.
2. Record Drawings – See EDDS Chapter 10.
3. Hydraulic and Scour Report – At a minimum, the report should include the following items:
    - Basin hydrology evaluation, including the expected range of flows in the waterway.
    - Channel hydraulics evaluation, including 100-year flood elevation relative to the bridge elevation and the corresponding maximum expected water velocity.
    - Scour evaluation, including soil depth calculation, bridge foundation review, and design of mitigation measures if necessary.

- If situated in a regulated floodplain, verification that a "no-rise" condition exists.

B. County Inspections & Acceptance

Bridges and buried structures in right-of-way or carrying a public road shall be inspected by a County bridge inspector prior to acceptance of the structure. After the above items have been submitted and approved, Snohomish County Public Works will schedule a bridge inspection by a county bridge inspector. Any deficiencies identified must be corrected before acceptance of the bridge. Inspections are performed in accordance with the National Bridge Inspection Standards (FHWA) in conformance with 23 CFR 650 Subpart C.

6-03 PERMITS FROM OTHER AGENCIES

Construction or reconstruction of bridges may require permits from agencies such as the Coast Guard, Army Corps of Engineers, Department of Ecology, or the Department of Fish and Wildlife, among others. It is the project applicant's responsibility to obtain all necessary permits.

6-04 PEDESTRIAN BRIDGES

Bridges that will carry pedestrian and bicycle traffic shall be designed in accordance with the AASHTO Guide Specifications for Design of Pedestrian Bridges.

6-05 BRIDGE DESIGN ELEMENTS

A. Bridge Design Proposals

Bridge design proposals shall address the elements listed below, as a minimum, for review by the Engineer.

The Engineer may direct that other design criteria, such as the bridge rehabilitation criteria set forth in the WSDOT Local Agency Guidelines, be applied under appropriate circumstances.

B. Geometrics

1. Minimum Bridge Widths for Public and Private Roads

   The bridge shall provide for the full width and configuration specified for the functional classification and future roadway need. This may include the traveled way plus curb, sidewalks, walkway, bike lanes, and/or shoulder on one or both sides. The bridge traveled-way width, and shoulders if present, shall be measured between curbs or between faces of rails, whichever is less, but in no case shall it be less than 28 feet for public roads and 20 feet for private roads.

2. Accommodations for Utilities

   Accommodation shall be made for utilities, including likely future improvements.

3. Sidewalk Widths for Urban Area Bridges

   Urban area bridges shall have a minimum 6-foot wide sidewalk on each side of the roadway when curb and gutter is not used. Planter strips are not required.

4. Separation for Active Transportation Modes

   Where operating speeds are 35 mph or higher, and significant bike and/or horseback traffic can be expected, the Engineer may require that facilities for these other modes of travel be separated from the traffic lanes by a bridge rail.

5. Vertical Clearance Over Roadways

   Overhead vertical clearance for motor vehicles, including overpasses, shall be 16.5 feet minimum.

6. Vertical Clearance Over Active Transportation Facilities

   Vertical clearance above a walkway, sidewalk, equestrian trail or bikeway shall be 10 feet minimum.

C. Water Crossing Structures

When a bridge crosses water it shall comply with WAC 220-660-190 (Water Crossing Structures). Deviation from the WAC 220-660-190 will require the approval of the Engineer. The following criteria are part of the WAC 220-660-190:

1. Bridge Height

   The design must have at least three feet of clearance between the bottom of the bridge structure and the water surface at the 100-year peak flow unless engineering justification shows a lower clearance will allow the free passage of anticipated debris.

2. Bridge Abutments

   The waterward face of all bridge elements that may come in contact with waters of the state including abutments, piers, pilings, sill, foundations, aprons, wing walls, and approach fill must be landward of the ordinary high-water line.

D. Approach Profile

1. Sag Vertical Curves

   A bridge shall not be located at the low point of a sag vertical curve to prevent accumulation of stormwater runoff on the bridge.

2. Width & Superelevation

   The width and superelevation of the bridge shall match the approach roadway.

E. Load Requirements

1. Live Loads – Vehicular Bridges

   All vehicular bridges shall be designed to carry a live load of HL-93 (AASHTO Load Resistance Factor Design method, LRFD).

2. Live Loads – Active Transportation Bridges

   Bridges for pedestrian and/or bicycle traffic shall be designed for a live load of 90 pounds per square foot.

3. Dead Loads

   All new bridges shall be designed for actual dead load and superimposed dead loads, such as utilities, pavement and bridge railings.

4. Superimposed Dead Loads - Utilities

   The minimum superimposed dead load for utilities is 120 pounds per linear foot, per utility line.

5. Superimposed Dead Loads – Asphalt Overlay

   The minimum superimposed dead loads for 2-inch asphalt overlays is 25 pounds per square foot.

6. All Other Loads

   All other loads not mentioned shall be per AASHTO LRFD (Load Resistance Factor Design) Bridge Design Specifications and the WSDOT Bridge Design Manual.

F. Approach Slabs

1. Requirements

   Approach slabs are required for all bridges. Approach slab design shall be per AASHTO LFRD (Load Resistance Factor Design) Bridge Design Specifications and the WSDOT Bridge Design Manual. The requirement for approach slabs may be waived only by deviation approved by the Engineer based on a geotechnical analysis.

2. Pavement Seats

   All new bridge plans shall provide pavement seats for approach slabs, unless otherwise approved by the Engineer.

3. Length & Width

   Approach slabs shall match the bridge width as required in 6-05.B.1, above

G. Substructures

1. Scour Protection

   All bridge foundations shall be protected from scour regardless of bridge type, location, and usage.

2. Scour Analysis

   A scour analysis is required for new bridges.

3. Piers

   Foundations for new bridges shall be located landward from the ordinary high water line and shall be founded on piles or drilled shafts unless it can be demonstrated that there will be no structural failure from expected scour for the life of the bridge.

4. Utility Openings

Bridge piers and diaphragms shall have openings for existing and future utilities.

H. Decks

1. Threaded Inserts for Utilities

   Bridge decks shall have threaded inserts for existing and future utility installations.

2. Concrete & Reinforcing Steel

   Bridge decks shall be concrete and all reinforcing steel shall be hot-dip galvanized steel.

6-06 GUARDRAILS AND RAILINGS

A. Approach Guardrails

Bridge approach guardrails are generally required at all four corners of each bridge.

B. MASH Compliant

All new bridge railing, rail transitions, and approach guardrail shall be MASH (Manual for Assessing Safety Hardware) compliant.

C. Standards and Specifications

1. Bridge railing, rail transitions and approach guardrail shall be designed in accordance with the AASHTO LRFD Bridge Design Specifications, the WSDOT Bridge Design Manual and WSDOT Standard Plans.

D. Hot-Dip Galvanized Steel

All exposed structural steel in bridge railings shall be hot-dip galvanized steel.

E. Pedestrian Railing Height

Pedestrian railing shall be a minimum height of 42 inches measured from the top of the walkway or future overlay.

CHAPTER 6 DRAWING INDEX