

Transmittal Number PT 12-032		Date March 8, 2012
Publication Distribution To: Design Manual holders		
Publication Title Design Manual Supplement – March 2012		Publication Number M 22-01
Originating Organization Project Development Office – Design Policy, Standards, and Safety Research Section http://www.wsdot.wa.gov/Design/Policy/default.htm		Project Development Office Approval Signature /s/ Pasco Bakotich III

Reason for the Supplement

This supplement revises *Design Manual* Chapters 1100, Design Matrix Procedures, and 1120, Basic Design Level.

This supplement provides new guidance for project programming and related design procedures and elements. (See the supplement cover letter for the background and description of changes.)

If you maintain a printed manual, remove the current Chapters 1100, 1120, and page 300-14 and replace them with this March 2012 supplement.

- Revisions have been marked in Chapter 1120.
- Changes to the Chapter 1100 text and matrices were extensive and revision marks are not shown.
- Page 300-14 (Exhibit 300-2) was revised because it describes Matrix 5 line numbers.

Note: When the *Design Manual* is updated in July 2012, these chapters will be incorporated into the manual and this supplement will be retired.

To get the latest information on WSDOT administrative and engineering manuals, sign up for e-mail updates for individual manuals at: <http://www.wsdot.wa.gov/publications/manuals/>

Washington State Department of Transportation
Design Manual Supplements

March 8, 2012

Note: To make your *Design Manual* complete, you must have the Supplements that are currently in effect.

Design Manual Supplements are issued as interim guidance until they are incorporated into the *Design Manual*. These two new Supplements will be retired in July 2012 when they are incorporated into the *Design Manual* as part of the planned revision package.

Subject/Title	Impacted Chapter(s)	Effective Date	Document Type
Impact Attenuator Systems	1620	8/2011	Supplement
Design Matrix Procedures & Basic Design Level	1100, 1120, & page 300-14	3/2012	Supplement

The *Design Manual* is available online, where you can download the entire manual, individual chapter files, known technical errata, and *Design Manual* Supplements:

 <http://www.wsdot.wa.gov/publications/manuals/m22-01.htm>



/s/ Pasco Bakotich III

Effective Date: March 8, 2012

Development Division Director &
State Design Engineer

Design Matrix Procedures and Basic Design Level

I. Introduction

A. Purpose

The purpose of this *Design Manual Supplement* is to revise the design policy related to projects on state transportation facilities. This supplement:

- Streamlines the project development process.
- Revises *Design Manual* Chapters 1100 Design Matrix Procedures and 1120 Basic Design Level.
- Provides new guidance for project programming and related design procedures and elements.

B. Background

The design matrices identify the design elements that need to be addressed for the most common WSDOT project types. Since their inception in the mid 1990s, the design matrices have evolved, incorporating lessons learned and reacting to changing programs and design criteria.

In 2008, FHWA provided ARRA funds to states for projects ready to advertise or for those that could be delivered in an accelerated timeline. To aid in accelerating project delivery, the HQ Design Office worked with FHWA to implement some design matrices revisions to help streamline the efficiency of the preliminary engineering phase. These revised matrices were used in the development of WSDOT's ARRA projects. FHWA did ask WSDOT to prepare a lessons-learned/best practices report for the ARRA matrices. During the preparation of that report, a recommendation was developed that a Design Matrix Review Committee be assembled to review the current matrices and determine if the revisions incorporated in the ARRA matrices should be permanently incorporated into the WSDOT *Design Manual*.

The Design Matrix Review Committee has completed their work resulting in revisions to each of the five design matrices, associated notes, and text in Chapter 1100 as well as revisions to Chapter 1120 Basic Design Level.

C. Discussion

The Design Matrix Review Committee was specifically focused on streamlining the delivery of preservation projects, but also recognized some immediate impact that could be made to safety improvement projects.

Preservation Projects:

The Design Matrix Review Committee re-evaluated and revised the project types and design elements for preservation projects. Some project types were eliminated or consolidated. Similarly, some of the design elements were removed from specific project types. In that process Design Exceptions (DEs) notations were removed for all preservation projects.

Safety Improvement Projects:

Due to the highway safety program needs far outweighing the available resources, WSDOT has started to transition away from a standards based approach (nominal safety) on safety improvement projects, and is moving towards a substantive safety method. This approach is changing the types of projects in WSDOT's safety improvement program. This is occurring as new safety evaluation tools are being released. Consequently, the project types in the safety program have been revised, with an understanding that there is more work to do as new tools are incorporated into WSDOT's project delivery processes for safety improvement projects. Changes in Chapter 1100 resulted in coordinated changes to Chapter 1120, Basic Design Level.

D. Implementation

This policy is effective immediately and is incorporated in the *Design Manual* available on-line:

 <http://www.wsdot.wa.gov/Publications/Manuals/M22-01.htm>

II. Instructions

- A. Use the revised Design Manual Chapters 1100 and 1120 at the link provided above. If you maintain a printed *Design Manual*, replace these two chapters in their entirety.
- B. Replace Page 300-14, Exhibit 300-2. This page was revised to correct references to row numbers on Design Matrix 5.

- 1100.01 General
- 1100.02 Selecting a Design Matrix
- 1100.03 Using a Design Matrix

1100.01 General

The *Design Manual* provides guidance for three levels of design for highway projects: basic, modified, and full design levels. The design matrices in this chapter are used to identify the design level(s) for a project and the associated processes for allowing design variances. The matrices address the majority of Preservation and Improvement projects and focus on those design elements that are of greatest concern in project development.

The design matrices are five tables that are identified by route type. Two of the matrices apply to Interstate highways; the other three apply to non-Interstate highways and address Preservation and Improvement projects.

A design matrix is used to determine the design level for the design elements of a project. Apply the appropriate design levels and document the design decisions as required by this chapter and Chapter 300.

1100.02 Selecting a Design Matrix

Selection of a design matrix (see Exhibit 1100-1) is based on highway system (Interstate, NHS excluding Interstate, and non-NHS) and location (main line and interchange).

Highway System	Location	
	Main Line	Interchange Area
Interstate	Matrix 1	Matrix 2
NHS*	Matrix 3	Matrix 4
Non-NHS	Matrix 5	Matrix 4

* Except Interstate.

Design Matrix Selection Guide

Exhibit 1100-1

(1) Interstate System

The Interstate System (Matrices 1 and 2) is a network of routes selected by the state and the FHWA under terms of the federal-aid acts. These routes are the principal arterials that are the most important to the economic welfare and defense of the United States. They connect, as directly as practicable, the following:

- Principal metropolitan areas and cities
- Industrial centers
- International border crossings

The Interstate System includes important routes into, through, and around urban areas; serves the national defense; and (where possible) connects with routes of continental importance. It also serves international and interstate travel and military movements.

The Interstate System is represented on the list of NHS highways (see Exhibit 1100-2) with the letter “I” before the route number.

(2) National Highway System (NHS)

The National Highway System (Matrices 3 and 4) is an interconnected system of principal arterial routes and highways, including toll facilities, that serves the following:

- Major population centers
- International border crossings
- Industrial centers
- Ports
- Airports
- Public transportation facilities
- Other intermodal transportation facilities
- Other major travel destinations

The NHS includes the Interstate System and the Strategic Highway Corridor Network (STRAHNET) and its highway connectors to major military installations (Interstate and non-Interstate).

The NHS meets national defense requirements and serves international, interstate, and interregional travel (see Exhibit 1100-2).

(3) Non-NHS Highways

The Non-NHS highways (Matrices 4 and 5) are state routes that form a highway network that supplements the NHS system by providing for freight mobility and regional and interregional travel. Non-NHS highways are not shown on Exhibit 1100-2. They are shown on the Washington State Department of Transportation (WSDOT) Official State Highway Map.

1100.03 Using a Design Matrix

The design matrices and associated notes are shown in Exhibits 1100-3 through 1100-8. Follow *Design Manual* guidance for all projects except as noted in the design matrices (and elsewhere as applicable). The definitions presented in this chapter are meant to provide clarification of terminology used in the *Design Manual*. There is no assurance that these terms are used consistently in references outside the *Design Manual*.

(1) Project Type

For project types (such as unstable slopes) not listed in the design matrices see Design Manual section 300.04 and consult the Headquarters (HQ) Design Office for guidance.

In the design matrices, row selection is based on Project Type. The Project Summary (see Chapter 300) defines the purpose and needs for the project and describes the project. For NHS and non-NHS routes (Matrices 3, 4, and 5), the project’s program/subprogram might provide sufficient information to identify the Project Type. (See the *Programming Manual* for details about budget programs and subprograms.)

The various sources of funds for these subprograms carry eligibility requirements that the designers and project developers must identify and monitor throughout project

development. This is especially important to ensure accuracy when writing agreements and to avoid delaying advertisement for bids if the Project Type changes.

Some projects involve work from several subprograms. In such cases, identify the various limits of the project that apply to each subprogram. Where the project limits overlap, apply the higher design level to the overlapping portion.

Project Types (in alphabetical order) are:

At Grade: Safety Improvement projects on NHS and non-NHS highways (45 mph or higher) to build grade-separation facilities that replace the existing intersections.

Bike Routes (Shldrs): Main line economic development Improvement projects to provide a statewide network of rural bicycle touring routes with shoulders a minimum of 4 feet wide.

Bike/Ped. Connectivity: Improvement projects to provide bicycle/pedestrian connections, along or across state highways within urban growth areas, to complete local networks.

Bridge Deck Rehab: Structures Preservation projects that repair delaminated bridge decks and add protective overlays to provide a sound, smooth surface, prevent further corrosion of the reinforcing steel, and preserve operational and structural integrity.

Bridge Rail Upgrades: Safety Improvement projects to update older bridge rails to improve strength and redirection capabilities.

Bridge Repl. (Multilane): Non-NHS main line structures Preservation projects that replace bridges on multilane highways to improve operational and structural capacity.

Bridge Replacement: NHS and two-lane non-NHS (main line and interchange) structures Preservation projects that replace bridges to improve operational and structural capacity.

Bridge Restrictions: Main line economic development Improvement projects that remove vertical or load capacity restrictions to benefit the movement of commerce.

BST: Roadway Preservation projects that resurface highways at regular intervals.

Collision Analysis Locations (CALs), Collision Analysis Corridors (CACs), Intersection Analysis Locations (IALs): Sites identified through a system-wide analysis that have a high-severity collision history. These sites are created with the intent to modify, where appropriate, specific highway elements that are focused on addressing the contributing factors of the identified high-severity collisions. See WSDOT's Safety Management website for additional information:

<http://wwwi.wsdot.wa.gov/planning/cpdmo/highwaysafetymanagement.htm>

Corridor: Main line Improvement projects to reduce and prevent vehicular, nonmotorized, and pedestrian collisions (within available resources).

Diamond Grinding: Grinding a concrete pavement, using gang-mounted diamond saw blades, to remove surface wear or joint faulting.

Dowel Bar Retrofit: Reestablishing the load transfer efficiencies of the existing concrete joints and transverse cracks by cutting slots, placing epoxy-coated dowel bars, and placing high-early strength nonshrink concrete.

Four-Lane Trunk System: NHS economic development Improvement projects to complete contiguous four-lane limited access facilities on a trunk system consisting of all

Freight and Goods Transportation Routes (FGTS) with a classification of 10,000,000 tons/year.

Freight & Goods (Frost Free): Main line economic development Improvement projects to reduce delay from weather-related closures on high-priority freight and goods highways.

Guardrail Upgrades: Safety Improvement projects limited to the specified roadside design elements. These projects focus on W-beam with 12-foot-6-inch spacing and on guardrail systems with concrete posts. The length of need is examined and minor adjustments are made. Removal is an option if guardrail is no longer needed.. For non-Interstate routes, additional length of more than 5% of the existing length is beyond the intent of this program. In these instances, consider funding in accordance with priority programming instructions and, if the length of need is not met, document to the Design Documentation Package (DDP) that the length of need is not addressed because it is beyond the intent of this program.

HMA Overlays: An HMA pavement overlay that is placed to minimize the aging effects and minor surface irregularities of the existing HMA pavement structure and to protect the public investment.

HOV: Main line mobility Improvement projects completing the freeway Core HOV lane system in the Puget Sound region and providing level of service C on HOV lanes (including business access transit lanes) within congested highway corridors. For Interstate see New/Reconstruction.

HOV Bypass: NHS and non-NHS ramp mobility Improvement projects to improve mobility within congested highway corridors by providing HOV bypass lanes on freeway ramps. Congested highway corridors have high congestion index values as described in the Highway System Plan (footnote in text for Improvement/Mobility). For Interstate see New/Reconstruction.

Intersection: Within available resources, Safety Improvement projects to reduce and prevent collisions, increase the safety of highways, and improve pedestrian safety.

Median Barrier: Limited safety Improvement projects: mainly new median barrier, with a focus on cable barrier, to reduce median crossover collisions.

Milling with HMA Inlays: Removing a specified thickness of the existing HMA pavement, typically from the traveled lanes, and then overlaying with HMA at the same specified thickness.

New/Reconstruction projects include the following types of work:

- Capacity changes: add a through lane, convert a general-purpose (GP) lane to a special-purpose lane (such as an HOV lane), or convert a high-occupancy vehicle (HOV) lane to GP.
- Other lane changes: add or eliminate a collector-distributor or auxiliary lane (a rural truck-climbing lane that, for its entire length, meets the warrants in Chapter 1270 is not considered new/reconstruction).
- New interchange.
- Changes in interchange type such as diamond to directional or adding a ramp.
- New or replacement bridge (on or over, main line or interchange ramp).
- New Safety Rest Areas Interstate.

Non-Interstate Freeway (mobility): On non-NHS and NHS interchanges and on NHS main line, these are mobility Improvement projects on multilane divided highways with limited access control within congested highway corridors.

Non-Interstate Freeway (safety): NHS and non-NHS (main line and interchanges) safety Improvement projects on multilane divided highways with limited access control to increase the safety within available resources.

PCCP Single Lane Rehab: Rehabilitation projects that removes a contiguous single lane of PCCP and replaces with PCCP in excess of ½ mile. Short sections of PCCP rehab should be considered preventative maintenance.

Preventive Maintenance: Includes roadway work such as pavement patching, crack sealing, restoration of drainage system, panel replacement, and joint and shoulder repair, and bridge work such as crack sealing, joint repair, slope stabilization, seismic retrofit, scour countermeasures, and painting. Preventive maintenance projects must not degrade any existing safety or geometric aspects of the facility. Any elements that will be reconstructed as part of a preventive maintenance project are to be addressed in accordance with full design level for NHS Routes and modified design level for non-NHS Routes.

Replace HMA w/PCCP at I/S (intersections): NHS and non-NHS main line roadway Preservation projects that restore existing safety features and replace existing HMA intersection pavement that has reached the point of lowest life cycle cost (11–15 years old) with PCCP that has about a 40-year life cycle.

Rest Areas (New): NHS and non-NHS main line economic development and safety Improvement projects to provide rest areas every 60 miles and some RV dump stations. For Interstate see New/Reconstruction.

Rural: Mobility Improvement projects providing uncongested level of service on rural highways within congested highway corridors. Congested highway corridors have high congestion index values as described in the Highway System Plan.

Urban: NHS and two-lane non-NHS (main line and interchange) mobility Improvement projects within congested urban highway corridors. Congested highway corridors have high congestion index values as described in the Highway System Plan.

Urban (multilane): Non-NHS mobility Improvement projects within congested urban multilane highway corridors. Congested highway corridors have high congestion index values as described in the Highway System Plan.

(2) Design Elements

The column headings on a design matrix are **Design Elements**. Not all potential design elements have been included in the matrices.

The design elements that are included are based on the following thirteen Federal Highway Administration (FHWA) controlling design criteria: design speed, lane width, shoulder width, bridge width, structural capacity, horizontal alignment, vertical alignment, grade, stopping sight distance, cross slope, superelevation, vertical clearance, and horizontal clearance. For the column headings, some of these controlling criteria have been combined (for example, design speed is part of horizontal and vertical alignment).

If addressing a design element that is not on the assigned matrix, use full design level as found elsewhere in this manual. With justification, on non-NHS routes, modified design level may be used.

If including a design element that is not covered in this manual, use an approved manual or guidance on the subject and document the decision and the basis for the decision.

The following elements are shown on the design matrices with references to chapters on those topics.

Horizontal Alignment: The horizontal attributes of the roadway, including horizontal curvature, superelevation, and stopping sight distance: all based on design speed. (See Chapter 1210 for horizontal alignment, Chapter 1250 for superelevation, Chapter 1260 for stopping sight distance, and Chapters 1140 or 1360 for design speed.)

Vertical Alignment: The vertical attributes of the roadway, including vertical curvature, profile grades, and stopping sight distance: all based on design speed. (See Chapter 1220 for vertical alignment, Chapters 1130, 1140, 1220, and 1360 for grades, Chapters 1130 and 1260 for stopping sight distance, and Chapters 1130, 1140, or 1360 for design speed.) **Lane Width:** Defined in Chapter 1140 (also see Chapters 1130, 1230, 1240, and 1360).

Shoulder Width: Defined in Chapter 1140 (also see Chapters 1130, 1230, and 1360). For shy distance requirements when barrier is present, see Chapter 1610.

Lane Transitions (pavement transitions): The rate and length of transition of changes in width of lanes (see Chapter 1210).

On/Off Connection: The widened portion of pavement at the end of a ramp connecting to a main lane of a freeway (see Chapter 1360).

Median Width: The distance between inside edge lines (see Chapters 1140 and 1230).

Cross Slope: Lane: The rate of elevation change across a lane. This element includes the algebraic difference in cross slope between adjacent lanes (see Chapters 1130 and 1230).

Cross Slope: Shoulder: The rate of elevation change across a shoulder (see Chapters 1130 and 1230).

Fill/Ditch Slopes: The downward slope from edge of shoulder to bottom of ditch or catch (see Chapters 1130 and 1230).

Access: The means of entering or leaving a public road, street, or highway with respect to abutting private property or another public road, street, or highway (see Chapters 520 and 1340).

Clear Zone: The total roadside border area, starting at the edge of the traveled way, available for use by errant vehicles. This area may consist of a shoulder, a recoverable slope, a nonrecoverable slope, and/or a clear run-out area. The median is part of a clear zone (see Chapter 1600).

Signing, Delineation, Illumination, ITS: Signs, guideposts, pavement markings, lighting, and intelligent transportation systems equipment. (See Chapters 720 for bridge signs and 1020 for signing, Chapter 1030 for delineation, Chapter 1040 for illumination, and Chapter 1050 for ITS.)

Vertical Clearance: Defined in Chapter 720.

Bicycle and Pedestrian: Defined in Chapter 1510, Pedestrian Design Considerations, Chapter 1515, Shared-Use Paths, and Chapter 1520, Roadway Bicycle Facilities.

Bridges: Lane Width: The width of a lane on a structure (see Chapters 720, 1130, 1140, 1230, 1240, and 1360).

Bridges: Shoulder Width: The distance between the edge of traveled way and the face of curb or barrier, whichever is less (see Chapters 720, 1130, 1140, 1230, and 1360; also see Chapter 1610 for shy distance requirements).

Bridges/Roadway: Vertical Clearance: The minimum height between the roadway, including shoulder, and an overhead obstruction (see Chapter 720).

Bridges: Structural Capacity: The load-bearing ability of a structure (see Chapter 720).

Intersections/Ramp Terminals: Turn Radii: Defined in Chapter 1310.

Intersections/Ramp Terminals: Angle: Defined in Chapters 1130 and 1310.

Intersections/Ramp Terminals: Intersection Sight Distance: Defined in Chapter 1310, Intersections at Grade, and Chapter 1360, Interchanges.

Barriers: Terminals and Transition Sections:

- Terminals: Crashworthy end treatments for longitudinal barriers that are designed to reduce the potential for spearing, vaulting, rolling, or excessive deceleration of impacting vehicles from either direction of travel. Impact attenuators are considered terminals. Beam guardrail terminals include anchorage.
- Transition Sections: Sections of barriers used to produce a gradual stiffening of a flexible or semirigid barrier as it connects to a more rigid barrier or fixed object (see Chapters 1600, 1610, and 1620).

Barriers: Standard Run: Guardrail and other barriers as shown in the *Standard Plans for Road, Bridge, and Municipal Construction*, excluding terminals, transitions, attenuators, and bridge rails (see Chapter 1610).

Barriers: Bridge Rail: Barrier on a bridge, excluding transitions (see Chapter 1610).

(3) Design Level

The design levels of basic, modified, and full (B, M, and F) were used to develop the design matrices. Each design level is based on the investment intended for the highway system and Project Type. (For example, the investment is greater for an Interstate overlay than for an overlay on a non-NHS route.)

(a) Blank Cell

A blank cell in a design matrix row signifies that the design element will not be addressed because it is beyond the scope of the typical project. In rare instances, a design element with a blank cell may be included if that element is linked to the original need that generated the project and is identified in the Project Summary or a Project Change Request Form.

(b) Basic Design Level (B)

Basic design level preserves pavement structures, extends pavement service life, and maintains safe highway operations. (See Chapter 1120 for design guidance.)

(c) Modified Design Level (M)

Modified design level preserves and improves existing roadway geometrics, safety, and operational elements. (See Chapter 1130 for design guidance.) Use full design level for design elements or portions of design elements that are not covered in Chapter 1130.

(d) Full Design Level (F)

Full design level improves roadway geometrics, safety, and operational elements. (See Chapter 1140 and other applicable *Design Manual* chapters for design guidance.)

(4) Safety Improvement Projects

In an effort to provide the greatest safety benefit with limited funding, it is WSDOT policy to focus highway safety project modifications on improvements that have the greatest potential to reduce severe or fatal injuries. The intent of this policy is to:

- Address the elements that are associated with severe-injury collision.
- Consider a range of solutions that include minor operational modifications, lower-cost improvements such as channelization, and higher-cost improvements such as, roundabouts, signalization, and widening.
- Recognize the substantial tradeoffs that must be made with the numerous competing needs and costs a highway designer faces in project development.

Because these projects are developed on a “substantive safety” basis, a matrix approach is not the most efficient method of scoping them. Conduct a collision data analysis to determine the contributing factors associated with the collisions. Once the contributing factors are identified, countermeasures should be identified that range from low cost to high cost. A benefit cost analysis should be completed to determine what countermeasure will be selected. Based on the selected countermeasure, determine and document those design elements and levels to be included in the project. See Safety Project Scoping process flowchart. The following documentation should be completed:

- Include an analysis of the collision history to identify contributing factors.
- Identify which of the 4 E’s (Engineering, Enforcement, Education and Emergency Services) will best address the contributing factors, if Engineering solutions are selected to address the contributing factors, then consider countermeasures that include operational, low-cost, and high-cost solutions.
- Select the recommended countermeasure based on a benefit/cost analysis. Tools that are available for use in selecting recommended countermeasures include, HSM, Safety Analyst, Road Safety Assessments (RSA’s), Interactive Highway Safety Design Model (IHSDM), and the Crash Modification Clearinghouse. New and other tools will be assessed for use as they become available.

Safety improvements may be implemented as a project focused on safety, as a minor part of a preservation project, or as a minor operational improvement.

- For I2-funded projects, see the Design Matrices.
- For spot improvements in P1, see Chapter 1120.
- For Q projects, see Chapter 1110.

(5) Design Variances

Types of design variances are design exceptions, evaluate upgrades, and deviations. (See Chapter 300 regarding the Design Variance Inventory System (DVIS).)

(a) Design Exception (DE)

A design exception in a matrix cell indicates that WSDOT has determined the design element is usually outside the scope of the Project Type. Therefore, an existing condition that does not meet or exceed the design level specified in the matrix may remain in place unless a need has been identified in the Highway System Plan and prioritized in accordance with the programming process. (See Chapter 300 regarding documentation.)

(b) Evaluate Upgrade (EU)

An evaluate upgrade in a matrix cell indicates that WSDOT has determined the design element is an item of work that is to be considered for inclusion in the project. For an existing element that does not meet or exceed the specified design level, an analysis is required to determine the impacts and cost-effectiveness of including the element in the project. The EU analysis must support the decision regarding whether or not to upgrade that element. (See Chapter 300 regarding documentation.)

(c) Deviation

A deviation is required when an existing or proposed design element differs from the specified design level for the project and neither DE nor EU processing is indicated. (See Chapter 300 regarding documentation.)

(d) DE or EU with /F or /M

DE or EU with /F or /M in a cell means that the design element is to be analyzed with respect to the specified design level. For instance, a DE/F is analyzed with respect to full design level and might be recorded as having an existing design element that does not meet or exceed current full design level. An EU/M is analyzed to decide whether or not to upgrade any existing design element that does not meet or exceed the current modified design level.

(6) Terminology in Notes

The **Access Control Tracking System** mentioned in note [3] in Design Matrices 3, 4, and 5 is a database list related to highway route numbers and mileposts. The database is available at: www.wsdot.wa.gov/design/accessandhearings. (See Chapter 520 for access control basics and Chapters 530 and 540 for limited and managed access, respectively.)

The **corridor or project analysis** mentioned in notes [2] and [4] in Design Matrices 3, 4, and 5 is the documentation needed to support a change in design level from the indicated design level and to support decisions to include, exclude, or modify design elements. The first step is to check for recommendations for future improvements in an approved route development plan or other approved study. If no approved plans or studies are available, an analysis can be based on route continuity and other existing features. (See Chapter 300 regarding documentation.) A project analysis is also used for multiple related design variances. Check with the HQ Design Office before using this approach. A corridor analysis is also used to establish design speed, as discussed in Chapters 1130 and 1140.

State Route	NHS Route Description	Begin SR MP	Begin ARM	End SR MP	End ARM
US 2	I-5 to Idaho State Line	0.00B	0.00	334.51	326.64
US 2 Couplet	Brown Street Couplet	287.45	0.00	288.08	0.63
US 2 Couplet	Division Street Couplet	289.19	0.00	290.72	1.53
SR 3	US 101 to SR 104	0.00	0.00	60.02	59.81
SR 4	US 101 to I-5	0.00	0.00	62.28	62.27
I-5	Oregon State Line to Canadian Border	0.00	0.00	276.56	276.62
SR 8	US 12 to US 101	0.00	0.00	20.67	20.67
SR 9	SR 546 to Canadian Border	93.61	93.52	98.17	98.08
SR 9 Spur	Sumas Spur	98.00	0.00	98.25	0.24
SR 11	I-5 to Alaskan Ferry Terminal	19.93	19.93	21.28	21.28
US 12	US 101 to Idaho State Line	0.00	0.00	434.19	430.76
US 12 Couplet	Aberdeen Couplet	0.33	0.00	0.68	0.35
SR 14	I-5 to US 97	0.00	0.00	101.02	100.93
SR 14 Spur	Maryhill Spur	100.66	0.00	101.05	0.39
SR 16	I-5 to SR 3	0.00	0.00	29.19	27.01
SR 16 Spur	SR 16 to SR 3	28.74	0.00	29.13	0.39
SR 17	US 395 to I-90	7.43	0.00	50.89	43.40
SR 18	SR 99 to I-5	2.20B	0.00	0.00	0.53
SR 18	I-5 to I-90	0.00	0.53	27.91	28.41
SR 20	US 101 to I-5	0.00	0.00	59.54	59.49
SR 20 Spur	SR 20 to San Juan Ferry	47.89	0.00	55.67	7.78
SR 22	US 97 to I-82	0.70	0.00	4.00	3.31
SR 26	I-90 to US 195	0.00	0.00	133.53	133.61
SR 26 Spur	SR 26 to US 195	133.44	0.00	133.51	0.07
SR 28	US 2 to SR 281	0.00B	0.00	29.77	33.91
I-82	I-90 to Oregon State Line	0.00	0.00	132.60	132.57
I-90	I-5 to Idaho State Line	1.94	0.00	299.82	297.52
I-90 Reverse Lane	Reversible lane	1.99	0.00	9.44	7.45
SR 96	I-5 to McCollum Park and Ride	0.00	0.00	0.52	0.52
US 97	Oregon State Line to SR 22	0.00B	0.00	61.44	61.30
US 97	I-90 to Canadian Border	133.90	118.80	336.48	321.62
US 97 Couplet	Maryhill Couplet	2.59	0.00	2.68	0.09
US 97 Spur	US 97 to US 2 (Orondo)	213.36	0.00	213.62	0.26
SR 99	188th to SeaTac Airport	18.35	14.70	18.77	15.12
SR 99	SR 509 to SR 104	26.04	22.40	43.60	39.84
US 101	Oregon State Line to SR 401	0.00	0.00	0.46	0.46
US 101	SR 4 to I-5	28.89	28.89	367.41	365.78
US 101 Couplet	Aberdeen Couplet	87.49	0.00	91.66	4.17
US 101 Couplet	Port Angeles Couplet	249.65	0.00	251.32	1.67
SR 104	US 101 to I-5	0.20	0.00	29.67	29.14
SR 109	Pacific Beach Access	0.00	0.00	30.25	30.29
SR 125	Oregon State Line to SR 125 Spur	0.00	0.00	6.09	6.08
SR 125 Spur	SR 125 to US 12	6.09	0.00	6.76	0.67
SR 127	US 12 to SR 26	0.03	0.00	27.05	27.05
SR 128	US 12 to Idaho State Line	0.00	0.00	2.30	2.30

NHS Highways in Washington
Exhibit 1100-2

State Route	NHS Route Description	Begin SR MP	Begin ARM	End SR MP	End ARM
SR 166	SR 16 to Bay St	0.02	0.00	3.40	3.38
SR 167	I-5 to SR 900 / S 2nd St	0.00	0.00	27.28	28.60
I-182	I-82 to US 395	0.00	0.00	15.19	15.19
US 195	Idaho State Line to I-90	0.00B	0.00	95.99	93.37
US 195 Spur	US 195 to Idaho State Line	0.06	0.00	0.60	0.54
I-205	Oregon State Line to I-5	26.59	0.00	37.16	10.57
SR 240	I-182 to Coast St / Bypass Hwy – Hanford Access	30.63	28.86	34.87	33.10
SR 270	US 195 to Idaho State Line	0.00	0.00	9.89	9.89
SR 270	Pullman Couplet	2.67	0.00	2.90	0.23
SR 281	I-90 to SR 28	0.00	0.00	10.55	10.55
SR 281 Spur	SR 281 to I-90	2.65	0.00	4.34	1.69
SR 303	SR 304 to SR 3	0.00B	0.00	9.16	9.32
SR 304	SR 3 to Bremerton Ferry	0.00	0.00	3.51	3.24
SR 305	Winslow Ferry to SR 3	0.02	0.00	13.52	13.50
SR 307	SR 305 to SR 104	0.00	0.00	5.25	5.25
SR 310	SR 3 to SR 304	0.00	0.00	1.84	1.84
US 395	Congressional High-Priority Route / I-82 to Canadian Border	13.05	19.81	270.26	275.09
SR 401	US 101 to SR 4	0.00	0.00	12.13	12.13
I-405	I-5 to I-5	0.00	0.00	30.32	30.30
SR 432	SR 4 to I-5	0.00	0.00	10.33	10.32
SR 433	Oregon State Line to SR 432	0.00	0.00	0.94	0.94
SR 500	I-5 to SR 503	0.00	0.00	5.96	5.96
SR 501	I-5 to Port of Vancouver	0.00	0.00	3.83	3.42
SR 502	I-5 to SR 503	0.00B	0.00	7.56	7.58
SR 503	SR 500 to SR 502	0.00	0.00	8.09	8.09
SR 509	12th Place S to SR 99	24.35B	26.13	29.83	33.11
SR 509	Pacific Ave to Marine View Drive	0.22	1.44	3.20	4.42
SR 512	I-5 to SR 167	0.00	0.00	12.06	12.06
SR 513	Sandpoint Naval Air Station	0.00	0.00	3.35	3.35
SR 516	I-5 to SR 167	2.03	2.02	4.72	4.99
SR 518	I-5 to SR 509	0.00	0.00	3.81	3.42
SR 519	I-90 to Seattle Ferry Terminal	0.00	0.00	1.14	1.14
SR 520	I-5 to SR 202	0.00	0.00	12.83	12.82
SR 522	I-5 to US 2	0.00	0.00	24.68	24.68
SR 524	Cedar Way Spur to I-5	4.64	4.76	5.32	5.44
SR 524 Spur	Cedar Way Spur – Lynnwood Park & Ride to SR 524	4.64	0.00	5.14	0.50
SR 525	I-5 to SR 20	0.00	0.00	30.49	30.72
SR 526	SR 525 to I-5	0.00	0.00	4.52	4.52
SR 529	I-5 to Everett Homeport	0.00	0.00	2.72	2.72
SR 539	I-5 to Canadian Border	0.00	0.00	15.16	15.16
SR 543	I-5 to Canadian Border	0.00	0.00	1.09	1.09
SR 546	SR 539 to SR 9	0.00	0.00	8.02	8.02
I-705	I-5 to Schuster Parkway	0.00	0.00	1.50	1.50
SR 970	I-90 to US 97	0.00	0.00	10.31	10.31

NHS Highways in Washington

Exhibit 1100-2 (continued)

↓ Project Type	Main Line															Bridges			Barriers				
	Horizontal Alignment	Vertical Alignment	Lane Width	Shoulder Width ^[13]	On / Off Connection	Median Width	Cross Slope Lane	Cross Slope Shoulder	Fill / Ditch Slopes	Clear Zone	Signing ^[10]	Delineation ^[9]	Illumination & ITS	Basic Safety	Vertical Clear. ^[11]	Bike and Pedestrian	Lane Width	Shoulder Width	Structural Capacity	Term. & Trans. Section ^[12]	Standard Run	Bridge Rail ^[14] ^[19]	
(1-1) Preventative Maintenance																							
Pavement Restoration																							
(1-2) Diamond Grinding/Dowel Bar Retrofit									[28]	[28]	[28]	[28]	[28]	B						F	[28]	F	
(1-3) BST						[28]		[28]	[28]	[28]	[28]	[28]	B							F	[28]	F	
(1-4) Milling with HMA Inlays						[28]		[28]	[28]	[28]	[28]	[28]	B							F	[28]	F	
(1-5) HMA Overlays						[28]	[28]	[29]	[28]	[28]	[28]	[28]	B	F						F	F	F	
(1-6) PCCP Single Lane Rehab						[28]	[28]	[29]	[28]	[28]	[28]	[28]	B	EU/F						F	F	F	
Bridge Rehabilitation																							
(1-7) Bridge Deck Rehabilitation												F						[11]	F ^[6]	F ^[22]	F		
Safety																							
(1-8) Median Barrier																				F ^[20]	F ^[20]		
(1-9) Bridge Rail Upgrades																				F	F ^[22]	F	
(1-10) CAL/CAC/IAL	Design Elements determined based on identified Counter Measures ^[27]																						
Reconstruction [16]																							
(1-11) New / Reconstruction	F	F	F	F	F	F	F	F	F	F	F	F	F		F	F	F	F	F	F	F	F	F

Design Matrix 1: Interstate Routes (Main Line)
Exhibit 1100-3

↓ Project Type	Ramps and Collector Distributors															Crossroad														
	Horizontal Alignment	Vertical Alignment	Lane Width	Shoulder Width	Lane Transition	On / Off Connection	Cross Slope Lane	Cross Slope Shoulder	Fill / Ditch Slopes	Limited Access	Clear Zone	Sign., Delin., Illum., & ITS [9] [10]	Basic Safety	Vertical Clear. [11]	Bike and Pedestrian	Ramp Terminals	Barriers	Lane Width	Shoulder Width	Fill / Ditch Slopes	Limited Access	Clear Zone	Sign., Delin., Illum. & ITS [10]	Vertical Clear. [11]	Bike and Pedestrian	Term. & Trans. Section [12]	Standard Run	Bridge Rail [14] [19]		
(2-1) Preventative Maintenance																														
Pavement Restoration																														
(2-2) Diamond Grinding/Dowel Bar Retrofit								[28]		[28]	[28]	B					F	[28]	F		[28]		[28]	[28]			F	[28]	F	
(2-3) BST						[28]		[28]		[28]	[28]	B					F	[28]	F		[28]		[28]	[28]			F	[28]	F	
(2-4) Milling With HMA Inlays						[28]		[28]		[28]	[28]	B		M			F	[28]	F		[28]		[28]	[28]		M	F	[28]	F	
(2-5) HMA Overlays						[28]	[28]	[29]		[28]	[28]	B	F	M			F	F	F		[29]		[28]	[28]	EU/F	M	F	F	F	
Bridge Rehabilitation																														
(2-6) Bridge Deck Rehabilitation													B	F	M			F ^[6]	F ^[22]	F						F	M	F ^[6]	F ^[22]	F
Safety																														
(2-7) Intersection			F	F	F			F	F	F	F			M	F	F	F	F	F	F	F	F	F	F	F	M	F	F	F	
(2-8) Guardrail Upgrades										F							F	F ^[23]									F	F ^[23]		
(2-9) Bridge Rail Upgrades																	F	F ^[22]	F								F	F ^[22]	F	
(2-10) CAL/CAC/IAL	Design Elements determined based on identified Counter Measures ^[27]																													
Reconstruction^[16]																														
(2-11) New / Reconstruction	F	F	F	F	F	F	F	F	F	F	F	F		F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F

Design Matrix 2: Interstate Interchange Areas
Exhibit 1100-4

↓ Project Type	Main Line														Bridges ^[11]				Intersections			Barriers				
	Horizontal Alignment	Vertical Alignment	Lane Width	Shoulder Width	Lane Transition	On / Off Connection	Median Width	Cross Slope Lane	Cross Slope Shoulder	Fill / Ditch Slopes	Access ^[3]	Clear Zone ^[18]	Sign., Del., Illum., & ITS	Basic Safety	Bike & Ped.	Lane Width	Shoulder Width	Vertical Clearance	Structural Capacity	Turn Radii	Angle	I/S Sight Distance	Term. & Trans. Section ^[12]	Standard Run	Bridge Rail ^[14] ^[19]	
(3-1) Preventative Maintenance																										
Preservation																										
Roadway																										
(3-2) BST							[28]		[28]		[28]	[28]	B								[28]	F	[28]	F		
(3-3) Milling With HMA Inlays							[28]		[28]		[28]	[28]	B	M							[28]	F	[28]	F		
(3-4) HMA Overlays							[28]		[28]		[28]	[28]	B	M			EU/F				[28]	F	[28]	F		
(3-5) Replace HMA w/PCCP at I/S			EU/M	EU/M	EU/F			EU/M	EU/M	[28]		[28]	[28]	B	M			F		EU/F	EU/F	[28]	F	[28]	F	
Structures																										
(3-6) Bridge Replacement	F ^[2]	F ^[2]	F ^[2]	F ^[2]	F	F ^[2]	F ^[2]	F ^[2]	F ^[2]	F ^[2]		F	F		F	F ^[2]	F ^[2]	F	F	F ^[2]	F ^[2]	F	F	F	F	
(3-7) Bridge Deck Rehab.												[28]	[28]	B	M			F	[11]			[28]	F ^[6]	F ^[22]	F	
Improvements^[16]																										
Mobility																										
(3-8) Non-Interstate Freeway	F	F	F	F	F	F	F	F	F	F	F	F	F		F	F	F	F	F	F	F	F	F	F	F	
(3-9) Urban	F ^[2]	F ^[2]	F ^[2]	F ^[2]	F	F ^[2]	F ^[2]	F ^[2]	F ^[2]	F ^[2]	F	F	F		F	F ^[2]	F ^[2]	F	F	F ^[2]	F ^[2]	F	F	F	F	
(3-10) Rural	F ^[2]	F ^[2]	F ^[2]	F ^[2]	F	F ^[2]	F ^[2]	F ^[2]	F ^[2]	F ^[2]	F	F	F		F	F ^[2]	F ^[2]	F	F	F ^[2]	F ^[2]	F	F	F	F	
(3-11) HOV	F ^[2]	F ^[2]	F ^[2]	F ^[2]	F	F ^[2]	F ^[2]	F ^[2]	F ^[2]	F ^[2]	F	F	F		F	F ^[2]	F ^[2]	F	F	F ^[2]	F ^[2]	F	F	F	F	
(3-12) Bike/Ped. Connectivity [5]			F ^[2]	F ^[2]											F	F ^[2]	F ^[2]									
Safety																										
(3-13) Non-Interstate Freeway	F	F	F	F	F	F	F	F	F	F	F	F	F		F	F	F	F		F	F	F	F	F	F	
(3-14) Intersection ^[1]			F ^[2]	F ^[2]	F					F ^[2]	F	F	F		M					F	F	F	F	F	F	
(3-15) Corridor ^{[1][24]}	M ^[4]	M ^[4]	M ^[4]	M ^[4]	F	F ^[17]	M ^[4]	M ^[4]	M ^[4]	M ^[4]	F	F	F		F	M ^[4]	M ^[4]	F		M ^[4]	M ^[4]	F	F	F	F	
(3-16) Median Barrier				DE/F																			F ^[20]	F ^[20]		
(3-17) Guardrail Upgrades				DE/F																			F	F ^[23]		
(3-18) Bridge Rail Upgrades																							F	F ^[22]	F	
(3-19) CAL/CAC/IAL	Design Elements determined based on identified Counter Measures ^[27]																									
Economic Development																										
(3-20) Freight & Goods (Frost Free) ^[8]	F ^[2]	F ^[2]	F ^[2]	F ^[2]	F	F ^[2]	F ^[2]	F ^[2]	F ^[2]	F ^[2]	EU/F	F	F		EU/F ^[26]	DE/F	DE/F	F	F	EU/F	EU/F	EU/F	F	F	F	
(3-21) Four-Lane Trunk System	F	F	F	F	F	F	F	F	F	F	F	F	F		F	F	F	F	F	F	F	F	F	F	F	
(3-22) Rest Areas (New)	F	F	F	F	F	F	F	F	F	F	F	F	F		F	F	F	F		F	F	F	F	F	F	
(3-23) Bridge Restrictions	F ^[2]	F ^[2]	F ^[2]	F ^[2]	F	F ^[2]	F ^[2]	F ^[2]	F ^[2]	F ^[2]		F	F		EU/F ^[26]	F ^[2]	F ^[2]	F	F	F ^[2]	F ^[2]	F	F	F	F	
(3-24) Bike Routes (Shldrs)			EU/M	[7]	EU/F				EU/M	EU/M		[28]	[28]	B	F	EU/M	EU/M	F				[28]	F	[28]	EU/F	

Design Matrix 3: Main Line NHS Routes (Except Interstate)
Exhibit 1100-5

↓ Project Type	Main Line														Bridges ^[11]				Intersections			Barriers		
	Horizontal Alignment	Vertical Alignment	Lane Width	Shoulder Width	Lane Transition	Median Width	Cross Slope Lane	Cross Slope Shoulder	Fill / Ditch Slopes	Access ^[3]	Clear Zone ^[18]	Sign., Del., Illum., & ITS	Basic Safety	Bike & Ped.	Lane Width	Shoulder Width	Vertical Clearance	Structural Capacity	Turn Radii	Angle	I/S Sight Distance	Term. & Trans. Section ^[12]	Standard Run	Bridge Rail ^[19]
(5-1) Preventative Maintenance																								
Preservation																								
Roadway																								
(5-2) BST							[28]		[28]		[28]	[28]	B								[28]	F	[28]	F
(5-3) Milling with HMA Inlays							[28]		[28]		[28]	[28]	B	M							[28]	F	[28]	F
(5-4) HMA Overlays							[28]		[28]		[28]	[28]	B	M			EU/F				[28]	F	[28]	F
(5-5) Replace HMA w/PCCP at I/S			EU/M	EU/M	EU/F		EU/M	EU/M	[28]		F	[28]	B	M			F		EU/F	EU/F	[28]	F	F	F
Structures																								
(5-6) Bridge Replacement	M	F	M	M	F		M	M	M		F	F		F	F ^[2]	F ^[2]	F	F	M	M	F	F	F	F
(5-7) Bridge Repl. (Multilane)	F ^[2]	F ^[2]	F ^[2]	F ^[2]	F	F ^[2]	F ^[2]	F ^[2]	F ^[2]		F	F		F	F ^[2]	F ^[2]	F	F	F ^[2]	F ^[2]	F	F	F	F
(5-8) Bridge Deck Rehab.												[28]	B	M				[11]			[28]	F ^[6]	F ^[22]	F
Improvements^[16]																								
Mobility																								
(5-9) Urban (Multilane)	F ^[2]	F ^[2]	F ^[2]	F ^[2]	F	F ^[2]	F ^[2]	F ^[2]	F ^[2]	F	F	F		F	F ^[2]	F ^[2]	F	F	EU/F	EU/F	F	F	F	F
(5-10) Urban	M	M	M	M	F		M	M	M	F	F	F		F	M	M	F	F	EU/M	EU/M	F	F	F	F
(5-11) Rural	M	M	M	M	F	M	M	M	M	F	F	F		F	M	M	F	F	EU/M	EU/M	F	F	F	F
(5-12) HOV	M	M	M	M	F	M	M	M	M	F	F	F		F	M	M	F	F	EU/M	EU/M	F	F	F	F
(5-13) Bike/Ped. Connectivity [5]			F ^[2]	F ^[2]										F	F ^[2]	F ^[2]								
Safety																								
(5-14) Non-Interstate Freeway	F ^[2]	F ^[2]	F ^[2]	F ^[2]	F ^[2]	F ^[2]	F ^[2]	F ^[2]	F ^[2]	F	F	F		F	F ^[2]	F ^[2]	F		F ^[2]	F ^[2]	F	F	F	F
(5-15) Intersection ^[1]			M ^[4]	M ^[4]	F				M ^[4]	F	F	F		M					M ^[4]	M ^[4]	F	F	F	F
(5-16) Corridor ^{[1][24]}	M ^[4]	M ^[4]	M ^[4]	M ^[4]	F	M ^[4]	M ^[4]	M ^[4]	M ^[4]	F	F	F		M	M ^[4]	M ^[4]	F		M ^[4]	M ^[4]	F	F	F	F
(5-17) Median Barrier				DE/F																		F ^[20]	F ^[20]	
(5-18) Guardrail Upgrades				DE/F																		F	F ^[23]	
(5-19) Bridge Rail Upgrades																						F	F ^[22]	F
(5-20) CAL/CAC/IAL	Design Elements determined based on identified Counter Measures ^[27]																							
Economic Development																								
(5-21) Freight & Goods (Frost Free) ^[8]	EU/M	EU/M	EU/M	EU/M	EU/M	EU/M	M	M	EU/M		F	[28]	B	EU/F ^[26]	DE/M	DE/M	F		EU/M	EU/M	EU/F	F	[28]	F
(5-22) Rest Areas (New)	F	F	F	F	F	F	F	F	F	F	F	F		F	F	F			F	F	F	F	F	F
(5-23) Bridge Restrictions	M	F	M	M	F	M	M	M	M		F	F		EU/F ^[26]	M	M	F	F	M	M	F	F	F	F
(5-24) Bike Routes (Shldrs)			EU/M	[7]	EU/F			EU/M	EU/M		[28]	[28]	B	F	EU/M	EU/M					[28]	F	[28]	EU/F

Design Matrix 5: Main Line Non-NHS Routes
Exhibit 1100-7

Design Matrix Notes:

- A blank cell indicates that the element is not applicable.
- B** Basic Design Level (see Chapter 1120).
- F** Full design level (see Chapter 1140).
- M** Modified design level (see Chapter 1130).
- DE** Design Exception to design level indicated.
- EU** Evaluate Upgrade to design level indicated.

- [1] Collision Reduction or Collision Prevention (At-Grade Removal, Signalization & Channelization). Specific deficiencies that created the project must be upgraded to design level as stated in the matrix.
- [2] Modified design level may apply based on a corridor or project analysis (see 1100.03(6)).
- [3] If designated as L/A acquired in the Access Control Tracking System, limited access requirements apply. If not, managed access applies (see 1100.03(6)).
- [4] Full design level may apply based on a corridor or project analysis (see 1100.03(6)).
- [5] For bike/pedestrian design, see Chapters 1510, 1515, and 1520.
- [6] Applies only to bridge end terminals and transition sections.
- [7] 4-ft minimum shoulders.
- [8] If all-weather structure can be achieved with spot digouts and overlay, modified design level applies to NHS highways and basic design level applies to non-NHS highways.
- [9] Continuous shoulder rumble strips required in rural areas (see Chapter 1600).
- [10] See Chapter 1020.
- [11] See Chapter 720.
- [12] Impact attenuators are considered as terminals.
- [13] See Chapters 1140 and 1230.
- [14] Includes crossroad bridge rail (see Chapter 1610).
- [16] For design elements not in the matrix headings, apply full design level as found in the applicable chapters and see 1100.03(2). Document with an evaluate upgrade.
- [17] DE for existing acceleration/deceleration lanes when length meets posted freeway speed and no significant crash history (see Chapter 1360).
- [18] On managed access highways within the limits of incorporated cities and towns, city and county design standards apply to areas outside the curb or outside the paved shoulder where no curb exists.
- [19] The funding sources for bridge rail are a function of the length of the bridge. Consult programming personnel.
- [20] Applies to median elements only.
- [22] Upgrade barrier, if necessary, within 200 ft of the end of the bridge.
- [23] See description of Guardrail Upgrades Project Type, 1100.03(1), regarding length of need.
- [24] Apply full design level to projects that realign or reconstruct significant portions of the alignment.
- [25] For impacts to the main line, use the Project Type row for Safety, Non-Interstate Freeway on Matrix 3 for NHS and on Matrix 5 for non-NHS.
- [26] Sidewalk ramps must be addressed for ADA compliance (see Chapter 1510).
- [27] Collision Analysis Locations (CALs), Collision Analysis Corridors (CACs), and Intersection Analysis Locations (IALs) require a collision data analysis to identify the contributing factors to the crashes from which counter measures will be identified to reduce the frequency and severity of the collisions. See Safety Project Scoping process flowchart.
- [28] See 1120 Basic Design Level, for further information.
- [29] EU for Fill and Ditch in-slopes steeper than 4:1. Addressing of the back slope or slopes protected by barrier is not required.

Design Matrix Notes
Exhibit 1100-8

- 1120.01 General
- 1120.02 Basic Safety
- 1120.03 Minor Safety and Minor Preservation Work
- 1120.04 Documentation

1120.01 General

Basic design level (B) preserves pavement structures, extends pavement service life, and restores the roadway for reasonably safe operations, which may include safety enhancements. Flexibility is provided so that other enhancements may be made while remaining within the scope of pavement preservation work.

The basic safety items of work listed in this chapter may be programmed under a separate project from the paving project as long as:

- There is some benefit to the delay.
- The safety features remain functional.
- The safety work planning is coordinated with the Capital Program Development and Management Office, in accordance with programming instructions and region strategies
- A separate project file is maintained that addresses the separation of work and the planned delivery of the future project. Specify the project delivery plans for the basic safety project in the Design Documentation Package.

The basic safety work can be accomplished separately using a corridor-by-corridor approach. If a standalone basic safety project is developed it shall include the design elements in the original matrix from which this work was deferred.

Each project should complete a GIS map with Roadside Features Inventory (RFIP) data and collisions plotted on it to assist with the identification of the following basic safety work.

1120.02 Basic Safety

For basic design level, include the following items of work:

- Install and replace delineation in accordance with Chapter 1030.
- Install and replace rumble strips in accordance with the design matrices (see Chapters 1100 and 1600).
- Adjust existing features (such as monuments, catch basins, and access covers) that are affected by resurfacing.
- Adjust existing standard run of barriers, including guardrail height, in accordance with Chapter 1610.

- Replace signing as needed; this does not include replacement of sign bridges or cantilever supports. Refer to Chapter 1020 for design guidance.
- Relocate, protect, or provide breakaway features for sign supports, luminaires, WSDOT electrical service poles, and other intelligent transportation systems (ITS) equipment inside the Design Clear Zone. Consult with the region Traffic Engineer and review the WSDOT ITS plan to determine the specific ITS devices within the project limits and the requirements for each project (see Chapters 1020, 1040, 1050, and 1330).
- Restore sight distance at public road intersections and the inside of curves through low-cost measures (when available) such as removal or relocation of signs and other obstructions or cutting of vegetative matter (see Chapter 1310).
- Upgrade bridge rail in accordance with the matrices and Chapter 1610.
- Upgrade barrier terminals and bridge end protection, including transitions, in accordance with Chapter 1610.
- Restore the cross slope to 1.5% when the existing cross slope is flatter than 1.5% and the steeper slope is needed to provide adequate highway runoff in areas of intense rainfall (see Chapter 1230).
- Remove the rigid top rail and brace rails from Type 1 and Type 6 chain link fence and retrofit with a tension wire design (see Chapter 560).

1120.03 Minor Safety and Minor Preservation Work

Consider the following items, where appropriate, within the limits of a pavement Preservation project:

- Spot safety enhancements, which are modifications to isolated roadway or roadside features that, in the engineer's judgment, reduce potential collision frequency and/or severity. Use the Roadside Features Inventory Program (RFIP) data, GIS mapping with collisions plotted on them, and Safety Analyst AASHTOWare to assist with the identification of spot safety locations for consideration.
- When recommended by the region Traffic Engineer, additional or improved channelization to address intersection-related safety concerns, where sufficient pavement width and structural adequacy exist or can be obtained. With justification, which addresses the impacts to all roadway users, channelization improvements may be implemented, with lane and shoulder widths no less than the design criteria specified in the "Rechannelize Existing Pavement projects" section in Chapter 1110. Consider illumination of these improvements. Document decisions when full illumination is not provided, including an analysis of the frequency and severity of nighttime collisions.
- Roadside safety hardware (such as guardrail, signposts, and impact attenuators).
- Addressing Location 1 Utility Objects in accordance with the *Utilities Accommodation Policy*.

- Consider the addition of traffic signal control, illumination, and intelligent transportation systems (ITS) equipment. Consult with the region Traffic Engineer and review the WSDOT ITS plan to determine the specific requirements for each project (see Chapters 1040, 1050, and 1330).

To maintain the intended function of existing systems, consider the following:

- Right of way fencing (see Chapter 560)
- Drainage (see Chapter 800)
- Illumination (see Chapter 1040)
- Intelligent transportation systems (ITS) (see Chapter 1050)
- Traffic control signals (see Chapter 1330)
- Pedestrian use (see Chapters 1510 and 1515)
- Bicycle use (see Chapters 1515 and 1520)

Examples of the above include, but are not limited to:

- Installing short sections of fence needed to control access.
- Replacing grates that are not bicycle-safe (see Chapter 1520).
- Upgrading electrical system components that require excessive maintenance.
- Replacing or upgrading a traffic signal controller.
- Installing conduit and junction boxes for future traffic signal control, illumination, or ITS projects.
- Replacing or upgrading nonstructural traffic control signals, illumination, and ITS equipment that is near or beyond the life expectancy.
- Beveling culverts.

1120.04 Documentation

For the list of documents required to be preserved in the Design Documentation Package and the Project File, see the Design Documentation Checklist:

☞ www.wsdot.wa.gov/design/projectdev/

Project Design	FHWA Oversight Level	Deviation and Corridor/Project Approval ^{[1][2]}	EU Approval ^[2]	Design and Project Development Approvals
Interstate				
New/Reconstruction ^[3] Federal funds No federal funds	[4] [5]	FHWA	Region	FHWA ^[10]
Intelligent Transportation Systems (ITS) Improvement project over \$1 million Preservation project	[6] [6]	HQ Design HQ Design	Region Region	HQ Design Region
All Other ^[7] Federal funds State funds Local agency funds	[6] [6] [5]	HQ Design	Region	Region
National Highway System (NHS)				
Managed access highway outside incorporated cities and towns or inside unincorporated cities and towns, or limited access highway	[6]	HQ Design	Region	Region
Managed access highway within incorporated cities and towns ^[8] Inside curb or EPS ^{[9][13]} Outside curb or EPS	[6] [6]	HQ Design HQ H&LP	Region N/A	Region City/Town
Non-National Highway System (Non-NHS)				
Improvement project on managed access highway outside incorporated cities and towns or within unincorporated cities and towns, or on limited access highway (Matrix lines 5-9 through 5-24)	N/A	HQ Design	Region	Region
Improvement project on managed access highway within incorporated cities and towns ^[8] Inside curb or EPS ^{[9][13]} Outside curb or EPS (Matrix lines 5-9 through 5-24)	N/A N/A	HQ Design HQ H&LP	Region N/A	Region City/Town
Preservation project on managed access highway outside incorporated cities and towns or within unincorporated cities and towns, or on limited access highway ^[11] (Matrix lines 5-2 through 5-8)	N/A	Region ^[12]	Region	Region
Preservation project on managed access highway within incorporated cities and towns ^{[8][11]} Inside curb or EPS ^{[9][13]} Outside curb or EPS (Matrix lines 5-2 through 5-8)	N/A N/A	Region HQ H&LP	Region N/A	Region City/Town

For table notes, see the following page.

Design Approval Level

Exhibit 300-2

