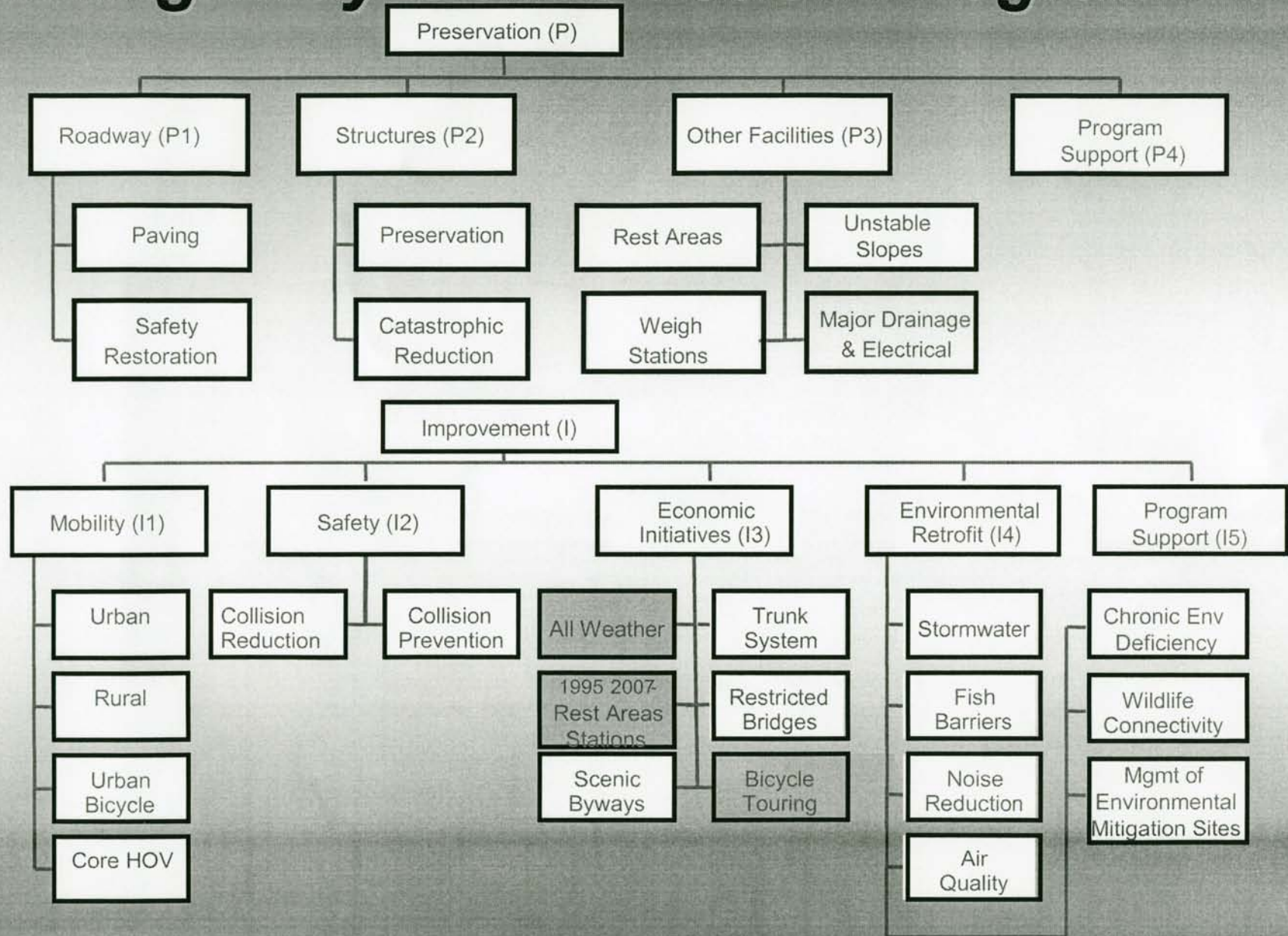



# Highway Construction Program



 Strategy no longer active

- 325.01 General
- 325.02 Selecting a Design Matrix
- 325.03 Using a Design Matrix

**325.01 General**

The *Design Manual* provides guidance for three levels of design for highway projects: the 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 330.

**325.02 Selecting a Design Matrix**

Selection of a design matrix (see Figure 325-1) 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**  
*Figure 325-1*

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:

- 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 Figure 325-2) with the letter "I" before the route number.

The **National Highway System (NHS)** (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 Figure 325-2).

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 Figure 325-2. They are shown on WSDOT's (free) Official State Highway Map of Washington.

### 325.03 Using a Design Matrix

The design matrices are shown in Figures 325-3 through 325-7. 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 not listed in the design matrices (such as unstable slopes), consult the Headquarters (HQ) Design Office for guidance.

In the design matrices, row selection is based on Project Type. The Project Summary (see Chapter 330) defines 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 funding programs and subprograms.)

The various sources of funds for these subprograms carry eligibility requirements that the designers and project development 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.

↕ Project Type														Bridges (11)				Intersections			Barriers								
	Design Elements →													Lane Width	Shldr Width	Vertical Clearance	Structural Capacity	Turn Radii	Angle	I/S Sight Dist.	Term. & Trans. Section (12)	Std Run	Bridge Rail (14)(19)						
Horiz. Align.	Vert. Align.	Lane Width	Shldr Width	Lane Transition	On/Off Conn.	Median Width	Cross Slope Lane	Cross Slope Shldr	Fill/ Ditch Slopes	Access (3)	Clear Zone (18)	Sign., Del., Illumin.	Basic Safety	Bike & Ped.															
<b>Preservation</b>																													
<b>Roadway</b>																													
(3-1) Non-Interstate Freeway	DE/F	DE/F	DE/F	DE/F	DE/F	DE/F	DE/F	DE/F	DE/F	DE/F	DE/F	B	B			DE/F	DE/F	F								F	B	F	
(3-2) HMA/PCCP/BST Overlays	DE/M	DE/M	DE/M	DE/M	DE/F	DE/F	DE/M	DE/M	DE/M	DE/M		B	B	M		DE/M	DE/M	F								B	F	B	F
(3-3) Replace HMA w/ PCCP at I/S	DE/M	DE/M	EU/M	EU/M	DE/F		DE/M	EU/M	DE/M	DE/M		B	B	M		DE/M	DE/M	F								B	F	B	F
<b>Structures</b>																													
(3-4) 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	F	
(3-5) Bridge Deck Rehab.												B	B	M				F								F(6)	F(22)	F	
<b>Improvements (16)</b>																													
<b>Mobility</b>																													
(3-6) 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	F	F	F	F	F
(3-7) 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	F(2)	F(2)	F	F	F	F(2)	F(2)	F	F	F	F	F	F	F
(3-8) 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	F(2)	F(2)	F	F	F	F(2)	F(2)	F	F	F	F	F	F	F
(3-9) HOV	F(2)	F(2)	F(2)	F(2)	F	F(2)	F(2)	F(2)	F(2)	F	F	F	F	F	F	F(2)	F(2)	F	F	F	F(2)	F(2)	F	F	F	F	F	F	F
(3-10) Bike/Ped. Connectivity	(5)	(5)	(5)	(5)	(5)					(5)	(5)	(5)	(5)	(5)		(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)
<b>Safety</b>																													
(3-11) 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	F	F	F	F	F
(3-12) Intersection (1)			F(2)	F(2)	F					F(2)	F	F	F	M						M	F	F	F	F	F	F	F	F	F
(3-13) 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(20)	F(20)	F	F
(3-14) Median Barrier				DE/F																						F	F(23)	F	F
(3-15) Guardrail Upgrades				DE/F																						F	F(23)	F	F
(3-16) Bridge Rail Upgrades																										F	F(22)	F	F
(3-17) Risk: Roadside										F	EU/F	F	F													F	F	F	F
(3-18) Risk: Sight Distance	FM(21)	FM(21)	FM(21)	FM(21)						FM(21)	F(21)	F(21)	F	F	F	F(21)	F(21)	F(21)			FM(21)	FM(21)	F(21)	F	F	F	F	F	F
(3-19) Risk: Roadway Width			FM(21)	FM(21)	F(21)	F(21)	FM(21)	FM(21)	FM(21)	FM(21)	F	F	F	F	F	F(21)	F(21)	F(21)			FM(21)	FM(21)	F(21)	F	F	F	F	F	F
(3-20) Risk: Realignment	F(2)	F(2)	F(2)	F(2)	F	F(2)	F(2)	F(2)	F(2)	F(2)	F	F	F	F	F	F(2)	F(2)	F			F(2)	F(2)	F(2)	F	F	F	F	F	F
<b>Economic Development</b>																													
(3-21) Freight & Goods (Frost Free)(8)	F(2)	F(2)	F(2)	F(2)	F	F(2)	F(2)	F(2)	F(2)	EU/F	F	B		EU/F(26)	DE/F	DE/F	F	F	F	EU/F	EU/F	EU/F	F	F	F	F	F	F	F
(3-22) 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	F	F	F	F	F
(3-23) 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	F	F	F	F	F	F
(3-24) Bridge Restrictions	F(2)	F(2)	F(2)	F(2)	F	F(2)	F(2)	F(2)	F(2)	F(2)	F	F	F	EU/F(26)	F(2)	F(2)	F	F	F	F(2)	F(2)	F	F	F	F	F	F	F	F
(3-25) Bike Routes (Shldr)			EU/M	(7)	EU/F					EU/M	EU/M		B	B	F	EU/M	EU/M	F							B	F	B	EU/F	F

- ☐ Not Applicable
- F Full design level. See Chapter 440.
- M Modified design level. See Chapter 430.
- B Basic design level. See Chapter 410.
- F/M Full for freeways/Modified for nonfreeway
- DE Design Exception
- EU Evaluate Upgrade

- (1) Collision Reduction (HAL, HAC, PAL), 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 325.03(5).
- (3) If designated as L/A acquired in the Access Control Tracking System, limited access requirements apply. If not, managed access applies. See 325.03(5).
- (4) Full design level may apply based on a corridor or project analysis. See 325.03(5).
- (5) For bike/pedestrian design see Chapters 1020 and 1025.
- (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 ditches and overlay, modified design level applies to NHS highways and basic design level applies to non-NHS highways.
- (11) See Chapter 1120.
- (12) Impact attenuators are considered as terminals.
- (14) Includes crossroad bridge rail. See Chapter 710.

- (16) For design elements not in the matrix headings, apply full design level as found in the applicable chapters and see 325.03(2).
- (17) DE for existing acceleration/deceleration lanes when length meets posted freeway speed and no significant accidents. See Chapter 940.
- (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.
- (21) Analyses required. See 325.03(5) for details.
- (22) Upgrade barrier, if necessary, within 200 ft of the end of the bridge.
- (23) See description of Guardrail Upgrades Project Type, 325.03(1) regarding length of need.
- (24) Apply Full design level to projects that realign or reconstruct significant portions of the alignment.
- (26) Sidewalk ramps must be addressed for ADA compliance. See Chapter 1025.

**Design Matrix 3:  
Main Line NHS Routes (Except Interstate)**  
Figure 325-5

- 410.01 General
- 410.02 Required Basic Safety Items of Work
- 410.03 Minor Safety and Minor Preservation Work

### 410.01 General

Basic design level (B) preserves pavement structures, extends pavement service life, and maintains safe operations of the highway. Basic design level includes restoring the roadway for safe operations and may include safety enhancement. Flexibility is provided so that other conditions can be enhanced while remaining within the scope of pavement preservation work.

The required safety items of work listed below 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, and the work is completed within two years after the completion of the paving project. If some of the required items are separated from the paving project, maintain a separate documentation file that addresses the separation of work during the two-year time period.

For bituminous surface treatment projects on non-NHS routes, the separation of required safety items is not limited to the two-year time period. The safety work can be accomplished separately using a corridor-by-corridor approach.

### 410.02 Required Basic Safety Items of Work

For basic design level, the following items of work are required:

- Install and replace delineation in accordance with Chapter 830
- Install and replace rumble strips in accordance with the design matrices (see Chapter 325) and Chapter 700
- Adjust existing features such as monuments, catch basins, and access covers that are affected by resurfacing
- Adjust guardrail height in accordance with Chapter 710
- Replace deficient signing as needed (this does not include replacement of sign bridges or cantilever supports)
- Relocate, protect, or provide breakaway features for sign supports, luminaires, and WSDOT electrical service poles inside the Design Clear Zone
- 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 and cutting of vegetative matter
- Upgrade nonstandard bridge rail in accordance with the matrices and Chapter 710
- Upgrade barrier terminals and bridge end protection, including transitions, in accordance with Chapter 710
- Restore the cross slope to 1.5% when the existing cross slope is flatter than 1.5% and, in the engineer's judgment, the steeper slope is needed to solve highway runoff problems in areas of intense rainfall
- 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 1460)

### 410.03 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 accident frequency or severity.
- When recommended by the Region Traffic Engineer, additional or improved channelization to address intersection-related accident concerns, where sufficient pavement width and structural adequacy exist or can be obtained. With justification, and considering 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 340. Consider illumination of these improvements. Document decisions when full illumination is not provided, including an analysis of the frequency and severity of nighttime accidents.
- Roadside safety hardware (such as guardrail, signposts, and impact attenuators).
- Addressing Location 1 Utility Objects in accordance with the *Utilities Accommodation Policy*.

Consider the following items when restoration, replacement, or completion is necessary to ensure that an existing system can function as intended:

- Right of way fencing
- Drainage
- Illumination
- Electrical
- Pedestrian and bicycle use

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

- Installing short sections of fence needed to control access
- Replacing grates that are a hazard to bicycles
- Upgrading electrical system components that require excessive maintenance
- Beveling culverts