Chapter 42 City and County Design Standards for All Routes

42.1 Introduction

The City Design Standards Committee and the County Design Standards Committee, in accordance with RCW 35.78.030 and 43.32.020, meet on a regular basis to review and update the city and county design standards for all facilities (NHS and Non-NHS).

The Local Agency Engineer may approve use of the minimum AASHTO and related standards as contained in the references. Design deviations must have the approval of the Washington State Department of Transportation (WSDOT) Local Programs in accordance with RCW 35.78.040 or RCW 36.86.080 as appropriate. When AASHTO and/or related design standards as contained in the references are updated and published, agencies must incorporate the new design standards for all projects no later than two years after of the publication date.

All projects are subject to Americans with Disabilities Act (ADA) and Section 504 of the Rehabilitation Act requirements for accessibility. For guidance on ADA standards, please see *Design Manual* M 22-01.

These standards apply to new construction and reconstruction projects, 3R and 2R projects, and low volume road and street projects on all routes which are classified as Principal Arterials, Minor Arterials, or Collectors. These standards are applicable to new or reconstructed bridges on rural minor collectors, local roads, and local streets.

Included in the standards are the Local Agency Design Matrices. The matrices are used to standardize design element requirements based on project type for all facilities. The Local Agency Design Matrices Checklists may serve as design documentation for decisions made.

In adopting these standards, the committees seek to encourage standardization of road design elements where necessary for consistency and to assure that motoring, bicycling, and pedestrian public safety needs are met. Considerations include safety, convenience, context sensitive solutions, proper drainage, and economical maintenance. The committees recognize that cities and counties must have the flexibility to carry out the general duty to provide streets, roads, and highways for the diverse and changing needs of the traveling public.

These standards cannot provide for all situations. They are intended to assist, but not to substitute for, competent work by design professionals. It is expected that land surveyors, engineers, and architects will bring to each project the best skills from their respective disciplines. These standards are also not intended to limit any innovative or creative effort, which could result in better quality, better cost savings, or both. An agency may adopt higher standards to fit local conditions. Special funding programs may also have varying standards.

The decision to use a particular road design element at a particular location should be made on the basis of an engineering analysis of the location. Thus, while this document provides design standards, it is not a substitute for engineering judgment.

Engineers should take into account all available information, including available funding, and use the professional judgment that comes from training and experience to make the final design determination. There shall be a record, of the matters considered during the design process that justify decisions made regarding the final project design. The project design must be approved by the approving authority as outlined on the agency's Certification Acceptance Agreement or the acting designated authority for a Non-Certification Acceptance agency. See Chapter 43.

42.2 Committee Membership

City Design Standards Committee RCW 35.78.020	County Design Standards Committee RCW 43.32.010	Other Participants
Jim Parvey, PE Senior Principal Engineer City of Tacoma jparvey@cityoftacoma.org	Seth Walker, PE Assistant County Engineer Columbia County seth_walker@co.columbia.wa.us	Alison Hellberg Association of Washington Cities alisonh@awcnet.org
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Ravyn Whitewolf, PE, PMP, AVS Public Works Director City of Blaine rwhitewolf@cityofblaine.com	Theresa Parsons, PE Design Engineering Manager Thurston County parsont@co.thurston.wa.us	Mike Horton Operations Mgr. for Transportation AECOM michael.horton@aecom.com

These design standards were developed with the approval and authorization of:

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Kyle McKeon, Committee Chair
Engineering Services Manager
Headquarters Local Programs
Washington State Department of Transportation

42.3 Local Agency Design Matrices

The Local Agency Design Matrices were created as part of the Local Agency Standards to assist designers in determining the design level for the geometric and safety elements of a project. The Local Agency Design Matrix Checklist may serve as documentation for design decisions made.

.31 Using the Matrices – The column headings on each of the three design matrices are design elements. They are based principally on the 13 controlling design criteria recognized by FHWA: 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. Within the column headings, some of the controlling criteria have been combined (for example, design speed is part of horizontal and vertical alignment). The matrices are divided into three tables, one each for Roadways, Cross Roads, and Bridges. Within the three tables the project types are identical, design elements vary depending on which elements apply.

A blank cell within the design matrix signifies that the design element need not be addressed because it is beyond the scope of the project type.

Design levels of City and County Design Standards (D), AASHTO (A), and Agency Evaluate (AE), are used in the matrix. The design level codes are noted in the cells by D, A or AE or by a number corresponding to a footnote. For roads that have volumes less than 400 ADT, AASHTO Geometric Design of Very Low Volume Roads (ADT<400) may be used.

Optional Checklists have been provided for the designer to use with the matrix. A checklist is available for each type of project in Appendix 42.101.

Matrix Cells: Each Matrix cell is either blank or has a coded design level.

.32 Design Levels – If the Design Level is D, use the Geometric Cross-Section for Two-Way Roads and Streets within the City and County Design Standards on page 12.

If the design level is A, the design standard is AASHTO (the most current edition of the AASHTO publication *A Policy on Geometric Design of Highway and Streets*, "Guidelines for Geometric Design of Very Low-Volume Local Roads (ADT< 400)," or as noted in the City and County Design Standards. When AASHTO and/or related design standards as contained in the references are updated and published, agencies must comply with the new design standards for all projects no later than two years after of the publication date.

When the Matrix cell has either a "D" or an "A" and the final design utilizes something less than Design Level A, a Design Deviation, approved by Headquarters Local Programs, is required.

A Blank Cell on a matrix line indicates that particular design element requires no evaluation or documentation. If the agency decides to improve or modify a blank cell design element, that element must meet Design Level A and the agency must justify in their design document files why the decision to upgrade the design element was made. Per FHWA guidelines, if an improvement in a "Blank Cell" area is made, it must meet all requirements of design level A. Or if, in the opinion of the agency's design Engineer, Design Level A cannot be achieved, a Design Exception may be considered.

AE in a matrix cell indicates that an agency needs to determine if the existing design element is less than Design Level A. If the existing design element meets or exceeds Design Level A the agency notes that in the design documents and no further action is required. If the existing design element is less than Design Level A, the agency shall

determine the impacts and cost effectiveness of upgrading the design element to Design Level A. The decision whether or not to upgrade, and its analysis and justification shall be in the agency design documentation files. If the agency upgrades, Design Level A applies. Or if, in the opinion of the agency's design Engineer, Design Level A cannot be achieved, a Design Exception may be utilized.

A Design Exception may be utilized if, in the opinion of the local agency's design Engineer, the existing design element is being improved but Design Level D or A cannot be achieved. For example, design standard requires a 6 foot wide shoulder for a project, the existing condition is a two foot wide shoulder but the best that can be reasonably achieved is a 4 foot wide shoulder. This is a Design Exception, improvement is being made but not to Design Level A.

42.4 Local Agency Design Matrix Definitions

.41 Design Elements – Design elements are the principal elements of design that are common to projects. The following elements are shown on the Design Matrix.

- Horizontal Alignment is the horizontal attributes of the roadway including horizontal curvature, superelevation, and stopping sight distance; all based on design speed.
- Vertical Alignment is the vertical attributes of the roadway including vertical curvature, profile grades, and stopping sight distance; all based on design speed.
- Lane Width is the distance between lane lines.
- Shoulder Width is the distance between the outside or inside edge line and the edge of in-slope, or face of barrier.
- Lane and Shoulder Taper (pavement transitions) are the rate and length of transition of changes in width of roadway surface.
- Pedestrian Facility is a facility designed to meet the needs of pedestrians in accordance with city, county, and ADA requirements concurrent with a local agency project
- Sidewalk Width is the width of a sidewalk from the face of curb to the back of sidewalk.
- Cross Slope, Lane is the rate of elevation change across a lane. This element includes the algebraic difference in cross slope between adjacent lanes.
- Cross Slope, Shoulder is the rate of elevation change across a shoulder.
- Superelevation is the rotation of the roadway cross section in such a manner as to overcome part of the centrifugal force that acts on a vehicle traversing a curve.
- Fill/Ditch Fore Slope is downward slope from edge of shoulder to bottom of ditch or catch.
- Clear Zone is the total roadside border area, starting at the edge of the traveled lane, 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.
- Safety Improvements are the safety items listed under the "Safety Improvements" section of these standards.
- Shared Use Bicycle and Pedestrian Facilities are walkways, paths, or trails for shared use by both pedestrian and bicycle traffic. Effective July 1, 2012, refer to the current AASHTO bicycle design standards and/or standards submitted by the local agency which have been approved by Local Programs for any facility allowing bicycle traffic, and NATCO urban bikeway design guide.

- Turn Radii is the geometric design of the intersection to allow the design vehicle for each turning movement to complete the turn without encroachment.
- I/S (Intersection) Sight Distance is the distance that the driver of a vehicle on the crossroad can see along the through roadway, as compared to the distance required for safe operation.
- I/S Angle is the angle between any two intersecting legs at the point that the center lines intersect.
- Barriers Standard Run (Std Run) are guardrail and other barriers excluding terminals, transitions, attenuators, and bridge rails.
- Barriers Bridge Rail is barrier on a bridge excluding transitions.
- Bridge Vertical Clearance is the minimum height between the roadway including shoulder and an overhead obstruction.
- Bridge Structural Capacity is the load bearing ability of a structure.
- Terminals are crashworthy end treatment for longitudinal barriers that is 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 and beam guardrail terminals include anchorage.
- Transitions are sections of barriers used to produce a gradual stiffening of a flexible or semi-rigid barrier as it connects to a more rigid barrier or fixed objects.

.42 Project Type Definitions

- New Construction involves the construction of a new roadway facility or structure where nothing of its type currently exists.
- Reconstruction projects may add additional travel lanes to an existing roadway or bridge and if 50 percent or more of the project length involves vertical or horizontal alignment changes, the project will be considered reconstruction.
- 3R projects focus primarily on the preservation and extending of the service life of existing facilities and on safety enhancements. Work may include: resurfacing, pavement structural and joint repair, lane and shoulder widening, alterations to vertical grades and horizontal curves, bridge repair, removal or protection of roadside obstacles, and improving bridges to meet current standards for structural loading and to accommodate the approach roadway width.
- 2R projects focus primarily on restoration of pavement structure, crown correction, ride quality basic safety, and spot safety. Widening shoulders for continuity with the existing roadway cross section is acceptable.
- Railroad is a project to reduce the accident frequency and severity at grade crossings. Project elements may include, signals, bells, signage, pavement markings gates or surfacing at the crossing. Railroad-highway grade separation projects are also in this category. If the project includes other roadway work, use 3R matrix line.
- Bridge New/Replacement is a new bridge or a replacement of an existing bridge.
- Bridge Widening is the widening of existing bridges.
- Bridge-Other are Project types that may include, scour mitigation, painting, seismic retrofit, deck repair, strengthening, rehabilitation, and electrical mechanical repairs.
- Paths and/or Trails is the construction of non-motorized facilities that are independent of a roadway alignment.

- Pedestrian Facilities are projects with a main focus of providing pedestrian facilities for public use.
- Other, Interpretive Centers, Etc. projects may include, bicycle facilities, structures, bus shelters, archeology and historic preservation, and buildings.
- Parking Facilities are projects that construct parking facilities. Project types may include Park and Ride facilities and on-street parking.

.43 Other Definitions

- Average Daily Traffic (ADT) – The general unit of measure for traffic defined as the total volume during a given time period (in whole days), greater than one day and less than one year, divided by the number of days in that time period.
- Design Hourly Volume (DHV) – The DHV is generally the 30th highest hourly volume (30 DHV) of the future year chosen for design. On the average rural road or arterial, DHV is about 15 percent of ADT. For urban areas, DHV is usually between 8 to 12 percent of the ADT.
- Low Volume Roads and Streets – For this document, a collector or lower classified road or street with an ADT of less than 400.
- Resurfacing – The addition of a layer or layers of paving material to provide additional structural integrity or improved serviceability and rideability.
- Restoration – Work performed on either pavement sections or bridge decks to render them suitable for an additional stage of construction. This may include supplementing the existing roadway by increasing surfacing and paving courses to provide structural capability and minor shoulder widening to provide roadway section continuity. Restoration will generally be performed within the existing right of way.
- Rehabilitation – Similar to "Restoration" except the work may include, but is not limited to, the following:
  - Reworking, strengthening, or removing and replacing the base and/or subgrade.
  - Recycling or reworking existing materials to improve their structural integrity.
  - Adding underdrains.
  - Replacing or restoring malfunctioning joints.
  - Substantial pavement under-sealing when essential for stabilization.
  - Pavement grinding to restore smoothness, providing adequate structural thickness remains.
  - Removing and replacing deteriorated materials.
  - Crack and joint sealing but only when the required shape factor is established by routing or sawing.
  - Improving or widening shoulders.

  Rehabilitation may require acquisitions of additional right of way.
- Traveled Lane – The portion of the roadway intended for the movement of vehicles, exclusive of shoulders and lanes for parking, turning, and storage for turning.

.44 Safety Improvements – When using AASHTO guidance for clear zone determinations, the designer should take into account all AASHTO guidance (i.e., AASHTO Roadside Design Guide) relating to clear zone and project circumstances. See references section of this chapter.

Mandatory Upgrades

1. Update all delineation and signing in accordance with the current MUTCD. (This does not include replacement of sign bridges or cantilever supports.)
2. Modify substandard guardrail transitions and terminals to current standards.

Agency Evaluate Need

3. Adjust existing features that are affected by resurfacing, such as guardrails, monuments, catch basins, and access covers. Adjustment may include asphalt tapers as appropriate.
4. Modification of drainage structures, which present a hazard in the clear zone, e.g., beveled end sections/safety bars for both parallel and cross-drains.
5. Remove, relocate, reduce severity of hazard by providing crashworthy features, protect, or delineate roadside obstacles inside the design clear zone.
6. Restore sight distance at public road intersections and the inside of curves through low cost measures if they are available such as removal or relocation of signs and other obstructions, and cutting of vegetative matter. The local agency Engineer will determine if the measures are low cost.

⇩ Project Type	Roadways														
Design Elements ⇨	Horiz. Align.	Vert. Align.	Lane Width	Shldr Width	Lane & Shldr Taper	Pedestrian Facilities	Cross Slope Lane	Cross Slope Shldr	Fill/ Ditch Slopes	Safety Improvements	Shared Bike/Ped Facilities	Turn Radii	I/S Sight Dist	I/S Angle	Guardrail & Barrier
New Construction	D	D	D	D	D	1	D	D	D	A	1	A	D	A	A
Re-Construction	A	A	A	A	A	1	A	A	A	A	1	A	A	A	A
3R	AE	AE	AE	AE	AE	1	AE	AE	AE	2	1	AE	AE	AE	1
2R							AE	AE		2	1				1
Railroad (If roadway work included, use 3R line)										AE	1		AE		1
Bridge Rehabilitation, Paint, Seismic, Scour, etc.															
Trails	1	1	1	1			1	1	1	1	1	1		1	
Pedestrian Facility Improvement Projects						1					1				
Other, Interpretive Centers, etc.	1	1	1	1	1	1	1	1	1	A	1	1	1	1	1
Parking Facilities	A	A	A	A	A	1	A	A	A	A	1	A	A	A	1

D Design Level D

A Design Level A

AE Agency Evaluate to Design Level A

1. When provided, must meet current applicable standards.
2. Refer to Safety Improvements on page 7. Mandatory Upgrade items 1 and all others are AE.

Local Agency Design Matrix

Table 1.1

⇩ Project Type	Cross Roads						
Design Elements ⇨	Horiz. Align	Vert. Align	Lane Width	Shldr Width	Fill/Ditch Slopes	Safety Improve-ments	Shared Bike/Ped Facilities
New Construction	AE	AE	AE	AE	AE	2	1
Re-Construction	AE	AE	AE	AE	AE	2	1
3R	AE	AE	AE	AE	AE	2	1
2R							1
Railroad (If roadway work included, use 3R line)							
Bridge Rehabilitation, Paint, Seismic, etc.							
Trails							
Pedestrian Facility Improvement Projects							
Other, Interpretive Centers, etc.	1	1	1	1	1	1	1
Parking Facilities	A	A	A	A	A	1	1

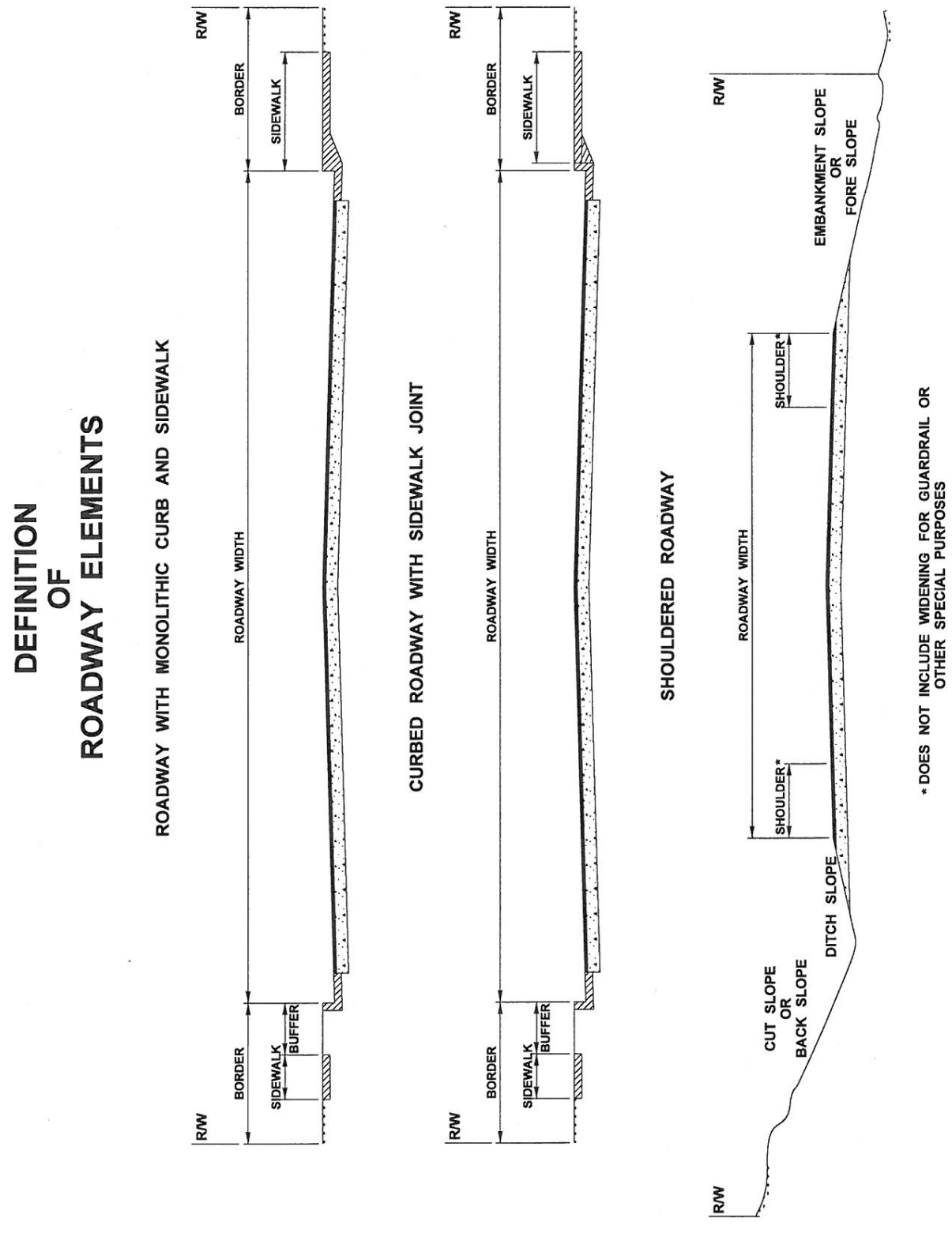
D Design Level D
A Design Level A
AE Agency Evaluate to Design Level A

1. When provided, must meet current standards.
2. Refer to Safety Improvements on page 7. Mandatory Upgrade items 1 and all others are AE.

Local Agency Design Matrix
Table 1.2

⇩ Project Type	Bridges				
Design Elements ⇨	Lane Width	Shldr Width	Vertical Clearance	Structural Capacity	Bridge Rail
New Construction	D	D	D	D	D
Re-Construction	A	A	D	D	D
3R	AE	AE	AE	AE	1
2R			AE	AE	1
Railroad (If roadway work included, use 3R line)					1
Bridge Rehabilitation, Paint, Seismic, etc.					
Trails	1	1	1	1	1
Pedestrian Facility Improvement Projects					
Other, Interpretive Centers, etc.	1	1	1	1	1
Parking Facilities	A	A	AE	AE	1

Local Agency Design Matrix
Table 1.3



Cross Section

42.5 Design Level D Standards for Two Way Roads and Streets

Design Standards	Arterial							Collector				
	Principal			Minor								
	Curbed[4]	Shouldered		Curbed[4]	Shouldered			Curbed[4]	Shouldered			
	DHV All	DHV Below 200	DHV 200 and Over	DHV All	DHV Below 100	DHV 100 to 200	DHV 201 and Over	DHV 400 and Over	ADT 400 to 750	ADT 751 to 1000	DHV 100 to 200	DHV 201 and Over
Right of Way	Not less than required for all design elements.											
Roadway Width[1][2][7][9]	24ft	36ft	40ft	24ft	32ft	36ft	40ft	24ft	26ft	28ft	34ft	40ft
Lane width:												
1. Exterior[2][7]	12ft	12ft	12ft	12ft	12ft	12ft	12ft	12ft	10ft	10ft	11ft	12ft
2. Interior Thru[2]	11ft	11ft	11ft	11ft	11ft	11ft	11ft	11ft	10ft	10ft	11ft	11ft
3. Two Way Left Turn[2]	11ft	11ft	11ft	11ft	11ft	11ft	11ft	11ft	10ft	10ft	11ft	11ft
4. Exclusive Turn[2]	11ft	11ft	11ft	11ft	11ft	11ft	11ft	11ft	10ft	10ft	11ft	11ft
5. Parking[2]	10ft[3]			10ft[3]					[5]			
Shoulder Width[6][7][9][2]		6ft	8ft		4ft	6ft	8ft		3ft	4ft	6ft	8ft
Clear Zone/Side Slopes	AASHTO[10]											
Ditch Slope (in slope)	Slopes steeper than 4:1 should only be used when achieving a 4:1 slope is impractical.											

(1) For curbed, distance from face of curb to face of curb. For shouldered, distance from paved edge to paved edge of shoulder.

(2) May be reduced to minimum allowed by AASHTO.

(3) 8 feet may be acceptable when the lane is not likely to become a traffic lane in the foreseeable future.

(4) Curbed section is appropriate for urban setting.

(5) Industrial areas 8 feet to 10 feet. Residential areas 7 feet to 10 feet.

(6) When guardrail is necessary, provide 2 feet of widening or longer posts to ensure lateral support.

(7) For roads with traffic volumes of less than 400 ADT, the low volume road and street standards may be used.

(8) Federal functional classification defined by WSDOT.

(9) For guidance for one-way streets, see AASHTO, and the current uniform fire code.

(10) When using AASHTO guidance for clear zone determinations, the designer should take into account all AASHTO materials relating to clear zone and project circumstances. See the reference section of this publication.

Note: Design Hourly Volume (DHV). The DHV is generally the 30th highest hourly volume (30 DHV) of the future year chosen for design. On the average rural road or arterial, DHV is about 15 percent of ADT. For urban areas, DHV is usually between 8 to 12 percent of the ADT or AADT.

Detectable Warnings (Truncated Domes)	For dimensions, see the WSDOT Standard Plans, F40 series. For material contrast requirements, see proposed ADA guidance from the U.S. Access Board at www.access-board.gov/ada-aba.htm U.S. Access Board at www.access-board.gov/prowac/draft.htm
New Sidewalks (when provided)	• Minimum Width – 60 inches continuous clear width exclusive of the curb or 48 inches clear width exclusive of the curb with 60 inch by 60 inch clear passing spaces at 200-foot maximum intervals. • Surface – Firm, stable, and slip resistant. • Cross slopes – 1:50 (2 percent) maximum. • Running Slope – When within street or highway right of way, must be consistent with the slope established by the roadway. If outside street or highway right of way, must be 5% max. unless designed as a ramp (see ADA guidance). • Buffer – Separation from vehicular ways by curbs or other barriers.

42.6 Roadway Geometrics

The AASHTO publication *A Policy on Geometric Design of Highways and Streets* (Green Book) is the design standard accepted by FHWA for project funding. The designer should read all text associated with the standards and should also consider related tables and text. Additionally, design references are provided in the References for New Construction and Reconstruction, 3R, and 2R Standards and in Tables 1.1, 1.2, and 1.3 of this chapter.

.61 Bridge Standards

Design Elements	References
Bridge Width	The minimum bridge width for two-way structures is the greater of: (1) the design roadway width, or (2) the existing roadway width.
Loading	HL 93 (for federally funded projects), others may use HS 20-44.
Vehicular Railing	AASHTO Crash Tested Rail, or Approved NCHRP 350 Crash Tested Rail.
Pedestrian Railing	AASHTO, NCHRP 350.
Approach Railing	AASHTO Crash Tested Rail, or Approved NCHRP 350 Crash Tested Rail.
Vertical Clearance	16.5 feet minimum.

.62 Other Standards

Design Elements	References
Bicycle	AASHTO Guide for the Development of Bicycle Facilities (RCW 35.75.060 and 36.82.145) and/or standards submitted by the local agency which have been approved by Local Programs, and NATCO urban bikeway design guide.
Signing	MUTCD, as modified by the Washington State Transportation Commission per RCW 47.36.030.
Americans with Disabilities Act – 1990 ADA	Code of Federal Regulations 28 CFR Part 35, Interim Final Rules U.S. Department of Justice. The Architectural and Transportation Barriers Compliance Board WSDOT/Standard F40 Series Current International Building Code, and Washington State Amendments.
Sidewalks	AASHTO Guide for Planning, Design, and Operation of Pedestrian Facilities and NATCO urban street design guide.
Low Volume Roads	2001 AASHTO Geometric Design of Very Low Volume Local Roads (ADT < 400)

42.7 3R Projects

.71 General Discussion – Funding restrictions and other considerations do not always allow improvement of all existing roads and streets to the standards desirable for new construction. Therefore, when pavement condition deteriorates to the level of minimal standards, a cost-effective pavement improvement is needed.

A project becomes 3R when the proposed improvement consists of resurfacing, restoration, or rehabilitation to preserve and extend the service life of the roadway, or enhances the safety of the traveling, bicycling, and/or walking public.

3R projects primarily involve work on an existing roadway surface and/or subsurface. Their purpose includes extending the service life, providing additional pavement strength, restoring or improving the original cross-section, increasing skid resistance, decreasing noise, improving the ride of the roadway, and enhancing safety.

Many factors influence the scope of 3R projects, including:

- Roadside conditions.
- Funding constraints.
- Environmental concerns.
- Changing traffic and land use patterns.
- Deterioration rate of surfacing.
- Accidents or accident rates.

Normally, all 3R improvements are made within the existing right of way, although acquiring right of way and/or easements should be considered when and where practical.

Each 3R project should be considered in context with the entire route between logical termini and within the constraints imposed by limited funding and other considerations.

As a minimum, normally include the following for a 3R project:

- Guardrail end treatments upgraded to current standards.
- Appropriate transition and connection of approach rail to bridge rail.
- Beveled end sections for both parallel and cross-drain structures located in the clear zone.
- Relocating, protecting, or providing breakaway features for sign supports and luminaires.
- Protection for exposed bridge piers and all abutments.
- Modification of raised drop inlets that present a hazard in the clear zone.

It is desirable to provide a roadside clear of fixed objects and nontraversable obstacles. The priority for action relative to roadside obstacles is: (1) remove, (2) redesign, (3) relocate, (4) reduce severity by crashworthy features, (5) protect, or (6) delineate.

On all projects, which include structures with deficient safety features, consideration must be given to correcting the deficient features. When complete upgrading is not practical, a partial or selective upgrading and/or other improvements should be considered to mitigate the effects of the substandard elements.

42.8 2R Projects

.81 General Discussion – Funding restrictions do not always allow improvement of existing roadways to the standards desired. Therefore, when pavement condition reaches a minimal condition, cost effective pavement improvements are needed.

Resurfacing and restoration (2R) projects involve work to restore the existing roadway surface and appurtenances for safe and efficient highway operation. This type of project provides for resurfacing of the existing roadway to provide structural adequacy, to restore the roadway surface condition, and to consider making minor safety improvements.

Resurfacing of the roadway will normally be to the existing width. This should consider paving of previously unpaved shoulders. If short lengths of narrower lanes or shoulders exist within the project limits, widening should be considered to provide roadway section continuity within the project limits.

42.9 References

The designer must use the standards and rationales incorporated into the following manuals (see the following page for addresses to acquire reference materials).

AASHTO

- A Policy on Geometric Design of Highways and Streets, 2011 Edition
- Guide for Design of Pavement Structures
- Highway Drainage Guidelines
- Guide for Roadway Lighting
- Roadside Design Guide
- Geometric Design of Very Low Volume Local Roads (ADT<400)
- AASHTO Guide for the Development of Bicycle Facilities
- AASHTO Guide for the Planning, Design, and Operation of Pedestrian Facilities

Transportation Research Board (TRB)

- *Highway Capacity Manual*

Washington State Department of Transportation (WSDOT)

- *Standard Specifications for Road, Bridge, and Municipal Construction* M 41-10
- Supplement to MUTCD
- *Bridge Design Manual* LRFD M 23-50
- *Hydraulics Manual* M 23-03
- *Standard Plans* M 21-01
- *Design Manual* M 22-01

Institute of Transportation Engineers (ITE)

- Traffic Engineering Handbook

FHWA

- *Manual on Uniform Traffic Control Devices* (MUTCD)
- 49 CFR Part 27 and Designing Sidewalks and Trails for Access, Part II

ADA

- 28 CFR Part 35, 28 CFR Part 36, Appendix A, and the Access Board's Proposed Public Right of Way Guidelines

NATCO

- Urban Bikeway Design Guide
- Urban Street Design Guide
- Transit Street Design Guide
- Urban Street Stormwater Guide

Roundabouts

- NCHRP Reports 572, 672, and 772
- WSDOT *Design Manual* M 22-01
  - Intersection Control Type
  - Roundabouts

Traffic Calming

- Traffic Calming ePrimer.

.91 Reference Materials

AASHTO

TRB
Transportation Research Board National Research Council
500 5th Street NW
Washington, DC 20418

WSDOT
Publications Services
PO Box 47304
Olympia, WA 98504-7304

ITE
Institute of Transportation Engineers
1627 Eye Street NW, Suite 600
Washington, DC 20006
202-785-0060
202-785-0609 (fax)

MUTCD

ADA
Office of the General Counsel Architectural and Transportation Barriers
Compliance Board
1331 F Street NW, Suite 1000
Washington, DC 20004-1111

National Assoication of City Transportation Officials (NACTO)
Urban Bikeway Design Guide

Urban Street Design Guide

42.10 Appendices

Appendix 42.101 Local Agency Design Matrix Checklists

Design Element	Design Level	Any work on Blank Cell Design Element? If "No" move down to next Design Element	If "Yes"	Meets Standard? If "Yes" move down to next Design Element	If "No"	Upgraded to Standard? If "Yes" move down to next Design Element	If "No"	Is a Deviation or Design Exception Required? If "No" Document to File	If "Yes"	HQ Local Programs Deviation Approval Date	Local Agency Design Exception Approval Date
Roadways											
Horizontal Alignment		☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→		
Vertical Alignment		☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→		
Lane Width		☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→		
Shoulder Width		☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→		
Lane & Shoulder Taper		☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→		
Ped. Facility		☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes	→		
Cross Slope Lane	AE	→	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→		
Cross Slope Shoulder	AE	→	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→		
Fill/Ditch Slopes		☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→		
Safety Improvements	2	→	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes	→		
Shared Bike/Ped	1	→	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes	→		N/A
Turn Radii		☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→		
Sight Distance		☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→		
I/S Angle		☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→		
Std Run	1	→	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes	→		N/A
Cross Roads											
Horizontal Alignment		☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→		
Vertical Alignment		☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→		
Lane Width		☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→		
Shoulder Width		☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→		
Fill/Ditch Slopes		☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→		
Safety Improvements		☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes	→		
Shared Bike/Ped Facility	1	→	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes	→		N/A
Bridges											
Lane Width		☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→		
Shoulder Width		☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→		
Vertical Clearance	AE	→	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→		
Structural Capacity	AE	→	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→		
Bridge Rail	1	→	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes	→		N/A

Design Levels

☐ Blank Cell
D Design Level D
A Design Level A
AE Agency Evaluate to Design Level A

(1) When provided, must meet current standards.

(2) Items 1 and 2 under Safety Improvements Definitions are required and all others are AE.

2R Project Checklist
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Design Element	Design Level	Meets AASHTO? If "Yes" move down to next Design Element	If "No"	Upgraded to AASHTO? If "Yes" move down to next Design Element	If "No"	Is a Deviation or Design Exception Required? If "No" Document to File	If "Yes"	HQ Local Programs Deviation Approval Date	Local Agency Design Exception Approval Date
Roadways									
Horizontal Alignment	AE	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→		
Vertical Alignment	AE	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→		
Lane Width	AE	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→		
Shoulder Width	AE	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→		
Lane & Shoulder Taper	AE	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→		
Ped. Facility	1	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes	→		N/A
Cross Slope Lane	AE	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→		
Cross Slope Shoulder	AE	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→		
Fill/Ditch Slopes	AE	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→		
Safety Improvements	2	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes	→		N/A
Shared Bike/Ped.	1	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes	→		N/A
Turn Radii	AE	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→		
Sight Distance	AE	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→		
I/S Angle	AE	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→		
Std Run	1	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes	→		N/A
Cross Roads									
Horizontal Alignment	AE	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→		
Vertical Alignment	AE	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→		
Lane Width	AE	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→		
Shoulder Width	AE	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→		
Fill/Ditch Slopes	AE	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→		
Safety Improvements	2	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes	→		N/A
Shared Bike/Ped. Facility	1	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes	→		N/A
Bridges									
Lane Width	AE	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→		
Shoulder Width	AE	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→		
Vertical Clearance	AE	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→		
Structural Capacity	AE	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→		
Bridge Rail	1	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes	→		N/A

Design Levels*
- ☐ Blank Cell
- **D** Design Level D
- **A** Design Level A
- **AE** Agency Evaluate to Design Level A

See Matrix Definitions for requirements.

(1) When provided, must meet current standards.

(2) Items 1 and 2 under Safety Improvements Definitions are required and all others are AE.

3R Project Checklist
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Design Element	Design Level	Meets AASHTO? If "Yes" move down to next Design Element	If "NO"	Upgraded to AASHTO? If Yes" move down to next Design Element	If "NO"	Is a Deviation or Design Exception Required? If "NO" Document to File	If "Yes"	HQ Local Programs Deviation Approval Date	Local Agency Design Exception Approval Date
Roadways									
Horizontal Alignment	A	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes	→		N/A
Vertical Alignment	A	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes	→		N/A
Lane Width	A	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes	→		N/A
Shoulder Width	A	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes	→		N/A
Lane & Shoulder Taper	A	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes	→		N/A
Ped. Facilities	1	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes	→		N/A
Cross Slope Lane	A	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes	→		N/A
Cross Slope Shoulder	A	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes	→		N/A
Fill/Ditch Slopes	A	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes	→		N/A
Safety Improvements	A	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes	→		N/A
Bike & Ped	1	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes	→		N/A
Turn Radii	A	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes	→		N/A
Sight Distance	A	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes	→		N/A
I/S Angle	A	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes	→		N/A
Std Run	A	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes	→		N/A
Cross Roads									
Horizontal Alignment	AE	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→		
Vertical Alignment	AE	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→		
Lane Width	AE	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→		
Shoulder Width	AE	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→		
Fill/Ditch Slopes	AE	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→		
Safety Improvements	AE	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes ☐ No	→		
Shared Bike/Ped. Facilities	1	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes	→		N/A
Bridges									
Lane Width	A	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes	→		N/A
Shoulder Width	A	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes	→		N/A
Vertical Clearance	D	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes	→		N/A
Structural Capacity	D	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes	→		N/A
Bridge Rail	D	☐ Yes ☐ No	→	☐ Yes ☐ No	→	☐ Yes	→		N/A

Design Levels*
- ☐ Blank Cell
- **D** Design Level D
- **A** Design Level A
- **AE** Agency Evaluate to Design Level A

(1) When provided, must meet current standards.

(2) Items 1 and 2 under Safety Improvements Definitions are required and all others are AE.

Local Agency Guidelines Design Matrix Reconstruction Checklist

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Design Element	Design Level	Meets AASHTO? If "Yes" move down to next Design Element	If "NO"	Is a Deviation or Design Exception Required? If "NO" Document to File	If "Yes"	HQ Local Programs Deviation Approval Date	Local Agency Design Exception Approval Date
Roadways							
Horizontal Alignment	D	☐ Yes ☐ No	→	☐ Yes	→		N/A
Vertical Alignment	D	☐ Yes ☐ No	→	☐ Yes	→		N/A
Lane Width	D	☐ Yes ☐ No	→	☐ Yes	→		N/A
Shoulder Width	D	☐ Yes ☐ No	→	☐ Yes	→		N/A
Lane & Shoulder Taper	D	☐ Yes ☐ No	→	☐ Yes	→		N/A
Ped. Facilities	1	☐ Yes ☐ No	→	☐ Yes	→		N/A
Cross Slope Lane	D	☐ Yes ☐ No	→	☐ Yes	→		N/A
Cross Slope Shoulder	D	☐ Yes ☐ No	→	☐ Yes	→		N/A
Fill/Ditch Slopes	D	☐ Yes ☐ No	→	☐ Yes	→		N/A
Safety Improvements	A	☐ Yes ☐ No	→	☐ Yes	→		N/A
Shared Bike/Ped. Facilities	1	☐ Yes ☐ No	→	☐ Yes	→		N/A
Turn Radii	A	☐ Yes ☐ No	→	☐ Yes	→		N/A
Sight Distance	D	☐ Yes ☐ No	→	☐ Yes	→		N/A
I/S Angle	A	☐ Yes ☐ No	→	☐ Yes	→		N/A
Std Run	A	☐ Yes ☐ No	→	☐ Yes	→		N/A
Cross Roads							
Horizontal Alignment	AE	☐ Yes ☐ No	→	☐ Yes ☐ No	→		
Vertical Alignment	AE	☐ Yes ☐ No	→	☐ Yes ☐ No	→		
Lane Width	AE	☐ Yes ☐ No	→	☐ Yes ☐ No	→		
Shoulder Width	AE	☐ Yes ☐ No	→	☐ Yes ☐ No	→		
Fill/Ditch Slopes	AE	☐ Yes ☐ No	→	☐ Yes ☐ No	→		
Safety Improvements	AE	☐ Yes ☐ No	→	☐ Yes ☐ No	→		
Shared Bike/Ped. Facilities	1	☐ Yes ☐ No	→	☐ Yes	→		N/A
Bridges							
Lane Width	D	☐ Yes ☐ No	→	☐ Yes	→		N/A
Shoulder Width	D	☐ Yes ☐ No	→	☐ Yes	→		N/A
Vertical Clearance	D	☐ Yes ☐ No	→	☐ Yes	→		N/A
Structural Capacity	D	☐ Yes ☐ No	→	☐ Yes	→		N/A
Bridge Rail	D	☐ Yes ☐ No	→	☐ Yes	→		N/A

Design Levels*
- ☐ Blank Cell
- **D** Design Level D
- **A** Design Level A
- **AE** Agency Evaluate to Design Level A

See Matrix Definitions for requirements.

(1) When provided, must meet current standards.

(2) Items 1 and 2 under Safety Improvements Definitions are required and all `others are AE.

Local Agency Guidelines Design Matrix New Construction Project Checklist

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