Part 100 Design Policies and Procedures

Section 101 Introduction

This section provides background information on design standard policies, processes, and design standard identification. Information is presented on the appropriate design standards relevant to the project work type. Work types are defined to assist the designer in applying the proper standards.

General information is provided concerning design processes and different design strategies, such as ODOT's Blueprint for Urban Design (BUD), where six urban contexts have been established to provide design flexibility. Originally developed in 2020 as a standalone document, the BUD has now been incorporated into the Highway Design Manual (HDM). Intended for most urban context areas, the six urban context design criteria are not to be used for interstate highways or other limited-access freeways, Oregon Highway plan designated expressways with interchanges, or similarly operating grade-separated arterials. See Section 214 for addition information about use of urban context design criteria where urban expressways are a mixture of both grade-separated interchanges and at-grade intersections. Additional design guidance is provided for ODOT urban and rural freeways (including interstate highways), rural expressways, and rural arterials, collectors, and local routes.

Other parts of the HDM are broken down into specific design guidance such as geometric design, cross section elements, elements of design, pedestrian design, bicycle design, etc. The parts are separated to address the various transportation modes that serve different types of users, such as pedestrians or bicycles, and discuss the standards that apply when designing these facilities. This format allows the HDM to be more flexible to incorporate future changes into the standards. Future additions might include subjects such as autonomous vehicles or robotic delivery services on sidewalks.

Both FHWA and ODOT recognize information found in resources outside federal or Oregon DOT publications. Some of these include publications from other state DOTs, guides developed by national organizations like the National Association of City Transportation Officials (NACTO), the Institute of Transportation Engineers (ITE), and the American Society of Civil Engineers (ASCE), as well as information provided by many other transportation engineering resources. While outside resources may be utilized for information purposes, the Oregon Highway Design Manual is the deciding factor for design of highways, roads and streets on the Oregon state highway system.

101.1 Documentation and Approval Font Key

Text within some parts of this manual is presented in specific fonts that show the required documentation and/or approval if the design does not meet the requirements shown.

Table 100-1 shows the four text fonts used, along with their descriptions. The text in figures, tables, exhibits, equations, footnotes, endnotes, and captions typically does not utilize the font key.

Table 100-1: Font Key

Font	Documentation	Approver
Bold text	Design Exceptions	State Roadway Engineer (SRE) and for some projects FHWA
Bold Italics text	Design Decisions Document	Region with Tech Expert input or other approver as described
Italics Text	Document decisions	Engineer of Record (EOR)
General Text (Not bold or italics)	N/A	N/A

Bold Text - Some standards appear in a bold font style. A design exception is required to justify and document not meeting a standard that appears in bold. The State Roadway Engineer (SRE) gives formal approval, and FHWA approves as required. See 101.2 for a description of design standards. In the case of 3R clear zone approvals and local agency projects off the state highway system, design exceptions can be approved by someone other than the State Roadway Engineer (see sections 402 and 1003.5).

Bold Italics Text - Both standards and guidelines may appear in a bold italics font style. While a formal design exception is not required when not meeting a standard or guideline that appears in bold italics, document and justify the decisions made by the Engineer of Record in decision documents or other engineering reports. When not meeting a standard or guideline that appears in bold italics, region approval with input from Technical Experts, or other approval as described in the HDM, is required. For urban projects, formally record decisions via the Urban Design Concurrence Document in the Design Decision portion. The Urban Design Concurrence document is located on the Highway Design Manual website. See 101.2 and 101.3 for descriptions of design standards and guidelines.

Italics Text - Design decisions that require documentation appear in italic font style in design parameters sections. While a formal design exception is not required, document the design decisions made by the Engineer of Record in decision documents or other engineering reports. See 101.3 and 101.4.

General Text - Any informational statement that does not convey any degree of mandate, recommendation, authorization, prohibition, or enforceable condition. The remaining text in the manual is general text and may include supporting information, background discussion, commentary, explanations, information about design process or procedures, description of

methods, or potential considerations and all other general discussion. General text statements do not include any special text formatting. General text may be used to inform and support design exception requests, particularly where narrative explanations show best practices or methods of design that support the requested design exception.

101.2 Standards

A standard is a statement of required, mandatory, or specifically prohibitive practice regarding a roadway geometric feature or appurtenance. The verb "provide" is typically used. The adjective "required" is typically used in figures to illustrate Standard statements. The verbs "should" and "may" are not used in Standard statements. The adjectives "recommended" and "optional" are only used in Standard statements to describe recommended or optional design features as they relate to required design features. Standard statements are sometimes modified by Best Practices (see 101.4).

101.3 Guidelines

A guideline is a statement of recommended practice in typical situations. The verb "should" is typically used. The adjective "recommended" is typically used in figures to illustrate Guideline statements. The verbs "provide" and "may" are not used in Guideline statements. The adjectives "required" and "optional" are only used in Guideline statements to describe required or optional design features as they relate to recommended design features. Guideline statements are sometimes modified by Best Practices (see 101.4).

101.4 Best Practices

A Best Practice is a statement of practice that is a permissive condition and carries no requirement or recommendation. Best Practice statements sometimes contain allowable ranges within a Standard or Guideline statement. The verb "may" is typically used. The adjective "optional" is typically used in figures to illustrate Best Practice statements. The verbs "shall" and "should" are not used in Best Practice statements. The adjectives "required" and "recommended" are only used in Best Practice statements to describe required or recommended design features as they relate to optional design features.

Section 102 Definitions

The following are definitions of words and phrases used in the HDM. Other definitions may be in the individual parts to which they apply. These definitions do not necessarily apply outside

the context of the HDM. The Oregon Standard Specifications for Construction along with ODOT manuals and guidance may also provide definitions for terms used in the HDM, but those definition do not necessarily apply to the HDM. Definitions provided in the HDM are applicable to the HDM.

Unless otherwise defined in this document, the terms used in the HDM are defined according to American Association of State Highway Transportation Officials (AASHTO) A Policy on Geometric Design of Highways and Streets (7th edition; 2018) which ODOT has adopted and incorporated into the HDM. Oregon Administrative Rules (OAR) and Oregon Revised Statutes (ORS) have specific definitions for legal regulations that are specific to Oregon Law and may not be in alignment with the HDM definitions.

These definitions are used to identify the ODOT applicable standards and sections for the design and construction on right of way. Construction of these facilities can be funded with various specialized funding programs with terms that are not synonymous with these definitions. Eligibility for funding is determined by the program definitions, rules and manager.

1R/3R Record of Decision -	Documentation to determine whether the 1R or 3R standard applies to a paving project.
AASHTO Green Book -	Formally titled A Policy on Geometric Design of Highways and *Streets, 2018* is a publication for the new construction of facilities. Adjustments to the guidance for preservation type projects is not considered in this publication.
ADA Ramp -	An asset in the ODOT FACS-STIP inventory used for tracking sloped connections to the pedestrian facility including but not limited to a concrete or asphalt walkway. The ADA Ramp may be for example a curb ramp, an accessible cut through, radial driveway curb cut, a signalized driveway, a blended transition, or end of walk transition to the shoulder on the state highway system. Curb cut, curb ramp and sidewalk ramp are synonymous terms in this document.
Context Sensitive Solutions -	A planning and design approach to advance programs and projects in a collaborative manner and in a way that fits into the community and environment.
Blueprint for Urban Design -	Formerly an interim and companion document to the HDM and other ODOT design manuals to provide updated urban design guidance until the related design manuals are updated. The policies of the BUD are incorporated into this manual.

Certified Local Public Agency - A local agency that has achieved or maintains certification per the processes in Section B of the ODOT Local Agency Guidelines for Certified Local Public Agencies. https://www.oregon.gov/odot/LocalGov/Pages/LAG-Manual.aspx

Climate Friendly Area - A climate-friendly area is an area, per Oregon Administrative Rule Chapter 660 Division 12, where people are able to meet most of their daily needs without relying upon a car. They are urban mixed-use areas that contain, or are planned to contain, a mixture of high-density housing, jobs, businesses, and services. These areas are served, or planned for service, by high quality pedestrian, bicycle, and transit infrastructure to provide frequent and convenient connections to key destinations within the city and region.

Design Exception - Approval authorized by the State Roadway Engineer to deviate from a design criteria standard. Design Exceptions are submitted on the Design Exception Request Form (see HDM Part 1000).

New Construction - Projects with improvements that construct facilities where no previous public right of way existed (i.e., virgin horizontal alignments and 4R projects).

"On or along the State Highway" - Facilities for public use that are adjacent to the state highway road system regardless of who has public ownership, public easements, or intergovernmental agreements of the underlying property where the facility resides.

Performance-Based Practical Design - A design approach grounded in performance management using appropriate performance-analysis tools considering both short and long-term project and system goals while addressing current project purpose and need. Engineering judgment is used to build improvements from existing conditions to meet project and system objectives.

Practical Design - A systematic approach to deliver the broadest benefits to the transportation system, within existing resources, by establishing appropriate project scopes to deliver specific results.

Reconstruction - Fully rebuilt projects on established and existing public right of way with alterations to the facility.

Relocation -	Project that replaces a segment of the existing highway facility with a newly constructed facility in a different location. A temporary detour is not considered relocation.
Urban Design Concurrence Form -	Form to determine project context, define project design criteria, and document project design decisions for projects.
Urban -	Relating to, or characteristic of a town or city.
Urban Context -	Relates to all nearby built and natural features, as well as social, economic and environmental factors impacting a location. Urban context is based on existing and future land use characteristics, development patterns, and roadway connectivity in an area. For purposes related to the Highway Design Manual, urban context is not limited to places within the current Urban Growth Boundary (UGB).
Urban Design -	For the HDM, the term applies to urban contexts relating to land uses that broadly identify the various built environments along ODOT roadways.

Section 103 Acronyms

1R	-	Resurfacing
1R(+)	-	1R project with additional work items added by other funding
3R	-	Resurfacing, Restoration, Rehabilitation
4R	-	Reconstruction, Resurfacing, Restoration, Rehabilitation
AASHTO	-	American Association of State Highway and Transportation Officials
ADA	-	American with Disabilities Act
APM	-	Analysis Procedure Manual
BDM	-	Bridge Design Manual
BUD	-	Blueprint for Urban Design
CC	-	Commercial Center
CFR	-	Code of Federal Regulations
CLPA	-	Certified Local Public Agency
CSS	-	Context Sensitive Solutions
DAP	-	Design Acceptance Package

DSL - Department of State Lands (Oregon)
ETSB - Engineering and Technical Services Branch (ODOT)
EOR - Engineer of Record (see also POR)
FACS - Features, Attributes, and Condition Survey
FHWA - Federal Highway Administration
GIS - Geographic Information System
HCM - Highway Capacity Manual (TRB)
HDM - ODOT Highway Design Manual
HSM - Highway Safety Manual (AASHTO)
IAMP - Interchange Area Management Plan
IMR - Interchange Modification Request
ITE - Institute of Transportation Engineers
LAG - Local Agency Guidelines
LCDC - Land Conservation Development Commission
LPA - Local Public Agency
MASH - Manual for Assessing Safety Hardware (AASHTO)
MUTCD - Manual of Uniform Traffic Control Devices
NACTO - National Association of City Transportation Officials
NCHRP - National Cooperative Highway Research Program
OAR - Oregon Administrative Rule
ODOT - Oregon Department of Transportation
OHP - Oregon Highway Plan
ORS - Oregon Revised Statute
OTP - Oregon Transportation Plan
OTTCH - Oregon Transportation Traffic Control Handbook
POR - Professional of Record (see also EOR)
PBPD - Performance-Based, Practical Design
PROWAG - Public Right of Way Accessibility Guidelines
RECP - Resident Engineer – Consultant Projects
ROW - Right of Way

S.C.O.P.E. - Safety, Corridor Context, Optimize the System, Public Support, Efficient Cost

SF - Single Function

SHPO - State Historic Preservation Office

STA - Special Transportation Area

STIP - State Transportation Improvement Plan

SRE - State Roadway Engineer

STE - State Traffic Engineer

SUE - Subsurface Utility Exploration

TPM - Transportation Project Manager

TPR - Transportation Planning Rule

TRB - Transportation Research Board

TSP - Transportation System Plan

UBA - Urban Business Area

UDC - Urban Design Concurrence

UGB - Urban Growth Boundary

V/C - Volume to Capacity

Section 104 Design Guidance

104.1 Blueprint for Urban Design (BUD)

In addition to ODOT's Practical Design philosophy and multi-modal transportation design, the BUD and its context and majority of content was an interim document bridging the gap between its inception and the update of the HDM. The BUD content is incorporated into this HDM update.

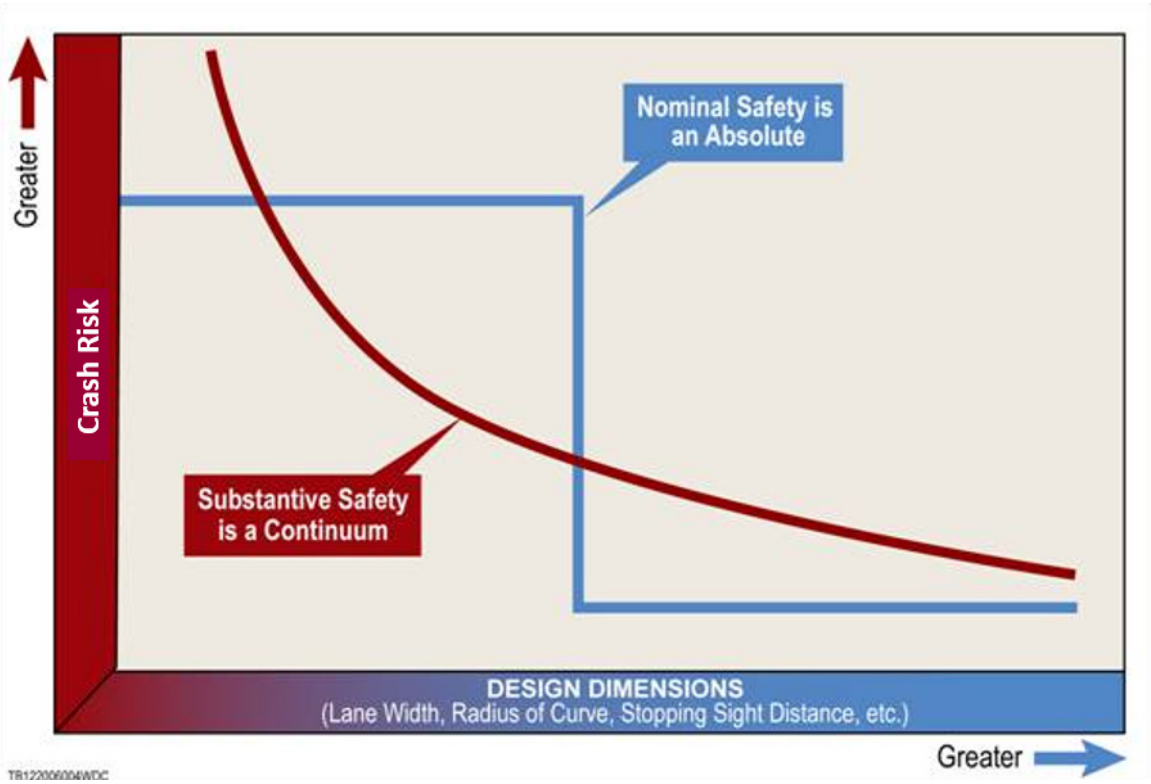
The BUD content now included in the HDM applies to urban land use contexts that broadly identify the various built environments on or along the state highway. The key concepts introduced by the BUD are that urban design:

1. Includes urban context in addition to the existing highway classification.
2. Highlights and provides flexibility.
3. Introduces performance concepts with Practical Design as Performance-Based, Practical Design.

4. Starts at the highest level of protection for pedestrians, bicyclists, and other users of the pedestrian and transition cross-section realms (Cross-section Realms, see Section 107).
5. Provides a focused design documentation process.

Urban contexts defined in the HDM are based on existing and future land use characteristics, development patterns, roadway classification and connectivity, along with overall community goals and aspirations of an area. Urban context is not limited to places within the current Urban Growth Boundary (UGB), nor is it confined to city or town limits. Urban context is also not defined by federal limitations on population density determinations of what is considered as an urban area. The urban planning principles, design principles, and guidance focus on all roadways within the HDM-defined urban contexts, except interstate highways and limited-access freeways, Oregon Highway Plan designated expressways with interchanges, or other similarly operating arterials. While the HDM urban design guidance does not apply to the main line or ramps of a limited access interstate highway, freeway, expressway/arterial with interchanges, it does apply along the crossroad between, and leading up to, the ramp terminals and urban contextual design criteria can be applied to complete the local network. For design consistency, the crossroad between the interstate or freeway ramp terminals and depending on channelization operations, sometimes a distance further, whether state owned or part of the local network, is considered part of the interchange. As such, continuity of the local network and context needs to be maintained in relationship to the operational needs of the main highway. Although the crossroad of an interstate or limited access freeway (expressway) may be located in an urban context, the intended mobility and high-level operation of the interstate or limited access freeway (expressway) has priority. Ramp traffic affected by operation of the crossroad cannot backup onto the main line of the interstate, freeway or expressway and cause a potential safety issue. However, design and operation focused on the crossroad that allows some queuing on the ramp is an acceptable trade-off to accommodate and balance the urban modal needs on the crossroad.

Figure 100-1: Comparing Nominal and Substantive Safety



(Source: NCHRP Report 480 – TRB 2002)

Figure 100-1 depicts nominal safety (subjective safety) and substantive safety (objective safety) in relation to crash risk and design dimensions. Nominal safety is safety that relies on the perception of the user. This assessment will vary between observers and will depend on their perspectives. Substantive safety is safety that can be measured or quantified independent of the observer. Design guidance has evolved over the years to be more context sensitive and to integrate flexibility, but these features are often underutilized. Additionally, design guidance now considers the various modal needs of a transportation system. This evolution reflects the shift from nominal safety (subjective) to substantive safety (objective). Transportation professionals strive to use guidance and standards to support evolving needs and provide a safe and efficient network.

In an effort to incorporate updated guidance from national perspectives and tailor it to meet the needs of the Agency and local contexts, ODOT founded the Urban Design Initiative. The initiative provides principles and guidance that can be used for both planners and engineers in order to allow flexibility to meet the modal needs of the users in urban communities.

The ODOT Urban Design Initiative recognized that ODOT's earlier urban design needs and guidance were not strategically aligned. The Main Street Handbook (1999) informs planners but does not reflect the most recent evolution of modal guidance. Additionally, planners and designers needed consistent tools that supported the recently adopted modal plans, such as the

Bicycle and Pedestrian Plan and Public Transportation Plan. A bridging document, the BUD met these identified needs and is incorporated into the HDM.

ODOT has taken a performance-based approach to project development and delivery that supports decision-making from planning through design. Identifying the desired project outcomes, while understanding the urban context and identifying the primary roadway users, can guide practitioners in determining appropriate performance measures to evaluate the trade-offs of various design decisions. Completing these steps early in the project flow can guide the planning phase and refine the range of alternatives considered. Reviewing and confirming project goals throughout planning, design, and construction validates that the chosen alternative, reflects the original project goals and serves the intended users.

> Performance-based design is an approach that emphasizes the outcomes of design decisions as the primary measure for design effectiveness.
> *NCHRP Report 785*

Understanding and executing a performance-based approach enables project teams to make informed decisions about the performance trade-offs of alternative solutions. This is especially helpful when developing solutions in fiscally and physically constrained environments. National activities and associated publications, such as FHWA Performance-Based Practical Design initiatives and NCHRP Report 785: Performance-Based Analysis of Geometric Design of Highways and Streets have resulted in a framework for how this approach can be executed within a project. As demonstrated in the AASHTO Green Book, this approach will continue to shape how practitioners deliver projects in a variety of contexts and stages of project flow.

Tort liability and risks are often seen as impediments to appropriately adapted flexible designs, given urban context. There is a misperception that "designing to standards" inherently improves safety performance and eliminates risks of lawsuits. Practitioners need to understand fundamental elements of tort liability to make informed decisions and learn how to manage risk by documenting the project evaluation and decision-making process. NCHRP Legal Digest 57 provides additional information on tort liability related to design guidance and standards.

Documenting the decision-making process when selecting the design for new or reconstructed roadways or preservation projects is an effective way to manage risk. This includes documenting design considerations and evaluated alternatives based on clearly outlined project goals. The guidance provided in the HDM allows for a diverse range of potential designs. Therefore, for urban projects, the discretionary decisions of project teams must be documented as part of ODOT's urban design concurrence documentation. The intent of the urban design concurrence documentation is to provide the justification and evidence necessary to manage tort liability. In many cases, it is beneficial to not only document what the project is accomplishing, but to also document what isn't being done or can't be done with the specific project and why. This is particularly important on preservation type projects where project scope is limited. As previously noted, the Roadway designer is responsible for the final

compilation of the Urban Design Concurrence document. The Urban Design Concurrence (UDC) document is located on the Highway Design Manual website.

104.2 Emerging Framework for Geometric Design

The 2012 version of the HDM incorporated ODOT's Practical Design philosophy by establishing appropriate project scopes fitted to specific project purpose and need. The Practical Design S.C.O.P.E. Values (Safety, Corridor Context, Optimize the System, Public Support, and Efficient Cost) are still valid today for the current version of the HDM. In addition to ODOT's Practical Design philosophy and multi-modal transportation design, the BUD, and its context and design content, has been incorporated into the HDM. The HDM gathers the advancements of multi-modal designs that have been developed since the 2012 HDM and highlights the opportunities for continued flexibility in ODOT's current design criteria in an effort to produce effective outcomes for each facility based upon the urban context and design flexibility to accommodate community needs.

On a national level, FHWA is also looking at performance-based design by modifying the controlling criteria from the thirteen controlling criteria established in 1985 to two controlling criteria for low-speed roadways (< 50 mph design speed) and ten controlling criteria for high-speed roadways (>=50 mph design speed). FHWA determined that all the criteria contained in the design standards are important, but that not all the criteria affect safety and operation to the same degree. FHWA noted that State DOT's can determine their own level of documentation needed based upon laws and practices. Additional information on controlling criteria can be found in Part 1000, Design Exceptions.

104.3 National Guidance Policies and Documents

ODOT regularly evaluates planning and design guidance from other national associations and organizations for incorporation into the information provided in the HDM. Practitioners follow the direction contained within the HDM and recommend changes to be considered from the following sources as needed:

- American Association of State Highway Transportation Officials (AASHTO)
- Federal Highway Administration (FHWA)
- Institute of Transportation Engineers (ITE)
- National Association of City Transportation Officials (NACTO)
- National Cooperative Highway Research Program (NCHRP)
- U.S. Access Board

Section 105 How ODOT Uses National Guidance

Federal law dictates the role of national standards for highway facilities in https://www.ecfr.gov/current/title-23. Title 23 CFR Part 625 requires that each state have standards for new construction (4R) and preservation (3R) of highways that account for applicable federal requirements including design exceptions. It identifies the AASHTO Green Book as the national design standard for NHS highways unless FHWA approves a substitution. The ODOT HDM is approved by FHWA for use in Oregon as the standard for ODOT highways and transportation facilities. The following are examples of how ODOT stays up to date with and incorporates national design guidance.

105.1 Design Flexibility

In addition to 23 CFR Part 625, section 1404 of the FAST Act, which amends 23 United States Code (USC) section 109, provides requirements as well as direction for flexibility and access for other modes of transportation in the design process. The revised requirements for flexibility and other modes from 23 USC 109 under section c (1) have been or will be incorporated into 23 CFR Part 625 with the next update to the CFR.

Title 23 CFR Part 655 requires that every state follow a national standard for uniformity in the use of traffic control devices and identifies the Manual on Uniform Traffic Control Devices (MUTCD) as the FHWA approved source. Oregon adopted the federal manual with a state-specific supplement to the MUTCD. Similar federal requirements exist where a national standard manual is recommended and a state-specific substitute manual is optional. Some examples of these include standards for bridge and illumination design.

23 CFR Part 658 establishes the National Freight Network and provides guidance to states for freight vehicle size and weight allowed to utilize the national network without special permits. It also provides guidance on what can and cannot be restricted concerning freight vehicles operating on the national freight network. Appendices A, B, and C of 23 CFR Part 658 should also be evaluated along with the ODOT Freight Mobility Manual when determining modal integration for a project.

The United States Department of Transportation (USDOT), led by Congressional action, developed federal policy and directives for states to take action on flexibility in design and addressing flexibility on the core National Highway System (NHS) routes. Additionally, the Fixing America's Surface Transportation (FAST) Act requires designs for projects on the NHS to consider all factors in 23 USC 109(c)(1), including cost savings that can be achieved by using flexibility in current design guidance. Based on this support for improved pedestrian and bicycle facilities and flexibility within current design standards, numerous national organizations produced innovative design guides and resources intended to supplement the

adopted standards. ODOT issued a letter of support that encourages engineers, planners and designers to reference the growing library of resources that help "…provide a safe, efficient transportation system that supports economic opportunity and livable communities for Oregonians…" and "…to be at the forefront of the integration of sustainable intermodal transportation…to help form sustainable solutions to today's ever-increasing intermodal transportation challenges…". The design resources referenced in ODOT's letter were those produced by AASHTO, NACTO, and ITE. Since these memoranda, the FHWA grew its library of publications that help encourage and support walking and bicycle use for all ages and abilities. A list of these publications can be found on the FHWA Bicycle and Pedestrian website.

Recent federal requirements and guidance have provided the ability to use flexible design to meet project goals and outcomes when integrating design for all road users. Incorporating guidance from innovative sources provides opportunities for enhanced facilities to accommodate specific needs. However, some documents are good on the concepts of what, but do not provide details on the how to actually design the elements into a roadway cross-section. As a result, while these innovative documents are a source of information and allowed with provisions as stated in the FAST Act, Section 1404(b), the final design must still meet state and/or federal design criteria when federal funds are being used. This is particularly true for roadways on the National Highway System, whether locally owned, state owned or federally owned. For questions relating to specific design criteria requirements for projects on local jurisdiction roadways, contact the ODOT Engineering and Technical Services Branch (ETSB) for information.

105.1.1 Innovative Concepts

In order to solve urban transportation issues through innovation, some concepts may conflict with requirements in the adopted highway standards. There is a process outlined by FHWA to enable innovation by experimenting with new ideas. Through the experimentation process, design standards can evolve, or new standards can be created. When innovative practices are acceptable to ODOT, standards and manuals to support these practices can be updated. FHWA provides a design deviation approach that provides further flexibility with the reduction in number of controlling criteria. However, approval for design deviations or concurrence is still processed at the state level. Federal regulation sets required criteria for design, but still provides flexibility for state jurisdictions to apply their own criteria as well and ODOT uses federal guidance when applying both federal regulations and specific state criteria.

105.1.2 Use of the Highway Safety Manual

In 2015, the Fixing America's Surface Transportation (FAST) act was passed to authorize federal funds for Federal-aid highways, highway safety programs, and public transit programs. It endorsed the use of federal funds for design flexibility outlined in Section 1404. Section 1404(a)

of the FAST Act also required the Secretary of Transportation, when developing design criteria for the NHS, to consider the Highway Safety Manual (HSM), published by AASHTO. The HSM is not a design standard, but it presents a variety of methods for quantitatively estimating crash frequency or severity at various locations. It is a foundational manual in the long-term effort to improve the state of the practice for safety prediction tools. The HSM is a key safety reference influencing the development of national design policy. Additionally, the increased use of improved safety production tools in the planning and design process allows improved analysis of safety performance among design alternatives.

105.1.3 Americans With Disabilities Act

Another example of national requirements and guidance that ODOT uses are regulations concerning the Americans with Disabilities Act. 28 CFR Part 35 prohibits discrimination on the basis of a disability under the Americans with Disabilities Act of 1990 in state and local government services. The ADA Amendments Act of 2008 broadened the scope of protection under the ADA in the definition of what a disability is, such that extensive analysis is not required. Various resources exist that provide guidance and best practices for implementing accessible pedestrian facilities. ODOT has incorporated national guidance and best practices under the ADA to optimize and provide better access for individuals. State and local governments are required to make transportation facilities and services accessible, even when explicit standards for ADA design criteria on transportation infrastructure are still emerging and evolving.

105.1.4 Participation in National Research, Committees and Organizations

While there are fundamental underlying physics and engineering principles that form the foundation for roadway design, it is an ever-evolving practice. There are often innovation and creative ideas, concepts, and techniques emerging for solutions to evolving challenges. ODOT stays up to date with the changing trends through participation in research projects at both the state and national level, with staff participating on AASHTO and NCHRP technical panels providing review and input. Participation on these panels provides access to current national and international practices. New publications, documentation, and information are reviewed for applicability to Oregon. Publications vetted through AASHTO and included in the Federal Register are generally adopted for use. Other national publications may be considered, when appropriate, as supplemental reference guidance to ODOT and AASHTO design criteria.

Section 106 Approval Processes

106.1 Design Standards

ODOT's Chief Engineer, through delegated authority from the Oregon Transportation Commission (OTC) is responsible for the approval of design standards.

106.2 Design Exceptions

The Chief Engineer has sub-delegated the approval of exceptions to design standards to the State Roadway Engineer. Most design exceptions require signature by both the Engineer of Record (EOR) and State Roadway Engineer as this is an Engineering Report. Design exceptions may also require approval by FHWA. Design exceptions and the design exception process are addressed in Part 1000 of the HDM.

106.3 Urban Design Concurrence Document

The BUD established the Urban Design Concurrence document form to determine project context, define design criteria, and document design decisions. Authority for approval of the Urban Design Concurrence Document (UDC) will reside in the Region Technical Center. The Region Technical Center Manager provides final approval of urban design concurrence with collaborative input from Region planning, traffic, roadway, and maintenance. Generally, the designer for roadway geometrics is responsible for the final compilation of the UDC. However, the Region Technical Center Manager may assign document compilation to another design team member if deemed more appropriate for a project. The document is a collaborative effort of the scoping and project development teams. The intent is for the form to be more of a living document throughout the planning, scoping and project development stages that aids in creating project business cases, project charters, scoping concepts and project narratives. It is important to maintain the UDC with project documentation through the various stages of a project. If a UDC is initiated with planning activities it should be included with documentation of those studies or plans (TSP, Facility Plans, etc.) and is provided for inclusion of project business cases and project charters and scoping activities. Not all planning activities will initiate a UDC. In this case, a UDC is initiated at project scoping. A "draft" UDC is included as part of the final scoping documents to document scoping decisions that led to the concept design.

The Context and Modal Integration sections of the document can be started in the region planning section prior to scoping. However, final determination is a collaborative effort of the scoping and project development teams when creating the draft and final UDC. Pertinent background information from Transportation System Plans, Corridor Studies or other planning

documents is included to aid the scoping team in defining project concepts. At the end of project scoping, the draft or concept Design Decisions portion of the Urban Design Concurrence Document is filled out identifying the scoping concept design for the project.

At project initiation, the project development team will utilize the draft or concept UDC for understanding of project goals and as a starting point for the final design. The project development team verifies that the concept UDC still covers the project goals and design needs in the event there have been significant changes in the project area since the scoping team finished the concept design. If changes have occurred, the UDC is updated to reflect those changes to ensure project goals and outcomes defined in scoping are met. Or, if the original goals and outcomes can no longer be met, the form is used to document why. Once the scoping concept design decisions are verified or modified as needed, the project team can move forward with project development and finalize the Urban Design Concurrence Document to be submitted with the Design Acceptance Package. The UDC establishes the design cross-section. Any deviations for the allowable design ranges will still need a Design Exception.

By ODOT directive and with the exception of interstate roadways, freeways, expressways or arterials with interchanges, every urban project requires a design concurrence document. The project category will determine the amount and extent of the information provided in the final concurrence document. Projects with limited scope like 1R or 3R paving projects, targeted safety projects or Single Function projects, etc. will have limitations when filling out some portions of the Urban Design Concurrence Document. However, even on these limited scope projects, project teams need to identify and include opportunities to upgrade and improve existing conditions for all users of the roadway system. When initially determining project scope within the limits of a project category, it is a good idea to start by answering the question, “What is an appropriate design for this roadway section and project?”, rather than the more typical and limiting question, “What do we have to do?"

Although an Urban Design Concurrence Document is required by policy on all urban projects, realistically there may be some projects of such limited scope that do not affect the roadway cross-section where completing the Urban Design Concurrence Document has no effect on project outcomes. In these cases, the Urban Design Concurrence Document is superfluous to the project and adds no significant value for documentation. In these rare instances, an Urban Design Concurrence Exemption Request can be submitted for potential approval by the State Roadway Engineer. The request form, Urban Design Concurrence Exemption Memo, is available on the Highway Design Manual website. It is provided as a template that can be added to region letterhead, filled out and submitted to the Engineering and Technical Services Branch (ETSB), Roadway Engineering Section. If approved by the State Roadway Engineer, the exemption memo is submitted with the Design Acceptance Package in lieu of the Urban Design Concurrence document.

There is a minimal number of project types where the Urban Design Concurrence Exemption Memo would apply. Examples of project types that could apply include ITS projects, bridge preservation category projects, bridge rail screening projects or other project types that have

limited, specific scope and do not affect the roadway cross-section. For more information on the applicability of the Urban Design Concurrence Exemption Memo, contact the Senior Urban Design Engineer in the Engineering and Technical Services Branch (ETSB), Roadway Engineering Section.

106.4 1R/3R Record of Decisions Documentation

The 1R/3R Record of Decisions Documentation form (ODOT form number 734-5244) is used as part of a formal process for determining whether a paving preservation project will be designated 1R or 3R. This document is filled out at project scoping and reviewed and validated at project initiation. The 1R/3R Record of Decision Documentation Form is approved by the Pavements Manager, the Region Traffic Manager, and the Region Roadway Manager. For more information, see 116.1.1.

106.5 FHWA Emergency Relief Program - Betterments

The FHWA Emergency Relief (ER) program is intended to assist the States and local agencies in repairing disaster damaged highway facilities and returning them to their pre-disaster condition. In-kind restoration is the predominant type of repair. Emergency relief fund and betterments for assisting states in repairing damaged highway facilities require approval from FHWA. Approval requires detailed justification. 118.2 23 USC Section 120(e) and FHWA website Special Federal Funding provides additional information on emergency relief and betterments. Work with the regional FHWA office to determine and document eligibility of emergency relief sites to describe and agree on the damage, scope of work to be performed, and estimated cost. For more information, see 118.2.

106.6 Record Retention

All project design documents are subject to ODOT record retention policies and schedules. For more information regarding these policies, see the Department of Transportation Highway Division Record Retention Schedules.

106.7 EOR Requirements for Projects

ODOT requires all plans, Professional of Record (POR) sheets, and design exceptions be in electronic (PDF) format. Requirements for the Engineer of Record are established by Oregon State Board of Examiner for Engineering and Land Surveying (OSBEELS) and are to be followed by engineers serving in this role on ODOT public work projects. ODOT uses digital seals and

signatures for electronic documents as allowed by administrative rule OAR 820-025-0001. ODOT Engineering and Technical Services Directive TSB21-01(D) provides ODOT requirements for use of digital seals and signatures on technical documents. See Figure 100-2, Figure 100-3, and Figure 100-4 for seal format according to OAR 820-025-0001. See Figure 100-5 for an example of a digitally signed engineering seal, provided by OSBEELS.

Figure 100-2: Engineering Seals from OAR 820-025-0005

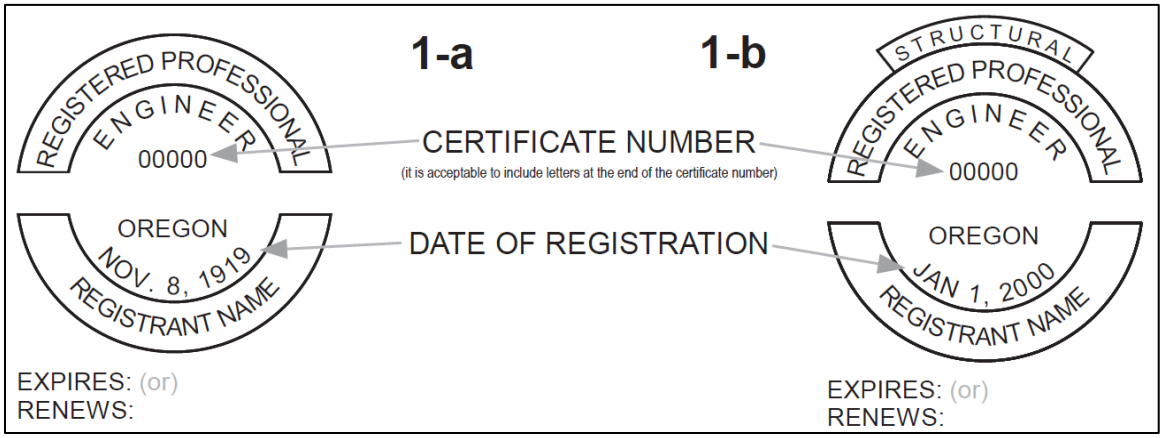


Figure 100-3: Land Surveyor and Photogrammetrist Seals from OAR 820-025-0005

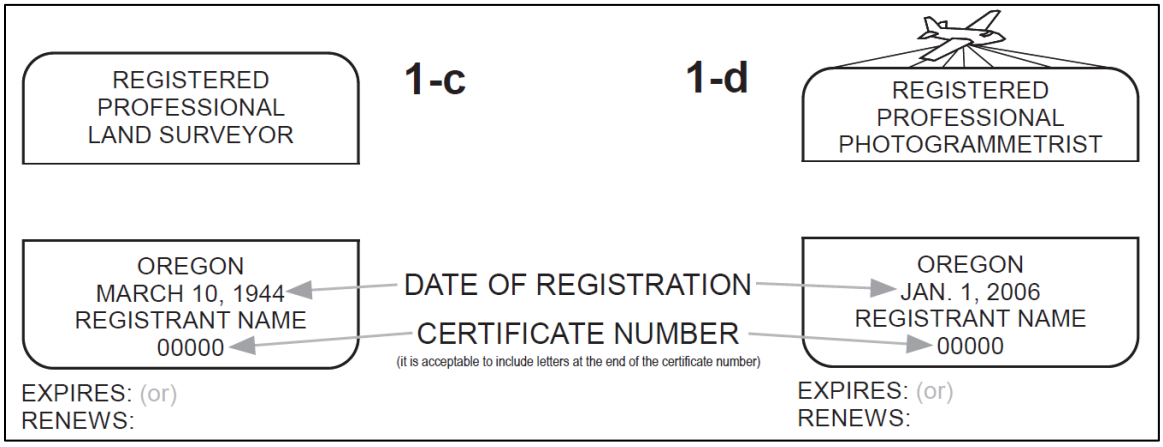


Figure 100-4: Water Right Examiner and Traffic Engineer Seals from OAR 820-025-0005

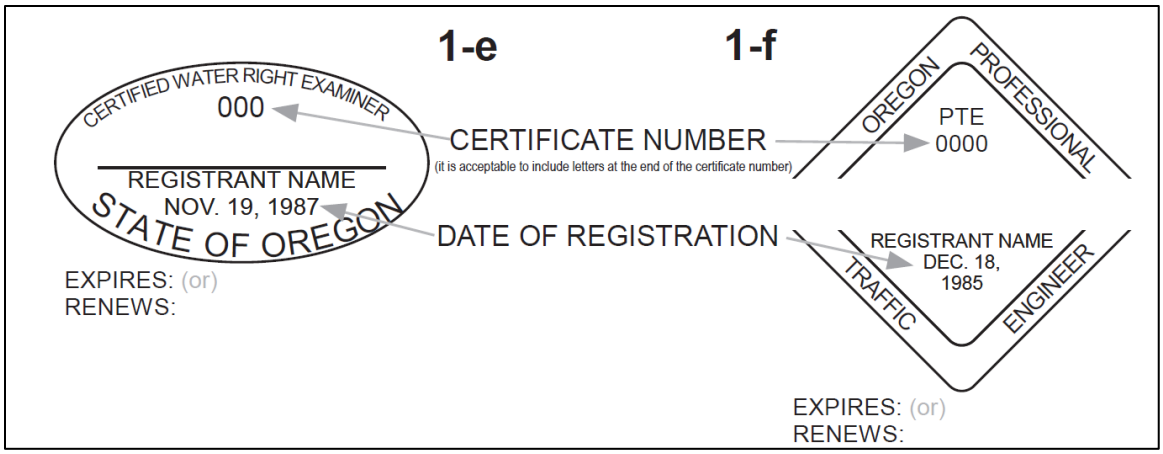
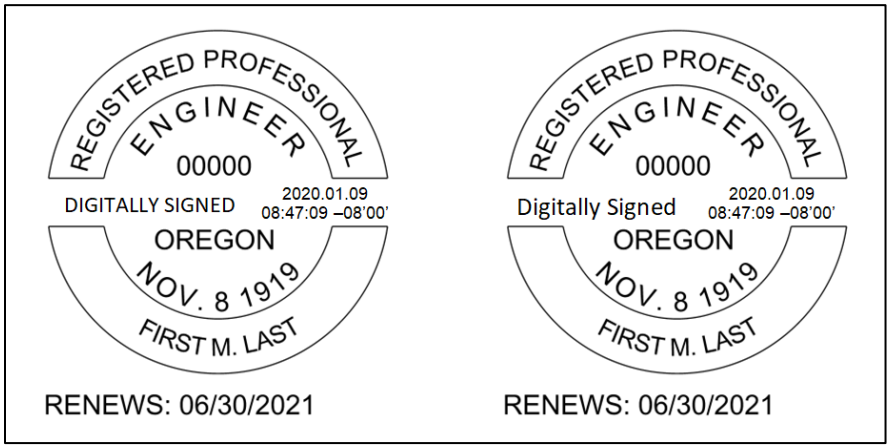


Figure 100-5: OSBEELS Digital Seal Examples



Section 107 Design Flexibility

107.1 Introduction

While there are fundamental underlying physics and engineering principles that form the foundation for roadway design, it is an ever-evolving practice. Innovation and creative ideas, concepts, and techniques continually emerge for solutions to evolving challenges. In the early 1990s, ODOT developed a formal process to involve interested parties to foster collaboration and provide inclusion and local insights into project development from roadway users. In the mid-1990s, ODOT embraced context sensitive solutions (CSS) design, which later became context sensitive and sustainable solutions (CSSS or CS3). The 1999 Oregon Highway Plan (OHP) (including amendments) established roadway segment designations to differentiate

contexts in urban locations. The official segment designations include Special Transportation Area (STA), Urban Business Area (UBA), and Commercial Centers (CC). The 2003 HDM created an urban design chapter to specifically address design for the roadway segment designations described in the 1999 OHP as well as for non-designated context segments that include Urban Suburban Fringe, Developed Areas, and Traditional Downtown/Central Business Districts. In addition to the segment designations, the 1999 OHP also categorized roadway sections into state-determined classifications. These classifications include Interstate Highways, Statewide Highways, Regional Highways, and District Highways.

In 2010, ODOT established its Practical Design strategy. That strategy provided a foundation for thought and processes to achieve more focused improvements at a lower cost. Practical Design was, at that time, the next logical step in the evolution of ODOT's approach to program and project development and delivery. It provided a platform to be more deliberate in our efforts to provide the underlying goal of developing the "Right Projects, at the Right Time, at the Right Cost, and in the Right Way".

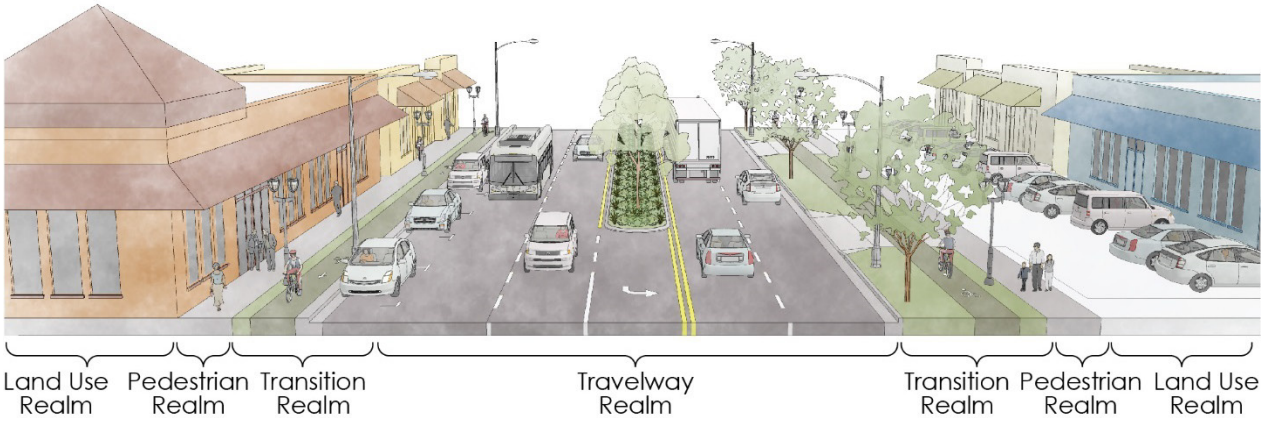
Performance-Based Practical Design is the next step in the evolution of roadway design from a contextual basis. Performance-Based Practical Design takes the concepts and principles of Practical Design and incorporates performance information to emphasize outcomes of design decisions as the primary measure for design effectiveness. Understanding and executing a performance-based approach enables project teams to make informed decisions about the performance trade-offs of alternative solutions. This is especially helpful when developing solutions in fiscally and physically constrained environments. ODOTs approach to Performance-Based Practical Design fits with national design trends. National activities and associated publications, such as FHWA Performance-Based Practical Design initiatives and NCHRP Report 785: Performance-Based Analysis of Geometric Design of Highways and Streets have resulted in a framework for how this approach can be executed within a project. In addition, the AASHTO Green Book is moving toward FHWA backed Performance-Based Practical Design principles. ODOT is on the leading edge of this transition with the development of the Blueprint for Urban Design and the subsequent inclusion of that information into the 2023 HDM.

Practical Design and its evolution to Performance-Based Practical Design afford the design flexibility to creatively design solutions to meet project needs and goals by focusing on outcomes. Engineering judgment is a key component when applying flexibility to designs to achieve appropriate solutions. Guidance throughout the HDM is intended to aid designers in making choices where trade-off decisions inherent to flexible design need to be made. An important aspect to decision making required in Performance-Based Practical design is utilizing multi-disciplinary teams that provide varied viewpoints and information to the project. The multi-disciplinary teams should include not only engineers, but also planners, landscape architects, active transportation staff and others pertinent to decisions that will affect project goals and outcomes.

When applying the Performance-Based Practical Design principles and determining appropriate trade-offs across a project cross-section, having a methodology to evaluate impacts to design elements is important. Dividing the cross-section into areas based on element functionality within those areas is one way to analyze potential individual element impacts caused by trade-off decisions in relation to the cross-section as a whole. As such, the "realm" concept was established. These realms include the following and are shown in Figure 100-6:

- Land Use Realm
- Pedestrian Realm
- Transition Realm
- Travelway Realm

Figure 100-6: Example of Cross-Section Realm



Context is a key factor in roadway design. Context includes the adjacent land use context as well as the context of the road itself. The highway has an intended function that is also integral to its context. The federal functional classifications as well as the ODOT classifications and the OHP segment designations all provide input in evaluating the roadway context. The overall context to be considered in the project design process includes the land use context and the determined roadway context, both from the perspectives of existing land uses as well as future planned land uses. Municipal and local community input is important in the context discussion as well. The Blueprint for Urban Design established six contexts for design that are listed below:

- Traditional Downtown/Central Business District
- Urban Mix
- Commercial Corridor
- Residential Corridor
- Suburban Fringe
- Rural Community

107.2 Practical Design

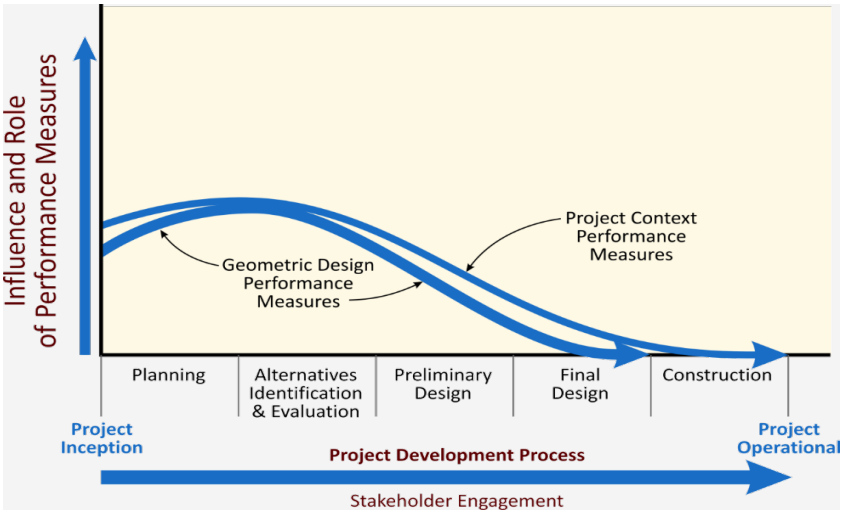
The 2012 version of the HDM incorporated ODOT's Practical Design philosophy by establishing appropriate project scopes fitted to specific project purpose and need. There are five key values that help form the foundation of Practical Design. These values support ODOT's mission of providing a safe, efficient transportation system that supports economic opportunity and livable communities for Oregonians. These "S.C.O.P.E." values provide a basis to be kept in mind when working through the project development and design process.

1. **Safety** - Overall system safety will not be compromised. The goal is to make the system as safe as practical. This does not mean settling for a lower level of safety, but instead, continue to make choices about safety and use sound engineering judgment when making safety decisions (i.e., look for high value add-ins with minimal cost). Individual projects may look different. But every project will either make the facility safer or will maintain the existing safety level for that facility.
2. **Corridor Context** - Practical Design takes the S.C.O.P.E. concept across a system, down to a corridor level, and applies it to each project. A corridor approach should be used in establishing or evaluating design criteria, and then be applied consistently throughout the corridor. Roadways should respect the character of the community, include the current and planned land uses, and work within the intended corridor use. The unique features of the project and how this "fix" fits with other parts of the corridor and with the natural and surrounding built environment should be considered.
3. **Optimize the System** - Adopting more of an asset management approach to managing pavements, bridges and roadway safety features allows the assessment of the current state of an individual infrastructure asset, and then to develop specific maintenance, repair, rehabilitation and replacement strategies that optimize the life-cycle investment in that particular asset. This, in turn, can allow available funding to be allocated on a priority basis to those assets and/or combination of assets that ensure that the entire highway system is optimized for safety, mobility and financial investment. This optimization for safety, mobility, and financial investment will involve balancing the trade-offs between these competing goals.
4. **Public Support** - ODOT recognizes that public trust is a cornerstone of success and strives to work in partnership with the local communities in making system improvements visible to the traveling public. Working with locals provides opportunities for the community to shape the chosen solution, and consider the needs for pedestrians, bicyclists, public transit users, freight and mobility. When working with community interests, it is essential to have clarity about the project purpose, need and alignment of the proposed project with the overall plan for Oregon's transportation system.

5. **Efficient Cost** - ODOT has limited funds to apply to projects and strives to stretch these funds as much as possible and to develop projects that meet the desired purpose but is open to considering incremental improvements. Practical Design requires applying the appropriate standards to the critical elements in order to meet the project specific purpose and need. This allows for a redistribution of funds that were previously used on other items that may not have been as high of a priority on one project, to be used where they will produce the most benefit to the system. Practical Design stresses making the best strategic decisions that benefit the overall system.

107.3 Performance-Based Practical Design

Figure 100-7: Role of Performance Measures within the Project Delivery Process



Source: NCHRP Report 785

Performance-Based Practical Design builds on the 2010 Practical Design Strategy utilizing the five base S.C.O.P.E. principles outlined previously in conjunction with performance metrics established for project outcomes. Aligning the two strategies emphasizes delivering projects that benefit the transportation system. Thereby, utilizing existing resources to establish appropriate project scopes that include different perspectives and discuss pertinent project information early in the project development flow. This helps establish clear project objectives and problem statements that focus on both short-term and long-term desired outcomes. More information about the use of context and performance-based design can be found in subsequent parts and sections of this document.

107.4 Context and Roadway Classification

There are many definitions of urban and rural. For this document and for ODOT urban project design, the focus is on land use context in relation to determined roadway context and classification. Urban design practices have been an evolving process. The 2012 ODOT HDM melded the Context Sensitive design principles of the 1990s with the 2010 ODOT Practical Design strategy of S.C.O.P.E. It prescribed design requirements categorized by the context of the highway. The 2012 HDM mirrored the design guidance in the AASHTO Green Book chapters for urban and rural. The next step in the progression of urban roadway design is performance-based design. National design guidance, including the eighth edition of the AASHTO Green Book, is moving toward integrating performance-based design that encompasses a focused approach to determine appropriate design with flexibility that better aligns roadway function and user needs based on the context. Performance-based design provides a framework for evaluating trade-offs and creating designs that meet the desired outcomes of a project to address all roadway user concerns. This type of approach is being adopted in many other states as well. Through the development of the Blueprint for Urban Design, ODOT is incorporating performance-based design into HDM criteria and accepted practices with this document. Performance-Based Practical Design is a refinement to, and the next step of, ODOT's continued practice of Context Sensitive Practical Design.

> Performance-based design is an approach that emphasizes the outcomes of design decisions as the primary measure for design effectiveness.
> *NCHRP Report 785*

Depending on the decided context of a highway, the ODOT criteria for various design elements is different. Design elements potentially affected by context include the width of travel lanes, turn lanes, shoulders and medians, superelevation rates, maximum degree of curvature, maximum grade, bicycle facility and pedestrian facility type and size, presence of on-street parking, and vertical clearance.

When determining the context of a roadway section, roadway federal functional classification, state classification, adjacent land use, roadside context, roadway segment designation, and to some extent, traffic volume and number of lanes is considered. Traffic volume, speed, and lane configuration along with classification are indicators of how a roadway section is being used and sets expectations for road users, as well as expectations for adjacent businesses – both existing and future.

With the increasing emphasis on active and public transportation, social equity, and climate impacts, defining context is even more important for urban design. Therefore, more differentiation within the previously established context categories was needed. As an example, the context defined in the OHP and 2012 HDM as "Urban/Suburban Fringe" covers a variety of cross-section types and potentially various land use or roadside context configurations. Creating greater differentiation in contexts based on more specific parameters along a section of roadway that affect its use can provide flexibility. It also helps prioritize design elements to

better address user and community needs, rather than a "one-size-fits-all" approach. This is the basis for performance-based design, which focuses on the outcomes of the design decisions as the primary measure of design effectiveness.

107.5 Design Standard Policy

The HDM represents ODOT's implementation of federal guidance, including the AASHTO Green Book, NCHRP, TRB research documents, ADA, and PROWAG. ODOT uses three sets of design criteria: ODOT4R/New, ODOT 3R, and ODOT 1R.

The standards selected for design of all projects are presented, with some modifications, from the following references:

2025 ODOT Highway Design Manual

2014 ODOT Hydraulics Manual

A Policy on Geometric Design of Highways and Streets – 2018 (AASHTO Green Book)

Roadside Design Guide (AASHTO, 2011)

A Policy on Design Standards – Interstate System. (AASHTO 2016).

Guide for the Development of Bicycle Facilities (AASHTO 2012)

Guidelines for Geometric Design of Low-Volume Roads (AASHTO 2019)

Guide for the Planning, Design, and Operation of Pedestrian Facilities (AASHTO 2021)

2010 Americans with Disabilities Act (ADA) Standards for Accessible Design

Public Rights-of-Way Accessibility Guidelines

Highway Drainage Guidelines (AASHTO 2007)

The applicable ODOT standards are defined in Table 100-3.

Section 108 Local Agency Guidelines

Some projects under ODOT roadway jurisdiction traverse across local agency boundaries. Some local public agencies (LPA) have adopted design standards and guidelines that may differ from ODOT design standards. Although the appropriate ODOT design standards are to be applied on ODOT roadway jurisdiction facilities, the designer should be aware of the local agency publications and design practices, which can provide additional guidance, concepts, and strategies for design.

The Local Agency Guidelines (LAG) manual for Certified Local Public Agencies (CLPAs) outlines guidance in delivering federal-aid projects including ADA requirements. Certified

Local Public Agencies are agencies that have undergone a process to become certified to deliver projects utilizing federal funds. These agencies when certified have established processes that have been reviewed by ODOT's local program manager in coordination with FHWA to deliver projects with federal funding. CLPAs submit design exceptions and concurrences for projects on or along the state highway through the ODOT established process. LPAs have three options in delivering projects with federal-aid funding including:

1. A CLPA delivers its own project through the certification program;
2. An LPA contracts with a Certified LPA to deliver the project; or
3. An LPA contracts with ODOT to deliver the project.

As noted above, any projects on the state highway system shall follow the standards and guidance in the HDM. Figure 100-8 and Figure 100-9 provide flowcharts to help determine when general design standards and accessibility design standards apply on local public agency projects. Local agencies may have more stringent requirements that must be adhered to when projects overlap jurisdictions. Both agencies' requirements need to be met. In addition to the Design Standards Matrix in Table 100-3, the LAG manual provides additional guidance on appropriate standards.

The LAG manual addresses projects where local agencies deliver projects on ODOT facilities. Local projects funded through ODOT-managed selection processes may be led by local agencies and are expected to be designed and constructed to reflect the original project proposal. ODOT retains decision-making authority for projects on state-owned roadways, including those projects led by local agencies. For local-led projects, ODOT's funding agreements require local agencies to submit final cost, as-constructed drawings, and other documents to confirm the project selected was what was ultimately constructed. Local agency projects on ODOT's system may only be led by certified agencies with ODOT approval to lead delivery. For projects not on ODOT's system or delivered by ODOT, the local agency is responsible for design decisions, but ODOT can aid the local agency in decision-making as an interested partner.

Figure 100-8: Application of General Design Standards on LPA Projects

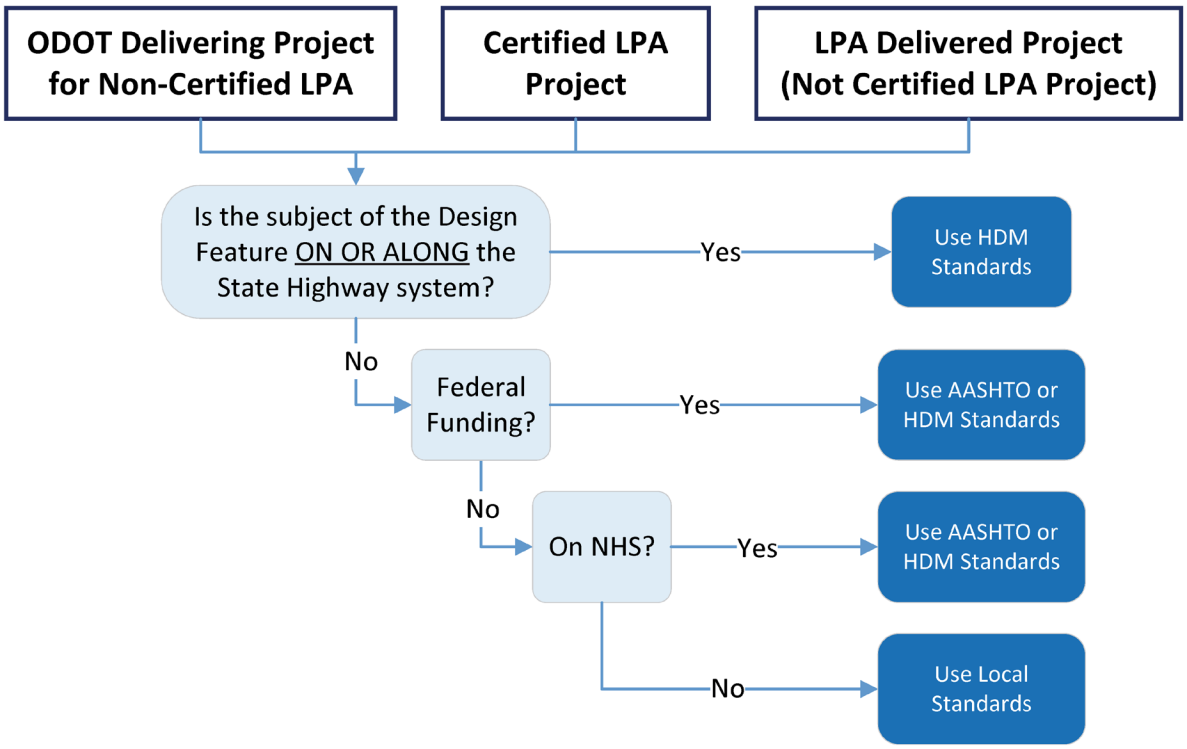
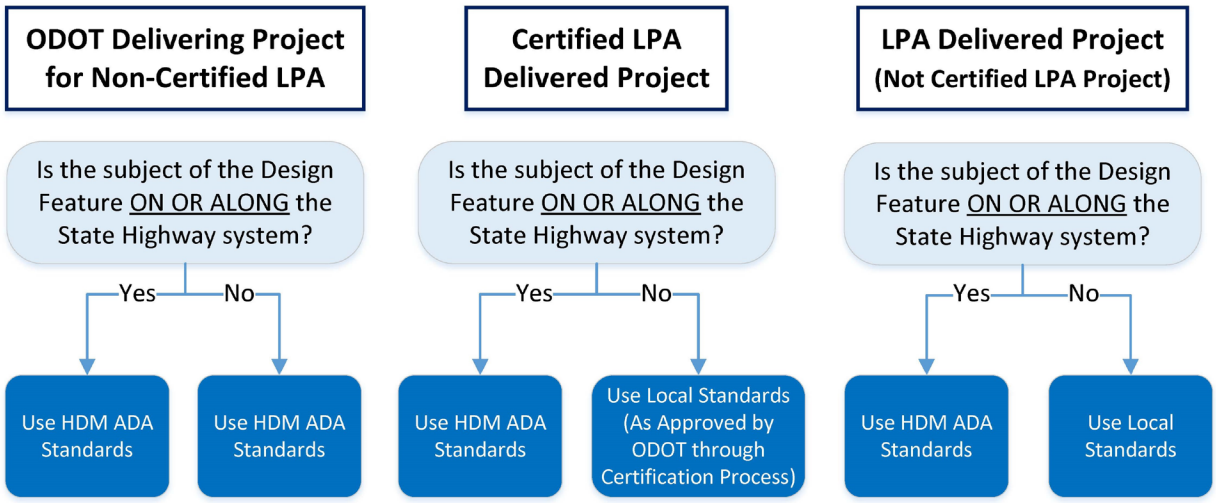


Figure 100-9: Application of Accessibility Design Standards on LPA Projects



Section 109 Plans, Programs, and Policies

109.1 Introduction

The authority and need to develop projects are established through various plans, programs and policies that outline the primary responsibility of ODOT to provide a safe, efficient, and integrated multi-modal transportation system for the mobility and accessibility of people and goods. In meeting these plans, programs and policies, ODOT shall consider appropriate alternatives for meeting statewide needs. For every project, a number of alternatives, including the no-build alternative, will be evaluated in arriving at the appropriate solution. This section only provides an overview of the project selection and development process. For more detailed information on project development, refer to ODOT's project delivery guidance, operational notices, bulletins, and directives.

109.2 Planning and Project Development

ODOT project development and delivery are organized by ODOT project delivery guidance, which includes both program and project development elements. Transportation planning (part of program development) includes development of the Oregon Transportation Plan and modal/topic plans that provide Oregon's strategic transportation vision and policies. Statewide policy plans also provide guidance and direction for developing more refined transportation system plans.

City and county Transportation System Plans (TSPs), which include the state system within their boundaries, describe existing conditions, identify roadway classification and transportation needs over a 20-year period, and develop priorities for transportation system improvements within a defined geographic area. Generally completed by local cities or counties, TSPs evaluate needs across all modes of transportation and may include portions of whole transportation corridors. Program Managers may consider projects identified in TSPs for inclusion in a future Statewide Transportation Improvement Program (STIP) and should refer to transportation planning documents to help with context and objectives for transportation improvements.

Transportation Policy Planning is high level and includes:

1. Oregon Transportation Plan
2. Oregon Highway Plan and other modal/topic plans
3. Strategic vision, high level policy planning
4. A framework to help prioritize investments for all modes of transportation

5. Identification of strategic objectives and outcomes from management and investment decisions

Transportation System Planning includes:

1. City, county, regional, or MPO TSPs
2. ODOT facility plans such as Interchange Area Management Plans (IAMPs), refinement plans, access management plans, scenic byway plans, etc.
3. An assessment of future transportation system needs and recommended solutions
4. Prioritized investment strategies and projects
5. Transportation Management systems used to evaluate highway assets and assist in the selection of projects
6. Planning work and documents for all modes of transportation, including pedestrians, bicyclists, micro-mobility users, ride-share participants and public transit riders
7. Projects that are prioritized for inclusion in the STIP

The Transportation Planning Section is responsible for managing the statewide policy planning process and the Regional Planning Units are responsible for managing or informing the system planning process. Local Transportation System Plans (TSPs) must follow state statutes when addressing the state highway system within their communities. OAR 366.215 dealing with freight mobility on the state highway system and ORS 374.329 dealing with transfer of state freight routes to local jurisdiction need to be incorporated when writing TSPs. The Federal Register 23 CFR Part 658 would also apply to National Freight Network roadways within a local TSP. In order to accommodate freight mobility, planning efforts should also consider the types and frequency of permitted freight loads through a corridor.

The following are key policies, rules, and statutes that uniquely inform urban design and will be highlighted in later portions of this document:

1. Bicycle and Pedestrian Bill (ORS 366.514)
2. Freight Reduction in Carrying Capacity Review (ORS 366.215) (OAR 731-012)
3. Transportation Planning Rule (TPR) (OAR 660-012-0060), including Section 8 and Section 10 related to Multimodal Mixed-Use Areas (MMA)
4. Oregon Highway Plan mobility standards/targets
5. Oregon Highway Plan, Policy 1A – Classification
6. Highway segment designations (OHP Policy 1B)
7. Special Transportation Areas (STA), Urban Business Areas (UBA), Commercial Centers (CC)
8. Practical Design Strategy (Appendix D of the HDM)

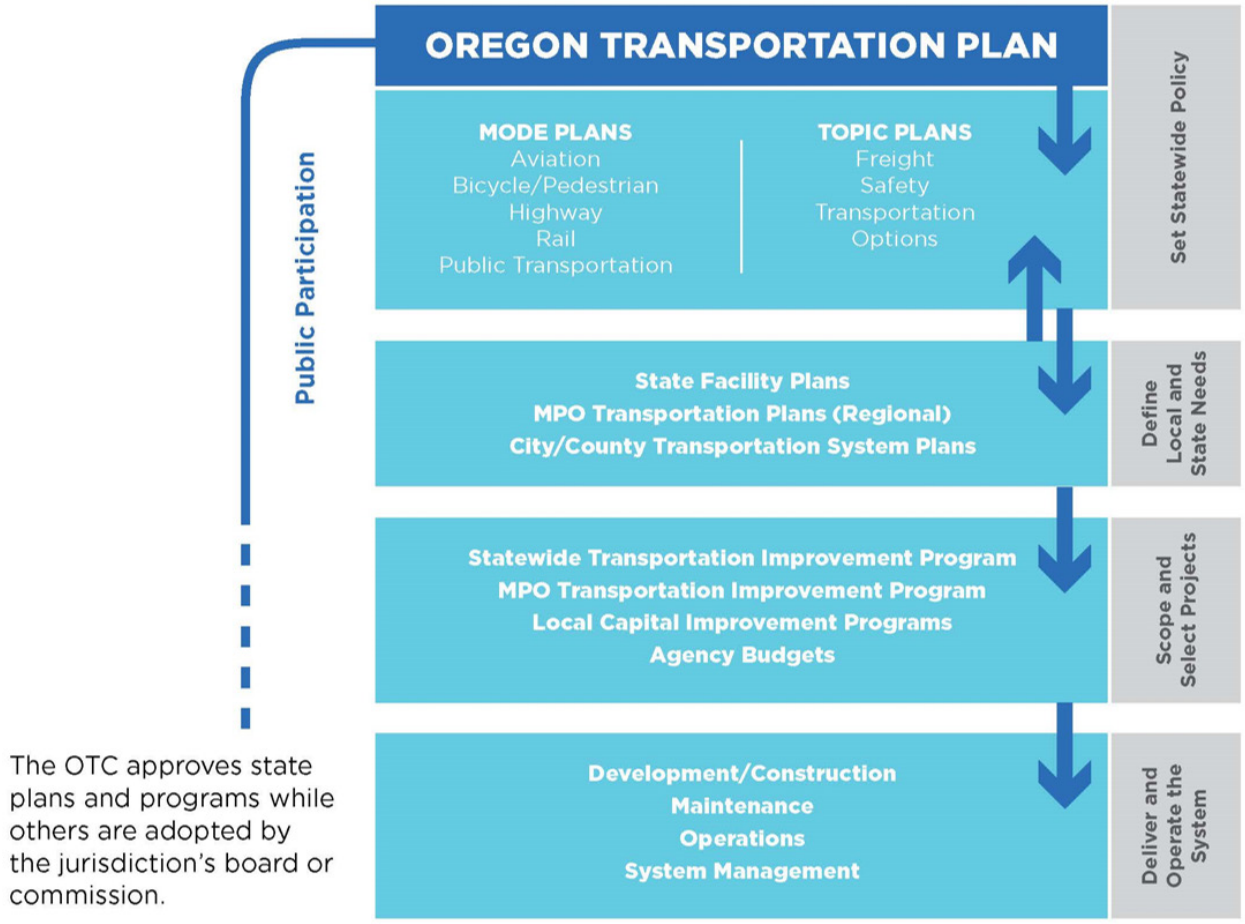
9. Applicable Oregon Land Use Law and rules (ORS 197, OAR 660, Division 12, 24, 22)

ODOT has the following statewide planning documents that have been adopted by the OTC and provide basis for project development:

1. Oregon Transportation Plan
2. Oregon Highway Plan
3. Oregon Bicycle and Pedestrian Plan
4. ODOT ADA Transition Plan
5. Oregon Freight Plan
6. Oregon Rail Plan
7. Oregon Transportation Options Plan
8. Oregon Public Transportation Plan
9. Oregon Transportation Safety Action Plan
10. Oregon Aviation Plan
11. Statewide Transportation Strategy

Figure 100-10 provides an overview of ODOT integrated transportation planning.

Figure 100-10: ODOT Integrated Transportation planning



109.3 Oregon Transportation Plan

The State Transportation System Plan is composed of the Oregon Transportation Plan (OTP), mode and topic plans, and facility plans. Oregon's statewide policy plans articulate the transportation system and focus ODOT's investments to maintain and improve that system, often by informing system management, project selection, and subsequent planning and design guidance. Oregon's transportation planning documents ultimately derive from and implement the goals and policies of the OTP. It establishes a vision and policy foundation to guide transportation system development and investment. The OTP and its mode and topic plans guide decisions by ODOT and other transportation agencies statewide and are reflected in the policies and decisions explained in local and regional plans. The OTP's influence on project delivery is primarily from its investment scenarios, which inform how Oregon should prioritize transportation investments across all modes that implement OTP goals in response to current

and future funding levels. Most modal and topic plans have similar scenarios and investment guidelines to help inform project investment decisions.

109.4 Mode and Topic Plans

ODOT uses two categories of statewide plans to implement the OTP: mode and topic plans. Policies and strategies in these plans often lead to further mode or topic studies, planning and design guidance, and guidance for project selection. ODOT's modal plans reflect four distinct transportation systems: highway, bicycle and pedestrian, rail, and public transit. The Bicycle and Pedestrian Plan (OBPP), for example, guides the state through efforts such as prioritizing projects, developing design guidance, collecting important data and other activities that support walking and biking in Oregon. Similarly, the Oregon Highway Plan (OHP) defines the state highway system and establishes policies for managing and enhancing that system. Both plans inform project delivery primarily by structuring how ODOT prioritizes investments in that mode, and by informing further planning and technical guidance developed by ODOT.

ODOT's topic plans recognize that some challenges and opportunities apply to all modes and require coordinated action outside of any one modal plan. For example, the Transportation Safety Action Plan (TSAP) prioritizes a set of actions to produce a safer transportation system across all modes. The TSAP evaluates safety in planning and design considerations while also informing how ODOT structures its safety project selection process. Similarly, the Oregon Freight Plan's (OFP) policies and strategies improve freight connections to local, state, tribal, regional, national, and international markets. The OFP is a resource designed to guide freight-related operation, maintenance, and investment decisions across all modes. Topic plans inform and focus ODOT's investment priorities (like modal plans) but do so with respect to Oregon's entire transportation system rather than for specific modes. ODOT's topic plans include the Oregon Statewide Transportation Strategy (which includes a 2050 vision for greenhouse gas emission reduction), Transportation Options, as well as the TSAP and OFP.

109.5 Local Plans

Mode and topic plans are statewide plans that are part of the OTP. These plans refine and apply OTP policy to specific modes or topics and guide state, regional, and local investment decisions for the parts of the transportation system that they address. Like the OTP, the goals, policies, and strategies of mode and topic plans are further refined in other regional and local plans such as facility plans, local transportation system plans, and other documents.

ODOT planners participate in ODOT scoping and project delivery teams and are responsible for communicating expectations from local plans for projects in urban areas. On development-funded projects, developers are expected to construct projects and frontages consistent with local TSPs and ODOT standards. Local plans include:

- Transportation System Plans (TSPs)
- Local Streets Plans
- Transit Development Plans (Transit Master Plans)
- Safe Routes to School Action Plans
- Facility Plans
- Streetscape Plans
- Active Transportation Plans (ATPs)

ODOT's multiple plans and programs help to identify transportation needs and determine which transportation projects will be developed and constructed. These plans and programs in concert with the Regions and Area Commissions on Transportation (ACTs) help guide the setting of priorities for the Statewide Transportation Improvement Program (STIP).

109.6 Statewide Transportation Improvement Program

The Statewide Transportation Improvement Program (STIP) is the Oregon Department of Transportation's capital improvement program for state and federally funded projects. The STIP is developed in coordination between ODOT, Federal and local governments, Area Commissions on Transportation, Metropolitan Planning Organizations (MPO), Tribal governments, and the public. The STIP is adopted by the Oregon Transportation Commission (OTC) and approved by FHWA and Federal Transit Administration (FTA) as required.

The STIP is a staged, multi-year program of multimodal transportation projects. It is consistent with the statewide transportation plan and planning processes as well as metropolitan plans and transportation improvement programs (TIPs). STIP cycles currently renew every three years. Typical project types include Safety, Operations, Bridge, Active Transportation, Pavement Preservation and Modernization STIP projects.

The STIP lists projects that are funded by different programs. Typical funding programs through the STIP include the following: (The following list is not all-inclusive. Check the STIP website for complete list.)

1. Fix-It Program - Includes all the capital funding categories that maintain or fix ODOT's portion of the transportations system. Fix-It needs are derived from a statewide asset management system. Projects that are eligible for Fix-It include: State-owned bridges; highway pavement; culverts; seismic mitigation; salmon (fish passage); bicycle and pedestrian facilities on state highways; and site mitigation and repair.
2. Enhance Highway Program - Enhance Highway programs enhance or expand the transportation system. This includes improving interchanges, new bridges on new alignments, and adding lanes on highways.

3. Safety Program - Safety program projects reduce deaths and injuries on Oregon roads. This includes the All Roads Transportation Safety Program (ARTS), which selects projects that will make roads safer for all transportation modes using the roadway.
4. Public and Active Transportation Program (Non-Highway Program) - Program provides direction on three sub-categories on non-highway funding including: Public Transportation; State Highway Fund bicycle and pedestrian; and non-highway discretionary such as curb ramps, active transportation, passenger rail, community paths, safe routes to school, and other transportation options.
5. Local Programs - Local program direct funding to local governments so they can fund priority projects including Metropolitan planning, Transportation Management Areas, Congestion mitigation and air quality, Surface transportation block grant program, Immediate Opportunity Fund, and Transportation and growth management.
6. Other Functions Program - Includes allocations for workforce development, statewide planning and data collection, and administrative programs provided for by federal resources.

While all STIP project should follow a decision-making process, it is imperative that urban design projects have a documented decision framework. The following is a general decision-making framework for the performance-based design approach to developing urban STIP projects.

1. Review previous corridor studies or project plans to understand the urban context and modal expectations.
2. To the extent possible when no prior applicable plans and studies are available, establish project goals and document the urban context and modal expectations. Collaboration through a multidisciplinary project team can help support these activities.
3. Verify during the scoping process that the conceptual design meets project goals and desired outcomes and fits the urban context.
4. Confirm during the final design stage that the design decisions align with the project goals, urban context and expected user needs.
5. Prior to construction, confirm that the final design meets the original project goals and desired outcomes. Include clear documentation of design decisions, particularly if they do not align with the guidance for the identified urban context.
6. Establish an approach for monitoring the project.

Any changes to prior decisions are evaluated against the original intent of the project, and justification is provided for evaluation by a multidisciplinary project team.

109.7 Transportation Planning Rule

In Oregon, transportation planning is governed by Oregon Administrative Rule 660[1], Division 12. This is also known as the Transportation Planning Rule (TPR). This rule establishes requirements for local agencies to develop, adopt and implement Transportation System Plans as well as corresponding policies for a jurisdiction's land use code. This rule was revised in 2022 to incorporate Climate-Friendly and Equitable Communities (CFEC) rulemaking which mandates that local jurisdictions within metropolitan areas prioritize transportation projects to meet climate goals, improve equity outcomes for underserved populations and support multimodal transportation and land use. At least one performance standard used for land use decision-making must support transportation options that avoid principal reliance on the automobile. CFEC rulemaking requires cities and counties within metropolitan areas that have more than 5,000 in population to designate Climate-Friendly Areas. During project development, see the local jurisdiction's Transportation System Plan for policies and requirements applicable for Climate-Friendly Areas and Metro Region 2040 centers as well as UGB-wide requirements for street parking, the pedestrian system network, the bicycle system network, the public transportation system and the street and highway system. If a project will not build improvements in a manner authorized by the TSP, the needs of the project shall be evaluated whether they could be satisfied in a manner consistent with the TSP or if the TSP could be amended. Financially-constrained project lists within CFEC-compliant TSPs must demonstrate that implementation of the project list will as a whole not increase VMT per capita on a household basis. Jurisdictions may receive exemptions from the sections of the TPR. See Sections 805 and 912.2 for specific application to Pedestrian and Bicycle facilities.

[1] Oregon Administrative Rule Chapter 660, Division 12; effective 08/17/2022

Section 110 Design Standards Identification and Selection

ODOT recognizes the following roadway project types along with the requisite design criteria and standards:

- 1R - Resurfacing
- 3R - Resurfacing, Restoration, and Rehabilitation
- 4R - Resurfacing, Restoration, Rehabilitation, and Reconstruction
- AASHTO

The following sections provide a brief description of each of the sources of design standards currently in use by ODOT. These standards give design criteria primarily for the state system. These standards are dependent on the highway's functional classification (See Appendix A) and the work type.

It is important to note that in addition to the standards described below, considerable reference information is available in other publications. A listing of these references is given in Section 121 and is considered supplemental to the design criteria given elsewhere in this manual. Procedures for deviating from these standards and guidelines are outlined in Part 1000, Design Exceptions.

Projects may include a variety of design criteria. Utilizing a flexibility in design approach to projects, coupled with different funding sources available that may also be bundled for economy, it is possible to have projects that involve several types of design standard requirements.

For example, a grind and inlay preservation project that includes new multimodal design elements such as a new separated multi-use path. In this specific instance, preservation standards such as 1R or 3R would be used for the preservation grind and inlay portion of the project and 4R standards for the separated multi-use path. The designer will need to work with the project team to determine the project elements and then select the appropriate standard.

110.1 Work Types

The standards used to develop roadway geometric and non-geometric details generally have a major effect on the overall project cost. The type of work, location of the project, and type of roadway facility are all factors that must be taken into consideration when making that selection.

When determining the appropriate design standard for use in project development, work types can be divided into the categories listed below. Funding may come from a number of funding programs such as Fix-It, Enhance, Safety, Local Programs or a combination of funding programs. It is the type of work that determines the design standard to use and not the funding type. It is possible to have a preservation project that the base funding is "Fix-It" and "Public and Active Transportation" program funding is included to install bicycle features such as a buffered bike lane. In this case 1R or 3R standards would be used for the preservation aspect of the project and 4R standards would be used as the base standard for the buffered bicycle lane. The project context and existing features may provide justification for using existing non-standard design features when it is determined to be an appropriate design through the design exception process. Further discussion of the specific categories is included in subsequent sections.

ODOT recognizes the following general highway work types:

1. Modernization [New Construction/Reconstruction]
2. Preservation
    a. Resurfacing
    b. Interstate Maintenance
    c. Resurfacing, Restoration, and Rehabilitation
3. Safety Improvements
4. Operations
5. Maintenance
6. Miscellaneous/Special Programs
    a. ADA Program
    b. Grant Project
    c. Property Development Permit Projects
    d. Emergency/Natural Disaster
7. Local Programs (AASHTO)

Table 100-2: Potential Applicable Design Standards

Work Type	1R	3R	4R	AASHTO
Modernization			✓	
Preservation: Resurfacing	✓	✓		
Preservation: Interstate Maintenance	✓	✓		
Safety Improvements		✓	✓	
Operations		✓	✓	
Maintenance	✓	✓	✓	
Misc./Special Programs: Grant Project			✓	✓
Misc./Special Programs: Property Development Permit Projects		✓	✓	
Misc./Special Programs: Emergency/Natural Disaster		✓*		
Local Programs			✓**	✓

✓* - Emergency/Natural Disaster projects may not be required to comply with all 3R design standards, as the main goal of these projects is to reopen compromised sections of highway, and projects are often designed to, at a minimum, meet design standards of the pre-emergency condition. However, it is important that permanent repairs should incorporate current design standards that do not materially change the function or character of the facility.

✓** - On or along the state highway

Work types can fall under a variety of design standards. See Table 100-2 for potential design standards that typically apply to each work type.

Other disciplines utilize other design standards that must also be determined during project development. Coordination with all disciplines involved with a project is critical to overall project success.

110.2 ADA Requirements for Paving Projects

An ADA ramp may require reconstruction when paving alterations occur adjacent to the ADA ramp. This requirement applies to all projects under the Interstate Maintenance, 1R, 3R, 4R, and

SF standards. See ADA Ramp Triggers at Bridges Section 110.2.2 when paving by a bridge structure. **Reconstruct ADA ramps when all of the following conditions apply:**

- **ADA Ramp is triggered by adjacent pavement alterations according to Section 110.2.1, Section 110.2.2, or Maintenance Operational Notice MG100-107 in Appendix H.**
- **ADA Ramp is listed as "Missing" or having a "Poor" functional condition in the ODOT ADA Ramp inventory.**
- **ADA Ramp does not have a year listed in the "Settlement Remediation Year" data field in FACS-STIP.**

When the paving limits incorporate portions of the private approach and impact the pedestrian access route, radial driveway curb cuts are triggered for accessibility upgrades. Contact the Statewide Asset Specialist for additional information or to verify evaluation of ADA Ramps.

Pavement treatments are described in Maintenance Operational Notice MG 100-107 in Appendix H and in Section 1.2.10 of the Bridge Design Manual, which describe alterations versus maintenance surfacing treatments. For example, a chip seal alone is not an alteration paving treatment however when multiple surface treatments are combined it may result in an alteration. Paving alterations are not limited to just asphalt roadbeds and include other surfacing materials such as reinforced concrete sections. Utility trench work is typically not considered a paving alteration; consultation with Engineering and Technical Services Branch, Roadway Engineering Section is recommended.

110.2.1 ADA Ramp Triggers with Paving Alterations

Paving alterations change the usability of the roadway facility, which includes pedestrian crosswalks. Paving alterations include reconstruction, rehabilitation, resurfacing, widening, and similar work while maintenance activities are treatments which are applied to seal and protect the road surface and improve friction for the vehicular use. [2] Refer to MG100-107 in Appendix H, which outlines when paving work is considered an alteration requiring ADA ramps to be addressed.

The requirement to provide curb ramps is intended to ensure that people with disabilities can access pedestrian walkways that cross a curb. The following illustrations show the curb ramp triggers based on various paving scenarios commonly encountered with projects. Curb ramps

[2] FHWA Joint Memo Technical Assistance on the Title II of the ADA Requirements to Provide Curb Ramps when Streets, Roads, or Highway are Altered through Resurfacing.

must be constructed and completed at the time the work or construction activity is triggered, or prior to the alteration work. Curb ramp reconstruction for a triggered ADA ramp often involves geometric revisions and reconstruction of the second curb ramp at the existing corner as it may have interdependent features.

Figure 100-11: Example 1 - 1R Paving Scenario Existing Conditions and Requirements

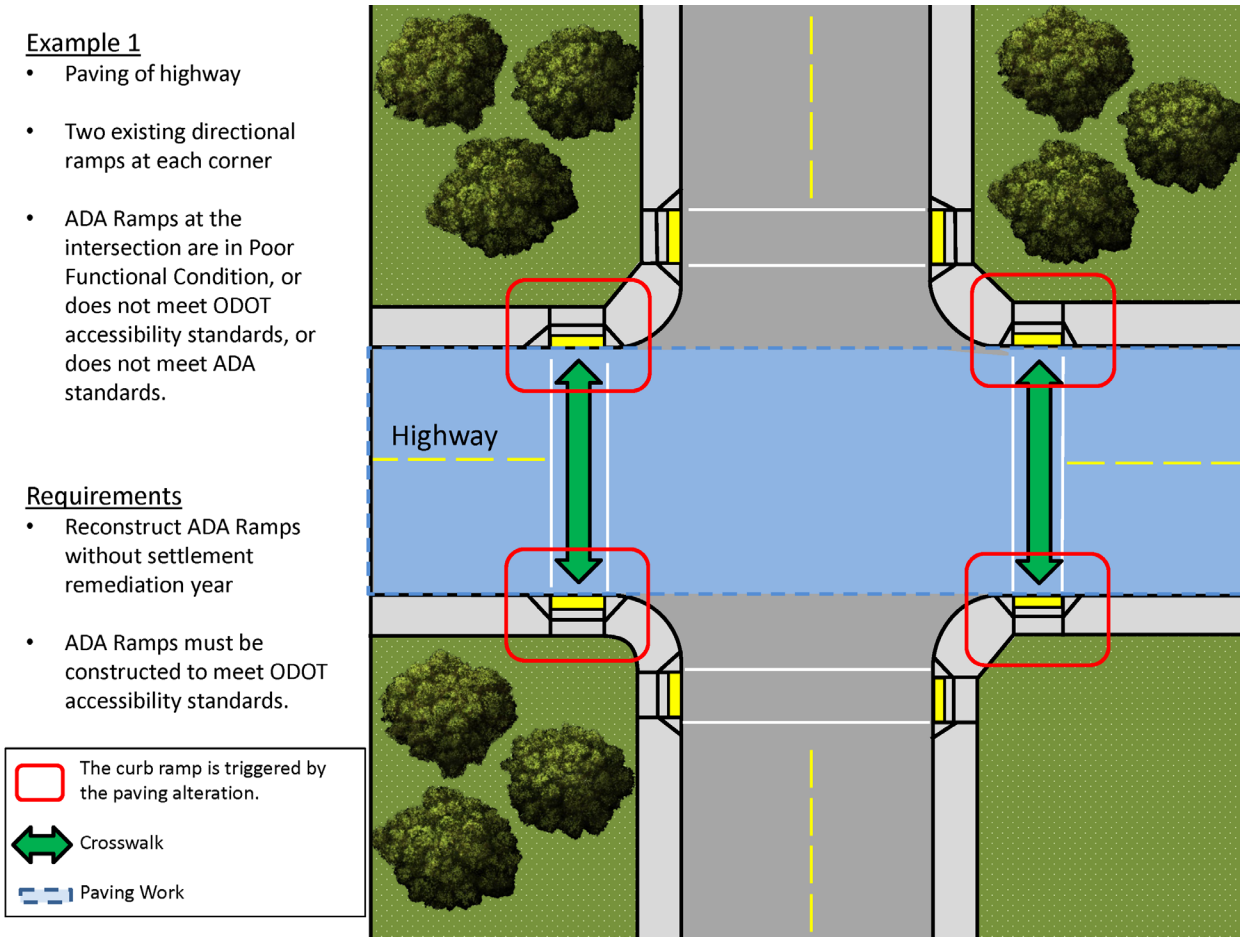


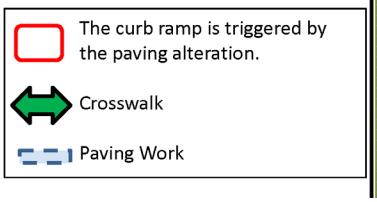
Figure 100-12: Example 2 - 1R Paving Scenario Existing Conditions and Requirements

Example 2

- Paving of highway and street approach at crosswalk.
- Two existing directional ramps at each corner
- ADA Ramps at the intersection are in Poor Functional Condition, or does not meet ODOT accessibility standards, or does not meet ADA standards.

Requirements

- Reconstruct ADA Ramps without settlement remediation year
- ADA Ramps must be constructed to meet ODOT accessibility standards.



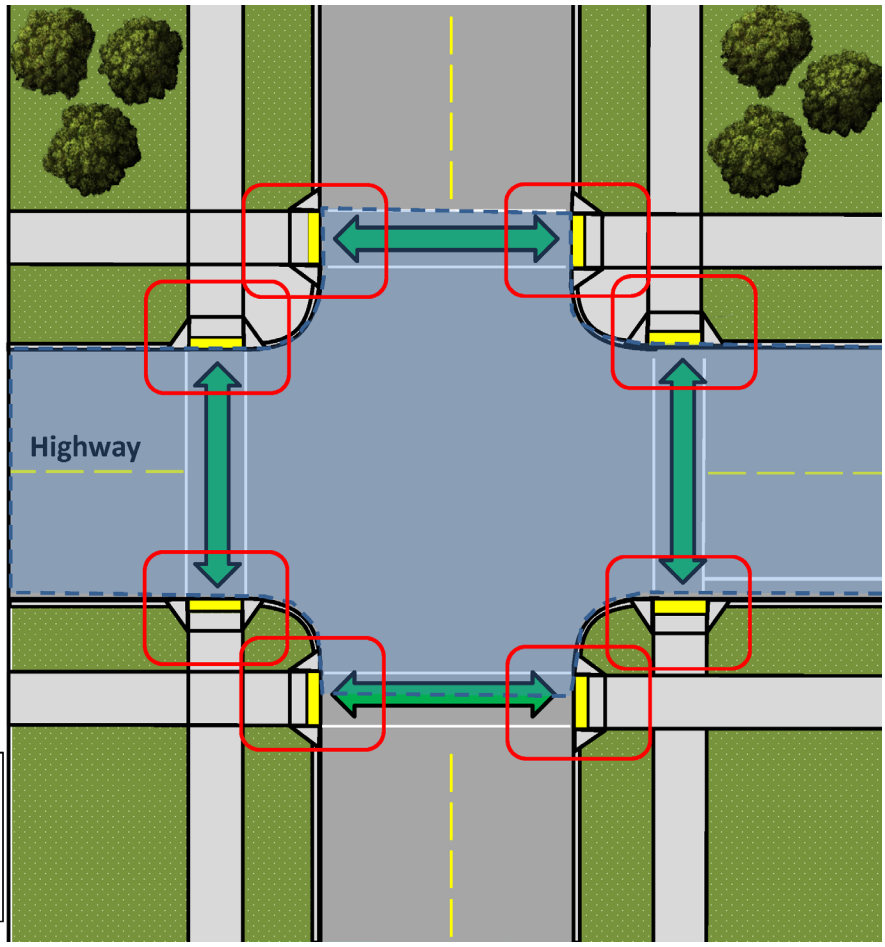


Figure 100-13: Example 3 - 1R Paving Scenario Existing Conditions and Requirements

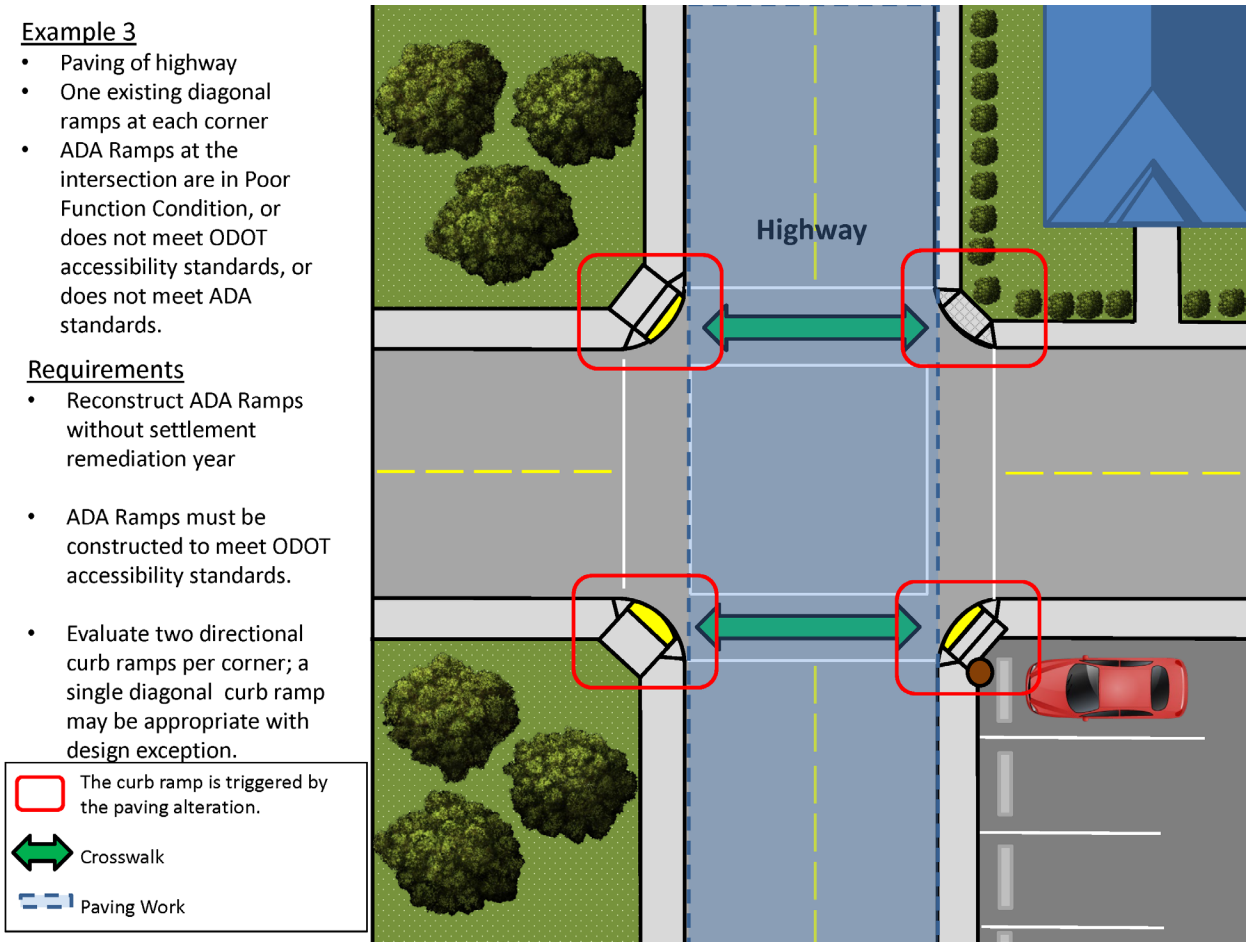


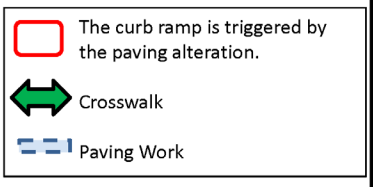
Figure 100-14: Example 4 - 1R Paving Scenario Existing Conditions and Requirements

Example 4

- Paving alteration
- ADA Ramps at the intersection are in Poor Functional Condition, or does not meet ODOT accessibility standards, or does not meet ADA standards.

Requirements

- Reconstruct ADA Ramps without settlement remediation year
- ADA Ramps must be constructed to meet ODOT accessibility standards.
- Evaluate two directional curb ramps per corner; a single diagonal curb ramp may be appropriate with design exception.



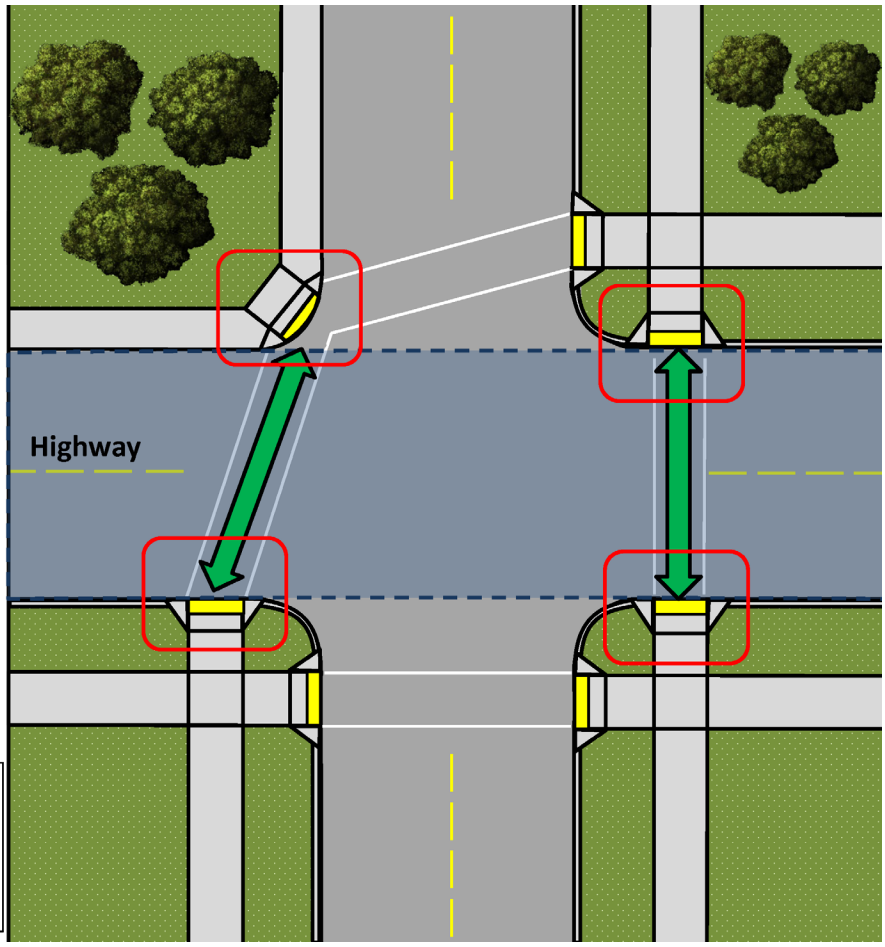


Figure 100-15: Example 5 - 1R Paving Scenario Existing Conditions

Existing Conditions:

- Sidewalk with no curb ramps on the north side of the highway
- Paved shoulder south side of the highway

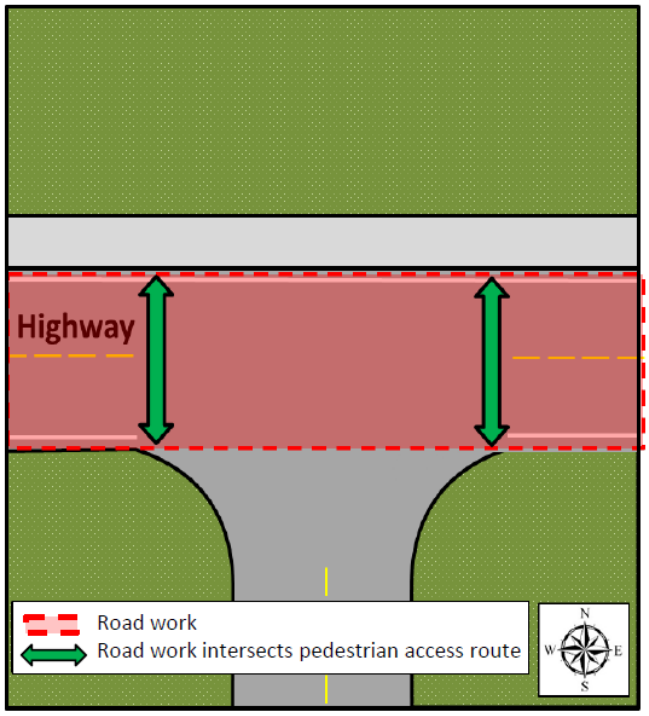


Figure 100-16: Example 5 - 1R Paving Scenario Requirements

Required:

- New curb ramps will need to be installed on the sidewalk on the north side as part of this project

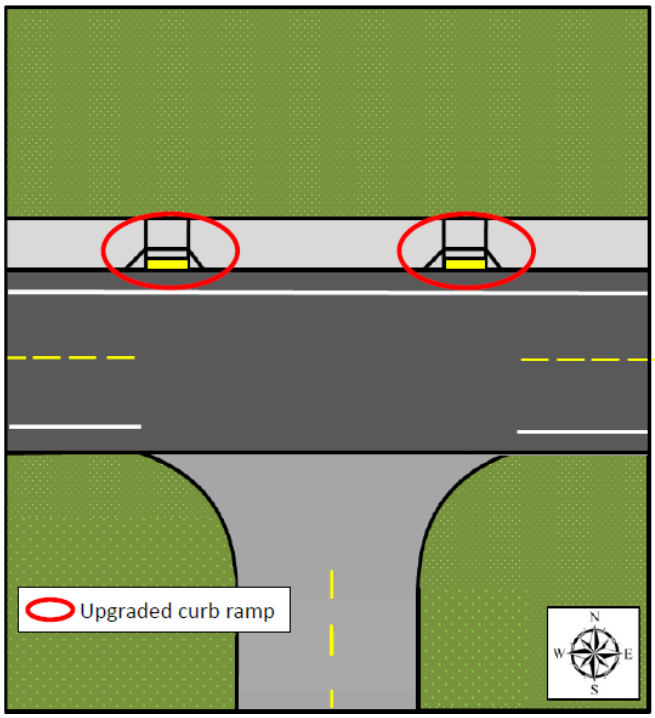


Figure 100-17: Example 6 - 1R Paving Scenario Existing Conditions

Existing Conditions:

- Paved shoulder north and south sides of the highway

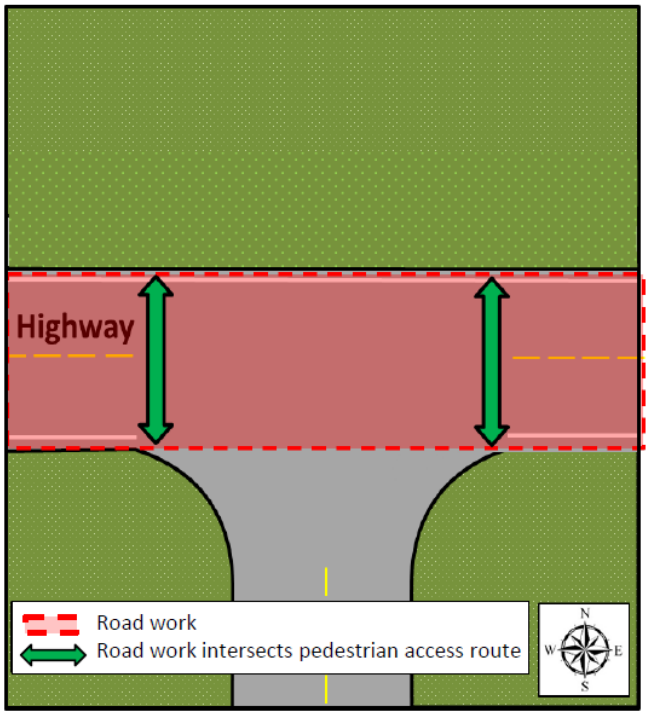
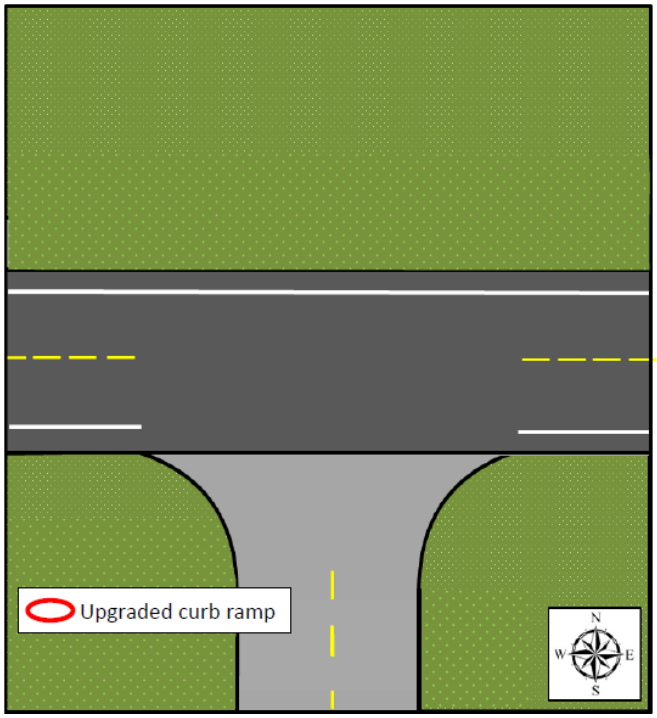


Figure 100-18: Example 6 - 1R Paving Scenario Requirements

Required:

- No curb ramps need to be installed on this project



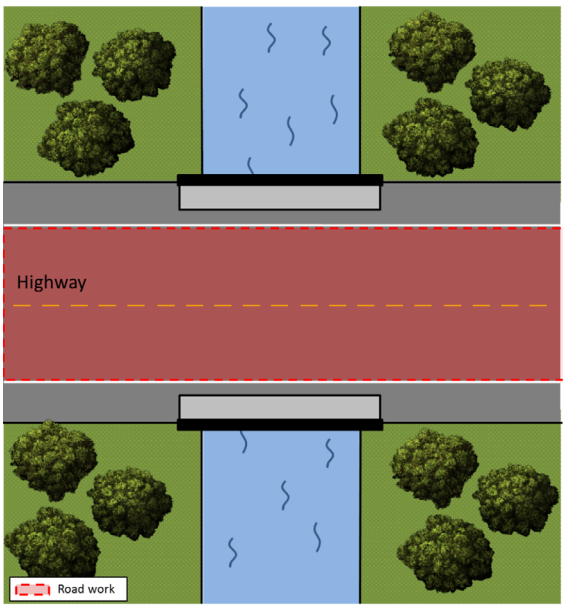
110.2.2 ADA Ramp Triggers at Bridges

Bridges provide a facility for both vehicular and pedestrian travel to cross over features such as a waterway or another transportation facility. Where walkways are not present, pedestrian travel may be expected on or along the roadway except where prohibited. Pedestrians travel in the shoulder or in the roadway when there is no walkway provided. Ensure the paving does not degrade the existing pedestrian usability and maintain a clear continuous route in the shoulder where there is no available walkway, see example figures below.

The sidewalk of a bridge is a facility that, when provided, must be accessible and usable to the greatest extent feasible by people with disabilities, regardless of whether the bridge is in an urban or rural setting. To determine whether the adjoining surface of a bridge rail is a walkway or a bridge safety curb (brush curb), refer to the Bridge Design Manual Section 1.2.10 Safety and Accessibility. Many existing bridges were constructed preceding accessibility requirements and may have only provided a narrow pedestrian sidewalk surface without a sloped end connection. Point constraints less than 32 inches do not negate the primary use for pedestrian activity and walkway determination. Some bridge rails have been altered to provide safety improvements for vehicular departures, and therefore reduced the available walkway width on bridges. Refer to Section 800 for geometric design requirements for walkways at bridge approaches and curb ramp design.

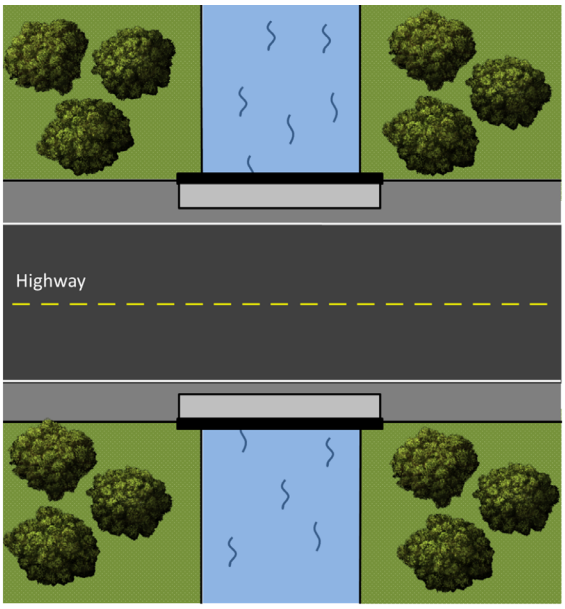
Usability of a bridge walkway can be affected when projects involve resurfacing a walkway, reconstructing a walkway, or altering (retrofitting) the bridge railing. These types of alterations provide opportunity to improve accessibility for pedestrians. The following illustrations show the curb ramp triggers based on various paving scenarios commonly encountered with projects with bridges. Curb ramps must be constructed and completed at the time of the alteration work when the construction activity occurs, or prior to the alteration work. If existing ADA ramps are not included in the inventory, utilize the curb ramp assets numbering conventions for bridges as shown on the Exhibit A: Curb Ramp Location and Numbering on the ODOT Asset webpage.

Figure 100-19: Example 1 - Paving in Lane ADA Ramp Triggers



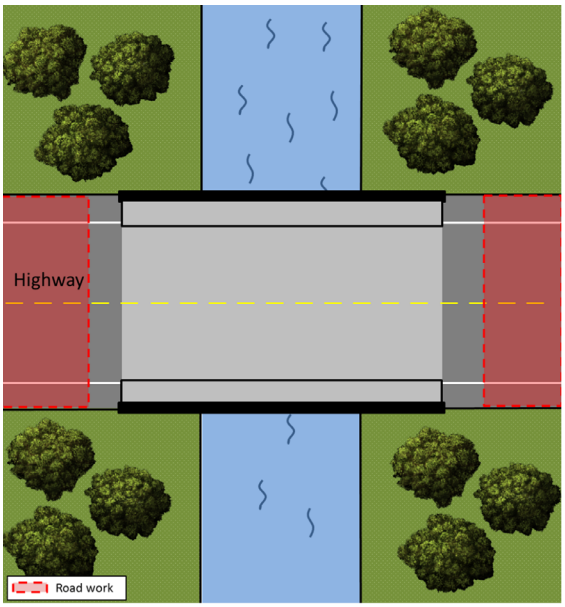
Project: Paving between fog lines through intersections.

Existing Conditions: Roadway with paved shoulder. Bridge with sidewalks.



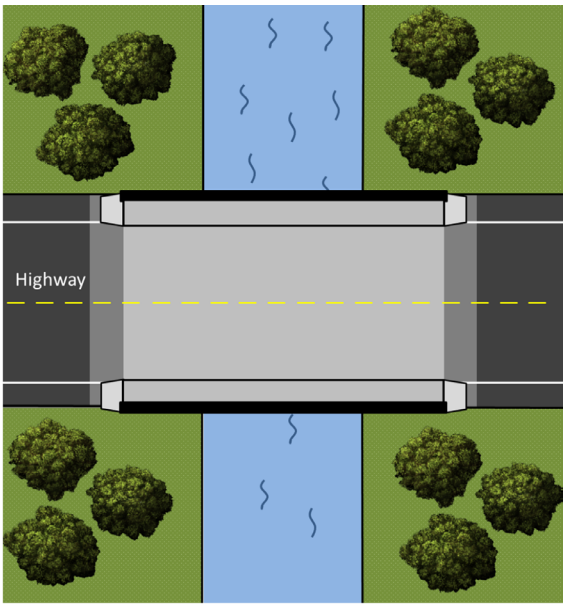
Required: Compliant curb ramps at all street crossings. Curb ramps are not required to be upgraded for the sidewalk on the bridge.

Figure 100-20: Example 2 - Full Width Paving Near Bridge Approach ADA Ramp Triggers



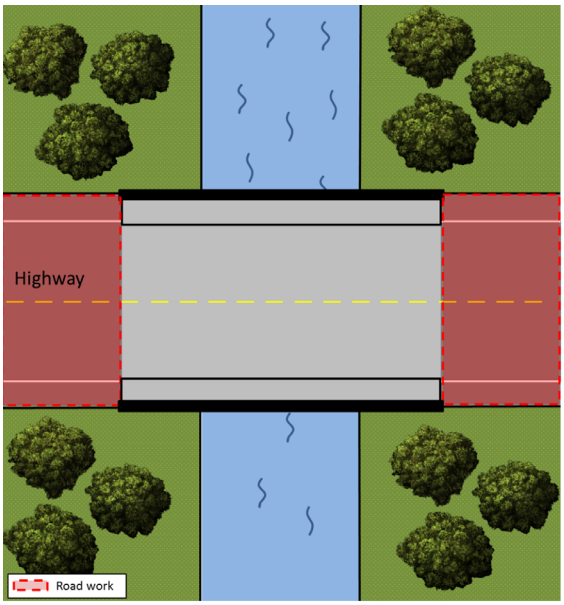
Project: Full-width paving on highway surrounding bridge.

Existing Conditions: Roadway with paved shoulders. Bridge with sidewalks.



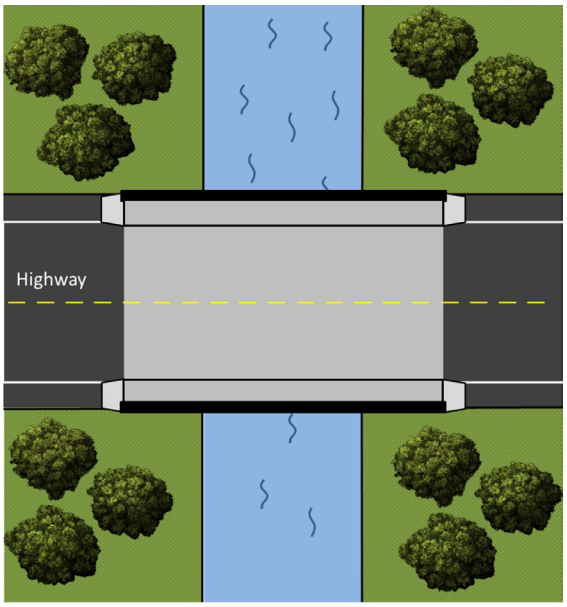
Required: Compliant curb ramps to the sidewalks on the bridge.

Figure 100-21: Example 3 - Full Width Paving to Bridge End ADA Ramp Triggers



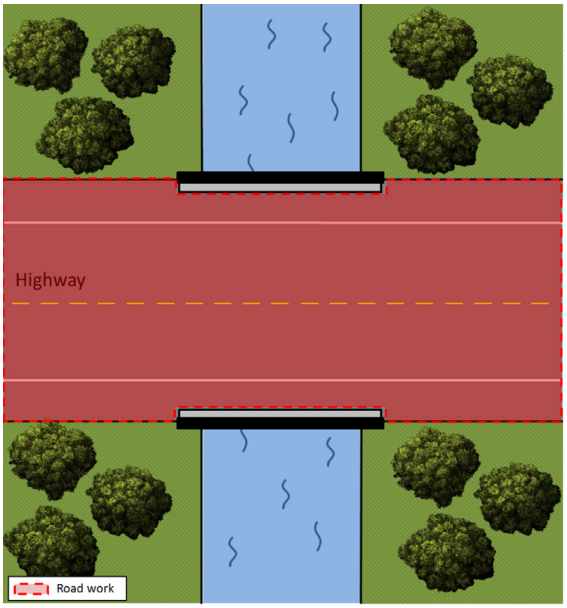
Project: Full-width paving to edge of concrete bridge deck.

Existing Conditions: Roadway with paved shoulders. Bridge with sidewalks.



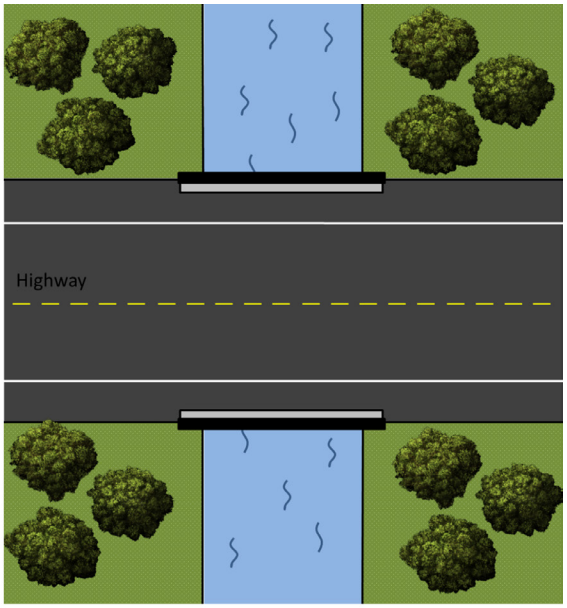
Required: ADA ramps to bridge sidewalks.

Figure 100-22: Example 4 - Full Width Paving Over Bridge with Safety Curb



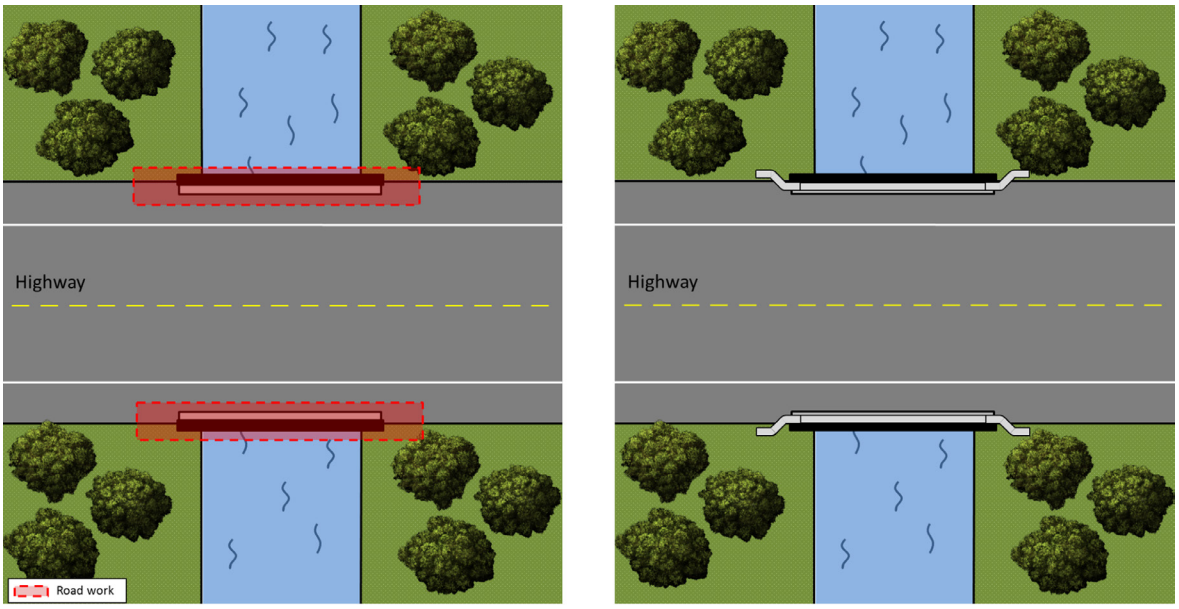
Project: Full-width paving over bridge.

Existing Conditions: Roadway with paved shoulders. Bridge without sidewalks.



Required: Ensure the pedestrian access is maintained along shoulder.

Figure 100-23: Example 5 - Bridge Rail Retrofit



Project: Rail retrofit or replacement on bridge.

Existing Conditions: Roadway with paved shoulders. Bridge without sidewalks.

Required: Ensure that pedestrian access is available along shoulder.

Section 111 ODOT 1R Standard

With agreement from FHWA, the ODOT 1R standard is intended to preserve the highway paving with single lift overlays or inlays that are considered non-structural. As such, these projects meet the FHWA definition of "alterations". See Section 110.2 for ADA requirements for paving alterations. Generally, no specific pavement design life is considered, but it is intended to provide at least 8-years of service. Since these are considered alterations and not reconstruction projects, the Oregon statute ORS 366.514 (Bike Bill) requirements are not triggered. However, shoulder widening and other bicycle related design items can be added to 1R projects if other funding alternatives are used and the addition of the design items does not delay the project.

In addition to bicycle design elements, safety analysis and inclusion of safety improvements or safety countermeasures is an important aspect of the 1R program. The replacement of safety items such as guardrail, guardrail terminals, concrete barrier, impact attenuators, and signs may also be included in the 1R project if funding other than Preservation funding is used and the added work will not delay the scheduled bid date. Additionally, any existing safety features that are impacted by the proposed resurfacing must be adjusted or replaced by the 1R project. As noted above in the project requirements, Section 110.2, all projects that include resurfacing (except for chip seals) are to install or upgrade curb ramps.

Where additional funds are available, additional work can be added to a 1R project. In this case, the project is considered to be a 1R+ project. The additional work would generally use the 4R standard. 1R projects may include minor restriping, such as narrowing travel lanes from 12 feet to 11 feet to upgrade bicycle facilities. Major restriping, such as a road diet, is not appropriate for a 1R project without additional funds.

111.1 Scoping Requirements

To ensure the intent of the program is met in addressing pavement and safety needs, adequate advance information is needed to assure adequate statewide decisions are made with consistency. If additional funding sources are anticipated through scoping, they should be identified with the final scoping documents.

1. 1R/3R Record of Decisions Documentation Form
    - This form steps the scoping team through the scoping process. Parts of the form are filled out by different sections including Pavements, Traffic, and Roadway.
    - Use of this form provides a statewide uniform approach to determining the project design standard – 1R vs 3R – that will be applied to a pavement preservation project.

111.2 Project Initiation Requirements

At project initiation, the 1R/3R Record of Decisions Documentation form must be reviewed and validated to ensure the project will be developed under the appropriate design standard.

111.3 Paving Criteria – 1R Projects

1. A paving project is initially designated 1R based on the appropriate paving treatment. 1R pavement treatments are defined as a single lift overlay or inlay and are considered as non-structural pavement preservation according to agreement with FHWA. For preservations design life expectation see ODOT Pavement Design Guide (ODOT PDG) Section 7.1 and other related guidance in the ODOT PDG.
    - Pavement Services is the final authority regarding the pavement design.
2. Where less than approximately 5 percent of a project (based on lane miles paved) includes more than a single lift non-structural overlay or inlay, the project may be designated 1R.
3. Where up to approximately 25 percent of a project (based on lane miles paved) includes more than a single lift non-structural overlay, the project may be designated 1R; however, this requires the approval of a design exception.

4. Where more than approximately 25 percent of a project (based on lane miles paved) includes more than a single lift non-structural overlay, the project must be designated 3R.
5. As an exception to this rule, a grind and inlay plus an overlay may also be considered for development under the 1R standard; however, this would be uncommon and requires the approval of a design exception.
6. Where the appropriate course of action is not clear based on the percentages noted above, include Technical Services, Roadway Engineering Unit staff in the discussion.
7. Chip seals are 1R projects and subject to the requirements of the 1R standard. Chip seals alone are not paving alterations resulting in ADA Ramp work as described in Section 110.2 and MG 100-107 in Appendix H.
8. Requirements for Unprotected and Unconnected Bridge Ends -1R Projects

On 1R paving projects, any bridge rail with unprotected ends or unconnected transitions exposed to traffic must be mitigated. Provide an end treatment meeting the current standard, or a design exception must be obtained. (Note: In very specific, one-way roadway locations a protected bridge rail trailing end may not be required. Contact the Senior Roadway/Roadside Design Engineer in the Engineering and Technical Services Branch (ETSB), Roadway Engineering Section for guidance.) For possible funding options, contact the Senior Roadway / Roadside Design Engineer in the ODOT Technical Services Roadway Engineering Section.

- Unprotected ends – Where the end of the bridge rail is exposed with no end treatment such as a transition to guardrail or a crash cushion.
- Unconnected transition – Where there is no crashworthy transition between the end of the bridge rail to the guardrail or other barrier.

111.4 Roadside Safety Hardware Requirements for 1R Projects

The FACS-STIP tool is used to access roadside safety hardware data and other inventory data used for scoping 1R projects.

ODOT has adopted the Manual for Assessing Safety Hardware (MASH 2016) as the standard criteria for assessing and crash testing roadside safety hardware. Existing safety hardware evaluated under the previous standard – NCHRP 350 is allowed to remain in service in most cases on 1R projects.

Pre-NCHRP 350 hardware may be upgraded if additional funding is available (1R+). Existing roadside safety hardware that is left in service must be adjusted as necessary to maintain functionality. See Part 400.

111.5 Curb Ramp Requirements for 1R Projects

See Section 110.2 for project requirements related to curb ramp reconstruction.

111.6 Preservation (1R vs. 3R)

The term preservation is often used as a catch-all meaning. Improvements to extend the service life of existing facilities, and rehabilitative work on roadways are preservation types of projects. In general, preservation projects add useful life to the road without increasing the capacity, and may include:

1. Pavement inlays and/or overlays (including minor safety and bridge improvements)
2. Interstate Maintenance (IM) Program (pavement preservation projects on the Interstate system)
3. Re-establishing an existing roadway
4. Resurfacing projects

The pavement preservation category of projects on state highways uses the ODOT 3R Urban, Rural, Freeway, or 1R standard depending upon the highway classification and location. Generally, preservation projects preserve and extend the service life of an existing highway typically by at least 8 years. 1R preservation projects are focused primarily on improving pavement condition and restriping markings. They are usually considered non-structural, and a specific design life may not be intended. 3R Preservation projects may include small portions of modernization activities as part of the project such as affecting subgrade, re-basing, adding a turn lane, or minor curve modifications. ***As long as these elements do not account for over 50 percent of the project length, the appropriate ODOT 3R standard is to be used, otherwise the project is treated as modernization and the appropriate ODOT 4R/New standard shall be used.*** As discussed earlier, the different funding sources may allow a combination of design standards to be used with the appropriate design standard being used for the specific work type. The ODOT Technical Services Roadway Engineering Unit can assist regarding the appropriate standards to use for projects that involve multiple work types.

There are cases where the designer needs to be aware of funding limitations as they relate to preservation type projects and safety features. This information is more fully discussed later in this section.

111.7 Preventive Maintenance

Preventive Maintenance is a planned strategy of cost-effective treatments to an existing roadway system and its appurtenances that preserves the system, retards future deterioration,

and maintains or improves the functional condition of the system without significantly increasing the structural capacity. An example of Preventive Maintenance is a chip seal project.

Preventive maintenance projects are often done through maintenance forces, and they preserve and extend the service life of existing highways and structures. Preventive maintenance projects are subject to ODOT 1R design standards, and generally maintain existing lane and shoulder widths. However, even these projects can evaluate the existing cross-section and with restriping, can reconfigure the cross-section to make improvements for multimodal considerations.

Section 112 ODOT 3R Design Standards

The 3R standard is intended to preserve and extend the service life of existing highways and enhance safety using cost-effective solutions. Service life is extended with structural rehabilitation without complete reconstruction.

ODOT 3R Design Standards are found in several Parts of the HDM. ODOT 3R design criteria are located in Parts 200 and 300, which contain information dealing with pavement widths, horizontal curvature, superelevation, and other design areas specific to this type of work. The 3R requirements are similar to TRB Special Report #214, but with additional guidance in respect to context, performance-base design, and design flexibility. Guidance from other research such as NCHRP Report 876, Guidelines for Integrating Cost-Effectiveness into Resurfacing, Restoration, and Rehabilitation (3R) Projects may be applicable. ODOT 3R standards have been developed for both Urban and Rural areas and are arranged according to functional class. 3R type projects located on designated expressways are to use the appropriate urban or rural arterial 3R standard.

112.1 Preservation (Resurfacing, Restoration, and Rehabilitation)

As stated above, 3R are projects that preserve and extend the service life of existing highways and enhance safety using cost-effective solutions. Improvements include extending pavement life by at least 8 years, safety enhancements, minor widening (minor widening considered to be widening at spot locations, widening at curves, etc.), improvements in vertical and horizontal alignment, improvement in superelevation, flattening of side slopes and removal of roadside hazards. The scope is influenced by factors such as roadside conditions, funding constraints, environmental concerns, changing traffic and land use patterns, surfacing deterioration and crash type and rate. 3R projects are not constructed with the intent of improving highway mobility; however, it is sometimes an incidental benefit of improving the riding surface and improving safety.

This category includes but is not limited to the following types of work: overlay projects with or without minor widening to shoulders or travel lanes, Latex Modified Concrete (LMC) overlays, widening for curb, and extending tapers. Also included in this class are projects with site-specific vertical or horizontal curve corrections, and left turn channelizations, when included in an overlay project for safety purposes. Scarifying existing surfacing, rebasing and repaving is considered as 3R if the scope of the job does not require the original subgrade to be altered. All project widening in this category is limited to less than a full lane width except when channelization is incorporated.

Due to the variance in project scopes, the application of 3R standards will typically involve substantial engineering judgment compared to 4R projects where, in general, design elements are being brought up to current standard. Project scope of work, purpose and need, and alternative analysis all combine to determine trade-offs in respect to 3R projects and must be included in the decision process of determining which design elements are affected. All projects shall strive to meet all of the 3R design requirements. However, with the primary focus of 3R projects preserving and extending the pavement life and the associated accessibility improvements such as curb ramps, not all projects are able to improve all project elements. In respect to engineering judgment, the use of design exceptions with appropriate justification may be an appropriate tool in designing 3R projects.

When preservation projects are being considered for 1R, the 1R/3R Record of Decisions Documentation process will be used to determine if the preservation project will be a 1R project, a 1R+ project, or a 3R project. Once this determination has been made the appropriate design standards are to be used.

As discussed above, engineering judgment will be involved in some preservation projects as it is possible for 3R projects to have some 4R design elements, such as vertical and horizontal curve correction, adding a bike lane, sidewalk, walkways and curb ramps. **Those 4R elements are to meet the 4R standards. Depending on the project specifics, it may be more appropriate from a design flexibility and context perspective to request a design exception to the 4R requirements.**

Section 113 ODOT 4R/New Design Standard

The ODOT 4R/New standard is intended to be used to either reconstruct or newly construct infrastructure. Reconstruction involves removal of base material and may involve changes to vertical or horizontal geometry of the highway.

Generally, these standards are found in the HDM, starting in this Part 100 and running through the remaining document. The ODOT 4R/New standards give specific values for use in all areas of design. It is intended that all design values given in the ODOT 4R/New standards are to be within the values or ranges given in the AASHTO Green Book. That publication is to be

referenced, when a particular design detail is not covered in the ODOT 4R/New standards. ODOT 4R/New standards have been developed for both Urban and Rural areas of the state and are further defined by freeways, expressways, and arterial standards.

The ODOT 4R/New standards also contain the following specific requirements which are not included within the AASHTO Green Book:

1. ODOT requires use of spirals. Use spiral lengths given in the HDM, as appropriate.
2. Superelevation runoffs match the ODOT spiral length.
3. ODOT requires construction minimum vertical clearances.
4. For vertical clearance on Local Agency jurisdiction roadways, see Part 300
5. Use ODOT specific design speeds. See Section 207.10 Speed, Context, and Design
6. Use a performance-based and context-sensitive design approach to ODOT's six urban contexts.

The ODOT 4R/New standard is applicable to projects that are considered either new construction or reconstruction as defined in the AASHTO Green Book.

New construction projects are projects constructed in a new location with new alignments where no existing roadway is present. Other New construction projects may include major additions such as interchanges and safety rest areas or rebuilding an existing facility with major vertical or horizontal alignment changes. Other modal new construction projects can include multi-use paths and off-road bicycle facility options. Very little of ODOT's work is new construction as most of the highway infrastructure is in place. ODOT primarily maintains, preserves, and enhances existing highway corridors. New construction projects generally improve transportation safety, address gaps and deficiencies in the multimodal transportation network, add capacity to the highway system to facilitate existing traffic and/or accommodate projected traffic growth thereby enhancing the corridor. New construction projects can also include new construction activities such as construction of a new segment of highway on new alignment. Other modal projects on state highways and bridges such as light-rail, bus-rapid transit, streetcar, and alike can be considered new construction or reconstruction projects. Rural new construction projects typically achieve a 20-year service life for pavements. A 30-year pavement service life is required for urban corridors, bridge approaches, grade constrained underpasses, and railroad crossing.

Reconstruction projects upgrade the facility to acceptable geometric standards and as a result, often provide a greater roadway width. The improvements may be in the form of additional lanes and/or wider shoulders and produce an improvement in the highway's mobility. Reconstruction projects normally include, but are not limited to, the following types of work:

1. Altering the original subgrade
2. New, or replacement of, Structures or bridges, and similar projects.

3. Addition of Lanes including:
    a. Through Lanes
    b. Passing and Climbing Lanes
    c. Turn Lanes
    d. Acceleration and Deceleration Lanes
    e. High Occupancy Vehicle (HOV) lanes
    f. Reconfiguring cross section with striping or managed lanes (4R only when adding lanes, striping reconfiguration can also be achieved with 1R and 3R projects.)
4. New alignments/New or upgraded facilities, including pedestrian, bicycle and transit facilities
5. Highway reconstruction with major alignment improvements or major widening
6. Grade separations and Interchanges
7. Widening of bridges to add travel lanes
8. New safety rest areas and viewpoints
9. Parking lot, park-n-ride, transit center/hub, and similar projects
10. Port of entry and weigh station facilities
11. Vehicle charging stations
12. Truck escape ramps
13. Median crossovers
14. Tolling infrastructure and facilities
15. New multi-use/shared use path

See the 2018 AASHTO Green Book, Section 1.7 for additional information on the definitions for New Construction, Reconstruction, and Construction Projects on Existing Roads.

When the 4R requirements cannot be achieved, a design exception is required (see 106.2 and Part 1000).

113.1 Single Function Projects (4R)

Single Function projects are 4R projects with a limited scope of work. Single Function projects do not require non-related substandard features of the roadway to be addressed. For example, if a guardrail upgrade qualifies as a Single Function project, it is not necessary to address other

substandard features on the roadway, such as lane and shoulder width, horizontal and vertical alignment, etc.

Design exceptions are only required on the element or component that is modified or altered within the 4R single function project. See specific or applicable sections throughout the HDM relating to each element or component. See Part 1000 for the design exception request process.

Single Function 4R projects include projects that do not permanently impact the travel lanes or shoulders of the highway (boundaries of the roadway realm). Generally, projects that only include work outside the edge of pavement will qualify for as a 4R single function project. For example, guardrail only projects are outside the edge of pavement. Culvert replacement projects may involve work within the roadway, however, will not permanently impact the travel lanes, and can be single function projects. These projects address a specific need. Another example of a single function project with work within the roadway is a rockfall mitigation project that also involves work to reopen the roadway, as long as the work within the roadway is restoring pre-slide conditions. The scope of work is limited to features that are directly impacted as a result of addressing the specific need. For example, a signal upgrade at an urban intersection may impact the sidewalk and trigger the need to provide necessary accessibility upgrades. In no case shall safety, operations, pedestrian and/or bicycle conditions be degraded as a result of a single function project. **Each feature constructed in a single function project must be built to the applicable standard for new construction.** Resurfacing projects are not single function projects (see 110.2.1).

ADA Program specific projects are technically not classified as Single Function, rather a very limited scope. While they are focused on a single overall objective, they have specific requirements that need to be met that often goes beyond the intent of the Single Function category. For practical purposes, ADA Program specific projects can be considered similar to Single Function projects in that they do not need to address all elements across the roadway section in the scope of improvements and substandard roadway features are not addressed. ADA Program specific projects focus needed accessibility upgrades.

Section 114 AASHTO Design Standards

These standards are contained in the AASHTO Green Book. AASHTO standards are specifically for use in the design of new construction and reconstruction projects, when the project is located on routes under local jurisdiction and federally funded. The FAST Act, Section 1404(b) provides for additional flexibility by providing for the use of other design guidance documents in conjunction with the AASHTO Green Book on locally owned NHS roadways where it is applicable.

As stated in the preface of the book, the AASHTO Green Book is not intended as a policy for 3R projects, traffic engineering, safety, and preventive maintenance-type projects that include very

minor or no roadway work. The reader is referred to NCHRP Report 876 and related references, for guidance in the design of 3R projects. However, for local agency urban preservation type projects utilizing federal funding, the local agency has the choice of using the ODOT 3R standard or AASHTO's Green Book in conjunction with other recognized guidance provided by provision from the FAST Act, Section 1404(b).

AASHTO's Green Book policy is organized in a system so the roadway's functional classification and volume determines which part of the policy applies to that roadway. The AASHTO policy includes chapters in which general design controls and elements are discussed as they apply to all types of functional classifications and provide groundwork to understanding basic design concepts. These chapters cover highway functions, design controls and criteria, elements of design, and cross section elements. The policy also gives specific design information for at-grade intersections, grade separations and interchanges.

Chapter 1 of the 2018 AASHTO Green Book continues to embrace design flexibility and performance-based design for projects as part of the project development process, and introduces definitions of the following work types:

1. New construction
2. Reconstruction
3. Projects on existing roads

The "projects on existing road" definition addresses projects "that do not change the basic roadway". Although not defined, these types of projects are very similar to 3R projects in respect to the following considerations:

- Maintaining the existing roadway if the roadway in question is performing well or,
- Making spot improvements to address crashes or,
- Making operational improvement for specific needs, or
- Making cost-effective design improvements that would be expected to reduce crashes.

Chapter 1 of the 2018 Green Book, 7th Edition, also introduced a context classification system that characterizes roadways by their surrounding environment and how the roadway fits into the community. This is very similar to the approach ODOT has taken, initially in the 2003 Highway Design Manual (OHP Highway Segment Designations) and further developed in the Blueprint for Urban Design (BUD). The next update of the AASHTO Green Book, the 8th edition, will be a wholesale change from previous versions and will fully incorporate these concepts throughout the revision. The remainder of AASHTO's 2018 Green Book policy covers design details as they relate to specific functional classifications. AASHTO Green Book policy provides design direction for the following classifications:

1. Rural and Urban Freeways
2. Rural and Urban Arterials

3. Rural & Urban Collector Roads and Streets
4. Local Roads and Streets including Special Purpose Roads

It is imperative that any user of the AASHTO Green Book study and understand the concept of functional classification. The 2018 AASHTO Green Book gives an explanation of this in Chapter 1 (Highway Functions) and the above-mentioned discussion on roadway context. Part 1200 of this manual outlines additional information dealing with traffic studies and functional class in urban areas and how it relates to design. There may be occasions, due to functional class definitions, that an urban setting may have a rural functional classification. In these situations, the designer should consult with the Region Roadway Manager.

Functional Classifications have been established for all state highways by the ODOT Transportation Development Branch. Appendix A contains a list of resources for determining route functional classification. The functional classification should also be checked against the functional classification contained in a local TSP. Design specifics cannot be accurately selected from the AASHTOs Green Book without the correct functional class being known. When determining context, functional classification is balanced with land use classification. A functional classification of a roadway through a rural town might be considered as a rural arterial, since the town may not reach the minimum defined population density to be considered urban under federal classification guideline. However, the land use classification may be more urban with adjoining properties being commercial and retail businesses centered around a core. In this case, an urban context would be appropriate for design criteria decisions, balancing the functional roadway classification with the urban feel and needs of the adjacent land use.

Section 115 Design Standards for Special Cases

Depending on the work to be done that does not fall within one of the above design standards, the design standard for the project needs to be decided as a special case for that project. That decision should be made by the project development team and approved by the State Roadway Engineer and/or the State Traffic Engineer.

115.1 Combined Projects Standards or Types

A project may have more than one design standard applied to different segments where it is appropriate and fits the purpose and need of the project scope. A project scope may include intersection improvements, while other portions may be limited to preservation paving. Many times, projects are combined for programmatic, scheduling, contracting or efficiency purposes, while still maintaining separate design standards.

115.2 Routine Maintenance

Routine Maintenance consists of work that is planned and performed on a routine basis to maintain and preserve the condition of the highway system or to respond to specific conditions and events that restore the highway system to an adequate level of service. Routine maintenance activities are typically performed by the district maintenance offices.

115.3 Bridge

Bridge design categories determine the design criteria and requirements for projects on bridges. These categories include Modernization, Retrofit, Preservation, or Maintenance. These categories and related design criteria and requirements are defined for bridge projects and found in the Bridge Design Manual (BDM).

These categories operate independently from the roadway design standards identified in Section 110 and Section 113. A project involving bridges will have both a roadway design standard and at least one bridge design category. For projects initiating outside of Bridge Program, the bridge design category may be based on the work required by the roadway design standard; however, the bridge design category must still be determined.

Roadway design standards and other agreements govern work outside of the bridge footprint, including approach slabs, drainage features and bridge rail transitions.

115.4 Safety

Safety projects address the statewide prioritized crash locations and corridors, including the Interstate system, in order to reduce the number of fatal and serious injury crashes. The All Roads Transportation Safety (ARTS) Program has been developed to address the safety needs on all public roads in Oregon. The ARTS Program is data and safety driven to achieve the greatest benefits in crash reduction and is blind to jurisdiction.

Safety projects typically fall into two categories, systemic and hot spots. Systemic projects are those that typically use low-cost safety measures that have been proven to reduce fatal and serious injury crashes. Systemic projects focus on intersections, roadway departures, and bicycle and pedestrian.

Examples of systemic projects include:

1. Installation of curve warning signs
2. Reflective backplates on signals
3. Delineation
4. Rumble strips

5. Countdown pedestrian timers
6. Bicycle and Pedestrian projects such as pedestrian lighting and bicycle lanes.

Hot spot projects are those that have been identified as having a higher than normal crash occurrences. Typical hot spot project locations are segments of roadways or intersections. Examples of hot spot projects include:

1. Left turn channelization
2. Installation of climbing lanes or passing lanes
3. Curve realignments
4. Installation of traffic signals
5. Installation of roundabouts
6. Conversion of a signal to a roundabout

With the Department's limited resources and performance-based, practical design approach, safety projects focus on providing solutions in a prioritized manner to solve the highest-level issues first. For example, the primary intent of a left turn channelization project may be to reduce rear-end crashes but may not address non-standard shoulder and lane widths or install a right turn lane where right turn criteria have been met. These safety projects are focused on a specific improvement that require mitigation but do not require addressing other non-standard features that are unrelated to the specific safety issue identified in the project scope. Limited safety funding is not intended to be used to upgrade features where there is no identified safety issue.

As with all projects, the Practical Design Goals and S.C.O.P.E. Values are applied to safety projects. As outlined by Practical Design Goal #3 (design projects that make the system better, address changing needs, and/or maintain current functionality by meeting, but not necessarily exceeding, the defined project purpose and need and project goals) safety projects may focus on specific prioritized safety issues, providing an incremental improvement while improving and/or maintaining safety. As with all projects, engineering judgment and the use of the design exception process are a vital element of the development of safety projects and help efficiently focus specific funding to projects where it is needed.

The design standard selection on a safety project will be determined on a case-by-case evaluation from discussion between region traffic and roadway staff and Engineering and Technical Services Branch, Traffic-Roadway staff based on project context and location specifics. Generally, safety projects use 4R standards for the elements affected. However, because safety projects are focused on particular concerns at prioritized crash sites, engineering judgment is necessary when evaluating roadway cross-section elements and safety treatments for proposed improvements. Table 100-2 lists applicable standards for project types.

In order to provide the greatest improvement in relation to the limited funding available, roadway elements that are directly related to the scope and focus of the safety issue being

addressed will be improved. It may be acceptable to leave in place existing non-standard roadway elements that do not directly affect the project focus, providing that doing so does not degrade the roadway section or create additional safety concerns. For safety projects that involve channelization, Figure: 500-19 Left-Turn Channelization provides alternative guidance on shoulder width. Safety projects that are considered Single Function 4R include traffic signals, illumination, signing, delineation, pavement marking, removal of fixed objects, pedestrian crossing improvements and continuous rumble strip projects that do not include significant additional pavement. Regardless of which standard is selected, design exceptions may be necessary to meet the project S.C.O.P.E. values and should be evaluated early in project scoping.

115.5 Operations

Operations projects increase the efficiency of the highway system, leading to safer traffic operations and greater system reliability. These types of projects include:

1. ITS: Intelligent Transportation System (includes ramp metering, variable message signing, incident management, emergency response, traffic management operation centers, and mountain pass and urban traffic cameras)
2. TDM: Transportation Demand Management (includes rideshare, vanpool, and park and ride programs)
3. Rockfalls and Slides (chronic rockfall areas and slides; not emergency repair work)
4. Signals, signs, channelization, and other operational improvements such as restriping and minor widening.

Many of the operational work type projects involve installation of system management equipment and operation improvement items such as ramp meters, response equipment or signs and signals. These installations would all use standard equipment. Operational projects such as rockfall and slide projects would use the Single function category, which includes 4R standards as this type of project is intended for safety enhancements and not an improvement in roadway width or highway mobility. Operational projects that include channelization or widening will also use 4R standards.

115.6 Development Review and Permitted Projects (Non-STIP)

Development review projects are those land development projects with associated traffic that may impact the safety and operations of state transportation facilities. Development review projects may impact traffic, mobility, ODOT facilities, access to the state system, local street network, safety, pedestrian facilities, rail, etc. Development review projects may result in

improvements on state highway frontage, such as sidewalks, bike lanes, right and left turn channelization, intersection traffic control such as roundabouts or signals/signal modifications as part of the mitigation alternatives.

Integrating new development into and along the existing infrastructure and transportation system creates the need for continuous collaboration. This type of project requires the development review team to review existing plans, prior studies, and/or other information about the project location to verify that the improvements associated with the development meet the code requirements and long-term needs for the area. ODOT staff reviewing development related projects should review the TSP and corridor plan, if available, to understand the urban context, goals and desired outcomes for the project area, and future right-of-way needs. In most cases, it will not be feasible to conduct a planning process as part of the development review, but project teams will be able to follow the decision-making framework in this chapter to document assumptions and decisions. **Development review projects shall use the 4R Standard.** Development Review projects do not require the design life V/C requirements (Table 1200-1; old Table 10-2) to be met as the project mitigation will determine the needed improvements on the state highway system. In many development review instances, there will be limitations on developer requirements for cross-section improvements. These limitations often restrict work to half-street improvements and improvements only along the developer's available frontage in order to meet permitting requirements. If the selected design does not align with adopted plans or current standards for the urban context, ODOT staff should document design decisions and seek agreement from the multidisciplinary project team.

115.7 Miscellaneous/Special Programs

These are projects funded through special programs such as grants that do not easily fit into other work types. The design standard selection on these projects will be determined on a case-by-case evaluation based on project context and location specifics. There are times when 3R standards or Single Function 4R guidelines are appropriate. Projects that provide greater roadway width, add capacity, affect curb placement, or improve the level of mobility are to use 4R standards. Examples of these special programs may include bicycle and pedestrian grants, fish passage and culvert improvements, and immediate opportunity funds.

Examples of special programs are the ADA Program and CQCR construction projects. The ADA Program Projects are a special case with application of design requirements and processes that deviate from 1R,3R, 4R, and SF standards under a technical bulletin for the program. When CQCR accessibility accommodations described in Part 800 result in a stand-alone construction project, they are a special case with an incremental improvement to the transportation system requiring coordination with the State Roadway Engineer. **When the ADA Program provides funds to a STIP project to complete curb ramp reconstruction because it is in the same vicinity, the project will follow the applicable roadway standards under 1R, 3R, 4R, or SF and follow all normal STIP processes and requirements.**

Section 116 Design Standard Selection

The following matrix shows which design standards are applicable for federally funded projects based on work type, and if the project involves a state route or local agency road.

Table 100-3 Design Standards Selection Matrix

Work Type	Interstate State Highways	Urban State Highways	Rural State Highways	Urban Local Agency Roads [1]	Rural Local Agency Roads [1]
Modernization	ODOT 4R/New [2] Freeway	ODOT 4R/New [2] Urban	ODOT 4R/New [2] Rural	AASHTO/ or Other Federally Recognized Criteria	AASHTO/ or Other Federally Recognized Criteria
Preservation	ODOT 3R Freeway	ODOT 3R Urban	ODOT 3R Rural	AASHTO [3] Or Other Federally Recognized Criteria	ODOT 3R Rural [4]
Preventive Maintenance[5]	1R	1R	1R	NA	NA
Safety-Operations-Miscellaneous/ Special Programs	ODOT Freeway [5]	ODOT Urban [5]	ODOT Rural [5]	AASHTO/or Other Federally Recognized Criteria	ODOT 3R Rural

1. For projects on a local jurisdiction route, the local authority may, at its option, use either the appropriate AASHTO Green Book standard or, with approval, select a standard of their own choice. Federal-aid projects must still comply with all applicable federal laws and regulations (e.g., ADA and historic preservation) when selecting standards for design. This discretion is given by ORS 368.036.and by provisions of the FAST Act, Section 1404(b), AASHTO standards are preferred to be used for all local agency jurisdiction roadway projects on the National Highway System (NHS). However, the FAST Act, Section 1404(b) provides guidance on flexibility and the use of other appropriate design guidance that can be used in conjunction with AASHTO design criteria, with approval.
2. Limited scope modernization projects may use Single Function 4R standards – determined on a case-by-case basis.
3. The local agency has the choice to use the AASHTO Green Book, other federally recognized criteria or ODOT 3R Urban design standards. Local Agencies may use AASHTO for Vertical Clearance requirements on Local Agency Jurisdiction Roads.

4. Federally funded Preventive Maintenance work, which includes Chip Seals and Thin Overlays, will be required to follow 1R standards. Preventive Maintenance projects and/or 1R Projects are not applicable to LPA Preservation Projects unless on the State Highway System.
5. The appropriate ODOT 3R standard may be used for some projects. Selection is case-by-case. Designer to confirm appropriate standard with Region Roadway Manager.

116.1 1R/3R Design Standard Selection

This section provides information on the process used to determine if a project uses 1R, (1R+), 3R, or 4R standards. 1R+ projects are 1R projects that include additional items outside the scope of pavement preservation paving. The initial design criteria determination is based on the project being either preservation or modernization, so ensure that ODOT Pavement Preservation was contacted during the Project Initiation phase. Some projects, due to funding and project elements, may consist of a combination of preservation and modernization projects. ***In those cases, 4R standards are to be used for the modernization portion of the project.*** For example, a paving preservation project includes enhance program funding to install a bike lane or a separate bike path. The bicycle design element of the preservation project will use the 4R standard.

The following guidance applies to all freeway, expressway, rural arterial, and urban arterial state highway projects. Once the design standard has been determined, subsequent parts of the HDM provide the design standards. As discussed earlier in this section, Single Function projects use 4R design criteria and are not required to use the 1R/3R record of decisions documentation procedures outlined below.

116.1.1 1R/3R Record of Decisions Documentation

The 1R/3R Record of Decisions Documentation document (ODOT Form 734-5244) is used to determine what standard will be used to develop a preservation project. It is populated at project scoping and verified at project initiation. The form is turned in at DAP for all 1R projects. ***If a combination project has both preservation and modernization elements over the same section of roadway, and over 50 percent of the project length is determined to be modernization, the project is considered a 4R project.*** If a combination project has both preservation and modernization elements, but those elements are on separate segments of the project, both standards can be applied to the project. The record of decisions document provides both a pavement assessment and safety assessment to determine if a project uses the 1R, 1R+, or 3R standards. The form is completed by multiple disciplines, including Pavements, Traffic, and Roadway. A 1R project is typically a pave only project with some specific design elements that must be upgraded to current standards. These mandatory upgrades include items such as unprotected and unconnected bridge ends and installing or upgrading curb ramps. Any asset

information that needs review is addressed in the document and is noted in the roadside inventory requirements discussed later in this Section. A 1R+ project is a 1R project that includes additional work that is not required for a 1R project. The additional work, or "+" element of the preservation project may look to upgrade other project assets and will typically use other asset funding sources to add additional elements to the project. These elements may be other safety elements or improvements such as bike lanes or channelization. Since 1R projects include paving, restriping will be needed as a 1R cost. Assessing the existing striping and the possibility of restriping to improve access for alternative modes is often a no cost inclusion to the project and is recommended. It is advantageous to utilize project resources to make incremental improvements where it is feasible, providing the inclusion is cost neutral and does not delay the project. The 1R standards are located in 110.2.1.

As discussed above, the procedures of the Record of Decisions Documentation document will determine if the preservation projects will use the 1R, or 3R standards. The decision document is to be filled out at project scoping and then revisited at project initiation and becomes part of the permanent project documentation. There may be occasion where, due to either pavement assessment, safety assessment changes, or other project impacts, the project may change from a 1R to a 3R, and the designer will need to use the appropriate standard. For all urban projects, including preservation, the Urban Design Concurrence document is to be filled out after the Record of Decisions Documentation document and is addressed below.

116.1.2 1R/3R Record of Decision and Urban Design Concurrence Document for Urban Projects

For all urban projects, including preservation projects, the Design Concurrence document is filled out after the 1R/3R Record of Decisions Documentation document. The Urban Design Concurrence Document is also filled out at both the project scoping phase and again at the project initiation phase. As both documents include a section addressing the design criteria or category to use, consistency can be maintained in respect to which standards are to be used on a specific project. The Urban Design Concurrence document contains planning summary, general project information, project context information and results in a specific design standard to use. In respect to this section, completing the design concurrence document determines if the project will use the 1R or 3R preservation design standards or other design standards, such as 4R or 4R/Single Function.

Both the 1R/3R Record of Decisions Documentation and Urban Design Concurrence Document documents are to be consistent in the selected project design standard. If the project uses the 1R standard, the design guidance for 1R standards is addressed in 110.2.1. If the project is determined to use 3R standards, the following roadside inventory requirements are to be followed. As discussed earlier in this Section, projects that use the 4R standards are to use the roadside inventory requirements below.

Section 117 Project Delivery Process

The ODOT Project Management Office (PMO) provides guidance material that outlines the program development and project development processes that are part of the project delivery process. The guidance material provides program development information such as system management, business case development, scoping teams, practical design, and draft and final STIP development. It also provides information on the project development milestones including project initiation, design acceptance, advanced plans, final plans and PS&E submittal.

ODOT's Project Delivery Life-Cycle model provides a project path that designers and project teams can continually use to re-enforce the project purpose and need. There are multiple milestones and documentation points that ensure the project purpose and need, as well as project goals and objectives are being met. The milestones are also used to document project decisions such as design criteria, finalizing the project charter, the DAP (Design Acceptance Package), change management requests, and S.C.O.P.E. integration elements. Designers should use the milestones as an opportunity to ensure that the project design is in line with the project purpose and need.

One of the more critical project delivery milestones is the DAP. DAP occurs at the end of the initial design phase where the different disciplines review the project. Some of the deliverables at DAP include Environmental documentation, Design Acceptance Plans, design narrative, access management documentation, and project footprint.

There are benefits in design staff understanding the program development and project delivery processes. Information regarding these processes is available from PMO.

There are opportunities within each stage of the ODOT Transportation System Lifecycle to apply a performance-based design approach and identify opportunities for tailoring this overall framework to align with the goals and objectives of projects. Within each stage of the Transportation System Lifecycle, evaluating the trade-offs between design, operations, and safety can help confirm that the project solutions align with the intent of the context and identified users.

A multidisciplinary project team established at the early stages of the project can provide continuity through project completion. In ODOT's Transportation System Lifecycle, this team (which may vary by project phase) will help verify that planning decisions are considered at the next stage of alternatives evaluation and preliminary design. During Program Development, this team is the Project Scoping Team, and during Project Development, this team is the Project Delivery Team. These multidisciplinary project teams will create documentation, maintain project continuity, and verify that design decisions are aligning with the original project goals. The performance-based approach establishes a framework that can guide this team throughout the project flow.

117.1 Design Flexibility in Project Delivery

ODOT's Performance-Based Practical Design (PBPD) strategy is an integral part of project development, and specifically, the design process. PBPD requires sound engineering judgment and making informed decisions based on a specific project scope, purpose and need. PBPD will typically require more contextual information around project outcomes and goals during project development allowing for proper decision making when weighing and determining the design elements for a specific project. In addition to ODOT's PBPD strategy the Department continues to promote design flexibility and multi-modal design within project development.

Integrating a performance-based approach and a multidisciplinary project team into the four stages of ODOT's System Lifecycle can help establish appropriate desired project outcomes and effectively evaluate trade-offs during decision making. This approach can also be a guide for creating an iterative process that allows for flexibility in the design, continuous verification of desired project outcomes, and documenting of design decisions throughout each stage of the process. Figure 100-24 illustrates how a performance-based approach may be integrated into the System Lifecycle stages and highlights key locations for input and documentation.

Figure 100-24 A Performance-Based Approach to ODOT Project Flow

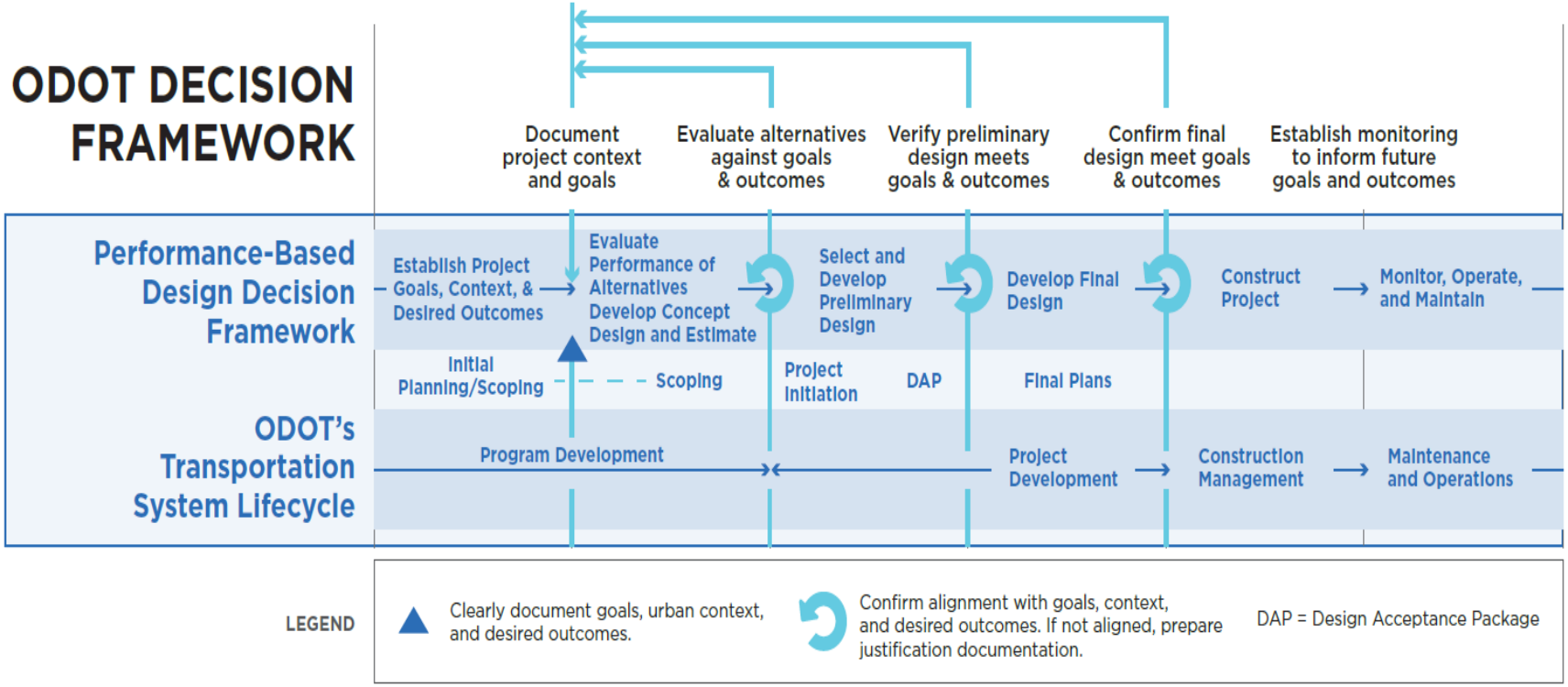


Figure 100-24 provides a multimodal decision-making framework and shows how this approach may become iterative at specific stages of the project. The process establishes links between planning and design to integrate and balance modal needs early in the decision-making. A draft UDC is produced from the scoping process to establish a concept design. The decision-making framework includes the following six stages:

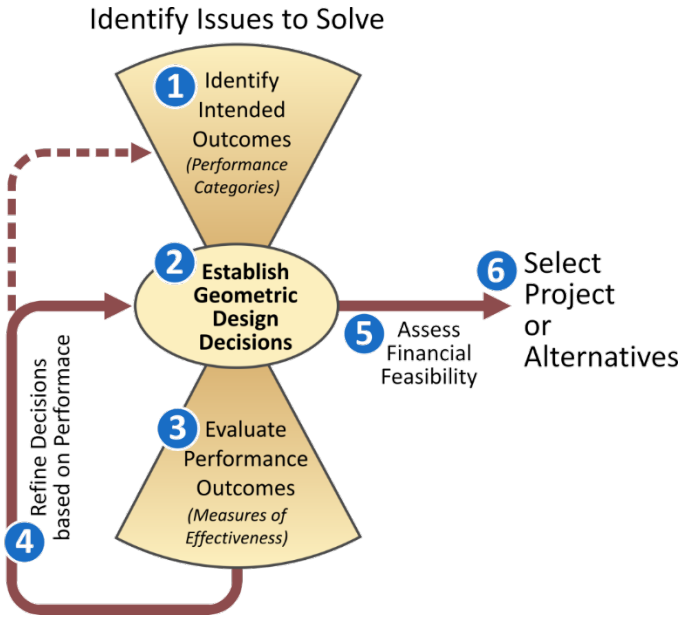
- Establish Project Goals, Context, and Desired Outcomes
- Evaluate Performance of Alternatives
- Select and Develop Preliminary Design
- Develop Final Design
- Construct Project
- Monitor, Operate, and Maintain

The circular arrow symbols in Figure 100-24 highlight milestones within the decision framework where the project goals and desired project outcomes should be revisited to verify that the planning and design decisions, alternatives development, and designs align with the original intent of the project and serve the needs of the users. These are also milestones in which design documentation of planning and design decisions is important. If design decisions, project team discussions, and alternative evaluations have led to any changes in the performance measures or project goals, this information and the project team decisions should be clearly documented. This process will need to follow guidance established in the ODOT Directive PD-02 and meet requirements and policies established through the ODOT Statewide Project Delivery Branch. For urban projects, changes should be justified through ODOT Urban Design Concurrence documentation for urban projects and through the designer narrative for projects outside urban locations, reviewed, and then approved or rejected by a multidisciplinary team. As noted previously, engaging the multidisciplinary project team early in the project can help identify constraints, project context considerations, and evaluate trade-offs for various design decisions. The blue circular arrow symbols represent logical milestones for engaging this team to ensure that input is received early, often, and continuously throughout the project. Changes will need to be justified through ODOT design documentation, reviewed, and then approved/rejected by the team. If the change is recommended but does not meet HDM design criteria, an approved design exception is required (see Part 1000). If the change is approved by the team and it is deemed a scope change, a Change Management Request (CMR) may be needed.

117.1.1 Design Flexibility - Applying a Performance-Based Approach within Project Development

Clear documentation of a performance-based approach can encourage effective problem-solving, collaborative decision making, and an overall greater return on infrastructure investments. NCHRP Report 785, Performance-Based Analysis of Geometric Design of Highways and Streets presents a performance-based model focused on desired project outcomes and applies the concepts at various project levels as shown in Figure 100-25.

Figure 100-25 Performance-Based Approach



Source: NCHRP Report 785

This performance-based approach is based on:

1. Identifying desired project outcomes and performance metrics
2. Establishing design decisions based on the desired outcomes
3. Evaluating the performance of the design
4. Iterating and refining the design to align solutions with the desired outcomes
5. Assessing the financial feasibility of the alternatives
6. Selecting a preferred alternative that aligns with the desired outcomes or re-assessing desired outcomes if no acceptable solution is identified

The performance-based approach aligns with ODOT's Practical Design Strategy which calls for delivering projects that benefit the transportation system within existing resources by

establishing appropriate scopes to deliver specific results focused on safety and operational needs of all road users through qualitative analysis of trade-offs between design alternatives. The ODOT Practical Design Strategy emphasizes the need to utilize different perspectives and discuss pertinent project information early in the project flow to establish clear project objectives and problem statements. This strategy describes the need to evaluate a specific project with the overall transportation system in mind and highlights that "the system context will shape the design".

The ODOT Performance-Based Practical Design Strategy identifies the benefits of a multidisciplinary project team and outlines the values associated with this strategy to make maximum use of techniques that provide safety performance analysis of the base design and design alternatives. The values, described by the acronym "S.C.O.P.E.," are compatible with ODOT's mission and assist decision-makers in their role in managing the state's transportation system. The "S.C.O.P.E." values previously discussed in 107.2 are shown below:

- Safety
- Corridor Context
- Optimize the System
- Public Support
- Efficient Cost

Understanding how to integrate practical design strategies and a performance-based approach into the project flow can help guide practitioners in setting up project teams, documenting decisions, and identifying solutions that serve the intent of the urban context and users within that context.

Integrating practical design strategies and a performance-based approach is most effective when applied at the earlier stages of the project development. Design influences are identified, outlined, discussed, and evaluated before the actual design of a project begins. Early project scoping and alternatives, identification and evaluation efforts have a major influence. As a project moves from preliminary to final design, it becomes much more difficult to affect overall project outcomes.

117.2 Programs to Fund Projects

Projects are funded from a variety of sources. Urban projects are typically more difficult to fund due to competing interests. Table 100-4 shows the primary ODOT programs to fund and deliver transportation projects.

Table 100-4: Primary ODOT Programs to Fund and Deliver Transportation Improvements

Program Type	Program Focus	How Are Projects Selected	Design Opportunities[1]	Who Develops Project
Fix-It Programs	Fix or preserve existing facilities (bridges, pavement, culverts, signals, etc.)	Data-driven, condition of assets	• Consider low-cost opportunities to address needs through innovative design (e.g., lane reconfiguration when repaving) • Leverage other funding programs to address other needs in project area	ODOT or Certified Local Agency
Enhance Programs	Enhance or expand transportation facilities	Legislature, ACTs, and ODOT staff recommend priority investments from state and local plans (can be competitive grants or discretionary).	• Most flexible to address design issues across modes and disciplines • Leverage other projects to address multiple needs in project area • Can fund stand-alone projects (grants and legislative discretionary projects)	ODOT or Certified Local Agency
Safety Programs	Reduce deaths and injuries on Oregon's roads	Data-driven, optimize safety impact (cost-benefit)	• Approved safety countermeasures list provides multiple options to encourage context appropriate design solutions	ODOT or Certified Local Agency
Local Government Programs	Direct funding to local governments	Local governments identify priority investments.	• Very flexible to address local priority design issues across modes and disciplines	MPO or Local Agency (if state funds) ODOT or Certified Local Agency (if federalized)

Table 100-4 (Continued): Primary ODOT Programs to Fund and Deliver Transportation Improvements

Program Type	Program Focus	How Are Projects Selected	Design Opportunities[1]	Who Develops Project
State-Funded Programs	Preserve and/or enhance transportation system (generally smaller projects than STIP Fix-It or Enhance) Examples: Safe Routes to School, Connect Oregon, State Pedestrian/Bicycle Program	Program-specific objectives (e.g., improve safety on school routes, promote economic growth)	• Very flexible to address design issues across modes and disciplines • Most flexible timeline (e.g., "Quick Fix" Safety or Pedestrian/Bicycle funds can be used for immediate improvements) • Not subject to Federal requirements or required to be in STIP • Can leverage other projects to address multimodal needs in project area or fund stand-alone projects	ODOT or Local Agency
Development-Related Projects	Serve demand generated when property develops or redevelops	Part of land use permitting process. ODOT works with local agency (land use authority) and developer to identify needed improvements.	• Consider opportunities to incrementally implement improvements in adopted plan and/or dedicate right-of-way for future improvements • Not subject to Federal requirements or required to be in STIP • Consider opportunities to address needs through innovative design and/or to leverage developer funded improvements	ODOT or Local Agency
Local Agency Projects	Locally funded projects	Local governments identify priority investments	Consider opportunities to address needs through innovative design and/or to leverage locally funded improvements	Local Agency

Table 100-4 (Continued): Primary ODOT Programs to Fund and Deliver Transportation Improvements

Program Type	Program Focus	How Are Projects Selected	Design Opportunities[1]	Who Develops Project
Public Transit and Active Transportation	Improve non-single occupancy vehicle (non-SOV) transportation options (e.g., pedestrian and bicycle, public transportation, , transportation options/demand management)	Legislature, ACTs, and ODOT staff recommend priority investments from state and local plans (can be competitive grants or discretionary).	• Very flexible to address design issues across modes and disciplines • Can leverage other projects to address multimodal needs in project area or fund standalone projects	ODOT or Certified Local Agency

[1]All projects that receive state and federal funds are required to include at least the minimum bicycle and pedestrian facilities (per ORS 355.514) within the project budget and meet accessibility requirements. Some funds can be used for stand-alone bicycle and pedestrian projects or enhanced bicycle and pedestrian facilities within another project.

117.3 Refined Decision-Making Framework

This section provides information on establishing project goals and desired outcomes to inform the performance-based decision making throughout the project flow. Information is provided to help practitioners identify and select performance measures that relate to the project goals and how to evaluate alternatives throughout the project flow described previously.

117.3.1 Establishing Project Goals and Desired Outcomes

Project goals and desired outcomes are identified early in the project flow. At a core, projects will have specific goals based on funding categories as in 1R Paving, 3R Preservation, 4R Enhance/Modernization or Safety focused projects. Safety and operational needs of all road users determined through performance analysis is also fundamental to project outcomes. Additional project goals are considered through a brief list of succinct points that speak to what a community thinks are important as it relates to a multimodal transportation vision and the associated land use goals of the study area. The multi-disciplinary project team (Project Scoping Team) identifies the final project goals and desired outcomes for consideration with the scoping phase. ODOT planning and active transportation members of the scoping team provide background information and direction for discussion of potential inclusion of additional project goals. Goals discussed may be visionary, future focused and aspirational as well as goals to achieve immediate needs. Not all projects can address all goals that may be discussed, but this process provides at least a minimum opportunity for project teams to include items with projects that make incremental improvements and build toward long-term objectives. As an example, even a minimal scope 1R paving project with funding category goals of simply paving and striping may be able to provide incremental improvements to a roadway section. Restriping a typical four or five lane section to include a lane reduction or "road diet" to gain operational and safety benefits of a median left turn lane or the addition of a buffered bicycle facility are initial steps to possible long-range goals and aspirations for the local community with little to no additional cost to the project.

117.3.2 Project Goals to Consider

Vision of place:

The vision will incorporate the existing context and may relate to a desired future land use pattern and nature of future growth (e.g., remain a Rural Community context, increase mix of uses to become an Urban Mix context). The role of the place in the region (e.g., employment center, residential enclave, neighborhood retail, regional shopping area, etc.) and other community values, such as safety, economic development, community character, as well as environmental and cost impacts are considered. The identified future vision of place is

documented in a local implementation-oriented plan (e.g., small area plans) and vetted with interested parties in the area.

Desired role of the facility:

The desired role of the facility will draw heavily from the transportation characteristics as well as regional and local vision and goals for the study area, vetted with interested parties. A facility could function as a regional commuting facility with longer-distance trips or a local-serving roadway with mostly short distance trips.

Major users of the facility:

The context and the role of the facility will inform who the users are. Based on observations of existing and future transportation and land use conditions, the project team can define who the major users of the facility are now and in the future. These users may include pedestrians, bicyclists, public transit users, freight traffic, motorists, etc., and includes user demographic groups (e.g., elderly, school children, tourists, retailers, employees, disadvantaged communities, etc.) from major land uses around the facility as well.

The project goals should be determined at the start of the project with scoping and confirmed at key milestones in the multimodal decision-making framework. This will help verify that the alternatives and design decisions align with the original intent of the project and serve the needs of the identified users.

117.3.3 Performance Measures, Evaluating Alternatives

Project-level performance measures allow practitioners to develop and evaluate alternatives based on the project goals and desired outcomes. For each project, performance measures are tailored to evaluate an alternative's ability to respond to the specific needs of the users and should relate directly to the project's documented goals. Therefore, performance measures are identified after defining the project's goals and desired outcomes, and before alternatives are developed. The measures chosen for a project are discussed, understood, vetted, and agreed upon with a multidisciplinary project team and when necessary, with key interested parties.

In general, project-level performance measures:

- **Reflect Project Goals and Desired Outcomes:** Balanced measures of success account for project goals and how these goals fit into the larger transportation network (i.e., local versus commuter oriented). An effective set of measures describes the experience of each anticipated user and provides a way to assess the likelihood of achieving desired outcomes. Projects typically have a wide range of goals and, therefore, no individual measure should be used to determine the complete solution to a problem. However, safety performance is primary to any set of project performance measures. For instance, a community may want to implement bicycle lanes on an ODOT arterial while minimally impacting traffic mobility. Along with safety performance measures of the

proposed bicycle facility, measures such as bicycle level of traffic stress (LTS) or multimodal level-of-service (MMLOS) could be used to measure impacts to bicyclists, while the traditional vehicle volume-to-capacity (v/c) ratio would still be considered for traffic mobility.

- **Are Understandable and Easy to Communicate:** With competing interests developing potential transportation projects, measures of success need to communicate to all of those involved. Evaluation criteria need to be readily measurable using available data and explained in a way that can be understood by non-technical interested parties and members of the public. While some measures require relatively complex calculations (such as v/c ratio), other simpler measures can still produce a good deal of understanding with minimum analysis. For instance, measures that describe the pedestrian environment can be as simple as determining the number of crosswalks per mile, the type of pedestrian signals provided, and the presence of Americans with Disabilities Act (ADA) compliant curb ramps. While it may seem that having more data and conducting more analysis would lead to the "correct" result, a simple and easy to understand set of evaluation criteria that truly reflect the context and project goals may lead to better buy-in by interested parties and the ultimate success of the project.
- **Are Consistent and Objectively Measurable:** To effectively support decision making, each measure needs to be objectively measurable for all alternatives. For example, a measure specific to traffic signal performance would not be consistently measurable for both alternatives when comparing a signalized corridor to a roundabout corridor. In another example, "forecast bicycle volumes" could be consistently and objectively measurable if the agency has a travel demand model for bicycle travel and takes infrastructure into account when predicting behavior. When selecting measures, it is important to agree on a consistent, objective methodology for evaluating the measure. Even more qualitative measures, such as "level of community support," can be measured using a consistent, objective method.
- **Help Differentiate Between Alternatives:** In aggregate, the selected set of measures needs to help differentiate performance among the alternatives to inform decision making. Each individual measure does not necessarily need to differentiate between all goals. In some cases, all alternatives under consideration will fulfill a goal (and related measure) to the same degree. However, within the set of measures, one or more must be measurably different between the various alternatives.
- **Need to be Specific to the Plan:** Effective measures of success need to be developed for specific plans and studies and not simply "copied and pasted" from previous studies with similar attributes. For example, while v/c ratio is generally used for many traffic-related roadway considerations, a study exploring ways to improve pedestrian safety on a corridor may focus on the number and spacing of pedestrian crossings instead. The v/c ratio may be a secondary evaluation element when determining a balance between the

number of pedestrian crossings, corridor operations and the projected success in meeting the goal of pedestrian safety.

While the concepts and design criteria from the Blueprint for Urban Design have been incorporated into the HDM, both volumes of the Blueprint for Urban Design remain as a reference document on the HDM web page. Appendix E in Volume 2 of the Blueprint for Urban Design provides a menu of potential project-level performance measures that could be considered for each mode and an example of linking performance measures to a project's goals and desired outcomes. This list is not intended to be an exhaustive list or to be prescriptive. The list draws from industry best practices, including latest guidance and research from FHWA, such as the FHWA Guidebook for Developing Pedestrian and Bicycle Performance, the Environmental Protection Agency (EPA) Guide to Sustainable Transportation Performance Measures, the Oregon Analysis Procedures Manual, and the Oregon Safety Action Plan. ODOT also has a set of system wide monitoring Key Performance Measures (KPMs); while these cannot all be applied at the project level to evaluate alternatives; they can help to inform the types of measures to be used. For example, one KPM is, "Number of serious traffic injuries per 100 million vehicle miles traveled (VMT) in Oregon." A corresponding project-level measure could be "predicted safety performance" for each alternative.

As discussed earlier in this section, establishing and applying performance measures has the greatest influence on project outcomes when they are incorporated early in project scoping and alternatives identification. The iterative nature of the project flow helps practitioners align solutions with the original desired outcomes.

117.3.4 Selecting and Developing the Preliminary Design

The context informs the types of users and the intensity of uses within each context. For almost every project, the needs of users can be addressed in multiple ways. The alternatives developed to respond to these needs should explore a variety of methods and means for meeting them.

Sometimes, due to limited right-of-way, difficult choices must be made for how to serve different users along a roadway. Where it is not possible to provide a high-quality facility for each mode along all ODOT roadways, it may be necessary to rely upon parallel networks to provide additional travel options that serve all users.

In many cases, there may not be one clear-cut alternative that equally serves all users at the same level. Selecting a well-vetted set of performance measures will frame a discussion and provide information for ODOT, the public, and local officials to understand the trade-offs among the alternatives.

Example: In a higher intensity area, such as a Traditional Downtown/Central Business District, local business owners may want to prioritize on-street parking over a dedicated bicycle facility, if they believe the on-street parking is critical to their customers. There are a variety of ways to address such a case. One solution would be to create a

shared lane (vehicles and bicycles) with speeds that are 25 mph or lower to allow for a basic level of bicycle access. In this case, since not all bicyclists are comfortable sharing a lane with vehicle traffic, the project team can also look beyond the roadway in question and consider the larger network in developing alternatives by including parallel routes. When balancing modal needs, in–depth analysis is required to determine potential unintended consequences in trade-offs.

The example above is focused on an urban location, but it provides an exercise in trade-off analysis that can be generalized to all projects. The important point to emphasize is the need to evaluate trade-offs in depth to determine and understand any unintended consequences that may arise and to balance the positive and negative effects to overall goals for all users and the surrounding community.

Some potential ways to help evaluate the trade-offs for this example between on-street parking and a bicycle facility may include:

- Number of people served by each facility. This may need additional data. (e.g., parking spaces on a block used by 50 customers per day; bicycle lane used by 200 people per day);
- Availability of alternative facilities to serve each use (e.g., whether there is a nearby low-stress route for bicyclists or whether there is available parking on side streets or parking lots);
- Understanding the trade-offs between impacts on safety, comfort, and convenience of users (e.g., asking motorists to park and walk an extra block to access destinations, versus asking bicyclists to ride in mixed traffic or out of direction on an alternate route);
- Economic impact (e.g., understanding potential economic impacts of convenient on-street parking space versus bicycle facility adjacent to businesses); and
- How each alternative supports community goals.

If design decisions, project team discussions, and alternative evaluations lead to any changes in the performance measures or project goals, this information and the project team decisions are clearly documented (potentially as part of ODOT design documentation) and justified for review by the project team who would either confirm the decisions or would provide alternate direction on how to proceed. The alternate direction could include:

- Additional or further modification to the project team revisions;
- Rejection of the revisions and return to original project goals; or
- Decision to change the scope of the project and reinitiate the process of goals development.

This is a similar approach to what the scoping team uses on ODOT STIP projects. After consensus has been reached, the preliminary design decisions and trade-offs should be well

documented, with support from interested parties as necessary. In some cases, this documentation will take the form of a "corridor plan" with a concept. In other cases, the documentation may be more informal and internal to ODOT to document the process and outcome to pass on to the final design project team.

117.3.5 Program and STIP Development

The program development phase is the process where projects are created through the transportation planning process to the approval of the Oregon Transportation Commission and into the STIP. There are five major milestones in this process including (See the Project Delivery Guidebook for detail on the milestones):

1. Transportation Planning
2. Management Systems Analysis
3. Identify Potential Projects
4. Draft Scope, Schedule, Cost Estimate (Draft STIP)
5. Project Selection (Final STIP)

As part of this process, designers will be part of scoping teams, develop purpose and need statements, and provide potential solutions to identified problem statements. The end result of this phase is the development of the draft STIP and projects selected for the final STIP. There are several key documents created during the program development and the final STIP development and project initiation. These include, the Business Case, the Project Charter, the Project Management Plan and the Practical Design S.C.O.P.E. Integration Form. The Urban Design Concurrence Document that focuses on the context, modal integration and project design decisions can be used to aid in the development of the Business Case and the Project Charter as well as being a basis for Project Management Plan and the Project Narrative as development continues to DAP and final plans.

One useful tool during scoping and programming is the Features, Attributes and Conditions Survey - Statewide Transportation Improvement Program (FACS-STIP) tool. It is a web-based geographic information system (GIS) application developed to provide easy access to transportation asset data. The tool consists of the Map tool, Data to Go, Asset Reporting and the Comment tool. It has continued to evolve over the years based on business needs and customer requests and will continue to respond to ODOT's evolving data needs.

117.4 Project Business Case

The Business Case is used to clearly define the problem, need, benefit, and value of projects. Business cases consider modal involvement, connections to basic assumptions, commitments

for funding and the project's original funding program goals early in the project's lifecycle and ensure these elements are not lost in the project development process. Funding program managers typically develop the initial needs business case. They are responsible for managing the funding program portfolio and meeting funding program goals. Active scoping begins once project sponsors complete the business case. Post scoping, funding program managers work with project sponsors and designers to finalize the business case before project selection. The business case will include identification of accessible transportation elements being included in the project or a description why there are no accessible elements required.

117.5 Project Charters

A Project Charter serves as the agreement for the scope, schedule, budget, approach, and risks of the project. The Project Charter is used to provide direction to the project team and baselines the project scope, schedule, and budget. A Project Charter is required for every STIP Project on the State system that is delivered by the ODOT. A Project Charter is first drafted after the project is scoped for STIP programming purposes.

The Project Charter is completed during the Project Initiation Phase of project development. The TPM or RE-CP is responsible for developing the Project Charter in collaboration with the Area Manager and program manager(s). The TPM or RE-CP should ensure that the project charter is consistent with information in the final Business Case. For more information regarding the project charters, see the Project Charter Guidance from the ODOT Project Management Office.

117.6 Project Management Plan

Project management plans document how a project is to be managed, executed and controlled, and are continuously updated throughout the life of the project. Project management plans may not be needed on projects where standard operating procedures are used. On projects without standard operating procedures, project management plans document the process the team is going to use to develop the project.

Section 118 Design Procedures

The purpose of this section is to provide the designer with a general outline of design procedures from STIP development to the production of Plans, Specifications, and Estimates (PS&E). This section provides a design procedure for determining whether a project uses 1R, 3R, or 4R design guidance. Single Function projects will typically use 4R design guidance. As such, Single Function projects are not discussed in detail in this section. Single Function projects will not be required to use the 1R/3R record of decision documentation procedures discussed

later in this section. This section also provides roadside inventory procedures for 1R, 3R, and 4R projects.

This section is not all inclusive of all design features but will provide the designer with a general basis on how projects are designed through the project development process, including final STIP project selection. The ODOT Project Management Office (PMO) provides guidance material that outlines the program development and project development processes that are part of the project delivery process.

118.1 Project Development Process

The project development phase begins with the assignment of a project from the approved STIP to the preparation of final plans and readying of the project for bid letting. There are seven major phases of the project development lifecycle in which designers participate. The seven phases include:

1. Project Initiation:

   Tasks include the establishment of the project team and the review and confirmation of the project scope. During this task, the designer may need to provide conceptual designs that address the project problem, purpose and need statement, and scope as addressed in the project prospectus. All disciplines need to collaborate and integrate design needs as initial design parameters are established from scoping information.

   a. For preservation projects, contact ODOT Pavement Services as part of the Project Initiation tasks. This allows ODOT Pavement Services to schedule testing, complete testing, and complete Preliminary Design work prior to project kick-off with remaining project team members.

2. Survey, Maps, Engineering and Environmental Reports:

   Depending on the type of project, the designer may need to participate in determining the type of survey information required for the project. Other task work involved may include Hazardous Materials Corridor study; the Environmental Baseline report; Area of Potential Impact maps; Work Zone Traffic issues; Pavement design; and Traffic Counts and Preliminary Traffic Analysis.

3. Design Acceptance Phase:

   The design acceptance package (DAP) milestone is a critical decision point for the designer as the project geometry boundaries are set to enable other activities such as right of way, environmental permitting, and construction contract work to begin. The designer will typically deliver the roadway design, stage construction design, design narrative, and potentially the traffic control plans and interchange layout sheet during

this task. The design narrative should provide a summary of the alternative analysis. Some of the deliverables for the designer at DAP may include:

a) Preliminary horizontal and vertical geometry alignments
b) Typical sections
c) Superelevation
d) Cut and Fill Slopes, Materials, and Earthwork
e) Guardrail, Concrete Barrier, Cable Barrier
f) Curb Ramp Footprint
g) Preliminary Drainage, Erosion Control, and Stage Construction design
h) Preliminary Quantity and Cost Estimate
i) Completion of the Roadside Inventory
j) Design Exception requests
k) Design Narrative
l) Design Maps, Profiles, Cross-Sections, and other deliverables
m) Urban Design Concurrence Document

The designer should also be aware of the coordination with other disciplines, including but not limited to:

a) Utilities
b) Right of Way
c) Bridge
d) Geotechnical Engineering
e) Geology
f) Environmental Services
g) Traffic Control
h) Pavements
i) Traffic
j) Transportation Analysis
k) Active Transportation Liaison
l) Region Transit Coordinator
m) Project Controls Office (PCO)

n) Rail

o) Aeronautics

p) Access Management

q) Commerce and Compliance Division

r) Statewide Mobility Program

s) Climate Change Office

t) Office of Equity and Civil Rights

u) Federal, State, and Local Agencies and other interested parties

4. Right of Way and Permits:

   During this stage, a number of right of way and permit functions are performed. Some of the tasks at this stage include; final right of way map and property descriptions; right of way acquisition; railroad encroachment map; right of way certification. Other tasks include obtaining required permits involving wetlands, fish passage, utilities, railroad, airport clearance, and others.

5. Plans Review Phase:

   The main purpose of this stage is additional technical and construction refinement of the project plans at the Preliminary Plans and Advance Plans milestones. Other tasks conducted in this phase include update of the communication plan; noise mitigation; access management procedures; revision of estimates; and preliminary special provisions.

6. Final Plans and Special Provisions for Construction:

   This stage includes the work conducted after the Advance Plans-Plans in Hand meeting. It is the last opportunity for technical review before the PS&E milestone. Final plans, cost estimate, construction schedule, and special provisions are deliverables during this stage.

7. Plans, Specifications, and Estimates for Construction - This stage involves the process where the project is considered complete and ready for bid advertisement through Project Controls Office and ODOT Procurement Office – Construction Contracts.

118.2 Roadside Inventory - General

For all projects whether using 1R, 1R+, 3R, or 4R standards, some form of a roadside inventory shall be made of roadside features. The inventory is performed to determine asset condition, to inventory existing features, to assist in bid item background, and to also determine those features that do not conform to AASHTO's "Roadside Design Guide - 2011" and/or the

AASHTO Green Book geometric design standards or non-geometric design standards (such as structural strength, safety features and traffic control, etc.). The inventory of roadside safety hardware is maintained by Engineering and Technical Services Branch (ETSB) staff. The FACS-STIP tool is used to access roadside safety hardware and other asset inventory data that can be accessed for scoping projects. The designer, along with assistance of the Project Team, should determine the level of detail needed for the project roadside inventory. Roadside safety is fundamental to the inventory process. Enough detail of the collected roadside items needs to be included for analysis to determine effects on roadway departure crashes and determine appropriate project scope for mitigation. Besides the mandatory use of the FACS-STIP tool, the roadside inventory can take many different forms, including but not limited to:

- A formal survey of the project;
- Use of the ODOT digital video log;
- Use of ODOT's TransGIS and multiple level data information;
- Use of the ODOT "Virtual Highway Corridor" tool;
- Use of other web mapping tools; or
- Different levels and intensity of project site visits.

The level of detail of the roadside inventory will vary between projects. This section provides direction on roadside inventory guidance for projects using 1R, 3R, or 4R standards. Preservation projects using 1R standards require minimal asset inventory work compared to projects using 4R (New Construction or Reconstruction) standards. Roadside inventory for projects using 3R standards will vary depending upon the project scope and purpose. However, complete roadside inventory for 3R projects is important for identifying deficiencies and determining final scope. This section should help the roadway, traffic, and other designers in providing the level of survey detail required to the Project Team.

The FACS-STIP Tool and associated user guides provide additional information to assist developing a roadside inventory for all projects. The FACS-STIP Tool provides data on highway features or attributes, such as freight routes, vertical clearance routes, state highway classification, functional classification, ORS 366.215 routes, etc. The FACS-STIP Tool is required to be used on all projects in an effort to maintain an accurate and up to date asset inventory.

The 2011 AASHTO "Roadside Design Guide" provides information and operating practices related to roadside safety. A design exception process (Part 1000) has been developed for those project-specific non-standard roadside features that are identified in the roadside inventory. Design exceptions are required for any non-standard equipment or non-standard clear zone feature that will not be corrected as part of the project. As discussed in Part 1000, 4R clear zone design exceptions are approved by the State Roadway Engineer while 3R clear zone design is the responsibility of the Region Technical Center.

118.2.1 Additional Roadside Inventory for 3R Projects

If it is determined that the 1R/3R Record of Decision Documentation results in the preservation project being 3R, additional roadside inventory features may be needed. As discussed previously, the scoping team should determine the level of effort that will be required, use the FACS-STIP tool for asset inventory, and use Region Scoping forms to assist project teams in capturing the appropriate level of roadside inventory. It may not be necessary to inventory every object near the roadway. Continuous runs of utility poles or trees at the R/W line may not need to be inventoried on every project. However, if objects are within the established clear zone, options to prevent or lessen potential vehicle impacts like delineation or shielding are a necessary consideration for need and feasibility.

Other than roadside features, the field work on these projects should be limited to the amount needed for quantity calculations. In general, field work should focus on addressing 3R requirements, including leveling for crown and super correction, lane and shoulder widths, bridge widths, existing rumble strips, and pavement detection loops. By their nature, urban projects may require some additional work, but every effort should be made to limit the survey work to the minimum needed for the particular project. By their nature, preservation projects on sections of highway having low crash history place special emphasis on pavement preservation even while recognizing that certain cost-effective safety improvements may be necessary and desirable. The following guidance discusses additional 3R inventory requirements for freeways and other state highways.

ODOT 3R Freeway Projects

If it is determined that the freeway preservation project is a 3R project, consider other assets and roadside inventory features for identification to address other design requirements such as Interstate Maintenance Design Features (see Section 310.3). The FACS-STIP tool can be used to capture additional assets.

1. Interchange Ramp Surfacing
2. Other roadside obstacles not addressed above in the 1R/3R decisions document
3. Delineators
4. Fencing
5. Signing, Illumination, and Signal Loops
6. Rumble Strips
7. Striping
8. Drainage
9. Bodies of Water

10. Drop-offs at Pavement Edge
11. Cattle and/or Equipment Pass Headwalls
12. Retaining Walls

ODOT 3R Urban and Rural Highways

If it is determined that the urban or rural non-freeway preservation project is a 3R project, consider other assets and roadside inventory features for identification to address other design requirements. In addition to the features listed below, the designer should be aware of other 3R design requirements that may impact the roadside inventory such as Mandatory 3R Design Features and the Urban Preservation Strategy (see Part 300).

1. Roadside Obstacles Within Clear Zone or R/W
    a. Trees
    b. Luminaires
    c. Utility Poles
    d. Fences
    e. Misc. Fixed Objects (mailboxes, fire hydrants, railroad crossing warning devices, etc.)
2. Existing Guardrail, Cable Rail, and Concrete Barrier, including Bridge Rail Connections
3. Drainage Facilities and Bodies of Water
4. Public Road Intersections with Stopping Sight Distance Less Than ODOT New Construction Standards
5. Horizontal Curves More Than 15 mph below project design speed, and the current year ADT is 2000 or greater.
6. Vertical Curves More Than 20 mph below the project design speed (Current year ADT greater than 2000), Hiding Intersections, Sharp Horizontal Curves, or Narrow Bridges
7. Accessible elements and facility deficiencies in the inventory or ADA Transition Plan
8. Drop-offs at Pavement Edge
9. Cattle and/or Equipment Pass Headwalls
10. Retaining Walls

Following is a further explanation of the above inventory items and some thoughts on appropriate mitigation measures that may be incorporated on this type of project.

1. Roadside Obstacles:

   With the emphasis on pavement preservation, the inventory of roadside obstacles is generally limited to R/W or clear zone, whichever is less. Consider including objects outside the clear zone when special circumstances provide an opportunity for a cost-effective improvement.

2. Existing Guardrail:

   During the inventory/analysis process, the project team should be looking for opportunities to modify existing installations that do not adequately protect obstacles either by extending or burying ends in cuts, or considering new runs based on existing obstacles.

3. Intersection Sight Distance:

   Most of this analysis can be done in the office from As-Constructed Plans. Many times, those intersections with deficient sight distance will also show up during the crash analysis. These intersections will probably have opportunities to incorporate low-cost mitigation elements with the project to diminish crash potential. Deficient intersections should be reviewed on-site with the Region Traffic Engineer to aid in identifying mitigation measures.

4. Horizontal Alignment:

   Horizontal curve deficiencies can best be identified by a review of As-Constructed plans, but superelevation rates need to be measured in the field. As a minimum, superelevation should be corrected as close as reasonably possible to the new construction standard with the project. Additional mitigation (delineation, signing, etc.) may also be appropriate due to site-specific conditions. The Region Traffic Engineer should be consulted for input.

5. Vertical Alignment:

   As-Constructed Plans should be used as a starting point for identifying vertical alignment deficiencies. Field verification is needed to determine if major driveways or intersections are hidden by the vertical curves. If a crash history exists at these locations or horizontal curve locations, it may be appropriate to include major safety improvements with the project. This need should be identified early, during project scoping, so funding can be procured.

6. Americans with Disabilities Act:

   Accessible elements and facility deficiencies in the inventory or ADA Transition Plan and barriers to the transportation system are predominantly in urban preservation projects however they occur in rural communities also. Accessibility accommodation is more than a standard; it is a legal requirement under Federal law. Intersection accommodation by installation of curb ramp and pedestrian ramp upgrades is an absolute minimum regardless of jurisdictional ownership of the sidewalks or walkway. Driveways, gaps, deficiencies or obstacles in the sidewalk or walkway should be carefully reviewed for potential improvements and may provide good opportunities to partner with local jurisdictions or ODOT Public and Active Transportation Program for a better overall facility. In rural areas, shoulders often serve pedestrians; shoulder widening may be considered as an incremental improvement.

118.2.2 Roadside Inventory for 4R Projects

The purpose of the inventory is to identify all objects and configurations that do not conform to the 2011 AASHTO "Roadside Design Guide" and the AASHTO Green Book geometric design standards and non-geometric standards (non-geometric standards relate to structural strength, safety features and traffic control). 4R projects shall have a full roadside inventory completed. In addition, safety projects identified through the All Roads Transportation Safety (ARTS) Program shall have a full roadside inventory completed.

The clear zone concept is discussed in the 2011 AASHTO "Roadside Design Guide". This guide provides an excellent elaboration on the clear zone concept and is a valuable working tool.

Guidelines

Region scoping forms and the FACS-STIP Tool were developed to assist project teams in the scoping effort. The Region scoping forms and/or the FACS-STIP Tool should be used to provide an inventory of conforming and nonconforming objects and provide appropriate details to be used in the development of the project. Nonconforming items are those not in conformance with current 4R design requirements.

An inventory of items should include, but not be limited to the following list of items:

1. Trees
2. Rock Outcrops
3. Steep Cut or Fill Slopes (1:3 or steeper)
4. Barriers (Guardrail, Cable Rail, and Concrete Barrier)
5. Impact Attenuators
6. Bridge Rails

7. Signs
8. Luminaires
9. Drainage Facilities and Bodies of Water
10. Curb Ramps & Pedestrian Ramps
11. Bicycle Facilities
12. Sidewalks, Walkways, and Curbs
13. Bridges
14. Footings and Headwalls
15. Retaining Walls
16. Utilities
17. Public Transit Stops/Facilities
18. Other:
    a. Roadway Surfaces and Dimensions
    b. Sight Distances
    c. Driveways
    d. Mailboxes
    e. Fences
    f. Structure Columns
    g. Signals, ATR and ITS structures
    h. Drop-offs at Pavement Edge
    i. Cattle and/or Equipment Pass Headwalls

The following is a further explanation of the above inventory items.

1. Trees present some interesting problems. The easy recommendation is to remove them if they are within clear zone, but in many cases the public sentiment is to save them at almost any cost. Some trees may be entitled to specific protection because of historic or ecological significance. In addition, federal legislation titled, Infrastructure Investment and Jobs Act (IIJA), encourages adding street trees to address urban heat islands to help mitigate urban conditions. Reasonable protection, such as extending a barrier required for another obstacle, may be more expensive but also more acceptable to the public than removal of the tree. See Part 400 regarding street and median trees.
2. Rock outcrops in cut slopes can sometimes be removed, but large outcrops or solid rock cuts may need guardrail or barrier protection. These are easily overlooked as they have

seldom been considered for protection. Decisions on the proper protection of slopes must be made only after considering the magnitude of the problem and the costs involved.

3. Fill slopes steeper than 1:3 within the clear zone should be considered for protection or flattening. While slope flattening is the desirable action, 3R projects, and at times, 4R projects seldom have adequate material available and R/W is frequently inadequate. Flattening may not be feasible due to streams or wetlands at the toe of the fill. Provision of barrier, guardrail, or cable rail is the usual solution. While vehicles can traverse a 1:3 slope, they cannot recover, and the large clear zone required (over 120 feet at 70 mph) frequently cannot be provided within the R/W.

   Cut slopes steeper than 1:3 within the clear zone should be flattened or considered for protection. Provide a 1:3 or 1:4 "safety slope" area at the bottom of steeper cuts if possible. Decisions on the proper protection of slopes must be made only after considering the magnitude of the problem and the costs involved.

4. Barriers include guardrail, cable rail, and concrete barriers. Barrier that does not meet NCHRP-Report 350 or MASH criteria must be replaced. Guardrail must be checked against current standards for type of rail, height, flare rates, anchors, bridge connectors, terminals, lap direction, miscellaneous hardware, etc. If the terminal can be buried in the backslope it should be considered even though only a flare may be required. Concrete barrier sloped ends are allowable only when design speed is less than 45 mph, or the sloped end is outside the clear zone.

   Concrete barrier shall meet current standards for size and shape. Consider the effect of overlays, past or present. At the base of the barrier the finished surface of the overlay must not be higher than the top of the vertical 3-inch portion of the barrier for proper functioning. Flare rates and terminal treatments (buried end, etc.) must conform with current standards. Narrow base barrier must be supported with embankment behind it.

   Guardrail protecting fixed objects needs approximately 6.5 feet from face of rail to object to provide space for adequate deflection. If deflection room cannot be provided, contact the Senior Roadside Design Engineer for possible solutions. Exposed guardrail and barrier ends that cannot be properly flared or buried, such as in exit ramp gores, should be protected with an impact attenuator.

   Contact the Senior Roadside Design Engineer in the ODOT Technical Services, Roadway Engineering Unit for guidance if there are questions concerning these items.

5. Existing impact attenuators must meet NCHRP-Report 350 criteria and be properly maintained with no modifications that are not approved by the manufacturer. Provide careful inspection by experienced personnel using the manufacturer's specification book. The District Manager, Senior Roadside Design Engineer, or manufacturer's

representative may be appropriate sources of expert assistance. If a bridge or other significant structure is affected, include Bridge Engineering in the discussion.

6. The 2011 AASHTO Roadside Design Guide identifies acceptable bridge rail shapes. If in doubt as to acceptability of a particular rail type, consult Bridge Engineering. The concrete "safety shape" should be used on freeways. Guardrail connections to bridge rail are a critical area. Chapter 7 of the “Roadside Design Guide”, Bridge Railings and Transitions provides an excellent guidance.
7. Signs must be mounted on breakaway posts if within the clear zone. The need for a multidirectional breakaway base should be considered. The slope on unidirectional single-support breakaway bases must be in the correct direction.

   Breakaways must not be in the ditch and should be at or above the ground surface, but not over 4 inches above the surface. Proper bolts, washers, slip plates, etc., must be in place with no modifications, such as welding, that may alter the function of the breakaway.

   The hinge mechanism must also have all hardware in place. No auxiliary sign panels should span the hinge in such a way as to alter its function. The hinge mechanism should be a minimum of 7 feet, above the ground. On fills the nearest sign post should be at least 30 feet outside the edge of the traveled way (fog line) so the vehicle will not be airborne when it strikes the sign. Signs mounted on wood posts must not have concrete foundation collars or support plates. Wood post installations must comply with the Oregon Standard Drawings.
8. Luminaires must have frangible or slip bases if within the clear zone. Some older frangible bases may not function properly with the newer small cars. Consult the Traffic Structures Engineer for acceptability of specific frangible bases. If luminaires cannot be readily relocated or protected, a study of the need for them should be considered. Eliminating them may be less hazardous than retaining them.
9. ODOT’s Drainage Facilities Management System (DFMS) has data on existing culverts, including condition assessments. Contact the Technical Services Hydraulic Engineering Section or the Region Hydraulics Engineer for assistance. ODOT maintenance personnel can also provide information (i.e., maintenance records and inspection reports) pertaining to the existing culvert. In addition to agency staff resources, neighboring landowners can be another invaluable resource for helping to understand a project site. Interviews with adjacent property owners can provide information such as known history of the site, including recollections of past floods and damages.

   Transverse or longitudinal culverts may need stabilization, rehabilitation, or replacement. Before extending an existing culvert, conduct a thorough evaluation of the pipe’s existing hydraulic performance and structural integrity.

Cross culverts can be lengthened to eliminate open ends, outlet ditches, etc., within the clear zone. Even though paved end slopes exist, they may not provide a safe end, since many of the 1:3 paved ends are inletted into 1:4 or 1:6 slopes, creating a ditch across the clear zone. Paved end slope installations must be constructed as shown in the Oregon Standard Drawings, with particular attention to warping or contouring the slope as shown.

Metal end sections on culvert pipes require appropriate end treatments. Safety end sections should be considered on larger pipes (See Oregon Standard Drawings). Recontouring around some existing paved end slopes must be considered if erosion and settlement have allowed the upper end of some paved end slopes to project more than 6 inches above the ground.

Longitudinal drainage ditches must be uniform and not eroded. Pipes under driveways and crossroads are to be reviewed to determine compliance with the Roadside Design Guide so that vehicles hitting them are not stopped abruptly or launched into the air. Type "M-E" or "M-O" inlets or modifications of them, may be required to accomplish these flatter end slopes. Pay particular attention to crash history when evaluating these features.

10. Most inventories for preservation and 4R projects are in conjunction with overlay or paving projects so correction of poor pavement conditions is an integral part of the project. Drop-offs, roughness, raveling joints, etc., must be analyzed if repaving is not already part of the proposed project.

Certain design elements can best be analyzed in the office using "As Constructed" plans. These include horizontal and vertical alignment and typical sections. Elements such as sight distance for merges, lane drops, road approaches, and intersections should also be analyzed in the field so the interaction of all elements can be better evaluated.

A broad viewpoint must be maintained so that possible hazards that don't fit conveniently in the categories already mentioned are not overlooked. Utilities (poles, valves, etc.) slope breaks that can launch a car or stop it as solidly as a barrier, cattle and equipment passes hidden by vegetation, erosion around culvert ends hidden by weed growth, etc., are easily overlooked. Shoulders on structures should be full width, according to current standards.

A working knowledge of the 2011 AASHTO “Roadside Design Guide”, the Project Delivery Guidebook, the HDM, and the AASHTO Green Book will assist in project scoping and data information collection. A good understanding of how the clear zone requirement is determined by considering design speed, side slope, ADT, and curvature is needed. All nonconforming items are to be inventoried, even though it may appear to be difficult to bring them into conformance with the appropriate standard. ODOT’s Practical Design Strategy document provides guidance in respect to project scope, economics and practicality of upgrading nonconforming elements.

The implementation of the 1R Preventive Maintenance Paving Program along with the 1R Safety Features Upgrade Program mark a fundamental change in ODOT's approach to maintaining the highway system while systematically improving safety.

118.3 Project Scoping

As discussed above, the 1R/1R+/3R design procedures and using the 1R/3R Record of Decisions Documentation determines if a project uses 1R, 1R+, or 3R standards. This 1R/3R Record of Decisions documentation is populated during the project scoping phase. Scoping assists in evaluating project context, asset condition, initial budget, identified risks, and potential opportunities. Scoping teams should consist of members from a variety of disciplines with a broad knowledge base. Each team will vary depending on the needs of the particular project. Each Region is responsible for the scoping of projects. 1R/3R projects may not require as many team members as a 4R project. Besides the TPM or RE-CP, representatives (not exclusive) may include Roadway, Bridge, Traffic, Maintenance, Construction, Environmental, Pavements, Utilities, Survey, Geo/Hydro, Access Management, Right of Way, and Local Agency.

The intent of the Scoping Team is to identify the parameters of the project, clearly identify the problem, identify a range of solutions, determine a general schedule in respect to urgency and timeframe, and develop estimated cost of the project based on general project elements and other funding opportunities. These may include some low-cost mitigation measures or safety enhancements if funding is available.

To assist in the analysis and scoping trip, scoping team members should gather a large amount of asset information prior to the site visit. The asset information can then be reviewed on site by the team and compared with the crash history.

The scoping team should determine the level of effort that will be required by the survey crew during project development phases. Very definite parameters should be set as to which roadside obstacles need to be inventoried. The intent of the inventory is not to survey every fixed object or culvert throughout the project. Although, these will probably need to be accurately identified and located during design phases. Only those objects near the roadway that constitute a substantial hazard should be inventoried for scoping. However, if there is a location with a number of run-off-the-road crashes (e.g., on the outside of a curve), then the effort and the area covered in the inventory should be increased. The ODOT Roadway Departure Safety program can be used to identify locations of high roadway departure locations and proposed countermeasures.

Other than roadside features, early field work should be limited to the amount needed for estimated quantity calculations, in particular leveling for crown and super correction. By their nature, urban projects may require some additional work, but every effort should be made to limit the survey work to the minimum needed for the particular project.

During scoping, the need for exceptions from design standards, or for new traffic control devices, should be identified. Design exception requests shall be submitted as early as possible in the project development process. This will minimize the need for redesign should the exception request be denied. Both the 1R/3R Record of Decisions Documentation and Urban Design Concurrence documents discuss design exceptions in respect to project scoping.

118.3.1 Asset Inventory- 1R/3R Preservation Projects

The 1R/3R Record of Decisions Documentation will determine if a project is either 1R, 1R+, or 3R. The 1R/3R asset inventory and roadside inventory requirements of the Record of Decisions Documentation include the following features:

1. Pavement Condition
2. Roadway Departure Safety Plans
3. Intersection Safety Plans
4. Bicycle/Pedestrian Safety Plans
5. Safety Plans
    a. Review of Safety Priority Index System (SPIS)
6. Review of Crash History
7. Accessible Elements and Facility Features in the Inventory or ADA Transition Plan
8. Bicycle Facilities
9. Bridges/Structures- Vertical Clearance
10. Bridges/Structures- Bridge Rail
11. Sidewalks and Walkways
12. Signs
13. Traffic Barriers
14. Traffic Signals
15. Public Transit Stops
16. Other Infrastructure Assets such as Geometry

Section 119 Motor Carrier Freight Considerations

The Oregon Freight Route system carries a significant tonnage of goods and materials within and through the state. They are shown with the nomenclature of "FR" in the Oregon Highway

Plan (OHP) Highway Classification tables. These routes are also known as Reduction Review Routes as determined by legislative action in ORS 366.215 and OAR 731-012. In addition, there are OHP designated Intermodal Connectors that are part of the National Highway System (NHS) connecting freight origin and destination points like ports, rail terminals or major industrial areas to arterial networks and interstate highways. These various designated routes are to provide a higher level of service and mobility than other statewide highways.

These Freight Routes will often be the most important facilities to local jurisdictions or small towns as their main street in addition to serving as connections for through truck traffic. As such, they should maintain an appropriate level of functionality for not only freight movements, but for all road users as well. ORS 366.215, Creation of state highways; reduction of vehicle-carrying capacity, states that ODOT may not permanently reduce the vehicle-carrying capacity of an identified freight route when altering, relocating, changing or realigning a state highway unless safety or access consideration require the reduction. When a project is proposed on a designated freight route, follow applicable ODOT guidance for determination of reduction of vehicle-carrying capacity and ORS 366.215 compliance. OAR 731-012 provides a process to follow when working through compliance with ORS 366.215. In order to accommodate freight mobility, planning and design efforts should also consider the types and frequency of permitted freight loads through a corridor.

In addition to designated freight routes, other state highways serve significant volumes of truck traffic as well and have been pre-approved for use of interstate size trucks. These routes are identified on Route Map 7 that is published by the ODOT Commerce and Compliance Division. Although Route Map 7 includes all highways, it identifies those highways where the use of interstate size trucks is allowed and where design should accommodate those vehicles.

Route Map 7 is color coded and identifies where the interstate truck is allowed without permit. Projects on routes identified by either the OHP Freight Map or pre-approved for WB-67 size trucks as shown on Route Map 7 should strongly consider freight needs in the design, particularly intersections. A WB-67 size truck is a single tractor trailer truck with a 67-foot wheelbase; this is currently the largest single tractor trailer approved for travel on Oregon highways without a permit. It is often referred to as the “interstate” design truck.

Section 120 FHWA Emergency Relief Program-Betterments

120.1 General

The FHWA Emergency Relief (ER) program is intended to assist the states and local agencies in repairing highway facilities damaged by disaster and returning those facilities to pre-disaster

condition. In-kind restoration is the predominant type of repair. The purpose of this section is to define betterments, explain the Federal Highway Administration (FHWA) policy on betterments, give examples of betterments and provide guidance on the submittal of betterment requests for FHWA approval. 23 USC Section 120(e) and FHWA website Special Federal Funding provide additional information pertaining to the Emergency Relief - Betterments program application and funding.

120.2 Definition

A betterment is defined as (1) an additional feature or upgrading, or (2) a change in capacity, function or character of the facility from its pre-disaster condition. Betterment requests during the last several years have been limited to the first category, with no proposals to change the capacity, function or character of a facility.

120.3 Policy

FHWA policy permits the approval of ER funding for upgrading or additional features to protect the highway from future disaster damage. To receive such approval, it must be shown that the ER expenditure is cost-effective in terms of reducing probable future recurring repair costs to the ER program. It is also FHWA policy that betterments to correct pre-existing conditions, particularly at landslides, will be subjected to a higher level of evaluation and it will be considerably more difficult to justify the expenditure of ER funds at such sites.

In general, betterments that change the capacity, function or character of a facility are not eligible for ER funding. Examples of this category of betterment include:

1. Adding lanes
2. Upgrading surfaces, such as from gravel to paved
3. Improving access control
4. Adding grade separation
5. Changing from rural to urban cross-section

One exception is that under special circumstances, ER funding can be used for a replacement bridge that can accommodate traffic volumes over the design life of the bridge, thus potentially allowing ER funding for added lane(s) on the structure.

120.4 Examples of Betterments

The following are examples of upgrading or additional features that are considered betterments. Specific FHWA approval is required before ER funds can be used for the following:

1. Stabilizing slide areas (e.g., internal dewatering systems, retaining structures, etc.)
2. Stabilizing slopes
3. Raising roadway grades
4. Relocating roadways to higher ground or away from slide prone areas
5. Installing riprap
6. Lengthening or raising bridges to increase waterway openings
7. Deepening channels
8. Increasing the size or number of drainage structures
9. Replacing culverts with bridges
10. Installing seismic retrofits on bridges
11. Adding scour protection at bridges
12. Adding spur dikes

There will be cases where one of the above features can be added with only a relatively minor expenditure of ER funds. These may include, short and low height retaining structures, small areas of rock inlays for slope stabilization or installation of small amounts of riprap incidental to other repair work. The decision whether this work will be considered a betterment will be decided on a case-by-case basis.

The following are examples of upgrading or additional features that are not considered betterments:

1. Replacement of older features or facilities with new ones,
2. Incorporation of current design standards, and
3. Additional features resulting from the environmental process required as a condition of permit approval or environmental commitment.

120.5 Approval Requests

To request approval of a betterment, it will be necessary to provide detailed justification. It is important that the request contain information regarding conditions at the site prior to the

disaster (including a brief summary of previous problems) and the current conditions at the site. The "do nothing" alternative must be discussed, and it is expected that most proposals would include at least two "build" alternatives. Estimated costs for each alternative are needed. The appropriate ODOT unit must review and endorse betterment requests prepared by consultants.

The same basic rules will apply to betterment requests on local agency facilities. These proposals must be reviewed and endorsed by the appropriate ODOT unit and the request to use ER funds for such betterments must be made by ODOT in order to be considered.

As previously noted, if ER funds are to be approved, the betterment must be economically justified based on an analysis of the cost of the betterment versus projected savings in costs to the ER program should future disasters occur. This cost/benefit analysis must focus solely on benefits resulting from estimated savings in future recurring repair costs under the ER program. The analysis cannot include other factors typically included in highway benefit/cost evaluations such as traffic delay costs, added user costs, motorist safety, economic impacts, etc.

If FHWA is unable to provide ER funding for betterment, ODOT or the local agency has the option to include the work in either the ER repair project or a separate project, and fund it with other Federal-aid, State or local funds.

Section 121 References

121.1 AASHTO References

The following policies are helpful when developing transportation projects, and are currently available by order from AASHTO:

- *A Policy on Geometric Design of Highways and Streets, 7th Edition – 2018 (AASHTO Green Book)*
- *Roadside Design Guide, 4th Edition - 2011*
- *A Policy on Design Standards - Interstate System - 2016*
- *Guide for the Development of Bicycle Facilities, 4th Edition – 2012*

121.2 Other References

The following list of references is not all-inclusive:

- Federal Aviation Regulations, Part 77 (D.O.T., F.A.A.)
- Oregon Standard Drawings

- Oregon Standard Specifications for Highway Construction 2021
- ODOT CAD Manual
- ODOT Roadway CAD Manual
- Contract Plans Development Guide
- Manual on Uniform Traffic Control Devices and Oregon Supplementals
- ODOT Traffic Volume Tables
- Highway Capacity Manual,
- 1999 Oregon Highway Plan, including amendments
- State of Oregon, Bicycle and Pedestrian Plan - 2016
- Oregon Bicycle and Pedestrian Design Guide - 2011, ODOT (HDM Appendix L)
- TRB Special Report #214, Practices for Resurfacing, Restoration and Rehabilitation
- ODOT Soil and Rock Classification Manual,
- ODOT Bridge Design Manual and CAD Manual
- ODOT Geotechnical Design Manual
- ODOT Hydraulics Manual
- ODOT Traffic Manual
- ODOT Traffic Control Plans Design Manual
- ODOT Right of Way Manual
- ODOT Survey Manual
- ODOT Project Delivery Guidebook
- ODOT Access Management Manual
- ODOT Analysis Procedures Manual (APM)
- ODOT Traffic Signal Policy and Guidelines
- ODOT Traffic Signal Design Manual
- ODOT Highway Safety Program Guide
- ODOT Construction Manual
- Local Agency Guidelines Manual