SCAN TEAM REPORT
NCHRP Project 20-68A, Scan 21-02

Leading Approaches to Implementing Context-Based Classification of Roadways in Planning and Design

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Acknowledgments

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Disclaimer

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Abbreviations and Acronyms

AASHTO	American Association of State Highway and Transportation Officials
BUD	Blueprint for Urban Design (ODOT)
Caltrans	California Department of Transportation
CDOT	Colorado Department of Transportation
CMAR	Context and Modal Accommodation Report (WSDOT)
CSS	Context-Sensitive Solution
DOT	Department of Transportation
DRPT	Virginia Department of Rail and Public Transportation
FDOT	Florida Department of Transportation
FHWA	Federal Highway Administration
GIS	Geographic Information System(s)
MassDOT	Massachusetts Department of Transportation
MDOT SHA	Maryland Department of Transportation State Highway Administration
NCHRP	National Cooperative Highway Research Program
ODOT	Oregon Department of Transportation
PBPD	Performance-Based Practical Design
TDOT	Tennessee Department of Transportation
VDOT	Virginia Department of Transportation
WSDOT	Washington State Department of Transportation

Executive Summary

There are many ways to apply context in the transportation world, and many agencies have focused on context-sensitive solutions (CSSs) for a few decades. The most recent version of the American Association of State Highway and Transportation Officials "A Policy on Geometric Design of Highways and Streets" (AASHTO Green Book, 2018) outlined context-based classifications. Introducing a new set of land-use context classifications (i.e., rural, rural town, suburban, urban, and urban core) creates a change in guidance for state transportation officials. The need for the contexts comes from our changing environment and ensuring that the transportation system accommodates all users to enhance mobility and accessibility, meet the needs of the communities, and improve our overall quality of life. While necessary, this paradigm shift of meeting the expectations of all users and matching the surrounding context may be challenging for many agencies.

Scan 21-02, "Leading Approaches to Implementing Context-Based Classification of Roadways in Planning and Design" describes the experiences gained in states implementing the context classifications. The scan's focus was to identify best practices and lessons learned that may be valuable to others working on implementation or have not yet implemented context-based classification. This scan included a spectrum of knowledge, from those just initiating the effort to those implementing it throughout their agency.

This scan was conducted in two phases. In the first phase, a desk scan was undertaken to identify national agencies that have experienced or are currently working on implementing the classifications. This phase also included having the scan team prepare a set of questions for invited agencies to provide a structured response. The second phase of this scan invited agencies to participate and present during a four-day virtual scan tour. Ten agencies gave information during the scan, with opportunities for roundtable discussions. The participants of the scan identified best practices at the end of each day and compiled a summary of thoughts on the last day.

The presentations were valuable and provided a range of actions that agencies have undertaken to incorporate context classifications. Many different approaches have been used to meet the context within agencies and states. A "one size fits all" approach was not identified during this scan. However, many similar foundational elements were recognized. Each of the states were implementing various efforts, which are highlighted in the summary of information. The intent was to highlight high-level actions that each presenting agency has under way. This information was then compiled into overall key findings and recommendations. The key findings and recommendations fall within three categories:

- Determining Context

- Developing a Context Framework

- Implementing Context Classifications

Overall, the key takeaway for this effort is to encourage engineering judgment and documentation to design for how people use roads and not force people to use them as designed. Table ES-1 provides a summary of this information.

	Key Findings	Recommendations
Determining Context	• Strong leadership and direction set the tone for the success. • Multidisciplined teams are necessary to ensure goals and outcomes are met. • Inclusive collaboration assists in defining policies and projects that meet the needs of all users. • AASHTO Green Book provides a starting point for classifying contexts.	• Define context classifications to meet state context and easily connect to AASHTO and meet the needs of the area. • Work with leadership to gain high-level support. • Gather data that assists with defining the context. • Collaborate with internal and external stakeholders.
Developing a Context Framework	• Context classifications is a paradigm shift requiring effort and direction. • Context classifications are best incorporated with an easily communicated process. • Setting flexible design criteria for all users assists in the achieving desired outcomes. • Flexibility needs to be encouraged for design and definition of standards.	• Develop a new process or improve a current process. 　▪ Change current processes to make change easier. 　▪ Create a bridging document. 　▪ Develop a new process with a multidisciplined team. 　▪ Outline information to be documented in a consistent form. • Support viewing standards in a flexible way.
Implementing Context Classifications	• Developing a consistent planning/design documentation process is better than using set standards. • Training and easy-to-use tools are needed to address major changes and improve implementation.	• Focus on documenting decisions. • Develop training programs that will: • Outline the contexts • Support engineering judgment • Set expectations • Document trade-offs and decisions • Encourage collaboration. • Create tools to support change.

Table ES-1. Context classification key findings and recommendations

Introduction

Background

TThe latest version of the American Association of State Highway and Transportation Officials "A Policy on Geometric Design of Highways and Streets" (AASHTO Green Book, 2018) outlined context-based classification of roadways. Introducing the set of land-use context classifications (i.e., rural, rural town, suburban, urban, and urban core) creates a change in guidance for state transportation officials. These classifications allow design solutions to match specific contexts better and provide flexibility in developing project scopes with traditional functional classifications of roadways (i.e., local roads and streets, collectors, arterials, and freeways).

While this change is needed, no clear direction has been provided to directly outline standards that will increase the message of incorporation of flexibility and using sound engineering judgment. The Green Book does not present specific methodologies or parameters for applying the new context classifications. This has allowed states to create many ways of approaching projects to plan and design within the context and expand accommodation of all users on the roads, not just vehicles, by understanding the context of the transportation system in specific situations. There are success stories throughout the nation and there is a need to compile these best practices to pass on to those states that are still working to understand how the new context classifications fit within their programs.

Scan Purpose and Scope

Scan 21-02, "Leading Approaches to Implementing Context-Based Classification of Roadways in Planning and Design," was conducted under the National Cooperative Highway Research Program (NCHRP) U.S. Domestic Scan Program. This scan was undertaken in recognition of the challenges that transportation agencies may have refining and implementing the new context classifications. Some agencies seeking to take advantage of the flexibility of these new classifications have implemented context classification in their design guidance, while others utilize reference documents, and others utilize other programs and use the classifications to support their efforts. The objective of the scan was to describe the experiences gained in such states and take information from lessons learned that may be valuable to others who are working on implementation or have not yet implemented context-based classification.

The scan was focused on investigating the following questions:

- In developing a project, when is context classification determined?

- Is context classification of roadways being done on a statewide, corridor, or project basis?

- What factors are considered in defining the context of a particular roadway?

- Is context based on current or anticipated future conditions?

- What agency staff participate in context classification decision making?

- What criteria are used for design exceptions within the determined context classification?

- What flexibility in design do designers have for differing context classifications?

- How are multimodal considerations (e.g., bike-ped, transit) incorporated into projects?

- Does context classification of roadways allow the flexibility for seasonal or special events? (e.g., outside dining, seasonal tourism sites, and festivals)?

The scan should encourage a more uniform implementation of guidance across the country and allow for a common language to develop nationwide, promoting greater cooperation and sharing among practitioners. The outcomes of this scan will also provide information for the AASHTO Committee on Design to consider in the development of the next version of the AASHTO Green Book.

Scan Approach and Participants

Representatives from state Departments of Transportation (DOTs) and the Federal Highway Administration (FHWA) formed a scan team to develop findings, recommendations, and implementable actions. A list of the team members is available in **Appendix A** and their bios are available in **Appendix B**. These team members have brought a magnitude of design and transportation system experience to the discussion and have provided great insight into the challenges that are being faced with implementation of the context-based classification.

The scan team first collaborated to establish a well-defined scope and identify agencies to be further researched. A desk scan was conducted to identify transportation agencies that have implemented context classifications. This was based on searches of the Transportation Research International Documentation database, supplemented by searches of resources on DOT web sites. In addition, a draft set of amplifying questions was developed based on initial discussions and the outcomes of the desk scan.

The scan team held a daylong organizational meeting on November 3, 2021, to review the results of the desk scan, refine the amplifying questions, and select organizations to include in the scan. The amplifying questions (**Appendix C)** outline the questions the overall team developed for the invited agencies to answer. The desk scan (**Appendix D**) outlines the literature search that was completed and outline this information in the presentation.

Following the initial meeting, the team invited the selected organizations to participate and asked them to provide written responses to the amplifying questions in advance of the scan meeting.

The team held a virtual scan meeting from March 21 through March 25, 2022. The scan heard from representatives from 10 agencies, who shared their practices and experiences incorporating elements of context classifications into their agencies. During the first four days of the meeting, the scan team heard presentations from:

- California Department of Transportation (Caltrans)

- Colorado Department of Transportation (CDOT)

- Florida Department of Transportation (FDOT)

- Maryland Department of Transportation State Highway Administration (MDOT SHA)

- Massachusetts Department of Transportation (MassDOT)

- Oregon Department of Transportation (ODOT)

- Tennessee Department of Transportation (TDOT)

- Virginia Department of Transportation (VDOT)

- Virginia Department of Rail and Public Transportation (DRPT)

- Washington State Department of Transportation (WSDOT)

Each representative presented information from their agency in the following categories:

- Implementation of Context Classification

- Stakeholder Engagement

- Design Criteria and Flexibility

- Opportunities Implementing Context Classification

- Challenges Implementing Context Classification

On the final day of the meeting, scan team members discussed what they had learned, synthesized the scan's findings, and identified opportunities for disseminating the scan's findings.

Summary of Information

All agencies that presented during the scan have defined context classifications. Many are moving in a similar direction but are taking different paths to achieve the final goal of designing for the context and acknowledging that "one size does not fit all." They are looking at their current tools, recognizing conversations with stakeholders, and defining the context for their area of influence to move in a direction that is the best fit for all parties. Table 2-1 shows the range of titled classifications related to those outlined in the AASHTO Green Book. The variation is mostly noted in the suburban areas, as these are the most difficult to identify. In addition, many states use special districts for areas not covered in the Green Book definitions.

Agency	AASHTO Green Book Classifications				
	Rural	Rural Town	Suburban	Urban	Urban Core
Caltrans	Rural	Rural Main Street	Suburban Community	Urban Community	Center City
CDOT	Mountainous Environment	Rural Places	Suburban Places Traditional Neighborhoods	Downtown Places	Urban Core
FDOT	Natural Rural	Rural Town	Suburban Residential Suburban Commercial	Urban General	Urban Center Urban Core
MDOT SHA	Rural	Traditional Town Center	Suburban Suburban Activity Center (Can Be Urban)	Urban Center	Urban Core
MassDOT	Natural	Rural Village Rural Developed	Suburban Low Density Suburban Town Center Suburban High Density	Urban Residential	Central Business District
ODOT	Rural	Rural Community	Suburban Fringe Residential Corridor Commercial Corridor	Urban Mix	Traditional Downtown / Central Business District
TDOT	Rural	Rural Town	Suburban	Urban	Urban Core
VDOT/ DRPT	T-1 Very Low Intensity	T-1 Very Low Intensity T-2 Low Intensity	T-2 Low Intensity	T-4 Medium Intensity T-3 Medium Low Intensity	T-5 Medium High Intensity T-6 High Intensity
WSDOT	Rural	Urban	Suburban	Urban	Urban Core

Table 2-1. Agency context classifications terminology

The presentations provided a broad range of approaches each state is taking and the different stages of implementation, from the early stages to working on updates to processes for others. Each DOT's efforts are highlighted below. Many do not have specific context classification programs in place but are including them in other ongoing efforts. These efforts show various ways the context classifications have been implemented and provide the reader of this document with a broad array of options and opportunities. Contact information for the host agencies is provided in Appendix E.

California

Caltrans uses its Complete Streets initiative as an avenue to plan for all users and utilize context classifications. In 2020, the legislature dedicated $100 million to complete streets, with importance placed on disadvantaged communities, safety, and local alignment with current plans. This effort works with communities to better understand the livability and comfort factors of all users and all modes. Elements of these projects are focused on bicycle facilities, pedestrian facilities, and main street areas throughout the state. With the focus on complete streets, designers need to submit a Complete Streets Decision waiver if a project is not incorporating Complete Streets elements and the reasons why.

Design Guidance and Documentation

The Caltrans Highway Design Manual defines area types, categorizes them into street types, and outlines workflows in addressing context. The guidance encourages flexibility and utilizes a robust documentation process if deviating from standards. The Design Standard Decision Document is used to document engineering decisions made regarding a proposed design that differs from the design standards. The document is required for any deviations to minimize liability. Districts are responsible for the approval of design decision documents.

Design speed ranges provided in the Caltrans Highway Design Manual match facilities, place types, and area conditions. In areas where speeds are under 45 mph, such as main streets, design speeds should be selected to be consistent with highway context, which may discourage high-speed operating behavior. The manual outlines a set of highway speed standards.

Terminology

Nomenclature for terms has been a critical component of encouraging flexibility. The direction and messaging fixated on documenting decisions to remove the stigma and hesitancy around design exceptions. The following is an example of some of the language changes:

- Mandatory standards changed to boldface standards
- Advisory standards changed to underlined standards
- Design Exception Fact Sheet renamed Design Standard Decision Document

Tools

Several tools are being developed and added to the already expansive toolbox. A Smart Mobility Framework document was developed in 2010 and updated in 2020. The Smart Mobility Framework Implementation Guide and Mapping Application followed in 2022. The initial chapter of the guide identifies the place types, moving people, and freight and incorporates active transportation and complete streets. Strategies have developed around the following five themes: network management, multimodal options, speed suitability, accessibility, and connectivity.

Equity

The Smart Mobility Framework Mapping Application utilizes different datasets in a geographic information system (GIS) mapping system and is used in conjunction with the Smart Mobility Framework Implementation Guide. This mapping application has outlined the place types (context) to a census tract level across the state with flexibility in the guidebook to use professional judgment in

applications. The mapping application is being updated with applicable data as it becomes available. Additional tools are under development, including accessibility and equity index mapping tools.

For the next steps, planned contextual guidance will detail the minimum expectations for place types and will work to bridge the gap between planning and design.

Colorado

CDOT is currently developing its new Roadway Design Guide. As part of this effort, it is defining elements and, to minimize confusion, developing an integrative approach to include:

- Context-sensitive solutions (CSSs)
- Multimodalism
- Performance-based practical design (PBPD) incorporating data-driven safety analysis

The context classification definitions will be a part of the Roadway Design Guide update. In addition, a context classification matrix will be included and highlight cross-section elements. The matrix provides a resource for those new to the transportation field and assists in setting expectations.

In 2017 a policy directive was issued to elevate bicycle and pedestrian opportunities in Colorado, including creating and maintaining a multimodal system. If the decision is made not to accommodate these elements, documentation based on specific exemption criteria needs to be provided.

Statewide Planning to Support Context Definitions

The statewide transportation planning team engaged in the most expansive multimodal outreach effort for its statewide transportation plan. The group visited every county in the state and gathered input for the three goal areas that addressed mobility, safety, and asset management. The collected information provided vital data to better understand the context and need for corridors throughout the state. Corridor profiles were created to document the information, leading to defining the context classifications and a better purpose and need.

PBPD and Data-Driven Safety Analysis

With the context definitions and the purpose and need drafted, defining outcomes for the PBPD moved forward. CDOT has been utilizing data-driven safety analysis for some time and is linking this action to the PBPD initiative. This effort has helped tie in a CSS process that outlines the project goals that lead to evaluation criteria to define the best solutions for the area.

Florida

FDOT has worked extensively around context classifications and in 2020 published the FDOT Context Classifications Guide. The endeavor was strongly supported by the 2018 Complete Streets policy. The context classification effort is considered the next generation of CSS. Understanding the land use was essential to designing how the transportation would fit required context-based decisions. FDOT recognized level of service requirements could not be met and needed design standards that communities wanted to see (i.e., look at land use first and design how the transportation system will fit). Context conversations were also blossoming from the PBPD perspective.

Leadership

The Florida 2018 Complete Streets policy required a typical section that serves all uses and is in harmony with the context of adjacent properties, which was a change in thinking from building for capacity in either a rural or urban setting. The motto was "complete streets is something we do with you, not to you." This direction provided insight into the approach that should be taken with context classifications. The classification effort was internal but informed by extensive outreach efforts that took place around complete streets. All efforts were in alignment and there was a natural progression to moving in the direction of context classifications.

Leadership was anxious for this information and fully supported an expedited delivery with a broad group of internal stakeholders with representation from the districts throughout the state. They met regularly and were resolute in completing the task. This collaboration helped significantly in achieving buy-in from the employees throughout FDOT. Having all groups within the department supporting the effort also provided a sense of ownership for more straightforward implementation.

Defining Context Classifications

Context definitions came from the transects' considerations and documents that served the AASHTO classifications. Many stakeholders were familiar with the transect descriptions and helped in the conversations when discussing complete streets.

The Complete Streets initiative focuses on all modes, including pedestrians, bicyclists, transit, motorists, and freight. Freight representations were critical to early conversations on these initiatives. All modes must be considered, or the overall system fails from a broader perspective. Assumed different users are based on classification.

FDOT developed a context classification matrix to describe each of the contexts based on the primary and secondary measures. Table 2-2 shows the different measures considered.

Primary Measures	• Roadway connectivity
	  ▪ Block length
	  ▪ Block perimeter
	  ▪ Intersection density
	• Form and intensity
	  ▪ Land uses
	  ▪ Building height
	  ▪ Building placement
	  ▪ Presence of fronting uses
	  ▪ Location of off-street parking

Secondary Measures	• Allowed residential density
	• Allowed commercial/retail density
	• Meet one of the following
	  ▪ Employment density
	  ▪ Population density

Table 2-2. Florida DOT context definition criteria

The classifications were applied throughout the state on all corridors managed by FDOT. This is a conversation starter when meeting with communities based on current land use. FDOT is the only state to have assigned a corridor a context throughout the state.

Design Criteria

Implemented in 2018, the FDOT Design Manual was a new manual with a new format that included context-based criteria and context-based decision making. The design criteria are based on functional classification, context classification, and design speed ranges.

Design speed ranges are outlined for each context, and the low-end speed is now defined as 25 mph. Standards were changed based on the context, which significantly minimized design exceptions. Target speed is addressed in the FDOT Context Classification Guide; however, the agency is still working on how that is utilized in the design. The target speed concept is a good theory; however, many roads have been built to higher speeds, making it challenging to slow people down. As noted by other DOTs, instituting the target speed concept needs to be done incrementally.

FDOT has outlined 10-foot lanes in its standards for low speed. Although there is a perspective that narrow lanes create slow speed, no research supports this argument. Performance checks with the target speed are necessary to evaluate the methods of slowing down vehicles.

The FDOT Context Classification Guide also addresses on-street parking and specifies that it is not to be used unless speeds are under 35 mph.

Tools

FDOT has created a [Complete Streets website](http://www.flcompletestreets.com/)[1] that provides several tools, including the related manuals and guides for addressing context-based design.

Maryland

MDOT SHA has focused on context classifications to meet the needs of its communities. The agency has a strong background in CSS and acknowledges that people move driven by their surrounding context. MD SHA's focus is on designing how people use facilities and how they want to use them.

People Driven: Short Trip Opportunity Areas

Increased pedestrian accidents created safety concerns that needed to be addressed quickly and in context with the situation. To evaluate this concern, MDOT SHA mapped Short Trip Opportunity Areas to identify hot spots and address the issues. The need for this data created a mapping exercise to gather data on a statewide level based on population, employment, zero cars per household, transit access, and schools. This information provided the background to gain a clear understanding of the context to be able to map access to destinations. The combination of the data and the safety data provided a map highlighting the hot spots and areas that needed to be addressed.

Context-Driven Context Classification

MDOT SHA outlined areas of focus, including asset management, accessibility, and mobility, requiring

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1   Complete Streets website, Florida Department of Transportation,
        http://www.flcompletestreets.com/

a new approach and new techniques. This led to the creation of the classifications. Six contexts were defined using the state-of-the-industry's practice to move beyond the manual designation. Leadership was visionary and impatient, as they needed a way to address these concerns quickly.

This data gathered for the Short Trip Opportunity Area effort also served to map the context areas throughout the state. Once the classifications were defined, MDOT SHA developed a map illustrating context areas. The biggest challenge was separating the suburban and urban contexts. In other areas, the context on one side was rural and urban on the other. To simplify, the data needed to be shown at a corridor level and not by parcel.

Design Approach and Process

Utilizing the context and the safety data, MDOT SHA began identifying treatments to minimize accidents, requiring innovation to address the issues. A PBPD is the basis of design and includes the following steps.

- Identify the context.
- Define the problem.
- Define needs and objectives.
- Define measures of effectiveness.
- Use data to drive decisions and discussions of perceived issues.
- Utilize experts and elevate as needed.

The context zone plays a critical role in the decision and is included on every plan sheet.

An innovative implementation committee is in place to review and vet proposed solutions. An online toolkit outlines the contexts and provides ideas for treatments MD SHA utilized rather than design criteria. A focus on conversations and trigger points for decision-making is in place.

Tools

MDOT SHA has created a public-facing website that provides a common language for conversations with internal and external stakeholders, promoting a joint effort to address the challenges. The agency continues adding information to the website and has recently included the toolkit outlining design elements with functional areas.

Massachusetts

In 2006, MassDOT developed the award-winning Project Development and Design Guide for planning and design for multimodal considerations and context-sensitive design. This design guide promoted flexibility and public involvement as critical components of delivering projects. Since 2006, external forces have impacted design guidance, including policies addressing congestion, climate, and choices.

MassDOT is currently updating the design guide to modernize, address changes, and incorporate the commitment to high-quality active transportation as a significant part of the design.

Building on a Pedestrian and Bicycle Initiative

MassDOT is required by policy to incorporate walking and biking into all projects. A design exception must be approved if active transportation is not incorporated into a project. Engineers are encouraged to address the end user's comfort and not focus on a one-size-fits-all approach. Designers found that just meeting the standards did not adequately address the user's comfort level and required the implementation of more context-sensitive solutions. Design guides are created to address the comfort of the user.

Tools

In addition, MassDOT developed the project initiation process using the Massachusetts Project Intake Tool dynamic web tool to combine all aspects of project initiation, application forms, mapping, GIS resources, agency review, communication, priority scoring, and project information database. MassDOT has undertaken an approach for short trips similar to the one used by MDOT SHA. This mapping tool identifies where vehicle use can be minimized due to the accessibility of active transportation networks and provides land information and other data sources to make the best data-based decision.

Process-Based Documentation

MassDOT developed a Design Justification Workbook to document all decision-making on a project and provide the necessary backup information. The workbook is easy to follow and takes the user through a process that provides a uniform method for evaluating design, contains controlling criteria, and replaces the Design Criteria Workbook. The workbook is submitted at 25% of completion, regardless of whether a formal exception approval is required. Transit agencies also review the 25% plans for input to enhance transit use.

Rapid Response

MassDOT has been working to address safety issues through road diets and installation of safety measures and has developed a rapid response approach to address community concerns and increase mobility and quality of life. Finding many roads are overbuilt can justify road diets to address problems with a fast response if roadway sections are not being modified. The expediency has shown a commitment to communities regarding accommodating all users.

Oregon

A strong history of CSS has helped in Oregon's journey. Beginning in the 1990s, ODOT implemented context-sensitive design and solutions, incorporating stakeholder engagement, flexibility, and an acceptance of context design.

In 2017, urban design issues became a priority. The Blueprint for Urban Design (BUD) bridging document was introduced in 2020 to address these concerns and move forward with context design. The document focused on PBPD and clearly outlined contexts with design criteria. This bridging document has supplemented the ODOT Highway Design Manual, which is currently being updated. The development of the BUD aligned with federal reports that also served to update the AASHTO Green Book. ODOT has strong leadership support for this effort, as shown by directives issued by the agency's chief engineer.

Bridging Document

The BUD is made up of two volumes; the initial volume is the primary document that outlines the context descriptions, design control ranges, and applications. Table 2-3 gives a broad overview of the different users considered, the characteristics used to define the context, and the different realms that begin to outline the relationships between the elements and the users. A design matrix is outlined for each context, outlining the widths of different elements that exist within each realm.

Context-Defining Characteristics	Modes/Users	Cross-Section Realms and Typical Elements
• Land use • Building coverage • Building setbacks • Building orientation • Parking • Block size	• Pedestrians • Bicycles • Transit • Freight • Motorists	• Land use realm – Building frontage • Pedestrian realm – Frontage buffer area and pedestrian facilities • Transition realm – Right shoulder, bicycle facility, bicycle buffer, and on-street parking • Travel way realm – Travel lanes, turn lanes, medians, etc. • Land use realm – Buildings

Table 2-3. Oregon Blueprint for Urban Design Context Considerations

The second volume of the BUD contains topical memorandums to support the guidance and offer additional information on topics such as bicycle facility selection, pedestrian crossing spacing guidance, and speed management and suggested target speeds.

The topical memorandum for speed management suggests that target speed is for urban-only areas under 40 mph and defines treatments to slow traffic to a target speed. While these recommended speeds are available, ODOT is required to design to a design speed (i.e., set at or above the posted speed) by legislation. The target and design speed are considered for the context; however, this requires an incremental approach to reducing speeds. In addition, ODOT is required to accommodate freight on specific roadways and bicyclists and pedestrians on all projects.

Project Documentation

The Urban Design Concurrence (UDC) document provides a consistent way to document the history, goals and vision, community outreach, modal integration, and context discussions for each specific project. This initial documentation is a high-level view that includes aspirational goals and is started with planning insights or activities; it is considered Part 1 of the documentation. The documentation moves on to Part 2, which outlines the project design decision elements, including those to be included and the dimensions, along with the decisions made. The UDC document is a living document that is used to:

- Identify planning activities and goals

- Develop concept designs at the scoping phase (draft UDC)

- Ensure that, as much as possible, final designs meet original goals and outcomes of planning endeavors within project fiscal and physical constraints. (At a minimum, incremental improvements are expected if wholesale changes are infeasible.)

The UDC is a collaborative effort of the multidiscipline project team in the decision-making process. Ultimately, the roadway designer, Maintenance, and the region's Technical Center manager sign off on and agree to move forward based on the final UDC.

Coordination and Training

The incorporation of context classifications and design requires coordination with multiple parties and a clear understanding of roles and responsibilities between planners and designers. There is a desire to keep planning conversations at a high level with general language without getting into actual dimensions; however, this can prove challenging and difficult to meet the public's expectations. ODOT has various team members in the trade-off conversations to gain insight and gather feedback. ODOT has spent much time training collaborators throughout the state. Training is a major element in changing mindsets to embrace the requirements outlined in the BUD.

For upcoming efforts, ODOT plans to look at a more detailed process of incorporating contexts into planning. Also, with the future trends and concerns related to equity, greenhouse gases, and climate change, additional details may need to be addressed.

Tennessee

Tennessee is in the early stages of incorporating context classifications and has made great strides to include standards that serve multimodal users. The contexts fully align with the AASHTO Green Book. Development pressures are causing TDOT to use the contexts to respond to growth pressures and incorporate appropriate access management techniques to grow in the best way possible. Utilizing context classifications is cultivating engineering judgment, documentation, and experimentation.

Conservative Approach and Growth

TDOT is taking a conservative approach to incorporating context classifications and utilizing functional classifications. Many of the references regarding the context are limited to rural and urban. The expanded contexts are beneficial with development, especially from an access management perspective. The standardized context assists with discussing the current and future land use in terms of contexts and how the spacing of accesses incorporates changes in operations. The integration requires leadership to see the benefit of implementing the classifications on a broad scale.

Multimodal Integration

Pedestrian safety is a concern with the growth in addressing multimodal issues. Multimodal design guidance includes outside agencies and multiple divisions within TDOT. Tables have been developed for standards addressing multimodal facilities; they are more focused on the pedestrians and cyclists due to safety concerns.

A simplified multimodal deviation request form is in place to encourage research and documentation of national best practices. The design exception is better received if backup documentation from leaders across the county is referenced, including AASHTO, National Association of City Transportation Officials, Institute of Transportation Engineers, and other DOTs.

As TDOT moves forward, efforts include developing a bridging document implementing design flexibility, including looking into the best approach to address design speeds for multimodal areas. Gaining buy-in from leaders and local jurisdictions is also a critical component moving forward for embracing the change. Local jurisdictions manage 50% of the roadways.

Virginia

VDOT and DRPT provided a joint presentation. The emphasis on addressing multimodal travel began in 2012 based on industry standards' best practices, including VDOT, AASHTO, Institute of Transportation Engineers, and Center for New Urbanism. Since this started when no classifications had been delineated, VDOT and DRPT utilized planning practices noted by the Center for New Urbanism and modified them to fit Virginia. Many stakeholders were brought together to determine the path forward—more than 50 local regional and state agencies participated. Many participants had similar goals but different paths for implementation. State plans and policies are aligned to encourage accessibility, connection to housing and employment centers, and modal choice to improve quality of life.

The Multimodal System Guidelines were initially published in 2013. In 2019, the guidelines were updated to make them more user-friendly, including current best practices and references to current and future trends. The changes also outline examples of mode share goals and incorporate updates to the current language (i.e., change parking to curbside activity, etc.).

Classification and Design

The Multimodal System Guidelines provides tools for comprehensive multimodal planning and implementing elements at various scales, emphasizing transit. The classifications are based on transect density and modal emphasis. Virginia utilized the transect data to define areas specific to Virginia and then calibrated it across the state using representative cities and towns. Metro centers are further refined with additional characteristics. VDOT references the Multimodal System Guidelines in the multimodal section of its design manuals.

The transects were mapped statewide by census tract and based on the following data:

- Mixed-use intensity
- Activity density – (jobs + people / acre)
- Average building height
- Typical net Floor Area Ratios (residential + nonresidential)
- Supported transit technology

The document provides a matrix of street elements based on transect and street elements. Design elements are outlined with a range to encourage flexibility and include both the minimum and the optimal value. Transit plays a major role in the outline of the standards; mode treatments are also outlined in the document to encourage flexibility.

Multimodal System Planning Process

The guidelines outline a process for creating a multimodal system plan by defining:

- What is the context (transportation, land use, adopted plans)?

- What are you connecting (defined multimodal districts and multimodal centers)?

- How are you connecting them (multimodal corridors with the modal emphasis)?

Moving forward, VDOT is looking at the best approach to address design speed for multimodal areas.

Washington State

WSDOT has recognized the importance of flexibility since 2005; by 2017, it had fully embraced context classifications. WSDOT incorporated the context classifications into its WSDOT Design Manual in September 2021. This context was defined early and incorporated into decision-making processes throughout project delivery. A Basis of Design Form documents the design elements for a project and ensourages a practical design approach to be employed in both the project scoping and design phases.

Documentation Process / Tools

The Basis of Design is the documentation process utilized for all designs and focuses on stepping through and documenting decisions with a multidisciplinary team. The Context and Modal Accommodation Report (CMAR) was developed to support the documentation process and create communications regarding context and modal priority. The data collected during the development of the CMAR helps to communicate and create better understanding of the contextual influences on alternatives evaluation and design decisions.

The information outlined in the Basis of Design Form includes who the system needs to serve, as well as community expectations, and clearly defines the need or issue to be addressed. The needs are broken down into baseline (or required) and contextual needs, which help with developing partnerships with outside agencies and communities to expand a project in a partnership effort.

The CMAR is incorporated during the pre-design phase, which falls between planning and design. The outcome of the CMAR is modal priority, which is used during alternatives evaluation.

Language

Words matter, and it is essential to use comments that promote flexibility. Changing from design exception to design analysis creates a different dynamic about the choices being made. WSDOT also uses the term "design up" to test things out and be able to balance the needs of the identified users. This assists with training the engineers to look at areas from multiple perspectives. Another term was a "road buffet" versus a "road diet," indicating the number of options available to users within the location.

Design

Context is determined on a project-by-project basis and is based on available data, planning information, and engagement with the local jurisdiction. The intent is ultimately to be able to tell the

story and why the decisions for design were made supporting PBPD. Context is a part of PBPD; the context does not prescribe standards but is a part of the process. Understanding the modal priority provides for a basis for balancing the performance, trade-offs, and dimensions. Context is connected to design standards, through an evaluation process for alternatives. The criteria used in design is based on speeds rather than the traditional functional classifications.

Speed management approaches are in place and continue to be developed. Changes in design speed would normally be employed incrementally, with a focus often on lowering speeds in urban and suburban contexts. As a factor in determining users' comfort level, WSDOT is looking at implementing level of traffic stress to better define design alternatives that address nonmotorized modes. The WSDOT Active Transportation Plan sets a level of traffic stress of 2 for bikes and pedestrians as an agency goal. The transition to level of traffic stress of 2 as a maximum threshold will justify lower speeds on state highways (< 35 mph) in urban or urbanizing areas.

Emerging Complete Streets requirements will likely transform the need for and use of context in design. The scope and scale of this transition in 2022 as it affects the development of guidance for planners and designers is still to be determined.

Key Findings

This scan team found no "one size fits all" or determined a right way or wrong way to implement context classification. Each of the agencies presenting had a different approach based on department organization, political environment and backing, leadership support, and what works best for their situation. However, many agencies apply the same foundational philosophies to provide best practices that others can use as they move forward. Below is a summary of the key elements to successfully defining, developing, and implementing context classifications.

Defining Context Classifications

Leadership

Strong leadership and direction set the tone for the success of context classification.

Leadership support and initiatives have led many states to embrace context classifications from the construct of social challenges, including multimodal needs, climate change, equity, safety, and more. The direction has come from legislative action or an executive directive. Those programs that have succeeded have done so with leadership emphasizing solutions to these challenges, breaking down silos, and empowering organizational and cultural change. While the policies or directives may have a different purpose, the context classification movement allows for a broadened approach to transportation and discussions to tackle the challenges. It also encourages interdisciplinary teams to work together to understand all aspects of the contexts. Most of the presenting states referred to policies with references to a Healthy Transportation Policy Directive, a Complete Streets Policy, and various policies for pedestrians and cyclists.

Planning and Design Team Coordination

Context is determined as early as possible. Planners include designers in their studies and work, and planners are included in the design process to ensure changes that may take place during design still meet the goals and outcomes of the project.

Collaboration of an interdisciplinary team is a critical component of ensuring context is the common thread between planning and design. Many conversations occur during planning efforts regarding land use, modes, modal facilities, and overall community vision. This information plays an integral part in context classifications as the area around the facility is an essential aspect of determining how the transportation system should function. Often multiple agencies are working on various aspects of community planning. Defining the needs early in a process assists in outlining roles and context as visions come to fruition. This information plays a role in how the context is determined, shares in agreements made, and determines the ultimate elements to assist design teams in defining the criteria.

Successful collaboration between planning and design includes identifying high-level elements in the planning phase and designing for these elements as the projects move into design. Having designers involved in planning efforts and planning staff engaged in design efforts assisted in seeing efficiencies in the overall process and streamlining projects.

Inclusive Collaboration

Inclusive collaboration assists in defining policies and projects that meet the needs of all users.

Context definitions and application efforts require multiple agencies, advocates, users, and community members to outline interests as they pertain to context. For instance, a solution defined for pedestrians and cyclists may not be feasible if freight user concerns are left out of the equation. The public is very well informed, and many states have conducted inclusive public outreach activities and taken feedback in defining the overall context.

Discussions regarding context and modes allow for broad conversations to take place earlier during planning efforts to understand the vision of the communities and the concerns of the users. Based on this information, a list of needs that addresses agency responsibilities, various users' concerns, and community visions are defined early to better inform planners and designers of project scopes. Additionally, an inclusive group may address social issues such as equity and climate change as a single entity cannot solve these issues. Inclusive collaboration may be characterized by shared goals, additional resources, and clear role definitions. Agencies have engaged a broad group of stakeholders in context discussions during long-range planning efforts, complete street and other active transportation workshops, stakeholder meetings, and scoping events. A prime example is the joint presentation from Virginia that included the transit agency and the DOT. They shared a document created by multiple agencies to address multimodal as a partner effort.

Context Definitions

Flexibility in defining the context descriptions for each state needs to be encouraged. Utilizing the five contexts outlined in NCHRP Report 855, "An Expanded Functional Classification System for Highways and Streets," and the AASHTO Green Book have been and should continue to be a starting point in delineating the context within each state. A reference should note a relationship to the AASHTO Green Book classification for consistency and understanding if a new context is defined.

Most of the presenting DOTs have incorporated context definitions that meet the various contexts of their state. Some states have added additional contexts to clarify the suburban and urban realms, specifically related to transition zones. They also renamed the contexts to convey the concept to their stakeholders better. An example of an added context is "Special District" or something similar, including industrial spaces, port locations, and airport area. Another example includes "Natural Context," referring to recreational, scenic, and environmentally sensitive corridors. While the labels may not match the terminology of the five AASHTO context definitions, they can generally be mapped back to the AASHTO Green Book classifications for national consistency.

In many states, the context descriptions are very detailed and utilize quantitative and qualitative data to define the various zones. The qualitative data includes setbacks, density numbers (housing

and jobs), access management, and land use zones. Characteristics for each class describe the area, including natural and built environments, and users of the facility. While all states consider all users, the modes may be determined as part of the classification descriptions or may be an outcome of the context classification.

Some states set perimeter limits around the facility to define the context, while others use areas that are expanded to the context-based population centers or based on census data. Florida is the only DOT that has outlined a context for the facilities it is responsible for maintaining. Others focus on project-by-project definitions. Numerous variations of contexts are used across the nation, focusing on the needs of the state. Outlining clear descriptions assists in better execution, regardless of the terminology used.

Developing Context Classification Framework

Process-Focused Approach

Most DOTs have embraced context classifications by developing an easily communicated process, as this is a paradigm shift for many agencies.

The incorporation of context classifications has been done in several different ways, including developing bridging documents and resources, integrating the concepts into all relevant reference documents, modifying design manuals, and adjusting standards focusing on design documentation. With these various approaches, many of the agencies developed a straightforward and effective process that could be communicated and for which training specific to their organizational situation could be developed. There was no conclusion on specific process steps; however, many questions considered in developing the process or approach were consistent. While the questions were similar, many of the answers were vastly different.

The following information outlines some of the questions DOTs faced in defining their process.

Who should be included in developing the process?

- Who needs to be involved in the process?

- What are the roles and responsibilities of the internal groups (e.g., Planning, Design, Environmental, and Policy)?

- How will the coordination take place?

- Are all voices being heard to develop a solid process?

What do we want from the context classifications?

- What are the state's different contexts? How do they relate to the five AASHTO classifications?

- What information and data do we have to support the classifications (e.g., information from complete streets discussions, safety data, local government data, census data, past projects, and studies)?

Where and when should context classification be applied?

- Should the context be based on existing context and future context?

- Should the context be defined project by project or for the entire system?

- What types of projects will utilize context classifications (e.g., improvement projects, preservations projects, safety projects)?

How will context classification be applied?

- What programs and processes do we have in place that assist in defining the context?

- What programs and processes do we have that these decisions would impact?

- How are the roadway needs incorporated?

- How are the needs of the communities considered?

How will design flexibility be addressed?

- How often will planning documents and design documents be reviewed?

- How will design criteria be defined? What elements will be included?

- Do standards need to be developed for contexts?

- How might we reduce the number of design exceptions?

- What are the considerable decision points?

- How is the information, including data and decisions, transferred from one group to another?

- How will this be communicated?

How will this process be implemented?

- What type of training is necessary?

- Who should be included in the training?

Design Criteria and Project Outcomes

There are many ways to address designing for the different contexts, including design standards, range of design standards, and documenting all decisions. Many DOTs still reference current design standards but have emphasized documenting design decisions rather than design exceptions.

In most states, the perception that design exceptions are harmful has been a significant obstacle. By changing the concept of "exception" to design justification, many DOTs have changed the designers' approach, embracing engineering judgment and design for the context.

PBPD is frequently referred to with context classifications as both encourage challenging problem solving and opportunities to see a different function for the transportation systems. Factors that lead to performance goals include practical choices, improved modal performance, safety, accessibility, and other societal goals like economic growth, healthy communities, and environmental quality. These

broad aspects expand the way we look at performance metrics overall and raise our responsibility to design for balance and functionality, creating challenges for the common standards approach. For instance, a few states utilize data to make data-driven decisions related to criteria. The safety data assist in outlining safety concerns for vulnerable users, which aids in making decisions on the types of treatments that may be appropriate to create a safer facility rather than defining the numbers from a table.

The presenting DOTs had a broad spectrum related to design criteria and how to achieve the desired performance. States with an extended implementation history have very prescriptive manuals with robust variations, allowing for flexibility to meet performance requirements with accepted design values. A set of criteria was defined as a range in an easy-to-follow matrix for each defined context. Other states outline standards with reference to flexible design and require documented and approved design exceptions. Again, many DOTs have modified the term "exceptions" to encourage flexibility.

Since most criteria are based on the design speed, much discussion took place regarding setting the design speed. Many consider design, posted, and target speed in their context discussions. A few states have developed speed management plans to guide the criteria discussions and have a clear approach to addressing the differing speeds. Most states use a phased approach to lowering speed and design to the state-required design speed while implementing treatments that may assist in reducing speed based on sound engineering judgment. PBPD plays a role in identifying the desired performance outcomes related to criteria.

Implementing Context Classification

Consistent Documentation

Consistent documentation aligns directly with a solid process and defends engineering judgment.

At least half of the states have a documentation process that defines all design decisions. Many have guidance documents, such as a design concurrence document, a context and modal accommodation report, and a design justification workbook that walk through the process, ask questions, note when reviews and approvals are necessary, and incorporate classifications into the overall analysis. Documents such as these were strongly supported to encourage documentation of not only design exceptions but also design analysis and decisions. The presented documents helped tell the story of the decisions made, were quickly reviewed, and encouraged engineering judgment. By encouraging engineering judgment, roads are being designed for how people use them, not forcing people to use the roads as designed.

Data and Tools for Implementation and Training

A major challenge is the acceptance of change. Training and easy-to-use tools are a significant part of implementation.

An identified challenge to implementing context classifications and a more flexible approach to design is acceptance of the change. These principles are a significant shift from how many have done their jobs—in many cases for decades. Implementation takes considerable collaboration and training effort.

Communication of the change can be made more accessible by creating materials and tools that are intuitive and easy to understand and reference during training activities. Multiple examples were given during the workshop, with some listed below.

- Outline the direction with a multidisciplinary team, including leadership.

- Graphic-oriented reference materials with easy-to-understand reference tables and or matrices

- Clear workflow charts

- An online "toolkit" to share concepts, ideas, and lessons learned with internal and external stakeholders.

- Planning resources, including GIS layers to evaluate data (e.g., equity index, safety data, land use, and right-of-way)

- GIS analysis tools for walkable or short trips

- GIS tools for different measures, including the level of traffic stress

- Graphic roadway elements—creating a pick-and-choose "roadway buffet"

- Documentation templates

- Comprehensive training workshops, including state-focused and nationwide

Recommendations

The findings of this domestic scan provide a wide range of actions that are working for those states that have implemented context classifications. While specific standards and actions have not been defined, the recommendations are focused on taking a foundational approach and each state designing a process that works for the organizational context. Agencies moving forward on incorporating the context classifications would benefit from the following recommendations, which are organized similar to the Key Findings chapter in this document for easy reference.

Define the Context Classifications

The definition of the contexts is a foundational starting point that creates a common language across agencies and within organizations. It is important to include users of the information at this initial step in some way to gain acceptance of a new way of thinking. The following are some recommendations to incorporate when outlining the classifications.

- Work with leadership to gain high-level support.

- Establish the specific objectives, outputs, and uses of context information in the design process.

- Outline a list of internal and external (as applicable) stakeholders to define contexts.

- Collaborate with outside agencies to move toward the change in concert.

- Gather relevant data and present in a GIS format or an easy-to-evaluate mapping system.

- Define context classifications to meet with state context while mapping to the five classifications noted in AASHTO.

  - Reference the AASHTO Green Book as a baseline to implement or expand based on the agency's need.

  - Outline the context based on the available data and include the natural and built environment. Definitions may be based on but not limited to:

    - Land use type

    - Business and residential populations

    - Access points

    - Building setbacks

- Determine how all modes will be incorporated into the situational contexts.

- Consider outside resources (NCHRP, DOTs, National Association of City Transportation Officials, and Center for New Urbanism) to gain knowledge, develop support, assist in defining contexts, and, if applicable, utilize as bridging documents.

Develop a Context Classification Framework

Consider any or all of the following to document a process that outlines expectations and approaches to addressing context classifications. This effort should be consistent throughout the organization(s) or agency(s):

- Change current processes to incorporate context classification in a phased approach to make change easier.
  - Outline all manuals that need to be modified to incorporate context classifications.
  - Evaluate the manuals for sections that may address all users, such as current planning and design manuals. Begin with documents that may be easier than others, such as multimodal documents.
  - Bring departments together to review and outline improvements to the documents.
- Create a bridging document to be referenced by appropriate manuals.
- Develop a new process with a multidisciplined team to utilize context classifications.
  - Develop a plan outlining where the discussions may begin.
  - Document the process.
  - Outline a workflow and identify easy-to-implement actions.
  - Define an implementation plan to utilize the process.
- Document a change management plan to begin full incorporation of classifications.
- Encourage flexible use of standards.
- Outline a speed management plan to assist in outlining the appropriate design, target, and posted speed to develop criteria for the given context.
- Implement as part of the organization's/agency's culture.
- Review and update documents when AASHTO Green Book Version 8 is released (as needed).

Implement Context Classifications

Implementation comes down to doing the work and ensuring all are engaged in the change. The following recommendations are set up to support the implementation for implementers across organizations and agencies.

- Create a process to document decisions made for a corridor and follow into a project.
  - Update current design exception processes and consider naming them something more related to decision documentation.
  - Encourage design for the users with documentation that justifies the overall design.

- Provide training explaining that a design exception is a tool to assist in documenting variations from a standard approach, the benefits of the change, and, most importantly, the reason the change is being recommended. Encourage flexibility with engineering judgment.

- Develop training programs that will outline the contexts and defining information, support engineering judgment, set expectations for the changes that are taking place, and encourage collaboration.

- Create a toolbox, including graphics, to outline elements for all users of roads. These toolboxes may be:

  - A website like FDOT Complete Streets and MDOT SHA Context Driven to share ideas and tools

  - Easy-to-follow templates for decision documentation

In addition, the scan team identified several additional concerns that need further support. When using engineering judgment, there has been a reliance on past studies and resources that supported the decisions being made. Now that we are moving away from moving vehicles and focusing on moving all users, more information and studies are needed to support making decisions for young and old practitioners that foster safe and usable environments for everyone. Additional recommendations include:

- Further study of speeds for the different contexts and inclusion of a recommended practice for defining and implementing design speed, posted speed, and target speed.

- Recommended widths for various contexts for the variation of speeds below 45, including lane width and shoulder width based on best practices.

The findings of this scan tour did not find a one-size-fits-all for context classifications; rather, it found that CSSs require many conversations with a broad range of stakeholders to find a solution that meets the needs of the transportation system and incorporates all users.

- Comprehensive training workshops, including state-focused and nationwide.

Implementation Strategy

This section presents strategies and supporting actions for disseminating the outcomes of this scan. The scan team identified strategies and actions for implementing the scan's recommendations and disseminating its results. Potential categories of dissemination actions and examples of dissemination activities are listed below.

Presentations

- AASHTO presentations
  - Committee on Design meeting
  - AASHTO Technical Committee on Geometric Design and TRB Standing Committee AKT10 on Pavement Management Systems
  - AASHTO Technical Committee on Nonmotorized Transportation
- Tennessee Engineer's Conference
- State Transportation Conference (Arizona, Maine, and Utah)
- Utah League of Cities and Towns
- Institute of Transportation Engineers (Complete Streets Council)
- Association of Pedestrian and Bicycle Professionals
- Smart Growth workshops
- TRB committees focusing on health/equity
- TRB annual meeting
- American Council of Engineering Companies/local affiliates
- American Society of Highway Engineers
- National Association of City Transportation Officials
- American Planning Association
- Association of Metropolitan Planning Organizations
- Rail-Volution (national transit conference)
- International Conference on Transport and Health
- American Traffic Safety Services Association
- American Public Works Association
- Association for Commuter Transportation
- League of American Bicyclists

Appendix A:
Scan Team Contact Information

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Appendix B: Scan Team Biographical Sketches

VAUGHN NELSON (AASHTO Chair) is the statewide design engineer of Utah Department of Transportation. He has worked for the Utah DOT for 10 years in design and construction. Prior to that, he worked for an engineering firm performing roadway design for large design-build projects. Nelson is currently the statewide design engineer, where he manages Utah DOT's design standards. He is a member of AASHTOs Technical Committee on Geometric Design and is currently working to update AASHTO's guidelines and UDOT's standards to incorporate context and performance-based design to provide safe facilities for all roadway users.

MICHAEL DENBLEYKER serves as the state roadway engineer and manager of the Roadway Engineering Group for the Arizona Department of Transportation. In this role, he is responsible for the oversight of the scoping, design, and delivery of roadway design projects. His work includes the administration of the department's roadway design standards and procedures. He coauthored the department's "Guiding Principles for Performance-Based Practical Design." DenBleyker has served as a design engineer and project manager and also managed Arizona DOT's Engineering Consultants Section, which is responsible for the administration of the department's consultant procurement process and contracts. He is a registered professional engineer in Arizona and Illinois and is a graduate of Calvin University in Grand Rapids, MI.

BRADFORD FOLEY is the Highway Program manager for the Maine Department of Transportation in Augusta, overseeing the design and construction of the state's roadways, including reconstruction, rehabilitation, and preservation. Under his direction, the program develops policy, standards, and guidelines for the design of the state's roadways. Foley has worked for the agency since 1987 and has served as a highway designer, project manager, and director of the Safety Office. He is a civil engineering graduate of the University of Vermont and a licensed professional engineer in Maine.

ALI HANGUL is assistant director of the Roadway Design Division of the Tennessee Department of Transportation in Nashville. Under his direction, the division develops policy, standards, manuals, and guidelines for roadway design. His primary duties include serving on departmental committees providing technical assistance to multimodal, planning, project development, construction, structures, maintenance, traffic operations, safety, materials divisions, and the research office. He serves as a state expert witness for the attorney general's Civil Law Division on litigations involving roadways or roadside design. He has been with the Tennessee DOT for 27 years. He serves on AASHTO's Committee on Design, the Transportation Research Board's Standing Committee on Roadside Safety Design (AKD20), and several National Cooperative Highway Research Program expert panels. He holds a bachelor's degree in civil engineering and received a master's degree in transportation engineering from the University of Tennessee at Knoxville. He is a registered professional engineer in Tennessee.

ELIZABETH HILTON is the Geometric Design Program manager in the Federal Highway Administration's Office of Infrastructure in Washington, DC. She leads on geometric design policy matters and provides engineering support on the office's efforts related to bicycle and pedestrian infrastructure, including accessible design for individuals with disabilities. She is a member of the American Association of State Highway and Transportation Officials' Technical Committee on Geometric Design and the Transportation Research Board's Performance Effects of Geometric Design Standing Committee. Hilton is a graduate of the University of Texas at Austin with a bachelor's degree in civil engineering and holds a master's degree in business administration from St. Edward's University in Austin. She is a licensed professional engineer in Texas.

DAVID L. HOLSTEIN is currently a transportation program director at Woolpert, a worldwide provider of engineering, architecture, and geospatial professional services. Prior to joining Woolpert, he served 31 years at the Ohio Department of Transportation. Most of his Ohio DOT career was spent in Traffic Operations, including serving as the state traffic engineer for approximately 17 years. During those years he was a foundational contributor to the agency's ITS and Transportation Systems Management and Operations programs. Holstein eventually left Traffic Operations to lead Ohio DOT's Office of Roadway Engineering, where he authored and implemented the agency's performance-based project development process, which has resulted in documented project cost savings of hundreds of millions of dollars. The culmination of his Ohio DOT career was serving as the deputy director of the Division of Engineering.

JAMES KELLEY is the director of the Tennessee Department of Transportation's Project Management Division and is responsible for managing various statewide programs and projects from concept to delivery. The division is the single point of accountability to deliver statewide programs and projects within a defined scope, schedule, budget, and ensuring quality. Before joining the Project Management Division, he served as assistant director of Roadway Design, responsible for the management of roadway design projects, statewide design training, quality assurance/quality control reviews, and development of the design guidelines. Kelley holds a bachelor's degree in civil engineering from the University of Alabama in Huntsville. He is a licensed professional engineer in Tennessee.

ANGELO PAPASTAMOS worked for Utah Department of Transportation for more than 24 years in a variety of positions, including serving as the Context-Sensitive Solutions director for five years. He is currently serving as one of Utah DOT's Transportation Planning managers. He created, developed, and guides the agency's TravelWise Program. Papastamos is focused on moving people and strives to incorporate the agency's quality of life framework into the statewide transportation network for all users, with particular attention to health, access, and equity.

KIM CLARK (Subject Matter Expert) currently serves as the owner of V-I-A Consulting, LLC, a Utah-based firm. Throughout her 28-year career, she has worked with DOTs and local governments to expand her knowledge of context-sensitive solutions, engineering concepts, environmental regulations, design standards, innovative contracting methods, and public involvement. Combining her thorough understanding of transportation engineering and processes with her knowledge of various communication methods, Clark has delivered numerous successful projects for various transportation projects, including planning, environmental, design, design-build, construction, and maintenance projects. Many of these projects have incorporated context concepts and performance-based planning and design, and this practical experience has provided a solid background for incorporating context classifications. During her career, Clark has served in corporate roles specializing in implementing sustainability and context-sensitive solution initiatives nationally, providing training and teaching experiences to university students and implementing various processes and pilot programs. She is a licensed professional engineer in Utah.

Appendix C:
Amplifying Questions

Amplifying Questions

This questionnaire is designed to inform the scan team about activities within your organization related to the new recently released 7th edition of the AASHTO "A Policy on Geometric Design of Highways and Streets (Green Book)" context-based classification of roadways, The new guidance introduced a broader set of land-use context classifications (including rural, rural town, suburban, urban, and urban core) to better match design solutions to specific contexts and provide flexibility in developing project scopes with traditional functional classifications of roadways (local roads and streets, collectors, arterials, and freeways).

The intent of this scan is to identify how the context-based classifications are being implemented throughout your organization.

The scan team developed a set of amplifying questions and are asking each scan participant to provide responses to these questions in advance of the scan meeting and orient their scan meeting presentations around aspects of these questions.

Questions are organized into four broad topic areas:

- Agency Information

- General Implementation

- Design Flexibility

- Opportunities

- Challenges

We request that each scan participant provide answers to each question. If your organization (or your other business units) has a particularly successful practice to share, please provide a more in-depth description of the practice, using the bullet lists of questions as guidance for the type of information that is of interest.

Agency Information
Interviewee Information

1. Name(s):

2. Title(s):

3. Contact Information:

Overall Agency

1. Agency type (local, regional, special, state):

2. Agency size and customers:

   a. Number of employees:

   b. Community population you serve:

   c. Budget allocation/year for the agency:

   d. What type of funds do you use to improve transportation services (federal, state, safety, etc.)?

3. What facilities is the agency responsible for (i.e., local/county roads, transit, state highways, etc.)?

4. Organization structure (centralized, decentralized, high-level organization structure):

Incorporation of Context Classification

1. Have you incorporated the new AASHTO: A Policy on Geometric Design of Highways and Streets (7th Edition) context classifications (rural, rural town, suburban, urban, and urban core)?

   a. Do the classifications follow the AASHTO Green Book?

   b. If not, why are the variations in place?

      i. How did you decide on these variations (research, local applications, etc.)?

If your response is NO to question 1, thank you for your response.

If your response is YES to question 1,
please continue to answer the following section.

General Implementation
Design Information and Sources

1. What resources are available that address context classification? (Please provide the hyperlinks if available to manuals, trainings, etc.)

Implementation of Context Classification

1. What is your process for implementing context classification?

2. Is context classification of roadways done on a statewide, corridor, or project basis?

   a. Is this a strategic approach the state is currently implementing?

Engagement/Stakeholders

1. Who engages in making the decision of the context classification?

   a. What agency staff participates in context classification decision making? (Please mark all that apply with degree of involvement.)

      ■ Programming

      ■ Long-range planning

      ■ Planning

- Public transportation

- Environmental

- Survey

- Right-of-way

- Multimodal

- Utilities

- Design

- Construction

- Others? _____

Explain the process:

b. Are outside agencies / groups involved?

- Consultants

- Contractors

- Local agencies (cities and counties)

- Transit agencies

- Regional planning organizations (metropolitan planning organizations/regional planning organizations)

- Interested parties (trucking, biking, walking, etc.)

- Environmental agencies

- Others? _____

Explain the process:

c. Who are the additional stakeholders involved?

2. How is the public involved in the classification?

Performance Analysis Tools/Measures

1. What factors are considered in defining the context of a particular roadway?

a. Are context classifications identified on all types of projects? (List the types of projects.)

b. What data is required to best determine the classification?

c. What tools are used to evaluate the conditions for the classification?

d. Is context based on current and/or anticipated future conditions?

e. How do you determine establishing modal priority?

f. What criteria would be used to change the classification of the context? Is there a threshold that needs to be met? Are planning documents in place? Does zoning need to be formally approved?

Timing and Incorporation of Classification

1. At what point is the context classification determined during your project development process (i.e., planning, environmental, design, others)?

2. How does the context classification influence the purpose and need of a project?

3. How is the context decision managed and documented throughout project delivery process?

4. How do you incorporate context classification for innovative or turnkey projects (e.g., alternative delivery methods, design-build, progressive design-build, construction manager/general contractor, construction manager at risk, etc.)?

Design Flexibility

Incorporating Flexibility

1. How do the agencies allow for design flexibility within the classifications they define?

    a. Are there set design criteria for each context classification? If not, how do you determine your design criteria?

    b. How are policy decisions made about flexible design criteria to fit the context classifications?

    c. When you deviate from standards, what is the process?

2. Does your agency have additional guidelines to address flexibility for accommodating scenic, historic, cultural, or otherwise important or critical aspects impacted by the road project separate from the context classifications?

Design Criteria

1. Is speed used as a design criterion for context classifications?

2. Is your agency moving toward designing to a target speed (i.e., design for the speed that you want them to drive)?

3. How do you select the design speed considering the posted speed and/or target speed?

4. If target speed is less than the posted speed and design speed, what techniques do you employ to slow vehicles down to the target speed?

5. Do you have restrictions regarding design speed or posted speed set through code or policy other than design standards? If so, please explain.

6. Have you defined a specific design vehicle based on each context classification? If so, please explain.

7. Is there a situation where multiple context classifications need to be assigned for in an area?

    a. Is there an intent to provide a consistent cross-section throughout the classification area? Please explain.

    b. How is this managed in constrained areas?

8. How do you transition from one classification to another?

9. Philosophically speaking, what are your thoughts about rewriting design standards for performance-based outcomes based on the context classifications rather than design speed?

Performance-Based Practical Design (PBPD)

1. How is your agency using PBPD in relation to context classification?

2. How does the project outcome and context shape the PBPD metrics used?

Opportunities

Multimodal Considerations

1. How are different modes (transit and active transportation) incorporated into the context classifications?

2. How is freight traffic addressed within the context classifications?

3. How is your agency providing access to opportunities and services and improving equitable outcomes factored into the context classifications? If not, then how should this be considered?

Livability/Quality of Life

1. How do context classifications factor into livability/quality-of-life benefits?

2. How do context classifications allow for the flexibility of seasonal or special events (e.g., outside dining, seasonal tourism sites, festivals)?

    a. What is the process that is in place to change classifications based on seasons or special events?

Other Opportunities

1. What additional opportunities do you see with implementing context classifications?

Challenges

Regulations

1. Do you have regulations that are limiting to context classifications? Boundaries may include:

    a. Statutes

    b. State codes

    c. Regulations

d.   Local ordinances

e.   Mindset

f.   Others? _____

Please explain:

Training/Adoptions

1.   What challenges do you see with implementing context classifications?

Other Challenges

1.   What other challenges do you see with implementing context classifications?

Thank you for your response to the survey.

Appendix D: Desk Scan

Desk Scan

Introduction

The American Association of State Highway and Transportation Officials "A Policy on Geometric Design of Highways and Street" (AASHTO Green Book, 2018) outlined context-based classification of roadways in the latest version. The new guidance introduced a broader set of land-use context classifications (including rural, rural town, suburban, urban, and urban core). The varieties allow design solutions to match specific contexts better and provide flexibility in developing project scopes with traditional functional classifications of roadways (local roads and streets, collectors, arterials, and freeways).

This literature review outlines the agencies that have implemented context classifications and notes some high-level practices. There is a strong correlation between context classifications and PBPD. The research focuses on the implementation of context classifications.

Hyperlinks are provided throughout this appendix for easy reference.

Findings

- While many agencies have developed guidance related to multimodal and CSSs, fewer have incorporated the specific context classifications.

- Most DOT's that have embraced the context classification have also incorporated a PBPD approach.

- Many of the agencies have incorporated the context classifications with design criteria and design acceptance/concurrence documents.

- Design exceptions are still in place in each of the agencies researched.

- Mode applications are a component of all context-based classification discussions.

- Many DOTs expand beyond the AASHTO Green Book guidance and the NCHRP Report 855 for definitions of context and criteria for determining context.

- Many of the agencies that have embraced the context classifications began with the implementation of Complete Streets.

National Documents/Reports

Completed Reports

Below are national reports that are common references related to the context classification:

NCHRP Research Report 855: An Expanded Functional Classification System for Highways and Streets (2018)[2] – This report presents the expanded classification system and clearly defines the different contexts as referenced by the AASHTO Green Book.

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2 NCHRP Research Report 855: An Expanded Functional Classification System for Highways and Streets (2018),
    https://doi.org/10.17226/24775

[NCHRP Research Report 839: A Performance-Based Highway Geometric Design Process (2016)](#)[3] – This report identifies the correlations between PBPD highway design and the context.

[NCHRP Project 20-07, Task 423 Planning for a Comprehensive Update and Restructuring of AASHTO's A Policy on Geometric Design of Highways and Streets, Green Book 8 Vision and Roadmap for Implementation (May 2019)](#) [4] – Special Note: This report is not an official publication of the National Cooperative Highway Research Program, the Transportation Research Board, or the National Academies of Sciences, Engineering, and Medicine.

Active Related Reports

It is important to note that additional studies are under way to address geometric design related to the context classification and expanded descriptions of the context classifications.

[NCHRP 15-17 Identification of AASHTO Context Classification](#)[5] – The principal investigator is Dr. Nikiforos Stamatiadi with the University of Kentucky. The estimated completion date is 11/14/2021. This research aims to develop practical guidance to assist state, regional, and local planners in identifying the appropriate context classification(s) for an area or a transportation project. Critical questions posed for this research include (1) What are the context(s)? (2) How will those context(s) change (spatially and temporally)? and (3) What are the implications for the various travel modes?

[NCHRP 15-77 Aligning Geometric Design with Roadway Context](#)[6] – The principal investigator is Brian Ray with Kittelson and Associates. The estimated completion date is 12/17/2021. The draft report is under review. This research aims to draft Part IV (Facility Design in Context) of the proposed 8th Edition of the Green Book, using a consistent structure for the context chapters and drawing content from the Green Book and research-based sources. This material should be suitable for direct use in a future project to develop the Green Book (8th Edition), although the development of Parts I-III may prompt changes.

Implementation of Context Classification Review
Florida Department of Transportation (FDOT)

FDOT has developed the [FDOT Context Classification Guide](#) (published July 2020)[7], which relates context classification and transportation characteristics to determine the design criteria for the nonlimited access state roadways. The guide describes the measures used to determine the context classification and outlines the relationship between the FDOT Design Manual and other FDOT guidance.

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3 NCHRP Research Report 839: A Performance-Based Highway Geometric Design Process (2016),
   https://doi.org/10.17226/22285
4 NCHRP Project 20-07, Task 423 Planning for a Comprehensive Update and
   Restructuring of AASHTO's A Policy on Geometric Design of Highways and Streets, Green Book 8 Vision and Roadmap for Implementation
   (May 2019),
   https://onlinepubs.trb.org/onlinepubs/nchrp/docs/NCHRP_20-07(423)_GB8_Vision_and_Road map.pdf
5 NCHRP 15-17 Identification of AASHTO Context Classification,
   http://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=4761
6 NCHRP 15-77 Aligning Geometric Design with Roadway Context,
   http://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=4766
7 Florida Department of Transportation Context Classification Guide,
   https://fdotwww.blob.core.windows.net/sitefinity/docs/default-source/roadway/completestreets/files/fdot-context-classification.pdf?s-fvrsn=12be90da_2

The document expands the classifications from the original six outlined in the AASHTO Green Book to the following eight contexts:

- C1-Natural

- C2-Rural

- C2T-Rural Town

- C3R-Suburban Residential

- C3C-Suburban Commercial

- C4-Urban General

- C5-Urban Center

- C6-Urban Core

The guide explores existing and future context classifications based on the type of project and horizon year. In addition, the document outlines primary and secondary measures for evaluation and outlines a step-by-step guide to determine the classification. With this information, FDOT outlines critical context-based design controls, including design users, design speed, and design vehicles.

The Florida's Complete Streets – A 360° Approach[8] website provides resources and further guidance related to complete streets, context classification, and design.

Phone Call – DeWayne Carver, AICP

Florida Department of Transportation Roadway Design Office, State Complete Streets Program Manager, October 21, 2021

A phone interview took place with DeWayne Carver. The following is a summary of the conversation.

- The Florida Department of Transportation is decentralized. Each District Planning Office and Complete Streets coordinator has assisted with assigning a context classification to each road within each district.

- Once a project moves into project delivery, a review of the classification review occurs to verify the context within the project limits and confirm or change the classification.

- Guidance for the future classification is subjective and has much has to do with what the district thinks will happen based on conversations, land use plans, and future land use development plans. Future classification is not required. Room for planning and engineering judgment was necessary rather than adding too many constraints.

- The context classification has been more of an internal process based on past discussions. The districts coordinate with local governments if there are concerns or changes. Context has changed slightly and may still have more changes in the future as we learn more.

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8   Florida Department of Transportation Context Classification Guide, https://fdotwww.blob.core.windows.net/sitefinity/docs/default-source/roadway/completestreets/files/fdot-context-classification.pdf?s-fvrsn=12be90da_2

- During the first round of Complete Street process discussions, stakeholders engaged in conversations that included context and modes. The information gathered during these discussions assisted with the context classification. External stakeholders seemed excited about the approach and were familiar with the concepts.

- The rollout of the process went well because an interdisciplinary team was assigned, and leadership supported the effort. Regular meetings took place to keep everyone focused.

- This process is changing the thinking in the department. It is easy to change the manuals but changing the mindset throughout the department is challenging. Many are busy and it takes time for implementation.

- Design speed is the most critical control as it rules the other criteria. Target speed is needed to set a design speed to set design control. The design speed ranges for each context are broad. Discussion with the public regarding the difference in speeds (target speed, posted speed, and design speed) is necessary.

- The interdisciplinary team defined the design criteria based on engineering judgment and experience. For instance, 10-foot lanes were not an issue for slower roads, so 10 feet is the minimum.

Oregon Department of Transportation (ODOT)

Oregon's Blueprint for Urban Design[9] applies an urban land use context that broadly identifies the various built environments through Oregon. The urban contexts defined by ODOT expand on the AASHTO Green Book and are defined as:

- Traditional Downtown/Central Business District

- Urban Mix

- Commercial Corridor

- Residential Corridor

- Suburban Fringe

- Rural Community

Oregon has outlined design considerations based on the classification and modes and design flexibility for each context. A section is also devoted to identifying the trade-offs to make the best decisions. Oregon utilized a performance-based approach considering the users, the context, and the safety and maintenance considerations.

Phone Call – Rich Crossler-Laird, Oregon Department of Transportation

Urban Design, October 20, 2021

A phone interview was conducted with Rich Crossler-Laird after reviewing BUD. The following is a summary of the conversation.

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9   Blueprint for Urban Design,
     https://www.oregon.gov/odot/Engineering/Documents_RoadwayEng/Blueprint-for-Urban-Design_v1.pdf

- The focus of the BUD was to bring engineers and planners together to eliminate disconnects between programming and project delivery. The BUD is currently focused on the design side and aligning with the Highway Design Manual. Planners are working on how to align the process within planning. The intent is to start the classification during the long-range planning stage. The Planning Department is currently working on this process.

- An Urban Design Concurrence[10] document allows planners and designers to document the decisions made throughout the project's life from planning through design. The initial section outlines the context, modal integration, and overall goals. The following section outlines the design decision documentation, which is done during scoping with an interdisciplinary team. In the preliminary stages, the decisions focus on the cross-section elements rather than the dimensions of the roadway. Coordination also takes place with the environmental team as part of a larger group. The discussion regarding the trade-offs is a critical part of the discussion.

- The BUD outlines dimensions. A design exception is outlined if there is a variance from the criteria. The decisions regarding both why and why not are documented. The design exception and variance documents are another step; however, the UDC documentation will provide the information to complete the forms.

- Training is a critical component to doing the work. Moving away from general standards is a mindset change. This change is not a cookbook approach where one may look up the answer; extensive training is necessary.

- A few laws create some obstacles, including addressing freight through areas. With the variances, much coordination takes place with a freight committee.

- Design speed, target speed, and posted speed are all noted in the UDC. These differences still cause concerns with the general public as the posted speed is not what they would like to see.

Washington State Department of Transportation (WSDOT)

WSDOT has incorporated the context classifications into its Washington State Department of Transportation Design Manual – September 2021[11] . A division of the manual is geared toward practical design and a section is devoted to considering the context. This context is defined early and incorporated into decision-making processes throughout the project delivery. A Basis of Design is a template for the process WSDOT uses to document the practical design approach and may be employed in both the project scoping and design phase.

In additional to including the information in the design manual, a Guidance Documents – Information About WSDOT's Practical Design Procedures [12] was developed in July 2017 and supports the context classifications.

Phone Call – John Donahue, Washington Department of Transportation

WSDOT Development Division, Assistant State Design Engineer, October 22, 2021

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10 Urban Design Concurrence,
https://www.oregon.gov/odot/Engineering/Documents_RoadwayEng/Design-Concurrence-Document.docx

11 Washington State Department of Transportation Design Manual – September 2021,
https://wsdot.wa.gov/publications/manuals/fulltext/M22-01/M22-0120Revision.pdf

12 Guidance Documents – Information About Washington State Department of Transportation's Practical Design Procedures,
https://www.wsdot.wa.gov/publications/fulltext/design/ASDE/Practical_Design.pdf

After reviewing the document, a phone interview was conducted with John Donahue. The following is a summary of the conversation.

- The value of this effort is in the conversations and documentation. The intent is to tell the story.

- Implementation began as a panel member on the NCHRP Report 855. WSDOT and the research team helped prototype a process for the state.

- A Basis of Design Form[13] was created to step through and document the process with a multi-disciplinary team. In conjunction with the BOD, a Context and Modal Accommodation Report[14] is used to walk through the criteria for identifying the context. Multiple tools are incorporated in both documents, and both are also used for approval purposes.

- The process is outlined for design. There are several iterations and "adjustment processes" throughout to check assumptions and decisions.

- Defining the modal priority is the starting point. A solid decision-making framework is in place to assist with this effort.

- Funding is a challenge as not many funds are generated for scoping. In the past year or two more money has been allocated toward the predesign process.

- Currently, no formal role in planning as the context discussion happens in the BOD. Planning guidance regarding context classification will ultimately apply during the long-range planning process; however, at this point, craft guidance is being applied on a case-by-case basis.

- Having a lot of data available helps support the decisions.

Minnesota Department of Transportation (MnDOT)

MnDOT sees PBPD as a continuing step of implementing CSSs adopted by the department in 2000. Performance-Based Practical Design[15] – Process and Design Guidance outlines the critical design criteria areas with recommendations for flexibility.

Phone Call – James Rosenow, Minnesota Department of Transportation

Design Flexibility Engineer, October 18, 2021

After reviewing the document, a phone interview was conducted with Jim Rosenow. The following is a summary of the conversation.

- This guidance document was the first step in providing background and advice for the criteria. MnDOT is currently in the process of updating the Design Manual to bring in the PBPD Process and Design Guidance Document.

- The AASHTO future guidance will assist in identifying the direction of implementing the context classification. More details and guidance will help with further definition as it becomes available through the next edition.

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13 Washington State DOT Basis of Design Form,
    https://wsdot.wa.gov/publications/fulltext/design/ASDE/BasisDesignForm.docx

14 Context and Modal Accommodation Report, Washington State Department of Transportation,
    https://www.wsdot.wa.gov/publications/fulltext/design/ASDE/ContextandModalAccommodationReport.docx

15 Minnesota Department of Transportation Performance-Based Practical Design – Process and Design Guidance,
    https://www.dot.state.mn.us/pbpd/design-guidance.html

- Moving completely from a code/standards framework will likely be a challenge as it has created a degree of consistency across all states. Some criteria may be more applicable to context classifications, such as design speed.

- The MnDOT standards are based on FHWA critical design criteria—a design exception process occurs when decisions differ from the standards.

- From a state code/statutory level, MnDOT follows the same FHWA guidance across the country. There are very few limitations by state codes other than meeting the federal requirements and following the AASHTO guidance.

- MnDOT Land Use Contexts: Types, Identification, and Use (No. 18-07-TS-05)[16] outlines the different land use context types based on NCHRP Report 855: An Expanded Functional Classification System for Highways and Streets.

Maryland Department of Transportation State Highway Administration (MDOT SHA)

Since 2019, MDOT SHA has implemented more than 200 projects that consider the "context" of an area summarized in six categories: urban core, urban center, traditional town center, suburban activity center, suburban area, or rural area. The MDOT SHA Context Driven guide[17] is an online guide that encourages flexibility and innovation to develop low-cost, high-impact solutions for each unique location. Solutions may include speed limit reductions, protected bike lanes, high visibility crosswalks, signal timing adjustments, and a host of other strategies.

New York Department of Transportation (NYDOT)

The New York Department of Transportation Highway Manual, Chapter 2, Design Criteria[18], was updated April 2021 to reflect the AASHTO Green Book context classification. Design criteria charts are outlined with the corresponding context classification. Deviations from the criteria noted require approval before moving forward.

South Carolina Department of Transportation (SCDOT)

The SCDOT Roadway Design Manual: Connecting People and Places 2021 [19] has a chapter devoted to CSSs. The Expanded Context Classification section was added within this chapter and references both NCHRP Report 855 and the AASHTO Green Book. The document encourages using the classifications to understand better and define the roadway. The overall chapter encourages engineering judgment in determining the appropriate design and is intended to guide engineers and planners. No specific crite-

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16 Minnesota DOT Land Use Contexts: Types, Identification, and Use (No. 18-07-TS-05),
    https://techmemos.dot.state.mn.us/

17 Maryland DOT SHA Context Driven guide,
    https://experience.arcgis.com/experience/3476e680584c49e48303fe6d52ceeda9/page/page_29/

18 New York Department of Transportation Highway Manual, Chapter 2, Design Criteria,
    https://www.dot.ny.gov/divisions/engineering/design/dqab/hdm/hdm-repository/chapt_02.pdf

19 South Carolina DOT Roadway Design Manual: Connecting People and Places 2021,
    https://www.scdot.org/business/pdf/roadway/2021_SCDOT_Roadway_Design_Manual.pdf

ria for each classification were found.

Colorado Department of Transportation (CDOT)

The CDOT Roadway Design Guide [20] was updated in 2018. Chapter 1 outlines the functional and contextual highway classifications and defines primary roadway users, including automobiles, bicyclists, and pedestrians. This chapter also references the PBPD process as being in the initial stages and that designers should consider its potential benefits to their project and the overall system. Specific coordination is required if PBPD is utilized on a project. CDOT's PBPD procedures will evolve as the PBPD methodologies and relevant technologies advance.

Kentucky Transportation Cabinet (KYTC)

The Kentucky Highway Design Manual, Section 0700, Geometric Design Guidelines [21], references the context classifications and directs designers to the AASHTO Green Book 2018. The context classification is noted and flexibility in design is encouraged.

Common criteria are outlined for rural local roads; rural arterial roads (other than freeways); and urban roadways for high-speed roadways, defined as interstates, other freeways, and roadways with a design speed.

An exception process is outlined for approval for a variance from the FHWA controlling criteria for roadways with a design speed <50 mph and for highways with a design speed >50 mph. The deviations from other standard geometric practices outside the controlling criteria will be documented and justified through a variance process.

California Department of Transportation (Caltrans)

Caltrans has identified place types within Chapter 80 of the Caltrans Highway Design Manual[22]. Each of the area types within this section, including rural areas, suburban areas, and urban/unurbanized areas, is defined and further categorized into street types. In addition, this chapter outlines the design standards and explains the process of deviating from standards.

In January 2005, Caltrans created Main Streets: Flexibility in Design and Operations[23] in an order to make local main streets more livable. Caltrans expanded this effort through the Complete Streets Elements Toolbox Version 2.0 [24] by providing a tool for Complete Street planning. The toolbox focuses on outlining the context of multimodal options, such as bike corridors and transit corridors.

Virginia Department of Transportation (VDOT)

VDOT supports PBPD to reflect the adoption of the 2018 AASHTO Green Book. This has been formally

20 Colorado DOT Roadway Design Guide (2018),
    https://www.codot.gov/business/designsupport/bulletins_manuals/cdot-roadway-design-guide-2018/2018-rev-rdg
21 Kentucky Highway Design Manual, Section 0700, Geometric Design Guidelines,
    https://transportation.ky.gov/Highway-Design/Highway%20Design%20Manual/Ch.700.pdf
22 Caltrans Highway Design Manual, https://dot.ca.gov/programs/design/manual-highway-design-manual-hdm
23 Caltrans Main Streets: Flexibility in Design and Operations,
    https://www.nh.gov/dot/org/projectdevelopment/highwaydesign/contextsensitivesolutions/documents/CalTrans-Main-streets-flexibility-in-design.pdf
24 Caltrans Complete Streets Elements Toolbox Version 2.0,
    https://dot.ca.gov/-/media/dot-media/programs/transportation-planning/documents/f0020348_complete-streets-elements-toolbox-a11y.pdf

noted in VDOT Instructional and Informational Memorandum Number IIM-LD-255.1[25], dated November 17, 2020, which encourages flexibility in design.

Appendix A1, Geometric Design Standards [26], of the VDOT Road Design Manual[27] references the various contexts outlined in the 2018 AASHTO Green Book and describes each context. No criteria are defined based on the specific contexts; however, flexibility in design is encouraged.

Virginia Department of Rail and Public Transportation (DRPT)

DRPT, in coordination with VDOT, developed the Multimodal System Design Guidelines[28], updated March 2020. In general, these guidelines do not conflict with, but meet or exceed, VDOT road design standards. Each context is outlined and further refined for specific areas within the area context. The document is comprehensive in outlining the criteria for each context.

Michigan Department of Transportation (MDOT)

The Multi Modal Development & Delivery Guidebook[29] provides a process that encourages collaboration with different departments and local governments to improve mobility throughout the state. Defining the street context is the initial step in the process and prioritizing what works for the area. The context areas are categorized as urban, suburban, small town, and rural roadways and corridors. The guide does not outline specific criteria; rather, it provides recommended data sources and treatments to address the need for each area.

Tennessee Department of Transportation (TDOT)

In 2018, TDOT released the new Multimodal Project Scoping Manual and Multimodal Design Chapter [30] and updated the Roadway Design Guidelines [31] to include a multimodal design chapter. The Multimodal Project Scoping Manual utilizes rural, suburban, and urban land use contexts. Additional descriptions will be used when necessary, including rural (town) and urban (core).

TDOT follows the AASHTO Green Book 2018 and encourages a holistic design along with engineering judgment. As noted in the manual, a flexible design approach has three key elements: engineering judgment, documentation, and experimentation.

The manual outlines applications for various roadway elements for all modes and addresses the distinctive design criteria with a robust design exceptions process.

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25 Virginia DOT Instructional and Informational Memorandum Number IIM-LD-255.1,
    https://www.virginiadot.org/business/resources/LocDes/IIM/IIM255.pdf

26 Virginia DOT Road Design Manual Appendix A1, Geometric Design Standards,
    https://www.virginiadot.org/business/resources/LocDes/RDM/Appendix_a1.pdf

27 Virginia DOT Road Design Manual, https://www.virginiadot.org/business/locdes/rdmanual-index.asp

28 Virginia Department of Rail and Public Transportation Multimodal System Design Guidelines,
    http://www.drpt.virginia.gov/transit/planning/multimodal-guidelines/

29 Michigan DOT Multi Modal Development & Delivery Guidebook,
    https://www.michigan.gov/documents/mdot/M2D2_Guidebook_682744_7.pdf

30 Tennessee DOT Multimodal Project Scoping Manual and Multimodal Design Chapter,
    https://www.tn.gov/content/dam/tn/tdot/roadway-design/documents/additional-resource/TDOT%20Multimodal%20Project%20Scoping%20Manual%20-%20041018.pdf

31 Tennessee DOT Roadway Design Guidelines,
    https://www.tn.gov/tdot/roadway-design/design-standards/design-guidelines.html

North Carolina Department of Transportation (NCDOT)

The NCDOT Complete Streets Evaluation[32] was conducted in July 2018 to evaluate the Complete Streets Policy and the use of the NCDOT Complete Streets Planning and Design Guidelines [33], developed in 2012. The early guidelines outlined eight different contexts and addressed all modes.

After the evaluation, the Complete Streets Policy was updated in 2019. Planning and design guidelines are planned to be incorporated into the project delivery process. Based on the Complete Streets [34] web page, the evaluation will guide future improvements to the program and will be integrated into the Roadway Design Manual.

Candidate Agencies for Inclusion in the Scan

The following transportation agencies are recommended for inclusion in the scan based on the documentation and the time the effort has been in place:

- Florida DOT has a full document outlining design criteria based on context classification. FDOT has also applied the context classification to long-range planning and assigned a context to each road.

- Minnesota DOT is updating its design manual to include the PBPD and context classifications.

- Oregon DOT's BUD outlines the design criteria and encourages interaction with an interdisciplinary team. The Planning Department is currently working on implementation to planning processes.

- Washington State DOT has incorporated the overall design process and has had the process in place for some time. It has a strong framework for stepping through the process with data to drive decisions.

- Maryland State Highway Administration has a full application online and provides a public-friendly interface.

On November 3, 2021, the scan team met to discuss the findings outlined in this report. Once all information was presented and discussed, the team recommended that Massachusetts DOT and Missouri DOT be added to the list of those that may be incorporating the context classification. From the list of these 12 remaining states, a poll was generated, and the following agencies were recommended to participate in the survey and the formal scan.

- California DOT

- Colorado DOT

- Massachusetts DOT

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32 North Carolina DOT Complete Streets Evaluation,
    https://connect.ncdot.gov/projects/BikePed/BikePed%20Documents/complete-streets-evaluation-final-report.pdf
33   North Carolina DOT Complete Streets Planning and Design Guidelines,
    https://www.completestreetsnc.org/wp-content/themes/CompleteStreets_Custom/pdfs/NCDOT-Complete-Streets-Planning-Design-Guidelines.pdf
34 North Carolina DOT Complete Streets,
    https://connect.ncdot.gov/projects/BikePed/Pages/Complete-Streets.aspx

- Michigan DOT

- New York DOT

- Tennessee DOT

- Virginia DOT (in coordination with Virginia Department of Rail and Public Transportation)

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2. California Department of Transportation. (2020). *Highway Design Manual* (7th Edition). Retrieved from https://dot.ca.gov/programs/design/manual-highway-design-manual-hdm

3. California Department of Transportation. (2018). Complete Streets Elements Toolbox Version 2.0. Retrieved from https://dot.ca.gov/-/media/dot-media/programs/transportation-planning/documents/f0020348_complete-streets-elements-toolbox-a11y.pdf

4. Colorado Department of Transportation. (2018). 2018 Revisions to the 2005 *CDOT Roadway Design Guide*. Retrieved from https://www.codot.gov/business/designsupport/bulletins_manuals/cdot-roadway-design-guide-2018/2018-rev-rdg

5. Florida Department of Transportation. (n.d.). Florida's complete streets, a 360-approach website. Retrieved October 26, 2021, from https://flcompletestreets.com/

6. Florida Department of Transportation. (2020). *FDOT Context Classification Guide*. Retrieved from https://fdotwww.blob.core.windows.net/sitefinity/docs/default-source/roadway/completestreets/files/fdot-context-classification.pdf?sfvrsn=12be90da_2

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