Chapter 9 Traffic Planning, Safety, Operations, and Design

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9-1 Overview

9-1.1 General

The Transportation Operations Division can be involved in planning studies, safety analysis, project design, and operations. This chapter contains information that can be helpful when working in the above project phases.

The *Manual on Uniform Traffic Control Devices* (MUTCD), as modified by the Washington Administrative Code, is used as a resource for projects that include traffic items.

9-1.2 Transportation Systems Management and Operations (TSMO)

The Transportation Operations Division leads the implementation and maintenance of the statewide TSMO Program Plan. TSMO covers a broad range of categories and associated strategies that encompass a balanced approach to transportation engineering, planning, and operational activities focused on maintaining a sustainable transportation system into the future. For more detailed information, visit TSMOWA.org.

9-1.3 Maintenance

Whether reviewing an existing facility or constructing a new project it is important to consider impacts to maintenance. Working with the maintenance division allows the Transportation Operations Division to implement projects such as Low Cost Enhancements (LCEs) more readily. Our Maintenance divisions provide critical insight into materials and design elements that will allow us to manage our short and long term maintenance considerations for the facility.

9-1.4 Active Transportation

Detailed guidance for active transportation is contained in Chapter 4. In each area of Planning, Safety, Design, and Operations multimodal and active transportation should be considered, especially when complying with complete streets. WSDOT incorporates active transportation guidance and standards throughout agency documents including the *Design Manual* and the *Traffic Manual*. For more resources refer to Pedestrian & bicycle facilities | WSDOT.

9-2 Planning

Guidelines and criteria for planning studies can be found here. The Transportation Operations Division can be involved in planning studies, especially with traffic and safety analysis. The Safety Guidance for Corridor Planning Studies documentation provides more information for safety. Traffic analysis is addressed in Chapter 12.

9-3 Safety

9-3.1 General

While the Washington State DOT requires safety analysis for all projects, the analysis is scalable depending on the scope and type of project. The Safety Analysis Guide (SAG) goes into more detail on safety analyses for each project type.

9-3.2 I2 Program

The I2 (Safety) program is an important program, aimed at reducing crashes statewide. There are two aspects that the program focuses on, Reduction, and Prevention. I2 Reduction focuses on reducing fatal and serious injury crashes that are occurring, a Crash Analysis Location (CAL) list is provided every two years to facilitate this effort, based on statewide network screening. I2 Prevention focuses on systemic projects to prevent crashes, current lists include run off the road and compact roundabouts. The Safety Division is responsible for developing these lists, a Crash Analysis Report (CAR) is required to be developed for any location that is to be addressed with a project. The Safety SharePoint site has information needed to develop a CAR.

The Highway Safety Issues Group (HSIG) involves HQ representatives and Region Traffic Engineers to discuss safety topics and approve methodology and processes for the I2 Program. The Highway Safety Executive Committee (HSEC) is the executive group responsible for final endorsement and approval for programs and recommendations that come from HSIG.

9-3.3 Human Factors

When performing safety, or operational, analyses it is important to also keep in mind how the roadway users will interact with or perceive their environment and how human factors have influenced the safety performance. Currently there is no WSDOT specific manual or guidance on human factors, however NCHRP and FHWA have research and documentation on the subject. Chapter 2 of the HSM (2010) and NCHRP Report 600, (Human Factors Guidelines for Road Systems, 2nd Edition, 2015) are valuable resources that can be used to perform human factors task analysis and specific human factors considerations during design. The Web-Only Document 316 from NCHRP offers an addendum and updates to the NCHHRP Report 600.

9-3.4 Target Zero

Washington State has committed to Target Zero, in an effort to reduce fatal and serious injury crashes to zero. The Washington Traffic Safety Commission (WTSC) prepares a Target Zero report every three years detailing trends in crashes statewide at the state and local agency levels. This report helps guide where to spend resources, such as prominent crash types and crashes involving vulnerable road users. WSDOT has adopted the Safe Systems Approach to help achieve Target Zero, per Executive Order E 1085.01. An overview of the Safe Systems Approach can be found on the U.S. DOT site, here. There are 6 key principles: Safer Land Use, Safer Road Users, Safer Vehicles, Safer Roads, Safer Speeds, and Post-Crash Care. The WTSC has further details on the 6 principles for Washington, here.

9-4 Design

9-4.1 General

Whether reviewing design plans or developing a Low Cost Enhancement (LCE) the *Design Manual* and *Standard Plans* are important resources to have. When reviewing design plans it is important to evaluate not only how the facility will operate, but how maintenance will be performed as well. Consult the area and signal maintenance crews as needed.

In general projects originating from the Transportation Operations Division will be LCEs. These projects must be documented per Transportation Operations Division procedures and the *Design Manual*. Design Bid Build (DBB) contracts must be documented per the *Design Manual*.

Low-cost enhancement (Q) projects are timely and cost-effective solutions to improve the safety and efficiency of the highway system. These projects focus on operational strategies and low-cost measures to solve specific and emergent needs. Q project are often developed by region Transportation Operations and implemented by state forces, but can also be delivered by contract, included as part of a capital project, or through agreements with local agencies.

For all projects, the Traffic Action Tracking System (TRACTS) shall be used to store project files and all materials necessary to support the project decisions. This includes meeting notes, emails and memos, records of phone conversations, copies of permits, backup data used for analysis and design, and design files. All documentation and approvals shall be completed prior to project delivery.

Any Q project that requires design analysis must be submitted to the Development Division to ensure any design deviations are in compliance with FHWA.

For regulatory projects, include documentation of the regulatory change (i.e. calendar action), no other formal documentation (i.e. QBOD) is required. If shoulders are to be metered a design analysis will be required.

Regulatory projects include, but are not limited to, speed limit revisions, various types of restrictions, signal and ITS operations, unsignalized intersection control, ramp meters, for metered shoulders see DM 1440, crosswalks, and special traffic control schemes.

For projects that only modify signing, delineation type, signals, illumination, and ITS, no other formal documentation is required.

For projects that modify any other design elements, such as delineation, the QBOD, as described in 9-4.2, shall be used and stored in TRACTS with the rest of the project files.

The Traffic Engineer has the responsibility and authority to authorize all expenditures for low-cost enhancement projects. For projects that require a QBOD, the Traffic Engineer shall be the approval authority.

Whenever a design element is outside of the ranges in the *Design Manual*, the region will prepare a Design Analysis, with the Traffic Engineer and ASDE as the approval authorities. If a project requires further review and approvals, the region will submit the Design Analysis to the HQ Transportation Operation Division.

Projects that result in a geometric change on the Interstate system require ASDE approval. This includes projects that change the lane and shoulder type or usage (HOV, part-time shoulder use, etc.) as well as modification of the lane and shoulder widths.

9-4.2 QBOD

The Q Basis of Design (QBOD) is a version of the Basis of Design specifically for Q projects. The QBOD documents the project need, context, design controls, alternative analysis, and design analysis, and design element selection. Refer to the *Design Manual* Chapter 300 for approval authority for design analyses. Design documentation may be required per the *Design Manual*, such as Plans For Approval may be needed for channelization changes. The QBOD shall be used when a Q project modifies any of the following design elements.

- Lane
- Median/Buffer
- Shoulder
- Streetside/Roadside Zone
- Pedestrian Facility (except for crosswalks and signal operations)
- Bicycle Facility
- Bridges
- Horizontal Alignment
- Vertical Alignment
- Cross Slope

- Side Slope
- Clear Zone
- Barrier, Guardrail, and Rumble Strips
- On/Off Connections
- Intersection/Ramp Terminal
- Road Approaches
- Roundabout
- Access Control

A QBOD Template can be found here.

9-4.3 Signals, Illumination, and ITS

Guidance and information on electrical design and implementation can be found on the Traffic: Illumination, Traffic Signals and Intelligent Transportation Systems (ITS) website.

9-5 Operations

9-5.1 General

The Transportation Operations Division is responsible for project reviews as well as operational policies and implementation of various elements of statewide traffic control, ITS deployments, LCEs, etc. on state facilities, employing TSMO principles with a focus on safety and mobility.

9-5.2 Traffic Systems and other Statewide Electrical Systems

Traffic Electrical Systems manages standards and policies for all highway lighting, traffic signal, intelligent transportation system (ITS; includes Commercial Vehicle Program field equipment), and associated power distribution systems. This includes the entire life cycle of this equipment, from initial selection, through planning, design, construction, and maintenance, to replacement and/or removal. The HQ Transportation Operations Division is developing a manual specific to lighting, traffic signal, and ITS regarding the design, construction, material, and maintenance standards of these systems. For training and

current resources consult headquarters and the Traffic Design – Signals, Illumination and ITS website.

9-5.3 Intelligent Transportation System (ITS) and Corridor Operations

ITS and Corridor Operations focuses on the coordination and utilization of technology to manage a corridor, maximizing safety and efficiency. Activities include optimizing traffic signals, operating ramp meters and active traffic management systems, integrated corridor management, and using traffic cameras, traffic data collection systems, road/weather information systems, and variable message signs to provide up to date information to travelers. Included in this effort is the operation of six year-round traffic management centers across the state and one winter operations center at Snoqualmie Pass, supported by software, web application IT development,

and maintenance staff.

Each Regions' Traffic Management Center (TMC) has its own standard operating procedures/ guidelines and system standards and is subject to specific regional ITS architectures, systems engineering, and concept of operations documents. However, overarching agency policies exist for certain systems, activities, and functions for the sake of consistency and resiliency (in the event of statewide emergencies and continuity of operations, for instance). Some internal applications and TSMO-related tools, policies and procedures are located under Tools & Services on the intranet site.

Similarly, capabilities and systems vary among each Region regarding legacy traffic signal equipment and software. Standardization of equipment, specifications, and operational practices are underway including the increasing use of automated traffic signal performance measures (ATSPMs), multimodal detection and operations, signal preemption and priority treatment.

For training and current resources consult the HQ Transportation Operations Division.

9-5.4 Low Cost Enhancements (LCE)

Low Cost Enhancements are lower cost projects that are generally developed to address locations that are identified through road safety audits, constituent requests, or other programs that don't require countermeasures that need large investments. There is an ongoing legislative proviso providing funding for LCEs specifically, which requires a report every two years detailing what types of projects and how the funding is being spent. It is important to track projects in the Traffic Action Tracking System (TRACTS) in order to facilitate easier and more accurate reporting to the legislature.

9-5.5 Transit/Public Transportation

Transit and public transportation can have a large impact on operations and should be a consideration for traffic reviews and projects. The Public Transportation Division has further information on sustainable transportation, park and rides, and other transit related topics.

The Public Transportation Division can help find ways to reduce transportation demand and to improve access for people.

9-5.6 Traffic Impact Analysis (TIA)

When new developments occur the Transportation Operations Division may need to perform analyses for traffic and potentially safety impacts from the increased volumes. Safety impacts will need to be addressed, especially if the impacted facility has been identified on I2 crash reduction lists. The *Design Manual* Chapter 1130 and 320 have information relating to TIAs.