Chapter 1430 Part-time Shoulder

1430.01 General

Part-time shoulders are managed lanes that allow vehicles to utilize the roadway's inside or outside shoulder as a travel lane during specified periods to reduce delays and increase the roadway's overall person throughput. This is a relatively low-cost Transportation Systems Management and Operations (TSMO) strategy that capitalizes on existing infrastructure and often requires minimal investment to implement. Typically, part-time shoulders are utilized at specific locations or along corridors that are experiencing routine congested periods coupled with a lack of sufficient capacity and where a larger capital improvement may be infeasible or cost prohibitive. Part-time shoulders are typically associated with freeway facilities but can be used on other roadways classifications, such as arterials.

The operational periods of the part-time shoulders can be statically or dynamically controlled which are described later in this chapter. Access can be limited to certain vehicle classes (e.g., buses only, high occupancy vehicles, no trucks, etc.). Part-time shoulders do not have a minimum or maximum design length. The design length of the part-time shoulder can be adjusted to meet desired operational needs and should reflect logical termini conducive to the roadway's characteristics. The operational period of the part-time shoulder use can be adjusted to meet desired operational needs and should reflect the solution needed to resolve or help resolve congestion for the target vehicles.

The implementation of part-time shoulder will require a Design Analysis. This documentation level is explained in more detail later in the chapter.

1430.02 Viability Assessment

Although a part-time shoulder can be an effective, low-cost operational enhancement, this managed lane option may not be conducive to all locations or corridors. When considering a part-time shoulder, conduct an assessment of the corridor's existing infrastructure within the proposed operational limits to ensure that the facility can cost effectively accommodate or be made to accommodate a part-time shoulder operation. Existing physical features such as shoulder widths, vertical clearances, pavement depths, clear zone, barrier locations, interchange ramps and other roadway features can be important considerations that may influence the relative feasibility and costs of the proposed part-time shoulder.

This assessment should include the operational parameters, safety performance, possible environmental considerations, and long term operational and maintenance costs of the proposed part-time shoulder. For example, prior to opening part time shoulder maintenance crews are often required to inspect and clear the shoulder of debris that may otherwise prohibit the use of the shoulder.

The introduction of part-time shoulder operations has the potential to shift the type and frequency of crashes along the corridor. Include potential mitigation strategies in the viability assessment (see Section 1430.05(2) for more information). Based on factors like these, the viability assessment may conclude that a part-time shoulder is not a feasible or reasonable option due to existing physical features and associated cost implications.

1430.03 Operational Parameters

The following operational parameters provide fundamental functional characteristics for any given part-time shoulder:

- Operational Period - when the part-time shoulder(s) is operable,
- Static or Dynamic Control - how operation periods are controlled,
- Vehicular Use Restrictions – which vehicles can or cannot access the part-time shoulder; and,
- Termini - the beginning and end of the managed lane.

These operational parameters are described in greater detail below and will affect various design elements associated with the managed lane. Coordinate with the Region Transportation Operations Office, Region Management, and any potential local partners that are affected by the proposed managed lane (e.g., transit agency) to establish optimal operational parameters for a potential part-time shoulder.

1430.03(1) Operational Period

The operational period is the specified time(s) when the part-time shoulder is active, and vehicles are allowed to access the shoulder. The operational period(s) of a part-time shoulder can be established based on certain times, traffic conditions, levels of congestion, desired operational characteristics, and/or benefits for the facility. The operational period can be statically or dynamically controlled as described below.

1430.03(2) Static or Dynamic Control

The part-time shoulder's operational period can be statically or dynamically controlled. Both static and dynamic part time shoulder's provide benefits to peak-period congestion and person through-put; however, dynamic control provides enhanced reliability as the part time shoulder can be opened (or remain closed) on-demand in response to real-time levels of congestion or incidents. The selection of static or dynamic control reflects the Region's desired level flexibility in operational control/responsiveness and ability to invest in infrastructure and associated operational costs. Coordinate with Region Transportation Operations Office affected stakeholders when determining a strategy for a part-time shoulder.

1430.03(2)(a) Static Control

Static control restricts use of the part-time shoulder to fixed (non-changing) conditions, such as a re-occurring operational period(s) reflecting historically congested peak periods. Other operational attributes such as operational speed and class of vehicles allowed or excluded can also be fixed. Static controls are communicated via static signing strategically placed throughout the part-time shoulder's corridor. A statically controlled part-time shoulder does not reflect or adjust to changing needs of the roadway or incidents that block the use of the shoulder (e.g., disabled vehicle or snow storage) and may limit the overall efficacy and/or effectiveness.

1430.03(2)(b) Dynamic Control

A dynamically controlled part-time shoulder adjusts the operational period, allowable vehicular classifications access and/or operational speeds to reflect the current operational demand. Such systems can also be used in response to an incident (such as a crash) as part of a Region's Active Transportation Management (ATM) response strategy. A dynamically controlled system will require additional investment into ATM systems, power, hardware, and associated maintenance/operational costs.

1430.03(3) Vehicle Use Restrictions

Use of part-time shoulder can be open to all vehicles or limited to certain vehicle classifications and/or occupancies. The geometric design requirements associated with the part-time shoulder are different depending on the vehicle classification allowed to access the managed lane. Therefore, the selection of allowable vehicle classification should take into consideration the part-time shoulder's operational needs and underlying purpose (e.g., to reduce overall congestion, promote transit ridership, reduce delay, etc.).

1430.03(4) Termini

Termini are the beginning and ending points (or limits) of the part-time shoulders. These should be established based on operational needs and physical characteristics of the roadway. Typically, there are trade-offs between the benefits associated with a part-time shoulder and physical constraints already existing in a corridor. For example, a part-time shoulder on a freeway could start at the end of an on-ramp merge or at the end of a drop lane, and the managed lane could end prior to the next off-ramp. Consult with the Region Transportation Operations Office, State Patrol HQ & District office, local transit agencies and other local partners to help determine the best apparent termini for the part-time shoulder.

1430.04 Design Criteria

Design criteria outlined in the following sections are allowed with a Design Analysis. The underlying design criteria for the Design Manual is provided by AASHTO, which does not include guidance associated with part-time shoulders. During the part-time shoulder's operational period, the use of the shoulder for the managed lane will result in shoulders and other design elements not meeting minimum AASHTO criteria. Consult with your ASDE for more information.

1430.04(1) Inside or Outside Shoulder Use

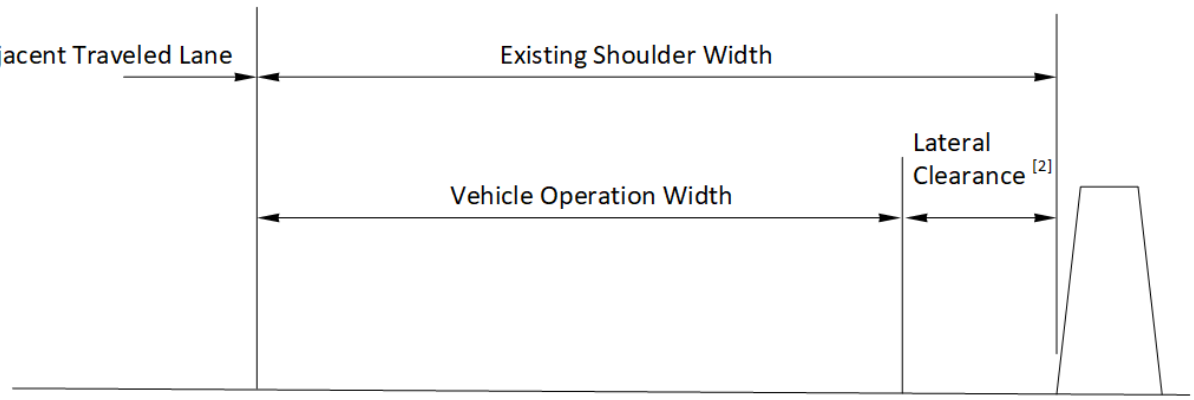
A part Part-time shoulder can utilize either the outside or inside shoulder on a separated roadway, such as a freeway. Typically, part-time shoulders utilize a roadway's outside shoulder since the outside shoulder is often wider than the inside shoulder. On the other hand, inside shoulders have less conflicts with interchange ramps. In locations with barrier, an inside shoulder alignment can help a driver feel more comfortable travelling next to a barrier on the left side of the vehicle.

The selection of the most suitable shoulder for use should assess the various benefits and trade-offs between an inside or outside shoulder alignment. Consult with the Region Transportation Operations Office, Region Management and any affected stakeholders when assessing the preferred alignment.

1430.04(2) Existing Shoulder Width

During operations, vehicles will be using a facility's existing shoulder for added capacity or through-put. The available shoulder is comprised of two parts: 1) the part-time shoulder vehicle operation width, and 2) the lateral clearance or distance to edge of pavement. See Exhibit 1430-1.

Exhibit 1430-1 Part Time Shoulder Layout [1]



[1] Outside shoulder (right side) alignment shown. Inside shoulder (left side) alignment is allowable.
[2] Lateral clearance or distance to edge of pavement when barrier is not present.

1430.04(3) Vehicle Operation Width

For part-time shoulders, the vehicle operation width is the area of the part-time shoulder that functions as the traveled way during the operational period. See Exhibit 1430-1. Consult with local transit agencies to ensure adequate width is provided if buses are anticipated to utilize the part-time shoulder.

1430.04(4) Lateral Clearance

Lateral clearance is the distance from the vehicle operation width to the edge of pavement or to a roadside object (e.g., concrete barrier, or guardrail) whichever is closer. See Exhibit 1430-1.

1430.04(5) Design Speed

The design speed for the part-time shoulder is the maximum operating speed that will be allowed during operations and is another parameter that needs to be determined for part-time shoulder operation. Although this can match the posted speed of the facility, the part-time shoulder's operating speed is typically slower than posted speed on freeway facilities. Slower operating speeds provide the following advantages:

1. Better accommodate the narrower width more commonly provided by the existing shoulder; and,
2. Diminish potential speed differential between the part-time shoulder and adjacent lane of travel that is usually moving slower or stopped.

The design speed will influence the part-time shoulder's allowable shoulder width, stopping sight distance and other critical design elements.

Exhibit 1430-2 Considerations for Part-Time Shoulder Utilization [1]

Part Time Shoulder Operating Speed	Minimum Shoulder Width (ft) [2][3][4]	Barrier or Curb	Trucks
≥ 40 mph	13	Yes	Yes
	12	No	No
	11	No	No
≤ 35 mph	13	Yes	Yes
	12	Yes	Yes
	11	Yes	No
	10	No	No

[1] A Design Analysis will be needed for shoulder width, lane width and other elements. See Section 1430.04.

[2] Minimum width of existing shoulder designated as part time shoulder.

[3] Includes vehicle operating width plus lateral clearance or distance to edge of pavement. See Exhibit 1430-1.

[4] 13 ft minimum for new construction.

When transit buses are allowed to use the part-time shoulder, consider entering into an operational agreement with a local transit agency to help ensure drivers adhere to conditions associated with use of the part-time shoulder. These conditions dictate when buses are allowed to access the shoulder. Such conditions may include operational hours in which transit vehicles may occupy the part-time shoulder and/or the maximum operating speed of the bus and/or speed differential between buses and adjacent traveled lanes. For instance, some part-time shoulder applications have interagency agreements with local transit agencies that allow buses to enter the shoulder when the mainline traffic speed is slower than 35 mph and operate in the part-time shoulder at a speed not greater than 15 mph above the current speed of traffic in the adjacent traveled lane. Such operational agreements can diminish potential operational issues associated with the use of a shoulder next to the lane of traffic.

1430.04(6) Stopping Sight Distance

As vehicles using a part-time shoulder occupy the existing shoulder and are inherently closer to roadside features, the presence of barriers and/or roadside objects may adversely affect horizonal and/or vertical stopping sight distance. Drivers may also encounter disabled vehicles or low-profile debris blocking the shoulder, or unauthorized pedestrians in urban areas. Assess the part-time shoulder’s stopping sight distances. A Design Analysis is required for stopping sight distances lower than applicable standards. See Design Manual Chapter 1260 Sight Distance for more information.

1430.04(7) Vertical Clearance

Assess the available vertical clearance within the limits of the part-time shoulder to ensure adequate vertical clearance is provided. Per Exhibit 720-3, a Design Analysis will be required at any locations not meeting applicable Design Manual requirements.

1430.04(8) Drainage

For roadways with an enclosed drainage system, drainage structures are typically located along the facilities shoulders. Drainage structures may be slightly recessed which can be problematic for vehicles and/or unable to handle loading associated with a higher volume of traffic. Additionally, shoulders may experience ponding and/or gutter line flows may extend into the part-time shoulder's operational width. A roadway's drainage system needs to be assessed for compatibility or possible adjustment when considering a part-time shoulder.

1430.04(9) Pavement Depth

The existing shoulder's pavement structure may not have been designed to handle an increased volume of traffic. Verify that the shoulder's existing pavement structure depth is suitable for additional loading associated with a part-time shoulder and adjust accordingly. Consult with the Region Materials Engineer for more information about required pavement depth for this use.

1430.04(10) Interchanges and Intersections

Interchanges allow traffic to enter and exit freeway facilities. Outside (right side) part-time shoulders at interchanges can introduce potential conflicts between the part-time shoulders through movements and vehicles attempting to use the interchange's on-ramps or off-ramps. Similarly, part-time shoulders, on either side, along arterials that cross intersections may introduce potential conflicts with turning movements especially turning movements with dedicated turning movement lanes. If a proposed part-time shoulder will cross on/off-ramps or an intersection's turning movements, consult with the Region Transportation Operations Office to determine if there are any acceptable/effective forms of mitigation.

1430.04(11) Pavement Markings

Pavement markings for a part-time shoulder are the same as for a standard roadway shoulder with a few additional considerations to better accommodate the managed lane. Continuous striping running along the edge of pavement or barrier may indicate the part-time shoulder is a general-purpose lane and may not be appropriate in most applications. Consult with Region Transportation Operations Office to determine appropriate pavement markings, document the recommendations and the final design.

1430.04(11)(a) Termini Striping

The termini of the part-time shoulder can be delineated with skip striping.

1430.04(11)(b) Delineating Fixed Objects

As part-time shoulders are utilizing the existing shoulder to function as a traveled lane, traffic will be closer to existing barrier or curb. Consider using a supplementary short pavement marking (e.g., limited white stripe) immediately prior to the beginning of the barrier to help alert drivers to fixed object.

1430.04(11)(c) Wide Areas

Consider providing hatching at locations where the existing shoulder is wider than the nominal part-time shoulder width. This will help dissuade drivers from occupying or drifting into this additional area.

1430.04(11)(d) Additional Pavement Markings

Based on site conditions and/or operational needs, additional pavement markings may be deemed appropriate for use with part-time shoulder. Consult with the Region Transportation Operations Office when assessing appropriate pavement markings.

1430.04(12) Signing

Additional signing will be necessary to alert motorist to the presence of the part-time shoulder, provide instruction and manage operations. A dynamically controlled part-time shoulder will require appropriate dynamic signing that reflects changing operational needs. Consult with the Region Transportation Operations Office when assessing appropriate signing.

1430.04(13) Clear zone

As vehicles will be occupying the shoulder during the part-time shoulder's operational period, the part-time shoulder's functional traveled way is closer to fixed objects or obstructions. Assess the Design Clear Zone for part-time shoulders longer than 400 feet in accordance with Section 1600.02.

For facilities with speeds of ≥ 40 mph, the design speed for a part-time shoulder is typically slower than the roadway's posted speed. This can result in the part-time shoulder's clear zone being narrower than the adjacent traveled lane's clear zone. In these situations, the effective clear zone for the facility is the part-time shoulder's clear zone or the clear zone of the adjacent through traffic lane, whichever is greater.

1430.04(14) Roadway Cross Slope and Superelevation

The roadway's cross slope or superelevation of the shoulder may be different than the adjacent lane. Verify that the proposed part-time shoulder's cross slope or superelevation is not more than 2% different than the adjacent lane. See Chapter 1250 for more information.

1430.04(15) Disabled Vehicles and Enforcement Areas

The shoulder allows for disabled vehicles and law enforcement to occupy the shoulder under typical operations; however, during the part-time shoulder's operation period, the shoulder will be unavailable for these critical functions. Where possible and deemed appropriate, provide additional width to accommodate disabled vehicles and law enforcement activities. Consult with law enforcement and maintenance when considering the location and frequency of possible/desirable sites. See Exhibit 1239-2 for more information.

1430.04(16) Rumble Strips

Remove existing rumble strips when converting a shoulder to a part-time shoulder. Consult with Region Materials Engineer as to the best method and requirements.

1430.05 Other Considerations

1430.05(1) Environmental

Although a part-time shoulder typically utilizes existing pavement, some projects may require minor widening. In either case, environmental considerations need to be assessed and documented appropriately. Environmental issues that are likely to warrant consideration for part-time shoulders utilizing the existing roadway pavement may include, but are not limited to, air quality and noise. Consult with Region Environment staff to ensure the appropriate environmental considerations are fully assessed and documented.

1430.05(2) Safety Considerations

Part-time shoulder may contribute to a shift in the type and frequency of crashes along the corridor. Congestion related crashes (e.g., rear ends associated with queueing) may decrease while the risk of crashes associated with driver behavior and geometry may increase. Evaluate the safety performance in accordance with the Safety Analysis guide. Use the WSDOT Safety Analysis Guide Section 7.2.1. Mobility Projects for the analysis.

1430.06 References

1430.06(1) Federal/State Laws and Codes

eCFR:: 23 CFR 625.4 -- Standards, policies, and standard specifications., Design Standards for Highways

1430.06(2) Design Guidance

Use of Freeway Shoulders for Travel - Guide for Planning, Evaluating, and Designing Part-Time Shoulder Use as a Traffic Management Strategy - FHWA Office of Operations https://ops.fhwa.dot.gov/publications/fhwahop15023/index.htm#toc

Guidelines for Implementing Managed Lanes. https://www.trb.org/NCHRP/Blurbs/175082.aspx

Safety Performance of Part-Time Shoulder Use on Freeways, Volume 1: Informational Guide and Safety Evaluation Guidelines. https://www.nap.edu/catalog/26394/safety-performance-of-part-time-shoulder-use-on-freeways-volume-1-informational-guide-and-safety-evaluation-guidelines

Safety Performance of Part-Time Shoulder Use on Freeways, Volume 2: Conduct of Research Report. https://www.nap.edu/catalog/26393/safety-performance-of-part-time-shoulder-use-on-freeways-volume-2-conduct-of-research-report

Freeway Management and OperationsHandbookhttps://ops.fhwa.dot.gov/freewaymgmt/publications/frwy_mgmt_handbook/

Decision Support Framework and Parameters for Dynamic Part-Time Shoulder Use: Considerations for Opening Freeway Shoulders for Travel as a Traffic Management Strategy. https://rosap.ntl.bts.gov/view/dot/43718

Active Traffic Management: Approaches: Active Transportation and Demand Management - FHWA Operations https://ops.fhwa.dot.gov/atdm/approaches/ptshoulderuse.htm

Safety Analysis Guide (wa.gov), WSDOT, April 2020

1430.06(3) Supporting Information

Review of I-405/SR527 to I-5 Hard Shoulder Running Concept of Operations. 2017. Northwest Region: WSDOT.

1430.06(4) Other States' Guidance Examples

Bus-Only Shoulders -A Transit Advantage What Are Bus-Only Shoulders? https://www.dot.state.mn.us/metro/teamtransit/pdf/bosupdate.pdf Pennsylvania DOT, Smart Corridor Initiatives | (transform76.com)

Managed Lanes GUIDEBOOK 2022 FLORIDA DEPARTMENT of TRANSPORTATION SYSTEMS IMPLEMENTATION OFFICE https://fdotwww.blob.core.windows.net/sitefinity/docs/default-source/planning/systems/systems-management/document-repository/managed-lanes/mlg-2023-final_feb-2023_online.pdf?sfvrsn=c85fd183_2