Chapter 1232 Geometric Cross Section – Freeways

If your roadway fits the definition of a freeway, use the guidance in this chapter for geometric cross-section elements. If your roadway is not a freeway, see Chapter 1230.

1232.01 General

Freeways are defined as divided highways with a minimum of two lanes in each direction for the exclusive use of vehicular traffic and with full control of access. Interstate is one type of freeway.

Freeways are high-speed facilities that prioritize through travel for vehicles, freight and transit. Lanes must be wide enough for all vehicles that use them. Shoulders provide very important functions for freeways.

Freeways can be thought of as a unique context. This is reflected by the fact that design controls (Chapter 1103) are fairly consistent for all freeways:

- **Modal priority:** motor vehicles
- **Access control:** full control
- **Design speed:** high

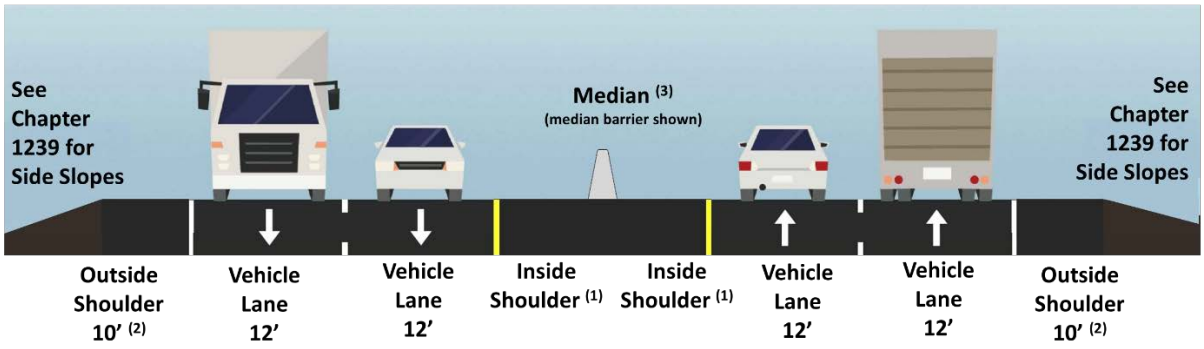
Freeways do not present the challenges of accommodating the competing needs of other modes such as pedestrians. Also, adjacent land use is generally not an issue due to freeways being limited access facilities. For these reasons, choosing cross-sectional element dimensions for freeways does not have as many complexities as for some other roadway types.

Note that there are locations where bicyclists are allowed use of the freeway shoulder.

The geometric cross-section for interstate freeways is shown in Exhibit 1232-1. The geometric cross-section for non-interstate freeways is shown in Exhibit 1232-2.

Refer to the *Design Manual* Glossary for terms used in this chapter. Refer to Chapter 300 for design documentation requirements.

Exhibit 1232-1 Geometric Cross Section - Interstate (4 lanes shown, can vary)



Notes:

See Chapter 1410 for HOV lane guidance.

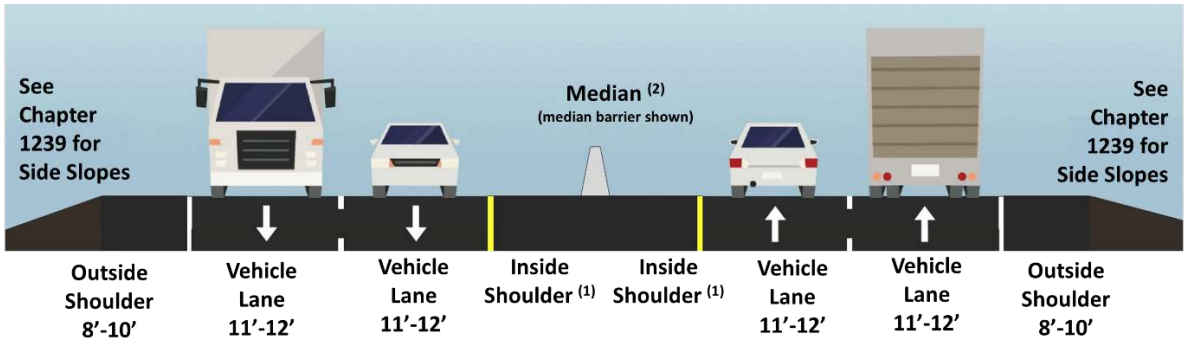
Use of the shoulder on a freeway for transit only use or as an HOV lane requires a Design Analysis.

[1] 4 ft minimum on facilities up to 4 lanes, and 10 ft minimum on 6-lane facilities.
In mountainous terrain, inside shoulder may be reduced to 4 ft on facilities up to 6 lanes.

[2] In mountainous terrain, outside shoulders may be reduced to 8 ft on facilities up to 6 lanes.

[3] Overall median width and design will vary. See Chapter 1239 and 1610.

Exhibit 1232-2 Geometric Cross Section – Non-Interstate (4 lanes shown, can vary)



Notes:

See Chapter 1410 for HOV lane guidance.

Use of the shoulder on a freeway for transit only use or as an HOV lane requires a Design Analysis.

[1] 4 ft minimum on facilities up to 4 lanes, and 8 ft minimum on 6-lane facilities.
In mountainous terrain, inside shoulder may be reduced to 4 ft on facilities up to 6 lanes

[2] Overall median width and design will vary. See Chapter 1239 and 1610.

Exhibit 1232-3 Median Section without Median Barrier

1232.02 Lane Width

For freeways, travel-through mobility and safety for motor vehicles are prioritized performance areas. Lanes must be wide enough for all vehicles that use them to travel safely at high speeds. When a range is given for lane width, use the mode/function/performance approach described in Chapter 1106 and "design up" to choose a width within the range. See Chapter 1231 for considerations for choosing a lane width.

1232.03 Shoulder Width

The prioritization of travel-through mobility and safety for motor vehicles results in placing a high priority on providing some important shoulder functions (see Chapter 1239) for freeways:

- Stopping out of traffic
- Emergency services & incidence response
- Maintenance operations

The high-speed nature of freeways reinforces the importance of providing these functions. For instance, the high speed differential between a stopped vehicle and adjacent traffic leads to a greater need to get stopped traffic out of the travelled way. Also, the limited access nature of freeways generally means that there are fewer access points to provide potential refuge.

When a range is given for shoulder width, use the mode/function/performance approach described in Chapter 1106 and "design up" to choose a width within the range. See Chapter 1239 for additional considerations for choosing a shoulder width.

1232.04 Other Elements

See the following chapters for guidance related to these other common geometric cross section elements:

- Side slopes, medians & curbs Chapter 1239
- Lateral clearance Chapter 1239
- Cross slope and superelevation Chapter 1250

1232.05 Design Flexibility

There are always locations that warrant special consideration. Existing freeways may have constraints (right-of-way or environmental considerations, for example) that make the cost of widening outweigh the benefits. The optimum solution may include widths different than those shown.

If this is the case for your project, and you choose widths different than shown in the Design Manual, formulate alternative solutions that consider the tradeoffs associated with various lane and shoulder widths and document the decision in a Design Analysis. Where appropriate, include documentation of your consultation with the project advisory team (see Chapter 1100) in the Design Analysis. When compiling the Design Analysis, consider recent design resources that explore options, performance, functions, and mitigation associated with various lane and shoulder dimensions. One source is FHWA HOP-16-060 "Use of Narrow Lanes and Narrow Shoulders on Freeways." Another source is NCHRP 15-47, "Developing an Improved Highway Geometric Design Process".

1232.06 References

1232.06(1) Design Guidance

Highway Runoff Manual, M 31-16, WSDOT

Local Agency Guidelines (LAG), M 36-63, WSDOT

Plans Preparation Manual, M 22-31, WSDOT

Standard Plans for Road, Bridge, and Municipal Construction, M 21-01, WSDOT

Standard Specifications for Road, Bridge, and Municipal Construction, M 41-10, WSDOT

1232.06(2) Supporting Information

Understanding Flexibility in Transportation Design – Washington, WA-RD 638.1, Washington State Department of Transportation, 2005
www.wsdot.wa.gov/research/reports/fullreports/638.1.pdf

A Policy on Geometric Design of Highways and Streets (Green Book), AASHTO, current edition
www.transportation.org/Pages/Default.aspx