Washington State
Department of Transportation

DEVIATION # 4

Horizontal Stopping Sight Distances

SR 24/I-82 to Keys Road-4 Laning

MP 0.15 to MP 1.48
0L-3549 PIN-502402E

This **Deviation Request** has been evaluated and documented in accordance with Washington State Department of Transportation manuals and current design standards and procedures.

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REGISTERED
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May 13, 2004

EXPIRES 9/15/05

Kerry J. Grant, Consultant Liaison Engineer

May 13, 2004
Date

☒ Deviation Approval Recommended ☐ Deviation Approved

Assistant Regional Administrator for Development – South Central Region

5/13/04
Date

☒ Deviation Approved

Assistant State Design Engineer for South Central &North Central Regions

5/25/04
Date

Project Overview

The "Nickel" project entitled "I-82 to Keys Road" on SR 24 plans to widen a 1.63-mile section of roadway from the I-82/Nob Hill Boulevard Interchange beginning at MP –0.15 and ending at MP 1.48 (0.19 miles east of Riverside Road). This project is an I1 Mobility project located partially within the City of Yakima, in Yakima County. This project will decrease congestion and accidents by increasing the number of traveled lanes from 2 to 4 and provide additional channelization at intersections throughout the project limits.

Design Matrix 2-Interstate Interchange Areas, Figure 325-4, applies to the interchange area and Design Matrix 5-Non-NHS Routes applies to the mainline of SR 24. SR 24 is functionally classified as a U1 Urban Principle Arterial from MP 0.00 to MP 0.85 and as R2 Rural Minor Arterial from MP 0.85 to the easterly limits of the project at MP 1.48. The current ADT is 18,000 with 5 percent trucks. The design speeds/posted speeds for SR 24 are 40 mph/35 mph (MP-0.15 to 0.53) and 60 mph/55 mph (MP0.53 to 1.48).

Existing Conditions

SR 24 presently has 2 twelve-foot lanes. The shoulders are eight feet in the area of the deviation except on the Yakima River Bridge, where they are only three feet. Shoulder slopes are generally 4:1's. There is guardrail protecting the Blue Slough and on the approaches to the Yakima River Bridge.

Proposed Project

The intersection of SR 24 and West Birchfield Road/S. 22nd Street will be moved 360 feet to the east of its current location, allowing for greater storage lengths between this intersection and the westbound ramp intersection.

The SR 24 alignment will be moved south of the existing alignment just east of the West Birchfield Road intersection, allowing for the construction of a new 1560-foot structure parallel to the existing bridge over the Yakima River. The existing structure will be removed as part of this project.

At MP 1.05 SR 24 passes over Blue Slough. This existing structure will be replaced with a larger pipe arch that was designed for fish passage. This new structure will require some minimal modifications to the stream channel.

SR 24 east of Riverside Road returns to its existing configuration at MP 1.48.

From MP 0.75 to MP 1.18 there is a 2400 ft. horizontal curve to the left with a length of 2258.39 ft. The roadway cross section consists of 2-12.5 ft. lanes eastbound with an 8 foot right shoulder, 2-12.5 ft. lanes westbound with an 8 ft. right shoulder separated by a 10 ft. median with pinned type 2 concrete barrier separating the opposing lanes. There is also a 12 foot pedestrian trail along the westbound lanes separated by a cast-in-place concrete type 4 shaped barrier with BP rail (see attached Roadway section A).

Deviation Description

The DM reference is the 650.02 Stopping Sight Distance (5) Horizontal Curves with a reference to Fig 650-2. Further Design Manual Supplement dated Oct. 9,2002, revised Figure 650-2 and states that the Design Stopping Sight Distance for a design speed of 60 MPH should be 570 feet .

The proposed deviation is to deviate the horizontal sight distance at two locations on this new alignment.

Location	Design SSD	M	Curve Radius	Proposed Stopping Sight Distance
L 114+00 vic. (E'Bound)	570'	10.25'	2411.25'	444'
L 119+00 Lt. vic. (W'Bound)	570'	10.25'	2376.25'	520'

The pedestrian barrier causes a deficiency in the horizontal stopping sight distance in the westbound outside lane, reducing the sight distance to 520 ft. and the median barrier reduces the horizontal stopping sight distance in the eastbound inside lane to 444 ft.

Alternatives

1. Increase the centerline radius from the project proposed 2,400 ft. to 9,996 ft. to achieve the required stopping sight distance. This alternative is not feasible because of:
    - Significant changes to the existing alignment would have to be made going into and out of the curve. This alignment would cause reverse curves on both ends of the new curve.
    - The length of the project would have to be increased by approximately 0.25 miles.
    - Increased impacts to the flood plain.
    - Increased impacts to nearby wetlands.
    - Increased impacts to both commercial and residential properties.
    - The alignment crosses the existing SR 24 in such a manner that a detour route would have to be developed instead of keeping the existing lanes open during construction, as is now planned under the proposed alignment.

    Due to the severity of these impacts **no cost estimate was prepared** for this alternative (see attached vicinity map).

2. Increase the roadway width by 10 feet, adding 7 ft to the left median shoulder of the eastbound lanes and 3 feet to the right shoulder of the westbound lanes, making the shoulders 11 feet each, achieving the required stopping sight distance.
    - **This would cost an additional $812,300.00,** 88% of which is an increase in the cost to the Yakima River Bridge.

3. Reduce the posted speed from 55 mph to 45 mph from MP 0.53 to MP1.29. This would reduce the required horizontal stopping sight distance to 425 ft.

The existing SR 24 configuration is two lanes and currently is posted 55 mph through this section. It is likely that the 85th percentile of traffic would continue at 55 mph through this section after construction, especially since the number of lanes is being increased from one to two in each direction.
The majority of the accidents in this area are rear end accidents at the non-signalized Keys Road intersection (MP 0.85).
There is no additional cost associated with this alternative.

4. Remove 1931 ft. of median barrier from around the curve to correct the horizontal stopping sight distance in eastbound inside lane only. The median barrier separates the eastbound from westbound traffic. The five-year accident history shows only one head-on collision and it resulted in only minor injuries. Removing the barrier protecting the pedestrian trail would not be acceptable; and this would still leave the westbound outside lane horizontal stopping sight distance deficient by 50 ft.
   Removing the median barrier **would save $12,960.00.**

5. Build this section of SR 24 as proposed with a 2400 ft. horizontal curve with a standard 8 ft. right shoulder on the outside westbound lane and a standard 4 ft. left shoulder on the eastbound inside lane. Limited sight distance warning signs will be posted in both directions prior to the curve with the sight restrictions.

Justifications

Increasing the curve radius to meet the design horizontal stopping sight distance would cause greater impacts to the surrounding properties and wetland areas. Increasing the shoulder widths to achieve a sight distance of 570 feet would add significantly to the cost of the project. Removing the barrier does not solve the sight distance problem for both directions of travel and exposes both pedestrians and vehicles to an increased accident risk. If the shoulder widths remain as proposed the westbound traffic will have adequate stopping sight distance for the posted speed of 55 mph and the eastbound traffic will have stopping sight distance for a speed of 52 mph, which is close to the posted speed.

Recommendation

The recommendation of the South Central Region is to deviate the horizontal stopping sight distance in the two locations. This recommendation is based on engineering judgment, environmental issues and project cost. The South Central Region proposes to build this section of SR 24 with a 2400 ft. horizontal curve with standard 8 ft. right shoulders and 4 ft. median shoulder widths.

Attachments

Vicinity Map
Roadway Section
Plan sheet showing lines of sight.