Washington State Department of Transportation

Basis of Design Form Date: 09-07-2017

Project Title: **I-82/South Union Gap Interchange – Construct Ramps**

PIN: **508209U**

Date: **6/20/2019**

**Basis of Design Phase**
(Identify the current project phase)

| Scoping | | Design | X |
|---|---|---|---|

## Related Planning Documents and Technical Reports

The following sources were used to document the planning decisions on this project:

- Value Engineering Study Interstate 82 South Union Gap I/C (June 2007)
- Cost Risk Assessment I-82 South Union Gap Interchange Improvements (October 2007)
- I-82/South Union Gap Level 1 Environmental Study (April 2010)
- IJR Amendment/Added Alternative E, I-82 South Union Gap Interchange Improvements MP 37.50 to MP 38.50 (June 2015)
- City of Union Gap Comprehensive Plan (June 2017)
- Yakima Valley Conference of Governments, Regional Transportation Plan (January 2017)
- ATC 01 & 02 Hamilton/Lochner Design-Build Proposal I-82/South Union Gap Interchange – Construct Ramps Project MP 37.50 to MP 38.50 (October 2018)

## General Project Information

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|---|---|---|---|---|---|---|
| **Route Information** | **SR** | **NHS (Y/N)** | **Functional Class** | **Current Posted Speed** | **Truck %** | **Current ADT** |
| | 82 | Yes | Interstate | 60 MPH | 14% | 36,000 |
| **Project Information** | **Begin MP** | **End MP** | **Sub-Program** | **County** | **Within City?** | **Funding** |
| | 37.0 | 38.5 | I3 – Economic Vitality | Yakima | Yes | Connecting Washington (CWA) |
| | **Existing Access Control** | **WSDOT Planned Access Control** | **Project Proposed Access Control** | **Project Delivery Method – Probable** | **Project Delivery Method - Final** | |
| | Limited Access Full Control | Limited Access Full Control | Limited Access Full Control | Design-Build | Design-Build | |
| **Brief Project Description** | The I-82 south Union Gap interchange is currently a partial interchange with an eastbound on-ramp and a westbound off-ramp to and from I-82 respectively. This project will complete the interchange by constructing a westbound on-ramp from the City of Union Gap to I-82 and an eastbound off-ramp into the City of Union Gap from I-82 to provide full access to W. Ahtanum Road via the City of Union Gap's future Regional Beltway project. | | | | | |
| **Important Project History or Background Information** | Trans-ACTION, a coalition of Yakima area-elected officials, business and community leaders, and WSDOT endorsed this project as one of the top regional transportation projects in the Yakima area. This project has developed over 48 design alternatives ranging from $70 million to $225 million. A Value Engineering (VE) team generated five concepts for the project that were compared to the baseline. Concept E was chosen as the preferred concept and released in the RFP because it provided a smaller, more fundable project that best improved access to Union Gap and I-82. During the proposal and design-build team selection process, additional alternatives were developed and approved through the ATC process resulting in final design 'Alternative 3'. | | | | | |
| **Future and Related Projects** | This project is compatible with the South Union Gap Beltway/Westside Connector. | | | | | |

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| **Major Environmental Considerations** | The Yakima River and Spring Creek are located adjacent to the project. Wide Hollow Creek is within the project limits. Wetlands are adjacent to I-82 and within the project limits. |

## Community Engagement

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| **Describe Community Engagement** | Some of the methods that have been used to actively communicate with the community regarding this project are the WSDOT website, displays at community events and fairs, email, traditional media, social media, an IJR hearing, NEPA open house, as well as a community open house. Over 48 alternatives have been evaluated during quarterly meeting with the community, earning endorsement for the project by a coalition of Yakima area elected officials, business and community leaders, TRANS-Action, and the YVCOG. Future community engagement efforts during the design-build phase of this project plan will consist of using the services of the SCR Communications office and the design-builder. |

## Section 1) Project Needs

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| **Record each BASELINE NEED statement along with the performance metric and target.** | **BN1 – Mobility**<br><br>Due to the missing directional movements for the westbound on-ramp and eastbound off-ramp at the South Union Gap (SUG) I/C, all vehicles and freight traveling to the City of Union Gap currently have to exit and enter the Interstate (I-82) using the Valley Mall Boulevard exit (Exit 36). This results in increased congestion and travel time due to vehicles using existing at grade intersections to access the south side of Union Gap/West Valley. The City of Union Gap and Yakima County are in the process of developing a Regional Beltway Connector. The purpose of this project, in conjunction with the future Regional Beltway Connector, is to reduce congestion at local intersections and improve interstate accessibility to the south side of Union Gap/West Valley.<br><br>**Metric:** Level of Service (LOS) at local intersections<br><br>**Target:** Improve LOS at local intersections with added directional movements at South Union Gap I/C.<br><br>**BN2 – Economic Vitality**<br><br>The City of Union Gap is pursuing opportunities for economic and industrial growth southeast of the regional airport. The City experienced substantial growth after the completion of the Valley Mall Boulevard interchange; however, the access to the area from I-82 is limited and hinders further growth. The City's comprehensive plan includes development of a Regional Beltway Connector adjacent to the south Union Gap interchange. The purpose of both projects is to reduce congestion at local intersections in the design year and improve interstate accessibility to the south side of Union Gap/West Valley to promote economic vitality.<br><br>**Metric:** Interstate access to undeveloped parcels and to future Regional Beltway Connector project.<br><br>**Target:** Improved interstate access to undeveloped parcels and to future Regional Beltway Connector project. |

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| | **BN3 – Safety**<br>There is no history of Fatal and Serious Injury Crashes in the last five years at this location. This project will add approximately 0.016 fatal crashes and 0.052 serious crashes per year to this interchange. This results in an additional fatal crash every 63 years and an additional serious crash every 19 years.<br>**Metric:** Number of Fatal and Serious Injury Crashes per year<br>**Target:** Minimize Fatal and Serious Injury Crashes |
| **Record each CONTEXTUAL NEED statement along with the performance metric and target.** | **CN1 – Environmental Impacts**<br>The south Union Gap interchange is located adjacent to environmentally sensitive areas (wetlands, streams, flood plains, and habitat areas) associated with Wide Hollow Creek, Spring Creek and Yakima River.<br>**Metric:** Acres of sensitive areas impacted (ac)<br>**Target:** a) no net rise to the Yakima River floodway<br>b) minimize impact to floodplain<br>c) minimize impacts to wetlands |
| **What are the contributing factors of each baseline and contextual need?** | **BN1 – Mobility** – Incomplete connection between I-82 and south Union Gap:<br>• Only I-82 WB off-ramp and I-82 EB on-ramp movements currently exist at the SUG interchange.<br>• I-82 WB on-ramp and I-82 EB off-ramp movements must drive through town including multiple roundabouts and at grade intersections.<br>• Peak hours increases travel time.<br><br>**BN2 – Economic Vitality** – Deficient access from south Union Gap interchange to undeveloped land southeast of the airport:<br>• Only WB off-ramp and EB on-ramp currently exist at exit.<br>• WB on-ramp and EB off-ramp must drive through town including multiple roundabouts and turning movements.<br>• Currently not compatible with future Regional Beltway Connector goals.<br><br>**BN3 – Safety**<br>• Safety is a required baseline performance metric for all economic vitality projects<br><br>**CN1 – Environmental Impacts** – Multiple environmentally sensitive areas adjacent to the project.<br>• Wide Hollow Creek is a fish bearing stream.<br>• Wide Hollow Creek outfalls into the Yakima River.<br>• Yakima River is a culturally significant waterbody to the Yakama Nation. |
| **Has a safety analysis been completed (per DM Chapter 321 and the Safety Analysis Guide)?** | ☐ No ☒ Yes<br>A SUG Safety Analysis was completed in September 2018 and found that this project is expected to slightly increase the serious and fatal crashes. Although, the added ramps and terminals increase the potential for all crash types, it is expected that the added ramp movements will reduce congestion and crashes at local intersections and Valley Mall Blvd I/C and likely offset the small increase. The majority of these crashes are predicted to be single vehicle crashes with approximately 60% being property damage only crashes. |

## Section 2) Context

**In consultation with Region Planning Office**

### Roadway I-82 MP 37.0 to MP 38.5

*[Duplicate this section as necessary to reflect 1) future conditions and 2) applicable milepost ranges]*

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| **Land Use Context** | **Freeway** | | *For freeways, document the urban/rural designation as listed on the State Route Log*<br>☐ Rural ☒ Urban<br>☒ Interstate ☐ Non-Interstate | | | | |
| | **Non-Freeway** | | ☐ Rural ☐ Suburban ☐ Urban ☐ Urban Core | | | | |
| **Transportation Context** | **Roadway Type (Final)** | | ☒ Freeway ☐ Principal Arterial ☐ Minor Arterial ☐ Collector ☐ Local | | | | |
| | **Bicycle Route Type** | | ☐ Citywide Connector ☐ Neighborhood Connector ☐ Local Connector | | | | |
| | **Pedestrian Route Type** | | ☒ P-1<br>*Rare Use* | ☐ P-2<br>*Low Volume* | ☐ P-3<br>*Medium Volume* | ☐ P-4<br>*High Volume* | |
| | **Freight Use** | **Freight Route Type** | ☒ T-1<br>*>10M tons/yr* | ☐ T-2<br>*4M to 10M tons/yr* | ☐ T-3<br>*0.30 to 4M tons/yr* | ☐ T-4<br>*0.10M to 0.30 tons/yr* | ☐ T-5<br>*At least 20,000 tons in 60 days and less than 100,000/yr* |
| | | **General** | *Coordinate with Region Planning Office. Describe any special design considerations that apply.*<br>WB-67 (Interstate Semitrailer, 53 feet) and WB-109D (Interstate Double Semitrailer, 114 feet) are the design vehicles for turning movements and turning roadway widths. | | | | |
| | **Transit Use** | **General** | *Coordinate with Region Planning Office. Describe any special design considerations that apply.*<br>Transit is not common at the interchange, but there will be no restrictions. | | | | |
| | **Complete streets and Main Street Highways** | | ☒ No ☐ Yes<br>This section of highway is not the main street of a city or town. | | | | |

## Section 3) Design Controls

**In consultation with Region Planning Office**

### Roadway I-82 MP 37.0 to MP 38.5

*[Duplicate this section as necessary to reflect 1) existing/design year conditions and 2) applicable milepost ranges]*

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| **Selected Design Year:** | A design year of 2035 was chosen in accordance with decisions outlined in the IJR for the Project. The alternatives presented in the IJR also evaluated options that had shorter horizon years. The final 'Alternative 3' was approved and is consistent with the DM Chapter 1103 – Design Control Selection. |
| **Design Users**<br>*(Legally Permitted to Use the Facility)* | ☒ Vehicles ☐ Bicycles ☐ Pedestrians ☒ Freight ☐ Transit ☐ Other<br>*Narrative: The design users consist of commuters, commercial truck operators, agricultural operators, and agricultural equipment.* |

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| **Modal Accommodation Level** | **Vehicles** | **Existing** | ☒ High ☐ Medium ☐ Low |
| | | **Design Year** | ☒ High ☐ Medium ☐ Low |
| | | *Notes*: 36,000 AADT (2016 Annual Traffic Report) | |
| | **Bicycles** | **Existing** | ☐ High ☐ Medium ☒ Low |
| | | **Design Year** | ☐ High ☐ Medium ☒ Low |
| | | *Notes*: Bicycles are rare for this interchange. | |
| | **Pedestrians** | **Existing** | ☐ High ☐ Medium ☒ Low |
| | | **Design Year** | ☐ High ☐ Medium ☒ Low |
| | | *Notes*: Pedestrians are rare for this interchange. | |
| | **Freight** | *(List special design considerations that may apply)*<br>WB-67 (Interstate Semitrailer, 53 feet) and WB-109D (Interstate Double Semitrailer, 114 feet) are the design vehicles for turning movements and turning roadway widths. | |
| | **Transit** | *(List special design considerations that may apply)*<br>No transit route stop areas exist within the project area. | |

| | Mode | Existing | Design Year | Notes |
|---|---|---|---|---|
| **Modal Priorities**<br>(rank/priority, 1,2,3 etc.) | Automobiles | *1* | *1* | *This interchange is expected to have an increase in agricultural freight use due to the upcoming City of Union Gap Regional Beltway Connector project.*<br>*Bike and Pedestrian trails are located east of the Yakima River within the project area. US 97 and I-82 do allow bikes and pedestrian traffic but experience low usage.* |
| | Transit | *2* | *2* | |
| | Freight | *1* | *1* | |
| | Pedestrians | *3* | *3* | |
| | Bicycles | *3* | *3* | |
| | Other | | | |

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| **Intersection Design Vehicle** | WB-67 (Interstate Semitrailer, 53 feet) commercial freight vehicle is the minimum size design vehicle used in the design of this project because of the high volume of agricultural freight on I-82 and US 97. The need for freight vehicles is vital for the economic growth of the local communities. The ramp alignments were double checked using WB-109D (Interstate Double Semitrailer, 114 feet). |
| **Terrain Classification** | Rolling (WSDOT Highway Log 2016) |
| **Access Control** | Full Access Control: The existing Limited Access Full Control will remain unchanged after this project is complete. Access control is categorized under Classification 1 with full limited access due to increased speed and higher projected vehicle volumes. Full Access Control promotes free movement of freight, ties the project to adjacent segments with full access control, and improves safety. The access density and spacing will remain unchanged. |
| **Target Speed** | The proposed posted speed limits for this project will be 60 mph on I-82, 55 mph on US 97, and 35 mph on Main Street. These speed limits match the existing posted speeds of the previously constructed projects in the south Union Gap Interchange. All posted speeds will remain unaffected by the project. |

## Section 4) Alternatives Analysis

| | | Alternative Name or Description |
|---|---|---|
| **Alternatives Considered** | **No Build** | |
| | **A** | One new overpass, new on-ramps to WB & EB I-82, new off-ramp from EB I-82 to Main Street, realign off-ramp from WB I-82 to Union Gap, realign US 97 and connect with Main Street and future beltway project. |
| | **B** | Three new overpasses and one new bridge over I-82, new on-ramps to WB & EB I-82, new off-ramp from EB I-82 connecting to Main Street and future Westside Beltway project. |
| | **C** | Two new overpasses, new on-ramps to WB & EB I-82, new off-ramp from EB I-82 to Main Street, realign off-ramp from WB I-82 to Union Gap, realign ramp from NB US 97 off-ramp and connect with Main Street and future beltway project. |
| | **D** | Three overpasses, new bridge over I-82, new off-ramp from EB I-82, new on-ramp to WB I-82, realign Main Street connections with US 97 and I-82, and connect with future beltway. |
| | **E** | Widen or remove and replace bridge over I-82, new I-82 EB off-ramp, realign US 97 NB off-ramp, widen Main Street to accommodate turning movements, and replace existing box culverts with larger box culverts |
| | **3** | One new bridge over I-82, new on-ramp from Main Street to WB I-82, new off-ramp from EB I-82 to Main Street, realign I-82 WB mainline to allow room for new on-ramp to WB I-82 to merge under existing overpass. |
| **Preferred Alternative** | **3** | |

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| **Attach copies or provide information (title, date, etc.) regarding alternatives analysis, trade-offs comparison, or similar exercises that have been completed for this project, such as an ALTERNATIVES COMPARISON TABLE.** | ***See ATC 01 & 02 Hamilton/Lochner Design-Build Proposal I-82/South Union Gap Interchange – Construct Ramps Project MP 37.50 to MP 38.50*** (October 2018)<br><br>'Alternative 3' was selected in order to produce a smaller, more cost effective project. This alternative helped avoid utility relocations, conflict with railroads, tribal impacts, environmental impacts, and the need for additional ROW while working within the design constraints. Benefits over Alternative E: (1) I-82 off-ramp to Main Street realigned, resulting in reduced wall heights which reduces long-term maintenance, (2) reduces the number of roadway closures required to build the project, (3) reduces the floodplain impacts, and (4) improves traffic safety by eliminating the left-turn terminal/conflict point of the EB Main Street to WB I-82 on-ramp traffic. |

## Section 5) Design Element Selection

*For each design element below, identify the design elements that will have dimensions changed in the preferred alternative for each alignment or location. You can group alignments into a single location if desired. You may need to add or delete columns.*

| Design Element | I-82 L LINE | A Line | B Line | C Line | M Line | N Line | X Line |
|---|---|---|---|---|---|---|---|
| **1. Lane** | N/A | X | X | X | X | N/A | N/A |
| **2. Median / Buffer** | X | N/A | N/A | N/A | N/A | N/A | N/A |
| **3. Shoulder** | X | X | X | N/A | X | N/A | N/A |
| **4. Streetside / Roadside Zone** | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| **5. Pedestrian Facility** | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| **6. Bicycle Facility** | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| **7. Bridges** | N/A | N/A | X | N/A | N/A | X | N/A |
| **8. Horizontal Alignment** | X | X | X | X | X | N/A | X |
| **9. Vertical Alignment** | N/A | X | X | N/A | N/A | N/A | X |
| **10. Cross Slope** | X | X | X | X | X | N/A | X |
| **11. Side Slope** | X | X | X | N/A | X | N/A | X |
| **12. Clear Zone** | N/A | X | X | N/A | X | N/A | X |
| **13. Barrier, Guardrail & Rumble Strips** | X | X | X | X | X | X | X |
| **14. Signals, Illumination, and ITS** | X | X | X | X | N/A | N/A | X |
| **15. Signing and Delineation** | X | X | X | X | X | X | X |
| **16. On/Off Connections** | N/A | X | X | N/A | N/A | N/A | X |
| **17. Intersection / Ramp Terminal** | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| **18. Road Approaches** | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| **19. Roundabout** | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| **20. Access Control** | N/A | N/A | N/A | N/A | N/A | N/A | N/A |