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TECHNICAL MEMORANDUM #5 (Exit 207)

Pendleton IAMPs: Exit 207

Detailed Evaluation of Select Concepts

Date:	June 17, 2020	Project #: 24043
To:	Technical Advisory Committee, Citizen Advisory Committee	
From:	Amy Griffiths, Mark Heisinger, Nick Foster, AICP, and Matt Hughart, AICP	

This memorandum describes and evaluates a select number of interchange and local circulation improvement concepts developed to provide for long-term growth in the vicinity of the Interstate 84 (I-84) Exit 207 interchange. These select concepts were rooted in the preliminary concept development and evaluation process in which two stages of concept evaluation were conducted. First, a set of five preliminary concepts, plus two accessory concepts, were developed by the project team based on input from the project's advisory committees. The project team screened these concepts and solicited feedback from the advisory committees and general public. Based on this screening, the Project Management Team selected two concepts to move forward for more detailed evaluation. These select concepts are the focus of this Technical Memorandum.

SUMMARY OF PRELIMINARY CONCEPT EVALUATION

The Exit 207 interchange and local circulation improvement ideas were initially developed by members of the project team, the Technical Advisory Committee (TAC), and the Citizen Advisory Committee (CAC) at the January 29, 2020 TAC/CAC meeting to address known, and anticipated future, geometric and traffic operations and safety conditions. Following this initial work session, the project team distilled the ideas presented at the meeting into seven unique preliminary concepts. These seven concepts were evaluated in *Technical Memorandum #5a,* which included a summary of the concept development process, a qualitative evaluation of the seven preliminary concepts, a summary of public feedback from an on-line feedback tool, and the concepts chosen to be evaluated at a more detailed level. Table 1 summarizes the results of this screening process. *Technical Memorandum #5a is included as Attachment "A."*

Table 1 Exit 207 Preliminary Concept Screening Results

Concept Description	Included for Further Evaluation?	Justification
Concept #1A – Converting existing PARCLO A interchange to a diamond interchange and widening the existing overpass structure.	No	While this concept scored well on the whole, it is a major reconstruction of the entire interchange. There is not enough evidence that the EB ramp terminals need to be completely modified.
Concept #1B – Converting the EB interchange ramps to a diamond form with a roundabout	Yes	Concept scored well and was generally supported by survey respondents. Concept better addresses known geometric issues and does not involve an unnecessary rebuild of the entire interchange.
Concept #1C– Constructing a new diamond interchange and a new overpass structure.	No	While this concept scored well on the whole, it is a major reconstruction of the entire interchange. There is not enough evidence that the EB ramp terminals need to be completely modified.
Concept #2 – Construction of a flyover ramp and modification of the WB ramp terminals	No	Flyover ramp is not necessary nor proportionate to the interchange volumes.
Concept #3 – Modification of the WB off ramp and relocation of Airport Road	Yes	Potentially the least costly option while still addressing the primary issues at the interchange.
Accessory #1 - This accessory creates new access roads on the north and south sides of US 30 (Westgate). This accessory can be paired with concepts 1A, 1B, 1C, and 2. The frontage road elements can be paired with Concept 3	No	This option requires a fairly significant amount of right of way acquisition.
Accessory #2 - This accessory creates a roundabout intersection with four legs: Airport Road, US 30 (Westgate), and a new access road behind the businesses on the north side of US 30. This accessory can be paired with concepts 1A, 1B, 1C, and 2. It improves access spacing by moving access to the northern businesses to the new access road.	Yes (paired with Concept #1B)	A new roundabout at Airport Road would result in a fully complete and modernized pedestrian and bicycle network. The roundabout could be constructed with minimal impacts to private right-of-way and easily paired with Concept #1B.

Based on the preliminary screening outlined above, the project team performed a more detailed operations, safety, and cost analysis of Concept #1B (with Accessory #2) and Concept #3. This analysis is described in the following section of this memorandum.

DETAILED EVALUATION OF SELECT CONCEPTS

Concepts #1B (with Accessory #2) and Concept #3 were further evaluated with respect to future traffic operations, safety effects, and planning-level cost estimates. Refined concept drawings were also prepared that consider the area's topography and the geometric and traffic control needs at the study intersections. These drawings are shown in Figure 1 and Figure 2, respectively.

Concept #1B with Accessory #2 Conceptual Drawing
Pendleton, OR

Figure
1

Concept #3 Conceptual Drawing
Pendleton, OR

Figure
2

Future Traffic Operations

The project team analyzed year 2040 AM and PM peak hour transportation operations at the project study intersections for both concepts. The traffic operations analysis was performed in accordance with the same methodologies used for the existing conditions operations analysis, presented in the *Methodology Memorandum* (Reference 1). The initial traffic operations analysis was performed assuming that existing stop-control remained at all study intersections, except at locations where a roundabout was identified as part of the preliminary concept development process. Where this did not result in intersections meeting their mobility targets and planning-level signal warrants were met, the project team modified the concept design to include traffic signals and turn lanes. The mobility targets for the study intersections are shown in Table 2. The following sections describe the traffic operations analysis results for each concept. *Intersection operations worksheets are shown in Attachment "B".*

Table 2: Study Intersection Performance Standards

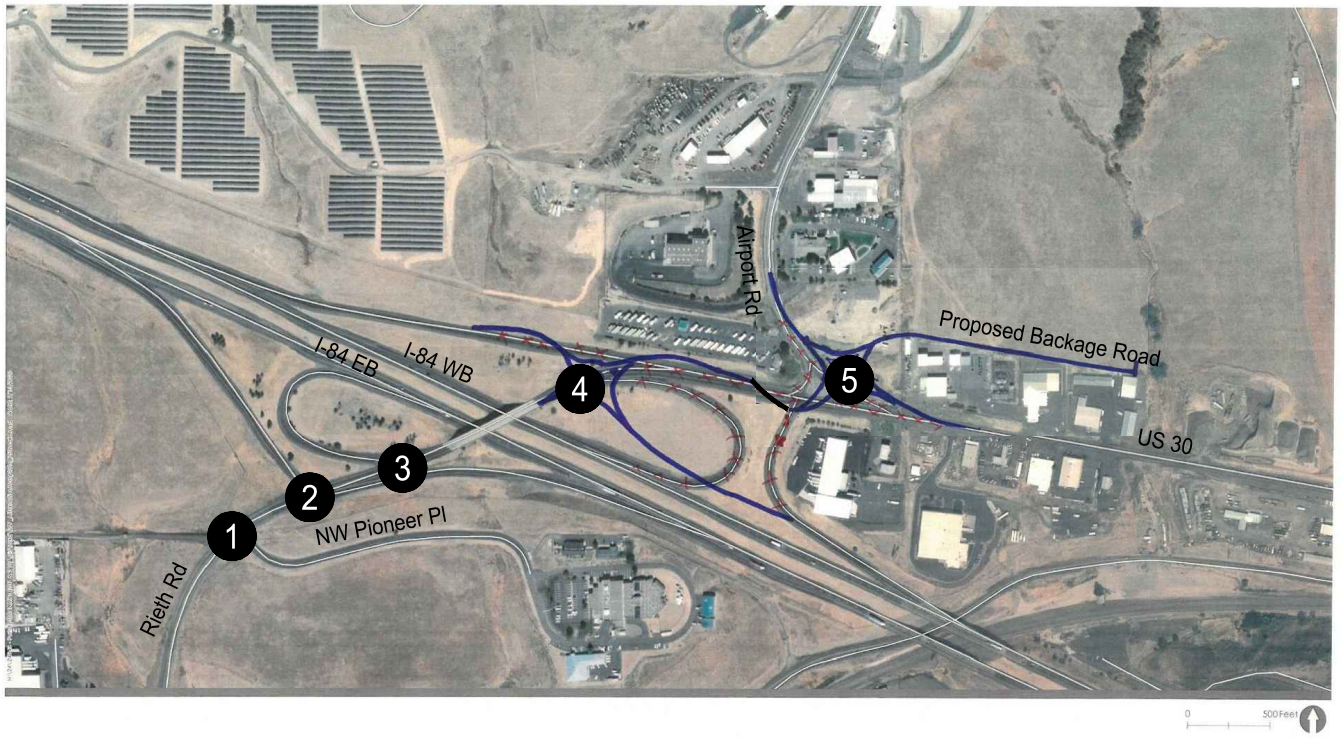
Intersection	OHP Mobility Target
I-84 Westbound Off Ramp/US 30/Airport Road Connector	0.85[1]
I-84 Westbound On Ramp/US 30	0.90[2]
I-84 Eastbound Off Ramp/US 30	0.85[1]
I-84 Eastbound On Ramp/US 30	0.90[2]
US 30/Airport Road	0.90 US 30 approach / 0.90 Airport Road approach
Rieth Road/NW Pioneer Place[3]	-

[1] The I-84 westbound and eastbound off ramps were evaluated with a more conservative v/c of 0.85 per Action 1F.1 of the Oregon Highway Plan.
[2] There are no conflicting movements at the I-84 westbound and eastbound on ramp intersections. As such, the US 30 eastbound and westbound major street through movements were evaluated under the US 30 District Highway mobility target of 0.90.
[3] The City of Pendleton does not have intersection or roadway performance targets – target v/c of 0.90 assumed.

Concept #1B (with Accessory #2)

Concept #1B converts the eastbound ramp terminal form from a partial cloverleaf to a diamond with a roundabout. This combines the two westbound on-ramps into one. Accessory #2 creates a roundabout intersection with four legs: Airport Road, US 30 (Westgate), and a new access road behind the businesses on the north side of US 30. It improves access spacing by moving access to the northern businesses to the new access road.

Lane configurations and traffic control for Concept #1B (with Accessory #2) are shown in Figure 3. The estimated year 2040 traffic volumes and operations for Concept #1B (with Accessory #2) are shown in Figure 4 and Figure 5 for the AM and PM peak hours, respectively. Given these lane configurations and traffic control, all study intersections in Concept #1B (with Accessory 2) meet their mobility targets and operate at LOS 'B' or better in the AM and PM peak hours.



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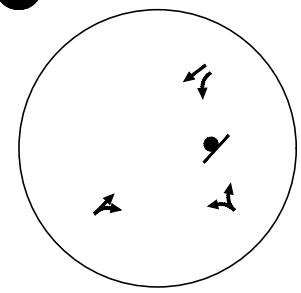
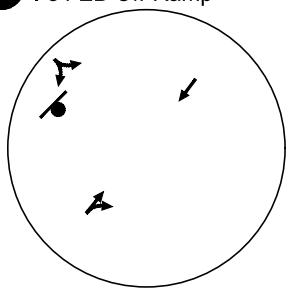
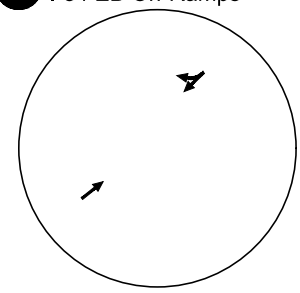
1 Rieth Rd / NW Pioneer Pl



2 US 30 / I-84 EB Off-Ramp



3 US 30 / I-84 EB On-Ramps



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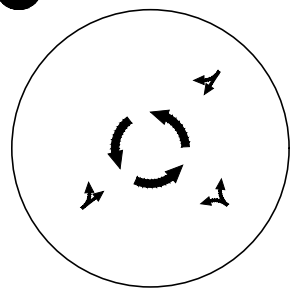
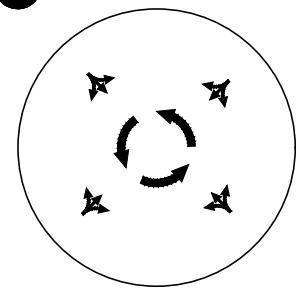


5 US 30 / Airport Road

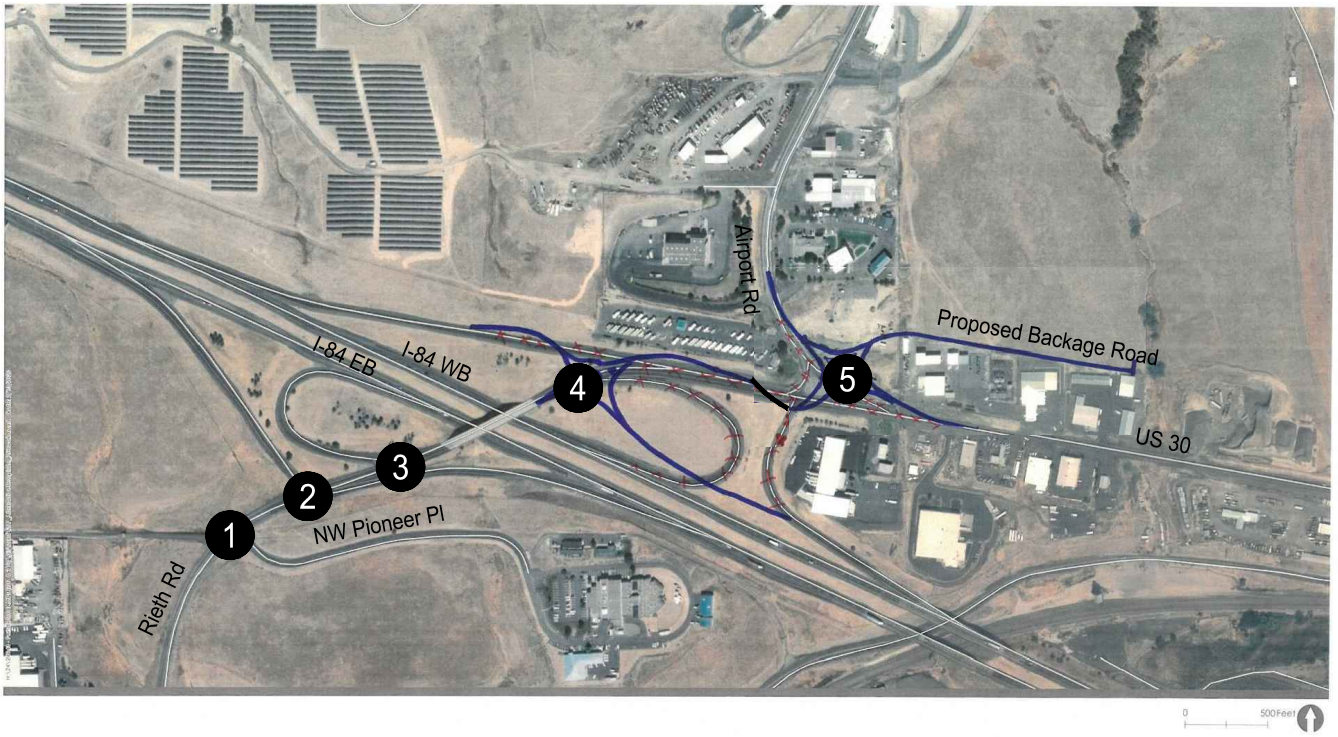


LEGEND

- Lane Movement
- # - Study Intersections
- Stop Sign

Concept #1B Accessory #2 Lane Configurations
Exit 207
Pendleton, OR

Figure 3



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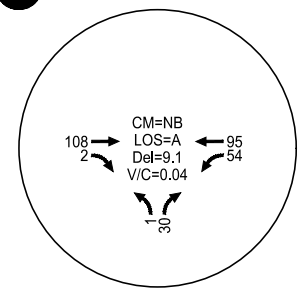

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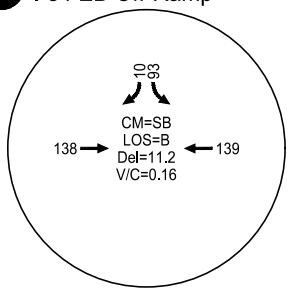

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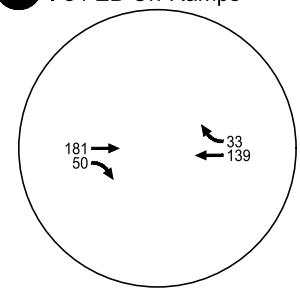

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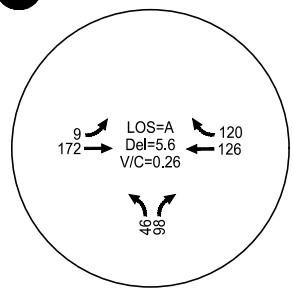
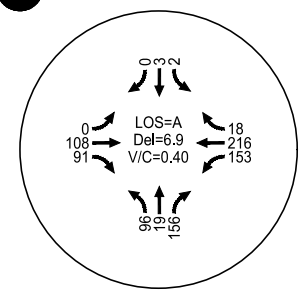


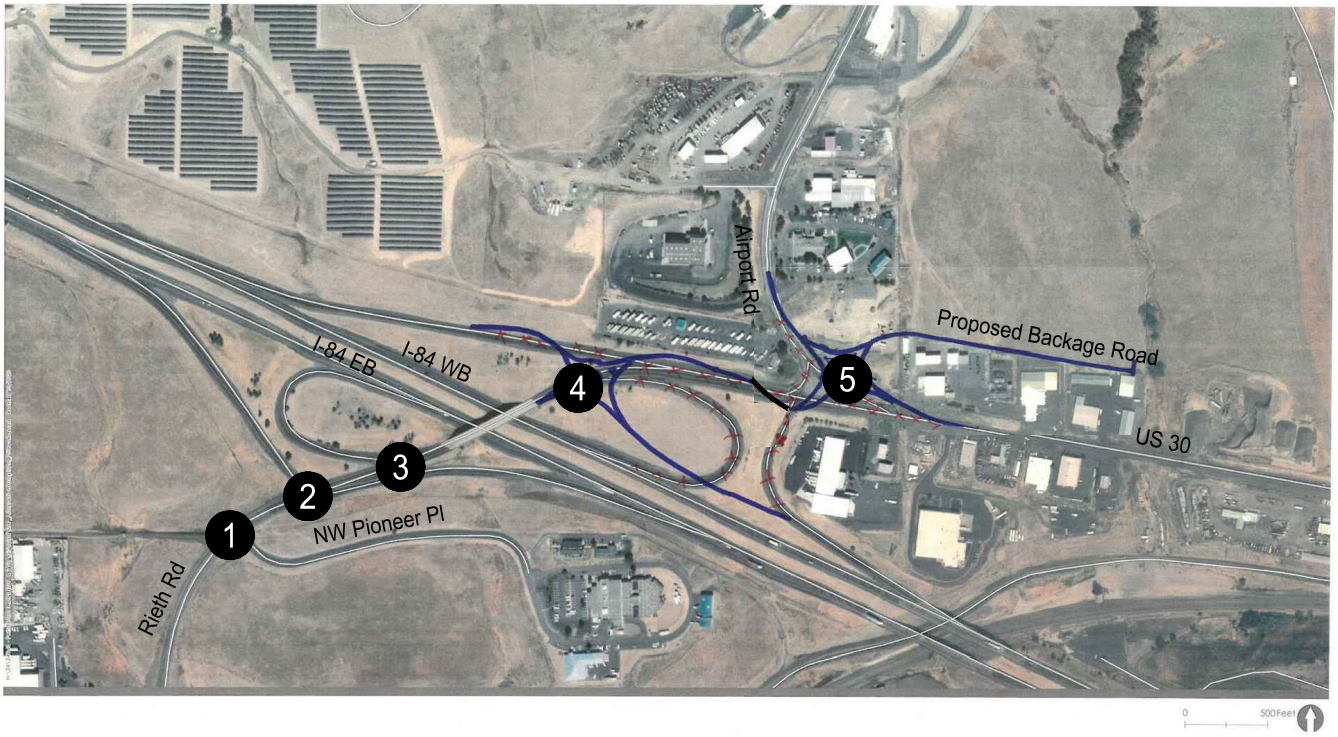
5 US 30 / Airport Road



- Study Intersections
CM - Critical Movement
LOS - Level of Service
Del - Vehicle Delay (s)
V/C - Volume-To-Capacity Ratio
- I-84 Peak Hour Volume

Future AM Peak Hour Traffic Operations
Exit 207 Concept #1B with Accessory #2
Pendleton, OR

Figure
4



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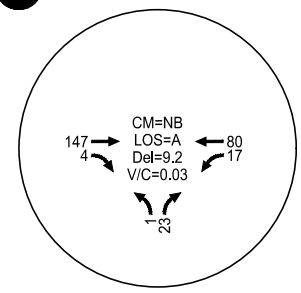
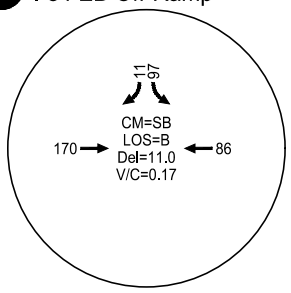
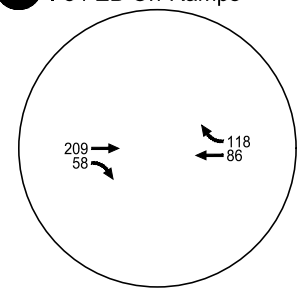
1 Rieth Rd / NW Pioneer Pl



2 US 30 / I-84 EB Off-Ramp



3 US 30 / I-84 EB On-Ramps



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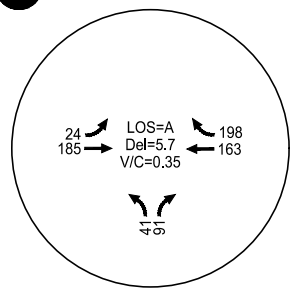
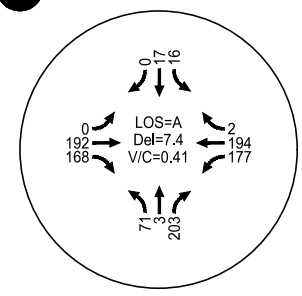


5 US 30 / Airport Road



- Study Intersections
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LOS - Level of Service
Del - Vehicle Delay (s)
V/C - Volume-To-Capacity Ratio
- I-84 Peak Hour Volume

Future PM Peak Hour Traffic Operations
Exit 207 Concept #1B with Accessory #2
Pendleton, OR

Figure
5

Concept #3

Concept #3 modified the westbound off-ramp, relocates Airport Road, and creates a backage road for accesses to properties along the north side of US 30. No changes are made to the operational characteristics of the ramp terminals under this concept.

Lane configurations and traffic control for Concept #3 study intersections are shown in Figure 6. The estimated year 2040 traffic volumes and operations for Concept #3 are shown in Figure 7 and Figure 8 for the AM and PM peak hours, respectively. Given these lane configurations and traffic control, all study intersections in Concept #3 meet their mobility targets and operate at LOS 'C' or better in the AM and PM peak hours.[1]

The US 30 / Airport Road intersection is approaching the mobility target during the PM peak hour under stop-controlled conditions and the intersection is forecast to meet planning-level signal warrants. Concept #3 includes construction of a traffic signal at this intersection to accommodate an anticipated future need and minimize disruption to traffic by consolidating reconstruction activities.

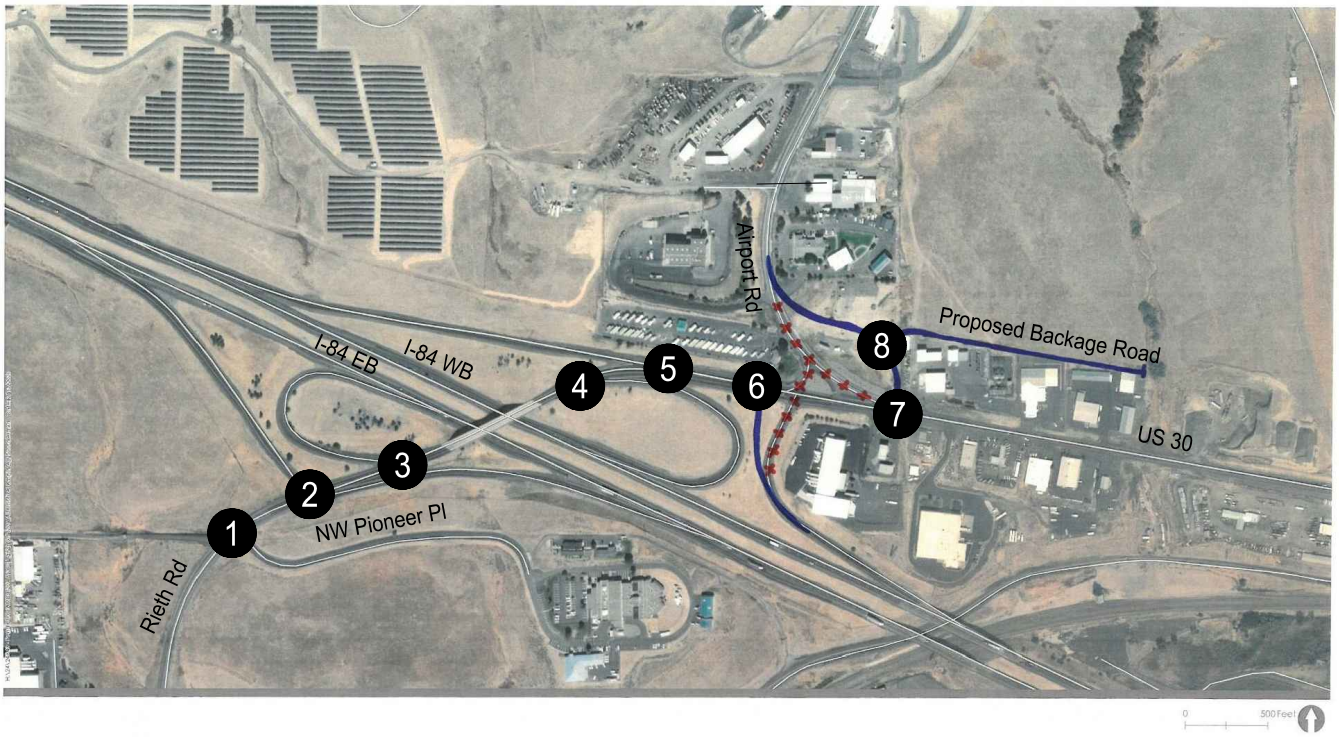
Bicycle and Pedestrian Considerations

Both concepts will provide spot improvements for walking and biking. All new roads and intersections would be built with appropriate facilities for people biking and people walking. Neither concept reconstructs the entire interchange, which limits their ability to address the larger deficiencies in the area. Implementing the biking and walking projects from the City's Transportation System Plan, including the connection from Pioneer Place to US 30 via Murietta Road, would best improve walking and biking in this area. The Active Transportation & Transit Plan (Reference 7) includes three projects in the vicinity of the study area. The impact, if any, that the concepts will have on these projects is described in Table 3.

Table 3: Impacts to Projects Identified in the Pendleton Active Transportation & Transit Plan

TSP Project	Description	Concept Impact
P1/B23	Add a dedicated walking/biking pathway to the Old Airport Road Alignment	No direct impacts
P37/B22	Install either a multi-use pathway along the north side of US 30 or improve the highway to accommodate sidewalks and bike lanes	This project could be partially built out or right-of-way preserved, particularly at the intersections, with either concept
P38	Install sidewalks or a multi-use pathway on the south side of Murrietta Road.	The proposed concepts do not directly affect this project

[1]The critical southbound Airport Road approach to the US 30/Airport Road intersection is projected to operate at a v/c of 0.83 and LOS 'E' during the PM peak hour under stop-controlled conditions. As shown in Attachment "B", this intersection meets ODOT's planning-level signal warrants. Under signalized conditions, the intersection is forecast to operate at a v/c of 0.65 and LOS 'B' during the PM hour.



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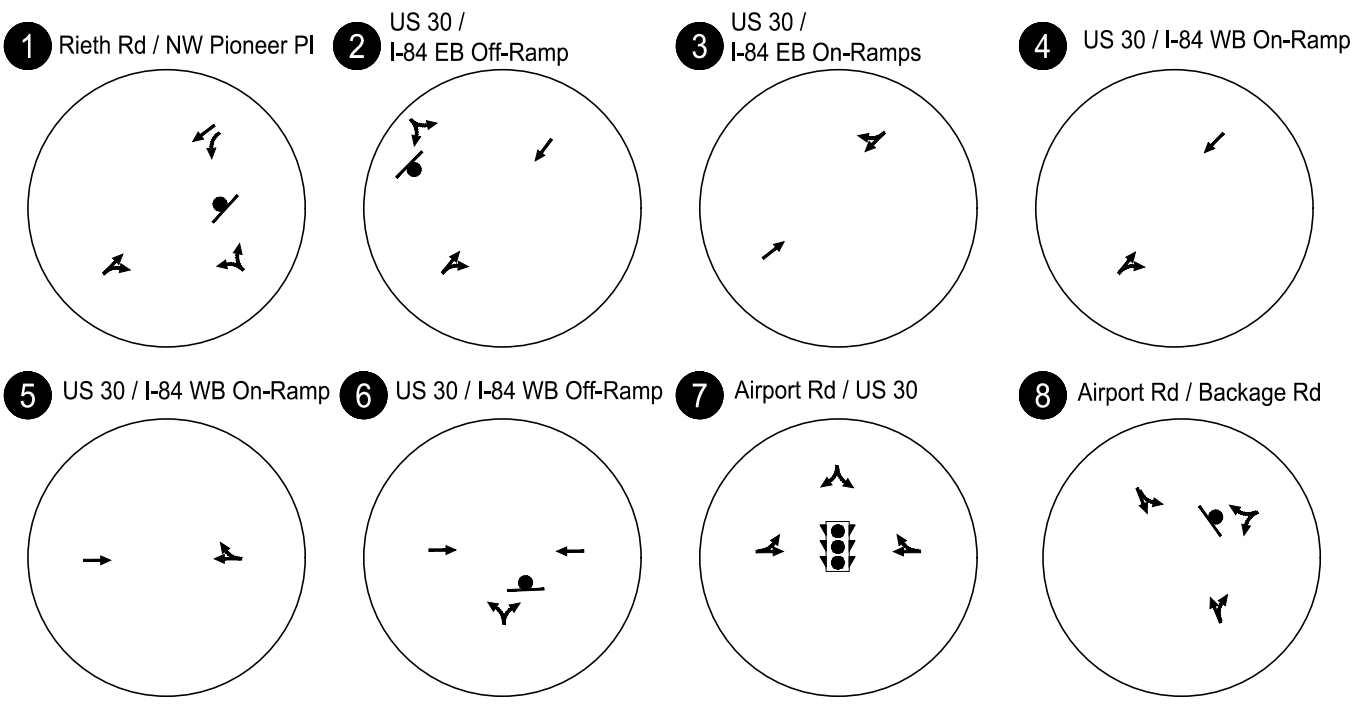
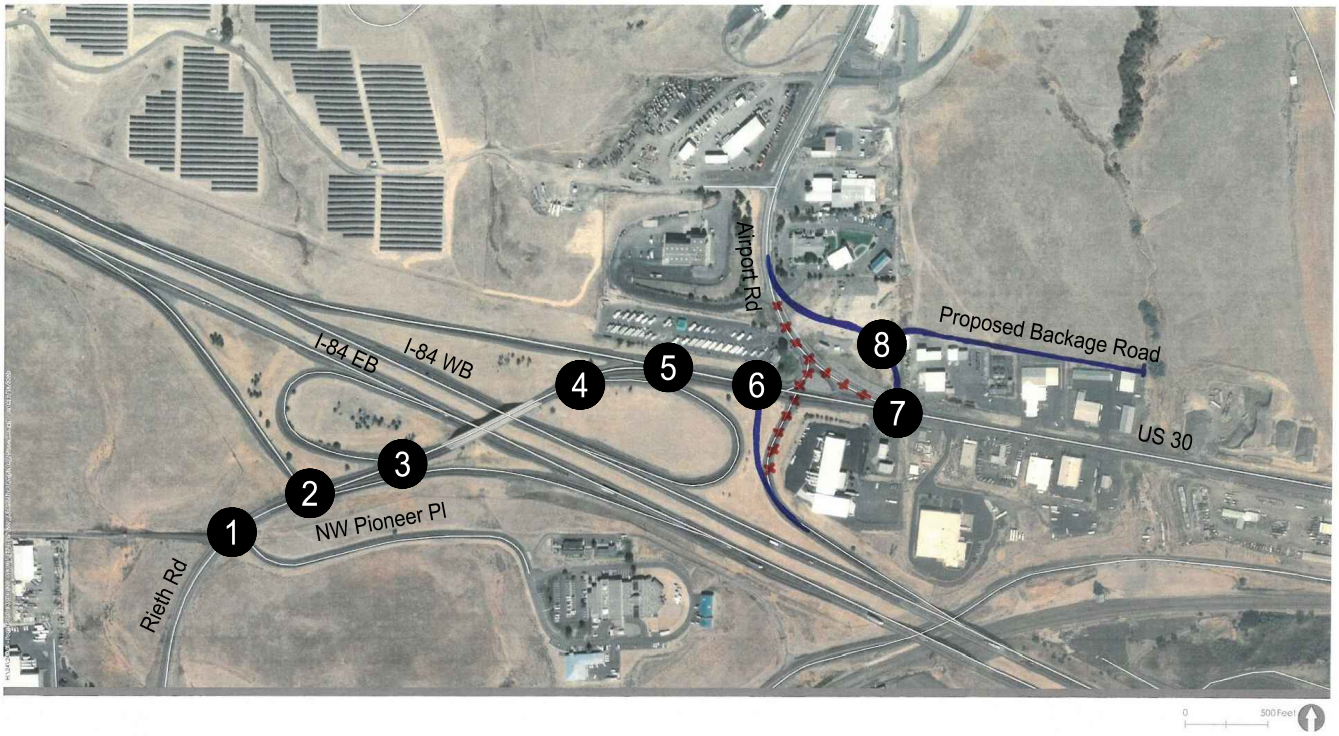


LEGEND

- # - Study Intersections
- - Signal
- - Stop Sign
- - Lane Movement

Concept #3 Lane Configurations
Exit 207
Pendleton, OR

Figure 6



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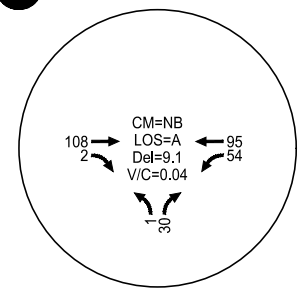
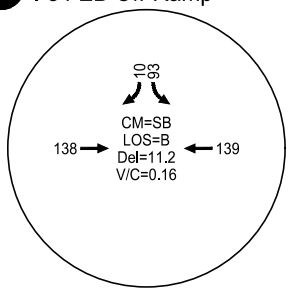
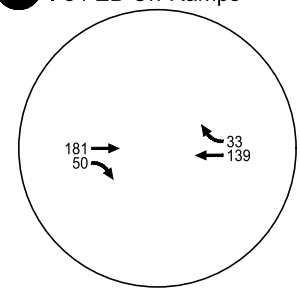
1 Rieth Rd / NW Pioneer Pl



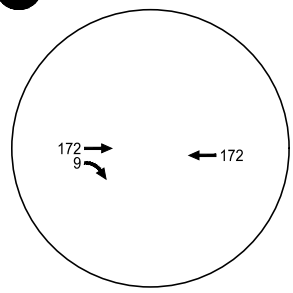
2 US 30 / I-84 EB Off-Ramp



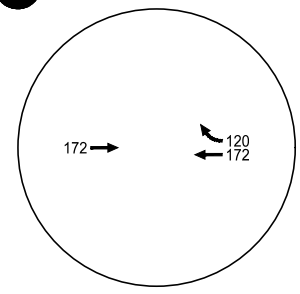
3 US 30 / I-84 EB On-Ramps



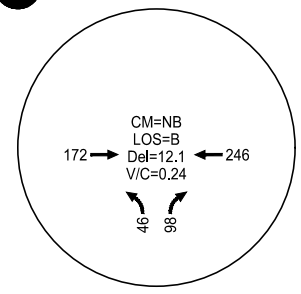
4 US 30 / I-84 WB On-Ramp



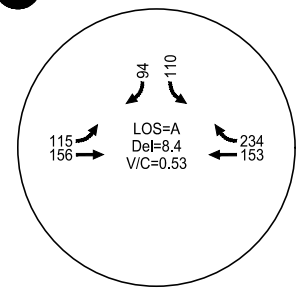
5 US 30 / I-84 WB On-Ramp



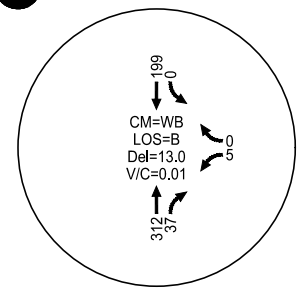
6 US 30 / I-84 WB Off-Ramp



7 Airport Rd / US 30



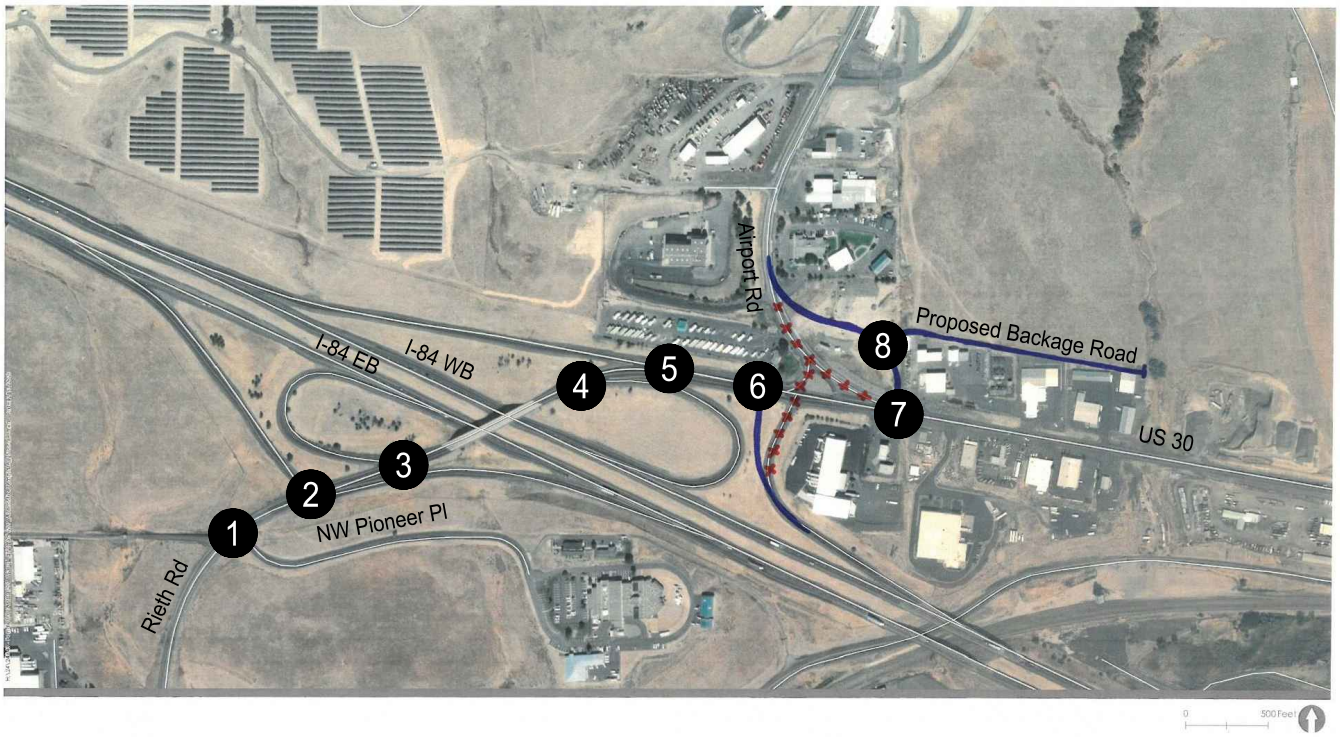
8 Airport Rd / Backage Rd



- Study Intersections
CM - Critical Movement
LOS - Level of Service
Del - Vehicle Delay (s)
V/C - Volume-To-Capacity Ratio
- I-84 Peak Hour Volume

Future AM Peak Hour Traffic Operations
Exit 207 Concept #3
Pendleton, OR

Figure
7



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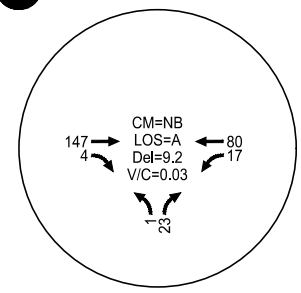
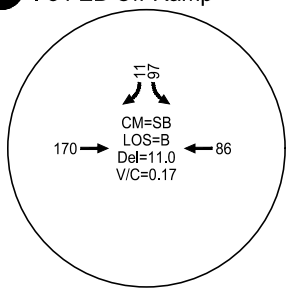
1 Rieth Rd / NW Pioneer Pl



2 US 30 / I-84 EB Off-Ramp



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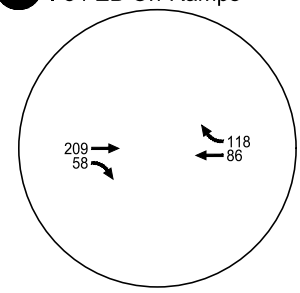

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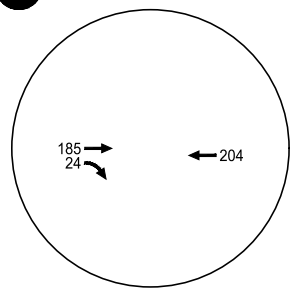

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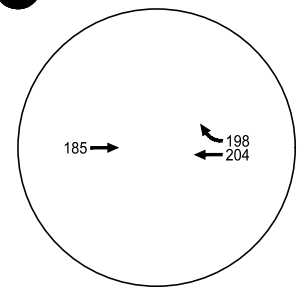

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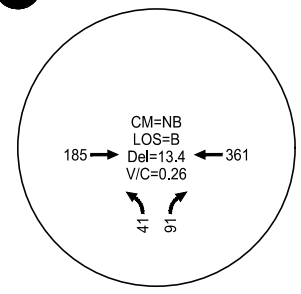
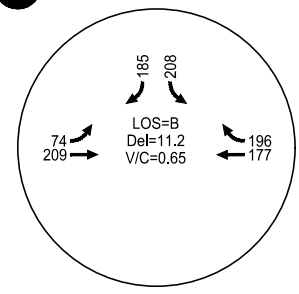


7 Airport Rd / US 30



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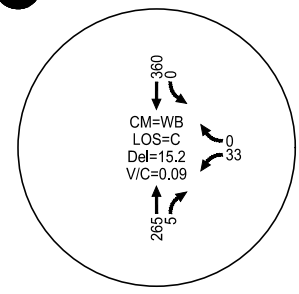

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V/C - Volume-To-Capacity Ratio
- I-84 Peak Hour Volume

Future PM Peak Hour Traffic Operations
Exit 207 Concept #3
Pendleton, OR

Figure
8

Future Safety Effects

The crash histories at the study intersections and along the study area roadways were reviewed in the *Existing Conditions: Transportation System Operations* memorandum (Reference 4). This section identifies crash reduction factors (CRFs) for the roadway and intersection treatments proposed in the two select concepts. The CMFs are used to estimate the potential reduction in crashes that could occur with the implementation of the proposed concepts.

Table 4 shows the countermeasures considered in developing the CRF for each scenario.

Table 4 Crash Modification Factors

Scenario	Countermeasures Considered	Crash Reduction Factor (CRF)	Appropriate Intersections/Segments
Concept #1B with Accessory #2	Convert interchange ramp terminal to roundabout[1]	24% (All Crashes)	• US 30 / I-84 WB On-Ramp
	Convert intersection with minor-road stop control to modern roundabout[2]	82% (Injury/Fatal Crashes)	• US 30 / I-84 WB Off-Ramp / Airport Road
	Change in driveway density[3]	16% (All Crashes)	• US 30
Concept #3	Convert four-leg intersection into two three-leg intersections[4]	33% (Injury/Fatal Crashes)	• US 30 / I-84 WB Off-Ramp / Airport Road
	Change in driveway density[3]	16% (All Crashes)	• US 30

[1] http://www.cmfclearinghouse.org/detail.cfm?facid=9445
[2] ODOT Crash Reduction Factor List H16
[3] Change in driveway density from 8 to 3 driveways in ¼ mile; http://www.cmfclearinghouse.org/detail.cfm?facid=2507
[4] ODOT Crash Reduction Factor List H23

Converting interchange ramp terminals and minor-road stop control intersections to roundabouts typically results in a decrease in overall crash frequency and severity. Relocating the north-side driveways along US 30 onto a backage road is expected to reduce the frequency of crashes along US 30.

As shown in Table 5, both concepts are expected to reduce crashes in the study. The adjusted crash reduction is slightly greater under Concept #1B with Accessory #2 than it is under Concept #3 when the CRFs from Table 4 are applied to the reported crashes for the most recent five year period for which data is available.

Table 5: Crash Reduction Assessment

Study Intersection or Segment	Observed Crashes/Year[1]	Adjusted Crashes/Year Under Concept #1B with Accessory #2	Adjusted Crashes/Year Under Concept #3
Reith Road / NW Pioneer Place	0.00	0.00[2]	0.00[2]
Rieth Road / I-84 EB Off-Ramp	0.20	0.20	0.20
US 30 / I-84 EB On-Ramp	0.00	0.00[2]	0.00[2]
US 30 / I-84 WB On-Ramp	0.00	0.00[2]	0.00[2]
US 30 / I-84 WB Off-Ramp / Airport Road	0.60	0.27	0.47
Airport Road / US 30	0.00	0.00[2]	0.00[2]
Rieth Road (within Operation and Access Study Area)	0.40	0.40	0.40
US 30 (within Operation and Access Study Area)	0.40	0.33	0.33
Total	1.**60**	**1.20**	**1.40**

[1]Observed crashes per year from 2013 to 2017.
[2]The number of crashes per year in the long-term is likely more than 0; however, no crashes were reported at this intersection from 2013 to 2017.

Cost Estimates

Planning-level cost estimates for Concept #1B (with Accessory #2) and Concept #3 are provided in Table 6. The concepts are expected to cost about the same amount at this stage of analysis. *The full planning level cost-estimates for each concept can be found in Attachment "C".*

Table 6: Cost Estimates

Concept	Total Estimated Project Cost
Concept #1B (with Accessory #2)	$4.7 - $5.2 Million
Concept #3	$4.8 – 5.3 Million

EVALUATION RESULTS

Table 7 summarizes the results of evaluating Concepts #1B and #3 against the evaluation criteria set forth in the *IAMP Definition and Background Memorandum* (Reference 2). These concepts were previously evaluated against these criteria at a high level as part of the screening evaluation summarized in Technical Memorandum #5a. This evaluation takes that screening one step further by refining the criteria and conducting a comparative analysis. Green shading indicates which concept performs best under that evaluation criteria. Orange shading indicates which concept performs worst under that evaluation criteria.

Table 7 Refined Concept Evaluation Results

Category	Evaluation Criteria	Concept Performance		Best Performing Concept
		Concept #1B with Accessory #2	Concept #3	
Transportation	Addresses the identified operational and safety concerns at the interchange: 1) Location of Airport Road across from I-84 WB off-ramp 2) Slide-offs along the I-84 WB off-ramp	The existing WB off ramp is relocated further to the west. This addresses the existing geometric slide-off deficiencies and eliminates the connection across from Airport Road.	The existing WB off ramp is relocated to the west (with minimal embankment to address slide-off deficiencies) and the Airport Road intersection is relocated to the east. These relocations eliminate the ramp terminal connection across from Airport Road. It does not provide the same level of separation as Concept #1B, though.	Concept #1B with Accessory #2
	Improves walking and biking access	Both concepts will provide spot improvements for walking and biking. However, neither concept reconstructs the entire interchange, which limits their ability to address the larger deficiencies in the area. Implementing the biking and walking projects from the City's Transportation System Plan, including the connection from Pioneer Place to US 30 via Murietta Road, would best improve walking and biking in this area.		*Both Concepts perform the same*
	Reduces crash potential	The estimated crash reduction is slightly greater with this concept and accessory than with Concept #3.	This concept is expected to reduce crashes, but not by as much as Concept #1B.	Concept #1B with Accessory #2
Land Use/ Economic Development	Accommodates future growth and minimizes right-of-way impacts	The backage road paralleling the north side of Highway 30 would require right-of-way acquisition. It is anticipated that the roundabouts could be constructed with minimal impacts to privately-owned right-of-way.	The backage road paralleling the north side of Highway 30 will require right-of-way acquisition. The Airport Road realignment can potentially be constructed through a public right-of-way	*Both Concepts perform the same*
Accessibility	Moves in the direction of ODOT access spacing requirements	This concept moves the WB ramp terminal further to the west, thereby increasing the spacing distance to Airport Road and other private accesses along Highway 30. The backage road along the north side of Highway 30 would further improve access management.	This concept moves the WB ramp terminal to the west, thereby increasing the spacing distance to Airport Road and other private accesses along Highway 30. The backage road along the north side of Highway 30 would further improve access management.	*Both Concepts perform the same*
Cost	Cost relative to other concepts	$4.7 – $5.2 Million	$4.8 – $5.3 Million	*Both Concepts perform about the same*
Implementation	Constructability	Construction of a roundabout at the WB ramp terminal would be difficult to implement while maintaining existing traffic flow. Likewise, the Airport Road connection to US 30 may need to be closed while the new intersection is constructed, which would require rerouting traffic to Barnhart Road.	The entire project could be constructed while maintaining existing traffic flow between I-84 and Airport Road. Some restrictions on Airport Road may be necessary to construct the new alignment.	Concept #3

Concept #1B slightly outperforms Concept #3 on more criteria. However, Concept #3 significantly outperforms Concept #1B with respect to the implementation criterion. Traffic flow would need to be significantly altered during the construction period for Concept #1B and traffic traveling to/from the airport area would need to travel out-of-direction through Barnhart Road. Concept #3 would have some impacts during its construction period, but traffic at the interchange could likely be mostly maintained during the construction period.

PRELIMINARY ACCESS MANAGEMENT PLAN

The project team has developed preliminary access management plans for the Operations and Access Study Area (OASA). The plan aims to move access locations in the OASA towards ODOT's access spacing standards through consolidation of driveways and relocation of public streets. Implementation of access management is anticipated to occur through the development and redevelopment of properties over time.

As Table 8 shows, there are 21 accesses within the OASA. Table 8 also summarizes the proposed access management plan for the Exit 207 OASA for accesses located within ODOT's ¼-mile spacing standard. Accesses shaded grey are located within ¼ mile of the interchange ramp terminals.

Table 8 Access Management Plan for Exit 207 Interchange

Access Number	Roadway	Approach Type	Side of Roadway	Access Width (ft)[1]	Proposed Access Management Plan Action Under Concept Alternatives
1	Rieth Rd	Private	West	52	No changes are proposed to accesses located outside of ODOT's ¼-mile spacing standard.
2	Rieth Rd	Private	East	400	
3	Rieth Rd	Private	West	72	
4	Rieth Rd	Private	West	20	
5	Rieth Rd	Public	East	90	
6	Rieth Rd	Private	East	45	
7	Rieth Rd	Private	East	45	
8	Rieth Rd	Public	West	47	Revisit access location and configuration when property redevelops.
9	Rieth Rd	Private	West	43	Revisit access location and configuration when property redevelops.
10	Rieth Rd	Public	East	35	Revisit access location and configuration when property redevelops.
11	US 30	Public	North	60	Both concepts relocate this access to a backage road
12	US 30	Public	North	240	Both concepts relocate this access to a backage road
13	US 30	Private	South	55	Consider consolidating accesses 13 and 14 as part of property redevelopment or through negotiation with the property owner.
14	US 30	Private	South	35	Consider consolidating accesses 13 and 14 as part of property redevelopment or through negotiation with the property owner.
15	US 30	Private	North	94	Both concepts relocate this access to a backage road
16	US 30	Private	South	900	Reduce access width to standards as part of property redevelopment or through negotiation with the property owner
17	US 30	Private	North	66	Both concepts relocate this access to a backage road
18	US 30	Private	North	37	Both concepts relocate this access to a backage road
19	US 30	Private	North	65	No changes are proposed to accesses located outside of ODOT's ¼-mile spacing standard.
20	US 30	Private	South	900	
21	US 30	Public	North	54	

NEXT STEPS

Based on the TAC and CAC meetings conducted on June 10, the preferred concept is Concept #1B paired with Accessory #2, pending further investigation of the feasibility of the roundabout at US 30/Airport Road. If the roundabout at this intersection is determined to be infeasible or too costly, it would be replaced with the Airport Road/US 30 intersection treatments and backage road from Concept #3. The results of this investigation will be reflected in Technical Memorandum #6 in July.

REFERENCES

1. Kittelson and Associates, Inc. *Pendleton IAMPs: Methodology Memorandum.* 2019.
2. Kittelson and Associates, Inc. *Pendleton IAMPs: Exit 207 – IAMP Definition and Background. 2019*.
3. Kittelson and Associates, Inc. *Pendleton IAMPs: Exit 207 – Existing Conditions: System Inventory.* 2019.
4. Kittelson and Associates, Inc. *Pendleton IAMPs: Exit 207 – Existing Conditions: Transportation System Operations.* 2019.
5. Kittelson and Associates, Inc. *Pendleton IAMPs: Exit 207 – Future Baseline Conditions: Transportation System Operations.* 2020.
6. Oregon Department of Transportation. *Analysis Procedures Manual – Version 2*. 2019.
7. City of Pendleton*. City of Pendleton Active Transportation & Transit Plan*. June 2016.

8. U.S. Department of Transportation Federal Highway Administration. *Crash Modification Factors Clearinghouse*. Publication Date Varies by Countermeasure.

ATTACHMENTS

A. Technical Memorandum #5A – Concepts Evaluation and Screening
B. Intersection Operations Worksheets and Signal Warrants
C. Planning Level Cost Estimates

Attachment A

Technical Memorandum #5A – Concepts Evaluation and Screening

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TECHNICAL MEMORANDUM #5a

Pendleton IAMPs: Exit 207 & Exit 210

Concepts Evaluation and Screening

Date:	April 27, 2020	Project #: 24043
To:	Technical Advisory Committee, Citizen Advisory Committee	
From:	Nick Foster, AICP, and Matt Hughart, AICP; Kittelson & Associates, Inc.	

This memorandum documents the development and evaluation of interchange, access, and local circulation concepts for the I-84 Exits 207 and 210 Interchange Area Management Plans (IAMPs). It includes a summary of the concept development process, qualitative evaluations of each concept, a summary of public feedback from an on-line feedback tool, and a consultant team recommendation for which concepts will be evaluated at a more detailed level.

DRAFT CONCEPTS

Concept Development Process

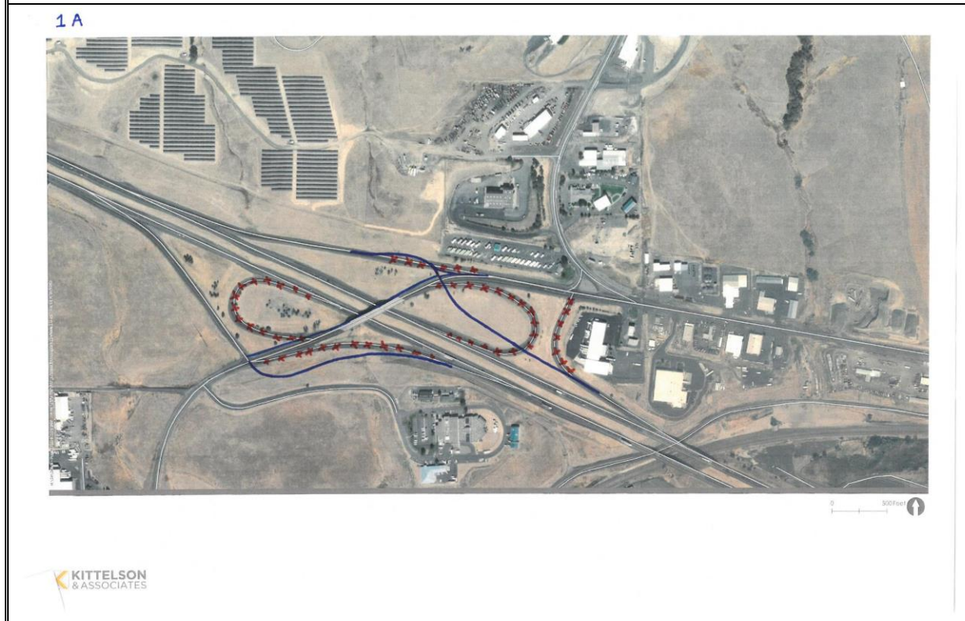
The concepts considered in this memorandum were initially developed by members of the project team, the TAC Committee, and CAC Committee at the January 29, 2020 project meeting to address known geometric and anticipated future traffic conditions. Following this initial work session, the project consultant team took the various circulation improvement ideas and distilled them into a set of unique/representative concepts. For each concept, the subsequent tables provide the following:

- A graphical illustration that conveys the basic components of the concept in a quick single-line sketch overlaid on an aerial photograph.
- A short narrative summarizing the main components of the concept.
- A high-level screening evaluation using the project evaluation criteria.
- A summary of committee and public comments received as part of the two-week virtual open house.
- Based on all the information listed above and following discussions with the City and ODOT, whether or not the concept will move forward in the more detailed alternatives evaluation.

Section 1 Exit 207 Concepts

Table 1 – Concept 1A

Exit 207 – Concept 1A	Evaluation Information				Evaluation Results	
Concept Description and Illustration	**Category**	**Evaluation Criteria**	**Scoring Key**		**Score**	**Comments**
This concept converts the existing interchange to a diamond interchange and widens the existing overpass structure to add-in a left-turn lane. This redesign would provide a simpler interchange form. Realigning the I-84 Westbound off-ramp will reduce the potential for slide-offs during the winter and improve access spacing to Airport Road and private accesses along US 30, thereby reducing conflicts in the interchange area. Removing the free-right-turns will also reduce conflicts for people walking through the area.	Transportation	Addresses the identified operational and safety concerns at the interchange: 1) Location of Airport Road across from I-84 WB off-ramp 2) Slide-offs along the I-84 WB off-ramp"	+1	Addresses both identified concerns	**+1**	**The existing WB off ramp is relocated further to the west. This addresses the existing geometric slide-off deficiencies and eliminates the connection across from Airport Road.**
			0	Addresses only one identified concern		
			-1	Does not address concerns and/or introduces new concerns		
		Improves walking and biking access	+1	Improves walking and biking in the study area for both ramps	**+1**	**This concept eliminates the free-flowing right-turn movements at the ramp terminals, improving pedestrian comfort and visibility. A widened overpass would allow for the construction of new sidewalks.**
			0	Improves walking and biking in the study area for one ramp		
			-1	Does not improve walking or biking in the study area		
	Land Use/ Economic Development	Accommodates future growth and minimizes right-of-way impacts	+1	Alternative provides for long-term growth in the study area with minimal ROW impacts	**+1**	**The diamond interchange and associated widening of the overpass structure can accommodate long-term growth. The right-of-way impacts to private property are expected to be minimal.**
			-1	Alternative precludes long-term growth or has significant ROW impacts		
	Accessibility	Moves in the direction of ODOT access spacing requirements	+1	Moves in the direction of ODOT's access spacing guidelines	**+1**	**This alternative moves the WB ramp terminal further to the west, thereby increasing the spacing distance to Airport Road and other private accesses along Highway 30.**
			-1	Does not move in the direction of ODOT's access spacing guidelines		
	Cost	Cost relative to other concepts	+1	Low construction costs		
			0	Moderate construction costs		
			-1	Substantial construction costs	**-1**	**The costs associated with widening the overpass and modifying the ramp terminals would be substantial.**
	Implementation	Constructability	+1	Project can be constructed with relative ease and/or can maintain existing traffic during construction.		
			-1	Construction of improvements will be a physical challenge and/or will require major detours during construction.	**-1**	**The existing overpass likely cannot be widened based on its current form. A separate parallel structure would need to be constructed in order to accommodate the extra width for a center turn lane.**
					2	

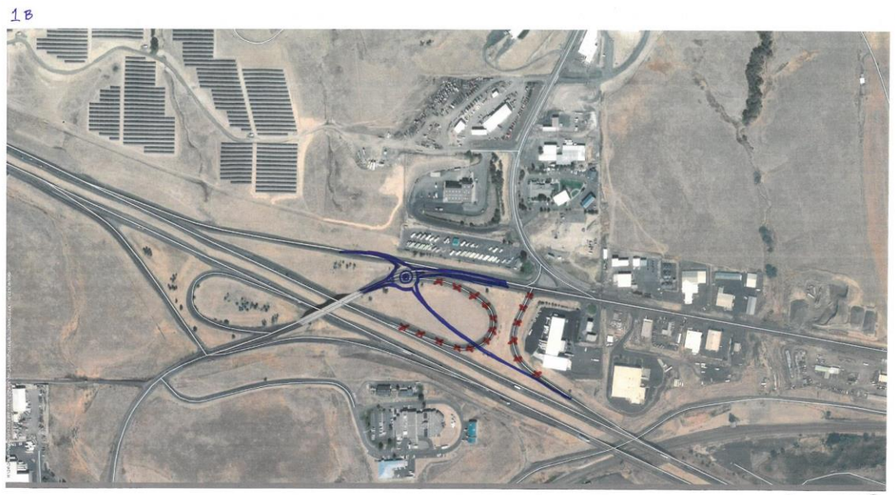


On-line Public Feedback & Miscellaneous Evaluation Comments
General support for the diamond reconfiguration for its simplicity and addressing identified safety concerns
Some concern about cost of structure modifications and whether all of this is necessary
Need to verify adequate acceleration/deceleration is provided on the ramps
Why modify the EB ramp configurations? They are adequately addressing existing interchange volumes

Next Steps	Justification
Do not move forward for further evaluation.	While this concept scored well on the whole, it is a major reconstruction of the entire interchange. There is not enough evidence that the EB ramp terminals need to be completely modified.

Table 2 – Concept 1B

Exit 207 – Concept 1B	Evaluation Information				Evaluation Results	
Concept Description and Illustration	**Category**	**Evaluation Criteria**	**Scoring Key**		**Score**	**Comments**
This concept converts the westbound ramps to a diamond interchange with a roundabout. Realigning the I-84 Westbound off-ramp will reduce the potential for slide-offs during the winter and improve access spacing to Airport Road and private accesses along US 30, thereby reducing conflicts in the interchange area. Removing the free-right-turns will also reduce conflicts for people walking through the area.	Transportation	Addresses the identified operational and safety concerns at the interchange: 1) Location of Airport Road across from I-84 WB off-ramp 2) Slide-offs along the I-84 WB off-ramp"	+1	Addresses both identified concerns	**+1**	**The existing WB off ramp is relocated further to the west. This addresses the existing geometric slide-off deficiencies and eliminates the connection across from Airport Road.**
			0	Addresses only one identified concern		
			-1	Does not address concerns and/or introduces new concerns		
		Improves walking and biking access	+1	Improves walking and biking in the study area for both ramps		
			0	Improves walking and biking in the study area for one ramp	**0**	**A roundabout at the WB ramp terminal could provide modern pedestrian and bicycle accommodations. No modifications are proposed for the EB ramp terminal where free flowing right-turns would still exist.**
			-1	Does not improve walking or biking in the study area		
	Land Use/ Economic Development	Accommodates future growth and minimizes right-of-way impacts	+1	Alternative provides for long-term growth in the study area with minimal ROW impacts	**+1**	**It is anticipated that the roundabout could be constructed with minimal impacts to privately-owned right-of-way.**
			-1	Alternative precludes long-term growth or has significant ROW impacts		
	Accessibility	Moves in the direction of ODOT access spacing requirements	+1	Moves in the direction of ODOT's access spacing guidelines	**+1**	**This alternative moves the WB ramp terminal further to the west, thereby increasing the spacing distance to Airport Road and other private accesses along Highway 30.**
			-1	Does not move in the direction of ODOT's access spacing guidelines		
	Cost	Cost relative to other concepts	+1	Low construction costs		
			0	Moderate construction costs	**0**	**As this option maintains the current overpass and does not modify the EB portion of the interchange. The costs of a roundabout at the WB ramp terminal would be significant. Compared to Concept 1A, the overall cost would be lower.**
			-1	Substantial construction costs		
	Implementation	Constructability	+1	Project can be constructed with relative ease and/or can maintain existing traffic during construction.		
			-1	Construction of improvements will be a physical challenge and/or will require major detours during construction.	**-1**	**Construction of a roundabout at the WB ramp terminal would be difficult to implement while maintaining existing traffic flow.**
					2	

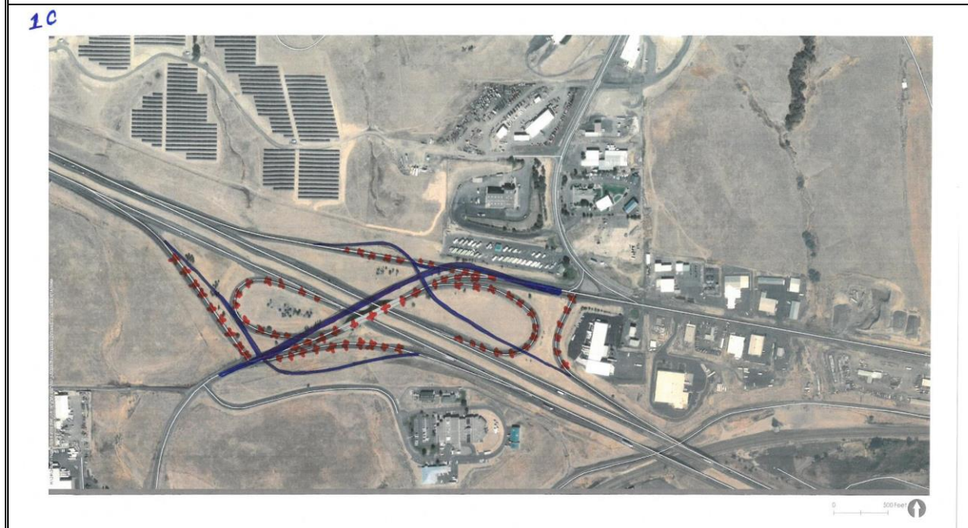


On-line Public Feedback & Miscellaneous Evaluation Comments
Some people opposed to roundabouts (in general, not just at this location)
How does the interchange maintain traffic volumes during roundabout construction?
Can the roundabout be replaced with a more traditional intersection?

Next Steps	Justification
Move forward for further evaluation	Concept scored well. Generally supported by survey respondents. Concept better addresses known geometric issues and does not involve an unnecessary rebuild of the entire interchange.

Table 3 – Concept 1C

Exit 207 – Concept 1C	Evaluation Information				Evaluation Results	
Concept Description and Illustration	**Category**	**Evaluation Criteria**	**Scoring Key**		**Score**	**Comments**
This concept constructs a new diamond interchange and a new overpass structure. This redesign would provide a simpler interchange form. Realigning the I-84 Westbound off-ramp will reduce the potential for slide-offs during the winter and improve access spacing to Airport Road and private accesses along US 30, thereby reducing conflicts in the interchange area. Removing the free-right-turns will also reduce conflicts for people walking through the area.	Transportation	Addresses the identified operational and safety concerns at the interchange: 1) Location of Airport Road across from I-84 WB off-ramp 2) Slide-offs along the I-84 WB off-ramp"	+1	Addresses both identified concerns	**+1**	**The existing WB off ramp is relocated further to the west. This addresses the existing geometric slide-off deficiencies and eliminates the connection across from Airport Road.**
			0	Addresses only one identified concern		
			-1	Does not address concerns and/or introduces new concerns		
		Improves walking and biking access	+1	Improves walking and biking in the study area for both ramps	**+1**	**Like Concept #1A, this design eliminates the free-flowing right-turn movements at the ramp terminals, improving pedestrian comfort and visibility.**
			0	Improves walking and biking in the study area for one ramp		
			-1	Does not improve walking or biking in the study area		
	Land Use/ Economic Development	Accommodates future growth and minimizes right-of-way impacts	+1	Alternative provides for long-term growth in the study area with minimal ROW impacts	**+1**	**The diamond interchange and new overpass can accommodate long-term growth. The right-of-way impacts to private property are expected to be minimal.**
			-1	Alternative precludes long-term growth or has significant ROW impacts		
	Accessibility	Moves in the direction of ODOT access spacing requirements	+1	Moves in the direction of ODOT's access spacing guidelines	**+1**	**This alternative moves the WB ramp terminal further to the west, thereby increasing the spacing distance to Airport Road and other private accesses along Highway 30.**
			-1	Does not move in the direction of ODOT's access spacing guidelines		
	Cost	Cost relative to other concepts	+1	Low construction costs		
			0	Moderate construction costs		
			-1	Substantial construction costs	**-1**	**This option and the new parallel overpass is expected to have substantial construction costs.**
	Implementation	Constructability	+1	Project can be constructed with relative ease and/or can maintain existing traffic during construction.		
			-1	Construction of improvements will be a physical challenge and/or will require major detours during construction.	**-1**	**A new interchange overpass and new diamond ramps would be extremely difficult to construct while maintaining existing traffic flow through the interchange.**
					2	



On-line Public Feedback & Miscellaneous Evaluation Comments	
Similar comments as at 1A	
Next Steps	**Justification**
Do not move forward for further evaluation.	Similar to 1A. Involves a complete rebuild of a functioning interchange.

Table 4 – Concept 2

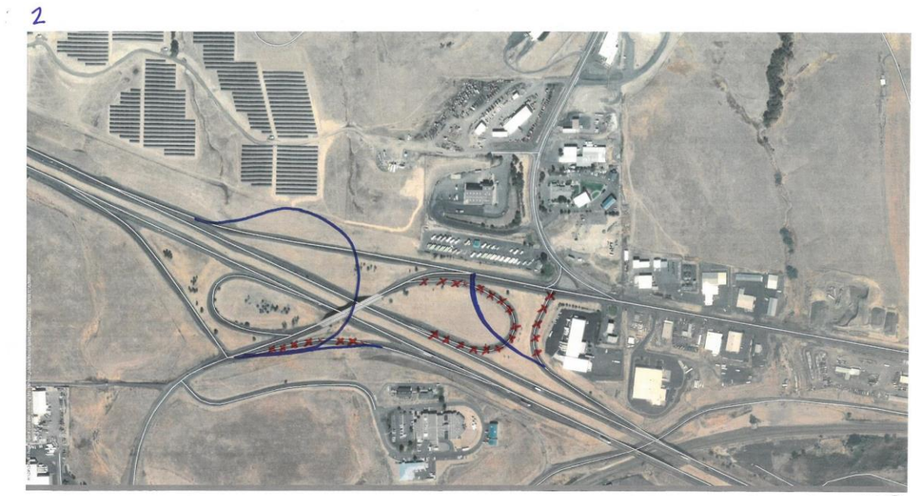
Exit 207 – Concept 2	Evaluation Information				Evaluation Results	
Concept Description and Illustration	**Category**	**Evaluation Criteria**	**Scoring Key**		**Score**	**Comments**
This concept constructs a flyover ramp and modifies the westbound ramps. Realigning the I-84 Westbound off-ramp will reduce the potential for slide-offs during the winter and improve access spacing to Airport Road and private accesses along US 30, thereby reducing conflicts in the interchange area. Removing the free-right-turns will also reduce conflicts for people walking through the area.	Transportation	Addresses the identified operational and safety concerns at the interchange: 1) Location of Airport Road across from I-84 WB off-ramp 2) Slide-offs along the I-84 WB off-ramp"	+1	Addresses both identified concerns	**+1**	**The existing WB off ramp is relocated further to the west. This addresses the existing geometric slide-off deficiencies and eliminates the connection across from Airport Road.**
			0	Addresses only one identified concern		
			-1	Does not address concerns and/or introduces new concerns		
		Improves walking and biking access	+1	Improves walking and biking in the study area for both ramps		
			0	Improves walking and biking in the study area for one ramp		
			-1	Does not improve walking or biking in the study area	**-1**	**There are minimal improvements to the walking or biking environment.**
	Land Use/ Economic Development	Accommodates future growth and minimizes right-of-way impacts	+1	Alternative provides for long-term growth in the study area with minimal ROW impacts	**+1**	**The fly-over is anticipated to provide for long-term growth in the study area. The right-of-way impacts to private property are expected to be minimal.**
			-1	Alternative precludes long-term growth or has significant ROW impacts		
	Accessibility	Moves in the direction of ODOT access spacing requirements	+1	Moves in the direction of ODOT's access spacing guidelines	**+1**	**This alternative moves the WB ramp terminal further to the west, thereby increasing the spacing distance to Airport Road and other private accesses along Highway 30. Compared to the other evaluated concepts, this improved access spacing is not as significant.**
			-1	Does not move in the direction of ODOT's access spacing guidelines		
	Cost	Cost relative to other concepts	+1	Low construction costs		
			0	Moderate construction costs		
			-1	Substantial construction costs	**-1**	**The construction of a fly-over ramp is anticipated to have substantial construction costs. Further, the eastbound left-turn volumes do not warrant such a massive and costly structure.**
	Implementation	Constructability	+1	Project can be constructed with relative ease and/or can maintain existing traffic during construction.		
			-1	Construction of improvements will be a physical challenge and/or will require major detours during construction.	**-1**	**The construction of a fly-over ramp will be an engineering challenge while maintaining existing traffic flow.**
					0	
On-line Public Feedback & Miscellaneous Evaluation Comments						
Like the relocation of the WB off-ramp.						
Concern about the cost of the concept, especially relative to others and whether the flyover may result in wintertime slide issues.						
Next Steps	**Justification**					
Do not move forward for further evaluation.	Flyover ramp is not necessary nor proportionate to the interchange volumes.					

Table 5 – Concept 3

Exit 207 – Concept 3	Evaluation Information				Evaluation Results	
Concept Description and Illustration	**Category**	**Evaluation Criteria**	**Scoring Key**		**Score**	**Comments**
This concept provides minimal changes to the interchange. It realigns the I-84 Westbound off-ramp to reduce the potential for slide-offs during the winter and improve access spacing to Airport Road and private accesses along US 30, thereby reducing conflicts in the interchange area. It also realigns Airport Road to provide more spacing between Airport Road and the I-84 Westbound off-ramp. It creates a new access road behind businesses along the northside of US 30 (Westgate) so that they can take access from that road instead of US 30; thereby reducing the number of accesses within ¼-mile of the I-84 interchange.	Transportation	Addresses the identified operational and safety concerns at the interchange: 1) Location of Airport Road across from I-84 WB off-ramp 2) Slide-offs along the I-84 WB off-ramp"	+1	Addresses both identified concerns	**+1**	**The existing WB off ramp is relocated slightly to the west and the Airport Road intersection is relocated slightly to the east. This addresses the existing geometric slide-off deficiencies and eliminates the connection across from Airport Road.**
			0	Addresses only one identified concern		
			-1	Does not address concerns and/or introduces new concerns		
		Improves walking and biking access	+1	Improves walking and biking in the study area for both ramps		
			0	Improves walking and biking in the study area for one ramp		
			-1	Does not improve walking or biking in the study area	**-1**	**Compared to Concepts #1A-#1C, this concept does not improve walking or biking conditions in the vicinity of the existing interchange ramps.**
	Land Use/ Economic Development	Accommodates future growth and minimizes right-of-way impacts	+1	Alternative provides for long-term growth in the study area with minimal ROW impacts		
			-1	Alternative precludes long-term growth or has significant ROW impacts	**-1**	**The backage road paralleling the north side of Highway 30 will require right-of-way acquisition. The Airport Road realignment may impact the OSP crime lab and/or the parking area.**
	Accessibility	Moves in the direction of ODOT access spacing requirements	+1	Moves in the direction of ODOT's access spacing guidelines	**+1**	**This alternative moves the WB ramp terminal slightly to the west, thereby increasing the spacing distance to Airport Road and other private accesses along Highway 30. The backage road along the north side of Highway 30 would further improve access management.**
			-1	Does not move in the direction of ODOT's access spacing guidelines		
	Cost	Cost relative to other concepts	+1	Low construction costs	**+1**	**In comparison to other concepts, this option is less expensive.**
			0	Moderate construction costs		
			-1	Substantial construction costs		
	Implementation	Constructability	+1	Project can be constructed with relative ease and/or can maintain existing traffic during construction.	**+1**	**The entire project could be constructed while maintaining existing traffic flow between I-84 and Airport Road.**
			-1	Construction of improvements will be a physical challenge and/or will require major detours during construction.		
					2	

On-line Public Feedback & Miscellaneous Evaluation Comments
Like the simplicity and that this may be the lowest cost option.
New WB off-ramp should be designed to alleviate slide-off/winter start-up issues.
Sight distance will need to be re-evaluated from the new WB off-ramp with respect to the curve to the west on US 30.
Eliminates a local street across from the WB off-ramp, but creates one additional intersection in closer proximity to WB on ramp.

Next Steps	Justification
Move forward for further evaluation	Potentially the least costly option while addressing the primary issues at the interchange.

Table 6 – Concept Accessory Elements

Exit 207 – Concept Accessory #1	Evaluation Results	
Concept Description and Illustration		**Comments**
This accessory creates new access roads on the north and south sides of US 30 (Westgate) so that businesses can take access from these roads instead of US 30; thereby reducing the number of accesses within ¼-mile of the I-84 interchange. This accessory can be paired with concepts 1A, 1B, 1C, and 2. The frontage road elements can be paired with Concept 3.	Positives:	This accessory moves the Airport Road intersection away from the I-84 WB off-ramp. The new frontage and backage roads on Highway 30 will significantly improve access management within the vicinity of the WB off-ramp.
	Negatives:	This option requires a fairly significant amount of right of way acquisition. It would increase the travel distance between Airport Road and I-84. This may be an important concern for the Pendleton Police Department and OSP offices. New backage road would need to cross a fairly sizable ravine.
		
On-line Public Feedback & Miscellaneous Evaluation Comments		
Like that it provides access to businesses away from the interchange relocates the Airport Road access.		
Concern about business access, cost, and ability to construct given the topography and land-use.		
Next Steps		
Do not move forward for further evaluation.	Cost and implementation challenges.	

Table 7 – Concept Accessory Elements

Exit 207 – Concept Accessory #2	Evaluation Results	
Concept Description and Illustration		**Comments**
This accessory creates a roundabout intersection with four legs: Airport Road, US 30 (Westgate), and a new access road behind the businesses on the north side of US 30. This accessory can be paired with concepts 1A, 1B, 1C, and 2. It improves access spacing by moving access to the northern businesses to the new access road.	Positives:	A new roundabout at Airport Road would result in a fully complete and modernized pedestrian and bicycle network. The roundabout could be constructed with minimal impacts to private right-of-way. The backage road along the north side of Highway 30 improves access management.
	Negatives:	The backage road requires right of way acquisition. Construction of a roundabout would require significant grading. A roundabout would be difficult to construct while maintaining existing traffic flow along Airport Road.
		
On-line Public Feedback & Miscellaneous Evaluation Comments		
Like that it relocates access and moves the Airport Road intersection. Roundabout may be in public ROW already.		
Concern about business access, cost, and ability to construct given the topography and land-use.		
Some opposed to roundabouts (in general, not just at this location)		
Next Steps		
Move forward for further evaluation, as an accessory to Concept 1B.	Improves access spacing	

Section 2 Exit 210 Concepts

Table 8 – Concept 1

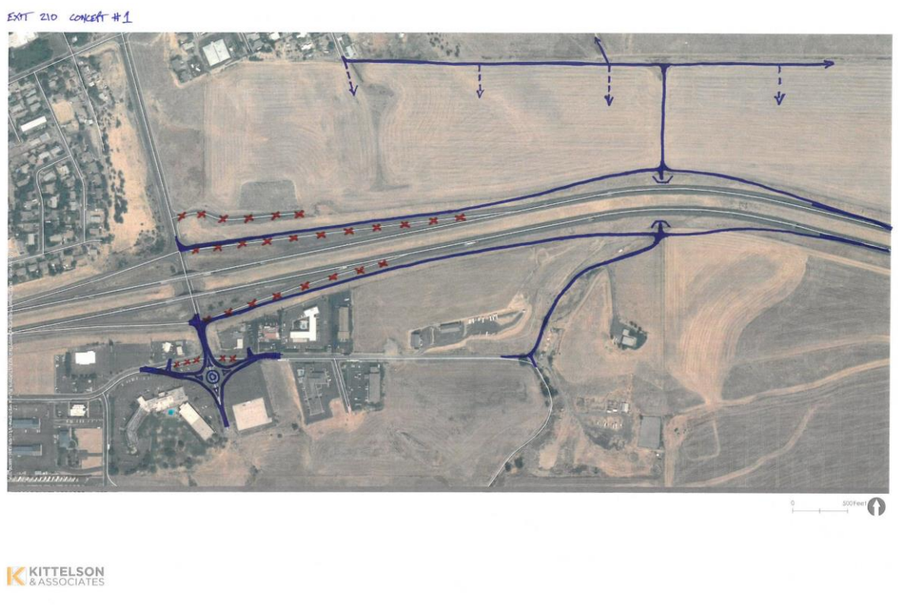
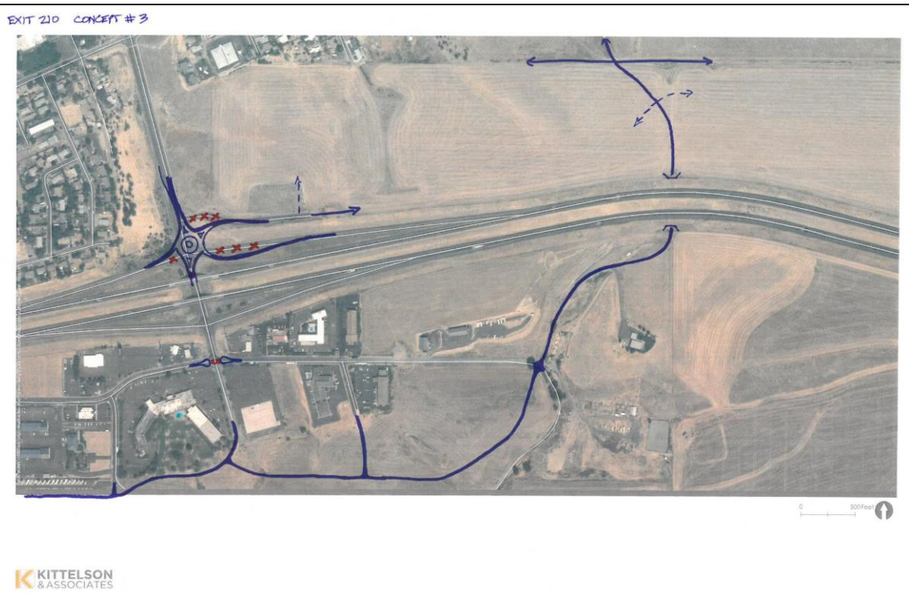
Exit 210 – Concept 1	Evaluation Information				Evaluation Results	
Concept Description and Illustration	**Category**	**Evaluation Criteria**	**Scoring Key**		**Score**	**Comments**
This concept converts the existing interchange to a split diamond interchange in which the westbound off-ramp and the eastbound on-ramp would be further to the east (where Old Dump Road is). This would allow development and existing neighborhoods north of I-84 to take access from a new road connecting to the new on/off ramps. It also closes off Kirk Avenue, eliminating the close spacing from the westbound ramp terminal. This concept relocates Nye Avenue further away from the eastbound ramp terminal and uses a roundabout to improve circulation. These adjustments improve access spacing thereby reducing potential conflicts and improving the capacity of the roadways.	Transportation	Addresses the limited intersection spacing between the WB ramp terminal and Kirk Avenue.	+1	Moves in the direction of ODOT's access spacing guidelines	**+1**	**This concept closes off Kirk Avenue, eliminating the close spacing from the WB ramp terminal.**
			-1	Does not move in the direction of ODOT's access spacing guidelines		
		Addresses the limited intersection spacing between the WB ramp terminal and Kirk Avenue.	+1	Moves in the direction of ODOT's access spacing guidelines	**+1**	**This concept relocates Nye Avenue further away from the EB ramp terminal and utilizes a roundabout intersection form to improve circulation efficiency**
			-1	Does not move in the direction of ODOT's access spacing guidelines		
	Land Use/ Economic Development	Accommodates future growth and minimizes right-of-way impacts	+1	Alternative provides for long-term growth in the study area with minimal ROW impacts		
			-1	Alternative precludes long-term growth or has significant ROW impacts	**-1**	**There would be ROW impacts associated with a new interchange at Old Dump Road. The new circulation network serving the northeast quadrant would require ROW, but most of these impacts would affect currently undeveloped property. Some infrastructure would be located outside the current Pendleton UGB.**
	Accessibility	Moves in the direction of ODOT access spacing requirements	+1	Provides direct and efficient access to properties in the northeast quadrant of the interchange.	**+1**	**The new split diamond interchange at Old Dump Road would provide direct access to the northeast quadrant of the interchange.**
			-1	Provides indirect or inefficient access to properties in the northeast quadrant of the interchange.		
	Cost	Cost relative to other concepts	+1	Low construction costs		
			0	Moderate construction costs		
			-1	Substantial construction costs	**-1**	**A new interchange underpass at Old Dump Road and the associated frontage roads would have substantial construction costs.**
	Implementation	Constructability	+1	Project can be constructed with relative ease and/or can maintain existing traffic during construction.		
			-1	Construction of improvements will be a physical challenge and/or will require major detours during construction.	**-1**	**While the majority of the split diamond interchange could be constructed while maintaining existing traffic, the scale of the project is comparatively large with many unknown complexities.**
					0	
On-line Public Feedback & Miscellaneous Evaluation Comments						
Like that it opens up access to property north of the interchange and provides a different access to the properties on the south side.						
Concern about roundabouts (in general, not just here) and about closing Kirk Avenue.						
Concern that access to north side from the north would be confusing/out-of-direction for potential customers.						
Next Steps	**Justification**					
Move forward for further evaluation.	Third highest score. Supported by survey respondents.					

Table 9 – Concept 2

Exit 210 – Concept 2	Evaluation Information				Evaluation Results	
Concept Description and Illustration	**Category**	**Evaluation Criteria**	**Scoring Key**		**Score**	**Comments**
This concept converts the existing interchange to a split diamond interchange in which the westbound off-ramp and the eastbound on-ramp would be further to the east (where Goad Road is). This would allow development and existing neighborhoods north of I-84 to take access from a new road connecting to the new on/off ramps. It closes off Kirk Avenue, eliminating the close spacing from the westbound ramp terminal. It also relocates Nye Avenue further away from the eastbound ramp terminal and uses a roundabout to improve circulation. These adjustments improve access spacing thereby reducing potential conflicts and improving the capacity of the roadways.	Transportation	Addresses the limited intersection spacing between the WB ramp terminal and Kirk Avenue.	+1	Moves in the direction of ODOT's access spacing guidelines	**+1**	**This concept closes off Kirk Avenue, eliminating the close spacing from the WB ramp terminal.**
			-1	Does not move in the direction of ODOT's access spacing guidelines		
		Addresses the limited intersection spacing between the WB ramp terminal and Kirk Avenue.	+1	Moves in the direction of ODOT's access spacing guidelines	**+1**	**This concept relocates Nye Avenue further away from the EB ramp terminal and utilizes a roundabout intersection form to improve circulation efficiency**
			-1	Does not move in the direction of ODOT's access spacing guidelines		
	Land Use/ Economic Development	Accommodates future growth and minimizes right-of-way impacts	+1	Alternative provides for long-term growth in the study area with minimal ROW impacts		
			-1	Alternative precludes long-term growth or has significant ROW impacts	**-1**	**There would be ROW impacts associated with a new interchange at Goad Road. All of this infrastructure would be located outside of the Pendleton UGB. The new circulation network serving the northeast quadrant would require ROW, but most of these impacts would affect currently undeveloped property.**
	Accessibility	Moves in the direction of ODOT access spacing requirements	+1	Provides direct and efficient access to properties in the northeast quadrant of the interchange.	**+1**	**The new split diamond interchange at Goad Road would provide direct access to the northeast quadrant of the interchange.**
			-1	Provides indirect or inefficient access to properties in the northeast quadrant of the interchange.		
	Cost	Cost relative to other concepts	+1	Low construction costs		
			0	Moderate construction costs		
			-1	Substantial construction costs	**-1**	**A new interchange at Goad Road and the associated frontage roads would have substantial construction costs.**
	Implementation	Constructability	+1	Project can be constructed with relative ease and/or can maintain existing traffic during construction.		
			-1	Construction of improvements will be a physical challenge and/or will require major detours during construction.	**-1**	**While the majority of the split diamond interchange could be constructed while maintaining existing traffic, the scale of the project is comparatively large with many unknown complexities.**
					0	
On-line Public Feedback & Miscellaneous Evaluation Comments						
Similar comments as to #1.						
FHWA not likely to approve due to proximity of Exit 211.						
Next Steps	**Justification**					
Do not move forward for further evaluation.	Interchange spacing and length of frontage roads are not likely to be approved by FHWA					

Table 10 – Concept 3

Exit 210 – Concept 3	Evaluation Information				Evaluation Results	
Concept Description and Illustration	**Category**	**Evaluation Criteria**	**Scoring Key**		**Score**	**Comments**
This concept creates a five-legged roundabout at the westbound ramp terminal. The roundabout would provide direct access to the northeast quadrant of the interchange via Kirk Avenue. The concept also creates a new south side access road, which allows for removing the intersection of 3rd Drive & Nye Avenue. This reduces conflicts in the study area. It also adds an underpass of I-84 via an extension of Old Dump Road to provide more connections to existing neighborhoods and future development and more evenly distribute traffic.	Transportation	Addresses the limited intersection spacing between the WB ramp terminal and Kirk Avenue.	+1	Moves in the direction of ODOT's access spacing guidelines		
			-1	Does not move in the direction of ODOT's access spacing guidelines	**-1**	**The incorporation of Kirk Ave into the WB ramp terminal is questionable from FHWA policy on interchange ramp design with local streets.**
		Addresses the limited intersection spacing between the WB ramp terminal and Kirk Avenue.	+1	Moves in the direction of ODOT's access spacing guidelines	**1**	**This concept closes off Nye Avenue and incorporates a new southside backage road.**
			-1	Does not move in the direction of ODOT's access spacing guidelines		
	Land Use/ Economic Development	Accommodates future growth and minimizes right-of-way impacts	+1	Alternative provides for long-term growth in the study area with minimal ROW impacts		
			-1	Alternative precludes long-term growth or has significant ROW impacts	**-1**	**A southside backage road would have significant ROW impacts. A new Old Dump Road underpass and associated access roads would also have significant ROW impacts, but would improve north-south connectivity.**
	Accessibility	Moves in the direction of ODOT access spacing requirements	+1	Provides direct and efficient access to properties in the northeast quadrant of the interchange.	**1**	**A five legged roundabout would provide direct access to the northeast quadrant of the interchange.**
			-1	Provides indirect or inefficient access to properties in the northeast quadrant of the interchange.		
	Cost	Cost relative to other concepts	+1	Low construction costs		
			0	Moderate construction costs		
			-1	Substantial construction costs	**-1**	**A roundabout at the WB ramp terminal and the southside backage road would have significant construction costs.**
	Implementation	Constructability	+1	Project can be constructed with relative ease and/or can maintain existing traffic during construction.		
			-1	Construction of improvements will be a physical challenge and/or will require major detours during construction.	**-1**	**There a significant grade challenges associated with a southside backage road. Grades are likely to steep at the WB ramp terminal for a roundabout.**
					-2	



On-line Public Feedback & Miscellaneous Evaluation Comments	
Like the access to the north side properties and the simplicity of the north side solution.	
South side roads may not be feasible. Opposition to closing Nye.	
Next Steps	**Justification**
Do not move forward for further evaluation.	Roundabout constructability challenges and south side roads are not feasible from a grade/topography standpoint. Low score.

Table 11 – Concept 4

Exit 210 – Concept 4	Evaluation Information				Evaluation Results	
Concept Description and Illustration	**Category**	**Evaluation Criteria**	**Scoring Key**		**Score**	**Comments**
This concept modifies the Kirk Avenue/OR-11 intersection so that it is only a right-in/right-out access. This minimizes the operational issues created by the close spacing to the I-84 Westbound off-ramp. The concept also relocates Nye Avenue further away from the eastbound ramp terminal and uses a roundabout to improve circulation. It also adds an underpass of I-84 via an extension of Old Dump Road to provide more connections to existing neighborhoods and future development and more evenly distribute traffic.	Transportation	Addresses the limited intersection spacing between the WB ramp terminal and Kirk Avenue.	+1	Moves in the direction of ODOT's access spacing guidelines	**+1**	**A Kirk Avenue right-in/right-out access off OR 11 would minimize the operational issues associated with the WB ramp terminal.**
			-1	Does not move in the direction of ODOT's access spacing guidelines		
		Addresses the limited intersection spacing between the WB ramp terminal and Kirk Avenue.	+1	Moves in the direction of ODOT's access spacing guidelines	**+1**	**This concept relocates Nye Avenue further away from the EB ramp terminal and utilizes a roundabout intersection form to improve circulation efficiency.**
			-1	Does not move in the direction of ODOT's access spacing guidelines		
	Land Use/ Economic Development	Accommodates future growth and minimizes right-of-way impacts	+1	Alternative provides for long-term growth in the study area with minimal ROW impacts		
			-1	Alternative precludes long-term growth or has significant ROW impacts	**-1**	**The Nye Avenue roundabout would require right-of-way from the Red Lion Hotel. The Old Dump Road access would have right-of-way impacts.**
	Accessibility	Moves in the direction of ODOT access spacing requirements	+1	Provides direct and efficient access to properties in the northeast quadrant of the interchange.		
			-1	Provides indirect or inefficient access to properties in the northeast quadrant of the interchange.	**-1**	**A right-in/right-out access at Kirk Avenue would limit return access to I-84 and other regional destinations.**
	Cost	Cost relative to other concepts	+1	Low construction costs		
			0	Moderate construction costs	**0**	**Compared to other concepts, costs would be more moderate.**
			-1	Substantial construction costs		
	Implementation	Constructability	+1	Project can be constructed with relative ease and/or can maintain existing traffic during construction.	**+1**	**All improvements could be constructed while maintaining existing traffic flow.**
			-1	Construction of improvements will be a physical challenge and/or will require major detours during construction.		
					+1	
On-line Public Feedback & Miscellaneous Evaluation Comments						
Like the simplicity and the use of Kirk Avenue.						
Concern about Kirk being restricted to Right-in/right-out. General roundabout concerns.						
Concerns about property impacts of relocating Nye/3rd intersection.						
Next Steps	**Justification**					
Do not move forward for further evaluation.	Right-in/right-out access only to Kirk Avenue is not an ideal long-term solution.					

Table 12 – Concept 5

Exit 210 – Concept 5	Evaluation Information				Evaluation Results	
Concept Description and Illustration	**Category**	**Evaluation Criteria**	**Scoring Key**		**Score**	**Comments**
This concept realigns the intersection of Kirk Avenue/OR-11 to the north to improve spacing between it and the I-84 Westbound ramp terminal. The concept also relocates the intersection of Nye Avenue/3rd Avenue further from the eastbound ramp terminal. These adjustments improve access spacing thereby reducing potential conflicts and improving the capacity of the roadways.	Transportation	Addresses the limited intersection spacing between the WB ramp terminal and Kirk Avenue.	+1	Moves in the direction of ODOT's access spacing guidelines	**+1**	**A realigned Kirk Avenue 700 feet to the north along OR 11 would eliminate the operational issues associated with the WB ramp terminal.**
			-1	Does not move in the direction of ODOT's access spacing guidelines		
		Addresses the limited intersection spacing between the WB ramp terminal and Kirk Avenue.	+1	Moves in the direction of ODOT's access spacing guidelines	**+1**	**This concept relocates Nye Avenue further away from the EB ramp terminal.**
			-1	Does not move in the direction of ODOT's access spacing guidelines		
	Land Use/ Economic Development	Accommodates future growth and minimizes right-of-way impacts	+1	Alternative provides for long-term growth in the study area with minimal ROW impacts	**+1**	**Realignment of Nye Avenue would have adjacent right-of-way impacts, but significantly less compared to other concepts.**
			-1	Alternative precludes long-term growth or has significant ROW impacts		
	Accessibility	Moves in the direction of ODOT access spacing requirements	+1	Provides direct and efficient access to properties in the northeast quadrant of the interchange.	**+1**	**While slightly relocated to the north, Kirk Avenue would be a full access intersection with OR 11 and provide efficient access back to the I-84 corridor.**
			-1	Provides indirect or inefficient access to properties in the northeast quadrant of the interchange.		
	Cost	Cost relative to other concepts	+1	Low construction costs	**+1**	**Kirk Avenue realignment would be costly, but the overall costs are low compared to other concepts.**
			0	Moderate construction costs		
			-1	Substantial construction costs		
	Implementation	Constructability	+1	Project can be constructed with relative ease and/or can maintain existing traffic during construction.		
			-1	Construction of improvements will be a physical challenge and/or will require major detours during construction.	**-1**	**The Kirk Avenue realignment would require significant regrading and large retaining walls against the adjacent steep hillside.**
					+4	
On-line Public Feedback & Miscellaneous Evaluation Comments						
Like the simplicity and that Kirk Avenue provides full access.						
Questions about whether extending Kirk in this way is really feasible given topography and basalt layers.						
Concerns about property impacts of relocating Nye/3rd intersection.						
Next Steps	**Justification**					
Move forward for further evaluation (including with one version that keeps the current Kirk Avenue as a right-in access, too).	Highest scoring concept. Provides intuitive access to north side.					

Table 13 – Concept 6

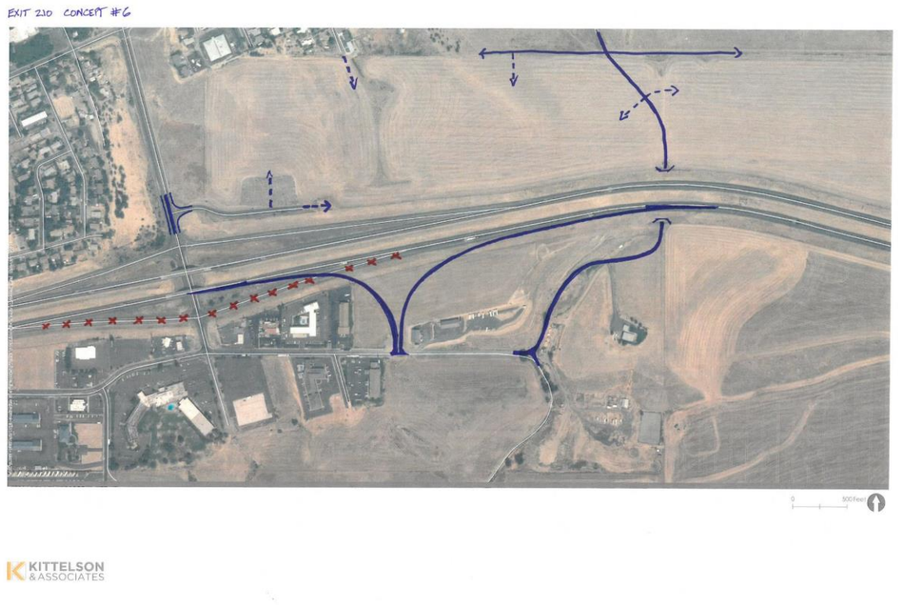
Exit 210 – Concept 6	Evaluation Information				Evaluation Results	
Concept Description and Illustration	**Category**	**Evaluation Criteria**	**Scoring Key**		**Score**	**Comments**
This concept relocates the eastbound ramps, which would eliminate the existing close spacing between Nye Avenue and eastbound ramps. It also modifies the Kirk Avenue/OR-11 access to only permit right-in and right-out access. These adjustments reduce potential vehicle conflicts. It also adds an underpass of I-84 via an extension of Old Dump Road to provide more connections to existing neighborhoods and future development and more evenly distribute traffic.	Transportation	Addresses the limited intersection spacing between the WB ramp terminal and Kirk Avenue.	+1	Moves in the direction of ODOT's access spacing guidelines	**+1**	**A Kirk Avenue right-in/right-out access off OR 11 would minimize the operational issues associated with the WB ramp terminal.**
			-1	Does not move in the direction of ODOT's access spacing guidelines		
		Addresses the limited intersection spacing between the WB ramp terminal and Kirk Avenue.	+1	Moves in the direction of ODOT's access spacing guidelines	**+1**	**The new buttonhook ramp design at Nye Avenue would eliminate the existing close spacing between Nye Avenue and EB ramp terminal.**
			-1	Does not move in the direction of ODOT's access spacing guidelines		
	Land Use/ Economic Development	Accommodates future growth and minimizes right-of-way impacts	+1	Alternative provides for long-term growth in the study area with minimal ROW impacts		
			-1	Alternative precludes long-term growth or has significant ROW impacts	**-1**	**The new buttonhook ramp design and Old Dump Road underpass would have significant ROW impacts.**
	Accessibility	Moves in the direction of ODOT access spacing requirements	+1	Provides direct and efficient access to properties in the northeast quadrant of the interchange.		
			-1	Provides indirect or inefficient access to properties in the northeast quadrant of the interchange.	**-1**	**Access to the northeast quadrant is indirect and inefficient.**
	Cost	Cost relative to other concepts	+1	Low construction costs		
			0	Moderate construction costs		
			-1	Substantial construction costs	**-1**	**Buttonhook ramps and Old Dump Road underpass would have significant construction costs.**
	Implementation	Constructability	+1	Project can be constructed with relative ease and/or can maintain existing traffic during construction.		
			-1	Construction of improvements will be a physical challenge and/or will require major detours during construction.	**-1**	**Button hook ramp design would likely require widening of the I-5 bridge structure over OR 11. The buttonhook design would introduce a significant speed curve on the offramp which would be a challenge to incorporate a design that is adequate for inclement weather conditions.**
					-2	
On-line Public Feedback & Miscellaneous Evaluation Comments						
Like the relocation of the eastbound interchange. Concern that this could create new access challenges, though.						
Relocated interchange uses up developable land.						
Similar feedback as before about Kirk Avenue being used, but as a right-in/right-out access.						
Preliminary Consultant Team Recommendation	**Justification**					
Do not move forward for further evaluation.	Interchange relocation impacts to private property and may transfer access challenges to a new location.					

Table 14 – Concept 7

Exit 210 – Concept 7	Evaluation Information				Evaluation Results	
Concept Description and Illustration	**Category**	**Evaluation Criteria**	**Scoring Key**		**Score**	**Comments**
This option creates roundabouts at the I-84 ramp terminals and at Nye Avenue. This would help reduce some of the concerns about having intersections closely spaced to the I-84 ramps by reducing potential conflicts and improving the capacity of the roadways.	Transportation	Addresses the limited intersection spacing between the WB ramp terminal and Kirk Avenue.	+1	Moves in the direction of ODOT's access spacing guidelines		
			-1	Does not move in the direction of ODOT's access spacing guidelines	**-1**	**The incorporation of Kirk Ave into the WB ramp terminal is questionable from FHWA policy on interchange ramp design with local streets.**
		Addresses the limited intersection spacing between the WB ramp terminal and Kirk Avenue.	+1	Moves in the direction of ODOT's access spacing guidelines	**+1**	**Roundabouts at the EB ramp terminal and Nye Avenue would introduce a constant flowing interchange minimizing the concerns associated with closely spaced ramps/intersections.**
			-1	Does not move in the direction of ODOT's access spacing guidelines		
	Land Use/ Economic Development	Accommodates future growth and minimizes right-of-way impacts	+1	Alternative provides for long-term growth in the study area with minimal ROW impacts	**+1**	**Realignment of Nye Avenue would have adjacent right-of-way impacts, but significantly less compared to other concepts. ROW impacts at the other roundabouts would not impact high-value portions of private property.**
			-1	Alternative precludes long-term growth or has significant ROW impacts		
	Accessibility	Moves in the direction of ODOT access spacing requirements	+1	Provides direct and efficient access to properties in the northeast quadrant of the interchange.	**+1**	**A five-legged roundabout would provide direct access to the northeast quadrant of the interchange.**
			-1	Provides indirect or inefficient access to properties in the northeast quadrant of the interchange.		
	Cost	Cost relative to other concepts	+1	Low construction costs		
			0	Moderate construction costs		
			-1	Substantial construction costs	**-1**	**All three roundabouts would have significant construction costs.**
	Implementation	Constructability	+1	Project can be constructed with relative ease and/or can maintain existing traffic during construction.		
			-1	Construction of improvements will be a physical challenge and/or will require major detours during construction.	**-1**	**Grades are likely to steep at the EB and WB ramp terminals for a roundabout. It would be difficult to maintain existing traffic flow on OR 11 and the interchange during construction.**
					0	

On-line Public Feedback & Miscellaneous Evaluation Comments
Like the simplicity and potential cost, relative to other concepts.
Topography may make this unrealistic.
General roundabout concerns.

Preliminary Consultant Team Recommendation	Justification
Do not move forward for further evaluation.	Roundabouts at the EB and WB ramp terminals are likely not feasible due to significant downslope of OR 11

NEXT STEPS

The project team will perform more detailed analyses of the following concepts:

Exit 207

- Concept 1B, w/ Accessory #2
- Concept 3

Exit 210

- Concept 1
- Concept 5 (as shown)
- Concept 5B (with right-in access at Kirk)

The results of this evaluation will be presented to the project advisory committees and the general public at upcoming virtual meetings and used to select the preferred alternative at each location.

Attachment B

Intersection Operations
Worksheets and Signal Warrants

Intersection	
Int Delay, s/veh	2.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	108	2	54	95	1	30
Future Vol, veh/h	108	2	54	95	1	30
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	5	-	-	-5	-3	-
Peak Hour Factor	86	86	86	86	86	86
Heavy Vehicles, %	42	0	0	35	0	0
Mvmt Flow	126	2	63	110	1	35

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	128	0	363	127
Stage 1	-	-	-	-	127	-
Stage 2	-	-	-	-	236	-
Critical Hdwy	-	-	4.1	-	5.8	5.9
Critical Hdwy Stg 1	-	-	-	-	4.8	-
Critical Hdwy Stg 2	-	-	-	-	4.8	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1470	-	680	938
Stage 1	-	-	-	-	923	-
Stage 2	-	-	-	-	840	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1470	-	651	938
Mov Cap-2 Maneuver	-	-	-	-	651	-
Stage 1	-	-	-	-	923	-
Stage 2	-	-	-	-	804	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.7	9.1
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	925	-	-	1470	-
HCM Lane V/C Ratio	0.039	-	-	0.043	-
HCM Control Delay (s)	9.1	-	-	7.6	-
HCM Lane LOS	A	-	-	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0.1	-

Intersection	
Int Delay, s/veh	3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑		↱	
Traffic Vol, veh/h	0	138	139	0	93	10
Future Vol, veh/h	0	138	139	0	93	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	4	-3	-	-2	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	2	31	19	2	24	8
Mvmt Flow	0	147	148	0	99	11

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	295	148
Stage 1	-	-	-	-	148	-
Stage 2	-	-	-	-	147	-
Critical Hdwy	-	-	-	-	6.24	6.08
Critical Hdwy Stg 1	-	-	-	-	5.24	-
Critical Hdwy Stg 2	-	-	-	-	5.24	-
Follow-up Hdwy	-	-	-	-	3.716	3.372
Pot Cap-1 Maneuver	0	-	-	0	674	890
Stage 1	0	-	-	0	842	-
Stage 2	0	-	-	0	843	-
Platoon blocked, %		-	-			
Mov Cap-1 Maneuver	-	-	-	-	674	890
Mov Cap-2 Maneuver	-	-	-	-	674	-
Stage 1	-	-	-	-	842	-
Stage 2	-	-	-	-	843	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	11.2
HCM LOS			B

Minor Lane/Major Mvmt	EBT	WBT	SBLn1
Capacity (veh/h)	-	-	690
HCM Lane V/C Ratio	-	-	0.159
HCM Control Delay (s)	-	-	11.2
HCM Lane LOS	-	-	B
HCM 95th %tile Q(veh)	-	-	0.6

Intersection	
Int Delay, s/veh	1.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	147	4	17	80	1	23
Future Vol, veh/h	147	4	17	80	1	23
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	5	-	-	-5	-3	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	7	0	0	17	0	0
Mvmt Flow	162	4	19	88	1	25

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	166	0	290	164
Stage 1	-	-	-	-	164	-
Stage 2	-	-	-	-	126	-
Critical Hdwy	-	-	4.1	-	5.8	5.9
Critical Hdwy Stg 1	-	-	-	-	4.8	-
Critical Hdwy Stg 2	-	-	-	-	4.8	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1424	-	740	898
Stage 1	-	-	-	-	894	-
Stage 2	-	-	-	-	924	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1424	-	730	898
Mov Cap-2 Maneuver	-	-	-	-	730	-
Stage 1	-	-	-	-	894	-
Stage 2	-	-	-	-	912	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.3	9.2
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	889	-	-	1424	-
HCM Lane V/C Ratio	0.03	-	-	0.013	-
HCM Control Delay (s)	9.2	-	-	7.6	-
HCM Lane LOS	A	-	-	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Intersection	
Int Delay, s/veh	3.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑		↱	
Traffic Vol, veh/h	0	170	86	0	97	11
Future Vol, veh/h	0	170	86	0	97	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	4	-3	-	-2	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	11	13	0	13	25
Mvmt Flow	0	189	96	0	108	12

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	285	96
Stage 1	-	-	-	-	96	-
Stage 2	-	-	-	-	189	-
Critical Hdwy	-	-	-	-	6.13	6.25
Critical Hdwy Stg 1	-	-	-	-	5.13	-
Critical Hdwy Stg 2	-	-	-	-	5.13	-
Follow-up Hdwy	-	-	-	-	3.617	3.525
Pot Cap-1 Maneuver	0	-	-	0	705	906
Stage 1	0	-	-	0	911	-
Stage 2	0	-	-	0	835	-
Platoon blocked, %		-	-			
Mov Cap-1 Maneuver	-	-	-	-	705	906
Mov Cap-2 Maneuver	-	-	-	-	705	-
Stage 1	-	-	-	-	911	-
Stage 2	-	-	-	-	835	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	11
HCM LOS			B

Minor Lane/Major Mvmt	EBT	WBT	SBLn1
Capacity (veh/h)	-	-	721
HCM Lane V/C Ratio	-	-	0.166
HCM Control Delay (s)	-	-	11
HCM Lane LOS	-	-	B
HCM 95th %tile Q(veh)	-	-	0.6

MOVEMENT SUMMARY

Site: 102 [US-30/I-84 Roundabout]

207 Concept 1B Accesssory 2 AM
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed mph
South: I-84												
3	L2	49	17.0	0.162	5.5	LOS A	0.7	18.0	0.40	0.28	0.40	33.7
8	T1	1	0.0	0.162	4.9	LOS A	0.7	18.0	0.40	0.28	0.40	34.1
18	R2	104	11.0	0.162	5.3	LOS A	0.7	18.0	0.40	0.28	0.40	32.9
Approach		154	12.8	0.162	5.3	LOS A	0.7	18.0	0.40	0.28	0.40	33.2
East: US-30												
6	T1	134	24.0	0.262	6.1	LOS A	1.0	32.1	0.22	0.10	0.22	34.2
16	R2	128	33.0	0.262	6.3	LOS A	1.0	32.1	0.22	0.10	0.22	32.9
Approach		262	28.4	0.262	6.2	LOS A	1.0	32.1	0.22	0.10	0.22	33.5
West: US-30												
5	L2	10	43.0	0.178	5.3	LOS A	0.0	0.0	0.00	0.00	0.00	36.5
2	T1	183	27.0	0.178	4.9	LOS A	0.0	0.0	0.00	0.00	0.00	37.6
Approach		193	27.8	0.178	4.9	LOS A	0.0	0.0	0.00	0.00	0.00	37.5
All Vehicles		609	24.3	0.262	5.6	LOS A	1.0	32.1	0.20	0.11	0.20	34.6

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 102 [US-30/I-84 Roundabout]

207 Concept 1B Accesssory 2 PM
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed mph
South: I-84												
3	L2	46	3.0	0.158	5.0	LOS A	0.6	17.4	0.41	0.29	0.41	34.0
8	T1	1	0.0	0.158	4.9	LOS A	0.6	17.4	0.41	0.29	0.41	34.0
18	R2	101	18.0	0.158	5.5	LOS A	0.6	17.4	0.41	0.29	0.41	32.6
Approach		148	13.2	0.158	5.4	LOS A	0.6	17.4	0.41	0.29	0.41	33.1
East: US-30												
6	T1	181	9.0	0.345	6.4	LOS A	1.8	49.6	0.27	0.13	0.27	34.3
16	R2	220	10.0	0.345	6.5	LOS A	1.8	49.6	0.27	0.13	0.27	33.2
Approach		401	9.5	0.345	6.5	LOS A	1.8	49.6	0.27	0.13	0.27	33.7
West: US-30												
5	L2	27	20.0	0.189	4.8	LOS A	0.0	0.0	0.00	0.00	0.00	37.2
2	T1	206	11.0	0.189	4.5	LOS A	0.0	0.0	0.00	0.00	0.00	37.7
Approach		232	12.0	0.189	4.5	LOS A	0.0	0.0	0.00	0.00	0.00	37.6
All Vehicles		781	11.0	0.345	5.7	LOS A	1.8	49.6	0.22	0.12	0.22	34.7

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [US-30/Airport Road Roundabout]

207 Concept 1B Accessory 2 AM
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed mph
South: US 30												
3	L2	104	13.0	0.280	6.1	LOS A	1.3	35.6	0.33	0.19	0.33	33.3
8	T1	21	12.0	0.280	6.1	LOS A	1.3	35.6	0.33	0.19	0.33	33.4
18	R2	170	15.0	0.280	6.2	LOS A	1.3	35.6	0.33	0.19	0.33	32.3
Approach		295	14.1	0.280	6.1	LOS A	1.3	35.6	0.33	0.19	0.33	32.7
East: US 30												
1	L2	166	20.0	0.404	8.0	LOS A	2.1	58.1	0.38	0.24	0.38	32.3
6	T1	235	11.0	0.404	7.7	LOS A	2.1	58.1	0.38	0.24	0.38	32.7
16	R2	20	11.0	0.404	7.7	LOS A	2.1	58.1	0.38	0.24	0.38	31.7
Approach		421	14.6	0.404	7.8	LOS A	2.1	58.1	0.38	0.24	0.38	32.5
North: Backage Road (New)												
7	L2	2	11.0	0.010	5.3	LOS A	0.0	0.9	0.53	0.38	0.53	33.7
4	T1	3	12.0	0.010	5.4	LOS A	0.0	0.9	0.53	0.38	0.53	33.8
14	R2	1	32.0	0.010	6.3	LOS A	0.0	0.9	0.53	0.38	0.53	32.3
Approach		7	15.0	0.010	5.5	LOS A	0.0	0.9	0.53	0.38	0.53	33.5
West: Airport Road												
5	L2	1	23.0	0.235	6.3	LOS A	0.9	27.3	0.39	0.26	0.39	33.9
2	T1	117	12.0	0.235	6.0	LOS A	0.9	27.3	0.39	0.26	0.39	34.4
12	R2	99	31.0	0.235	6.6	LOS A	0.9	27.3	0.39	0.26	0.39	32.9
Approach		217	20.7	0.235	6.2	LOS A	0.9	27.3	0.39	0.26	0.39	33.7
All Vehicles		939	15.8	0.404	6.9	LOS A	2.1	58.1	0.37	0.23	0.37	32.8

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [US-30/Airport Road Roundabout]

207 Concept 1B Accessory 2 PM
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed mph
South: US 30												
3	L2	79	28.0	0.328	7.8	LOS A	1.5	41.6	0.46	0.35	0.46	32.6
8	T1	3	8.0	0.328	7.1	LOS A	1.5	41.6	0.46	0.35	0.46	33.2
18	R2	226	9.0	0.328	7.2	LOS A	1.5	41.6	0.46	0.35	0.46	32.2
Approach		308	13.9	0.328	7.3	LOS A	1.5	41.6	0.46	0.35	0.46	32.3
East: US 30												
1	L2	197	10.0	0.365	6.8	LOS A	2.0	52.9	0.32	0.18	0.32	32.8
6	T1	216	8.0	0.365	6.8	LOS A	2.0	52.9	0.32	0.18	0.32	32.9
16	R2	2	10.0	0.365	6.8	LOS A	2.0	52.9	0.32	0.18	0.32	31.9
Approach		414	9.0	0.365	6.8	LOS A	2.0	52.9	0.32	0.18	0.32	32.9
North: Backage Road (New)												
7	L2	18	10.0	0.052	5.6	LOS A	0.2	5.1	0.54	0.44	0.54	33.4
4	T1	19	8.0	0.052	5.5	LOS A	0.2	5.1	0.54	0.44	0.54	33.5
14	R2	1	9.0	0.052	5.5	LOS A	0.2	5.1	0.54	0.44	0.54	32.5
Approach		38	9.0	0.052	5.5	LOS A	0.2	5.1	0.54	0.44	0.54	33.5
West: Airport Road												
5	L2	1	40.0	0.410	9.3	LOS A	2.1	57.4	0.51	0.40	0.51	32.4
2	T1	213	8.0	0.410	8.2	LOS A	2.1	57.4	0.51	0.40	0.51	33.4
12	R2	187	9.0	0.410	8.3	LOS A	2.1	57.4	0.51	0.40	0.51	32.4
Approach		401	8.6	0.410	8.3	LOS A	2.1	57.4	0.51	0.40	0.51	32.9
All Vehicles		1161	10.1	0.410	7.4	LOS A	2.1	57.4	0.43	0.31	0.43	32.8

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

HCS7 Freeway Diverge Report

Project Information			
Analyst	KAI	Date	1/20/2020
Agency		Analysis Year	2040
Jurisdiction	City of Pendleton	Time Period Analyzed	Future AM
Project Description	Exit 207 IAMP - Segment 1 (EB Off-Ramp) - Alternative 1B with Accessory 2	Unit	United States Customary

Geometric Data		
	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1500	200
Terrain Type	Specific Grade	Rolling
Percent Grade, %	-3.10	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors		
Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	0.968	0.950
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity		
Demand Volume (V_i)	1089	103
Peak Hour Factor (PHF)	0.88	0.94
Total Trucks, %	30.00	22.00
Single-Unit Trucks (SUT), %	30	-
Tractor-Trailers (TT), %	70	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.775	0.694
Flow Rate (v_i),pc/h	1597	158
Capacity (c), pc/h	4646	1995
Volume-to-Capacity Ratio (v/c)	0.34	0.08

Speed and Density			
Upstream Equilibrium Distance (L_{EQ}), ft	-	Number of Outer Lanes on Freeway (N_O)	0
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.312
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	61.3
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	1.000	Outer Lanes Freeway Speed (S_O), mi/h	76.8
Flow in Lanes 1 and 2 (v_{12}), pc/h	1597	Ramp Junction Speed (S), mi/h	61.3
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	13.0
Level of Service (LOS)	B	Density in Ramp Influence Area (D_R), pc/mi/ln	16.2

HCS7 Freeway Diverge Report

Project Information

Analyst	KAI	Date	1/20/2020
Agency		Analysis Year	2040
Jurisdiction	City of Pendleton	Time Period Analyzed	Future PM
Project Description	Exit 207 IAMP - Segment 1 (EB Off-Ramp) - Alternative 1B with Accessory 2	Unit	United States Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1500	200
Terrain Type	Specific Grade	Rolling
Percent Grade, %	-3.10	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	0.968	0.950
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (V_i)	1006	108
Peak Hour Factor (PHF)	0.88	0.94
Total Trucks, %	30.00	14.00
Single-Unit Trucks (SUT), %	30	-
Tractor-Trailers (TT), %	70	-
Heavy Vehicle Adjustment Factor (f_{HV})	0.775	0.781
Flow Rate (v_i),pc/h	1475	147
Capacity (c), pc/h	4646	1995
Volume-to-Capacity Ratio (v/c)	0.32	0.07

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Number of Outer Lanes on Freeway (N_O)	0
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.311
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	61.3
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	1.000	Outer Lanes Freeway Speed (S_O), mi/h	76.8
Flow in Lanes 1 and 2 (v_{12}), pc/h	1475	Ramp Junction Speed (S), mi/h	61.3
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	12.0
Level of Service (LOS)	B	Density in Ramp Influence Area (D_R), pc/mi/ln	15.1

HCS7 Basic Freeway Report

Project Information

Analyst	KAI	Date	1/20/2020
Agency		Analysis Year	2040
Jurisdiction	City of Pendleton	Time Period Analyzed	Future AM
Project Description	Exit 207 IAMP - Segment 2 (Between EB On and Off Ramps) - Alternative 1B with Accessory 2	Unit	United States Customary

Geometric Data

Number of Lanes, ln	2	Terrain Type	Rolling
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	0.83
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	67.2
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.968
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	986	Heavy Vehicle Adjustment Factor (f_{HV})	0.625
Peak Hour Factor	0.88	Flow Rate (V_p), pc/h/ln	896
Total Trucks, %	30.00	Capacity (c), pc/h/ln	2372
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2296
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.39
Passenger Car Equivalent (E_T)	3.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	67.2
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	13.3
Total Ramp Density Adjustment	2.8	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	67.2		

HCS7 Basic Freeway Report

Project Information

Analyst	KAI	Date	1/20/2020
Agency		Analysis Year	2040
Jurisdiction	City of Pendleton	Time Period Analyzed	Future PM
Project Description	Exit 207 IAMP - Segment 2 (Between EB On and Off Ramps) - Alternative 1B with Accessory 2	Unit	United States Customary

Geometric Data

Number of Lanes, ln	2	Terrain Type	Rolling
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	0.83
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	67.2
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.968
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	898	Heavy Vehicle Adjustment Factor (f_{HV})	0.625
Peak Hour Factor	0.88	Flow Rate (V_p), pc/h/ln	816
Total Trucks, %	30.00	Capacity (c), pc/h/ln	2372
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2296
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.36
Passenger Car Equivalent (E_T)	3.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	67.2
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	12.1
Total Ramp Density Adjustment	2.8	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	67.2		

HCS7 Freeway Merge Report

Project Information			
Analyst	KAI	Date	1/20/2020
Agency		Analysis Year	2040
Jurisdiction	City of Pendleton	Time Period Analyzed	Future AM
Project Description	Exit 207 IAMP - Segment 3 (EB ON-Ramp #1) - Alternative 1B with Accessory 2	Unit	United States Customary

Geometric Data		
	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	25.0
Segment Length (L) / Acceleration Length (LA),ft	1500	700
Terrain Type	Rolling	Specific Grade
Percent Grade, %	-	-2.00
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors		
Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	0.968	0.950
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity		
Demand Volume (Vi)	986	33
Peak Hour Factor (PHF)	0.88	0.94
Total Trucks, %	30.00	41.00
Single-Unit Trucks (SUT), %	-	30
Tractor-Trailers (TT), %	-	70
Heavy Vehicle Adjustment Factor (fHV)	0.625	0.715
Flow Rate (vi),pc/h	1793	49
Capacity (c), pc/h	4646	1805
Volume-to-Capacity Ratio (v/c)	0.40	0.03

Speed and Density			
Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	0
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	0.311
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	-
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	61.3
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	1.000	Outer Lanes Freeway Speed (SO), mi/h	70.0
Flow in Lanes 1 and 2 (v12), pc/h	1793	Ramp Junction Speed (S), mi/h	61.3
Flow Entering Ramp-Infl. Area (vR12), pc/h	1842	Average Density (D), pc/mi/ln	15.0
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	15.5

HCS7 Freeway Merge Report

Project Information			
Analyst	KAI	Date	1/20/2020
Agency		Analysis Year	2040
Jurisdiction	City of Pendleton	Time Period Analyzed	Future PM
Project Description	Exit 207 IAMP - Segment 3 (EB On-Ramp #1) - Alternative 1B with Accessory 2	Unit	United States Customary

Geometric Data		
	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	25.0
Segment Length (L) / Acceleration Length (LA),ft	1500	700
Terrain Type	Rolling	Specific Grade
Percent Grade, %	-	-2.00
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors		
Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	0.968	0.950
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity		
Demand Volume (Vi)	898	118
Peak Hour Factor (PHF)	0.88	0.94
Total Trucks, %	30.00	21.00
Single-Unit Trucks (SUT), %	-	30
Tractor-Trailers (TT), %	-	70
Heavy Vehicle Adjustment Factor (fHV)	0.625	0.828
Flow Rate (vi),pc/h	1633	152
Capacity (c), pc/h	4646	1805
Volume-to-Capacity Ratio (v/c)	0.38	0.08

Speed and Density			
Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	0
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	0.309
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	-
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	61.3
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	1.000	Outer Lanes Freeway Speed (SO), mi/h	70.0
Flow in Lanes 1 and 2 (v12), pc/h	1633	Ramp Junction Speed (S), mi/h	61.3
Flow Entering Ramp-Infl. Area (vR12), pc/h	1785	Average Density (D), pc/mi/ln	14.6
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	15.0

HCS7 Freeway Merge Report

Project Information			
Analyst	KAI	Date	1/20/2020
Agency		Analysis Year	2040
Jurisdiction	City of Pendleton	Time Period Analyzed	Future AM
Project Description	Exit 207 IAMP - Segment 4 (EB On-Ramp #2) - Alternative 1B with Accessory 2	Unit	United States Customary

Geometric Data		
	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Acceleration Length (LA),ft	1500	600
Terrain Type	Specific Grade	Specific Grade
Percent Grade, %	-4.40	-2.80
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors		
Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	0.968	0.950
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity		
Demand Volume (Vi)	1019	50
Peak Hour Factor (PHF)	0.88	0.94
Total Trucks, %	30.00	33.00
Single-Unit Trucks (SUT), %	30	30
Tractor-Trailers (TT), %	70	70
Heavy Vehicle Adjustment Factor (fHV)	0.775	0.758
Flow Rate (vi),pc/h	1494	70
Capacity (c), pc/h	4646	1900
Volume-to-Capacity Ratio (v/c)	0.34	0.04

Speed and Density			
Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	0
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	0.298
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	-
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	61.7
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	1.000	Outer Lanes Freeway Speed (SO), mi/h	70.0
Flow in Lanes 1 and 2 (v12), pc/h	1494	Ramp Junction Speed (S), mi/h	61.7
Flow Entering Ramp-Infl. Area (vR12), pc/h	1564	Average Density (D), pc/mi/ln	12.7
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	14.0

HCS7 Freeway Merge Report

Project Information			
Analyst	KAI	Date	1/20/2020
Agency		Analysis Year	2040
Jurisdiction	City of Pendleton	Time Period Analyzed	Future PM
Project Description	Exit 207 IAMP - Segment 4 (EB On-Ramp #2) - Alternative 1B with Accessory 2	Unit	United States Customary

Geometric Data		
	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Acceleration Length (LA),ft	1500	600
Terrain Type	Specific Grade	Specific Grade
Percent Grade, %	-4.40	-2.80
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors		
Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	0.968	0.950
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity		
Demand Volume (Vi)	1016	58
Peak Hour Factor (PHF)	0.88	0.92
Total Trucks, %	30.00	9.00
Single-Unit Trucks (SUT), %	30	30
Tractor-Trailers (TT), %	70	70
Heavy Vehicle Adjustment Factor (fHV)	0.775	0.907
Flow Rate (vi),pc/h	1490	70
Capacity (c), pc/h	4646	1900
Volume-to-Capacity Ratio (v/c)	0.34	0.04

Speed and Density			
Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	0
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	0.298
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	-
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	61.7
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	1.000	Outer Lanes Freeway Speed (SO), mi/h	70.0
Flow in Lanes 1 and 2 (v12), pc/h	1490	Ramp Junction Speed (S), mi/h	61.7
Flow Entering Ramp-Infl. Area (vR12), pc/h	1560	Average Density (D), pc/mi/ln	12.6
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	13.9

HCS7 Freeway Diverge Report

Project Information

Analyst	KAI	Date	1/20/2020
Agency		Analysis Year	2040
Jurisdiction	City of Pendleton	Time Period Analyzed	Future AM
Project Description	Exit 207 IAMP - Segment 5 (WB Off-Ramp) - Alternative 1B with Accessory 2	Unit	United States Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	25.0
Segment Length (L) / Deceleration Length (LA),ft	1500	300
Terrain Type	Specific Grade	Specific Grade
Percent Grade, %	2.70	5.80
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	0.968	0.950
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (v_i)	971	144
Peak Hour Factor (PHF)	0.88	0.94
Total Trucks, %	30.00	12.00
Single-Unit Trucks (SUT), %	30	30
Tractor-Trailers (TT), %	70	70
Heavy Vehicle Adjustment Factor (f_{HV})	0.759	0.859
Flow Rate (v_i),pc/h	1454	178
Capacity (c), pc/h	4646	1805
Volume-to-Capacity Ratio (v/c)	0.31	0.10

Speed and Density

Upstream Equilibrium Distance (L_{EQ}), ft	-	Number of Outer Lanes on Freeway (N_O)	0
Distance to Upstream Ramp (L_{UP}), ft	-	Speed Index (D_S)	0.574
Downstream Equilibrium Distance (L_{EQ}), ft	-	Flow Outer Lanes (v_{OA}), pc/h/ln	-
Distance to Downstream Ramp (L_{DOWN}), ft	-	Off-Ramp Influence Area Speed (S_R), mi/h	53.9
Prop. Freeway Vehicles in Lane 1 and 2 (P_{FD})	1.000	Outer Lanes Freeway Speed (S_O), mi/h	76.8
Flow in Lanes 1 and 2 (v_{12}), pc/h	1454	Ramp Junction Speed (S), mi/h	53.9
Flow Entering Ramp-Infl. Area (v_{R12}), pc/h	-	Average Density (D), pc/mi/ln	13.5
Level of Service (LOS)	B	Density in Ramp Influence Area (D_R), pc/mi/ln	14.1

HCS7 Freeway Diverge Report

Project Information			
Analyst	KAI	Date	1/20/2020
Agency		Analysis Year	2040
Jurisdiction	City of Pendleton	Time Period Analyzed	Future PM
Project Description	Exit 207 IAMP - Segment 5 (WB Off-Ramp) - Alternative 1B with Accessory 2	Unit	United States Customary

Geometric Data		
	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	25.0
Segment Length (L) / Deceleration Length (LA),ft	1500	300
Terrain Type	Specific Grade	Specific Grade
Percent Grade, %	2.70	5.80
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors		
Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	0.968	0.950
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity		
Demand Volume (Vi)	1004	132
Peak Hour Factor (PHF)	0.88	0.94
Total Trucks, %	30.00	13.00
Single-Unit Trucks (SUT), %	30	30
Tractor-Trailers (TT), %	70	70
Heavy Vehicle Adjustment Factor (fHV)	0.759	0.852
Flow Rate (vi),pc/h	1503	165
Capacity (c), pc/h	4646	1805
Volume-to-Capacity Ratio (v/c)	0.32	0.09

Speed and Density			
Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	0
Distance to Upstream Ramp (LUP), ft	-	Speed Index (DS)	0.573
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	-
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	54.0
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	1.000	Outer Lanes Freeway Speed (SO), mi/h	76.8
Flow in Lanes 1 and 2 (v12), pc/h	1503	Ramp Junction Speed (S), mi/h	54.0
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	13.9
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	14.5

HCS7 Basic Freeway Report

Project Information

Analyst	KAI	Date	1/21/2020
Agency		Analysis Year	2040
Jurisdiction	City of Pendleton	Time Period Analyzed	Future AM
Project Description	Exit 207 IAMP - Segment 6 (Between WB Off and On Ramps) - Alternative 1B with Accessory 2	Unit	United States Customary

Geometric Data

Number of Lanes, ln	2	Terrain Type	Specific Grade
Segment Length (L), ft	-	Percent Grade, %	2.80
Measured or Base Free-Flow Speed	Base	Grade Length, mi	0.20
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	0.83
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	67.2
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.968
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	827	Heavy Vehicle Adjustment Factor (f_{HV})	0.765
Peak Hour Factor	0.88	Flow Rate (V_p), pc/h/ln	614
Total Trucks, %	30.00	Capacity (c), pc/h/ln	2372
Single-Unit Trucks (SUT), %	30	Adjusted Capacity (c_{adj}), pc/h/ln	2296
Tractor-Trailers (TT), %	70	Volume-to-Capacity Ratio (v/c)	0.27
Passenger Car Equivalent (E_T)	2.026		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	67.2
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	9.1
Total Ramp Density Adjustment	2.8	Level of Service (LOS)	A
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	67.2		

HCS7 Basic Freeway Report

Project Information

Analyst	KAI	Date	1/21/2020
Agency		Analysis Year	2040
Jurisdiction	City of Pendleton	Time Period Analyzed	Future PM
Project Description	Exit 207 IAMP - Segment 6 (Between WB Off and On Ramps) - Alternative 1B with Accessory 2	Unit	United States Customary

Geometric Data

Number of Lanes, ln	2	Terrain Type	Specific Grade
Segment Length (L), ft	-	Percent Grade, %	2.80
Measured or Base Free-Flow Speed	Base	Grade Length, mi	0.20
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	0.83
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	67.2
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.968
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	872	Heavy Vehicle Adjustment Factor (f_{HV})	0.765
Peak Hour Factor	0.88	Flow Rate (V_p), pc/h/ln	648
Total Trucks, %	30.00	Capacity (c), pc/h/ln	2372
Single-Unit Trucks (SUT), %	30	Adjusted Capacity (c_{adj}), pc/h/ln	2296
Tractor-Trailers (TT), %	70	Volume-to-Capacity Ratio (v/c)	0.28
Passenger Car Equivalent (E_T)	2.026		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	67.2
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	9.6
Total Ramp Density Adjustment	2.8	Level of Service (LOS)	A
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	67.2		

HCS7 Freeway Merge Report

Project Information			
Analyst	KAI	Date	1/21/2020
Agency		Analysis Year	2040
Jurisdiction	City of Pendleton	Time Period Analyzed	Future AM
Project Description	Exit 207 IAMP - Segment 7 (WB On-Ramp) - Alternative 1B with Accessory 2	Unit	United States Customary

Geometric Data		
	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	25.0
Segment Length (L) / Acceleration Length (LA),ft	1500	900
Terrain Type	Specific Grade	Specific Grade
Percent Grade, %	2.80	-3.40
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors		
Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	0.968	0.950
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity		
Demand Volume (Vi)	827	129
Peak Hour Factor (PHF)	0.88	0.94
Total Trucks, %	30.00	43.00
Single-Unit Trucks (SUT), %	30	30
Tractor-Trailers (TT), %	70	70
Heavy Vehicle Adjustment Factor (fHV)	0.765	0.706
Flow Rate (vi),pc/h	1228	194
Capacity (c), pc/h	4646	1805
Volume-to-Capacity Ratio (v/c)	0.31	0.11

Speed and Density			
Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	0
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	0.292
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	-
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	61.8
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	1.000	Outer Lanes Freeway Speed (SO), mi/h	70.0
Flow in Lanes 1 and 2 (v12), pc/h	1228	Ramp Junction Speed (S), mi/h	61.8
Flow Entering Ramp-Infl. Area (vR12), pc/h	1422	Average Density (D), pc/mi/ln	11.5
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	10.9

HCS7 Freeway Merge Report

Project Information			
Analyst	KAI	Date	1/21/2020
Agency		Analysis Year	2040
Jurisdiction	City of Pendleton	Time Period Analyzed	Future PM
Project Description	Exit 207 IAMP - Segment 7 (WB On-Ramp #1) - Alternative 1B with Accessory 2	Unit	United States Customary

Geometric Data		
	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	25.0
Segment Length (L) / Acceleration Length (LA),ft	1500	900
Terrain Type	Specific Grade	Specific Grade
Percent Grade, %	2.80	-3.40
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors		
Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	0.968	0.950
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity		
Demand Volume (Vi)	872	222
Peak Hour Factor (PHF)	0.88	0.88
Total Trucks, %	30.00	20.00
Single-Unit Trucks (SUT), %	30	30
Tractor-Trailers (TT), %	70	70
Heavy Vehicle Adjustment Factor (fHV)	0.765	0.835
Flow Rate (vi),pc/h	1295	302
Capacity (c), pc/h	4646	1805
Volume-to-Capacity Ratio (v/c)	0.34	0.17

Speed and Density			
Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	0
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	0.295
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	-
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	61.7
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	1.000	Outer Lanes Freeway Speed (SO), mi/h	70.0
Flow in Lanes 1 and 2 (v12), pc/h	1295	Ramp Junction Speed (S), mi/h	61.7
Flow Entering Ramp-Infl. Area (vR12), pc/h	1597	Average Density (D), pc/mi/ln	12.9
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	12.2

Intersection	
Int Delay, s/veh	2.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	108	2	54	95	1	30
Future Vol, veh/h	108	2	54	95	1	30
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	5	-	-	-5	-3	-
Peak Hour Factor	86	86	86	86	86	86
Heavy Vehicles, %	42	0	0	35	0	0
Mvmt Flow	126	2	63	110	1	35

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	128	0	363	127
Stage 1	-	-	-	-	127	-
Stage 2	-	-	-	-	236	-
Critical Hdwy	-	-	4.1	-	5.8	5.9
Critical Hdwy Stg 1	-	-	-	-	4.8	-
Critical Hdwy Stg 2	-	-	-	-	4.8	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1470	-	680	938
Stage 1	-	-	-	-	923	-
Stage 2	-	-	-	-	840	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1470	-	651	938
Mov Cap-2 Maneuver	-	-	-	-	651	-
Stage 1	-	-	-	-	923	-
Stage 2	-	-	-	-	804	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.7	9.1
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	925	-	-	1470	-
HCM Lane V/C Ratio	0.039	-	-	0.043	-
HCM Control Delay (s)	9.1	-	-	7.6	-
HCM Lane LOS	A	-	-	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0.1	-

Intersection	
Int Delay, s/veh	3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑		↱	
Traffic Vol, veh/h	0	138	139	0	93	10
Future Vol, veh/h	0	138	139	0	93	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	4	-3	-	-2	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	2	31	19	2	24	8
Mvmt Flow	0	147	148	0	99	11

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	295	148
Stage 1	-	-	-	-	148	-
Stage 2	-	-	-	-	147	-
Critical Hdwy	-	-	-	-	6.24	6.08
Critical Hdwy Stg 1	-	-	-	-	5.24	-
Critical Hdwy Stg 2	-	-	-	-	5.24	-
Follow-up Hdwy	-	-	-	-	3.716	3.372
Pot Cap-1 Maneuver	0	-	-	0	674	890
Stage 1	0	-	-	0	842	-
Stage 2	0	-	-	0	843	-
Platoon blocked, %		-	-			
Mov Cap-1 Maneuver	-	-	-	-	674	890
Mov Cap-2 Maneuver	-	-	-	-	674	-
Stage 1	-	-	-	-	842	-
Stage 2	-	-	-	-	843	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	11.2
HCM LOS			B

Minor Lane/Major Mvmt	EBT	WBT	SBLn1
Capacity (veh/h)	-	-	690
HCM Lane V/C Ratio	-	-	0.159
HCM Control Delay (s)	-	-	11.2
HCM Lane LOS	-	-	B
HCM 95th %tile Q(veh)	-	-	0.6

Intersection	
Int Delay, s/veh	3.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	172	0	0	246	46	98
Future Vol, veh/h	172	0	0	246	46	98
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	-2	-	-	3	5	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	18	0	0	24	17	8
Mvmt Flow	187	0	0	267	50	107

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	-	-	-	454	187
Stage 1	-	-	-	-	187	-
Stage 2	-	-	-	-	267	-
Critical Hdwy	-	-	-	-	7.57	6.78
Critical Hdwy Stg 1	-	-	-	-	6.57	-
Critical Hdwy Stg 2	-	-	-	-	6.57	-
Follow-up Hdwy	-	-	-	-	3.653	3.372
Pot Cap-1 Maneuver	-	0	0	-	473	818
Stage 1	-	0	0	-	769	-
Stage 2	-	0	0	-	691	-
Platoon blocked, %	-			-		
Mov Cap-1 Maneuver	-	-	-	-	473	818
Mov Cap-2 Maneuver	-	-	-	-	473	-
Stage 1	-	-	-	-	769	-
Stage 2	-	-	-	-	691	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	12.1
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	WBT
Capacity (veh/h)	663	-	-
HCM Lane V/C Ratio	0.236	-	-
HCM Control Delay (s)	12.1	-	-
HCM Lane LOS	B	-	-
HCM 95th %tile Q(veh)	0.9	-	-

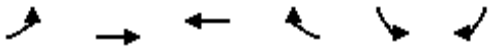
Intersection	
Int Delay, s/veh	5.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	115	156	153	234	110	94
Future Vol, veh/h	115	156	153	234	110	94
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	-3	3	-	-4	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	13	15	20	11	12	31
Mvmt Flow	125	170	166	254	120	102

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	420	0	-	0	713	293
Stage 1	-	-	-	-	293	-
Stage 2	-	-	-	-	420	-
Critical Hdwy	4.23	-	-	-	5.72	6.11
Critical Hdwy Stg 1	-	-	-	-	4.72	-
Critical Hdwy Stg 2	-	-	-	-	4.72	-
Follow-up Hdwy	2.317	-	-	-	3.608	3.579
Pot Cap-1 Maneuver	1083	-	-	-	450	705
Stage 1	-	-	-	-	784	-
Stage 2	-	-	-	-	705	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1083	-	-	-	393	705
Mov Cap-2 Maneuver	-	-	-	-	393	-
Stage 1	-	-	-	-	684	-
Stage 2	-	-	-	-	705	-

Approach	EB	WB	SB
HCM Control Delay, s	3.7	0	18.1
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1083	-	-	-	494
HCM Lane V/C Ratio	0.115	-	-	-	0.449
HCM Control Delay (s)	8.8	0	-	-	18.1
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0.4	-	-	-	2.3



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	115	156	153	234	110	94
Future Volume (veh/h)	115	156	153	234	110	94
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1651	1651	1428	1428	1895	1895
Adj Flow Rate, veh/h	125	170	166	254	120	102
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	15	15	20	20	0	0
Cap, veh/h	291	310	244	373	184	157
Arrive On Green	0.48	0.48	0.48	0.48	0.22	0.22
Sat Flow, veh/h	249	646	509	779	839	713
Grp Volume(v), veh/h	295	0	0	420	223	0
Grp Sat Flow(s),veh/h/ln	896	0	0	1288	1559	0
Q Serve(g_s), s	2.5	0.0	0.0	7.5	3.9	0.0
Cycle Q Clear(g_c), s	10.1	0.0	0.0	7.5	3.9	0.0
Prop In Lane	0.42			0.60	0.54	0.46
Lane Grp Cap(c), veh/h	601	0	0	617	342	0
V/C Ratio(X)	0.49	0.00	0.00	0.68	0.65	0.00
Avail Cap(c_a), veh/h	1811	0	0	1874	1434	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	6.2	0.0	0.0	6.0	10.6	0.0
Incr Delay (d2), s/veh	0.6	0.0	0.0	1.3	2.1	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	0.0	0.0	1.1	1.1	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	6.8	0.0	0.0	7.3	12.7	0.0
LnGrp LOS	A	A	A	A	B	A
Approach Vol, veh/h		295	420		223	
Approach Delay, s/veh		6.8	7.3		12.7	
Approach LOS		A	A		B	

Timer - Assigned Phs			4		6	8
Phs Duration (G+Y+Rc), s			18.8		11.1	18.8
Change Period (Y+Rc), s			4.5		4.5	4.5
Max Green Setting (Gmax), s			43.5		27.5	43.5
Max Q Clear Time (g_c+I1), s			12.1		5.9	9.5
Green Ext Time (p_c), s			2.3		0.7	3.2

Intersection Summary		
HCM 6th Ctrl Delay		8.4
HCM 6th LOS		A

Intersection	
Int Delay, s/veh	0.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	0	312	37	0	199
Future Vol, veh/h	5	0	312	37	0	199
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	17	11	12	17	12	21
Mvmt Flow	5	0	339	40	0	216

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	575	359	0	0	379	0
Stage 1	359	-	-	-	-	-
Stage 2	216	-	-	-	-	-
Critical Hdwy	6.57	6.31	-	-	4.22	-
Critical Hdwy Stg 1	5.57	-	-	-	-	-
Critical Hdwy Stg 2	5.57	-	-	-	-	-
Follow-up Hdwy	3.653	3.399	-	-	2.308	-
Pot Cap-1 Maneuver	455	666	-	-	1127	-
Stage 1	675	-	-	-	-	-
Stage 2	786	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	455	666	-	-	1127	-
Mov Cap-2 Maneuver	455	-	-	-	-	-
Stage 1	675	-	-	-	-	-
Stage 2	786	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	455	1127	-
HCM Lane V/C Ratio	-	-	0.012	-	-
HCM Control Delay (s)	-	-	13	0	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	0	0	-

Intersection	
Int Delay, s/veh	1.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	147	4	17	80	1	23
Future Vol, veh/h	147	4	17	80	1	23
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	5	-	-	-5	-3	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	7	0	0	17	0	0
Mvmt Flow	162	4	19	88	1	25

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	166	0	290	164
Stage 1	-	-	-	-	164	-
Stage 2	-	-	-	-	126	-
Critical Hdwy	-	-	4.1	-	5.8	5.9
Critical Hdwy Stg 1	-	-	-	-	4.8	-
Critical Hdwy Stg 2	-	-	-	-	4.8	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1424	-	740	898
Stage 1	-	-	-	-	894	-
Stage 2	-	-	-	-	924	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1424	-	730	898
Mov Cap-2 Maneuver	-	-	-	-	730	-
Stage 1	-	-	-	-	894	-
Stage 2	-	-	-	-	912	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.3	9.2
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	889	-	-	1424	-
HCM Lane V/C Ratio	0.03	-	-	0.013	-
HCM Control Delay (s)	9.2	-	-	7.6	-
HCM Lane LOS	A	-	-	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Intersection	
Int Delay, s/veh	3.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑	↑		↱	
Traffic Vol, veh/h	0	170	86	0	97	11
Future Vol, veh/h	0	170	86	0	97	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	4	-3	-	-2	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	11	13	0	13	25
Mvmt Flow	0	189	96	0	108	12

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	285	96
Stage 1	-	-	-	-	96	-
Stage 2	-	-	-	-	189	-
Critical Hdwy	-	-	-	-	6.13	6.25
Critical Hdwy Stg 1	-	-	-	-	5.13	-
Critical Hdwy Stg 2	-	-	-	-	5.13	-
Follow-up Hdwy	-	-	-	-	3.617	3.525
Pot Cap-1 Maneuver	0	-	-	0	705	906
Stage 1	0	-	-	0	911	-
Stage 2	0	-	-	0	835	-
Platoon blocked, %		-	-			
Mov Cap-1 Maneuver	-	-	-	-	705	906
Mov Cap-2 Maneuver	-	-	-	-	705	-
Stage 1	-	-	-	-	911	-
Stage 2	-	-	-	-	835	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	11
HCM LOS			B

Minor Lane/Major Mvmt	EBT	WBT	SBLn1
Capacity (veh/h)	-	-	721
HCM Lane V/C Ratio	-	-	0.166
HCM Control Delay (s)	-	-	11
HCM Lane LOS	-	-	B
HCM 95th %tile Q(veh)	-	-	0.6

Intersection	
Int Delay, s/veh	2.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	185	0	0	361	41	91
Future Vol, veh/h	185	0	0	361	41	91
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	-2	-	-	3	5	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	11	0	0	10	17	18
Mvmt Flow	206	0	0	401	46	101

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	-	-	-	607	206
Stage 1	-	-	-	-	206	-
Stage 2	-	-	-	-	401	-
Critical Hdwy	-	-	-	-	7.57	6.88
Critical Hdwy Stg 1	-	-	-	-	6.57	-
Critical Hdwy Stg 2	-	-	-	-	6.57	-
Follow-up Hdwy	-	-	-	-	3.653	3.462
Pot Cap-1 Maneuver	-	0	0	-	368	773
Stage 1	-	0	0	-	750	-
Stage 2	-	0	0	-	577	-
Platoon blocked, %	-			-		
Mov Cap-1 Maneuver	-	-	-	-	368	773
Mov Cap-2 Maneuver	-	-	-	-	368	-
Stage 1	-	-	-	-	750	-
Stage 2	-	-	-	-	577	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	13.4
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	WBT
Capacity (veh/h)	576	-	-
HCM Lane V/C Ratio	0.255	-	-
HCM Control Delay (s)	13.4	-	-
HCM Lane LOS	B	-	-
HCM 95th %tile Q(veh)	1	-	-

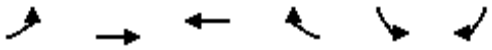
Intersection	
Int Delay, s/veh	14.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	74	209	177	196	208	185
Future Vol, veh/h	74	209	177	196	208	185
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	-3	3	-	-4	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	28	15	10	8	8	9
Mvmt Flow	82	232	197	218	231	206

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	415	0	-	0	702	306
Stage 1	-	-	-	-	306	-
Stage 2	-	-	-	-	396	-
Critical Hdwy	4.38	-	-	-	5.68	5.89
Critical Hdwy Stg 1	-	-	-	-	4.68	-
Critical Hdwy Stg 2	-	-	-	-	4.68	-
Follow-up Hdwy	2.452	-	-	-	3.572	3.381
Pot Cap-1 Maneuver	1017	-	-	-	462	743
Stage 1	-	-	-	-	785	-
Stage 2	-	-	-	-	728	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1017	-	-	-	419	743
Mov Cap-2 Maneuver	-	-	-	-	419	-
Stage 1	-	-	-	-	712	-
Stage 2	-	-	-	-	728	-

Approach	EB	WB	SB
HCM Control Delay, s	2.3	0	36.8
HCM LOS			E

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1017	-	-	-	527
HCM Lane V/C Ratio	0.081	-	-	-	0.829
HCM Control Delay (s)	8.9	0	-	-	36.8
HCM Lane LOS	A	A	-	-	E
HCM 95th %tile Q(veh)	0.3	-	-	-	8.3



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	74	209	177	196	208	185
Future Volume (veh/h)	74	209	177	196	208	185
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1651	1651	1565	1565	1895	1895
Adj Flow Rate, veh/h	82	232	197	218	231	206
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	15	15	10	10	0	0
Cap, veh/h	184	381	273	302	292	260
Arrive On Green	0.40	0.40	0.40	0.40	0.34	0.34
Sat Flow, veh/h	141	945	679	751	847	755
Grp Volume(v), veh/h	314	0	0	415	438	0
Grp Sat Flow(s),veh/h/ln	1086	0	0	1430	1606	0
Q Serve(g_s), s	1.5	0.0	0.0	8.7	8.8	0.0
Cycle Q Clear(g_c), s	10.2	0.0	0.0	8.7	8.8	0.0
Prop In Lane	0.26			0.53	0.53	0.47
Lane Grp Cap(c), veh/h	565	0	0	575	554	0
V/C Ratio(X)	0.56	0.00	0.00	0.72	0.79	0.00
Avail Cap(c_a), veh/h	1420	0	0	1465	1556	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	8.3	0.0	0.0	9.0	10.5	0.0
Incr Delay (d2), s/veh	0.9	0.0	0.0	1.7	2.6	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.3	0.0	0.0	2.0	2.6	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	9.1	0.0	0.0	10.7	13.1	0.0
LnGrp LOS	A	A	A	B	B	A
Approach Vol, veh/h		314	415		438	
Approach Delay, s/veh		9.1	10.7		13.1	
Approach LOS		A	B		B	

Timer - Assigned Phs			4		6	8
Phs Duration (G+Y+Rc), s			18.8		16.8	18.8
Change Period (Y+Rc), s			4.5		4.5	4.5
Max Green Setting (Gmax), s			36.5		34.5	36.5
Max Q Clear Time (g_c+I1), s			12.2		10.8	10.7
Green Ext Time (p_c), s			2.2		1.5	2.9

Intersection Summary		
HCM 6th Ctrl Delay		11.2
HCM 6th LOS		B

Intersection	
Int Delay, s/veh	0.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	33	0	265	5	0	360
Future Vol, veh/h	33	0	265	5	0	360
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	13	11	13	13	12	8
Mvmt Flow	37	0	294	6	0	400

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	697	297	0	0	300	0
Stage 1	297	-	-	-	-	-
Stage 2	400	-	-	-	-	-
Critical Hdwy	6.53	6.31	-	-	4.22	-
Critical Hdwy Stg 1	5.53	-	-	-	-	-
Critical Hdwy Stg 2	5.53	-	-	-	-	-
Follow-up Hdwy	3.617	3.399	-	-	2.308	-
Pot Cap-1 Maneuver	391	722	-	-	1206	-
Stage 1	729	-	-	-	-	-
Stage 2	654	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	391	722	-	-	1206	-
Mov Cap-2 Maneuver	391	-	-	-	-	-
Stage 1	729	-	-	-	-	-
Stage 2	654	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	15.2	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	391	1206	-
HCM Lane V/C Ratio	-	-	0.094	-	-
HCM Control Delay (s)	-	-	15.2	0	-
HCM Lane LOS	-	-	C	A	-
HCM 95th %tile Q(veh)	-	-	0.3	0	-

Signal Warrant Assessment

Based on 2009 Edition of the MUTCD

Project #:	24043
Project Name:	Pendleton IAMPs
Analyst:	AEG
Date:	6/5/2020
Intersection:	US 30/Airport Road
Scenario:	2040 Future PM

Volume Adjustment Factor =	1.0
North-South Approach =	Minor
East-West Approach =	Major
Major Street Thru Lanes =	1
Minor Street Thru Lanes =	1
Speed > 40 mph?	No
Population < 10,000?	No
Warrant Factor	100%
Peak Hour or Daily Count?	Peak Hour

Warrant Summary

Warrant	Name	Analyzed?	Met?
#1	Eight-Highest	Yes	No
#2	Four-Hour	Yes	Yes
#3	Peak Hour	Yes	Yes

**This signal warrant shall be applied only in unusual cases, such as office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time.*

Select Type Of Major Street Approach From Dropdown Menu	Urban Principal Arterial
Select Type Of Minor Street Approach From Dropdown Menu	Urban Minor Arterial

Note: traffic volume profile for weekday (if weekend is desired, tab "vol profile" needs to be adjusted)

Traffic Volumes

Hour		Major Street		Minor Street		Major St.	Minor St.
Begin	End	EB	WB	NB	SB	Adj. Factor	Adj. Factor
3:15 PM	4:15 PM	373	282	393	0	1.00	1.00
2nd Highest Hour		349	264	372	0	0.94	0.95
3rd Highest Hour		344	260	367	0	0.92	0.93
4th Highest Hour		334	253	351	0	0.90	0.89
5th Highest Hour		305	231	346	0	0.82	0.88
6th Highest Hour		300	227	346	0	0.81	0.88
7th Highest Hour		281	212	330	0	0.75	0.84
8th Highest Hour		262	198	325	0	0.70	0.83
9th Highest Hour		262	198	314	0	0.70	0.80
10th Highest Hour		257	194	293	0	0.69	0.75
11th Highest Hour		242	183	283	0	0.65	0.72
12th Highest Hour		228	172	278	0	0.61	0.71
13th Highest Hour		223	168	267	0	0.60	0.68
14th Highest Hour		213	161	231	0	0.57	0.59
15th Highest Hour		170	128	183	0	0.45	0.47
16th Highest Hour		160	121	173	0	0.43	0.44
17th Highest Hour		145	110	121	0	0.39	0.31
18th Highest Hour		126	95	100	0	0.34	0.25
19th Highest Hour		102	77	52	0	0.27	0.13
20th Highest Hour		48	37	37	0	0.13	0.09
21st Highest Hour		44	33	31	0	0.12	0.08
22nd Highest Hour		29	22	21	0	0.08	0.05
23rd Highest Hour		24	18	10	0	0.06	0.03
24th Highest Hour		24	18	10	0	0.06	0.03

Data Input

HCS7 Freeway Diverge Report

Project Information

Analyst	KAI	Date	1/20/2020
Agency		Analysis Year	2040
Jurisdiction	City of Pendleton	Time Period Analyzed	Future AM
Project Description	Exit 207 IAMP - Segment 1 (EB Off-Ramp) - Alternative 3	Unit	United States Customary

Geometric Data

	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1500	200
Terrain Type	Specific Grade	Rolling
Percent Grade, %	-3.10	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors

Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	0.968	0.950
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity

Demand Volume (Vi)	1089	103
Peak Hour Factor (PHF)	0.88	0.94
Total Trucks, %	30.00	22.00
Single-Unit Trucks (SUT), %	30	-
Tractor-Trailers (TT), %	70	-
Heavy Vehicle Adjustment Factor (fHV)	0.775	0.694
Flow Rate (vi),pc/h	1597	158
Capacity (c), pc/h	4646	1995
Volume-to-Capacity Ratio (v/c)	0.34	0.08

Speed and Density

Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	0
Distance to Upstream Ramp (LUP), ft	-	Speed Index (DS)	0.312
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	-
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	61.3
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	1.000	Outer Lanes Freeway Speed (SO), mi/h	76.8
Flow in Lanes 1 and 2 (v12), pc/h	1597	Ramp Junction Speed (S), mi/h	61.3
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	13.0
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	16.2

HCS7 Freeway Diverge Report

Project Information			
Analyst	KAI	Date	1/20/2020
Agency		Analysis Year	2040
Jurisdiction	City of Pendleton	Time Period Analyzed	Future PM
Project Description	Exit 207 IAMP - Segment 1 (EB Off-Ramp) - Alternative 3	Unit	United States Customary

Geometric Data		
	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	45.0
Segment Length (L) / Deceleration Length (LA),ft	1500	200
Terrain Type	Specific Grade	Rolling
Percent Grade, %	-3.10	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors		
Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	0.968	0.950
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity		
Demand Volume (Vi)	1006	108
Peak Hour Factor (PHF)	0.88	0.94
Total Trucks, %	30.00	14.00
Single-Unit Trucks (SUT), %	30	-
Tractor-Trailers (TT), %	70	-
Heavy Vehicle Adjustment Factor (fHV)	0.775	0.781
Flow Rate (vi),pc/h	1475	147
Capacity (c), pc/h	4646	1995
Volume-to-Capacity Ratio (v/c)	0.32	0.07

Speed and Density			
Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	0
Distance to Upstream Ramp (LUP), ft	-	Speed Index (DS)	0.311
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	-
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	61.3
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	1.000	Outer Lanes Freeway Speed (SO), mi/h	76.8
Flow in Lanes 1 and 2 (v12), pc/h	1475	Ramp Junction Speed (S), mi/h	61.3
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	12.0
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	15.1

HCS7 Basic Freeway Report

Project Information

Analyst	KAI	Date	1/20/2020
Agency		Analysis Year	2040
Jurisdiction	City of Pendleton	Time Period Analyzed	Future AM
Project Description	Exit 207 IAMP - Segment 2 (Between EB On and Off Ramps) - Alternative 3	Unit	United States Customary

Geometric Data

Number of Lanes, ln	2	Terrain Type	Rolling
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	0.83
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	67.2
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.968
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	986	Heavy Vehicle Adjustment Factor (f_{HV})	0.625
Peak Hour Factor	0.88	Flow Rate (V_p), pc/h/ln	896
Total Trucks, %	30.00	Capacity (c), pc/h/ln	2372
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2296
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.39
Passenger Car Equivalent (E_T)	3.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	67.2
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	13.3
Total Ramp Density Adjustment	2.8	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	67.2		

HCS7 Basic Freeway Report

Project Information

Analyst	KAI	Date	1/20/2020
Agency		Analysis Year	2040
Jurisdiction	City of Pendleton	Time Period Analyzed	Future PM
Project Description	Exit 207 IAMP - Segment 2 (Between EB On and Off Ramps) - Alternative 3	Unit	United States Customary

Geometric Data

Number of Lanes, ln	2	Terrain Type	Rolling
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	0.83
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	67.2
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.968
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	898	Heavy Vehicle Adjustment Factor (f_{HV})	0.625
Peak Hour Factor	0.88	Flow Rate (V_p), pc/h/ln	816
Total Trucks, %	30.00	Capacity (c), pc/h/ln	2372
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (c_{adj}), pc/h/ln	2296
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.36
Passenger Car Equivalent (E_T)	3.000		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	67.2
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	12.1
Total Ramp Density Adjustment	2.8	Level of Service (LOS)	B
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	67.2		

HCS7 Freeway Merge Report

Project Information			
Analyst	KAI	Date	1/20/2020
Agency		Analysis Year	2040
Jurisdiction	City of Pendleton	Time Period Analyzed	Future AM
Project Description	Exit 207 IAMP - Segment 3 (EB ON-Ramp #1) - Alternative 3	Unit	United States Customary

Geometric Data		
	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	25.0
Segment Length (L) / Acceleration Length (LA),ft	1500	700
Terrain Type	Rolling	Specific Grade
Percent Grade, %	-	-2.00
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors		
Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	0.968	0.950
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity		
Demand Volume (Vi)	986	33
Peak Hour Factor (PHF)	0.88	0.94
Total Trucks, %	30.00	41.00
Single-Unit Trucks (SUT), %	-	30
Tractor-Trailers (TT), %	-	70
Heavy Vehicle Adjustment Factor (fHV)	0.625	0.715
Flow Rate (vi),pc/h	1793	49
Capacity (c), pc/h	4646	1805
Volume-to-Capacity Ratio (v/c)	0.40	0.03

Speed and Density			
Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	0
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	0.311
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	-
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	61.3
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	1.000	Outer Lanes Freeway Speed (SO), mi/h	70.0
Flow in Lanes 1 and 2 (v12), pc/h	1793	Ramp Junction Speed (S), mi/h	61.3
Flow Entering Ramp-Infl. Area (vR12), pc/h	1842	Average Density (D), pc/mi/ln	15.0
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	15.5

HCS7 Freeway Merge Report

Project Information			
Analyst	KAI	Date	1/20/2020
Agency		Analysis Year	2040
Jurisdiction	City of Pendleton	Time Period Analyzed	Future PM
Project Description	Exit 207 IAMP - Segment 3 (EB On-Ramp #1) - Alternative 3	Unit	United States Customary

Geometric Data		
	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	25.0
Segment Length (L) / Acceleration Length (LA),ft	1500	700
Terrain Type	Rolling	Specific Grade
Percent Grade, %	-	-2.00
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors		
Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	0.968	0.950
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity		
Demand Volume (Vi)	898	118
Peak Hour Factor (PHF)	0.88	0.94
Total Trucks, %	30.00	21.00
Single-Unit Trucks (SUT), %	-	30
Tractor-Trailers (TT), %	-	70
Heavy Vehicle Adjustment Factor (fHV)	0.625	0.828
Flow Rate (vi),pc/h	1633	152
Capacity (c), pc/h	4646	1805
Volume-to-Capacity Ratio (v/c)	0.38	0.08

Speed and Density			
Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	0
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	0.309
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	-
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	61.3
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	1.000	Outer Lanes Freeway Speed (SO), mi/h	70.0
Flow in Lanes 1 and 2 (v12), pc/h	1633	Ramp Junction Speed (S), mi/h	61.3
Flow Entering Ramp-Infl. Area (vR12), pc/h	1785	Average Density (D), pc/mi/ln	14.6
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	15.0

HCS7 Freeway Merge Report

Project Information			
Analyst	KAI	Date	1/20/2020
Agency		Analysis Year	2040
Jurisdiction	City of Pendleton	Time Period Analyzed	Future AM
Project Description	Exit 207 IAMP - Segment 4 (EB On-Ramp #2) - Alternative 3	Unit	United States Customary

Geometric Data		
	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Acceleration Length (LA),ft	1500	600
Terrain Type	Specific Grade	Specific Grade
Percent Grade, %	-4.40	-2.80
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors		
Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	0.968	0.950
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity		
Demand Volume (Vi)	1019	50
Peak Hour Factor (PHF)	0.88	0.94
Total Trucks, %	30.00	33.00
Single-Unit Trucks (SUT), %	30	30
Tractor-Trailers (TT), %	70	70
Heavy Vehicle Adjustment Factor (fHV)	0.775	0.758
Flow Rate (vi),pc/h	1494	70
Capacity (c), pc/h	4646	1900
Volume-to-Capacity Ratio (v/c)	0.34	0.04

Speed and Density			
Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	0
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	0.298
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	-
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	61.7
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	1.000	Outer Lanes Freeway Speed (SO), mi/h	70.0
Flow in Lanes 1 and 2 (v12), pc/h	1494	Ramp Junction Speed (S), mi/h	61.7
Flow Entering Ramp-Infl. Area (vR12), pc/h	1564	Average Density (D), pc/mi/ln	12.7
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	14.0

HCS7 Freeway Merge Report

Project Information			
Analyst	KAI	Date	1/20/2020
Agency		Analysis Year	2040
Jurisdiction	City of Pendleton	Time Period Analyzed	Future PM
Project Description	Exit 207 IAMP - Segment 4 (EB On-Ramp #2) - Alternative 3	Unit	United States Customary

Geometric Data		
	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	35.0
Segment Length (L) / Acceleration Length (LA),ft	1500	600
Terrain Type	Specific Grade	Specific Grade
Percent Grade, %	-4.40	-2.80
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors		
Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	0.968	0.950
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity		
Demand Volume (Vi)	1016	58
Peak Hour Factor (PHF)	0.88	0.92
Total Trucks, %	30.00	9.00
Single-Unit Trucks (SUT), %	30	30
Tractor-Trailers (TT), %	70	70
Heavy Vehicle Adjustment Factor (fHV)	0.775	0.907
Flow Rate (vi),pc/h	1490	70
Capacity (c), pc/h	4646	1900
Volume-to-Capacity Ratio (v/c)	0.34	0.04

Speed and Density			
Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	0
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	0.298
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	-
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	61.7
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	1.000	Outer Lanes Freeway Speed (SO), mi/h	70.0
Flow in Lanes 1 and 2 (v12), pc/h	1490	Ramp Junction Speed (S), mi/h	61.7
Flow Entering Ramp-Infl. Area (vR12), pc/h	1560	Average Density (D), pc/mi/ln	12.6
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	13.9

HCS7 Freeway Diverge Report

Project Information			
Analyst	KAI	Date	1/20/2020
Agency		Analysis Year	2040
Jurisdiction	City of Pendleton	Time Period Analyzed	Future AM
Project Description	Exit 207 IAMP - Segment 5 (WB Off-Ramp) - Alternative 3	Unit	United States Customary

Geometric Data		
	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	25.0
Segment Length (L) / Deceleration Length (LA),ft	1500	300
Terrain Type	Specific Grade	Specific Grade
Percent Grade, %	2.70	5.80
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors		
Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	0.968	0.950
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity		
Demand Volume (Vi)	971	144
Peak Hour Factor (PHF)	0.88	0.94
Total Trucks, %	30.00	12.00
Single-Unit Trucks (SUT), %	30	30
Tractor-Trailers (TT), %	70	70
Heavy Vehicle Adjustment Factor (fHV)	0.759	0.859
Flow Rate (vi),pc/h	1454	178
Capacity (c), pc/h	4646	1805
Volume-to-Capacity Ratio (v/c)	0.31	0.10

Speed and Density			
Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	0
Distance to Upstream Ramp (LUP), ft	-	Speed Index (DS)	0.574
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	-
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	53.9
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	1.000	Outer Lanes Freeway Speed (SO), mi/h	76.8
Flow in Lanes 1 and 2 (v12), pc/h	1454	Ramp Junction Speed (S), mi/h	53.9
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	13.5
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	14.1

HCS7 Freeway Diverge Report

Project Information			
Analyst	KAI	Date	1/20/2020
Agency		Analysis Year	2040
Jurisdiction	City of Pendleton	Time Period Analyzed	Future PM
Project Description	Exit 207 IAMP - Segment 5 (WB Off-Ramp) - Alternative 3	Unit	United States Customary

Geometric Data		
	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	25.0
Segment Length (L) / Deceleration Length (LA),ft	1500	300
Terrain Type	Specific Grade	Specific Grade
Percent Grade, %	2.70	5.80
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors		
Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	0.968	0.950
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity		
Demand Volume (Vi)	1004	132
Peak Hour Factor (PHF)	0.88	0.94
Total Trucks, %	30.00	13.00
Single-Unit Trucks (SUT), %	30	30
Tractor-Trailers (TT), %	70	70
Heavy Vehicle Adjustment Factor (fHV)	0.759	0.852
Flow Rate (vi),pc/h	1503	165
Capacity (c), pc/h	4646	1805
Volume-to-Capacity Ratio (v/c)	0.32	0.09

Speed and Density			
Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	0
Distance to Upstream Ramp (LUP), ft	-	Speed Index (DS)	0.573
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	-
Distance to Downstream Ramp (LDOWN), ft	-	Off-Ramp Influence Area Speed (SR), mi/h	54.0
Prop. Freeway Vehicles in Lane 1 and 2 (PFD)	1.000	Outer Lanes Freeway Speed (SO), mi/h	76.8
Flow in Lanes 1 and 2 (v12), pc/h	1503	Ramp Junction Speed (S), mi/h	54.0
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	13.9
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	14.5

HCS7 Basic Freeway Report

Project Information

Analyst	KAI	Date	1/21/2020
Agency		Analysis Year	2040
Jurisdiction	City of Pendleton	Time Period Analyzed	Future AM
Project Description	Exit 207 IAMP - Segment 6 (Between WB Off and On Ramps) - Alternative 3	Unit	United States Customary

Geometric Data

Number of Lanes, ln	2	Terrain Type	Specific Grade
Segment Length (L), ft	-	Percent Grade, %	2.80
Measured or Base Free-Flow Speed	Base	Grade Length, mi	0.20
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	0.83
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	67.2
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.968
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	827	Heavy Vehicle Adjustment Factor (f_{HV})	0.765
Peak Hour Factor	0.88	Flow Rate (V_p), pc/h/ln	614
Total Trucks, %	30.00	Capacity (c), pc/h/ln	2372
Single-Unit Trucks (SUT), %	30	Adjusted Capacity (c_{adj}), pc/h/ln	2296
Tractor-Trailers (TT), %	70	Volume-to-Capacity Ratio (v/c)	0.27
Passenger Car Equivalent (E_T)	2.026		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	67.2
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	9.1
Total Ramp Density Adjustment	2.8	Level of Service (LOS)	A
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	67.2		

HCS7 Basic Freeway Report

Project Information

Analyst	KAI	Date	1/21/2020
Agency		Analysis Year	2040
Jurisdiction	City of Pendleton	Time Period Analyzed	Future PM
Project Description	Exit 207 IAMP - Segment 6 (Between WB Off and On Ramps) - Alternative 3	Unit	United States Customary

Geometric Data

Number of Lanes, ln	2	Terrain Type	Specific Grade
Segment Length (L), ft	-	Percent Grade, %	2.80
Measured or Base Free-Flow Speed	Base	Grade Length, mi	0.20
Base Free-Flow Speed (BFFS), mi/h	70.0	Total Ramp Density (TRD), ramps/mi	0.83
Lane Width, ft	12	Free-Flow Speed (FFS), mi/h	67.2
Right-Side Lateral Clearance, ft	10		

Adjustment Factors

Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Weather Type	Non-Severe Weather	Final Capacity Adjustment Factor (CAF)	0.968
Incident Type	No Incident	Demand Adjustment Factor (DAF)	1.000

Demand and Capacity

Demand Volume veh/h	872	Heavy Vehicle Adjustment Factor (f_{HV})	0.765
Peak Hour Factor	0.88	Flow Rate (V_p), pc/h/ln	648
Total Trucks, %	30.00	Capacity (c), pc/h/ln	2372
Single-Unit Trucks (SUT), %	30	Adjusted Capacity (c_{adj}), pc/h/ln	2296
Tractor-Trailers (TT), %	70	Volume-to-Capacity Ratio (v/c)	0.28
Passenger Car Equivalent (E_T)	2.026		

Speed and Density

Lane Width Adjustment (f_{LW})	0.0	Average Speed (S), mi/h	67.2
Right-Side Lateral Clearance Adj. (f_{RLC})	0.0	Density (D), pc/mi/ln	9.6
Total Ramp Density Adjustment	2.8	Level of Service (LOS)	A
Adjusted Free-Flow Speed (FFS_{adj}), mi/h	67.2		

HCS7 Freeway Merge Report

Project Information			
Analyst	KAI	Date	1/21/2020
Agency		Analysis Year	2040
Jurisdiction	City of Pendleton	Time Period Analyzed	Future AM
Project Description	Exit 207 IAMP - Segment 7 (WB On-Ramp #1) - Alternative 3	Unit	United States Customary

Geometric Data		
	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	25.0
Segment Length (L) / Acceleration Length (LA),ft	1500	900
Terrain Type	Specific Grade	Specific Grade
Percent Grade, %	2.80	-3.40
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors		
Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	0.968	0.950
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity		
Demand Volume (Vi)	827	9
Peak Hour Factor (PHF)	0.88	0.94
Total Trucks, %	30.00	43.00
Single-Unit Trucks (SUT), %	30	30
Tractor-Trailers (TT), %	70	70
Heavy Vehicle Adjustment Factor (fHV)	0.765	0.706
Flow Rate (vi),pc/h	1228	14
Capacity (c), pc/h	4646	1805
Volume-to-Capacity Ratio (v/c)	0.27	0.01

Speed and Density			
Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	0
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	0.290
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	-
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	61.9
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	1.000	Outer Lanes Freeway Speed (SO), mi/h	70.0
Flow in Lanes 1 and 2 (v12), pc/h	1228	Ramp Junction Speed (S), mi/h	61.9
Flow Entering Ramp-Infl. Area (vR12), pc/h	1242	Average Density (D), pc/mi/ln	10.0
Level of Service (LOS)	A	Density in Ramp Influence Area (DR), pc/mi/ln	9.6

HCS7 Freeway Merge Report

Project Information			
Analyst	KAI	Date	1/21/2020
Agency		Analysis Year	2040
Jurisdiction	City of Pendleton	Time Period Analyzed	Future PM
Project Description	Exit 207 IAMP - Segment 7 (WB On-Ramp #1) - Alternative 3	Unit	United States Customary

Geometric Data		
	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	25.0
Segment Length (L) / Acceleration Length (LA),ft	1500	900
Terrain Type	Specific Grade	Specific Grade
Percent Grade, %	2.80	-3.40
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors		
Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	0.968	0.950
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity		
Demand Volume (Vi)	872	24
Peak Hour Factor (PHF)	0.88	0.88
Total Trucks, %	30.00	20.00
Single-Unit Trucks (SUT), %	30	30
Tractor-Trailers (TT), %	70	70
Heavy Vehicle Adjustment Factor (fHV)	0.765	0.835
Flow Rate (vi),pc/h	1295	33
Capacity (c), pc/h	4646	1805
Volume-to-Capacity Ratio (v/c)	0.29	0.02

Speed and Density			
Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	0
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	0.291
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	-
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	61.9
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	1.000	Outer Lanes Freeway Speed (SO), mi/h	70.0
Flow in Lanes 1 and 2 (v12), pc/h	1295	Ramp Junction Speed (S), mi/h	61.9
Flow Entering Ramp-Infl. Area (vR12), pc/h	1328	Average Density (D), pc/mi/ln	10.7
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	10.2

HCS7 Freeway Merge Report

Project Information			
Analyst	KAI	Date	1/21/2020
Agency		Analysis Year	2040
Jurisdiction	City of Pendleton	Time Period Analyzed	Future AM
Project Description	Exit 207 IAMP - Segment 8 (WB On-Ramp #2) - Alternative 3	Unit	United States Customary

Geometric Data		
	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1500	750
Terrain Type	Specific Grade	Rolling
Percent Grade, %	2.40	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors		
Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	0.968	0.950
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity		
Demand Volume (Vi)	836	120
Peak Hour Factor (PHF)	0.88	0.94
Total Trucks, %	30.00	33.00
Single-Unit Trucks (SUT), %	30	-
Tractor-Trailers (TT), %	70	-
Heavy Vehicle Adjustment Factor (fHV)	0.761	0.602
Flow Rate (vi),pc/h	1248	212
Capacity (c), pc/h	4646	1995
Volume-to-Capacity Ratio (v/c)	0.31	0.11

Speed and Density			
Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	0
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	0.270
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	-
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	62.4
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	1.000	Outer Lanes Freeway Speed (SO), mi/h	70.0
Flow in Lanes 1 and 2 (v12), pc/h	1248	Ramp Junction Speed (S), mi/h	62.4
Flow Entering Ramp-Infl. Area (vR12), pc/h	1460	Average Density (D), pc/mi/ln	11.7
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	12.1

HCS7 Freeway Merge Report

Project Information			
Analyst	KAI	Date	1/21/2020
Agency		Analysis Year	2040
Jurisdiction	City of Pendleton	Time Period Analyzed	Future PM
Project Description	Exit 207 IAMP - Segment 8 (WB On-Ramp #2) - Alternative 3	Unit	United States Customary

Geometric Data		
	Freeway	Ramp
Number of Lanes (N), ln	2	1
Free-Flow Speed (FFS), mi/h	70.0	45.0
Segment Length (L) / Acceleration Length (LA),ft	1500	750
Terrain Type	Specific Grade	Rolling
Percent Grade, %	2.40	-
Segment Type / Ramp Side	Freeway	Right

Adjustment Factors		
Driver Population	All Familiar	All Familiar
Weather Type	Non-Severe Weather	Non-Severe Weather
Incident Type	No Incident	-
Final Speed Adjustment Factor (SAF)	1.000	1.000
Final Capacity Adjustment Factor (CAF)	0.968	0.950
Demand Adjustment Factor (DAF)	1.000	1.000

Demand and Capacity		
Demand Volume (Vi)	896	198
Peak Hour Factor (PHF)	0.88	0.88
Total Trucks, %	30.00	10.00
Single-Unit Trucks (SUT), %	30	-
Tractor-Trailers (TT), %	70	-
Heavy Vehicle Adjustment Factor (fHV)	0.761	0.833
Flow Rate (vi),pc/h	1338	270
Capacity (c), pc/h	4646	1995
Volume-to-Capacity Ratio (v/c)	0.35	0.14

Speed and Density			
Upstream Equilibrium Distance (LEQ), ft	-	Number of Outer Lanes on Freeway (NO)	0
Distance to Upstream Ramp (LUP), ft	-	Speed Index (MS)	0.273
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/h/ln	-
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influence Area Speed (SR), mi/h	62.4
Prop. Freeway Vehicles in Lane 1 and 2 (PFM)	1.000	Outer Lanes Freeway Speed (SO), mi/h	70.0
Flow in Lanes 1 and 2 (v12), pc/h	1338	Ramp Junction Speed (S), mi/h	62.4
Flow Entering Ramp-Infl. Area (vR12), pc/h	1608	Average Density (D), pc/mi/ln	12.9
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	13.3

Attachment C

Planning Level Cost Estimates

ODOT- Exit 207 IAMP
PLANNING LEVEL COST ESTIMATE
IAMP
(YEAR 2020 COSTS)
6/2/2020

Prepared By: DR
Reviewed By: ASL
Anderson Perry and Associates, Inc

Exit 207 - Alternative 1B With Accessory #2

NO.	DESCRIPTION	UNIT	UNIT PRICE	ESTIMATED QUANTITY	TOTAL PRICE
1	Mobilization/Demobilization (10%)	LS	$ 287,000	All Req'd	$ 287,000
2	Temporary Protection and Direction of Traffic	LS	$ 42,000	All Req'd	42,000
3	Asphalt Concrete Pavement	TON	100	13,400	1,340,000
4	Aggregate Base	TON	28	32,900	921,200
5	Geotextile Fabric	SQYD	2	35,400	53,100
6	Concrete Pavement	SQYD	50	5,000	250,000
7	Earthwork	CY	10	20,600	206,000
8	Permanent Signing and Striping	LS	50,000	All Req'd	50,000
9	Erosion Control	LS	$ 14,000	All Req'd	14,000
				Total Estimated Construction Cost	**$ 3,163,300**
				Construction Condingency (20%)	$ 632,000
				Construction Engineering (15%)	$ 474,000
				Preliminary Engineering (15%)	$ 474,000
				TOTAL ESTIMATED PROJECT COST (2020)	**$ 4,743,300**

ODOT- Exit 207 IAMP
PLANNING LEVEL COST ESTIMATE
IAMP
(YEAR 2020 COSTS)
6/2/2020

Prepared By: DR
Reviewed By: ASL
Anderson Perry and Associates, Inc

Exit 207 - Alternative 3

NO.	DESCRIPTION	UNIT	UNIT PRICE	ESTIMATED QUANTITY	TOTAL PRICE
1	Mobilization/Demobilization (10%)	LS	$ 287,000	All Req'd	$ 287,000
2	Temporary Protection and Direction of Traffic	LS	$ 42,000	All Req'd	42,000
3	Asphalt Concrete Pavement	TON	100	12,700	1,270,000
4	Aggregate Base	TON	28	37,200	1,041,600
5	Geotextile Fabric	SQYD	2	38,700	58,100
6	Earthwork	CY	10	14,400	144,000
7	Permanent Signing and Striping	LS	50,000	All Req'd	50,000
8	Signalized Intersection	EA	300,000	1	300,000
9	Erosion Control	LS	$ 14,000	All Req'd	14,000
				Total Estimated Construction Cost	**$ 3,206,700**
				Construction Condingency (20%)	$ 641,000
				Construction Engineering (15%)	$ 481,000
				Preliminary Engineering (15%)	$ 481,000
				TOTAL ESTIMATED PROJECT COST (2020)	**$ 4,809,700**