KITTELSON & ASSOCIATES
101 S CAPITOL BOULEVARD, SUITE 600
BOISE, ID 83702
P 208.338.2683 F 208.338.2685

TECHNICAL MEMORANDUM #4

Pendleton IAMPs: Exit 210

Future Baseline Conditions: Transportation System Operations

Date:	January 28, 2020	Project #: 24043
To:	Technical Advisory Committee, Citizen Advisory Committee	
From:	Amy Griffiths, Mark Heisinger, Nick Foster, AICP, and Matt Hughart, AICP; Kittelson & Associates, Inc.	

This memorandum describes future land-use and traffic growth projections and future traffic operations within the vicinity of the I-84 Exit 210 interchange. The information in this memorandum provides a basis for the development and analysis of potential project alternatives. It will inform the identification of various opportunities and constraints for meeting the goals and objectives of the interchange area management plan (IAMP).

FUTURE LAND USE ANALYSIS

The analysis of potential future land use in the Interchange Management Study Area (IMSA) builds off the analysis of vacant and re-developable land presented in the *Existing Conditions: System Inventory* memorandum (Reference 1). Most vacant and re-developable land within the IMSA is located northeast and south of the Exit 210 interchange. Vacant and re-developable land northeast land is primarily zoned for residential uses (i.e., R-1 – Low Density Residential, R-2 – Medium Density Residential, or R-3 – High Density Residential), commercial uses (i.e., C-3 – Service Commercial), or farm use (i.e., EFU-CO – Farm Use). Vacant and re-developable land south of the interchange is zoned for commercial uses (i.e., C-3 – Service Commercial and C-2 – Tourist Commercial).

The project team evaluated the development potential of the vacant and re-developable lands under their current zoning designations. Table 1 summarizes the results of this analysis by zone. Note that this analysis assumes full build-out of the vacant and re-developable properties and does not necessarily reflect 20-year development projections.

Table 1 – Estimated Development Potential

Zoning Designation	Development Potential
Residential (R-1, 2, & 3 & EFU)	250 - 2,100[1]
Tourist Commercial (C-2)	11,000[2]
Service Commercial (C-3)	378,000[2]

[1] number of units
[2] sq. ft of gross leasable area

The land-use analysis is further described in Attachment "A."

FUTURE GROWTH PROJECTIONS

The project team obtained the Pendleton Travel Demand Model for year 2015 and year 2040 from the Oregon Department of Transportation (ODOT) and used it to develop future traffic volumes within the Exit 210 Operations and Access Study Area (OASA). This process included manually redistributing some volumes and then post-processing the volumes using National Cooperative Highway Research Program (NCHRP) Report 765 methodology to develop intersection turning movement and link volumes for the AM and PM peak hours.

In addition to analyzing the processed volumes from the ODOT travel demand model, the project team also conducted a sensitivity analysis assuming additional growth in the vacant properties northeast and south of the interchange.

Modifications to Travel Demand Model Projections

An initial review of the future travel demand model revealed several roadway links within the Exit 210 OASA that experienced a decline in traffic volumes between year 2015 and year 2040. These declines were inconsistent with the projected growth in employment in the area. Further inspection revealed that the model was routing large amounts of traffic along US 30 to the Barnhart Road interchange with I-84 via a new connection along Old Airport Road (i.e., shifting demand from I-84 to this northerly route). To address this unrealistic shift in volumes, the project team redistributed some traffic volume from the US 30-Old Airport Road-Barnhart Road route to I-84 through the Exit 207 and Exit 210 interchanges. The project team also redistributed some local road traffic volumes to achieve growth commensurate with the expected increase in development in the area.

Developing Final Projected Volumes from the Travel Demand Model

The project team post-processed the redistributed model volumes using the NCHRP Report 765 methodology, as recommended by the ODOT *Analysis Procedures Manual* (Reference 1). This analysis produced year 2040 intersection turning movements and I-84 link volumes for the AM and PM peak hours. These volumes were then balanced between study intersections. The resulting year 2040 traffic volumes are shown in Figures 1 and 2 for the AM and PM peak hour, respectively.

FUTURE BASELINE TRANSPORTATION SYSTEM OPERATIONS

The project team analyzed year 2040 AM and PM peak hour transportation operations for all study intersections within the Exit 210 OASA and for all I-84 merge, diverge, and mainline segments within the vicinity of the Exit 210 interchange. The traffic operations analysis was performed in accordance with the same methodologies used for the existing conditions operations analysis, presented in the *Existing Conditions: Transportation System Operations* memorandum (Reference 2).

ODOT uses volume-to-capacity (V/C) ratios to assess highway segment and intersection operations. The applicable mobility targets at each of the Exit 210 OASA study intersections, I-84 interchange terminals, and highway segments are summarized in Table 2.

Table 2 – Study Intersection Performance Targets

Intersection	OHP Mobility Target
OR 11/SE Isaac Avenue	0.80 OR 11 approach / 0.90 Isaac Avenue approach
OR 11/SE Kirk Avenue	0.80 OR 11 approach / 0.90 Kirk Avenue approach
I-84 Westbound Ramp Terminal/OR 11	0.85[1]
I-84 Eastbound Ramp Terminal/OR 11	0.85[1]
SE 3rd Avenue/SE Nye Avenue[2]	0.90[2]

[1] The I-84 westbound and eastbound ramp terminals were evaluated with a more conservative v/c of 0.85 per Action 1F.1 of the Oregon Highway Plan.
[2] The City of Pendleton does not have intersection or roadway performance targets – target v/c of 0.90 assumed.
[3] The highway segment mobility target for I-84 is 0.80.

Study Intersections

The results of the year 2040 traffic operations analysis for the study intersections are shown in Figures 1 and 2 for the AM and PM peak hours, respectively. The critical movements at each intersection are forecast to operate under the applicable mobility targets outlined in Table 2. *Intersection operations worksheets are shown in Attachment "B."*

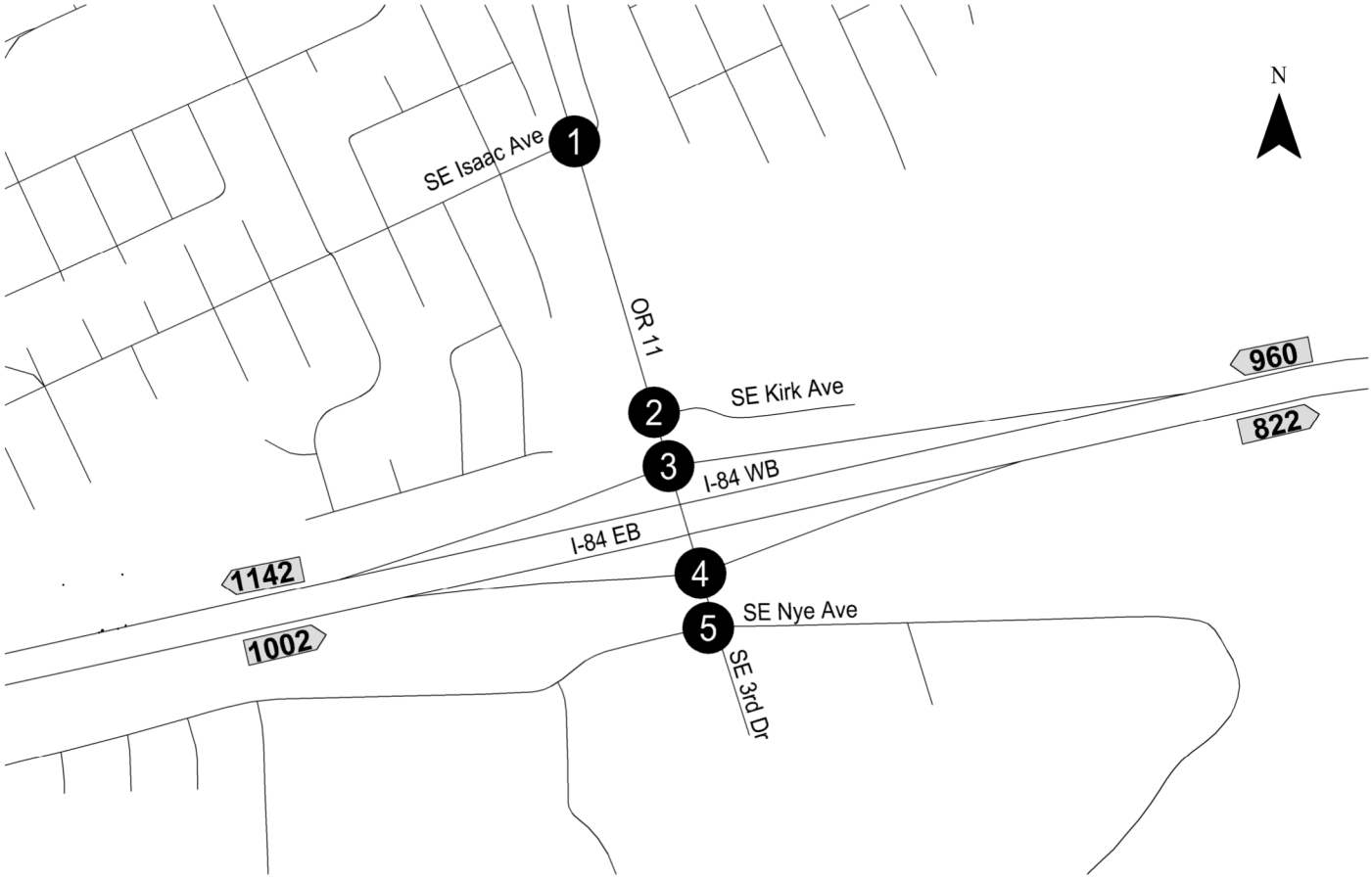
I-84 Merge, Diverge, and Mainline Segments

The results of the year 2040 traffic operations analysis for I-84 merge, diverge, and mainline segments are shown in Table 3. As shown in Table 3, all segment v/c ratios are forecast to operate below the target v/c ratio of 0.80 during the AM and PM peak hours. *Freeway operations worksheets are shown in Attachment "C."*

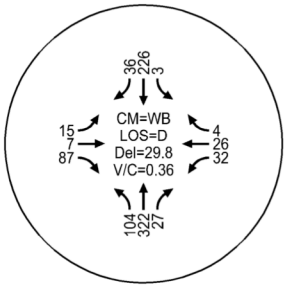
Table 3 I-84 AM and PM Peak Hour Operations

Segment #	Direction	Type	Location	LOS[1]		V/C[2]	
				AM	PM	AM	PM
1	EB	Diverge	W of EB Off-Ramp	B	B	0.32	0.36
2	EB	Main	EB Off-Ramp to EB On-Ramp	A	B	0.30	0.34
3	EB	Merge	EB On-Ramp	B	B	0.36	0.40
4	WB	Diverge	EB of WB Off-Ramp	B	B	0.38	0.39
5	WB	Main	WB Off-Ramp to WB On-Ramp	B	B	0.36	0.35
6	WB	Merge	WB On-Ramp	C	B	0.55	0.40

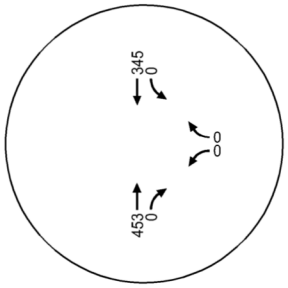
[1]Level-of-service – defined in terms of vehicle density (passenger car/mile/lane).
[2] Volume-to-capacity ratio. For merge/diverge segments – the reported v/c indicates worst-case for either the ramp or mainline facilities.



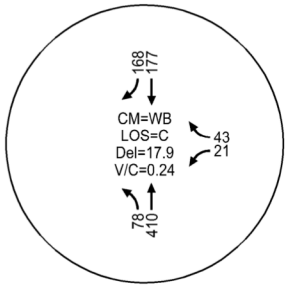
1 SE Isaac Ave / OR 11



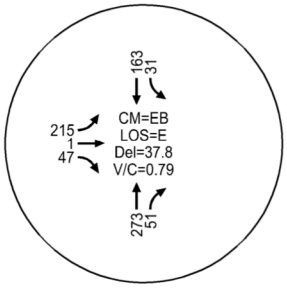
2 SE Kirk Ave / OR 11



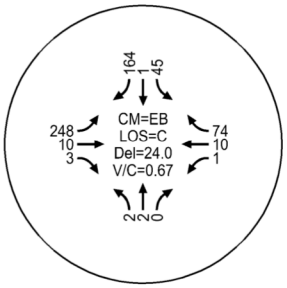
3 I-84 WB Ramp Terminal / OR 11



4 I-84 EB Ramp Terminal / OR 11



5 SE Nye Ave / SE 3rd Dr



- 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 210
Pendleton, OR

Figure
1

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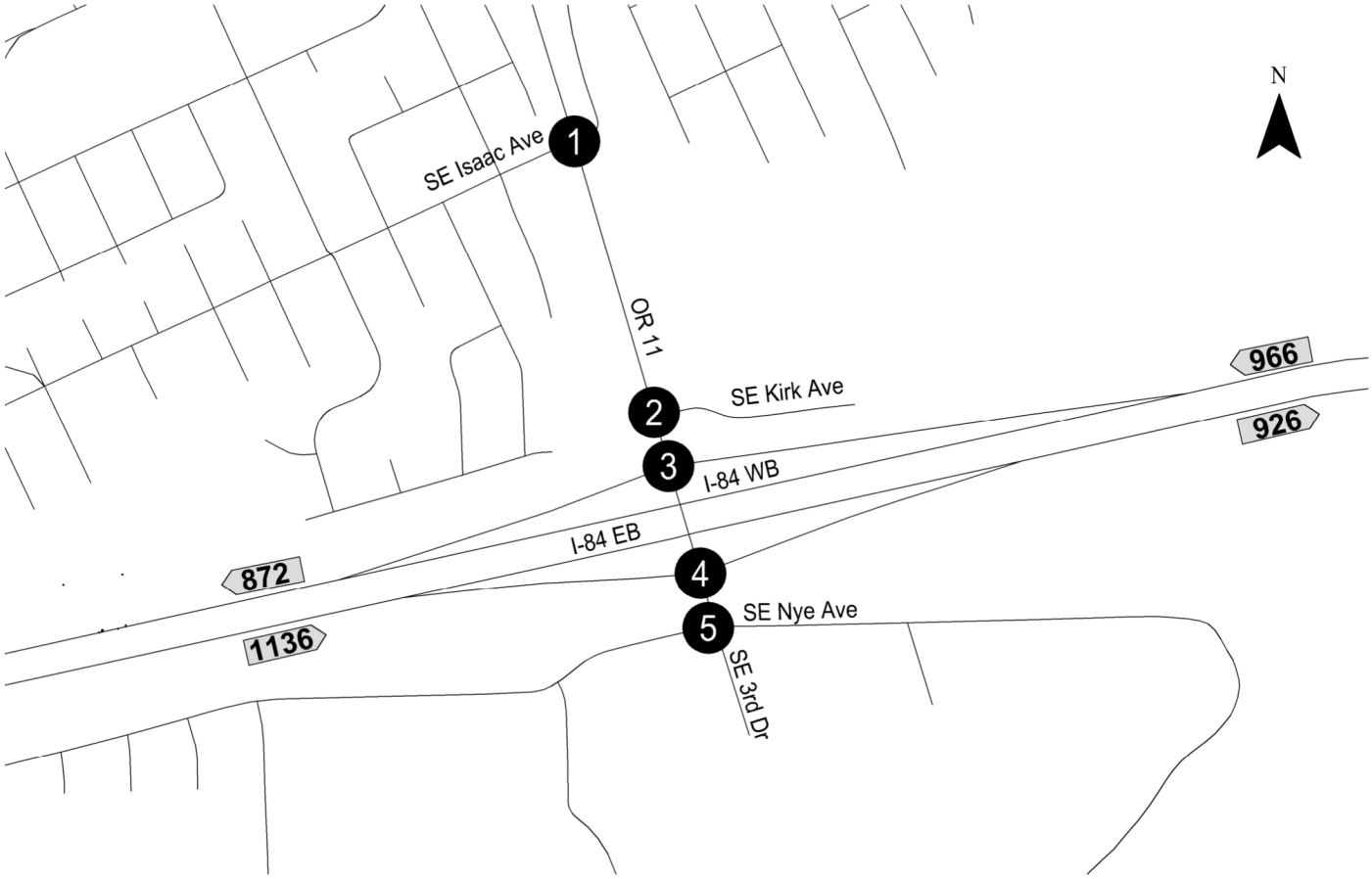

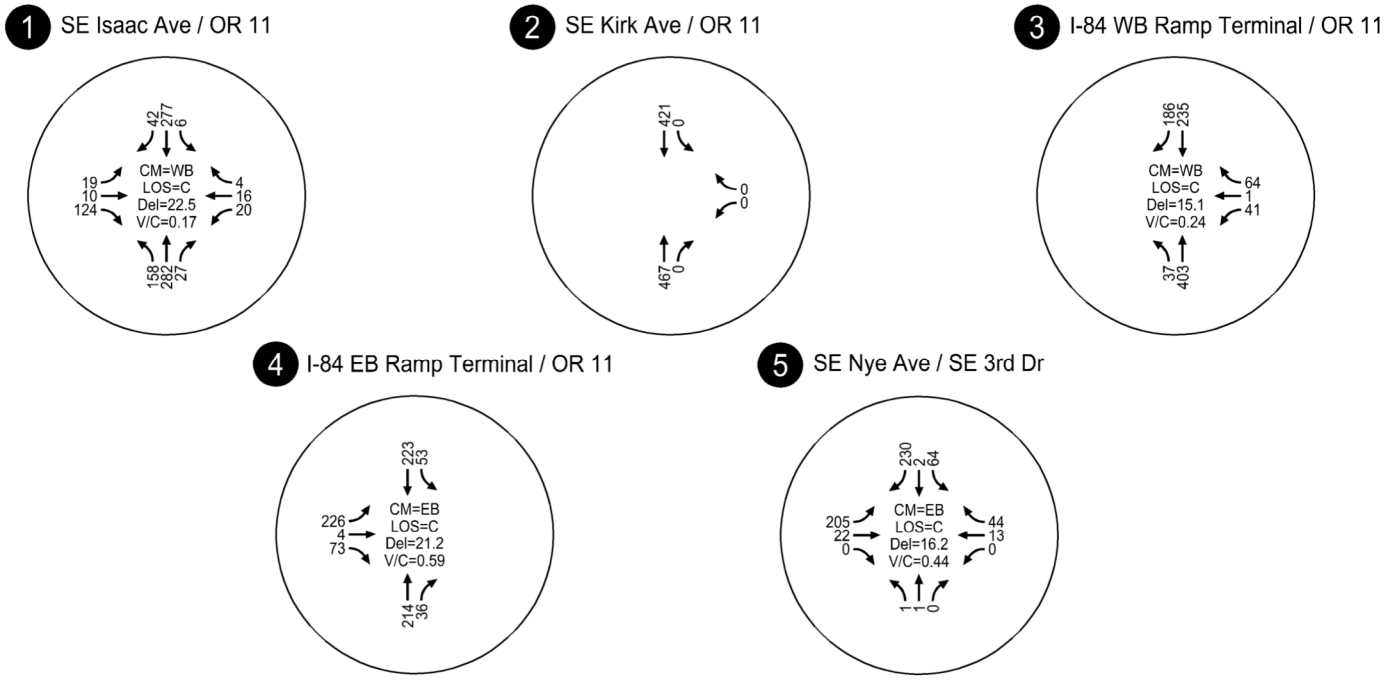

- Study Intersections
CM - Critical Movement
LOS - Level of Service
Del - Vehicle Delay (s)
V/C - Volume-To-Capacity Ratio
- I-84 Peak Hour Volume

Future PM Peak Hour Traffic Operations
Exit 210
Pendleton, OR

Figure
2

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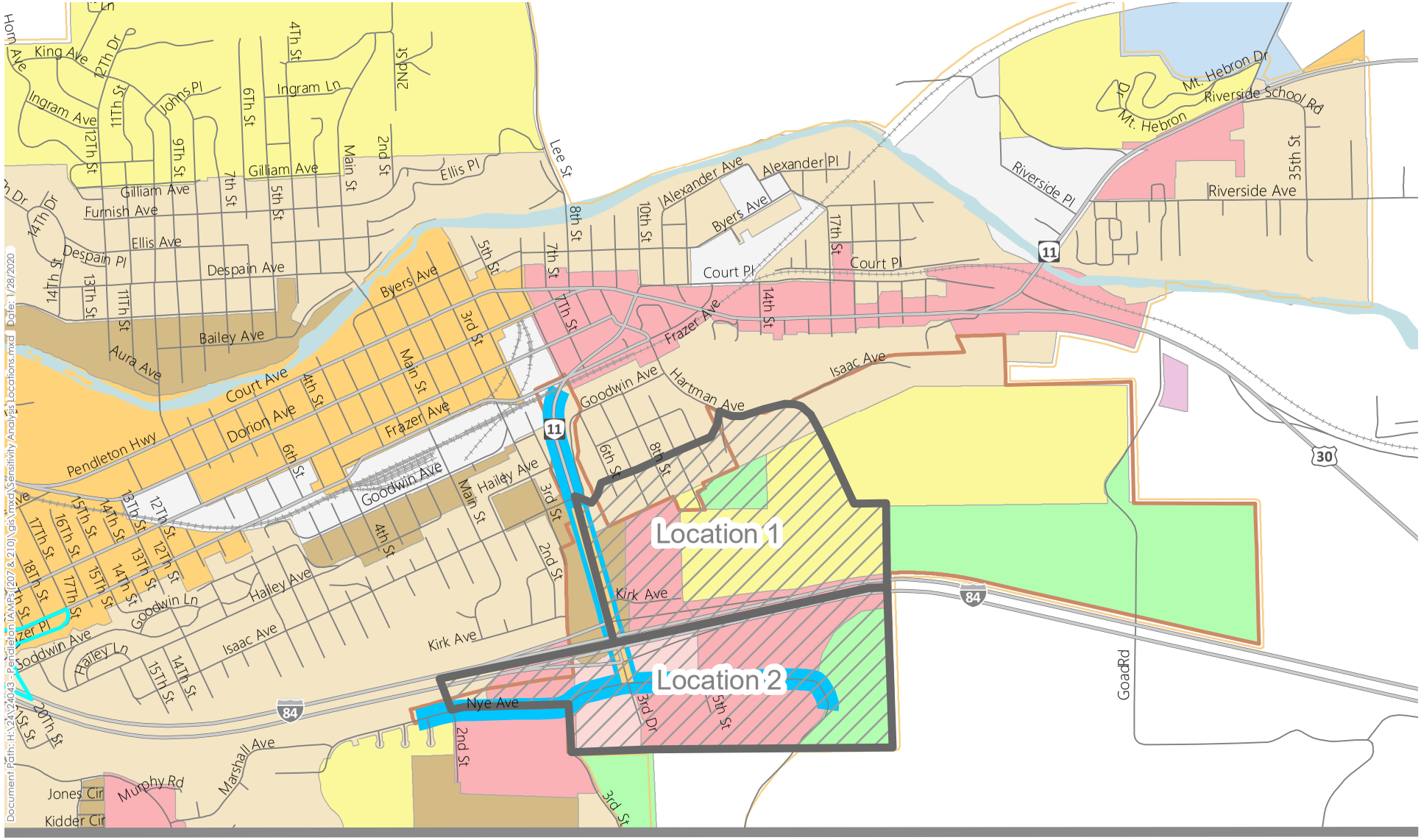
Sensitivity Analysis

As noted previously, the travel demand model assumed modest growth in the study area, below the development potential of the area. Therefore, the project team conducted a sensitivity analysis to evaluate the effect that additional development might have on the Exit 210 OASA. This analysis focuses on growth that could occur in two general areas that will have a direct effect on the function of the Exit 210 interchange:

- **Location 1:** Vacant properties northeast of the Exit 210 interchange. They are accessed by Kirk Avenue, Isaac Avenue, and Goad Road. These properties are currently zoned for Service Commercial, Low-Density Residential, Medium-Density Residential, High-Density Residential and Farm uses.
- **Location 2:** Infill development south of the Exit 210 interchange. These properties access Nye Avenue on either side of SE 3rd Drive. These properties include the former Bi-Mart site, the vacant property east of the Super 8 Hotel, and the vacant property east of the Hampton Inn. These properties are zoned for Service Commercial

Locations 1 and 2 and their underlying zoning designations are shown in Figure 3.



Sensitivity Analysis Locations
Minimum 1320' IAMP Limits
Operations/Access Study Area
Interchange Management Study Area
Pendleton City UGB

Zoning Classification

CMU - Central Mixed Use
C-2 - Tourist Commercial
C-3 - Service Commercial
M-1 - Light Industrial
M-2 - Heavy Industrial
AA - Airport Activities
R-1 - Low Density Residential
R-2 - Medium Density Residential
R-3 - High Density Residential
EFU-CO - Farm Use
IRA - Industrial Reserve Area Overlay
UC - Uncinorporated Community
RR-2 - Rural Residential 2 Ac
RR-4 - Rural Residential 4 Ac
RHI - Rural Heavy Industrial
RLI - Rural Light Industrial

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Figure 3

Sensitivity Analysis Locations and Zoning
Exit 210

Sensitivity Analysis - Trip Generation and Trip Distribution

The additional development assumed in the sensitivity analysis was based on the build-out of Location 1 and 2 in accordance with the current City of Pendleton zoning designations[1]. Tables 3 and 4 show the assumed level of development and their trip generation potential in Locations 1 and 2, respectively.

Table 4 Trip Generation Northeast of Exit 210 Interchange (Location 1)

Land Use (unit type)	ITE Code[1]	Units	Daily	Weekday AM Peak Hour			Weekday PM Peak Hour		
				Total	In	Out	Total	In	Out
Multi-family Housing (Low-Rise)	220	94	670	45	10	35	56	35	21
Single-family Housing	210	508	4638	365	91	274	484	305	179
Total Residential:			***5308***	***410***	***102***	***309***	***540***	***340***	***200***
Gas Station (1000 sf)	944	1	1203	85	42	43	109	55	54
Shopping Center (1000 sf)	820	116	6650	210	130	80	606	291	315
Hotel (rooms)	310	100	702	45	26	18	49	25	24
Fast Food (1000 sf)	934	3	1413	121	61	59	98	51	47
Total Commercial:			***9968***	***460***	***260***	***200***	***863***	***422***	***441***
Internal Capture (Commercial):			***-1196***	***-60***	***-34***	***-26***	***-95***	***-46***	***-48***
Total Commercial (Adjusted for Internal Capture):			***8772***	***400***	***226***	***174***	***768***	***376***	***392***
Total:			***14,080***	***810***	***328***	***482***	***1307***	***716***	***592***

[1]In accordance with ITE Trip Generation Manual 10th Edition (Reference 3)

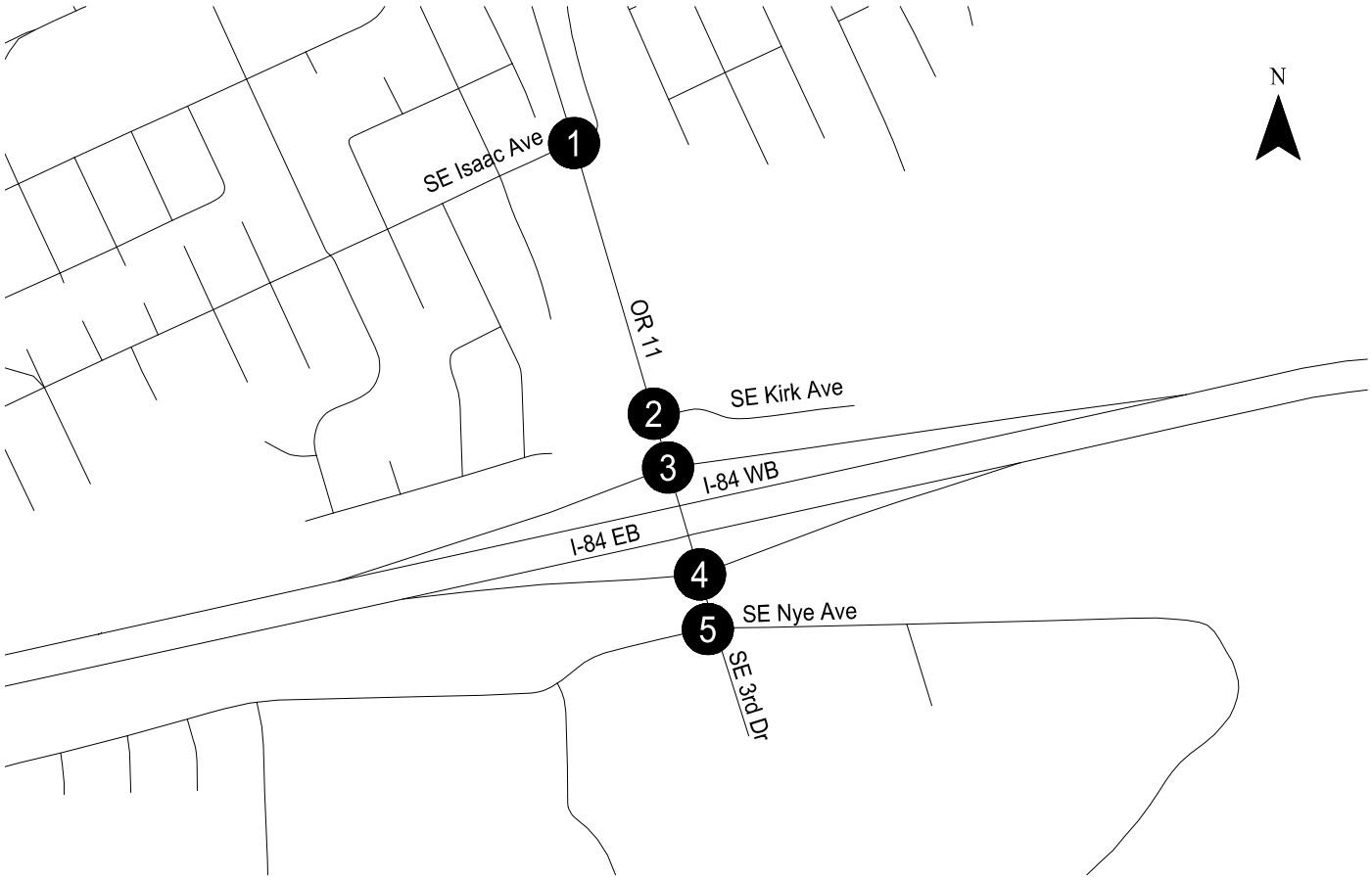
Table 5 Trip Generation South of Exit 210 Interchange (Location 2)

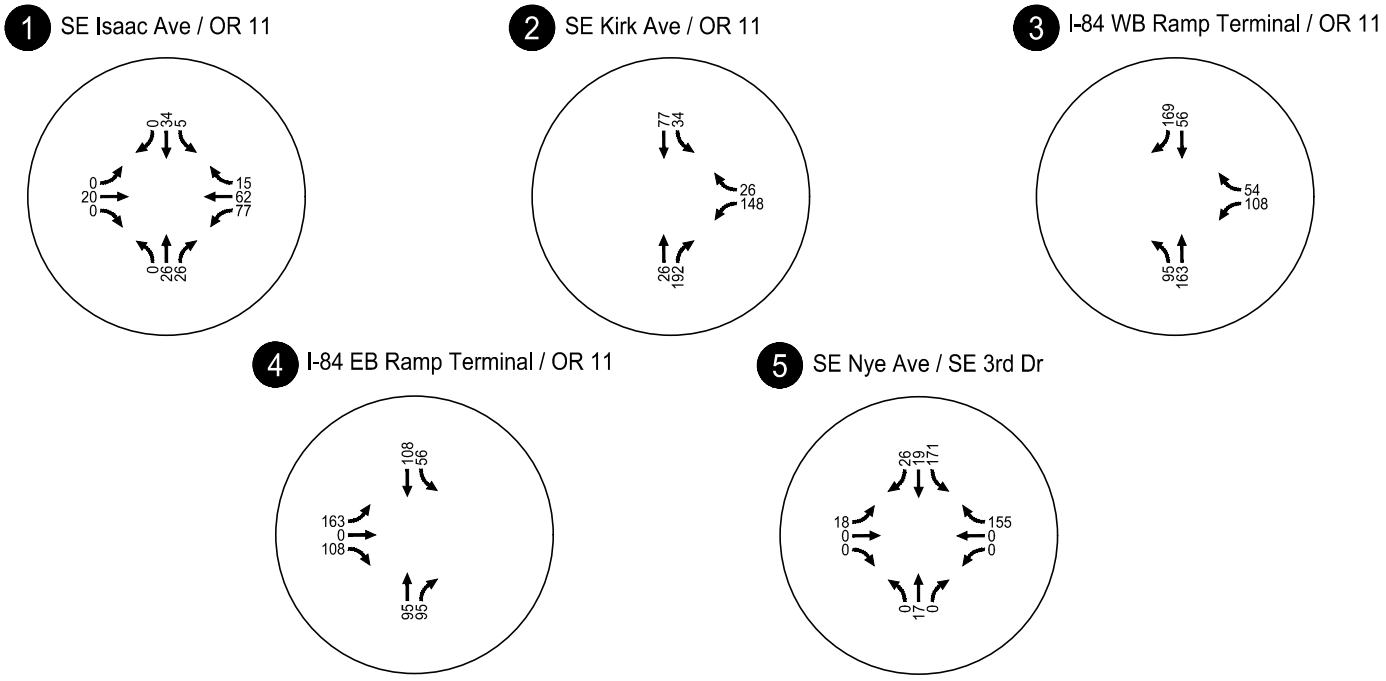
Land Use (unit type)	ITE Code[1]	Units	Daily	Weekday AM Peak Hour			Weekday PM Peak Hour		
				Total	In	Out	Total	In	Out
Hotel - West of 3rd Dr (rooms)	310	100	702	45	26	18	49	25	24
Hotel - East of 3rd Dr (rooms)	310	100	702	45	26	18	49	25	24
Gas Station (1000 sf)	944	1.8	2165	152	76	76	197	98	99
Fast Food (1000 sf)	934	3	1413	121	61	59	98	51	47
Total:			***4982***	***362***	***190***	***172***	***393***	***199***	***194***

[1]In accordance with ITE Trip Generation Manual 10th Edition (Reference 3)

As shown in Tables 3 and 4, there are approximately 1,200 trips generated in the AM peak hour and 1,700 trips generated in the PM peak hour by the additional development. The project team assigned the trips onto the surrounding roadway network, assuming that most of the trips are I-84-oriented, as shown in Figures 4 and 5 for the AM and PM peak hours, respectively.

[1] The area in Location 1, northeast of the Exit 210 interchange, is designated as a Mixed-use Opportunity Area in the City's Comprehensive Plan. This designation allows the underlying zoning of this area to change with a master plan development application.

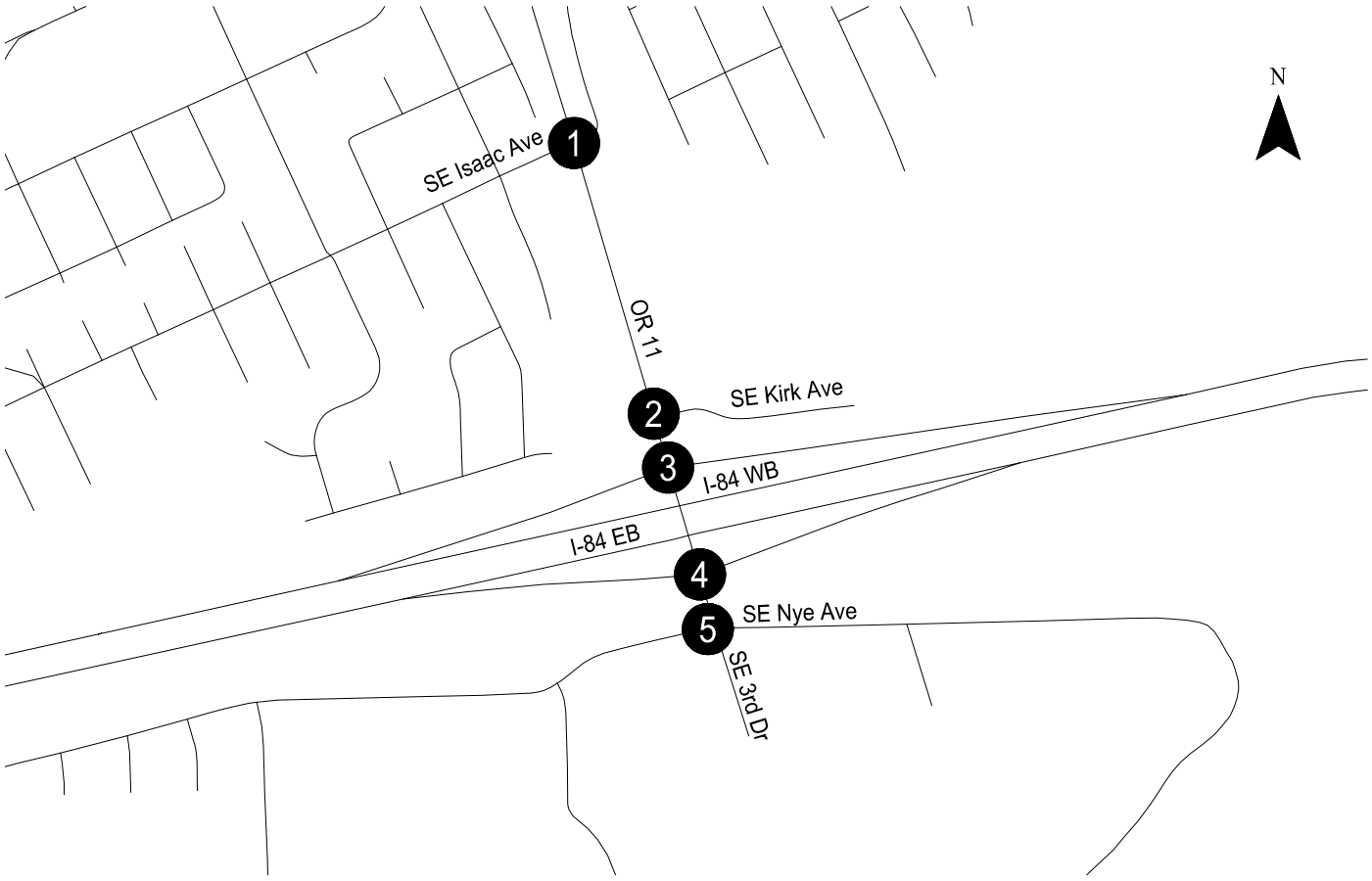


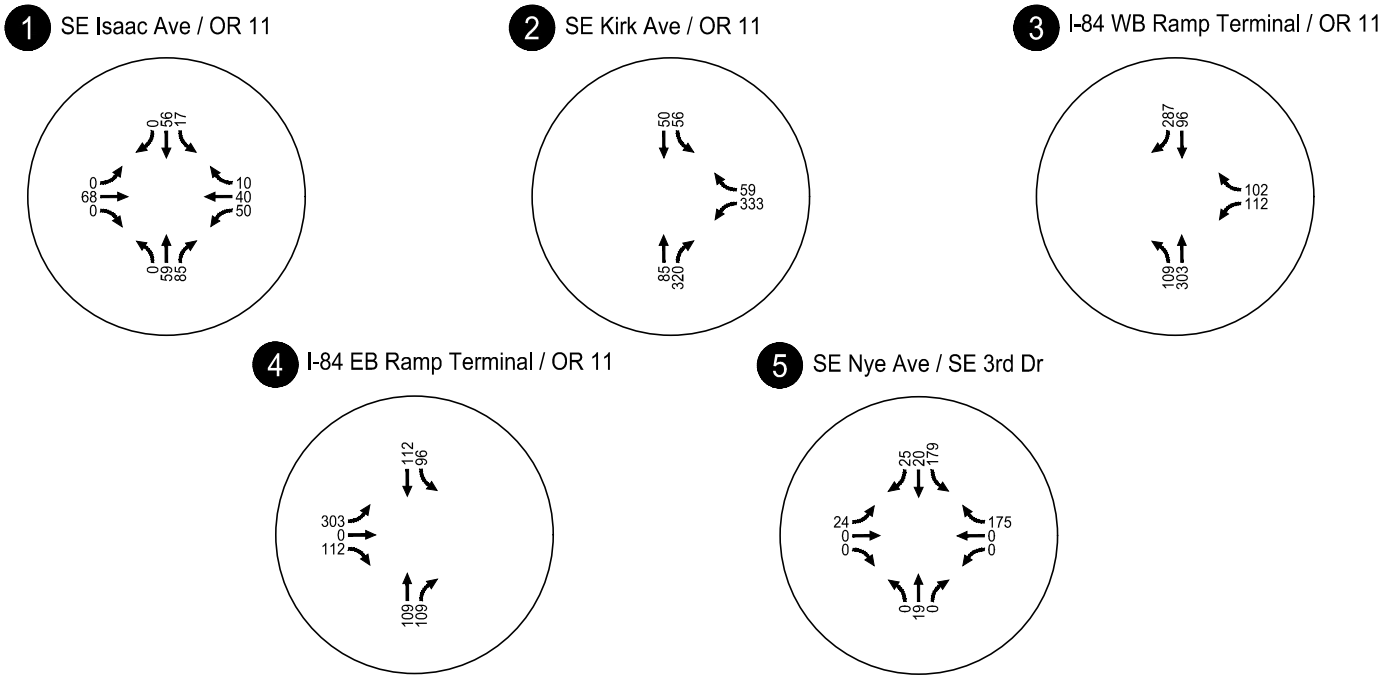


- Study Intersections

Future AM Peak Hour Trip Assignment
Sensitivity Analysis - Exit 210
Pendleton, OR

Figure
4





- Study Intersections

Future PM Peak Hour Trip Assignment
Sensitivity Analysis - Exit 210
Pendleton, OR

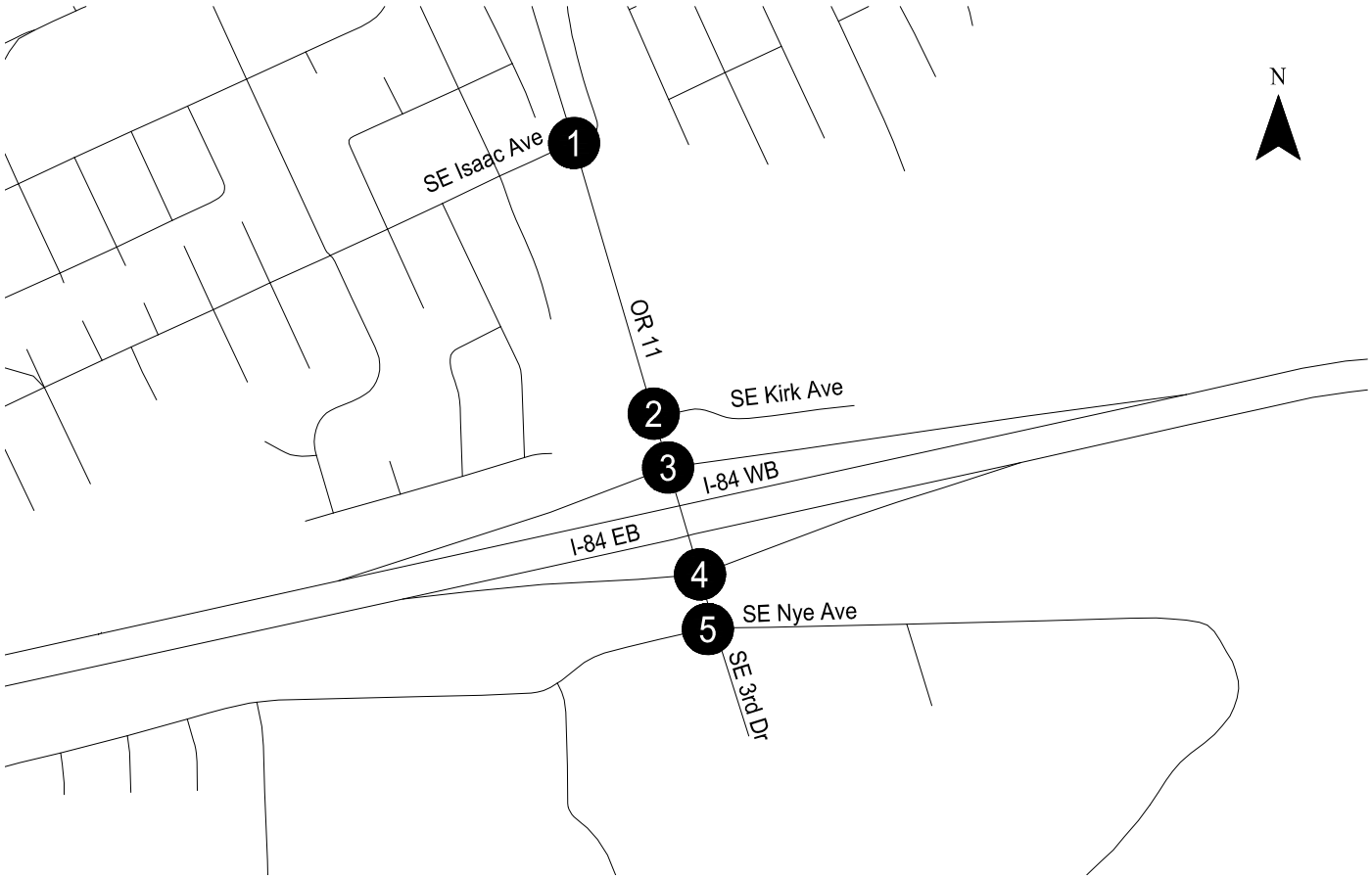
Figure 5

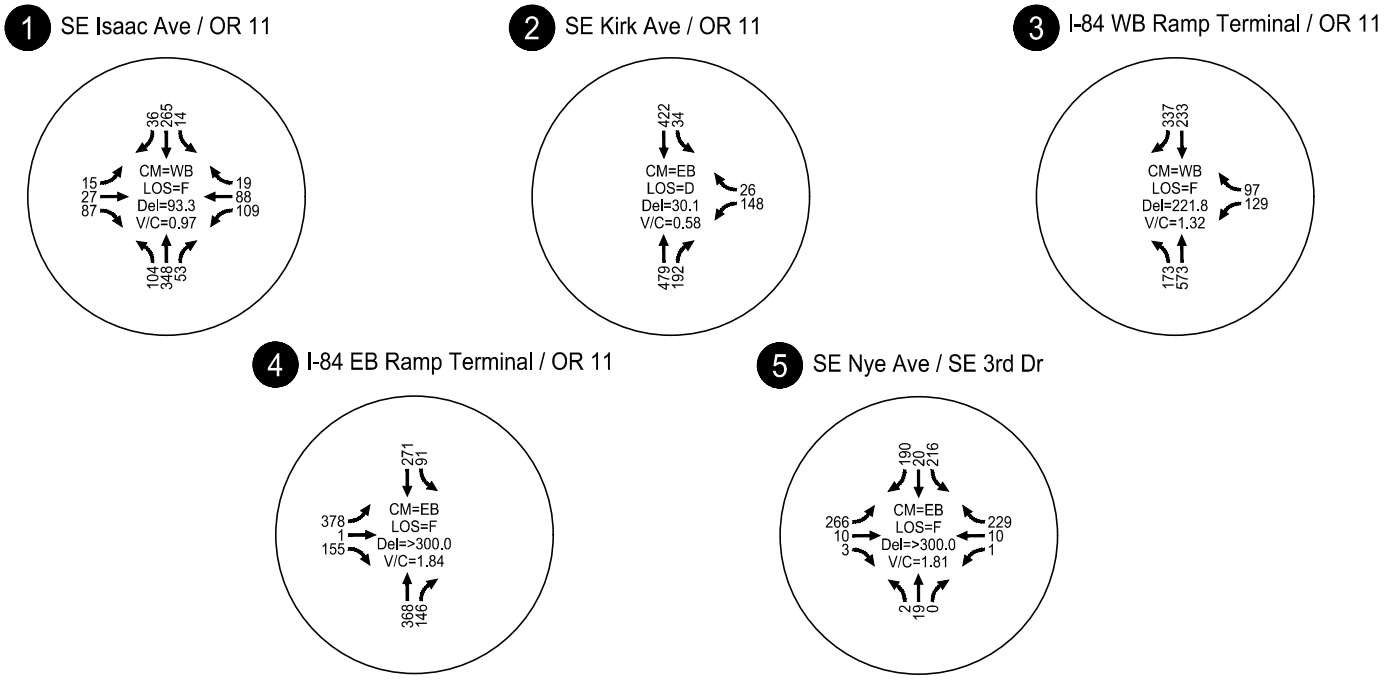
Sensitivity Analysis – Study Intersection Traffic Operations

The results of the year 2040 traffic operations analysis for the study intersections are shown in Figures 6 and 7 for the AM and PM peak hours, respectively. The critical movements at each intersection operate above the applicable mobility targets outlined in Table 1, except for the SE Kirk Ave/OR 11 intersection in the AM peak hour. The critical movements of all intersections operate at level of service (LOS) F during the AM and PM peak hour, except for the SE Kirk Ave/OR 11 intersection in the AM peak hour which operates at LOS D. *Intersection operations worksheets are included in Attachment "D."*

NEXT STEPS

The project team will review the findings of these analyses with the project Technical and Citizen Advisory Committees (TAC/CAC). The results of these findings will be used to create project alternatives for the Exit 210 interchange area. These alternatives may include modifications related to the Exit 210 interchange, local circulation and/or access, and/or land development requirements/guidelines.





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

Future AM Peak Hour Traffic Operations Sensitivity Analysis - Exit 210 Pendleton, OR

Figure 6

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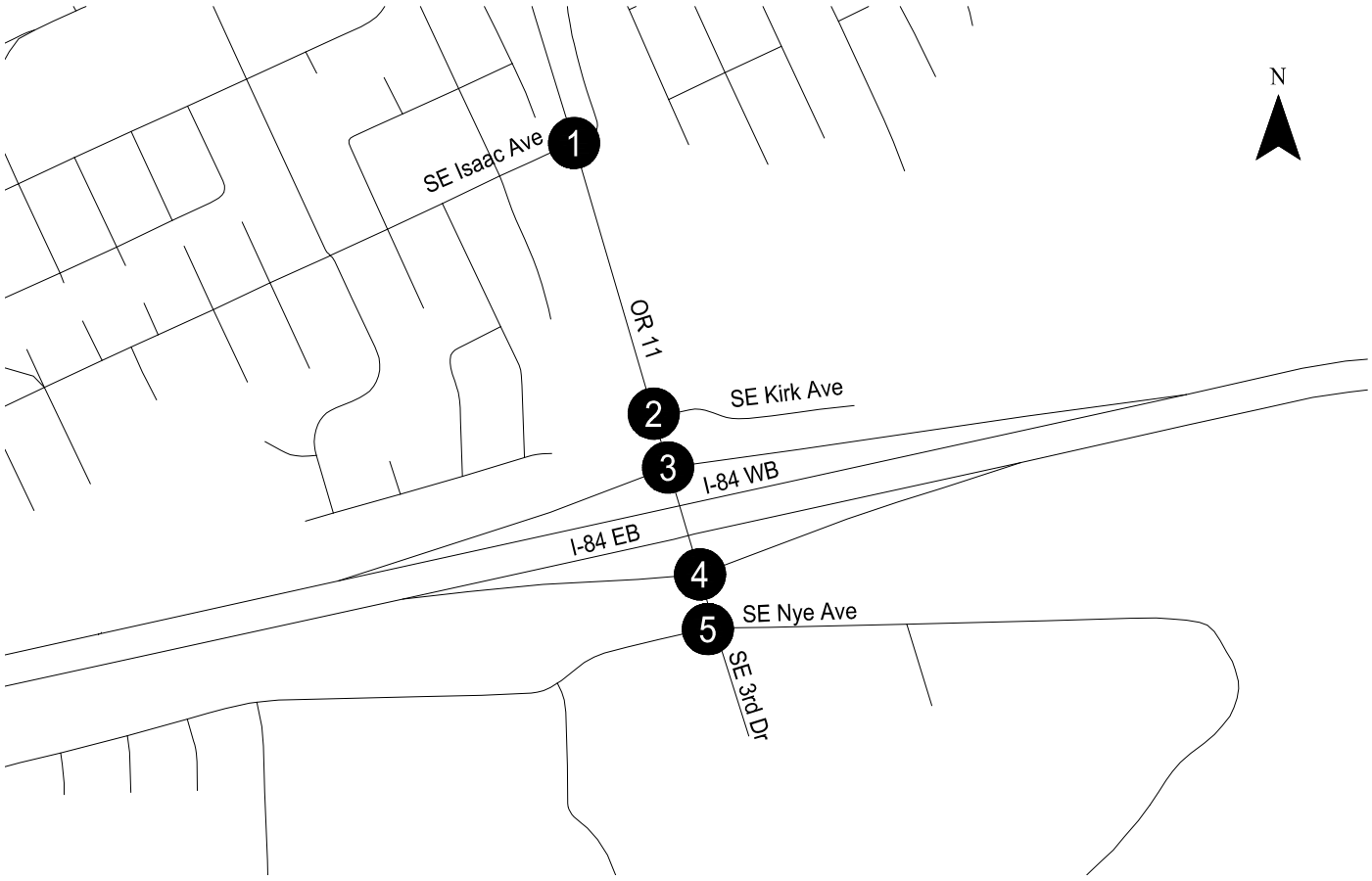

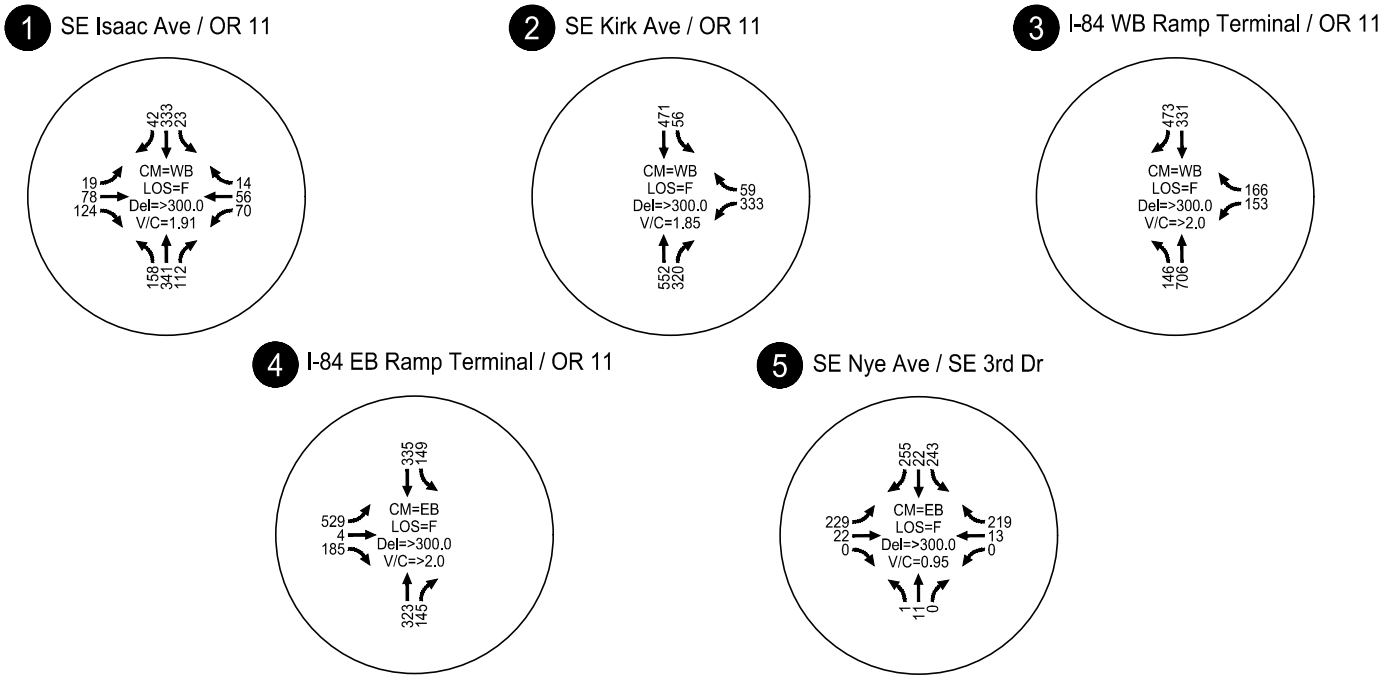

- Study Intersections
CM - Critical Movement
LOS - Level of Service
Del - Vehicle Delay (s)
V/C - Volume-To-Capacity Ratio

Future PM Peak Hour Traffic Operations Sensitivity Analysis - Exit 210 Pendleton, OR

Figure 7

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REFERENCES

1. Oregon Department of Transportation. *Analysis Procedures Manual – Version 2*. 2019.
2. Kittelson and Associates, Inc. *Pendleton IAMPs: Exit 210 – Existing Conditions: Transportation System Operations.* 2019.
3. Institute of Transportation Engineers. *Trip Generation Manual – 10th Edition*. 2017.

Attachment A
Future Land Use Analysis
Memorandum

MEMORANDUM

Future Land Use Analysis

Pendleton Exit 210 IAMP - Task 6.1

DATE	January 28, 2019
TO	Nick Foster and Matt Hughart, KAI
FROM	Darci Rudzinski, and Clinton "CJ" Doxsee, APG

OVERVIEW

This memorandum presents assumptions and analysis for future land uses in the Interchange Management Study Area (IMSA). It addresses Task 6.1 of the Pendleton Interchange Area Management Plan (IAMP) for Exit 207. The following land use assumptions are based on the development potential of vacant parcels in the IMSA, the development patterns demonstrated in Pendleton and other Oregon communities, and anticipated development resulting from extending City services. The assumptions will be used to inform modeling future traffic conditions in the IMSA over the course of the year 2040 planning horizon.

EXISTING CONDITIONS

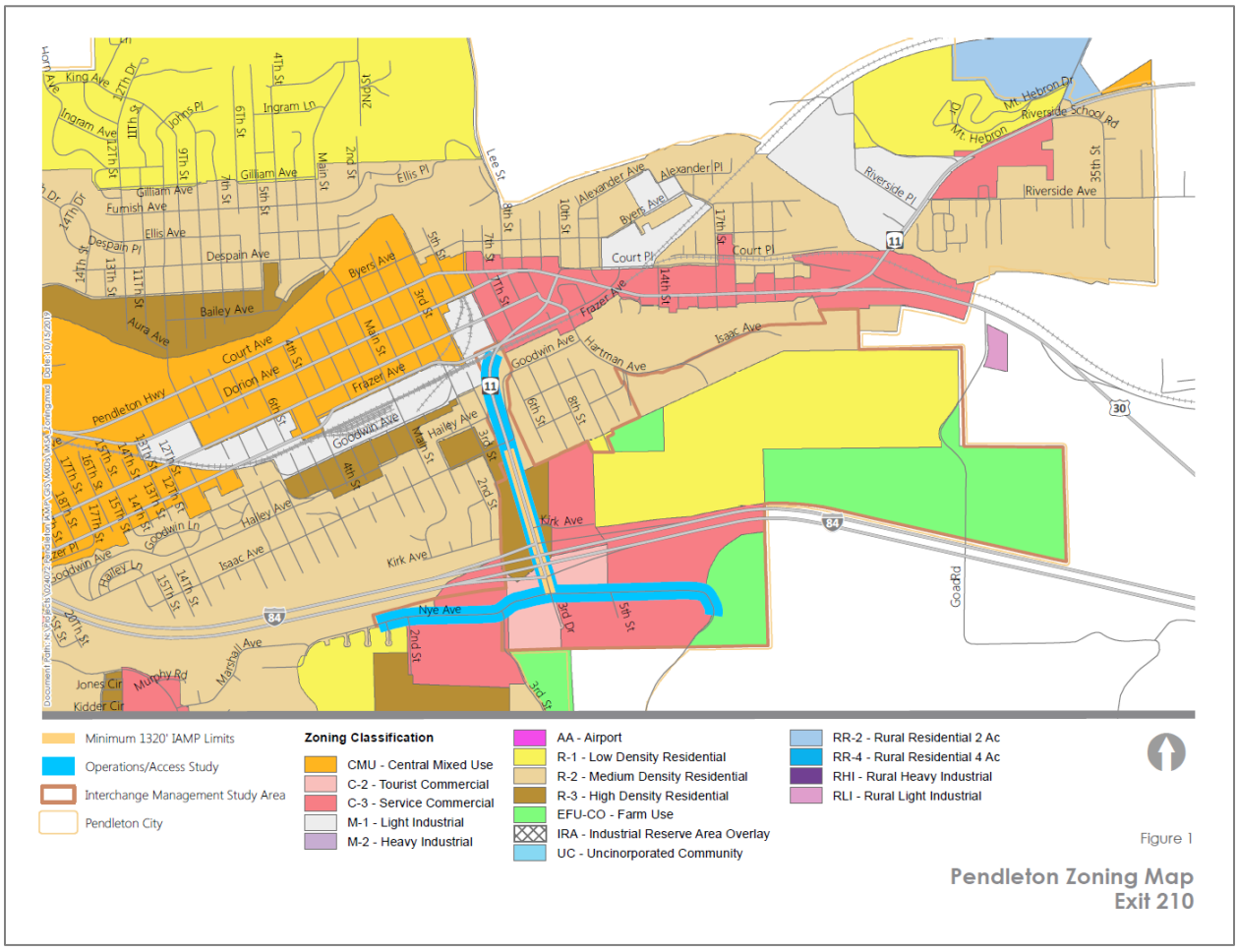
Current Uses and Zoning

As identified in *Technical Memorandum #2: Existing Conditions – Land Use and Demographics Overview*, there are areas of vacant land within the IMSA. These areas represent the most significant development potential in the IMSA.

As shown on Figure 1, parcels within the IMSA all have City of Pendleton zoning applied to them. The City of Pendleton Unified Development Code implements the policy established in the Comprehensive Plan and regulates development through zoning designations and provisions that apply generally to all development and specifically to land divisions. The following zones are found within the IMSA and within the UGB.

- C-2 – Tourist Commercial
- C-3 – Service Commercial
- EFU-CO – Farm Use
- R-1 – Low-density Residential
- R-2 – Medium-density Residential
- R-3 – High-density Residential

Figure 1: Zoning



North of the Interchange

Land north of the interchange is predominantly zoned R-1 (Low-density Residential) or EFU-CO (Farm Use). There are also areas zoned R-3 (High-density Residential) and C-3 (Service Commercial) located adjacent to or near OR-11 and the interchange exit. Most of the area located northeast of the interchange exit is vacant and has the East Side Mixed Use Opportunity Area (MOA) Subdistrict applied to it. The MOA allows for a mixed used area that has the potential to accommodate commercial uses, as well as a range of housing types and densities through a master planning process.

A significant majority of the area is vacant.

South of the Interchange

Land south of the interchange is predominantly zoned C-3 (Service Commercial) or C-2 (Tourist Commercial). There is a small portion of the area zoned EFU-CO (Farm Use). Unlike the EFU-CO area north of the interchange, this area does not have the MOA applied. A fairly large portion of the land zoned C-3 is either vacant or redevelopable.

Land Use Designations and Development Standards

All development in the vicinity of the interchange will have some impact on the facility, so it is important to review the zoning for surrounding parcels and connecting roads. Permitted land uses and the applicable standards associated with the zone designations are an indicator of the potential growth in the area. Recommendations for restricting uses or modifying development standards (e.g. restricting uses with high traffic generation rates or limiting building size) are possible outcomes of the IAMP process.

Residential Uses

Most of the residential land within the IMSA is zoned for low-density residential (R-1). The R-1 zoned land is primarily located northeast of the interchange. The purpose of the R-1 zone is to provide for transition of large, sparsely settled areas to urban one-family residential uses. It also stated within a designated Opportunity Area – the MOA – the purpose is to provide land that is suitable for the range of urban land uses authorized by a Master Development Plan approved by the City. Permitted uses within the R-1 zone include single-family dwellings, duplexes or similar, manufactured homes with limitations, townhouses, and uses approved through a Master Development Plan. Conditional uses in the zone include agricultural services, churches or similar, multi-family dwellings, hospitals, light industrial uses, manufactured homes, schools, and transportation facilities. Residential densities for R-1 zone land require a minimum of one dwelling per acre and a maximum of 9 dwellings per acre. The minimum lot size for a typical single-family home is 6,000 square feet. The minimum lot size varies between 3,000 and 9,000 square feet depending on the design (i.e. duplex) or slope.

High-density residentially zoned land (R-3) is also located near the interchange. The purpose of the R-3 zone is to provide for residential development at increased densities, offering varying forms of urban living in close proximity to jobs, goods, and services. It also states that within a designated Opportunity Area – the MOA – the purpose is to provide suitable urban land uses authorized by a Master Development Plan approved by the City. Permitted uses within the zone include duplexes or similar, multi-family dwellings, residential care facilities, and uses approved through a Master Development Plan. Conditional uses in the zone include churches, government buildings, health services, neighborhood commercial uses, office spaces, schools, and transportation facilities. Residential densities for R-3 zoned land requires a minimum of 10 dwellings per acre and a maximum of 35 dwellings per acre. There is no minimum lot size for multi-family dwellings.

Commercial Uses

Land zoned C-2 is primarily located south of the interchange. The stated purpose of the zone is to provide areas suitable for motels, restaurants, service stations, and other similar uses for the accommodation of tourists or travelers. The list of permitted uses is consistent the purpose statement and include eating and drinking establishments, hotels/motels/similar lodging, service stations, and information centers. Conditional uses in the zone include transit facilities, transportation and utility services, and health care services. There are no minimum lot size or maximum lot coverage requirements in the C-2 zone.

Land zoned C-3 is located on both sides of the interchange, but is more prominently found on the south side. The stated purpose of the zone is to provide areas for retail and services uses, and housing opportunities which are accessible to the entire community. Permitted uses within the zone include

vehicles sales/service/fueling, auto-oriented uses, retail businesses, office space, restaurants, hotels, light manufacturing, museums, and commercial amusement businesses. Conditional uses in the zone include any permitted use with more than 25,000 square feet of gross floor area, warehousing, animal clinics, and transportation facilities. There are no minimum lot size or maximum lot coverage requirements in the C-3 zone.

Industrial Uses

There are not industrially zoned areas within the IMSA.

Agricultural Uses

Some areas within the IMSA are located within the city's UGB and have the EFU-CO zone applied to them. The purpose of the EFU-CO zone is to preserve agricultural lands and scenic resources. However, for the purposes of this analysis, the area is assumed to develop within the planning horizon and within the range of development allowed by the MOA. The MOA allows for a mixed used area that incorporates a range of commercial and housing types and densities through a master planning process. For the purpose of this analysis, the area is assumed to develop with low-density residential development.

FUTURE LAND USES AND ASSUMPTIONS

The IMSA includes a variety of land uses, including commercial, residential, and exclusive farm use. For the purpose of forecasting future development potential, the study area was divided into nine sub-areas, as illustrated in Figure 2. Each sub-area corresponds to a transportation analysis zone (TAZ) from the Oregon Department of Transportation's travel demand model.

Figure 2: Study Sub-areas

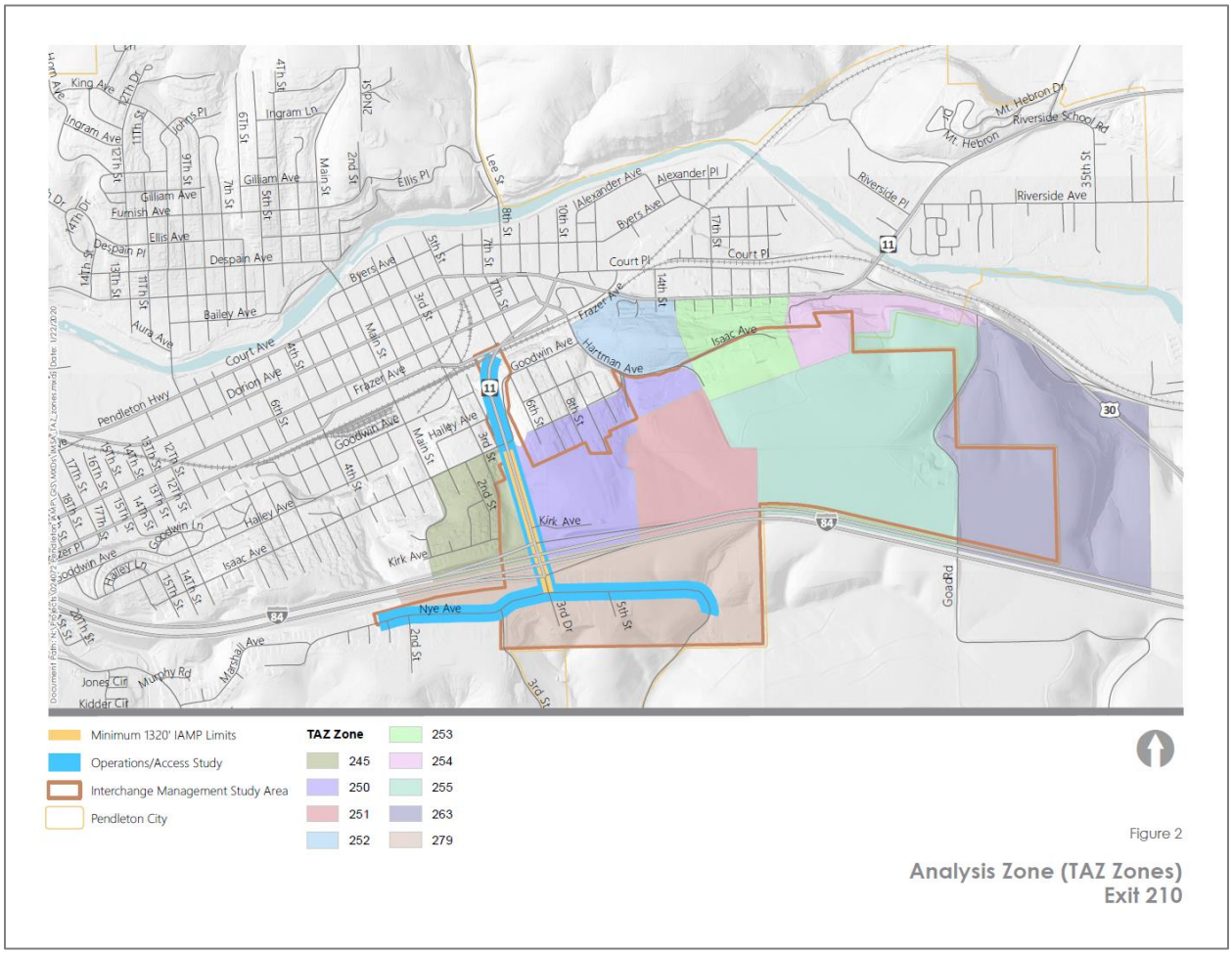
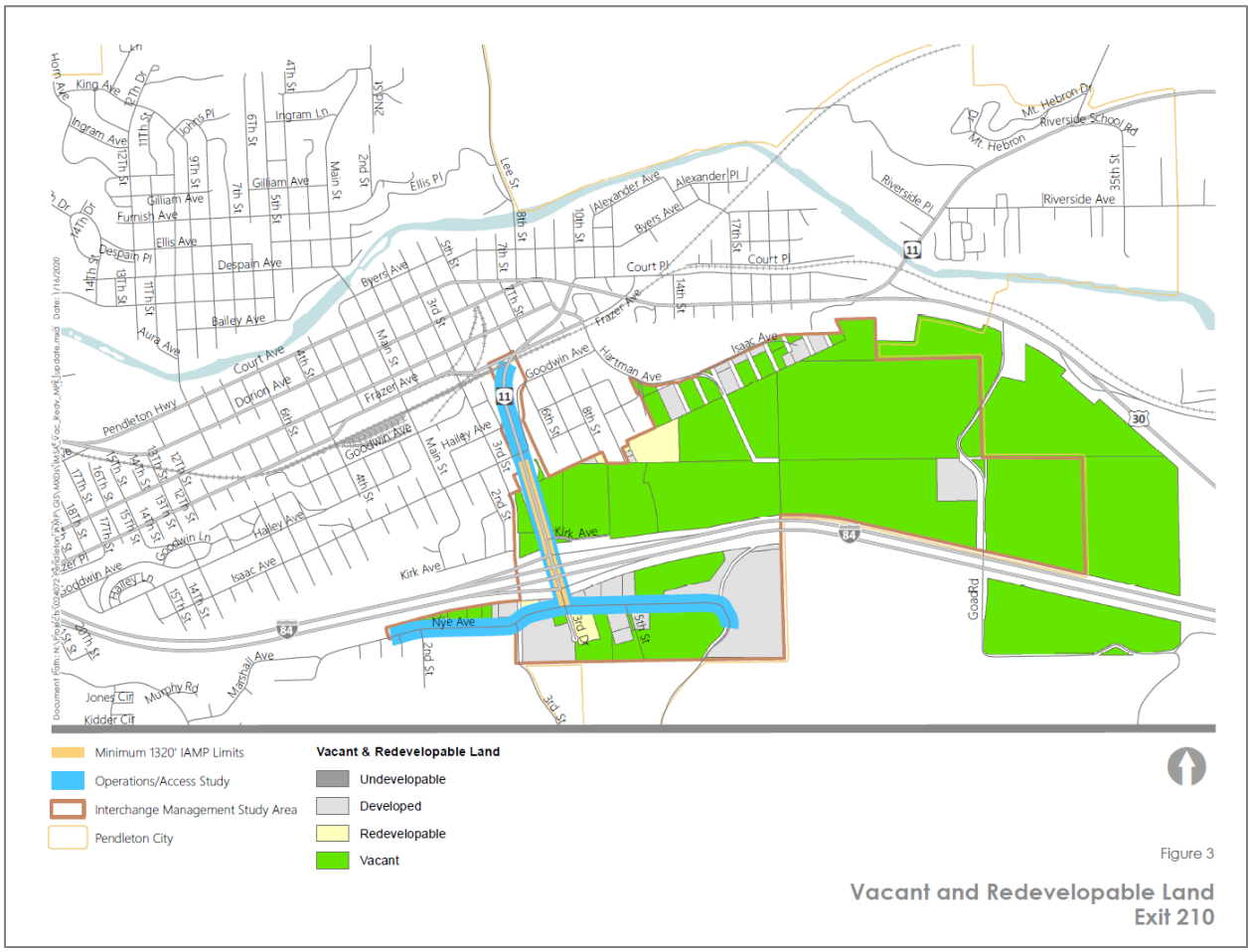


Figure 3: Vacant & Redevelopable Land



The analysis of future land uses within the IMSA focused on parcels that are vacant or expected to have redevelopment potential that would generate traffic (see Figure 3). The analysis factored the following assumptions to determine buildout potential growth:

- The net vacant and redevelopable acres were calculated assuming a 20% reduction to account for utilities and right-of-way dedications.
- The floor-area-ratio (FAR) for commercial zones (C-2) is assumed to be 0.20. A FAR of 0.20 reflects a range of typical auto-oriented commercial development types.
- Residential dwellings were calculated based on the minimum and maximum range of units per acre allowed by code.
- Areas zoned EFU-CO and have the MOA overlay applied are assumed to develop as low-density residential development.
- Standard employee per square foot ratios were used to estimate the number of employees associated with the amount of new development. The ratio assumed 400 square feet per employee for commercial development.
- The R-3 zoned area in Sub-area 250 is assumed to develop at a factor of one-third due to topographical constraints. The R-3 zoned land in Sub-area is assumed to be undevelopable to due to topographical constraints.

Table 1: Residential & Commercial/Industrial Full Buildout Forecast

SUB-AREA & ZONE	Gross Vacant/ Redevelopable Acres	Net Vacant/ Redevelopable Acres	Size (1,000 Sq. Ft. GLA)	Employees	Dwellings at Min. Density	Dwellings at Max Density
249	**0**	**0**	**0**	**0**	**0**	**4**
R-2	0	0	0	0	0	4
250	**40**	**32**	**98**	**243**	**39**	**235**
C-3	14	11	98	243	0	0
EFU-CO	2	2	0	0	1	14
R-1	13	10	0	0	10	91
R-2	6	5	0	0	19	90
R-3	4	3	0	0	9	40
251	**51**	**41**	**0**	**0**	**38**	**363**
C-3	0	0	0	0	0	0
EFU-CO	5	4	0	0	3	34
R-1	46	37	0	0	35	329
R-2	0	0	0	0	0	0
252	**0**	**0**	**0**	**0**	**0**	**1**
R-2	0	0	0	0	0	1
253	**12**	**10**	**0**	**0**	**18**	**120**
R-1	7	6	0	0	5	52
R-2	5	4	0	0	13	68
254	**9**	**7**	**0**	**0**	**23**	**118**
R-1	2	1	0	0	1	12
R-2	7	6	0	0	22	106
255	**129**	**103**	**0**	**0**	**100**	**926**
EFU-CO	48	39	0	0	38	348
R-1	80	64	0	0	62	574
R-2	0	0	0	0	0	4
263	**43**	**35**	**0**	**0**	**34**	**310**
EFU-CO	43	35	0	0	34	310
278	**0**	**0**	**1**	**1**	**0**	**0**
C-3	0	0	1	1	0	0
279	**43**	**34**	**289**	**716**	**0**	**14**
C-2	2	1	11	26	0	0
C-3	40	32	278	690	0	0
EFU-CO	0	0	0	0	0	3
R-2	1	1	0	0	0	11
281	**0**	**0**	**1**	**0**	**0**	**0**
C-3	0	0	1	0	0	0
R-2	0	0	0	0	0	0
Grand Total	**328**	**262**	**388**	**960**	**252**	**2,091**

As summarized in Table 1, the full buildout of vacant/redevelopable commercial, residential, and farmland within the IMSA would generate just under a 400,000 square feet of gross lease area (GLA) and slightly under 960 employees. The bulk of the GLA growth (just under 300,000 square feet) and new employees (716) would occur in Sub-area 279, located south of the interchange on Nye Avenue. Other

sub-areas that would see large increases in the amount of commercial GLA would include Sub-area 250 with approximately 250,000 square feet of development and close to 100 new employees.

There is a wide range of potential new housing allowed under Pendleton's zoning code. Assuming the EFU-CO zones develop as low-density residential, there could be between 300 and 2,200 new houses within the IMSA. The 300 new housing estimate assumes new development is built at the minimum required density, while the 2,200 estimate assumes all housing will be built at the maximum allowed density. Most of the new housing would potentially be built in Sub-areas 250 and 255. This is where most of the EFU-CO and MOA overlay land is located.

A partial buildout scenario was also generated that used the same assumptions as those listed above. The partial buildout scenario assumes that 65% of the vacant and redevelopable area will be built out over the planning horizon. This scenario assumes a modest pace of growth. The partial buildout scenario is summarized in Table 2.

Table 2: Residential & Commercial/Industrial Partial (65%) Buildout Forecast

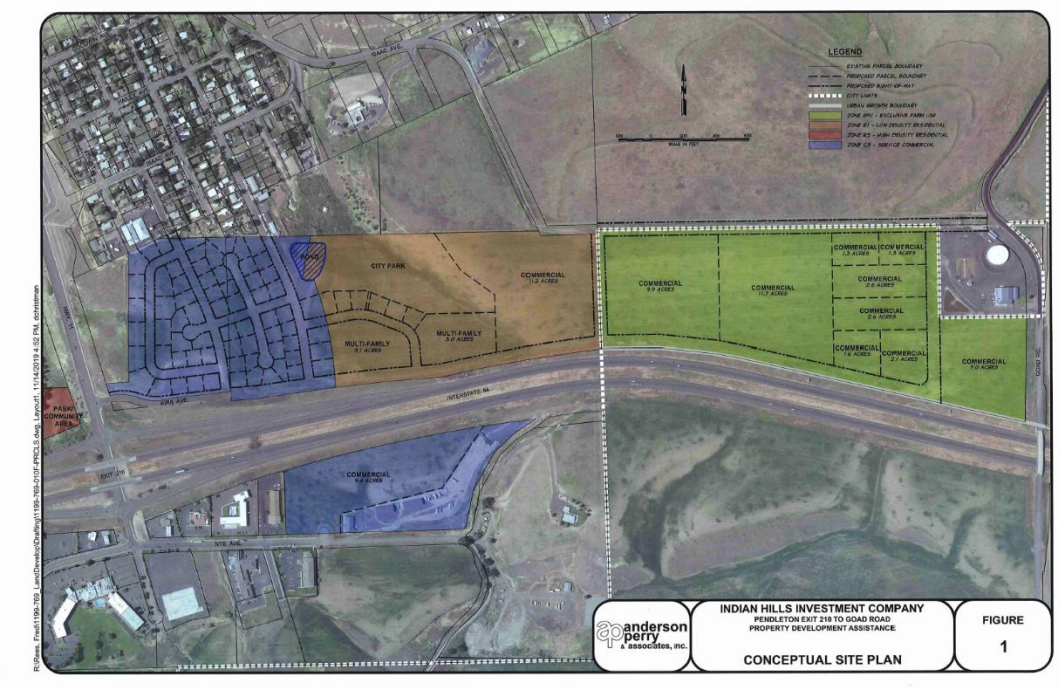
SUB-AREA & ZONE	Gross Vacant/ Redevelopable Acres	Net Vacant/ Redevelopable Acres	Size (1,000 Sq. Ft. GLA)	Employees	Dwellings at Min. Density	Dwellings at Max Density
249	**0**	**0**	**0**	**0**	**0**	**2**
R-2	0	0	0	0	0	2
250	**40**	**21**	**64**	**158**	**23**	**154**
C-3	14	7	64	158	0	0
EFU-CO	2	1	0	0	1	9
R-1	13	7	0	0	6	60
R-2	6	3	0	0	10	59
R-3	4	2	0	0	6	26
251	**51**	**26**	**0**	**0**	**25**	**236**
C-3	0	0	0	0	0	0
EFU-CO	5	2	0	0	2	22
R-1	46	24	0	0	23	214
R-2	0	0	0	0	0	0
252	**0**	**0**	**0**	**0**	**0**	**0**
R-2	0	0	0	0	0	0
253	**12**	**6**	**0**	**0**	**8**	**77**
R-1	7	4	0	0	2	33
R-2	5	3	0	0	6	44
254	**9**	**5**	**0**	**0**	**15**	**76**
R-1	2	1	0	0	0	8
R-2	7	4	0	0	15	68
255	**129**	**67**	**0**	**0**	**65**	**601**
EFU-CO	48	25	0	0	25	226
R-1	80	42	0	0	40	373
R-2	0	0	0	0	0	2
263	**43**	**22**	**0**	**0**	**21**	**201**
EFU-CO	43	22	0	0	21	201
278	**0**	**0**	**1**	**0**	**0**	**0**
C-3	0	0	1	0	0	0

SUB-AREA & ZONE	Gross Vacant/ Redevelopable Acres	Net Vacant/ Redevelopable Acres	Size (1,000 Sq. Ft. GLA)	Employees	Dwellings at Min. Density	Dwellings at Max Density
279	**43**	**22**	**188**	**463**	**0**	**10**
C-2	2	1	7	17	0	0
C-3	40	21	180	446	0	0
EFU-CO	0	0	0	0	0	2
R-2	1	1	0	0	0	8
281	**0**	**0**	**1**	**0**	**0**	**0**
C-3	0	0	1	0	0	0
R-2	0	0	0	0	0	0
Grand Total	**328**	**170**	**252**	**621**	**157**	**1,357**

East Side Mixed Use Opportunity Area (MOA): Development Scenario

A large portion of the East Side Mixed Use Opportunity Area (MOA) is under common ownership and is currently in the early design stages of development. Recent conceptual site plans show a mix of single-family, multi-family, and commercial development across Sub-areas 250, 251, and 255. See Figure 4. According to the conceptual site plan, approximately 50 acres of the MOA overlay area would be developed with commercial uses. After factoring for right-of-way and utility deductions, this would result in an approximate increase of 12 acres of commercial land and a corresponding reduction to the amount of low-density residential land, as compared to the full buildout assumptions.

Figure 4: MOA Conceptual Site Plan



Attachment B
Year 2040 Intersection Operations
Worksheets

Intersection	
Int Delay, s/veh	5.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↕			↕	
Traffic Vol, veh/h	15	7	87	32	26	4	104	322	27	3	226	36
Future Vol, veh/h	15	7	87	32	26	4	104	322	27	3	226	36
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	5	-	-	-4	-	-	4	-	-	-4	-
Peak Hour Factor	76	76	76	76	76	76	76	76	76	76	76	76
Heavy Vehicles, %	0	0	3	0	13	50	5	9	0	100	15	18
Mvmt Flow	20	9	114	42	34	5	137	424	36	4	297	47

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	832	1063	172	877	1068	230	344	0	0	460	0	0
Stage 1	329	329	-	716	716	-	-	-	-	-	-	-
Stage 2	503	734	-	161	352	-	-	-	-	-	-	-
Critical Hdwy	8.5	7.5	7.46	6.7	5.96	7.5	4.2	-	-	6.1	-	-
Critical Hdwy Stg 1	7.5	6.5	-	5.7	4.96	-	-	-	-	-	-	-
Critical Hdwy Stg 2	7.5	6.5	-	5.7	4.96	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.33	3.5	4.13	3.8	2.25	-	-	3.2	-	-
Pot Cap-1 Maneuver	210	167	819	299	258	661	1190	-	-	629	-	-
Stage 1	606	593	-	460	477	-	-	-	-	-	-	-
Stage 2	456	350	-	861	652	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	161	140	819	214	216	661	1190	-	-	629	-	-
Mov Cap-2 Maneuver	161	140	-	214	216	-	-	-	-	-	-	-
Stage 1	512	588	-	389	403	-	-	-	-	-	-	-
Stage 2	350	296	-	723	647	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	17.2	29.8	2.2	0.1
HCM LOS	C	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1190	-	-	437	225	629	-	-
HCM Lane V/C Ratio	0.115	-	-	0.328	0.363	0.006	-	-
HCM Control Delay (s)	8.4	0.4	-	17.2	29.8	10.8	0	-
HCM Lane LOS	A	A	-	C	D	B	A	-
HCM 95th %tile Q(veh)	0.4	-	-	1.4	1.6	0	-	-

Intersection	
Int Delay, s/veh	2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	21	0	43	78	410	0	0	177	168
Future Vol, veh/h	0	0	0	21	0	43	78	410	0	0	177	168
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Yield	Yield	Yield	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	150	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-2	-	-	-2	-	-	4	-	-	-4	-
Peak Hour Factor	72	72	72	72	72	72	72	72	72	72	72	72
Heavy Vehicles, %	0	0	0	0	0	7	15	8	0	0	10	8
Mvmt Flow	0	0	0	29	0	60	108	569	0	0	246	233

Major/Minor	Minor1			Major1			Major2		
Conflicting Flow All	1148	1264	569	479	0	-	-	-	0
Stage 1	785	785	-	-	-	-	-	-	-
Stage 2	363	479	-	-	-	-	-	-	-
Critical Hdwy	6	6.1	6.07	4.25	-	-	-	-	-
Critical Hdwy Stg 1	5	5.1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5	5.1	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.363	2.335	-	-	-	-	-
Pot Cap-1 Maneuver	252	197	529	1019	-	0	0	-	-
Stage 1	494	444	-	-	-	0	0	-	-
Stage 2	737	589	-	-	-	0	0	-	-
Platoon blocked, %					-			-	-
Mov Cap-1 Maneuver	225	0	529	1019	-	-	-	-	-
Mov Cap-2 Maneuver	225	0	-	-	-	-	-	-	-
Stage 1	442	0	-	-	-	-	-	-	-
Stage 2	737	0	-	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	17.9	1.4	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	WBLn1	SBT	SBR
Capacity (veh/h)	1019	-	367	-	-
HCM Lane V/C Ratio	0.106	-	0.242	-	-
HCM Control Delay (s)	9	-	17.9	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0.4	-	0.9	-	-

Intersection	
Int Delay, s/veh	12.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	215	1	41	0	0	0	0	273	51	31	163	0
Future Vol, veh/h	215	1	41	0	0	0	0	273	51	31	163	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Yield	Yield	Yield	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	150	-	-
Veh in Median Storage, #	-	0	-	-	16979	-	-	0	-	-	0	-
Grade, %	-	-2	-	-	-2	-	-	-4	-	-	4	-
Peak Hour Factor	74	74	74	74	74	74	74	74	74	74	74	74
Heavy Vehicles, %	10	100	20	0	0	0	0	9	8	4	9	0
Mvmt Flow	291	1	55	0	0	0	0	369	69	42	220	0

Major/Minor	Minor2			Major1			Major2		
Conflicting Flow All	708	742	220	-	0	0	438	0	0
Stage 1	304	304	-	-	-	-	-	-	-
Stage 2	404	438	-	-	-	-	-	-	-
Critical Hdwy	6.1	7.1	6.2	-	-	-	4.14	-	-
Critical Hdwy Stg 1	5.1	6.1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.1	6.1	-	-	-	-	-	-	-
Follow-up Hdwy	3.59	4.9	3.48	-	-	-	2.236	-	-
Pot Cap-1 Maneuver	421	270	786	0	-	-	1111	-	0
Stage 1	756	536	-	0	-	-	-	-	0
Stage 2	687	464	-	0	-	-	-	-	0
Platoon blocked, %					-	-		-	
Mov Cap-1 Maneuver	405	0	786	-	-	-	1111	-	-
Mov Cap-2 Maneuver	405	0	-	-	-	-	-	-	-
Stage 1	756	0	-	-	-	-	-	-	-
Stage 2	661	0	-	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	37.8	0	1.3
HCM LOS	E		

Minor Lane/Major Mvmt	NBT	NBR	EBLn1	SBL	SBT
Capacity (veh/h)	-	-	439	1111	-
HCM Lane V/C Ratio	-	-	0.791	0.038	-
HCM Control Delay (s)	-	-	37.8	8.4	-
HCM Lane LOS	-	-	E	A	-
HCM 95th %tile Q(veh)	-	-	7	0.1	-

Intersection	
Int Delay, s/veh	13.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	248	10	3	1	10	74	2	2	0	45	1	164
Future Vol, veh/h	248	10	3	1	10	74	2	2	0	45	1	164
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	4	-
Peak Hour Factor	72	72	72	72	72	72	72	72	72	72	72	72
Heavy Vehicles, %	10	0	0	0	10	2	0	50	0	0	0	13
Mvmt Flow	344	14	4	1	14	103	3	3	0	63	1	228

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	309	250	115	259	364	3	229	0	0	3	0	0
Stage 1	241	241	-	9	9	-	-	-	-	-	-	-
Stage 2	68	9	-	250	355	-	-	-	-	-	-	-
Critical Hdwy	7.2	6.5	6.2	7.1	6.6	6.22	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.2	5.5	-	6.1	5.6	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.2	5.5	-	6.1	5.6	-	-	-	-	-	-	-
Follow-up Hdwy	3.59	4	3.3	3.5	4.09	3.318	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	628	656	943	698	551	1081	1351	-	-	1632	-	-
Stage 1	745	710	-	1017	872	-	-	-	-	-	-	-
Stage 2	923	892	-	759	616	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	536	625	943	658	525	1081	1351	-	-	1632	-	-
Mov Cap-2 Maneuver	536	625	-	658	525	-	-	-	-	-	-	-
Stage 1	744	677	-	1015	870	-	-	-	-	-	-	-
Stage 2	820	890	-	706	588	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	24	9.3	3.8	1.6
HCM LOS	C	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1351	-	-	542	955	1632	-	-
HCM Lane V/C Ratio	0.002	-	-	0.669	0.124	0.038	-	-
HCM Control Delay (s)	7.7	0	-	24	9.3	7.3	0	-
HCM Lane LOS	A	A	-	C	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	5	0.4	0.1	-	-

Intersection	
Int Delay, s/veh	5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	19	10	124	20	16	4	158	282	27	6	277	42
Future Vol, veh/h	19	10	124	20	16	4	158	282	27	6	277	42
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	5	-	-	-4	-	-	4	-	-	-4	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	0	0	2	0	9	0	2	9	5	25	7	3
Mvmt Flow	20	11	132	21	17	4	168	300	29	6	295	45

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	825	995	170	816	1003	165	340	0	0	329	0	0
Stage 1	330	330	-	651	651	-	-	-	-	-	-	-
Stage 2	495	665	-	165	352	-	-	-	-	-	-	-
Critical Hdwy	8.5	7.5	7.44	6.7	5.88	6.5	4.14	-	-	4.6	-	-
Critical Hdwy Stg 1	7.5	6.5	-	5.7	4.88	-	-	-	-	-	-	-
Critical Hdwy Stg 2	7.5	6.5	-	5.7	4.88	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.32	3.5	4.09	3.3	2.22	-	-	2.45	-	-
Pot Cap-1 Maneuver	213	187	824	326	287	873	1216	-	-	1077	-	-
Stage 1	605	592	-	495	515	-	-	-	-	-	-	-
Stage 2	462	383	-	857	663	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	174	154	824	225	236	873	1216	-	-	1077	-	-
Mov Cap-2 Maneuver	174	154	-	225	236	-	-	-	-	-	-	-
Stage 1	502	588	-	411	427	-	-	-	-	-	-	-
Stage 2	366	318	-	702	658	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	16.6	22.5	3	0.2
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1216	-	-	471	248	1077	-	-
HCM Lane V/C Ratio	0.138	-	-	0.346	0.172	0.006	-	-
HCM Control Delay (s)	8.4	0.3	-	16.6	22.5	8.4	0	-
HCM Lane LOS	A	A	-	C	C	A	A	-
HCM 95th %tile Q(veh)	0.5	-	-	1.5	0.6	0	-	-

Intersection	
Int Delay, s/veh	2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	41	1	64	37	403	0	0	235	186
Future Vol, veh/h	0	0	0	41	1	64	37	403	0	0	235	186
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Yield	Yield	Yield	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	150	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-2	-	-	-2	-	-	4	-	-	-4	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	0	0	0	8	0	2	10	6	0	0	4	4
Mvmt Flow	0	0	0	44	1	69	40	433	0	0	253	200

Major/Minor	Minor1			Major1			Major2			
Conflicting Flow All	866	966	433	453	0	-	-	-	0	
Stage 1	513	513	-	-	-	-	-	-	-	
Stage 2	353	453	-	-	-	-	-	-	-	
Critical Hdwy	6.08	6.1	6.02	4.2	-	-	-	-	-	
Critical Hdwy Stg 1	5.08	5.1	-	-	-	-	-	-	-	
Critical Hdwy Stg 2	5.08	5.1	-	-	-	-	-	-	-	
Follow-up Hdwy	3.572	4	3.318	2.29	-	-	-	-	-	
Pot Cap-1 Maneuver	348	286	638	1067	-	0	0	-	-	
Stage 1	624	571	-	-	-	0	0	-	-	
Stage 2	726	603	-	-	-	0	0	-	-	
Platoon blocked, %					-			-	-	
Mov Cap-1 Maneuver	335	0	638	1067	-	-	-	-	-	
Mov Cap-2 Maneuver	335	0	-	-	-	-	-	-	-	
Stage 1	601	0	-	-	-	-	-	-	-	
Stage 2	726	0	-	-	-	-	-	-	-	

Approach	WB	NB	SB
HCM Control Delay, s	15.1	0.7	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	WBLn1	SBT	SBR
Capacity (veh/h)	1067	-	471	-	-
HCM Lane V/C Ratio	0.037	-	0.242	-	-
HCM Control Delay (s)	8.5	-	15.1	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0.1	-	0.9	-	-

Intersection	
Int Delay, s/veh	8.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	226	4	73	0	0	0	0	214	36	53	223	0
Future Vol, veh/h	226	4	73	0	0	0	0	214	36	53	223	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Yield	Yield	Yield	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	150	-	-
Veh in Median Storage, #	-	0	-	-	16979	-	-	0	-	-	0	-
Grade, %	-	-2	-	-	-2	-	-	-4	-	-	4	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	8	33	16	0	0	0	0	5	13	2	5	0
Mvmt Flow	233	4	75	0	0	0	0	221	37	55	230	0

Major/Minor	Minor2			Major1			Major2		
Conflicting Flow All	580	598	230	-	0	0	258	0	0
Stage 1	340	340	-	-	-	-	-	-	-
Stage 2	240	258	-	-	-	-	-	-	-
Critical Hdwy	6.08	6.43	6.16	-	-	-	4.12	-	-
Critical Hdwy Stg 1	5.08	5.43	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.08	5.43	-	-	-	-	-	-	-
Follow-up Hdwy	3.572	4.297	3.444	-	-	-	2.218	-	-
Pot Cap-1 Maneuver	498	403	786	0	-	-	1307	-	0
Stage 1	735	610	-	0	-	-	-	-	0
Stage 2	807	660	-	0	-	-	-	-	0
Platoon blocked, %					-	-		-	
Mov Cap-1 Maneuver	477	0	786	-	-	-	1307	-	-
Mov Cap-2 Maneuver	477	0	-	-	-	-	-	-	-
Stage 1	735	0	-	-	-	-	-	-	-
Stage 2	773	0	-	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	21.2	0	1.5
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	EBLn1	SBL	SBT
Capacity (veh/h)	-	-	528	1307	-
HCM Lane V/C Ratio	-	-	0.592	0.042	-
HCM Control Delay (s)	-	-	21.2	7.9	-
HCM Lane LOS	-	-	C	A	-
HCM 95th %tile Q(veh)	-	-	3.8	0.1	-

Intersection	
Int Delay, s/veh	8.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	205	22	0	0	13	44	1	1	0	64	2	230
Future Vol, veh/h	205	22	0	0	13	44	1	1	0	64	2	230
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	4	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	3	11	0	0	0	3	0	0	0	0	0	5
Mvmt Flow	230	25	0	0	15	49	1	1	0	72	2	258

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	310	278	131	291	407	1	260	0	0	1	0	0
Stage 1	275	275	-	3	3	-	-	-	-	-	-	-
Stage 2	35	3	-	288	404	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.61	6.2	7.1	6.5	6.23	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.13	5.61	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.61	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.099	3.3	3.5	4	3.327	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	641	615	924	665	537	1081	1316	-	-	1635	-	-
Stage 1	729	666	-	1025	897	-	-	-	-	-	-	-
Stage 2	978	876	-	724	603	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	574	582	924	617	508	1081	1316	-	-	1635	-	-
Mov Cap-2 Maneuver	574	582	-	617	508	-	-	-	-	-	-	-
Stage 1	728	631	-	1024	896	-	-	-	-	-	-	-
Stage 2	917	875	-	659	571	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	16.2	9.5	3.9	1.6
HCM LOS	C	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1316	-	-	575	860	1635	-	-
HCM Lane V/C Ratio	0.001	-	-	0.444	0.074	0.044	-	-
HCM Control Delay (s)	7.7	0	-	16.2	9.5	7.3	0	-
HCM Lane LOS	A	A	-	C	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	2.3	0.2	0.1	-	-

Attachment C
Year 2040 Freeway Operations
Worksheets

HCS7 Freeway Diverge 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 210 IAMP - Segment 1 (EB Off-Ramp)	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, %	-3.40	-
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)	1002	263
Peak Hour Factor (PHF)	0.88	0.74
Total Trucks, %	32.00	12.00
Single-Unit Trucks (SUT), %	30	-
Tractor-Trailers (TT), %	70	-
Heavy Vehicle Adjustment Factor (fHV)	0.763	0.806
Flow Rate (vi),pc/h	1492	441
Capacity (c), pc/h	4646	1995
Volume-to-Capacity Ratio (v/c)	0.32	0.22

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)	0.338
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	60.5
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	1492	Ramp Junction Speed (S), mi/h	60.5
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	12.3
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	15.3

1_EB_Diverge_AM - Future.xuf

HCS7 Freeway Diverge 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 210 IAMP - Segment 1 (EB Off-Ramp)	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, %	-3.40	-
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)	1136	203
Peak Hour Factor (PHF)	0.88	0.92
Total Trucks, %	32.00	11.00
Single-Unit Trucks (SUT), %	30	-
Tractor-Trailers (TT), %	70	-
Heavy Vehicle Adjustment Factor (fHV)	0.763	0.820
Flow Rate (vi),pc/h	1692	269
Capacity (c), pc/h	4646	1995
Volume-to-Capacity Ratio (v/c)	0.36	0.13

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)	0.322
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	61.0
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	1692	Ramp Junction Speed (S), mi/h	61.0
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	17.0

1_EB_Diverge_PM - Future.xuf

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 210 IAMP - Segment 2 (EB Between On and Off Ramps)	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	739	Heavy Vehicle Adjustment Factor (f_{HV})	0.610
Peak Hour Factor	0.88	Flow Rate (V_p), pc/h/ln	688
Total Trucks, %	32.00	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)	0.30
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	10.2
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 210 IAMP - Segment 2 (EB Between On and Off Ramps)	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	833	Heavy Vehicle Adjustment Factor (f_{HV})	0.610
Peak Hour Factor	0.88	Flow Rate (V_p), pc/h/ln	776
Total Trucks, %	32.00	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)	0.34
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	11.5
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	1/21/2020
Agency		Analysis Year	2040
Jurisdiction	City of Pendleton	Time Period Analyzed	Future AM
Project Description	Exit 210 IAMP - Segment 3 (EB On-Ramp)	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	725
Terrain Type	Rolling	Rolling
Percent Grade, %	-	-
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)	822	83
Peak Hour Factor (PHF)	0.88	0.74
Total Trucks, %	32.00	7.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.610	0.877
Flow Rate (vi),pc/h	1531	128
Capacity (c), pc/h	4646	1995
Volume-to-Capacity Ratio (v/c)	0.36	0.06

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)	0.276
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	62.3
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	1531	Ramp Junction Speed (S), mi/h	62.3
Flow Entering Ramp-Infl. Area (vR12), pc/h	1659	Average Density (D), pc/mi/ln	13.3
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	13.9

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 210 IAMP - Segment 3 (EB On-Ramp)	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	725
Terrain Type	Rolling	Rolling
Percent Grade, %	-	-
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)	926	93
Peak Hour Factor (PHF)	0.88	0.97
Total Trucks, %	32.00	8.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.610	0.862
Flow Rate (vi),pc/h	1725	111
Capacity (c), pc/h	4646	1995
Volume-to-Capacity Ratio (v/c)	0.40	0.06

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)	0.280
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	62.2
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	1725	Ramp Junction Speed (S), mi/h	62.2
Flow Entering Ramp-Infl. Area (vR12), pc/h	1836	Average Density (D), pc/mi/ln	14.8
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	15.3

HCS7 Freeway Diverge 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 210 IAMP - Segment 4 (WB Off-Ramp)	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	290
Terrain Type	Rolling	Specific Grade
Percent Grade, %	-	-2.30
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)	960	64
Peak Hour Factor (PHF)	0.88	0.72
Total Trucks, %	32.00	5.00
Single-Unit Trucks (SUT), %	-	30
Tractor-Trailers (TT), %	-	70
Heavy Vehicle Adjustment Factor (fHV)	0.610	0.939
Flow Rate (vi),pc/h	1788	95
Capacity (c), pc/h	4646	1995
Volume-to-Capacity Ratio (v/c)	0.38	0.05

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)	0.307
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	61.4
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	1788	Ramp Junction Speed (S), mi/h	61.4
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	14.6
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	17.0

4_WB_Diverge_AM - Future.xuf

HCS7 Freeway Diverge 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 210 IAMP - Segment 4 (WB Off-Ramp)	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	290
Terrain Type	Rolling	Specific Grade
Percent Grade, %	-	-2.30
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)	966	106
Peak Hour Factor (PHF)	0.88	0.93
Total Trucks, %	32.00	4.00
Single-Unit Trucks (SUT), %	-	30
Tractor-Trailers (TT), %	-	70
Heavy Vehicle Adjustment Factor (fHV)	0.610	0.948
Flow Rate (vi),pc/h	1800	120
Capacity (c), pc/h	4646	1995
Volume-to-Capacity Ratio (v/c)	0.39	0.06

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)	0.309
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	1800	Ramp Junction Speed (S), mi/h	61.3
Flow Entering Ramp-Infl. Area (vR12), pc/h	-	Average Density (D), pc/mi/ln	14.7
Level of Service (LOS)	B	Density in Ramp Influence Area (DR), pc/mi/ln	17.1

4_WB_Diverge_PM - Future.xuf

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 210 IAMP - Segment 5 (WB Between On and Off Ramps)	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	896	Heavy Vehicle Adjustment Factor (f_{HV})	0.610
Peak Hour Factor	0.88	Flow Rate (V_p), pc/h/ln	834
Total Trucks, %	32.00	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	12.4
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	1/21/2020
Agency		Analysis Year	2040
Jurisdiction	City of Pendleton	Time Period Analyzed	Future PM
Project Description	Exit 210 IAMP - Segment 5 (WB Between On and Off Ramps)	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	860	Heavy Vehicle Adjustment Factor (f_{HV})	0.610
Peak Hour Factor	0.88	Flow Rate (V_p), pc/h/ln	801
Total Trucks, %	32.00	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)	0.35
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	11.9
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	1/21/2020
Agency		Analysis Year	2040
Jurisdiction	City of Pendleton	Time Period Analyzed	Future AM
Project Description	Exit 210 IAMP - Segment 6 (WB On-Ramp)	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	725
Terrain Type	Rolling	Rolling
Percent Grade, %	-	-
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)	1142	246
Peak Hour Factor (PHF)	0.88	0.72
Total Trucks, %	32.00	11.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.610	0.820
Flow Rate (vi),pc/h	2127	417
Capacity (c), pc/h	4646	1995
Volume-to-Capacity Ratio (v/c)	0.55	0.21

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)	0.305
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	61.5
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	2127	Ramp Junction Speed (S), mi/h	61.5
Flow Entering Ramp-Infl. Area (vR12), pc/h	2544	Average Density (D), pc/mi/ln	20.7
Level of Service (LOS)	C	Density in Ramp Influence Area (DR), pc/mi/ln	20.7

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 210 IAMP - Segment 6 (WB On-Ramp)		

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	650
Terrain Type	Rolling	Rolling
Percent Grade, %	-	-
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)	860	224
Peak Hour Factor (PHF)	0.88	0.93
Total Trucks, %	32.00	5.00
Single-Unit Trucks (SUT), %	-	-
Tractor-Trailers (TT), %	-	-
Heavy Vehicle Adjustment Factor (fHV)	0.610	0.909
Flow Rate (vi),pc/h	1602	265
Capacity (c), pc/h	4646	1995
Volume-to-Capacity Ratio (v/c)	0.40	0.13

Speed and Density			
Upstream Equilibrium Distance (LEQ), ft	-	Density in Ramp Influence Area (DR), pc/mi/ln	15.9
Distance to Upstream Ramp (LUP), ft	-	Speed Index (M)	0.288
Downstream Equilibrium Distance (LEQ), ft	-	Flow Outer Lanes (vOA), pc/mi/ln	-
Distance to Downstream Ramp (LDOWN), ft	-	On-Ramp Influenece Area Speed (SR), mi/h	61.9
Prop. Freeway Vehicles in Lane 1 and 2 (PM)	1.000	Outer Lanes Freeway Speed (SO), mi/h	-
Flow in Lanes 1 and 2 (v12), pc/h	1602	Ramp Junction Speed (S), mi/h	61.9
Flow Entering Ramp-Infl. Area (vR12), pc/h	1867	Average Density (D), pc/mi/ln	15.1
Level of Service (LOS)	B		

Attachment D
Year 2040 Intersection Operations
Worksheets – Sensitivity Analysis

Intersection	
Int Delay, s/veh	170.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	15	51	87	198	159	37	104	352	82	14	265	36
Future Vol, veh/h	15	51	87	198	159	37	104	352	82	14	265	36
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	5	-	-	-4	-	-	4	-	-	-4	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	0	3	0	5	5	5	9	0	100	10	10
Mvmt Flow	17	57	97	220	177	41	116	391	91	16	294	40

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	862	1060	167	877	1035	241	334	0	0	482	0	0
Stage 1	346	346	-	669	669	-	-	-	-	-	-	-
Stage 2	516	714	-	208	366	-	-	-	-	-	-	-
Critical Hdwy	8.5	7.5	7.46	6.7	5.8	6.6	4.2	-	-	6.1	-	-
Critical Hdwy Stg 1	7.5	6.5	-	5.7	4.8	-	-	-	-	-	-	-
Critical Hdwy Stg 2	7.5	6.5	-	5.7	4.8	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.33	3.5	4.05	3.35	2.25	-	-	3.2	-	-
Pot Cap-1 Maneuver	198	168	825	299	284	771	1201	-	-	611	-	-
Stage 1	589	580	-	485	518	-	-	-	-	-	-	-
Stage 2	446	359	-	817	666	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	66	141	825	~ 160	238	771	1201	-	-	611	-	-
Mov Cap-2 Maneuver	66	141	-	~ 160	238	-	-	-	-	-	-	-
Stage 1	510	561	-	420	449	-	-	-	-	-	-	-
Stage 2	222	311	-	628	645	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	61.4	$ 579.3	1.9	0.7
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1201	-	-	220	202	611	-	-
HCM Lane V/C Ratio	0.096	-	-	0.773	2.167	0.025	-	-
HCM Control Delay (s)	8.3	0.4	-	61.4	$ 579.3	11	0.2	-
HCM Lane LOS	A	A	-	F	F	B	A	-
HCM 95th %tile Q(veh)	0.3	-	-	5.4	34.3	0.1	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	7.2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	170	30	508	221	39	511
Future Vol, veh/h	170	30	508	221	39	511
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, %	-4	-	4	-	-	-4
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	189	33	564	246	43	568

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1057	405	0	0	810	0
Stage 1	687	-	-	-	-	-
Stage 2	370	-	-	-	-	-
Critical Hdwy	6	6.5	-	-	4.1	-
Critical Hdwy Stg 1	5	-	-	-	-	-
Critical Hdwy Stg 2	5	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	283	629	-	-	825	-
Stage 1	543	-	-	-	-	-
Stage 2	733	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	261	629	-	-	825	-
Mov Cap-2 Maneuver	261	-	-	-	-	-
Stage 1	543	-	-	-	-	-
Stage 2	677	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	50.6	0	1
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	286	825	-
HCM Lane V/C Ratio	-	-	0.777	0.053	-
HCM Control Delay (s)	-	-	50.6	9.6	0.3
HCM Lane LOS	-	-	F	A	A
HCM 95th %tile Q(veh)	-	-	6	0.2	-

Intersection	
Int Delay, s/veh	10.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	67	0	112	158	617	0	0	261	420
Future Vol, veh/h	0	0	0	67	0	112	158	617	0	0	261	420
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Yield	Yield	Yield	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	150	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-2	-	-	-2	-	-	4	-	-	-4	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	0	0	7	15	8	0	0	10	8
Mvmt Flow	0	0	0	74	0	124	176	686	0	0	290	467

Major/Minor	Minor1			Major1			Major2			
Conflicting Flow All	1562	1795	686	757	0	-	-	-	0
Stage 1	1038	1038	-	-	-	-	-	-	-
Stage 2	524	757	-	-	-	-	-	-	-
Critical Hdwy	6	6.1	6.07	4.25	-	-	-	-	-
Critical Hdwy Stg 1	5	5.1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5	5.1	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.363	2.335	-	-	-	-	-
Pot Cap-1 Maneuver	148	99	456	798	-	0	0	-	-
Stage 1	386	349	-	-	-	0	0	-	-
Stage 2	634	455	-	-	-	0	0	-	-
Platoon blocked, %					-			-	-
Mov Cap-1 Maneuver	115	0	456	798	-	-	-	-	-
Mov Cap-2 Maneuver	115	0	-	-	-	-	-	-	-
Stage 1	301	0	-	-	-	-	-	-	-
Stage 2	634	0	-	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	88.8	2.2	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	WBLn1	SBT	SBR
Capacity (veh/h)	798	-	216	-	-
HCM Lane V/C Ratio	0.22	-	0.921	-	-
HCM Control Delay (s)	10.8	-	88.8	-	-
HCM Lane LOS	B	-	F	-	-
HCM 95th %tile Q(veh)	0.8	-	7.6	-	-

Intersection	
Int Delay, s/veh	188.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	422	1	139	0	0	0	0	353	90	119	209	0
Future Vol, veh/h	422	1	139	0	0	0	0	353	90	119	209	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Yield	Yield	Yield	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	150	-	-
Veh in Median Storage, #	-	0	-	-	16979	-	-	0	-	-	0	-
Grade, %	-	-2	-	-	-2	-	-	-4	-	-	4	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	10	100	20	0	0	0	0	9	8	4	9	0
Mvmt Flow	469	1	154	0	0	0	0	392	100	132	232	0

Major/Minor	Minor2			Major1			Major2		
Conflicting Flow All	938	988	232	-	0	0	492	0	0
Stage 1	496	496	-	-	-	-	-	-	-
Stage 2	442	492	-	-	-	-	-	-	-
Critical Hdwy	6.1	7.1	6.2	-	-	-	4.14	-	-
Critical Hdwy Stg 1	5.1	6.1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.1	6.1	-	-	-	-	-	-	-
Follow-up Hdwy	3.59	4.9	3.48	-	-	-	2.236	-	-
Pot Cap-1 Maneuver	~ 315	190	774	0	-	-	1061	-	0
Stage 1	630	436	-	0	-	-	-	-	0
Stage 2	663	438	-	0	-	-	-	-	0
Platoon blocked, %					-	-		-	
Mov Cap-1 Maneuver	~ 276	0	774	-	-	-	1061	-	-
Mov Cap-2 Maneuver	~ 276	0	-	-	-	-	-	-	-
Stage 1	630	0	-	-	-	-	-	-	-
Stage 2	581	0	-	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	$ 444.6	0	3.2
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	EBLn1	SBL	SBT
Capacity (veh/h)	-	-	328	1061	-
HCM Lane V/C Ratio	-	-	1.904	0.125	-
HCM Control Delay (s)	-	-	$ 444.6	8.9	-
HCM Lane LOS	-	-	F	A	-
HCM 95th %tile Q(veh)	-	-	42.6	0.4	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	44.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	266	10	3	1	10	165	2	12	0	146	12	190
Future Vol, veh/h	266	10	3	1	10	165	2	12	0	146	12	190
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	4	-
Peak Hour Factor	85	85	85	85	85	85	85	85	85	85	85	85
Heavy Vehicles, %	10	0	0	0	10	2	0	50	0	0	0	13
Mvmt Flow	313	12	4	1	12	194	2	14	0	172	14	224

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	591	488	126	496	600	14	238	0	0	14	0	0
Stage 1	470	470	-	18	18	-	-	-	-	-	-	-
Stage 2	121	18	-	478	582	-	-	-	-	-	-	-
Critical Hdwy	7.2	6.5	6.2	7.1	6.6	6.22	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.2	5.5	-	6.1	5.6	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.2	5.5	-	6.1	5.6	-	-	-	-	-	-	-
Follow-up Hdwy	3.59	4	3.3	3.5	4.09	3.318	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	407	483	930	487	404	1066	1341	-	-	1617	-	-
Stage 1	559	563	-	1006	865	-	-	-	-	-	-	-
Stage 2	864	884	-	572	487	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	~ 293	421	930	429	352	1066	1341	-	-	1617	-	-
Mov Cap-2 Maneuver	~ 293	421	-	429	352	-	-	-	-	-	-	-
Stage 1	558	492	-	1004	863	-	-	-	-	-	-	-
Stage 2	696	882	-	486	426	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	120.6	9.8	1.1	3.1
HCM LOS	F	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1341	-	-	298	949	1617	-	-
HCM Lane V/C Ratio	0.002	-	-	1.101	0.218	0.106	-	-
HCM Control Delay (s)	7.7	0	-	120.6	9.8	7.5	0	-
HCM Lane LOS	A	A	-	F	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	13.1	0.8	0.4	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	169.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	19	152	124	124	99	25	158	348	205	42	340	42
Future Vol, veh/h	19	152	124	124	99	25	158	348	205	42	340	42
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	5	-	-	-4	-	-	4	-	-	-4	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	0	0	2	0	9	0	2	9	5	10	7	3
Mvmt Flow	20	162	132	132	105	27	168	370	218	45	362	45

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1049	1399	204	1167	1312	294	407	0	0	588	0	0
Stage 1	475	475	-	815	815	-	-	-	-	-	-	-
Stage 2	574	924	-	352	497	-	-	-	-	-	-	-
Critical Hdwy	8.5	7.5	7.44	6.7	5.88	6.5	4.14	-	-	4.3	-	-
Critical Hdwy Stg 1	7.5	6.5	-	5.7	4.88	-	-	-	-	-	-	-
Critical Hdwy Stg 2	7.5	6.5	-	5.7	4.88	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.32	3.5	4.09	3.3	2.22	-	-	2.3	-	-
Pot Cap-1 Maneuver	138	~ 96	780	196	199	732	1148	-	-	930	-	-
Stage 1	477	491	-	410	447	-	-	-	-	-	-	-
Stage 2	406	271	-	696	587	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	44	~ 70	780	-	144	732	1148	-	-	930	-	-
Mov Cap-2 Maneuver	44	~ 70	-	-	144	-	-	-	-	-	-	-
Stage 1	369	460	-	317	346	-	-	-	-	-	-	-
Stage 2	211	210	-	351	550	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	$ 956.9		2.2	1.1
HCM LOS	F	-		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1148	-	-	107	-	930	-	-
HCM Lane V/C Ratio	0.146	-	-	2.933	-	0.048	-	-
HCM Control Delay (s)	8.7	0.5	-	$ 956.9	-	9.1	0.2	-
HCM Lane LOS	A	A	-	F	-	A	A	-
HCM 95th %tile Q(veh)	0.5	-	-	29.8	-	0.2	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	180.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	375	66	645	359	64	525
Future Vol, veh/h	375	66	645	359	64	525
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, %	-4	-	4	-	-	-4
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	417	73	717	399	71	583

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1351	558	0	0	1116	0
Stage 1	917	-	-	-	-	-
Stage 2	434	-	-	-	-	-
Critical Hdwy	6	6.5	-	-	4.1	-
Critical Hdwy Stg 1	5	-	-	-	-	-
Critical Hdwy Stg 2	5	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.2	-
Pot Cap-1 Maneuver	~ 194	509	-	-	633	-
Stage 1	435	-	-	-	-	-
Stage 2	690	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	~ 162	509	-	-	633	-
Mov Cap-2 Maneuver	~ 162	-	-	-	-	-
Stage 1	435	-	-	-	-	-
Stage 2	575	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	$ 830.4	0	2
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	180	633	-
HCM Lane V/C Ratio	-	-	2.722	0.112	-
HCM Control Delay (s)	-	-	$ 830.4	11.4	0.8
HCM Lane LOS	-	-	F	B	A
HCM 95th %tile Q(veh)	-	-	43	0.4	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	52.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	86	1	199	121	805	0	0	355	545
Future Vol, veh/h	0	0	0	86	1	199	121	805	0	0	355	545
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Yield	Yield	Yield	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	150	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	-2	-	-	-2	-	-	4	-	-	-4	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	0	0	0	8	0	2	10	6	0	0	4	4
Mvmt Flow	0	0	0	92	1	214	130	866	0	0	382	586

Major/Minor	Minor1		Major1		Major2				
Conflicting Flow All	1801	2094	866	968	0	-	-	-	0
Stage 1	1126	1126	-	-	-	-	-	-	-
Stage 2	675	968	-	-	-	-	-	-	-
Critical Hdwy	6.08	6.1	6.02	4.2	-	-	-	-	-
Critical Hdwy Stg 1	5.08	5.1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.08	5.1	-	-	-	-	-	-	-
Follow-up Hdwy	3.572	4	3.318	2.29	-	-	-	-	-
Pot Cap-1 Maneuver	103	67	370	681	-	0	0	-	-
Stage 1	342	320	-	-	-	0	0	-	-
Stage 2	533	373	-	-	-	0	0	-	-
Platoon blocked, %					-			-	-
Mov Cap-1 Maneuver	~ 83	0	370	681	-	-	-	-	-
Mov Cap-2 Maneuver	~ 83	0	-	-	-	-	-	-	-
Stage 1	277	0	-	-	-	-	-	-	-
Stage 2	533	0	-	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	$ 382	1.5	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	WBLn1	SBT	SBR
Capacity (veh/h)	681	-	181	-	-
HCM Lane V/C Ratio	0.191	-	1.699	-	-
HCM Control Delay (s)	11.5	-	$ 382	-	-
HCM Lane LOS	B	-	F	-	-
HCM 95th %tile Q(veh)	0.7	-	21.2	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	413.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	628	4	165	0	0	0	0	298	77	173	268	0
Future Vol, veh/h	628	4	165	0	0	0	0	298	77	173	268	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Yield	Yield	Yield	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	150	-	-
Veh in Median Storage, #	-	0	-	-	16979	-	-	0	-	-	0	-
Grade, %	-	-2	-	-	-2	-	-	-4	-	-	4	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	8	33	16	0	0	0	0	5	13	2	5	0
Mvmt Flow	647	4	170	0	0	0	0	307	79	178	276	0

Major/Minor	Minor2			Major1			Major2		
Conflicting Flow All	979	1018	276	-	0	0	386	0	0
Stage 1	632	632	-	-	-	-	-	-	-
Stage 2	347	386	-	-	-	-	-	-	-
Critical Hdwy	6.08	6.43	6.16	-	-	-	4.12	-	-
Critical Hdwy Stg 1	5.08	5.43	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.08	5.43	-	-	-	-	-	-	-
Follow-up Hdwy	3.572	4.297	3.444	-	-	-	2.218	-	-
Pot Cap-1 Maneuver	~ 302	235	742	0	-	-	1172	-	0
Stage 1	~ 556	460	-	0	-	-	-	-	0
Stage 2	730	584	-	0	-	-	-	-	0
Platoon blocked, %					-	-		-	
Mov Cap-1 Maneuver	~ 256	0	742	-	-	-	1172	-	-
Mov Cap-2 Maneuver	~ 256	0	-	-	-	-	-	-	-
Stage 1	~ 556	0	-	-	-	-	-	-	-
Stage 2	~ 619	0	-	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	$ 834.9	0	3.4
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	EBLn1	SBL	SBT
Capacity (veh/h)	-	-	296	1172	-
HCM Lane V/C Ratio	-	-	2.776	0.152	-
HCM Control Delay (s)	-	-	$ 834.9	8.6	-
HCM Lane LOS	-	-	F	A	-
HCM 95th %tile Q(veh)	-	-	70.1	0.5	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	26.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		⇕			⇕			⇕			⇕	
Traffic Vol, veh/h	229	22	0	0	13	135	1	11	0	165	13	255
Future Vol, veh/h	229	22	0	0	13	135	1	11	0	165	13	255
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	4	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	3	11	0	0	0	3	0	0	0	0	0	5
Mvmt Flow	257	25	0	0	15	152	1	12	0	185	15	287

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	627	543	159	555	686	12	302	0	0	12	0	0
Stage 1	529	529	-	14	14	-	-	-	-	-	-	-
Stage 2	98	14	-	541	672	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.61	6.2	7.1	6.5	6.23	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.13	5.61	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.61	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4.099	3.3	3.5	4	3.327	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	395	434	892	445	373	1066	1270	-	-	1620	-	-
Stage 1	531	513	-	1011	888	-	-	-	-	-	-	-
Stage 2	906	866	-	529	458	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	291	372	892	376	319	1066	1270	-	-	1620	-	-
Mov Cap-2 Maneuver	291	372	-	376	319	-	-	-	-	-	-	-
Stage 1	530	440	-	1010	887	-	-	-	-	-	-	-
Stage 2	764	865	-	428	393	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	78.6	10	0.7	2.9
HCM LOS	F	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1270	-	-	297	884	1620	-	-
HCM Lane V/C Ratio	0.001	-	-	0.95	0.188	0.114	-	-
HCM Control Delay (s)	7.8	0	-	78.6	10	7.5	0	-
HCM Lane LOS	A	A	-	F	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	9.4	0.7	0.4	-	-