

## TECHNICAL MEMORANDUM #6 (Exit 210)

### Pendleton IAMPs: Exit 210

Preferred Concept

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Date: August 25, 2020 Project #: 24043

To: Technical Advisory Committee, Citizen Advisory Committee

From: Mark Heisinger, Nick Foster, AICP, RSP, and Matt Hughart, AICP

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This memorandum describes and evaluates the preferred interchange and local circulation improvement concept developed for the Exit 210 Interchange Area Management Plan (IAMP). The preferred concept was developed through an evaluation process that included a high-level screening of initial interchange alternatives, a detailed evaluation of two selected alternatives, and feedback from the project's advisory committees.

### SUMMARY OF CONCEPT EVALUATION

The Exit 210 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) to address known, and anticipated future, geometric and traffic operations and safety conditions. The project team distilled these ideas into unique concepts, which were evaluated in a tiered evaluation process against an established set of criteria. This evaluation was described in *Technical Memorandum #5* (Reference 1).

#### TAC/CAC Meeting #3 Results

The findings of *Technical Memorandum #5* were discussed at TAC/CAC Meeting #3, which was held on June 11, 2020. It was determined at the meeting that the preferred concept would be a combination of Concept #1 and Concept #5. The preferred concept would likely be implemented as a phased approach, beginning with components of Concept #5 and phasing in components of Concept #1 over a longer period of time as needed. The combined phased approach was chosen because it addresses the existing, and anticipated future, operational, safety, geometric, and access spacing issues at the interchange and allows for the greatest amount of access options to future development northeast of the interchange. The phased approach provides for components of the concept to be constructed as they are needed based on growth in the area.

## PREFERRED CONCEPT

This section describes and evaluates the preferred concept for the Exit 210 interchange. Figure 1 shows a concept drawing of the preferred concept.

The fundamental components of the preferred concept are listed below. The letters before each component description correspond with the label ID's on Figure 1.

- A. **OR 11 Roadway Reallocation:** Reallocate the existing four-lane cross-section to a three-lane cross-section (i.e., one travel lane in each direction with a center turn lane) from the OR 11 / WB Ramp Terminal intersection to approximately 500 feet south of SE 9<sup>th</sup> Street where the existing bike lanes begin. The roadway reallocation will include sidewalks and bike lanes on both sides of OR 11. Before signal warrants are met at the Isaac Ave / OR 11 intersection, a pedestrian hybrid beacon (PHB) or rectangular rapid flashing beacon (RRFB) would be installed at the intersection.
- B. **Nye Avenue / 3<sup>rd</sup> Drive Intersection Relocation and Roundabout:** Relocate the Nye Avenue / 3<sup>rd</sup> Drive intersection approximately 100 feet to the south and convert the intersection to a roundabout. This improves access spacing with the EB Ramp Terminal / OR 11 intersection and increases intersection capacity.
- C. **Isaac Ave / OR 11 Intersection Signalization:** Signalize the Isaac Ave / OR 11 intersection to increase intersection capacity.
- D. **EB Ramp Terminal / OR 11 Intersection Signalization:** Signalize the EB Ramp Terminal /OR 11 Intersection and add an eastbound left-turn lane. This increases intersection capacity and mitigates queue spillback to adjacent intersections on OR11.
- E. **Kirk Avenue Realignment:** Realign Kirk Avenue approximately 700 feet north. Limit access at the existing Kirk Avenue alignment so that only northbound right-turns from OR 11 are allowed. This improves access spacing with the WB Ramp Terminal / OR 11 intersection and would allow a full access intersection to development northeast of the interchange.
- F. **Nye Avenue/SE Franklin Grade Road Extension and Underpass:** Extend Nye Avenue east via the SE Franklin Grade Road alignment. Construct an underpass under I-84 to provide access to the split diamond interchange and the land on the north side of I-84. The location shown in Figure 1 is conceptual and it is expected that the actual location will be determined in the final design stage of the project.
- G. **Split Diamond Interchange:** Convert the existing interchange to a split diamond interchange by relocating the westbound (WB) off-ramp and eastbound (EB) on-ramp to the east at the new SE Franklin Grade Road alignment. The SE Franklin Grade Road extension, described above, including the I-84 underpass could be built in conjunction with the interchange if it has not already been constructed.

H:\2A\24043 - Pendleton IAMPs (207 & 210)\dwg\Lane Configurations Exit 210\_AEG.dwg Aug 17, 2020 - 5:35pm - mheisinger Layout Tab: Preferred Concept



- Implementation Independent of Development
- Implementation Driven by Regional Growth or Interchange Area Development
- Implementation Driven by Interchange Area Development

Exit 210 Preferred Concept  
 Conceptual Drawing  
 Pendleton, OR

Figure  
 1

## Phasing Plan

Phasing will primarily be contingent on the location and scale of future development. Factors such as roadway or intersection capacity and funding will also affect phasing. Some components can be implemented once funding is available. Implementation of other components may be driven by broader regional growth or development in the immediate interchange area. The components of the preferred concept and descriptions of the factors that will affect their phasing order are shown in Table 4. The triggers for each component are also identified in Figure 1.

**Table 1 Preferred Concept Phasing Triggers**

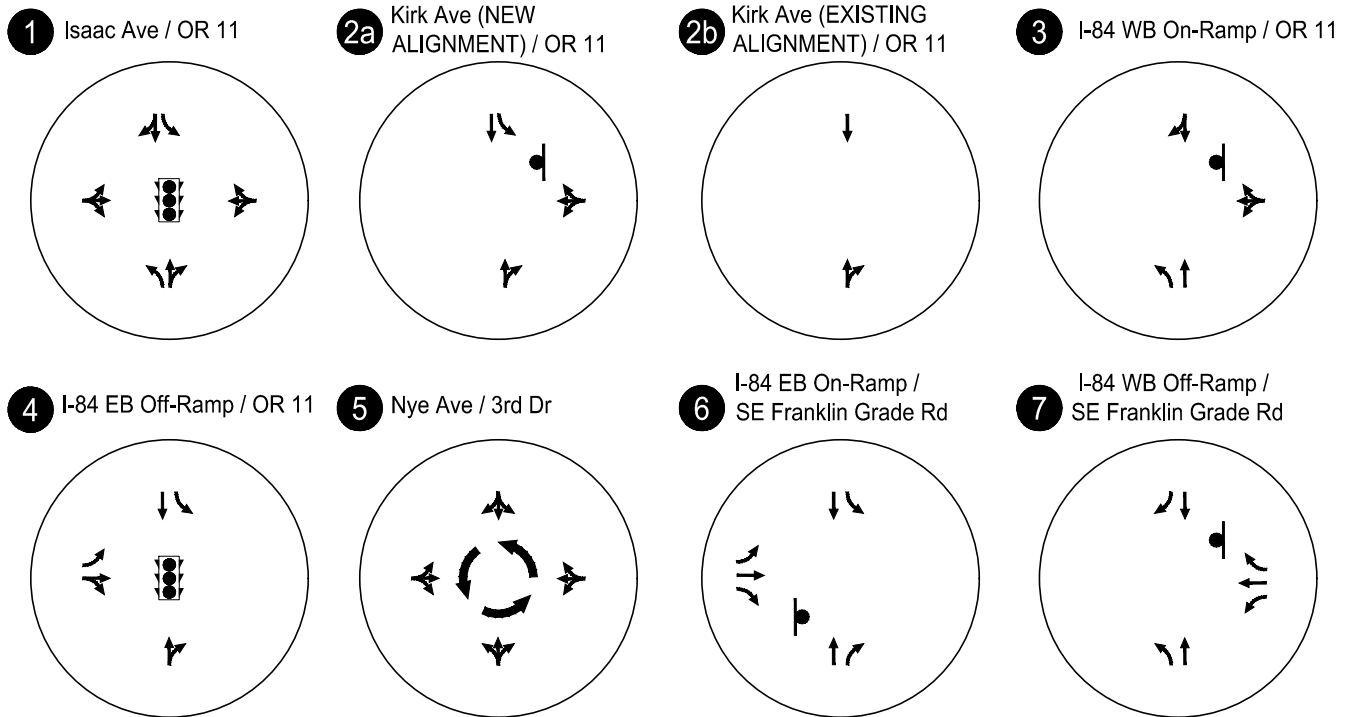
Component ID	Component	Trigger for Component
A	<b>OR 11 Roadway Reallocation</b>	When funding can be made available. <i>Can be implemented independent of development.</i>
B	<b>Nye Avenue / 3rd Drive Intersection Relocation and Roundabout</b>	When the intersection volume-to-capacity (v/c) ratio reaches 0.90, when queues during the typical peak hour interfere with operations at the I-84 EB ramp terminal, or when crash patterns occur that could be mitigated by this project. <i>Driven by either regional growth or local interchange area development.</i>
C	<b>Isaac Ave / OR 11 Intersection Signalization</b>	When the intersection no longer meets ODOT’s mobility target and signal warrants are met or when the crash history signal warrant is met. <i>Driven by either regional growth or local interchange area development.</i>
D	<b>EB Ramp Terminal / OR 11 Intersection Signalization</b>	When the intersection no longer meets ODOT’s mobility target and signal warrants are met or when the crash history signal warrant is met. <i>Driven by either regional growth or local interchange area development.</i>
E	<b>Kirk Avenue Realignment</b>	Development northeast of the Exit 210 interchange. This would likely be built as part of the first phase of development before the split diamond interchange or Nye Avenue/ SE Franklin Grade Road extension are built. <i>Driven by development in local interchange area.</i>
F/G	<b>SE Franklin Grade Road Extension and Underpass/Split Diamond Interchange and Nye Avenue</b>	Development northeast of the Exit 210 interchange requiring more direct access from the interchange. The connection to Nye Avenue can be built as part of a subsequent phase after the interchange. <i>Driven by development in local interchange area.</i>

## Operations Evaluations Results

The assumed lane configurations for the preferred concept are shown in Figure 2. The year 2040 AM and PM motor vehicle traffic volumes and operations are shown in Figure 3 and Figure 4, respectively. All intersections are projected to operate under-capacity and meet ODOT mobility targets with the lane configurations shown in Figure 2. It should be noted that signalization of the Kirk Avenue / OR 11 and I-84 WB Ramp Terminal / OR 11 intersections may be required to meet ODOT mobility targets, depending on the timing of development northeast of the Exit 210 interchange and the construction of the split diamond interchange. Operations worksheets are shown in Attachment “A.”

## 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 2). Crash reduction factors (CRFs) for the roadway and intersection treatments were identified for Concept #1 and Concept



**LEGEND**

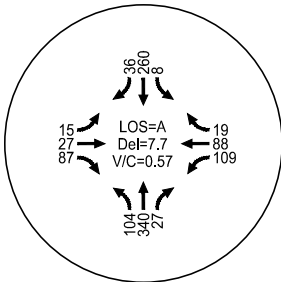
- # - Study Intersections
- ⊥ - Stop Sign
- ↔ - Lane Movement
- ⦿ - Roundabout
- 🚦 - Traffic Signal

Lane Configurations Preferred Concept - Exit 210 Pendleton, OR

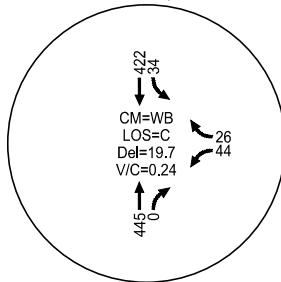
Figure 2



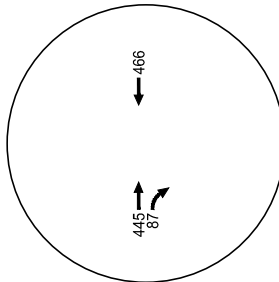
**1** Isaac Ave / OR 11



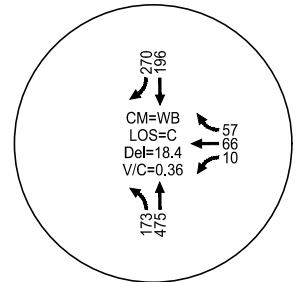
**2a** Kirk Ave (NEW ALIGNMENT) / OR 11



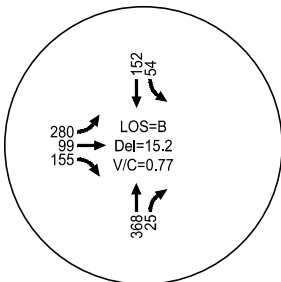
**2b** Kirk Ave (EXISTING ALIGNMENT) / OR 11



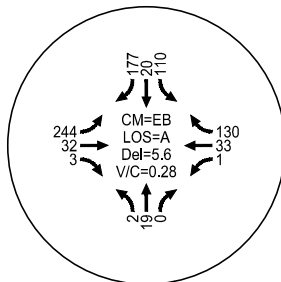
**3** I-84 WB On-Ramp / OR 11



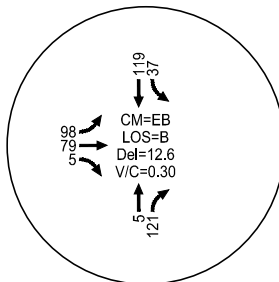
**4** I-84 EB Off-Ramp / OR 11



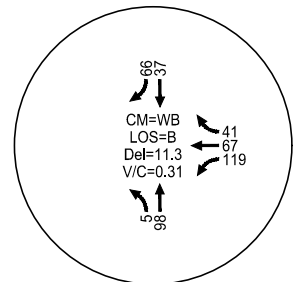
**5** Nye Ave / 3rd Dr



**6** I-84 EB On-Ramp / SE Franklin Grade Rd



**7** I-84 WB Off-Ramp / SE Franklin Grade Rd



**LEGEND**

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

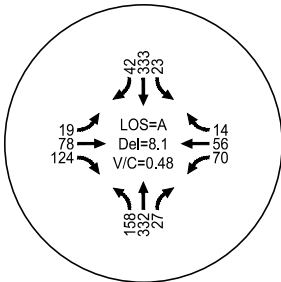
Year 2040 AM - Traffic Volumes and Operations  
Preferred Concept - Exit 210  
Pendleton, OR

Figure  
3

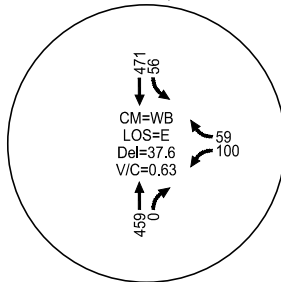
H:\2\24043 - Pendleton IAMPs (207 & 210)\dwg\lane Configurations Exit 210\_AEG.dwg Aug 17, 2020 - 5:39pm - mhelsinger Layout Tab: Future AM - Preferred



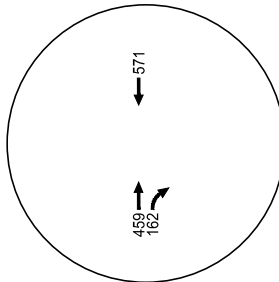
**1** Isaac Ave / OR 11



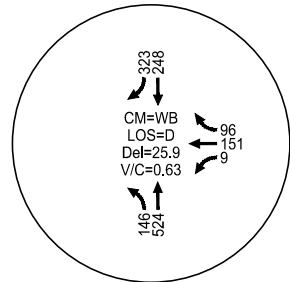
**2a** Kirk Ave (NEW ALIGNMENT) / OR 11



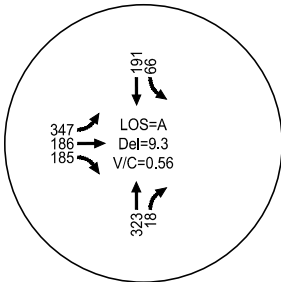
**2b** Kirk Ave (EXISTING ALIGNMENT) / OR 11



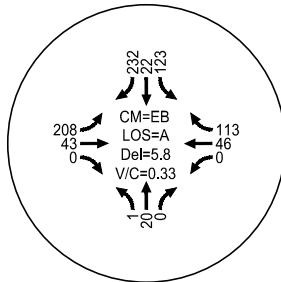
**3** I-84 WB On-Ramp / OR 11



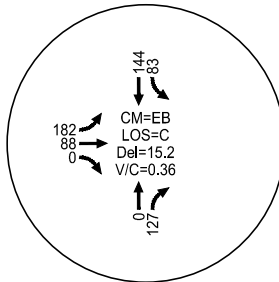
**4** I-84 EB Off-Ramp / OR 11



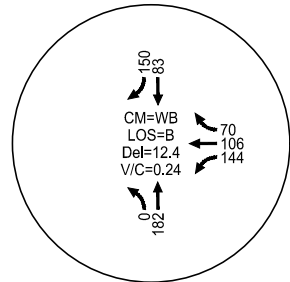
**5** Nye Ave / 3rd Dr



**6** I-84 EB On-Ramp / SE Franklin Grade Rd



**7** I-84 WB Off-Ramp / SE Franklin Grade Rd



**LEGEND**

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

Year 2040 PM - Traffic Volumes and Operations  
Preferred Concept - Exit 210  
Pendleton, OR

Figure  
4

#5 in *Technical Memorandum #5*. The CRFs are used to estimate the potential reduction in crashes that could occur with the implementation of the preferred concept.

There are not CRFs for each treatment proposed in the preferred concept (e.g., there is no CRF for converting a standard diamond interchange into a split diamond interchange). Therefore, not all treatments are analyzed. Table 2 shows the treatments for which CRFs are readily available.

**Table 2 Crash Reduction Factors**

Countermeasures Considered	CRF <sup>1</sup>	Appropriate Intersections/Segments
Convert intersection with minor-road stop control to traffic signal	67% (Angle-Related Crashes) - 143% (Rear-End Crashes)	<ul style="list-style-type: none"> <li>SE Isaac Ave / OR 11</li> <li>I-84 EB Ramp Terminal / OR 11</li> </ul>
Convert intersection with minor-road stop control to modern roundabout	82% (Injury/Fatal Crashes)	<ul style="list-style-type: none"> <li>SE Nye Ave / 3rd Drive</li> </ul>
Convert 4-Lane Roadway to 3-Lane Roadway with Center Turn Lane	29% (All Crashes)	<ul style="list-style-type: none"> <li>OR 11 (I-84 WB Ramp Terminal to SE Isaac Ave)</li> </ul>

<sup>1</sup>ODOT Crash Reduction Factor List

Table 3 shows the adjusted crash rates at the study intersections and roadway segments, based on the application of the CRFs presented in Table 2. The preferred concept is expected to reduce the study intersection and roadway segment crash frequencies in the study area.

**Table 3: Crash Rate<sup>1</sup> Assessment**

Study Intersection or Segment	Observed Crashes/Year <sup>1</sup>	Preferred Concept Adjusted Crashes/Year
SE Isaac Avenue / OR 11	1.00	0.75
SE Kirk Avenue / OR 11	0	0 <sup>2</sup>
I-84 WB Ramp Terminal / OR 11	0.40	0.40
I-84 EB Ramp Terminal / OR 11	0.80	0.68
SE Nye Avenue / SE 3rd Drive	0	0 <sup>2</sup>
OR 11 (I-84 WB Ramp Terminal to SE Isaac Ave)	1.2	0.85
<b>Total</b>	<b>3.40</b>	<b>2.68</b>

<sup>1</sup>Observed crashes per year from 2013 to 2017.

<sup>2</sup> 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

Table 4 shows the cost estimates for the different components of the preferred concept. The cost estimates assume a construction contingency cost of 20 percent, and construction engineering and preliminary engineering costs of 15 percent. The total cost of the preferred concept is estimated to be about \$22.8 million. Detailed cost estimate sheets are shown in Attachment "B."



**Table 4 Preferred Concept Cost Estimate**

Component ID	Component	Estimated Cost
A	OR 11 Roadway Reallocation	\$1,800,000
B	Nye Avenue / 3rd Drive Intersection Relocation and Roundabout	\$2,100,000
C	Isaac Ave / OR 11 Intersection Signalization	\$500,000
D	EB Ramp Terminal / OR 11 Intersection Signalization	\$500,000
E	Kirk Avenue Realignment	\$5,300,000
F	Nye Avenue/SE Franklin Grade Road Extension	\$2,900,000 - \$5,600,000 <sup>1</sup>
G	Split Diamond Interchange at SE Franklin Grade Road	\$6,900,000 - \$9,700,000 <sup>2</sup>
<b>Total</b>		<b>\$22,800,000</b>

<sup>1</sup>Lower cost is only for the extension of Nye Avenue. The higher cost includes the I-84 underpass and SE Franklin Grade Road extension.

<sup>2</sup>Lower cost is only for the split diamond interchange. The higher cost includes the I-84 underpass and SE Franklin Grade Road extension.

The cost of the OR 11 Roadway Reallocation (Component ID “A”) is primarily attributable to the construction of sidewalks on the roadway. The Nye Avenue Road Extension and Split Diamond Interchange (Component ID’s “F” and “G”) may be constructed independently of each other and would both require a new I-84 underpass. A range of costs is shown for the Nye Avenue Road Extension and Split Diamond Interchange to show the cost of each component with and without the I-84 underpass and the SE Franklin Grade Road extension.

**Access Plan**

The project team has developed a preliminary access management plan for the Operations and Access Study Area (OASA) that reflects the preferred interchange concept. 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. Some of these access changes would need to be implemented with the interchange reconfiguration and others are anticipated to occur over time as properties develop or redevelop.

As Table 5 shows, there are 50 accesses within the OASA. Table 5 also summarizes the proposed access management plan for the Exit 210 OASA for accesses located within ODOT’s ¼-mile spacing standard. Accesses shaded grey are located within ¼ mile of the interchange ramp terminals. A map showing the locations of each access is shown in Figure 5.

**Table 5 Exit 210 IMSA Access Inventory**

Access Number	Roadway	Approach Type	Side of Roadway	What Does the Access Serve?	Proposed Access Management Plan Action Under Preferred Concept
1	OR 11	Public	West	Isaac Ave	No changes are proposed to accesses located outside of ODOT’s ¼-mile spacing standard.
2	OR 11	Public	East	SE 5 <sup>th</sup> St	
3	OR 11	Public	East	Kirk Ave	Relocate Kirk Avenue approximately 700 feet north. Access would still be within ¼-mile of I-84 WB ramp terminal intersection.
4	3 <sup>rd</sup> Dr	Public	Both	Nye Ave	Relocate 3 <sup>rd</sup> Drive / Nye Avenue intersection approximately 200 feet south. Access would still be within ¼ mile of I-84 WB ramp terminal intersection.

Access Number	Roadway	Approach Type	Side of Roadway	What Does the Access Serve?	Proposed Access Management Plan Action Under Preferred Concept
5	3 <sup>rd</sup> Dr	Private	West	Red Lion Hotel	Revisit access location and configuration when property redevelops
6	3 <sup>rd</sup> Dr	Private	East	Vacant Commercial Lot	Revisit access location and configuration when property redevelops
7	Nye Ave	Public	South	SW 3 <sup>rd</sup> Pl	No changes are proposed to accesses along Nye Avenue as they are not anticipated to have a safety or operational impact to the Exit 210 interchange ramps.
8	Nye Ave	Private	North	Residential Driveway	
9	Nye Ave	Private	North	Residential Driveway	
10	Nye Ave	Private	North	Residential Driveway	
11	Nye Ave	Private	North	Residential Driveway	
12	Nye Ave	Private	North	Residential Driveway	
13	Nye Ave	Public	South	SW 2 <sup>nd</sup> St	
14	Nye Ave	Private	North	Residential Driveway (undeveloped lot)	
15	Nye Ave	Private	North	Residential Driveway (undeveloped lot)	
16	Nye Ave	Private	North	Residential Driveway (undeveloped lot)	
17	Nye Ave	Private	North	Residential Driveway	
18	Nye Ave	Private	South	Office Building	
19	Nye Ave	Private	North	Hampton Inn	
20	Nye Ave	Private	South	Utility/Maintenance Yard	
21	Nye Ave	Private	South	Residential Apartments	
22	Nye Ave	Private	North	Hampton Inn	
23	Nye Ave	Private	South	Utility/Maintenance Yard	
24	Nye Ave	Private	North	Office Building	
25	Nye Ave	Private	North	Office Building	
26	Nye Ave	Private	South	Office Building	
27	Nye Ave	Private	South	Office Building	
28	Nye Ave	Private	North	Office Building	
29	Nye Ave	Private	North	Office Building	
30	Nye Ave	Public	South	SE 3 <sup>rd</sup> St	
31	Nye Ave	Private	South	Red Lion Hotel	
32	Nye Ave	Private	North	Office Building	
33	Nye Ave	Private	North	Parking Lot	
34	Nye Ave	Private	North	Chevron	
35	Nye Ave	Private	North	Chevron	
36	Nye Ave	Private	North	Chevron	
37	Nye Ave	Private	South	Red Lion Hotel	
38	Nye Ave	Private	South	Vacant Commercial Lot	
39	Nye Ave	Private	South	Vacant Commercial Lot	
40	Nye Ave	Private	North	Sinclair	
41	Nye Ave	Private	North	Sinclair	
42	Nye Ave	Private	North	Shari's	
43	Nye Ave	Private	North	Shari's	
44	Nye Ave	Private	South	Best Western	
45	Nye Ave	Private	South	Best Western	
46	Nye Ave	Private	North	Motel 6	
47	Nye Ave	Private	South	SE 6 <sup>th</sup> St	
48	Nye Ave	Private	North	Super 8	
49	Nye Ave	Private	South	Holiday Inn	
50	Nye Ave	Private	North	Residential Driveway	

## NEXT STEPS

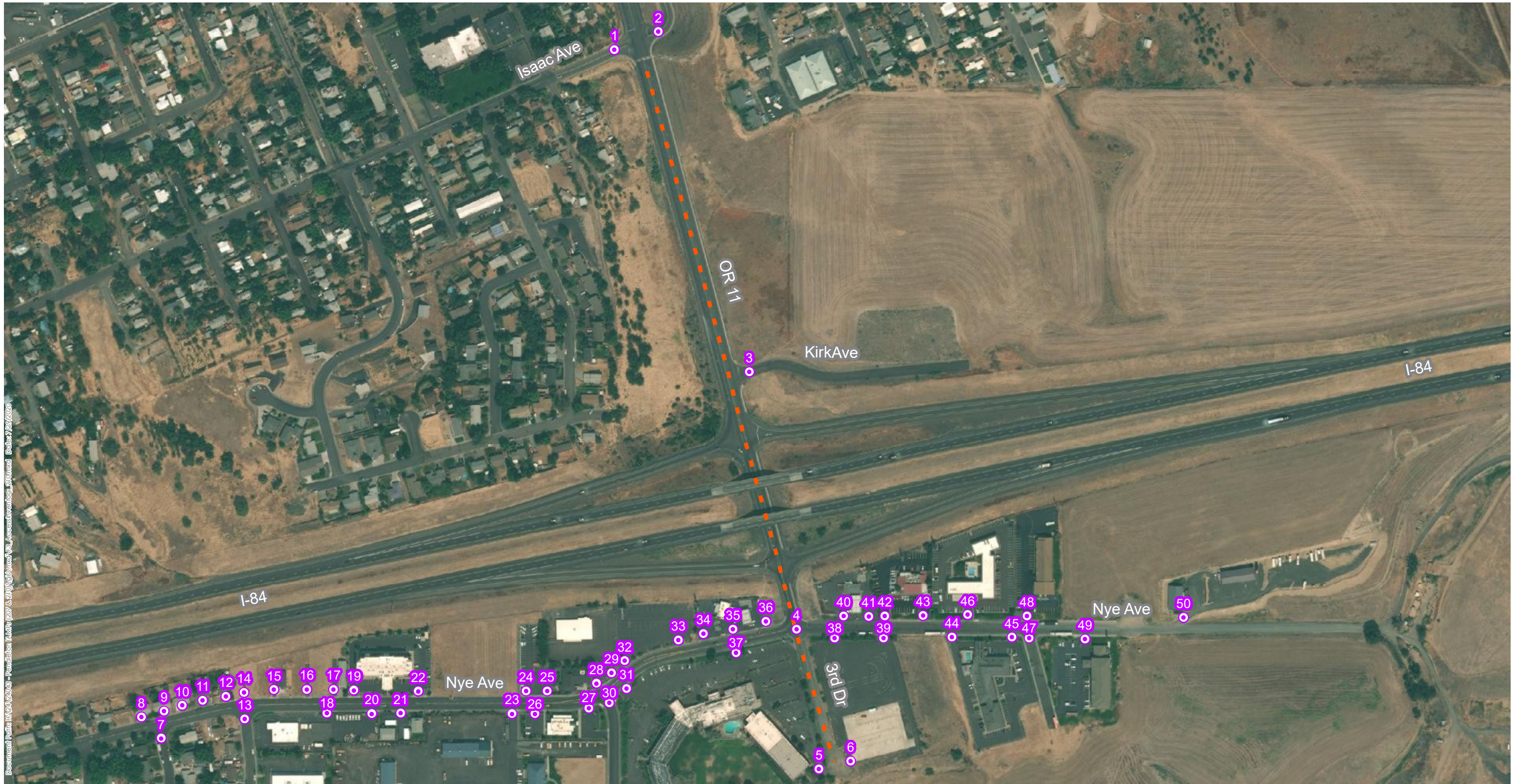
The preferred concept will be presented to the general public for feedback. That feedback will be used to refine the preferred concept for the Exit 210 interchange, which will be incorporated into the draft IAMP. Recommended code changes and supporting ordinances for implementation of the IAMP will be developed and presented in after the preferred concept is refined.

## REFERENCES

1. Kittelson and Associates, Inc. *Pendleton IAMPs: Exit 210 – Detailed Evaluation of Select Concepts*. 2020.
2. Kittelson and Associates, Inc. *Pendleton IAMPs: Exit 210 – Existing Conditions: System Inventory*. 2019.

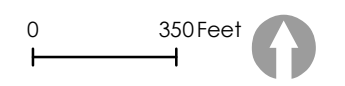
## ATTACHMENTS

- A. Traffic Operations Worksheets
- B. Cost Estimate Worksheets



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
















- Access Location - Driveway/Roadway
- Minimum 1320' IAMP Limits



Attachment A  
Traffic Operations Worksheets

HCM Signalized Intersection Capacity Analysis  
1: OR 11 & SE Isaac Avenue

Future AM - Preferred Concept  
Exit 210 IAMP

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	15	27	87	109	88	19	104	340	27	8	260	36	
Future Volume (vph)	15	27	87	109	88	19	104	340	27	8	260	36	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	
Grade (%)		5%			-4%			4%				-4%	
Total Lost time (s)		4.5			4.5		4.5	4.5		4.5	4.5		
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00		
Fr <sub>t</sub>		0.91			0.99		1.00	0.99		1.00	0.98		
Fl <sub>t</sub> Protected		0.99			0.98		0.95	1.00		0.95	1.00		
Satd. Flow (prot)		1511			1607		1552	1566		848	1519		
Fl <sub>t</sub> Permitted		0.95			0.77		0.54	1.00		0.46	1.00		
Satd. Flow (perm)		1445			1272		889	1566		412	1519		
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	
Adj. Flow (vph)	17	30	97	121	98	21	116	378	30	9	289	40	
RTOR Reduction (vph)	0	65	0	0	5	0	0	4	0	0	7	0	
Lane Group Flow (vph)	0	79	0	0	235	0	116	404	0	9	322	0	
Heavy Vehicles (%)	0%	0%	3%	0%	13%	20%	5%	9%	0%	100%	15%	18%	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA		
Protected Phases		4			8			2			6		
Permitted Phases	4			8			2			6			
Actuated Green, G (s)		13.7			13.7		18.3	18.3		18.3	18.3		
Effective Green, g (s)		13.7			13.7		18.3	18.3		18.3	18.3		
Actuated g/C Ratio		0.33			0.33		0.45	0.45		0.45	0.45		
Clearance Time (s)		4.5			4.5		4.5	4.5		4.5	4.5		
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0		
Lane Grp Cap (vph)		482			425		396	698		183	677		
v/s Ratio Prot								c0.26				0.21	
v/s Ratio Perm		0.05			c0.19		0.13			0.02			
v/c Ratio		0.16			0.55		0.29	0.58		0.05	0.48		
Uniform Delay, d <sub>1</sub>		9.6			11.2		7.2	8.5		6.4	8.0		
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00		
Incremental Delay, d <sub>2</sub>		0.2			1.6		0.4	1.2		0.1	0.5		
Delay (s)		9.8			12.7		7.6	9.6		6.5	8.5		
Level of Service		A			B		A	A		A	A		
Approach Delay (s)		9.8			12.7			9.2			8.5		
Approach LOS		A			B			A			A		
<b>Intersection Summary</b>													
HCM 2000 Control Delay			9.7									HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.57										
Actuated Cycle Length (s)			41.0									Sum of lost time (s)	9.0
Intersection Capacity Utilization			56.1%									ICU Level of Service	B
Analysis Period (min)			15										
c Critical Lane Group													

HCM 6th Signalized Intersection Summary  
1: OR 11 & SE Isaac Avenue

Future AM - Preferred Concept  
Exit 210 IAMP



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↗	↘		↗	↘	
Traffic Volume (veh/h)	15	27	87	109	88	19	104	340	27	8	260	36
Future Volume (veh/h)	15	27	87	109	88	19	104	340	27	8	260	36
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1614	1614	1614	1715	1715	1715	1595	1540	1540	512	1688	1688
Adj Flow Rate, veh/h	17	30	97	121	98	21	116	378	30	9	289	40
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	0	0	0	13	13	13	5	9	9	100	15	15
Cap, veh/h	164	94	237	351	184	33	539	608	48	322	626	87
Arrive On Green	0.25	0.25	0.25	0.25	0.25	0.25	0.43	0.43	0.43	0.43	0.43	0.43
Sat Flow, veh/h	84	381	959	638	745	133	973	1408	112	291	1451	201
Grp Volume(v), veh/h	144	0	0	240	0	0	116	0	408	9	0	329
Grp Sat Flow(s),veh/h/ln	1424	0	0	1515	0	0	973	0	1520	291	0	1651
Q Serve(g_s), s	0.0	0.0	0.0	1.4	0.0	0.0	2.7	0.0	5.8	0.7	0.0	4.0
Cycle Q Clear(g_c), s	2.3	0.0	0.0	3.8	0.0	0.0	6.7	0.0	5.8	6.5	0.0	4.0
Prop In Lane	0.12		0.67	0.50		0.09	1.00		0.07	1.00		0.12
Lane Grp Cap(c), veh/h	496	0	0	568	0	0	539	0	656	322	0	713
V/C Ratio(X)	0.29	0.00	0.00	0.42	0.00	0.00	0.22	0.00	0.62	0.03	0.00	0.46
Avail Cap(c_a), veh/h	1763	0	0	1874	0	0	1457	0	2089	596	0	2269
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	8.8	0.0	0.0	9.3	0.0	0.0	8.0	0.0	6.2	8.7	0.0	5.7
Incr Delay (d2), s/veh	0.3	0.0	0.0	0.5	0.0	0.0	0.2	0.0	1.0	0.0	0.0	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	0.0	0.0	0.9	0.0	0.0	0.4	0.0	1.0	0.0	0.0	0.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	9.1	0.0	0.0	9.8	0.0	0.0	8.2	0.0	7.2	8.8	0.0	6.1
LnGrp LOS	A	A	A	A	A	A	A	A	A	A	A	A
Approach Vol, veh/h		144			240			524				338
Approach Delay, s/veh		9.1			9.8			7.4				6.2
Approach LOS		A			A			A				A
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		16.6		11.4		16.6		11.4				
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s		38.5		32.5		38.5		32.5				
Max Q Clear Time (g_c+I1), s		8.7		4.3		8.5		5.8				
Green Ext Time (p_c), s		3.4		0.9		2.4		1.5				
<b>Intersection Summary</b>												
HCM 6th Ctrl Delay				7.7								
HCM 6th LOS				A								

Intersection						
Int Delay, s/veh	1.7					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔		↔		↔	↔
Traffic Vol, veh/h	44	26	445	0	34	422
Future Vol, veh/h	44	26	445	0	34	422
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	-	-	-	150	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	4	-	-	-4
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	48	28	484	0	37	459

Major/Minor	Minor1	Major1	Major2			
Conflicting Flow All	1017	484	0	0	484	0
Stage 1	484	-	-	-	-	-
Stage 2	533	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218	-
Pot Cap-1 Maneuver	263	583	-	-	1079	-
Stage 1	620	-	-	-	-	-
Stage 2	588	-	-	-	-	-
Platoon blocked, %			-	-		
Mov Cap-1 Maneuver	254	583	-	-	1079	-
Mov Cap-2 Maneuver	254	-	-	-	-	-
Stage 1	620	-	-	-	-	-
Stage 2	568	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	19.7	0	0.6
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	321	1079
HCM Lane V/C Ratio	-	-	0.237	0.034
HCM Control Delay (s)	-	-	19.7	8.5
HCM Lane LOS	-	-	C	A
HCM 95th %tile Q(veh)	-	-	0.9	0.1



Intersection												
Int Delay, s/veh	3.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↕		↗	↑			↘	
Traffic Vol, veh/h	0	0	0	10	66	57	173	475	0	0	196	270
Future Vol, veh/h	0	0	0	10	66	57	173	475	0	0	196	270
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	-	-	-	-	-
Veh in Median Storage, #	-	2	-	-	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	10	10	10	8	0	0	10	10
Mvmt Flow	0	0	0	11	73	63	192	528	0	0	218	300

















Major/Minor	Minor1		Major1		Major2		
Conflicting Flow All	1280	1430	528	518	0	-	0
Stage 1	912	912	-	-	-	-	-
Stage 2	368	518	-	-	-	-	-
Critical Hdwy	6	6.2	6.1	4.2	-	-	-
Critical Hdwy Stg 1	5	5.2	-	-	-	-	-
Critical Hdwy Stg 2	5	5.2	-	-	-	-	-
Follow-up Hdwy	3.5	4.09	3.39	2.29	-	-	-
Pot Cap-1 Maneuver	213	152	551	1008	-	0	0
Stage 1	437	379	-	-	-	0	0
Stage 2	734	551	-	-	-	0	0
Platoon blocked, %					-	-	-
Mov Cap-1 Maneuver	173	0	551	1008	-	-	-
Mov Cap-2 Maneuver	173	0	-	-	-	-	-
Stage 1	354	0	-	-	-	-	-
Stage 2	734	0	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	18.4	2.5	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBTWBLn1	SBT	SBR
Capacity (veh/h)	1008	-	415	-
HCM Lane V/C Ratio	0.191	-	0.356	-
HCM Control Delay (s)	9.4	-	18.4	-
HCM Lane LOS	A	-	C	-
HCM 95th %tile Q(veh)	0.7	-	1.6	-

HCM Signalized Intersection Capacity Analysis  
4: SE 3rd Drive/OR 11 & I-84 EB Ramp Terminal

Future AM - Preferred Concept  
Exit 210 IAMP

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	280	99	155	0	0	0	0	368	25	54	152	0	
Future Volume (vph)	280	99	155	0	0	0	0	368	25	54	152	0	
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	
Grade (%)		-2%			-2%			-4%			4%		
Total Lost time (s)		4.5						4.5		4.5	4.5		
Lane Util. Factor		1.00						1.00		1.00	1.00		
Frt		0.96						0.99		1.00	1.00		
Flt Protected		0.97						1.00		0.95	1.00		
Satd. Flow (prot)		1504						1622		1481	1573		
Flt Permitted		0.97						1.00		0.33	1.00		
Satd. Flow (perm)		1504						1622		515	1573		
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	
Adj. Flow (vph)	311	110	172	0	0	0	0	409	28	60	169	0	
RTOR Reduction (vph)	0	19	0	0	0	0	0	3	0	0	0	0	
Lane Group Flow (vph)	0	574	0	0	0	0	0	434	0	60	169	0	
Heavy Vehicles (%)	10%	10%	10%	0%	0%	0%	0%	9%	10%	10%	9%	0%	
Parking (#/hr)									0				
Turn Type	Perm	NA						NA		Perm	NA		
Protected Phases		4						2			6		
Permitted Phases	4									6			
Actuated Green, G (s)		28.6						21.5		21.5	21.5		
Effective Green, g (s)		28.6						21.5		21.5	21.5		
Actuated g/C Ratio		0.48						0.36		0.36	0.36		
Clearance Time (s)		4.5						4.5		4.5	4.5		
Vehicle Extension (s)		3.0						3.0		3.0	3.0		
Lane Grp Cap (vph)		727						590		187	572		
v/s Ratio Prot								c0.27			0.11		
v/s Ratio Perm		0.38								0.12			
v/c Ratio		0.79						0.74		0.32	0.30		
Uniform Delay, d1		12.7						16.3		13.5	13.4		
Progression Factor		1.00						1.00		1.00	1.00		
Incremental Delay, d2		5.7						4.7		1.0	0.3		
Delay (s)		18.4						21.1		14.5	13.7		
Level of Service		B						C		B	B		
Approach Delay (s)		18.4			0.0			21.1			13.9		
Approach LOS		B			A			C			B		
<b>Intersection Summary</b>													
HCM 2000 Control Delay			18.5									HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.77										
Actuated Cycle Length (s)			59.1									Sum of lost time (s)	9.0
Intersection Capacity Utilization			70.9%									ICU Level of Service	C
Analysis Period (min)			15										
c	Critical Lane Group												

HCM 6th Signalized Intersection Summary  
 4: SE 3rd Drive/OR 11 & I-84 EB Ramp Terminal

Future AM - Preferred Concept  
 Exit 210 IAMP



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕						↕		↕	↕	
Traffic Volume (veh/h)	280	99	155	0	0	0	0	368	25	54	152	0
Future Volume (veh/h)	280	99	155	0	0	0	0	368	25	54	152	0
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	0.90	1.00	1.00	1.00
Work Zone On Approach		No						No			No	
Adj Sat Flow, veh/h/ln	1822	1684	1822				0	1770	1770	1527	1540	0
Adj Flow Rate, veh/h	311	110	172				0	409	28	60	169	0
Peak Hour Factor	0.90	0.90	0.90				0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	0	10	0				0	9	9	10	9	0
Cap, veh/h	374	132	207				0	542	37	246	567	0
Arrive On Green	0.46	0.46	0.46				0.00	0.37	0.37	0.37	0.37	0.00
Sat Flow, veh/h	819	290	453				0	1474	101	843	1540	0
Grp Volume(v), veh/h	593	0	0				0	0	437	60	169	0
Grp Sat Flow(s),veh/h/ln	1562	0	0				0	0	1575	843	1540	0
Q Serve(g_s), s	17.0	0.0	0.0				0.0	0.0	12.4	3.4	4.0	0.0
Cycle Q Clear(g_c), s	17.0	0.0	0.0				0.0	0.0	12.4	15.9	4.0	0.0
Prop In Lane	0.52		0.29				0.00		0.06	1.00		0.00
Lane Grp Cap(c), veh/h	713	0	0				0	0	580	246	567	0
V/C Ratio(X)	0.83	0.00	0.00				0.00	0.00	0.75	0.24	0.30	0.00
Avail Cap(c_a), veh/h	1235	0	0				0	0	938	438	917	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	0.00	0.00				0.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	12.2	0.0	0.0				0.0	0.0	14.2	21.1	11.5	0.0
Incr Delay (d2), s/veh	2.6	0.0	0.0				0.0	0.0	2.0	0.5	0.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.2	0.0	0.0				0.0	0.0	4.0	0.7	1.2	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	14.8	0.0	0.0				0.0	0.0	16.2	21.6	11.8	0.0
LnGrp LOS	B	A	A				A	A	B	C	B	A
Approach Vol, veh/h		593						437			229	
Approach Delay, s/veh		14.8						16.2			14.4	
Approach LOS		B						B			B	
Timer - Assigned Phs		2		4				6				
Phs Duration (G+Y+Rc), s		23.3		27.9				23.3				
Change Period (Y+Rc), s		4.5		4.5				4.5				
Max Green Setting (Gmax), s		30.5		40.5				30.5				
Max Q Clear Time (g_c+I1), s		14.4		19.0				17.9				
Green Ext Time (p_c), s		2.5		4.3				1.0				
<b>Intersection Summary</b>												
HCM 6th Ctrl Delay			15.2									
HCM 6th LOS			B									

# MOVEMENT SUMMARY

 Site: 101 [SE Nye Ave & SE 3rd Dr]

Future AM - Preferred Concept  
Roundabout

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph	
South: SE 3rd Dr												
3	L2	2	0.0	0.039	6.3	LOS A	0.1	3.7	0.48	0.36	34.2	
8	T1	21	50.0	0.039	6.3	LOS A	0.1	3.7	0.48	0.36	33.3	
18	R2	1	0.0	0.039	6.3	LOS A	0.1	3.7	0.48	0.36	33.2	
Approach		24	43.2	0.039	6.3	LOS A	0.1	3.7	0.48	0.36	33.4	
East: SE Nye Ave												
1	L2	1	0.0	0.186	5.6	LOS A	0.8	21.2	0.47	0.37	35.0	
6	T1	36	10.0	0.186	5.6	LOS A	0.8	21.2	0.47	0.37	34.7	
16	R2	141	2.0	0.186	5.6	LOS A	0.8	21.2	0.47	0.37	33.8	
Approach		178	3.6	0.186	5.6	LOS A	0.8	21.2	0.47	0.37	34.0	
North: RoadName												
7	L2	120	0.0	0.272	5.4	LOS A	1.4	36.8	0.18	0.07	34.0	
4	T1	22	0.0	0.272	5.4	LOS A	1.4	36.8	0.18	0.07	33.9	
14	R2	192	13.0	0.272	5.4	LOS A	1.4	36.8	0.18	0.07	32.6	
Approach		334	7.5	0.272	5.4	LOS A	1.4	36.8	0.18	0.07	33.2	
West: RoadName												
5	L2	265	10.0	0.276	5.9	LOS A	1.3	35.8	0.34	0.20	32.2	
2	T1	35	0.0	0.276	5.9	LOS A	1.3	35.8	0.34	0.20	32.4	
12	R2	3	0.0	0.276	5.9	LOS A	1.3	35.8	0.34	0.20	31.6	
Approach		303	8.7	0.276	5.9	LOS A	1.3	35.8	0.34	0.20	32.2	
All Vehicles		839	8.1	0.276	5.6	LOS A	1.4	36.8	0.31	0.19	33.0	

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.

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Project: H:\24\24043 - Pendleton IAMPs (207 & 210)\Operations Analysis\Alternatives (including Synchro and HCS files)\210\Preferred Concept\210\_Fut\_AM\_C1\_3rdNye\_Roundabout.sip7

Intersection												
Int Delay, s/veh	5.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↔						↑	↗	↘	↑	
Traffic Vol, veh/h	98	79	5	0	0	0	0	5	121	37	119	0
Future Vol, veh/h	98	79	5	0	0	0	0	5	121	37	119	0
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	-	-	-	-	-	-	-	-	150	150	-	-
Veh in Median Storage, #	-	0	-	-	16979	-	-	0	-	-	0	-
Grade, %	-	0	-	-	-2	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	10	10	10	10	10	10	10	10	10	10	10	2
Mvmt Flow	109	88	6	0	0	0	0	6	134	41	132	0

Major/Minor	Minor2			Major1			Major2		
Conflicting Flow All	287	354	132	-	0	0	140	0	0
Stage 1	214	214	-	-	-	-	-	-	-
Stage 2	73	140	-	-	-	-	-	-	-
Critical Hdwy	6.5	6.6	6.3	-	-	-	4.2	-	-
Critical Hdwy Stg 1	5.5	5.6	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.5	5.6	-	-	-	-	-	-	-
Follow-up Hdwy	3.59	4.09	3.39	-	-	-	2.29	-	-
Pot Cap-1 Maneuver	687	559	896	0	-	-	1395	-	0
Stage 1	803	711	-	0	-	-	-	-	0
Stage 2	930	766	-	0	-	-	-	-	0
Platoon blocked, %									
Mov Cap-1 Maneuver	667	0	896	-	-	-	1395	-	-
Mov Cap-2 Maneuver	667	0	-	-	-	-	-	-	-
Stage 1	803	0	-	-	-	-	-	-	-
Stage 2	903	0	-	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.6	0	1.8
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	EBLn1	SBL	SBT
Capacity (veh/h)	-	-	675	1395	-
HCM Lane V/C Ratio	-	-	0.3	0.029	-
HCM Control Delay (s)	-	-	12.6	7.7	-
HCM Lane LOS	-	-	B	A	-
HCM 95th %tile Q(veh)	-	-	1.3	0.1	-

Intersection												
Int Delay, s/veh	6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↕		↕	↑			↑	↗
Traffic Vol, veh/h	0	0	0	119	67	41	5	98	0	0	37	66
Future Vol, veh/h	0	0	0	119	67	41	5	98	0	0	37	66
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	-	-	-	-	-	-	150	-	-	-	-	150
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	-2	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	92	90	90	90	90	90
Heavy Vehicles, %	2	2	2	10	10	10	10	10	10	10	10	10
Mvmt Flow	0	0	0	132	74	46	5	109	0	0	41	73

Major/Minor	Minor1	Major1	Major2				
Conflicting Flow All	197	233	109	114	0	-	-
Stage 1	119	119	-	-	-	-	-
Stage 2	78	114	-	-	-	-	-
Critical Hdwy	6.1	6.2	6.1	4.2	-	-	-
Critical Hdwy Stg 1	5.1	5.2	-	-	-	-	-
Critical Hdwy Stg 2	5.1	5.2	-	-	-	-	-
Follow-up Hdwy	3.59	4.09	3.39	2.29	-	-	-
Pot Cap-1 Maneuver	791	671	929	1427	-	0	0
Stage 1	898	792	-	-	-	0	0
Stage 2	933	796	-	-	-	0	0
Platoon blocked, %					-	-	-
Mov Cap-1 Maneuver	788	0	929	1427	-	-	-
Mov Cap-2 Maneuver	788	0	-	-	-	-	-
Stage 1	894	0	-	-	-	-	-
Stage 2	933	0	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.3	0.4	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBTWBLn1	SBT	SBR
Capacity (veh/h)	1427	-	820	-
HCM Lane V/C Ratio	0.004	-	0.308	-
HCM Control Delay (s)	7.5	-	11.3	-
HCM Lane LOS	A	-	B	-
HCM 95th %tile Q(veh)	0	-	1.3	-

# HCM Signalized Intersection Capacity Analysis

## 1: OR 11 & SE Isaac Avenue

Exit 210 IAMP  
Future PM - Preferred Concept



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↗	↖		↗	↖	
Traffic Volume (vph)	19	78	124	70	56	14	158	332	27	23	333	42
Future Volume (vph)	19	78	124	70	56	14	158	332	27	23	333	42
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Grade (%)		5%			-4%			4%				-4%
Total Lost time (s)		4.5			4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Fr <sub>t</sub>		0.92			0.99		1.00	0.99		1.00	0.98	
Fl <sub>t</sub> Protected		1.00			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1553			1658		1597	1560		1357	1647	
Fl <sub>t</sub> Permitted		0.96			0.80		0.50	1.00		0.52	1.00	
Satd. Flow (perm)		1504			1357		839	1560		737	1647	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	20	83	132	74	60	15	168	353	29	24	354	45
RTOR Reduction (vph)	0	63	0	0	6	0	0	4	0	0	7	0
Lane Group Flow (vph)	0	172	0	0	143	0	168	378	0	24	392	0
Heavy Vehicles (%)	0%	0%	2%	0%	9%	0%	2%	9%	5%	25%	7%	3%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		9.8			9.8		16.0	16.0		16.0	16.0	
Effective Green, g (s)		9.8			9.8		16.0	16.0		16.0	16.0	
Actuated g/C Ratio		0.28			0.28		0.46	0.46		0.46	0.46	
Clearance Time (s)		4.5			4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		423			382		385	717		338	757	
v/s Ratio Prot								c0.24			0.24	
v/s Ratio Perm		c0.11			0.11		0.20			0.03		
v/c Ratio		0.41			0.38		0.44	0.53		0.07	0.52	
Uniform Delay, d <sub>1</sub>		10.1			10.0		6.4	6.7		5.2	6.7	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d <sub>2</sub>		0.6			0.6		0.8	0.7		0.1	0.6	
Delay (s)		10.8			10.7		7.1	7.4		5.3	7.3	
Level of Service		B			B		A	A		A	A	
Approach Delay (s)		10.8			10.7			7.3			7.2	
Approach LOS		B			B			A			A	

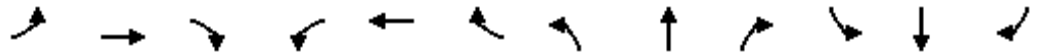
### Intersection Summary

HCM 2000 Control Delay	8.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	34.8	Sum of lost time (s)	9.0
Intersection Capacity Utilization	68.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Signalized Intersection Summary  
 1: OR 11 & SE Isaac Avenue

Exit 210 IAMP  
 Future PM - Preferred Concept



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↕		↕	↕	
Traffic Volume (veh/h)	19	78	124	70	56	14	158	332	27	23	333	42
Future Volume (veh/h)	19	78	124	70	56	14	158	332	27	23	333	42
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1614	1614	1614	1770	1770	1770	1636	1540	1540	1549	1798	1798
Adj Flow Rate, veh/h	20	83	132	74	60	15	168	353	29	24	354	45
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	0	0	0	9	9	9	2	9	9	25	7	7
Cap, veh/h	137	139	197	310	207	39	528	669	55	496	745	95
Arrive On Green	0.24	0.24	0.24	0.24	0.24	0.24	0.48	0.48	0.48	0.48	0.48	0.48
Sat Flow, veh/h	62	573	814	587	855	161	936	1404	115	900	1564	199
Grp Volume(v), veh/h	235	0	0	149	0	0	168	0	382	24	0	399
Grp Sat Flow(s),veh/h/ln	1449	0	0	1603	0	0	936	0	1520	900	0	1762
Q Serve(g_s), s	0.8	0.0	0.0	0.0	0.0	0.0	4.7	0.0	5.6	0.6	0.0	4.9
Cycle Q Clear(g_c), s	4.7	0.0	0.0	2.3	0.0	0.0	9.6	0.0	5.6	6.2	0.0	4.9
Prop In Lane	0.09		0.56	0.50		0.10	1.00		0.08	1.00		0.11
Lane Grp Cap(c), veh/h	473	0	0	557	0	0	528	0	724	496	0	840
V/C Ratio(X)	0.50	0.00	0.00	0.27	0.00	0.00	0.32	0.00	0.53	0.05	0.00	0.47
Avail Cap(c_a), veh/h	1355	0	0	1425	0	0	1352	0	2063	1289	0	2392
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	11.0	0.0	0.0	10.1	0.0	0.0	8.9	0.0	5.9	8.0	0.0	5.7
Incr Delay (d2), s/veh	0.8	0.0	0.0	0.3	0.0	0.0	0.3	0.0	0.6	0.0	0.0	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	0.0	0.0	0.7	0.0	0.0	0.7	0.0	1.0	0.1	0.0	1.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	11.8	0.0	0.0	10.3	0.0	0.0	9.3	0.0	6.5	8.1	0.0	6.1
LnGrp LOS	B	A	A	B	A	A	A	A	A	A	A	A
Approach Vol, veh/h		235			149			550				423
Approach Delay, s/veh		11.8			10.3			7.3				6.2
Approach LOS		B			B			A				A
Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		19.8		12.3		19.8		12.3				
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s		43.5		27.5		43.5		27.5				
Max Q Clear Time (g_c+I1), s		11.6		6.7		8.2		4.3				
Green Ext Time (p_c), s		3.6		1.4		2.9		0.9				
<b>Intersection Summary</b>												
HCM 6th Ctrl Delay				8.1								
HCM 6th LOS				A								



Intersection						
Int Delay, s/veh	5.6					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↘↗		↑		↘↗	↑
Traffic Vol, veh/h	100	59	459	0	56	471
Future Vol, veh/h	100	59	459	0	56	471
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	-	-	-	150	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	4	-	-	-4
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	109	64	499	0	61	512

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	1133	499	0	-	499
Stage 1	499	-	-	-	-
Stage 2	634	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218
Pot Cap-1 Maneuver	224	572	-	0	1065
Stage 1	610	-	-	0	-
Stage 2	529	-	-	0	-
Platoon blocked, %			-		-
Mov Cap-1 Maneuver	211	572	-	-	1065
Mov Cap-2 Maneuver	211	-	-	-	-
Stage 1	610	-	-	-	-
Stage 2	499	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	37.6	0	0.9
HCM LOS	E		

Minor Lane/Major Mvmt	NBTWBLn1	SBL	SBT
Capacity (veh/h)	- 276	1065	-
HCM Lane V/C Ratio	- 0.626	0.057	-
HCM Control Delay (s)	- 37.6	8.6	-
HCM Lane LOS	- E	A	-
HCM 95th %tile Q(veh)	- 3.9	0.2	-

Intersection												
Int Delay, s/veh	5.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					↕		↕	↑			↕	
Traffic Vol, veh/h	0	0	0	9	151	96	146	524	0	0	248	323
Future Vol, veh/h	0	0	0	9	151	96	146	524	0	0	248	323
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	-	-	-	-	-
Veh in Median Storage, #	-	2	-	-	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	10	10	10	10	6	0	0	4	10
Mvmt Flow	0	0	0	10	162	103	157	563	0	0	267	347

Major/Minor	Minor1	Major1	Major2						
Conflicting Flow All	1318	1491	563	614	0	-	-	-	0
Stage 1	877	877	-	-	-	-	-	-	-
Stage 2	441	614	-	-	-	-	-	-	-
Critical Hdwy	6.1	6.2	6.1	4.2	-	-	-	-	-
Critical Hdwy Stg 1	5.1	5.2	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.1	5.2	-	-	-	-	-	-	-
Follow-up Hdwy	3.59	4.09	3.39	2.29	-	-	-	-	-
Pot Cap-1 Maneuver	193	~ 140	527	928	-	0	0	-	-
Stage 1	434	392	-	-	-	0	0	-	-
Stage 2	664	504	-	-	-	0	0	-	-
Platoon blocked, %					-			-	-
Mov Cap-1 Maneuver	160	0	527	928	-	-	-	-	-
Mov Cap-2 Maneuver	160	0	-	-	-	-	-	-	-
Stage 1	361	0	-	-	-	-	-	-	-
Stage 2	664	0	-	-	-	-	-	-	-

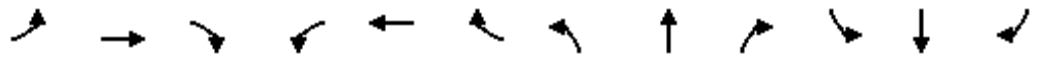
Approach	WB	NB	SB
HCM Control Delay, s	25.9	2.1	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBTWBLn1	SBT	SBR
Capacity (veh/h)	928	-	440	-
HCM Lane V/C Ratio	0.169	-	0.626	-
HCM Control Delay (s)	9.7	-	25.9	-
HCM Lane LOS	A	-	D	-
HCM 95th %tile Q(veh)	0.6	-	4.2	-

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

HCM Signalized Intersection Capacity Analysis  
 4: SE 3rd Drive/OR 11 & I-84 EB Ramp Terminal

Exit 210 IAMP  
 Future PM - Preferred Concept



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	347	186	185	0	0	0	0	323	18	66	191	0
Future Volume (vph)	347	186	185	0	0	0	0	323	18	66	191	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Grade (%)		-2%			-2%			-4%				4%
Total Lost time (s)	4.5	4.5						4.5		4.5	4.5	
Lane Util. Factor	1.00	1.00						1.00		1.00	1.00	
Frt	1.00	0.93						0.99		1.00	1.00	
Flt Protected	0.95	1.00						1.00		0.95	1.00	
Satd. Flow (prot)	1526	1487						1683		1481	1633	
Flt Permitted	0.95	1.00						1.00		0.48	1.00	
Satd. Flow (perm)	1526	1487						1683		747	1633	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	358	192	191	0	0	0	0	333	19	68	197	0
RTOR Reduction (vph)	0	49	0	0	0	0	0	3	0	0	0	0
Lane Group Flow (vph)	358	334	0	0	0	0	0	349	0	68	197	0
Heavy Vehicles (%)	10%	10%	10%	0%	0%	0%	0%	5%	10%	10%	5%	0%
Turn Type	Perm	NA						NA		Perm	NA	
Protected Phases		4						2			6	
Permitted Phases	4									6		
Actuated Green, G (s)	17.5	17.5						15.1		15.1	15.1	
Effective Green, g (s)	17.5	17.5						15.1		15.1	15.1	
Actuated g/C Ratio	0.42	0.42						0.36		0.36	0.36	
Clearance Time (s)	4.5	4.5						4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0						3.0		3.0	3.0	
Lane Grp Cap (vph)	641	625						610		271	592	
v/s Ratio Prot		0.22						c0.21			0.12	
v/s Ratio Perm	c0.23									0.09		
v/c Ratio	0.56	0.53						0.57		0.25	0.33	
Uniform Delay, d1	9.1	9.0						10.7		9.3	9.6	
Progression Factor	1.00	1.00						1.00		1.00	1.00	
Incremental Delay, d2	1.1	0.9						1.3		0.5	0.3	
Delay (s)	10.2	9.9						12.0		9.8	9.9	
Level of Service	B	A						B		A	A	
Approach Delay (s)		10.0			0.0			12.0			9.9	
Approach LOS		B			A			B			A	

Intersection Summary			
HCM 2000 Control Delay	10.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	41.6	Sum of lost time (s)	9.0
Intersection Capacity Utilization	91.9%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCM 6th Signalized Intersection Summary  
 4: SE 3rd Drive/OR 11 & I-84 EB Ramp Terminal

Exit 210 IAMP  
 Future PM - Preferred Concept



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	347	186	185	0	0	0	0	323	18	66	191	0
Future Volume (veh/h)	347	186	185	0	0	0	0	323	18	66	191	0
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				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	1684	1684	1684				0	1826	1826	1527	1595	0
Adj Flow Rate, veh/h	358	192	191				0	333	19	68	197	0
Peak Hour Factor	0.97	0.97	0.97				0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	10	10	10				0	5	5	10	5	0
Cap, veh/h	619	299	297				0	573	33	382	535	0
Arrive On Green	0.39	0.39	0.39				0.00	0.34	0.34	0.34	0.34	0.00
Sat Flow, veh/h	1604	775	771				0	1711	98	912	1595	0
Grp Volume(v), veh/h	358	0	383				0	0	352	68	197	0
Grp Sat Flow(s),veh/h/ln	1604	0	1545				0	0	1808	912	1595	0
Q Serve(g_s), s	5.7	0.0	6.5				0.0	0.0	5.2	2.1	3.0	0.0
Cycle Q Clear(g_c), s	5.7	0.0	6.5				0.0	0.0	5.2	7.3	3.0	0.0
Prop In Lane	1.00		0.50				0.00		0.05	1.00		0.00
Lane Grp Cap(c), veh/h	619	0	596				0	0	606	382	535	0
V/C Ratio(X)	0.58	0.00	0.64				0.00	0.00	0.58	0.18	0.37	0.00
Avail Cap(c_a), veh/h	1864	0	1796				0	0	1877	1023	1655	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	0.00	1.00				0.00	0.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	7.8	0.0	8.1				0.0	0.0	8.9	11.9	8.1	0.0
Incr Delay (d2), s/veh	0.9	0.0	1.2				0.0	0.0	0.9	0.2	0.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	0.0	1.5				0.0	0.0	1.5	0.4	0.8	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	8.7	0.0	9.3				0.0	0.0	9.7	12.1	8.6	0.0
LnGrp LOS	A	A	A				A	A	A	B	A	A
Approach Vol, veh/h		741						352			265	
Approach Delay, s/veh		9.0						9.7			9.5	
Approach LOS		A						A			A	
Timer - Assigned Phs		2		4				6				
Phs Duration (G+Y+Rc), s		15.3		17.0				15.3				
Change Period (Y+Rc), s		4.5		4.5				4.5				
Max Green Setting (Gmax), s		33.5		37.5				33.5				
Max Q Clear Time (g_c+I1), s		7.2		8.5				9.3				
Green Ext Time (p_c), s		2.2		3.9				1.5				
<b>Intersection Summary</b>												
HCM 6th Ctrl Delay			9.3									
HCM 6th LOS			A									

# MOVEMENT SUMMARY

 Site: 101 [SE Nye Ave & SE 3rd Dr]

Future PM - Preferred Concept  
Roundabout

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: SE 3rd Dr											
3	L2	1	0.0	0.039	6.3	LOS A	0.1	3.7	0.48	0.35	34.5
8	T1	22	50.0	0.039	6.3	LOS A	0.1	3.7	0.48	0.35	33.5
18	R2	1	0.0	0.039	6.3	LOS A	0.1	3.7	0.48	0.35	33.4
Approach		24	45.5	0.039	6.3	LOS A	0.1	3.7	0.48	0.35	33.6
East: SE Nye Ave											
1	L2	1	0.0	0.164	5.1	LOS A	0.7	18.5	0.43	0.32	35.2
6	T1	39	10.0	0.164	5.1	LOS A	0.7	18.5	0.43	0.32	34.9
16	R2	123	2.0	0.164	5.1	LOS A	0.7	18.5	0.43	0.32	34.0
Approach		163	3.9	0.164	5.1	LOS A	0.7	18.5	0.43	0.32	34.3
North: RoadName											
7	L2	134	0.0	0.334	6.1	LOS A	1.8	48.7	0.20	0.08	33.7
4	T1	22	0.0	0.334	6.1	LOS A	1.8	48.7	0.20	0.08	33.6
14	R2	252	13.0	0.334	6.1	LOS A	1.8	48.7	0.20	0.08	32.4
Approach		408	8.0	0.334	6.1	LOS A	1.8	48.7	0.20	0.08	32.9
West: RoadName											
5	L2	226	10.0	0.252	5.7	LOS A	1.2	31.7	0.35	0.22	32.5
2	T1	47	0.0	0.252	5.7	LOS A	1.2	31.7	0.35	0.22	32.7
12	R2	1	0.0	0.252	5.7	LOS A	1.2	31.7	0.35	0.22	31.8
Approach		274	8.3	0.252	5.7	LOS A	1.2	31.7	0.35	0.22	32.5
All Vehicles		868	8.4	0.334	5.8	LOS A	1.8	48.7	0.30	0.17	33.0

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.

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Project: H:\24\24043 - Pendleton IAMPs (207 & 210)\Operations Analysis\Alternatives (including Synchro and HCS files)\210\Preferred Concept  
210\_Fut\_PM\_C1\_3rdNye\_Roundabout.sip7

HCM 6th TWSC  
6: Goad Road (New) & I-84 EB Ramp Terminal

Exit 210 IAMP  
Future PM - Preferred Concept

Intersection												
Int Delay, s/veh	1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑	↗					↑	↗	↘	↑	
Traffic Vol, veh/h	182	88	0	0	0	0	0	0	127	83	144	0
Future Vol, veh/h	182	88	0	0	0	0	0	0	127	83	144	0
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	150	-	150	-	-	-	-	-	150	150	-	-
Veh in Median Storage, #	-	0	-	-	16979	-	-	0	-	-	0	-
Grade, %	-	0	-	-	-2	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	10	10	10	0	2	2	2	10	10	10	10	2
Mvmt Flow	198	96	0	0	0	0	0	0	138	90	157	0

Major/Minor	Minor2			Major1			Major2		
Conflicting Flow All	406	475	157	-	0	0	138	0	0
Stage 1	337	337	-	-	-	-	-	-	-
Stage 2	69	138	-	-	-	-	-	-	-
Critical Hdwy	6.5	6.6	6.3	-	-	-	4.2	-	-
Critical Hdwy Stg 1	5.5	5.6	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.5	5.6	-	-	-	-	-	-	-
Follow-up Hdwy	3.59	4.09	3.39	-	-	-	2.29	-	-
Pot Cap-1 Maneuver	586	477	868	0	-	-	1398	-	0
Stage 1	706	627	-	0	-	-	-	-	0
Stage 2	934	767	-	0	-	-	-	-	0
Platoon blocked, %									
Mov Cap-1 Maneuver	548	0	868	-	-	-	1398	-	-
Mov Cap-2 Maneuver	548	0	-	-	-	-	-	-	-
Stage 1	706	0	-	-	-	-	-	-	-
Stage 2	874	0	-	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s		0	2.8
HCM LOS	-		

Minor Lane/Major Mvmt	NBT	NBR	EBLn1	EBLn2	EBLn3	SBL	SBT
Capacity (veh/h)	-	-	548	-	-	1398	-
HCM Lane V/C Ratio	-	-	0.361	-	-	0.065	-
HCM Control Delay (s)	-	-	15.2	-	0	7.8	-
HCM Lane LOS	-	-	C	-	A	A	-
HCM 95th %tile Q(veh)	-	-	1.6	-	-	0.2	-

Intersection												
Int Delay, s/veh	0											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations				↖	↗	↖	↖	↗			↗	↖
Traffic Vol, veh/h	0	0	0	144	106	70	0	182	0	0	83	150
Future Vol, veh/h	0	0	0	144	106	70	0	182	0	0	83	150
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	-	-	-	150	-	150	150	-	-	-	-	150
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	-2	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	10	10	10	10	10	10	10	10	10
Mvmt Flow	0	0	0	157	115	76	0	198	0	0	90	163

Major/Minor	Minor1		Major1		Major2				
Conflicting Flow All	370	451	198	253	0	-	-	-	0
Stage 1	198	198	-	-	-	-	-	-	-
Stage 2	172	253	-	-	-	-	-	-	-
Critical Hdwy	6.1	6.2	6.1	4.2	-	-	-	-	-
Critical Hdwy Stg 1	5.1	5.2	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.1	5.2	-	-	-	-	-	-	-
Follow-up Hdwy	3.59	4.09	3.39	2.29	-	-	-	-	-
Pot Cap-1 Maneuver	641	517	832	1267	-	0	0	-	-
Stage 1	835	738	-	-	-	0	0	-	-
Stage 2	855	703	-	-	-	0	0	-	-
Platoon blocked, %					-			-	-
Mov Cap-1 Maneuver	641	0	832	1267	-	-	-	-	-
Mov Cap-2 Maneuver	641	0	-	-	-	-	-	-	-
Stage 1	835	0	-	-	-	-	-	-	-
Stage 2	855	0	-	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s		0	0
HCM LOS	-		

Minor Lane/Major Mvmt	NBL	NBTWBLn1	WBLn2	WBLn3	SBT	SBR
Capacity (veh/h)	1267	-	641	-	832	-
HCM Lane V/C Ratio	-	-	0.244	-	0.091	-
HCM Control Delay (s)	0	-	12.4	-	9.8	-
HCM Lane LOS	A	-	B	-	A	-
HCM 95th %tile Q(veh)	0	-	1	-	0.3	-

Attachment B  
Cost Estimate Worksheets



**ODOT- Exit 210 IAMP  
 PLANNING LEVEL COST ESTIMATE  
 IAMP  
 (YEAR 2020 COSTS)  
 7/15/2020**

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

<b>Exit 210 - Alternate Section Breakdown:</b>
<b>Nye Avenue/3rd roundabout and intersection realignment</b>

NO.	DESCRIPTION	UNIT	UNIT PRICE	ESTIMATED QUANTITY	TOTAL PRICE
1	Mobilization/Demobilization (10%)	LS	\$ 129,000	All Req'd	\$ 129,000
2	Temporary Protection and Direction of Traffic	LS	\$ 19,000	All Req'd	19,000
3	Asphalt Concrete Pavement	TON	100	4,400	440,000
4	Aggregate Base	TON	28	13,000	364,000
5	Geotextile Fabric	SQYD	2	14,000	21,000
6	Concrete Apron	SQYD	50	2,400	120,000
7	Earthwork	CY	20	15,000	300,000
8	Permanent Signing and Striping	LS	10,000	All Req'd	10,000
9	Erosion Control	LS	\$ 7,000	All Req'd	7,000
<b>Total Estimated Construction Cost</b>					<b>\$ 1,410,000</b>
Construction Contingency (20%)					\$ 282,000
Construction Engineering (15%)					\$ 212,000
Preliminary Engineering (15%)					\$ 212,000
<b>TOTAL ESTIMATED PROJECT COST (2020)</b>					<b>\$ 2,116,000</b>

**ODOT- Exit 210 IAMP  
 PLANNING LEVEL COST ESTIMATE  
 IAMP  
 (YEAR 2020 COSTS)  
 7/15/2020**

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

<b>Exit 210 - Alternate Section Breakdown:</b>					
<b>Kirk Avenue re-alignment</b>					
NO.	DESCRIPTION	UNIT	UNIT PRICE	ESTIMATED QUANTITY	TOTAL PRICE
1	Mobilization/Demobilization (10%)	LS	\$ 320,000	All Req'd	\$ 320,000
2	Temporary Protection and Direction of Traffic	LS	\$ 48,000	All Req'd	48,000
3	Asphalt Concrete Pavement	TON	100	12,000	1,200,000
4	Aggregate Base	TON	28	42,000	1,176,000
5	Geotextile Fabric	SQYD	2	44,650	67,000
6	Earthwork	CY	20	34,000	680,000
7	Permanent Signing and Striping	LS	10,000	All Req'd	10,000
8	Erosion Control	LS	\$ 16,000	All Req'd	16,000
<b>Total Estimated Construction Cost</b>					<b>\$ 3,517,000</b>
Construction Contingency (20%)					\$ 704,000
Construction Engineering (15%)					\$ 528,000
Preliminary Engineering (15%)					\$ 528,000
<b>TOTAL ESTIMATED PROJECT COST (2020)</b>					<b>\$ 5,277,000</b>

**ODOT- Exit 210 IAMP  
PLANNING LEVEL COST ESTIMATE  
IAMP  
(YEAR 2020 COSTS)  
7/15/2020**

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

<b>Exit 210 - Alternate Section Breakdown:</b>					
<b>OR11 roadway re-allocation</b>					
NO.	DESCRIPTION	UNIT	UNIT PRICE	ESTIMATED QUANTITY	TOTAL PRICE
1	Mobilization/Demobilization (10%)	LS	\$ 111,000	All Req'd	\$ 111,000
2	Temporary Protection and Direction of Traffic	LS	\$ 17,000	All Req'd	17,000
3	Asphalt Concrete Pavement	TON	100	2,000	200,000
4	Aggregate Base	TON	28	7,300	204,400
5	Geotextile Fabric	SQYD	2	7,700	11,600
6	Signalized Intersection	EA	300,000	All Req'd	300,000
7	6' Concrete Sidewalk	SY	50	1,100	55,000
8	Earthwork	CY	20	15,000	300,000
9	Permanent Signing and Striping	LS	10,000	All Req'd	10,000
10	Erosion Control	LS	\$ 6,000	All Req'd	6,000
<b>Total Estimated Construction Cost</b>					<b>\$ 1,215,000</b>
Construction Contingency (20%)					\$ 243,000
Construction Engineering (15%)					\$ 183,000
Preliminary Engineering (15%)					\$ 183,000
<b>TOTAL ESTIMATED PROJECT COST (2020)</b>					<b>\$ 1,824,000</b>

<b>Exit 210 - Alternate Section Breakdown:</b>					
<b>OR11/Isaac Ave Signalization</b>					
NO.	DESCRIPTION	UNIT	UNIT PRICE	ESTIMATED QUANTITY	TOTAL PRICE
1	Mobilization/Demobilization (10%)	LS	\$ 32,000	All Req'd	\$ 32,000
2	Temporary Protection and Direction of Traffic	LS	\$ 5,000	All Req'd	5,000
6	Signalized Intersection	EA	300,000	All Req'd	300,000
9	Permanent Signing and Striping	LS	10,000	All Req'd	10,000
10	Erosion Control	LS	\$ 2,000	All Req'd	2,000
<b>Total Estimated Construction Cost</b>					<b>\$ 349,000</b>
Construction Contingency (20%)					\$ 70,000
Construction Engineering (15%)					\$ 53,000
Preliminary Engineering (15%)					\$ 53,000
<b>TOTAL ESTIMATED PROJECT COST (2020)</b>					<b>\$ 525,000</b>

**ODOT- Exit 210 IAMP  
PLANNING LEVEL COST ESTIMATE  
IAMP  
(YEAR 2020 COSTS)  
8/18/2020**

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

<b>Exit 210 - Alternate Section Breakdown:</b>					
<b>"D" : EB Ramp Terminal Intersection Traffic Signal</b>					
NO.	DESCRIPTION	UNIT	UNIT PRICE	ESTIMATED QUANTITY	TOTAL PRICE
1	Mobilization/Demobilization (10%)	LS	\$ 33,000	All Req'd	\$ 33,000
2	Temporary Protection and Direction of Traffic	LS	\$ 5,000	All Req'd	5,000
3	Signalized Intersection	EA	300,000	All Req'd	300,000
7	Earthwork/Excavation	CY	20	160	3,200
8	Permanent Signing and Striping	LS	10,000	All Req'd	10,000
9	Erosion Control	LS	\$ 2,000	All Req'd	2,000
<b>Total Estimated Construction Cost</b>					<b>\$ 353,200</b>
Construction Contingency (20%)					\$ 71,000
Construction Engineering (15%)					\$ 53,000
Preliminary Engineering (15%)					\$ 53,000
<b>TOTAL ESTIMATED PROJECT COST (2020)</b>					<b>\$ 530,200</b>

<b>Exit 210 - Alternate Section Breakdown:</b>					
<b>"F1" : Nye Avenue Extension From Terminus to South of Underpass</b>					
NO.	DESCRIPTION	UNIT	UNIT PRICE	ESTIMATED QUANTITY	TOTAL PRICE
1	Mobilization/Demobilization (10%)	LS	\$ 174,000	All Req'd	\$ 174,000
2	Temporary Protection and Direction of Traffic	LS	\$ 26,000	All Req'd	26,000
3	Asphalt Concrete Pavement	TON	100	3,000	300,000
4	Aggregate Base	TON	28	11,000	308,000
5	Geotextile Fabric	SQYD	2	12,600	42,000
7	Earthwork/Excavation	CY	20	52,000	1,040,000
8	Permanent Signing and Striping	LS	10,000	All Req'd	10,000
9	Erosion Control	LS	\$ 9,000	All Req'd	9,000
<b>Total Estimated Construction Cost</b>					<b>\$ 1,909,000</b>
Construction Contingency (20%)					\$ 382,000
Construction Engineering (15%)					\$ 287,000
Preliminary Engineering (15%)					\$ 287,000
<b>TOTAL ESTIMATED PROJECT COST (2020)</b>					<b>\$ 2,865,000</b>

<b>Exit 210 - Alternate Section Breakdown:</b>					
<b>"F2" : F1 + Underpass and Old Dump Road Extension</b>					

NO.	DESCRIPTION	UNIT	UNIT PRICE	ESTIMATED QUANTITY	TOTAL PRICE
1	Mobilization/Demobilization (10%)	LS	\$ 338,000	All Req'd	338,000
2	Temporary Protection and Direction of Traffic	LS	\$ 50,000	All Req'd	50,000
3	Asphalt Concrete Pavement	TON	100	10,000	1,000,000
4	Aggregate Base	TON	28	24,000	672,000
5	Geotextile Fabric	SQYD	2	25,600	38,400
6	Underpass	EA	225,000	All Req'd	225,000
7	Earthwork/Excavation	CY	20	68,000	1,360,000
8	Permanent Signing and Striping	LS	10,000	All Req'd	10,000
9	Erosion Control	LS	\$ 17,000	All Req'd	17,000
<b>Total Estimated Construction Cost</b>					<b>\$ 3,710,400</b>
Construction Contingency (20%)					\$ 743,000
Construction Engineering (15%)					\$ 557,000
Preliminary Engineering (15%)					\$ 557,000
<b>TOTAL ESTIMATED PROJECT COST (2020)</b>					<b>\$ 5,567,400</b>

<b>Exit 210 - Alternate Section Breakdown:</b>					
<b>"G1" : Split Diamond Interchange/No EB Signalised Intersection</b>					

NO.	DESCRIPTION	UNIT	UNIT PRICE	ESTIMATED QUANTITY	TOTAL PRICE
1	Mobilization/Demobilization (10%)	LS	\$ 418,000	All Req'd	\$ 418,000
2	Temporary Protection and Direction of Traffic	LS	\$ 62,000	All Req'd	62,000
3	Asphalt Concrete Pavement	TON	100	20,000	2,000,000
4	Aggregate Base	TON	28	45,000	1,260,000
5	Geotextile Fabric	SQYD	2	48,000	42,000
7	Earthwork/Excavation	CY	20	39,000	780,000
8	Permanent Signing and Striping	LS	10,000	All Req'd	10,000
9	Erosion Control	LS	\$ 21,000	All Req'd	21,000
<b>Total Estimated Construction Cost</b>					<b>\$ 4,593,000</b>
Construction Contingency (20%)					\$ 919,000
Construction Engineering (15%)					\$ 689,000
Preliminary Engineering (15%)					\$ 689,000
<b>TOTAL ESTIMATED PROJECT COST (2020)</b>					<b>\$ 6,890,000</b>

**Exit 210 - Alternate Section Breakdown:****"G2" : G1 + Underpass + Old Dump Road Extension**

NO.	DESCRIPTION	UNIT	UNIT PRICE	ESTIMATED QUANTITY	TOTAL PRICE
1	Mobilization/Demobilization (10%)	LS	\$ 587,000	All Req'd	\$ 587,000
2	Temporary Protection and Direction of Traffic	LS	\$ 87,000	All Req'd	87,000
3	Asphalt Concrete Pavement	TON	100	27,000	2,700,000
4	Aggregate Base	TON	28	58,000	1,624,000
5	Geotextile Fabric	SQYD	2	61,000	91,500
	Underpass	EA	225,000	All Req'd	225,000
7	Earthwork/Excavation	CY	20	55,000	1,100,000
8	Permanent Signing and Striping	LS	10,000	All Req'd	10,000
9	Erosion Control	LS	\$ 29,000	All Req'd	29,000
					-
			<b>Total Estimated Construction Cost</b>		<b>\$ 6,453,500</b>
			Construction Contingency (20%)		\$ 1,291,000
			Construction Engineering (15%)		\$ 969,000
			Preliminary Engineering (15%)		\$ 969,000
			<b>TOTAL ESTIMATED PROJECT COST (2020)</b>		<b>\$ 9,682,500</b>