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## **SR 315 Conceptual Alternative Summary Evaluation**

Based upon the Conceptual Alternatives Analysis Evaluation Criteria, SR 315 Conceptual Alternative 1 is advanced for additional analysis based on the following (also see Table 15):

- **Operational efficiency:** Alternative 1 has a higher average vehicle speed (54.1 compared to 51.4) and lower overall travel time (793 compared to 1127) than Alternative 2.
- **Safety:** Both contain a “weave” between the movements for 270 WB to 315 Northbound and 23 northbound/southbound to 315 southbound. SR 315 Conceptual Alternative 2 requires traffic from 315 SB to 270 EB to make a double lane change to complete the weave maneuver. Overall Alternative 1 eliminates 25 percent more of the existing weaving conditions.
- **Environmental Issues:** While both Alternatives require some additional right-of-way, SR 315 Conceptual Alternative 2 requires property from the Olentangy Parkland to construct the eastbound I-270 ramp to US 23, a Section 4(f) resource. Both alternatives impact four streams. Wetland impacts are both similar, each impacting a provisional Category 1 and Category 2 resource.
- **Construction:** SR 315 Conceptual Alternative 1 requires less complicated construction methods and smaller quantities of materials than SR 315 Conceptual Alternative 2. In addition, Alternative 1 requires short term ramp and lane closures for approximately 1 month, while Alternative 2 will require these same ramp closures for approximately 2 years.
- **Cost:** SR 315 Conceptual Alternative 1 is estimated to cost \$24 million less than SR 315 Conceptual Alternative 2.

In summary, SR 315 Conceptual Alternative 1 has greater improvements in the operational efficiency of the transportation system, avoids impacts to a Section 4(f) resource, does not require long term ramp and lane closures, and has less overall cost than Conceptual Alternative 2. As a result, Conceptual Alternative 1 meets the project’s Purpose and Need, minimizes overall environmental impacts, and is advanced for additional analysis during Step 6 of the PDP.

### **6.3.3 I-270 at US 23 Interchange**

There are two different partial cloverleaf conceptual alternatives for this interchange. US 23 Interchange Conceptual Alternative 1 replaces the free-flow exit ramps to US 23 from I-270 with 2 trumpet style ramps. Two new “T” intersections are created on US 23. All free-flow entrance ramps onto I-270 are preserved. The alternative also eliminates zones of intense weaving on east & westbound I-270, north & southbound on US 23, and weaving zones beyond the interchange on US 23 (Figure 7).

**Table 15. Alternatives Analysis Summary for I-270 at SR 315**

Evaluation Criteria			SR 315 Conceptual Alternative	
Category	Criteria	Description	1	2
Operational Efficiency	Speed	2028 Average Vehicle Speed-AM&PM Peak (MPH)	54.1	51.4
	Travel Time	2028 Total Time-AM&PM Peak (Hrs)	793	1127
	Level of Service	2028 (AM & PM Peak Hour) on SR 315	AM: C or better* PM: D or better	AM: C or better PM: D or better
		2028 (AM & PM Peak Hour) on I-270	AM: D or better** PM: D or better**	AM: E or better PM: D or better***
Safety	Weaving	Approximate reduction (%) for all movements)	77	51
Environmental Resources	Community	Impact to existing local plans/projects	Low	Medium
	Relocations	Residential/Business (Total Takes)	0/0	0/0
	ROW	Total additional ROW (acres)	0.4	2.4
	Section 4(f)	Yes/No	No	Yes, additional ROW requirements may result in one encroachment
	Cultural	Low/Medium/High	Medium, additional ROW requirements necessitate Section 106 coordination	
	Geologic	Description	Exposed shale bedrock in the infield and cut slopes of the existing interchange	
	Endangered Species	Description	Additional ROW is open/old-field	
	Wetlands	#/Total acres	2/0.28 acres	2/0.29 acres
	Aquatic Resources	#/Total linear feet	Each impact 4 streams/720 linear feet	
	Floodplains	acres	15.6	15.9
	Additional Environmental Notes			Both have potential noise impacts on the Olentangy Parklands in the SE quadrant of the interchange.
Construction	Duration	Construction duration Note: Const. at different locations can overlap	2 Years	2.5 Years
	MOT	Delay caused by lane & ramp closures	Low	High
Cost	Estimated Total Costs	Cost (\$ in millions)	54	78

\* - LOS D when three thru lanes on SR 315 southbound, south of I-270

\*\* - LOS E on westbound I-270 before Sawmill exit ramp

\*\*\* - LOS F on eastbound I-270 at the SR 315/US 23 on ramp

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US 23 Interchange Conceptual Alternative 2 replaces the free-flow entrance ramps from US 23 to I-270 with 2 trumpet style ramps. Two new "T" intersections are created on US 23. All free-flow exit ramps from I-270 are preserved. The alternative also eliminates zones of intense weaving on east & westbound I-270 and north & southbound on US 23, but it preserves the weaving zones beyond the interchange on US 23 (Figure 8).

Both alternatives include a design to braid US 23 traffic to westbound I-270 with I-270 westbound traffic to SR 315, which eliminates the weaving zone on westbound I-270 between US 23 and SR 315.

### **I-270 at US 23 Conceptual Alternative Summary Evaluation**

Based upon the Conceptual Alternative evaluation criteria, US 23 Interchange Conceptual Alternative 1 is advanced for additional analysis based on the following (also see Table 16):

- Operational performance: Both Conceptual Alternatives for the US 23 interchange provide similar results in regard to speed and travel time saving.
- Safety: US 23 Interchange Conceptual Alternative 1 eliminates 100 percent of the existing weaving conditions on US 23 near interchange ramps.

US 23 Interchange Conceptual Alternatives 1 and 2 each contain a "weave" between the movements for 270 eastbound to US 23 southbound and 315 northbound/southbound to US 23 northbound. However, the length of the "weave" is very long (3000 feet for both).

- Environmental Issues: US 23 Interchange Conceptual Alternative 1 does not result in wetland impacts, and it does not result in changes with locally planned improvements to Hard Road. US 23 Conceptual Alternative 2 requires the take of Wetland C, a 0.42 acre Category 1 resource. Both Conceptual Alternatives have similar stream impacts
- Construction: Both Conceptual Alternatives require the replacement of the US-23 bridge over I-270, braiding ramps in the NW quadrant, and separating the CD roads between 315 and 23 from 270 with barrier walls. This work will require multiple closures of lanes and ramps. In addition, US 23 Interchange Conceptual Alternative 1 will take approximately 2.5 years construct verses 2 years for US 23 Conceptual Alternative 2.
- Cost: US 23 Interchange Conceptual Alternative 1 is estimated to cost approximately \$10 million more than the other alternative mainly because of additional amounts of pavement (\$0.5 million), earthwork (\$1.6 million), MSE walls (\$1.2 million), cast in place retaining walls (\$1.0 million), structures (\$2.0

**Table 16. Alternative Analysis Summary for I-270 at US 23**

Evaluation Criteria			US 23 Conceptual Alternative	
Category	Criteria	Description	Interchange 1	Interchange 2
Operational Efficiency	Speed	2028 Average Vehicle Speed-AM&PM Peak (MPH)	48.3	48.5
	Travel Time	2028 Total Time-AM&PM Peak (Hours)	1196	1123
	Level of Service	2028 (AM & PM Peak Hour) at US 23/ramp intersections	C or better	C or better
Safety	Weaving	Approximate % reduction (for all movements)n	89	84
Environmental Resources	Community	Impact to existing local plans/projects	Low	Low
	Relocations	Residential/Business (Total Takes)	1*/0	0/0
	ROW	Total additional ROW (acres)	3.5	2.27
	Section 4(f)	Yes/No	No	No
	Cultural	Low/Medium/High	Medium, additional ROW requirements necessitate Section 106 coordination	
	Geologic	Description	Durable shale bedrock is exposed in the infield and cut slopes	
	Endangered Species	Description	Medium, forested areas which will be impacted will need evaluation for Indiana Bat habitat.	
	Wetlands	#/Total acres	0/0	1/0.42 acre
	Aquatic Resources	#/Total linear feet	1/3,845	1/3,890
Floodplains	Acres	0		
Construction	Duration	Construction duration Note: Const. at different locations can overlap	2.5 Years	2 Years
	Maintenance of Traffic	Delay caused by lane & ramp closures	High	High
Cost	Estimated Total Costs	Cost (in million \$)	\$39	\$29

\* one vacant property parcel

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million), utility relocations (\$0.2 million), and overall construction costs (\$1.6 million).

In summary, while US 23 Interchange Conceptual Alternative 1 takes a little longer to construct and cost approximately \$10 million more than Alternative 2, it will completely eliminate weaving conditions on US 23 and therefore greatly improve safety on the transportation system. In addition, Alternative 1 is the only alternative for the US 23 Interchange that can be combined with Alternatives C & D on US 23 North of I-270 (see Section 6.3.4). As a result, US 23 Conceptual Alternative 1 meets the project's Purpose and Need, minimizes overall environmental impacts, and is advanced for additional analysis during Step 6 of the PDP.

#### **6.3.4 US 23 – North of I-270**

Three conceptual alternatives were evaluated for this portion of the study area. US 23 North of I-270 Conceptual Alternative A (Figure 9; page 51) provides additional northbound and southbound lanes on US 23. The other two Conceptual Alternatives create a separate, one-way roadway northbound which by-passes the signals on US 23 between I-270 and Flint Rd. There are two different variations of this alternative, based upon whether the grade separated roadway is above or below normal grade. The alternative with a grade separated roadway below normal grade (trenched), will be referred to as US 23 North of I-270 Alternative C. And the alternative with a grade separated roadway above grade (on structure), will be referred to as US 23 North of I-270 Conceptual Alternative D (Figure 10).

#### **US 23 North of I-270 Conceptual Alternative Summary Evaluation**

Based upon the Conceptual Alternative evaluation criteria, Conceptual Alternative C is advanced for additional analysis based on the following (also see Table 17):

- **Operational performance:** Both Conceptual Alternatives C and D provide higher average vehicle speeds and a greater decrease in travel time than Conceptual Alternative A. Conceptual Alternative C is below grade so large vehicles in the express lanes way may have slightly higher operating speed than those for Conceptual Alternative D which is above grade.
- **Environmental Issues:** Since Conceptual Alternative D is a structure, vertical clearance over local roadways along US 23 is necessary to provide local access. The profile of the structure must rise sharply at the tie in points with existing US 23 in order to minimize project length. In spite of this, Alternative D requires an additional 500-600 feet of length to touch down on the north end with US 23 as compared to Conceptual Alternative C because of the topographic features of the area. The extended length requires additional right-of-way. As the structure for Conceptual Alternative D approaches touchdown (and the structure clearance height is lowered) nearby properties will have restricted access to US 23. If access is restricted to US 23, the flow of local traffic to/from businesses and residential areas will be disrupted and additional property takes may be necessary.

**Table 17 Alternatives Analysis Summary for US 23 from I-270 to Flint Road**

Evaluation Criteria			US 23 North of I-270		
Category	Criteria	Description	A	C	D
Operational Efficiency	Speed	2028 Average Vehicle Speed-AM&PM Peak (MPH)	13	15 - Surface 33 - Express	15 - Surface 33 - Express
	Travel Time	2028 Total Time-AM&PM Peak (Hours)	1072.6	638.4	638.4
	Level of Service	2028 (AM & PM Peak Hour) at signalized intersections	NA	C* or better	
Safety	Weaving	Approximate % reduction for all movements	N/A	N/A	N/A
	Safety Notes		Weaving is more a function the I-270 interchange than the design of US-23.		
Environmental and Community Issues	Community	Impact to existing local plans/projects	No	No	No
	Relocations	Residential/Business (Total Takes)	1/3	1/3	0/0
	ROW	Total additional ROW (acres)	10.3	10.3	7.2
	Section 4(f)	Yes/No	No	No	Potential, NR Eligible Resource
	Cultural	Low/Medium/High	Low	Low	Low
	Geologic	Description	None	Shallow Rock	None
	Endangered Species	Description	None	None	None
	Wetlands	#/Total acres	0/0	0/0	0/0
	Aquatic Resources	#/Total linear feet	0/0	0/0	0/0
	Floodplains	Acres	0	0	0
Construction	Duration	Years	1	2.5	2
	MOT	Delay caused by lane & ramp closures	Low	High	High
Cost	Estimated Total Costs	Cost in millions	\$ 6 Mil	\$ 70 Mil	\$ 44 Mil

\*will operate at the same levels because US 23 will be grade separated for each alternative.

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As a structure, Conceptual Alternative D will be very visible to local businesses, residential areas, and the Pontifical College Josephinum (Josephinum). Josephinum is the only Pontifical Seminary in the United States and is owned by the Roman Catholic Church in Rome through the Holy See. The complex on US 23 was established in 1931, and is eligible for the National Register of Historic Places. Alterations to the viewshed of this resource would likely result in a potential Section 4(f) impact. In a letter to ODOT (Appendix 1), Josephinum identified concerns about viewshed impacts resulting from the project: "The landscape and serenity of the present grounds, coupled with the architecture, help foster an educational atmosphere that is conducive to the development of our students. For the proper formation of our students, it is crucial that the landscape, seclusion from the main highway and serenity be maintained as a result of this project."

In addition, Josephinum has also expressed concerns about noise impacts resulting from the project: "We are worried about the greater noise from increased or redirected traffic as a result of the construction of the project." ODOT evaluated the potential noise impacts for both Conceptual Alternatives C and D. Although the noise levels are not predicted to exceed the FHWA criteria, Conceptual Alternative D has a discernibly higher (3.1 to 3.9 decibels (dBA)) noise level than Conceptual Alternative C. (In general, a 3.0 dBA is perceptible difference to the human ear).

- **Construction:** Conceptual Alternative C will take approximately 2.5 years to construct versus 2 years for Conceptual Alternative D. Both construction times are longer than that expected for Conceptual Alternative A (1 year).
- **Cost:** Both Conceptual Alternatives C and D require extensive bridges and retaining walls and are considerably more expensive than Conceptual Alternative A.

In summary, the performance of US 23 north of I-270 in the northbound direction is critical to the operational function of the US-23 interchange. Both Conceptual Alternatives C and D provide higher average vehicle speeds and decreased travel times than Conceptual Alternative A (Table 16). In addition, Alternatives C and D will provide larger residual traffic capacity in the northbound direction of US 23 (the direction traveling away from I-270) for the design year (2028) than Conceptual Alternative A. It is anticipated that US 23 North of I-270 will experience performance failures at critical intersections on US 23 with Alternative A. Although this alternative has lower overall costs and does not require temporary closures during construction, it does not improve the operational performance of the system. As a result, Alternative A does not meet the Purpose and Need of the project and was removed from additional consideration.

Both the viewshed and noise concerns are minimized by Conceptual Alternative C because it is below-grade. Conceptual Alternative C also provides for better opportunities to incorporate aesthetic design components than Conceptual Alternative D

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because less of the transportation facility would be visible to the local residents, business patrons, and from the Pontifical College. As a result of the ROW acquisition, access concerns to US 23, viewshed and aesthetic concerns to a Section 4(f) resource, and nearby residents and businesses. Additionally, Conceptual Alternative C has a discernibly lower noise impacts when compared to Conceptual Alternative D. As a result, Conceptual Alternative C meets the project's Purpose and Need, minimizes overall environmental impacts, and is advanced for additional analysis during Step 6 of the PDP.

### **6.3.5 York Temple Drive Conceptual Relocation Alternative**

The proposed Conceptual Alternative eliminates the direct access from York Temple Drive to US 23 and relocate/extend York Temple Drive to access West Campus View Boulevard (Figure 10). This would eliminate an unsignalized intersection on US 23 which is approximately 650 feet from the existing I-270 interchange. The current configuration allows for Left/right turns onto York Temple but only allow right-out movements. The new configuration would provide full access at a signalized intersection.

#### **York Temple Drive Conceptual Alternative Summary Evaluation**

Based upon the Conceptual Alternative evaluation criteria, the Conceptual Alternative is advanced for additional analysis based on the following:

- **Operational performance:** The proposed Conceptual Alternative enables southbound US 23 to experience improved operation efficiently by elimination of an access point near the I-270 interchange.
- **Safety:** The Conceptual Alternative provides full access for the area further north from the I-270 interchange.
- **Environmental Issues:** Opposition to the Conceptual Alternative has been voiced by nearby property owners.
- **Construction:** Timeframe for construction of the Conceptual Alternative has been included in the US 23 Conceptual Alternative.
- **Cost:** Total cost of the Conceptual Alternative is approximately \$510,000 greater than the no build.

In summary, the Conceptual Relocation Alternative is advanced for additional analysis because it meets the Purpose and Need of the Project identified in Section 2 and enables southbound US 23 to experience improved operational efficiency by the elimination of an access point near the I-270 interchange. The Relocation Alternative will clearly provide safer access to US 23 (via W. Campus View Blvd.) for York Temple Drive traffic.

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Safety and improved operations are the key benefits of the Relocation Alternative over the No-build Alternative. In other words, without the relocation of York Temple Drive, the "improvements" made to the US 23 Interchange and on US 23 itself will degrade the existing operational and safety conditions at the York Temple Drive/ US 23 intersection.

#### **6.4 Typical Cross Sections**

Typical cross sections and curve data for conceptual alternatives advanced for additional analysis are listed in Appendix 4 along with a table of potential design exceptions.

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## 7 Summary and Conclusions

The existing design of the interchanges on the NCO is inadequate for the traffic volumes it is currently experiencing and will only continue to increase. Several locations with failing traffic conditions and high crash rates correspond to weave areas at and between the interchanges. To address these concerns, ODOT began to evaluate I-270 between SR 315 and US 23 as part of the PDP.

Based upon the Conceptual Alternatives Analysis the following alternatives are recommended for further evaluation during Step 6 of the PDP:

- SR 315 Conceptual Alternative 1. Overall, when compared to the other concept evaluated, this alternative has greater improvements in operational efficiency of the transportation system, avoids impacts to a Section 4(f) resource, does not require long term ramp and lane closures, and has less overall cost.
- US 23 Interchange Conceptual Alternative 1. While this alternative takes a little longer to construct than the other Alternative evaluated, it will completely eliminate weaving conditions on US 23 and therefore greatly improve safety. In addition, Alternative 1 is the only alternative for the US 23 Interchange that can be combined with Alternative C on US 23 North of I-270.
- US 23 North of I-270 Conceptual Alternative C. This alternative is recommended for additional analysis in the area north of I-270 because it meets the project's Purpose and Need and avoids both direct and indirect impacts to a Section 4(f) resource (St. Josephinum College). This includes minimizing viewshed impacts and a perceptible lower noise impact when compared to Conceptual Alternative D.
- York Temple Drive Conceptual Alternative. The Conceptual Relocation Alternative is advanced for additional analysis because it enables southbound US 23 to experience improved operational efficiency by the elimination of an access point near the I-270 interchange. The Relocation Alternative will clearly provide safer access to US 23 (via W. Campus View Blvd.) for York Temple Drive traffic.