West Davis Corridor Southern Interchange

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INTRODUCTION

The West Davis Corridor (WDC) is a corridor planned by the Utah Department of Transportation (UDOT) extending from approximately the Legacy/I-15 junction in Davis County and S.R. 193 in West Point. The 16-mile divided highway will

- Alleviate congestion from commuter traffic,
- Provide a route for truck traffic to communities in the western portion of Davis County, and
- Accommodate the additional 52,000 commutes that are anticipated to be generated by 2040 from 2015 levels.

NSLP engineering focused on the southern terminus of this project. The interchange needed to connect northbound Interstate 15 and Legacy Parkway to northbound West Davis Corridor, and southbound West Davis Corridor to southbound Legacy Parkway and Interstate 15.

ALTERNATIVES

WDC to Legacy, Legacy to I-15 Alternative
The WDC to Legacy, Legacy to I-15 Alternative connects the WDC directly to Legacy but not I-15. A separate ramp structure then connects Legacy to I-15, further south. The advantage of this alternative is that it has a much smaller footprint than any of the other alternatives.

Braided Ramp Alternative
The Braided Ramp Alternative combines all ramps that cross over a highway into one single overpass. Southbound Legacy to WDC does not cross over any existing highways and would connect on the ground. This alternative would result in a small footprint and potentially fewer materials as three of the ramps would combine into overpass. This alternative would have complex geometry as southbound I-15 and northbound Legacy would have to cross.

Separate Ramps Alternative
The Separate Ramps Alternative separates each direction of traffic into its own overpass. Once grounded, the exits would combine to make up the West Davis Corridor. No overpass is required for the southbound Legacy ramp. This alternative is simple, however requires a large footprint.

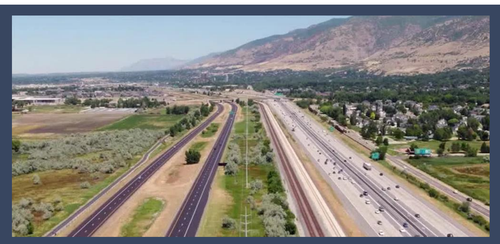

Figure 4: Location of interchange looking north

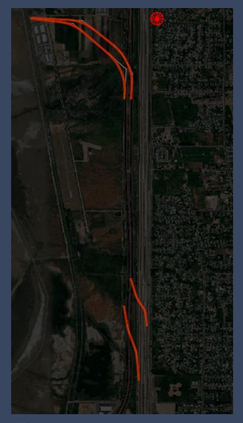

Figure 1: WDC to Legacy, Legacy to I-15 Alternative

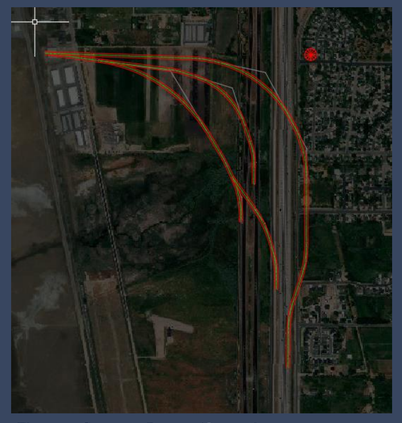

Figure 2: Separate Ramps Alternative

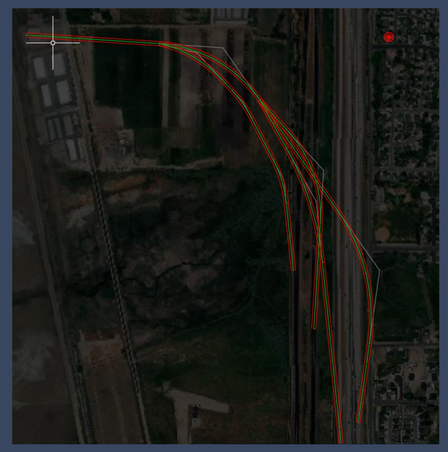

Figure 3: Braided Ramps Alternative

DECISION CRITERIA

The alternative decision was made with a Pugh matrix with five categories: anticipated level of service (LOS), driver understanding (i.e., alignment simplicity), cost, required right of way, and impact to neighboring developments and a nearby park.

Right of way and house/park impact were considered separately as not all right of way acquisition is equally challenging or disruptive. While the separate ramps alternative required approximately the same amount of land acquisition as the braided ramps alternative, it required the acquisition and demolition of significantly more homes, and necessitated removal of a portion of a neighborhood park.

The final design was a combination of the braided ramp alternative and the separate ramp alterative. The simplicity of the separate ramp alternative provided the main framework for the final design, but it was combined with some elements of the braided ramp to reduce the footprint of the project. The final design provides an economic and relatively simple solution for the purpose and need of the project.

Item	Quantity		Cost per unit	Cost
Area of MSE Wall	55975	ft^2	50	$2,798,750.00
Fill for MSE Wall section	1119500	ft^3	25	$27,987,500.00
Fill for non MSE Wall Section fill factor 1.2	7005.84	ft^3	25	$175,146.00
Roadway costs	4670	ft^2	100	$467,000.00
Bridge pier	7		250000	$1,750,000.00
Bridge deck	1200	ft^2	10000	$12,000,000.00
18 in Storm Drain	3150	ft	50	$157,500.00
Drainage Structure CB-9	13	ea	5000	$65,000.00
			Total:	$45,400,896.00

Table 2: Northbound I-15 to WDC Cost Estimate

DESIGN

A complete design of this project would have entailed a full-employment contract for a team of environmental, transportation, traffic, geotechnical, drainage, and structural engineers. To that end, the scope here was significantly limited.

Past the initial alignments for all four ramps, design work was only completed for the ramp connecting northbound I-15 to northbound West Davis Corridor. Design elements include

- drainage
- a cross-section of the highway
- signage
- barriers
- side slopes
- horizontal and vertical curves
- bridge pier placements, and
- bridge clearances.

The guiding design standards for this project were the UDOT Roadway Design and Structures Design Detailing Manuals and the Utah Manual on Uniform Traffic Control Devices.

	Weight	Separate Ramps	Score	WDC to Legacy, Legacy to I-15	Score	Braided Ramps	Score
Cost	3	3	9	2	6	1	3
Right of Way	2	1	2	3	6	2	4
Driver Understanding	4	3	12	1	4	2	8
LOS	5	2	10	1	5	2	10
Houses/Park Impact	1	1	1	2	2	3	3
Total			34		23		28

Table 1: Pugh Matrix. A higher score shows a more desirable option

CONCLUSION

The cost estimate for the northbound I-15 to northbound WDC ramp is $45.5 million. A full estimate is included in Table 2. Cost estimates were obtained from UDOT standards and from unit material costs for similar projects.

To complete design work for the southern interchange, additional work would include

- A full geotechnical analysis and design
- A full design of bridge structures
- Re-alignment of the Legacy Bike Path
- Hydraulic culvert design for a small stream passing west of the project
- Completed design work for all other ramps

Upon completion, the WDC is anticipated to shorten commutes for residents of western Davis County, provide a route for commercial traffic, and accommodate growth in the area.

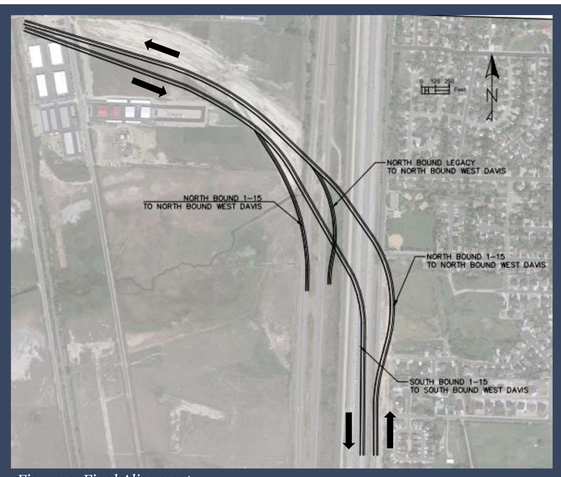

Figure 4: Final Alignment

REFERENCES

Utah Department of Transportation. (2017). Chapter 1: Purpose and Need for Action. In West Davis Corridor: Final Environmental Impact Statement. Retrieved from https://westdavis.udot.utah.gov/wp-content/uploads/2019/10/WDC_FEIS_01_Purpose.pdf

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