



WEST DAVIS  
CORRIDOR

# Technical Memorandum 16: Level 2 Screening Alternatives Cost Estimate

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in support of the  
Environmental Impact Statement

## West Davis Corridor Project

Federal Highway Administration  
Utah Department of Transportation



UDOT Project No. S-0067(14)0

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## 1.0 Introduction

The purpose of this memorandum is to document the process used to develop preliminary cost estimates for the West Davis Corridor (WDC) Level 2 screening alternatives. The cost data will be used to assist in the screening process and to develop a better understanding of the magnitude of the differences in each alternative. The cost estimates in this memorandum are preliminary and are based on other similar and recent roadway construction projects in Utah.

During Level 2 screening, it was not possible to include every possible cost of the project, since only preliminary engineering had been performed, and many details that would be determined with additional engineering design were unknown. However, the estimates were calculated the same way for each alternative and provided a reasonable, relative comparison in costs between the alternatives. More-detailed cost estimates will be developed for the alternatives evaluated in detailed in the Environmental Impact Statement (EIS) and will be based on a more detailed level of preliminary engineering.

## 2.0 General Assumptions

The construction costs in this memorandum have been developed based on similar projects in Utah and other states. These costs were based on actual construction costs and are intended to be used to compare the WDC Level 2 screening alternatives. The costs of other improvements, such as transit, increased bus service, trails, and so on, were not evaluated.

Roadway construction costs per mile do not include right-of-way (ROW), interchanges, major utilities, or major structures. Items included in the costs per mile include engineering, mobilization, pavement, earthwork, drainage, lighting, landscaping, signing, and striping.

A basic ROW width of 250 feet was used to develop ROW costs for new alignments that are designated freeways. A basic ROW width of 112 feet was used to develop ROW costs for a four-lane arterial. These ROW widths are based on the roadway geometric standards in *A Policy on the Geometric Design of Highways and Streets* from the American Association of State Highway and Transportation Officials (AASHTO 2004). ROW widths at potential interchange areas also encompassed the area needed for ramps and their slopes to match existing grades. For widening existing roads, the cost assumes two additional 12-foot lanes.

## 3.0 Right-of-Way and Roadway Construction Cost Estimates

### 3.1 Residential and Agricultural Relocation Cost Estimate

In Level 2 screening, the number of structures affected by the alternatives' ROW was calculated using geographic information system (GIS) software. To determine the cost of residential or agricultural structures, local property information was used. Property values nationally and in Utah increased until 2008 and declined in 2008 and 2009.

Table 3-1 shows the median property values in 2008 and the average sales values in the second quarter of 2010 for cities and ZIP codes in the WDC study area. Although sales values have decreased in 2009 and 2010 compared to 2008, the median price of residential properties sold in July 2010 increased 5% over the values in July 2009 (Salt Lake Board of Realtors, no date).

**Table 3-1. Property and Sales Values in the WDC Study Area**

City and ZIP Code		2008 Median Property Value <sup>a</sup>	2nd Quarter 2010 Average Sales Value <sup>b</sup>
Clearfield	84015 <sup>c</sup>	\$173,859	\$164,400
Centerville	84014	\$281,620	\$255,050
Farmington	84025	\$306,837	\$268,986
Kaysville	84037	\$259,692	\$267,500
Layton	84040	\$220,800	\$232,447
Layton	84041	\$220,800	\$179,900
Syracuse	84075	\$249,981	\$220,000
Riverdale	84405	\$177,246	\$163,500
Roy	84067	\$170,347	\$155,400
Hooper	84315	\$222,296	\$229,000
Ogden	84401 <sup>c</sup>	\$145,000	\$125,900
Ogden	84404	\$142,800	\$140,500

<sup>a</sup> Source: City-data.com, no date

<sup>b</sup> Source: Salt Lake Board of Realtors, no date

<sup>c</sup> The sales values reported by the Salt Lake Board of Realtors are grouped by ZIP code. Clinton and West Point share a ZIP code with Clearfield (84015), and West Haven shares a ZIP code with Ogden (84401).

For the Level 2 screening cost estimate, the average second-quarter 2010 sales information was used. Based on these data, the average cost of a residential property in the WDC study area was \$200,215. The WDC team used a value of \$200,000 for each residential property for the screening cost estimate. Additionally, a value of \$35,000 for relocation costs was assumed for each affected residential parcel as part of the screening cost estimate.

## 3.2 Business Relocations Cost Estimate

For the different business relocation categories, costs per relocation/acquisition were determined by using costs from previous EIS projects and samplings of property values taken from [www.landandfarm.com](http://www.landandfarm.com).

### Agricultural

The relocation/acquisition of agricultural structures was estimated based on an analysis of GIS data. **The cost estimate used a value of \$500,000 for each agricultural relocation/acquisition.** Additionally, a value of \$35,000 for relocation costs was assumed for each affected agricultural parcel as part of the screening cost estimate.

### Industrial

**Table 3-2. Cost Estimate for Industrial Business Acquisitions**

Sample	Acres <sup>a</sup>	Price <sup>a</sup>
Sample 1	1.56	\$321,000
Sample 2	0.63	\$575,000
Sample 3	5.00	\$816,750
Sample 4	3.15	\$297,044
Sample 5	1.10	\$167,706
Sample 6	3.08	\$1,073,318
Average	2.42	\$541,803

**The cost estimate used a value of \$500,000 for each industrial acquisition.**

<sup>a</sup> Acreages and prices obtained from [www.landandfarm.com](http://www.landandfarm.com).

Additionally, a value of \$35,000 for relocation costs was assumed for each affected industrial parcel as part of the screening cost estimate.

### Utility

The utility relocation cost estimate used the same value as the industrial relocation/acquisition value. The cost estimate used a value of \$500,000 for each utility relocation/acquisition.

## Commercial

The commercial relocation cost estimate was based on a sample commercial property acquisition on the Utah Department of Transportation (UDOT) State Route 108 (SR-108) project (2008) in Roy, Utah:

- Property ID: 08-050-0080
- Name: Triple Stop
- Type: gas/car wash/auto sales
- ROW/acquisition costs: \$1,727,166

The cost estimate used a value of \$1,500,000 for each commercial property relocation/acquisition. Additionally, a value of \$35,000 for relocation costs was assumed for each affected commercial parcel as part of the screening cost estimate.

## Institutional

The institutional relocation/acquisition cost estimate used the same value as the commercial relocation/acquisition value, which was \$1,500,000. The cost estimate used a value of \$1,500,000 for each institutional property relocation/acquisition. Additionally, a value of \$35,000 for relocation costs was assumed for each affected institutional parcel as part of the screening cost estimate.

### 3.3 Land Value Cost Estimate

For the various land-use categories identified in Level 2 screening using GIS data, unit costs per square foot of land type were estimated by taking a sampling of listed properties for each category from [www.landandfarm.com](http://www.landandfarm.com). The price, acreage, and cost per square foot are shown in Table 3-3 through Table 3-7. Where listings could not be found for certain categories (Institutional, Open Space, and Protection Area), evaluation of GIS data determined that these land-use categories had similar attributes to other land-use categories that would likely cause them to be valued similarly. This is described more in the following sections.

## Agricultural

**Table 3-3. Cost Estimate for Agricultural Land Value**

Sample	Price	Acres	Cost / SQ FT
Sample 1	\$3,000,000	2,050.00	\$0.03
Sample 2	\$977,500	57.50	\$0.39
Sample 3	\$494,900	32.79	\$0.35
Sample 4	\$5,800,000	323.00	\$0.41
Sample 5	\$2,499,000	57.00	\$1.01
Average	\$2,554,280	504.06	\$0.44

**The cost estimate used a value of \$0.50 per square foot for agricultural property.**

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## Commercial

**Table 3-4. Cost Estimate for Commercial Land Value**

Sample	Price	Acres	Cost / SQ FT
Sample 1	\$650,000	4.02	\$3.71
Sample 2	\$700,000	0.34	\$47.26
Sample 3	\$149,900	0.57	\$6.04
Sample 4	\$2,702,135	9.19	\$6.75
Sample 5	\$389,000	1.74	\$5.13
Sample 6	\$275,000	1.67	\$3.78
Sample 7	\$900,000	28.37	\$0.73
Sample 8	\$2,191,939	6.29	\$8.00
Sample 9	\$495,000	5.00	\$2.27
Average	\$939,219	6.35	\$9.30

The cost estimate used a value of \$10.00 per square foot for commercial property.

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## Industrial

**Table 3-5. Cost Estimate for Industrial Land Value**

Sample	Price	Acres	Cost / SQ FT
Sample 1	\$575,000	0.63	\$20.95
Sample 2	\$816,750	5.00	\$3.75
Sample 3	\$1,132,560	5.20	\$5.00
Sample 4	\$2,923,965	17.90	\$3.75
Sample 5	\$929,353	5.02	\$4.25
Sample 6	\$1,175,470	5.14	\$5.25
Sample 7	\$1,599,750	11.85	\$3.10
Sample 8	\$1,073,318	3.08	\$8.00
Sample 9	\$795,000	6.11	\$2.99
Average	\$1,224,574	6.66	\$6.34

The cost estimate used a value of \$7.50 per square foot for industrial property.

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## Institutional

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Evaluation of GIS data indicates that institutional land uses would have attributes similar to those of industrial land uses. **The cost estimate used a value of \$7.50 per square foot for institutional property.**

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## Open Space

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Evaluation of GIS data indicates that open space land uses would have attributes similar to those of agricultural land uses. **The cost estimate used a value of \$0.50 per square foot for open space property.**

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1                   **Protection Area**

2                   Evaluation of GIS data indicates that protection area land uses would have attributes similar  
3                   to those of agricultural land uses. **The cost estimate used a value of \$0.50 per square foot**  
4                   **for protection area property.**

5                   **Recreational**

**Table 3-6. Cost Estimate for Recreational Land Value**

Sample	Price	Acres	Cost / SQ FT
Sample 1	\$1,950,000	1,244.00	\$0.04
Sample 2	\$142,740	71.37	\$0.05
Sample 3	\$160,000	80.00	\$0.05
Sample 4	\$147,500	5.98	\$0.57
Sample 5	\$1,490,000	308.86	\$0.11
Sample 6	\$1,988,310	2,082.00	\$0.02
Sample 7	\$995,000	40.00	\$0.57
Sample 8	\$2,890,000	111.44	\$0.60
Average	\$1,220,444	492.96	\$0.25

**The cost estimate used a value of \$0.25 per square foot for recreational property.**

6                   **Residential**

**Table 3-7. Cost Estimate for Residential Land Value**

Sample	Price	Acres	Cost / SQ FT
Sample 1	\$94,000	0.83	\$2.60
Sample 2	\$76,544	2.56	\$0.69
Sample 3	\$74,900	0.90	\$1.91
Sample 4	\$59,000	0.20	\$6.77
Sample 5	\$679,000	0.74	\$21.06
Sample 6	\$2,000,000	26.32	\$1.74
Sample 7	\$150,000	2.50	\$1.38
Sample 8	\$575,000	10.22	\$1.29
Sample 9	\$760,000	14.17	\$1.23
Average	\$496,494	6.49	\$4.30

**The cost estimate used a value of \$5.00 per square foot for residential property.**

### 3.4 Four-Lane Divided Highway Cost Estimate

Construction costs for the Legacy Parkway and the Southern Parkway were used to estimate the costs per mile for the WDC's four-lane divided highway segments, since they are very similar in design to the four-lane WDC Level 2 screening alternatives. Based on these projects, a cost estimate of \$8 million per mile for a limited-access highway was assumed.

#### Legacy Parkway

Legacy Parkway Segment 1 total construction cost = \$95.5 million.

\$95.5 million (total cost) – \$50 million (cost of two interchanges, miscellaneous structures, and a trail) = \$45.5 million (total roadway cost).

Per-mile roadway cost adjusted for inflation:  $(\$45.5 \text{ million} \times 1.2 \text{ [20\% inflation from 2006]}) / 5.8 \text{ miles} = \$9.4 \text{ million/mile}$ .

Legacy Parkway Segment 2 total construction cost = \$80 million.

\$80 million (total cost) – \$35 million (cost of one interchange, one crossing, and a trail) = \$45 million (total roadway cost).

Per-mile roadway cost adjusted for inflation:  $(\$45 \text{ million} \times 1.2 \text{ [20\% inflation from 2006]}) / 5.4 \text{ miles} = \$10 \text{ million/mile}$ .

#### Southern Parkway

Southern Parkway total roadway costs = \$5 million/mile.

#### Average Roadway Costs

$(\$9.4 \text{ million/mile} + \$10 \text{ million/mile} + \$5 \text{ million/mile}) / 3 = \$8.1 \text{ million} \sim \$8 \text{ million/mile}$ .

### 3.5 Five-Lane Arterial Cost Estimate

A cost estimate of \$10 million per mile was assumed for five-lane arterials on a new alignment. The construction costs for a five-lane arterial will be very similar to the construction costs to widen existing roads described in Section 3.6, Widen Existing Roads Cost Estimate. The WDC screening cost estimate assumed that the five-lane arterial construction costs would be \$1 million less per mile than the widen existing roads construction costs, since fewer utility relocations and minimal traffic control are normally required for new construction.

## 3.6 Widen Existing Roads Cost Estimate

A cost estimate of \$11 million per mile was assumed for widening an existing two-lane roadway to a five-lane arterial. The cost estimate assumed that full reconstruction would be required. The construction costs for Mountain View Corridor (MVC) and the construction cost estimate for SR-108 were used to estimate the costs per mile for widening existing roads.

### Mountain View Corridor

The MVC will ultimately be a four-lane divided highway with two-lane frontage roads on each side. The costs per mile for MVC include the costs of constructing the frontage roads, which include shoulders on both sides; therefore, taking the cost per mile times four lanes equals a five-lane section with shoulders on the outside.

MVC Segment 1 construction cost = \$3.2 million/lane-mile.

$\$3.2 \text{ million} \times 4 \text{ lanes} = \$12.8 \text{ million/mile.}$

MVC Segment 2 construction cost = \$2.9 million/lane-mile.

$\$2.9 \text{ million} \times 4 \text{ lanes} = \$11.6 \text{ million/mile.}$

### SR-108

SR-108 construction cost estimate =  $\$75.9 \text{ million} / 9 \text{ miles} = \$8.4 \text{ million/mile.}$

### Average

$(\$12.8 \text{ million} + \$11.6 \text{ million} + \$8.4 \text{ million}) / 3 = \$10.93 \text{ million} \sim \$11 \text{ million/mile.}$

### Structures over Local Roads

The WDC team also assumed a cost of \$1,512,000 for the cost of structures over two-lane local roads. The WDC team based this cost assumption on each structure having a width of 84 feet and a length of 100 feet. The cost per square foot was assumed to be \$180 per square foot for structures over local roads. Therefore,  $8,400 \text{ square feet} \times \$180/\text{square foot} = \$1,512,000$  per structure.

## 3.7 I-15 Widening Cost Estimate

A cost estimate of \$30 million per interchange was assumed for each interchange along I-15 that would need to be reconstructed as part of any WDC Level 2 screening alternative. For the Level 2 screening alternatives that proposed widening I-15 with an additional general-purpose lane, it was assumed that all interchanges would need to be reconstructed in order to meet design standards and to accommodate the lane widening.

The cost estimate assumed that rural diamond interchange costs were approximately \$19 million per interchange (see Section 3.8, Rural Interchange Cost Estimate). Urban

interchanges cost about 50% more than rural interchanges due to the additional bridge area needed to cross an interstate, the additional retaining walls needed to minimize ROW impacts, and the need for additional maintenance-of-traffic costs during construction. Additional construction costs for acceleration and deceleration lanes are also included with the cost estimate for reconstructing an existing interchange, since the number of lanes for each ramp would likely increase based on the traffic volumes forecasted for the design year.

A cost estimate of \$2.5 million per structure widening was assumed for each existing I-15 structure that would need to be widened to accommodate the additional lane widening for the Level 2 screening alternatives that proposed widening I-15. The cost per square foot for widened interstate structures was assumed to be \$250 per square foot. This value was determined based on coordination with UDOT's structures engineers. The lengths and widths of the existing structures were estimated using existing UDOT and GIS data. See Unit Cost Data – I-15 Structure Widening/Reconstruct in Appendix B.

A cost estimate of \$6 million per mile was assumed for the construction of one additional lane in each direction on I-15. The cost estimate included major roadway items such as drainage, retaining walls, and noise walls. See Unit Cost Data – I-15 Widening (Two Lanes) in Appendix B.

### 3.8 Rural Interchange Cost Estimate

A cost estimate of \$19 million per rural interchange was assumed. The Southern Parkway Atkinville interchange actual construction cost in St. George (2008) and Legacy Parkway actual construction costs were used to estimate the cost per interchange.

Atkinville interchange construction cost = \$14 million.

Estimated interchange costs on Legacy Parkway for each rural interchange ~ \$20 million.

$\$20 \text{ million} \times 1.2 \text{ (20\% inflation from 2006)} = \$24 \text{ million.}$

$(\$14 \text{ million} + \$24 \text{ million}) / 2 = \$19 \text{ million per interchange.}$

### 3.9 System-to-System Interchanges Cost Estimate

System-to-system interchanges are difficult to estimate because there is no generic system-to-system interchange to use as a basis for construction cost. During Level 2 screening, the WDC team evaluated two connections to Legacy Parkway and I-15 in Farmington: the Shepard Lane connection and the Glovers Lane connection.

A cost estimate of \$100 million was assumed for the Shepard Lane connection. Appendix A provides the supporting information for this cost estimate.

A cost estimate of \$75 million was assumed for the Glovers Lane connection. Appendix A provides the supporting information for this cost estimate.

For both of these system-to-system interchanges, the cost estimates included structure costs (such as bridges, retaining walls, and barriers), costs for materials (such as pavement, base

1 material, and fill material), other construction costs (such as excavation and pavement  
2 removal), utility relocation costs, and right-of-way costs. The quantities of structures,  
3 materials, other construction costs, utilities, and right-of-way were estimated from the  
4 preliminary level of engineering design available at the time of the Level 2 screening. The  
5 cost estimates for both of these system-to-system interchanges were done similarly and  
6 represent a conservative estimate of the costs based on the amount of engineering information  
7 available at the time of the Level 2 screening. More-detailed cost estimates of the  
8 interchanges will be included as part of the Draft EIS when additional engineering design  
9 information is available.

### 10 **3.10 Wetland Mitigation Cost**

11 The WDC team contacted the UDOT wetland specialist regarding wetland mitigation costs in  
12 Utah. UDOT recently calculated the cost per acre for the Utah County Wetland Mitigation  
13 Bank, which was constructed in 2009. Including design, land cost, monitoring, and  
14 construction, the estimated cost was \$125,000 per acre. According to UDOT, the cost per  
15 acre was high because this mitigation bank is in an urban area. UDOT stated that mitigation  
16 costs would likely be less in the WDC study area because land costs are lower given the more  
17 rural nature of the study area. Land cost is the largest factor in the overall cost of wetland  
18 mitigation sites (Johnson 2011).

19 For the Level 2 screening cost analysis, the WDC team assumed a cost of \$125,000 per acre  
20 at a mitigation ratio of 2:1, meaning that for every acre of wetland affected, the WDC team  
21 assumed that the mitigation costs would be \$250,000.  
22

1 **4.0 References**

2 [AASHTO] American Association of State Highway and Transportation Officials  
3 2004 *A Policy on the Geometric Design of Highways and Streets.*

4 Johnson, Terry

5 2011 Personal communication between Terry Johnson, UDOT Senior Landscape Architect, and  
6 Vince Izzo of HDR regarding wetland mitigation cost. April 7.

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## Appendix A– Cost Estimate

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### WDC EIS Level 2 Screening Data

Level 2 Screening Measures*	Costs		Alternative 05	Alternative 08	Alternative 09A+04	Alternative 10A - Power Corridor Four-Lane Divided Highway			
			I-15 and East-West Arterial Widening	I-15, East-West and North-South Arterial Widening	D&RG and East-West Arterial Widening	Original Option and Grovers Lane	Original Option and Shepard Lane	Modified Option and Grovers Lane	Modified Option and Shepard Lane
*Measures are preliminary. The impacts and costs of alternatives advanced to the Draft EIS will change based on additional engineering design.									
Impacts to the Built Environment	Unit Price	Unit							
Number of residential relocations			213	413	967	649	661	251	263
<i>plat</i>	\$200,000	EA	0	0	46	66	66	38	38
<i>residential</i>	\$235,000	EA	213	413	921	583	594	213	224
Number of business relocations			39	119	116	28	29	23	24
<i>agricultural</i>	\$535,000	EA	2	2	2	3	3	3	3
<i>commercial</i>	\$1,535,000	EA	30	103	46	16	16	14	14
<i>industrial</i>	\$535,000	EA	3	8	58	3	3	3	3
<i>institutional</i>	\$1,535,000	EA	4	6	10	6	7	3	4
Number of utility relocations	\$500,000	EA	19	20	19	106	102	64	60
<b>Impacts to Natural Resources</b>									
Total Acres of Wetlands	\$250,000	Acre	2.6	2.6	22.1	56.0	46.1	47.5	37.6
<b>Acres of Land Use/R-O-W</b>									
<i>agricultural</i>	\$0.50	SQFT	13.96	18.18	243.8	490.43	415.19	518.78	443.55
<i>commercial</i>	\$10.00	SQFT	48.00	63.82	12.7	4.34	4.34	4.34	4.34
<i>industrial</i>	\$7.50	SQFT	42.15	42.71	151.3	44.82	44.82	44.82	44.82
<i>institutional</i>	\$7.50	SQFT	5.86	7.26	14.4	1.66	1.89	0.28	0.51
<i>open space</i>	\$0.50	SQFT	5.97	5.97	0.3	25.18	0.05	25.18	0.05
<i>protection area</i>	\$0.50	SQFT	0.00	0.00	0.0	39.59	39.56	39.59	39.56
<i>recreational</i>	\$0.25	SQFT	0.52	0.83	11.0	14.79	9.04	21.27	15.52
<i>residential</i>	\$5.00	SQFT	145.71	170.06	461.0	216.24	227.95	89.97	101.68
<b>Construction Data</b>									
I-15 Interchanges Reconstruct	\$30,000,000	EA	10	10	0	0	0	0	0
I-15 Structures to widen/reconstruct	\$2,500,000	EA	10	10	0	0	0	0	0
Miles of I-15 two-lane widening	\$6,000,000	MILE	17.5	17.5	0	0	0	0	0
Miles of two lane existing arterial widening	\$11,000,000	MILE	18.4	32.85	18.4	1.81	1.81	1.02	1.02
Length of new four-lane freeway	\$8,000,000	MILE	0	0	18.9	19.66	16.7	18.69	15.73
Length of new five-lane arterial	\$10,000,000	MILE	0	0	0	0	0	0	0
# of structures over 2-lane local roads	\$1,512,000	EA	0	0	34	49	47	28	26
# of rural interchanges	\$19,000,000	EA	0	0	8	8	8	6	6
Grovers Lane system-to-system interchange	\$75,000,000	EA	0	0	1	1	0	1	0
Shepard Lane system-to-system interchange	\$100,000,000	EA	0	0	0	0	1	0	1
<b>Costs</b>									
Relocations			\$114,420,000	\$279,720,000	\$353,195,000	\$240,185,000	\$242,305,000	\$118,960,000	\$121,080,000
Wetlands Mitigation			\$643,644	\$643,644	\$5,525,063	\$14,002,110	\$11,527,441	\$11,852,748	\$9,378,079
Land-Use/R-O-W			\$68,771,245	\$81,701,487	\$165,514,621	\$76,426,211	\$76,802,117	\$49,159,244	\$49,535,150
Construction			\$632,400,000	\$791,350,000	\$632,008,000	\$478,278,000	\$476,574,000	\$392,076,000	\$390,372,000
Total Cost			\$816,234,889	\$1,153,415,130	\$1,156,242,684	\$808,891,321	\$807,208,558	\$572,047,991	\$570,365,229
Total Cost Rounded			\$816,000,000	\$1,153,000,000	\$1,156,000,000	\$809,000,000	\$807,000,000	\$572,000,000	\$570,000,000
Total Cost Estimate (to nearest \$1 M)			\$816 Million	\$1.15 Billion	\$1.16 Billion	\$809 Million	\$807 Million	\$574 Million	\$572 Million

## WDC EIS Level 2 Screening Data

Level 2 Screening Measures*	Costs		Alternative 11A - 2001 Corridor Four-Lane Divided Highway				Alternative 13A - Western Corridor Four-Lane Divided Highway			
			4100 West Option and Grovers Lane	4100 West Option and Shepard Lane	4800 West Option and Grovers Lane	4800 West Option and Shepard Lane	5100 West and Grovers Lane	5100 West and Shepard Lane	4700 West and Grovers Lane	4700 West and Shepard Lane
*Measures are preliminary. The impacts and costs of alternatives advanced to the Draft EIS will change based on additional engineering design.										
<b>Impacts to the Built Environment</b>	<b>Unit Price</b>	<b>Unit</b>								
Number of residential relocations			32	44	25	37	57	69	42	54
<i>plat</i>	\$200,000	EA	2	2	2	2	16	16	16	16
<i>residential</i>	\$235,000	EA	30	41	24	35	40	51	25	36
Number of business relocations			8	9	7	8	4	5	4	5
<i>agricultural</i>	\$535,000	EA	5	5	5	5	2	2	2	2
<i>commercial</i>	\$1,535,000	EA	2	2	2	2	2	2	2	2
<i>industrial</i>	\$535,000	EA	0	0	0	0	0	0	0	0
<i>institutional</i>	\$1,535,000	EA	1	2	0	1	0	1	0	1
Number of utility relocations	\$500,000	EA	7	3	7	3	7	3	7	3
<b>Impacts to Natural Resources</b>										
Total Acres of Wetlands	\$250,000	Acre	137.4	127.4	116.5	106.6	86.0	76.1	86.8	76.9
<b>Acres of Land Use/R-O-W</b>										
<i>agricultural</i>	\$0.50	SQFT	499.38	424.15	535.06	459.82	591.59	516.35	595.53	520.29
<i>commercial</i>	\$10.00	SQFT	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>industrial</i>	\$7.50	SQFT	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<i>institutional</i>	\$7.50	SQFT	0.26	0.49	0.26	0.49	0.89	1.12	0.81	1.04
<i>open space</i>	\$0.50	SQFT	37.57	12.45	37.57	12.45	25.18	0.05	25.18	0.05
<i>protection area</i>	\$0.50	SQFT	63.26	63.23	63.26	63.23	80.32	80.29	80.32	80.29
<i>recreational</i>	\$0.25	SQFT	21.10	15.35	21.10	15.35	21.75	16.00	25.04	19.29
<i>residential</i>	\$5.00	SQFT	70.46	82.17	54.98	66.69	80.32	92.04	88.88	100.59
<b>Construction Data</b>										
I-15 Interchanges Reconstruct	\$30,000,000	EA	0	0	0	0	0	0	0	0
I-15 Structures to widen/reconstruct	\$2,500,000	EA	0	0	0	0	0	0	0	0
Miles of I-15 two-lane widening	\$6,000,000	MILE	0	0	0	0	0	0	0	0
Miles of two lane existing arterial widening	\$11,000,000	MILE	1.02	1.02	1.02	1.02	0.8	0.8	0.71	0.71
Length of new four-lane freeway	\$8,000,000	MILE	19.62	16.66	20.03	17.07	22.04	19.08	22.46	19.5
Length of new five-lane arterial	\$10,000,000	MILE	0	0	0	0	0	0	0	0
# of structures over 2-lane local roads	\$1,512,000	EA	15	13	18	16	19	17	21	19
# of rural interchanges	\$19,000,000	EA	5	5	5	5	6	6	6	6
Grovers Lane system-to-system interchange	\$75,000,000	EA	1	0	1	0	1	0	1	0
Shepard Lane system-to-system interchange	\$100,000,000	EA	0	1	0	1	0	1	0	1
<b>Costs</b>										
Relocations			\$18,230,000	\$20,350,000	\$15,285,000	\$17,405,000	\$20,240,000	\$22,360,000	\$16,715,000	\$18,835,000
Wetlands Mitigation			\$34,328,463	\$31,853,795	\$29,134,786	\$26,660,117	\$21,510,929	\$19,036,261	\$21,698,313	\$19,223,645
Land-Use/R-O-W			\$28,734,036	\$29,109,942	\$26,139,490	\$26,515,396	\$33,205,241	\$33,581,147	\$35,165,393	\$35,541,299
Construction			\$360,860,000	\$359,156,000	\$368,676,000	\$366,972,000	\$402,848,000	\$401,144,000	\$408,242,000	\$406,538,000
Total Cost			\$442,152,500	\$440,469,737	\$439,235,276	\$437,552,513	\$477,804,170	\$476,121,408	\$481,820,706	\$480,137,944
Total Cost Rounded			\$442,000,000	\$440,000,000	\$439,000,000	\$438,000,000	\$478,000,000	\$476,000,000	\$482,000,000	\$480,000,000
Total Cost Estimate (to nearest \$1 M)			\$446 Million	\$444 Million	\$441 Million	\$439 Million	\$478 Million	\$476 Million	\$482 Million	\$481 Million

<b>Cost Estimates for WDC System Interchanges to I-15</b>		
	<b>Glovers Lane Option System Interchange</b>	<b>Shepard Lane Option System Interchange</b>
Structures	\$26 million (121,000 sq. ft.)	\$42 million (188,000 sq. ft.)
Retaining Walls	\$13 million (160,000 sq. ft.)	\$15 million (180,000 sq. ft.)
Pavement	\$6 million (900,000 sq. ft.)	\$12 million (2,100,000 sq. ft.)
Earthwork	\$3 million (300,000 c.y.)	\$5 million (500,000 c.y.)
Right-of-way	\$7 million (35 acres)	\$10 million (50 acres)
Contingency & Miscellaneous Items	\$20 million	\$16 million
<b>TOTALS</b>	<b>\$75 million</b>	<b>\$100 million</b>

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## Appendix B – Backup Data

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### Unit Cost Data – I-15 Structure Widening/Reconstruct

Notes:

- 1) Cost per square foot coordinated with UDOT Structures group
- 2) Lengths and widths from GIS estimates

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Cost/SQ FT of Bridge = \$250

<u>Location</u>	<u>Length (FT)</u>	<u>Width (FT)</u>	<u>Area (SQ FT)</u>	<u>Cost</u>
Shepard Lane	545	33	17,985	\$4,496,250
Burton Lane	450	33	14,850	\$3,712,500
Gentile Street	310	65	20,150	\$5,037,500
Church Street	250	42	10,500	\$2,625,000
4400 South	270	33	8,910	\$2,227,500
I-15 NB over 200 S	125	24	3,000	\$750,000
I-15 SB over 200 S	125	24	3,000	\$750,000
I-15 NB over UPRR	250	24	6,000	\$1,500,000
I-15 SB over UPRR	245	24	5,880	\$1,470,000

<b>Total cost (all structures) =</b>	<b>\$22,568,750</b>
<b>Average cost (per structure) =</b>	<b>\$2,507,639</b>

**Unit Cost Data – I-15 Widening (Two Lanes)**

Notes:

- 1) Assumed unit weight of 145# / CF for HMA
- 2) Assumed unit weight of 131# / CF for OGBC

Length of widening (miles) =	16.5
Width of widening (total feet) =	48.0

<u>Item</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Quantity</u>	<u>Amount</u>
Roadway excavation	yd <sup>3</sup>	\$9.00	154,880	\$1,393,920
12" PCCP	sq yd	\$12.00	464,640	\$5,575,680
3" hot mix asphalt	ton	\$85.00	75,794	\$6,442,524
6" open graded base course	ton	\$80.00	136,953	\$10,956,211
12" granular borrow	yd <sup>3</sup>	\$18.00	154,880	\$2,787,840
Drainage	lump	\$5,000,000.00	1	\$5,000,000
Retaining/noise walls	sq ft	\$40.00	871,200	\$34,848,000
<b>SUBTOTAL</b>				<b>\$67,004,175</b>
Traffic control	8%			\$5,360,334
Mobilization	10%			\$6,700,418
Contingency	25%			\$16,751,044
<b>GRAND TOTAL</b>				<b>\$95,815,971</b>
<b>Cost per mile</b>				<b>\$5,807,029</b>