3.0 TRAFFIC ANALYSIS OF ALTERNATES

3.1 Preliminary Traffic Impact Analysis

A cursory traffic impact analysis was performed to provide a general overview of the impacts of connecting the proposed Beltway to Ahtanum Road at the Longfibre Road, Goodman Road, and South 3rd Avenue intersections. The analysis used traffic count information established by Shea, Carr & Jewell (see report data in Appendix) at the three intersections as well as anticipated future traffic counts determined by WSDOT for the regional Beltway connector. It should be noted that an extensive traffic analysis projecting future traffic demands from surrounding properties based on potential land uses has not been performed for this Beltway Corridor Study.

The analysis has used a “level of service” (LOS) rating that is determined by the delay in seconds that a vehicle has to wait before completing its traffic movement. The City of Union Gap has adopted a LOS D as the lowest acceptable level of service at any intersection. The following table, derived from the 2000 TRD Highway Capacity Manual, summarizes the ranges for each level of service based on vehicle delay.

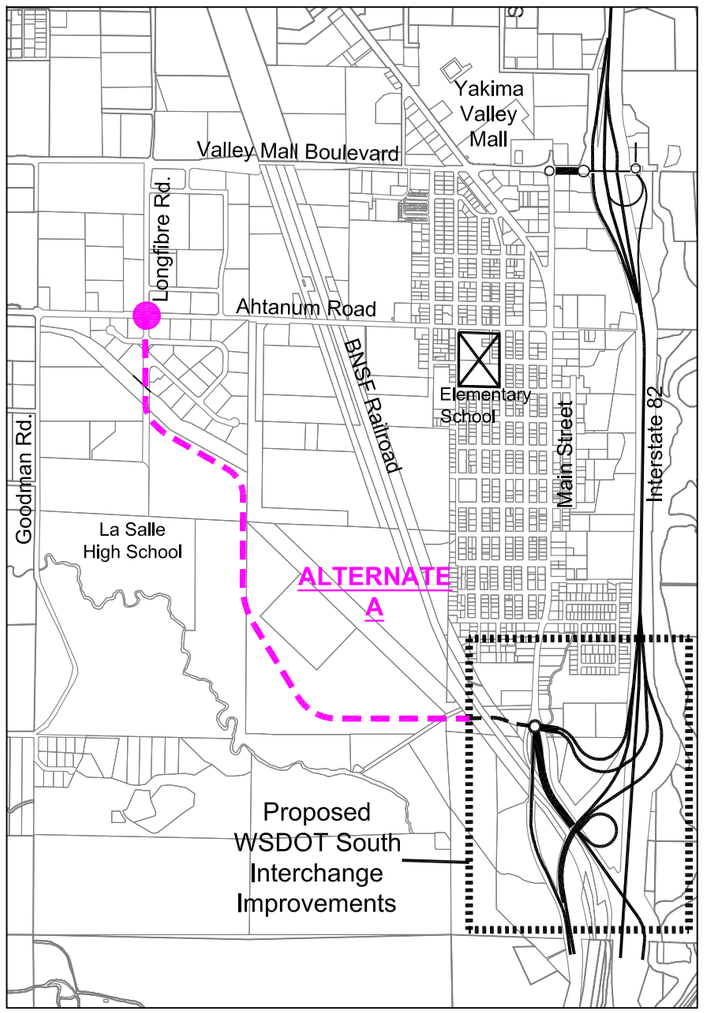
Traffic Capacity - Level of Service (LOS)

LOS	Control Delay per Vehicle (sec/veh)
A	Greater than or equal to 10
B	Greater than 10 to 20
C	Greater than 20 to 35
D	Greater than 35 to 55
E	Greater than 55 to 80
F	Greater than 80

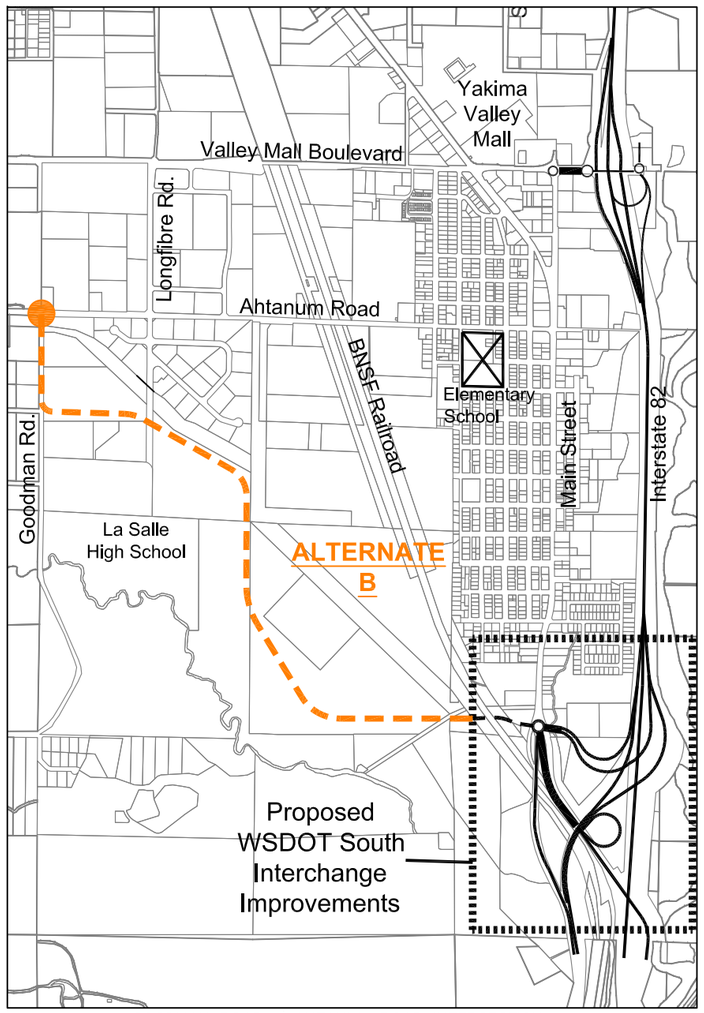
The preliminary analysis herein assumes that the Beltway arterial has been completed from Main Street at or near the South Union Gap Interchange to Ahtanum Road and that the traffic counts on the new arterial are as provided by WSDOT. In addition, some new development along Longfibre Road north of Ahtanum Road is also assumed based on the data presented in the Shea, Carr, & Jewell preliminary Traffic Impact Analysis prepared for a proposed new development that would be located across from Costco Wholesale. Figure 3.1 – Intersection Traffic Exhibit shows the recorded 2009 peak hour traffic counts and Beltway future peak hour traffic counts based on the combined WSDOT and Shea, Carr, & Jewell projections.

Under these conditions Ahtanum Road is shown to have adequate capacity to accommodate the expected traffic from the Beltway connector without mitigation. The analyses of the existing intersections at Longfibre Road, Goodman Road, and South Third Avenue are provided below.

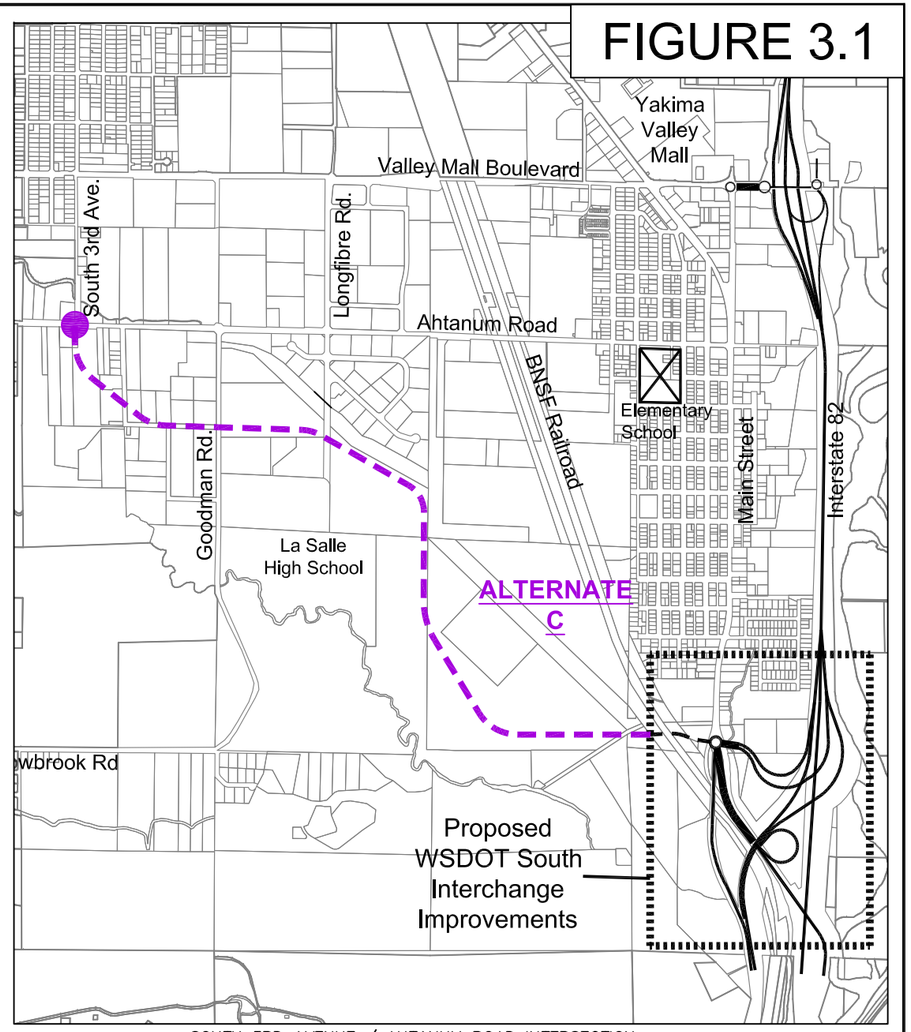
FIGURE 3.1



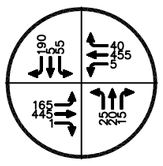
LONGFIBRE ROAD / AHTANUM ROAD INTERSECTION



GOODMAN ROAD / AHTANUM ROAD INTERSECTION

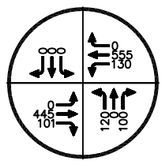


SOUTH 3RD AVENUE / AHTANUM ROAD INTERSECTION



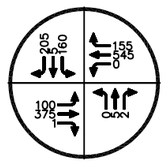
SHEA, CARR & JEWELL 2009 RECORDED TRAFFIC COUNTS

FUTURE TRAFFIC PROJECTIONS. SEE NOTE 1 BELOW.

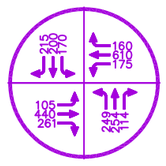


SHEA, CARR & JEWELL 2009 RECORDED TRAFFIC COUNTS

FUTURE TRAFFIC PROJECTIONS. SEE NOTE 1 BELOW.



SHEA, CARR & JEWELL 2009 RECORDED TRAFFIC COUNTS



FUTURE TRAFFIC PROJECTIONS. SEE NOTE 1 BELOW.

ESTIMATED PEAK HOUR TRIPS

NOTE 1:
COMBINED TRAFFIC COUNTS ARE FROM DATA COLLECTED BY SHEA, CARR & JEWELL AND ANTICIPATED TRAFFIC COUNTS BY WASHINGTON STATE DEPARTMENT OF TRANSPORTATION (WSDOT). WSDOT APPROXIMATES THAT 260 EAST BOUND PEAK HOUR TRIPS AND 610 WEST BOUND PEAK TRIPS GENERATED FROM NEW REGIONAL BELTWAY CONNECTOR.

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City of Union Gap
REGIONAL BELTWAY CONNECTOR

INTERSECTION TRAFFIC EXHIBIT

Longfibre Road and Ahtanum Road Intersection

The existing intersection of Longfibre Road and Ahtanum Road is controlled by an existing signal with traffic loops. Vehicles traveling on Ahtanum Road through the intersection both eastbound and westbound, have an isolated left turn lane and two through lanes. The Longfibre Road southbound and northbound approaches each have an isolated left turn lane and a single through lane.

Looking East

Looking West

Looking North

Looking South

The table below summarizes the anticipated traffic impacts at the intersection based on WSDOT and Shea, Carr, & Jewell traffic projections.

Longfibre Road and Ahtanum Road Intersection

Approach	Base Year 2009		Projection w/ Beltway	
	LOS (sec)	v/c	LOS (sec)	v/c
Southbound	B (16.1)	0.14	B (19.4)	0.58
Northbound	B (16.8)	0.06	B (19.2)	0.09
Eastbound	B (18.1)	0.46	B (19.4)	0.58
Westbound	C (29.6)	0.63	C (31.6)	0.66

It is anticipated with the initial estimated Beltway traffic and the proposed new development traffic, Longfibre Road will be adequate to handle the traffic demand. However, the existing 3-lane Longfibre Road was not originally constructed to be a part of a regional Beltway connector or to accommodate extensive retail commercial development. Additional travel lanes may be required in the future to increase capacity.

Goodman Road and Ahtanum Road Intersection

The existing intersection of Goodman Road and Ahtanum Road is controlled by an existing signal with traffic loops. Vehicles traveling eastbound on Ahtanum Road move from a single lane on the west leg to two through lanes on the east leg. There is no eastbound to northbound left turn movement as Goodman Road does not extend to the north. Westbound vehicles on Ahtanum Road have an isolated left turn lane and two through lanes on the east leg converging to a single through lane on the west leg.

Looking East

Looking West

The northbound Goodman Road approach has an isolated left turn lane and a single combined through/right turn lane. The left turn lane has a minimal amount of queuing capacity as the existing 2-lane Wide Hollow Creek Bridge is just south of the intersection. Currently, Goodman Road does not extend further to the north. However, a north leg stub-out exists at the intersection and a signal pole was installed for the future southbound movement.

Looking North

Looking South

The absence of a continuation of Goodman Road to the north will force projected Beltway traffic traveling to Valley Mall Boulevard to turn onto Ahtanum Road in order to continue to either the east to Longfibre Road or the west to South 3rd Avenue. As noted earlier in this Section, Ahtanum Road has the capacity to accommodate the additional traffic demand.

The table below summarizes the anticipated traffic impacts at the intersection based on WSDOT and Shea, Carr, & Jewell traffic projections. These preliminary calculations do not include commercial and residential development that could occur along Goodman Road to the south of the regional Beltway connector in the future.

Goodman Road and Ahtanum Road Intersection

Approach	Base Year 2009		Projection w/ Beltway	
	LOS (sec)	v/c	LOS (sec)	v/c
Southbound	NA	NA	NA	NA
Northbound	A (6.2)	0.13	B (13.0)	0.25
Eastbound	B (16.3)	0.53	C (31.9)	0.33
Westbound	B (19.7)	0.75	C (33.4)	0.83

South 3rd Avenue and Ahtanum Road Intersection

The existing intersection of South 3rd Avenue and Ahtanum Road is controlled by an existing signal with traffic loops. Vehicles traveling eastbound and westbound on Ahtanum Road through the intersection have an isolated left turn lane and single through lane. The South 3rd Avenue southbound approach has an isolated left turn lane and a single through lane. There is a limited length of northbound approach with a left turn lane and a single through lane that provides access to a few homes to the south on the dead-end street.

Looking East

Looking West

Looking North

Looking South

The table below summarizes the anticipated traffic impacts at the intersection based on WSDOT and Shea, Carr, & Jewell traffic projections.

South 3rd Avenue and Ahtanum Road Intersection

Approach	Base Year 2009		Projection w/ Beltway	
	LOS (sec)	v/c	LOS (sec)	v/c
Southbound	C (23.3)	0.41	C (31.4)	0.22
Northbound	B (20.0)	0.01	C (22.7)	0.01
Eastbound	B (10.2)	0.47	B (19.6)	0.38
Westbound	C (28.8)	0.87	C (30.8)	0.22

3.2 Summary

The limited preliminary traffic impact analysis showed that all three of the Ahtanum Road intersections would accommodate the additional traffic generated by connection to the proposed new Beltway. Each of the existing intersecting streets; Longfibre Road, Goodman Road, and South 3rd Avenue, are 3-lane roadways that are unlikely to be widened to 5-lanes in the future. All of the intersections are signalized and include traffic loops for actuated control. Should the area develop more fully in the future, combining two or more of the alignment alternates may be necessary to increase transportation capacity.

4.0 COST ESTIMATES

4.1 Preliminary Estimated Project Costs

Preliminary cost estimates for both the recommended "urban" non-median section (Figure 2.2) and the lower cost "rural" section (Figure 2.3) for each of the three alternates are provided in the Appendix of this Corridor Study. All assumptions that were made in preparing the preliminary cost estimates have been identified at the end of the spreadsheets. An estimated cost for construction of a center median on a "per linear foot" basis is also provided in the Appendix. A center median could be constructed through the entire length or just a portion of the Beltway connector for either the urban or rural sections.

Figure 4.1 – Preliminary Cost Estimates summarizes the total estimated project costs for both the urban and rural sections for each of the three alternate alignments. It is probable that the proposed Beltway connector will be constructed in phases over a period of time. The initial demand for the arterial will likely be development pressures starting near the northern end, south of Wide Hollow Creek. Depending on the alignment chosen, this may require construction of a new bridge making the initial improvement phase more costly than future phases.

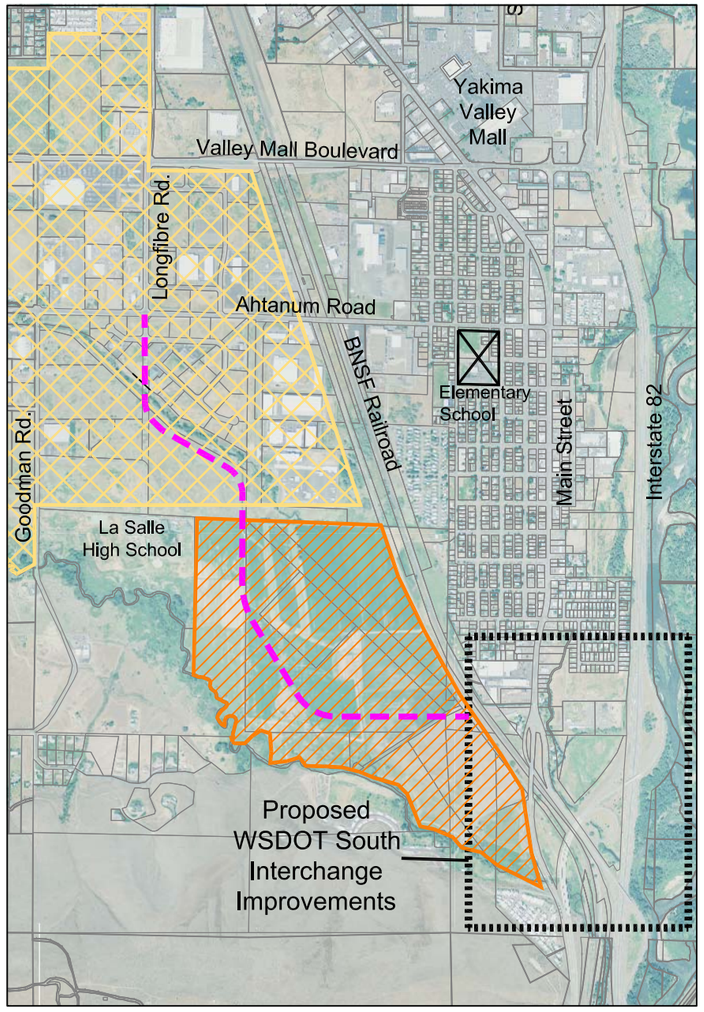
4.2 Funding Opportunities

Historically, Union Gap has actively pursued funding opportunities in the form of grants and low interest loans from local, state, and federal programs. The City has assisted WSDOT in securing funding for the preliminary engineering and environmental investigation work completed to date for the South Union Gap Interchange.

In February 2010, *TRANS*-Action and Union Gap representatives, including City Council Members, met with Senators Patty Murray and Maria Cantwell, Congressman Doc Hastings, and their staffs regarding the regional Beltway connector. *TRANS*-Action and the City provided information showing the need for a regional "Westside Connector" to improved access to western areas of the Upper Yakima Valley. The first phase of this Westside Connector was proposed to be the construction of the Beltway arterial providing more direct route from the South Union Gap I-82/US 97 Interchange to Ahtanum Road, one of the region's primary east-west arterials. The Beltway was shown to also provide improved access to undeveloped land within Union Gap and to lessen traffic on Valley Mall Boulevard by providing an alternate transportation route.

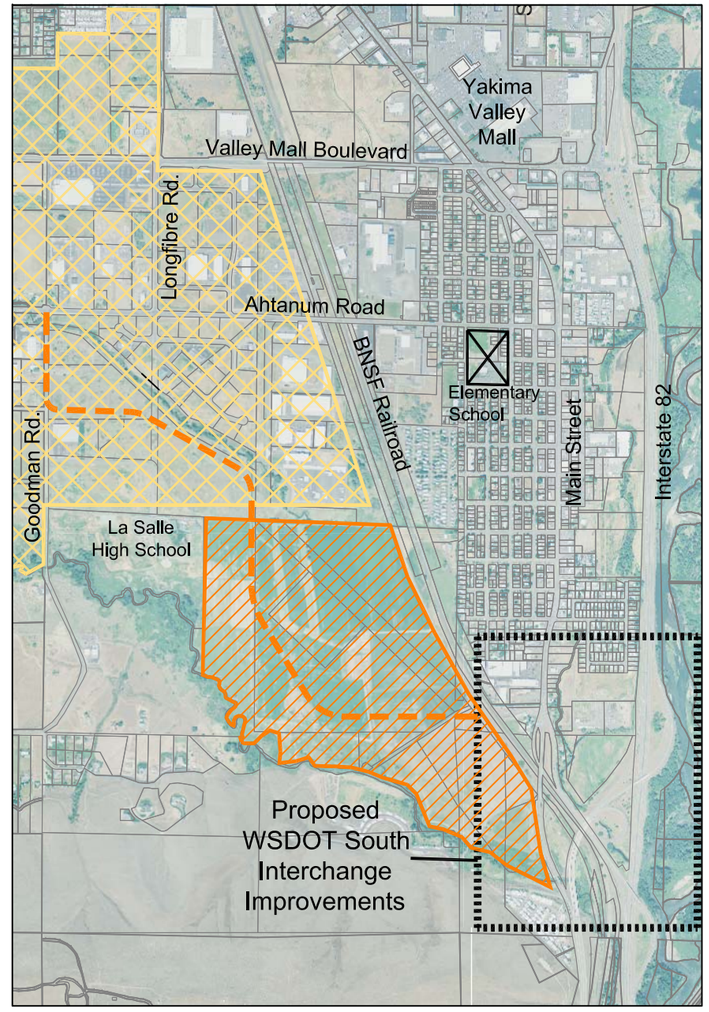
In order to qualify for federal funding, Union Gap requested and received federal classification of the proposed Beltway connector from the South Union Gap Interchange to the Longfibre Road and Ahtanum Road intersection. This designation allows the City to apply for both federal Surface Transportation Program (STP) and Washington State Transportation Improvement Board (TIB) grant funding. The opportunity may exist in the future to partner with WSDOT in applying for federal Transportation Investment Generating Economic Recovery (TIGER)

FIGURE 4.1



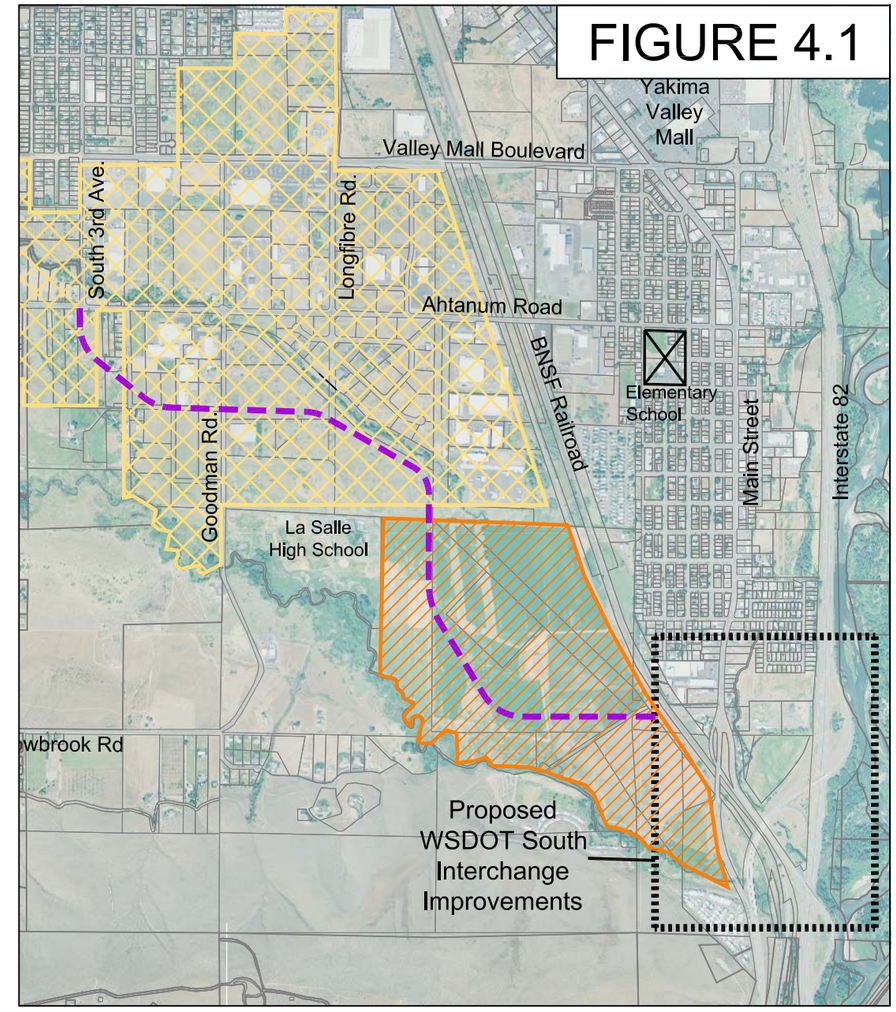
ALTERNATE A

ESTIMATED TOTAL PROJECT COST – URBAN SECTION = $11,500,000
ESTIMATED TOTAL PROJECT COST – RURAL SECTION = $10,210,000
COST PER LINEAR FOOT OF CENTER MEDIAN = $250/LF



ALTERNATE B

ESTIMATED TOTAL PROJECT COST – URBAN SECTION = $13,016,000
ESTIMATED TOTAL PROJECT COST – RURAL SECTION = $11,714,000
COST PER LINEAR FOOT OF CENTER MEDIAN = $250/LF



ALTERNATE C

ESTIMATED TOTAL PROJECT COST – URBAN SECTION = $14,072,000
ESTIMATED TOTAL PROJECT COST – RURAL SECTION = $12,033,000
COST PER LINEAR FOOT OF CENTER MEDIAN = $250/LF

EXISTING INDUSTRIAL AND COMMERCIAL ZONED PROPERTY

POTENTIAL MIXED USE DEVELOPMENT

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City of Union Gap

REGIONAL BELTWAY CONNECTOR

PRELIMINARY COST ESTIMATES

Discretionary Grants should the US Congress continue the program. TIGER program funds are awarded on a “competitive basis for projects that will have a significant impact on the Nation, a metropolitan area, or a region.”

Another source of transportation and utility funding is the local Yakima County Supporting Investment in Economic Development (SIED) grant/loan program. SIED is a competitive program that provides public infrastructure funding to economic development projects that are tied to the opening of a new business or expansion of an existing business that creates well-paying jobs. The City has secured SIED funding for a number of previous projects near the Beltway corridor area including the Ahtanum Ridge Business Park, the Sutherland Business Park, and improvements to Ahtanum Road and Longfibre Road.

5.0 PREFERRED ALTERNATE SELECTION

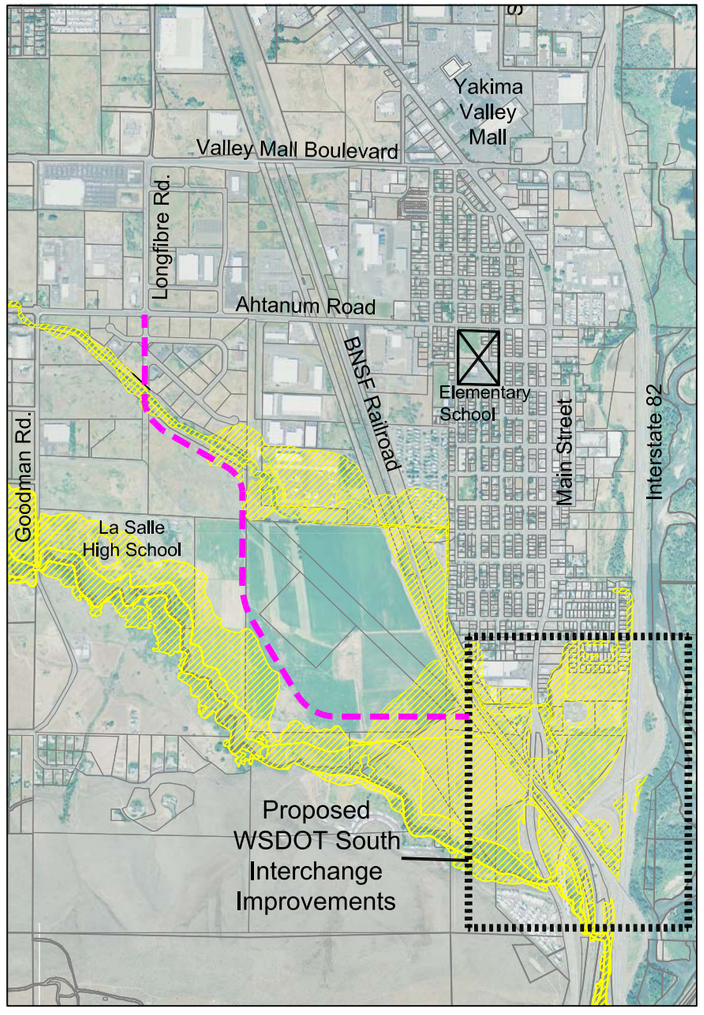
5.1 Comparison of Alignment Alternates

The Corridor Study has provided an analysis of the various factors affecting the viability and location of the proposed regional Beltway connector. Three potential alignments alternates were developed based on logical north end connections to Ahtanum Road. Preliminary cost estimates presented in Section 4.1 identified Alternate A to be the least cost alignment. However, costs should not be the only criteria used in selecting a “preferred” alternate.

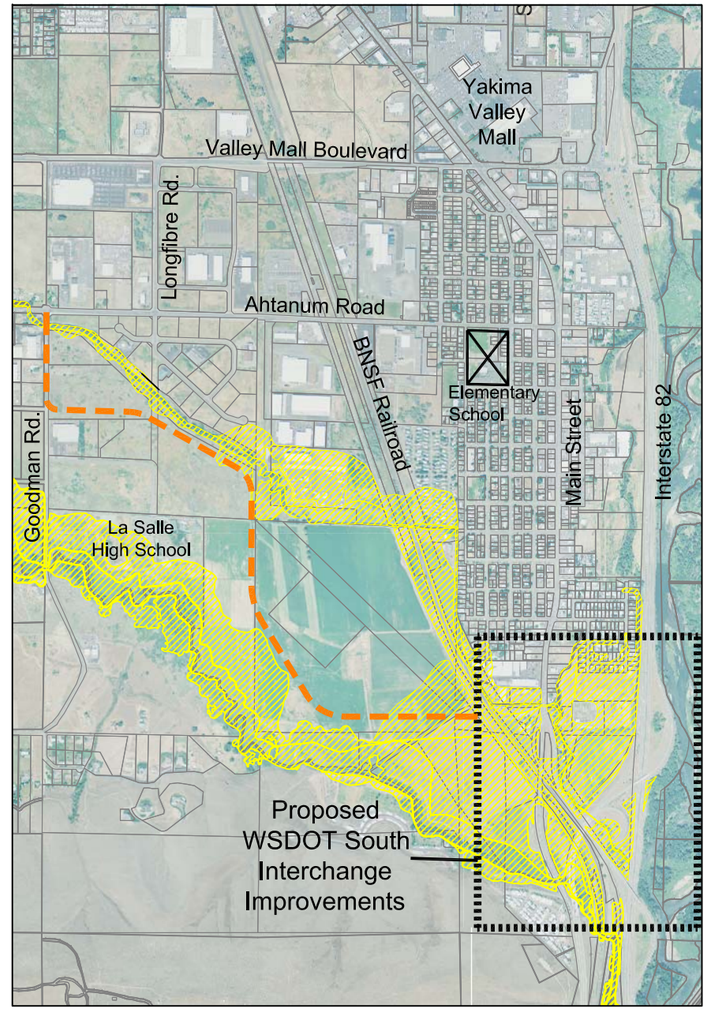
Figure 5.1 – Alignment Rankings provides a comparison of the three alternate alignments based on nine key factors including access to existing and future commercial/industrial properties, environmental and permitting requirements, impacts to existing traffic routes, connection to existing transportation infrastructure, and estimated project costs. The alignment alternates were ranked against one another in each consideration factor from 1 (best) to 3 (worst). The rankings for each alternate were tallied to provide a total score. Based on the consideration factors used in the comparison, Alternate A was easily the best alignment option of the three.

Alignment Alternate A is shown on Figure 5.2 – Preferred Alternate A Alignment with major travel routes, existing commercial/industrial zoned properties, and potential mixed use development areas. It has been noted previously in the Study that construction of the Alternate A alignment would not preclude the future construction of one of the other alignment alternates. In particular, Alternate C would provide an additional connection to an existing north-south travel route thereby increasing the capacity of the regional transportation system.

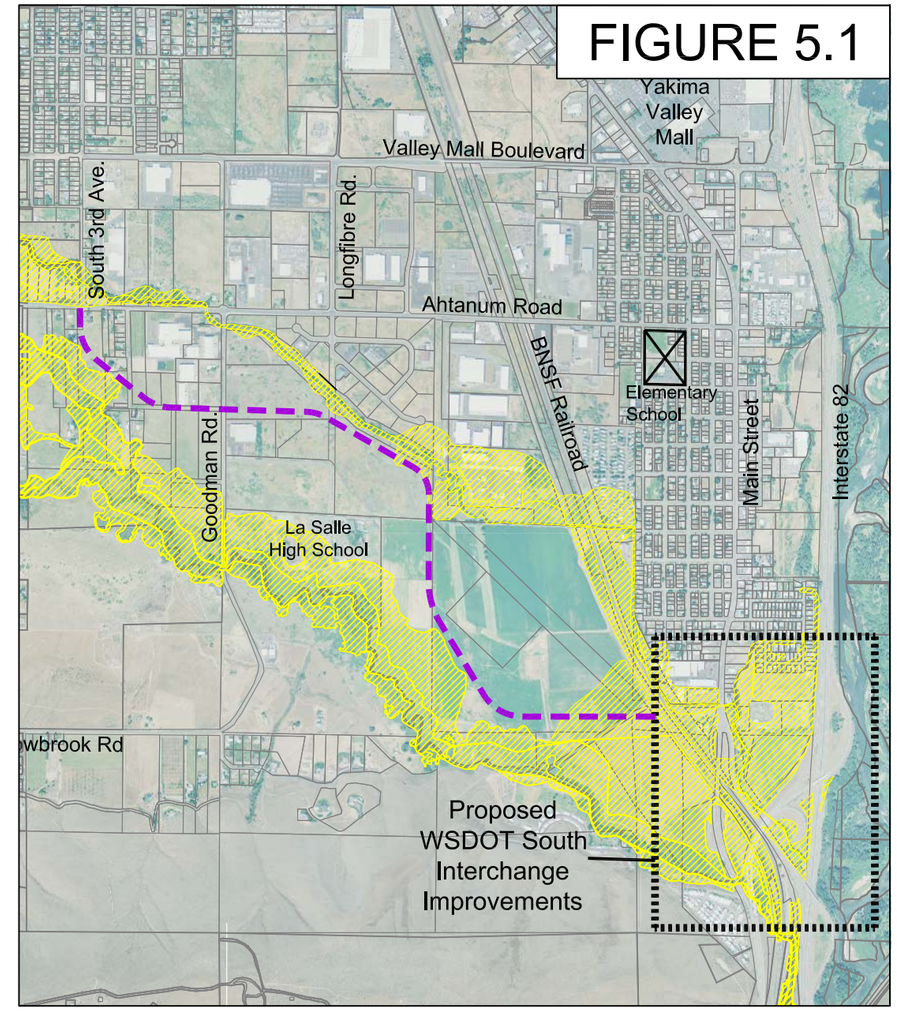
FIGURE 5.1



ALTERNATE A



ALTERNATE B



ALTERNATE C

	Provides access to existing Union Gap commercial/ industrial areas	Provides access to currently undeveloped/ vacant properties	Provides access to Valley Mall Blvd.	No Bridge (1), New Bridge (2), Replace Existing Bridge (3)	Minimizes required environmental review and permitting	Limited impacts to existing traffic routes	Connects to existing signalized intersection with adequate lane configuration	Minimizes acquisition of new right-of-way	Estimated project cost - Least (1) to Most (3)	**Total Ranking Points (Best = Lowest Total)**
ALTERNATE A	1	1	1	2	2	1	1	1	1	**11**
ALTERNATE B	2	2	3	3	3	3	3	2	3	**24**
ALTERNATE C	3	3	2	1	1	2	2	3	2	**19**

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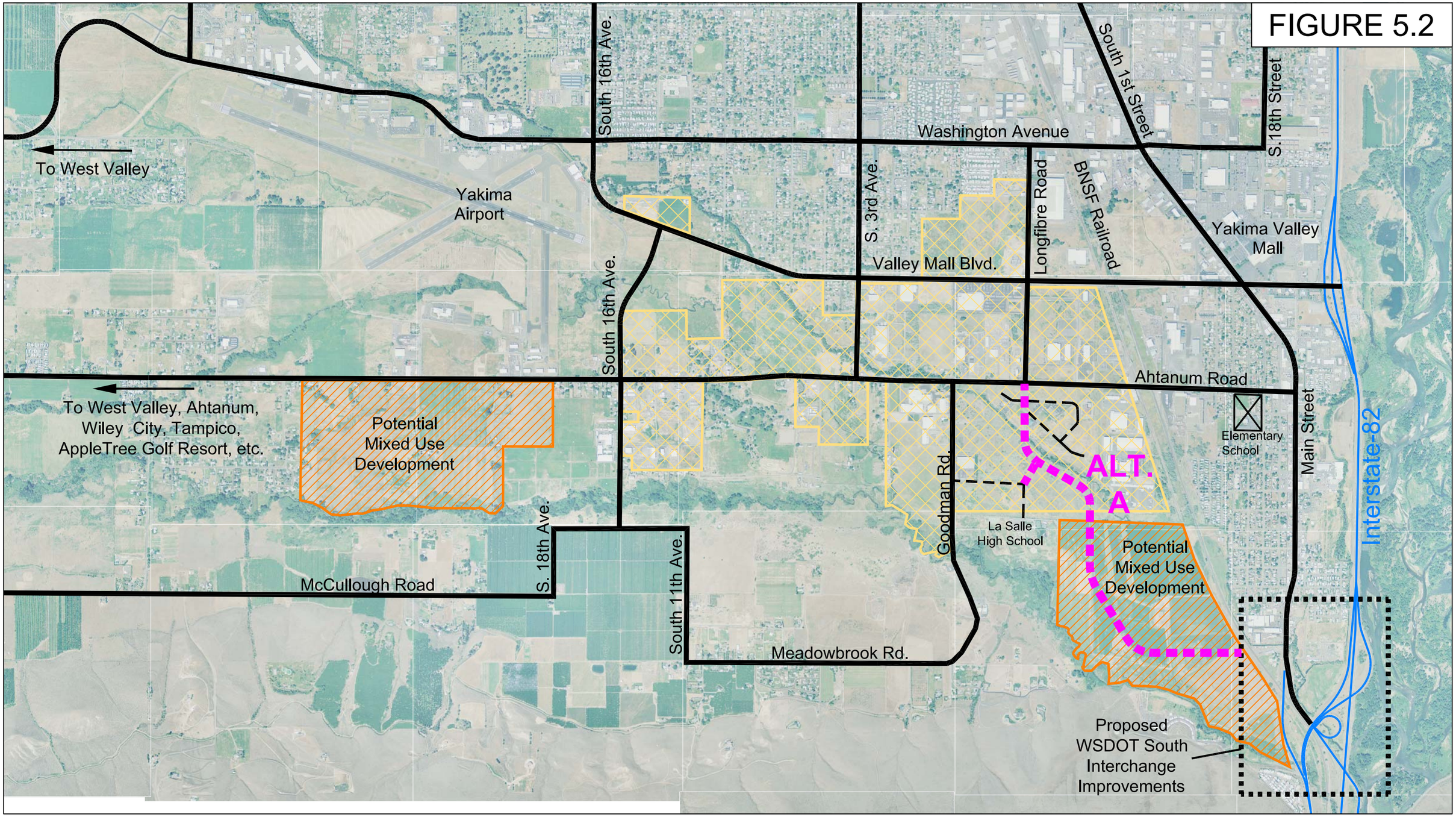
City of Union Gap

REGIONAL BELTWAY CONNECTOR

ALIGNMENT RANKINGS

FIGURE 5.2



EXISTING MAJOR TRAVEL ROUTES

PROPOSED BELTWAY CONNECTOR

EXISTING INDUSTRIAL AND COMMERCIAL ZONED PROPERTY

POTENTIAL MIXED USE DEVELOPMENT

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City of Union Gap

REGIONAL BELTWAY CONNECTOR

PREFERRED ALTERNATE A ALIGNMENT

APPENDIX 1

Excerpt from Traffic Impact Analysis for Union Gap Promenade

by Shea, Carr & Jewell

Revised September 2009

Traffic Impact Analysis

Project Information

Project:	Union Gap Promenade
Prepared For:	**White-Leasure Development** 416 South 8th St Suite 200 Boise, ID 83702

Reviewing Agency:

Jurisdiction:	City of Union Gap PO Box 3008 Union Gap, WA 98903-0008

Project Representative

Prepared By:	**Shea, Carr & Jewell, Inc.** 2102 Carriage Drive, Bldg H Olympia, WA 98502 360.352.1465 www.sheacarrjewell.com
Contact:	Eric S. Johnston, Senior Transportation Engineer

Project Reference:	Project Reference: 0590.04 Path: N:\Projects\0590 White-Leasure Development\0590.04 Union Gap Promenade\Phase 03 Transportation Planning\Report\UGP TIA 090617.doc

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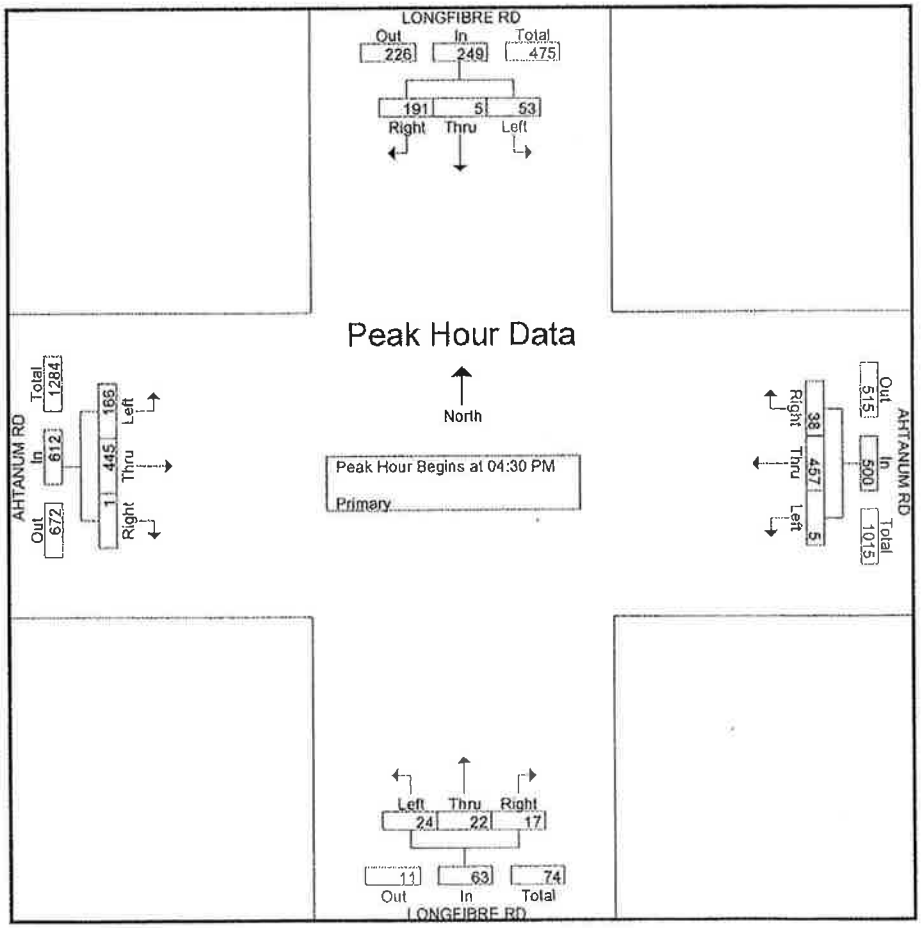
UNION GAP, WASHINGTON
LONGFIBRE RD
AHTANUM RD
LOC# 12P S&C09100M

File Name : S&C11812P
Site Code : 00000012
Start Date : 4/28/2009
Page No : 2

	LONGFIBRE RD From North				AHTANUM RD From East				LONGFIBRE RD From South				AHTANUM RD From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:30 PM																	
04:30 PM	40	2	14	56	13	125	1	139	3	5	4	12	0	131	59	190	397
04:45 PM	39	0	10	49	4	96	0	100	4	4	2	10	0	96	31	127	286
05:00 PM	58	3	17	78	11	125	2	138	3	5	11	19	1	102	45	148	383
05:15 PM	54	0	12	66	10	111	2	123	7	8	7	22	0	116	31	147	358
Total Volume	191	5	53	249	38	457	5	500	17	22	24	63	1	445	166	612	1424
% App. Total	76.7	2	21.3		7.6	91.4	1		27	34.9	38.1		0.2	72.7	27.1		
PHF	.823	.417	.779	.798	.731	.914	.625	.899	.607	.688	.545	.716	.250	.849	.703	.805	.897



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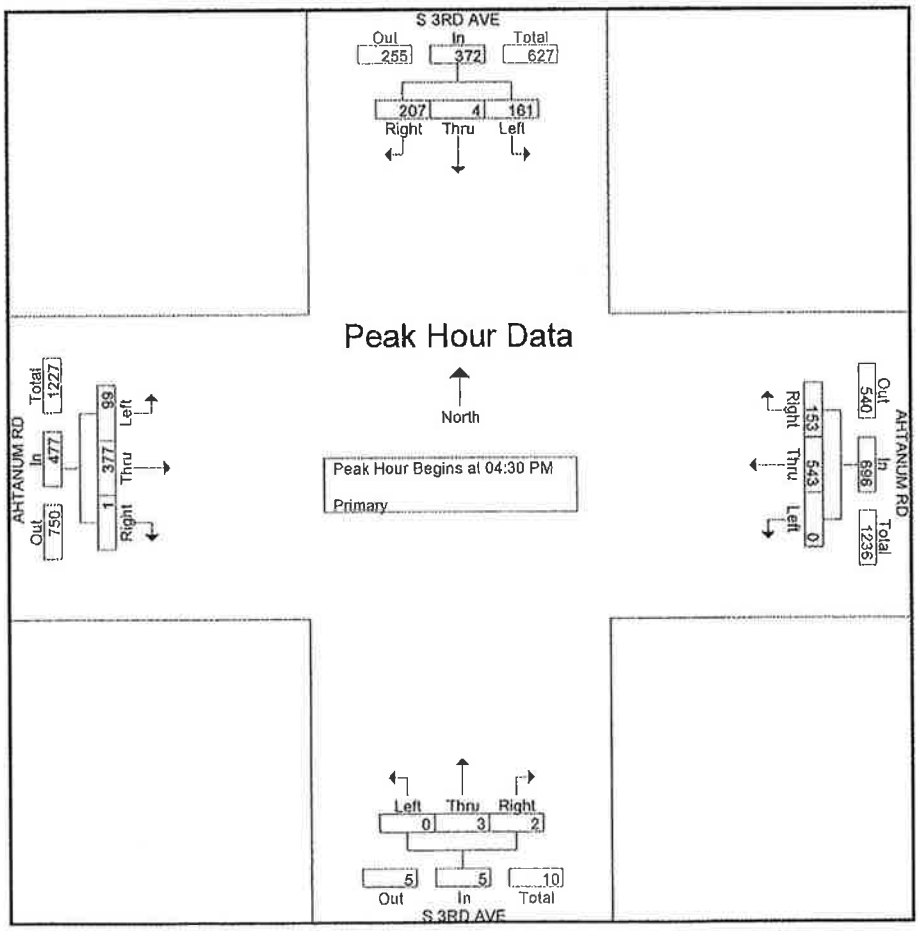
UNION GAP, WASHINGTON
S 3RD AVE
AHTANUM RD
LOC# 10P S&C09100M

File Name : S&C11810P
Site Code : 00000010
Start Date : 4/28/2009
Page No : 2

	S 3RD AVE From North				AHTANUM RD From East				S 3RD AVE From South				AHTANUM RD From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:30 PM																	
04:30 PM	49	1	50	100	57	135	0	192	1	1	0	2	0	97	32	129	423
04:45 PM	50	0	35	85	33	128	0	161	0	1	0	1	1	79	22	102	349
05:00 PM	49	0	33	82	31	139	0	170	0	0	0	0	0	116	22	138	390
05:15 PM	59	3	43	105	32	141	0	173	1	1	0	2	0	85	23	108	388
Total Volume	207	4	161	372	153	543	0	696	2	3	0	5	1	377	99	477	1550
% App. Total	55.6	1.1	43.3		22	78	0		40	60	0		0.2	79	20.8		
PHF	.877	.333	.805	.886	.671	.963	.000	.906	.500	.750	.000	.625	.250	.813	.773	.864	.916



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UNION GAP, WASHINGTON
GOODMAN RD
AHTANUM RD
LOC# 11P S&C09100M

File Name : S&C11911P
Site Code : 00000011
Start Date : 4/29/2009
Page No : 2

	From North				AHTANUM RD From East				GOODMAN RD From South				AHTANUM RD From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																	
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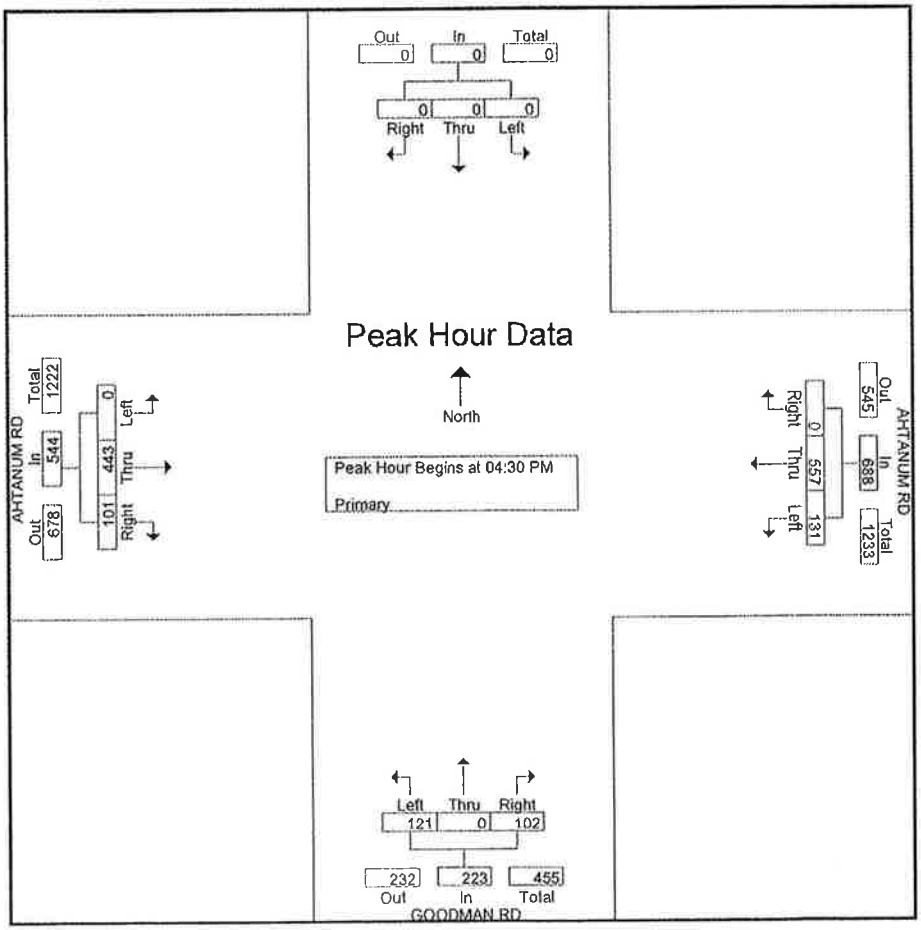
04:30 PM	0	0	0	0	0	138	31	169	21	0	29	50	35	126	0	161	380
04:45 PM	0	0	0	0	0	121	37	158	21	0	35	56	26	113	0	139	353
05:00 PM	0	0	0	0	0	139	39	178	41	0	32	73	18	112	0	130	381
05:15 PM	0	0	0	0	0	159	24	183	19	0	25	44	22	92	0	114	341
Total Volume	0	0	0	0	0	557	131	688	102	0	121	223	101	443	0	544	1455
% App. Total	0	0	0		0	81	19		45.7	0	54.3		18.6	81.4	0		
PHF	.000	.000	.000	.000	.000	.876	.840	.940	.622	.000	.864	.764	.721	.879	.000	.845	.955



HCM Signalized Intersection Capacity Analysis
9: Ahtanum Rd & 3rd Ave

2011 Phase 2 Conditions
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	105	440	1	0	610	160	0	5	2	170	5	215
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0			4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00			1.00			1.00		1.00	1.00	
Frt	1.00	1.00			0.97			0.96		1.00	0.85	
Flt Protected	0.95	1.00			1.00			1.00		0.95	1.00	
Satd. Flow (prot)	1770	1862			1805			1791		1770	1589	
Flt Permitted	0.08	1.00			1.00			1.00		0.75	1.00	
Satd. Flow (perm)	157	1862			1805			1791		1403	1589	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	114	478	1	0	663	174	0	5	2	185	5	234
RTOR Reduction (vph)	0	0	0	0	10	0	0	1	0	0	168	0
Lane Group Flow (vph)	114	479	0	0	827	0	0	6	0	185	71	0
Turn Type	pm+pt			pm+pt			Perm			Perm		
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	55.0	55.0			45.0			24.8		24.8	24.8	
Effective Green, g (s)	55.0	55.0			45.0			24.8		24.8	24.8	
Actuated g/C Ratio	0.63	0.63			0.51			0.28		0.28	0.28	
Clearance Time (s)	4.0	4.0			4.0			4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0			3.0			3.0		3.0	3.0	
Lane Grp Cap (vph)	209	1166			925			506		396	449	
v/s Ratio Prot	c0.04	0.26			c0.46			0.00			0.04	
v/s Ratio Perm	0.30									c0.13		
v/c Ratio	0.55	0.41			0.89			0.01		0.47	0.16	
Uniform Delay, d1	16.1	8.2			19.3			22.7		26.0	23.7	
Progression Factor	1.00	1.00			1.00			1.00		1.00	1.00	
Incremental Delay, d2	2.9	0.2			11.0			0.0		3.9	0.8	
Delay (s)	19.0	8.5			30.2			22.7		30.0	24.4	
Level of Service	B	A			C			C		C	C	
Approach Delay (s)		10.5			30.2			22.7			26.8	
Approach LOS		B			C			C			C	

Intersection Summary

HCM Average Control Delay	23.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	87.8	Sum of lost time (s)	12.0
Intersection Capacity Utilization	73.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
10: Ahtanum Rd & Goodman Rd

2011 Phase 2 Conditions
PM Peak Hour

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	505	105	135	625	125	105
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0	4.0	4.0
Lane Util. Factor	0.95		1.00	0.95	1.00	1.00
Frt	0.97		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	3448		1770	3539	1770	1583
Flt Permitted	1.00		0.29	1.00	0.95	1.00
Satd. Flow (perm)	3448		538	3539	1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	549	114	147	679	136	114
RTOR Reduction (vph)	31	0	0	0	0	54
Lane Group Flow (vph)	632	0	147	679	136	60
Turn Type			Perm			Perm
Protected Phases	4			8	2	
Permitted Phases			8			2
Actuated Green, G (s)	18.9		18.9	18.9	30.4	30.4
Effective Green, g (s)	18.9		18.9	18.9	30.4	30.4
Actuated g/C Ratio	0.33		0.33	0.33	0.53	0.53
Clearance Time (s)	4.0		4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	1137		177	1167	939	840
v/s Ratio Prot	0.18			0.19	c0.08	
v/s Ratio Perm			c0.27			0.04
v/c Ratio	0.56		0.83	0.58	0.14	0.07
Uniform Delay, d1	15.8		17.7	15.9	6.8	6.6
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	0.6		26.8	0.7	0.3	0.2
Delay (s)	16.3		44.6	16.7	7.2	6.7
Level of Service	B		D	B	A	A
Approach Delay (s)	16.3			21.6	7.0	
Approach LOS	B			C	A	

Intersection Summary

HCM Average Control Delay	17.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	57.3	Sum of lost time (s)	8.0
Intersection Capacity Utilization	41.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
11: Ahtanum Rd & Longfibre Ave

2011 Phase 2 Conditions
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	225	455	1	5	470	55	25	25	20	70	5	250
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	0.98		1.00	0.93		1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3538		1770	3483		1770	1737		1770	1588	
Flt Permitted	0.21	1.00		0.47	1.00		0.52	1.00		0.67	1.00	
Satd. Flow (perm)	393	3538		876	3483		967	1737		1251	1588	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	245	495	1	5	511	60	27	27	22	76	5	272
RTOR Reduction (vph)	0	0	0	0	10	0	0	14	0	0	171	0
Lane Group Flow (vph)	245	496	0	5	561	0	27	35	0	76	106	0
Turn Type	pm+pt			pm+pt			pm+pt			pm+pt		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	40.9	35.9		22.6	21.6		32.4	30.3		37.2	32.7	
Effective Green, g (s)	40.9	35.9		22.6	21.6		32.4	30.3		37.2	32.7	
Actuated g/C Ratio	0.47	0.41		0.26	0.25		0.37	0.35		0.42	0.37	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	424	1448		236	858		376	600		557	592	
v/s Ratio Prot	c0.10	0.14		0.00	c0.16		0.00	0.02		c0.01	c0.07	
v/s Ratio Perm	0.17			0.01			0.02			0.05		
v/c Ratio	0.58	0.34		0.02	0.65		0.07	0.06		0.14	0.18	
Uniform Delay, d1	15.9	17.8		24.2	29.7		17.8	19.2		15.2	18.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.9	0.1		0.0	1.8		0.1	0.2		0.1	0.7	
Delay (s)	17.8	17.9		24.3	31.5		17.9	19.3		15.3	19.2	
Level of Service	B	B		C	C		B	B		B	B	
Approach Delay (s)		17.9			31.4			18.8			18.3	
Approach LOS		B			C			B			B	

Intersection Summary

HCM Average Control Delay	22.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	87.7	Sum of lost time (s)	16.0
Intersection Capacity Utilization	58.0%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
12: Ahtanum Rd & Sutherland Rd

2011 Phase 2 Conditions
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	5	540	0	0	515	10	0	0	0	10	0	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	587	0	0	560	11	0	0	0	11	0	5
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)		950										
pX, platoon unblocked				0.96			0.96	0.96	0.96	0.96	0.96	
vC, conflicting volume	571			587			863	1168	293	870	1163	285
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	571			489			797	1094	183	783	1088	285
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			100			100	100	100	96	100	99
cM capacity (veh/h)	998			1029			263	203	796	272	205	711

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1	SB 2
Volume Total	5	391	196	0	373	197	0	11	5
Volume Left	5	0	0	0	0	0	0	11	0
Volume Right	0	0	0	0	0	11	0	0	5
cSH	998	1700	1700	1700	1700	1700	1700	272	711
Volume to Capacity	0.01	0.23	0.12	0.00	0.22	0.12	0.00	0.04	0.01
Queue Length 95th (ft)	0	0	0	0	0	0	0	3	1
Control Delay (s)	8.6	0.0	0.0	0.0	0.0	0.0	0.0	18.8	10.1
Lane LOS	A						A	C	B
Approach Delay (s)	0.1			0.0			0.0	15.9	
Approach LOS							A	C	

Intersection Summary

Average Delay	0.3		
Intersection Capacity Utilization	24.9%	ICU Level of Service	A
Analysis Period (min)	15		

APPENDIX 2

Safe Route To School National Course

Summary Report

Safe Routes to School: Union Gap School

A SRTS National Course with focus on Union Gap School was held on October 25, 2011

Safe Routes to School Program

Safe Routes to School (SRTS) programs are developed and implemented collaboratively by parents, schools, community leaders, and governments. SRTS programs enable and encourage children to walk and bicycle to school through application of four "E's": Engineering solutions, Education about walking and biking safety and the benefits of children walking and biking to school, Encouragement of walking and biking, and Enforcement strategies to improve safety and accessibility around schools. Through these efforts, walking and bicycling to school becomes a safer and more appealing transportation option, and children reap the benefits to their health and well-being.

Safe Routes to School National Course

The SRTS National Course is a one-day course that was developed by the Pedestrian and Bicycle Information Center and is maintained by the National Center for Safe Routes to School. Fundamental to the course is the understanding that each community and school has a different set of conditions requiring their own unique solutions. The course helps schools and communities establish an understanding of SRTS so that they can create their own programs using best practices that are most suited to their needs.

Union Gap School SRTS National Course: October 25, 2011

On October 25, 2011, a SRTS National Course was held with focus on Union Gap School. In addition to learning about SRTS and best practices, course participants observed conditions at and around Union Gap School both during the school day and at school dismissal. They identified strengths and challenges related to safe routes, and discussed ideas for potential solutions to current issues. Participants illustrated challenges and potential solutions on poster-sized maps of the school ground and vicinity.

Course participants identified the following strengths:

- Well regulated, designed, and enforced drop off/pick up area
- Strong control of children's entry to and exit from campus to guide children to safest routes and crossing areas
- High-intensity Activated Crosswalk (HAWK) signal terrific asset for crossing Ahtanum
- Variable speed signal south of school on Ahtanum and other signage

Course participants identified the following challenges:

- Heavy traffic, especially truck traffic, on Ahtanum between industrial area to west and Main Street, and Main Street in vicinity of Ahtanum.

- Street features on Ahtanum and Main Street designed for heavy car/truck traffic, often not encouraging or enabling children to walk or bike

- Lack of sidewalks on S. 4th Street west of school and W. Columbia Street

- Little nonmotorized access to school; entry/exit restricted to drop off/pickup area and one area at north end of school

Course participants identified the following ideas to address the challenges:

- Establish truck route to divert truck traffic to north or south of Ahtanum.
- Sidewalks on S. 4th Street and W. Columbia Street
- Establish an off-campus drop-off area to lessen congestion at pickup/dropoff area while still requiring kids to walk some distance to campus
- Put Ahtanum and Main Street on a "road diet," i.e. reduce travel lanes and add bike lanes and sidewalks buffers, crossing medians, crosswalks, reduced curb cuts, etc.
- Increase crossing guards
- Carpool education for parents
- Walking school bus to and from E. Ahtanum Road and the trailer park
- Mentoring program - older students mentor younger students about walking/biking
- Establish a walk/bike day
- Establish a bike workshop for bike repair and education.
- Apply for grants

The following local individuals attended the course: Dennis Henne, City of Union Gap; Shawn Conrad, Yakima Valley Conference of Governments; Jeanine Richards, WSDOT South Central; Ron Burke, WSDOT South Central; Julie Heilman-Suarez, WSDOT South Central.

<u>What's Next</u>

The National Course laid a foundation for establishing a SRTS program at Union Gap School. Dennis Henne and Shawn Conrad can work with the Union Gap School to prioritize and flesh out the ideas generated during the course. These can be used to establish a program and pursue funding for program activities. In addition, Safe Routes to School has a competitive grant program that can provide funding for proposed SRTS programs that include the full complement of engineering, education, encouragement, and enforcement strategies.

Union Gap Schools

Date: October 2011

School
Highway
Local Roadway
Other Roadway

Drop off Lot

Improve ped facility

Feet
0 400 800

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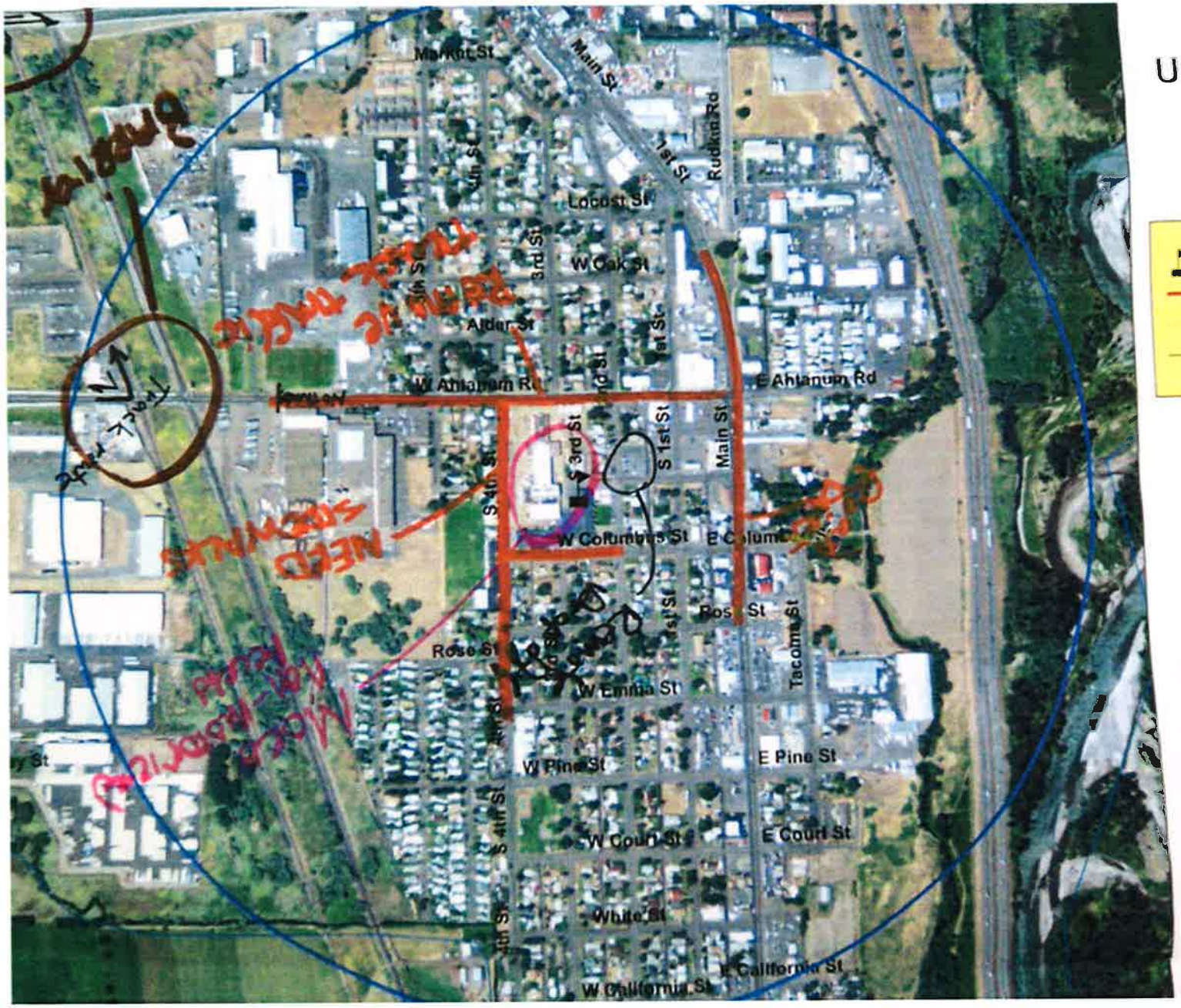
Union Gap Schools

Date: October 2011



School
Highway
Local Roadway
Other Roadway

Feet
0 400 800

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APPENDIX 3

Beltway Connector Alternate A

Preliminary Cost Estimates

CITY OF UNION GAP

Regional Beltway Connector - Corridor Study

Urban Section Alternate A - Connection to Longfibre Road

Item No.	Item Description	Unit	Quantity	Unit Cost	Total
	Schedule A - Roadway Construction				
1	Mobilization	LS	- - -	- - -	$ 500,000
2	Project Temporary Traffic Control	LS	- - -	- - -	$ 20,000
3	SPCC Plan	LS	- - -	- - -	$ 1,400
4	ESC Lead	LS	- - -	- - -	$ 30,000
5	Erosion/Water Pollution Control	LS	- - -	- - -	$ 40,000
6	Clearing and Grubbing	LS	- - -	- - -	$ 50,000
7	Removal of Structures and Obstructions	LS	- - -	- - -	$ 20,000
8	Roadway Excavation	CY	8,500	$ 10.00	$ 85,000
9	Roadway Embankement	CY	68,000	$ 25.00	$ 1,700,000
10	Crushed Surfacing Base Course	TON	17,000	$ 18.00	$ 306,000
11	Crushed Surfacing Top Course	TON	3,000	$ 22.00	$ 66,000
12	HMA Cl. ½" PG 64-28	TON	18,000	$ 85.00	$ 1,530,000
13	HMA Cl. ½" PG 70-28	TON	8,000	$ 95.00	$ 760,000
14	Construction Geotextile for Separation	SY	66,000	$ 3.00	$ 198,000
15	Cement Concrete Sidewalk 4-Inch	SY	7,300	$ 30.00	$ 219,000
16	Cement Concrete Traffic Curb and Gutter	LF	16,500	$ 10.00	$ 165,000
17	Cement Concrete Sidewalk Ramp	EA	12	$ 800.00	$ 9,600
18	Curb Inlet	EA	56	$ 2,500.00	$ 140,000
19	Illumination System, One Side Complete	LS	- - -	- - -	$ 320,000
20	Pedestrian Lighting	LS	- - -	- - -	$ 260,000
21	Roadside Swale (both sides of road)	LF	8,500	$ 30.00	$ 255,000
22	Permanent Signing	LS	- - -	- - -	$ 25,000
23	Pavement Markings	LS	- - -	- - -	$ 50,000
24	Minor Changes	FA	Est.	- - -	$ 50,000
25	New Bridge, Wide Hollow Creek Crossing	LS	- - -	- - -	$ 1,000,000
	Schedule A Subtotal				$ 7,800,000
	Schedule B - Utility Construction				
26	Mobilization	LS	- - -	- - -	$ 2,000
27	Shoring or Extra Excavation	LF	300	$2.00	$ 600
28	PVC Sanitary Sewer Pipe,10 In. Diam in Place	LF	150	$60.00	$ 9,000
29	12 In. Diam. Water Main and Fittings, in Place	LF	150	$60.00	$ 9,000
30	Select Backfill, as Directed	CY	180	$30.00	$ 5,400
31	Minor Changes	FA	Est.	- - -	$ 2,000
	Schedule B Subtotal				$ 28,000

Sch. A & B Subtotal	$ 7,828,000
8.1% Sales Tax (Sch. B Only)	$ 2,268
Subtotal	$ 7,830,268
Contingencies (15%)	$ 1,174,532
Total Estimate Construction Cost	$ 9,004,800
Environmental Review	$ 100,000
R/W Services - Appraisal/Plans/Etc.	$ 100,000
Property Acquisition for R/W	$ 0
Design Engineering (11.5%)	$ 1,035,550
Construction Engineering (13.5%)	$ 1,215,650
Constr./Funding Admin. Services	$ 44,000
Total Estimated Project Cost	**$ 11,500,000**

CITY OF UNION GAP

Regional Beltway Connector - Corridor Study

Urban Section Alternate A - Connection to Longfibre Road

Assumptions:

1. An assumed cross section of the roadway, pathway, swales and lights is located in Figures 2.2.
2. Up to 1 foot of excavation is expected in the new roadway section to strip the surface.
3. It is assumed approximately 2 feet of embankment will be required to raise the roadway and provide structural bearing support.
4. It is assumed that necessary R/W for the Beltway corridor will be provided to the project by the property owners as part of a future subdivision and/or in exchange for utility infrastructure, connections fees, or by other agreement. Costs for purchasing property are not included in Alternate A as only two properties owners are involved.
5. The pavement section is assumed to be similar to Valley Mall Boulevard for estimating purposes. A geotechnical evaluation will be required as part of the project design phase.
6. Curb inlets spacing every 300 feet on both sides of the roadway.
7. Street light spacing at 130 feet on center assuming no median. If a center median is constructed the per linear foot costs are provided in Appendix 5.
8. Estimate assumes a creek crossing (bridge) will be required to cross Wide Hollow Creek.
9. It is assumed utility improvements will consist of water and sewer stubs across the new corridor to access future improvements installed by others. Refer to Figures 2.11 and 2.12.

CITY OF UNION GAP

Regional Beltway Connector - Corridor Study

Rural Section Alternate A - Connection to Longfibre Road

Item No.	Item Description	Unit	Quantity	Unit Cost	Total
	Schedule A - Roadway Construction				
1	Mobilization	LS	- - -	- - -	$ 500,000
2	Project Temporary Traffic Control	LS	- - -	- - -	$ 20,000
3	SPCC Plan	LS	- - -	- - -	$ 1,500
4	ESC Lead	LS	- - -	- - -	$ 30,000
5	Erosion/Water Pollution Control	LS	- - -	- - -	$ 40,000
6	Clearing and Grubbing	LS	- - -	- - -	$ 50,000
7	Removal of Structures and Obstructions	LS	- - -	- - -	$ 20,000
8	Roadway Excavation	CY	8,500	$ 10.00	$ 85,000
9	Roadway Embankement	CY	68,000	$ 25.00	$ 1,700,000
10	Crushed Surfacing Base Course	TON	17,000	$ 18.00	$ 306,000
11	Crushed Surfacing Top Course	TON	2,000	$ 22.00	$ 44,000
12	HMA Cl. ½" PG 64-28	TON	19,800	$ 85.00	$ 1,683,000
13	HMA Cl. ½" PG 70-28	TON	8,900	$ 95.00	$ 845,500
14	Construction Geotextile for Separation	SY	66,000	$ 3.00	$ 198,000
15	Roadside Swale (both sides of road)	LF	8,500	$ 30.00	$ 255,000
16	Permanent Signing	LS	- - -	- - -	$ 25,000
17	Pavement Markings	LS	- - -	- - -	$ 50,000
18	Minor Changes	FA	Est.	- - -	$ 50,000
19	New Bridge, Wide Hollow Creek Crossing	LS	- - -	- - -	$ 1,000,000
	Schedule A Subtotal				$ 6,903,000
	Schedule B - Utility Construction				
20	Mobilization	LS	- - -	- - -	$ 2,000
21	Shoring or Extra Excavation	LF	300	$2.00	$ 600
22	PVC Sanitary Sewer Pipe,10 In. Diam in Place	LF	150	$60.00	$ 9,000
23	12 In. Diam. Water Main and Fittings, in Place	LF	150	$60.00	$ 9,000
24	Select Backfill, as Directed	CY	180	$30.00	$ 5,400
25	Minor Changes	FA	Est.	- - -	$ 2,000
	Schedule B Subtotal				$ 28,000

Sch. A & B Subtotal	$ 6,931,000
8.1% Sales Tax (Sch. B Only)	$ 2,268
Subtotal	$ 6,933,268
Contingencies (15%)	$ 1,039,732
Total Estimate Construction Cost	$ 7,973,000
Environmental Review	$ 100,000
R/W Services - Appraisal/Plans/Etc.	$ 100,000
Property Acquisition for R/W	$ 0
Design Engineering (11.5%)	$ 917,000
Construction Engineering (13.5%)	$ 1,076,000
Constr./Funding Admin. Services	$ 44,000
Total Estimated Project Cost	**$ 10,210,000**

CITY OF UNION GAP

Regional Beltway Connector - Corridor Study

Rural Section Alternate A - Connection to Longfibre Road

Assumptions:

1. An assumed cross section of the roadway, pathway, swales and lights is located in Figures 2.2.
2. Up to 1 foot of excavation is expected in the new roadway section to strip the surface.
3. It is assumed approximately 2 feet of embankment will be required to raise the roadway and provide structural bearing support.
4. It is assumed that necessary R/W for the Beltway corridor will be provided to the project by the property owners as part of a future subdivision and/or in exchange for utility infrastructure, connections fees, or by other agreement. Costs for purchasing property are not included in Alternate A as only two properties owners are involved.
5. The pavement section is assumed to be similar to Valley Mall Boulevard for estimating purposes. A geotechnical evaluation will be required as part of the project design phase.
6. Curb inlets spacing every 300 feet on both sides of the roadway.
7. Street light spacing at 130 feet on center assuming no median. If a center median is constructed the per linear foot costs are provided in Appendix 5.
8. Estimate assumes a creek crossing (bridge) will be required to cross Wide Hollow Creek.
9. It is assumed utility improvements will consist of water and sewer stubs across the new corridor to access future improvements installed by others. Refer to Figures 2.11 and 2.12.

APPENDIX 4

Beltway Connector Alternate B

Preliminary Cost Estimates

CITY OF UNION GAP

Regional Beltway Connector - Corridor Study

Urban Section Alternate B - Connection to Goodman Road

Item No.	Item Description	Unit	Quantity	Unit Cost	Total
	Schedule A - Roadway Construction				
1	Mobilization	LS	- - -	- - -	$ 550,000
2	Project Temporary Traffic Control	LS	- - -	- - -	$ 20,000
3	SPCC Plan	LS	- - -	- - -	$ 1,400
4	ESC Lead	LS	- - -	- - -	$ 34,000
5	Erosion/Water Pollution Control	LS	- - -	- - -	$ 48,000
6	Clearing and Grubbing	LS	- - -	- - -	$ 53,000
7	Removal of Structures and Obstructions	LS	- - -	- - -	$ 27,000
8	Roadway Excavation	CY	9,540	$ 10.00	$ 95,400
9	Roadway Embankement	CY	78,500	$ 25.00	$ 1,962,500
10	Crushed Surfacing Base Course	TON	19,000	$ 18.00	$ 342,000
11	Crushed Surfacing Top Course	TON	3,500	$ 22.00	$ 77,000
12	HMA Cl. ½" PG 64-28	TON	20,500	$ 85.00	$ 1,742,500
13	HMA Cl. ½" PG 70-28	TON	9,000	$ 95.00	$ 855,000
14	Construction Geotextile for Separation	SY	76,500	$ 3.00	$ 229,500
15	Cement Concrete Sidewalk 4-Inch	SY	7,400	$ 30.00	$ 222,000
16	Cement Concrete Traffic Curb and Gutter	LF	19,100	$ 10.00	$ 191,000
17	Cement Concrete Sidewalk Ramp	EA	20	$ 800.00	$ 16,000
18	Curb Inlet	EA	64	$ 2,500.00	$ 160,000
19	Illumination System, One Side Complete	LS	- - -	- - -	$ 370,000
20	Pedestrian Lighting	LS	- - -	- - -	$ 296,000
21	Roadside Swale (both sides of road)	LF	9,540	$ 30.00	$ 286,200
22	Permanent Signing	LS	- - -	- - -	$ 29,000
23	Pavement Markings	LS	- - -	- - -	$ 58,500
24	Minor Changes	FA	Est.	- - -	$ 50,000
25	Bridge Imp., Wide Hollow Creek Crossing	LS	- - -	- - -	$ 1,000,000
	Schedule A Subtotal				$ 8,716,000
	Schedule B - Utility Construction				
26	Mobilization	LS	- - -	- - -	$ 2,000
27	Shoring or Extra Excavation	LF	300	$2.00	$ 600
28	PVC Sanitary Sewer Pipe,10 In. Diam in Place	LF	150	$60.00	$ 9,000
29	12 In. Diam. Water Main and Fittings, in Place	LF	150	$60.00	$ 9,000
30	Select Backfill, as Directed	CY	180	$30.00	$ 5,400
31	Minor Changes	FA	Est.	- - -	$ 2,000
	Schedule B Subtotal				$ 28,000

Sch. A & B Subtotal	$ 8,744,000
8.1% Sales Tax (Sch. B Only)	$ 2,268
Subtotal	$ 8,746,268
Contingencies (15%)	$ 1,311,732
Total Estimate Construction Cost	$ 10,058,000
Environmental Review	$ 100,000
R/W Services - Appraisal/Plans/Etc.	$ 100,000
Property Acquisition for R/W	$ 194,000
Design Engineering (11.5%)	$ 1,156,500
Construction Engineering (13.5%)	$ 1,357,500
Constr./Funding Admin. Services	$ 50,000
Total Estimated Project Cost	**$ 13,016,000**

CITY OF UNION GAP

Regional Beltway Connector - Corridor Study

Urban Section Alternate B - Connection to Goodman Road

Assumptions:

1. An assumed cross section of the roadway, pathway, swales and lights is located in Figures 2.2.
2. Up to 1 foot of excavation is expected in the new roadway section to strip the surface.
3. It is assumed approximately 2 feet of embankment will be required to raise the roadway and provide structural bearing support.
4. Costs to acquire right of way across existing properties averages between $ 0.75 and $ 2.00 per square foot based on assessed property values. The property acquisition costs noted above are an expectation of the costs associated with land purchases necessary for this alignment.
5. The pavement section is assumed to be similar to Valley Mall Boulevard for estimating purposes. A geotechnical evaluation will be required as part of the project design phase.
6. Curb inlets spacing every 300 feet on both sides of the roadway.
7. Street light spacing at 130 feet on center assuming no median. If a center median is constructed the per linear foot costs are provided in Appendix 5.
8. Estimate assumes bridge improvements will be required to cross Wide Hollow Creek.
9. It is assumed utility improvements will consist of water and sewer stubs across the new corridor to access future improvements installed by others. Refer to Figures 2.11 and 2.12.

CITY OF UNION GAP

Regional Beltway Connector - Corridor Study

Rural Section Alternate B - Connection to Goodman Road

Item No.	Item Description	Unit	Quantity	Unit Cost	Total
	Schedule A - Roadway Construction				
1	Mobilization	LS	- - -	- - -	$ 550,000
2	Project Temporary Traffic Control	LS	- - -	- - -	$ 20,000
3	SPCC Plan	LS	- - -	- - -	$ 1,500
4	ESC Lead	LS	- - -	- - -	$ 34,000
5	Erosion/Water Pollution Control	LS	- - -	- - -	$ 48,000
6	Clearing and Grubbing	LS	- - -	- - -	$ 53,000
7	Removal of Structures and Obstructions	LS	- - -	- - -	$ 27,000
8	Roadway Excavation	CY	9,540	$ 10.00	$ 95,400
9	Roadway Embankement	CY	79,200	$ 25.00	$ 1,980,000
10	Crushed Surfacing Base Course	TON	19,500	$ 18.00	$ 351,000
11	Crushed Surfacing Top Course	TON	2,000	$ 22.00	$ 44,000
12	HMA Cl. ½" PG 64-28	TON	23,000	$ 85.00	$ 1,955,000
13	HMA Cl. ½" PG 70-28	TON	10,500	$ 95.00	$ 997,500
14	Construction Geotextile for Separation	SY	76,500	$ 3.00	$ 229,500
15	Roadside Swale (both sides of road)	LF	9,540	$ 30.00	$ 286,200
16	Permanent Signing	LS	- - -	- - -	$ 29,000
17	Pavement Markings	LS	- - -	- - -	$ 58,500
18	Minor Changes	FA	Est.	- - -	$ 50,000
19	Bridge Imp., Wide Hollow Creek Crossing	LS	- - -	- - -	$ 1,000,000
	Schedule A Subtotal				$ 7,809,600
	Schedule B - Utility Construction				
20	Mobilization	LS	- - -	- - -	$ 2,000
21	Shoring or Extra Excavation	LF	300	$2.00	$ 600
22	PVC Sanitary Sewer Pipe,10 In. Diam in Place	LF	150	$60.00	$ 9,000
23	12 In. Diam. Water Main and Fittings, in Place	LF	150	$60.00	$ 9,000
24	Select Backfill, as Directed	CY	180	$30.00	$ 5,400
25	Minor Changes	FA	Est.	- - -	$ 2,000
	Schedule B Subtotal				$ 28,000

Sch. A & B Subtotal	$ 7,837,600
8.1% Sales Tax (Sch. B Only)	$ 2,268
Subtotal	$ 7,839,868
Contingencies (15%)	$ 1,176,132
Total Estimate Construction Cost	$ 9,016,000
Environmental Review	$ 100,000
R/W Services - Appraisal/Plans/Etc.	$ 100,000
Property Acquisition for R/W	$ 194,000
Design Engineering (11.5%)	$ 1,037,000
Construction Engineering (13.5%)	$ 1,217,000
Constr./Funding Admin. Services	$ 50,000
Total Estimated Project Cost	**$ 11,714,000**

CITY OF UNION GAP

Regional Beltway Connector - Corridor Study

Rural Section Alternate B - Connection to Goodman Road

Assumptions:

1. An assumed cross section of the roadway, pathway, swales and lights is located in Figures 2.2.
2. Up to 1 foot of excavation is expected in the new roadway section to strip the surface.
3. It is assumed approximately 2 feet of embankment will be required to raise the roadway and provide structural bearing support.
4. Costs to acquire right of way across existing properties averages between $ 0.75 and $ 2.00 per square foot based on assessed property values. The property acquisition costs noted above are an expectation of the costs associated with land purchases necessary for this alignment.
5. The pavement section is assumed to be similar to Valley Mall Boulevard for estimating purposes. A geotechnical evaluation will be required as part of the project design phase.
6. Curb inlets spacing every 300 feet on both sides of the roadway.
7. Street light spacing at 130 feet on center assuming no median. If a center median is constructed the per linear foot costs are provided in Appendix 5.
8. Estimate assumes bridge improvements will be required to cross Wide Hollow Creek.
9. It is assumed utility improvements will consist of water and sewer stubs across the new corridor to access future improvements installed by others. Refer to Figures 2.11 and 2.12.

APPENDIX 5

Beltway Connector Alternate C

Preliminary Cost Estimates

CITY OF UNION GAP

Regional Beltway Connector - Corridor Study

Urban Section Alternate C - Connection to South Third Avenue

Item No.	Item Description	Unit	Quantity	Unit Cost	Total
	Schedule A - Roadway Construction				
1	Mobilization	LS	- - -	- - -	$ 600,000
2	Project Temporary Traffic Control	LS	- - -	- - -	$ 23,000
3	SPCC Plan	LS	- - -	- - -	$ 2,000
4	ESC Lead	LS	- - -	- - -	$ 40,000
5	Erosion/Water Pollution Control	LS	- - -	- - -	$ 57,000
6	Clearing and Grubbing	LS	- - -	- - -	$ 62,000
7	Removal of Structures and Obstructions	LS	- - -	- - -	$ 31,000
8	Roadway Excavation	CY	11,250	$ 10.00	$ 112,500
9	Roadway Embankement	CY	93,000	$ 25.00	$ 2,325,000
10	Crushed Surfacing Base Course	TON	22,500	$ 18.00	$ 405,000
11	Crushed Surfacing Top Course	TON	4,000	$ 22.00	$ 88,000
12	HMA Cl. ½" PG 64-28	TON	23,800	$ 85.00	$ 2,023,000
13	HMA Cl. ½" PG 70-28	TON	10,500	$ 95.00	$ 997,500
14	Construction Geotextile for Separation	SY	90,000	$ 3.00	$ 270,000
15	Cement Concrete Sidewalk 4-Inch	SY	9,900	$ 30.00	$ 297,000
16	Cement Concrete Traffic Curb and Gutter	LF	22,500	$ 10.00	$ 225,000
17	Cement Concrete Sidewalk Ramp	EA	40	$ 800.00	$ 32,000
18	Curb Inlet	EA	76	$ 2,500.00	$ 190,000
19	Illumination System, One Side Complete	LS	- - -	- - -	$ 435,000
20	Pedestrian Lighting	LS	- - -	- - -	$ 348,000
21	Roadside Swale (both sides of road)	LF	11,250	$ 30.00	$ 337,500
22	Permanent Signing	LS	- - -	- - -	$ 34,000
23	Pavement Markings	LS	- - -	- - -	$ 67,500
24	Minor Changes	FA	Est.	- - -	$ 50,000
	Schedule A Subtotal				$ 9,052,000
	Schedule B - Utility Construction				
25	Mobilization	LS	- - -	- - -	$ 2,000
26	Shoring or Extra Excavation	LF	300	$2.00	$ 600
27	PVC Sanitary Sewer Pipe,10 In. Diam in Place	LF	150	$60.00	$ 9,000
28	12 In. Diam. Water Main and Fittings, in Place	LF	150	$60.00	$ 9,000
29	Select Backfill, as Directed	CY	180	$30.00	$ 5,400
30	Minor Changes	FA	Est.	- - -	$ 2,000
	Schedule B Subtotal				$ 28,000

Sch. A & B Subtotal	$ 9,080,000
8.1% Sales Tax (Sch. B Only)	$ 2,268
Subtotal	$ 9,082,268
Contingencies (15%)	$ 1,512,732
Total Estimate Construction Cost	$ 10,595,000
Environmental Review	$ 100,000
R/W Services - Appraisal/Plans/Etc.	$ 100,000
Property Acquisition for R/W	$ 328,000
Design Engineering (11.5%)	$ 1,333,500
Construction Engineering (13.5%)	$ 1,565,500
Constr./Funding Admin. Services	$ 50,000
Total Estimated Project Cost	**$ 14,072,000**

CITY OF UNION GAP

Regional Beltway Connector - Corridor Study

Rural Section Alternate C - Connection to South Third Avenue

Item No.	Item Description	Unit	Quantity	Unit Cost	Total
	Schedule A - Roadway Construction				
1	Mobilization	LS	- - -	- - -	$ 600,000
2	Project Temporary Traffic Control	LS	- - -	- - -	$ 23,000
3	SPCC Plan	LS	- - -	- - -	$ 2,000
4	ESC Lead	LS	- - -	- - -	$ 40,000
5	Erosion/Water Pollution Control	LS	- - -	- - -	$ 57,000
6	Clearing and Grubbing	LS	- - -	- - -	$ 62,000
7	Removal of Structures and Obstructions	LS	- - -	- - -	$ 31,000
8	Roadway Excavation	CY	11,250	$ 10.00	$ 112,500
9	Roadway Embankement	CY	93,500	$ 25.00	$ 2,337,500
10	Crushed Surfacing Base Course	TON	23,100	$ 18.00	$ 415,800
11	Crushed Surfacing Top Course	TON	2,250	$ 22.00	$ 49,500
12	HMA Cl. ½" PG 64-28	TON	27,000	$ 85.00	$ 2,295,000
13	HMA Cl. ½" PG 70-28	TON	12,150	$ 95.00	$ 1,154,250
14	Construction Geotextile for Separation	SY	90,000	$ 3.00	$ 270,000
15	Roadside Swale (both sides of road)	LF	11,250	$ 30.00	$ 337,500
16	Permanent Signing	LS	- - -	- - -	$ 34,000
17	Pavement Markings	LS	- - -	- - -	$ 67,500
18	Minor Changes	FA	Est.	- - -	$ 50,000
	Schedule A Subtotal				$ 7,938,550
	Schedule B - Utility Construction				
19	Mobilization	LS	- - -	- - -	$ 2,000
20	Shoring or Extra Excavation	LF	300	$2.00	$ 600
21	PVC Sanitary Sewer Pipe,10 In. Diam in Place	LF	150	$60.00	$ 9,000
22	12 In. Diam. Water Main and Fittings, in Place	LF	150	$60.00	$ 9,000
23	Select Backfill, as Directed	CY	180	$30.00	$ 5,400
24	Minor Changes	FA	Est.	- - -	$ 2,000
	Schedule B Subtotal				$ 28,000

Sch. A & B Subtotal	$ 7,966,550
8.1% Sales Tax (Sch. B Only)	$ 2,268
Subtotal	$ 7,968,818
Contingencies (15%)	$ 1,195,182
Total Estimate Construction Cost	$ 9,164,000
Environmental Review	$ 100,000
R/W Services - Appraisal/Plans/Etc.	$ 100,000
Property Acquisition for R/W	$ 328,000
Design Engineering (11.5%)	$ 1,054,000
Construction Engineering (13.5%)	$ 1,237,000
Constr./Funding Admin. Services	$ 50,000
Total Estimated Project Cost	**$ 12,033,000**

CITY OF UNION GAP

Regional Beltway Connector - Corridor Study

Rural Section Alternate C - Connection to South Third Avenue

Assumptions:

1. An assumed cross section of the roadway, pathway, swales and lights is located in Figures 2.2.
2. Up to 1 foot of excavation is expected in the new roadway section to strip the surface.
3. It is assumed approximately 2 feet of embankment will be required to raise the roadway and provide structural bearing support.
4. Costs to acquire right of way across existing properties averages between $ 0.75 and $ 2.00 per square foot based on assessed property values. The property acquisition costs noted above are an expectation of the costs associated with land purchases necessary for this alignment.
5. The pavement section is assumed to be similar to Valley Mall Boulevard for estimating purposes. A geotechnical evaluation will be required as part of the project design phase.
6. Curb inlets spacing every 300 feet on both sides of the roadway.
7. Street light spacing at 130 feet on center assuming no median. If a center median is constructed the per linear foot costs are provided in Appendix 5.
8. It is assumed utility improvements will consist of water and sewer stubs across the new corridor to access future improvements installed by others. Refer to Figures 2.11 and 2.12.

CITY OF UNION GAP

Regional Beltway Connector - Corridor Study

Urban Section Alternate C - Connection to South Third Avenue

Assumptions:

1. An assumed cross section of the roadway, pathway, swales and lights is located in Figures 2.2.
2. Up to 1 foot of excavation is expected in the new roadway section to strip the surface.
3. It is assumed approximately 2 feet of embankment will be required to raise the roadway and provide structural bearing support.
4. Costs to acquire right of way across existing properties averages between $ 0.75 and $ 2.00 per square foot based on assessed property values. The property acquisition costs noted above are an expectation of the costs associated with land purchases necessary for this alignment.
5. The pavement section is assumed to be similar to Valley Mall Boulevard for estimating purposes. A geotechnical evaluation will be required as part of the project design phase.
6. Curb inlets spacing every 300 feet on both sides of the roadway.
7. Street light spacing at 130 feet on center assuming no median. If a center median is constructed the per linear foot costs are provided in Appendix 5.
8. It is assumed utility improvements will consist of water and sewer stubs across the new corridor to access future improvements installed by others. Refer to Figures 2.11 and 2.12.

APPENDIX 6

Beltway Connector Median Addition

Preliminary Cost Estimate

CITY OF UNION GAP
BELTWAY PLANNING STUDY
Median Section - Preliminary Engineer's Cost Estimate Per LF

1	Mobilization	L.F.	1.00	$6.00	$6.00
2	Roadway Embankement	C.Y.	1.11	$25.00	$27.75
3	Crushed Surfacing Base Course	TON	0.07	$18.00	$1.23
4	HMA Cl. ½" PG 64-28	TON	0.08	$85.00	$6.55
5	HMA Cl. ½" PG 70-28	TON	0.04	$95.00	$3.68
6	Construction Geotextile for Separation	SY	0.22	$3.00	$0.66
7	Barrier Curb 18-Inch	L.F.	2.00	$20.00	$40.00
8	Root Barrier	L.F.	2.00	$2.00	$4.00
9	Landscaping (Ash Tree or equivalent tree)	L.F.	1	$20.00	$20.00
10	Illumination System, Opposite Side	L.F.	1	$40.00	$40.00
11	Underground Irrigation System, Complete	L.F.	1	$20.00	$20.00
12	Minor Changes	L.F.	1	$1.50	$1.50
		Subtotal			$170.00
		Contingencies (15%)			$30.00
		Total Estimate Construction Cost			$200.00
		Design Engineering (11.5%)			$23.00
		Construction Engineering (13.5%)			$27.00
		Total Estimated Project Cost			**$250.00**