

LOCHNER

Memorandum

To: Don Skillingstad
From: Steve Lewis/Mark Burrus
CC: File
Subject: Alternatives Review & Selection - UPDATED
Date: January 12, 2015

This memo was updated to reflect the results of the January 8, 2015 Technical Committee Meeting.

To recap:

Alternative 1 is what we are referring to as the “no build” option for the IJR. It includes the park & ride lot, but no modifications to the Interstate System for high capacity transit.

Alternative 2 includes a west bound center median flyer stop and an east bound off ramp transit stop, as well as the park & ride lot from the “no build” option.

Alternative 3A replaces the west bound center median flyer stop with a west bound on-ramp transit stop.

Alternative 3B replaces the west bound center median flyer stop with a west bound shoulder flyer stop.

Each of the four alternatives are shown below for reference.



Alternative 1



Alternative 2



Alternative 3A



Alternative 3B

Each of the Measures of Effectiveness was reviewed with the Technical Committee at the November 6th meeting (as well as with the Core Stakeholder Group later in the day) and to which STA has added one additional measure, System Operating Cost. The Measures of Effectiveness are further described below, and now include in total:

- Travel Time
- Safety
- Pedestrian Travel Distance
- Deviations
- Environmental Impacts
- Compatibility with Local Plans
- Operations & Maintenance Cost
- System Operations Cost
- Construction Cost

Alternatives Scoring Process

Prior to the Technical Committee Meeting, STA and Lochner evaluated and ranked the alternatives based on STA's goal of expanding connectivity to the West Plains communities and improving travel times to and from Cheney and Eastern Washington University by providing improved high quality, higher performance and cost-effective transit services. The results of the ranking by this method are shown in Method 1 of the attached matrix.

During the Technical Committee Meeting, the team discussed other ways to rank the alternatives that might be more impartial. The first method proposed was a tiered system. In this way, the measures were not ranked individually, but instead fall into three distinct tiers. The results of the ranking by this method are shown in Method 2 of the attached matrix.

A third method was suggested by Barb De Ste Croix, WSDOT HQ. This method, it was agreed by the team was the most impartial. Using this method, the team first ranked the measures of effectiveness by comparing each measure to the others to determine which was more important. The results provided the weighting to be used in the actual scoring analysis. The team then worked through the scoring analysis to

rank the alternatives. The results of the ranking by this method are shown in Method 3 of the attached matrix.

Results

All 3 scoring methods yielded similar results as shown in the attached matrix. Alternative 3B scored the lowest with the No Build and Alternative 3A scoring similarly, and Alternative 2 scoring the highest. Based on the results of this analysis Alternative 2 has been selected as the preferred alternative and will move forward in conceptual design.

West Plains Transit Center

Measures of Effectiveness

Travel Time

The measure of effectiveness from travel time is taken from Policy Point 3, Table 3.8: 2020 and 2040 Transit Travel time (in minutes). The values shown in the table were converted to seconds and summed to obtain one set of values for each direction of travel along I-90. The travel times evaluated do not include the future WSDOT roundabouts project.

Location	Type	2020+2040			
		No Build	Alternative 2	Alternative 3A	Alternative 3B
I-90, WB					
Without WSDOT Roundabouts	AM	2451	772	1629	772
	PM	2709	794	1826	794
I-90, EB					
Without WSDOT Roundabouts	AM	3254	2602	2602	2602
	PM	3958	3241	3241	3241
Total		12372	7409	9298	7409
		1	4	3	4

Delta 4963
Increment 1241

Best (4)	7400	8641
Good (3)	8642	9883
Neutral (2)	9884	11124
Poor (1)	11125	12366

Safety

The collision analysis, as summarized in Policy Point 3, indicates that the build alternatives have minor impact on the safety of the freeway and the adjacent local street system in the study area, as compared to base conditions in 2040. This is because the build alternatives involve only a few express buses accessing the West Plains Transit Center during the peak hours. Policy Point 3, Table 3.19: 2020 and 2040 ISATe Collision Analysis for Build Alternatives indicates that there is no change in the number of collisions between the base condition and the build alternatives; therefore all alternatives are scored equally as shown below.

	No Build	Center	On Ramp	Shoulder of WB
Alternative	1	2	3A	3B
Score	2	2	2	2

Delta 0
Increment 10

Best (4)	5.0	15.0
Good (3)	16.0	26.0
Neutral (2)	27.0	37.0
Poor (1)	38.0	48.0

Pedestrian Travel Distance

The Pedestrian Travel Distance Measure of Effectiveness is based on the distance a pedestrian must travel from the time they enter the pedestrian bridge until they reach the pedestrian platform at the flyer stop for each of the build alternatives. The pedestrian bridge configuration is that used in the concept drawing and as shown in the alternatives presented in Policy Point 2.

	No Build	Center	On Ramp	Shoulder of WB
Alternative	1	2	3A	3B
Pedestrian Travel Distance (ft)	0	754	1214	979
Score	4	2	1	1

		Best (4)	0	304
		Good (3)	305	608
		Neutral (2)	609	913
		Poor (1)	914	1217

Delta 1214
Increment 304

Deviations Needed to Implement Improvements

This measure quantifies the number of deviations that are anticipated to be required for each of the alternatives. The analysis, based on conceptual level design using aerial photography, indicates two of the alternatives, 2 and 3B, may require deviations.

Alternative 2

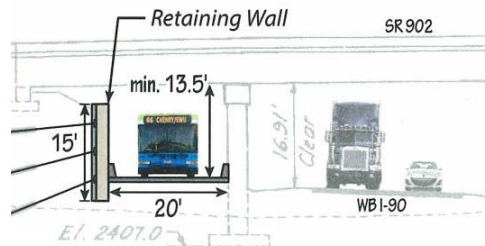
Alternative 2 may require a shoulder width deviation. Design standard for a non-separated HOV lane is 12 feet in a tangent with minimum combined shoulder width of 12 feet, giving a total roadway width of 24 feet. Separating the HOV lane from the general purpose lane would require barrier on the right side which adds an additional 2 feet of width plus 2 feet of shy distance on each side for a total of 30 feet. Measuring using aerial photography, there appears to be approximately 28 feet of available width between the center pier and the inside edge of shoulder.

Per the as-built plans, Four Lakes to Geiger Field, the width available between the centerline of the pier and the edge of pavement is 34 feet. Subtracting half the 3 foot pier diameter, (1.5 feet) minus the barrier including 2 feet for deflection leaves 28.5 feet.

Alternative 3B

Using the as-built drawing from the Four Lakes to Geiger Field project, an analysis was done to evaluate the feasibility of constructing a transit only lane between the existing bridge pier and abutment on the north side of westbound I-90. The analysis showed the option is feasible, however a deviation will likely be required for shoulder width (horizontal clearance) as well as vertical clearance. Horizontal clearance required is 24 feet and there is 20 feet available. Vertical clearance, based on WSDOT Design Manual Exhibit 720-1, is >16 feet and there is 13.5 feet available. See Figure 1 below.

Figure 1



	No Build	Center	On Ramp	Shoulder of WB
Alternative	1	2	3A	3B
Shoulder Width	0	1	0	1
Vertical Clearance	0	0	0	1
Total	0	1	0	2
Score	4	3	4	2

Legend: Best (4) Good (3) Neutral (2) Poor (1)

Environmental Impacts

This measure looks at impacts to sensitive areas, such as wetlands and streams. No environmental field work has been completed at this stage in the IJR process, however historical data obtained for the interchange area has identified wetlands along the eastbound off-ramp, and adjacent to the east bound on-ramp and the west bound off-ramp. The area of impacts to these previously identified wetlands was estimated and scored as shown below. Wetland impacts along the eastbound off-ramp are the same for all alternatives. Should additional environmental impacts be identified as design progresses, this measure will need to be reevaluated.

	No Build	Center	On Ramp	Shoulder of WB
Alternative	1	2	3A	3B
	Impact area in acres			
Wetland A - EB off ramp	0	0.23	0.23	0.23
Wetland B - EB on ramp	0	0	0	0.34
Wetland C - WB off ramp	0	0	0	0
Total	0.00	0.23	0.23	0.57
Score	4	4	4	1

Delta 0.34
Increment 0.09

Best (4)	0.23	0.32
Good (3)	0.33	0.41
Neutral (2)	0.42	0.51
Poor (1)	0.52	0.60

Compatibility with Local Plans

Policy Point 5 (draft) of the IJR discusses the compatibility of the alternatives with local plans including Connect Spokane, WSDOT's I-90/SR 902 Interchange Improvement Project, Horizon 2040 the Washington State Transportation Plan and the County. Of these, the I-90/SR 902 Interchange Improvement project has the most impact on future operations.

	No Build	Center	On Ramp	Shoulder of WB
Alternative	1	2	3A	3B
Horizon 2040	0	1	1	1
Connect Spokane	0	1	1	1
WSDOT I-90/SR 902 IC	1	1	1	1
WA State Trans. Plan	1	1	1	1
Spokane County Comprehensive Plan	1	1	1	1
Total	3	5	5	5
Score	2	4	4	4

Delta 2
Increment 0.5

Best (4)	5.3	4.8
Good (3)	4.7	4.2
Neutral (2)	4.1	3.6
Poor (1)	3.5	3.0

Operations and Maintenance Cost

Evaluating Operations and Maintenance (O&M) is based on two main criteria: area of new pavement and area of new (pedestrian) bridge to be maintained. For this alternative analysis, it was assumed that all other costs related to O&M would be relatively equivalent. Costs such as snow removal would be a function of new pavement and are not broken out separately.

	No Build	Center	On Ramp	Shoulder of WB
Alternative	1	2	3A	3B
Area of New Pavement (sf)	22959	99075	118851	197973
Area of Ped Bridge (sf)	0	7540	12140	9790
	17219	76191	92173	150927
Score	4	3	2	1

Weighted Average ((0.75xPavement) + (0.25xStructure))

Delta 133708
Increment 33427

Best (4)	17219	50646
Good (3)	50647	84074
Neutral (2)	84075	117502
Poor (1)	117503	150930

Systems Operations Cost

Systems operations cost impacts are based upon a number of factors including the cost per hour of service, annual service hours, vehicle purchase costs, vehicle maintenance costs, passenger impact and passenger delay. The relative costs for flyer stops vs no flyer stops was analyzed. If no flyer stops are constructed, the system will require additional vehicles and staff, an additional route, and result in additional passenger delay. The construction of flyer stops will not require additional systems costs.

	No Build	Center	On Ramp	Shoulder of WB
Alternative	1	2	3A	3B
System Impact	1	4	4	4
Passenger Impact	1	4	3	4
Score	1	4	3	4

Legend: Best (4) Good (3) Neutral (2) Poor (1)

Construction Cost

The project is early in the conceptual design phase so complete cost estimates have not yet been developed. To determine differences in costs between the build alternatives, quantities for the more costly elements were estimated. Using WSDOT's Unit Bid Analysis tool, equal unit bid prices were determined and summed to develop order of magnitude costs.

		1_No Build		2_Center		3A_On Ramp		3B_Shldr of WB	
Alternative	Unit Cost	Quantity	Price	Quantity	Price	Quantity	Price	Quantity	Price
Pedestrian Bridge Structure Area (sf)	\$ 300	0	\$ -	7540	\$ 2,262,000	12140	\$ 3,642,000	9790	\$ 2,937,000
Pedestrian Platform (sf)	\$ 150	0	\$ -	1108	\$ 166,200	1108	\$ 166,200	1108	\$ 166,200
Area of New Pavement (sf)		0	\$ -	99075	\$ -	118851	\$ -	197973	\$ -
HMA (tons)	\$ 90	0	\$ -	7376	\$ 663,803	8848	\$ 796,302	14738	\$ 1,326,419
Stem Wall (sf)	\$ 75	0	\$ -	0	\$ -	0	\$ -	1110	\$ 83,250
Raised Median (LS)	\$370,000	0	\$ -	1	\$ 370,000	0	\$ -	0	\$ -
Total			\$ -		\$ 3,462,003		\$ 4,604,502		\$ 4,512,869
		4		2		1		1	
							Best	0	1,200,000
					Della	\$ 4,610,000	Good	1,210,000	2,410,000
					Increment	\$ 1,200,000	Neutral	2,420,000	3,620,000
							Poor	3,630,000	4,830,000

Legend: Best (4) Good (3) Neutral (2) Poor (1)

Attachment

METHOD 1 - STA/LOCHNER SCORING				BASE SCALE				WEIGHTED SCALE																			
MEASURE	WEIGHT			NB	2	3A	3B		NB	2	3A	3B		Ranking	Score	Alternative											
Travel Time	9			1	4	3	4		9	36	27	36		2	123.0	No Build											
Safety	8			2	2	2	2		16	16	16	16		1	139.0	ALT 2											
Pedestrian Travel Distance	7			4	2	1	1		28	14	7	7		2	123.0	ALT 3A											
Deviations	6			4	3	4	2		24	18	24	12		3	107.0	ALT 3B											
Environmental Impacts	5			4	4	4	1		20	20	20	5															
Compatibility with Local Plans	4			2	4	4	4		8	16	16	16															
Operations and Maintenance Cost	3			4	3	2	2		12	9	6	6															
Systems Operations Cost	2			1	4	3	4		2	8	6	8															
Construction Cost	1			4	2	1	1		4	2	1	1															
TOTAL				26	28	24	21		123	139	123	107															
METHOD 2 - TIERED SCORING				BASE SCALE				WEIGHTED SCALE																			
MEASURE	WEIGHT			NB	2	3A	3B		NB	2	3A	3B		Ranking	Score	Alternative											
Travel Time	9			1	4	3	4		9	36	27	36		2	122.0	No Build											
Safety	9			2	2	2	2		18	18	18	18		1	136.0	ALT 2											
Pedestrian Travel Distance	9			4	2	1	1		36	18	9	9		3	120.0	ALT 3A											
Deviations	5			4	3	4	2		20	15	20	10		4	105.0	ALT 3B											
Environmental Impacts	5			4	4	4	1		20	20	20	5															
Compatibility with Local Plans	5			2	4	4	4		10	20	20	20															
Operations and Maintenance Cost	1			4	3	2	2		4	3	2	2															
Systems Operations Cost	1			1	4	3	4		1	4	3	4															
Construction Cost	1			4	2	1	1		4	2	1	1															
TOTAL				26	28	24	21		122	136	120	105															
METHOD 3 - TECHNICAL COMMITTEE SCORING																											
CRITERIA WEIGHTING												SCREENING OF ALTERNATIVES (4=Best, 3=Good, 2=Neutral, 1=Poor)															
		Travel Time	Safety	Pedestrian Travel Distance	Deviations	Environmental Impacts	Compatibility with Local Plans	Operations and Maintenance Cost	Systems Operations Cost	Construction Cost	TOTAL	Percentage of Total			Travel Time	Safety	Pedestrian Travel Distance	Deviations	Environmental Impacts	Compatibility with Local Plans	Operations and Maintenance Cost	Systems Operations Cost	Construction Cost				
	MEASURE	a	b	c	d	e	f	g	h	i	j	k		Alternative	7.5	9	3.5	2	6	1.5	4.5	6.5	4.5	SCORE			
a	Travel Time	x	b	a	a	a	a	a	a/h	a	7.5	17%		No Build	1	2	4	4	4	2	4	1	4	117			
b	Safety		x	b	b	b	b	b	b	b	9	20%		ALT 2	4	2	2	3	4	4	3	4	2	139.5			
c	Pedestrian Travel Distance			x	c/d	c/e	c	g	h	c/i	3.5	8%		ALT 3A	3	2	1	4	4	4	2	3	1	115			
d	Deviations				x	e	d/f	g	h	i	2	4%		ALT 3B	4	2	1	2	1	4	1	4	1	102.5			
e	Environmental Impacts					x	e	e/g	e	e	6	13%															
f	Compatibility with Local Plans						x	g	h	i	1.5	3%		Ranking	Score	Alternative											
g	Operations and Maintenance Cost							x	h	i	4.5	10%		2	117.0	No Build											
h	Systems Operations Cost								x	h	6.5	14%		1	139.5	ALT 2											
i	Construction Cost									x	4.5	10%		3	115.0	ALT 3A											
	TOTAL										45	100%		4	102.5	ALT 3B											