To:	Will Robbins, Staff Engineer Vester Wilson, Solid Waste Superintendent		
From:	Great West Engineering | HDR	Technical Memorandum:	Traffic and Roadway Alternatives
Date:		Job No.:	W.O. 12-29 – City of Billings Solid Waste Management Plan

BACKGROUND

The team of Great West Engineering and HDR Engineering has been hired by the City of Billings to prepare a Solid Waste Management Plan. The scope of the project includes an evaluation of future landfill expansion alternatives to provide disposal capacity for the City once the existing landfill has reached capacity. The City owns approximately 350 acres adjacent to the existing landfill which appears suitable for licensing of a landfill expansion. Two primary landfill expansion alternatives were evaluated as defined below and discussed in detail in a separate document.

Landfill Alternative 1

Stand Alone Facility is designed to place a new landfill separate from the existing landfill across Hillcrest Road. This facility will stand alone from the existing landfill. The foot print is situated in a manner that maximizes space while allowing for set-back from the property lines, and to direct the stormwater run-on around the landfill to the northwest via a drainage ditch.

Landfill Alternative 2

Overlap Facility is designed to overlap onto the existing landfill and remove Hillcrest Road. This alternative capitalizes on the airspace gained with the overlap of the existing fill which will allow more capacity in the early life of this alternative. The foot print is also situated in a manner that maximizes space while allowing for set-back from the property lines, and to direct the stormwater run-on around the landfill to the southeast via a large drainage ditch.

PURPOSE OF TECHNICAL MEMORANDUM

The purpose of the Traffic and Roadways Alternatives Evaluation is to identify critical issues that may influence the selection of landfill expansion alternatives and to identify routes that may be utilized to access the expansion. This memorandum also provides a preliminary comparative ranking between roadway alternatives which is provided to help assist the City in selection of the preferred alternative. This memorandum is intended to be a high level review of the routes, but is not to be construed as a detailed Corridor Study. Once the City has selected a preferred landfill expansion and roadway alternative the engineer is contracted in another task to prepare documents for licensing of the expansion. This will include a detailed Traffic Impact Study which will support the environmental documentation which will be submitted to the Montana DEQ. Eventually this documentation will be included in the State's environmental review of the licensing documentation and available for public review.

EXISTING TRAFFIC DATA

Great West Engineering conducted a preliminary traffic review of the area around the Billings Landfill to determine potential impacts associated with modifying or changing the primary route to the landfill. This technical memorandum does not replace a Traffic Impact Statement, but it is adequate to identify critical issues that should be considered in alternative route selection.

The existing primary route for vehicles arriving at the landfill is to travel south on Blue Creek Road then turn west onto Jellison Road. The right turn movement at this intersection utilizes a dedicated right turn lane. The landfill entrance is located approximately 0.7 miles along Jellison Road to the south.

A count was conducted at the intersection of Blue Creek Road and Jellison Road on Wednesday morning, 10/17/2012 from 7:30 am to 9:30 am. Counting times were selected based on traffic counts conducted by the City of Billings and are intended to pick up the highest impact to the intersection. Counts completed by the City of Billings will be included in the Traffic Impact Study.

The peak hour of traffic within this count is from 7:30 am to 8:30 am. The intersection is unsignalized and has one stop sign on Jellison Road. Jellison does not have an eastbound approach resulting in a "T" intersection.

Table 1 is adapted from the Highway Capacity Manual to identify the Level of Service based on control delay for unsignalized intersections.

Table 1: Level of Service Criteria for Unsignalized Intersections

Level of Service	Control Delay per Vehicle (seconds per vehicle)	Impact on Minor Street Traffic
A	≤ 10	Little or no delay
B	> 10 ≤ 15	Short traffic delays
C	> 15 ≤ 25	Average traffic delays
D	> 25 ≤ 35	Long traffic delays
E	> 35 ≤ 50	Very long traffic delays
F	> 50	Unacceptable traffic delays

Source: *Highway Capacity Manual (HCM 2000)*

Presented in Table 2 is the Level of Service data for the intersection of Blue Creek Road and Jellison Road. McTrans HCS+ was used for the analysis.

**

Table 2: AM Peak Levels of Service: Unsignalized Intersections								
Intersection	PM PEAK LOS							
(Major/Minor)	EB		WB		NB		SB	
	Ex.	**	Ex.	**	Ex.	**	Ex.	**
Blue Creek Rd. (N~S) & Jellison Road (E~W)	B	*B*	~	~	A	*A*	A	*A*
Control Delay (sec)	11.5	*14.6*	~	~	7.5	*7.5*		

Resultant LOS without the dedicated Right Turn Lane.

As identified above, the eastbound movement operates at a Level of Service B, but is close to operating at LOS A. Directing landfill traffic from Jellison to Hillcrest or Collier is not anticipated to significantly impact these intersections, but will be further evaluated with the Traffic Impact Study.

The Billings Landfill collects vehicle data at the scale site year round. A summary of the date is shown in Table 3. The data used in the LOS analysis showed southbound right turns at 54 vph (0.67 peak hour factor) and eastbound left turns at 79 vph (0.76 peak hour factor). The unadjusted 2011 peak hour volume at the landfill during the fall is 80 vph and 147 vph in the spring. A correlation with landfill/non landfill traffic will be created with the Traffic Impact Study. The average day vehicle counts are accurate, however some of the vehicles were not classified as residential or commercial.

Table 3
Landfill Traffic Summary

2011	Day	Hour	Residential Hour	Commercial Hour	Residential Day	Commercial Day
Average vehicles/year	395	44	31	11	280	99
Average vehicles/summer	500	56	39	14	355	125
Average vehicles/spring	440	49	35	12	312	110
Average vehicles/fall	354	39	28	10	251	88
Average vehicles/winter	266	30	21	7	189	67
Average vehicles/winter spring fall	358	40	28	10	254	89

2011	Day	Hour	Residential Hour	Commercial Hour	Residential Day	Commercial Day
Max vehicles/year	1,057	147	104	37	750	264
Max vehicles/summer	733	102	72	25	520	183
Max vehicles/spring	1,057	147	104	37	750	264
Max vehicles/fall	574	80	57	20	408	144
Max vehicles/winter	551	77	54	19	391	138
Max vehicles/winter spring fall	1,057	147	104	37	750	264

The Montana Department of Transportation maintains yearly count data on Blue Creek Road and is summarized below:

Location: S. Billings Blvd (Blue Creek Road), N of Yellowstone Rv Bridge
Site ID: 56-4A-188
Dept. Route: U-1033
Corridor: C000416
Owner: MDT
County: Yellowstone
AADT 2009: 9650 (Estimated)
AADT 2010: 9700 (Actual)
AADT 2011: 9660 (Estimated)

Location: S-416 (Blue Creek Road), RP 2, 1.5 mi SE of Yellostone Rv Bridge
Site ID: 56-4-10
Dept. Route: S-416
Corridor: C000416
Owner: MDT
County: Yellowstone
AADT 2009: 4200 (Actual)
AADT 2010: 4190 (Estimated)
AADT 2011: 4850 (Actual)

Changing the primary approach to the landfill is expected to occur within the bounds of the two traffic counts shown above. No change of data is expected until service areas are expanded. Traffic and crash data will be obtained from MDT during the Traffic Impact Study.

OVERVIEW OF ALTERNATE ROUTES

Field and topographical map reconnaissance were conducted to determine potential alternate routes to accommodate expansion of the landfill south across Hillcrest Road while still providing acceptable levels of service. Hillcrest is a collector County road that serves residential and ranching properties to the south of Blue Creek Road. An electrical substation, overhead power, buried telephone lines, gas mains, and a commercial property are located along Hillcrest Road. Existing curve data and the roadway function were used to determine a design speed of 45 mph. This design speed is used for all roadway alternatives.

Roadway Alternative 1

Reconstruction of Hillcrest Road
Refer to the attached plan sheets for an overview of this alternative: 1 (Key Map), 2 (Plan& Profile of Hillcrest), 3 (Blue Creek Road Intersection and Substation), and 7 (Typical Section Details). This roadway alternative is not compatible with the Landfill Overlap Alternative.

This alternative will maintain the existing horizontal alignment, but will improve the typical section to include two foot shoulders as well as improving the cut/fill slopes to meet existing County Road standards. The intersection of Hillcrest and Blue Creek Road does not provide adequate grades or sight distances. This alternative includes the construction of an approach landing along Hillcrest Road to meet MDT standards resulting in an approximate ten foot cut adjacent to the substation. This cut creates the need for a retaining wall separating the lowered Hillcrest Road from the substation to minimize impacts. Utility relocation will be required.

The alternative includes reconstruction of approximately 1100 feet of Blue Creek Road to improve the intersection sight distance to meet minimum MDT requirements.

The right turn lane found at the intersection of Blue Creek and Jellison does not appear to be warranted based on traffic count data alone, but is likely there due to accident data. During the field reconnaissance, a crash occurred that was caused by a north turning vehicle on Jellison unable to see north on Blue Creek due to the presence of a large commercial vehicle. This Technical Memorandum includes the addition of a dedicated right turn lane from Blue Creek Road to Hillcrest Road.

If landfill roads are required for crossing the reconstructed Hillcrest, they should be located where there is adequate sight distance. A two way stop controlled intersection should be appropriate based on the estimated traffic counts.

The estimated cost of this alternative is $5.3 million. Property acquisition will be required on the eastern end of Hillcrest on the north side of the road.

Roadway Alternative 2

Reroute of Hillcrest Road
Refer to the attached plan sheets for an overview of this alternative: 1 (Key Map), 4 (Plan& Profile of Rerouted Hillcrest Road), 5 (Blue Creek Road Intersection), and 7 (Typical Section Details). This roadway alternative is compatible with the landfill overlap alternative and the landfill standalone alternative.

Hillcrest Road will be rerouted along the perimeter of the proposed expansion. This reroute will need to cross an existing drainage. The proposed landfill expansion will include rerouting the drainage for stormwater run-on control. Under the Landfill overlap alternative the drainage ditch will be constructed to the south and east of the landfill footprint. Should this alternative be selected for advancement, the drainage ditch and roadway design can be combined to reduce the overall excavation and subsequently costs.

Hillcrest can be maintained as a landfill road as appropriate until the landfill expansion will no longer allow. At this time, the asphalt can be milled to improve internal landfill roads as the opportunity arises.

Rerouting Hillcrest will add approximately 0.75 miles of roadway, causing a delay of emergency services of approximately one minute to locations along Stratton Road and on Hillcrest Road south of this new intersection.

The relocation of Hillcrest will also require modifying the existing intersection at Blue Creek Road. This modification increases the distance available for a right turn lane, provides access to the substation, and improves the sight distance on Blue Creek Road. See sheet 5 for more information. Minor utility relocation may be required with this alternative.

An option for this route is to maintain Hillcrest as the thru road and tee Stratton into Hillcrest. Sight distance concerns will be evaluated and the option will be further explored in the design phase if this alternative is selected.

The estimated cost of this alternative is $7.5 million. Property acquisition will be required near the new intersection with Blue Creek Road.

Roadway Alternative 3

Reroute of Hillcrest to Collier Road
Refer to the attached plan sheets for an overview of this alternative: 1 (Key Map), 6 (Plan & Profile of Extension), and 7 (Typical Section Details). This alternative is compatible with the Landfill Overlap Alternative and the Landfill Standalone Alternative.

This roadway alternative reroutes Hillcrest Road from the intersection of Stratton Road to Collier Road, and then reconstructs Collier to meet current County Road standards. This alternative maintains the existing Blue Creek/Hillcrest intersection for access to existing private approaches on the east end of Hillcrest while shifting the remaining traffic to Collier Road. This alternative will not capitalize on the stormwater run-on ditch construction to the extent of Roadway Alternative 2 but there will be some reduction in construction costs in the Landfill Overlap alternative by coordinating the design of the road and run-on drainage ditch.

This reconstruction adds approximately 1.5 miles to Stratton Road and the southern reach of Hillcrest Road causing a delay of emergency services of approximately two minutes, but improves the northern reach of Collier Road. This improvement will result in a slight improvement in response time to residents on Collier Road. A dedicated right turn lane is recommended from Blue Creek onto Collier, and sight distance appears to be adequate. Utility relocation may be required for roadway improvements.

An option for this route is to maintain Hillcrest as the thru road and tee Collier into Hillcrest. This option will be further explored in the design phase if this alternative is selected.

The estimated cost of this alternative is $7.0 million. Significant property acquisition will be required.

SUMMARY

The existing alignment along Blue Creek Road does not provide adequate sight distance for vehicles on Hillcrest, but is adequate for vehicles on Collier Road. A dedicated right turn lane on Blue Creek is recommended for accident reduction. Two way stop control is likely adequate for landfill traffic crossing Hillcrest.

Selection of the roadway alternative is based not only on the construction costs, but on traffic safety, emergency response times, landfill benefits and public opinion. Table 4 is an example matrix that could be used to select the roadway alternate in conjunction with landfill expansion. Capital costs are ranked using a statistics-based formula. In this matrix, reconstruction of Hillcrest is the highest scoring alternative. However, this alternative is not technically feasible should the City select Landfill Overlap Alternative. In addition, the City may weight and rank these alternatives differently than shown in this draft report. The City may also have additional criteria in the selection of the preferred roadway alternative. Alternative selection will ultimately be determined by the City of Billings.

TABLE 4
CITY OF BILLINGS LANDFILL
ROADWAY ALTERNATIVE SELECTION MATRIX

CRITERIA →	Capital Cost		Safety		Emergency Response		Landfill Benefits		Public Opinion		Total
WEIGHTING FACTOR →	25		25		10		10		10		
ALTERNATIVE	Score	Wgt Score	Score	Wgt Score	Score	Wgt Score	Score	Wgt Score	Score	Wgt Score	Score
Alternative 1 Reconstruct Hillcrest	6.5	163	8	200	10	100	10	100	10	100	663
Alternative 2 Perimeter Road	4.2	105	7	175	9	90	8	80	8	80	530
Alternative 3 Collier Road	3.5	88	10	250	8	80	9	90	9	90	598

TABLE 5 CITY OF BILLINGS LANDFILL ROADWAY ALTERNATIVE SELECTION MATRIX #2		
CRITERIA →	Capital Cost	Emergency Response
ALTERNATIVE		Increase
Alternative 1 Reconstruct Hillcrest	$5.3 Million	No Change
Alternative 2 Perimeter Road	$7.5 Million	1 minute
Alternative 3 Collier Road	$7.0 Million	2 minutes

Great West Engineering
2501 Belt View Dr.
Helena, MT 59601
406-449-8627

Project Number: 1-12150
Serial Number: D4-4853
Counted By: C. Laity
Other Notes (Weather, Day of Week):

File Name : Not Named 10
Site Code : 00000000
Start Date : 10/17/2012
Page No : 1

Groups Printed- Passenger Vehicles - Trucks

	BLUE CREEK From North					BLUE CREEK From South					JELLISON From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:30 AM	13	26	0	0	39	0	107	0	0	107	1	0	26	0	27	173
07:45 AM	13	38	0	0	51	0	110	0	0	110	0	0	19	0	19	180
Total	26	64	0	0	90	0	217	0	0	217	1	0	45	0	46	353
08:00 AM	8	31	0	0	39	0	90	0	0	90	0	0	15	0	15	144
08:15 AM	20	36	0	0	56	0	84	0	0	84	0	0	19	0	19	159
08:30 AM	21	25	0	0	46	0	64	0	0	64	0	0	22	0	22	132
08:45 AM	13	22	0	0	35	0	50	1	0	51	0	0	20	0	20	106
Total	62	114	0	0	176	0	288	1	0	289	0	0	76	0	76	541
09:00 AM	20	26	0	0	46	0	56	0	0	56	0	0	25	0	25	127
09:15 AM	14	29	0	0	43	0	35	2	0	37	0	0	15	0	15	95
Grand Total	122	233	0	0	355	0	596	3	0	599	1	0	161	0	162	1116
Apprch %	34.4	65.6	0	0		0	99.5	0.5	0		0.6	0	99.4	0		
Total %	10.9	20.9	0	0	31.8	0	53.4	0.3	0	53.7	0.1	0	14.4	0	14.5	
Passenger Vehicles	77	221	0	0	298	0	572	1	0	573	1	0	124	0	125	996
% Passenger Vehicles	63.1	94.8	0	0	83.9	0	96	33.3	0	95.7	100	0	77	0	77.2	89.2
Trucks	45	12	0	0	57	0	24	2	0	26	0	0	37	0	37	120
% Trucks	36.9	5.2	0	0	16.1	0	4	66.7	0	4.3	0	0	23	0	22.8	10.8

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File Name : Not Named 10
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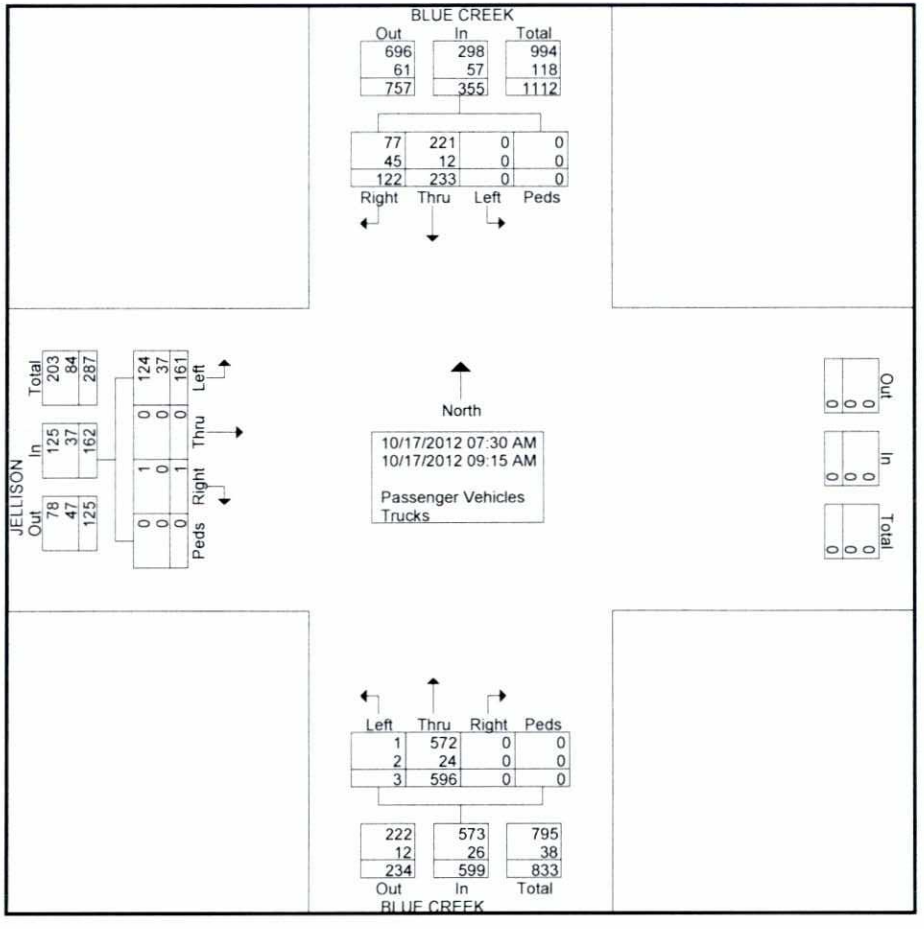
Page No : 2



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File Name : Not Named 10
Site Code : 00000000
Start Date : 10/17/2012
Page No : 3

	BLUE CREEK From North					BLUE CREEK From South					JELLISON From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:30 AM to 09:15 AM - Peak 1 of 1																
Peak Hour for Entire Intersection Begins at 07:30 AM																
07:30 AM	13	26	0	0	39	0	107	0	0	107	**1**	0	**26**	0	**27**	173
07:45 AM	13	**38**	0	0	51	0	**110**	0	0	**110**	0	0	19	0	19	**180**
08:00 AM	8	31	0	0	39	0	90	0	0	90	0	0	15	0	15	144
08:15 AM	**20**	36	0	0	**56**	0	84	0	0	84	0	0	19	0	19	159
Total Volume	54	131	0	0	185	0	391	0	0	391	1	0	79	0	80	656
% App. Total	29.2	70.8	0	0		0	100	0	0		1.2	0	98.8	0		
PHF	.675	.862	.000	.000	.826	.000	.889	.000	.000	.889	.250	.000	.760	.000	.741	.911

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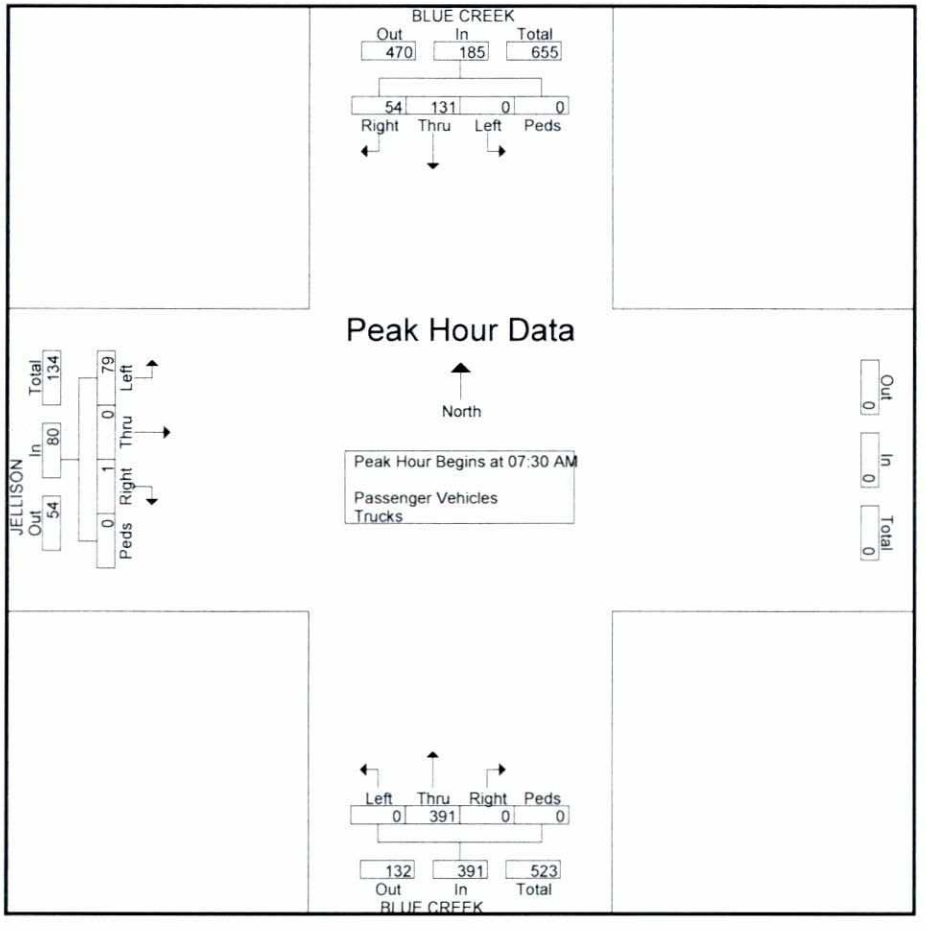

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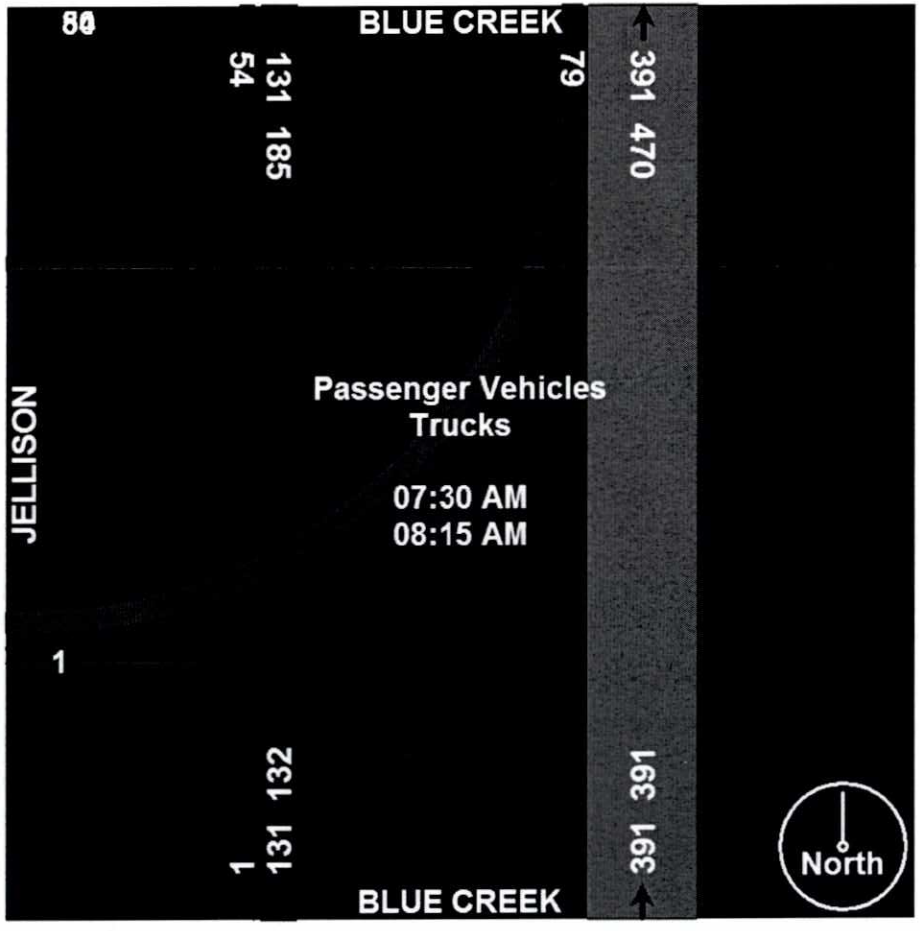

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	C. Laity
Agency/Co.	
Date Performed	11/11/2012
Analysis Time Period	7:30-8:30 10/17 - Wednesday

Site Information

Intersection	Blue Creek / Jellison
Jurisdiction	
Analysis Year	2012

Project Description 1-12150

East/West Street: Jellison | North/South Street: Blue Creek

Intersection Orientation: North-South | Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	0	391			131	54
Peak-Hour Factor, PHF	1.00	0.89	1.00	1.00	0.86	0.68
Hourly Flow Rate, HFR (veh/h)	0	439	0	0	151	79
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Two Way Left Turn Lane					
RT Channelized			0			1
Lanes	0	1	0	0	1	1
Configuration	LT				T	R
Upstream Signal		0			0	

Minor Street	Eastbound			Westbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	79	0	1			
Peak-Hour Factor, PHF	0.76	1.00	0.25	1.00	1.00	1.00
Hourly Flow Rate, HFR (veh/h)	103	0	4	0	0	0
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	1	0	0	0	0
Configuration		LTR				

Delay, Queue Length, and Level of Service

Approach	Northbound	Southbound	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	LT						LTR	
v (veh/h)	0						107	
C (m) (veh/h)	1442						657	
v/c	0.00						0.16	
95% queue length	0.00						0.58	
Control Delay (s/veh)	7.5						11.5	
LOS	A						B	
Approach Delay (s/veh)	--	--					11.5	
Approach LOS	--	--					B	

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DRAFT OPINION OF PROBABLE COST

PROJECT	OWNER	COUNTY	DATE
City of Billings - Roadway Alternative #2 (Perimeter Road: 45 MPH)	***City of Billings***	***Yellowstone***	***10/24/2012***

ITEM NO.	*DESCRIPTION*	*UNIT*	*QUANTITY*	*PRICE*	*AMOUNT*
1	Mobilization	Lump Sum	1	$552,000.00	$552,000.00
2	Soil Erosion and Pollution Control	Lump Sum	1	$15,000.00	$15,000.00
3	Excavation & Grading	Cubic Yard	325000	$8.00	$2,600,000.00
4	Geotextile Separation Fabric	Square Yard	45191	$4.00	$181,000.00
5	3" Minus Pitrun Material	Cubic Yard	17268	$30.00	$518,000.00
6	1 1/2" Minus Crushed Gravel	Cubic Yard	3343	$35.00	$117,000.00
7	Hot Asphalt Concrete Pavement	Tons	4166	$100.00	$417,000.00
8	CMP Cross-Drain Culverts (18" Diameter)	Linear Foot	780	$45.00	$35,000.00
9	RCP Drainage Culverts (36" Diameter)	Linear Foot	250	$120.00	$30,000.00
10	Seeding	Acre	22	$750.00	$16,000.00
11	Guardrail	Linear Foot	4000	$25.00	$100,000.00
12	Fencing - 3 strand barb wire	Linear Foot	300	$3.00	$1,000.00
13	**Utility Relocation (Per Bob & Steph)**	**Lump Sum**	**1**	**$300,000.00**	**$300,000.00**
14	**Property Acquisition (Per Bob & Steph)**	**Lump Sum**	**1**		**$0.00**
15	Ditch Blocks Permanent Erosion (Sections w/grade >5%)	Sta	30	$500.00	$15,000.00
16	Traffic Control	Lump Sum	1	$15,000.00	$15,000.00
17	Right Turn Lane on Blue Creek Road	Lump Sum	1	$175,000.00	$175,000.00
18	Reconstruct of Blue Creek Road	Lump Sum	1	$380,000.00	$380,000.00
19	Roadway Obliteration on Hillcrest	Linear Foot	500	$40.00	$20,000.00
20	Spur Road to Hillcrest	Lump Sum	1	$30,000.00	$30,000.00
		TOTAL CONSTRUCTION			$5,517,000.00
		CONTINGENCY (15%)			$828,000.00
		ENGINEERING (10%)			$552,000.00
		CONSTRUCTION MANAGEMENT (10%)			$552,000.00
		TOTAL PROJECT COST			$7,449,000.00

GreatWest engineering

DRAFT OPINION OF PROBABLE COST

PROJECT	OWNER	COUNTY	DATE
City of Billings - Roadway Alternative #3 (Perimeter Road to Collier Road: 45 MPH)	***City of Billings***	***Yellowstone***	***10/24/2012***

ITEM NO.	*DESCRIPTION*	*UNIT*	*QUANTITY*	*PRICE*	*AMOUNT*
1	Mobilization	Lump Sum	1	$516,000.00	$516,000.00
2	Soil Erosion and Pollution Control	Lump Sum	1	$16,500.00	$17,000.00
3	Embankment & Grading	Cubic Yard	320000	$8.00	$2,560,000.00
4	Geotextile Separation Fabric	Square Yard	50567	$4.00	$202,000.00
5	3" Minus Pitrun Material	Cubic Yard	19322	$30.00	$580,000.00
6	1 1/2" Minus Crushed Gravel	Cubic Yard	3741	$35.00	$131,000.00
7	Hot Asphalt Concrete Pavement	Tons	4662	$100.00	$466,000.00
8	CMP Cross-Drain Culverts (18" Diameter)	Linear Foot	680	$45.00	$31,000.00
9	RCP Drainage Culverts (36" Diameter)	Linear Foot	250	$120.00	$30,000.00
10	RCP Drainage Culverts (48" Diameter)	Linear Foot	300	$150.00	$45,000.00
11	Seeding	Acre	20	$750.00	$15,000.00
12	Guardrail	Linear Foot	5000	$25.00	$125,000.00
13	Fencing - 3 strand barb wire	Linear Foot	3000	$3.00	$9,000.00
14	**Utility Relocation (Per Bob & Steph)**	**Lump Sum**	**1**	**$150,000.00**	**$150,000.00**
15	**Property Acquisition (Per Bob & Steph)**				**$0.00**
16	Ditch Blocks Permanent Erosion (Sections w/grade >6%)	Sta	32	$500.00	$16,000.00
17	Traffic Control	Lump Sum	1	$40,000.00	$40,000.00
18	Cul-De-Sac on Hillcrest Road	Lump Sum	1	$20,000.00	$20,000.00
19	Right Turn Lane (On Blue Creek Road)	Lump Sum	1	$200,000.00	$200,000.00
		TOTAL CONSTRUCTION			$5,153,000.00
		CONTINGENCY (15%)			$773,000.00
		ENGINEERING (10%)			$515,000.00
		CONSTRUCTION MANAGEMENT (10%)			$515,000.00
		TOTAL PROJECT COST			$6,956,000.00

GreatWest engineering

DRAFT OPINION OF PROBABLE COST

PROJECT	OWNER	COUNTY	DATE
City of Billings - Roadway Alternative #1 (Reconstruction of Hillcrest Road: 45 MPH)	***City of Billings***	***Yellowstone***	***10/24/2012***

ITEM NO.	DESCRIPTION	UNIT	QUANTITY	PRICE	AMOUNT
1	Mobilization	Lump Sum	1	$390,000.00	$390,000.00
2	Soil Erosion and Pollution Control	Lump Sum	1	$10,000.00	$10,000.00
3	Roadway Excavation	Cubic Yard	14881	$12.00	$179,000.00
4	Excavation & Grading	Cubic Yard	74674	$8.00	$597,000.00
5	Retaining Wall	Square Yard	800	$350.00	$280,000.00
6	Geotextile Separation Fabric	Square Yard	29611	$4.00	$118,000.00
7	3" Minus Pitrun Material	Cubic Yard	11315	$30.00	$339,000.00
8	1 1/2" Minus Crushed Gravel	Cubic Yard	2167	$35.00	$76,000.00
9	Hot Asphalt Concrete Pavement	Tons	2730	$100.00	$273,000.00
10	CMP Cross-Drain Culverts (18" Diameter)	Linear Foot	320	$45.00	$14,000.00
11	Seeding	Acre	4	$750.00	$3,000.00
12	Reconstruct of Blue Creek Road	Lump Sum	1	$380,000	$380,000.00
13	Guardrail (Length of retaining wall+100')	Linear Foot	800	$25.00	$20,000.00
14	Fencing - 3 strand barb wire	Linear Foot	2000	$3.00	$6,000.00
15	**Utility Relocation (Per Bob & Steph)**	**Lump Sum**	**1**	**$750,000.00**	$750,000.00
16	**Property Acquisition (Per Bob & Steph)**	**Lump Sum**	**1**		$0.00
17	Ditch Blocks Permanent Erosion (Sections w/grade >5%)	Sta	48	$500.00	$24,000.00
18	Right Turn Lane on Blue Creek Road	Lump Sum	1	$175,000.00	$175,000.00
19	Misc. Stratton Road Upgrades	Lump Sum	1	$10,000.00	$10,000.00
20	Traffic Control	Lump Sum	1	$140,000.00	$140,000.00
21	Driveway Approach Modifications	Lump Sum	1	$150,000.00	$150,000.00
		TOTAL CONSTRUCTION			$3,934,000.00
		CONTINGENCY (15%)			$590,000.00
		ENGINEERING (10%)			$393,000.00
		CONSTRUCTION MANAGEMENT (10%)			$393,000.00
		TOTAL PROJECT COST			$5,310,000.00