

Exhibit 5

Accident Analysis

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In support of the project planning effort for the I-90 Corridor Study, MDT performed an accident analysis for the 16 mile corridor segment for the period January 1, 1999 through December 31, 2001. As part of the consultant effort for the I-90 E/W Corridor Study CH2M Hill obtained additional data for the most recent calendar year (2002). This technical memorandum summarizes the methodology used to analyze updated crash data for the Missoula MT, I-90 East West, Corridor Study Phase 1 for the most recent, 3 year period of January 1, 2000 through December 31, 2002.

Analysis of Crash Data

Summary crash data is presented in Appendix A1. 132 vehicle crash incidents were reported in year 2002. This represents a 36% increase from the previous year 2001 and is 33% higher than the previously analyzed prior 3 year (1999-2001) average of 99 crash incidents per year. During the 2000 to 2002 analysis period a total of 323 crashes were reported with 65.9% of the incidents involving only one vehicle.

As a result, the all vehicle crash rate along the corridor increased from 1.05 to 1.16 accidents per million vehicle miles. This is higher than the recorded statewide average for rural interstate highways. The severity index and rate decreased for the period. Truck crashes and severity also decreased, however the truck accident rate (1.11 crashes per million vehicle miles) was still higher than the Statewide Average of 0.85.

The percentage of dark-lighted reported incidents (13%) is significantly higher than the previously determined statewide average for rural highways (2.4% for 1999-2002). The study area showed higher interchange related accidents than the statewide average for rural highways (0.8% for 1999-2002).

Table 1 presents other significant characteristics of the analysis.

Crash Location Factors

During the period, 75% of the reported crashes were non-junction related, meaning they occurred on the freeway mainline. The highest percentages of these occurred along the MP96.4 to MP 99.99 (DeSmet to Airport Interchanges) and between MP 107.4 and MP 100.2 (East Missoula to Bonner Interchanges) with the latter segment having the highest crash rate (1.28 crashes per million vehicle miles) within the study area.

The highest number cluster of crashes occurred at the Reserve, Van Buren and Bonner Interchanges. This was consistent with the previously studied period. Factors that could be potentially contributing in these areas include the following:

- Lack of Acceleration and Deceleration lanes on mainline: the majority of overcrossings and straight on and off tapers cause either slow acceleration and merging into mainline traffic (on-ramps) or increased difficulty with lane changes or deceleration combined with the off ramp maneuver at relatively high operating speeds (particularly for heavy vehicles).
- Complexity of the Interchange or Intersection
- Near side barrier (vicinity Orange to Van Buren)
- Congestion related, queuing on ramps
- Speed differential between lanes
- Geometrics
- Close interchange spacing (particularly between Orange and Van Buren)
- Lack of illumination at interchanges
- Lack of advanced signage at ramp junctions

HES CLUSTERS OR PROJECTS:

The Hazard Elimination Safety (HES) list contained in the MDT accident report IM 90-2(104)94 shown below have been investigated by MDT and the 2002 program is complete. There are no recent or pending safety improvements planned for this segment of freeway.

<u>Reference posts</u>	<u>Year</u>
95.9-96.4	1995
96.6-97.1	1997
103.0-103.6	1997,1999
105.2-106.0	2001
105.4-105.9	1995,1997
105.4-106.0	1996
106.0-108.2	1995
106.3-107.5	1993
106.4-107.47	1994
107.1-107.4	1996
108.2-109.8	1998
108.5-109.8	1997
108.8-109.9	1996
109.8-110.5	1996
110.0-110.5	1993
110.0-110.7	2001
110.0-111.2	1999
110.0-110.5	1998
110.1-110.6	1997

Future Crash Projections

Future projections of I-90 mainline crash rates were created using the non-junction related accident data described above and presented in Exhibit 5.1. The accident records were organized into eight bi-directional segments, by interchange area, to determine the average annual accident rate for the three-year period from January 1, 2000 to December 31, 2002. Using the current split among injury/fatal and property damage only accidents, two crash rates for each segment were computed. It was assumed that the frequency of accidents would remain relatively constant given that no safety countermeasures would be implemented by 2025. Using these split accident rates and the projected 2025 average daily traffic volumes, an average annual number of accidents (injury/fatal and PDO) was computed for each segment. The projected ADT volumes were created using the growth rates for each I-90 segment presented earlier in this report and used throughout the future capacity analysis.

The current accident data showed that there was an average of 81 non-junction related accidents per year through the 16-mile section; with 54 property damage only, 26 injury and one fatal accident. The crash projections for 2025 predict that there will be 141 non-junction related accidents per year, with 92 property damage only and 48 combined injury/fatal accidents. That is an overall increase of 74 percent over the entire 16-mile section of I-90.

TABLE 1 Engineering Study Evaluation			
Description: Missoula - E & W			
Route & RP: Interstate 90 RP 94.4 - 110.2			
Data time Frame: 1-1-2000 to 12-31-2002			
	Statewide Avg for Rural I/S	Study Area 99 - 01	Study Area 00 - 02
All Vehicles Accident Rate:	1.13 ¹⁾	1.05	1.16
All Vehicles Severity Index:	2.14 ²⁾	2.39	1.82
All Vehicles Severity Rate:	2.41 ³⁾	2.51	2.11
Truck Accident Rate:	0.85 ⁴⁾	1.14	1.1
Truck Severity Index:	2.03 ⁴⁾	2.03	1.63
Truck Severity Rate:	1.73 ⁴⁾	2.31	1.78
Truck Accidents:	N/A	39	40
Total Recorded Accidents:	N/A	297	323
<u>Variations from Average Occurrence:</u>			
o 62% dry road conditions vs. 55.1% statewide average for rural interstate			
o 13% dark-lighted vs. 2.4% statewide average for rural interstate			
o 13% Interchange related accidents vs. 0.8% statewide average for rural interstate.			
<u>Other Statistics:</u>			
o 25 and under drivers comprise 26% of drivers in accidents			
o 36% increase in number of accidents in 2002 from 2001			
o 39% dark condition accidents on the corridor			
o 39% of drivers in accidents contribute too fast for conditions & carelessness			
o 51% of accidents occur between noon - 8 p.m.			
o 61% of accidents involve male drivers			
<u>Interchanges/Intersections:</u>			
o Highest cluster of interchange accidents occurred at Reserve, Van Buren, & Bonner. Non junction highest % of accidents from Orange to Bonner.			
o Highest number of intersection accidents occurred at Desmet & Reserve			
¹⁾ Accident rates are defined as the number of accidents per million vehicle-miles. 95-99			
²⁾ Severity index is defined as the ratio of the sum of fatal and incapacitating injury accidents times 8 plus the number of other injury accidents times 3 plus the number of property damage accidents to the total number of accidents. One occurrence per incident with the greatest severity measured. 95-99			
³⁾ Severity rate is defined as the accident rate multiplied by the severity index. 95-99			
⁴⁾ Statewide average truck accident rate, severity index, and severity rate are for years 95-99.			

Accident Appendix A1:

Accident Summary for January 1, 2000 to December 31, 2002					
Total Accidents (1999 had 106 accidents)					
2000	94				
2001	97				
2002	132				
Total	323				
Accidents (# of vehicles)		Accidents Type			
1	213	0.66	Injury	111	0.34
2	100	0.31	Fatality	6	0.02
3 or 4	10	0.03	PDO	206	0.64
Total	323		Total	323	
Accidents (time of day)		Road Conditions			
0 - 2:59	25	0.08	Dry	200	0.62
3 - 5:59	22	0.07	Ice	64	0.20
6 - 8:59	46	0.14	Snow/slush	25	0.08
9 - 11:59	27	0.08	Wet	31	0.10
12 - 14:59	51	0.16	Other	3	0.01
15 - 17:59	56	0.17	Total	323	
18 - 20:59	58	0.18			
21 - 23:59	38	0.12			
Total	323		Accidents (Light Condition)		
			Dark not lit	84	0.26
			Dark & Lit	41	0.13
Accidents (day of the week)			Dawn	5	0.02
Sunday	41	0.13	Daylight	184	0.57
Monday	52	0.16	Dusk	9	0.03
Tuesday	40	0.12	Total	323	
Wednesday	43	0.13			
Thursday	53	0.16			
Friday	48	0.15			
Saturday	46	0.14			
Total	323				

Accident Appendix A2:

Accident Summary 00-02		Weather Conditions	
All Vehicle Accident Rate	1.16	Clear	132 0.41
All Vehicle Severity Index	1.82	Cloudy	110 0.34
All Vehicle Severity Rate	2.11	Snow/Blowing Snow	52 0.16
Truck Accident Rate	1.10	Fog	8 0.02
Truck Severity Index	1.63	Rain/Sleet	16 0.05
Truck Severity Rate	1.78	Other	5 0.02
Weighted avg AADT 00 - 02		16074	Total 323
Commercial traffic AADT 00 - 02		2106	

Accident By Junction		Code	
Non Junction	243	0.75	NJ
In Intersection	13	0.04	II
Intersection Related	24	0.07	IR
Interchange (in or related)	42	0.13	IC
In Driveway	0	0.00	ID
Driveway Related	1	0.00	DR
Railroad Crossing Related	0	0.00	RC
Total	323		

	Accident Grouping (Non Junction)		Segment Length	Accident Rate	
	Total	Accid. per mi			
94 - 96.39	14	5.9	2.39	0.33	west of DeSmet
96.4 - 99.99	46	12.8	3.59	0.73	DeSmet to Airport
100 - 101.79	28	15.6	1.79	0.89	Airport to Reserve
101.8 - 104.79	38	12.7	2.99	0.72	Reserve to Orange
104.8 - 105.69	17	19.1	0.89	0.97	Orange to VanBuren
105.7 - 107.39	29	17.2	1.69	0.97	VanBuren to E. Missoula
107.4 - 109.39	45	22.6	1.99	1.28	E. Missoula to Bonner
109.4 - 110.2	26	32.5	0.8	1.48	east of Bonner
	243				

Accident Appendix A3:

Accident Grouping (In Intersection)				Accident Grouping (Intersection Related)	
Desmet	5			Desmet	5
Airport	1			Airport	0
Reserve	2			Reserve	6
Orange	1			Orange	1
VanBuren	1			VanBuren	5
E. Missoula	3			E. Missoula	4
Bonner	0			Bonner	3
	13				24
Total Accidents In Intersection and Intersection Related					
Desmet	10	0.27			
Airport	1	0.03			
Reserve	8	0.22			
Orange	2	0.05			
VanBuren	6	0.16			
E. Missoula	7	0.19			
Bonner	3	0.08			
	37				
Interchange In or Related					
Desmet	3	0.07			
Airport	1	0.02			
Reserve	10	0.24			
Orange	5	0.12			
VanBuren	10	0.24			
E. Missoula	5	0.12			
Bonner	8	0.19			
	42				

Accident Appendix B1:

Total Drivers involved in Accidents
Total 438

Driver Age		
18 & under	30	0.07
19 - 25	84	0.19
26 - 30	45	0.10
31 - 35	48	0.11
36 - 40	43	0.10
41 - 45	41	0.09
46 - 50	32	0.07
51 - 55	34	0.08
56 - 60	29	0.07
61 - 65	13	0.03
66 - 70	10	0.02
Over 70	19	0.04
unknown	10	0.02
Total	438	

Accidents Classification		
M	269	0.61
F	159	0.36
Not listed	10	0.02
Total	438	

Car Classification		
Subcompact Car	3	0.01
Compact Car	48	0.11
Midsize Car	64	0.15
Passenger Car	64	0.15
Large Car	19	0.04
Small Wagon	6	0.01
Midsize Wagon	6	0.01
Large Wagon	1	0.00
Van	21	0.05
Minivan	4	0.01
SUV	38	0.09
Small Pickup	32	0.07
Pickup	22	0.05
Std Pickup	59	0.13
Pickup Camper	1	0.00
Truck/Tractor	40	0.09
Other	2	0.00
Ambulance	2	0.00
Motorhome	1	0.00
Motorcycle	2	0.00
Work Construction	3	0.01
Total	438	

Car Classification (summary)		
Car	198	0.45
Wagon/Van/SUV	76	0.17
Pickup	114	0.26
Truck/Tractor	40	0.09
Other	10	0.02
Total	438	

Accident Appendix B2:

Contributing Circumstance	
None	157
Too fast for cond	74
Drugs	2
Alcohol	28
Inattention	27
Careless Driving	26
Improper Lane Change	9
Followed too closely	9
Fell Asleep	6
Failed to Yield	15
Disregard signage	4
Improper Passing/Parking	2
Wrong side/Way	1
Slushy/Rain/Snow	7
Severe Wind	1
Icy	14
Fog/smog/smoke	4
Exhaust from fire	1
Blowing sand/soil	1
Breaks	1
Wheels	4
Truck Coupling	2
Steering	1
Fuel System	1
Cargo	3
Ruts/Bumps	1
Obstruction/Debris	3
Other Vehicle	2
Other Environment	2
Other Driver	27
Power Plant	1
Total	436

Contributing Circumstance (Summary)		
None	157	0.36
Too fast for cond	74	0.17
Alcohol/Drugs	30	0.07
Careless Driving	98	0.22
Due to weather/visibility	28	0.06
Car malfunction	9	0.02
Road condition/Obstruction	7	0.02
Other	33	0.08
Total	436	

EXHIBIT 5.1

Future Year Crash Projections

Based on Three Year I-90 Accident History by Subsegment: Missoula, MT I-90 East West, Corridor Study Phase I

January 1, 2000 through December 31, 2002

Both Directions	Milepost ¹		Segment Length (Miles)	Number of Accidents				Total Injuries (Persons)	Total Fatalities (Persons)	Average Annual Accident Rate (Accidents per Million Vehicle-Miles)	2025 Severity Rate		2025 No Build Average Annual Accidents				
				Property Damage Only	Injury ²	Fatal	Total				Inj/Fatal	PDO	ADT	Total	Injury/Fatal	PDO	
Segment Description	From	To															
West of DeSmet I/C 3 Years (Average Annual)	94.00	96.40	2.40	7 2	6 2	1 0	14 5	17 6	1 0	0.33	0.17	0.17	33650	10	5	5	
From DeSmet I/C to Airport I/C 3 Years (Average Annual)	96.40	100.00	3.60	26 9	19 6	1 0	46 15	26 9	1 0	0.72	0.32	0.41	33650	32	14	18	
From Airport I/C to Reserve St. I/C 3 Years (Average Annual)	100.00	101.80	1.80	19 6	9 3	0 0	28 9	12 4	0 0	0.88	0.28	0.60	33650	20	6	13	
From Reserve St. I/C to Orange St. I/C 3 Years (Average Annual)	101.80	104.80	3.00	28 9	10 3	0 0	38 13	11 4	0 0	0.72	0.19	0.53	27940	22	6	16	
From Orange St. I/C to Van Buren St. I/C 3 Years (Average Annual)	104.80	105.70	0.90	15 5	1 0	1 0	17 6	7 2	1 0	0.96	0.11	0.85	26730	8	1	7	
From Van Buren St. I/C to E Missoula I/C 3 Years (Average Annual)	105.70	107.40	1.70	18 6	11 4	0 0	29 10	15 5	0 0	0.97	0.37	0.60	24560	15	6	9	
From E Missoula I/C to Bonner I/C 3 Years (Average Annual)	107.40	109.40	2.00	30 10	15 5	0 0	45 15	19 6	0 0	1.28	0.43	0.85	25040	23	8	16	
East of Bonner I/C 3 Years (Average Annual)	109.40	110.20	0.80	19 6	7 2	0 0	26 9	10 3	0 0	1.47	0.40	1.08	25040	11	3	8	
Total/Overall 3 Years (Average Annual)*	94.00	110.20	16.20	162 54	78 26	3 1	243 81	117 39	3 1	0.85				141	48	92	

1 - Mileposts listed are averages of related eastbound and westbound mileposts.

2 - Disabling, Evident, or Possible Injury

Note: Average annual "total" column may not agree with component total due to rounding.