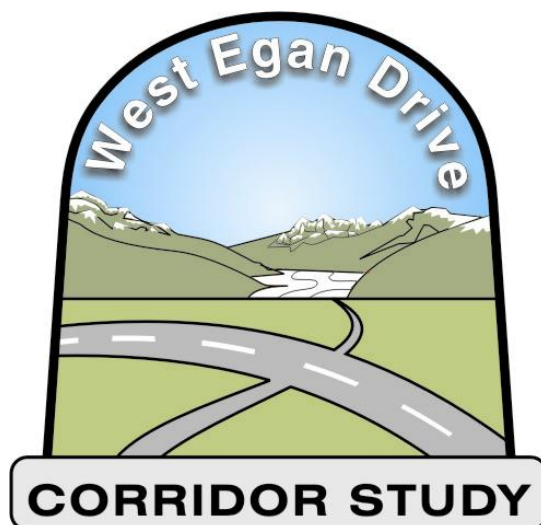


**Section 10**

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Final Report Chapter 7 Appendix





## **Section 10: Final Report Chapter 7 Appendix**

Appendix A - Construction Staging Notes

Appendix B - Cost Opinion and Quantities

Appendix C - Traffic Operations Analysis

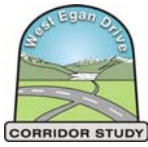


**Section 10 Final Report Chapter 7 Appendix**

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Appendix A: Construction Staging Notes





## Appendix: Construction Staging

These notes on possible construction staging of the projects recommended in this report were used in the development of the implementation plan and the sequencing schedule. Details may change as the Proposed Action is refined and implemented.

### **BROTHERHOOD BRIDGE**

The elevation of the new bridge will be the same as the existing one, causing fewer traffic control problems. Recommended construction staging:

- Build north side of bridge while maintaining traffic on existing bridge.
- Build transition zones to divert traffic across the new bridge (north side).
- Demolish existing bridge.
- Build south side of bridge.
- Open entire bridge (five lanes) for traffic.

### **INDUSTRIAL BOULEVARD/GLACIER HIGHWAY**

Recommended construction staging:

#### **Realign and Signalize Industrial Boulevard (Phase 1)**

1. Realign Industrial Boulevard with Wildmeadow Lane. This will improve access to the industrial area with improvements such as vertical grades, available storage, exclusive turn lanes along side streets, etc. Connect businesses and parking areas on both sides of Glacier Highway to the new alignment.
2. Install a signal at the Glacier Highway/Industrial Boulevard/Wildmeadow Lane intersection. Though it is not necessary that Glacier Highway be five lanes by 2015, the locations of the signal poles should accommodate the future expansion.

#### **Improve Glacier Highway to Five Lane s (Phase 2)**

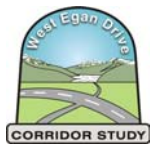
1. The phasing of this work is depends on the construction schedule for the new Brotherhood Bridge. If the bridge construction is postponed, the upgrading of Glacier Highway also can be delayed.

### **EGAN DRIVE BETWEEN VINTAGE BOULEVARD AND MENDENHALL LOOP ROAD**

#### **Phase 1: Couplet Intersection**

*Stage 1: Build Eastbound Frontage Road and Mendenhall Loop Road Westbound Off-Ramp*

1. Maintain eastbound and westbound Egan Drive traffic and travel patterns in the study area.



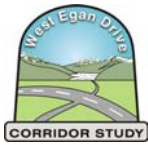
2. Build two-lane eastbound frontage road from Vintage Boulevard to Egan Drive, east of Mendenhall Loop Road. Temporary improvements are needed, as the Department's Proposed Action requires only a one-lane frontage road system. The vertical profile of the frontage roads should accommodate future ramps to/from Riverside Drive.
3. Build a two-lane westbound off-ramp at Mendenhall Loop Road. A portion of the westbound off-ramp at Mendenhall Loop Road will have to be rebuilt to accommodate future changes in Egan Drive, as noted in the Department's Proposed Action. The stages of construction should be coordinated when possible to maximize efficiency.
4. Build permanent traffic signals at the Eastbound Frontage Road/Mendenhall Loop Road and Eastbound Frontage Road/Riverside Road intersections.
5. Provide new access to Mendenhall Loop Road north of Del Rae Road; cul-de-sac existing Hurlock Avenue.

*Stage 2: Build Westbound Frontage Road and Extend Riverside Drive*

1. Reroute Egan Drive eastbound traffic to the new eastbound frontage road built during Stage 1. Reroute Egan westbound traffic to existing eastbound lanes from Mendenhall Loop Road to Vintage Boulevard. Maintain all existing turning movements in the study area.
2. Operate the eastbound Frontage Road/Riverside Drive intersection as three-leg signalized intersection.
3. Modify the existing traffic signals at Egan Drive/Riverside Drive and the Egan Drive/Mendenhall Loop Road intersection to accommodate rerouted traffic.
4. Build a two-lane westbound frontage road from Mendenhall Loop Road to Vintage Boulevard. The alignment should be reviewed during the next design stage of this project to avoid conflicting with westbound traffic on the existing eastbound lanes. This will be a temporary measure, as the Department's Proposed Action requires only a one-lane frontage road system. Vertical profiles of the frontage roads should accommodate profiles of the future ramps to/from Riverside Drive.
5. Extend Riverside Drive south from Egan Drive to Glacier Highway.
6. Realign Del Rae Road.
7. Build traffic signals at westbound Egan Drive/Mendenhall Loop Road and westbound Riverside Drive/Egan Drive

*Stage 3: Reroute Traffic to the Frontage Road System*

1. Reroute Egan Drive westbound traffic to the new westbound frontage road built during Stages 1 and 2.
2. Remove the existing traffic signals at the Egan Drive/Riverside Drive and Egan Drive/Mendenhall Loop Road intersections.
3. Cul-de-sac Glacier Highway (North) south of Egan Drive and Del Rae Road west of Mendenhall Loop Road.



### **Phase 2: Elevate Egan Drive**

1. In the “footprint” of the Department’s Proposed Action as outlined in Phase 1, there is adequate space between the frontage roads to allow relatively easy construction of an elevated Egan Drive.
2. Minimal disruption to traffic patterns is required.

### **Phase 3: New Ramps to/from Riverside Drive**

1. With the “footprint” of the Department’s Proposed Action and most of the construction in Phases 1 and 2 completed, the construction of the ramps will be relatively easy.
2. Minimal disruption to traffic patterns is required.

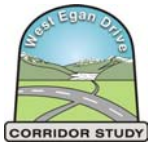
## **GLACIER HIGHWAY (AIRPORT)/EGAN DRIVE**

### *Stage 1: Build Westbound Frontage Road and Lemon Spur Extension*

1. Maintain eastbound traffic on existing Egan Drive in the vicinity of Glacier Highway (Airport). Traffic on Egan Drive will experience minimal disruption.
2. Build a two-lane westbound off-ramp in the form of wider shoulders at Glacier Highway (Airport) to accommodate Egan Drive through traffic during Stage 2 of construction. Build a two-lane westbound frontage road from Glacier Highway (Airport); connect to the westbound frontage road that is part of the couplet between Mendenhall Loop Road and Vintage Boulevard (Phase 1). As this is not part of the future plan, wider shoulders should serve the need to accommodate two travel lanes during the construction phase of this project.
3. Extend Lemon Spur Road from Fred Meyer to Glacier Highway (Airport). The new Lemon Spur Road connection would create opportunities to allow additional movements at this intersection. However, leaving the intersection in this interim form is not recommended, as the public may become accustomed to the temporary new traffic patterns.
4. Install a permanent traffic signal at the westbound frontage road/Glacier Highway (Airport) intersection.

### *Stage 2: Build Westbound Egan Drive (North side of Egan Drive)*

1. Reroute Egan westbound traffic to the westbound frontage road system completed during Stage 1. Maintain all existing travel patterns in the vicinity of the construction area. This will result in two closely spaced traffic signals: the existing one and the new westbound off-ramp traffic signal.
2. Build future westbound Egan Drive, including the north side of the overpass at the McNugget intersection, according to the Department’s Proposed Action.
3. Reconstruct the westbound off-ramp to Mendenhall Loop Road from the elevated Egan Drive to the westbound frontage road between Glacier Highway (Airport) and Mendenhall Loop Road.



*Stage 3: Build Eastbound Egan Drive and Eastbound On-Ramp*

1. Reroute eastbound Egan Drive traffic to the westbound Egan Drive built in Stage 2. Improve traffic operations by eliminating the existing signal. Note that eastbound right-in and right-out movements at this intersection cannot be served due to the elevation difference. To maintain travel patterns as much as possible during the upgrading of the McNugget intersection, build the Yandukin interchange first. Detour traffic to the Yandukin interchange via Old Dairy and/or the new Lemon Spur Road connection.
2. Build eastbound Egan Drive travel lanes and eastbound on-ramp as outlined in the Department's Proposed Action.
3. Open the ultimate new interchange configurations at the end of Stage 3.

**YANDUKIN DRIVE/EGAN DRIVE**

The Yandukin Drive/Egan Drive interchange can be built separately from the other parts of this implementation plan. However, as noted previously, to maintain anticipated travel patterns during the construction of the McNugget interchange, the Yandukin interchange should be built first.

*Stage 1: Build Eastbound and Westbound Ramps*

1. As traffic will be maintained on the existing Egan Drive and would experience minimal disruption.
2. Build eastbound and westbound ramps by means of wider shoulders to accommodate two-lane traffic temporarily.
3. Realign Yandukin Drive, extending to Glacier Highway (Lemon Road).

*Stage 2: Elevate Egan Drive*

1. Reroute eastbound and westbound Egan Drive traffic to the ramps, as well as the traffic to realigned Yandukin Drive built in Stage 1. Maintain the existing access patterns to minimize confusion. It is to be noted that during construction, the ramp terminal signals will operate close to capacity.
2. Elevate Egan Drive and build a new bridge, according to the Department's Proposed Action.
3. Open the ultimate interchange configuration at the end of Stage 2.

## Section 10 Final Report Chapter 7 Appendix

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### Appendix B: Cost Opinion and Quantities





# WEDCOR-Task 7

## Cost Opinion Summary, Proposed Action

ITEM	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
<b>ROADWAY COSTS</b>					
1	<b>EARTHWORK</b> Embankment	CU YD	655,213	\$7.00	\$ 4,586,000
2	<b>NEW PAVEMENT STRUCTURE</b>	SQ YD	422,406	\$18.00	\$ 7,603,000
3	<b>PAVEMENT REMOVAL</b>	SQ YD	422,406	\$2.00	\$ 845,000
4	<b>CONCRETE MEDIAN BARRIER</b>	L.F.	14,000	\$75.00	\$ 1,050,000
5	<b>GUARDRAIL</b>	L.F.	16,800	\$30.00	\$ 504,000
6	<b>DRAINAGE, Cross Culverts</b>	L.S.	5 % of Items 1-5	N/A	\$ 729,000
	<b>DRAINAGE, Storm Drain System</b>	L.S.	1	\$900,000.00	\$ 900,000
7	<b>CURB &amp; GUTTER</b>	L.F.	73041	\$20.00	\$ 1,461,000
8	<b>SIDEWALK</b>	SQ YD	44762	\$95.00	\$ 4,252,000
9	<b>LIGHTING SYSTEM</b>	L.S.	1	\$800,000.00	\$ 800,000
	<b>SIGNALIZATION</b>	L.S.	1	\$5,800,000.00	\$ 5,800,000
10	<b>SIGNING/PVM'T MARKINGS</b>	L.S.	5 % of Items 1-5	N/A	\$ 729,000
11	<b>FIELD OFFICE AND LABORATORY</b>	EA	1	\$25,000	\$ 25,000
12	<b>INCIDENTALS</b> Clearing, Fencing, Landscaping, Surveying, Slope Treatment, etc.	L.S.	20 % of Items 1-5	N/A	\$ 2,918,000
<b>Subtotal Roadway Costs (Items 1-12)</b>					\$ 32,202,000
<b>STRUCTURE COSTS</b>					
13	<b>NEW BRIDGES</b>				
	Deck Bulb Tee (140' max.)	SQ FT	53,668	\$200.00	\$ 10,734,000
	Steel Girder or Concrete Supergirders (200' max.)	SQ FT	29,110	\$250.00	\$ 7,278,000
	Steel Girder or Balanced Cantilever Segmental	SQ FT	33,095	\$320.00	\$ 10,590,000
14	<b>RETAINING WALLS</b>				
	Height >15'	SQ FT	51,250	\$40.00	\$ 2,050,000
15	<b>BRIDGE REMOVALS</b>	SQ FT	13,330	\$10.00	\$ 133,000
<b>Subtotal Structure Costs (Items 13-15)</b>					\$ 30,785,000
<b>Total Roadway and Structure Costs (Items 1-15)</b>					\$ 62,987,000
16	<b>MAINTENANCE OF TRAFFIC</b>	L.S.	5 % of Items 1-13	N/A	\$ 3,149,000
17	<b>MOBILIZATION</b>	L.S.	5 % of Items 1-13	N/A	\$ 3,149,000
18	<b>MITIGATION</b> Wetland, Noise, Detention, etc.				
19	<b>ROADWAY AND BRIDGE CONTINGENCY</b>	L.S.	10 % of items 1-13	N/A	\$ 6,299,000
<b>Total Construction Costs (Items 1-19)</b>					\$ 75,584,000
20	<b>TYPICAL UTILITIES</b>	L.S.	2 % of Items 1-13		\$ 1,260,000
21	<b>RIGHT-OF-WAY</b>	L.S.			\$ 9,916,028
22	<b>RELOCATIONS &amp; COMPENSATION</b>	VARIABLE			\$ -
<b>Program Costs (Items 1-22)</b>					\$ 86,760,028
23	<b>PHASE 2 ENGINEERING</b>	L.S.	7 % of Items 1-20	N/A	\$ 5,379,000
24	<b>PHASE 4 ENGINEERING (with ICAP)</b>	L.S.	15 % of Items 1-20	N/A	\$ 11,527,000
<b>Engineering Costs (Items 23-24)</b>					\$ 16,906,000
<b>TOTAL PROJECT COST</b>				say	\$ 103,667,000

# WEDCOR-Task 7

## Cost Opinion Summary, Industrial Blvd Relocation

ITEM	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
<b>ROADWAY COSTS</b>					
1	<b>EARTHWORK</b> Embankment	CU YD	10,000	\$7.00	\$ 70,000
2	<b>NEW PAVEMENT STRUCTURE</b>	SQ YD	10,146	\$18.00	\$ 183,000
3	<b>PAVEMENT REMOVAL</b>	SQ YD	10,146	\$2.00	\$ 20,000
4	<b>CONCRETE MEDIAN BARRIER</b>	L.F.	0	\$75.00	\$ -
5	<b>GUARDRAIL</b>	L.F.	0	\$30.00	\$ -
6	<b>DRAINAGE, Cross Culverts</b>	L.S.	5 % of Items 1-5	N/A	\$ 14,000
	<b>DRAINAGE, Storm Drain System</b>	L.S.	0	\$900,000.00	\$ -
7	<b>CURB &amp; GUTTER</b>	L.F.	4941	\$20.00	\$ 99,000
8	<b>SIDEWALK</b>	SQ YD	2066	\$95.00	\$ 196,000
9	<b>LIGHTING SYSTEM</b>	L.S.	0	\$800,000.00	\$ -
	<b>SIGNALIZATION</b>	L.S.	1	\$400,000.00	\$ 400,000
10	<b>SIGNING/PVM'T MARKINGS</b>	L.S.	5 % of Items 1-5	N/A	\$ 14,000
11	<b>FIELD OFFICE AND LABORATORY</b>	EA	1	\$25,000	\$ 25,000
12	<b>INCIDENTALS</b> Clearing, Fencing, Landscaping, Surveying, Slope Treatment, etc.	L.S.	20 % of Items 1-5	N/A	\$ 55,000
<b>Subtotal Roadway Costs (Items 1-12)</b>					\$ 1,076,000
<b>STRUCTURE COSTS</b>					
13	<b>NEW BRIDGES</b>				
	Deck Bulb Tee (140' max.)	SQ FT	0	\$200.00	\$ -
	Steel Girder or Concrete Supergirders (200' max.)	SQ FT	0	\$250.00	\$ -
	Steel Girder or Balanced Cantilever Segmental	SQ FT	0	\$320.00	\$ -
14	<b>RETAINING WALLS</b>				
	Height >15'	SQ FT	0	\$40.00	\$ -
15	<b>BRIDGE REMOVALS</b>	SQ FT	0	\$10.00	\$ -
<b>Subtotal Structure Costs (Items 13-15)</b>					\$ -
<b>Total Roadway and Structure Costs (Items 1-15)</b>					\$ 1,076,000
16	<b>MAINTENANCE OF TRAFFIC</b>	L.S.	5 % of Items 1-13	N/A	\$ 54,000
17	<b>MOBILIZATION</b>	L.S.	5 % of Items 1-13	N/A	\$ 54,000
18	<b>MITIGATION</b> Wetland, Noise, Detention, etc.				
19	<b>ROADWAY AND BRIDGE CONTINGENCY</b>	L.S.	10 % of items 1-13	N/A	\$ 108,000
<b>Total Construction Costs (Items 1-19)</b>					\$ 1,292,000
20	<b>TYPICAL UTILITIES</b>	L.S.	2 % of Items 1-13		\$ 22,000
21	<b>RIGHT-OF-WAY</b>	L.S.			\$ 741,180
22	<b>RELOCATIONS &amp; COMPENSATION</b>	VARIABLE			\$ -
<b>Program Costs (Items 1-22)</b>					\$ 2,055,180
23	<b>PHASE 2 ENGINEERING</b>	L.S.	7 % of Items 1-20	N/A	\$ 92,000
24	<b>PHASE 4 ENGINEERING (with ICAP)</b>	L.S.	15 % of Items 1-20	N/A	\$ 197,000
<b>Engineering Costs (Items 23-24)</b>					\$ 289,000
<b>TOTAL PROJECT COST</b>					say \$ 2,345,000

# WEDCOR-Task 7

## Cost Opinion Summary, Industrial Blvd Signal and Brotherhood Bridge

ITEM	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
<b>ROADWAY COSTS</b>					
1	<b>EARTHWORK</b> Embankment	CU YD	30,274	\$7.00	\$ 212,000
2	<b>NEW PAVEMENT STRUCTURE</b>	SQ YD	29,334	\$18.00	\$ 528,000
3	<b>PAVEMENT REMOVAL</b>	SQ YD	29,334	\$2.00	\$ 59,000
4	<b>CONCRETE MEDIAN BARRIER</b>	L.F.	0	\$75.00	\$ -
5	<b>GUARDRAIL</b>	L.F.	0	\$30.00	\$ -
6	<b>DRAINAGE, Cross Culverts</b>	L.S.	5 % of Items 1-5	N/A	\$ 40,000
	<b>DRAINAGE, Storm Drain System</b>	L.S.	0	\$900,000.00	\$ -
7	<b>CURB &amp; GUTTER</b>	L.F.	0	\$20.00	\$ -
8	<b>SIDEWALK</b>	SQ YD	1681	\$95.00	\$ 160,000
9	<b>LIGHTING SYSTEM</b>	L.S.	0.2	\$800,000.00	\$ 160,000
	<b>SIGNALIZATION</b>	L.S.	0	\$400,000.00	\$ -
10	<b>SIGNING/PVM'T MARKINGS</b>	L.S.	5 % of Items 1-5	N/A	\$ 40,000
11	<b>FIELD OFFICE AND LABORATORY</b>	EA	1	\$25,000	\$ 25,000
12	<b>INCIDENTALS</b> Clearing, Fencing, Landscaping, Surveying, Slope Treatment, etc.	L.S.	20 % of Items 1-5	N/A	\$ 160,000
<b>Subtotal Roadway Costs (Items 1-12)</b>					<b>\$ 1,384,000</b>
<b>STRUCTURE COSTS</b>					
13	<b>NEW BRIDGES</b>				
	Deck Bulb Tee (140' max.)	SQ FT	0	\$200.00	\$ -
	Steel Girder or Concrete Supergirders (200' max.)	SQ FT	0	\$250.00	\$ -
	Steel Girder or Balanced Cantilever Segmental	SQ FT	33,095	\$320.00	\$ 10,590,000
14	<b>RETAINING WALLS</b>				
	Height >15'	SQ FT	0	\$40.00	\$ -
15	<b>BRIDGE REMOVALS</b>	SQ FT	13,330	\$10.00	\$ 133,000
<b>Subtotal Structure Costs (Items 13-15)</b>					<b>\$ 10,723,000</b>
<b>Total Roadway and Structure Costs (Items 1-15)</b>					<b>\$ 12,107,000</b>
16	<b>MAINTENANCE OF TRAFFIC</b>	L.S.	5 % of Items 1-13	N/A	\$ 605,000
17	<b>MOBILIZATION</b>	L.S.	5 % of Items 1-13	N/A	\$ 605,000
18	<b>MITIGATION</b> Wetland, Noise, Detention, etc.				
19	<b>ROADWAY AND BRIDGE CONTINGENCY</b>	L.S.	10 % of items 1-13	N/A	\$ 1,211,000
<b>Total Construction Costs (Items 1-19)</b>					<b>\$ 14,528,000</b>
20	<b>TYPICAL UTILITIES</b>	L.S.	2 % of Items 1-13		\$ 242,000
21	<b>RIGHT-OF-WAY</b>	L.S.			\$ 442,050
22	<b>RELOCATIONS &amp; COMPENSATION</b>	VARIABLE			\$ -
<b>Program Costs (Items 1-22)</b>					<b>\$ 15,212,050</b>
23	<b>PHASE 2 ENGINEERING</b>	L.S.	7 % of Items 1-20	N/A	\$ 1,034,000
24	<b>PHASE 4 ENGINEERING (with ICAP)</b>	L.S.	15 % of Items 1-20	N/A	\$ 2,216,000
<b>Engineering Costs (Items 23-24)</b>					<b>\$ 3,250,000</b>
<b>TOTAL PROJECT COST</b>				say	<b>\$ 18,463,000</b>

# WEDCOR-Task 7

## Cost Opinion Summary, Yandukin Interchange

ITEM	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
<b>ROADWAY COSTS</b>					
1	<b>EARTHWORK</b> Embankment	CU YD	126,681	\$7.00	\$ 887,000
2	<b>NEW PAVEMENT STRUCTURE</b>	SQ YD	99,816	\$18.00	\$ 1,797,000
3	<b>PAVEMENT REMOVAL</b>	SQ YD	99,816	\$2.00	\$ 200,000
4	<b>CONCRETE MEDIAN BARRIER</b>	L.F.	5,000	\$75.00	\$ 375,000
5	<b>GUARDRAIL</b>	L.F.	3,400	\$30.00	\$ 102,000
6	<b>DRAINAGE, Cross Culverts</b>	L.S.	5 % of Items 1-5	N/A	\$ 168,000
	<b>DRAINAGE, Storm Drain System</b>	L.S.	0.25	\$900,000.00	\$ 225,000
7	<b>CURB &amp; GUTTER</b>	L.F.	15571	\$20.00	\$ 311,000
8	<b>SIDEWALK</b>	SQ YD	7624	\$95.00	\$ 724,000
9	<b>LIGHTING SYSTEM</b>	L.S.	0.2	\$800,000.00	\$ 160,000
	<b>SIGNALIZATION</b>	L.S.	1	\$900,000.00	\$ 900,000
10	<b>SIGNING/PVM'T MARKINGS</b>	L.S.	5 % of Items 1-5	N/A	\$ 168,000
11	<b>FIELD OFFICE AND LABORATORY</b>	EA	1	\$25,000	\$ 25,000
12	<b>INCIDENTALS</b> Clearing, Fencing, Landscaping, Surveying, Slope Treatment, etc.	L.S.	20 % of Items 1-5	N/A	\$ 672,000
<b>Subtotal Roadway Costs (Items 1-12)</b>					\$ 6,714,000
<b>STRUCTURE COSTS</b>					
13	<b>NEW BRIDGES</b>				
	Deck Bulb Tee (140' max.)	SQ FT	0	\$200.00	\$ -
	Steel Girder or Concrete Supergirders (200' max.)	SQ FT	13,925	\$250.00	\$ 3,481,000
	Steel Girder or Balanced Cantilever Segmental	SQ FT	0	\$320.00	\$ -
14	<b>RETAINING WALLS</b>				
	Height >15'	SQ FT	0	\$40.00	\$ -
15	<b>BRIDGE REMOVALS</b>	SQ FT	0	\$10.00	\$ -
<b>Subtotal Structure Costs (Items 13-15)</b>					\$ 3,481,000
<b>Total Roadway and Structure Costs (Items 1-15)</b>					\$ 10,195,000
16	<b>MAINTENANCE OF TRAFFIC</b>	L.S.	5 % of Items 1-13	N/A	\$ 510,000
17	<b>MOBILIZATION</b>	L.S.	5 % of Items 1-13	N/A	\$ 510,000
18	<b>MITIGATION</b> Wetland, Noise, Detention, etc.				
19	<b>ROADWAY AND BRIDGE CONTINGENCY</b>	L.S.	10 % of items 1-13	N/A	\$ 1,020,000
<b>Total Construction Costs (Items 1-19)</b>					\$ 12,235,000
20	<b>TYPICAL UTILITIES</b>	L.S.	2 % of Items 1-13		\$ 204,000
21	<b>RIGHT-OF-WAY</b>	L.S.			\$ 867,011
22	<b>RELOCATIONS &amp; COMPENSATION</b>	VARIABLE			\$ -
<b>Program Costs (Items 1-22)</b>					\$ 13,306,011
23	<b>PHASE 2 ENGINEERING</b>	L.S.	7 % of Items 1-20	N/A	\$ 871,000
24	<b>PHASE 4 ENGINEERING (with ICAP)</b>	L.S.	15 % of Items 1-20	N/A	\$ 1,866,000
<b>Engineering Costs (Items 23-24)</b>					\$ 2,737,000
<b>TOTAL PROJECT COST</b>					say \$ 16,044,000

# WEDCOR-Task 7

## Cost Opinion Summary, Vintage/Riverside/Mendenhall Loop Couplet

ITEM	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
<b>ROADWAY COSTS</b>					
1	<b>EARTHWORK</b> Embankment	CU YD	26,076	\$7.00	\$ 183,000
2	<b>NEW PAVEMENT STRUCTURE</b>	SQ YD	51,770	\$18.00	\$ 932,000
3	<b>PAVEMENT REMOVAL</b>	SQ YD	51,770	\$2.00	\$ 104,000
4	<b>CONCRETE MEDIAN BARRIER</b>	L.F.	0	\$75.00	\$ -
5	<b>GUARDRAIL</b>	L.F.	0	\$30.00	\$ -
6	<b>DRAINAGE, Cross Culverts</b>	L.S.	5 % of Items 1-5	N/A	\$ 61,000
	<b>DRAINAGE, Storm Drain System</b>	L.S.	0	\$900,000.00	\$ -
7	<b>CURB &amp; GUTTER</b>	L.F.	14697	\$20.00	\$ 294,000
8	<b>SIDEWALK</b>	SQ YD	10511	\$95.00	\$ 999,000
9	<b>LIGHTING SYSTEM</b>	L.S.	0	\$800,000.00	\$ -
	<b>SIGNALIZATION</b>	L.S.	1	\$1,300,000.00	\$ 1,300,000
10	<b>SIGNING/PVM'T MARKINGS</b>	L.S.	5 % of Items 1-5	N/A	\$ 61,000
11	<b>FIELD OFFICE AND LABORATORY</b>	EA	1	\$25,000	\$ 25,000
12	<b>INCIDENTALS</b> Clearing, Fencing, Landscaping, Surveying, Slope Treatment, etc.	L.S.	20 % of Items 1-5	N/A	\$ 244,000
<b>Subtotal Roadway Costs (Items 1-12)</b>					\$ 4,203,000
<b>STRUCTURE COSTS</b>					
13	<b>NEW BRIDGES</b>				
	Deck Bulb Tee (140' max.)	SQ FT	0	\$200.00	\$ -
	Steel Girder or Concrete Supergirders (200' max.)	SQ FT	0	\$250.00	\$ -
	Steel Girder or Balanced Cantilever Segmental	SQ FT	0	\$320.00	\$ -
14	<b>RETAINING WALLS</b>				
	Height >15'	SQ FT	2,500	\$40.00	\$ 100,000
15	<b>BRIDGE REMOVALS</b>	SQ FT	0	\$10.00	\$ -
<b>Subtotal Structure Costs (Items 13-15)</b>					\$ 100,000
<b>Total Roadway and Structure Costs (Items 1-15)</b>					\$ 4,303,000
16	<b>MAINTENANCE OF TRAFFIC</b>	L.S.	5 % of Items 1-13	N/A	\$ 215,000
17	<b>MOBILIZATION</b>	L.S.	5 % of Items 1-13	N/A	\$ 215,000
18	<b>MITIGATION</b> Wetland, Noise, Detention, etc.				
19	<b>ROADWAY AND BRIDGE CONTINGENCY</b>	L.S.	10 % of items 1-13	N/A	\$ 430,000
<b>Total Construction Costs (Items 1-19)</b>					\$ 5,163,000
20	<b>TYPICAL UTILITIES</b>	L.S.	2 % of Items 1-13		\$ 86,000
21	<b>RIGHT-OF-WAY</b>	L.S.			\$ 3,354,218
22	<b>RELOCATIONS &amp; COMPENSATION</b>	VARIABLE			\$ -
<b>Program Costs (Items 1-22)</b>					\$ 8,603,218
23	<b>PHASE 2 ENGINEERING</b>	L.S.	7 % of Items 1-20	N/A	\$ 367,000
24	<b>PHASE 4 ENGINEERING (with ICAP)</b>	L.S.	15 % of Items 1-20	N/A	\$ 787,000
<b>Engineering Costs (Items 23-24)</b>					\$ 1,154,000
<b>TOTAL PROJECT COST</b>					say \$ 9,758,000

# WEDCOR-Task 7

## Cost Opinion Summary, Mendenhall Loop/Glacier Hwy Signal

ITEM	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
<b>ROADWAY COSTS</b>					
1	<b>EARTHWORK</b> Embankment	CU YD	2,000	\$7.00	\$ 14,000
2	<b>NEW PAVEMENT STRUCTURE</b>	SQ YD	1,180	\$18.00	\$ 21,000
3	<b>PAVEMENT REMOVAL</b>	SQ YD	1,180	\$2.00	\$ 2,000
4	<b>CONCRETE MEDIAN BARRIER</b>	L.F.	0	\$75.00	\$ -
5	<b>GUARDRAIL</b>	L.F.	0	\$30.00	\$ -
6	<b>DRAINAGE, Cross Culverts</b>	L.S.	5 % of Items 1-5	N/A	\$ 2,000
	<b>DRAINAGE, Storm Drain System</b>	L.S.	0	\$900,000.00	\$ -
7	<b>CURB &amp; GUTTER</b>	L.F.	521	\$20.00	\$ 10,000
8	<b>SIDEWALK</b>	SQ YD	145	\$95.00	\$ 14,000
9	<b>LIGHTING SYSTEM</b>	L.S.	0	\$800,000.00	\$ -
	<b>SIGNALIZATION</b>	L.S.	1	\$400,000.00	\$ 400,000
10	<b>SIGNING/PVM'T MARKINGS</b>	L.S.	5 % of Items 1-5	N/A	\$ 2,000
11	<b>FIELD OFFICE AND LABORATORY</b>	EA	1	\$25,000	\$ 25,000
12	<b>INCIDENTALS</b> Clearing, Fencing, Landscaping, Surveying, Slope Treatment, etc.	L.S.	20 % of Items 1-5	N/A	\$ 7,000
<b>Subtotal Roadway Costs (Items 1-12)</b>					\$ 497,000
<b>STRUCTURE COSTS</b>					
13	<b>NEW BRIDGES</b>				
	Deck Bulb Tee (140' max.)	SQ FT	0	\$200.00	\$ -
	Steel Girder or Concrete Supergirders (200' max.)	SQ FT	0	\$250.00	\$ -
	Steel Girder or Balanced Cantilever Segmental	SQ FT	0	\$320.00	\$ -
14	<b>RETAINING WALLS</b>				
	Height >15'	SQ FT	0	\$40.00	\$ -
15	<b>BRIDGE REMOVALS</b>	SQ FT	0	\$10.00	\$ -
<b>Subtotal Structure Costs (Items 13-15)</b>					\$ -
<b>Total Roadway and Structure Costs (Items 1-15)</b>					\$ 497,000
16	<b>MAINTENANCE OF TRAFFIC</b>	L.S.	5 % of Items 1-13	N/A	\$ 25,000
17	<b>MOBILIZATION</b>	L.S.	5 % of Items 1-13	N/A	\$ 25,000
18	<b>MITIGATION</b> Wetland, Noise, Detention, etc.				
19	<b>ROADWAY AND BRIDGE CONTINGENCY</b>	L.S.	10 % of items 1-13	N/A	\$ 50,000
<b>Total Construction Costs (Items 1-19)</b>					\$ 597,000
20	<b>TYPICAL UTILITIES</b>	L.S.	2 % of Items 1-13		\$ 10,000
21	<b>RIGHT-OF-WAY</b>	L.S.			\$ -
22	<b>RELOCATIONS &amp; COMPENSATION</b>	VARIABLE			\$ -
<b>Program Costs (Items 1-22)</b>					\$ 607,000
23	<b>PHASE 2 ENGINEERING</b>	L.S.	7 % of Items 1-20	N/A	\$ 42,000
24	<b>PHASE 4 ENGINEERING (with ICAP)</b>	L.S.	15 % of Items 1-20	N/A	\$ 91,000
<b>Engineering Costs (Items 23-24)</b>					\$ 133,000
<b>TOTAL PROJECT COST</b>					say \$ 740,000

# WEDCOR-Task 7

## Cost Opinion Summary, McNugget Interchange

ITEM	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
<b>ROADWAY COSTS</b>					
1	<b>EARTHWORK</b> Embankment	CU YD	131,542	\$7.00	\$ 921,000
2	<b>NEW PAVEMENT STRUCTURE</b>	SQ YD	61,300	\$18.00	\$ 1,103,000
3	<b>PAVEMENT REMOVAL</b>	SQ YD	61,300	\$2.00	\$ 123,000
4	<b>CONCRETE MEDIAN BARRIER</b>	L.F.	3,700	\$75.00	\$ 278,000
5	<b>GUARDRAIL</b>	L.F.	3,600	\$30.00	\$ 108,000
6	<b>DRAINAGE, Cross Culverts</b>	L.S.	5 % of Items 1-5	N/A	\$ 127,000
	<b>DRAINAGE, Storm Drain System</b>	L.S.	0.25	\$900,000.00	\$ 225,000
7	<b>CURB &amp; GUTTER</b>	L.F.	7423	\$20.00	\$ 148,000
8	<b>SIDEWALK</b>	SQ YD	2666	\$95.00	\$ 253,000
9	<b>LIGHTING SYSTEM</b>	L.S.	0.2	\$800,000.00	\$ 160,000
	<b>SIGNALIZATION</b>	L.S.	1	\$700,000.00	\$ 700,000
10	<b>SIGNING/PVM'T MARKINGS</b>	L.S.	5 % of Items 1-5	N/A	\$ 127,000
11	<b>FIELD OFFICE AND LABORATORY</b>	EA	1	\$25,000	\$ 25,000
12	<b>INCIDENTALS</b> Clearing, Fencing, Landscaping, Surveying, Slope Treatment, etc.	L.S.	20 % of Items 1-5	N/A	\$ 507,000
<b>Subtotal Roadway Costs (Items 1-12)</b>					\$ 4,805,000
<b>STRUCTURE COSTS</b>					
13	<b>NEW BRIDGES</b>				
	Deck Bulb Tee (140' max.)	SQ FT	12,323	\$200.00	\$ 2,465,000
	Steel Girder or Concrete Supergirders (200' max.)	SQ FT	0	\$250.00	\$ -
	Steel Girder or Balanced Cantilever Segmental	SQ FT	0	\$320.00	\$ -
14	<b>RETAINING WALLS</b>				
	Height >15'	SQ FT	0	\$40.00	\$ -
15	<b>BRIDGE REMOVALS</b>	SQ FT	0	\$10.00	\$ -
<b>Subtotal Structure Costs (Items 13-15)</b>					\$ 2,465,000
<b>Total Roadway and Structure Costs (Items 1-15)</b>					\$ 7,270,000
16	<b>MAINTENANCE OF TRAFFIC</b>	L.S.	5 % of Items 1-13	N/A	\$ 364,000
17	<b>MOBILIZATION</b>	L.S.	5 % of Items 1-13	N/A	\$ 364,000
18	<b>MITIGATION</b> Wetland, Noise, Detention, etc.				
19	<b>ROADWAY AND BRIDGE CONTINGENCY</b>	L.S.	10 % of items 1-13	N/A	\$ 727,000
<b>Total Construction Costs (Items 1-19)</b>					\$ 8,725,000
20	<b>TYPICAL UTILITIES</b>	L.S.	2 % of Items 1-13		\$ 145,000
21	<b>RIGHT-OF-WAY</b>	L.S.			\$ 1,639,755
22	<b>RELOCATIONS &amp; COMPENSATION</b>	VARIABLE			\$ -
<b>Program Costs (Items 1-22)</b>					\$ 10,509,755
23	<b>PHASE 2 ENGINEERING</b>	L.S.	7 % of Items 1-20	N/A	\$ 621,000
24	<b>PHASE 4 ENGINEERING (with ICAP)</b>	L.S.	15 % of Items 1-20	N/A	\$ 1,331,000
<b>Engineering Costs (Items 23-24)</b>					\$ 1,952,000
<b>TOTAL PROJECT COST</b>					say \$ 12,462,000

# WEDCOR-Task 7

## Cost Opinion Summary, Mendenhall Loop/Glacier Hwy Widening

ITEM	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
<b>ROADWAY COSTS</b>					
1	<b>EARTHWORK</b> Embankment	CU YD	10,000	\$7.00	\$ 70,000
2	<b>NEW PAVEMENT STRUCTURE</b>	SQ YD	115,456	\$18.00	\$ 2,078,000
3	<b>PAVEMENT REMOVAL</b>	SQ YD	115,456	\$2.00	\$ 231,000
4	<b>CONCRETE MEDIAN BARRIER</b>	L.F.	0	\$75.00	\$ -
5	<b>GUARDRAIL</b>	L.F.	0	\$30.00	\$ -
6	<b>DRAINAGE, Cross Culverts</b>	L.S.	5 % of Items 1-5	N/A	\$ 119,000
	<b>DRAINAGE, Storm Drain System</b>	L.S.	0	\$900,000.00	\$ -
7	<b>CURB &amp; GUTTER</b>	L.F.	29889	\$20.00	\$ 598,000
8	<b>SIDEWALK</b>	SQ YD	20069	\$95.00	\$ 1,907,000
9	<b>LIGHTING SYSTEM</b>	L.S.	0	\$800,000.00	\$ -
	<b>SIGNALIZATION</b>	L.S.	1	\$2,100,000.00	\$ 2,100,000
10	<b>SIGNING/PVM'T MARKINGS</b>	L.S.	5 % of Items 1-5	N/A	\$ 119,000
11	<b>FIELD OFFICE AND LABORATORY</b>	EA	1	\$25,000	\$ 25,000
12	<b>INCIDENTALS</b> Clearing, Fencing, Landscaping, Surveying, Slope Treatment, etc.	L.S.	20 % of Items 1-5	N/A	\$ 476,000
<b>Subtotal Roadway Costs (Items 1-12)</b>					\$ 7,723,000
<b>STRUCTURE COSTS</b>					
13	<b>NEW BRIDGES</b>				
	Deck Bulb Tee (140' max.)	SQ FT	0	\$200.00	\$ -
	Steel Girder or Concrete Supergirders (200' max.)	SQ FT	0	\$250.00	\$ -
	Steel Girder or Balanced Cantilever Segmental	SQ FT	0	\$320.00	\$ -
14	<b>RETAINING WALLS</b>				
	Height >15'	SQ FT	0	\$40.00	\$ -
15	<b>BRIDGE REMOVALS</b>	SQ FT	0	\$10.00	\$ -
<b>Subtotal Structure Costs (Items 13-15)</b>					\$ -
<b>Total Roadway and Structure Costs (Items 1-15)</b>					\$ 7,723,000
16	<b>MAINTENANCE OF TRAFFIC</b>	L.S.	5 % of Items 1-13	N/A	\$ 386,000
17	<b>MOBILIZATION</b>	L.S.	5 % of Items 1-13	N/A	\$ 386,000
18	<b>MITIGATION</b> Wetland, Noise, Detention, etc.				
19	<b>ROADWAY AND BRIDGE CONTINGENCY</b>	L.S.	10 % of items 1-13	N/A	\$ 772,000
<b>Total Construction Costs (Items 1-19)</b>					\$ 9,267,000
20	<b>TYPICAL UTILITIES</b>	L.S.	2 % of Items 1-13		\$ 154,000
21	<b>RIGHT-OF-WAY</b>	L.S.			\$ 2,871,815
22	<b>RELOCATIONS &amp; COMPENSATION</b>	VARIABLE			\$ -
<b>Program Costs (Items 1-22)</b>					\$ 12,292,815
23	<b>PHASE 2 ENGINEERING</b>	L.S.	7 % of Items 1-20	N/A	\$ 659,000
24	<b>PHASE 4 ENGINEERING (with ICAP)</b>	L.S.	15 % of Items 1-20	N/A	\$ 1,413,000
<b>Engineering Costs (Items 23-24)</b>					\$ 2,072,000
<b>TOTAL PROJECT COST</b>					say \$ 14,365,000



# WEDCOR-Task 7

## Cost Opinion Summary, Elevate Egan Drive

ITEM	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
<b>ROADWAY COSTS</b>					
1	<b>EARTHWORK</b> Embankment	CU YD	273,072	\$7.00	\$ 1,912,000
2	<b>NEW PAVEMENT STRUCTURE</b>	SQ YD	42,837	\$18.00	\$ 771,000
3	<b>PAVEMENT REMOVAL</b>	SQ YD	42,837	\$2.00	\$ 86,000
4	<b>CONCRETE MEDIAN BARRIER</b>	L.F.	4,300	\$75.00	\$ 323,000
5	<b>GUARDRAIL</b>	L.F.	7,000	\$30.00	\$ 210,000
6	<b>DRAINAGE, Cross Culverts</b>	L.S.	5 % of Items 1-5	N/A	\$ 165,000
	<b>DRAINAGE, Storm Drain System</b>	L.S.	0.5	\$900,000.00	\$ 450,000
7	<b>CURB &amp; GUTTER</b>	L.F.	0	\$20.00	\$ -
8	<b>SIDEWALK</b>	SQ YD	0	\$95.00	\$ -
9	<b>LIGHTING SYSTEM</b>	L.S.	0.4	\$800,000.00	\$ 320,000
	<b>SIGNALIZATION</b>	L.S.	1	\$0.00	\$ -
10	<b>SIGNING/PVM'T MARKINGS</b>	L.S.	5 % of Items 1-5	N/A	\$ 165,000
11	<b>FIELD OFFICE AND LABORATORY</b>	EA	1	\$25,000	\$ 25,000
12	<b>INCIDENTALS</b> Clearing, Fencing, Landscaping, Surveying, Slope Treatment, etc.	L.S.	20 % of Items 1-5	N/A	\$ 660,000
<b>Subtotal Roadway Costs (Items 1-12)</b>					\$ 5,087,000
<b>STRUCTURE COSTS</b>					
13	<b>NEW BRIDGES</b>				
	Deck Bulb Tee (140' max.)	SQ FT	35,706	\$200.00	\$ 7,141,000
	Steel Girder or Concrete Supergirders (200' max.)	SQ FT	15,185	\$250.00	\$ 3,796,000
	Steel Girder or Balanced Cantilever Segmental	SQ FT	0	\$320.00	\$ -
14	<b>RETAINING WALLS</b>				
	Height >15'	SQ FT	12,300	\$40.00	\$ 492,000
15	<b>BRIDGE REMOVALS</b>	SQ FT	0	\$10.00	\$ -
<b>Subtotal Structure Costs (Items 13-15)</b>					\$ 11,429,000
<b>Total Roadway and Structure Costs (Items 1-15)</b>					\$ 16,516,000
16	<b>MAINTENANCE OF TRAFFIC</b>	L.S.	5 % of Items 1-13	N/A	\$ 826,000
17	<b>MOBILIZATION</b>	L.S.	5 % of Items 1-13	N/A	\$ 826,000
18	<b>MITIGATION</b> Wetland, Noise, Detention, etc.				
19	<b>ROADWAY AND BRIDGE CONTINGENCY</b>	L.S.	10 % of items 1-13	N/A	\$ 1,652,000
<b>Total Construction Costs (Items 1-19)</b>					\$ 19,820,000
20	<b>TYPICAL UTILITIES</b>	L.S.	2 % of Items 1-13		\$ 330,000
21	<b>RIGHT-OF-WAY</b>	L.S.			\$ -
22	<b>RELOCATIONS &amp; COMPENSATION</b>	VARIABLE			\$ -
<b>Program Costs (Items 1-22)</b>					\$ 20,150,000
23	<b>PHASE 2 ENGINEERING</b>	L.S.	7 % of Items 1-20	N/A	\$ 1,411,000
24	<b>PHASE 4 ENGINEERING (with ICAP)</b>	L.S.	15 % of Items 1-20	N/A	\$ 3,023,000
<b>Engineering Costs (Items 23-24)</b>					\$ 4,434,000
<b>TOTAL PROJECT COST</b>					say \$ 24,584,000

# WEDCOR-Task 7

## Cost Opinion Summary, Egan Dr Ramps

ITEM	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
<b>ROADWAY COSTS</b>					
1	<b>EARTHWORK</b> Embankment	CU YD	67,109	\$7.00	\$ 470,000
2	<b>NEW PAVEMENT STRUCTURE</b>	SQ YD	10,610	\$18.00	\$ 191,000
3	<b>PAVEMENT REMOVAL</b>	SQ YD	10,610	\$2.00	\$ 21,000
4	<b>CONCRETE MEDIAN BARRIER</b>	L.F.	1,000	\$75.00	\$ 75,000
5	<b>GUARDRAIL</b>	L.F.	2,800	\$30.00	\$ 84,000
6	<b>DRAINAGE, Cross Culverts</b>	L.S.	5 % of Items 1-5	N/A	\$ 42,000
	<b>DRAINAGE, Storm Drain System</b>	L.S.	0	\$900,000.00	\$ -
7	<b>CURB &amp; GUTTER</b>	L.F.	0	\$20.00	\$ -
8	<b>SIDEWALK</b>	SQ YD	0	\$95.00	\$ -
9	<b>LIGHTING SYSTEM</b>	L.S.	0	\$800,000.00	\$ -
	<b>SIGNALIZATION</b>	L.S.	1	\$600,000.00	\$ 600,000
10	<b>SIGNING/PVM'T MARKINGS</b>	L.S.	5 % of Items 1-5	N/A	\$ 42,000
11	<b>FIELD OFFICE AND LABORATORY</b>	EA	1	\$25,000	\$ 25,000
12	<b>INCIDENTALS</b> Clearing, Fencing, Landscaping, Surveying, Slope Treatment, etc.	L.S.	20 % of Items 1-5	N/A	\$ 168,000
<b>Subtotal Roadway Costs (Items 1-12)</b>					<b>\$ 1,718,000</b>
<b>STRUCTURE COSTS</b>					
13	<b>NEW BRIDGES</b>				
	Deck Bulb Tee (140' max.)	SQ FT	5,639	\$200.00	\$ 1,128,000
	Steel Girder or Concrete Supergirders (200' max.)	SQ FT	0	\$250.00	\$ -
	Steel Girder or Balanced Cantilever Segmental	SQ FT	0	\$320.00	\$ -
14	<b>RETAINING WALLS</b>				
	Height >15'	SQ FT	36,450	\$40.00	\$ 1,458,000
15	<b>BRIDGE REMOVALS</b>	SQ FT	0	\$10.00	\$ -
<b>Subtotal Structure Costs (Items 13-15)</b>					<b>\$ 2,586,000</b>
<b>Total Roadway and Structure Costs (Items 1-15)</b>					<b>\$ 4,304,000</b>
16	<b>MAINTENANCE OF TRAFFIC</b>	L.S.	5 % of Items 1-13	N/A	\$ 215,000
17	<b>MOBILIZATION</b>	L.S.	5 % of Items 1-13	N/A	\$ 215,000
18	<b>MITIGATION</b> Wetland, Noise, Detention, etc.				
19	<b>ROADWAY AND BRIDGE CONTINGENCY</b>	L.S.	10 % of items 1-13	N/A	\$ 430,000
<b>Total Construction Costs (Items 1-19)</b>					<b>\$ 5,164,000</b>
20	<b>TYPICAL UTILITIES</b>	L.S.	2 % of Items 1-13		\$ 86,000
21	<b>RIGHT-OF-WAY</b>	L.S.			\$ -
22	<b>RELOCATIONS &amp; COMPENSATION</b>	VARIABLE			\$ -
<b>Program Costs (Items 1-22)</b>					<b>\$ 5,250,000</b>
23	<b>PHASE 2 ENGINEERING</b>	L.S.	7 % of Items 1-20	N/A	\$ 368,000
24	<b>PHASE 4 ENGINEERING (with ICAP)</b>	L.S.	15 % of Items 1-20	N/A	\$ 788,000
<b>Engineering Costs (Items 23-24)</b>					<b>\$ 1,156,000</b>
<b>TOTAL PROJECT COST</b>				say	<b>\$ 6,406,000</b>

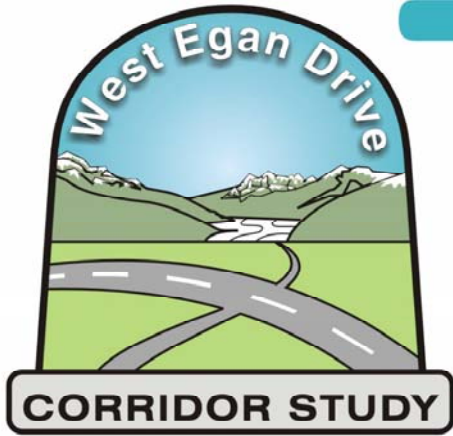
**Section 10 Final Report Chapter 7 Appendix**

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Appendix C: Traffic Operations Analysis



## West Egan Drive Corridor Study



### Interim Action Traffic Operations Analysis (Appendix C to Memo 7)

May 2003

Kittelson & Associates, Inc.  
in association with CH2M Hill,  
Cogan Owens Cogan, and Southeast Strategies

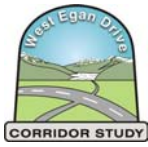
### INTRODUCTION

This memo documents the results of the 2015 a.m. and p.m. peak hour traffic operations analysis performed on the proposed interim concept. The traffic operations analysis considers 2015 a.m. and p.m. peak hour capacity, intersection level of service, and queuing conditions assuming the interim plan has been constructed as described below:

- **Industrial Boulevard/Egan Drive** – Relocate the intersection west of its current location to a new location opposite Wildmeadow Lane. The intersection will be signalized.
- **Vintage Boulevard to Mendenhall Loop Road on Egan Drive** – Construct frontage roads on the north and south side of Egan Drive. Egan Drive traffic will be divided between a pair of one-way frontage roads, with westbound traffic on the north side of Egan Drive and eastbound traffic on the south side of Egan Drive. This also includes extending Riverside Drive; closing off Glacier Highway (North) at Egan Drive; converting Vintage Boulevard/Egan Drive to a right-in-right-out only intersection and; relocating the Hurlock Avenue access; and closing Del Rae Road at Mendenhall Loop Road.
- **Yandukin Drive/Egan Drive** – Full movement interchange is constructed.
- **Glacier Highway (Airport)/Egan Drive** – No changes are made at this intersection.
- **Glacier Highway (Airport)/Mendenhall Loop Road/Glacier Highway (North)** - This intersection will be signalized

The forecast a.m. and p.m. peak hour 2015 traffic volumes are presented in Figures 1 and 2, respectively. These forecasts were achieved through the following process:

- Develop a growth factor based on a straight-line interpolation to 2015 between the existing weekday a.m. and p.m. peak hour and the 2025 no-build weekday a.m. and p.m. peak hour.
- Apply the weekday a.m. and p.m. peak hour growth factor to the existing traffic volumes.



- Re-assign the resulting 2015 traffic volumes to the interim network as proposed above using the results of the origin-destination survey conducted as part of Task 3

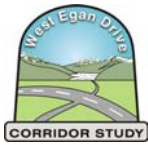
### **ANALYSIS OF THE INTERIM ACTION**

As described above, the lane configurations and traffic control devices identified for the interim action have been designed to provide Level of Service (LOS) D or better operating conditions and an intersection volume-to-capacity ratio less than or equal to 0.90, except where noted. Though ADOT&PF design guidelines strive for LOS C conditions, LOS D is considered generally acceptable at signalized intersections. A tabular summary of forecast 2015 weekday a.m. and p.m. peak hour traffic operating conditions for the interim action is included in Table 1. The traffic operations calculation work sheets are included as Appendix A. The proposed interim action lane configurations are shown in Figure 3

The evaluation also includes a study of 95th-percentile vehicle queue lengths at critical study intersections where queuing may be of concern because of close intersection spacing, or where travel demand is high and it is essential to confirm that adequate vehicle storage is provided. A 95th-percentile queue represents a standard design threshold that is used to ensure that turn lanes are sized properly and that intersections are spaced appropriately. In broad terms, queues will be no longer than the 95th-percentile queue for 95 percent of the signal cycles during the peak hour.

#### *Interim Action – Major System Features*

- Construct one-way frontage roads with at-grade intersections on the north and south side of Egan Drive between the intersections of Vintage Boulevard/Egan Drive, Riverside Drive/Egan Drive, and Mendenhall Loop Road/Egan Drive. Egan Drive traffic will be divided between the pair of one-way frontage roads, with westbound traffic on the north and eastbound traffic on the south side of Egan Drive. The Vintage Boulevard/Egan Drive intersection will be limited to a right-in-right-out only on the westbound frontage road.
- The Glacier Highway (Airport)/Egan Drive intersection remains an at-grade intersection with the current lane configurations and traffic control.
- The Yandukin Drive/Egan Drive intersection is relocated east and converted to a traditional diamond interchange with full access for all movements.
- Industrial Boulevard is relocated to the west opposite Wildmeadow Lane and a traffic signal is installed.
- Riverside Drive is extended south from Egan Drive and aligned with Glacier Highway (north). Glacier Highway (North) no longer connects to Egan Drive at Vintage Boulevard.
- Access to/from Hurlock Avenue via Mendenhall Loop Road would be replaced by a new access to Mendenhall Loop Road opposite the existing Del Rae Road intersection.



- Del Rae Road would form a cul-de-sac (eliminating the Del Rae Road/Mendenhall Loop Road Extension intersection) and be re-aligned to intersect with Glacier Highway (North) south of the current intersection.

#### *Interim Action Facility Needs*

- Egan Drive is divided into two one-way roads acting as a one-way couplet from Vintage Boulevard to Mendenhall Loop Road. Each road would have two through lanes and varying turn lanes. All intersections are at-grade and signalized with the exception of Vintage Boulevard, which is unsignalized.
- Glacier Highway (Airport) from Old Dairy Road to the Mendenhall Loop Road interchange becomes a five-lane roadway.
- Right turns from Egan Drive to northbound Mendenhall Loop Road are no longer free flowing; they would be controlled by traffic signals.
- Riverside Drive is a four-lane roadway north of Egan Drive (two through lanes northbound, one through lane southbound, plus center left turn lane) to James Boulevard where Riverside Drive would return to a two-lane facility.

#### **Traffic Operations**

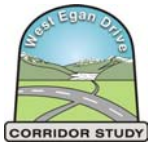
Some notable operational elements of the interim action are identified below:

#### *Capacity and Delay*

- All but one of the signalized intersections have been designed to operate at Level of Service (LOS) D or better and a volume-to-capacity ratio of 0.90 or better during both the weekday a.m. and p.m. peak hour (all signals operate at LOS C or better during the weekday p.m. peak hour). The exception is Egan Drive/Glacier Highway (airport), which is expected to operate at an acceptable LOS D and volume-to-capacity ratio of 0.93 during the weekday a.m. peak hour and 0.91 during the weekday p.m. peak hour. This occurs because the Interim Action assumes no modifications at this intersection.

Intersection modifications were considered at this location; however, the traffic operations analysis revealed that the additional travel options provided with construction of the Yandukin Drive/Egan Drive interchange sufficiently extends the life of the intersection of Glacier Highway (Airport)/Egan Drive to allow ADOT&PF to delay modifications at the Glacier Highway (Airport)/Egan Drive intersection. Therefore it is recommended that following construction of the Yandukin interchange, traffic operations are monitored at the intersection of Glacier Highway (Airport)/Egan Drive to assess the need for modifications to the existing traffic control.

- At the Glacier Highway (Airport)/Berners Avenue intersection the delay experienced by the northbound left-turning vehicles during the peak hours results in LOS E during the a.m. peak and LOS F during the p.m. peak. However, the northbound left-turn volume is light (during both peak hours), and alternative routes to Glacier Highway are available.
- At the Glacier Highway (North)/Del Rae Road intersection the delay experienced by the westbound (side street) vehicles due to the relatively high volume of northbound and



southbound through traffic results in LOS D conditions during the p.m. peak hour. However, the westbound volumes are very low and do not warrant any additional lanes or traffic control.

### *Queuing*

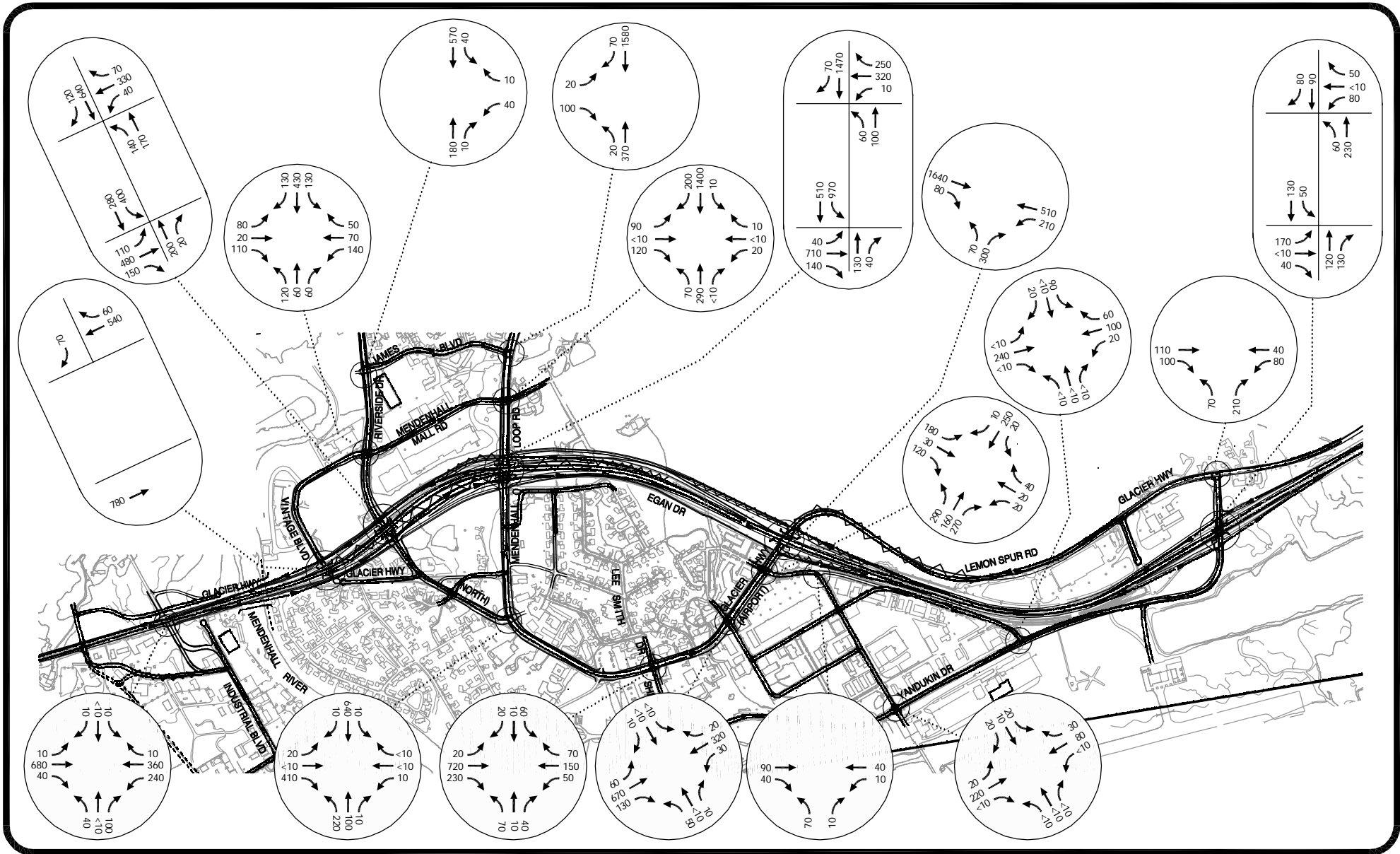
The design accommodates the forecasted vehicle queuing needs with the exception of the Eastbound Egan Drive/Mendenhall Loop Road intersection. During the a.m. peak hour the southbound left-turn movement at this intersection will spill north through the Westbound Egan Drive/Mendenhall Loop Road intersection. This queue is expected to occur on a green indication and therefore is not likely to have a lasting impact during the peak hour.

In general, the signal timing along Mendenhall Loop Road and Riverside Drive at the Egan Drive intersections will need to be carefully developed and closely monitored. Separate time of day plans will be needed to accommodate the variations in traffic flow throughout the day. Pretimed operation should be considered during the weekday a.m. and p.m. peak periods to create consistent, regular operations through the intersections and minimize queuing between intersections.

### *Weaving Sections*

There are no weaving sections in the Interim Action.





Kittelson & Associates, Inc. in association with CH2M Hill, Cogan Owens Cogan and Southeast Strategies

## INTERIM ACTION WEEKDAY AM PEAK HOUR TRAFFIC VOLUMES

### West Egan Drive Corridor Study

Alaska Department of Transportation & Public Facilities

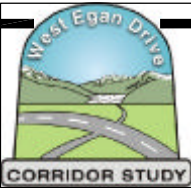
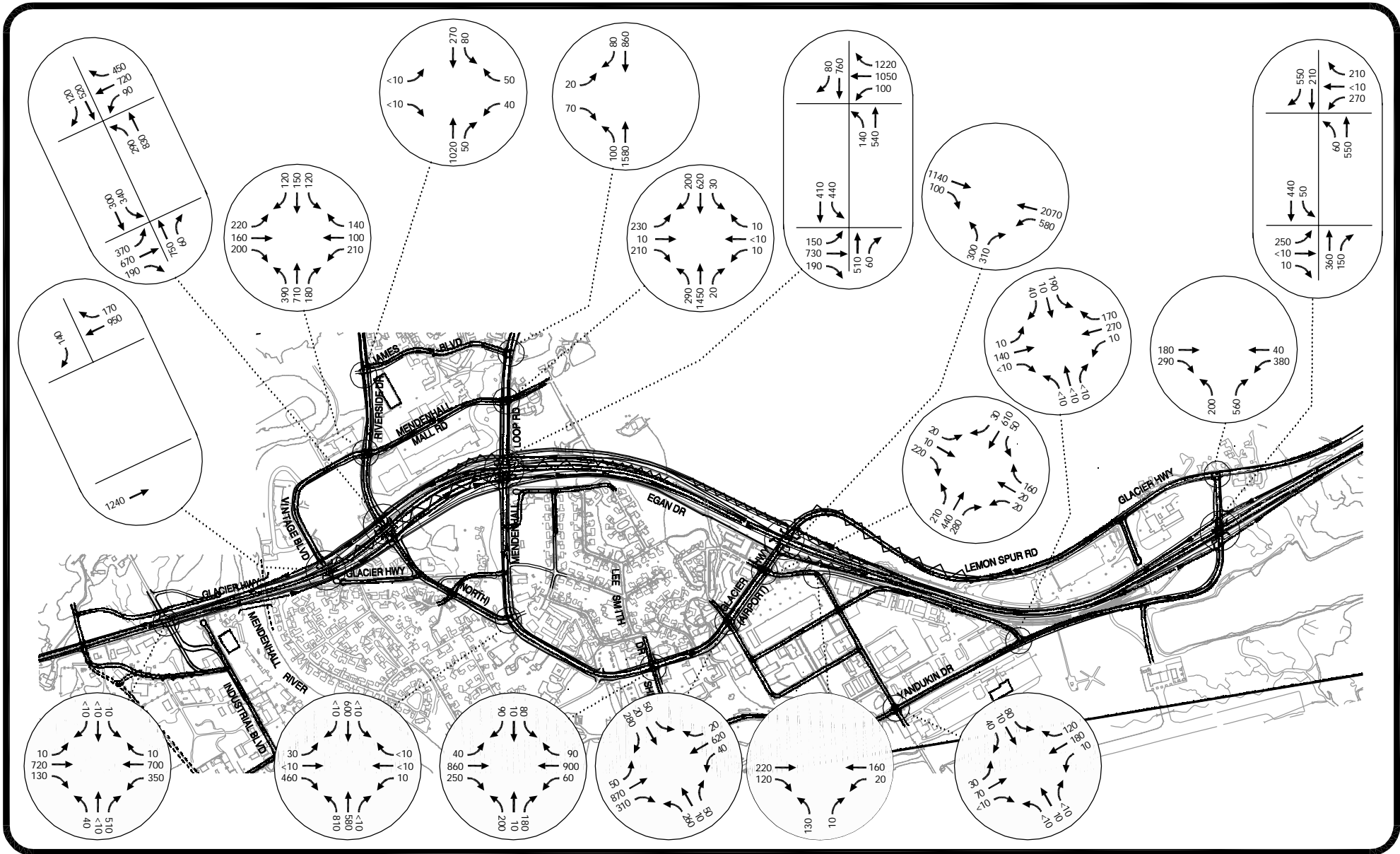


DATE  
MAY 2003

FIGURE  
1

4978DWG5/TASK-6/INTERIM\_ACTION



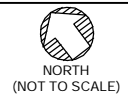


**CORRIDOR STUDY**  
Kittelson & Associates, Inc. in association with CH2M Hill, Cogan Owens Cogan and Southeast Strategies

## INTERIM ACTION WEEKDAY PM PEAK HOUR TRAFFIC VOLUMES

### West Egan Drive Corridor Study

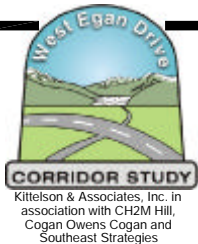
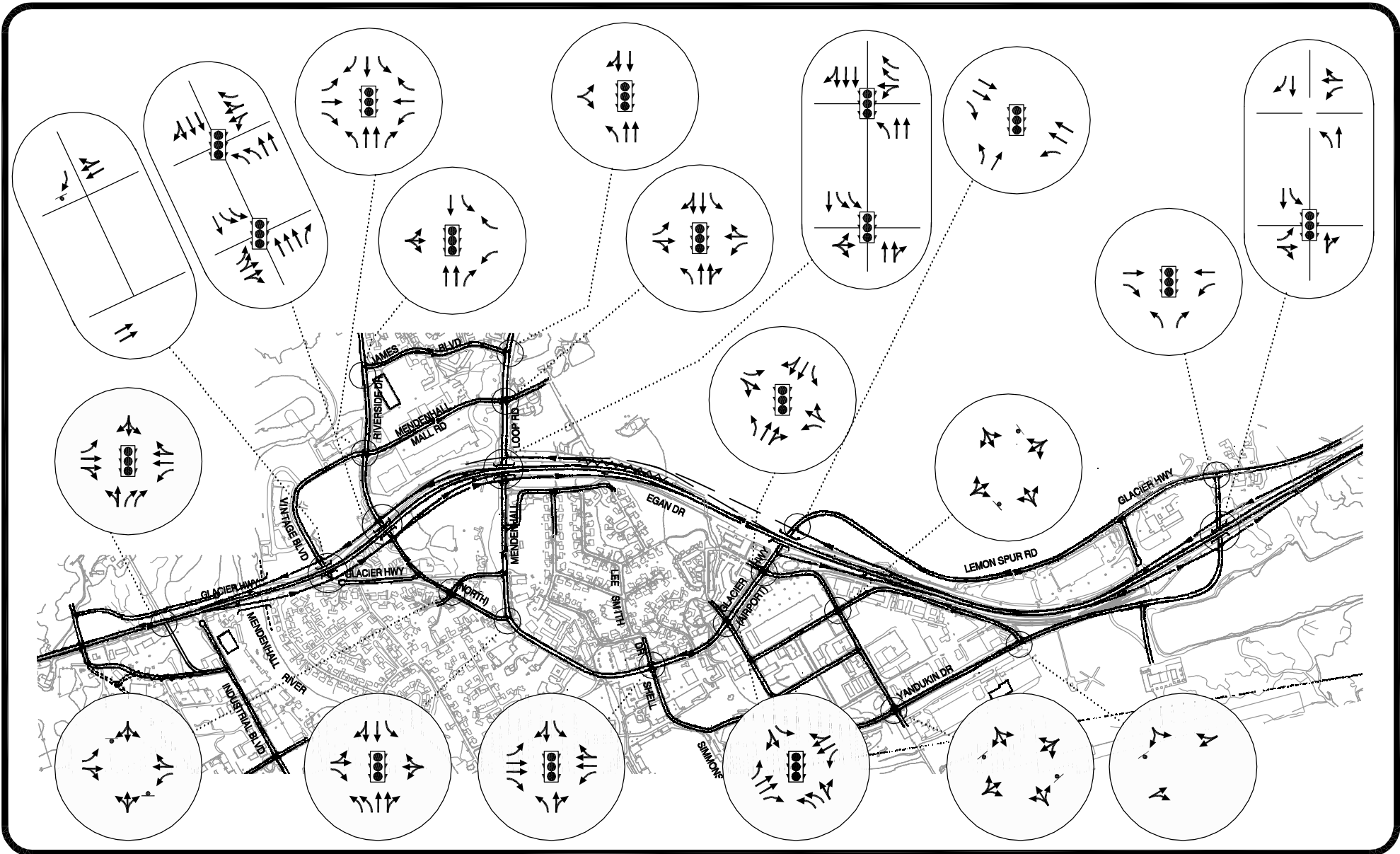
Alaska Department of Transportation & Public Facilities



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FIGURE  
2

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**INTERIM ACTION**  
**LANE CONFIGURATION AND TRAFFIC CONTROL DEVICES**

West Egan Drive Corridor Study

Alaska Department of Transportation & Public Facilities



DATE  
MAY 2003

FIGURE  
3

4978DWG5/TASK-6/INTERIM\_ACTION



**TABLE 1: INTERIM ACTION YEAR 2015 WEEKDAY OPERATIONS**

Intersection (* = signalized)	LOS	V/C <sup>1</sup>	Control delay (sec/veh) <sup>1</sup>	Crit. Mov't	LOS	V/C <sup>1</sup>	Control delay (sec/veh) <sup>1</sup>	Crit. Mov't
	AM Peak Hour				PM Peak Hour			
Glacier Hwy / Industrial Blvd*	C	0.46	24.9	--	C	0.65	21.2	--
Egan Dr / Vintage Blvd North Ramp	B	0.10	10.8	SB RT	C	0.30	15.9	SB RT
Egan Dr / Riverside Dr North Ramp*	C	0.37	21.5	--	B	0.64	17.1	--
Egan Dr / Riverside Dr South Ramp*	C	0.46	20.3	--	C	0.63	25.4	--
Egan Dr / Mendenhall Loop Rd North Ramp*	B	0.52	17.8	--	C	0.81	22.5	--
Egan Dr / Mendenhall Loop Rd South Ramp*	B	0.78	18.2	--	C	0.76	30.4	--
Egan Dr / Glacier Highway (Airport) *	D	0.93	38.0	--	C	0.91	32.6	--
Egan Dr / Yandukin Dr North Ramp*	A	0.20	9.3	--	B	0.60	13.7	--
Egan Dr / Yandukin Dr South Ramp*	B	0.32	18.2	--	B	0.51	12.5	--
Mendenhall Mall Rd / Vintage Blvd / Riverside Dr*	C	0.46	23.5	--	C	0.62	22.8	--
James Blvd. / Riverside Dr*	A	0.40	4.9	--	A	0.41	6.1	--
James Blvd / Mendenhall Loop Rd*	A	0.65	7.7	--	A	0.59	3.6	--
Mendenhall Mall Rd / Mendenhall Loop Rd*	B	0.70	16.6	--	C	0.76	24.2	--
Glacier Hwy (North) / Del Rae Rd	B	0.04	13.8	EB LTR	D	0.09	27.7	WB LTR
Glacier Hwy (North)/Mendenhall Loop Rd Ext*	C	0.52	20.7	--	B	0.56	19.4	--
Glacier Hwy (Airport) / Berners Ave.	E	0.12	36.3	NB LT	F	0.34	>50	NB LT
Glacier Hwy (Airport)/ Shell Simmons Dr.*	A	0.32	5.6	--	B	0.53	11.3	--
Glacier Hwy (Airport) / Jordan Ave.*	A	0.28	9.5	--	C	0.62	25.3	--
Glacier Hwy (Airport) / Old Dairy Rd./Trout St.*	A	0.47	9.8	--	B	0.49	10.1	--
Old Dairy Rd / Crest St	A	0.10	9.8	NB LT/RT	C	0.32	15.3	NB LT/RT
Yandukin Dr / Old Dairy Rd*	B	0.20	12.8	SB LTR	C	0.52	20.6	SB LTR
Yandukin Dr / Crest Street	B	0.02	10.9	NB LTR	B	0.24	13.0	SB LTR
Glacier Hwy (Lemon Rd) / Lemon Spur Road*	C	0.27	24.3	--	B	0.61	19.7	--

<sup>1</sup> Averaged over all movements at signalized intersections; for critical movement only at unsignalized intersections  
 NB = northbound, SB = southbound, EB = eastbound, WB = westbound  
 LT = left, TH = through, RT = right; LTR = left/through/right  
 LOS = Level of Service, V/C= volume-to-capacity ratio