EXECUTIVE SUMMARY

Current development pressures adjacent to the Highway 566 corridor north of Calgary and through Rocky View County combined with the future planned growth in this area has resulted in a large projected increase in future traffic volumes. This future traffic demand created the need to conduct an access management and functional planning study for the purpose of protecting the right-of-way for future widening requirements of Highway 566. To facilitate planning for this growth and to ensure future traffic is accommodated on Highway 566 and within the neighbouring communities in the future, Rocky View County requested that Alberta Transportation undertake a study of Highway 566. Alberta Transportation retained iTRANS Consulting Inc. (iTRANS) to undertake the study.

The study area is the Highway 566 corridor from Range Road 20 to Range Road 11 and Range Road 292 to Highway 9. Range Road 11 to Range Road 292 was previously addressed in a study prepared by Al-Terra in 2005. A key map of the study area is shown in **Exhibit ES-1**. Highway 2 intersects Highway 566 1.6 km east of Range Road 11 and 3.2 km west of Range Road 292.

This study includes the functional design for twinning Highway 566, an access management plan, a review of roadway widening alternatives, and culminates with a recommended alignment.

A. Existing Conditions

The horizontal alignment is basically straight with no curves and several small deflections.

The existing Highway 566 vertical grades are relatively flat and range from 0.25% to 6.5%.

The steepest segment is approximately 100 m long immediately east of Range Road 282. The existing Highway 566 has been constructed to a two lane rural paved standard with intersection treatments at only a few intersections. Pavement width varies between 9.0 m to 10.0 m while the right of way varies from approximately 20.0 m to 40.0 m within the study area.

The existing rural cross-section throughout the corridor includes paved shoulders and ground ditches.

Intersectional analysis was undertaken at several existing intersections including Range Road 13 at Highway 566. The analysis yields that the northbound (shared left turn-through-right turn) lane in the p.m. peak hour and the southbound (shared left turn-through-right turn) in the a.m. peak hour may be at capacity. Attempts to improve the intersectional capacity by adding additional lanes on the northbound and southbound approaches (i.e. northbound shared left turn-through lane plus a dedicated right turn lane) did not yield improved level-of-service to satisfactory levels.

B. Traffic Forecasting Approach

To determine the ultimate horizon traffic volumes it was proposed to use the Rocky View County model as a base and manually add in future traffic from the Kathyrn Hamlet Redevelopment Plan. This proposal was also considered by the Technical Review Committee and ultimately agreed to.

The first step included a comparison of the various model results and calculation of a range of growth factors to grow the traffic from the existing volumes to the rocky view County Model volumes. These growth rates ranged from 1.30% to 3.40%, and suggest that the ultimate horizon may be 'sooner' than expected. Also, the right-of-way requirements do not change from the 20 year scenario to the ultimate scenario (The original study scope included at the 20 year and ultimate scenarios), as both the twinning of the highway, and then widening from four to six lanes can all occur within the proposed 62.0 m right-of-way. The proposed cross section will be discussed in further detail in upcoming sections. In consideration of the above iTRANS proposed not undertaking the 20 year scenario. This proposal was considered by the Technical Review Committee and ultimately agreed to. The requirement for twinning can occur as development occurs. This study will however identify the required right-of-way, which will fit the highway configuration for both the twinning and ultimate six-laning.

C. Land Use

The significant land use assumptions reflected in the Rocky View County model used as a base in the generation of the ultimate traffic volumes are as follows:

- City of Calgary – population of 3.1 million
- City of Airdrie – population of 80,800
- Rocky View County planning areas fully built out, including: West Airdrie, East Airdrie/North Balzac, East Balzac, SE Industrial Corridor, Greater Springbank, and Plan 8 areas.

The proposed land use assumptions used in this study are illustrated in **Exhibit ES-2**.

It should be noted that the land use discussed shown on exhibits and included in this project report is intended strictly for the identification of the road network and appropriate road classifications, and should be treated as information only.

D. Future Road Network

As per Alberta Transportation guidelines at-grade intersections will be permitted approximately every 1.6 kilometres (this is discussed in greater detail in design criteria section).

The following missing intersection approaches at existing intersections were added:
- North leg of Highway 566/Range Road 285
- South leg of Highway 566/Range Road 281
- North leg of Highway 566/Range Road 274

Also, there is an existing north–south road allowance between Highway 791 and Range Road 275 but no road structure exists. A future road was assumed at this location.

Highway 566 is currently being used as a high load network between Range Road 20 and Highway 772. East of Range Road 290 to Highway 9 the highway is being considered as a future high load corridor and accordingly any traffic signals installed on Highway 566 should have provisions to accommodate high loads.

E. Future Traffic Volumes

Trip Generation

To determine the total ultimate scenario trip generation the trips output from the Rocky View County transportation model were added to the trips generated by Hamlet of Kathyrn Concept Plan area.

In their review of the Draft Report the City noted the following, *"The City of Calgary in partnership with Alberta Transportation had prepared a regional transportation model to forecast the future traffic volumes and patterns in and outside the City. iTRANS, however, used trip outputs from the Rocky View County transportation model which were added to the trips generated by Hamlet of Kathryn Concept Plan area. The City of Calgary didn't agree with the model outputs being used for this study".* It should be noted that the approach used did incorporate traffic volumes generated by the County model, which are larger than the City traffic volumes, and therefore provides a more conservative analysis.

Trip Distribution

Within the **trip distribution** module of the EMME/2 model, the generated trips are distributed among all zones in origin-destination (OD) pairs.

For the Kathyrn Hamlet Conceptual Scheme, the trip distribution was as follows:
5% to and from north of Kathyrn via Range Road 273
5% to and from south of Kathyrn via Highway 9
15% distributed to Calgary via Highway 9
60% distributed to Calgary via the Highway 566/Highway 2 interchange
15% distributed to Airdrie via the Highway 566/highway 2 interchange

Trip Assignment

The detailed assignment process yields the ultimate a.m. and p.m. peak hour traffic volumes are summarized in **Exhibit ES-3** and the ultimate daily traffic volumes in **Exhibit ES-4.**

F. Future Traffic Analysis

The following initial intersection control and lane configuration assumptions were made:

- All intersections are signalized.
- The minimum left turn lane storage length is 60 m.
- All left turn lanes shall be slotted. This promotes safer turning radius, an important feature as this corridor is a future high load corridor.

With these initial conditions determined the peak hour traffic volumes were input into Synchro and each intersection was evaluated. The analysis illustrates that not all movements are accommodated satisfactorily. Attempts to improve operations at these intersections were taken such as modifying signal timings and geometric improvements; however, these improvements did not help improve the intersection operations.

The resulting lane configurations are shown in sketch **Exhibit ES-5**.

As significant congestion is evident six sensitivity analyses were undertaken as follows:

1. Additional intersection between intersections
2. Flyover between intersections
3. Grade separated
4. 50% reduction in intersectional traffic volumes
5. Jughandle
6. Regional Ring Road in place

Additional intersection between intersections

To determine if additional intersections would assist in alleviating the traffic congestion an additional intersection in place at the mid-point between the intersections spaced at 1.6 km was assumed. The worse-case scenario which was between the Range Road 292 and 291 intersections was reviewed. The analysis results concluded that an additional intersection will not provide satisfactory intersection operating conditions. The intersection operations improved slightly, but the large through east-west traffic volumes are significant enough to maintain the congestion. The ‘new’ intersection also does not provide satisfactory operating conditions.

Flyover between intersections

To determine if flyovers would assist in alleviating the traffic congestion a flyover in place at the mid-point between the intersections spaced at 1.6 km was assumed. A flyover is a grade-separated road that does not permit turning movements. The worse-case scenario which was between the Range Road 292 and 291 intersections was reviewed. The analysis results concluded that a flyover will not provide satisfactory intersection operating conditions. The northbound and southbound movements at the intersections improve slightly, but the large through east-west traffic volumes again maintain the congestion.

Grade separated
This alternative was explored to determine if grade separation would alleviate the traffic congestion. A diamond interchange at the intersection of Range Road 291 and Highway 566 was assumed. The analysis yields one congested intersection movement, the eastbound left turn at the south ramp intersection.

50% reduction in intersectional traffic volumes
To determine if 50% reduction in intersectional traffic volumes would assist in alleviating the traffic congestion, the worse-case scenario between the Range Road 292 and 291 intersections was reviewed. The analysis results conclude that reduction in intersectional traffic volumes will provide satisfactory intersection operating conditions for the reviewed intersections except northbound left and southbound left at the intersection of Highway 566 and Range Road 292 which operate at LOS F but within acceptable v/c ratio of 0.92.

Jughandle
This alternative was explored to determine if providing jughandles would alleviate the traffic congestion. Jughandle is an at grade intersectional geometry adapted to accommodate the worst turning movements which cause congestion at the intersection. Two jughandles on the north and south of Highway 566 at the intersection of Range Road 291 and Highway 566 were assumed to accommodate the eastbound and westbound left and right turns.
The analysis results yielded the provision of jughandles to accommodate the left and right turn movements at Highway 566 did not provide acceptable traffic conditions at the intersection of Highway 566 and Range road 291.

Regional Ring Road in place
The Regional Ring Road was coded into the Rocky View County model in order to determine if this would alleviate the congestion and the intersection of Highway 566 and Range Road 291 was re-analyzed. The analysis results illustrated that although a slight improvement can be seen in some of the movements but overall the Regional Ring Road did not provide the satisfactory traffic operating conditions at the studied intersection

G. Design Criteria

As suggested by Alberta Transportation the design designations are:
- Rural – Urban (RAD/UAD-411.4-110/100/80) Stage 1
- Urban (UFD/UAD-616.6-110/100/80) Stage 2

Stage 1 involves construction of a four lane cross-section with a 15.4 m narrow depressed median. Stage 2 reflects an upgrade to a six lane cross-section with the two additional lanes being added to the inside and a resulting 8.0 m flush median. Both design designations reflect a 62.0 m right of way, and will accommodate a City of Calgary Expressway standard if in the future the City assumes jurisdiction of the Highway.

The proposed cross-section is illustrated in **Exhibit ES-6.**

Ultimately, Highway 566 will be adjacent to both urban and rural development. For example, west of Highway 2 the ultimate build out of the recently annexed City of Calgary area immediately south of Highway 566 will be urban residential in nature. Recently Rocky View County has experienced urban type development, however they have formally adopted City of Calgary standards for roads requiring urban cross-sections (an example of this is Range Road 292). The following typical intersection drawings were developed:

1. 6 lane (dual slotted lefts) / 6 lane (dual slotted lefts)
2. 6 lane (dual slotted lefts) / 6 lane (single slotted lefts)
3. 6 lane (dual slotted lefts) / 4 lane (dual slotted lefts)
4. 6 lane (dual slotted lefts) / 4 lane (single slotted lefts)
5. 6 lane (single slotted lefts) / 4 lane (dual slotted lefts)
6. 6 lane (single slotted lefts) / 4 lane (single slotted lefts)

The access management review noted that the minimum spacing between Public Road accesses for both Multi-Lane and Major Two-Lane Highways should be 1.6 km and this intersection spacing was adopted for this study.

H. Widening Alternatives

On preliminary discussion with the Technical Review Committee two widening alternatives became evident, widen north or widen south. Either alternatives would maintain the current pavement and alter it from a two-lane undivided roadway to ultimately either two lanes of eastbound or westbound traffic. Through discussion with the Technical Review Committee it was decided to superimpose the existing centreline with either the future centreline of the eastbound or westbound lanes (depending if the widening occurs to the north or south).

I. Decision Matrix

The decision criteria used in deciding between widening to the south versus widening to the north included the ability to incorporate existing right-of-way widenings, right-of-way acquisition costs, impacts to property, and continuity with previous planning. The decision criteria are summarized in **Table ES-1**. A checkmark notes a favourable position.

Table ES-1: Decision Matrix

Decision Criteria	West of Highway 2		East of Highway 2	
	North	South	North	South
Existing ROW Widening				✓
ROW Acquisition Costs	✓		✓	
Property Impacts	✓			✓
Previous Planning Continuity		✓		✓

J. Functional Plans

The following drawings reflect the functional plans generated:

- Plan and Profile drawings at a 1:5000 scale, Sheets 1 to 16
- Standard Intersection layouts at a 1:2000 scale, Sheets 1 to 19
- Right-of-Way drawings at a 1:5000 scale, Sheets 1 to 16
- Access Management Plan drawings at a 1:10000 scale, Sheets 1 to 9

K. Ancillary Studies

The following supporting studies were also completed. Copies of these studies are appended.

- A historical resources overview was undertaken by Bison Historical services Ltd.
- A geotechnical assessment was undertaken by Thurber Engineering Ltd.
- A functional stormwater management report was prepared by Stormwater Solutions Inc.
- An environmental review report was prepared by Wardrop Engineering Ltd.
- An existing utilities and relocation cost estimate was prepared by Wardrop Engineering Ltd.
- An estimate of land values along the Highway 566 corridor was undertaken by SunAgro Land Services Ltd.

L. Cost Estimates

The cost estimate is summarized in **Table ES-2.**

Table ES-2: Cost Estimate

From	To	Roadway	Traffic Signals	Railway Signals	Subtotal	Engineering & Contingency 30%	Totals
W of Range Road 20	Range Road 20	$ 1,754,748	$ 250,000	$ -	$ 2,004,748	$ 601,424	$ 2,606,172
Range Road 20	Panorama Road	$ 3,375,070	$ 250,000	$ -	$ 3,625,070	$ 1,087,521	$ 4,712,591
Panorama Road	Range Road 14	$ 3,386,110	$ 250,000	$ -	$ 3,636,110	$ 1,090,833	$ 4,726,943
Range Road 14	Range Road 13	$ 3,387,934	$ 250,000	$ -	$ 3,637,934	$ 1,091,380	$ 4,729,314
Range Road 13	Range Road 12	$ 3,382,702	$ 250,000	$ -	$ 3,632,702	$ 1,089,811	$ 4,722,513
Range Road 12	Range Road 11	$ 3,381,358	$ 250,000	$ -	$ 3,631,358	$ 1,089,407	$ 4,720,765
Range Road 11	East of Range Road 11	$ 1,628,962	$ -	$ -	$ 1,628,962	$ 488,689	$ 2,117,651
W of Range Road 292	Range Road 292	$ 1,617,010	$ -	$ -	$ 1,617,010	$ 485,103	$ 2,102,113
Range Road 292	Range Road 291	$ 3,365,038	$ 250,000	$ -	$ 3,615,038	$ 1,084,511	$ 4,699,549
Range Road 291	Range Road 290	$ 3,375,598	$ 250,000	$ -	$ 3,625,598	$ 1,087,679	$ 4,713,277
Range Road 290	Range Road 285	$ 3,363,454	$ 250,000	$ -	$ 3,613,454	$ 1,084,036	$ 4,697,490
Range Road 285	Range Road 284	$ 3,371,758	$ 250,000	$ -	$ 3,621,758	$ 1,086,527	$ 4,708,285
Range Road 284	Range Road 283	$ 3,371,086	$ 250,000	$ -	$ 3,621,086	$ 1,086,326	$ 4,707,412
Range Road 283	Range Road 282	$ 3,376,750	$ 250,000	$ -	$ 3,626,750	$ 1,088,025	$ 4,714,775
Range Road 282	Range Road 281	$ 3,368,638	$ 250,000	$ -	$ 3,618,638	$ 1,085,591	$ 4,704,229
Range Road 281	Range Road 280	$ 3,368,254	$ 250,000	$ -	$ 3,618,254	$ 1,085,476	$ 4,703,730
Range Road 280	Range Road 275	$ 3,367,774	$ 250,000	$ -	$ 3,617,774	$ 1,085,332	$ 4,703,106
Range Road 275	Range Road 274	$ 3,365,230	$ 250,000	$ -	$ 3,615,230	$ 1,084,569	$ 4,699,799
Range Road 274	Range Road 273	$ 3,365,326	$ 250,000	$ 250,000	$ 3,865,326	$ 1,159,598	$ 5,024,924
Range Road 273	Highway 9	$ 3,366,094	$ 250,000	$ -	$ 3,616,094	$ 1,084,828	$ 4,700,922
Highway 9	E of Highway 9	$ 1,624,210	$ -	$ -	$ 1,624,210	$ 487,263	$ 2,111,473
						TOTAL COST ESTIMATE	**$ 89,327,035**
						UTILITIES	**$ 5,128,202**
						TOTAL COST ESTIMATE	**$ 94,455,237**

Note: Excludes ROW

M. Project Documentation

Technical Review Committee (TRC) meetings at Alberta Transportation's Calgary Willowglen office on the following dates:

- April 2, 2009
- June 2, 2009

The TRC was comprised by the following people:

- Jerry Lau, P.Eng., Alberta Transportation
- Trevor Richelhof, Alberta Transportation
- Jeannette Vu, E.I.T., Rocky View County
- Naveed Butt, P.Eng., City of Calgary
- Tomasz Kroman, P.Eng., iTRANS Consulting
- Jay Magus, P.Eng., iTRANS Consulting

Progress meetings between Alberta Transportation and iTRANS Consulting Inc. were held at Alberta Transportation's Calgary Willowglen office on the following dates:

- May 5, 2009
- May 27, 2009
- June 12, 2009
- August 5, 2009
- September 18, 2009
- October 20, 2009

Public Open Houses were held at the Balzac Community Hall on the following dates:

- Wednesday June 24, 2009, from 3:00 p.m. to 8:00 p.m.
- Wednesday October 27, 2009, from 3:00 p.m. to 8:00 p.m.

A presentation was provided to Rocky View County Council on Tuesday, February 16, 2010

N. Conclusions

Based on the results of the study the following conclusions can be drawn:

1. No immediate improvements to the existing intersections are required. However, the initial analysis completed noted a few intersection movements at capacity. A traffic signal warrant was conducted, but the results indicated a traffic signal is not warranted. It is recommended that current traffic volumes should be collected, a signal warrant analysis completed, and the intersection be monitored due to completion of Stoney Trail and near completion of other projects on the Queen Elizabeth II Highway.
2. The ultimate traffic generated by the proposed land use type and density suggested in the Rocky View County planning areas of West Airdrie, North Airdrie/ North Balzac, and East Balzac will not be satisfactorily accommodated at intersections on Highway 566.
3. All intersections along the corridor will require multi-lane intersecting roads.
4. The intersections should all be of an urban type.

5. The ultimate a.m. and p.m. peak hour traffic volumes are summarized in **Exhibit 4-3**.
6. The ultimate daily traffic volumes are illustrated in **Exhibit 4-4**.
7. All intersections will require traffic signals with provisions for high loads.
8. Additional intersections between the proposed intersection locations (spaced at 1.6 kilometres) will not provide satisfactory intersection operating conditions.
9. Flyovers between the proposed intersection locations (spaced at 1.6 kilometres) will not provide satisfactory intersection operating conditions.
10. Separation of the through movements could be explored once traffic operating conditions reached unacceptable conditions.
11. Reduction in intersectional traffic volumes by 50% will provide satisfactory intersection operating conditions for the reviewed intersections
12. The provision of jughandles to accommodate the left and right turn movements at Highway 566 did not provide acceptable traffic conditions at the intersections.
13. Coding of the Regional Ring Road in the Rocky View County Model did not provide the satisfactory traffic operating conditions at the studied intersection.

0. Recommendations

Based on the conclusions of the study, it is recommended that Alberta Transportation:

1. Monitors the Range Road 13 intersection closely as:
   - Range Road 13 becomes Centre Street south of the Highway, then Harvest Hills Boulevard south of Stoney Trail NW, ultimately connecting with Beddington Trail and Highway 2. This connection is expected to be maintained in the long-term and continue to be an attractive route for commuters as the northwest area of Calgary continues growing in population.
   - Ultimately to provide a safe condition traffic signals, with provisions for high loads, may be required with appropriate speed reduction.
   - To provide input to potential developers in the area that traffic signals may be required.
   - To request that Rocky View County and the City of Calgary provide input to potential area developers that traffic signals may be required.
2. Adopt the future intersection lane configurations as shown in **Exhibit 4-5**.
3. Adopt the design designations as:
   - Rural – Urban (RAD/UAD-411.4-110/100/80) Stage 1
   - Urban (UFD/UAD-616.6-110/100/80) Stage 2
4. Adopt the cross-section illustrated in **Exhibit 5-1.**
5. Adopt minimum intersection spacing of 1.6 km between Public Road accesses for both Multi-Lane and Major Two-Lane Highways.
6. In consideration of the review the right-of-way widening recommendation was as follows:
   - West of Highway 2 widen to the north.
   - East of Highway 2 widen to the south
7. Adopt the recommended functional Plan / Profile drawings.
8. Adopt the access management plans.