

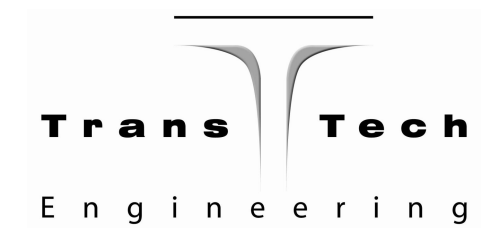
Functional Planning Study – Volume 1

Report No. 939
Calgary Southwest Ring Road (Highway 201)
Glenmore Trail/Stoney Trail Interchange to
Highway 22X/Sarcee Trail Interchange

Prepared for:

Alberta Infrastructure and Transportation
2nd Floor, Twin Atria Building
4999 - 98 Avenue
Edmonton, Alberta T6B 2X3

Prepared by:



110, 3030 3rd Avenue NE
Calgary, Alberta T2A 6T7

August 2008

Project No. 2004-28-03

©TransTech Engineering. 2007
Information contained herein is copyright -
TransTech Engineering. All rights reserved
Duplication and/or distribution is prohibited

CORPORATE AUTHORIZATION

This document entitled “Southwest Calgary Ring Road Functional Planning Study” was prepared by TransTech Engineering for the account of Alberta Infrastructure and Transportation. This report has been prepared based on our review and discussions with the Project Technical Steering Committee. Any use which a third party makes of this report, or reliance on or decisions made based on it, are the responsibilities of such third parties. TransTech Engineering accepts no responsibility for damages of any kind whatsoever, suffered by any third party for any reason including decisions and actions taken based on the contents of this report.

**PERMIT TO PRACTICE
FOCUS CORPORATION**
Signature _____
Date _____
PERMIT NUMBER: P 6386
The Association of Professional Engineers,
Geologists and Geophysicists of Alberta

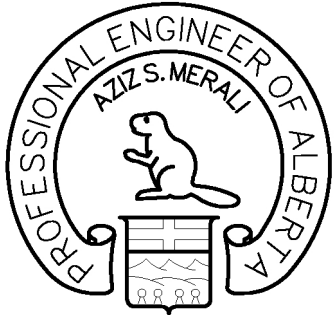


Table of Contents

SECTION	TITLE	PAGE NO.
VOLUME 1		
Letter of Transmittal		
EXECUTIVE SUMMARY.....E-1		
E-1	INTRODUCTION.....	E-1
E-2	STUDY LIMITS.....	E-1
E-3	STUDY OBJECTIVES.....	E-1
E-4	DESIGN PARAMETERS.....	E-1
E-5	RECOMMENDED ULTIMATE STAGE PLAN.....	E-1
E-6	RECOMMENDED STAGE 1 – PLAN (2033 HORIZON).....	E-2
E-7	COST ESTIMATES.....	E-2
E-8	PUBLIC CONSULTATION.....	E-3
1	INTRODUCTION.....	1-1
1.1	BACKGROUND.....	1-1
1.2	STUDY LIMITS.....	1-1
1.3	STUDY OBJECTIVES.....	1-1
1.4	STUDY TEAM.....	1-2
1.5	TECHNICAL STEERING COMMITTEE.....	1-2
1.6	STUDY PROCESS.....	1-3
	PROJECT START UP.....	1-3
	PROJECT OPEN HOUSE.....	1-3
	CORRIDOR PLAN AND TRAFFIC ANALYSES.....	1-3
	ULTIMATE STAGE CORRIDOR PLAN.....	1-3
	PUBLIC CONSULTATION & COMMUNICATION.....	1-3
	STAGE 1 CORRIDOR PLAN.....	1-3
	PROJECT REPORT.....	1-3
2	DESIGN PARAMETERS.....	2-1
2.1	RING ROAD AND HIGHWAY PENETRATOR AGREEMENT.....	2-1
2.2	DESIGN CRITERIA.....	2-1
2.2.1	General Design Criteria for the SWCRR.....	2-1
2.2.2	Alignment Elements.....	2-1
2.2.3	Cross-Section Elements.....	2-2
2.2.4	Cross-Section Elements.....	2-2
2.3	TYPICAL CROSS SECTIONS.....	2-4
2.4	TRANSFER LANES.....	2-5
2.5	PAVEMENT DRAINAGE.....	2-5
2.6	HYDROTECHNICAL.....	2-5
2.7	NOISE ATTENUATION.....	2-5

NOISE ATTENUATION GUIDELINES FOR PROVINCIAL HIGHWAYS UNDER PROVINCIAL JURISDICTION WITHIN CITIES AND URBAN AREAS 2-6

2.8	TRANSPORTATION & UTILITY CORRIDOR (TUC).....	2-6
2.9	STORM WATER MANAGEMENT.....	2-7
2.9.1	Allowable release rate.....	2-7
2.9.2	Stormwater Quality Enhancement.....	2-7
2.9.3	Stormwater Quality Enhancement Facilities.....	2-7

3 TRAFFIC FORECASTING & ANALYSES.....3-1

3.1	TRAFFIC FORECASTS.....	3-1
3.2	TRAFFIC ANALYSIS.....	3-1
3.2.1	Freeway Analysis.....	3-1
3.2.2	Capacity Analysis Software.....	3-2
3.2.3	Capacity Analyses Process.....	3-3
3.2.3.1	Comparison of the SWCRR EMME/2 traffic forecasts.....	3-3

4 RECOMMENDED ULTIMATE STAGE PLAN (2.1 MILLION POPULATION) 4-1

4.1	INTRODUCTION.....	4-1
4.2	SOUTH WEST CALGARY RING ROAD.....	4-1
4.2.1	Horizontal Alignment.....	4-1
4.2.2	Vertical Alignment.....	4-1
4.2.3	Transfer Lanes.....	4-2
4.2.4	Road Closures.....	4-2
4.3	INTERCHANGES.....	4-2
4.3.1	Highway 22X (Spruce Meadows Trail) Systems Interchange.....	4-2
4.3.2	162 nd Avenue.....	4-3
4.3.3	146 th Avenue.....	4-3
4.3.4	130 th Avenue.....	4-4
4.3.5	Anderson Road.....	4-4
4.3.6	90 th Avenue.....	4-5
4.3.7	Old Strathcona Road.....	4-6
4.3.8	Glenmore Trail & Sarcee Trail Systems Interchange.....	4-6
4.3.9	Glenmore Trail & 37 th Street.....	4-6
4.3.10	Westhills Way.....	4-7
4.3.11	69 th Street.....	4-7
4.3.12	Glenmore Trail / Highway 8 / Stoney Trail Systems Interchange.....	4-8
4.4	EARTHWORKS MATERIAL MANAGEMENT – MASS HAUL.....	4-9

5 RECOMMENDED STAGE 1 PLAN (1.5 MILLION POPULATION) 5-1

5.1	INITIAL STAGE PLANNING HORIZON.....	5-1
5.2	TRAFFIC FORECASTS.....	5-1
5.3	ROADWAY OPTIONS FOR STAGE.....	5-1
5.3.1	Scenario 1 – Collector (CD) Roads only.....	5-1
5.3.2	Scenario 2 – Express (Core) & Collector (CD) Roads with limited Transfers.....	5-1
5.3.3	Scenario 2A – Express (Core) & Collector (CD) Roads with all Transfers.....	5-2
5.4	RECOMMENDED STAGE 1 PLAN FOR THE SWCRR.....	5-2

5.4.1	Horizontal Alignment.....	5-2			
5.4.2	Vertical Alignment.....	5-2			
5.4.3	Cross section.....	5-2			
5.4.4	Highway 22X systems Interchange.....	5-2			
5.4.5	162 nd Avenue.....	5-3			
5.4.6	146 th Avenue.....	5-3			
5.4.7	130 th Avenue.....	5-3			
5.4.8	Anderson Road.....	5-3			
5.4.9	90 th Avenue.....	5-3			
5.4.10	Old Strathcona Road.....	5-3			
5.4.11	Glenmore Trail & Sarcee Trail Systems Interchange.....	5-3			
5.4.12	Glenmore Trail & 37 th Street.....	5-3			
5.4.13	Westhills Way.....	5-3			
5.4.14	69 th Street.....	5-3			
5.4.15	Glenmore Trail / Highway 8 / Stoney Trail Systems Interchange.....	5-3			
6	PUBLIC CONSULTATION/COMMUNICATIONS PROCESS.....	6-1			
6.1	PUBLIC CONSULTATION/COMMUNICATIONS PROCESS.....	6-1			
6.2	KEY CONSULTATION ACTIVITIES.....	6-1			
6.3	SENSITIVITY TO KEY ISSUES.....	6-3			
6.4	TSUU T'INA AND GENERAL PUBLIC OPEN HOUSES – JULY, 2005.....	6-3			
6.5	COMMUNITY ASSOCIATION ENGAGEMENT MEETINGS – SEPTEMBER, 2005.....	6-4			
6.6	COMMUNITY FOCUSED OPEN HOUSES – OCTOBER, 2005.....	6-4			
6.7	TSUU T'INA AND CALGARY PUBLIC OPEN HOUSES TO REVIEW PROPOSED ROUTING – NOVEMBER, 2005.....	6-4			
6.8	TSUU T'INA AND CALGARY PUBLIC INFORMATION UPDATE SESSIONS - JUNE, 2006.....	6-4			
6.9	TSUU T'INA AND CALGARY PUBLIC INFORMATION UPDATE SESSIONS – NOVEMBER 2006.....	6-5			
7	UTILITIES.....	7-1			
7.1	UTILITIES.....	7-1			
	ATCO PIPELINES.....	7-1			
	ALTA LINK – TSUU T'INA NATION TT-940.....	7-1			
	ENMAX POWER LINES.....	7-1			
	SHAW CABLE.....	7-1			
	TELUS.....	7-1			
	WATER MAINS.....	7-2			
	SANITARY SEWERS MAINS.....	7-2			
	STORM SEWER MAINS.....	7-2			
8	BRIDGE PLANNING.....	8-1			
8.1	INTRODUCTION.....	8-1			
8.1.1	Bridge Planning Parameters.....	8-1			
8.1.2	Bridge Planning Parameters Summary.....	8-1			
8.1.3	Bridge Geometry.....	8-2			
8.1.3.1	Horizontal Criteria.....	8-2			
8.1.3.2	Vertical Criteria.....	8-2			
8.1.3.3	Structure Cross-Section & Superelevation.....	8-2			
8.1.4	Geotechnical Assessment.....	8-2			
8.1.5	Bridge Plans.....	8-3			
8.2	ELBOW RIVER AND FISH CREEK.....	8-3			
8.2.1	Elbow River Crossing.....	8-3			
8.2.2	Fish Creek Crossing.....	8-3			
8.3	SPRUCE MEADOWS TRAIL SW.....	8-3			
8.3.1	SWCRR Southbound Collector over Spruce Meadows Trail Eastbound – S1.....	8-3			
8.3.2	SWCRR Southbound Express over Spruce Meadows Trail Eastbound – S2.....	8-4			
8.3.3	SWCRR Northbound Express over Spruce Meadows Trail Eastbound – S3.....	8-4			
8.3.4	SWCRR Northbound Collector over Spruce Meadows Trail Eastbound – S4.....	8-4			
8.3.5	SWCRR Southbound Collector over Spruce Meadows Trail Westbound – S5.....	8-4			
8.3.6	SWCRR Southbound Express over Spruce Meadows Trail Westbound – S6.....	8-4			
8.3.7	Spruce Meadows Trail Westbound to SWCRR Southbound – S7.....	8-5			
8.3.8	SWCRR Northbound Express over Spruce Meadows Trail Westbound – S8.....	8-5			
8.3.9	SWCRR Northbound Collector over Spruce Meadows Trail Westbound – S9.....	8-5			
8.3.10	Spruce Meadows Trail Westbound over SWCRR Southbound Express – S10.....	8-5			
8.3.11	Spruce Meadows Trail Westbound to SWCRR Southbound – S11.....	8-6			
8.3.12	Spruce Meadows Trail Westbound to SWCRR Southbound – S12.....	8-6			
8.3.13	SWCRR Northbound Express over Southbound SWCRR to Spruce Meadows Trail Eastbound – S13.....	8-6			
8.3.14	SWCRR Northbound Collector over SWCRR Express – S14.....	8-7			
8.4	162 AVENUE SW – S15 & S16.....	8-7			
8.5	146 AVENUE SW – S17.....	8-7			
8.6	130 AVENUE SW.....	8-8			
8.7	ANDERSON ROAD SW.....	8-8			
8.7.1	Anderson Road Westbound to SWCRR Southbound Directional Ramp – S19.....	8-8			
8.7.2	Anderson Road Eastbound Tunnel – S20.....	8-8			
8.7.3	Anderson Road over SWCRR – S21.....	8-9			
8.8	90 AVENUE SW – S22.....	8-9			
8.9	OLD STRATHCONA ROAD – S23.....	8-10			
8.10	GLENMORE TRAIL AND SARCEE TRAIL SW.....	8-10			
8.10.1	Sarcee Trail Northbound to Glenmore Trail Eastbound – S24.....	8-10			
8.10.2	Sarcee Trail Southbound over SWCRR – S25.....	8-10			
8.10.3	Glenmore Trail Westbound over Sarcee Trail – S26.....	8-11			
8.10.4	Glenmore Trail Eastbound over SWCRR and Sarcee Trail – S27.....	8-11			
8.10.5	Glenmore Trail Westbound to Sarcee Trail Southbound – S28.....	8-12			
8.10.6	Sarcee Trail Southbound to Glenmore Trail Eastbound Tunnels – S29 & S30.....	8-12			
8.10.6.1	Additional Design Considerations.....	8-12			
8.11	GLENMORE TRAIL, 37 STREET, & OLD STRATHCONA ROAD SW.....	8-12			
8.11.1	37 Street SW over Glenmore Trail SW – S31.....	8-13			
8.11.2	Glenmore Trail Westbound to 37 Street Southbound (Old Strathcona Road) Directional Ramp – S32.....	8-13			
8.12	WESTHILLS WAY SW – S33.....	8-13			
8.13	69 STREET SW – S34.....	8-14			
8.14	HIGHWAY 8.....	8-14			

8.14.1	Lateral Clearance	8-14
8.14.2	Highway 8 Eastbound Collector over Highway 8 Eastbound to SWCRR Northbound Ramp – S35	8-14
8.14.3	Highway 8 Eastbound Express over SWCRR Southbound Express – S36	8-14
8.14.4	Highway 8 Westbound Express over SWCRR Southbound Express – S37	8-15
8.14.5	Highway 8 Westbound Collector over SWCRR Northbound Express – S38	8-15
8.14.6	SWCRR Southbound Express over Highway 8 Eastbound to SWCRR Northbound Ramp – S39	8-15
8.14.7	SWCRR Northbound Express over Highway 8 Eastbound to SWCRR Northbound Ramp – S40	8-15
8.14.8	SWCRR Westbound to Northbound Ramp over Highway 8 Eastbound to SWCRR Northbound Ramp – S41	8-16
8.15	WEASELHEAD ROAD UNDERPASS – S-42.....	8-16

9 ESTIMATE OF CONSTRUCTION COSTS9-1

LIST OF FIGURES

FIGURE	TITLE	PAGE NO.
Figure 3-1:	Speed-flow curves and LOS for basic freeway segment.....	3- 2
Figure 3-2:	Left entrance to right exit weave	3-2
Figure 3-3:	Right entrance to left exit weave	3-3
Figure 4-1:	Mass Haul SWCRR HWY 22X to Fish Creek	4-11
Figure 4-2:	Mass Haul SWCRR Fish Creek to Elbow River	4-12
Figure 4-3:	Mass Haul SWCRR Elbow River to HWY 8 & 17 Avenue	4-13

LIST OF TABLES

TABLE	TITLE	PAGE NO.
Table 2-1:	Road Design Speeds (other than SWCRR).....	2-3
Table 2-2:	Decision Sight Distance	2-3
Table 4-1:	Mass Haul Sections	4-10
Table 4-2:	Mass Haul Quantities	4-10
Table 6-1:	Public Consultation	6-2
Table 8-1:	Structure Depth	8-1
Table 8-2:	Bridge Plans for Interchanges and Crossing.....	8-17
Table 8-3:	Lateral Clearance Check.....	8-19
Table 8-4:	Shy Line Offset.....	8-21
Table 8-5:	Decision Sight Distance.....	8-22

EXECUTIVE SUMMARY

E-1 INTRODUCTION

The Calgary Ring Road System was conceived in the 1970's when a restricted development area (RDA) was established around the city. Subsequently several conceptual level plans for the corridor were developed which defined the widths of the specific components including roadway, pipelines, power transmission lines, service access roads, roadway buffers and municipal services. The resulting right of way containing the roadway and utility components is called the Transportation & Utility Corridor (TUC).

Recently the Province of Alberta entered into an agreement with the Tsuu T'ina Nation to determine the process and schedule of transferring nation lands to the Province of Alberta for the construction of the Southwest Calgary Ring Road (SWCRR). An Agreement in Principal Relating to Tenure (AIP) was signed in 2004 and defined the process of determining the land area required for the TUC. It also included details of the roadway standards to be used and nominal widths of the utility and road corridor.

The Province and the Tsuu T'ina Nation executed a framework agreement in March 2005 that outlined additional details of the land transfer process and compensation.

This report documents the study process, planning parameters & design requirements, public consultation completed, recommends a corridor plan and identifies the right of way required for the TUC, interchanges and storm water facilities.

A complimentary environmental study was undertaken simultaneously with this study to investigate and address environmental issues coordinated by Canadian Environmental Assessment Agency (CEAA). The study was completed by AMEC Earth & Environmental and is published as a separate report.

An investigation of the risk of hazardous material spill associated with the movement of commercial goods on the SWCRR across the Elbow River was undertaken by The Bercha Group and published in a separate report titled "*Southwest Calgary Ring Road Dangerous Goods Spill Risk Analysis*" (March 29th, 2007)

E-2 STUDY LIMITS

The limit of this study includes:

- ☒ Portion of Glenmore Trail between 101st Street SW (west City limits) and east of 37th Street SW
- ☒ SWCRR between Glenmore Trail and Highway 22X (Spruce Meadows Trail) SW.
- ☒ Intersecting Roads on the City of Calgary road system, within the boundaries of the SWCRR Interchanges.

E-3 STUDY OBJECTIVES

The primary objectives for this study were:

- A. Based on the recommended route from the SWCRR Regional Network Study (Draft Report), develop Ultimate Stage (2.1 million population Horizon) and Initial Stage (2033 Horizon) Functional level plans.
- B. Identify Right of Way requirements for the TUC, Interchanges and Storm Water Facilities.

E-4 DESIGN PARAMETERS

In 2004, the Tsuu T'ina Nation and Alberta Infrastructure and Transportation signed an Agreement in Principal for the planning design and construction of the southwest portion of the Calgary Ring Road through Tsuu T'ina Nation lands. This agreement defined a nominal width of the roadway and utility corridors and the design standards to be used in the development of the Ring Road corridor

This study complies with the design standards listed in the Agreement in Principal

E-5 RECOMMENDED ULTIMATE STAGE PLAN

The Ultimate Stage planning for the SWCRR has been completed based on several assumptions including accommodating the Calgary Ring Road (Inner Ring Road) and the Regional Ring Road (Outer Ring Road) and the traffic demands generated from the expected land uses when Calgary's regional population reaches 2.1 million people and the Tsuu T'ina Lands west of SWCRR at Buffalo Run, east of SWCRR near 90th Avenue and former DND lands north of Elbow River and east of Discovery Ridge are fully developed.

The recommended roadway designs should accommodate the projected traffic demands expected during the Ultimate Stage when the Calgary regional population exceeds 2.1 million people. The recommended corridor design will provide efficient flow of traffic while providing effective connections to the adjacent road network

The recommended horizontal alignment is similar to the alignment developed during the Southwest Calgary Regional Network Study in 2004. Revisions were required to minimize and in many cases avoid the impacts to adjacent communities and other sensitive areas. In addition, alignment revisions were required to provide more efficient designs of the Elbow River and Fish Creek bridges and the SWCRR interchanges.

The proposed vertical profile for the SWCRR, between Highway 22X at the south end of the project and Stoney Trail at the west end of the project, has been developed with the intent of providing a balance of earthworks while containing the construction within the limits of the proposed TUC.

Consideration was also given to the following:

- Integrate the requirements and recommendations of the storm drainage plan, geotechnical assessment, historical resources assessment and environmental stakeholders group.
- Profile restrictions, earthwork volumes, materials management plan and right of way constraints.
- Approved access, alignment and connections on both sides of the corridor.
- Evaluation and integration of the comments received through the public consultation process.
- Allowance for other TUC components.

Existing connections of roadways such as Lower Springbank Road to 101st Street SW and to Glenmore Trail as well as Spruce Meadows Trail (Highway 22X) connection to 37th Street SW and to 24th Street SW, occurring at the edges of the SWCRR study area, will need to be closed to accommodate the proposed SWCRR roadway and interchanges. Vehicles currently using these intersections will need to use alternate routes to access the SWCRR roadway system. Since the impacted existing intersections are at the edge of the SWCRR study area, they will need to be reviewed during subsequent planning of the West and South Calgary Ring Road Study.

E-6 RECOMMENDED STAGE 1 – PLAN (2033 HORIZON)

The City of Calgary had recently developed an EMME/2 model using the land uses and road network expected in 2025. The Tsuu T’ina land uses and development rates were added to this model to complete the SWCRR stage 1 model that will most closely represent Alberta Infrastructure and Transportation’s “base” requirement for the planning of Stage 1. With the addition of the Tsuu T’ina land uses, the planning horizon is estimated to be about year 2033.

The 2025 EMME/2 model used to forecast the traffic demands for Stage 1 of the SWCRR is based on the following key parameters:

	Population	Employment
City of Calgary	1,287,600	749,600
Areas outside the City	263,600	100,400
TOTAL	1,551,300	849,900

The horizontal alignment for stage 1 coincides with the ultimate stage SWCRR horizontal alignment. The stage 1 horizontal alignment for all cross roads also coincides with the Ultimate stage alignments except for the Highway 22X EB alignment.

Similar to the horizontal alignment, the vertical alignment coincides with the Ultimate stage profiles.

During that SWCRR study, Alberta Infrastructure and Transportation advised that the stage 1 plan should be created with the assumption that all of the earthworks grading for the Ultimate stage designs will be completed in stage 1. Future upgrades should require very little additional grading.

This approach will minimize future impacts on communities adjacent to the SWCRR corridor

In general terms the Collector roads with specific number of lanes are recommended to be constructed in Stage 1. Future upgrades will include adding more lanes on the collector roads followed by paving of the express lanes –since all grading will be completed in stage 1. All drainage facilities are assumed to be constructed during Stage 1.

E-7 COST ESTIMATES

Construction costs have been developed to assist in the budget and programming process.

Costs have been developed using the average 2006 unit prices published by Alberta Infrastructure and Transportation and DO NOT INCLUDE Inflation. Unit costs were developed for key components such as earthworks, pavement & bridges. Utility costs were estimated in conjunction with the individual utility company.

The approximate cost to construct the **Ultimate stage plans** and designs, within the study limits, using the approach suggested in this study is \$ 1.74 Billion. This cost does NOT INCLUDE land acquisition costs.

The approximate cost to construct the **1st stage plans** and designs, within the study limits, using the approach suggested in this study is \$ 1.3 Billion. This cost does NOT INCLUDE land acquisition costs.

E-8 PUBLIC CONSULTATION

Stakeholder engagement was a significant component of the functional planning study. Due to the complexity of this project, the three partners - the Province, City, and Tsuu T'ina Nation - agreed to undertake a more extensive public consultation process than usual.

A comprehensive communications/engagement plan was developed in consultation with the partners. It included project stakeholders, as well as communications/consultation objectives and activities.

Four sets of public open houses were held between June 2005 and December 2006, as well as several consultation meetings with community leaders and communities directly affected by the SWCRR, meetings with regulatory representatives and meetings with other stakeholders, individually or in groups.

Intentionally Left Blank