FINAL REPORT

Highway 2A Functional Planning Study (Lacombe to Blackfalds)

Alberta Infrastructure and Transportation

Presented to:

Alberta Infrastructure and Transportation
Central Region

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Red Deer, Alberta
T4N 6K8

CastleGlenn Consultants Inc.
Engineers, Project Managers & Planners

R-993-1

Alberta
Transportation

Preface

FUNCTIONAL PLANNING STUDY: HIGHWAY 2A FROM BLACKFALDS TO LACOMBE

This functional planning study covers a study area for Highway 2A from the south limits of the Town of Blackfalds to the south limits of the Town of Lacombe and was completed by CastleGlenn Consultants. It has been reviewed by Alberta Transportation technical standards branch and they have identified issues of concern.

The main issue of concern is that the functional planning study only addresses the needs of the roadway to the four lane stage. Technical standards believes that planning for a six lane roadway is prudent given the 20 year time horizon data in the study predicts volumes between 28,000 to 36,000 AADT throughout the corridor if development plans in place are implemented.

A second issue identified by technical standards branch was the proposed right of way limits at the township road 40-0 intersection seem to be incorrect, additional right of way will be required at this intersection. Detailed design has proceeded at the intersection as a spot improvement that respects this functional plan.

Access to the property in between the proposed northbound and southbound lanes where they diverge was also raised as a concern. This issue will also be addressed with the detailed design of township road 40-0 intersection.

Any further work in the area should take into account the above issues identified by the technical standards branch as well as the addendum information provided by Central Region.

Alberta
INFRASTRUCTURE AND TRANSPORTATION

Memorandum

FROM **Stu Becker, P.Eng**
Regional Director
Central Region

OUR FILE REFERENCE **2600-2A:18-FP**

TO Allan Kwan, P.Eng
Executive Director
Technical Standards

DATE December 20, 2007

TELEPHONE 340-4325
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SUBJECT ADDENDUM TO FUNCTIONAL PLANNING STUDY: HIGHWAY 2A LACOMBE TO BLACKFALDS

This addendum was prepared to update the recommendations from the functional planning study "Highway 2A, Lacombe to Blackfalds" completed by CastleGlenn Consultants. The Region supports the recommendations from the study, however the elements listed below will require further review as projects are identified for delivery:

Highway 2A and Twp Road 400 intersection

The study recommends Highway 2A realign to the west and intersects Twp Rd 400 at a 70 degree skew angle. Although the skew angle still meets the minimum requirement for intersection, realignment of Twp Rd 400 would make this intersection angle more desirable, at closer to 90 degree angle. The Region suggested realignment of Twp Rd 400 east and west of the intersection, to achieve a 90 degree crossing.

Broadway Avenue Intersection

The study recommends access closure at Broadway Avenue. Subsequent discussions with the Town of Blackfalds and general agreement that the functionality of Highway 2A has declined with the implementation of signals, continued access to Highway 2A at Broadway Avenue could be allowed should it be required for proper area structure planning.

Stu Becker, P.Eng.
Regional Director
Central Region

Date: DEC. 20/07

Allan Kwan, P.Eng.
Executive Director
Technical Standards

Date: _____

FUNCTIONAL PLANNING STUDY

HIGHWAY 2A

Town of Blackfalds to S. Limits Town of Lacombe

CastleGlenn Consultants Inc.
Engineers, Project Managers & Planners

Mr. Arthur E. Gordon, B.A. P. Eng.
Transportation Planning
CastleGlenn Consultants Ltd.
Consulting Engineers

Date: January 31st, 2006

Alberta
INFRASTRUCTURE AND
TRANSPORTATION

Accepted by:

Mr. Stu Becker P. Eng.
Regional Director
Central Region

Date: SEPT. 11/08

Mr. Allan Kwan, P. Eng
Executive Director
Technical Standards Branch
Transportation and Civil Engineering

Date: _____

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ACKNOWLEDGMENTS

The Consulting Team comprised of CastleGlenn Consultants, FMA Heritage Resource Consultants and Clifton and Associates and Land Data Technology wish to extend their sincere appreciation to those individuals and groups from Alberta Infrastructure and Transportation, Town of Blackfalds, Town of Lacombe, Lacombe County, and the residents and employees of the municipalities without whose cooperation and input this study could not have been accomplished.

In particular, we wish to express our sincere appreciation to the members of the Technical Review Committee:

- Mr. Brian Reid P.Eng., Infrastructure Manager Central Region;
- Mr. Alain Momedi P.Eng., Former Infrastructure Engineer Central Region,
- Mr. Mike Damberger P.Eng., Infrastructure Engineer Central Region;
- Mr. Ray Kerber, Director of Operations and Engineering Services, Town of Blackfalds;
- Mr. Ken Kendall, Assistant Chief Administrative Officer, Town of Lacombe; and
- Mr. Phil Lodermeier, Public Works Supervisor, Lacombe County.

The contents of this document must be credited to numerous other individuals within the above agencies who have inadvertently been excluded from the above list but which have contributed to the study process through their comments or guidance.

Executive Summary

CastleGlenn Consultants Inc. was retained in late August 2004 to undertake a functional planning study that would address the requirements of the Highway 2A corridor between the Town of Blackfalds (Highway 597) and the Town of Lacombe. The study involved investigating ways to improve traffic operations, as well as assessing the need and time frame for the ultimate twinning of Highway 2A. It was recognized that access management would remain a key factor in arriving at the most effective solutions to improve traffic operations until such time as development of a four-lane facility along the corridor would be required.

Existing Conditions

The existing 11 km section of Highway 2A can be characterized as follows:

- The roadway serves as an inter-community link between the communities of Blackfalds and Lacombe. The land uses within the study area are predominately a mixture of agriculture, residential industrial and commercial facilities exist adjacent to Highway 2A through the Town of Blackfalds;
- The current posted speed limit on Highway 2A is 60 km/hr within the urban limits of the Town of Blackfalds; this transitions to 80 km/hr outside of the urban limits and further increases to 100 km/hr in rural areas (north of Township Road 40-0);
- An undivided two lane rural cross-section (average pavement width approximately 12.4 meters) with generally no auxiliary lanes except for a section of roadway in the Town of Blackfalds and just south of the Town of Lacombe;
- A CP Rail grade-separated structure is located approximately 1.5 km north of Blackfalds (Bridge File 73527, remaining life span projected to 2052). The "sharp" horizontal curvature of the southbound Highway 2A approach to the structure requires an adverse reduction in the posted speed limit reduction from 100 km/hr to 75 km/hr. The area has been the site of approximately 14 collisions during a five year period;
- A CP Rail at-grade rail crossing is located approximately 3 km south of Lacombe;
- Approximately 30% of the intersections within the study area have been identified has having substandard geometry including intersections angles and limited sight distance;
- Two-way traffic volumes north of Highway 597 corridor are approximately 14,500 vehicles-per-day (vpd) while south of the Town of Lacombe, traffic volumes are approximately 8,500 vpd;

- Two intersections with Highway 2A (Highway 597 and Park Street) are controlled by traffic signals. The Highway 2A/Highway 597 intersection is operating at unsatisfactory levels of service ("E") during the morning peak hour; [However, recent initiatives have been undertaken by AIT to improve/upgrade the intersection configuration.]
- A total of twelve two-way STOP-controlled intersections are located along the Highway 2A corridor. All operate at a satisfactory Level-of-Service (LOS);
- Collision Analysis indicated a total of 130 collisions during the five-year period between 1998 and 2002. Two sections of the corridor (Kilometre 6-7 (South Highway 597 to North Highway 597) and Kilometre 9-11 (C&E Trail to Township Road 40-0)) were found to be in the range, or exceed, the 2004 average provincial collision rate;
- The Environmental Overview that consisted of a Phase I Environmental Site Assessment (ESA) and a review of the Valued Ecosystem Components (VEC) indicated a potential for:
  - contamination could exist at the Dow Chemical glycol loading facility. The preferred alignment was selected in part to avoid these lands.
  - a potential for rare plants and wildlife concerns and a need to protect vegetation and wildlife resources within the study area.

- Alberta Community Development indicated that a *"Historical Resource Impact Assessment* " in not required" and that "Alberta Transportation has "Historical Resource Act Clearance for the this study.

Forecast Traffic Conditions

The 20-year forecast traffic volumes indicated that:

- Traffic will be heaviest during the forecast afternoon peak hour of travel demand:
- Just south of the Town of Lacombe's corporate limits traffic volumes will reach 1,420 vph in the peak direction;
- South of Blackfalds, traffic volumes will reach 2,250 vph in the peak direction;
- Of the 2,250 vehicles traveling in the peak direction just north of Highway 597, approximately 720 vehicles (32%) will remain within the Town of Blackfalds limits;
- During the time of "ultimate" development Highway 2A will be function at congested levels and exhibit traffic operational characteristics similar to an "arterial" roadway;
- Development beyond that projected time horizon assumed within this study (ie Phase III land uses) Highway 2A would be required to conform to a six-lane configuration. (i.e peak direction peak hourly volumes south of Lacombe exceed 2,700 vph per direction.)

Issues and Resolution

Several issues were identified throughout the study process. The following provides a brief outline of the issues and their resolution:

a) Highway 2 / Township Road 40-0 Access Closure

For the purposes of this study, it was assumed that the Hwy 2/Twp. Rd. 40-0 access would be closed and a local roadway would be developed that would extend south from Twp. Rd. 40-0 and connect with the Town of Blackfalds future West Arterial.

b) New Grade-Separated CP Rail Crossing

It was determined the existing grade-separated CP Rail crossing was undesirable to accommodate a future 4 lane facility due the geometry of the structure approaches. A preferred solution at the time of Highway 2A twinning would see the use of the existing structure for the southbound Highway 2 lanes and a new structure for northbound lanes. The new structure would be located approximately 300 meters north of the existing structure and avoid environmentally sensitive areas while providing for a desirable approach road alignment. In addition it would be designed to accommodate CP Rail's requirement to span 3 parallel rail tracks.

"Ultimately", the existing structure would be decommissioned at the time when the residual bridge life would be exhausted, and the new alignment could then be expanded to accommodate 4 lanes of travel.

c) Emergency Routing

In the past, Highway 2A was used as an emergency by-pass route when Highway 2 would become impassable (due to severe accident, traffic disruption, chemical spill etc,). During the closure of Highway 2 travel through the urbanized areas (Lacombe, Blackfalds Red Deer etc.) on the emergency by-pass route causes motorists to experience significant delays. The future widening of Highway 2A is partially intended to alleviate the above concerns by adding additional lanes and providing 3 meter wide shoulders that can accommodate emergency vehicles.

d) Integration with Local Planning Initiatives

The Town of Lacombe, the Town of Blackfalds and the County of Lacombe have all undertaken several transportation planning initiatives at a local level. This functional planning study provided the opportunity to undertake a composite assessment of all the local initiatives aimed at determining the impacts to the Highway 2A corridor. Land use forecasts and conclusions involving future local infrastructure requirements were taken

into consideration and rationalized within the context of impacts to the Highway 2A corridor.

e) Preferred South By-Pass Location

The *Town of Lacombe Transportation Study* recommended a South By-Pass be implemented and proposed a conceptual alignment option. Through the course of this study it became evident that a consensus regarding the alignment of the South By-Pass did not exists between the Town of Lacombe and those property owners / institutions along the alignment. As such, the Town of Lacombe will likely need to reach an agreement with the adjacent landowners in order to further pursue the proposed alignment of the South By-pass. For the purposes of this study it was assumed that the South By-Pass would be located at the approximate location designated within the *Town of Lacombe Transportation Study*.

Highway 2A Access Management

The preferred access management strategy along the Highway 2A corridor aims at achieving satisfactory intersection spacing to meet "ultimate" travel demand forecasts through the following elements:

- Closures of the seven intersections with/adjacent to Highway 2A from Highway 597 to the northern limits of the Town of Blackfalds;
- Closure of five intersections/accesses with Highway 2A from the northern limits of the Town of Blackfalds to the southern limits of the Town of Lacombe;
- Improvement of eleven intersections with Highway 2A (includes Highway 597, Indiana Street, Park Street, Gregg Street, C&E Trail, Township Road 40-0, Township Road 40-1, Township Road 40-2, Highway 2A/Range Road 27-2, C & E Trail North and "Future South By-Pass);
- Addition of approximately 3.6 km of service road length that would address the interconnectivity issues and required closures while adhering to local area concerns;
- Upgrades to accommodate the CP Rail Corridor including:
    - A new CP Rail grade-separated structure designed to accommodate three CP Rail tracks located approximately 300 m north of the existing CP Rail overpass;
    - Interconnection of traffic signals with grade crossing automatic warning systems at intersections adjacent to the CP Rail corridor; and
    - Monitoring of the existing at-grade-crossing located approximately 770 meters north of Township Road 40-2 for warrants of warning system with gates in both the southbound and northbound Highway 2A directions.

The Proposed Staging Strategy

- A staging strategy was developed where interim, or more immediate, improvements can take place and remain consistent with the "ultimate" vision for the twinned 4-lane configuration. The staging strategy includes such aspects as:
  - intersection improvements and access consolidations that can be scheduled as part of regular maintenance or capital activities on an "as required-when warranted" basis;
  - small individual projects such as closure to minor accesses can be implemented as low cost items with short duration times and can result in immediate benefits;
  - other projects that involve intersection modifications, service road modifications, off-site costs and/or the requirement of additional property will likely be subject to future development initiatives; and
  - the proposed staging strategy is also intended to serve as a guideline to assist in the responses to future development and access management initiatives.

All aspects of staging subject to Provincial budgetary and priority processes in addition to the level of anticipated development assumed within this study being realized.

Where Do We Go From Here?

This *Highway 2A Functional Planning Study* was developed as a comprehensive functional plan to address the corridor requirements and offers Alberta Infrastructure and Transportation flexibility:

- in staging as the strategy is segmented into various projects each of which can be scheduled to meet development timetables or warrants;
- to respond to municipal initiatives with the required "ultimate" term highway road improvements;
- respond to development initiatives with functional plans made in preparation of area structure and integrated master plans being advanced; and
- to accommodate additional highway through-lane capacity through the reduction of low volume intersections and accesses as they are phased out;

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1.0 INTRODUCTION

CastleGlenn Consultants Inc. was retained in late August 2004 to undertake a functional planning study that would address the requirements of the Highway 2A corridor between the Town of Blackfalds (Highway 597) and the Town of Lacombe. The study involved investigating ways to improve traffic operations, as well as assessing the need and time frame for the ultimate twinning of Highway 2A. It was recognized that access management would remain a key factor in arriving at the most effective solutions to improve traffic operations until such time as twinning of the corridor would be required.

As well, a goal of this study was to identify a series of preferred "shorter-term" improvements that could be implemented to address existing traffic concerns through either access consolidation and intersection modifications with the objective of achieving improved traffic operations along the corridor. An interim access management strategy was required that incorporated a staged roadway/intersection improvement program that would maximize the use of the existing roadway infrastructure.

Identifying the associated right-of-way requirements necessary to implement the "ultimate" twinning of the corridor was considered to be a fundamental requirements to permit the Town of Blackfalds, Town of Lacombe and the County of Lacombe to continue to plan for development along the periphery of the Highway 2A corridor and assure Alberta Infrastructure and Transportation that sufficient property has been protected.

The Study Components

The County of Lacombe, Town of Blackfalds and Town of Lacombe is required by law to have in place those land use by-laws, municipal development plans and area structure plans that assist the municipalities in managing, programming and planning for urban growth and the upgrading of the area's roadway system.

The County of Lacombe, Town of Blackfalds and Town of Lacombe have all experienced significant growth during the past several years. As area structure plans are continually being submitted for approval to the county and municipalities, Alberta Infrastructure and Transportation recognized the need to assess traffic operations along Highway 2A between Blackfalds and Lacombe to ensure that the existing facility could sustain future development initiatives. The undertaking of this study would assure that Alberta Infrastructure and Transportation would be able to best advance its position assuring that the use of existing highway infrastructure is maximized through improved traffic operations.

The Planning Level

It is important to emphasize that this study was oriented at a functional planning level involving intersection modifications, access management mitigation measures and realignment options to address the need to improve traffic operations along the Highway 2A corridor. Subsequent phases of the development of this corridor would likely involve the detailed engineering design phase prior to any construction being initiated.

1.1 Study Area

As depicted in Exhibit 1-1, the study area encompasses the Highway 2A corridor from Highway 597 (Blackfalds) to the south corporate limits of the Town of Lacombe.

The boundaries outlined above include lands adjacent to the highway corridor, as modifications to these lands will be required to accommodate future access and roadway improvements. The lands along the Highway 2A corridor within the urbanized limits of Blackfalds can best be described as commercial, residential and light industrial. To the north of Blackfalds, the lands adjacent to the highway are generally used for agricultural purposes.

The study area is bisected in the north-south direction by the CP Rail line. Through the Town of Blackfalds, the CP Rail line parallels the highway to the west, however it transitions just north of the CP Rail grade separation, and continues to parallel Highway 2A on the east side. The CP Rail grade separated structure was constructed in 1957, and was completely refurbished in 1998. Residential

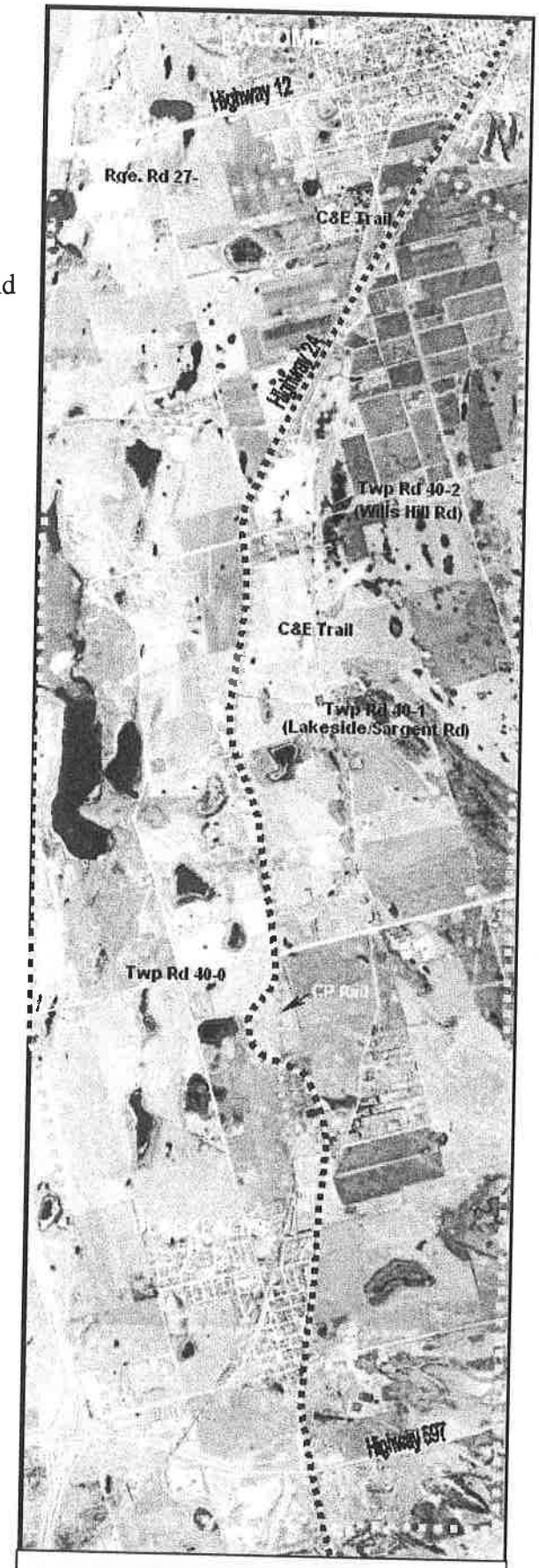

Exhibit 1-1: Study Area

development has been initiated on the east/west lands, adjacent to the railway corridor, within the vicinity of the CP Rail structure.

The CP Rail corridor maintains two controlled at-grade railway crossings: Broadway Avenue within the Town of Blackfalds and just north of the Range Road 27-1/Highway 2A intersection.

The rail crossing, north of the Range Road 27-1 intersection was implemented to accommodate the CP Rail spur line that detaches from the main railway line at this location. The CP Rail spur line continues to the west serving the community of Bentley. It is imperative that any solutions must effectively deal with the long-term requirements of the CP Rail corridor.

1.2 Background

Economic Impacts

Highway 2A in the vicinity of the study area, is used as an inter-community corridor between Red Deer, Blackfalds and Lacombe. Many residents utilize this facility as a commuter route to reach the employment sectors of Red Deer, as well as to access surrounding resource industry centers such as Joffree via the Highway 597 corridor. The Town of Blackfalds (population 3,900) is characterized as a "Community of Commuters"; with over 65 percent of the working population traveling to Red Deer for employment while the remaining 35 percent work within Blackfalds, at the nearby petrochemical plants, or within the Blindman Industrial Park.[1]

The Town of Lacombe (population 10,000) is located at the center of one of Alberta's most fertile production areas; as such, agriculture remains one of the areas primary land uses. Wheat, barley and oats remain the predominant crops grown in the area. Over time however, the Lacombe area has attracted various industries such as dairy operations, hog and beef operations, greenhouses, and a wide range of agricultural support services. The Agricultural Research Station (comprising both provincial and federal agencies) remains a long standing land holder within the area. The facility undertakes cattle and hog breeding research and develops forage-based cropping systems within the Plant Science Section.

[1] Town of Blackfalds Web-site: http://www.blackfalds.com/about/, October 26th, 2004

The Highway 2A corridor within the urbanized areas of the Town of Blackfalds and the Town of Lacombe contributes to the communities growing economic base. Hence, this study has raised concern by business establishments located adjacent to the corridors who have grown to depend on the corridor and its associated economic benefits. These establishments closely identify with the impacts associated with the proposed improvements and preferred access management solutions. Business such as the Blackfalds Esso Gas Station, Blackfalds Motor Inn located on the east, and the Parkwood commercial development located on the west side of Highway 2A depend on the corridor's pass-by traffic for patronage. Each of the candidate access management solutions that were investigated remained sensitive to the potential impacts upon the existing local business community. Section 3 of this report highlights the impacts to several establishments situated adjacent to the Highway 2A corridor.

Municipal Planning Impacts

The Town of Blackfalds, Town of Lacombe and County of Lacombe remain thriving communities that have experienced significant growth:

- The Town of Blackfalds has been experiencing an annual growth rate of approximately 10 percent. Residential/commercial development has "skirted" to the east side of Highway 2A (Parkwood Developments) and additional urban expansion (i.e. school, residential, etc.) to the north and west is projected to occur within the 8,000-population horizon. Additional industrial development within the Town has also been suggested for lands south of Highway 597.

- The Town of Lacombe has been experiencing an annual growth rate of 3 percent. Substantial changes to the Towns overall development patterns have occurred due to constraints on proposed developments to the north. These changes have allowed residential development to occur south of Highway 12 and to the east of Highway 2A.

- The County of Lacombe has recently undertaken the "*Lacombe/Blackfalds Area Structure Plan*" and the associated "*Lacombe/Blackfalds Traffic Impact Assessment*". These studies identified several potential development initiatives, residential and industrial in nature, within those areas adjacent to the Highway 2A corridor but outside of the existing Town urbanized areas.

Clearly, the advent of the current development potential along the Highway 2A corridor would result in the need for upgrades and infrastructure improvements leading to the eventual twinning of the corridor. Planning for the phased development of the corridor will enable Alberta Infrastructure and Transportation to accommodate the continued

growth of the municipalities and at the same time protect those lands necessary to assure development of the "ultimate" preferred configuration.

1.3 Past Planning Initiatives

The following past planning initiatives were reviewed as part of the study area familiarization process:

- *"Geotechnical Investigation Highway 2A/CPR Overpass-Section 35-39-27-W4M Blackfalds, Alberta RX05605* (AGRA Earth and Environmental Limited, Prepared for Reid Crowther and Partners Limited, April, 1997)

  The purpose of the investigation was to determine local soil and ground water conditions and to provide sufficient sub-surface information to define geotechnical patterns for design of possible foundation alternatives for crossing options. The geotechnical investigation consisted of drilling 6 bore holes on either side of the existing bridge and at the toe (south-east of the overpass) of the existing embankment. The study concluded that the general soil profile consisted of pavement and rock fill (200-300 mm of asphalt pavement over 200 mm of crushed gravel fill), sediments of sand, silt and clay (moisture content ranged between 20 and 30 percent and were considered to be above the optimum moisture content (OMC) and considered to be frost susceptible and sensitive to disturbance); clay and clay till (to approximately 853 metres) and bedrock (below 853 meters). The study concluded that "*foundation conditions at the site are considered poor due to the presence of extensive fine grained, sensitive and frost susceptible soils. The most practical foundation system for the proposed bridge would be a driven pile foundation.*" and "*the proposed raise in grade of 400 to 500mm to accommodate the new bridge girders is expected to have minimal impact on the embankment and foundation of soils in terms of potential settlement, however, if the grade is raised further this assessment should be reviewed.*"

- "*Town of Lacombe - Highway 2A Traffic Study*"
  (Stantec Consulting, October 1999)

  This study detailed a long-term roadway network plan which included the upgrading of Highway 2A to a four-lane cross section from 58th Street to Airport Road, with a reduced number of direct accesses onto the highway. The plan also recommended the implementation of a South By-pass corridor that would connect 58th Street at Highway 2A to Highway 12 at the east corporate limits of Town of Lacombe.

- "*Town of Lacombe Transportation Study*"
  (Bunt & Associates Engineering [Alberta] Ltd., December 2002)

  This document was produced to update the Town of Lacombe's transportation master plan, as well as to identify and evaluate required changes to Highway 12 on behalf of Alberta Infrastructure and Transportation. The document identified several short-term (immediate) and long-term (20,000 population horizon) improvements required throughout the Town of Lacombe. Short-term

improvements included traffic signal warrants, additional signage and lighting standards. Long-term improvements included up-grading several existing 2-lane roadways to accommodate 4-lanes (Highway 12, Highway 2A, West Side Road, C&E Trail between Woodland Drive and 63rd Avenue, Wolf Creek Drive between Highway 2A and 46th Avenue), a south by-pass, additional signalization, and Highway 12 intersection improvements.

- *"Town of Blackfalds Transportation Study"* (Stantec Consulting Ltd., June 2003)

  This document was produced as a key component of managing and planning for growth within the Town of Blackfalds. This study detailed short (4,000 population horizon), medium (8,000 population horizons) and long-term (12,000 population horizon) roadway network plans for the town. The long-term roadway network recommended for the Town of Blackfalds included the following:

  - Highway 2A and Highway 597 would be upgraded to a 4-lane divided cross-section;
  - Highway 2A / Broadway Avenue intersection would be consolidated;
  - Highway 2A / South Street intersection (east leg) would be consolidated;
  - Highway 2A / Indiana Street would be restricted to right-in, right-out;
  - The intersections of Highway 2A at Park Street, Gregg Street and the proposed East collector would be fully signalized;
  - Construction of a new West Arterial in Blackfalds west of Highway 2A; and
  - Construction of a new East Collector in Blackfalds east of Highway 2A.

- *"Safety Assessment (Final) Highway 2A:18 (Km 16.229) Highway 2A & Highway"* (EBA Engineering Consultants, August 2004)

  This report involved an examination of the safety performance and operation of the intersection of Highway 2A:!8 and Highway 597:02. The study recommended the upgrade of the intersection to include exclusive right turn lanes on all legs of the intersection and to maintain the exclusive left turn lanes on Highway 2A in the northbound and southbound directions. These upgrades were determined to be warranted at the time of the report circulation [August 2004]. Improvement to traffic signal operations were also recommended that included "*an advance 7 second flashing warning before the start of the amber phase.*" Upon completion of the above modifications, it was recommended that AIT conduct a detailed review of traffic movements by signal phase to determine the warrant for and type of left turn phasing and delay to through traffic in both directions.

- *"Safety Assessment (Final) Highway 2A:18 (Km 16.229) Highway 2A & Highway"* (EBA Engineering Consultants, August 2004)

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northbound and southbound directions. These upgrades were determined to be warranted at the time of the report circulation [August 2004]. Improvement to traffic signal operations were also recommended that included "*an advance 7 second flashing warning before the start of the amber phase.*" Upon completion of the above modifications, it was recommended that AIT conduct a detailed review of traffic movements by signal phase to determine the warrant for and type of left turn phasing and delay to through traffic in both directions.

- *"Lacombe/Blackfalds Area Structure Plan - Traffic Impact Assessment (Final)"* (CastleGlenn Consultants Inc., January, 2006)

  The purpose of this assessment was to provide Lacombe County with a strategic plan that would address future infrastructure required to accommodate new residential/industrial growth within the Lacombe/Blackfalds area; confirm the county roadway network required to accommodate the full impact of build-out envisioned within the *Lacombe/Blackfalds Area Structure Plan;* identifying the roadway/intersection improvements required to sustain the forecast traffic growth and to achieve efficient traffic operations throughout the network; and determine the necessary proponent contributions required to develop the required infrastructure. The above objectives were intended to enable Lacombe County to develop a position that would assure that the transportation requirements of the area structure plan were sustainable; that the required infrastructure upgrades could be implemented when warranted; and that all beneficiaries would contribute a fair share to the cost of the infrastructure. The document concluded that Lacombe County should be encouraged to consider implementing a residential density of 1.25 acres/lot for proposed country residential areas (keeping in mind servicing constraints); and continue to coordinate the land use approvals process with Alberta Infrastructure and Transportation to assure that future intersections along the Highway 2A corridor proceed in concert with Lacombe County development initiatives.

1.4 Objectives

CastleGlenn notes that this study was to:

- Identify operational and safety issues on Highway 2A from the Highway 597 junction (Blackfalds) to Lacombe;
- Develop a recommended plan (ultimate and first stage) to address geometric, operational, safety, access and capacity deficiencies along this section of highway. Identification of right-of-way requirements for realignments and future twinning is required;
- Develop a staging/phasing strategy with estimated costs for construction of recommended improvements identified in the study for budgetary/programming purposes; and
- Define basic right-of-way requirements for the recommended improvements.

1.5 Methodology

The following activities were undertaken as part of a "*tailor-made*" methodology used to address the planning requirements for this study:

- All relevant information, such as area structure plans, official plans and local transportation plans were collected and reviewed;
- Traffic exhibits illustrating current and future traffic volumes (20-year projection) were prepared using historical traffic count information from Alberta Infrastructure, current traffic, count information collected November 2004 and municipal demographics and land use forecasts;
- A site survey was undertaken to record the addresses of all institutions, businesses and residences;
- An utility impact assessment was undertaken;
- An environmental assessment was undertaken to meet the requirements of Schedule 3: Environmental Assessment Requirements;
- A Historical Resources Impact Overview was undertaken to meet the requirements of Schedule 2: Historical Resources Overview;
- A constraint review was undertaken to identify existing deficiencies, collision prone locations, safety concerns, operational problems and any other constraints that would impact the proposed upgrade of the highway
- Existing local drainage patterns were assessed to ensure that proposed improvements and realignments do not alter these patterns. Mitigation measures were recommended, if required;
- An assessment of existing structures was undertaken;
- The comparison of improvement alternatives took into account property impacts and other factors such as travel time and benefit-cost;
- The evaluation included a review of alternatives from the perspective of forecast traffic, safety, geometrics, land-use, operations, property impacts, conceptual costs and access management;
- A conceptual access management scheme was developed that was consistent with the function and design standards of the highway;
- Detailed assessment of the need for climbing/passing lanes was undertaken and when warranted the appropriate locations climbing/passing lanes were identified;
- Cost estimates were itemized for (unit cost) each alternative alignment;
- Basic right-of-way requirements were determined for the recommended solutions and basic right-of-way requests were prepared;
- 1:5,000 scale functional plans on digital mosaic/profile base sheets (using 3° TM NAD 83) standards incorporating all typical roadway cross sections were prepared to illustrate the first stage and "ultimate" alignment alternatives;

- 1:2,000 scale functional plans on digital mosaic/profile base sheets (using 3° TM NAD 83) standards of the preferred "short-term" access management modifications were prepared;
- Four meetings with the technical review committee (TRC) were held. [The first to present existing conditions and examine potential areas for improvement (, the second to present the results of the evaluation and assessment process and the last to present the findings and conclusions);
- Presentations to the Town of Lacombe, Town of Blackfalds and Lacombe County Councils were organized to seek resolution on the alignment and intersection improvements; and
- A public involvement program included two public open houses, which were conducted in accordance with Alberta Infrastructure and Transportation guidelines for the purpose of introducing the study and the potential options and to provide the results of the evaluation/assessment process and study findings.

2.0 THE HIGHWAY 2A CORRIDOR

2.1 Existing Roadway Conditions and Jurisdictions

The Highway 2A corridor represents an essential component in what is an integrated transportation system involving a combination of highways, County and local roadways that serve the Lacombe-Blackfalds area. There are three provincial highways which function in concert with one another and fall within the jurisdiction of Alberta Infrastructure and Transportation:

- *Highway 2A*, serves as a north-south commuting corridor that can be characterized as a two-lane undivided highway with a rural cross section. This section of highway serves as an inter-community link between the Town of Blackfalds and the Town of Lacombe.
    - Along the 11 kilometre section of Highway 2A a total of 14 at-grade intersections provide access to adjacent lands.
    - Currently 2 of the intersections operates with traffic signals:
        - the junction of Highway 2A and 597 is controlled by traffic signals in all directions;
        - the junction of Park Street and Highway 2A is controlled by traffic signals in the north-south direction and STOP-controlled in the east-west direction.

    with the remainder (12) being STOP-controlled intersections.

    - Broadway Avenue,
    - South Street,
    - Indiana Street,
    - Park Street,
    - Gregg Street,
    - C&E Trail [South],
    - Township Road 40-0,
    - Township Road 40-1,
    - Township Road 40-2,
    - Range Road 27-1,
    - C&E Trail [North], and
    - 58th Street.

    Of the 14 intersections identified, one of the signalized intersections and 6 of the STOP-controlled intersections provide access to Lacombe County lands (Highway 597, Township Roads 40-0, 40-1 and 40-2, Range Road 27-1, C&E Trail and 58th Street). All of the intersections along the Highway 2A corridor fall within the jurisdiction of Alberta Infrastructure and Transportation.
- The Highway 12 corridor traverses the CP Rail corridor by way of a grade separated structure that has recently been reconstructed.
- Current Highway standards (AT Highway Geometric Design Guide 1995/99 - Table A-7) indicate that typical design speeds for highways range from 90 to 120 km/hr.
- The current posted speed limit on Highway 2A is 60 km/hr within the urban limits of the Town of Blackfalds; this transitions to 80 km/hr outside of the urban limits and further increases to 100 km/hr within the surrounding rural areas. Within the urban limits there are 5 operating intersections (Highway 597, Broadway Avenue, Indiana

Street, Park Street and Gregg Street) and 2 sets of traffic signals (Highway 597 [full signalization] and Park Street [east-west direction]). The remaining 7 intersections are STOP-controlled (C&E Trail [South], Township Road 40-0, Township Road 40-1, Township Road 40-2, Range Road 27-1, C&E Trail [North] and 58th Street).

- The lands adjacent to the highway vary in character:
  - within the urbanized limits of Blackfalds the adjacent lands can best be described as a mixture of commercial, residential and light industrial;
  - through the lands within the jurisdiction of Lacombe County, the lands paralleling Highway 2A are comprised of mainly agricultural lands uses with pockets of country residential development. [The County of Lacombe has developed plans that would see areas between the two communities (Blackfalds and Lacombe) develop as country residential land uses.]
  - The lands to the south of the Town of Lacombe are used for experimental agricultural research by both the Federal and Provincial authorities.

Clearly, the existing conditions of the Highway 2A corridor are uncharacteristic of a "typical" rural highway system, however the highway corridors within the designated study area must provide a balance between the roadway functioning as an arterial to the Town of Blackfalds and Town of Lacombe and as fundamental links within Alberta's rural highway system. The interconnecting highways served by the Highway 2A corridor include the following:

- *Highway 2* is located west of Highway 2A and is characterised as a 4 lane undivided rural highway. Currently there are three locations that provide direct access to Highway 2: Highway 597, Township Road 40-0 and Highway 12. It should be noted that Highway 2 between Calgary and Edmonton is to be upgraded to a "freeway" standard likely sometime within the next decade. Adoption of this standard implies that all at-grade intersections accessing Highway 2 (Township Road 40-0) would be closed. As concerns the section of Highway 2 between Highway 597 and Highway 12 (in the vicinity of the Town of Lacombe), the lands adjacent to Highway 2 are predominantly characterized by light industrial and agricultural land uses.
- *Highway 597* is classified as a 2 lane undivided rural highway. This highway runs in the east-west direction. The majority of the lands located adjacent to Highway 597 are currently undeveloped. The few developments that have been realized are primarily industrial land uses. The lands to the north of the corridor fall within the jurisdiction of the Town of Blackfalds. The lands to the south of the corridor fall within the jurisdiction of Lacombe County.
- *Highway 12* although located north of the study area serves as the gateway to the Town of Lacombe where it transitions into 50th Avenue and provides access to Highway 2. The junction of Highway 2A and 50th Avenue takes place within an urban environment and is controlled by traffic signals.

All other roadways within the study area were determined to fall under the jurisdiction of the surrounding municipalities, (Town of Blackfalds, Town of Lacombe) or Lacombe County. (It should be emphasized that for the purpose of this study only the infrastructure improvements required along the Highway 2A corridor ere identified.)

A site visit was undertaken in fall of 2004 to observe and document the existing intersection configurations and land uses along the study corridor. (Refer to Appendix "A")

2.2 Existing Rail Corridors

The study area is bisected in the north-south direction by a CP Rail line that is approximately 10.5 kilometres in length. The CP Rail corridor runs parallels to Highway 2A on the west side as it travels through the Town of Blackfalds and transitions just north of the CP Rail grade separation which is located south of Township Road 40-0. North of the CP Rail grade separation the rail corridor continues to parallel Highway 2A on the east side. The CP Rail Corridor bisects the study area in the north-south direction.

- The CP Rail grade separation [Bridge File 73527] is located south of Township Road 40-0. The original structure built in 1947 had a span of 38.1 metres, is supported on four concrete piers (5-span at 7.6m) and had an overhead clearance of 6.86 meters[1]. (The road elevation at the existing bridge was about 888.5 meters and the track elevation is approximately 881.5 meters with side ditches at 881 meters) In 1958 the bridge deck was widened to 12.6 meters and subsequently, in 1998, AIT reconstructed (bridge replacement) the existing CP Rail overpass structure to a 3-span (14.0-14.3-14.0 meter) structure with a 13.4 m clear roadway width. This action increased the overhead clearance to 7.010 meters and extending the expected remaining life expectancy of the structure by 50 years. (As per an AIT 2002-02-11 bridge inspection report.) (The improvements included a new substructure and superstructure.) Minimal modifications were made to the existing highway alignment and grade lines approaching the structure resulting in an at-bridge highway design speed of 80 km-per-hour[2]. These approaches have a general rating between "*poor*" and "*adequate*".

There are a total of 11 railway crossings that occur within the overall study area:

- eight at-grade crossings (Highway 597, South Street, Broadway Avenue, Township Road 40-0, 40-1, 40-2, C&E Trail [north] and 58th Avenue); The Broadway Avenue at-grade crossing occurs within the Town of Blackfalds. [The Town of Blackfalds has made known their intention to extend Gregg Street west across the CP Rail corridor, creating a new at-grade railway crossing and in turn closing the existing at-grade Broadway crossing.]

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[1] "*Geotechnical Investigation Highway 2A/CPR Overpass-Section 35-39-27-W4M Blackfalds, Alberta RX05605* (AGRA Earth and Environmental Limited, Prepared for Reid Crowther and Partners Limited, April, 1997) – Page 1

[2] Letter to Randy Shalagan, P. Eng. From Reid Crowther (L. Atkin)- (April 8, 1997-page 2) Bridge File 73527.

- a grade-separated structure north of Blackfalds (approximately 1.2 kilometres north of C&E Trail [south]);
- an at-grade spur rail line rail crossings with Highway 2A; (This is located south of the urban area of Lacombe and accommodates the CP Rail spur line that diverts westerly from the main CP railway line and continues to the west serving the community of Bentley, and beyond); and
- an at-grade spur line rail crossing with Range Road 27-1.

The minimum radius of the track curves within the study area is approximately 900 meters and the track grade does not appear to exceed 1.5 percent. The CP Rail corridor accommodates freight trains that transport a variety of items along the main line to such industries as the DOW Chemical Loading Facility.

A search of the CP Rail electronic files was undertaken to find historical records pertaining to such incidents as crossing accidents, derailments, grass fires, venting of compressed gasses from tanker cars, and leaks/seepage of commodities along the section of the Leduc Subdivision between Mile 10.9 *(Highway 597)* and Mile 18.0 *(approximately the Lacombe Section Headquarters)*. The CPR electronic files search covered the time frame from August 15th, 1986 to October 24th, 2004.

The CP Rail electronic records indicated that:

- On August 29th, 2001 a derailment occurred at M18.0 *(Lacombe Section Headquarters)* on the south side siding switch. Rail cars containing one load grain and four loads plastic pellets derailed, spilling their contents. Due to this derailment, two hundred metres of track and ties were damaged;
- on June 24th, 2003 there was a spill of less than 50 gallons of glycol from the top dome of a tanker car at M11.5 *(the site of the Dow Chemical Loading Facility)*; [As there is the potential for environmental contamination, Alberta Transportation would require a clearance report should land be required for highway redevelopment.]
- There have been numerous wheel derailments of tanker cars at this same facility *(Dow Chemical Loading Facility)* with no reported spills; and
- several right-of-way fires have occurred between M10.5 and M11.0 (within the vicinity of Highway 597).

2.3 Existing Deficiencies

A site visit and desk study were performed to identify the existing highway deficiencies along the in the study corridor. Comments received from the public open house held on September 29th, 2004 were also used to identify problematic areas and issues pertaining to the current configuration of Highway 2A between Blackfalds and Lacombe.

2.2.1 Highway 2A Alignment Deficiencies

Using information obtained from site visits, aerial photography and an alignment survey done by EBA Engineering Consultants Ltd (Surveyed 2000/07/17) the following geometrical deficiencies were observed along the existing Highway 2A alignment:

- ***Highway 2A CP Rail Overpass Approach*** consists of three horizontal curves ranging from a 430m radius to a 290m radius separated by short tangents. The posted speed limit for the southbound lanes decreases from 100 km/hr to 75 km/hr in the vicinity of the overpass. According to the *TAC Manual - Geometric Design Guide for Canada Roads [Section 1.2.3.1]* "*it is widely believed that collisions rate is more directly affected by speed variations then by speed. Collision frequency will be reduced on roads that do not require drivers to make large speed adjustments and that promote uniformity of speeds*" As such, this area has been a site of approximately 14 collisions during a five-year period (1998-2002). In addition during the public consultations numerous people expressed they were uncomfortable when manoeuvring around the steep super elevated approach roads to the overpass.
- ***350 meters north of Township Road 40-0*** a vertical crest curve has a "k" parameter of approximately 74 which allows for a posted speed of 90km/hr based upon required stopping sight distance criteria; however the current posted speed in the area is 100 km/hr.

2.2.2 Intersection Deficiencies

The following intersections were identified as having deficiencies associated with limited sight distance, substandard intersection angles (min 70 degrees) and layout characteristics:

- ***Highway 597 / Highway 2A*** intersection was identified as a problematic area by the public during an open house held on September 29th, 2004. One of the major issues discussed was limited sight distance. When attempting to make a left-turn from the north/southbound lanes motorist feel there is insufficient sight distance to successfully complete the movement due to the slight offset of the opposing lanes. The alignment of these lanes would allow motorists to see past vehicles in the opposite left-turn lane.
- ***58th Avenue / Highway 2A*** is angled at approximately 45 degrees. The minimum intersection angle with a primary or secondary highway is 70 degrees as specified in the *AT Highway Geometric Design Guide [Section D.3.2].*
- ***Range Road. 27-1 / Highway 2A*** is angled at approximately 45 degrees. The minimum intersection angle with a primary or secondary highway is 70 degrees as specified in the *AT Highway Geometric Design Guide [Section D.3.2].*
- ***C&E Trail / Highway 2A*** intersection angle and geometry of the north leg is not a conventional layout when compared to the required standards in the *AT Highway*

Geometric Design Guide [Section D.3]. The north leg of C&E trail approaches Highway 2A at an acute angle of approximately 20 degrees and intersects Highway 2A at 90 degrees through a short 30-meter radius.

2.4 Drainage Patterns

The existing cross-section of Highway 2A through the urban/rural sections of the study area typically consists of two 3.7 meter lanes and 3 meter shoulders with a cross fall of 2 percent from the centerline. Drainage ditches exist on either side of the highway collecting storm water and surface runoff and channelling the discharge parallel to the highway through a system of culverts and open channels to the appropriate storm water collection areas located adjacent to the highway.

Along the existing Highway 2A alignment there are several stretches of high fill sections where the pavement is high enough above the original ground that accumulation and retention of water adjacent to the road is not an issue. In these areas run-off from the pavement is allowed to flow down the fill sections and filtrate through the ground soil or accumulate at the bottom of the fill. Cut sections along the existing Highway 2A alignment typically contain a 1.0 meter (deep) ditch with mild side slopes.

2.5 Study Area Traffic Trends and Constraints

2.5.1 Current Traffic Trends

The current traffic volumes entering the study area from the south are approximately 9,500 vehicles-per-day (vpd), however as one continues toward the northern limits of the Town of Blackfalds traffic volumes along Highway 2A decrease to approximately 6,800 vpd. North of Blackfalds and south of Lacombe, traffic volumes continue to decrease to approximately 6,500 vpd. During the summer months traffic volumes increase by approximately 400 vpd.

Exhibit 2-1 illustrates the average annual growth rate in daily traffic volumes, the average daily traffic (AADT) and the average summer daily traffic (ASDT) along the Highway 2A corridor. The exhibit indicates that on average traffic volumes are growing at an average annual rate of approximately 3 percent per year and that heavy-vehicle (truck) traffic represents about 10 percent of all vehicle traffic. Historical intersection turning movement information was obtained from the Alberta Infrastructure and Transportation website (Appendix "A") for the following intersections:

- Highway 597 (2003);
- Park Street (2003);
- C&E Trail (North);
- Broadway Avenue (2003);
- Indiana Street (2003); and
- Gregg Street (2003).

Traffic counts were undertaken within the study area during the month of November (2004) at various intersections to record the existing morning and afternoon peak hour traffic volumes. The following intersections were surveyed during the morning and afternoon peak hours of travel demand:

- South Street;
- C&E Trail (South);
- Township Road 40-0;
- Township Road 40-1.
- Township Road 40-2;
- Range Road 27-1; and
- 58th Avenue;

The raw information (See Appendix "A") was collected and transcribed to depict the morning and afternoon peak hour individual turning movements occurring at each intersection within the study area.

Information obtained from the historical counts and surveyed traffic counts were used to create Exhibits 2-2 and 2-3. These exhibits illustrate the existing balanced morning and afternoon peak hour traffic volumes along the Highway 2A corridor. This traffic information represents "balanced" volumes such that the traffic departing from one intersection balances with that arriving at the next intersection downstream. The "balanced" traffic volumes for each intersection were used to undertake intersection capacity analysis. (See Appendix "B")

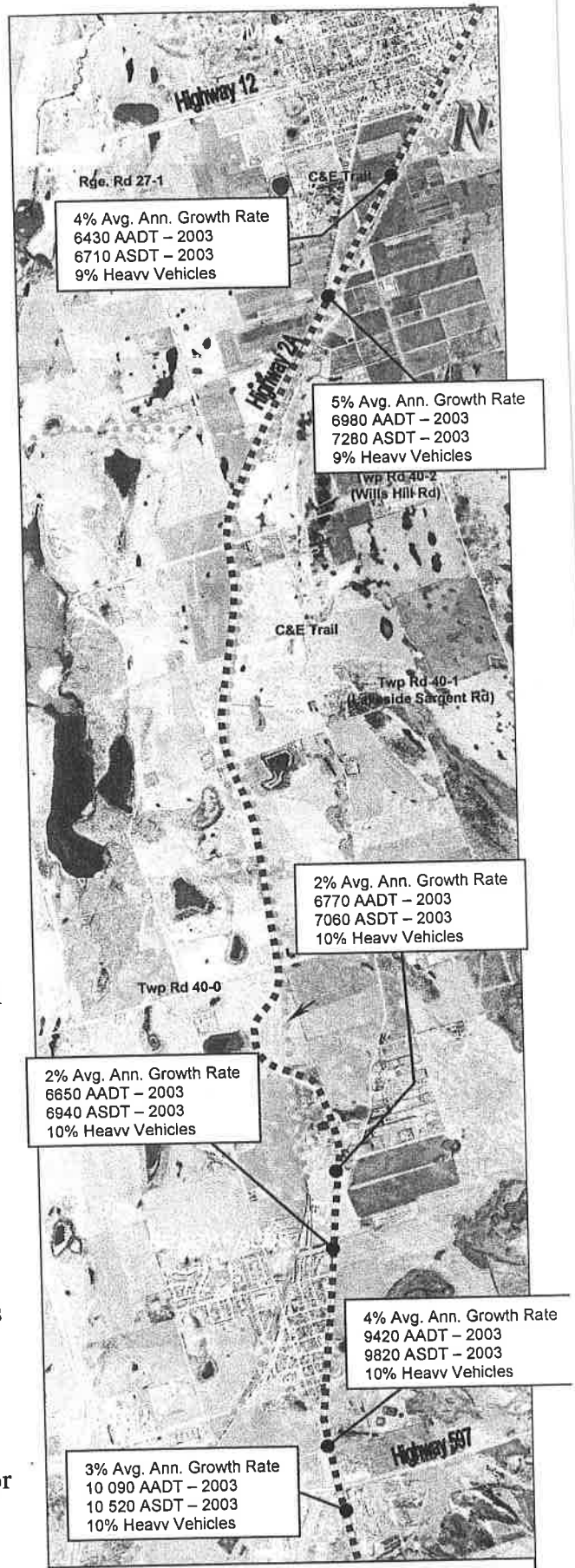


Exhibit 2-1: Average Daily Traffic Trends

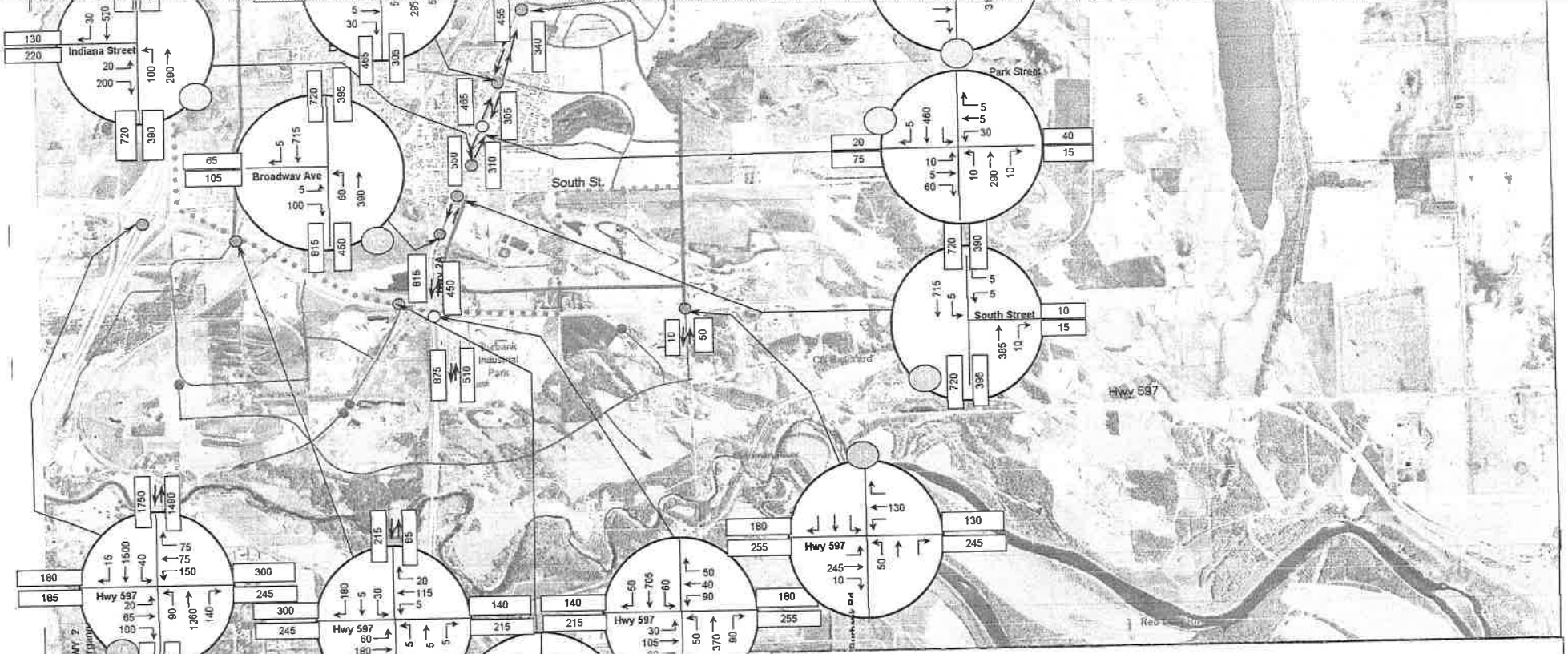


Exhibit 2-2:

Balanced Traffic Volumes
Morning Peak Hour

Highway 2A Functional Planning Study
Blackfalds to Lacombe

CastleGlenn Consultants Inc.
Engineers, Project Managers & Planners

Settings

☐	1	Rural Light Industrial	Phase I
☐	2a	Rural Light Industrial	Phase I
☐	2b	Rural Light Industrial	Phase I
☐	3a	Future Urban Expansion: Industrial	Phase 3
☐	3b	Future Urban Expansion: Residential	Phase 3
☐	4	Future Urban Expansion: Residential	Phase I
☐	5a	Future Urban Expansion: Residential	Phase I
☐	5b	Future Urban Expansion: Residential	Phase 2
☐	5c	Future Urban Expansion: Residential	Phase 2
☐	6a	Future Urban Expansion: Residential	Phase 2
☐	6b	Future Urban Expansion: Residential	Phase 2
☐	7a	Country Residential I	Phase I
☐	7b	Country Residential I	Phase 3
☐	7c	Country Residential I	Phase 3
☐	8a	Country Residential I	Phase 2
☐	8b	Country Residential I	Phase 2
☐	9a	Country Residential I	Phase 2
☐	9b	Country Residential I	Phase 2
☐	10	Country Residential II	Phase I
☐	10a	Country Residential II	Phase 3
☐	10b	Country Residential II	Phase I
☐	11a	Country Residential I	Phase I
☐	11b	Country Residential I	Phase I
☐	12	Country Residential I	Phase 2
☐	13a	Future Urban Expansion: Residential	Phase 3
☐	13b	Future Urban Expansion: Residential	Phase 3
☐	13c	Future Urban Expansion: Industrial	Phase 3
☐	U-4	Country Residential I	Phase 2
☐	U-5	Cemetery	Phase I

Special Study Areas

☐	Ia	Country Residential I	Phase 3
☐	Ib	Country Residential I	Phase 3
☐	Ic	Country Residential I	Phase 3
☐	Id	Country Residential I	Phase 3
☐	Ie	Rural Light Industrial	Phase 3
☐	If	Rural Light Industrial	Phase 3
☐	Ig	Rural Light Industrial	Phase 3
☐	Ih	Rural Light Industrial	Phase 3
☐	II	Recreational Area	Phase 3
☐	III	Country Residential I	Phase 3

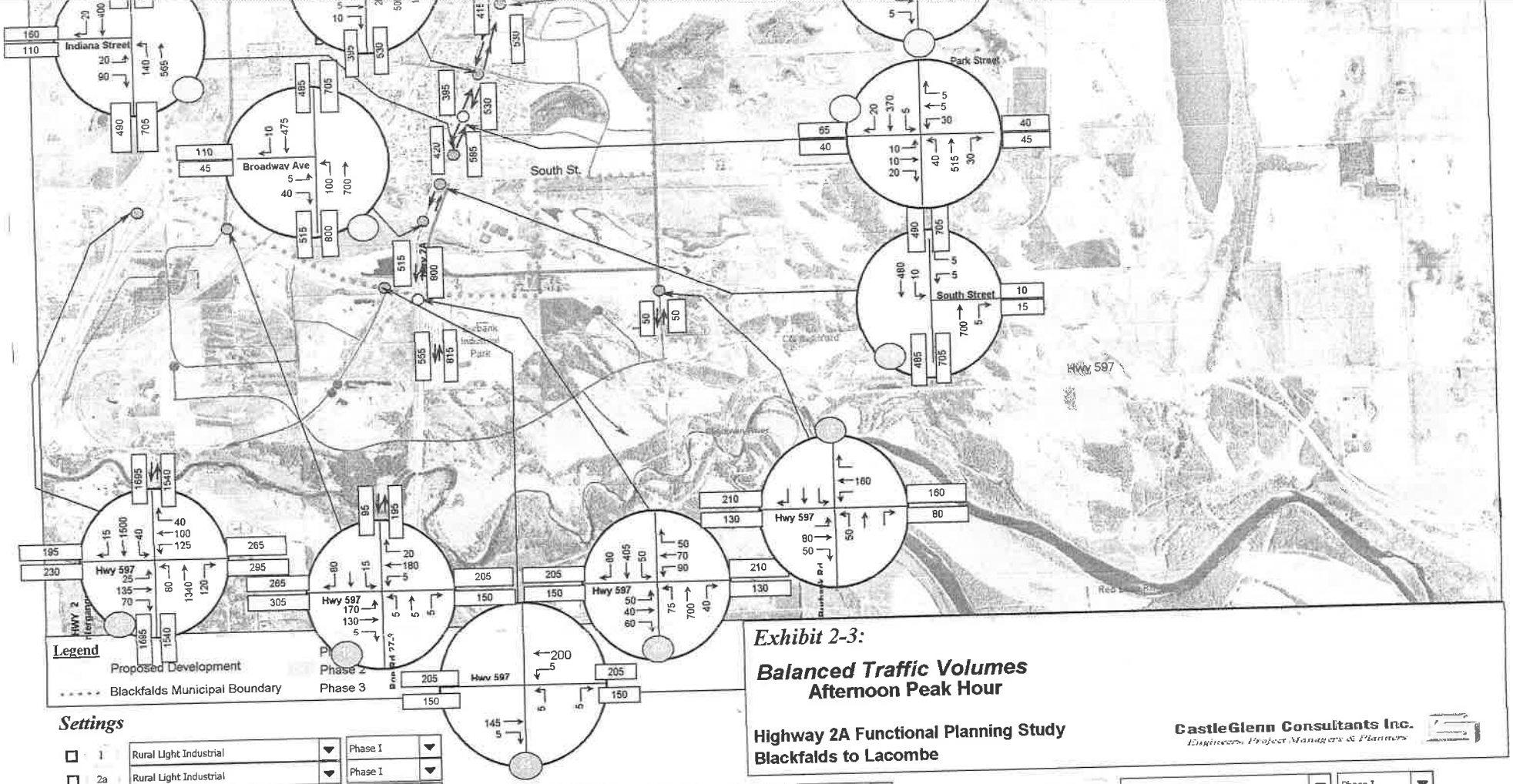


Exhibit 2-3:

Balanced Traffic Volumes
Afternoon Peak Hour

Highway 2A Functional Planning Study
Blackfalds to Lacombe

CastleGlenn Consultants Inc.
Engineers, Project Managers & Planners

Settings

☐	1	Rural Light Industrial	Phase I
☐	2a	Rural Light Industrial	Phase I
☐	2b	Rural Light Industrial	Phase I
☐	3a	Future Urban Expansion: Industrial	Phase 3
☐	3b	Future Urban Expansion: Residential	Phase 3
☐	4	Future Urban Expansion: Residential	Phase I
☐	5a	Future Urban Expansion: Residential	Phase I
☐	5b	Future Urban Expansion: Residential	Phase 2
☐	5c	Future Urban Expansion: Residential	Phase 2
☐	6a	Future Urban Expansion: Residential	Phase 2
☐	6b	Future Urban Expansion: Residential	Phase 2
☐	7a	Country Residential I	Phase I
☐	7b	Country Residential I	Phase 3
☐	7c	Country Residential I	Phase 3
☐	8a	Country Residential I	Phase 2
☐	8b	Country Residential I	Phase 2
☐	9a	Country Residential I	Phase 2
☐	9b	Country Residential I	Phase 2
☐	10	Country Residential II	Phase I
☐	10a	Country Residential II	Phase 3
☐	10b	Country Residential II	Phase I
☐	11a	Country Residential I	Phase I
☐	11b	Country Residential I	Phase I
☐	12	Country Residential I	Phase 2
☐	13a	Future Urban Expansion: Residential	Phase 3
☐	13b	Future Urban Expansion: Residential	Phase 3
☐	13c	Future Urban Expansion: Industrial	Phase 3
☐	U-4	Country Residential I	Phase 2
☐	U-5	Cemetery	Phase I

Special Study Areas

☐	Ia	Country Residential I	Phase 3
☐	Ib	Country Residential I	Phase 3
☐	Ic	Country Residential I	Phase 3
☐	Id	Country Residential I	Phase 3
☐	Ie	Rural Light Industrial	Phase 3
☐	If	Rural Light Industrial	Phase 3
☐	Ig	Rural Light Industrial	Phase 3
☐	Ih	Rural Light Industrial	Phase 3
☐	II	Recreational Area	Phase 3
☐	III	Country Residential I	Phase 3

Table 2-1 provides the level-of-service (LOS) results from the analysis of the above traffic conditions at each of the intersections along Highway 2A. Un-signalized intersection analysis (consistent with Highway Capacity Manual (HCM) techniques) was used for all intersections that are STOP-controlled while detailed signalized intersection capacity analysis was undertaken for those intersections controlled by traffic signals.

Table 2-1 indicates that the *Highway 2A/597 intersection*, in its current configuration, operates at unsatisfactory levels of service "E" during the morning peak hour. Recent initiatives have been undertaken by Alberta Infrastructure and Transportation to improve the intersection configuration.

As the *Park Street / Highway 2A intersection* is signalized in the north/south direction and STOP-controlled in the east/west directions the intersection capacity analysis was undertaken using the following two control scenarios:

- Assuming the intersection operated as a 2-way STOP-controlled intersection revealed an overall Level-of-Service (LOS) "A", however, when the individual turning movements from the minor leg of the intersection are examined in detail the LOS is more representative of a LOS "C," and the maximum theoretical delay time experienced by motorists is approximately 24 seconds.
- Assuming a 4-way signalized analysis approach, an overall LOS "D" resulted.

Given that the east-west direction of this intersection is STOP controlled, while the north-south direction of travel is periodically stopped to create sufficient gaps to permit east-west traffic to traverse the intersection, the true level-of-service for this intersection is likely an average between the two analysis results and likely representative of a LOS "C" operation which is satisfactory. Clearly, though, future growth will have an impact on current traffic trends, which in turn would likely require a review of traffic control measures at the Park Street intersection.

Table 2.1 indicates for all other 2-way STOP controlled intersections along the Highway 2A corridor that overall levels of service are satisfactory, however, levels of service results accompanied by theoretical delays for specific movements from the minor leg of the intersections (east-west crossings of Highway 2A) indicate that delays could approach an average of 20 seconds-per-vehicle. This is, at present, still thought to be acceptable, however as through traffic volumes on Highway 2A continue to grow levels of service are anticipated to decline and delays rise.

Table 2-1: Level of Service Analysis Results – Highway 2A Existing Conditions

Intersection	Intersection Control	Level of Service			
		Morning Peak Hour		Afternoon Peak Hour	
Highway 2A and …		Overall	Movements Exhibiting Delay	Overall	Movements Exhibiting Delay
Highway 597	Signalized	E	--	D	--
Broadway Avenue	STOP – Controlled (EB)*	A	EB-LT-"C" – 15.1 sec. EB-RT-"A" – 4.0 sec.	A	EB-LT-"B" – 12.8 sec. EB-RT-"A" – 3.7 sec.
South Street	STOP - Controlled (WB, EB)*	A	WB-LT/RT-"B" – 14.3 sec.	A	WB-LT/RT-"C" – 16.9 sec.
Indiana Street	STOP - Controlled (EB)*	A	EB-LT-"C" – 21.9 sec. EB-RT-"B" – 14.9 sec.	A	EB-LT-"E" – 36.9 sec. EB-RT-"A" – 7.9 sec.
Park Street	Signalized (NB, SB)* STOP - Controlled (WB, EB)*	A**	--	A**	--
Gregg Street	STOP - Controlled (WB, EB)*	A	EB-TH/LT - "C" – 17.4 sec. EB-RT - "A" – 7.9 sec. WB-TH/LT -"C"- 15.5 sec. WB-RT - "A" – 6.3 sec.	A	EB-TH/LT - "C" – 23.1 sec. EB-RT - "A" – 7.1 sec. WB-TH/LT -"C"- 20.0 sec. WB-RT - "A" – 8.1 sec.
C&E Trail (South)	STOP - Controlled (WB, EB)*	A	EB-TH/LT/RT - "A" – 7.0 sec. WB-TH/LT/RT -"C"- 17.8 sec.	A	EB-TH/LT/RT - "A" – 6.8 sec. WB-TH/LT/RT -"C"- 21.4 sec.
Township Road 40-0	STOP - Controlled (WB, EB)*	A	EB-TH/LT - "B" – 14.6 sec. EB-RT - "A" – 7.0 sec. WB-TH/LT -"B"- 14.4 sec. WB-RT - "A" – 6.4 sec.	A	EB-TH/LT - "C" – 17.9 sec. EB-RT - "A" – 6.8 sec. WB-TH/LT -"C"- 17.1 sec. WB-RT - "A" – 7.8 sec.
Township Road 40-1	STOP - Controlled (WB, EB)*	A	EB-TH/LT/RT - "C" – 15.9 sec. WB-TH/LT/RT -"A"- 8.0 sec.	A	EB-TH/LT/RT - "C" – 18.4 sec. WB-TH/LT/RT -"A"- 9.8 sec.
Township Road 40-2	STOP - Controlled (WB, EB)*	A	EB-TH/LT/RT - "C" – 15.5 sec. WB-TH/LT/RT -"A"- 11.6 sec.	A	EB-TH/LT/RT - "C" – 15.8 sec. WB-TH/LT/RT -"B"- 14.2 sec.
Range Road 27-1	STOP - Controlled (EB)*	A	EB-LT/RT-"B" – 13.4 sec.	A	EB-LT/RT-"B" – 12.8 sec.
C&E Trail (North)	STOP – Controlled (WB, EB)*	A	EB-TH/LT/RT - "A" – 8.4 sec. WB-TH/LT/RT -"C"- 19.5 sec.	A	EB-TH/LT/RT - "A" – 7.9 sec. WB-TH/LT/RT -"C"- 24.0 sec.
58th Avenue	STOP - Controlled (WB, EB)*	A	EB-TH/LT/RT - "B" – 11.0 sec. WB-TH/LT/RT -"B"- 11.0 sec.	A	EB-TH/LT/RT - "B" – 12.6 sec. WB-TH/LT/RT -"C"- 18.9 sec.

* Orientation of Intersection Control: Northbound, Southbound, Eastbound or Westbound

** See above text.

2.5.2 Collision History

Exhibit 2-4 indicates that within the vicinity of the study area, a total of 130 collisions have occurred along Highway 2A corridor during the five year period between 1998 and 2002. The following facts were derived from an evaluation of the collision information:

- Approximately 22 percent (28 of 130 collisions) of reported collisions occurred within the Town of Blackfalds;
- Approximately 26 percent (34 of the 130 collisions) of the reported collisions occurred at the intersection of Highway 597 / Highway 2A. Of these 34 reported collisions 53 percent were angle collisions, while 29 percent were rear-end collisions;
- Approximately 52 percent (68 of the 130 collisions) of the reported collisions occurred along Highway 2A, north of the Town of Blackfalds. Of these 68 reported collisions 38 percent (26 of the 68 collisions) occurred within the vicinity of the CP Rail grade separation; and
- The 130 reported collisions over this five-year period resulted in 89 counts of property damage, 36 injuries and 2 fatalities.

To further evaluate the collision information along the study corridor collision rates were calculated for one/two kilometer segments along the highway. Table 2-2 displays the calculated collision rates for each segment.

Table 2-2: Highway 2A Collision Rate Evaluation

Km	Description/Location	Average AADT (1998 - 2002)	Length	Total No. of Collisions/year	Collision Rate*
6 - 7	South Hwy 597 to North Hwy 597	9,755	1.0	8	**213**
7 - 9	Town of Blackfalds	7,392	2.0	4	78
9 - 11	C&E Trail to Twp. Rd. 40-0	6,980	2.0	5	**102**
11 - 13	Twp. Rd. 40-0 to North Twp. Rd 40-1	6,980	2.0	2	43
13 - 15	North Twp. Rd. 40-1 to North Twp. Rd. 40-2	6,980	2.0	2	47
15 - 17	North Twp. Rd. 40-2 to C&E Trail	6,705	2.0	2	45

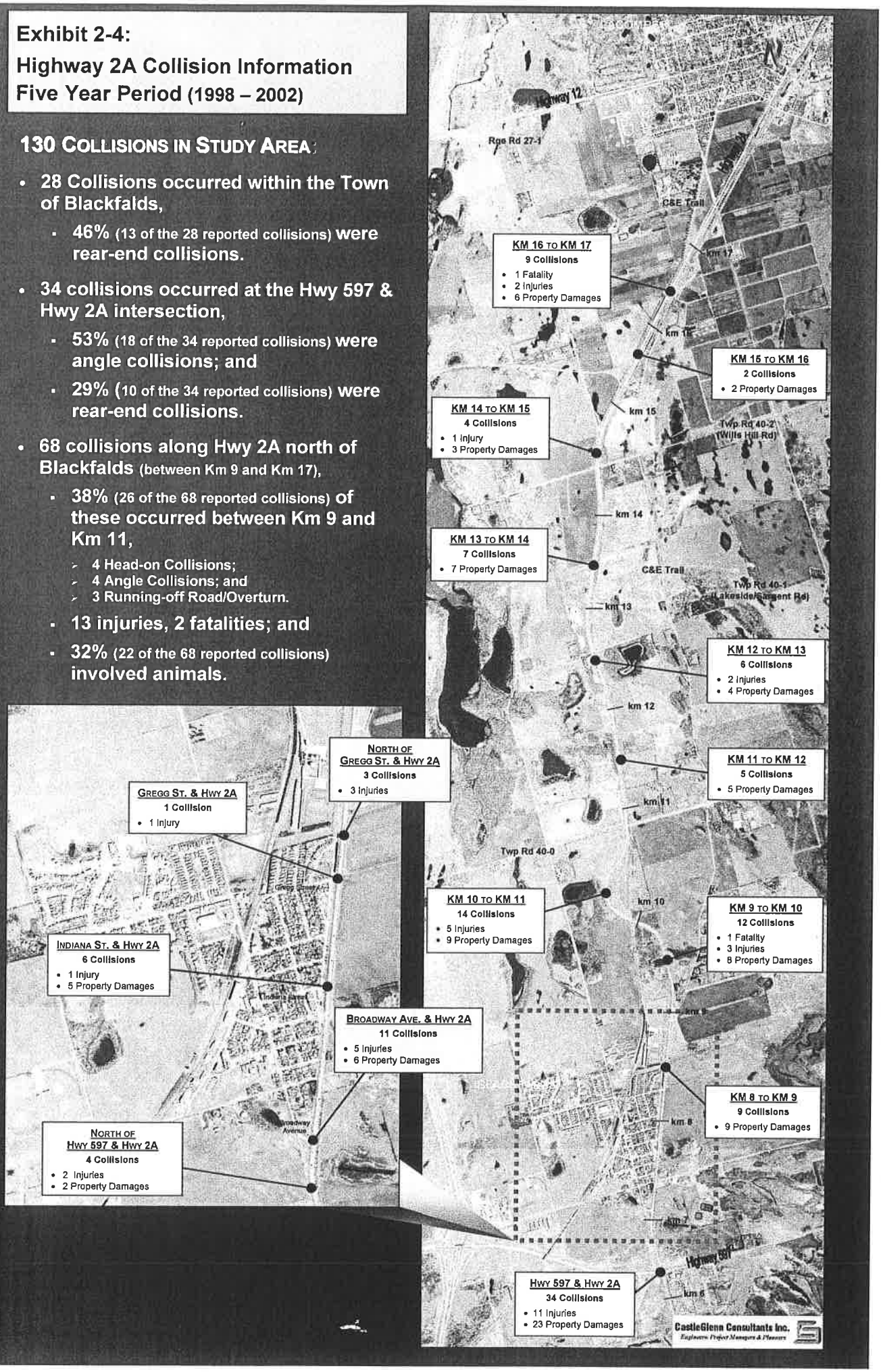
* Collision Rat is defined as the number of collisions per-100-million-vehicle-kilometres of travel.

In **2004**, the average provincial collision rate for a two-lane, undivided rural highway was 109 collisions per-100-million-vehicle-kilometres. [This represents an increase from 2001:94 and 2002:101 collisions per-100-million-vehicle-kilometres.] When the collision rates from Table 2-2 were compared to the **2004** average provincial collision rate, two of the Highway 2A link segments were found to be in the range of this value: kilometre 6-7 (South Highway 597 to North Highway 597) and kilometre 9-11 (C&E Trail to Township Road 40-0).

Exhibit 2-4:
Highway 2A Collision Information
Five Year Period (1998 – 2002)

130 Collisions in Study Area:

- 28 Collisions occurred within the Town of Blackfalds,
  - 46% (13 of the 28 reported collisions) were rear-end collisions.
- 34 collisions occurred at the Hwy 597 & Hwy 2A intersection,
  - 53% (18 of the 34 reported collisions) were angle collisions; and
  - 29% (10 of the 34 reported collisions) were rear-end collisions.
- 68 collisions along Hwy 2A north of Blackfalds (between Km 9 and Km 17),
  - 38% (26 of the 68 reported collisions) of these occurred between Km 9 and Km 11,
    - 4 Head-on Collisions;
    - 4 Angle Collisions; and
    - 3 Running-off Road/Overturn.
  - 13 injuries, 2 fatalities; and
  - 32% (22 of the 68 reported collisions) involved animals.



2.6 Environmental Overview

Clifton Associates Ltd. In concert with AXYS Environmental Consulting Ltd. was retained to undertake an Initial Environmental Overview that would identify areas of potential environmental concern that may be encountered when performing road improvements and realignment in the study area and to provide an opinion on the environmental condition of the site. The overview consisted of a Phase I Environmental Site Assessment (ESA) and a review of the Valued Ecosystem Components (VEC). (See Appendix "C" for complete report.)

The Phase I ESA defined the site location, and provided a description of existing land uses, current zoning, topography, geology and hydrogeology. The effort also included a historical records review from land titles documents, fire insurance maps, historical aerial photography, CPR records, regulatory records as well as site reconnaissance.

Exhibit 2-5 depicts the three potential highway realignment options that the VEC focused upon. (*Note: The Preferred Alignment in the vicinity of the CP grade separated Rail Crossing goes east of the structure [See Section 7] and not west as depicted. In part, the preferred corridor was selected to avoid the impact to wetlands and rare plant potential identified as part of the VEC initiative.*) The VEC focused on those corridors that represented a significant divergence from the existing alignment to assess the potential impacts to lands which were considered neither agricultural nor within the existing highway right-of-way. [The VEC methodologies were never designed to

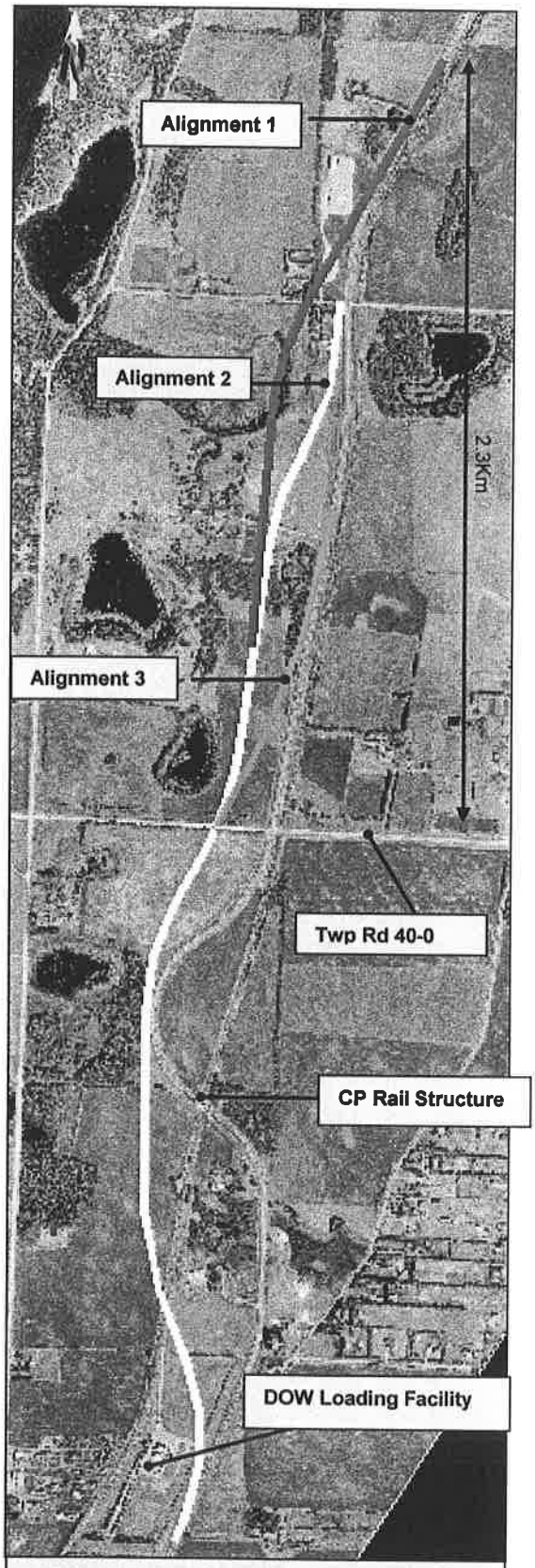


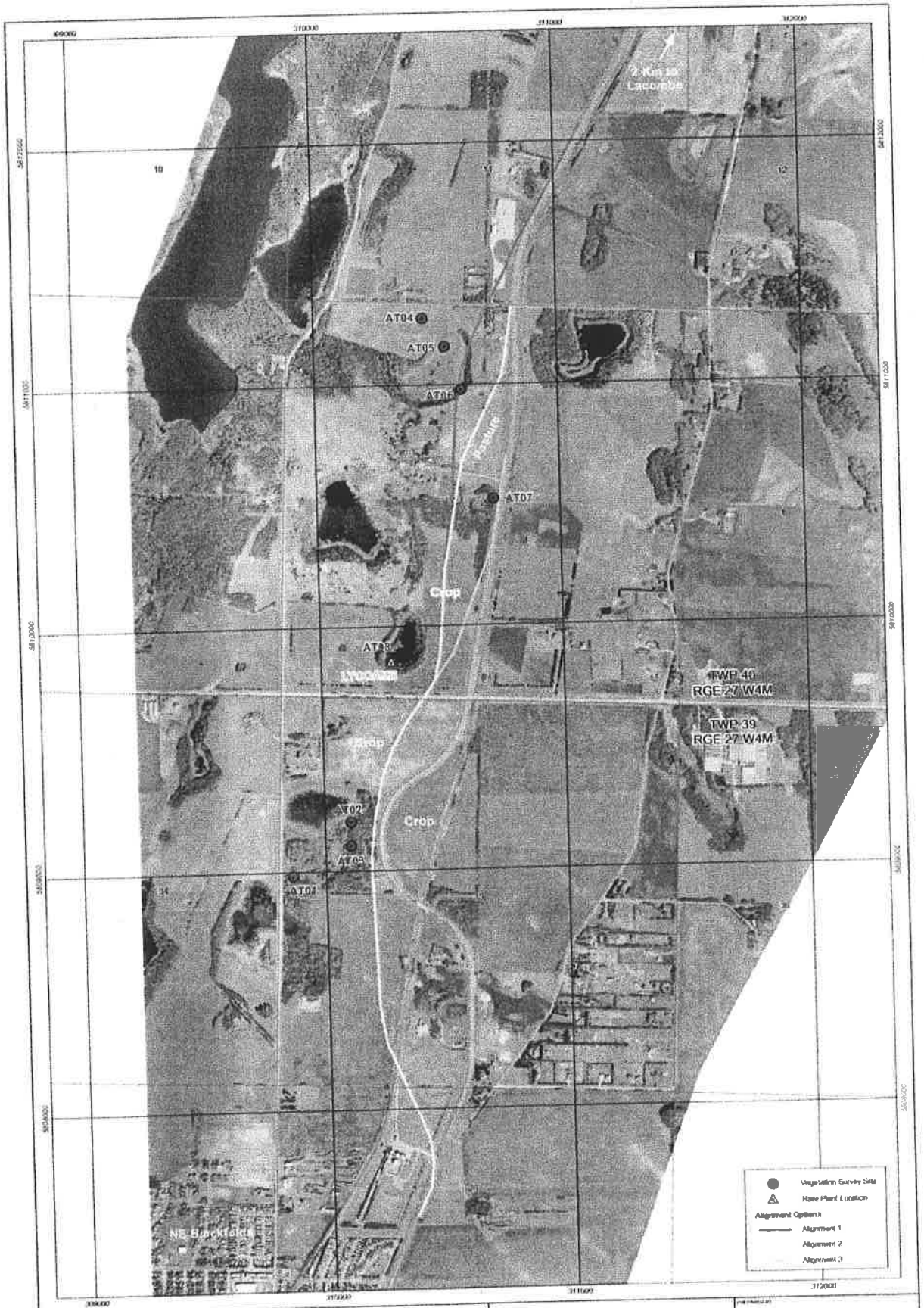
Exhibit 2-5: Potential Alignment Options

yield sufficient baseline information in which to conduct an Environmental Impact Assessment (ESA) and this effort would likely have to take place at the time of detailed design.] Nevertheless, it was still considered worthwhile to assess the impacts of those options which would divert away from the already disturbed portions of the existing corridor. The Assessment of Valued Ecosystem Components involved a regulatory review (Environmental Protection and Enhancement Act, Soil Conservation Act, Weed Control Act, Water Act, Migratory Bird Convention Act, Species at Risk Act and Wildlife Act), a desktop review involving a search for rare vegetation, plant tracking, county specific weed concerns, classification of plant communities, a search of the biodiversity species databank (BSOD), air-photo interpretation, evidence of wildlife (browse marks, tracks and bedding, denning and nesting were recorded by the vegetation field crew) was recorded, Regional fish and wildlife authorities were contacted and a field survey (conducted on September 24, 2004) was conducted by a botanist. (Exhibit 2-6 illustrates the location of the field survey ground plots.)

The findings of the VEC indicated that:

- there have been no occurrences of rare plant locations or wildlife sightings from the review of ANHIC databases and BSOD searches;
- four primary plant communities were identified; (Agricultural land, forest/woodland, riparian vegetation and long-term disturbed)
- all riparian areas were observed to experience seasonal water fluctuations resulting in "high" rare plant potential habitats;
- a rare plant survey be conducted prior to the commencement of any construction activity that may impact these (riparian) areas;
- care should be taken not to introduce weed species during construction;
- riparian areas should be completely avoided;
- all construction activities maintain a distance of 100 meters from the top of the bank of the riparian area containing rare plant species and that construction and vegetation management activities occur outside the breeding bird timing windows.
- wildlife diversity throughout the region is very high with wetlands and forested habitats being an important source of food and shelter for birds, mammals and amphibian species;
- no wildlife species designated as "endangered" or "at-risk" have been identified within the study area or the site visit, however, additional wildlife surveys are required (given the late-September timeframe of the original VEC survey and the adoption of the preferred alignment corridor which was not investigated.)
- preliminary mitigation measures to limit project impacts on vegetative resources. [See Appendix C *AXYS Environmental Report November 2004 - Table 6-1.*]

The assessment recommended that further investigation within the study area be undertake to identify rare plants and wildlife of concern at the time of detailed design. [See Appendix "C"]



ENVIRONMENTAL OVERVIEW OF ALIGNMENT OPTIONS FOR HIGHWAY 2A
LACOMBE TO BLACKFALDS

Exhibit 2-6: Highway 2A Alignment Options and Location of Vegetation Survey Sites

The conclusions of the VEC represented one of the component within the multi-factorial analysis (See Section 6.0) that was undertaken to assess the relative impacts of these constraints when evaluating the various alignment alternatives (particularly as concerns site AT07).

The Phase 1 ESA component of the environmental overview the following environmental information was revealed: (See Appendix "C" for location of all sites referred to in the following bullets.)

- *Alberta Environment Water Data Management Records* had records for 156 groundwater wells located within the proximity to the study area with the majority drilled to a depth ranging from 30 to 90 meters. (Static water levels ranged between 9m to 50m below ground surface.) [Acreages between the Town of Lacombe and the Town of Blackfalds inclusive of residents of Blackstone Estates and Greystone Ranch rely on individual water wells for their water supply.]
- A review of *aerial photography* indicated;
  - the presence of a service station complex in the north-west corner of the Highway 597/Highway 2A intersection in 1973. By 1991 the service station complex was no longer visible; and
  - ground surface staining in 2003 located approximately 150 meters west of the Highway 2A right-of-way around the largest of three AST's (above-ground-storage-tanks) in the vicinity of the Dow Chemical plant. The three ASTs are used for the storage of glycol with a combined capacity of 7.8 million litres. [Glycol is an odorless, colorless, syrupy liquid with a sweet taste and is toxic. The major use of glycol is as an engine coolant, antifreeze and deicing fluid for windshields and jet engines. Ethylene glycol has become increasingly important in the plastics industry for the manufacture of polyester fibers, resins, including polyethylene used to make plastic bottles for soft drinks. Ethylene glycol's high boiling point and affinity for water makes it an ideal dehydrator for natural gas production.] Glycol is pumped from Prentice and loaded onto tanker cars at Blackfalds.
- *CPR records* indicate:
  - a spill (24 June 2003 -Mile 11.5) of less than 50 gallons of glycol from the dome of a tanker car in the vicinity of the Dow Chemical Plant. There have been numerous derailments of tanker cars at the facility with no reported spills; [As there is the potential for environmental contamination, Alberta Infrastructure and Transportation would require a clearance report should land be required for highway redevelopment.]
  - a spill had been reported (29 August 2001-Mile 18.0) in the vicinity of the Lacombe Section headquarters involving a load of grain and 4-loads of plastic pellets resulting in 200meters of track and ties being damaged; and
  - CPR right-of-way fires have occurred at Mile 10.5 and 11.0 (south of the Dow Chemical Facility).

- *Petroleum Tank Management Association* (PTMAA) records indicate:
  - a storage tank which was reportedly removed in September 1996 which was located in the property of AGT located on Park Street approximately 125 meters from the Highway 2A right-of-way;
  - Two above ground storage tanks (6000 litre diesel fuel / 9000 litre gasoline) were installed in 1999 which were located approximately 500 meters west of the Highway 2A right-of-way at the Lacombe Research Centre;
- *Alberta Energy and Utilities Board (EUB) records* indicate:
  - The presence of 9 wells (1,665 to 2,205 m depth) that were located within a quarter section of the Highway 2A right-of-way boundary. The wells were drilled between 1953 and 2003; [Eight of the wells have been abandoned. The ninth well, located east of Highway 2A and south of Township Road 40-1 [16-02-040-27 W4], contains flowing gas and is located approximately 340 meters east of Highway 2A and 340 meters south of Township Road 40-1];
- A review of *underground utility pipeline* information indicated:
  - the study area is underlain by several high and low pressure natural gas pipelines and one glycol pipeline that originates in Prentiss, runs north of the Blackstone Estates community and terminates at the DOW Chemical Loading Facility.
- Site visits and interviews indicated:
  - Vision Truck Lines, located on the west side of Highway 2A and north of Twp Rd 40-1, maintains a small AST (capacity unknown).
  - J. H. Helm Cereal Research maintains two (7,600 litre) AST's with one for diesel and the other gasoline located approximately 350 metres east of the Highway 2A right-of-way.

The Environmental Overview concluded that:

- *the potential for contamination may exist at the Dow Chemical glycol loading facility and if property should be required by AIT for future development or highway realignment, the concerns should be addressed through sub-surface investigations.*
- *In general, provided sound planning and construction mitigations are followed, future construction activities* (on the corridor located nearest to the existing corridor) *should not appreciably decrease the vegetation and wildlife resources in the study area.* [See Appendix "C"]

2.7 Historical Resources Overview

The objectives of the Historical Resource Overview (HRO) were to undertake a database search, literature review, field investigation and to provide planning data,

relative to historical resources, suitable for inclusion in a highway management plan associated with the "ultimate" upgrading of Highway 2A.

- The Historical Resources Inventory *database search* determined the number and nature of previously recorded sites in the vicinity of the Highway 2A study area.
- The *literature review* was completed to provide the context for understanding the potential of additional unrecorded historical resource sites within the project area by looking at past human area usage, as well as recorded environmental changes.
- The *field investigation* involved a visual examination of the study area, as well as areas that were considered to be of historical significance to collect additional information and to further aid in the evaluation process.

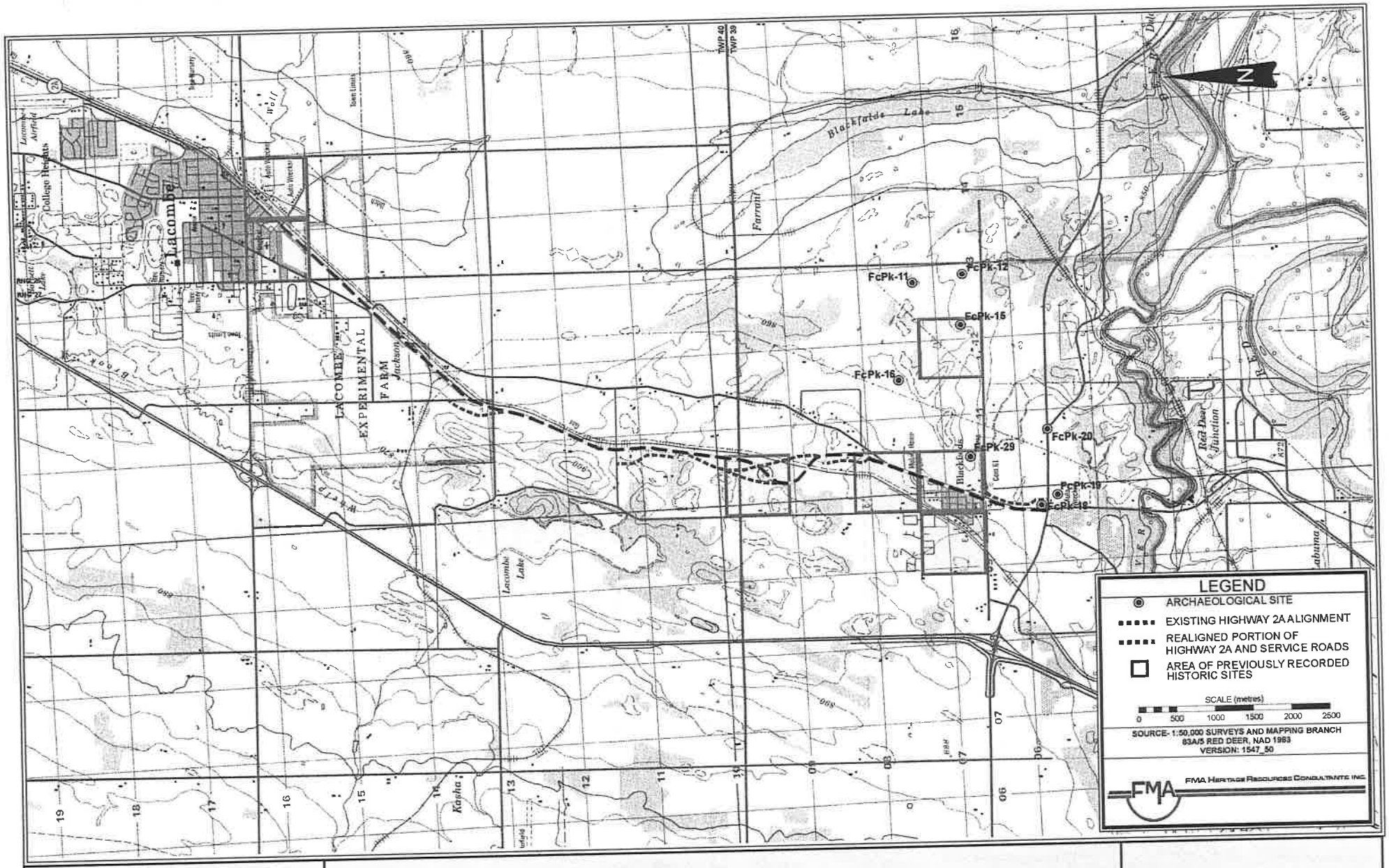
The HRO revealed that the study area is part of the "parkland zone," characterized by "rolling grasslands supporting frequent forested patches." This region is highly disturbed, as the municipal boundaries of the Towns of Blackfalds and Lacombe have been subject to urban development and lands adjacent to Highway 2A between the towns are under "intensive cultivation" (crops and pastureland). Lands located within the highway right-of-way have also been highly disrupted through typical highway development activities such as grading and ditching.

The database and literature review revealed that there are a total of twelve historical/archaeological sites located within the study area: three archaeological sites and nine historical sites. Exhibit 2-7 illustrates the sites of potential archaeological/historical significance. *Although it was found that one of the three historical sites (FcBK 18) may be impacted by the proposed highway improvements, due to the highly disturbed nature of the area it is not considered to be concern.* The majority of historical sites identified within the study area are located within the urban limits of Blackfalds and Lacombe and therefore will not be affected by the proposed Highway 2A improvements. It should be noted however that the Atsinger Farm located approximately 1.5 km north of Blackfalds has been identified as an historic site. However through field investigations it was determined that the farm will not be affected by the proposed widening of Highway 2A.

[The above represents a synopsis of the HRO findings and the reader is encouraged to reference Appendix "D" – Historical Resources Overview (FMA, February 2005)]

The following conclusions and recommendations were developed for Alberta Infrastructure and Transportations review:

- The historical resource potential of the study area is "low" due to the high level of disturbance within the area;



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Sites of Archaeological/Historical Significance

Exhibit 2-7

- development within the existing Highway 2A right-of-way and areas of proposed realignment areas should not require further investigation; and
- deviation from the existing highway corridor will require site specific evaluations to be undertaken. (This could involve a full Historical Impact Assessment [HIA] at the time of detailed design)

Correspondence received from Alberta Community Development (dated April 13th, 2005) indicated that "*a Historical Resource Impact Assessment is not required*" and that Alberta Transportation has "*Historical Resource Act clearance for the Highway 2A Blackfalds to Lacombe Functional Planning Study*". [See Appendix "D"]

2.8 Utility Assessment

CastleGlenn Consultants undertook a utility search to identify the approximate location of existing utilities within the study area (Please note: Before commencement of detailed design the location of all utilities should be verified by contacting the appropriate utility agencies and requesting a marking of buried utilities within the proposed construction site).

In August 2004 a utility "locate request" was placed with "Alberta One Call Corporation" for thirty-four Quarter Sections on lands located within and adjacent to the existing Highway 2A right of way. The following is a list of utility companies that responded to the locate request:

- 360 Networks Ltd;
- Alberta Supernet;
- ATCO Gas and Pipelines;
- ATCO Gas;
- Bell West Inc;
- Chain Lakes Gas Co-op Ltd.;
- Canadian Natural Resources Ltd
- Dow Chemical Company;
- Fairborne Energy Ltd;
- Fortis Alberta;
- Inter Pipeline Fund;
- Shaw Cable;
- Telus Communications INC.; and

The above utility companies provided approximate locations of utilities within the study area by submitting sketches and/or electronic. In addition to the information received from the individual utility companies, CastleGlenn Consultants contacted Abacus Datagraphics Ltd, which provided mapping (in digital format) reflecting information and approximate locations of oil and gas facilities within the study area.

Exhibits 2-8, 2-9 and 2-10 depict the approximate location of existing utilities that were plotted based on information provided by the utility companies, Abacus Datagraphics Ltd and a visual site survey. The exhibits illustrate the general location of the following utilities in relation to Highway 2A, between Blackfalds and Lacombe:

- Low pressure gas lines;
- Medium pressure gas lines;
- High pressure gas lines;
- Overhead power lines;
- Overhead Telus lines;
- Underground Telus cable;
- Underground fibre optic cable;
- Dow Chemical Pipeline;
- Flowing Gas wellhead;
- Abandoned gas wellhead;
- Existing street light; and
- Underground Shaw cable.

Table 2-3: *Potential utilities conflicts* specifies areas of potential conflict between the existing utilities and proposed Highway 2A improvements and mitigation measures to address the conflicts.\

The following is a summary of table 2-3:

- In approximately 10 locations mainly in the vicinity of Blackfalds pressure gas lines cross beneath the existing Highway 2A lanes. Depending on the existing burial depth of the pipelines and proposed final design, gas pipelines may need to be relocated or protected to prevent damage and ensure future accessibility to the pipelines.
- Two DOW Chemical pipelines extending from the DOW loading facility cross Highway 2A in the vicinity of the exsiting CP rail overpass. The burial depth of the pipelines will have to be confirmed or the pipelines will have to be relocated before detailed design to ensure there is no conflict with the proposed CP rail overpass.
- Overhead utility cable and underground fibre optic cable located in the vicinity of the proposed CP rail overpass will require relocation or adequate protection.
- A medium pressure gas pipeline that parallels the west side of Highway 2A between TWP Rd 40-1 and Range Road 27-1 will be located within the new proposed highway right of way; however, the pipeline does not appear to be in direct conflict with the proposed twinning and service road improvements. The precise location of the pipeline should be surveyed to ensure there is no conflict.
- Underground Telus cable is located within the existing highway right of way paralleling the east side of Highway 2A from the northern limits of the Town of Blackfalds to the southern limits of the Town of Lacombe. Twinning of the highway is proposed mainly on the west side of the existing lanes except for two short sections of highway just north of Blackfalds and south of Lacombe were relocation of Telus lines will most likely be required

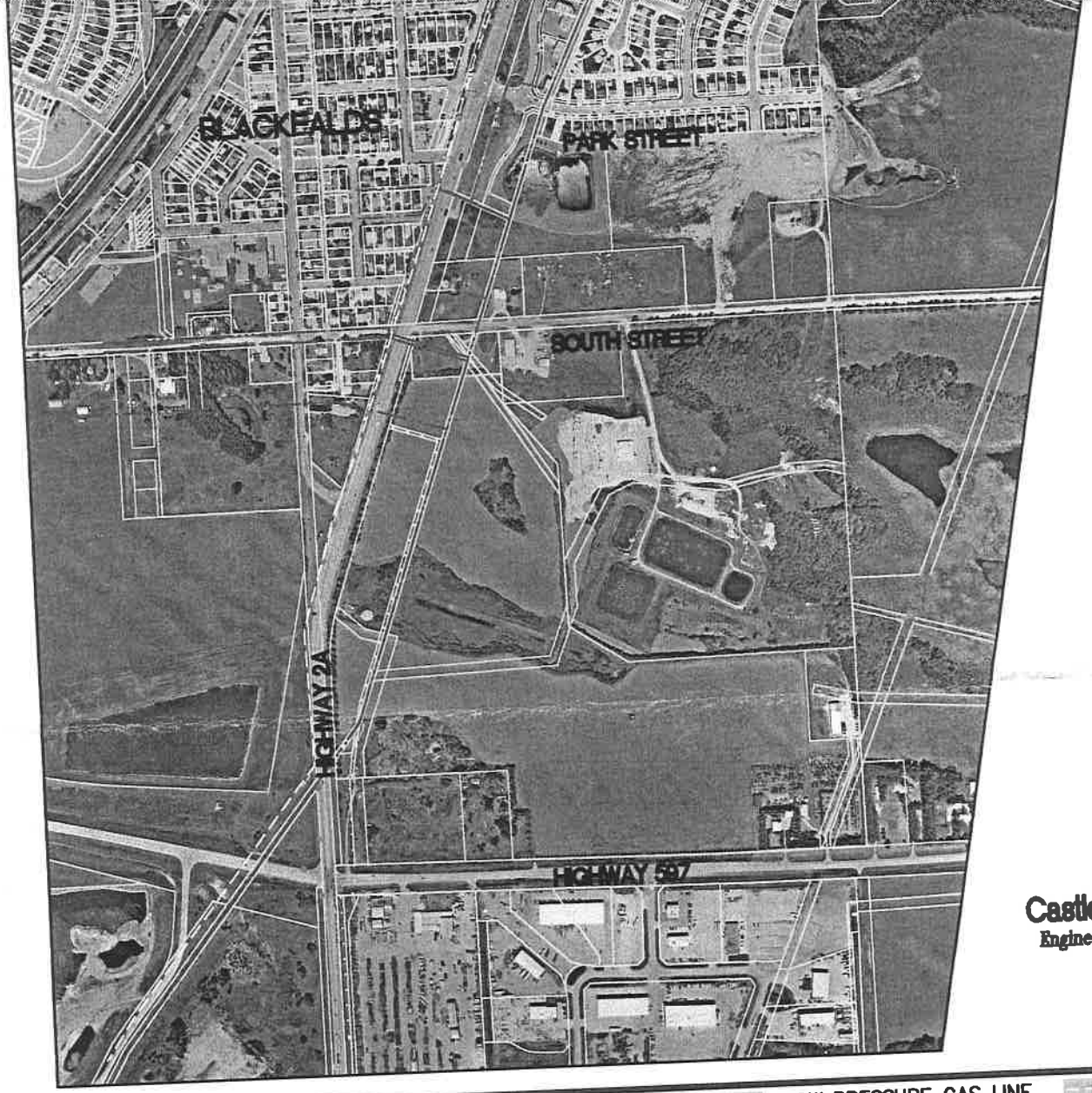
In addition to exhibits 2-8, 2-9 and 2-10 the location of the identified existing utilities is depicted in the functional plan drawings. (See Annex "A")

Table 2-3: Potential Utility Conflicts

Exhibit	*Utility*	*Approximate location of Potential Conflict*	*Impact/Mitigation*
2-7a	High Pressure Gas line	– Crossing Hwy 2A, 160m North of Highway 597 – Crossing Hwy 2A, 20m South of South street	– Depending on the existing burial depth and proposed final design, pipelines may need to be relocated or protected as required to prevent damage or inaccessibility by proposed highway widening improvements.
2-7a	Street Lights	– Intersection of Hwy 2A/Hwy 597 – Intersection of Hwy 2A/Indinana Street – Intersection of Hwy 2A/Park Street – Intersection of Hwy 2A/Gregg Street	– Relocation of street light poles is required to avoid conflict with proposed Hwy 2A intersection improvements and Highway widening.
2-7a	Medium Pressure Gas line	– Crossing Hwy 2A, 130m south of South Street – Crossing Hwy 2A, 160m south of Park Street – Crossing Hwy 2A, 320m north of C & E Trail – West of Hwy 2A and north of DOW loading facility property	– Depending on the existing burial depth and proposed final design, pipelines may need to be relocated or protected as required to prevent damage or inaccessibility by proposed highway widening improvements.
2-7a	Shaw Underground Cable	– Crossing at Gregg Street	– Cable is buried beneath pavement at intersection; however, adequacy of cable protection should be verified with proposed final design.
2-7a	Underground Fiber Optic	– Crossing Hwy 2A, 150m south of South Street – Intersection of Hwy 2A/Park Street	– Depending on the existing burial depth and proposed final design, cable may need to be protected or relocated to prevent damage or inaccessibility by proposed highway widening improvements.
2-7a	Low Pressure Gas line	– Crossing Hwy 2A, 160m south of Park Street – Crossing Hwy 2A, 130m north of Gregg Street – Crossing Hwy 2A, 130m north of C & E Trail – West of Hwy 2A on DOW loading facility property	– Depending on the existing burial depth and proposed final design, pipelines may need to be relocated or protected as required to prevent damage or inaccessibility by proposed highway widening improvements.
2-7a	Telus Underground Cable	– Intersection of Hwy 2A/C & E Trail – East of Hwy 2A and north of Hwy2A/C&E Trail intersection	– Cable is buried beneath pavement at Hwy 2A/C&E intersection; however, adequacy of cable protection should be verified with proposed final design. – Buried cable located on the east side of Hwy 2a and north of the Hwy 2A/C&E intersection may need to be relocated to avoid conflict or inaccessibility with proposed north bound highway lanes
2-7a	Overhead Utilities	– DOW loading facility, paralleling west of side of Hwy 2A	– Several utility poles will require relocation to avoid conflict with a proposed service road located north of the DOW loading facility and west of Hwy 2A.

Table 2-3: Potential Utility Conflicts

Exhibit	*Utility*	*Approximate location of Potential Conflict*	*Impact/Mitigation*
2-7a	DOW Chemical Pipeline	– In vicinity of existing CP Rail overpass.	– Depending on the existing burial depth and proposed final design, pipelines may need to be relocated or protected to prevent damage or inaccessibility by proposed Hwy 2A northbound lanes.
2-7b	Telus Underground Cable	– 300m south of TWP Rd 40-0 (proposed location of Hwy 2A northbound lanes) – Intersection of Hwy 2A/TWP Rd 40-1	– Buried cable may need to be relocated or protected to avoid conflict or inaccessibility by proposed highway widening improvements and proposed new CP rail overpass structure located approximately 550m south of TWP Rd 40-0
2-7b	Medium Pressure Gas line	– 40m south and 120m west of Hwy 2A/TWP Rd 40-0 intersection – 600m of pipeline located south of TWP Rd 40-1 and west of Hwy 2A – North of TWP Rd 40-1 and paralleling on the west side of Hwy 2A	– Depending on the existing burial depth and proposed final design, pipelines may need to be relocated or protected to prevent damage or inaccessibility by proposed Hwy 2A northbound lanes
2-7b	Overhead Utilities	– 120m west of Hwy 2A/TWP Rd 40-0 intersection (proposed location of new intersection) – 300m south of TWP Rd 40-0 (proposed location of Hwy 2A northbound lanes)	– Two overhead utility poles\will require relocation to avoid conflict with a new proposed Hwy 2A/TWP Rd 40-0 intersection – Approximately 50m of overhead utilities lines will have to be relocated or adequately protected to avoid conflict with a proposed new CP rail overpass structure located approximately 550m south of TWP Rd 40-0
2-7c	High Pressure Gas line	– Crossing Hwy 2A, 50m north of TWP Rd 40-2	– Depending on the existing burial depth and proposed final design, pipelines may need to be relocated or protected to prevent damage or inaccessibility by proposed Hwy 2A northbound lanes
2-7c	Telus Underground Cable	– Cable on the east side of Hwy 2A north TWP Rd 40-2 to southern limits of Town of Lacombe – 250m north of Hwy 2A/TWP Rd 40-3 intersection (proposed location of new TWP Rd 40-3 intersection)	– Buried cable may need to be relocated or protected to avoid conflict or inaccessibility by proposed highway widening. – Highway widening on the east side of Hwy 2A located north of TWP Rd 40-2 to the southern limits of Town of Lacombe does not appear to have a major impact on the buried cable located below the highway side ditch; however the location of the cable should be confirmed in more detail to ensure no conflict exists.
2-7c	Underground Fiber Optic	– 250m north of Hwy 2A/TWP Rd 40-3 intersection (proposed location of new Hwy 2A/TWP Rd 40-3 intersection)	– Depending on the existing burial depth and proposed final design, cable may need to be protected or relocated to prevent damage or inaccessibility by the new proposed Hwy 2A/TWP Rd 40-3 intersection.



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0m 200m 400m

SCALE 1: 10,000

EXHIBIT 2-8
LOCATION OF EXISTING UTILITIES
HIGHWAY 2A
MARCH 2005
RED DEER TO BLACKFALDS ALBERTA

LEGEND

- LOW PRESSURE GAS LINE
- MED. PRESSURE GAS LINE
- HIGH PRESSURE GAS LINE
- OVERHEAD POWER LINES
- OVERHEAD TELUS LINES
- FLOWING GAS WELLHEAD
- TELUS UNDERGROUND CABLE
- SHAW UNDERGROUND CABLE
- UNDERGROUND FIBRE OPTIC
- DOW CHEMICAL PIPELINE
- EXISTING STREET LIGHT
- ABANDONED WELLHEAD

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FOR CONTINUATION SEE EXHIBIT 2-8

Alberta
INFRASTRUCTURE AND TRANSPORTATION

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Engineers, Project Managers & Planners

0m 200m 400m

SCALE 1: 10,000

EXHIBIT 2-9
LOCATION OF EXISTING UTILITIES
HIGHWAY 2A
MARCH 2005
RED DEER TO BLACKFALDS ALBERTA

LEGEND

- LOW PRESSURE GAS LINE
- MED. PRESSURE GAS LINE
- HIGH PRESSURE GAS LINE
- OVERHEAD POWER LINES
- OVERHEAD TELUS LINES
- FLOWING GAS WELLHEAD
- TELUS UNDERGROUND CABLE
- SHAW UNDERGROUND CABLE
- UNDERGROUND FIBRE OPTIC
- DOW CHEMICAL PIPELINE
- EXISTING STREET LIGHT
- ABANDONED WELLHEAD

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FOR CONTINUATION SEE EXHIBIT 2-9

Alberta
INFRASTRUCTURE AND TRANSPORTATION

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0m 200m 400m

SCALE 1: 10,000

EXHIBIT 2-10
LOCATION OF EXISTING UTILITIES
HIGHWAY 2A
MARCH 2005
RED DEER TO BLACKFALDS ALBERTA

LEGEND

- LOW PRESSURE GAS LINE
- MED. PRESSURE GAS LINE
- HIGH PRESSURE GAS LINE
- OVERHEAD POWER LINES
- OVERHEAD TELUS LINES
- FLOWING GAS WELLHEAD
- TELUS UNDERGROUND CABLE
- SHAW UNDERGROUND CABLE
- UNDERGROUND FIBRE OPTIC
- DOW CHEMICAL PIPELINE
- EXISTING STREET LIGHT
- ABANDONED WELLHEAD

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3.0 ISSUES IDENTIFICATION AND RESOLUTION

Throughout the duration of this study several issues were raised by stakeholders, developers, business owners, residents, municipal staff and local councillors. Ultimately these issues were resolved through the process of technical evaluation and open public debate. The following sections described these issues, the rational for the concerns raised and resolutions of issues, if achieved.

3.1 Highway 2 / Township Road 40-0 Access Closure

For over a decade, (The closure of the Twp Rd 40-0 access was originally scheduled for November 1st, 1995.), Alberta Infrastructure and Transportation has indicated that to accommodate the ultimate "freeway" designation of Highway 2, (which limits access during the "ultimate" time frame exclusively to grade-separated structures) several at-grade intersections would be required to be closed. With the passage of the "*Highways Development and Protection Act*" [Chapter/Regulation: H-8.5 2004 – Proclamation Pending as of January, 2006] it becomes necessary to restrict the use of existing intersections to traffic volume growth no greater than average growth rates for agricultural areas and hence it may become necessary to close public roads that access freeways when traffic volumes increase beyond normal agricultural growth rates. In such cases, the local road network needs to be developed to compliment the freeway intersection closures.

Since 1995, property owners living within the vicinity of the Township Road 40-0 / Highway 2 intersection, have indicated their desire to have the access remained open until such time as a local roadway network capable of addressing the forecast land-uses on the east side of Highway 2 could be developed. (Refer to Appendix "E-1" for correspondence between Lacombe County and AIT) As a service road along the east side has yet to be constructed, the Township Road 40-0 access remains open.

In 2004, AIT completed the "*Highway 2 Calgary to Edmonton Corridor Upgrade Study*" [Al-Terra Engineering Ltd. & CastleGlenn Consultants, August 2004] to review the existing Highway 2 corridor between Calgary and Edmonton and identify the improvements required to upgrade the highway corridor to "freeway" standards. The study identified the closure of Township Road 40-0 as a "short-term" improvement that would be implemented within the next 10 years. The study also proposed the development of a service road from parcel N ½ 3-Rge. 27 –Twp 39 – W4 connecting to the Blackfalds future West Arterial to facilitate with the proposed closure.

Exhibit 3.1 has been extracted from the *"Lacombe/Blackfalds Area Structure Plan Traffic Impact Assessment"* [CastleGlenn Consultants, January 2006] and illustrates a conceptual alignment (See blue line within Zone 5a) for a roadway For analysis purposes only, the future closure of the Highway 2 / Township Road 40-0 access was taken into consideration and simulated within the traffic model discussed in Section 5. Forecast traffic volumes that may have utilized this access were distributed to adjacent roads and intersections within the study area.

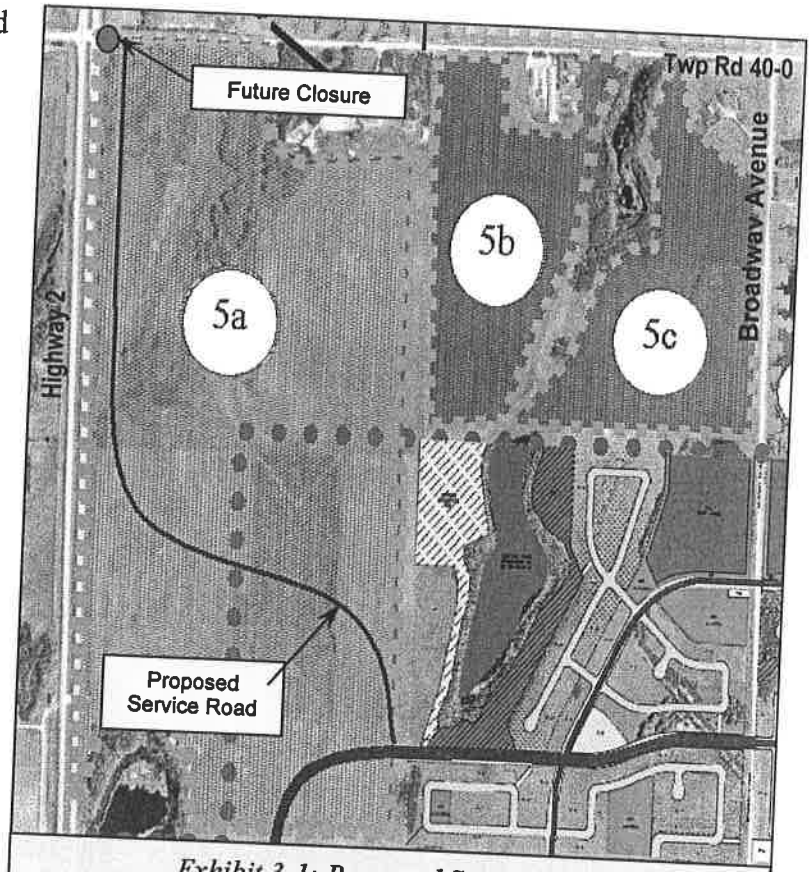


Exhibit 3-1: Proposed Service Road

3.2 New Grade-Separated CP Rail Crossing

As part of the planning to establish Highway 2A as a 4-lane facility, the viability of an additional grade-separated crossing in the vicinity of the existing CP Rail overpass (BF 73527) was assessed.

The 1998 AIT reconstruction did little to change the existing highway alignment and grade lines approaching the existing structure, which have a general rating between "*poor*" and "*adequate*". For the above reason the existing CP Rail overpass approach alignment was determined to be undesirable to accommodate a future 4-lane facility developed to meet the "ultimate" time frame requirements. Several alternative locations for an "ultimate" twinned structure were examined keeping in mind the advantages associated in developing a new highway alignment in a staged manner that would make use of the existing structure to the greatest extent possible. This was achieved by the

adoption of an assumption where an initial stage could see the development of a new alignment as a two-lane facility with both lanes serving northbound traffic volumes; the existing structure would continue to be used to support two-lanes of southbound traffic volumes. "Ultimately", the existing structure would be decommissioned at the time when the residual bridge life would be exhausted, and the new alignment expanded to accommodate 4 lanes of travel.

CP Rail representatives (See Appendix E-7) were contacted and provided additional insight into their plans to add an additional siding/tracking in the immediate vicinity of the existing corridor with in the next few years. Exact timing of the construction would be dependent on CP Rail's internal funding, approvals and market conditions; however a CP Railway Network Plan (See Appendix E-7 "*CP Rail Portion of Leduc Subdivision from Red Deer to Wolf Creek*", February 24, 2005) depicts the construction of a siding track east of the existing track line between TWP 40-0 and Broadway avenue in 2006 (or later). In addition to the siding track a future high-speed track line is proposed west of the existing track that would parallel the existing Highway 2A lanes as part of a high-speed rail project between Edmonton and Calgary. In summary, a new CP Rail overpass structure could ultimately be required to span as many as 3 track lines in place of the existing single track.

An initial alternative was considered in which a new CP Rail overpass would be built on the west side to the existing Highway 2A lanes near the DOW Chemical lands (See Exhibit 2-5 page 23); however, this alternative was not recommended for the following reasons:

- A portion of DOW Chemical lands would be required for right-of-way and construction purposes effecting the potential operation of the plants loading facility and numerous track spur lines. (See Page 27 for Environmental Overview Conclusion)
- A significant portion of an existing wetland area located northwest of the existing structure would have to be filled requiring large volumes of soil for the new highway lanes and posing potential environmental consequences. (See Section 2.5)

Several alternative highway alignment options were explored (See Section 3.1.2) involving a new CP Rail overpass located east of the existing structure. A preferred alignment was selected subsequent to a multivariate evaluation (See Section 5.1) which provided an evaluation of all of the alternatives. The evaluation indicated that the "preferred" highway alignment would locate the CP Rail overpass at a 52-degree skew angle with the future railway tracks. It is understood this skew angle is greater than the "desired"

30-degree skew angle and would result in a longer (and more expensive) structure; however the additional structure length can be justified given that the 52-degree skew angle would allow for a:

- horizontal alignment adequate for a 110km/hr design speed;
- curvilinear alignment that minimizes the impact to the wetland area located approximately 1.4 kilometre north the structure and avoids filling of an additional wetland depression located 150 meter north of the Township Road 40-0 while maintaining AIT design standards for the new Highway 2A/ Township Road 40-0 intersection; and
- a single 1550 meter horizontal highway curve south of the structure that minimizes the amount of land required for right-of-way purposes.

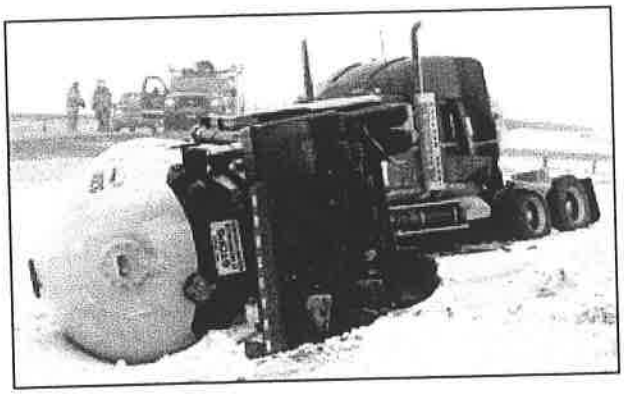
During the course of the study it was agreed the new highway lanes approaching the proposed CP Rail overpass were to be designed to the same 110km/hr standard as the reminder of the twinned Highway 2A alignment between Blackfalds and Lacombe. This design speed consistency combined with a curvilinear design was found to meet motorist expectations and offer a preferred geometric design when compared to the existing structure curve layout. At the "ultimate stage" the existing CP Rail overpass (BF 73527) would be decommissioned at a time when the bridge life would be exhausted, and the new alignment would be expanded to accommodate two additional lanes of travel for south bound traffic.

3.3 Speed Transitions into the Town of Blackfalds

The issue of achieving a required vehicle speed reduction in the vicinity of Blackfalds as concerns southbound Highway 2A traffic was addressed within the design process. The preferred design provides a distance of over 1.3 km in advance of the Town of Blackfalds that can be used as a transition zone to permit motorists the opportunity to reduce vehicle speed before entering the first intersection (Highway 2A/"future" East collector). This transition zone would commence approximately 100 meters after crossing the new CP Rail overpass. In addition to the transition zone, the topographical and elevation transition between the overpass and the Town of Blackfalds urban limits also encourage southbound motorists to travel at lower speeds given the proposed 3 percent grade transition from the structure into a vertical curve just before the town limits. In addition to the anticipatory sight distance and grade transition the natural environment will provide the motorist with visual cues as it transitions between a rural setting in the vicinity of the structure to the urban environment at the town limits. All

of the above factors were thought to cumulatively result in motorists naturally achieving the "desired speed reduction" through to the limits of the urban area.

3.4 Emergency Routing



On January 18th 2005, a northbound vehicle travelling on Highway 2, approximately 100 metres south of the Highway 2/Hwy 12 interchange hauling two propane laden trailers rolled in the centre median. The slippery road conditions combined with poor weather contributed to two other vehicles also losing control. The potential propane's explosive potential As a result of the accident, emergency crews were forced to close Highway 2 between Morningside and Blackfalds, re-routing all traffic along Highway 2A for more than eight hours. As Highway 2A is generally characterised as a 2 lane undivided facility with several signalized intersections within urbanized areas, motorist experienced significant delays. (For additional information refer to Appendix "E-2", Lacombe Globe Article entitled "Hats Off.")

Although the future widening of Highway 2A to a 4-lane facility would facilitate increased traffic volumes and ameliorate the delays associated with a similar emergency incident, the following short-term mitigation measures were raised within the scope of this study for consideration by AIT:

- Consider implementing "changeable message signs" along the Highway 2 corridor in advance of the Highway 12 interchange (Lacombe) in the southbound direction and in advance of the Highway 67 (Red Deer) interchange in the northbound direction. "Changeable message signs" are capable of displaying real-time information to advise motorists of collisions, and weather/road/environmental conditions. "Changeable message signs" would allow AIT to provide motorists with up-to-date highway information when necessary;
- investigate the viability of implementing pre-emptive signal phasing at the Highway 2A / Highway 597 intersection. Pre-emptive signal phasing with allow AIT to adjust signal timing to better facilitate high traffic periods and unique traffic patterns/demands; and
- consider undertaking a global "Emergency Routing Measures Study" to identify and examine mitigation measures that would allow AIT to efficiently deal with emergency situations such as the recent closure of Highway 2.

3.5 Integration with Local Planning Initiatives

In the fall of 2003 Lacombe County undertook the "*Lacombe/Blackfalds Area Structure Plan*" [Armin A. Preiksaitis & Associates Ltd., May 2004] which outlined the (25 year horizon) land use objectives associated with the Lacombe/Blackfalds area. The objective of the assignment was to identify future Lacombe County infrastructure requirements associated with the potential future traffic impacts with the goal of identifying sustainable development levies.

The Lacombe/Blackfalds Area Structure Plan identified approximately 3,260 acres of potential development that would accommodate approximately 5,300 homes in lands designated as future urban expansion areas, 1,040 country residential homes on County lands, 1.4M SF of future commercial/industrial space and a future 100-acre recreational area.

Subsequent to the development of the area structure plan, Lacombe County initiated the "*Lacombe/Blackfalds Area Structure Plan Traffic Impact Assessment* [CastleGlenn Consultants, January 2006] which divided the forecast growth into three development horizon periods: the next 10 years (Phase I); within the next 10 to 20 years (Phase II); and beyond the 20-year time frame over (Phase III).

The traffic impact assessment indicated that at the time of "ultimate" development the area structure plan would generate approximately 14,380 new vehicle trips during the afternoon peak hour of travel demand. In particular, traffic forecasts [See Appendix "E-3" Forecast Traffic – Phase III] along the Highway 597 corridor are anticipated to increase by approximately 10 times in the peak direction, [From 300 vph (2004) to 2,870 vph (Phase III)] in the peak direction] during the afternoon peak hour of travel demand. This significant pressure along the Highway 597 corridor implies a future widening of Highway 597 between Highway 2 and Range Road 26-4. AIT may wish to continue to monitor Lacombe County development/annexation initiatives and ensure that functional planning can precede the required infrastructure improvements along the Highway 597 corridor needed to support the planned development adjacent to the corridor.

Network Roadway Assumptions Impacting the Highway Corridors

The "*Lacombe/Blackfalds Area Structure Plan Traffic Impact Assessment* [CastleGlenn Consultants, January 2006] provided the opportunity to incorporate new land use objectives and address future access requirements that were previously unknown.

Exhibit 3-2 was extracted from the above assessment and illustrates a proposed local roadway network which integrates with the major highways (Highway 2A and Highway 597). The yellow-shaded areas denote Phase III development initiatives which represent the "ultimate" time frame of development.

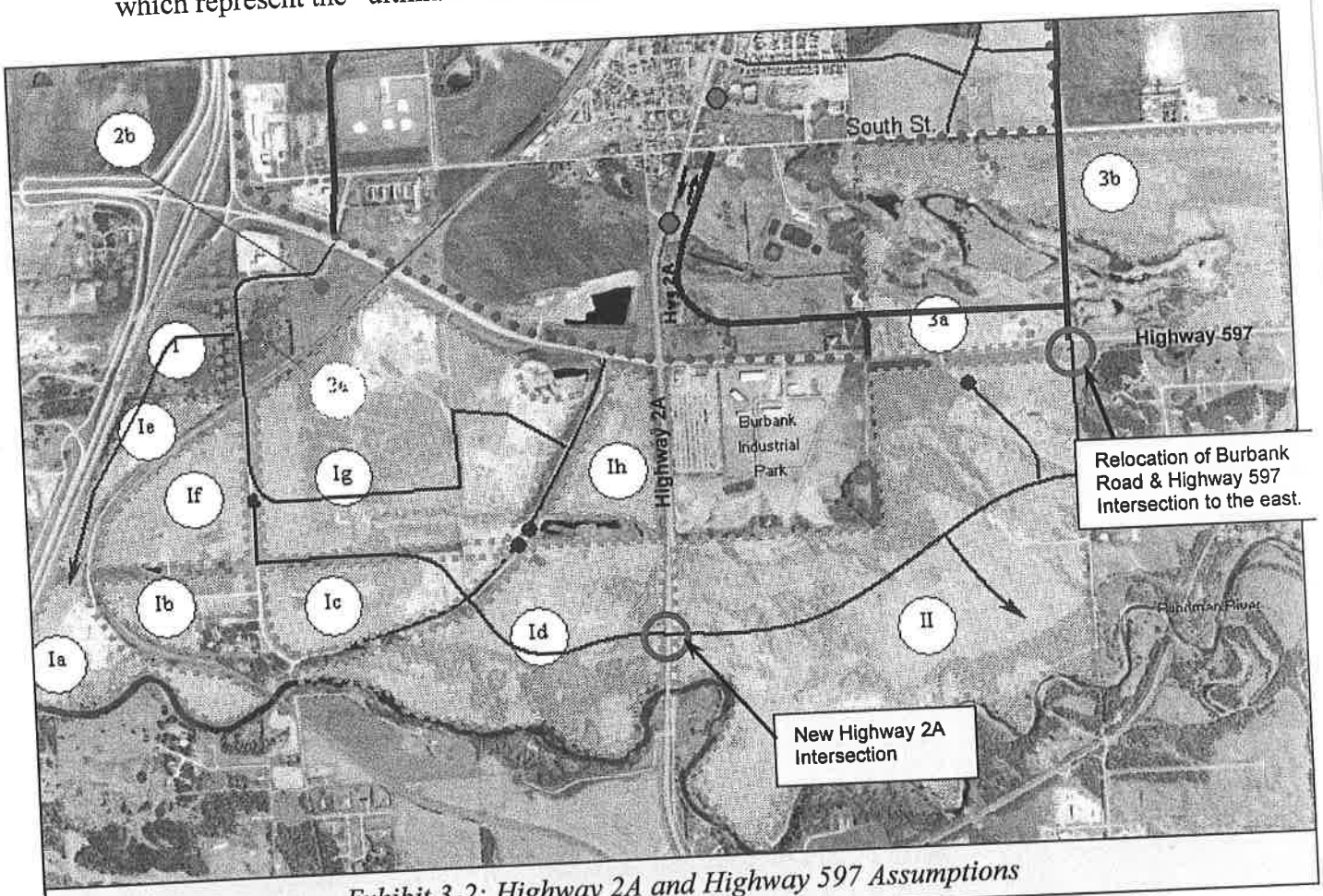


Exhibit 3-2: Highway 2A and Highway 597 Assumptions

Although the local roadway corridors illustrated in Exhibit 3-2 are outside of the scope of this assignment; [It should be noted that Phase III of the *Lacombe/Blackfalds Area Structure Plan Traffic Impact Assessment* was not included within this functional planning study as the proposed development initiatives would occur beyond the 20-year time horizon associated with this study.] AIT should be aware of the following new accesses that would impact the adjacent highways:

- a new intersection along Highway 2A, south of the Highway 2A/Highway 597 intersection. This new intersection would provide access to the residential community (Growth Zones Ib, Ic and Id) and recreational area (Growth Zone II) identified for the lands adjacent to Highway 2A and south of Highway 597 (See Exhibit 3-2);

- Burbank Road would be realigned to match the future alignment of Blackfalds' East Collector Road. (See Exhibit 3-2). This would require the relocation of the Burbank Road/Highway 597 intersection east.

As Highway 2A and Highway 597 fall within AIT jurisdiction, the roadway infrastructure improvements identified along these roadways would be subject to AIT's access approval process and should be considered when evaluating interim development proposals. Nevertheless, it is recognized that the local roadways depicted in Exhibit 3-2 are the sole interpretation of the traffic impact assessment undertaken on behalf of Lacombe County and do not have any status. The ultimate location and configuration of the local network would be dependent upon site-specific area structure plans that could modify the access requirements. AIT is encouraged to incorporate the above access arrangements within its corridor plans.

The impacts associated with the twenty year horizon growth forecasts were incorporated within the travel demand forecasts associated with this Highway 2A functional planning study.

3.6 Preferred South By-Pass Location

The "*Town of Lacombe Transportation Study*" (Bunt & Associates Engineering Ltd., Dec. 2002) recommended the implementation of a new "primary collector" roadway designated as the "South By-Pass". This conclusion is supported by be two previous initiatives ["*1990 Transportation Study*" [B-A Consulting Group] and "*1998 Highway 2A Transportation Study*"[Stantec]] which acknowledged the requirement for this corridor.

The most recent (2002) study noted that:

- This "primary collector" roadway, (as illustrated in the above study) would intersect Highway 2A between the existing C&E Trail intersection and the 58th Street intersection with the Highway 2A corridor. The South Bypass would continue easterly to connect with Range Road 26-5/32nd Street.
- "*although not needed to manage traffic volumes at the 20,000 population horizon, it* (the South Bypass) *represents a possible means of reducing truck traffic on Highway 12*[1]" which travels through the Town of Lacombe's urban area. [The 2001 population of Lacombe was approximately 9,300 persons and the local economy provided approximately 2,400 jobs.]; and
- "*The west section of this by-pass would not be expected to carry a significant volume of traffic and it would be very expensive to construct. As such, there is limited utility and likely motivation to undertake the development of the west section of the south by-pass, particularly since there is no means of legislating truck traffic off Highway*

[1] "*Town of Lacombe Transportation Study*" (Bunt & Associates Engineering Ltd., Dec. 2002) Page 1-7

12"[2] Despite this the South By-pass was proposed as a mitigation measure to reduce heavy vehicle traffic travelling within the east portion of the town.

- The development of the South By-pass would result in a new intersection on Highway 2A located south of the Town of Lacombe and serve to connect the south-east and south-west development initiatives at a time when the 2-lane east-west capacity of the Highway 12 corridor would be exhausted.

Exhibit 3-3 illustrates the location of the Highway 2A/Future South Truck By-Pass as well those lands designated by the Town of Lacombe and County of Lacombe for future development. Much work remains to be undertaken to establish this local initiative as the corridor is located on lands outside of the Town's jurisdiction and on Provincial (Alberta Agriculture) and Federal (Agriculture & Ag-Food Canada) lands. Contact with both agencies noted significant concerns to their operations associated with the potential Bypass.

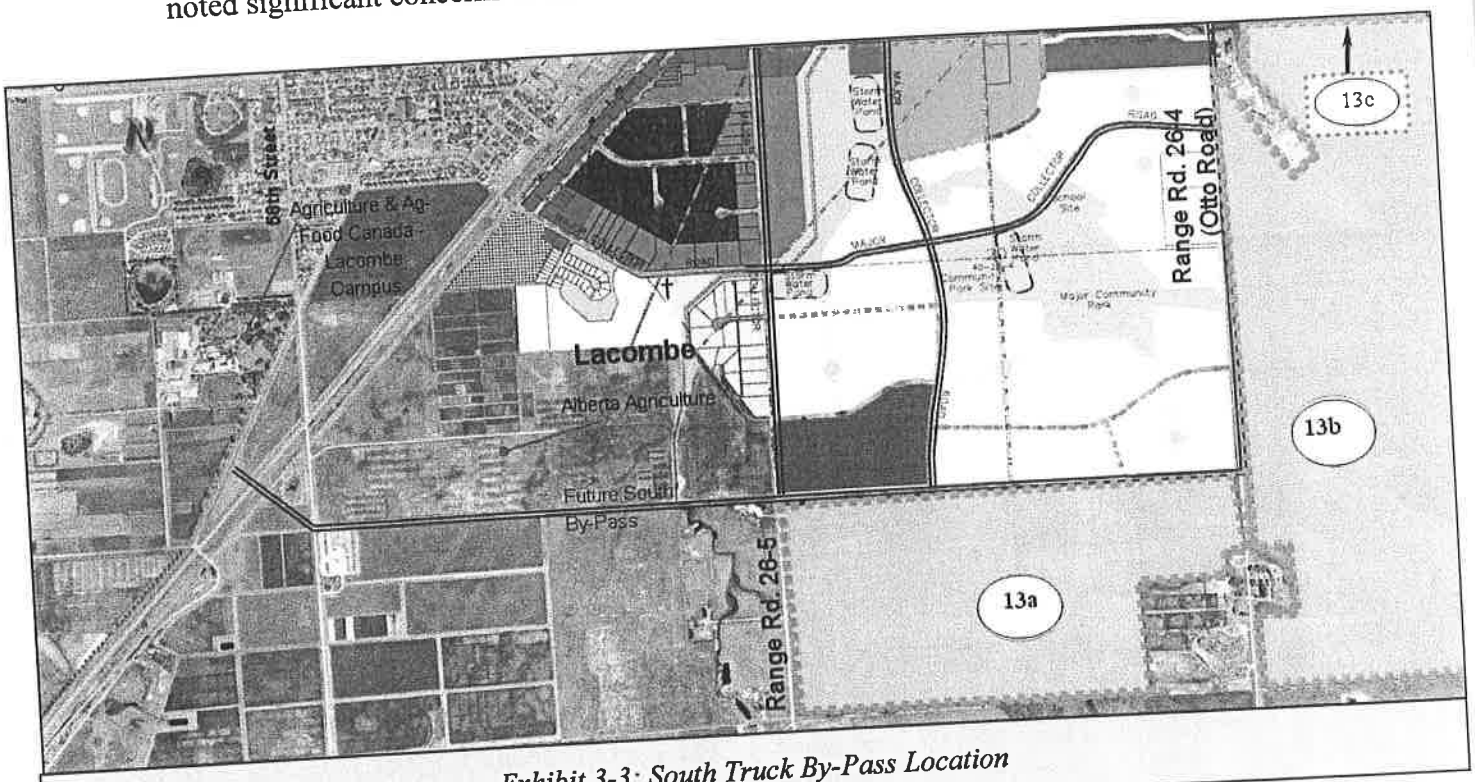


Exhibit 3-3: South Truck By-Pass Location

Exhibit 3-3 illustrates that this study did not consider the western portion of the South Truck Bypass within its analysis given the 20-year time frame of analysis and the significant impacts of this leg of the roadway on Federal Crown (Agriculture & Ag-Food Canada) lands operations.

[2] Ibid Page 8-28

Exhibit 3-4 illustrates that accommodating the east leg of the South By-pass was determined to require the acquisition of 0.5 acres of Federal lands (Agriculture and Agri-Food Canada) and approximately 3.6 acres of Provincial land (Alberta Agriculture). Agency representatives were contacted to discuss the proposed intersection location (Option 1) and potential impacts. (Refer to Appendix "E-4" for correspondence).

- Agency representatives indicated that the proposed location was not feasible as the lands required to accommodate the new intersection were considered "indispensable". Alberta Agriculture indicated that the proposed location of the South Truck By-Pass was unacceptable, as the implementation of such a roadway within the area would disrupt the seasonal and daily activities of the Provincial Field Station located south of the proposed alignment.

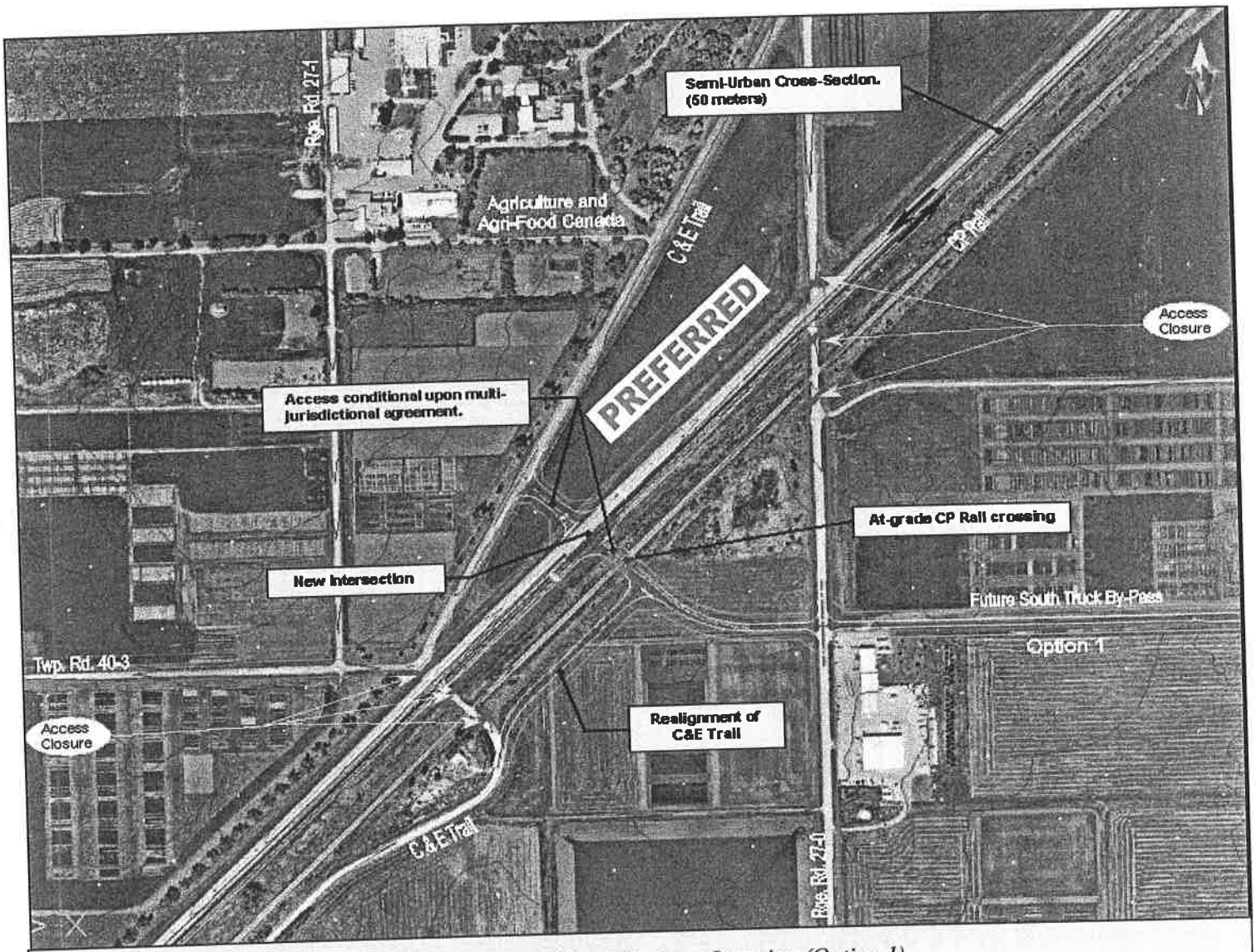


Exhibit 3-4: South Truck By-Pass Location (Option 1)

An additional option (Option 2) was proposed that recommended relocating the South By-Pass one concession further north. Exhibit 3-5 illustrates this alternative. The northern option was circulated among all the effected stakeholders to try and reach a consensus regarding the South Truck By-Pass and the corresponding intersection location.

- The Town of Lacombe subsequently indicated that the northern option was not feasible and that the southern option was still the preferred alignment.

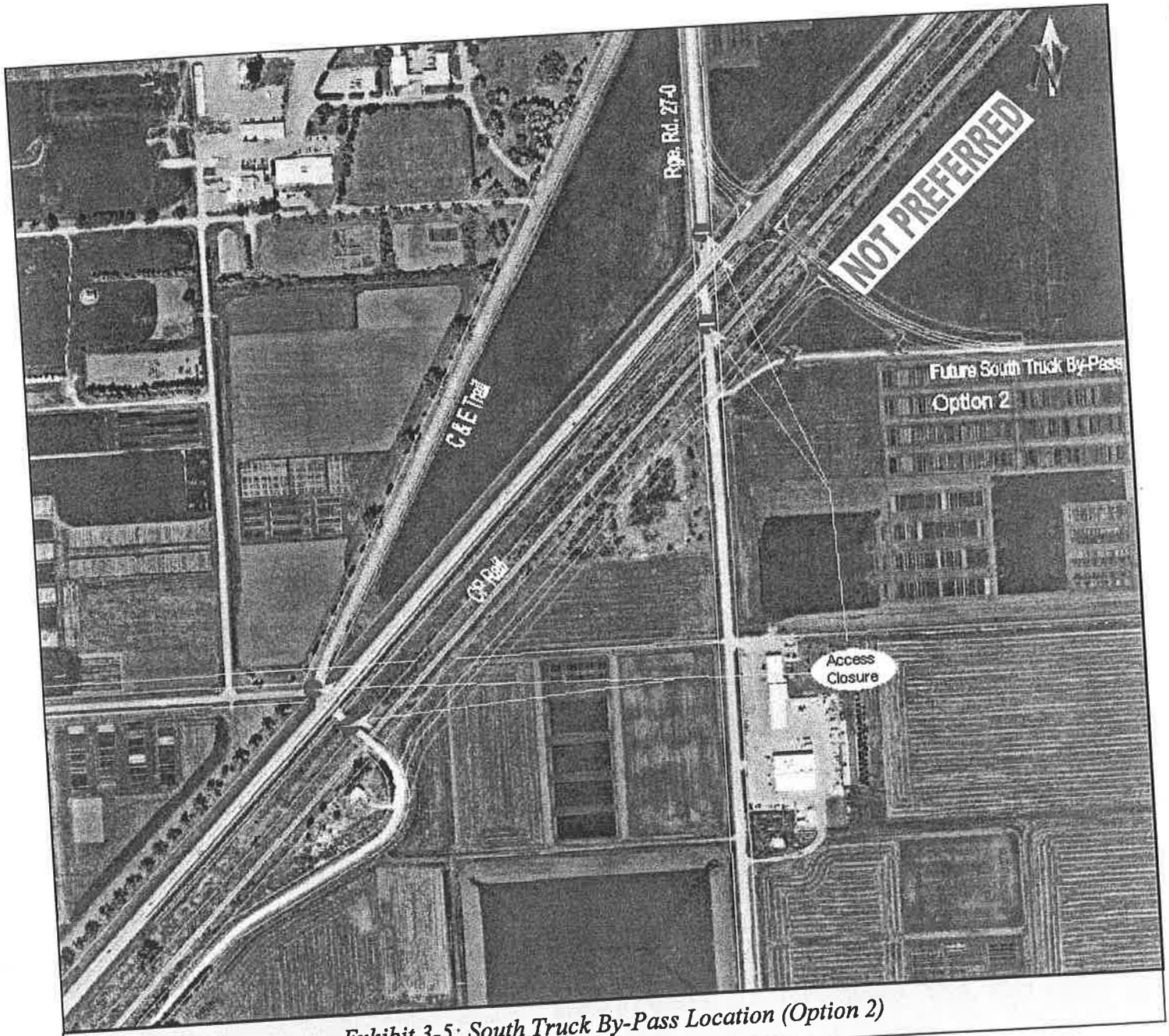


Exhibit 3-5: South Truck By-Pass Location (Option 2)

It became evident throughout the course of this study that further pursuit of establishing the southern alignment would require the Town of Lacombe to establish agreements with adjacent property owners/institutions.

- AIT indicated that from the perspective of the Highway 2A corridor it would prefer to see the closure of the C&E Trail and 58th Street intersections and hence preferred Option 1.

Therefore, for the purposes of this functional planning study, it was assumed that the South Truck By-Pass intersection would be implemented in the southern location. This assumption however is dependant on the Town of Lacombe reaching a formal agreement with the parties adjacent to the proposed South truck By-Pass route.

3.7 Highway 2A Accesses - Town of Blackfalds

Development of the access management strategy for the section of Highway 2A through the Town of Blackfalds uncovered several issues and concerns regarding this section of the highway corridor. The following sections summarize theses issues and their resolution.

Gregg Street and Highway 2A Intersection

The *Town of Blackfalds Transportation Study* [Stantec Consulting Ltd. (June 2003)] identified Gregg Street as a future primary east-west link. Future plans indicate that Gregg Street is to eventually extend westward across the CP Rail tracks to link with Wormacks Road. The existing 35 degree Broadway Avenue CP Rail crossing would be replaced by a 90 degree rail crossing at Gregg Street. As such, Broadway Avenue will no longer provide continuous north-south access through the Town of Blackfalds. Upon the closure of the Broadway Avenue CP Rail crossing, Broadway Avenue will terminate at Railway Street on the south side of the tracks and commence again on the north side of the tracks at the beginning at Wormacks Road.

Submission of several area structure plans for the lands on the east side of Highway 2A and lands east of the existing Town limits have created a need to provide such an east-west route. The extension of Gregg Street would permit residents to easily travel to/from either side of the Town. For the purposes of this functional planning study the Gregg Street Extension was simulated and the intersection of Gregg Street / Highway 2A was determined, by the twenty-year time frame to require traffic signals. Traffic signals would likely be implemented when warranted prior to the 20-year horizon.

As the Town of Blackfalds has recently (February 2005) been in contact with the CP Rail authorities, it is recommended that further dialogue between Alberta Infrastructure and Transportation will occur to ensure that the Gregg Street / Highway 2A intersection is developed to integrate with the extension of Gregg Street across the CP Rail corridor and the resulting increased traffic volume crossing the Highway 2A corridor.

Indiana Street/ Park Street Intersections

The close proximity of Indiana Street and Park Street and the intersections formed with the Highway 2A intersection has represented an area of concern.

- The existing intersection spacing between Park Street and Indiana Street intersections along Highway 2A is approximately 115 meters. [According to the *TAC Geometric Design Guide for Canadian Roads* (Page 2.3.1.12) the minimum intersection spacing between a signalized and un-signalized intersection is 200 meters.]

As the spacing between Park Street and Indiana Street does not meet minimum design standards, two options were initially considered to correct this deficiency:

- complete closure of the Indiana Intersection; or
- partial restriction of vehicle movements at the Indiana Street intersection (i.e right-in, right-out only, right-in only, slip ramp right-out only etc.)

The two access management options were presented to officials from the Town of Blackfalds and at a Public Open House [September 29th, 2004] to obtain feedback from public officials, landowners, retailers and residents. Subsequent to the public meeting several comments (Refer to Appendix "E-5") regarding the proposed access closure were received from residents. Public opinion could be expressed through the following statements:

- The closure of Indiana Street would isolate businesses adjacent to Highway 2A;
- The closure of Indiana Street would force commercial vehicles to use residential roads creating noise and safety issues; and
- One submission suggested relocating the existing traffic signals at Park Street to Indiana Street to provide better access to the downtown core and business along Railway Avenue;

Representatives from the Town of Blackfalds indicated their desire to maintain access to Indiana Street which would be in concert with their review of the feedback from the community and the recommendations within the "*Town of Blackfalds Transportation Study*" [Stantec Consulting Ltd., June 2003].

A technical analysis indicated that conversion of the Park Street Intersection to right-in-right-out operation would continue to provide adequate traffic operations however; from a design perspective the arrangement would not be desirable. The right-in-right-out solution would offer considerable room to further extend the northbound left turn storage length, parallel lane and taper for vehicles turning left from Highway 2A onto Park Street

It was the consultant's opinion that the appropriate solution would be to restrict Indiana Street to right-in, right-out access. This would be achieved by installing a continuous centre median separating the northbound and southbound Highway 2A traffic lanes to restrict left turn movements to/from the minor leg of the intersection. This solution would still permit traffic to access the businesses adjacent to Highway 2A and satisfy the vehicle storage and traffic operational requirements as outlined in the *TAC Geometric Design Guide for Canadian Roads.*

The N.W.P Industries Access

Forecast traffic volumes at the Highway 597/Highway 2A intersection indicate that at the time of Highway 2A's twinning (approximately 2014) double eastbound left turn lanes would be required on Highway 597. (Each lane would be approximately 240 meters in length which includes deceleration and storage requirements). The eastbound left turn lanes would be separated from Highway 597 westbound traffic by a proposed raised center median that would extend across the entire lot frontage of the existing NWP Industries lands located just south of Highway 597.

To accommodate the proposed left turn lanes and avoid turning movement conflicts the existing NWP industries (all-directional) accesses onto Highway 597 will need to be modified. Allowing the entrances to be open in concert with a divided 4-lane Highway 597 cross section would pose the following constraints:

- During the peak hours of travel demand motorists attempting to make a northbound left turn from the NWP industries site onto the westbound lanes of Highway 597 would be blocked by the vehicles stored in the eastbound double left turn lanes (assuming a depressed center median solution that would permit this movement).
- Even during non-peak hours egress traffic from the site attempting to merge with westbound Highway 597 traffic would be required to look to the west to ensure the eastbound lanes are clear, then look across the highway to make sure the double left turn lanes and the two through lanes are clear. This crossing movement may cause driver apprehension and pose safety concerns especially with heavy vehicle (e.g.

WB-23's) that have slow acceleration characteristics, require a long intersection crossing sight distances and have a large turning movement radii.

- Vehicles that do manage to cross the highway onto the westbound lanes may cause premature deceleration constraints for that eastbound Highway 597 traffic attempting to merge into the westbound left turn lanes.

The above issues were discussed with NWP industries representatives and it was understood that the two NWP accesses would be closed. Exhibit 3-6 illustrates the access solution that was presented to NWP representatives that would see the construction of a service road from the site within an existing 25 meter road allowance right of way adjacent to site that would connect to the existing road system within the Burbank Industrial Park. (See Appendix "E-6" for correspondence).

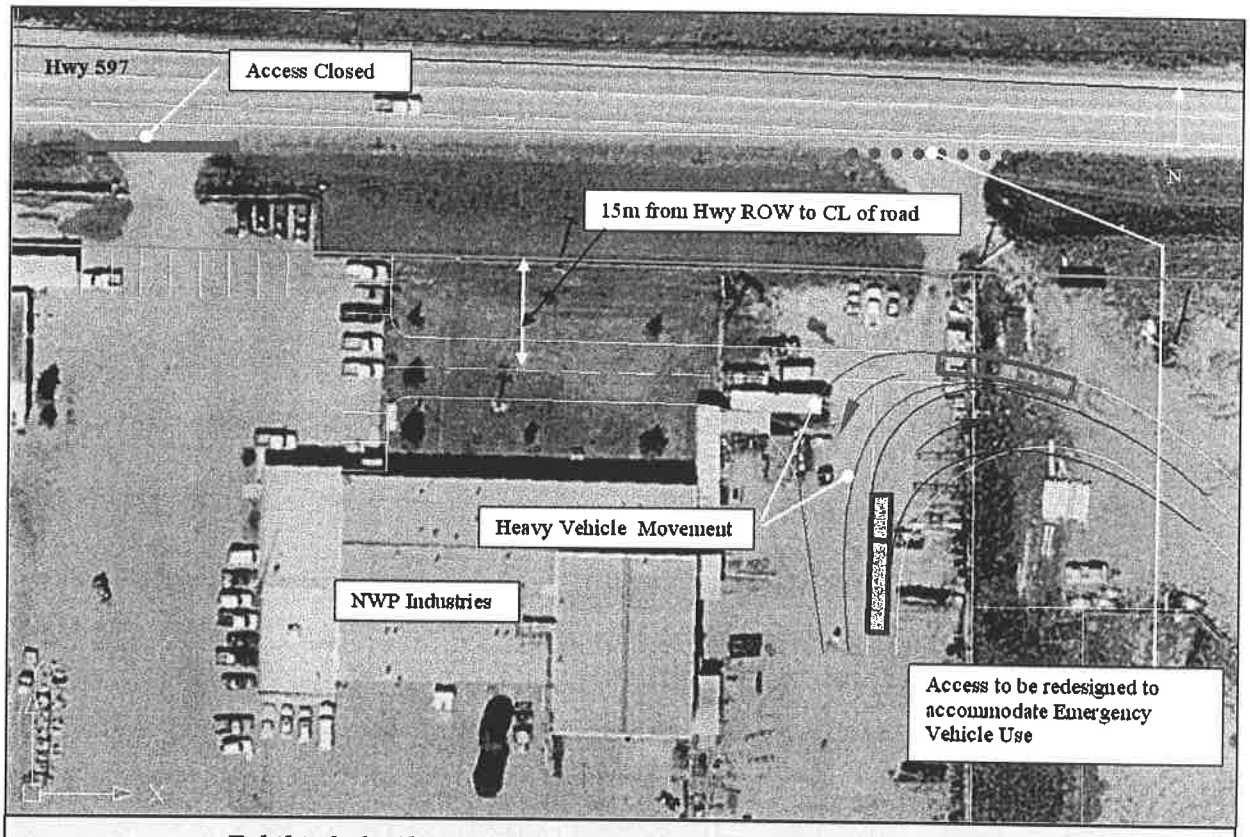


Exhibit 3-6: Alternative Access Arrangement NWP Industries

Lands East of Highway 2A between 597 and South Street

The *South-East Area Structure Plan* (Stantec Consulting Ltd., June 2003) details the proposed commercial/industrial development plans prepared for those lands located east of Highway 2A, south of South Street and north of Highway 597. Exhibit 3-7 depicts two future accesses to/from the site as proposed within the site plan.

- A direct access to/from Highway 2A is to be located just south of the existing Broadway Avenue access; [The "*Town of Blackfalds Transportation Study*" [Stantec June 2003] recommended closure of the Broadway Avenue intersection with Highway 2A.]
- a second access is depicted to/from Highway 597 located approximately 440 meters east of the Highway 2A/597 intersection.

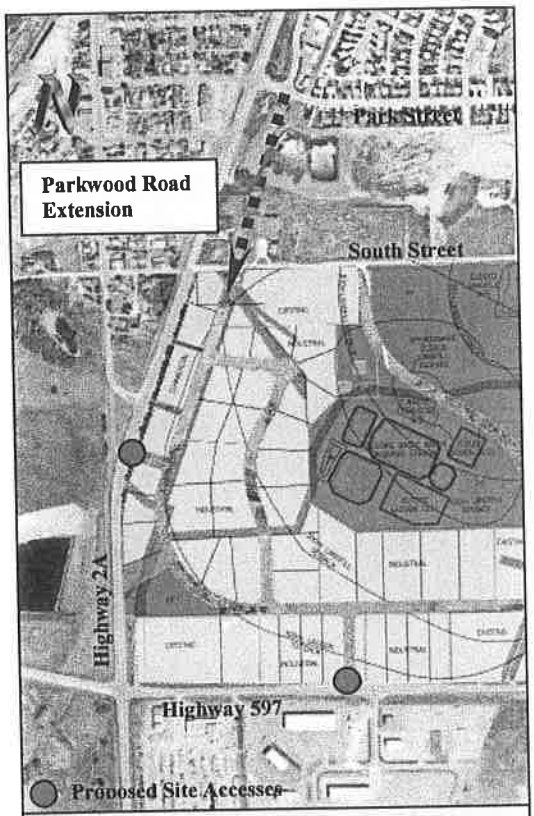


Exhibit 3-7: Southeast Area Structure Plan

As part of the mandate of this study an access management strategy was developed for the Highway 2A corridor between Blackfalds and Lacombe. The access management plan recommended was developed in concert with the *Town of Blackfalds Transportation Study* (Stantec Consulting Ltd., June 2003) and the Alberta Infrastructure and Transportation Access Management Guidelines ((AT Highway Geometric Design Guide 1995/99).

According to the Access Management Guidelines "*proper access management maintains or enhances safety of the through traffic*" on a roadway. Random entrances and exit volumes interrupt the through traffic, and for highways with high traffic volumes these frequent interruptions can result in "*unstable traffic flow*" causing the operating speed of the traffic to decrease. The guidelines also state "*attempts should be made to remove all non-essential means of access.*"

The review of the *South-East Area Structure Plan* recommendations indicated that they were not in compliance with current aaccess management guidelines for the following reasons:

- Subsequent to effecting the closure of Broadway Avenue in concert with restrictions on Indiana Street to facilitate through vehicle traffic on the future 4-lane Highway 2A, it makes little sense to permit a new access onto Highway 2A;
- It is inherently inequitable to, on the one hand limit access to businesses located on the west side of Highway 2A and, by opening a new intersection to the SE area, provide access to future businesses on the east side of Highway 2A
- Alternate access can be provided to the SE area through the southerly extension of Parkwood Road from Park Street and the implementation of an access to/from

Highway 597. The implementation of signage along the Highway 2A corridor in advance of the site may be considered to direct motorists to the access points of the proposed site.

- The location for the Highway 2A access as proposed in the SE ASP is located near curve of the future 4-lane divided Highway 2A alignment which does not comply with desired roadway design practice.
- A preliminary review of the site plan overlaid onto air photography seemed to indicate that the proposed Highway 597 intersection (providing access to the SE area) did not line up with the entrance to the Burbank Industrial Park. Two off-set T intersections would not be conducive to the long term requirements for Highway 597. It is essential that a four-leg intersection be developed to assure a single intersection with Highway 597. In this way opposing left turns into the future SE area and the Burbank industrial park can be consolidated at a single intersection location.

AIT is encouraged not to permit the proposed commercial/industrial accesses as outlined in the *South-east Area Structure Plan* (NW 23-39-27-4) and consider the alternative access arrangements that would:

- encourage the Town of Blackfalds to consider the southerly extension of Parkwood Road beyond Park Street to access the proposed SE area in place of a direct access onto Highway 2A; and
- assure that the proposed access to/from Highway 597 lines up with the entrance to the Burbank Industrial Park to form a single 4-leg intersection.

4.0 OPTIONS ASSESSMENT

4.1 Alternative Cross Sections

Three alternative cross-sections with varying centerline spacing between the northbound and southbound lanes were identified and evaluated for conformance to the future twinning of Highway 2A. (See Appendix "F-1" for full discussion)

Exhibit 4-1 provides an illustration of the following three concepts:

- *22.8 meter Centerline Spacing*: This cross-section (AITHGDG Figure C-6.2b) would consist of a 15.4 meter center depressed median that would require either the relocation of CP Rail tracks located east of the highway or the removal of several large deciduous trees and significant property acquisition on the west side of the highway. (See Exhibit 4.1, Section A-A)

PREFERRED in Rural Enviornment

- *13.4 meter Centerline Spacing*: This cross-section (AITHGDG Figure C-6.2e) would consist of a 6 meter raised median. This centerline spacing was the preferred option because it:

PREFERRED in Urban Enviornment

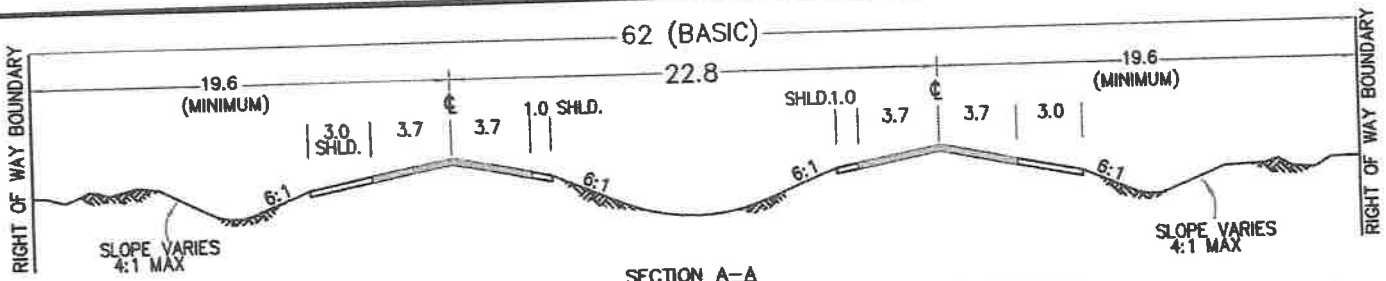
  - required the least amount of right-of-way;
  - did not disturb the trees located on the west side of the highway;
  - did not require the relocation of CP Rail tracks; and
  - provided a desirable cross-section transition between the rural areas and urban area of the Towns of Lacombe/Blackfalds.

  ATHGDG Figure C-6.2e states a 6 meter raised median is intended for a rural-urban cross-section with a maximum design speed of 70 km/hr, however upon detailed design it may be decided to use a mountable curb at the edge of the center median to exceed the 70km/hr design speed for this section of highway. (See Exhibit 4.1, Section B-B)

- *45 meter Centerline Spacing*: This cross-section would accommodate approximately 50 large deciduous trees in the 35.6 meter center median located on Agriculture and Agri-Food Canada lands (west of the existing Highway 2A lanes) while providing a desirable spacing between northbound and southbound traffic. This cross-section was not preferred due to the required 84.2 meter right-of-way width that would see significant land acquisition from the Agriculture and Agri-food Canada lands. (See Exhibit 4.1, Section C-C)

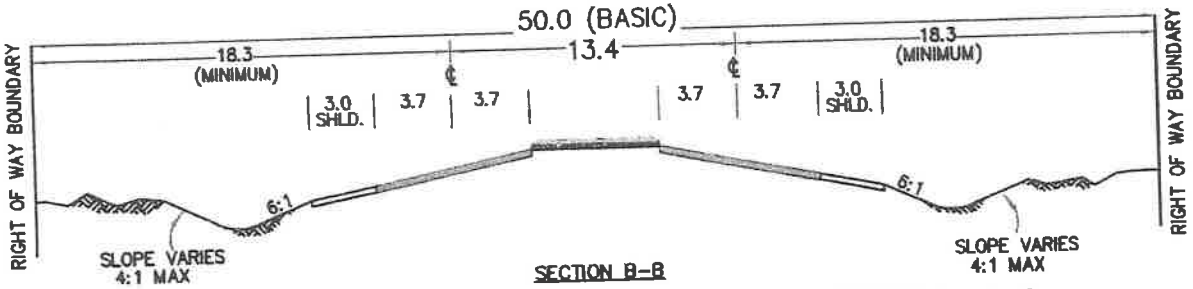
NOT PREFERRED

It was appreciated that the alternative cross-sections were not to be used as a monolithic template to be superimposed along the entire corridor, rather sensitivity to the surrounding environment, traffic operations, future land uses and property impacts represented some of the variables that were considered in selecting the appropriate cross-section to apply to the design. In particular, transition zones where the environment transcends from an open rural (agricultural) setting to a tight, urban-municipal, retail/industrial oriented land use required special consideration.



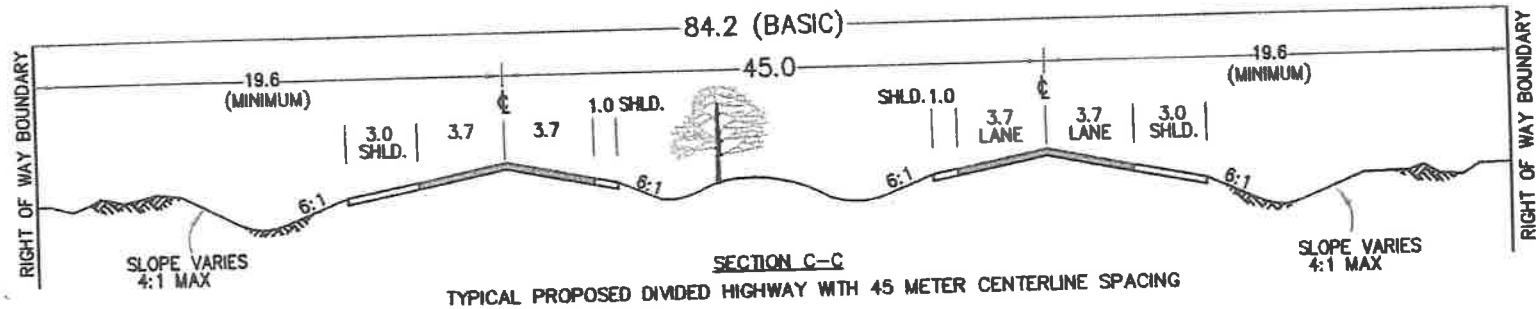
SECTION A–A

TYPICAL PROPOSED DIVIDED HIGHWAY WITH 22.8 METER CENTERLINE SPACING



SECTION B–B

TYPICAL PROPOSED HIGHWAY RAISED MEDIAN WITH 13.4 METER CENTERLINE SPACING



SECTION C–C

TYPICAL PROPOSED DIVIDED HIGHWAY WITH 45 METER CENTERLINE SPACING

Exhibit 4-1
Typical Cross Sections
NOVEMBER 2004
HIGHWAY 2A BLACKFALDS TO LACOMBE

Alberta TRANSPORTATION

CastleGlenn Consultants Inc.
Engineers, Project Managers & Planners

NOTE: A) ALL DIMENSIONS ARE IN METERS
B) DRAWINGS ARE NOT TO SCALE

4.1 Highway 2A Alignment Options

Several alignment and access management options were identified, examined, assessed and evaluated as part of the Highway 2A Functional Planning Study addressing the corridor between Blackfalds and Lacombe. A multi-variate factor analysis was undertaken to provide a relative comparison of the alignment and access management options by varying the importance of numerous independent factors (See Section 6). All of the alternatives where compiled into a technical working document entitled *"Options Assessment"* Report (Nov. 2004).

Exhibit 4-2 illustrates five sections, ("A" through "E") which were used to subdivide the Highway 2A corridor. The ""*Options Assessment*" Report provides detailed sketches and comments regarding each of the alignment options. The following provides a summary of the alternatives:

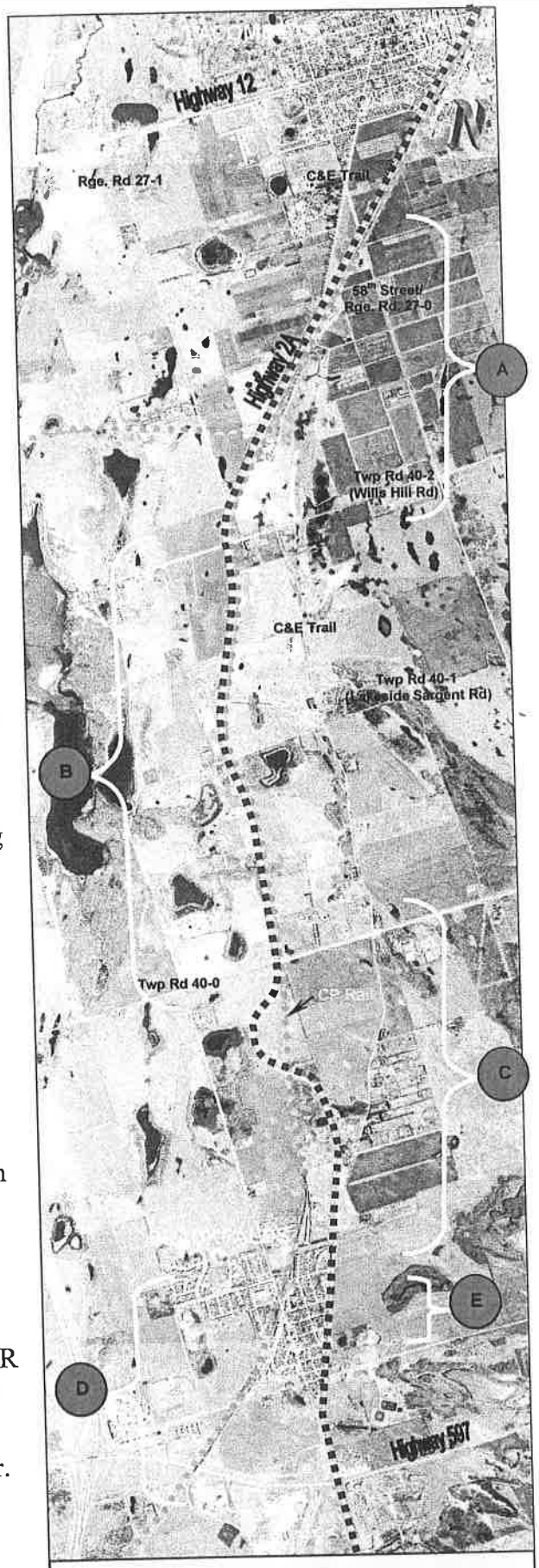


Exhibit 4-2: Highway Segments

4.1.1 Section "A": 58th Street to Twp Rd 40-2

Six alignment concepts were initially identified within the "*Options Assessment*" Report (Nov. 2004). Each of the concepts included:

- provision for proposed South Truck By-Pass on the east side of Highway 2A as recommended by the *Town of Lacombe Highway 2A Traffic Study (Stantec, October 1999)*;
- a minimum design speed of 110 km/hr;
- an expanded at-grade rail crossing with the CPR spur line to accommodate the future lanes; and
- a desire to avoid having to relocate the CPR tracks located east of the Highway 2A corridor.

The concepts were differentiated by:

- The side of Highway 2A that the widening would take place on (east or west or transition);

- The applied cross-section; (One of the concepts applied the 84.2m cross section in order to preserve the trees on the west side of Highway 2A in the vicinity of Agriculture & Agri-Food Canada.)
- The location of the future South By-pass Road and Highway 2A intersection; and
- The surrounding local area roadway network.

Subsequent to the production of the "*Options Assessment*" Report (Nov. 2004) and discussions with stakeholders the options were further refined and three additional alignment concepts were identified. (See Appendix "F-1": Exhibits A-3A-II(2), A-3A-II(3) and A-3A-III in) All of these options involves a 50.0 meter basic cross section (See Exhibit 4-1) but differed in the location of the future South By-pass Road and Highway 2A intersection.

- The *Town of Lacombe Highway 2A Traffic Study (Stantec, Oct. 1999)* and *Town of Lacombe Highway 2A Transportation Study Final Report (Bunt & Associates, Dec. 2002)* proposed that the South By-Pass would connect to Highway 2A via a new intersection between the C&E Trail (North) and 58th Street/Range Road 27-0 intersection. (The C&E Trail (North) and 58th Street/Range Road 27-0 intersections would subsequently be closed.)
- This functional planning study explored alternative options (See Appendix "F-1," Exhibits A-3A-II(3) and A-3A-III) where the proposed South By-Pass would be relocated further north. (See Exhibit 3-5 Pg. 47)

Exhibit 4-3 illustrates the preferred intersection configuration linking the South By-Pass with Highway 2A. In general, this concept was preferred over a more northerly location of the future South Bypass/Highway 2A intersection as it offers desirable highway design characteristics and avoids significant property impacts. This preliminary concept was carried forward for further evaluation refinement and design assessment.

4.1.2 Section "B": Township Road 40-2 to Township Road 40-0

Section "B" of the study corridor spans the 3.3 Km distance between Township 40-0 and Township 40-2. The "*Options Assessment*" Report (Nov. 2004) identified four preliminary alignment concepts within Section "B" of the study corridor;

Each of the concepts included:

- An intersection with Highway 2A in the vicinity of Township Road 40-2;
- An intersection with Highway 2A in the vicinity of Township Road 40-1;
- Accommodation for the twinning of Highway 2A on the west side of the existing lanes north of Township Road 40-1;

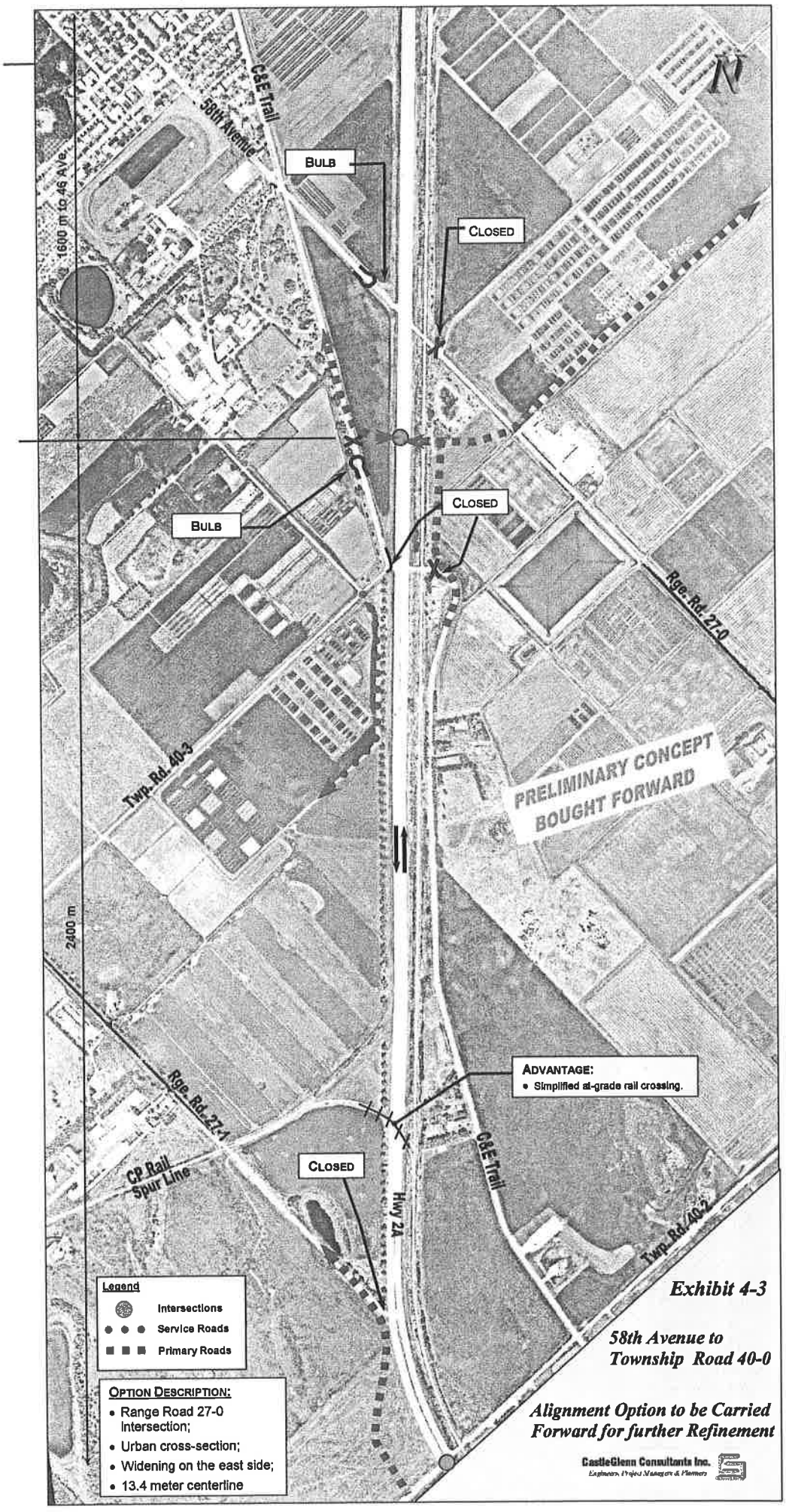


Exhibit 4-3

58th Avenue to Township Road 40-0

Alignment Option to be Carried Forward for further Refinement

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The concepts were differentiated by:

- The side of Highway 2A that the widening would take place on south of Township Road 40-1 (The east side would involve relocation of the CP Rail alignment but avoid any effects on (riparian) wetland areas. (See Exhibit 2-6 Page 25 Site AT07);
- The potential to realign both directional lanes (northbound and southbound) to the west to avoid wetland areas in their entirety;
- The applied cross-section; (One of the concepts split the northbound and southbound lanes on either side of a wetland area to avoid any impact to the wetland area, however this would in turn effect an established forested area west of Site AT07.)
- The location of the intersection of the Township Road 40-0/Highway 2A intersection. (Two of the concepts had the Twp Rd 40-0 intersection located west of its current location.)

Upon vetting the initial concepts through the Technical Review Committee, five additional options where identified for that portion of the alignment between the lands south of Township Road 40-0 and Township Road 40-1. The additional options gave special consideration to the wetlands located approximately 850 meters south of Township Road. 40-1 on the west side of the existing highway lanes and also took into consideration:

- earthworks, intersection angles and horizontal/vertical profiles;
- a 110km/hr design speed;
- construction cost; and
- property requirements and potential future development.

Exhibit 4-4 displays the additional options and provides a comparison of each based on conceptual cost, amount of land required, horizontal alignment configuration and impacts to wetland (See Appendix "F-2" for a detailed description of each alignment option).

In total, six highway alignment options (See Appendix "F") were analyzed through the multi-variate technique (See Section 6) and the following observations were made:

- *Option "A"* – minimized the impact to the wetlands by paralleling the existing highway lanes and provided a 80° angle at the new Highway 2A/Township Road 40-0 intersection. The segment of the horizontal alignment in the vicinity of the wetlands was designed with minimum curve radii. Two sub-options were used to minimize the impact to the wetlands located approximately 850 meters south of Township Road. 40-1. *Option "A-1"* involved a retaining wall solution (Marginal Cost of $1M). The wall was determined to be approximately 9m in height, 186m in length and occupy a wall area of 1,225 m^2. *Option "A-2"* involved a 2:1 fill embankment to daylight the finished ground surface in the wetlands depression (Marginal Cost of $250K).

NOT PREFERRED

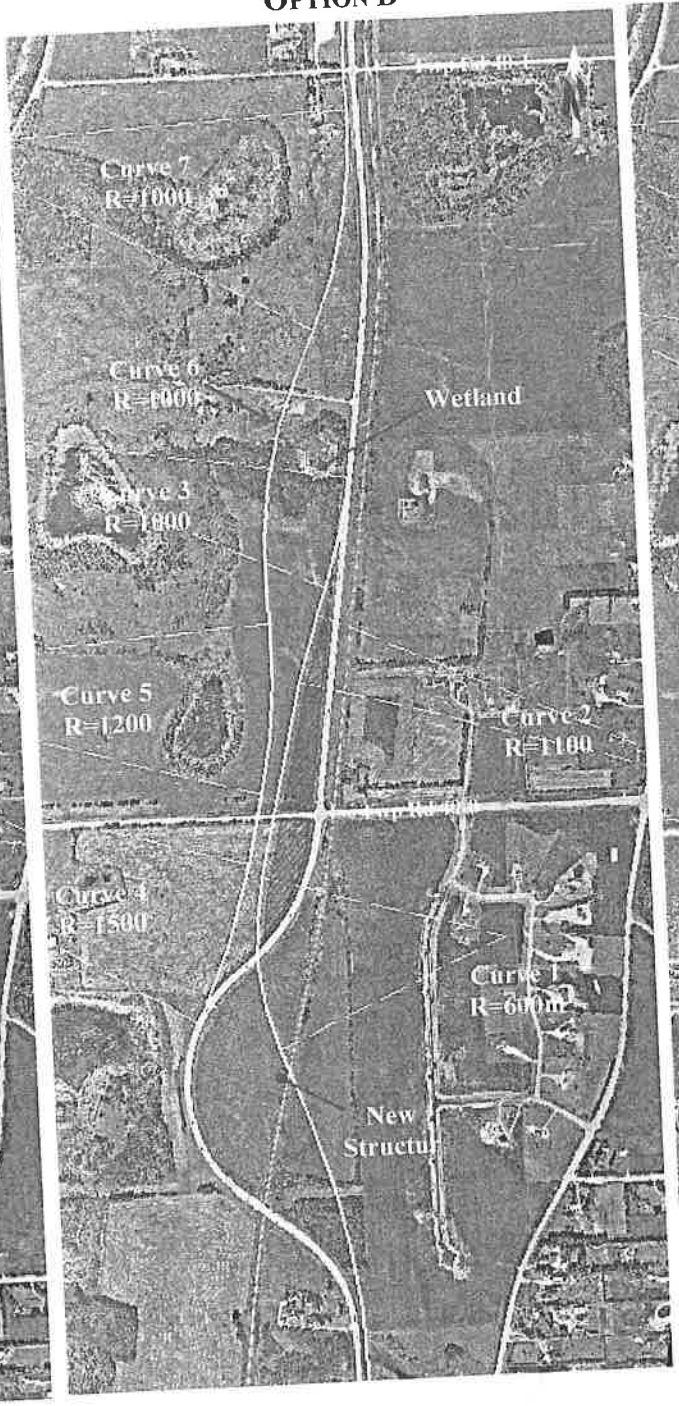
C

bought – 23 Acres (37 Acres
s 13.8 Acres of Available
land (hatched in red))

curvilinear alignment

ew lanes near the wetland will
embankment that will require
of the wetlands to be filled

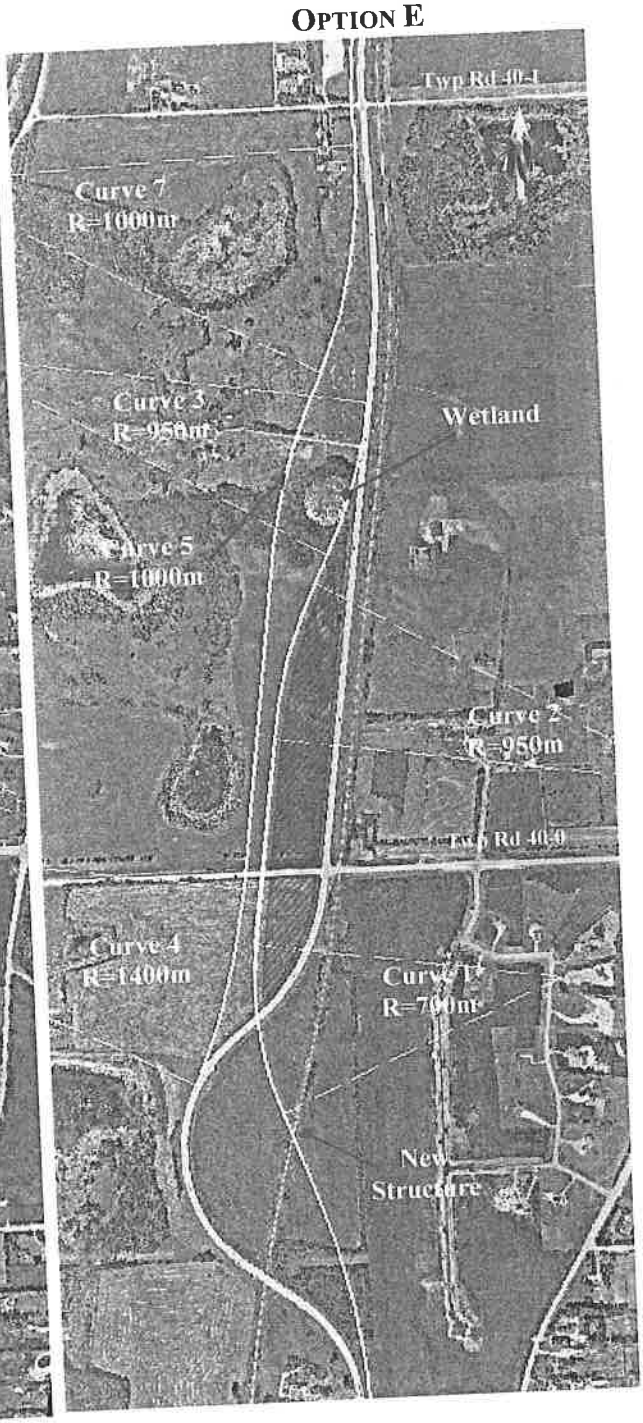
OPTION D



Cost: $ 2,540,000

- Amount of land to be acquired – 48 Acres *(56 Acres of required land minus 8 Acres of Available land for development land (hatched in red))*
- Construction has no impact to wetland
- 48 Acres of land required for new lanes and highway right-of-way

OPTION E



Cost: $ 2,900,000

- Amount of land to be acquired – 44 Acres *(62 Acres of required land minus 18 Acres of Available land for development land (hatched in red))*
- The location of the new lanes near the wetland
  will be constructed on an embankment that will require a significant portion of the wetlands to be filled
- 44 Acres of land required for new lanes and highway right-of-way

2A / CP Rail Structure to Township Road 40-1 (Section B-2)

Exhibit 4-4

- *Option "B"* – was structured to minimize property requirements associated with the corridor while not impacting the CP Rail Tracks located to the east of the existing alignment. This was achieved by designing the Highway 2A/Township Road 40-0 intersection to a minimum 70° angle. As the corridor in the vicinity of the wetland, located approximately 850 meters south of Township Road. 40-1, remained identical to Option "A", the same two sub-options were carried forward but were re-referenced as *Options "B-I"* (9m retaining wall) and *Option "B-II"* (2:1 fill embankment).

PREFERRED

- *Option "B-1"* - [See "*Options Assessment*" Report (Nov. 2004)] This option which was referenced from the Options report and depicted a new Highway 2A southbound alignment on the west side of the existing highway lanes. This was conceptually evaluated to assess the impacts of completely avoiding the wetlands by relocating approximately 800 meters of CP Rail track further east to make room for the 4 highway lanes between the undisturbed wetlands and the proposed Highway 2A corridor.

NOT PREFERRED

- *Option "C"* – accommodated a desired 80° intersection angle between Highway 2A/Township Road 40-0 and exceeded minimum horizontal curve criteria; however, the proposed southbound highway lanes would be constructed on an embankment that would require filling a significant portion of the wetland.

NOT PREFERRED

- *Option "D"* - had no impact on the wetlands; however, this option required the most right-of-way and would require the removal of a significant amount of trees located west of the wetland. The Highway 2A/Township Road 40-0 was designed at a minimum 70° angle.

NOT PREFERRED

- *Option "E"* - was similar to Option D, however, to accommodate a desired 80° intersection angle between Highway 2A/Township Road 40-0 the southbound lanes would be constructed on an embankment that would require filling a significant portion of the wetland.

After completing the multi-variate factor analysis and comparing the various alignment options it was determined Option B was the preferred alignment alternative. As regards the appropriate sub-option to be carried forward adjacent to the wetland area:

- *Option "B-I"* - Retaining Wall: This solution which would involve a 186 meter long, 9 meter high, 1,225 m^2 wall area retaining wall to retain fill used for the new southbound highway lanes, would result in the minimum amount of fill and intrusion on the adjacent wetland and associated impact to the riparian habitat. However, the high construction cost (approximately $1 million), potential soil settlement problems, general disruption to animal habitat, and esthetic look of such a wall led to this option not being preferred.

NOT PREFERRED

- *"Option B-II"* – Fill Embankment: This solution involved establishing a fill embankment extending approximately 20 meters from the edge of the highway shoulder at a 2:1 slope towards the wetland to support the new southbound highway lanes. This option was found to be preferred due to the partial impact to the wetland, the low construction cost (approximately $250,000) and the ability to implement environmental mitigation measures when compared to Option B-I.

PREFERRED

4.1.3 Section "C": Township Road 40-0 to Gregg Street

The "*Options Assessment*" Report (Nov. 2004) identified four options for the 2.8 km section of Highway 2A between Township Road 40-0 and Gregg Street. Each option outlined the implementation of a new grade separated CP Rail overpass structure to ultimately facilitate the twinning of the highway. The new structure would initially be implemented to accommodate 2 lanes of traffic, however it was considered prudent, for the purposes of this functional planning study to assure planning provisions would be in place to provide for a future widening / twinning that could accommodate 4 lanes when warranted.

Each of the concepts included:

- A new Highway 2A CP grade-separated structure over the CP Rail alignment needed to accommodate the two new Highway 2A lanes;
- A common starting point. The point of commencement for this section of the alignment was the intersection formed by the East Collector in the vicinity of the C&E Trail / DOW Chemical Loading facility entrance;

The concepts were differentiated by:

- the side of the existing CP Rail structure that the new Highway 2A/CP Rail grade separation would take place on;
- the potential of relocating various lengths of existing CP Rail track to accommodate an optimal crossing angle with a proposed new bridge structure;
- two alternative locations for the future Township Road 40-0 intersection and the 4-lane Highway 2A corridor; and
- the surrounding local area roadway network.

Two options *(Options "C-1b" and "C-3a")* depicted relocation of the CP Rail tracks to accommodate a desired skew angle of less than 30° between the rail track and the overpass. These options were not preferred for the following reasons:

- Significant lengths (2 kilometers minimum) of railway track would have to be relocated to accommodate the track curves and long tangents between curves that are required due to the type, volume and speed of trains that use the railway tracks within the area;
- Communication with CP Rail staff indicated possible future construction of two additional tracks that would parallel the existing railway corridor (See Section 3.2 and Appendix E-7). Relocation of the existing tracks would require future railway tracks to have additional curves and longer track lines, which by CP Rail standards, would be undesirable; and
- The cost of significant lengths of track relocation involving staging for rail down-time is not insignificant.

The remaining two options *(Options "C-1a" and "C-2")* depicted a new grade separated rail crossing located on lands north and south of the existing CPR overpass (BF 73527) respectively. Location of the new structure to the south however would imply that the new structure would accommodate the southbound lanes and the existing structure the northbound lanes. Developing this concept *(Option "C-2")* further indicated that:

- the approach lanes located west of the existing overpass would require several undesired "broken back" curves;
- the required lands are characterized by varying topography containing wetlands which present environmental concerns; [See Section 2.5, Exhibit 2-6 Page 25 Sites AT02 & AT03], and
- the approach lanes would encroach on residential buildings/acreages and lands within the vicinity, and adjacent to the D.O.W Chemical Loading Facility which could present operational concerns to the plant and potential environmental concerns requiring further investigation.

Exhibit 4-5 illustrates the option *(Options "C-1a")* that was considered to be preferred. The desirable aspects of this concept are summarized as follows:

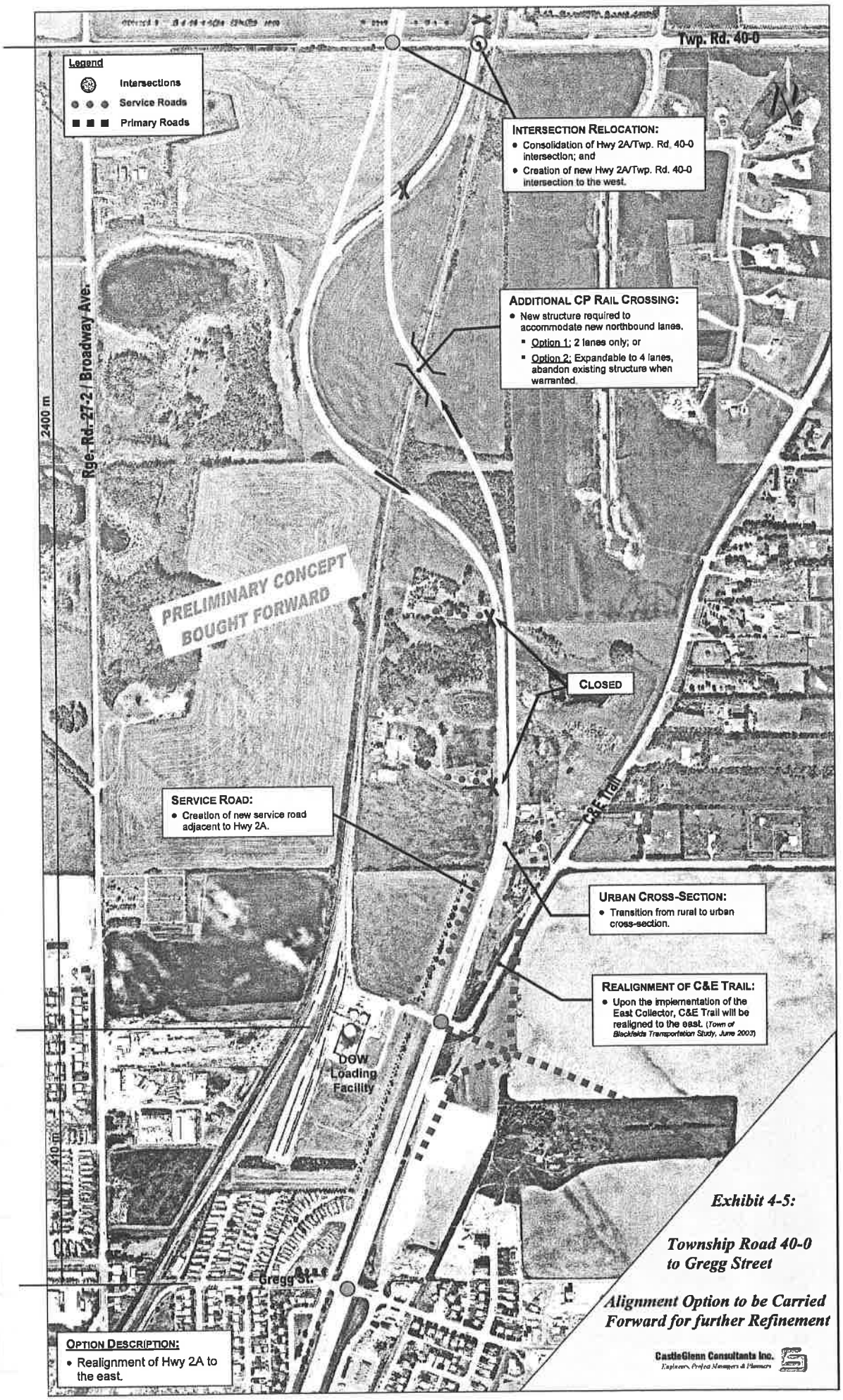
- the approach lanes to the new structure could be constructed with a preferred single 1,550 meter curve radius;
- existing buildings, wetlands and industrial operations are not impacted; and
- the possibility exists to protect the alignment to accommodate an "ultimate" 4 lanes Highway 2A facility if required, and when warranted, at a time when the existing CP bridge structure has reached the end of its structural life.
- the relocation of the Township Road 40-0 intersection further to the west provides the potential for the existing sections of paved Highway 2A corridor to revert to access or frontage roads and the adjacent lands developed as Highway Commercial land uses with appropriate intersection separation readily designed into the plans.

It was for all of the above reasons that this option *(Options "C-1a")* was forwarded on for further design development, refinement and review.

4.1.4 Section "D and E": Gregg Street to Highway 597

Recommendations outlined in the "*Town of Blackfalds Transportation Study*" *(Stantec, June 2003)* were to greatest extent incorporated into the access management plan for the Highway 2A corridor in the vicinity of Blackfalds. These access management solutions feature:

- the closure of Broadway Avenue and South Street accesses to Highway 2A;
- the conversion of Indiana Street to a right-in, right-out access;


Legend
Intersections
Service Roads
Primary Roads
Twp. Rd. 40-0
INTERSECTION RELOCATION:
• Consolidation of Hwy 2A/Twp. Rd. 40-0 intersection; and
• Creation of new Hwy 2A/Twp. Rd. 40-0 intersection to the west.
ADDITIONAL CP RAIL CROSSING:
• New structure required to accommodate new northbound lanes.
▪ Option 1: 2 lanes only; or
▪ Option 2: Expandable to 4 lanes, abandon existing structure when warranted.
Rge. Rd. 27-2 / Broadway Ave.
2400 m
PRELIMINARY CONCEPT BOUGHT FORWARD
CLOSED
C&E Trail
SERVICE ROAD:
• Creation of new service road adjacent to Hwy 2A.
URBAN CROSS-SECTION:
• Transition from rural to urban cross-section.
REALIGNMENT OF C&E TRAIL:
• Upon the implementation of the East Collector, C&E Trail will be realigned to the east. (Town of Blackfalds Transportation Study, June 2003)
DOW Loading Facility
410 m
Gregg St.
OPTION DESCRIPTION:
• Realignment of Hwy 2A to the east.
Exhibit 4-5:
Township Road 40-0 to Gregg Street
Alignment Option to be Carried Forward for further Refinement
CastleGlenn Consultants Inc.
Engineers, Project Managers & Planners

- the conversion of the east/west STOP-controls at Park Street to traffic signals; and
- full signalization of the Gregg Street intersection when warranted.
- The development of an internal local roadway network that would see Broadway Avenue be diverted westward and a new Parkwood Road developed that would serve as a frontage road linking Park Street on the north to the development in the north-east quadrant of the Highway 2A/Highway 597 intersection.

In general, the widening of Highway 2A on the east side of the existing highway through the Town of Blackfalds was identified as the preferred option because:

- There is not enough existing right-of-way (approximately 3 to 5 meters short of the required distance) to accommodate widening of Highway 2A to the west;
- The lands fronting the east side of Highway 2A impact fewer residents. Widening on the west side of the highway would directly affect six residential lots to accommodate the necessary right-of-way requirements; and
- Widening to the east side would not require the relocation of street light standards, while widening Highway 2A on the west side does require utility relocation.

Park Street and Indiana Street

Exhibit 4-6 illustrates the existing intersection spacing between Park Street and Indiana Street which is approximately 115 meters. According to the *TAC Geometric Design Guide for Canadian Roads* (Page 2.3.1.12) the minimum intersection spacing between two intersections is 200 meters. As the spacing between Park Street and Indiana Street does not meet minimum design standards, the deficiency could be corrected either through complete closure or restricting access to perhaps right-in-right-out only movements.

The "*Options Assessment*" Report identified four alternatives for this section of roadway which include:

- developing and formalizing a service road on the east side and parallel to the Highway 2A corridor;
- converting the Indiana Street Access to right-in-right-out access only by construction of a centre median;
- converting the Indiana Street Access to right-in-right-out access only by construction of a traffic island at the throat of the intersection; and
- implementing a complete closure of Indiana Street.

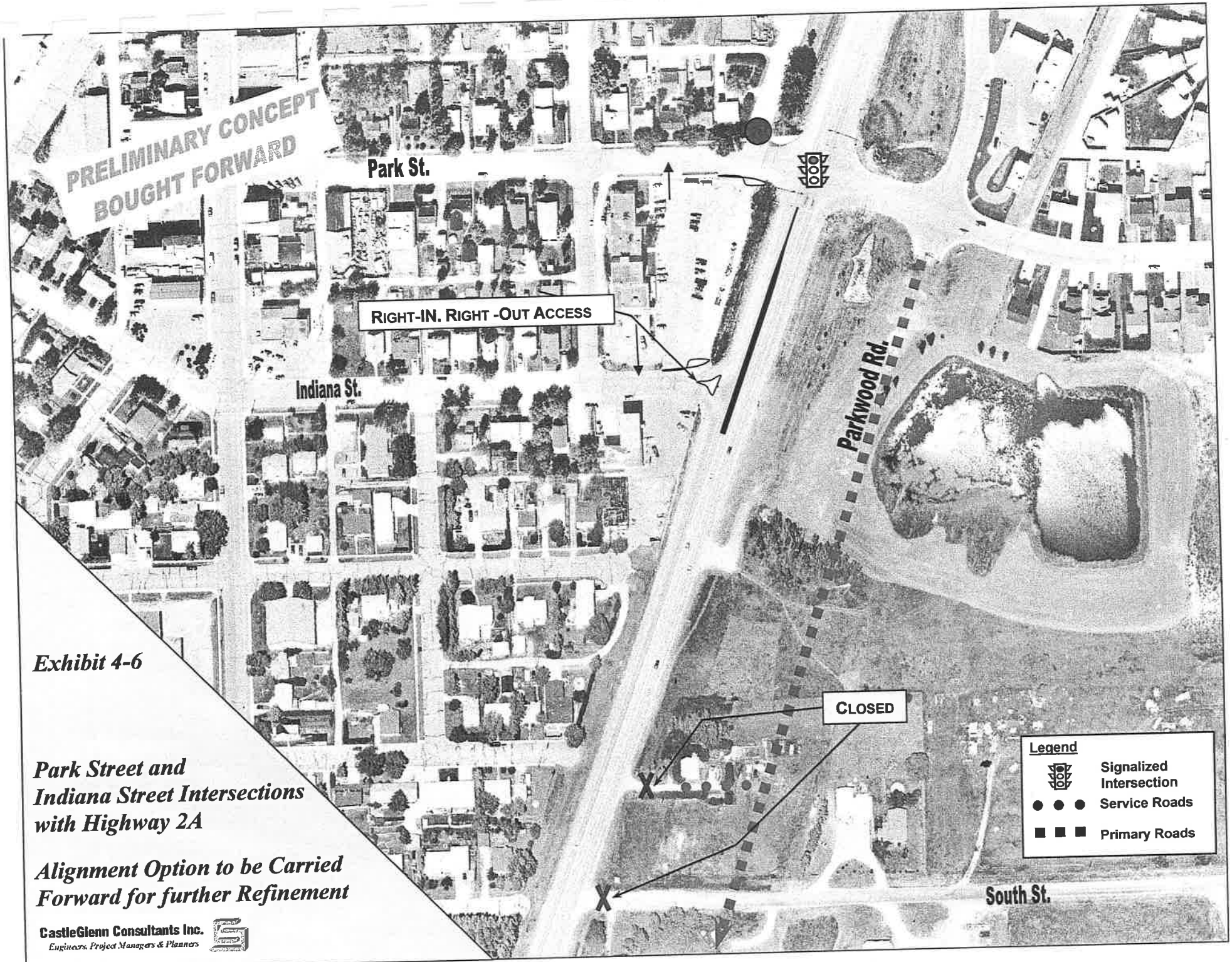


Exhibit 4-6

Park Street and Indiana Street Intersections with Highway 2A

Alignment Option to be Carried Forward for further Refinement

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Subsequent to the "*Options Assessment*" Report (Nov. 2004) it was determined that any arrangement to accommodate a West Service Road parallel to Highway 2A would not be well received for the following reasons:

- The current section of the link between Park Street and Indiana Street that could be used as a West Service Road is intended to be reserved as parking in front of the establishments.
- The locations of the accesses that would become the service road are situated too close to Highway 2A to provide sufficient stacking distance from Highway 2A without blocking the accesses.
- The land available is not sufficient to accommodate the right-of-way requirements;
- The concept conflicts with existing utilities;
- The concept conflicts with existing property arrangements.
- The Town of Blackfalds garbage collection service utilizes the area between the alley and Minto Street as a "turn around" area for Garbage trucks; a West Service Road would disrupt this service; and

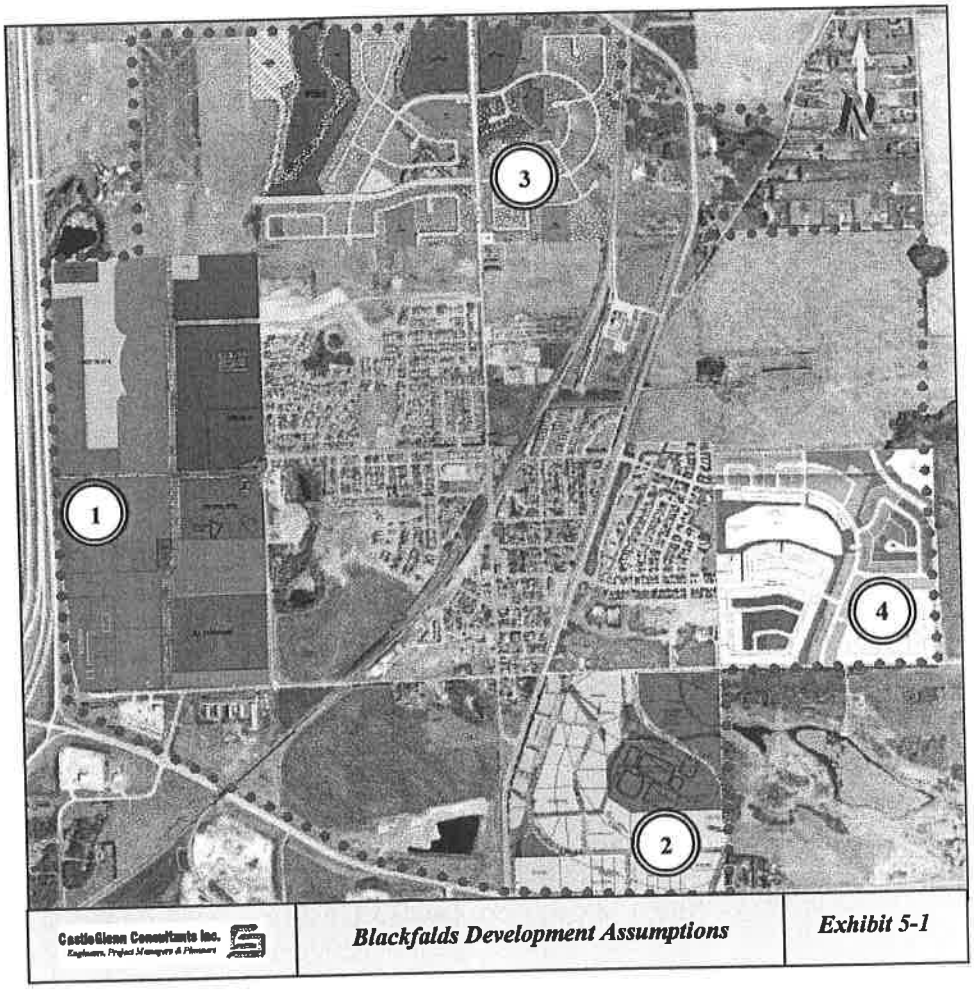
Complete closure of the Indiana Street intersection was recognized yet not pursued as the public and business owners expressed negative feedback regarding this option. As such, the conversion of the Indiana Street/Highway 2A intersection to a right-in, right-out access was the preferred solution as it corrected the insufficient intersection spacing and still provided direct access from/to Highway 2A. The implementation of a 6 meter raised median to separate the northbound and southbound traffic would restrict left turn movements from the Indiana Street/ Highway 2A intersection.

5.0 LAND USE POTENTIAL AND FORECAST TRAFFIC TRENDS

Forecast traffic volumes were based on the most current understanding of planned development within the study area. The Town of Blackfalds, Town of Lacombe and Lacombe County were contacted to help identify the future development initiatives planned for the study area. [For the purposes of this traffic assessment it was assumed that 50 % of the municipal development growth would occur in within a ten year time horizon and the remainder within a ten to twenty year time horizon.]

5.1 Town of Blackfalds Growth

Several area structure plans were referenced to develop a composite plan of development throughout the Town of Blackfalds. The relevant subdivision plans were extracted and have been superimposed on air photography to provide an appreciation of the scope of development planned for each area. Exhibit 5-1 illustrates the areas in the Town of Blackfalds where future development has been identified and illustrates the following four distinct areas.



- North-West Area Structure Plan (Area 1 – 306 Acres);
- South-East Area Structure Plan (Area 2 – 154 Acres);
- North Area Structure Plan (Area 3 – 96 Acres); and
- East Area Structure Plan (Area 4 – 160 Acres).

The traffic volumes for these municipalities were forecast based on the most current understanding of planned development within the study area

5.1.1 Area 1: North-West Area Structure Plan

Exhibit 5-2 highlights the future development sites bounded to the west by Highway 2, to the east by Leung Road and to the south by South Street. The "*Blackfalds North-West Area Structure Plan*" (Stantec, September 2004)] developed for parcels NW-27 and SW-27 indicated that future land uses would consist of residential (57 acres), industrial (94 acres), commercial (5.5 acres) and approximately 50 acres of public facility districts including provisions for storm water management and community/social facilities. The remaining lands would be used to accommodate roadway infrastructure, develop urban reserves (i.e. sports facilities) and to preserve environmental areas. The following assumptions were adopted to assist in the development of land use estimates for this future community:

Exhibit 5-2: North-West Area Structure Plan

- The are structure plan outlines the following guidelines concerning densities:
  - "*the residential design density should be between 10 residential units per gross developable hectare and 12.5 residential units per gross developable hectare.*"
  - single homes "*shall not be less than 70 percent;*" and
  - multiple family house units "shall contribute no less than 10 percent but not more than 30 percent."
- For the purposes of this assessment it was assumed that:

- single-family homes would consist of approximately 85 percent of the residential area (245 dwelling units) while multiple family homes would account for the remaining 15 percent (45 dwelling units);
- the industrial land use was assumed to be light in nature as the type of industrial land use was not specified within the area structure plan document;
- commercial land use is to consist of "*one or two sites for a district – or small shopping centre*" and "*one or more neighbourhood convenience store sites*" it was assumed that there would be two small shopping plazas and one convenience store implemented within the designated commercial area; and
- the gross leasable area assumed for the commercial area was 25 percent of the total area.

Based on the above land use assumption, estimates of traffic generation were prepared and applied to the land use to determine traffic forecast attributed to the development of the North-West area in the Town of Blackfalds.

Tables 5-1 and 5-2 detail the traffic generation characteristics associated with the development of parcels NW-27 and SW-27 within the "*North-West Area Structure Plan.*" This development is anticipated to generate a total of approximately 1,510 vehicles trips during the afternoon peak hour of travel demand.

Table 5-1: North-West Area Structure Plan Traffic Generation Characteristics - NW 27 (Vehicles-Per-Hour)

Land Use	Trips			
	Morning		Afternoon	
	Inbound	Outbound	Inbound	Outbound
Residential: Singles	46	138	156	92
Residential: Multiples/Semi-Detached	8	23	20	15
Industrial	123	25	33	115
Total	176	186	209	222

*Traffic generation rates referenced from "Trip Generation " 7th Edition, Institute of Transportation Engineers.

Table 5-2: North-West Area Structure Plan Traffic Generation Characteristics - SW 27 (Vehicles-Per-Hour)

Land Use	Trips			
	Morning		Afternoon	
	Inbound	Outbound	Inbound	Outbound
Industrial	436	89	99	351
Commercial				
Small Shopping Plaza (Hair Salon/Medical Practice/Dry Cleaners)	44	28	128	139
Small Shopping Plaza (Retail/Small Food Service/Bank)	46	30	136	147
Convenience Store	41	26	39	42
Total	567	173	402	679

*Traffic generation rates referenced from "Trip Generation " 7th Edition, Institute of Transportation Engineers.

5.1.2 Area 2: South-East Area Structure Plan

The "*South-East Area Structure Plan*" *(Stantec, June 2004)* was referenced to develop an appreciation of the land use development patterns for the lands located south of South Street, east of Highway 2A and north of Highway 597. Exhibit 5-3 illustrates the proposed development plan superimposed on air-photography. For the most part the lands have been designated commercial and industrial in nature.

The following assumptions were adopted to assist in the development of land use estimates for this future community:

- commercial lands were assumed to consist of retail plazas, and restaurants (Refer to Table 4-3 for commercial land use break down);
- the gross leasable area for the commercial lands was assumed to be 25 percent of the total area; and
- the industrial land use was assumed to be light in nature as the type of industrial land use was not specified in the area structure plan.

Table 5-3 details the traffic generation characteristics associated with the South-East Area Structure Plan. This development is anticipated to generate approximately 1,180 vehicles-per-hour during the afternoon peak hour of travel demand.

Exhibit 5-3: South-East Area Structure Plan

Table 5-3: South-East Area Structure Plan Traffic Generation Characteristics (Vehicles-Per-Hour)

Land Use	Trips			
	Morning		Afternoon	
	Inbound	Outbound	Inbound	Outbound
Industrial	320	66	85	301
Commercial				
Shopping Plaza (Dry Cleaners/Drugstore/Hair Salon/Small Food Service)	46	30	136	147
Shopping Plaza (Retail/Small Food Service/Medical Pratice)	36	23	104	113
Automobile Care Centre	29	15	24	24
Restaurant (Drive Through)	24	23	16	15
Shopping Plaza	17	16	59	54
Restaurant (Sit Down)	18	17	20	13
Convenience Store	31	31	35	34
Quality Restaurant	3	3	4	2
Total	524	224	483	702

*Traffic generation rates referenced from "Trip Generation " 7th Edition, Institute of Transportation Engineers.

5.1.3 Area 3: North Area Structure Plan

The "*North Area Structure Plan*" *(MPS Engineering LTD., March, 2003)* outlined the planned development for the lands (SW 1/4 Sec.35-39-27-4 and SE 1/4 Sec. 34-39-27-4) bounded by the CP Rail corridor on the west, agricultural lands on the east, Township Road 40-0 to the north and to the south by the Town of Blackfalds. Exhibit 5-4 illustrates the proposed development plan for these parcels.

Exhibit 5-4: North Area Structure Plan

According to the "*North Area Structure Plan*" approximately 985 residential dwellings (822 single family units and 163 multiple family units) will developed within the area and approximately 1.5 acres has been reserved for commercial initiatives. Specific details regarding the type of commercial development were not indicated within the area structure plan, therefore for the purposes of this assessment it was assumed that approximately 16,000 square feet of retail land use (shopping plaza) would be constructed (The gross leasable area for the commercial development was assumed to be 25 percent of the total area).

Tables 5-4 and 5-5 detail the traffic generation characteristics associated with the development of parcels NW-27 and SW-27 within the "*North Area Structure Plan*". This development is anticipated to generate approximately 980 vph during the afternoon peak hour of travel demand.

Table 5-4: North Area Structure Plan Traffic Generation Characteristics – SW Parcel (Vehicles-Per-Hour)

Land Use	Trips			
	Morning		Afternoon	
	Inbound	Outbound	Inbound	Outbound
Residential: Singles	69	206	234	137
Residential: Multiples/Semi-Detached	21	64	58	42
Total	90	271	291	179

*Traffic generation rates referenced from "Trip Generation " 7th Edition, Institute of Transportation Engineers.

Table 5-5: North Area Structure Plan Traffic Generation Characteristics – SE Parcel (Vehicles-Per-Hour)

Land Use	Trips			
	Morning		Afternoon	
	Inbound	Outbound	Inbound	Outbound
Residential: Singles	85	256	290	170
Residential: Multiples/Semi-Detached	6	18	16	11
Commercial: Shopping Plaza (Dry Cleaners/Hair Salon/Small Food Service)	32	20	90	98
Total	123	294	396	279

*Traffic generation rates referenced from "Trip Generation " 7th Edition, Institute of Transportation Engineers.

5.1.4 Area 4: East Area Structure Plan

The "East *Area Structure Plan*" addresses those lands situated north of South Street and east of the Parkwood Center Development. Plans for this subdivision involve only residential land uses. Exhibit 5-5 illustrates the proposed development plan that accommodates approximately 570 residential dwellings (435 single family units and 137 multiple family units).

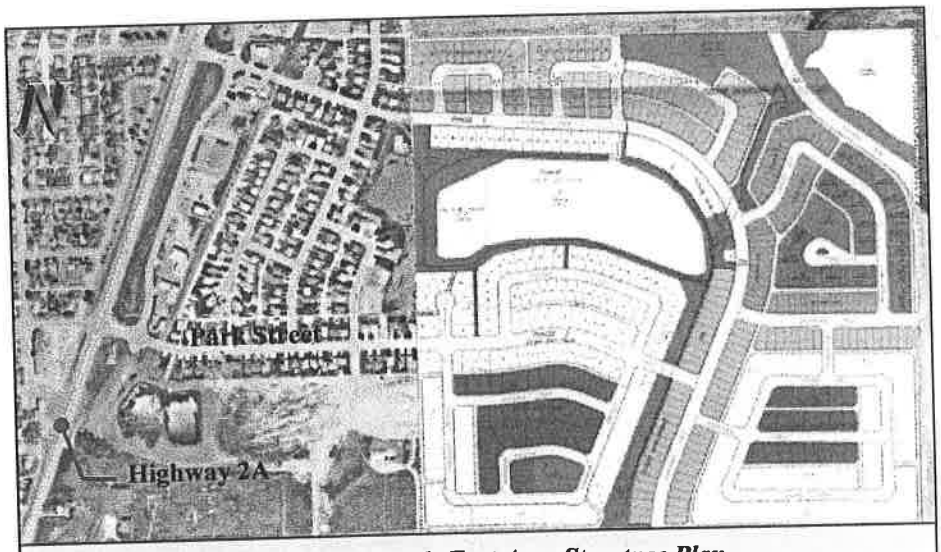


Exhibit 5-5: South-East Area Structure Plan

Tables 5-6 details the traffic generation characteristics associated with the "East *Area Structure Plan*". This development is anticipated to generate approximately 550 vph during the afternoon peak hour of travel demand.

Table 5-6: East Area Structure Plan Traffic Generation Characteristics (Vehicles-per-hour)

Land Use	Trips			
	Morning		Afternoon	
	Inbound	Outbound	Inbound	Outbound
Residential: Singles	82	245	277	163
Residential: Multi-family	23	69	62	45
Total	105	314	339	207

*Traffic generation rates referenced from "Trip Generation " 7th Edition, Institute of Transportation Engineers.

It should be noted that the traffic generation characteristics of those lands located north of the "*East Area Structure Plan*" (NE 26-39-27-W4M) was excluded from this assessment. A conceptual plan illustrating a proposed roadway network has been produced, however, plans for this area have yet to be approved by the Town of Blackfalds Council. This assumption may actually under-estimate the amount of traffic on the Highway 2A corridor and local County Roads in that the development of this land would result in increased traffic volumes utilizing the transportation network within the study area.

5.1.5 Cumulative Traffic Generation Impacts

Table 5-7 indicates the cumulative traffic generation impacts associated with all of the preceding Town of Blackfalds development initiatives. The table indicates that the total impact of the 4 area structure plans represent approximately 830 acres of lands and in their entirety, the development impacts have the potential of generating over 4,390 new vehicle trips during the afternoon peak hour of travel demand.

Table 5-7: Cumulative Traffic Generation Characteristics (Vehicles-per-hour)

Area Structure Plan	Acres	Morning Peak Hour		Afternoon Peak Hour	
		Inbound	Outbound	Inbound	Outbound
North-West Area Structure Plan	306.0	743	359	611	901
South-East Area Structure Plan	154.3	524	224	483	702
North Area Structure Plan	206.8	213	565	687	458
East Area Structure Plan	160.3	105	314	339	207
Total New Growth	827.4	1,585	1,461	2,119	2,269

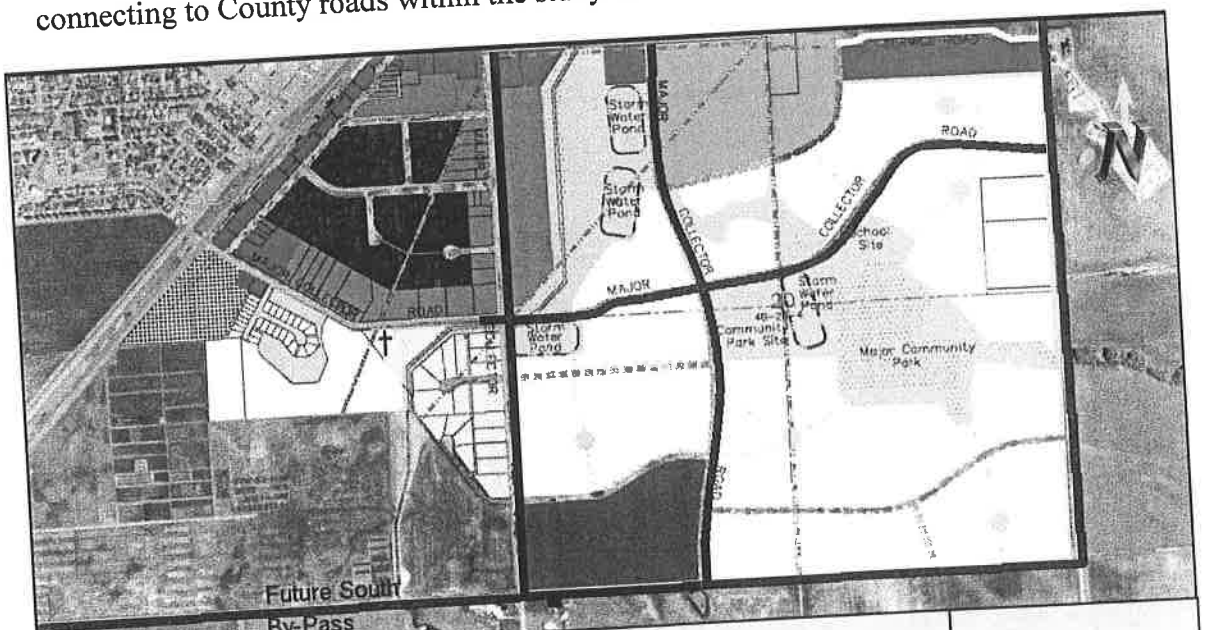
For the purposes of this traffic assessment it was assumed that approximately 20 percent of the forecast traffic would remain within the boundaries of Blackfalds

representing that component of traffic which shops, visit friends, works and takes advantage of the local services and facilities within the Town itself. This rate of internal trips has the effect of reducing the impacts on the surrounding road system. As such, approximately 3,510 new vehicle trips (80% of 4,390) were determined to be generated during the afternoon peak hour of travel demand and would utilize the study areas roadway.

5.2 Town of Lacombe Urban Growth

The "*South East Area Structure Plan*" (See Exhibit 5-6) is currently the only plan of development within the Town of Lacombe's urban boundary that has been identified within close proximity of the study area addressed within this project.

The roadway network within the *South East Area Structure Plan* in concert with the *Town of Lacombe Transportation Study* [Bunt & Associated Engineering Ltd. (2002)] was used to provide estimates of forecast traffic trends generated to/from those roadways connecting to County roads within the study area.



CastleGlenn Consultants Inc. Engineers, Project Managers & Planners	*Lacombe Development Assumptions*	*Exhibit 5-6*

An understanding of the development impacts of those lands within the Town of Lacombe is required as this component of growth will contribute to the traffic on the Highway 2A corridor.

Table 5-8 highlights the results of the approach used to develop peak hour travel demand forecasts representing development internal to the Town of Lacombe urban

boundary. Future daily traffic volumes[1] were referenced for six north-south links (Range Road 27-1/58th Street, C&E Trail, Highway 2A, Range Road 26-5/45th Street, future Wolf Creek Extension and Range Road 26-4/34th Street) that provide the Town of Lacombe access to the lands south of the urban area. As the traffic volumes presented in the *Town of Lacombe Transportation Study* represented *two-way daily* traffic volumes and the model developed for the purpose of this assessment had been based on *one-way directional peak hour* traffic volumes, a method was developed to convert from one to the other. Current daily traffic estimates on each of the existing north-south corridors were compared to existing directional information to determine one-way daily "peak direction" and "counter peak direction" traffic volumes. (See Table 5-8, Columns 3 and 4) The daily traffic volumes were then translated into peak hour volumes by dividing the daily volumes by a representative K-factor of 10.

The process indicated that the forecast development within the Town of Lacombe [population time horizon of 20,000] is anticipated to contribute an additional 1,750 new vehicle trips during the afternoon peak hour of travel demand that would directly impact the roadway system to the south of the existing urban area of the Town.

Table 5-8: Determination of Town of Lacombe Forecast Traffic Volumes

North-South Links	Existing Daily Traffic	Forecast Daily Traffic	One-Way Daily Peak Direction Traffic	One-way Daily Counter Peak Direction Traffic	One-Way Peak Hour Peak Direction Traffic	One-way Peak Hour, Counter Peak Direction Traffic
Range Rd 27-0 / 58th Street	3,000	3,000	850	650	85	65
C&E Trail	2,000	4,000	1,130	870	113	87
Highway 2A	7,000	10,000	2,875	2,175	288	218
Range Rd 26-5 / 45th Street	n/a	3,000	920	600	92	60
Future Wolf Creek Drive Extension	n/a	11,000	3,110	2,390	311	239
Range Rd 26-4 / 34th Street	n/a	n/a	1,130	870	113	87
Total	12,000	31,000	10,015	7,555	1,002	756

For the purposes of this functional planning study it was assumed that a component of traffic would remain internal to the Town of Lacombe. [This would represent that component of traffic that would be using the north-south corridors to travel between adjoining industrial centres or between employment areas and retail/residential areas.] This rate of internalization was assumed to be

- 25 percent for those new trips utilizing Range Road 27-0/58th Street, C&E Trail and Highway 2A; and

[1] *"Town of Lacombe Transportation Study"* [Bunt & Associated Engineering Ltd. (2002)], Exhibit 8-5, Page 8-21.

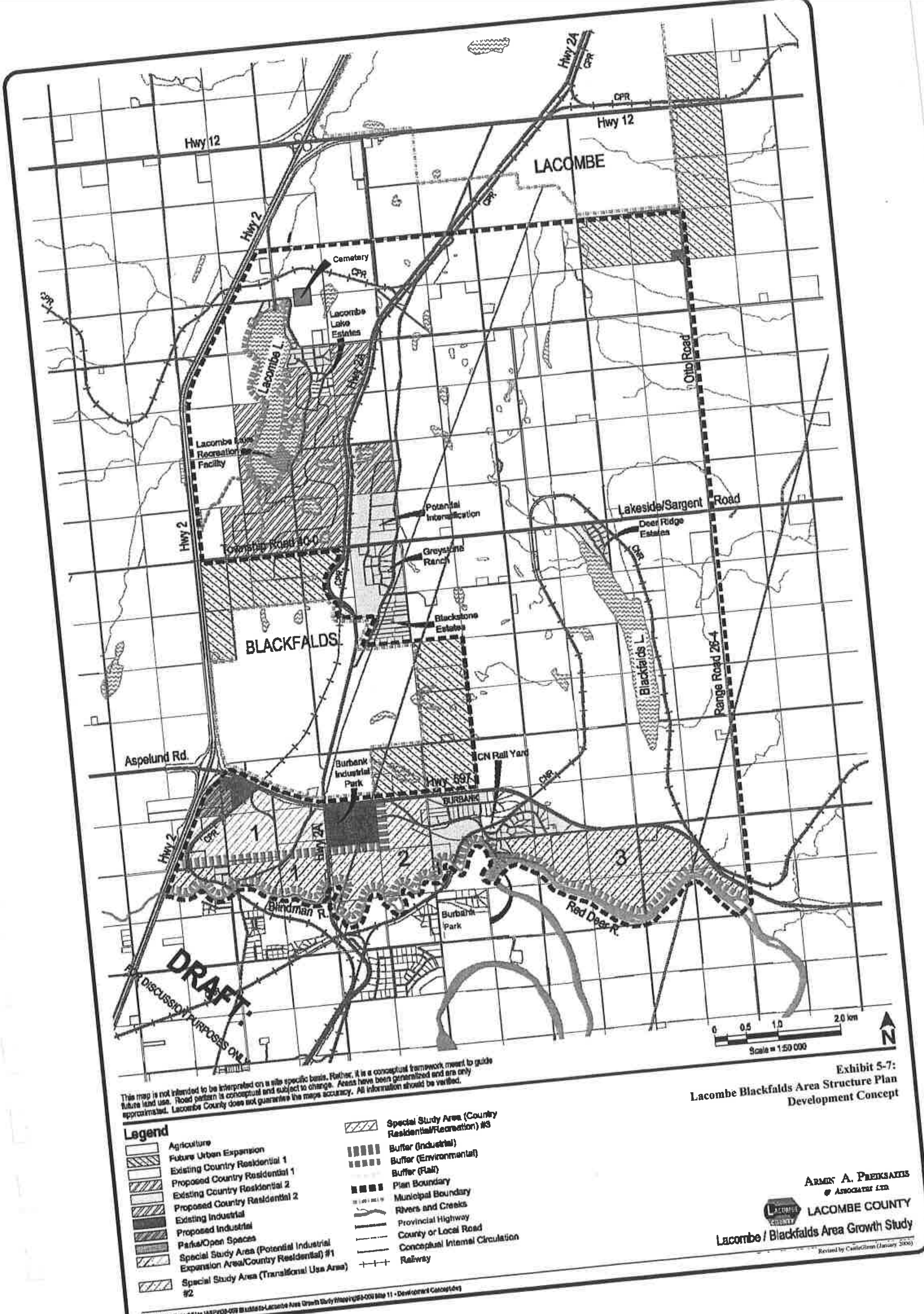
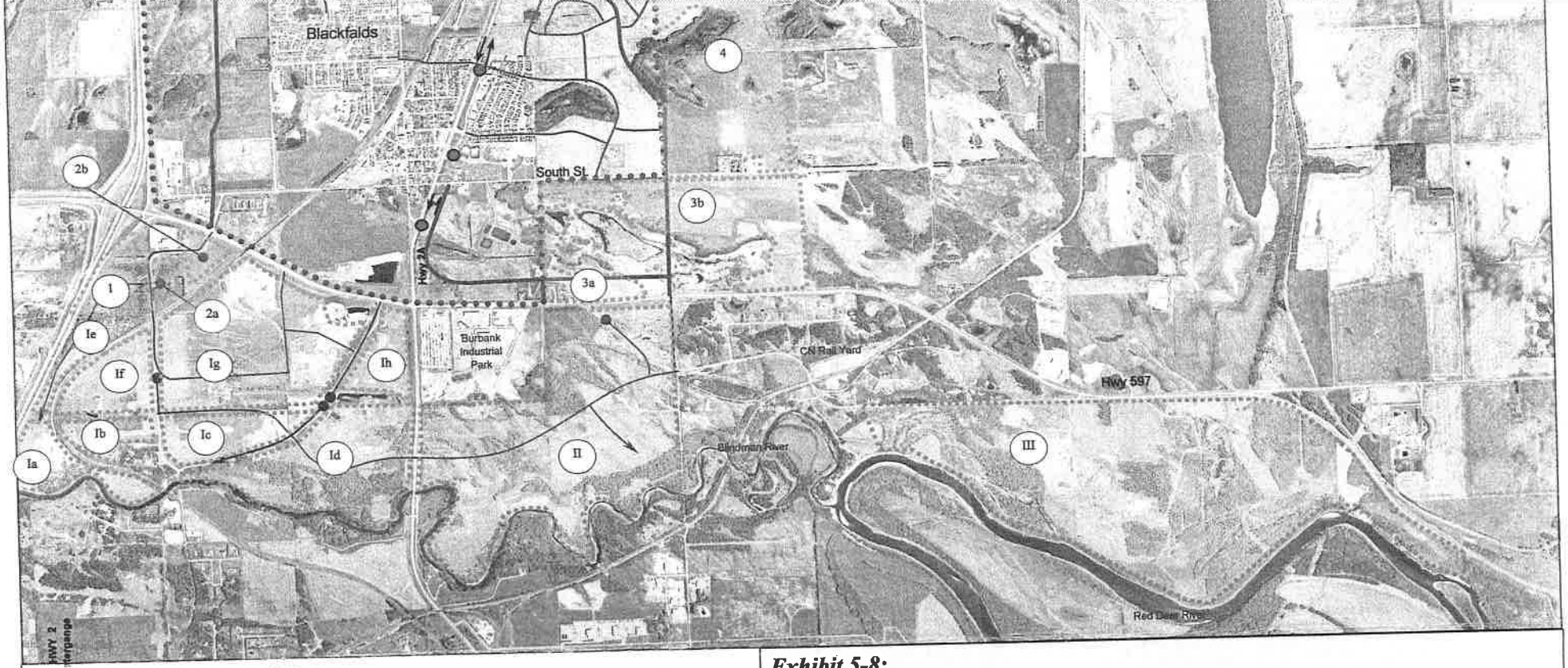

Hwy 2A
CPR
Hwy 12
Hwy 12
LACOMBE
Hwy 2
Cemetery
Lacombe Lake Estates
Lacombe L.
Hwy 2A
Otto Road
Lacombe Lake Recreation Facility
Potential Intensification
Lakeside/Sargent Road
Deer Ridge Estates
Township Road 40-0
Greystone Ranch
Blackstone Estates
BLACKFALDS
Blackfalds L.
Range Road 26-4
Aspelund Rd.
Burbank Industrial Park
CN Rail Yard
Hwy 597
BURBANK
1
1
2
3
Blindman R.
Burbank Park
Red Deer R.
DRAFT
FOR DISCUSSION PURPOSES ONLY
0 0.5 1.0 2.0 km
Scale = 1:50 000
N
This map is not intended to be interpreted on a site specific basis. Rather, it is a conceptual framework meant to guide future land use. Road pattern is conceptual and subject to change. Areas have been generalized and are only approximated. Lacombe County does not guarantee the maps accuracy. All information should be verified.
Legend
Agriculture
Future Urban Expansion
Existing Country Residential 1
Proposed Country Residential 1
Existing Country Residential 2
Proposed Country Residential 2
Existing Industrial
Proposed Industrial
Parks/Open Spaces
Special Study Area (Potential Industrial Expansion Area/Country Residential) #1
Special Study Area (Transitional Use Area) #2
Special Study Area (Country Residential/Recreation) #3
Buffer (Industrial)
Buffer (Environmental)
Buffer (Rail)
Plan Boundary
Municipal Boundary
Rivers and Creeks
Provincial Highway
County or Local Road
Conceptual Internal Circulation
Railway
Armin A. Preiksaitis & Associates Ltd.
LACOMBE COUNTY
Lacombe / Blackfalds Area Growth Study
Revised by CastleGlenn (January 2006)

Exhibit 5-7: Lacombe Blackfalds Area Structure Plan Development Concept



Legend

- Proposed Development
- Blackfalds Municipal Boundary
- Phase I
- Phase 2
- Phase 3

Exhibit 5-8:

Lacombe/Blackfalds Area Structure Plan
Proposed Growth Zones

CastleGlenn Consultants Inc.
Engineers, Project Managers & Planners

Settings

☑	1	Rural Light Industrial	Phase I
☑	2a	Rural Light Industrial	Phase I
☑	2b	Rural Light Industrial	Phase I
☑	3a	Future Urban Expansion: Industrial	Phase 3
☑	3b	Future Urban Expansion: Residential	Phase 3
☑	4	Future Urban Expansion: Residential	Phase I
☑	5a	Future Urban Expansion: Residential	Phase I
☑	5b	Future Urban Expansion: Residential	Phase 2
☑	5c	Future Urban Expansion: Residential	Phase 2
☑	6a	Future Urban Expansion: Residential	Phase 2
☑	6b	Future Urban Expansion: Residential	Phase 2
☑	7a	Country Residential I	Phase I
☑	7b	Country Residential I	Phase 3
☑	7c	Country Residential I	Phase 3
☑	8a	Country Residential I	Phase 2
☑	8b	Country Residential I	Phase 2
☑	9a	Country Residential I	Phase 2
☑	9b	Country Residential I	Phase 2
☑	10	Country Residential II	Phase I
☑	10a	Country Residential II	Phase 3
☑	10b	Country Residential II	Phase I
☑	11a	Country Residential I	Phase I
☑	11b	Country Residential I	Phase I
☑	12	Country Residential I	Phase 2
☑	13a	Future Urban Expansion: Residential	Phase 3
☑	13b	Future Urban Expansion: Residential	Phase 3
☑	13c	Future Urban Expansion: Industrial	Phase 3
☑	U-4	Country Residential I	Phase 2
☑	U-5	Cemetery	Phase I

Special Study Areas

☑	Ia	Country Residential I	Phase 3
☑	Ib	Country Residential I	Phase 3
☑	Ic	Country Residential I	Phase 3
☑	Id	Country Residential I	Phase 3
☑	Ie	Rural Light Industrial	Phase 3
☑	If	Rural Light Industrial	Phase 3
☑	Ig	Rural Light Industrial	Phase 3
☑	Ih	Rural Light Industrial	Phase 3
☑	II	Recreational Area	Phase 3
☑	III	Country Residential I	Phase 3

- *Scenario II:* This scenario assumed the following…
  - *Country Residential I:* Lot sizes would range from 2.5 acres (1.0 hectares) to 4.0 acres (1.62 hectares). The average residential density was assumed to be 3.25 acres/lot;
  - *Country Residential II:* Lot sizes would rang from 4.0 acres (1.62 hectares) and 6.0 acres (2.43 hectares). The average residential density of 4.00 acres/lot was assumed as a worse-case scenario [This land use designation applies to 3 growth zones. A sensitivity analysis indicated that the difference between a 4.00 and 5.00 acre/lot assumption was less than 20 vehicles/hour in the peak direction during the peak hour of travel demand to the overall generation of traffic from these zones.];

- *Rural Light Industrial* and *Future Urban Expansion: Industrial land* uses were assumed to occupy approximately 3,000 square feet of gross floor area/acre. This estimate was based on the existing gross floor area/acre of the Burbank Industrial Park. (Refer to Appendix "G" for calculation);
- *Future Urban Expansion: Residential* - Conventional urban residential densities can range from 10 to 12 dwellings/hectare depending on the type of residential units. An average residential density of 11.24 dwellings/hectare (27.77 dwelling/acre) was assumed;
- *Recreational* land use designation assumed that 40 percent of the overall area would be developed upon build-out for active recreational purposes. The remainder of the lands would be preserved as a natural setting; and
- the proposed *cemetery* was assumed to accommodate approximately 600 plots/acre.

Using the forecast land use assumptions outlined above an estimate of the number of units for each land use was determined. Refer to Table 5-9 below for results.

Table 5-9: Lacombe/Blackfalds Area Structure Plan Unit Estimates

Land Use	Total Acres	Developable Acres	Low Density Results	High Density Results
Country Residential I	2,098.2	1,113.2	343 lots	891 lots
Country Residential II	422.8	251.2	69 lots	149 lots
Future Urban Expansion: Residential	1,610.8	1,162.9	5,291 dwellings	5,291 dwellings
Future Urban Expansion: Industrial	241.1	167.5	503,000 SF GFA	503,000 SF GFA
Rural Light Industrial	513.4	305.0	915,000 SF GFA	915,000 SF GFA
Cemetery	20.0	13.9	8,740 plots	8,740 plots
Recreational Area	453.5	244.9	98 acres	98 acres
Total	5,359.7	3,258.8		

Using the "high" density growth zone magnitudes outlined above, forecast peak hour traffic volumes were generated for each growth zone by applying the appropriate traffic generation rates (referenced from the "Trip Generation Manual" Institute of Transportation Engineers (7th Edition)) to the land use magnitudes. For the purposes of this study the traffic generated

for the *Lacombe/Blackfalds Area Structure Plan* developments were distributed to/from origins/destinations outside of the study area. This assumption may actually underestimate the amount of traffic on the Highway 2A corridor and local County Roads in that "shared trips" between local land uses were not accounted for and routed rather to origins/destinations outside of the study area. (i.e visiting neighbours, picking up supplies, going home from work … all outside of the study area boundaries.).

The development initiatives were divided into three phases indicative of various time horizons [Phase I (10-year time horizon), Phase II (10 to 20 year time horizon) and Phase III (beyond the 25 year time horizon)]. The following sections describe the incremental growth in traffic associated with each of the development phases:

Phase I

Table 5-10 displays the traffic generation characteristics associated with Phase I of the development horizon. The growth zones designated as Phase I result in an anticipated traffic generation component of approximately 2,720 vehicles-per- hour (vph) during the peak hour of travel demand spread over the various roadways/highways. The Future Urban Expansion: Residential land use is anticipated to contribute the greatest amount of traffic (1,150 vph during peak hour) to the roadway network.

Table 5-10: Phase I - Summary of Land Use Traffic Generation Characteristics (Vehicles-per-hour)

Land Use	No. Units	Morning Peak Hour		Afternoon Peak Hour	
		Inbound	Outbound	Inbound	Outbound
Country Residential I	123 lots	71	284	399	100
Country Residential II	80 lots	46	185	260	65
Future Urban Expansion: Residential	1,859 dwellings	209	740	749	403
Future Urban Expansion: Industrial	n/a	--	--	--	--
Rural Light Industrial	153,000 SF GFA	635	130	163	577
Cemetery		2	2	3	3
Recreational Area	n/a	--	--	--	--
Total		963	1,341	1,574	1,148

Phase II

Table 5-11 displays the traffic generation characteristics for those growth zones assigned within Phase II of the development horizon. Phase II is anticipated to generate approximately 900 vph in the peak direction during the peak hour of travel demand.

Table 5-11: Phase II - Summary of Land Use Traffic Generation Characteristics (Vehicles-per-hour)

Land Use		Morning Peak Hour		Afternoon Peak Hour	
		Inbound	Outbound	Inbound	Outbound
Country Residential I	155 lots	89	356	501	125
Country Residential II	n/a	--	--	--	--
Future Urban Expansion: Residential	443 dwellings	50	176	179	96
Future Urban Expansion: Industrial	n/a	--	--	--	--
Rural Light Industrial	n/a	--	--	--	--
Cemetery		--	--	--	--
Recreational Area	n/a	--	--	--	--
Total		139	533	680	221

Phase III

Phase III (See Table 5-12) represents a significant growth component in that the Rural Light Industrial land use and the Future Urban Expansion Industrial Land use combine to generate approximately 5,260 vph in the peak direction during the morning peak hour of travel demand. The total anticipated traffic generated component associated with Phase III of the horizon development potential will represent over 10,755 vph during the afternoon peak hour.

Table 5-12: Phase III - Summary of Land Use Traffic Generation Characteristics (Vehicles-per-hour)

Land Use		Morning Peak Hour		Afternoon Peak Hour	
		Inbound	Outbound	Inbound	Outbound
Country Residential I	613 lots	353	1,412	1,986	496
Country Residential II	68 lots	39	157	221	55
Future Urban Expansion: Residential	2,989 dwellings	335	1,189	1,205	649
Future Urban Expansion: Industrial	503,000 SF GFA	2,089	428	535	1,897
Rural Light Industrial	762,000 SF GFA	3,167	649	812	2,877
Cemetery		--	--	--	--
Recreational Area	98 acres	8	6	9	11
Total		5,992	3,841	4,767	5,986

It should be noted that Phase III development initiatives were not included in the traffic volume forecasting for this study, as the developments proposed for Phase III will not occur within the 20-year time horizon.

Total Traffic Impact

The total amount of traffic generated by each land use (See Table 5-13) anticipated to occur upon the 20-year time horizon of the *Lacombe/Blackfalds Area Structure Plan* would have the potential of contributing approximately 3,600 new vehicle trips during

the afternoon peak hour of travel demand. This volume of traffic would be distributed over all of the surrounding roadways and highways.

Table 5-13: Summary of Land Use Traffic Generation Characteristics (Phase I & II) (Vehicles-Per-Hour)

Land Use		Morning Peak Hour		Afternoon Peak Hour	
		Inbound	Outbound	Inbound	Outbound
Country Residential I	278 lots	160	640	900	225
Country Residential II	80 lots	46	185	260	65
Future Urban Expansion: Residential	5,291 dwellings	258	916	928	500
Future Urban Expansion: Industrial	503,000 SF GFA	–	–	–	–
Rural Light Industrial	915,000 SF GFA	635	130	163	577
Cemetery	13.9 acres	2	2	3	3
Recreational Area	98 acres	–	–	–	–
Total		1,102	1,873	2,254	1,370

5.4 Traffic Forecasting Approach and Simulation

A traffic simulation model was developed (using MS Excel) to determine the impacts associated with the traffic generated from County lands, new proposed development within the Town of Blackfalds, the Town of Lacombe and background traffic generated on Highway 2A and 597. The following sections serve to provide an appreciation of

5.4.1 Traffic Distribution Assumptions

The distribution of traffic associated with each of the various growth zones inclusive of the traffic generated from the Town of Blackfalds and the Town of Lacombe growth was undertaken using the following process:

1. Primary access points to/from the study area were defined by identifying each roadway corridor that could be used to enter, or leave, the study area. Exhibit 3-9 depicts the access points used for this traffic distribution exercise. Fifteen access points were identified:
   - accesses to the north; (A-E, G and P)
   - 3 accesses to the south; (L, N, and M),
   - access to the east; (H, I, J and K) and
   - 2 accesses to the west (O and F).
2. Existing traffic distribution patterns were examined and the percentage of traffic destined to/from each access point was estimated for:
   - each growth zone within Lacombe County [See Appendix "H" which details the distribution assumptions associated with each growth zone.]; and

- each of the proposed area structure plans within the Town of Blackfalds. [See Appendix "H" which details the distribution assumptions associated with each area structure plan. Appendix "H-1" details a sensitivity check that was undertake to assess the distribution assumptions for each individual area structure plan to high demand travel corridors This was compared to the results in Appendix "H".]

3. Traffic from the Town of Lacombe was distributed from each of the individual roadways intersecting the study area boundary to each of the access points described above. The model was designed with flexibility to offer a different distribution pattern for each roadway that would account for the surrounding land use profile (i.e residential vs. employment based traffic.)

The traffic distribution percentage assumptions were then applied to the traffic generation characteristics.

5.4.2 Background Traffic Growth

The background highway traffic growth was incorporated into the traffic model by creating two exclusive layers for the Highway 2A and Highway 597 annual growth estimates. The component representing background traffic growth on these two Highway corridors was only applied to the "through-traffic" component since the model takes into account all development along the Highway 2A corridor and the Highway 597 Corridor (between Highway 2 and 2A). This avoids double counting the effects of adjacent land uses. [The following tables identify the "through-traffic" component upon which growth estimates were applied.]

Highway 2A Through Traffic Component

	Morning	Afternoon
Southbound Hwy 2A Through Traffic Component	250	195
Northbound Hwy 2A Through Traffic Component	215	270

Highway 597 Through Traffic Component

	Morning	Afternoon
Eastbound Hwy 597 Through Traffic Component	70	40
Westbound Hwy 597 Through Traffic Component	40	60

The model was build with sensitivity analysis in mind and permits the growth percentiles to be adjusted to any value desired by the use. For the purposes of this study:

- a 1 percent annual growth rate was applied to the Highway 2A through traffic component for the first 10 years and ½ percent beyond the 10 year time horizon.
- a 4 percent annual growth rate was applied to Highway 597 through traffic for the first 10 years and 1½ percent annual growth rate beyond the 10-year time horizon.

A review of historical traffic volume information along Highway 597 corridor over the last 10 years indicated an average annual rate of growth of 3.6 percent and similarly for Highway 2A (3.3%). However, since the model treats background traffic growth on either corridor is independent of adjacent land use growth, sensitivity was required to assure that the "through-traffic" growth on both corridors should roughly balance with one-another.

For the purpose of this study, a 20-year forecast was taken to represent the time frame of build-out upon which the above annual growth rates were applied. The tables below represent the additional background through traffic component that was added to each of the highway Corridors over the 20-year period. This growth is independent of any land use growth inside of the study area inclusive of County lands, and lands within the Town of Lacombe and the Town of Blackfalds.

Highway 2A Through Traffic Component

	Growth Component	
	Morning	Afternoon
Southbound Hwy 2A Through Traffic Component	39	30
Northbound Hwy 2A Through Traffic Component	33	42

Highway 597 Through Traffic Component

	Growth Component	
	Morning	Afternoon
Eastbound Hwy 597 Through Traffic Component	43	24
Westbound Hwy 597 Through Traffic Component	24	37

5.4.3 Peak Hour Traffic Volumes

The simulation model was capable of developing forecasts traffic volumes representing both morning and afternoon peak hours of travel demand for the time horizons specified for each phase. The peak hour was selected as this time frame would represent the highest demand and "worst-case" congestion scenario on which to base intersection requirements.

5.4.4 New Development Growth

The traffic model developed was capable of simulating traffic forecasts for each of the developments proposed within the *Lacombe/Blackfalds Area Structure Plan*. In addition, new development growth from the adjacent municipalities was also factored into the model. The model provides the flexibility to either turn "on" or "off" any growth zone to examine the traffic impacts associated with individual developments or to assess cumulative impacts. The simulation model was also developed with the

capability of permitting the user to change the phasing assumptions for each individual growth zone or proposed development initiative.

5.4.5 Components of Traffic

The simulation model was structured into several layers. In this way each of the individual components of traffic could be easily viewed, verified, evaluated and assessed in terms of impacts caused throughout the study area.

A "layer" accounts for every turning movement at every intersection within the entire study area. Hence, the model makes it becomes possible to view as an example, all "*Existing Traffic Volumes*" or for that matter the Town of "*Blackfalds: East Area Structure Plan*" impacts within the entire study area at a touch of a button.

The first two layers addressed the existing traffic volumes representing the raw information collected from historical traffic information, traffic count surveys and the results of the balanced traffic volumes (See Section 2.4.1).

Existing Traffic Volumes
Balanced Traffic Volumes

A layer was assigned to represent the highway through traffic growth component along Highway 2A and Highway 597.

Growth: Hwy 2A Thru Traffic = (1 pct over 10 yrs: 0.5 pct over 10 yrs)
Growth: Hwy 597 Thru Traffic = (4 pct over 10 yrs: 1.5 pct over 10 yrs)

Several traffic component layers were assigned to the growth associated with the municipalities.

- Four layers were assigned specifically to account for forecast development within the Town of Blackfalds representing each of the proposed new development areas located within the Town's existing urban area.
- The individual area structure plan layers were aggregated to form a total Town of Blackfalds Urban impacts layer.
- The Town of Lacombe's growth was also summarized into one layer to represent the traffic volumes forecasted for a 20,000-population time horizon, consistent with the Town's horizon threshold.

Blackfalds: North-West Area Structure Plan
Blackfalds: South-East Area Structure Plan
Blackfalds: North Area Structure Plan
Blackfalds: East Area Structure Plan
Lacombe: Urban Growth

Lastly, a cumulative "Total Town Growth" simulation layer was created to display the total effect of the Town of Blackfalds and Town of Lacombe's planned development initiatives on the study area's roadway network.

Total Town Growth (Blackfalds & Lacombe)

A traffic component layer was also assigned to the growth associated with Lacombe County. This layer permitted the examination of each phase individually or cumulatively. The model was designed to provide the flexibility to examine each of the three phases of development either individually or cumulatively.

Lacombe County ASP Zones: Phase 1, 2 & 3

To summarize the cumulative effect of the municipalities and Counties planned development initiatives, the "Total Growth" simulation layer was created.

Total Growth

The staging strategy (see Section 7.2) was simulated by developing traffic diversion assumptions related to each individual phase of improvements. The staging strategy was segmented into five distinct improvements that translated into diversions of vehicular traffic onto the municipal and county roadway networks when implemented.

Diversion: Range Road 27-1
Diversion: C& E Trail North to New South Truck By-Pass
Diversion: South Street
Diversion: Broadway Ave
Diversion: Indiana Street

Lastly, the simulation could generate any time horizon after the 20-year time frame, when Highway 2A and Highway 597 through traffic continues to grow and development opportunities are realized.

Forecast Traffic 2024

5.4.6 Traffic Forecasts

Exhibit 5-9 and 5-10 provide estimates of forecast traffic volumes along the Highway 2A corridor. The exhibits depict a 20-year (2024) time horizon that would reflect the growth traffic volumes. The exhibits assume over the 20-year period:

- "through traffic" along Highway 2A will grow at an annual growth rate of 1 percent over the first 10 years and 0.5 percent for the remaining 10 years;

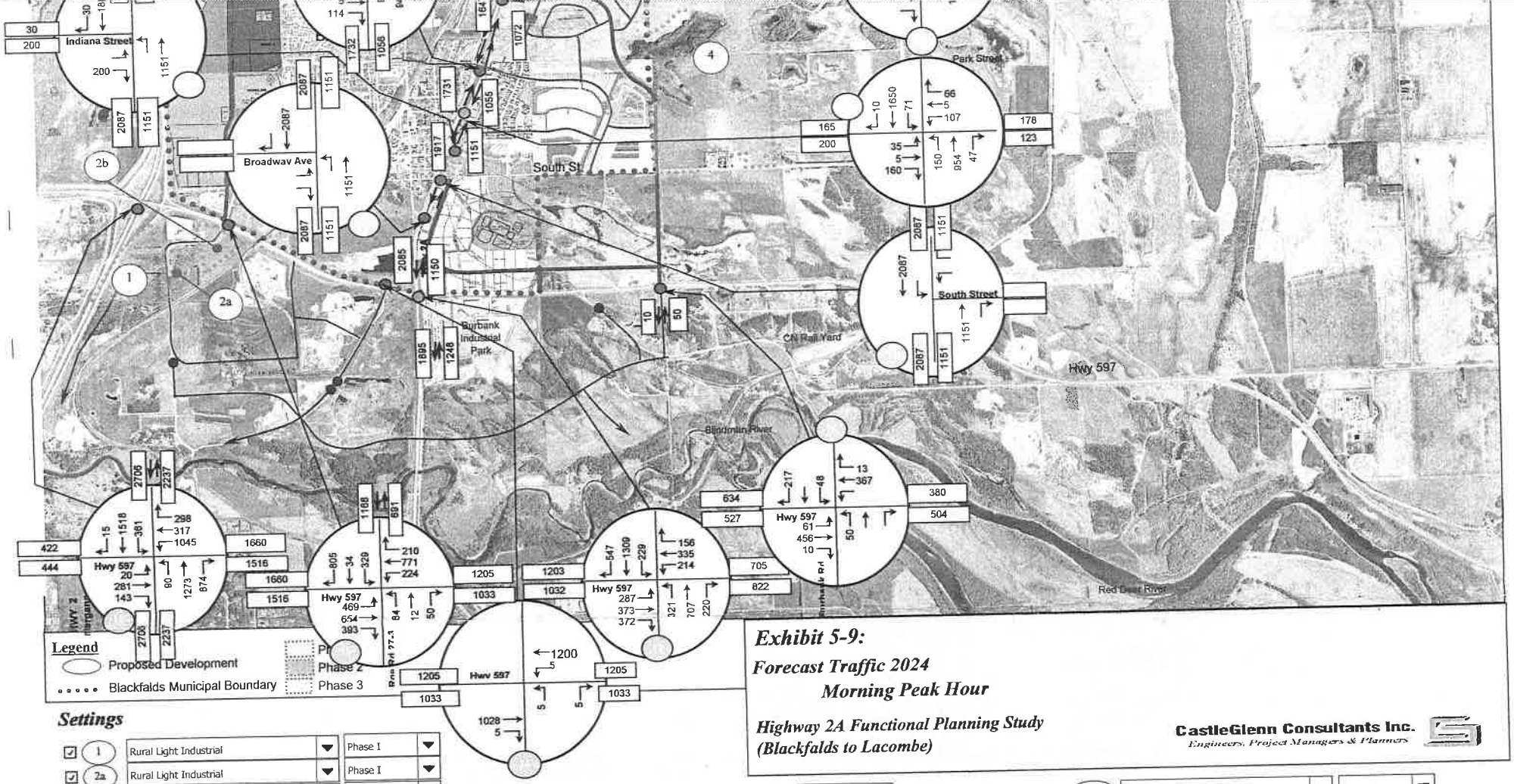


Exhibit 5-9:

Forecast Traffic 2024

Morning Peak Hour

Highway 2A Functional Planning Study
(Blackfalds to Lacombe)

CastleGlenn Consultants Inc.
Engineers, Project Managers & Planners

Settings

☑	1	Rural Light Industrial	Phase I
☑	2a	Rural Light Industrial	Phase I
☑	2b	Rural Light Industrial	Phase I
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☑	10	Country Residential II	Phase I
☐	10a	Country Residential II	Phase 3
☑	10b	Country Residential II	Phase I
☑	11a	Country Residential I	Phase I
☑	11b	Country Residential I	Phase I
☑	12	Country Residential I	Phase 2
☐	13a	Future Urban Expansion: Residential	Phase 3
☐	13b	Future Urban Expansion: Residential	Phase 3
☐	13c	Future Urban Expansion: Industrial	Phase 3
☑	U-4	Country Residential I	Phase 2
☑	U-5	Cemetery	Phase I

Special Study Areas

☐	Ia	Country Residential I	Phase 3
☐	Ib	Country Residential I	Phase 3
☐	Ic	Country Residential I	Phase 3
☐	Id	Country Residential I	Phase 3
☐	Ie	Rural Light Industrial	Phase 3
☐	If	Rural Light Industrial	Phase 3
☐	Ig	Rural Light Industrial	Phase 3
☐	Ih	Rural Light Industrial	Phase 3
☐	II	Recreational Area	Phase 3
☐	III	Country Residential I	Phase 3

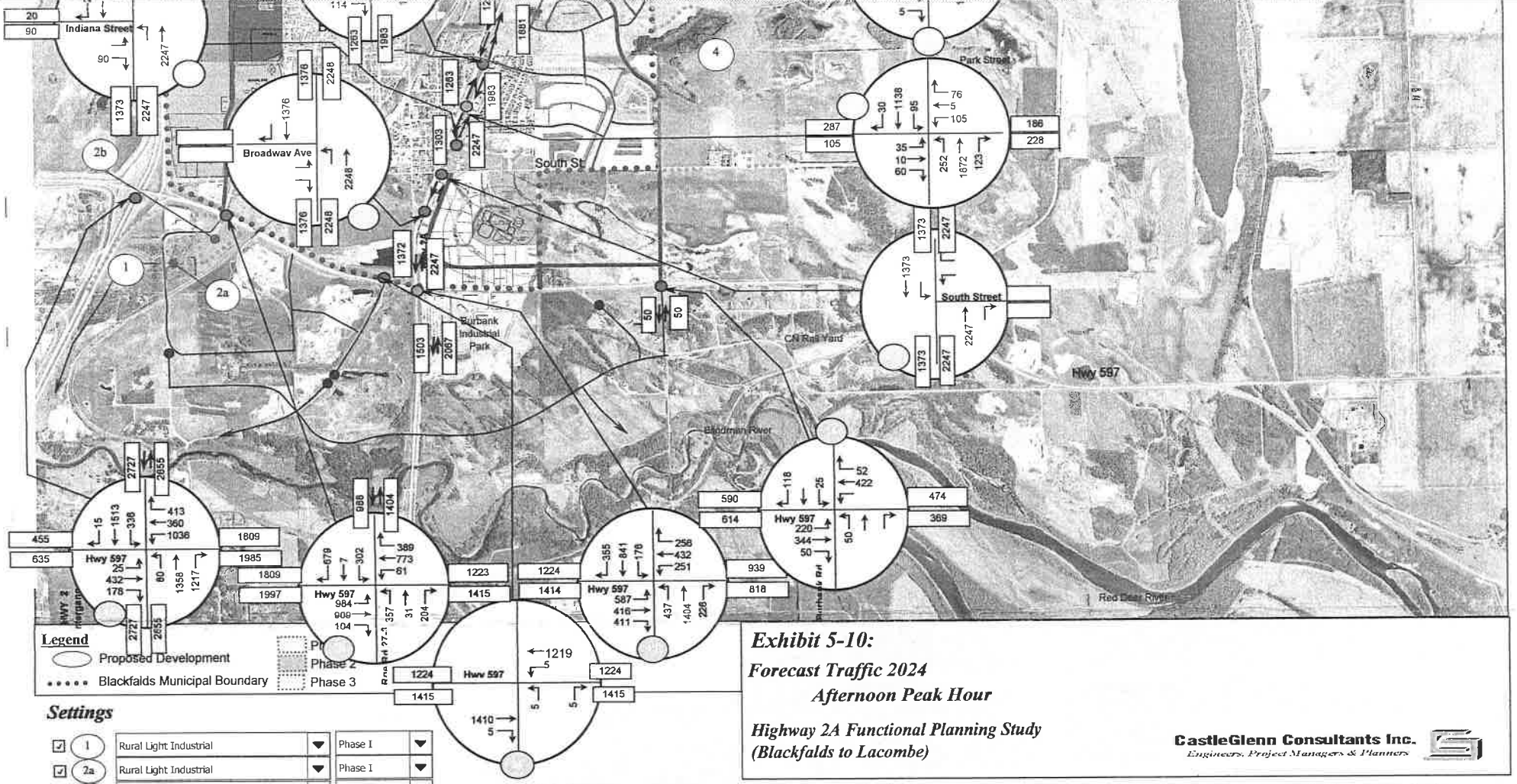

Exhibit 5-10:

Forecast Traffic 2024
Afternoon Peak Hour

Highway 2A Functional Planning Study
(Blackfalds to Lacombe)

CastleGlenn Consultants Inc.
Engineers, Project Managers & Planners

Settings

☑	1	Rural Light Industrial	Phase I
☑	2a	Rural Light Industrial	Phase I
☑	2b	Rural Light Industrial	Phase I
☐	3a	Future Urban Expansion: Industrial	Phase 3
☐	3b	Future Urban Expansion: Residential	Phase 3
☑	4	Future Urban Expansion: Residential	Phase I
☑	5a	Future Urban Expansion: Residential	Phase I
☑	5b	Future Urban Expansion: Residential	Phase 2
☑	5c	Future Urban Expansion: Residential	Phase 2
☑	6a	Future Urban Expansion: Residential	Phase 2
☑	6b	Future Urban Expansion: Residential	Phase 2
☑	7a	Country Residential I	Phase I
☐	7b	Country Residential I	Phase 3
☐	7c	Country Residential I	Phase 3
☑	8a	Country Residential I	Phase 2
☑	8b	Country Residential I	Phase 2
☑	9a	Country Residential I	Phase 2
☑	9b	Country Residential I	Phase 2
☑	10	Country Residential II	Phase I
☐	10a	Country Residential II	Phase 3
☑	10b	Country Residential II	Phase I
☑	11a	Country Residential I	Phase I
☑	11b	Country Residential I	Phase I
☑	12	Country Residential I	Phase 2
☐	13a	Future Urban Expansion: Residential	Phase 3
☐	13b	Future Urban Expansion: Residential	Phase 3
☐	13c	Future Urban Expansion: Industrial	Phase 3
☑	U-4	Country Residential I	Phase 2
☑	U-5	Cemetery	Phase I

Special Study Areas

☐	Ia	Country Residential I	Phase 3
☐	Ib	Country Residential I	Phase 3
☐	Ic	Country Residential I	Phase 3
☐	Id	Country Residential I	Phase 3
☐	Ie	Rural Light Industrial	Phase 3
☐	If	Rural Light Industrial	Phase 3
☐	Ig	Rural Light Industrial	Phase 3
☐	Ih	Rural Light Industrial	Phase 3
☐	II	Recreational Area	Phase 3
☐	III	Country Residential I	Phase 3

- "through traffic" along Highway 597 will grow at an annual growth rate of 4 percent over the first 10 years and 1.5 percent for the remaining 10 years;
- the Broadway Avenue, South Street, Range Road 27-1, C&E (North) Trail and 58th Street accesses to Highway 2A have been consolidated;
- Indiana Street access has been restricted to right-in, right-out access only;
- the proposed Future South Truck By-Pass has been implemented; and
- all planned municipal and county development anticipated within the 20-year horizon has also been implemented.

The 20-year traffic forecast indicates that:

- the forecast afternoon peak hour of travel demand represents the time period where traffic volumes on Highway 2A represent the heaviest traffic flows;
- the forecast afternoon peak hour volumes indicate that:
  - just south of the Town of Lacombe's corporate limits volumes will reach 1,420 vph in the peak direction;
  - just south of the Town of Blackfalds, volumes will reach 2,310 vph in the peak direction; and
  - of the 2,250 vehicles traveling in the peak direction just north of Highway 597, approximately 720 vehicles, (32%) will remain within the corporate limits of Town of Blackfalds;
- the traffic volumes using Township Road 40-0, on the west of Highway 2A will be dependant upon the development of those lands south and north of the Township Road 40-0; and
- the traffic volumes using Highway 597 will be dependant upon the development of those lands south of the highway.

A comparison of the forecast traffic volumes (Exhibits 5-9 and 5-10) with the existing balanced (Exhibits 2-2 and 2-3) traffic indicates that traffic growth on Highway 2A is anticipated to reach approximately 2,310 vehicles-per-hour (vph) in the peak direction within the corporate limits of the Town of Blackfalds and 1,425 vph in the peak direction south of the Town of Lacombe. A two-way average annual daily traffic (AADT) forecast of 36,190 vehicles-per-day (vpd) was determined for section of Highway 2A within the Town of Blackfalds and 28,140 vpd south of the Town of Lacombe (assuming a "k-value" of 10 to convert from peak hour to 24 hour traffic). In comparison the current AADTs are 9,500 vpd and 6,500 vpd (See Exhibit 2-1). This indicates that traffic volumes along Highway 2A will almost quadruple upon the 20-year time horizon (2024) assuming all planned municipal and county development is implemented.

5.4.7 Forecast Levels of Service

Table 5-1 provides a summary of the forecast levels of service at each of the intersections within the 20-year time horizon (2024). The column title "intersection control" indicates that proposed changes to current intersection operations consistent with the recommendations of this functional planning study and concludes that:

- *Highway 597 / Highway 2A*: This intersection will be functioning at poor levels of service (LOS "E" during the morning peak hour and LOS "F" during the afternoon) due to high left-volumes in all directions at the time of the horizon year (2024). [It should be emphasised that upon further development the lands located south of Highway 597, the level of service of the Highway 597 / Highway 2A intersection will continue to deteriorate];
- *Indiana Street / Highway 2A:* When analysed as a STOP-controlled right-in, right-out access only this intersection was found to operate at satisfactory levels of service (LOS "A") with minimal delays (less than 5 seconds) at the time of the horizon year (2024);
- *Park Street / Highway 2A:* This intersection was found to operate at congested levels (LOS "D" during the morning peak hour and LOS "E" in the afternoon peak hour) at the time of the horizon year (2024) when pedestrian movements are not taken into consideration. Upon pedestrian actualization the intersection will experience poor levels of service (LOS "D" during the morning peak hour and LOS "F" in the afternoon peak hour).
- *Gregg Street / Highway 2A:* This intersection, when analysed as a signalized intersection (ignoring pedestrian movements), was found to operate at a satisfactory level of service (LOS "C") during the morning peak hour at the time of the horizon year (2024). During the afternoon peak hour the intersection was found operate at a congested level of service (LOS "D") at the time of the horizon year (2024). Upon the inclusion of pedestrian movements the intersection would experience a decrease in levels of service (LOS "D" during the morning peak hour and LOS "E" in the afternoon peak hour).
- *C&E Trail / Highway 2A:* When analysed as a signalized intersection, this intersection was found to operate at a satisfactory level of service (LOS "C"/"C") at the time of the horizon year (2024);
- *Township Road 40-0 / Highway 2A:* This intersection will require signalization at the time of horizon year (2024). When analysed as a signalized intersection (ignoring pedestrian movements) this intersection was found to operate at congested levels of service (LOS "D"/"E") during the morning and afternoon peak hours.
- *Township Road 40-1 / Highway 2A* and *Township Road 40-2 / Highway 2A:* These intersections will require signalization at the time of the horizon year (2024). When analysed as signalized intersections (ignoring pedestrian movements), these intersections were found to operate at satisfactory levels of service (LOS "C") during the morning peak hour at the time of the horizon year (2024). During the afternoon peak hour the intersection was found operate at a congested level of service (LOS "D") at the time of the horizon year (2024).

- *Future South Truck By-Pass / Highway 2A:* When analysed as a signalized intersection, this intersection will operate at congested levels of service (LOS "D"/"D") at the time of the horizon year (2024).

In conclusion, by the end of the 20-year time horizon, Highway 2A will be functioning at congested levels exhibiting traffic operational characteristics similar to a "local arterial" roadway rather than a "highway."

Table 5-14: Highway 2A Level of Service Analysis Results (20-year Forecast Conditions)

Intersection	*Intersection Control*	*Level of Service*	
		Morning Peak Hour	*Afternoon Peak Hour*
Highway 2A and ...			
Highway 597	Traffic Signals	E[1]	F
Broadway Avenue	Closed		
South Street	Closed		
Indiana Street	STOP - Controlled (EB)*	A[2]	A[3]
Park Street	Pedestrian Actuated Traffic Signals	D[4]	E[5]
Gregg Street	Pedestrian Actuated Traffic Signals	C[6]	D[7]
C&E Trail (South)	Traffic Signals	C	C
Township Road 40-0	Traffic Signals	D	E[8]
Township Road 40-1	Traffic Signals	C	D[7]
Township Road 40-2	Traffic Signals	C[9]	D[10]
Range Road 27-1	Closed		
C&E Trail (North)	Closed		
58th Avenue	Closed		
Future South Truck By-Pass	Traffic Signals	D[11]	D[12]

* Orientation of Intersection Control: Northbound, Southbound, Eastbound or Westbound

1. Assumes a 125 second cycle length.
2. During the morning peak hour, EB RT experiences delays of 4.6 seconds (LOS "A").
3. During the afternoon peak hour, EB RT experiences delays of 4.0 seconds (LOS "A").
4. Assumes a 110 second cycle length. When east-west pedestrian crossings are activated a LOS "D" will be achieved assuming a 110 second cycle length.
5. Assumes a 150 second cycle length. When east-west pedestrian crossings are activated a LOS "F" will be achieved assuming a 150 second cycle length.
6. Assumes a 95 second cycle length. When east-west pedestrian crossings are activated a LOS "D" will be achieved assuming a 95 second cycle length.
7. Assumes a 125 second cycle length. When east-west pedestrian crossings are activated a LOS "E" will be achieved assuming a 125 second cycle length.
8. Assumes a 115 second cycle length.
9. Assumes a 120 second cycle length.
10. Assumes a 100 second cycle length.
11. Assumes a 115 second cycle length.
12. Assumes a 110 second cycle length.
13. Assumes a 110 second cycle length.

6.0 ANALYSIS AND EVALUATION OF ALIGNMENT OPTIONS

The options detailed in Section 4.0 of this document, and the *Options Assessment* report (November 2004), were analyzed and evaluated using the following factors/criteria as part of the assessment process. (The following listing is not in any order of priority.):

- traffic operational related impacts;
- geometrical adherence to Alberta Infrastructure and Transportation and National design standards and policies;
- flexibility characteristics;
- conceptual capital costs;
- conformance to desired municipal/county development planning objectives;
- likely development opportunity impacts.
- property impacts; and
- environmental impacts.

Tables 6-1A & 6-1B serve as an example to highlight the evaluation approach used to assess the six highway alignment options that were considered for the section of Highway 2A between Township Road 40-2 and Township Road 40-0 (This section of Highway 2A was previously denoted as Section "B"). (See Exhibit 4-4). The following text and tables serve as an example of the multi-variate factor analysis approach used in the evaluation process to determine the most successful access management solutions and desirable highway alignment.

6.1 Multi-Variate Factor Analysis

Multi-variate factor analysis was undertaken to provide a relative comparison of the alternative highway alignment options by varying the importance of the independent factors. Table 6-2 indicates each of the eight factors that were assessed and Table 6-3 illustrates the values determined for each of the factors. Appendix "I" contains several tables which indicate: the point values assigned to each of the factors; the calculation of un-weighted points for each factor; the assignment of weights to each factor; and lastly the determination of weighted points for each factor. The sum of the weighted points provides an overall ranking for the alternatives. As well sensitivity analysis was used to assess the impacts of varying the applied weights. Up to 286 alternative weighting scenarios were assessed to determine the desirability of the preferred solution under various weighting scenarios.

Table 6-1A: Multi-Variate Factor Analysis of Highway Alignment Options "B-1", "A", "B"

Criteria	*Option "A"* *"Widening to the east of Hwy 2A, new NB lanes converge with existing lanes north of wetland"*	*Option "B"* *"Widening to the east of Hwy 2A, new NB lanes converge with existing lanes south of wetland "*	*Option "B-1"* *"22.8m centerline spacing and rail relocation to east"*
Conceptual Capital Costs	Minor • New Hwy 2A/TWP Rd 40-0 Intersection • Traffic Signals and intersection lighting • Auxiliary Lanes in all directions • New Service Road • New Pavement & road earthworks • Earth fill for wetland	Low • New Hwy 2A/TWP Rd 40-0 Intersection • Traffic Signals and intersection lighting • Auxiliary Lanes in all directions • New Service Road • New Pavement & road earthworks • Earth fill for wetland	High • Relocation of CPR tracks • Relocation of underground & overhead utilities • New Hwy 2A/TWP Rd 40-0 Intersection • Traffic Signals and intersection lighting • Auxiliary Lanes in all directions • New Service Road • New Pavement & road earthworks
Traffic Operations	Minor Deviation	Insignificant Deviation	Substantial Deviation • New rail road construction is required • Rail and vehicle traffic diversion required
Design Conformance	Minor Deviation • Minimum curve radii are used for alignment in vicinity of wetland	Insignificant Deviation • Minimum angle used for Hwy2A/Twp Rd 40-0 intersection	Insignificant Deviation • Minimum angle used for Hwy2A/Twp Rd 40-0 intersection
Flexibility Characteristics	Could be implemented in two stages	Could be implemented in two stages	Inflexible, could be implemented in single stage only
Municipal Conformance	Insignificant Deviation	Moderate Conformance • Lands width between the existing and new Hwy 2A lanes allow for only a small lot depth	Moderate Conformance • Relocation of CPR tracks conflicts with developable land
Development Opportunity Impacts	Substantial • Substantial amount of land can be developed between the existing and new Hwy 2A lanes • Existing Hwy lanes can be utilized as frontage for commercial development	Minor • Small amount of land can be developed between the existing and new Hwy 2A lanes	Minor • Small amount of land can be developed between the existing and new Hwy 2A lanes
Property impacts	Moderate • Moderate amount of land required for Right-of-Way	Minor • Small amount of land required for Right-of-Way	Minor • Small amount of land required for Right-of-Way
Environmental Impacts	Moderate • Portion of Wetland requires earth fill to support new highway lanes	Moderate • Portion of Wetland requires earth fill to support new highway lanes	Low • No impact to Wetlands • No removal of Trees required

Table 6-1B: Multi-Variate Factor Analysis of Highway Alignment Options "C", "D", "E"

Criteria	*Option "C"* *"Westerly deviation of existing lanes encroaching on wetland"*	*Option "D"* *"Relocation of SB lanes to the west of wetland, converging NB lanes with existing south of wetland."*	*Option "E"* *"Relocation of SB lanes to the west of wetland, converging NB lanes with existing north of wetland."*
Conceptual Capital Costs	Minor: • Extra Earth fill for wetland • New Hwy 2A/TWP Rd 40-0 Intersection • Traffic Signals and intersection lighting • Auxiliary Lanes in all directions • New Service Road • New Pavement & road earthworks	Minor: • Removal of trees and additional clearing/grubbing • Relocation/protection of Gas main • New Hwy 2A/TWP Rd 40-0 Intersection • Traffic Signals and intersection lighting • Auxiliary Lanes in all directions • New Service Road • New Pavement & road earthworks	Moderate: • Extra Earth fill for wetland • Removal of trees and additional clearing/grubbing • Relocation/protection of Gas main • New Hwy 2A/TWP Rd 40-0 Intersection • Traffic Signals and intersection lighting • Auxiliary Lanes in all directions • New Service Road • New Pavement & road earthworks
Traffic Operations	Minor	Insignificant	Minor
Design Conformance	Fully Adheres • Aesthetically pleasing, curve linear alignment	Fully Adheres • Aesthetically pleasing, curve linear alignment with large horizontal curves • Minimum angle used for Hwy2A/Twp Rd 40-0 intersection	Fully Adheres • Aesthetically pleasing, curve linear alignment
Flexibility Characteristics	Could be implemented in two stages	Could be implemented in three stages 3	Could be implemented in three stages 3
Municipal Conformance	Insignificant Deviation	Moderate Conformance • Lands width between the existing and new Hwy 2A lanes allow for only a small lot depth	Complete Conformity
Development Opportunity Impacts	Significant • Significant amount of land can be developed between the existing and new Hwy 2A lanes • Existing Hwy lanes can be utilized as frontage for commercial development	Substantial • Substantial amount of land can be developed between the existing and new Hwy 2A lanes • Existing Hwy lanes can be utilized as frontage for commercial development	Significant • Significant amount of land can be developed between the existing and new Hwy 2A lanes • Existing Hwy lanes can be utilized as frontage for commercial development
Property impacts	Moderate • Moderate amount of land required for Right-of-Way	Significant • Significant amount of land required for Right-of-Way • Impacts on developed land	Significant • Significant amount of land required for Right-of-Way • Impacts on developed land
Environmental Impacts	High • A large Portion of Wetland requires earth fill to support new highway lane	Minor • No earth fill of Wetlands Required • Some removal of trees near wetland is required	Significant • A large Portion of Wetland requires earth fill • Some removal of trees near wetland is required

Table 6-2: Factors Used in Multi-Variate Factor Analysis

Factor	Description
Conceptual Capital Costs	This factor addresses the capital costs associated with the construction of alignment option.
Traffic Operations	This factor addresses travel time impacts, highway and railway impacts and anticipated intersection and highway operations.
Design Conformance	This factor accounts for conformance to geometric design standards, best practices, safety, driver anticipation and speed transitions.
Flexibility Characteristics	This factor addresses the construction staging opportunities of each alternative.
Municipal/County Conformance	This factor addresses the conformance with Municipal planning and infrastructure objectives. Any options conflicting municipal/county development plans will have a negative impact.
Development Opportunity Impacts	This factor addresses the impact each option will have on residential and residential development within this area.
Property Impacts	This factor addresses impacts to adjacent lands (included right of way impacts.
Environmental Impacts	This factor accounts for environmental impacts that might be inflicted by the construction of each option. These include impacts to wetlands, woodlands, local habitat and general drainage patterns.

Table 6-3: Factor Values for Highway 2A Alignment Options – Section "B" (Township Road 40-2 to Township Road 40-0)

Factor Values		Option "B-1"	Option "A"	Option "B"	Option "C"	Option "D"	Option "E"
		22.8m centerline spacing and rail relocation to east	Widening to the east of Hwy 2A, new NB lanes converge with existing lanes north of wetland	Widening to the east of Hwy 2A, new NB lanes converge with existing lanes south of wetland	Westerly deviation of existing lanes encroaching on wetland	Relocation of SB lanes to the west of wetland, converging NB lanes with existing south of wetland.	Relocation of SB lanes to the west of wetland, converging NB lanes with existing north of wetland.
Costs	Conceptual Costs	5 - High	3 - Minor	2 - Low	3 - Minor	3 - Minor	4 - Moderate
Operations	Traffic	5 - Substantial	3 - Minor	2 - Insignificant	3 - Minor	2 - Insignificant	3 - Minor
Policy & Design	Design Adherance	2 - Insignificant	3 - Minor Deviation	2 - Insignificant Deviation	1 - Fully Adheres	1 - Fully Adheres	1 - Fully Adheres
	Flexibility Characteristics	1 - 1 Stage	2 - 2 Stages	2 - 2 Stages	2 - 2 Stages	3 - 3 Stages	3 - 3 Stages
	Municipal/County Conformance	3 - Moderate	2 - Insignificant Deviation	3 - Moderate Conformance	2 - Insignificant Deviation	3 - Moderate Conformance	1 - Complete Conformity
Area Impacts	Development Opportunity Impacts	4 - Minor	2 - Substantial	4 - Minor	1 - Significant	2 - Substantial	1 - Significant
	Property Impacts	4 - Minor	3 - Moderate	4 - Minor	3 - Moderate	1 - Significant	1 - Significant
	Environmental Impacts	2 - Low	4 - Moderate	4 - Moderate	5 - High	3 - Minor	6 - Significant

Table 6-3 serves to classify the various factors into four primary categories dealing with "costs", "operations", "policy & design" and "area impacts". The following elaborates on the values used to assess each factor:

- The "*cost*" category consisted of a single factor "*conceptual cost*". The estimates take into consideration the following project costs:
  - Earth works (cut & fill quantities, overhaul)
  - Roadway Construction (granulars, asphalt, barrier systems)
  - Rail Track relocation
  - Land for right-of-way

  Option "B-1" was estimated to be the most expensive option ($3.5M conceptual base construction cost) due to the high cost associated with relocating 1.1km of rail track. Option "A", "B", "C" and "D" resulted in lower costs (approximately $2.5M conceptual base construction cost). Given that Option "B" resulted in the most economical solution it was assigned one less point than Options "A","C" and "D".

- The "*traffic operations*" category examined the impact of alignment options on travel time, intersection operations and CP rail operations. Travel time and intersection operation did not vary significantly between alignment options due to the similar intersection configurations and equivalent highway alignment lengths; however; Option "B-1" which requires the relocation CPR track was seen to result in a significant negative impact to CP Rail operations due to the risk of rail track downtime that could occur during construction.

- The "*policy and design*" category incorporated factors such as:
  - "*Design Adherence*" indicated the degree of adherence to Provincial and National highway geometrical design standards and guidelines including: horizontal/vertical curves, curvilinear design and consistency with surrounding topography.
  - *"Flexibility Characteristics"* in staging was assessed subjectively taking into account the ability of each alignment option to be constructed in as many stages as possible providing for immediate benefits to vehicular traffic while minimizing the extent of infrastructure required.
  - *"Municipal/County Conformance"* assed the viability to promote economic development, land use planning, accessibility to the surrounding highway and service road system. One of the key elements analyzed in this section of roadway was the potential to the use existing Highway 2Alanes in the vicinity of Township Road 40-0 as a service road fronting developable lands.

- The "*area impacts*" category was intended to incorporate municipal, economic and environmental factors. This category addressed factors such as:

- The "*development opportunity impacts*" factor was assessed from the perspective of economic development opportunities and constraints that would be imposed upon the lands resulting from each alternative. The measures of this factor ranged from "minor" to "significant" development opportunities. Option "C" & Option "E" provided the most development opportunity due to the westerly deviation of proposed highway alignment which opens up a large developable area between the proposed and existing highway lanes.
- The "*property impacts*" factor was assessed using a ranking system that went from "minor" through to "significant" amount of land required for highway right of way. Option "D" and Option "E" required the most amount of land due the diverging northbound and southbound highway alignment in the vicinity of the wetland area.
- The "*environmental impacts*" factor accounted for the severity of environmental consequences for each alignment option. The ranking system ranged from "minor" to "significant" environmental impact. Each option was assessed for the amount of earth fill and construction disruption including tree removal to the wetland area located north of Township Road 40-0. Option "E" was determined to have the largest environmental impact due to the requirement of filling a large portion of the wetland area and removal of trees.

6.2 Points, Weights and Selecting the Recommended Configuration

Appendix "I" outlines the strategy used to assign points to each of the factors values based upon the achieved score. Each of the four categories was assigned a point score ranging from 0 of 3 points which were divided equally among the various factors. (e.g. The three factors *(Design Adherence, Flexibility Characteristics* and *Municipal/County Conformance)* within the *Policy and Design* Category each had a maximum potential score of 1 point resulting in an overall maximum of 3 points for the category)

The un-weighted points awarded to each concept for each of the four categories was then determined. Factor weights, (which were proportioned to add to 100 percent) were then applied to the point score that each alternative achieved in each category to derive a total point score out of 3. This was then proportionally adjusted to provide a score out of 100. This process was repeated over every permutation and combination (using 10 percent intervals) of weighting scenarios over the four categories (286 alternative scenarios) to determine the influence of the weights on the preferred solution.

Table 6-4 presents the results of this analysis and indicates that option "B" represent the most frequently (56% = [161/286]) selected alternative out of all of the weighting strategies assessed in the evaluation process. As well, the overall average score, which represents the

degree of desirability, indicated that Option "B" is proved very desirable in that this option ranked with 1 point from the highest point score.

Table 6-4: Results of Factorial Analysis on Section "B" Options

Section "B" Options	*All Combinations*		
	Selected	*Percentage*	*Avg. Score*
Option "E"	26	9.1%	**70.7**
Option "A"	3	1.0%	54.7
Option "C"	34	11.9%	59.0
Option "D"	57	19.9%	68.0
Option "B"	**161**	**56.3%**	**69.3**
Option "B-1"	5	1.7%	48.5
Total & Overall Average	286	100%	52.9

The multi-variate factor analysis provided the following conclusions regarding Section "B":

1. The final value of average weighted points (70.7) indicated that Option "E" ranked highest in comparison to other alternatives. However this ranking is achieved only when a narrow band (approximately 9 percent) of the alternative weighting strategies are assumed. (i.e. only when the "policy and design" category are ranked highly and all other categories are assigned minimal importance.) In general the rankings of Options "B","D" and "E" all resulted weighted score values well above average and hence proved to be desirable solutions.
2. **Option "B" was preferred over the competing alignment options when the widest diversity (161 out of 286) of weighting strategies was applied.** In short, Option "B" represent the most frequently selected of the alternative solutions with a high degree of independence from which weighting strategy was selected.

Given the above, the multi-factorial analysis indicated that **Option "B" was selected as the recommended alternative for Alignment "B" of the corridor.** In a similar manner, each of the various options was vetted for each section of the corridor. In this manner, options were designated as "preliminary concepts" to be brought forward for additional design review, evaluation and assessment. This refinement process proved to be an iterative process where selected improvements to the overall design of the corridor were undertaken leading to the overall "preferred alignment".

7.0 THE PREFERRED ALIGNMENT

The preferred Highway 2A alignment and access management strategy is presented in Annex "A" in the form of functional plans depicting approximately 11.6 kilometres of the Highway 2A corridor beginning at station 10+000 (Highway 2A/Highway 597 intersection) and ending at Station 21+575 (just south of intersection Highway 2A/45A Street, Town of Lacombe). The functional plans are drawn to a SI horizontal scale of 1:2500 and a vertical scale of 1:250. A sheet index in the bottom right corner of the plans indicates the approximate location of the figure view port relative to the entire highway corridor. The functional plans depict:

- Plan and Profile views of the proposed and existing highway lanes;
- Intersection closures and modifications;
- Horizontal and vertical curve information;
- Proposed highway grades;
- Cross-section of various highway segments;
- Existing and proposed right of way boundaries;
- Proposed service road layout; and
- Location of existing utilities (for detailed descriptions see Section 2.7).

Annex "A" contains the Right-of-Way Request plans that indicate the associated property requirements for the Highway 2A improvements. In addition to illustrating the required right-of-way boundaries the drawings list:

- required right-of-way area in acres and hectares;
- certificate of title for each property; and
- landowner information including name and address.

7.1 Design Criteria

Table 7-1 summarizes the design criteria parameters for the proposed twinned Highway 2 cross-section and service roads.

Table 7-1: Highway 2A and Service Road Design Criteria

CRITERIA		HIGHWAY 2A		SERVICE ROAD
DESIGN	Design Designation	RAD-411.4-110 (DEPRESSED MEDIAN)	RAD-410.9-90 (RAISED MEDIAN)	RLU-208-60
	Design Speed	110km/hr	90km/hr	60 km/hr
	Design Vehicle	WB-23, WB-21	WB-23, WB-21	WB-23, WB-21
HORIZONTAL ALIGNMENT	Min. Horizontal Curve Radius	600 m	340 m	130 m
	Max. Superelevation	6%	6%	8%
VERTICAL ALIGNMENT	Min "K" Value (Crest Curves)	100	55	15
	Min "K" Value (Sag Curves)	60	40	20
	Min. S.S.D.	235 m	170 m	85 m
	Max. Gradient	3 %	5 %	10 %
CROSS SECTION	Through Lane Width	3.7 m	3.7 m	4.0 m
	Auxiliary Lane width	3.5 m	3.5 m	NA
	Shoulder Width Outside	3.0 m	3.0 m	0 m
	Shoulder Width Inside	1.0 m	0.5 m	NA
	Median Width	15.4 m	6.0 m	NA
	Side Slope - Normal	6:1	6:1	4:1
	On Fills - Maximum	3:1 (over 6.5 m)	3:1 (over 6.5 m)	2:1 (with guardrail)
	Clear Zone	9.0 m – 10.5 m	6.5 m – 7.5 m	3.5 m – 4.5 m
	Basic R/W Width	62 m	52.6 m	30 m

7.2 The Highway 2A Corridor

The following sections describe the proposed Highway 2A improvements as illustrated in the functional plans. (See Annex "A")

7.2.1 Highway 597 to Northern limits of Town of Blackfalds

Annex "A" [See Figure 2 to Figure 4 (Station 10+050 to 12+600)] illustrates the proposed improvements for Highway 2A beginning at the southern terminus of the corridor (Highway 2A/Highway 597 intersection) to the northern limits of the Town of Blackfalds.

Through this section of the corridor it was desired to maximize the use of existing pavement to the greatest extent possible. In this manner the existing lanes could be used as either the new southbound or northbound lanes of the twinned highway. This being said, at the Highway 2A/Highway 597 signalized intersection the new southbound highway lanes are proposed [as part of the Functional Planning Study addressing the section of Highway 2A between Red Deer and Blackfalds (CastleGlenn Consultants Inc. 2004)] to be located on the west side of the existing lanes. Yet, it was desired to implement a transition to the east side of the existing highway within the Town of Blackfalds for the following reasons:

- the east side of the highway has fewer lots fronting the highway requiring right-of-way property; and
- thirteen less existing streetlights would have to be relocated on the east side to avoid conflict with the proposed improvements.

This lane changeover was achieved by transitioning through the horizontal curve located between Blackfalds and Highway 597.

The proposed cross-section for the segment of highway through the Town of Blackfalds (See *Alberta Transportation Highway Geometric Design Guide Figure C-6.2e)* consists of:

- a centerline spacing of 13.4 meters between the northbound and southbound lanes
- a continuous 6m wide raised median which accommodates 3.5 meter left-turn lanes at typical intersections. [The median would span from the traffic signal controlled Highway 597 intersection through to the Park Street, Gregg Street and DOW Chemical/Future East Collector intersection in the Town of Blackfalds.]; and
- mountable curbs at the centerline median which would permit a cross-section design speed of 90km/hr.

The minimum right-of-way width for the proposed cross-section is 50 meters with an 18.3 meter separation between the centerline of the paved surface and the edge of the right-of-way boundary. This right-of-way configuration allows for a possible "ultimate" urban cross-section through the Town of Blackfalds assuming curbs, gutters and sidewalks in place of side ditches. This cross-section type remains to be decided upon during the detailed design phase of the project.

All auxiliary lanes including left-turn, acceleration and deceleration lanes on Highway 2A located between Highway 597 and the C & E Trail just north of the Town of Blackfalds were designed to a 90km/hr standard. The proposed auxiliary lane design (See *Alberta Transportation Highway Geometric Design Guide Table D.8.4)* includes the following:

- lane taper length of 87.5 meters at 25:1
- required deceleration length of 150 meters
- acceleration lane length of 167.5 meters (includes 80 m parallel lane and 87.5 m taper)

The storage length for left and right turn lanes at Highway 2A intersections was taken as the governing value of:

- storage length provided by standard treatment – 17.5 meters for a 90km/hr design speed (See *Alberta Transportation Highway Geometric Design Guide Table D.8.4*). or
- storage length required to accommodate forecast 2024 traffic volumes (See Exhibits 5-9 and 5-10)

The cross-fall for the highway lanes is designed to drain storm water runoff from the inside median edge to the outside shoulder (See *Alberta Infrastructure and Transportation Highway Geometric Design Guide Figure C-1: Normal Cross-Section Elements*). Drainage ditches located on either side of the highway shoulders would drain storm water away from the lanes and channel the runoff to the Town of Blackfald's storm water collection system. If, at the time of detailed design the crown of the northbound and southbound lanes were chosen to be in the center of the pavement a runoff collection system composed of gutters and catch basins would be required at the median edge to prevent ponding of the water on the highway.

The minimum right-of-way width for the proposed cross-section is 50 meters with an 18.3 meter separation between the centerline of the paved surface and the edge of the right-of-way boundary. This right-of-way configuration allows for a possible urban cross-section through the Town of Blackfalds complete with curbs, gutters and

sidewalks instead of side ditches. This cross-section type may be decided upon during the detailed design phase of the project.

The preferred access management strategy for this segment of Highway 2A involves:

- Closure of the following at-grade intersections:
  - Highway 597/access located 25 meters east of Highway 2A and on the north side of Highway 597;
  - Highway 597/NWP Industries access located 110 meters east of Highway 2A and on the south side of Highway 597;
  - Highway 2A/Broadway Avenue located 550m north of Highway 597 on the west side of Highway 2A;
  - Highway 2A/South Street located 850m north of Highway 597 on the east side of Highway 2A. (The South Street intersection on the west side of Highway 2A has already been closed; and
  - The existing accesses located 60 and 180 meters north of South Street on the east side of Highway 2A.
  - The existing north-south service road fronting the Blackfalds Motor Inn access on either side of Park Street located 15 meters west of Highway 2A would be closed. [Access from/to the dwellings located north of Park Street would occur via North Street or Waghorn Street to East Avenue in order to access Park Street. Similarly, access from/to the dwellings located south of Park Street would occur via East Avenue.]
  - The existing north-south service road accesses located on either side of Gregg Street on the west side of Highway 2A and offset approximately 15 meters from the Highway 2A alignment would be closed. [Access from/to the dwellings located south of Gregg Street would occur via Park Street. Access from/to the dwellings north of Gregg Street (Blackfalds Mobile Home Park) would occur via the secondary accesses located west of the north-south service road.]
- Improvement of the following at-grade intersections within the vicinity of the Town of Blackfalds:
  - *Highway 2A/Highway 597:* This intersection includes upgrading to a type "V" intersection (See *Alberta Infrastructure and Transportation Highway Geometric Design Guide Figure D-7.5*) with dedicated left-turn lanes in each direction and channalization of all quadrants of the intersection;
  - *Highway 2A/Indiana Street:* This intersection was reconfigured to permit right-in, right-out access on to Highway 2A only and improve the setback distances from Highway 2A for driveways accessing the ESSO Gas Station and the Blackfalds Motor Inn. The centerline for the new driveways would be located a minimum of approximately 10 meters back from the Indiana Street STOP bar;

- *Highway 2A/Park Street*: This intersection was converted from the existing STOP-controlled intersection (in the eastbound and westbound directions) to traffic signal controlled in all direction and included provision for auxiliary left-turn lanes and right turn channelization in all directions;
- *Highway 2A/Gregg Street:* This intersection was upgraded to include provision for full signalization when warranted, dedicated left-turn lanes and right turn channelization in all directions; and
- *Highway 2A/C&E Trail:* This intersection would be modified to accommodate the future proposed future East Collector at a 90° approach angle to Highway 2A. Improvements would include a reconfigured intersection with dedicated left-turn lanes in three directions (no left turn lane at DOW Chemical road) and right turn channelization in the eastern quadrant of the intersection. The C&E Trail intersection would be realigned to intersect with the future East Collector to provide for a 130m radii bulb (to accommodate heavy vehicles) between the C&E Trail/Service Road intersection and Highway 2A.

- Service Road construction at the following locations:
  - The southerly extension of Parkwood Road from the Park Street intersection paralleling the east side of Highway 2A past South Street toward Highway 597. (approximately 940 meters in length). This new frontage road would be required to support the above highway intersection closures and provide access to the lands in the South-East Area Structure Plan (See Exhibit 5.1) located in the south-east quadrant of the Highway 597/Highway 2A intersection. [The service road would be an extension of Parkwood Drive and would provide local traffic access to Highway 2A from the Highway 2A/Park Street intersection.];
  - The northerly extension of Parkwood Road, approximately 150 meters in length, which would form the south leg of a 4-leg intersection represented by the future East Collector and the relocated C&E Trail intersection; and
  - A new service road located on the west side of Highway 2A that would extend between the D.O.W Chemical/Future East Collector intersection northward toward the two existing residential driveways; (a distance of approximately 770 meters). [This service road is required to affect the closure of two acreage accesses (13+000 & 13+300) located on the west side of Highway 2A.]

7.2.2 C & E Trail (South) to Township Road 40-0

Annex "A" [See Figure 5 to Figure 8 (Station 12+550 to 15+200)] illustrates the highway improvements north of the Highway 2A/ C & E Trail (South) intersection to the Highway 2A/Township Road 40-0 intersection.

Approximately 120 meters north of the Highway 2A/C & E Trail intersection the proposed northbound highway lanes diverge from the southbound lanes to form a 1,550

meter radius horizontal curve. The northbound lanes (designed to a 110 km/hr standard) approach the proposed CP Rail overpass at a grade of 2.8 % and depart the structure at a 3.3 % grade towards the new Highway 2A/Township Road 40-0 intersection. A 617 meter vertical curve (K=100) is proposed between the two grades.

The CP Rail overpass was designed with the following assumptions:

- Vertical clearance from the bottom of the overpass girders to the top of the CP Rail tail tracks is 7.01 meters (See *Alberta Transportation Highway Geometric Design Guide Figure C-9.3.1*);
- Horizontal clearance from the center of the rail track to an abutment or column is 5.5 meters (See *Alberta Transportation Highway Geometric Design Guide Figure C-9.3.1*);
- Girder depth of the overpass structure is 2 meters;
- Length of the structure is approximately 76 meters on a skew angle of 52°;
- Overpass structure has been designed to accommodate three CP Rail tracks consisting of a:
  - Existing freight track;
  - Proposed siding track located 4.3 meters east of the existing track; and
  - Proposed high speed track located 8.6 meters west of the existing track.
- The horizontal clearance from columns or abutments located on either side of the three tracks is 39 meters on a on a skew angle of 52°.
- There has been no design changes to the existing CP Rail structure to address the ultimate requirements of the CPR to accommodate three tracks; [For the purposes of this functional planning study it was assumed that, as the CPR initiated the need for the 3 tracks, they would in turn be required to address all of the required structural modifications inclusive of improvements to the existing structure or the construction of a replacement structure in a new more desirable location.]

Approximately 300 meters north of the existing CP Rail overpass (BF 73527) the southbound alignment diverges from the existing highway lanes to form a new Highway 2A/Township Road 40-0 intersection at a 70° angle (Station 14+500). It was recognized during the design process that a trade-off existed between the desirability to achieve a 90° angle at the Highway 2A/Township Road 40-0 intersection while still achieving a "desired" 30° skew angle at the future span of the CP Rail corridor structure. The new alignment, as designed, represented the optimal configuration that would still provide for a 110 km/hr design speed standard which would be achieved by the 70° intersection angle in concert with a 52° skew angle at the CP Rail structure.

It was assumed that southbound vehicles would continue to use the existing CP Rail overpass until the end of its structural- life [See Section 2.2, Page 12 which indicated that the 2002 Bridge Inspection Report suggested a remaining life expectancy of the existing CP Rail structure to 50 years.] and requires replacement, still be required to adhere to the existing posted speed of 75 km/hr due to the geometrical limitation of the existing highway alignment.

The grade across the proposed Highway 2A/Township Road 40-0 intersection is 3.3% with a centerline spacing of 38 meters between the northbound and southbound lanes. The available intersection crossing sight-distance on Township Road 40-0 is approximately 530 meters in the south direction and over 1,000 meters in the north direction. This sight distance satisfies heavy vehicle crossing requirements given that the 38-meter centerline provides a median wide enough to allow a heavy vehicle (WB-23) to safely cross Highway 2A in two stages. Dedicated left turn lanes are proposed in all directions, including highway acceleration and deceleration lanes. The west leg of the Township Road 40-0 intersection is designed with two eastbound left turn lanes and a center median that will accommodate the forecast 2024 morning peak hour traffic volumes. When warranted the intersection will require full signalization and as such should be designed to provide for underground conduit in advance of the traffic signal warrants.

The separation between the northbound and southbound lanes transitions from the 6.0m wide continuous raised median with a centerline spacing of 13.4 meters at the DOW Chemical / Future East Collector intersection to a 38m centreline spacing at the Township Road 40-0 intersection. The increase in centreline spacing is to draw a clear transition between the urban and rural environments on either side of the CP Rail structure.

The realignment of Highway 2A (both directions of travel) between Stations 14+050 to 15+150 provides for the potential abandonment of the existing Highway 2A alignment between these two stations. The existing Highway 2A corridor between these stations can potentially be converted to a service road that would provide access to those properties between the existing Highway 2A alignment and the northbound lanes of the new Highway 2A alignment. Access closures are indicated at Stations 14+300 and 14+850 respectively which would likely take the form of turning circles of sufficient radii to accommodate a heavy vehicle (i.e. WB-23).

Approximately 670 meters north of the Highway 2A/Township Road 40-0 intersection the northbound highway lanes would tie into the existing Highway 2A alignment. The new southbound lanes are proposed on the west of the existing highway alignment to avoid relocation of CP Rail tracks as well as Telus underground cable and overhead utilities that parallel the east side of Highway 2A.

7.2.3 Township Road 40-0 to Township Road 40-2

Annex "A" [See Figure 9 to Figure 11 (Station 15+200 to 17+800)] illustrates the twinning of Highway 2A on the west side of the existing highway alignment. The centreline spacing between the northbound and southbound lanes transitions from a 38m centreline spacing at the Township Road 40-0 intersection to a 22.8 meter fixed centerline separation distance in the vicinity of the riparian area/wetland (See Exhibit 2-6, Page 25 Site AT07).

Maintaining the 22.8 meter centreline separation in the vicinity of the riparian area/wetland located approximately 810 meters north of the Highway 2A/Township Road 40-0 intersection, involved addressing, what would be a 9 meter high escarpment leading down towards a 3 acre wetland depression. The solution to this constraint involved establishing a fill embankment that would extend approximately 20 meters from the edge of the proposed Highway 2A southbound lane towards the wetland at a 2:1 slope. This option was found to be preferred due to the partial impact to the wetland, the low net construction cost (approximately $250,000) and the ability to implement environmental mitigation measures. A 190 meter long guard rail paralleling the highway would be required to mitigate the hazard posed to errant vehicles that may leave the highway.

The 22.8 meter centerline spacing allows for a 15.4 meter depressed median that can accommodate opposing left turn lanes at the Township Road 40-1 intersections and a center median drainage channel with 6:1 side slopes.

The cross fall for the highway lanes is designed to drain storm water away from the center of the pavement to either the side ditches or the center median ditch. The ditches would collect surface runoff and channel the discharge through a system of culverts and open channels to naturally occurring depressions that accumulate storm water.

The minimum proposed right-of-way width for the 22.8 meter centerline spacing cross-section is 62 meters (See *Alberta Transportation Highway Geometric Design Guide Figure C-6.2b*) with the right-of-way boundary offset a distance of 19.6 meters from the centerline of the pavement.

The preferred access management strategy for this segment of Highway 2A involves:

- Closure of the following at grade intersections:
  - Highway 2A /Residential access located 950m north of Township Road 40-0 (100 meters north of wetland depression) (Station 15+410);
  - Highway 2A/ Residential access located 610m north of Township Road 40-1 (Station 16+740); and
  - Highway 2A/ Agricultural access located 650m south of Township Road 40-2 (Station 17+210).

- Improvement of the following Intersections:
  - *Highway 2A/Township Road 40-1*: The improvements to this intersection include full signalization of the intersection when warranted, dedicated left-turn lanes in all directions, highway acceleration and deceleration lanes designed for a 110 km/hr standard and right turn channelization in the northwest quadrant of the intersection. A vertical curve on the existing highway alignment located 300 meters north of Township Road 40-1 was adjusted from a length of 320 meters to 500 meters in order to satisfy the 600 meter vehicle crossing sight distance requirement In addition, trees and shrubs located approximately with in a 600 meter radius north of Township Road 40-1 in the CP Rail right-of-way will have to be removed to provide an unobstructed view at the intersection. It can be noted that the 15.4 meter wide median at the intersection does not provide sufficient refuge for heavy vehicles (WB-23) attempting to cross the highway in two stages. Accommodating this would result in significant property impacts jeopardizing the adjacent businesses (R.C. Jacobson Holdings Ltd) and the agricultural acreage immediately south of the Township Road 40-1 intersection. Therefore, the intersection has been designed to accommodate heavy vehicle traffic (WB-23's) to cross Highway 2A in one stage requiring approximately 600m of crossing sight distance; and
  - *Highway 2A/Township Road 40-2*: The improvements to this intersection include full signalization of the intersection when warranted, dedicated left-turn lanes in all directions, highway acceleration and deceleration lanes designed for a 110 km/hr standard and right turn channelization in the west quadrants of the intersection. To satisfy the crossing sight distance requirements for a heavy vehicle (WB-23) trees and shrubs located within a 600 meter radius north of

Township Road 40-2 in the CP Rail right-of-way would have to be removed to provide an unobstructed view while at the intersection.

- *Traffic Operation Upgrades*: At the time of intersection traffic signal warrants at Township Road 40-1, Township Road 40-2 or the future South Bypass intersection consideration should be given to the interaction of such traffic signals with the existing at-grade rail crossings located immediately to the east of each intersection. The distance between the proposed traffic signal stop line and the rail crossing at the Township Road 40-1 and Township Road 40-2 intersections is approximately 30 meters. Section 15 of the *AIT Road /Rail Crossing Guidelines for at Grade Rail Crossings and Grade Separations* states "*with less than 60 meters between the traffic signal stop line and the crossing surface of a grade crossing with an automatic warning system, the warning system and traffic signals shall be interconnected*". Interconnection of traffic signals with crossing automatic warning systems is done to pre-empt the normal operation of the traffic signals upon the approach of a train, permitting any vehicles and pedestrians occupying the grade crossing to clear, while preventing additional vehicles from occupying or approaching the grade crossing from the traffic signals during the approach and passage of trains.

- The following provisions for service road were identified, however, it should be appreciated that these provisions are subject and secondary to an approved area structure plan (ASP) that could propose internal or local roadways that address the issue of proposed closures while better meeting local area concerns. In that case, the ASP would negate the requirement for the following service/frontage roads:
  - A new service/frontage road paralleling the west side of Highway 2A, (approximately 700 meters in length), is to be provided to assure a connection to an existing residential acreage (NE2 40-27-4) to Township Road 40-1. The service road would be required as a result of the proposed closure of the existing access on Highway 2A located 950m north of Township Road 40-0 (Station 15+410).
  - A new service/frontage road paralleling the west side of Highway 2A (approximately 1,000 meter in length) is to be provided to assure a connection to an existing residential acreage (SE11 40-27-4) to Township Road 40-2. The service road would be require as a result of the proposed closures of the existing accesses on Highway 2A located 610m north of Township Road 40-1 (Station 16+740) and 650m south of Township Road 40-2 (Station 17+210).

7.2.4 Township Road 40-2 to Southern Limits of Town of Lacombe

Annex "A" [See Figure 12 to Figure 16 (Station 17+800 to 21+700)] illustrates the Highway 2A and local road improvements north of Township Road 40-2 to the southern limits of the Town of Lacombe.

A cross-section transition occurs just north of Township Road 40-2 from a 22.8 meter centerline spacing with a depressed median to a 13.4 meter centerline with a raised median: This cross section transition is proposed to avoid:

- property acquisition from the Lacombe Experimental Farm lands;
- the removal of approximately 50 large deciduous trees located on the west side;
- the relocation of the CP Rail tracks on the east side of Highway 2A; and
- the relocation of underground and overhead utilities.

The right-of-way width for the proposed cross-section is minimum 50 meters with an 18.3 meter separation between the centerline of the paved surface and the edge of the right-of-way boundary.

All auxiliary lanes including left-turn, acceleration and deceleration lanes on Highway 2A were designed to a 110 km/hr design speed with mountable curbs at the edge of the raised median.

The cross-fall for the Highway 2A lanes is designed to drain storm water runoff from inside median edge to the outside shoulder (See *Alberta Infrastructure and Transportation Highway Geometric Design Guide Figure C-1: Normal Cross-Section Elements*). Drainage ditches located on either side of the highway shoulders would drain storm water away from the lanes and channel the runoff to the through a system of culverts and open channels to appropriate storm water collection areas.

The existing CP Rail/Highway 2A at-grade rail crossing (CP Rail Reference: Mile 0.07 Hoadley Subdivision) which provides for a spur line located approximately 770 meters north of Township Road 40-2 will require widening to accommodate the proposed new southbound Highway 2A lanes. Currently motorists are warned of an approaching train through a system of automatic visual and audible warning signals in the northbound and southbound direction. The existing warning signal in the southbound direction would have to be relocated to avoid conflict with the new southbound lanes. During the course of this study CP Rail officials were contacted and did not specify any proposal for track changes or additions at this spur line crossing; however, if this, or increased rail demand for this spur line was to change in the future further modifications would be required.

Exhibit 7-1: Existing At-Grade CP Rail Crossing

Section 12 of the "*Alberta Infrastructure and Transportation Road/Rail Crossing Guidelines for At-Grade Crossings and Grade Separations Crossing*" provides several warrants for new automatic warning systems equipped with gates where:

- The forecast cross product is 50,000 or more; [Current 20-year forecast AADT approaches 38,000 so if more than two trains-per-day are anticipated, rail gates would be a necessity.] or
- The maximum train speed is 50 miles-per-hour (mph) or more; or
- There are two or more tracks where trains may be passing one another; or
- Trains, engines or railway cars, standing or stored on adjacent tracks may obscure driver or pedestrian sightlines of trains approaching the grade crossing, within the limits in figure 8-2, or
- Train speeds exceed 15 mph: and
    - The crossing surface is 30 meters or less from the stop line of the traffic signals or a stop sign; or

- The crossing surface is between 30 and 60 m from the stop line of traffic signals, unless traffic studies indicate the queued traffic will not encroach closer than 5m from the crossing surface.

The existing at-grade-crossing should be monitored prior to the time of construction and provision made for rail gates installed in both southbound and northbound directions should any of the above warrant criteria be met.

The preferred access management strategy for this segment of Highway 2A involves:

- Closure of the following at grade intersections:
  - Highway 2A /Range Road 27-0 (Station 18+250); and
  - Highway 2A /58th Street (Station 20+550).
- Improvement of the following Intersections:
  - *Highway 2A/Range Road 27-2*: This intersection would be closed and traffic on Range Road 27-1 would be diverted to the improved Township Road 40-2 intersection. This would be accomplished through the southerly extension of Range Road 27-2 to Township Road 40-2; a distance of approximately 550 meters. The rationale for this improvement aside from providing for the future 4-lane cross section is that the existing Highway 2A/Range Road 27-2 intersection forms a substandard "Y" configuration located on a horizontal curve. As a 4-lane configuration this location would likely distorts intersection sight distances and poses safety concerns.
  - *Highway 2A/C & E Trail North*: It is proposed that the existing intersection be relocated approximately 240 meters north of the existing location to improve the existing substandard "Y" configuration at the west leg of the C&E Trail North intersection to a standard 90° angle with Highway 2A while still achieving a desirable connection to the proposed future Lacombe South Bypass.
  - *The "Future South Bypass/Highway 2A*: This intersection would include full signalization of the intersection when warranted with interconnection between traffic lights and automatic at-grade rail crossing gates to address the CP Rail corridor to the east, dedicated left-turn lanes in all directions, highway acceleration and deceleration lanes designed for a 110 km/hr standard and right turn channelization in the east and west quadrants of the intersection.

7.3 Proposed Staging Strategy

The staging strategy for proposed Highway 2A corridor improvements has been broken down into three phases.

7.3.1 Stage I - Improvements

Stage I Improvements are designed to address the immediate safety and operational concerns of the Town of Blackfalds and include the following:

- Improving Highway 2A/Highway 597 intersection - includes addition of exclusive right turn lanes on all legs, signing and pavement marking improvements, change timing of advanced warning lights (See *Safety Assessment, Highway 2A:18, Highway 2A & Highway 597-EBA Engineering Consultants Ltd, August 2004)*.
- Closing the Broadway Avenue/Highway 2A intersection;
- Converting the Indiana Street/Highway 2A intersection to right-in-right-out only operation;
- Implement full traffic signals at Park Street and Gregg Street when warranted; and
- Close the South Street/Highway 2A Intersection and the accesses located 60 and 180 meters north of South Street on the east side of Highway 2A when the southern extension (approximately 350-meters) of Parkwood Road thru to South Street is completed.

The above improvements are to be staged in concert with additional proposed improvements that are outlined in the "*Town of Blackfalds Transportation Study*" (Stantec Consulting, June 2003). These improvements are to be undertaken by the Town of Blackfalds and represent initiatives separate from improvements to the Highway 2A corridor:

- Construction of West Arterial from South Street to Womacks Road;
- Extension of Womacks Road from Leung Road to West Arterial;
- Construction of arterial connection of Gregg Street to Womacks Road, including new railway crossing; and
- Eliminate existing rail crossing and construct realignment of East Railway Street to Gregg Street, including tie-in of Broadway Avenue and Wilson Street.

7.3.2 Stage II - Improvements

Stage II Improvements are scheduled at the time twinning of Highway 2A is required. Based upon land use and forecast traffic trends (See Section 5.0) warrants for twinning have been estimated occur within the decade (by 2014). It should be appreciated that this estimate is subject to assumptions regarding development patterns/initiatives and the associated growth in traffic volumes. The timing for twinning may change as development patterns and traffic volumes are realized.

The proposed improvements for Phase II are depicted in the *"Functional Plans"* (See Annex "A"). The improvements include:

- Closure of the following intersections:
  - Highway 597/access located 25 meters east of Highway 2A;
  - Highway 597/NWP Industries access located 110 meters east of Highway 2A;
  - Highway 2A/Residencial access located 60 meters north of South Street;
  - Highway 2A/Residential access located 475 meters north of D.O.W Chemical highway access road
  - Highway 2A/ Residential access located 850 meters north of DOW Chemical highway access road
  - Highway 2A /Residential access located 950 meters north of Township Road 40-0 (100 meters north of wetland depression); and
  - Highway 2A/ Residential access located 610 meters north of Township Road 40-1
  - Highway 2A /Range Road 27-0 (Station 18+250); and
  - Highway 2A /58th Street.
- Improvement of the following intersections to accommodate twinning of Hwy 2A:
  - Highway 597/Highway 2A
  - Highway 2A/Park Street
  - Highway 2A/Gregg Street
  - Highway 2A/Township Road 40-0 (includes provision for future traffic signals)
  - Highway 2A/Township Road 40-1 (includes provision for future traffic signals)
  - Highway 2A/Township Road 40-2 (includes provision for future traffic signals)
- Construction of the following new intersections:
  - With the advent of the construction of the East Collector within the Town of Blackfalds, it is likely that the improvements to the Highway 2A/East Collector intersection (including signalization as warranted) and the East Collector/ C & E Trail intersection would be triggered;
  - A new Range Road 27-1/Township Road 40-2 intersection to accommodate the southerly extension of Range Road 27-1 and the closure of the Range Road 27-1 intersection; and
  - The Highway 2A/South By-Pass (includes provisions for traffic signals when warranted) intersection.
- Construction of the following service roads:

- 940 meter long service road paralleling the east side of Highway 2A from Highway 597 to Park street (southern continuation of service road to be determined)
- 150 meter Parkwood road extension to the north that would form the south leg of the new East Collector/C&E Trail intersection.
- 770 meter long service road paralleling the west side of Highway 2A extending north from the Dow Chemical entrance
- 700 meter long service road paralleling the west side of Highway 2A connecting a residential access (on lands owned by Edith Schaffer and Peggy Sue Bayne) to Township Road 40-1.
- 1,000 meter long service road paralleling the west side of Highway 2A connecting a residential access (on lands owned by David and Marilyn Anderson) to Township Road 40-2.
- 550 meter extension of Range Road 27-2 to Township Road 40-2.
- 240 meter extension of the C & E Trail to the Future South By-Pass located at the southern limits of the Town of Lacombe.

- Twinning of Highway 2A from Highway 597 to the southern limits of Lacombe;
- Constructing a new CP Rail overpass;

7.3.3 Stage III - Improvements

Stage III improvements can be implemented at the time the existing CP Rail grade separation (BF 73527) approaching its life expectancy estimated to be sometime within the fifty year time horizon. At that time the existing Highway 2A southbound alignment would be abandoned and the existing overpass structure de-commissioned. A new superior Highway 2A southbound alignment would be constructed parallel to the northbound alignment with a new CP Rail overpass structure adjacent to the northbound Highway 2A structure.

7.4 Cost Estimate

Conceptual construction cost estimates for the twinning of Highway 2A have been estimated at $30.2 million (See Appendix "K"). This estimate includes all improvements in Stage I and Stage II (As depicted in Annex "A") and takes into account the cost of acquired private lands for service road and highway right-of-way purposes. The cost of required Crown land (14.8 Acres) required for right-of-way purposes is to be determined in the future and subject to federal/provincial negotiations. A separate estimate should be developed by AIT property personnel.

The following items should be taken into consideration when reviewing the cost estimates contained in Appendix "K":

- All earthwork quantities are based upon approximations and remain to be refined at the time of detailed design.
- The cost estimates provide a 20 percent contingency and an estimate of 15 percent for required engineering services that include planning, design, construction administration and project management.
- The cost of protecting and/or relocating existing utilities has been estimated; however it should be refined at the time of a more detailed utility assessment that will identify the exact location and burial depth of utilities.
- Unit prices used to determine the project cost estimate were referenced from the *"Alberta Infrastructure and Transportation Central Region and Provincial Weighted Unit Price Averages Report"* based on 2004 Construction prices; however cost of items not listed in the AIT unit price report were assumed.

8.0 SUMMARY OF COMMUNITY AND PUBLIC INVOLVEMENT

The public involvement strategy for the Highway 2A Functional Planning Study followed Alberta Transportation "*Communications Procedures for Open Houses*" and consisted of two public open houses that were held on:

- Wednesday, September 29th, 2004; and
- Wednesday, January 26th, 2005.

The public open houses were preceded by letters of invitation to all property owners that lived adjacent to the highway corridor. Advertisements notifying residents of the public open house were placed in the in the Lacombe Globe (circulated on September 21st and 28th, 2004 for the first public open house and January 11th and 18th, 2005 for the second public open house) two weeks in advance of the public open houses.

In addition to the public open house, a focus group/stakeholder meeting with individual property owners was arranged and conducted on January 24th, 2005. (See Section 8.2) The stakeholder meeting was used to present the consultant's preferred alignment and obtain feedback from effected property owners.

The following sections provide a synopsis of the public involvement activities. Sample public consultation materials are contained in Appendix "L".

8.1 Public Open House No. 1

A public open house was held on Wednesday, September 29th, 2004, commencing at 7:00 p.m. at the Blackfalds Multipurpose Complex (5302 Broadway Avenue, Blackfalds). This meeting represented the first of two sessions concerning alternative corridor alignment concepts along Highway 2A between Lacombe and Blackfalds.

The open house consisted of approximately 25 panels that exhibited the study area, existing conditions, traffic volumes and collision information as well as various alignment options that were to move forward in the evaluation and assessment process. Representatives of the Study Team were on hand to explain the extent of the project, the study's mandate and to answer any questions or concerns. As well, representatives of Alberta Transportation, the Town of Blackfalds, Town of Lacombe and Lacombe County were in attendance to assist in addressing questions and concerns raised by the public.

8.1.1 Attendance: Public Open House No. 1

Based on the Study Sign-in Sheets, it was estimated that the attendance at the public open house was approximately 49 persons. Business representatives were in attendance from Agriculture and Agri-Food Canada and NWP. No other businesses were formally represented.

Efforts to advise the public about the public open house included an advertisement placed in the Lacombe Globe newspaper on September 21st and September 28th, 2004, as well 164 letters of invitation were sent to home addresses adjacent to the study corridor.

Exhibit 8-1 illustrates the location of the attendees place-of-residence and place-of-work. The red dots indicate the attendees place-of-residence and the blue dots indicate their place-of-work. The majority of individuals who attended the public open house live inside the Blackfalds area, where as several attendees live directly adjacent to the Highway 2A corridor. It should also be noted that only one individual residing in the Town of Lacombe was in attendance.

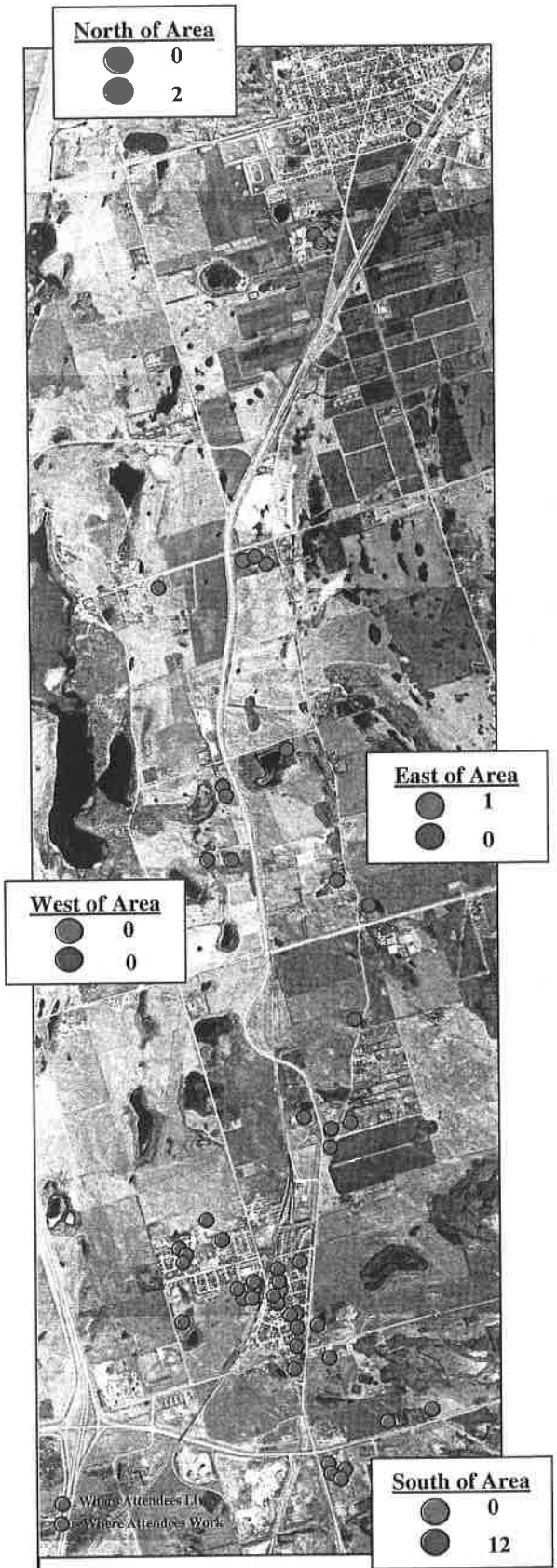

Exhibit 8-1: Place-of-Residence & Place-of-Work

8.1.2 General Tone: POH No.1

Attendees to the Public Open House were initially requested to sign-in and then provided with a handout sheet (See Appendix "L") to help familiarize them with the project goals and objectives, current highway traffic

volumes in the area and the study methodology.

A formal presentation was made by the study team to introduce the objectives of the study, explain the study process, identify issues, and highlight potential solutions that were going to be examined. At the end of the presentation the attendees identified additional issues and concerns as well as introduced alternative solutions to the proposed options.

Attendees were provided with comment sheets and encouraged to complete them at the end of the meeting or by mail or fax. The comment sheets were designed in an open format intended to generate concerns and solutions. In addition to the comment sheets there were photo mosaics available illustrating conceptual alignment options for the study corridor. The attendees were encouraged to use these photo mosaics to come up with their own alignment options.

Exhibit 8-2: Attendees Competing Comments Sheets

8.1.3 Feedback: Public Open House No. 1

The general concern of those in attendance at the public open house presentation was regarding the intersection of Highway 597 / Highway 2A, full signalization at Park St. and the safety of pedestrians crossing the highway.

Subsequent to the public open house nineteen comment sheets were received. The comments were again regarding intersection of Highway 597 / Highway 2A, full signalization at Park St. and the safety of pedestrians crossing the highway.

The public was helpful in identifying issues and comments regarding:

- Highway 2A / Highway 597 intersection:
  - Repainting the lines at the intersection as an interim solution;
  - The illumination of this intersection late at night is not sufficient;
  - The alignment of the eastbound/westbound left-turn lanes should be evaluated and corrected;
  - The need for a dedicated left-turn phase in all directions; and

- The implementation of a dedicated right-turn lane in the east/west directions should be considered.

- Poor visibility at the intersection of Township Road 40-0 / Highway 2A.
- Difficulties accessing Township Road 40-0 and C&E Trail during rush hour.
- Evaluation/assessment of the westbound approach and southbound left-turn manoeuvre at the South Street / Highway 2A intersection.
- The need to ensure that the intersection of South Street / Highway 2A can accommodate heavy vehicle traffic as the Garbage Transfer Station is located off of South Street.
- Lowering the posted speed limit through Blackfalds from 60 km/hr to 50 km/hr and along Highway 2A, north of Blackfalds from 100 km/hr to 80 km/hr.
- Recommended length of acceleration lanes along the highway to adequately integrate into the highway traffic.
- The feasibility of implementing a pedestrian overpass.
- The need for full signalization at both the Park Street and Gregg Street intersections.
- Limiting access along Highway 2A throughout the Town of Blackfalds as a positive alternative for residents, but a negative alternative for business owners.
- The re-routing of traffic through school zones and playground areas is not feasible, as this would only increase problems further.
- Motorist that are commuting between the communities should utilize Highway 2 instead of relying on Highway 2A.
- The need for local police enforcement along Highway 2A through the Town of Blackfalds to monitor speeding.

8.2 Public Open House No. 2

A public open house to present the consultant's preferred alignment option for the Highway 2A corridor was held on Wednesday, January 26th, 2005 at 6:00 p.m. at the Kozy Korner Community Centre (5024 – 53rd Street, Lacombe). A formal presentation was made by the study team to review the objectives, issues/concerns, and to highlight the preferred solutions that had been devised since the first public open house that was held on September 29th, 2004.

Representatives from the study team were on hand to explain the extent of the project, the study's mandate and to answer any questions or concerns. As well, representatives for the Town of Blackfalds, Town of Lacombe, Lacombe County and Alberta

Infrastructure and Transportation were in attendance to assist with addressing questions and concerns raised by the public.

8.2.1 Attendance: Public Open House No. 2

Based on the sign-in sheets, it was estimated that the attendance at the public open house was approximately 42 persons. Business representatives were in attendance from such industries as NWP and Heck's Trucking Oilfield Hauling Inc.

Efforts to advise the public about the public open house included an advertisement placed in the Lacombe Globe newspaper on January 11th and 18th, 2005, as well 184 letters of invitation were sent to home addresses adjacent to the study corridor. Several of these letters were returned due to incorrect addresses or tenants relocating.

Exhibit 8-3 illustrates the relationship between the location of the attendees place-of-residence and place-of-work. On this exhibit the blue dots indicate the attendees place-of-residence and the red dots indicate their place-of-work. Attendance at the public open house was spread among individuals residing in Blackfalds and Lacombe, as well as adjacent to the Highway 2A corridor.

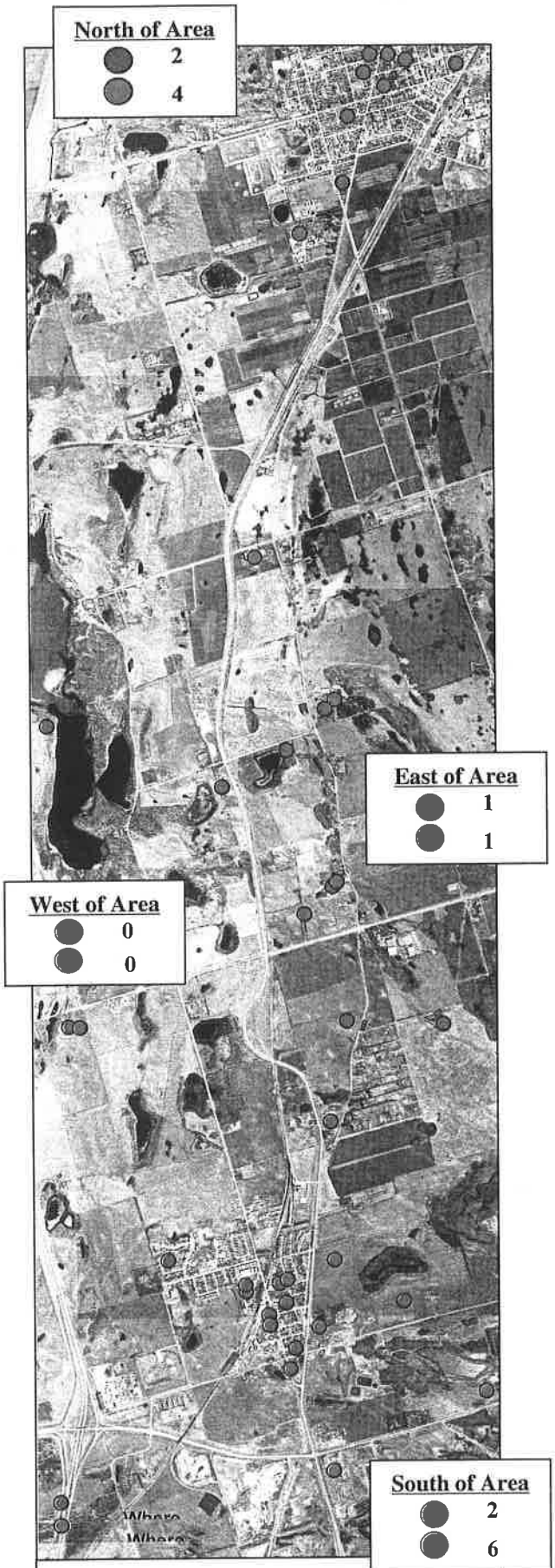

Exhibit 8-3: Place-of-Residence & Place-of-Work

8.2.2 General Tone: Public Open House No.2

Exhibit 8-4: CastleGlenn Informing Attendees of Proposed Solutions

The study team made a presentation that provided a recap of the materials presented at the first public open house held on September 29th, 2004 and explained the preferred solutions that were developed based on the comments received from the previous open house and through further study of the existing and forecast conditions through the corridor. Several comments and questions were raised to the study team's attention in either a one-on-one discussion or during the formal presentation. The questions raised were regarding the speed limit along the corridor upon the realignment, number of lanes required through Blackfalds, and the annual growth rate.

8.2.3 Feedback: Public Open House No. 2

Attendees were provided with comment sheets and encouraged to complete them at the end of the meeting or by mail or fax. Subsequent to the public open house four comment sheets had been received. The majority of comments received were regarding the intersection of Highway 2A/597. Individuals feel that the intersection should be reduced to 60 km/hr and that a left turn phase should be implemented in all directions.

8.3 Stakeholder Meeting

Exhibit 8-5: CastleGlenn Presenting Findings

Effected landowners adjacent to the preferred realignment option were invited to a stakeholder meeting held on January 24th, 2005 at the Blackfalds Multipurpose Complex (5302 Broadway Avenue, Blackfalds). This meeting was held prior the second public house scheduled for January 26th, 2005 and was used to present the consultant's preferred

realignment and allow the effected landowners the opportunity to provide feedback on the preferred option. Of the 23 landowners invited, 19 individuals were in attendance.

Those in attendance were provided with comment sheets and encouraged to complete them at the end of the meeting or by mail or fax. Subsequent to the public open house 3 comment sheets were received. The general comments and concerns expressed in the comment sheets included the following:

- Noise from the highway may increase due to the realignment and mitigation measures may be required.
- The service road network proposed for the properties located in the southwest quadrant of the Highway 2A/Township. Road 40-1 intersection should be reviewed and an alternate location, further to the west should be considered.

8.4 Presentations to Blackfalds, Lacombe and Lacombe County Councils

Appendix "L" contains material that was presented to the local authorities which include the Lacombe County, Town of Blackfalds and Town of Lacombe Councils.

8.4.1 Town of Lacombe Council: September 27th, 2004

Appendix "M-1" details the material presented in late September to the Town of Lacombe Council. At this meeting the Town of Lacombe Council discussed:

- Provincial collision rates; and
- Why the study limits did not extend further into the Town of Lacombe.

8.4.2 Lacombe County Council: September 28th, 2004

Appendix "M-2" details the material presented in late September to the Lacombe County Council. At this meeting the Lacombe County Council discussed:

- The suggested time line for implementation of recommendations from the study;
- Ways to improve the curvilinear alignment in the vicinity of the CP Rail grade separation; and
- Public and private access closures along the highway.

8.4.3 Town of Blackfalds Council: September 28th, 2004

Appendix "M-3" details the material presented in late September to the Town of Blackfalds Council. At this meeting the Town of Blackfalds Council discussed:

- The signalization of Gregg Street; and
- The Highway 597 / Highway 2A intersection.

9.0 FINDINGS AND RECOMMENDATIONS

9.1 General Findings

9.1.1 The General Study Area

- Highway 2A functions as an inter-community link between the communities of Red Deer, Blackfalds and Lacombe.
- The study area encompasses a total highway length of approximately 11 kilometres.
- Within the study area the land uses are predominately a mixture of agriculture, residential and industrial. Commercial facilities exist adjacent to Highway 2A through the Town of Blackfalds including such uses as gas/convenience stations, motel accommodations and fast-food restaurants.
- The study area is bisected in the north-south direction by a CP Rail line. Although there are a total of 11 railway crossings that occur within the overall study area only two crossings were found to impact the Highway 2A corridor which include:
  - a grade-separated structure north of Blackfalds [Bridge File 73527] located approximately 1.2 kilometres north of C&E Trail South; and
  - an at-grade spur rail line rail crossings with Highway 2A and Range Road 27-1 located approximately 3 kilometres south of Lacombe.

9.1.2 Existing Highway 2A Conditions

- Highway 2A can be described as:
  - a two-lane undivided arterial with a rural cross-section;
  - a corridor with a grade-separated CP Rail structure which allows Highway 2A to crossover the railway corridor north of Blackfalds;
  - having an at-grade crossing with a CP Rail spur rail and Highway 2A;
  - being controlled by two signalized intersections located at Highway 597 and Park Street. The Park Street intersection has pedestrian actuated signals in the north/south directions only; and
  - having a total of 12 at-grade, STOP-controlled intersections within the study area.
- The existing drainage characteristics of the Highway 2A corridor consists of:
  - a typical cross-section where the pavement is crowed at the centerline with a 2% slope down to the shoulder edge;
  - drainage ditches located on either side of the highway corridor which collect storm water and surface runoff and channel the discharge parallel to the highway through a system of culverts and open channels to storm water collection areas located adjacent to the highway; and
  - several fill sections above 2.5 meters in height where run-off from the highway pavement flows down the fill sections and filtrates through the ground soil or accumulates at the bottom of the fill.

- *Traffic volumes* are characterized as follows:
  - Two-way traffic volumes north of the Highway 597 corridor are approximately 14,500 vehicles-per-day (vpd);
  - Two-way traffic volumes south of the Town of Lacombe are approximately 8,500 vpd;
  - During the summer months traffic volumes increase by approximately 400 vpd;
  - The average annual growth rate was determined to be approximately 3 percent per year; and
  - Heavy-vehicle traffic within the study represents approximately 10 percent of the total vehicle traffic.
- *Level-of-Service* (LOS) analysis of existing traffic conditions indicates that:
  - The Highway 2A/Highway 597 intersection is operating at unsatisfactory levels of service ("E") during the morning peak hour. [Recent initiatives have been undertaken by Alberta Infrastructure and Transportation to improve/upgrade the intersection configuration.];
  - A review of the traffic control measures currently in place at the Highway 2A/Park Street intersection indicate satisfactory traffic operations and tolerable average delays, however, increasing minor street traffic volumes in concert with east-west pedestrian movements justify a consistent monitoring program as traffic demands in the study area continue to grow; and
  - Two-way STOPPED controlled intersections along the Highway 2A corridor are currently operating at satisfactory level-of-services.
- *Collision Analysis* indicates that the 11 kilometres of highway has experienced approximately 130 collisions during the five-year period between 1998 and 2002, of which:
  - 89 incidents resulted in property damage; 36 in injuries and 2 fatalities;
  - 22 percent of reported collisions occurred within the Town of Blackfalds;
  - 26 percent of the reported collisions occurred at the Highway 597 / Highway 2A intersection;
  - 52 percent (68 incidents) of the reported collisions occurred along the Highway 2A corridor, north of the Town of Blackfalds. Of these 38 percent occurred within the vicinity of the CP Rail grade-separation; and
  - Two sections of the Highway 2A corridor (Kilometre 6-7 (South Highway 597 to North Highway 597) and Kilometre 9-11 (C&E Trail to Township Road 40-0)) were found to be in the range, or exceed, the 2004 average provincial collision rate (of 109 collisions-per-100-million-vehicle-kilometres).
- A *utility review* indicated the general location of the following utilities in relation to the Highway 2A study corridor:
  - Low, medium and high pressure gas lines;
  - D.O.W Chemical loading facility (Glycol) pipelines;
  - Overhead utility cables;

- Underground fibre optic cables;
- Shaw Cable underground cables; and
- Telus underground cables.

9.1.3 Environmental Overview

The Environmental Overview consisted of a Phase I Environmental Site Assessment (ESA) and a review of the Valued Ecosystem Components (VEC). The ESA component of the overview concluded that:

- *the potential for contamination may exist at the Dow Chemical glycol loading facility and if property should be required by AIT for future development or highway realignment, the concerns should be addressed through sub-surface investigations.*
- *In general, provided sound planning and construction mitigations are followed, future construction activities* (on the corridor located nearest to the existing corridor) *should not appreciably decrease the vegetation and wildlife resources in the study area.* [See Appendix "C"]

The VEC component of the overview concluded that:

- The Assessment of Valued Ecosystem Component identified several issues concerning the realignment of Highway 2A such as increased weed invasion, reduced integrity of wetlands and disruption of wildlife movement across the Highway corridor. The study found a potential for rare plants and wildlife concerns and a need to protect vegetation and wildlife resources within the study area. Despite this, in general, "providing sound planning and construction mitigations are followed, future construction activities (on the corridor located nearest to the existing corridor) should not appreciably decrease the vegetation and wildlife resources

9.1.4 Historical Resource Overview (HRO)

The following conclusions and recommendations were developed for Alberta Infrastructure and Transportations review:

- the historical resource potential of the study area is low due to the high level of disturbance within the area;
- development within the existing Highway 2A right-of-way and areas of proposed realignment areas should not require further investigation;
- deviations from the existing highway corridor will require site specific evaluations to be undertaken. This could involve a full Historical Impact Assessment [HIA] at the time of detailed design; and
- despite the above, Alberta Community Development indicated that a "Historical Resource Impact Assessment in not required" and that "Alberta Transportation has "Historical Resource Act Clearance for the Highway 2A Blackfalds to Lacombe Functional Planning Study.".

9.1.5 Existing Deficiencies

The following geometrical deficiencies were observed along the existing Highway 2A alignment:

- The approaches to the ***Highway 2A CP Rail Overpass*** require speed variations of greater than 20 kph. (i.e. The posted speed limit for the southbound lanes decreases from 100 km/hr to 75 km/hr in the vicinity of the overpass.) This is attributed to the three horizontal curves ranging from a 290 to 430 metres radius separated by short tangents.
- The posted speed along the vertical crest curve located ***350 meters north of Township Road 40-0*** is currently 100 km/hr. Upon examining the vertical crest curve it was found that the curve has a "k" parameter of approximately 74, which allows for a posted speed of 90km/hr based upon current stopping sight distance standards.

The following intersections were identified as having deficiencies associated with limited sight distance, substandard intersection angles (min 70 degrees) and layout characteristics

- ***Highway 597 / Highway 2A*** provides insufficient sight distance.
- ***58th Street / Hwy 2A*** and ***Range Road 27-1 /Highway 2A*** currently intersect Highway 2A at a 45 degrees angle. The minimum intersection angle recommended is 70 degrees.
- The north leg of ***C&E Trail approaches Highway 2A*** at an acute angle of approximately 20 degrees and intersects Highway 2A at 90 degrees through a short 30-meter radius. This intersection angle and geometric layout is unconventional layout when compared to current AIT design standards.

9.2 Issues and Resolution

Several issues were identified throughout the study process. The following sub-section, serves to identify each issues, critical findings and their resolution

9.2.1 Highway 2 / Township Road 40-0 Access Closure

- the Highway 2 / Township Road 40-0 intersection was originally scheduled for closure in November 1995;
- For the purposes of this study, it was assumed that the Hwy 2/Twp. Rd. 40-0 access would be closed and a local roadway would be developed that would extend in the southerly direction from parcel N½ 3-Rge. 27-Twp 39-W4 located north of Twp. Rd. 40-0 and connect with the Town of Blackfalds future West Arterial.

9.2.2 New Grade-Separated CP Rail Crossing

One of the components involved within consideration of twinning (four-laning) of Highway 2A involved consideration of a new grade-separated CP Rail structure that would provide for 2 additional lanes of travel across the CP Rail alignment. The following points highlight the relevant findings associated with this issue.

- In 1998, AIT reconstructed (improvements included a new substructure and superstructure) the Highway 2A structure over the CP Rail Corridor. These improvements have been estimated to result in the life expectancy of the structure being extended to a fifty year horizon (2052).
- Minimal modification were made to the existing highway alignment, which has a rating between "poor" and "adequate" It was determined that the existing highway alignment in the vicinity of the CP Rail corridor would be undesirable to accommodate a future 4-lanes facility. Nevertheless, the study found that it would be most advantageous to develop a new alignment in a strategically staged manner that would use the existing structure to the greatest extent possible.
- It was found that, in the "ultimate" time frame, a new structure over the CP corridor along a more preferred alignment would address several of the existing alignment deficiencies.
- it was perceived as prudent to initially develop a new alignment as a two-lane facility with both lanes northbound, such that the existing CP structure would continue to be used to support southbound traffic volumes. "Ultimately", the existing structure would be decommissioned at the time when the residual bridge life would be exhausted, and the new alignment could then be expanded to accommodate 4 lanes of travel.
- CP Rail indicated that to accommodate their future initiatives the new structure would require sufficient width to span 3 parallel rail tracks. The CP initiatives would also require the widening/replacement of the existing CP structure. In this case, consideration should be given to abandon the existing alignment altogether and construct the corridor along its ultimate alignment.
- Subsequent to an evaluation of several alternative alignment options, it was determined that the most desirable location to twin the CP structure would be north of the existing structure. This would avoid environmentally sensitive areas and produce a more geometrically desirable alignment.

9.2.3 Emergency Routing

- Highway 2A is used as an emergency by-pass route when Highway 2 for any reason (severe accident, traffic disruption, chemical spill, structural failures etc.) becomes impassable.
- During instances where up to 6 highway (Highway 2) travel lanes are constrained to a two-lane facility (Highway 2A) routed through an urbanized areas (Lacombe, Blackfalds Red Deer etc.) which is traffic signal controlled, motorists can expect to experience significant delays.

- A future widening of Highway 2A would facilitate the requirements of an emergency by-pass route, should Highway 2 becomes impassable by increasing the capacity of the Highway 2A corridor to handle increased traffic volumes; providing greater passing opportunities offered by two lanes in each direction; and providing opportunities for emergency vehicle flow using ample roadway shoulders when necessary.

9.2.4 Integration with Local Planning Initiatives

- This study integrated to the greatest extent possible with the most recent planning initiatives undertaken by the Town of Lacombe, the Town of Blackfalds and the County of Lacombe. Land use forecasts and conclusions involving future local infrastructure requirements were taken into consideration and rationalized within the context of impacts to the Highway 2A corridor.
- Development initiatives proposed for the lands located south of Highway 597 were found to result in ancillary impacts outside of the scope to this functional planning assignment (both because this study addresses only Highway 2A and also because the timing of such land use Phase III changes were felt to be beyond a twenty year time frame) in that traffic forecasts along the Highway 597 corridor are anticipated to increase by a factor of 10 times in the peak direction, [From 300 vph (2004) to 2,870 vph (Phase III)] during the afternoon peak hour of travel demand. Nevertheless, it was recognized that the configuration of local roadways and plans of development are at this time limited to the interpretation of Lacombe County and currently are independent of site-specific area structure plans.

9.2.5 Preferred South By-Pass Location

- The *Town of Lacombe Transportation Study* (Bunt & Associates Eng. Ltd., Dec. 2002) recommended a South By-Pass be implemented and proposed a conceptual alignment option.
- Through the course of this functional planning study it became evident that a consensus regarding the alignment of the South By-Pass did not exists between the Town of Lacombe and those property owners / institutions along the alignment. As such, the Town of Lacombe will likely need to reach an agreement with the adjacent landowners in order to further pursue the proposed alignment of the South By-pass.
- For the purposes of this study it was assumed that the South By-pass would be located at the approximate location as designated in the *Town of Lacombe Transportation Study* (Bunt & Associates Eng. Ltd., Dec. 2002); however it is understood that this location is dependant on the Town of Lacombe reaching agreements with the relevant stakeholders.

9.2.6 Highway 2A Access Management

- The *Town of Blackfalds Transportation Study* (Stantec, June 2003) was reviewed. The following recommendations were felt to be consistent with plans to accommodate

the "ultimate" twinning of the Highway 2A corridor. These recommendations included:

- recognition of Gregg Street as a future primary east-west corridor that will eventually extend west across the CP Rail and connect with Wormacks Road;
- recognition that "ultimately" Broadway Avenue will terminate at Railway Street on the south side of the CP Rail tracks and commence again on the north side at beginning at Wormacks Road;
- recognition that the widening of the Highway 2A corridor would include the conversion of the Indiana Street intersection to right-in, right-out access only; (This would be achieved by implementing a 6 meter raised centre median, which in turn would separate the north/southbound highway through traffic.) and
- recognition that widening of the Highway 2A corridor would include the "ultimate" closure of the Broadway Avenue intersection with Highway 2A and the South Street intersections (The west leg is already closed.) with Highway 2A.

- In addition to the above, this functional planning study resulted in the following findings:
  - To accommodate the proposed left turn lanes at the "ultimate" Highway 597/Highway 2A intersection configuration, the two existing NWP industries accesses located on Highway 597 will require closure A solution presented to NWP would see the construction of a service road from the site within an existing 25 meter road allowance adjacent to site that would connect to the local road system within Burbank Industrial Park;
  - Access to the lands located east of Highway 2A corridor between Highway 597 and South Street as denoted in the *South-East Area Structure Plan* would best be accommodated by the extension of Parkwood Road south from Park Street and the implementation of a future site access onto Highway 597 opposite the entrance to the Burbank Industrial Park. These locations differ from those suggested within the area structure plan which was felt to be inconsistent with AIT access management guidelines. The implementation of signage along the Highway 2A corridor in advance of the site was found to better advise motorists of the site's access points.

9.3 The Access Management Strategy

The preferred access management strategy along the Highway 2A corridor between the Town of Blackfalds and Town of Lacombe was found to result in satisfactory intersection spacing that complies with design standards and affords efficient traffic operations.

The following elements were identified as part of the access management strategy:

- ***Closures*** of the following at-grade intersections:
  - Highway 597/access located 25 meters east of Highway 2A and on the north side of Highway 597;
  - Highway 597/NWP Industries access located 110 meters east of Highway 2A and on the south side of Highway 597;
  - Highway 2A/Broadway Avenue located 550m north of Highway 597 on the west side of Highway 2A;
  - Highway 2A/South Street located 850m north of Highway 597 on the east side of Highway 2A. (The South Street intersection on the west side of Highway 2A has already been closed;
  - The existing accesses located 60 and 180 meters north of South Street on the east side of Highway 2A;
  - The existing north-south service road fronting the Blackfalds Motor Inn access on either side of Park Street located 15 meters west of Highway 2A would be closed. [Access from/to the dwellings located north of Park Street would occur via North Street or Waghorn Street to East Avenue in order to access Park Street. Similarly, access from/to the dwellings located south of Park Street would occur via East Avenue.];
  - The existing north-south service road accesses located on either side of Gregg Street on the west side of Highway 2A and offset approximately 15 meters from the Highway 2A alignment would be closed. [Access from/to the dwellings located south of Gregg Street would occur via Park Street. Access from/to the dwellings north of Gregg Street (Blackfalds Mobile Home Park) would occur via the secondary accesses located west of the north-south service road.];
  - Highway 2A /Residential access located 950m north of Township Road 40-0 (100 meters north of wetland depression) (Station 15+410);
  - Highway 2A/ Residential access located 610m north of Township Road 40-1 (Station 16+740);
  - Highway 2A/ Agricultural access located 650m south of Township Road 40-2 (Station 17+210).
  - Highway 2A /Range Road 27-0 (Station 18+250); and
  - Highway 2A /58th Street (Station 20+550).
- ***Improvement of the following at-grade intersections***:
  - *Highway 2A/Highway 597:* This intersection includes upgrading to a type "V" intersection (See *Alberta Infrastructure and Transportation Highway Geometric Design Guide Figure D-7.5*) with dedicated left-turn lanes in each direction and channalization of all quadrants of the intersection;
  - *Highway 2A/Indiana Street:* This intersection was reconfigured to permit right-in, right-out access on to Highway 2A only and improve the setback distances from Highway 2A for driveways accessing the ESSO Gas Station and the Blackfalds Motor Inn. The centerline for the new driveways would be located a minimum of approximately 10 meters back from the Indiana Street STOP bar;

- *Highway 2A/Park Street*: This intersection was converted from the existing STOP-controlled intersection (in the eastbound and westbound directions) to traffic signal controlled in all direction and included provision for auxiliary left-turn lanes and right turn channelization in all directions;
- *Highway 2A/Gregg Street:* This intersection was upgraded to include provision for full signalization when warranted, dedicated left-turn lanes and right turn channelization in all directions; and
- *Highway 2A/C&E Trail:* This intersection would be modified to accommodate the future proposed future East Collector at a 90° approach angle to Highway 2A. Improvements would include a reconfigured intersection with dedicated left-turn lanes in three directions (no left turn lane at DOW Chemical road) and right turn channelization in the eastern quadrant of the intersection. The C&E Trail intersection would be realigned to intersect with the future East Collector to provide for a 130m radii bulb (to accommodate heavy vehicles) between the C&E Trail/Service Road intersection and Highway 2A.
- *Highway 2A/Township Road 40-0:* This intersection would be relocated and upgraded to accommodate a 70° angle (Station 14+500). [The design process incorporated an evaluation that determined that the trade-off between the desirability to achieve a 90° angle at the Highway 2A/Township Road 40-0 intersection while still achieving a "desired" 30° skew angle at the future span of the CP Rail corridor structure from a new alignment that could also still provide for a 110 km/hr design speed standard would be achieved by the 70° intersection angle in concert with a 52° skew angle at the CP Rail structure.] The west leg of the Township Road 40-0 intersection is designed with two eastbound left turn lanes and a center median that will accommodate the forecast 2024 morning peak hour traffic volumes. When warranted the intersection will require full signalization and as such should be designed to provide for underground conduit in advance of the traffic signal warrants.
- *Highway 2A/Township Road 40-1*: The improvements to this intersection include full signalization of the intersection when warranted, dedicated left-turn lanes in all directions, highway acceleration and deceleration lanes designed for a 110 km/hr standard and right turn channelization in the northwest quadrant of the intersection;
- *Highway 2A/Township Road 40-2*: The improvements to this intersection include full signalization of the intersection when warranted, dedicated left-turn lanes in all directions, highway acceleration and deceleration lanes designed for a 110 km/hr standard and right turn channelization in the west quadrants of the intersection;
- *Highway 2A/Range Road 27-2*: This intersection would be closed and traffic on Range Road 27-1 would be diverted to the improved Township Road 40-2 intersection. This would be accomplished through the southerly extension of Range Road 27-2 to Township Road 40-2; a distance of approximately 550 meters. The rationale for this improvement aside from providing for the future 4-lane cross section is that the existing Highway 2A/Range Road 27-2 intersection forms a substandard "Y" configuration located on a horizontal

curve. As a 4-lane configuration this location would likely distorts intersection sight distances and poses safety concerns.

- *Highway 2A/C & E Trail North*: It is proposed that the existing intersection be relocated approximately 240 meters north of the existing location to improve the existing substandard "Y" configuration at the west leg of the C&E Trail North intersection to a standard 90° angle with Highway 2A while still achieving a desirable connection to the proposed future Lacombe South Bypass.
- *The "Future South Bypass/Highway 2A*: This intersection would include full signalization of the intersection when warranted with interconnection between traffic lights and automatic at-grade rail crossing gates to address the CP Rail corridor to the east, dedicated left-turn lanes in all directions, highway acceleration and deceleration lanes designed for a 110 km/hr standard and right turn channelization in the east and west quadrants of the intersection.

- ***Required Service Roads*** at the following locations
[It should be appreciated that the following Service Road provisions could be subject, and secondary, to an approved area structure plan (ASP) that could propose internal or local roadways that address the interconnectivity issues and required closures while better meeting local area concerns. In that case, the ASP would negate the requirement for the following service/frontage roads.]:
  - The southerly extension of Parkwood Road from the Park Street intersection paralleling the east side of Highway 2A past South Street toward Highway 597. (approximately 940 meters in length). This new frontage road would be required to support the above highway intersection closures and provide access to the lands in the South-East Area Structure Plan (See Exhibit 5.1) located in the south-east quadrant of the Highway 597/Highway 2A intersection. [The service road would be an extension of Parkwood Drive and would provide local traffic access to Highway 2A from the Highway 2A/Park Street intersection.];
  - The northerly extension of Parkwood Road, approximately 150 meters in length, which would form the south leg of a 4-leg intersection represented by the future East Collector and the relocated C&E Trail intersection; and
  - A new service road located on the west side of Highway 2A that would extend between the D.O.W Chemical/Future East Collector intersection northward toward the two existing residential driveways; (a distance of approximately 770 meters). [This service road is required to affect the closure of two acreage accesses (13+000 & 13+300) located on the west side of Highway 2A.]
  - A new service/frontage road paralleling the west side of Highway 2A, (approximately 700 meters in length), is to be provided to assure a connection to an existing residential acreage (NE2 40-27-4) to Township Road 40-1. [The service road would be required as a result of the proposed closure of the existing access on Highway 2A located 950m north of Township Road 40-0 (Station 15+410).]
  - A new service/frontage road paralleling the west side of Highway 2A (approximately 1,000 meter in length) is to be provided to assure a connection to an existing residential acreage (SE11 40-27-4) to Township Road 40-2. [The

service road would be require as a result of the proposed closures of the existing accesses on Highway 2A located 610m north of Township Road 40-1 (Station 16+740) and 650m south of Township Road 40-2 (Station 17+210).]

- ***Upgrades to Accommodate the CP Rail Corridor*** include
  - A new CP Rail grade-separated structure designed to accommodate three CP Rail tracks located approximately 300 meters north of the existing CP Rail overpass.
  - At the time of intersection traffic signal warrants at all intersections in the immediate vicinity of the CP Rail corridor consideration should be given to the interaction of such traffic signals with the existing at-grade rail crossings located immediately to the east of each intersection. [Interconnection of traffic signals with crossing automatic warning systems is done to pre-empt the normal operation of the traffic signals upon the approach of a train, permitting any vehicles and pedestrians occupying the grade crossing to clear, while preventing additional vehicles from occupying or approaching the grade crossing from the traffic signals during the approach and passage of trains.]
  - The existing at-grade-crossing of the CP Rail Corridor (CP Rail Reference: Mile 0.07 Hoadley Subdivision) which provides for a spur line located approximately 770 meters north of Township Road 40-2 should be monitored prior to the time of construction and provision made for rail gates installed in both southbound and northbound directions should any of the above warrant criteria be met prior to widening of Highway 2A. At the time of detailed design, the warrants for rail gates/signals should be re-assessed.

9.4 Forecast Traffic Conditions

- *Town of Blackfalds* forecast development impacts have the potential of generating over 1,815 new vehicle trips during the peak hour of travel demand in the peak direction.
- *Town of Lacombe* forecast development is anticipated to contribute approximately 1,000 new vehicle trips during the peak hour of travel demand in the peak direction upon reaching a population time horizon of 20,000
- *Lacombe County's* planned development initiative have the potential of generating over 2,250 new vehicle trips during the peak hour of travel demand in the peak direction by the end of the 20-year time horizon.
- For the purposes of this functional planning study *"Through" traffic* volumes were simulated as follows:
  - Through traffic along Highway 2A is anticipated to grow at a rate of 1 percent over the next decade and 0.5 percent after this time;
  - Through traffic along Highway 597 is anticipated to grow at a rate of 4 percent over the next decade and 1.5 percent for the remaining 10 years;

  The rationale for the lower growth rate being used along the Highway 2A corridor is based upon the understanding that the vast majority of forecast land uses have already been accounted for within the land use analysis, while, as concerns the

Highway 597 corridor, this is not the case. The higher through-traffic growth rates adopted along Highway 597 take into account the growth in development along the Highway 597 corridor.

- Forecast traffic volumes indicate that:
  - traffic will be heaviest during the forecast afternoon peak hour of travel demand:
  - just south of the Town of Lacombe's corporate limits traffic volumes will reach 1,420 vph in the peak direction;
  - just south of the Town of Blackfalds, traffic volumes will reach 2,250 vph in the peak direction;
  - the Town of Blackfalds is forecast to draw approximately 32 percent, (720 vehicles/per hour) from the northbound afternoon peak hour traffic flow of 2,250 vehicles; and
  - Proposed County Development (inclusive of the new urban expansion areas) is anticipated to draw from the northbound peak hour traffic flow approximately 100 vph at the Township Road 40-0 intersection with Highway 2A. [Despite generating approximately 1,000 new vehicles trips in the peak direction of travel several alternate routes to the development south of Township 40-0 were found to be more attractive. The future West Arterial that would connect Highway 597 directly to the urban expansion areas in the vicinity of Blackfalds would serve to divert traffic (approximately 500 vph) which would ordinarily use the Highway 2A corridor. In addition, traffic destined to these areas would find the new Gregg Street corridor and the Park Street intersections with Highway 2A more attractive to access these area than Township Road 40-0 as this route would require traffic to double back on itself. The nominal northbound left turn movements at the Township Road 40-0 intersection is also attributed to the country residential land use located north of Township Road 40-0 (approximately 300 dwellings in total).]
- Intersection capacity analysis of the forecast traffic conditions indicates that during the time of "ultimate" development Highway 2A will be functioning at congested levels and exhibiting traffic operational characteristics similar to an "arterial" roadway.

9.5 The Proposed Staging Strategy

- Development of the Highway 2A corridor is intended to be implemented in a staged manner where interim, or more immediate, improvements can take place and remain consistent with the "ultimate" vision for the twinned 4-lane configuration. The staging strategy includes such aspects as:
  - intersection improvements and access consolidations that can be scheduled as part of regular maintenance or capital activities on an "as required-when warranted" basis;
  - small individual projects such as closure to minor accesses can be implemented as low cost items with short duration times and can result in immediate benefits;

- other projects that involve intersection modifications, service road modifications, off-site costs and/or the requirement of additional property will likely be subject to future development initiatives; and
- the proposed staging strategy is also intended to serve as a guideline to assist in the responses to future development and access management initiatives.

The following three stages are subject to Provincial budgetary and priority processes in addition to the level of anticipated development assumed within this study being realized.

9.5.1 Stage I: Relatively Short-Term Improvements

The following projects represent a series of intersection improvements that are intended to address those safety and operational concerns which will develop as growth along the corridor proceeds. The individual improvements are not in any particular order of priority, rather the list is intended to represent several locations where improvements can be staged relatively early on in the process of achieving the ultimate twinning of the Highway 2A corridor.

- *Highway 2A/Highway 597 Intersection:*
  - Interim upgrades to this intersection would include implementation of exclusive right turn lanes in all direction, improved signage and pavement marking, modifications of traffic signal timing inclusive of advanced warning lights as per "*Safety Assessment, Highway 2A:18, Highway 2A & Highway 597*" EBA Engineering Consultants Ltd *(August 2004)*, and closure of Broadway Avenue/Highway 2A intersection.
- *Highway 2A/Indiana Street Intersection:*
  - This existing "T" intersection would be converted to the to a right-in, right-out access by prohibiting the north/eastbound left turn movements to remedy the insufficient intersection spacing between Park Street and Indiana Street. This could be accomplished prior to twinning when warranted through the use of a channelized island located at the throat of the intersection. The intersection modifications would also be aimed at improving the setback distances from Highway 2A for those access driveways located upstream [ESSO Gas Station and Blackfalds Motor Inn. The centerline for the new driveways would be located a minimum of approximately 10 meters back from the Indiana Street STOP bar.]
- *Highway 2A / Park Street Intersection:*
  - The existing traffic signal control intersection would be expanded to convert the existing east/west STOP control to traffic signal control when warranted.
- *Highway 2A / Gregg Street Intersection:*

- Improvements to this intersection will likely be development driven or driven by local roadway network initiatives which would result in traffic diversions. Intersection improvements include full signalization of the intersection when warranted, implementation of dedicated left-turn lanes in all directions, channelization of the eastern quadrants of the intersection and closure of the service road access located approximately 15 meters west of Highway 2A on Gregg Street.

- *Southerly Extension of Parkwood Road Park Street to South Street:*
  - The advent of this 350 metre frontage road could be used to effect the closures of the east leg of the South Street intersection in addition to the existing accesses located 60 and 180 meters north of South Street on the east side of Highway 2A. As the South Street (east leg) intersection and the two access are characterized by low traffic volumes, there is little degree of immediacy associated with the desired closures. Nevertheless, in the case where the above extension is development driven, the associated closures should be implemented as a condition of development.

- *Southerly Extension of Range Road 27-1 from Hwy 2A to Twp Rd . 40-2:*
  - The advent of this 550 metre frontage road could be used to affect the closure of the Range Road 27-1/Highway 2A intersection in advance of the twinning of Highway 2A should the closure be warranted.

9.5.2 Stage II: Moderate-Term Improvements

The following projects were assembled keeping in mind those land uses that are anticipated to represent a timing beyond the current decade[1]. The individual improvements are not in any particular order of priority, rather the list is intended to represent several locations where work can be undertaken and remain in concert with the ultimate objective of achieving the desired 4-lane cross section of Highway 2A along the corridor.

The proposed improvements for Phase II are depicted in the *"Functional Plans"* (See Annex "A"). The improvements are intended to be consistent with the "ultimate" 4-laning of Highway 2A and include:

- the closure of 9 intersections;
  - Highway 597/access located 25 meters east of Highway 2A;
  - Highway 597/NWP Industries access located 110 meters east of Highway 2A;
  - Highway 2A/Residencial accesses located

[1] Land use and forecast traffic trends warrants indicate that Highway 2A will require twinning by 2014. It should be appreciated that this estimate of timing is subject to forecast development patterns/initiatives and associated traffic volumes. The warrants for twinning may change as true development patterns and traffic volumes are realized.

    - 60 meters north of South Street;
    - 475 meters north of D.O.W Chemical highway access road;
    - 850 meters north of DOW Chemical highway access road;
    - 950 meters north of Township Road 40-0 (100 meters north of wetland depression);
    - 610 meters north of Township Road 40-1;
  - Highway 2A /Range Road 27-0 (Station 18+250); and
  - Highway 2A /58th Street.
- the development of 7 frontage/service roads ranging in length from 150 meters to 1 kilometre required to effect the closure of existing intersections along the corridor;
- improvements to 6 existing intersections that would accommodate the "ultimate" twinning of the Highway 2A corridor:
  - Highway 597/Highway 2A;
  - Highway 2A/Park Street;
  - Highway 2A/Gregg Street;
  - Highway 2A/Township Road 40-0 to be relocated approximately 125 meters west of its current location; (includes provisions for future traffic signals);
  - Highway 2A/Township Road 40-1 (includes provisions for future traffic signals); and
  - Highway 2A/Township Road 40-2. (includes provisions for future traffic signals)
- development of 2 new "service/frontage road intersections" needed to effect closures:
  - East Collector/ C & E Trail intersection; (Improvements to this intersection could be a local municipal initiative and be development driven.) and
  - Range Road 27-1/Township Road 40-2 intersection.
- development of a new South By-pass intersection which will consolidate the adjacent intersections and result in the closure of the C&E Trail intersection and 58th Street-Range Road 27-0 intersection with Highway 2A when implemented. This would be done in concert with the northerly (240 metre) extension of the C&E Trail to form an intersection with the new South By-pass roadway east of Highway 2A. [The development of this intersection is conditional upon the Town of Lacombe securing the necessary agreements/clearances from effected stakeholders and agencies.]; and
- improvements to the existing CP Rail at-grade intersection with the Highway 2A corridor.

As regards the future twinning of the Highway 2A corridor, it is assumed that twinning of the corridor would be undertaken in the following three sections

- *Twinning between Highway 597 and the Northern Limits of Blackfalds*: A 6 meter raised, concrete median (13.4 meter centerline spacing) commencing just north of the Highway 2A/Highway 597 intersection and terminating at the northern limits of the Town of Blackfalds. This cross-section allows for mountable curbs at the centreline median;
- *Twinning between the Township Road 40-0 to 40-2*: A 15.4 meter depressed median (22.8 meter centerline spacing) north of Township Road 40-0 to Township Road 40-2 to accommodate opposing left turn lanes and a center median drainage channel with 6:1 side slopes; and
- *Twinning between the Township Road 40-2 and Town of Lacombe:* The highway cross-section, north of Township Road 40-2 to the southern limits of the Town of Lacombe to transition from a 22.8 meter centerline spacing with a depressed median to a 13.4 meter centerline with a raised median.

As regards the new CP Rail overpass structure

- The development of the new CP Rail overpass needed to support the northbound highway lanes would likely be triggered only after all associated improvement measures to the adjacent intersections have been undertaken to assure that traffic flow over the existing 2-lane structure has been maximized. [As the life expectancy of the existing CP Rail overpass (BF 73527) has been estimated to last approximately 45 years] it becomes essential to maximize the utilization of the existing structure prior to the time when the per-lane capacity of the existing structure is exceeded.

9.5.3 Stage III: "Ultimate" Improvements

- By the year 2050 the existing CP Rail overpass will be approaching its life expectancy, at this time, the Highway 2A southbound alignment would be abandoned and the existing overpass structure commissioned.
- A superior Highway 2A southbound alignment would be constructed parallel to the northbound alignment with a new CP RAIL overpasses adjacent to the northbound Highway 2A structure constructed as part of the Stage II improvements.

9.6 The Costs Associated with Preferred Alignment

- The total construction cost estimate associated with the twinning of the Highway 2A corridor was estimated at $29M and include a 20% contingency and 15% for engineering services.
- A property estimate of $1.16M was determined for the additional property requirements necessary to implement the access management strategy and provide for a 4-lane cross section along the Highway 2A corridor.
- The total conceptual construction cost estimate inclusive of property was determined to be approximately $30.2M.

9.7 Where Do We Go From Here?

This *Highway 2A Functional Planning Study* was developed as a comprehensive functional plan to address the corridor requirements and offers Alberta Infrastructure and Transportation:

- flexibility in staging as the strategy is segmented into various projects each of which can be scheduled to meet development timetables or warrants;
- flexibility to respond to municipal initiatives with the required "ultimate" term highway road improvements;
- flexibility to respond to development initiatives with functional plans made in preparation of area structure and integrated master plans being advanced; and
- plans to accommodate additional highway through-lane capacity through the reduction of low volume intersections and accesses as they are phased out;

In addition to the above, it was found worthwhile for AIT consider:

- Initiating a functional planning study along the Highway 597 corridor that would define the future requirements necessary to sustain the proposed Lacombe County developments adjacent to the highway corridor;
- Encouraging the Town of Lacombe to develop a multi-jurisdictional agreement involving Agriculture and Agri-Food Canada, Alberta Agriculture, County of Lacombe and Alberta Infrastructure and Transportation regarding the recommended location of the proposed South By-pass intersection.

9.8 Recommendations

It is recommended that…

1. The infrastructure improvements consistent with the *Highway 2A Functional Planning Study (Blackfalds to Lacombe)* be received by Alberta Infrastructure and Transportation;
2. The Town of Lacombe, Town of Blackfalds and County of Lacombe be informed that the *Highway 2A Functional Planning Study (Blackfalds to Lacombe)* represents a planning document and as such highway intersection / widening construction is currently not scheduled;
3. The Town of Lacombe, Town of Blackfalds and the County of Lacombe Councils be requested to incorporate the *Highway 2A Functional Planning Study (Blackfalds to Lacombe)* within their area structure and municipal development plans noting comments related to;
    - The desire to establish priority improvements which integrate with local planning initiatives; and
    - The desire to effect timing of improvements to address areas of local concern.

4. Subsequent to Alberta Infrastructure and Transportations endorsement of the general intersection modifications and highway realignment as recommended in the *Highway 2A Functional Planning Study (Blackfalds to Lacombe)*, Alberta Infrastructure and Transportation is encouraged to pursue those initiatives necessary to confirm the detailed engineering feasibility of the "ultimate" alignments associated with future requirements. These activities would likely include, but are not limited to:

    a) Presentations to the Town of Blackfalds, Town of Lacombe and County of Lacombe with the goal of seeking endorsement of those components of functional plan that would proceed to detailed design;

    b) Responding to development driven initiatives [i.e *South-East Area Structure Plan* (NW 23-39-27-4)] to assure that access provisions are in accordance with the access management strategy.

    c) Monitoring traffic (vehicular and pedestrian) at critical intersections along the Highway 2A corridor to enable AIT to assess warrants for signalization, traffic signal phasing improvements, or infrastructure improvements.

    d) Undertaking Phase II environmental assessment and heritage resource investigations prior to detailed design and construction to obtain the necessary clearances;

    e) Development of individual detailed intersection construction staging strategies that would offer the flexibility to convert the various intersections along the Highway 2A corridor to their ultimate 4-lane configuration;

    f) Encouragement of the Town of Lacombe to continue negotiations with the adjacent landowners, agencies and institutions to develop a multi-jurisdictional agreements that would solidify the location of the proposed South By-pass and intersection location with Highway 2A;

5. In addition to the above, it was found worthwhile for AIT consider:

    a. undertaking a functional planning study that would address the "ultimate" requirements along the Highway 597 corridor specifically between Highway 2 and Range Road 26-4 to accommodate the forecast traffic volumes associated with the *Lacombe/Blackfalds Area Structure Plan.*

    b. coordinating ITS initiatives with a system of emergency "changeable message signs" and global emergency routing measures along the Highway 2 corridor in advance of the Highway 12 interchange (Lacombe) in the southbound direction and in advance of the Highway 67 (Red Deer) interchange in the northbound direction.

Highway 2A
Blackfalds to Lacombe

Annex "A": Functional Plans

Annex "B": Right of Way Request Plans

Presented to:

Mike Damberger, P.Eng

Alberta Infrastructure and Transportation
4th Floor Provincial Building
4920 - 51 Street
Red Deer, Alberta
T4N 6K8

July, 2005

CastleGlenn Consultants Inc.
Engineers, Project Managers & Planners

Annex "A": Functional Plans & Cross Sections

FOR CONTINUATION SEE HWY 2A (RED DEER TO BLACKFALDS) TRANSPORTATION PLANNING STUDY, FUNCTIONAL PLANS, JULY 2004

FOR CONTINUATION SEE FIGURE 1-B

CLOSED
CLOSED
CLOSED
FIG. 1-B
FIG. 1-C
FIG. 1-D
RIGHT IN/OUT
HIGHWAY 2A
HIGHWAY 597
SOUTH ST.
BROADWAY AVE
RAILWAY ST
BLACKFALDS
DOW LOADING FACILITY
EXISTING CP RAIL OVERPASS
CLOSED
CANDELTRAK

FIGURE : 1-A
HIGHWAY 2A PROPOSED IMPROVEMENTS
MARCH 2005
BLACKFALDS TO LACOMBE ALBERTA

LEGEND

- PROP. EDGE OF LANE (PLAN)
- EXISTING LOT LINE
- PROP. RIGHT OF WAY
- FLOWING GAS WELLHEAD
- LOW PRESSURE GAS LINE
- MED. PRESSURE GAS LINE
- HIGH PRESSURE GAS LINE
- OVERHEAD POWER LINES
- TELUS UNDERGROUND CABLE
- SHAW UNDERGROUND CABLE
- UNDERGROUND FIBER OPTIC
- DOW CHEMICAL PIPELINE
- OVERHEAD TELUS LINES
- ABANDONED WELLHEAD

0m 200m 400m
SCALE 1: 10,000

Alberta
INFRASTRUCTURE AND TRANSPORTATION

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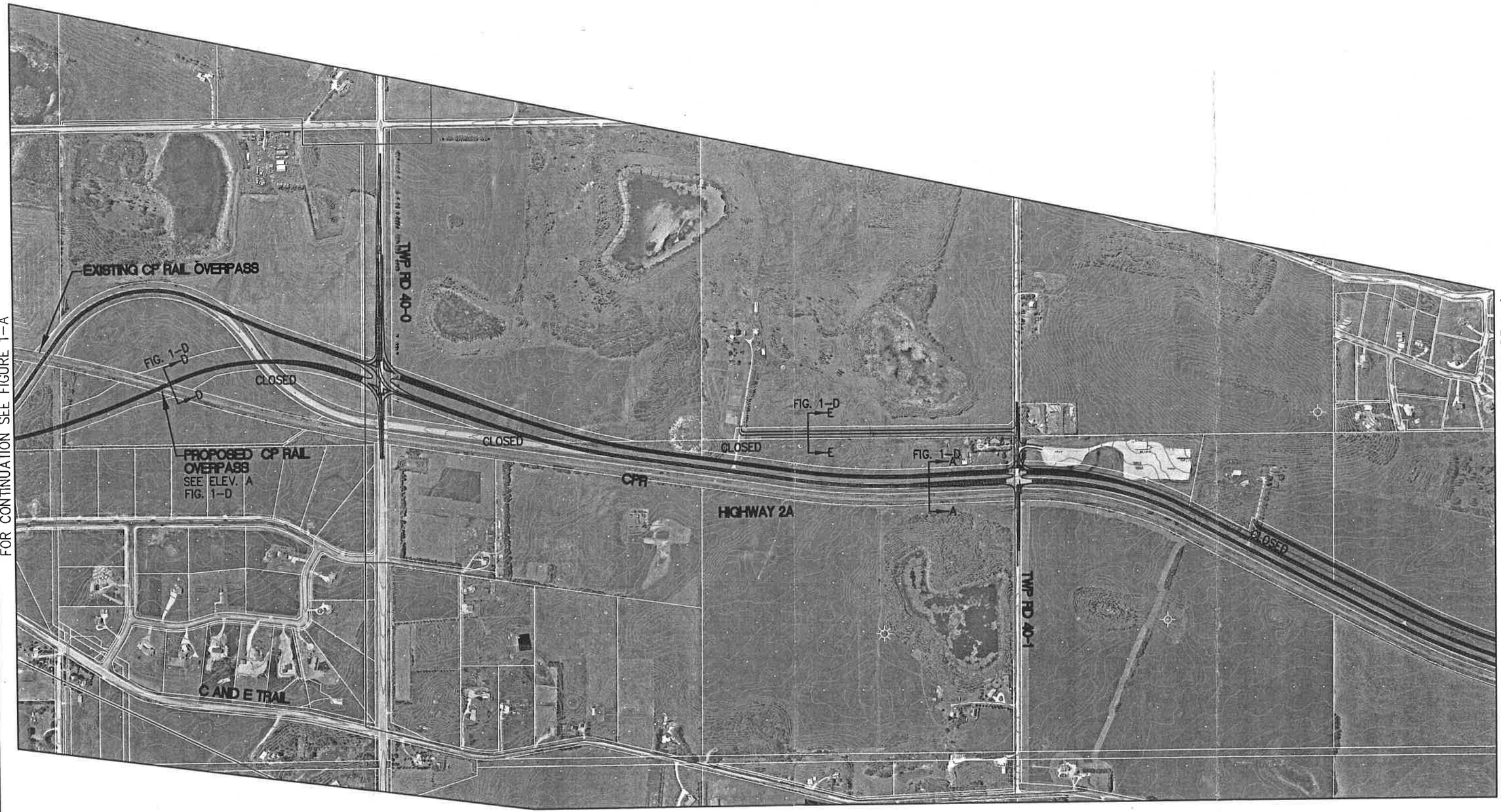
FOR CONTINUATION SEE FIGURE 1-A



FOR CONTINUATION SEE FIGURE 1-C

FIGURE : 1-B
HIGHWAY 2A PROPOSED IMPROVEMENTS
MARCH 2005
BLACKFALDS TO LACOMBE ALBERTA

LEGEND

- PROP. EDGE OF LANE (PLAN)
- EXISTING LOT LINE
- PROP. RIGHT OF WAY
- FLOWING GAS WELLHEAD
- LOW PRESSURE GAS LINE
- MED. PRESSURE GAS LINE
- HIGH PRESSURE GAS LINE
- OVERHEAD POWER LINES
- TELUS UNDERGROUND CABLE
- SHAW UNDERGROUND CABLE
- UNDERGROUND FIBER OPTIC
- DOW CHEMICAL PIPELINE
- OVERHEAD TELUS LINES
- ABANDONED WELLHEAD

0m 200m 400m
SCALE 1: 10,000

Alberta Infrastructure and Transportation

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FOR CONTINUATION SEE FIGURE 1–B

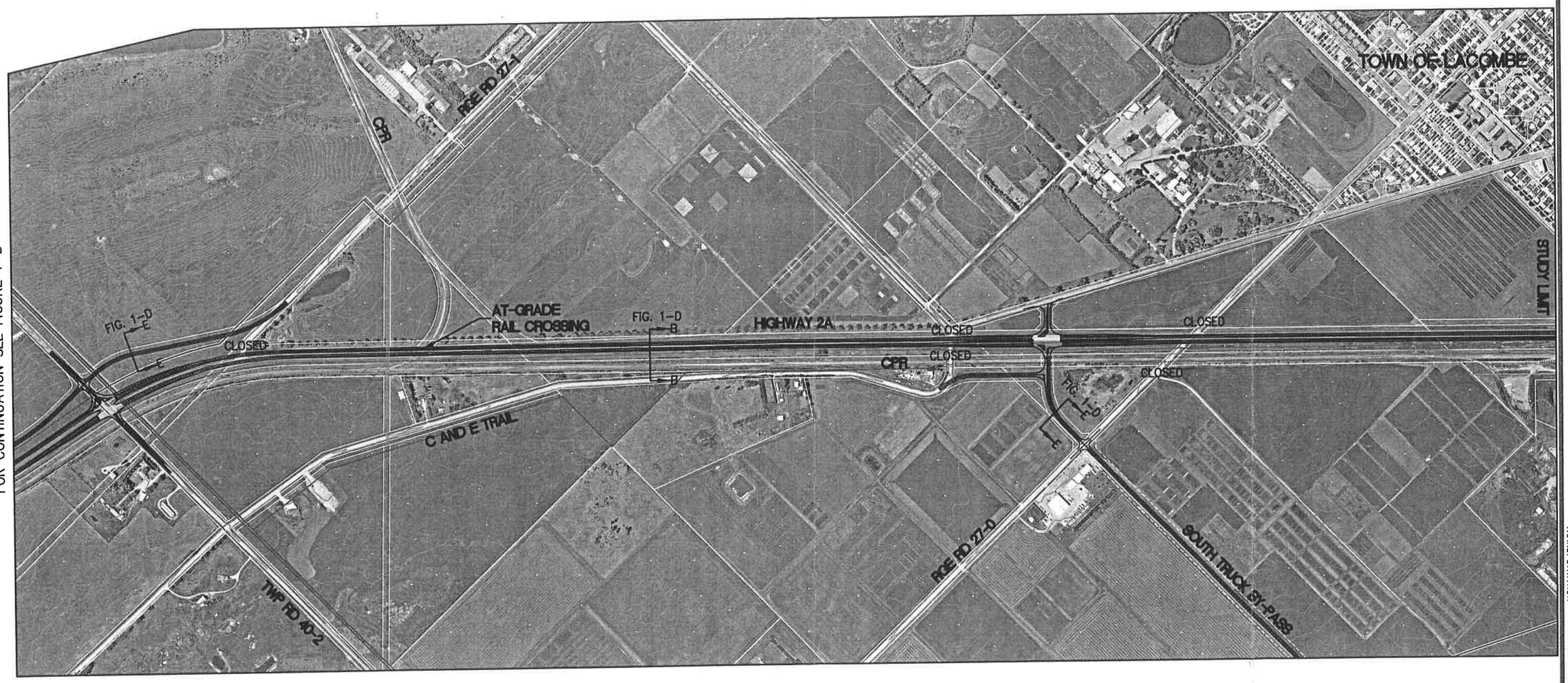

FIGURE : 1–C
HIGHWAY 2A PROPOSED IMPROVEMENTS
MARCH 2005
BLACKFALDS TO LACOMBE ALBERTA

LEGEND

- PROP. EDGE OF LANE (PLAN)
- EXISTING LOT LINE
- PROP. RIGHT OF WAY
- FLOWING GAS WELLHEAD
- LOW PRESSURE GAS LINE
- MED. PRESSURE GAS LINE
- HIGH PRESSURE GAS LINE
- OVERHEAD POWER LINES
- TELUS UNDERGROUND CABLE
- SHAW UNDERGROUND CABLE
- UNDERGROUND FIBER OPTIC
- DOW CHEMICAL PIPELINE
- OVERHEAD TELUS LINES
- ABANDONED WELLHEAD

0m 200m 400m
SCALE 1: 10,000

Alberta INFRASTRUCTURE AND TRANSPORTATION

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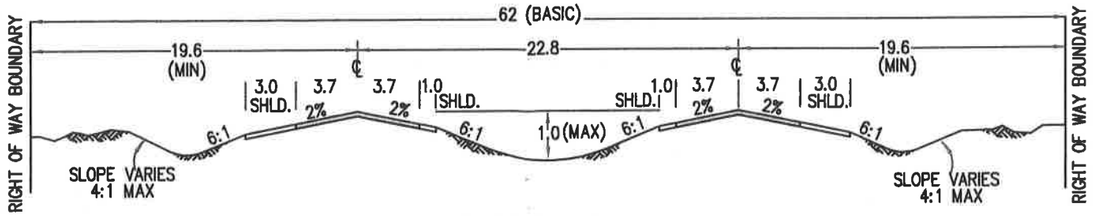
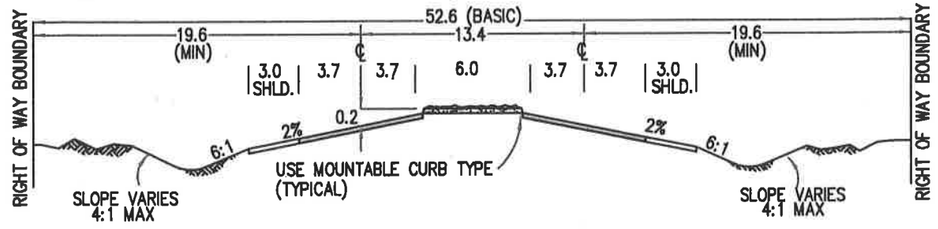


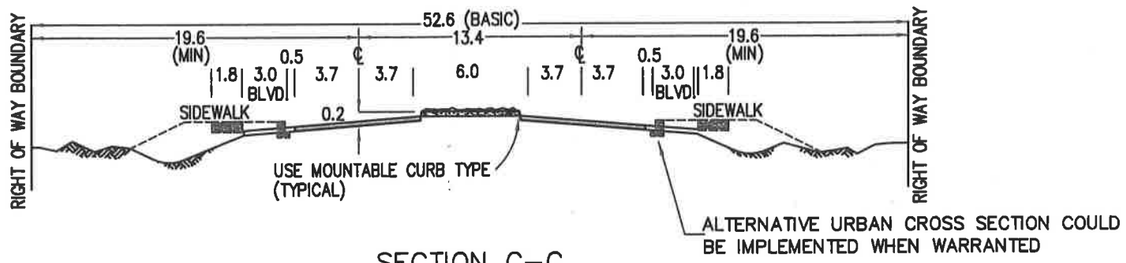
SECTION A–A

TYPICAL PROPOSED HIGHWAY DEPRESSED MEDIAN CROSS–SECTION



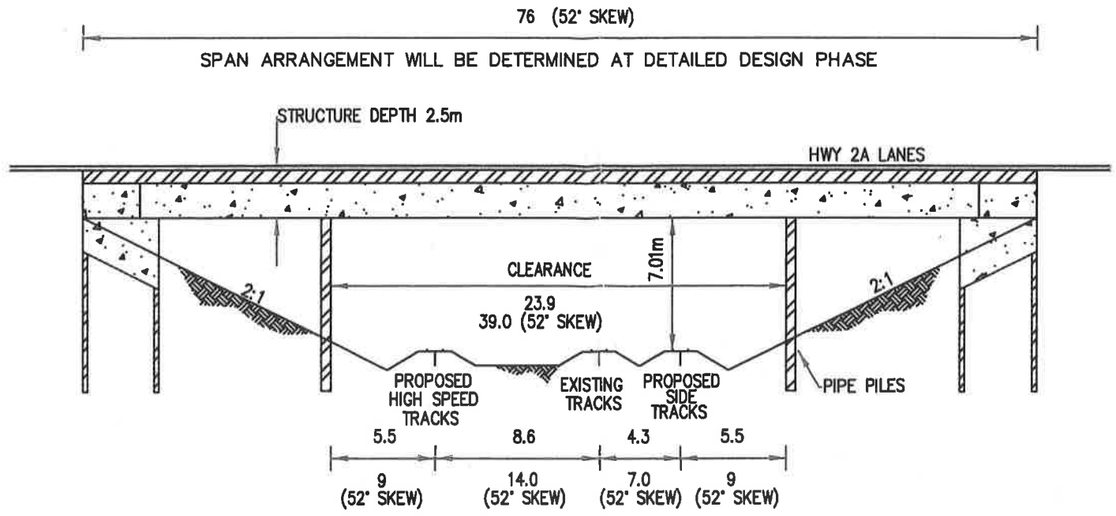
SECTION B–B

TYPICAL PROPOSED HIGHWAY RAISED MEDIAN CROSS–SECTION



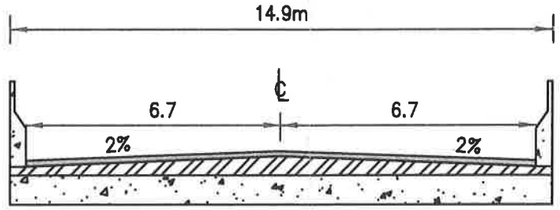
SECTION C–C

ALTERNATIVE PROPOSED RAISED MEDIAN CROSS–SECTION



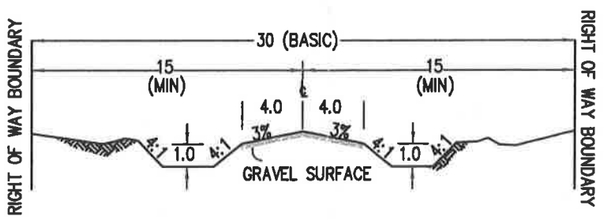
ELEVATION A

PROPOSED CPR OVERPASS ELEVATION



SECTION D–D

PROPOSED CPR OVERPASS CROSS–SECTION



SECTION E–E

TYPICAL SERVICE ROAD CROSS–SECTION

FIGURE : 1–D
TYPICAL CROSS SECTIONS
MARCH 2005
BLACKFALDS TO LACOMBE

Alberta INFRASTRUCTURE AND TRANSPORTATION

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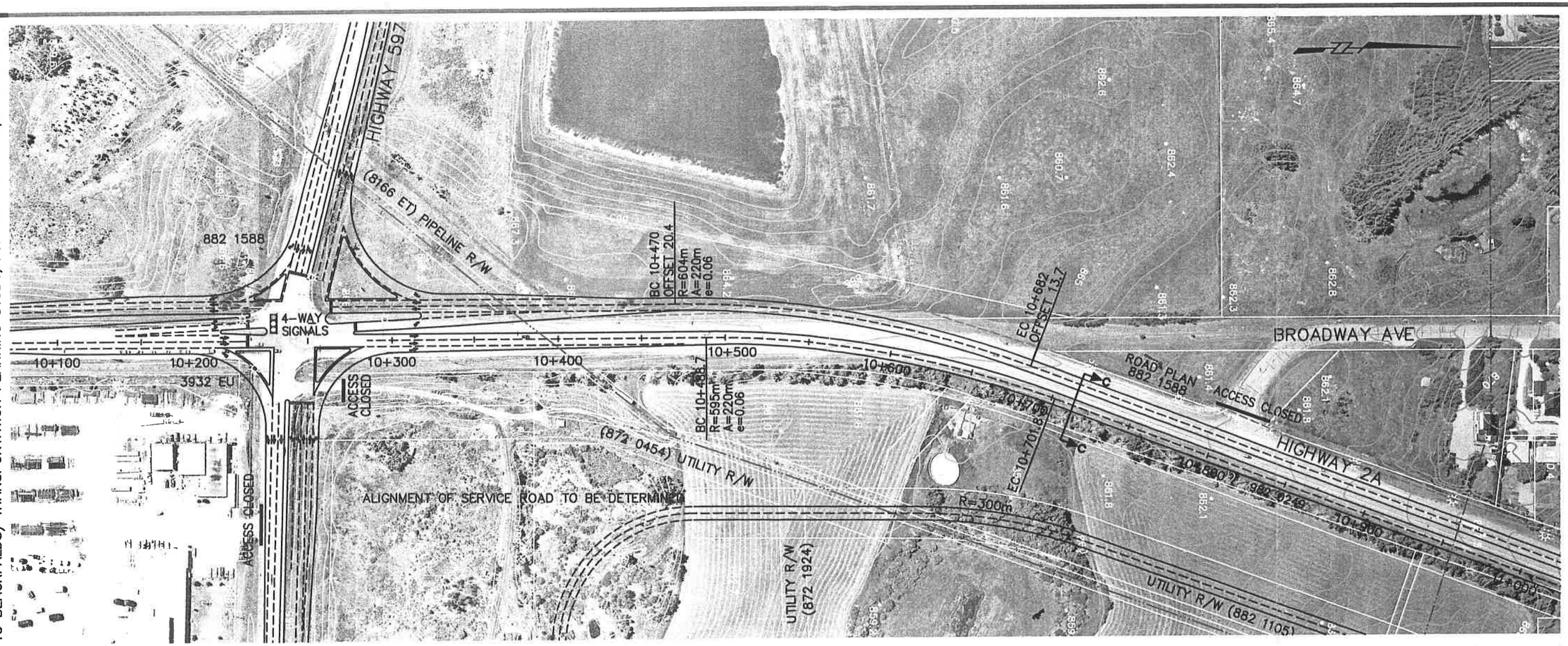
NOTE: A) ALL DIMENSIONS ARE IN METERS
B) DRAWINGS ARE NOT TO SCALE

C:\JOBS\RED DEER(B–L) \HC.DWG



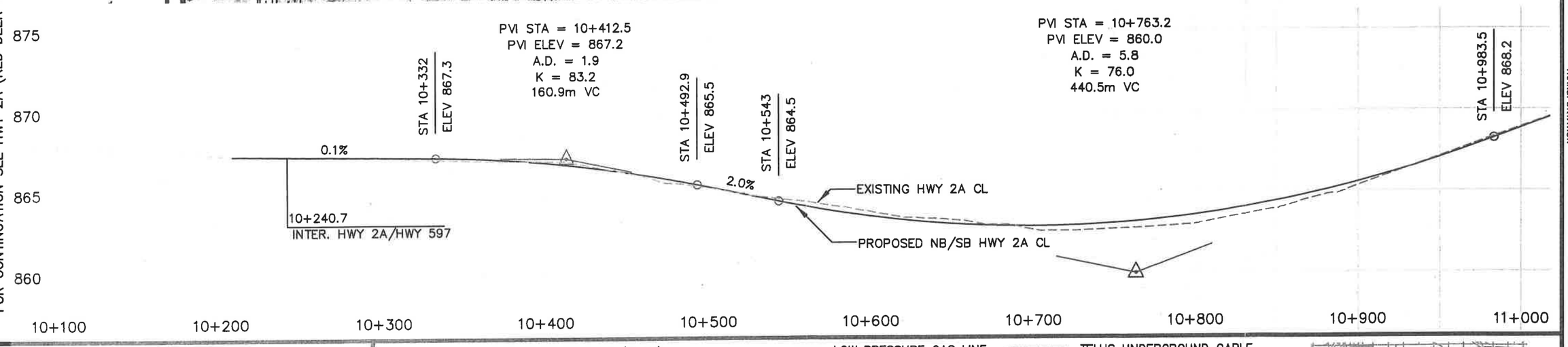


FIGURE : 2
HIGHWAY 2A PROPOSED IMPROVEMENTS
(STA 10+100 – 11+000)
MARCH 2005
BLACKFALDS TO LACOMBE ALBERTA

LEGEND

- PROP. EDGE OF LANE (PLAN)
- APPROX. PROPOSED HIGHWAY PROFILE
- APPROX. EXISTING HIGHWAY PROFILE
- EXISTING LOT LINE
- PROP. RIGHT OF WAY
- EXISTING STREET LIGHT
- LOW PRESSURE GAS LINE
- MED. PRESSURE GAS LINE
- HIGH PRESSURE GAS LINE
- OVERHEAD POWER LINES
- OVERHEAD TELUS LINES
- TELUS UNDERGROUND CABLE
- SHAW UNDERGROUND CABLE
- UNDERGROUND FIBER OPTIC
- DOW CHEMICAL PIPELINE

0 100m
SCALE 1:2500 HORIZ.
1:250 VERT.

SHEET INDEX

Alberta Infrastructure and Transportation

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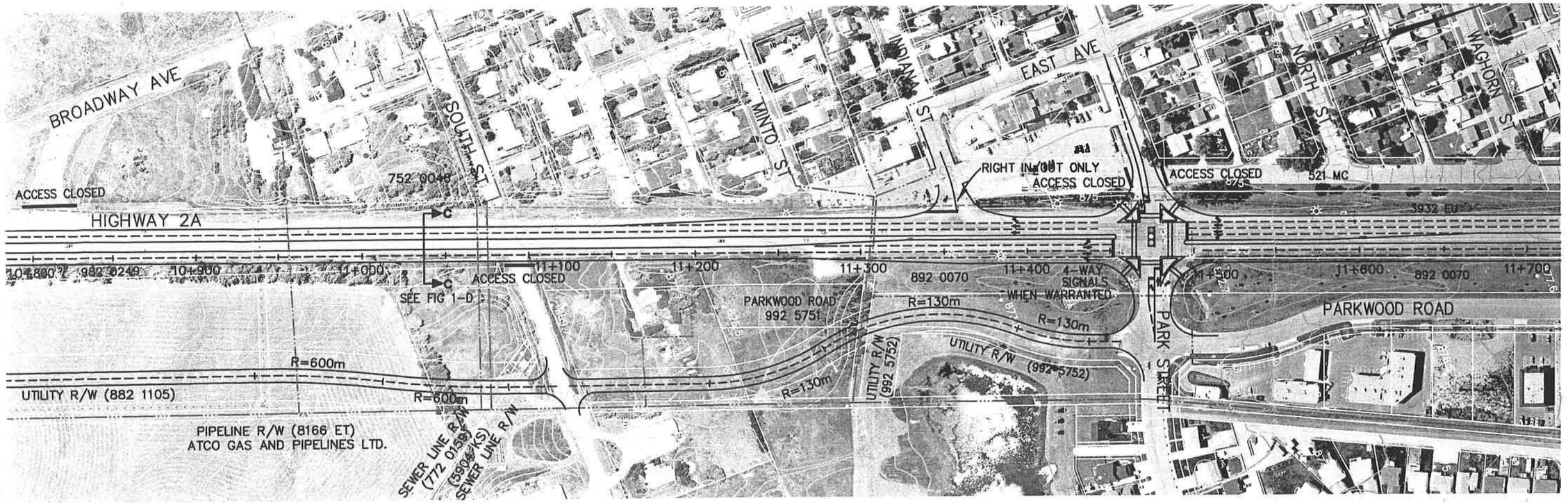
C:\JOBS\RED DEER(B-L) \HC.DWG



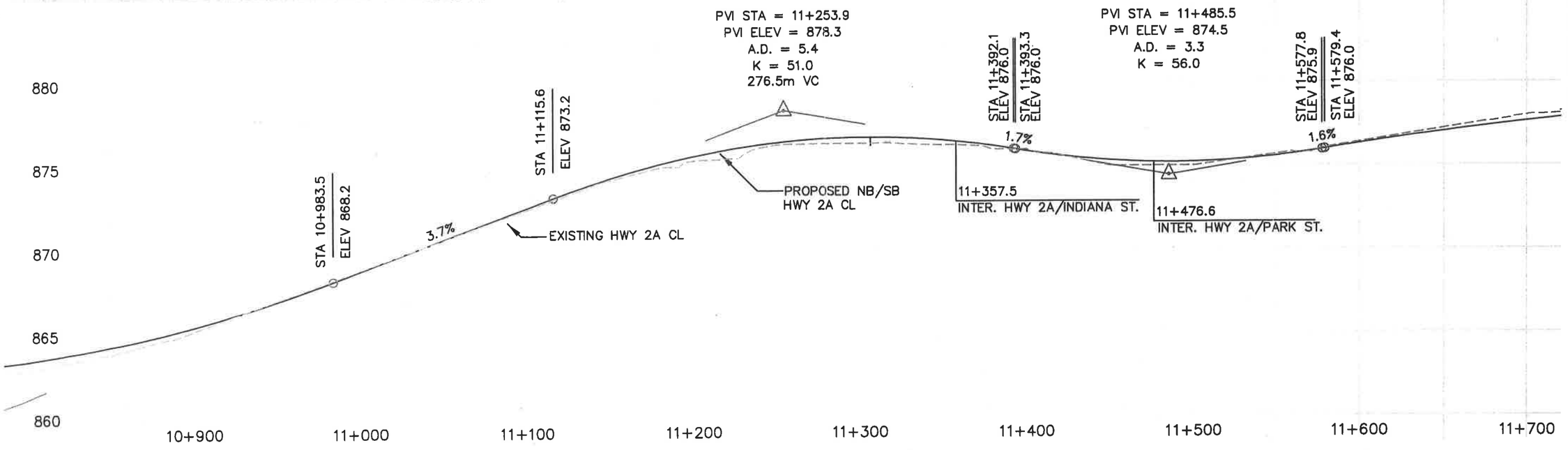
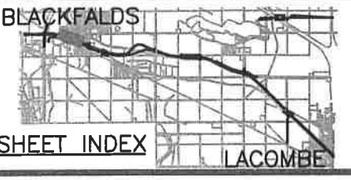


FIGURE : 3
HIGHWAY 2A PROPOSED IMPROVEMENTS
(STA 10+800 – 11+700)
MARCH 2005
BLACKFALDS TO LACOMBE ALBERTA

LEGEND

- PROP. EDGE OF LANE (PLAN)
- APPROX. PROPOSED HIGHWAY PROFILE
- APPROX. EXISTING HIGHWAY PROFILE
- EXISTING LOT LINE
- PROP. RIGHT OF WAY
- EXISTING STREET LIGHT
- LOW PRESSURE GAS LINE
- MED. PRESSURE GAS LINE
- HIGH PRESSURE GAS LINE
- OVERHEAD POWER LINES
- OVERHEAD TELUS LINES
- TELUS UNDERGROUND CABLE
- SHAW UNDERGROUND CABLE
- UNDERGROUND FIBER OPTIC
- DOW CHEMICAL PIPELINE

0 100m
SCALE 1:2500 HORIZ.
1:250 VERT.



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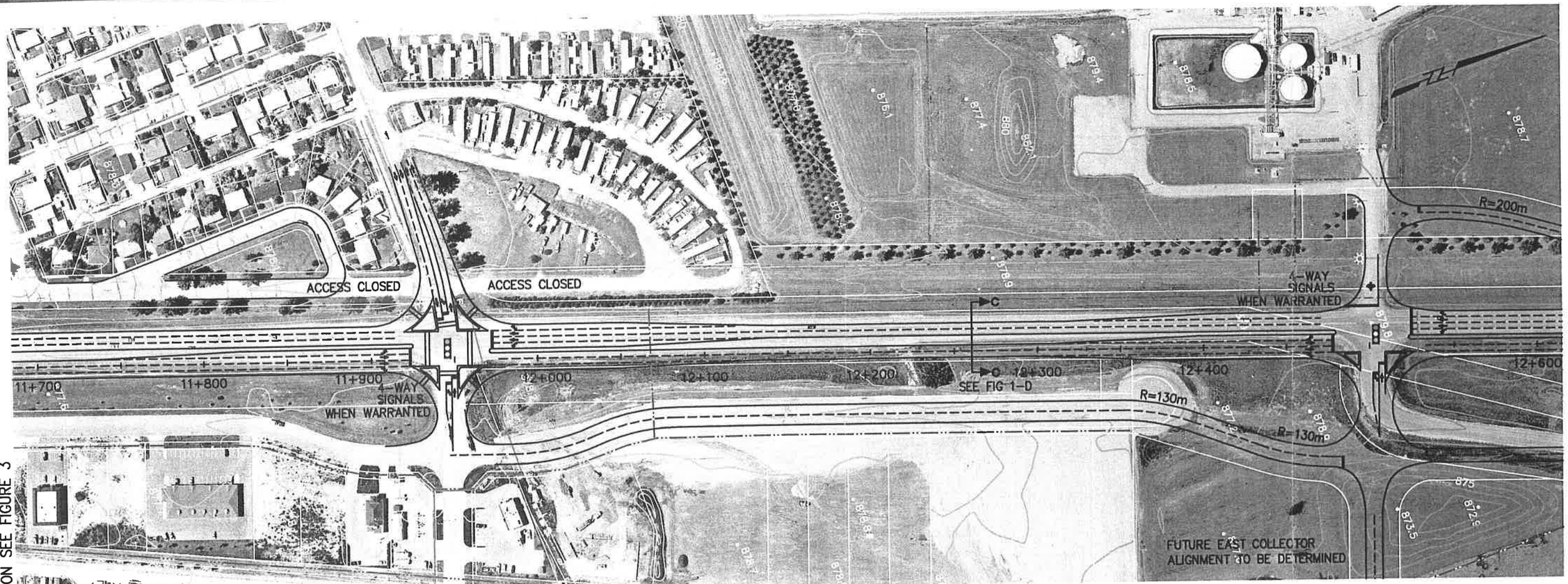


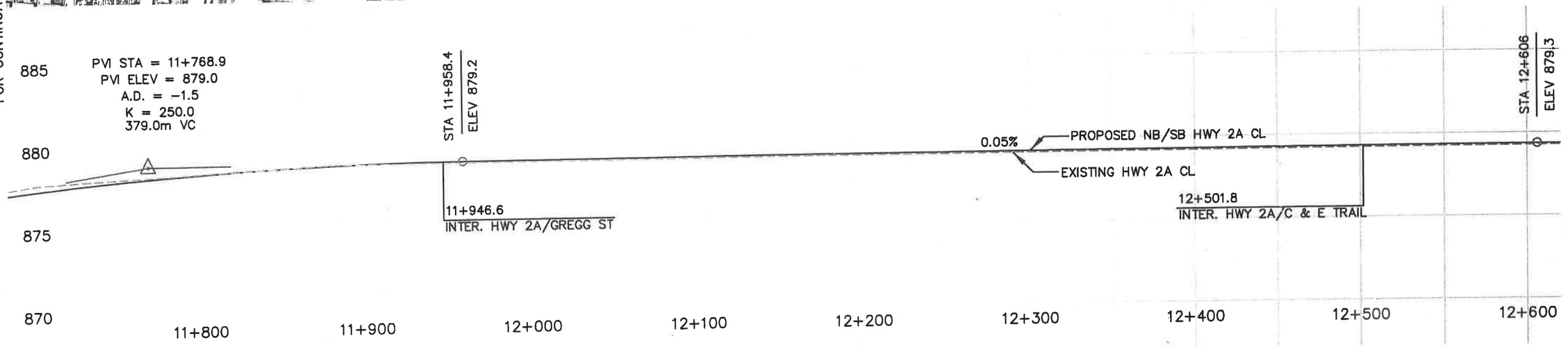
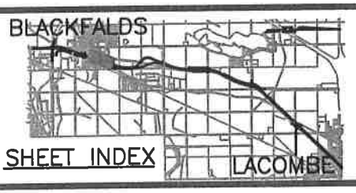


FIGURE : 4
HIGHWAY 2A PROPOSED IMPROVEMENTS
(STA 11+700 – 12+600)
MARCH 2005
BLACKFALDS TO LACOMBE ALBERTA

LEGEND

- PROP. EDGE OF LANE (PLAN)
- APPROX. PROPOSED HIGHWAY PROFILE
- APPROX. EXISTING HIGHWAY PROFILE
- EXISTING LOT LINE
- PROP. RIGHT OF WAY
- EXISTING STREET LIGHT
- LOW PRESSURE GAS LINE
- MED. PRESSURE GAS LINE
- HIGH PRESSURE GAS LINE
- OVERHEAD POWER LINES
- OVERHEAD TELUS LINES
- TELUS UNDERGROUND CABLE
- SHAW UNDERGROUND CABLE
- UNDERGROUND FIBER OPTIC
- DOW CHEMICAL PIPELINE

0 100m
SCALE 1:2500 HORIZ.
1:250 VERT.



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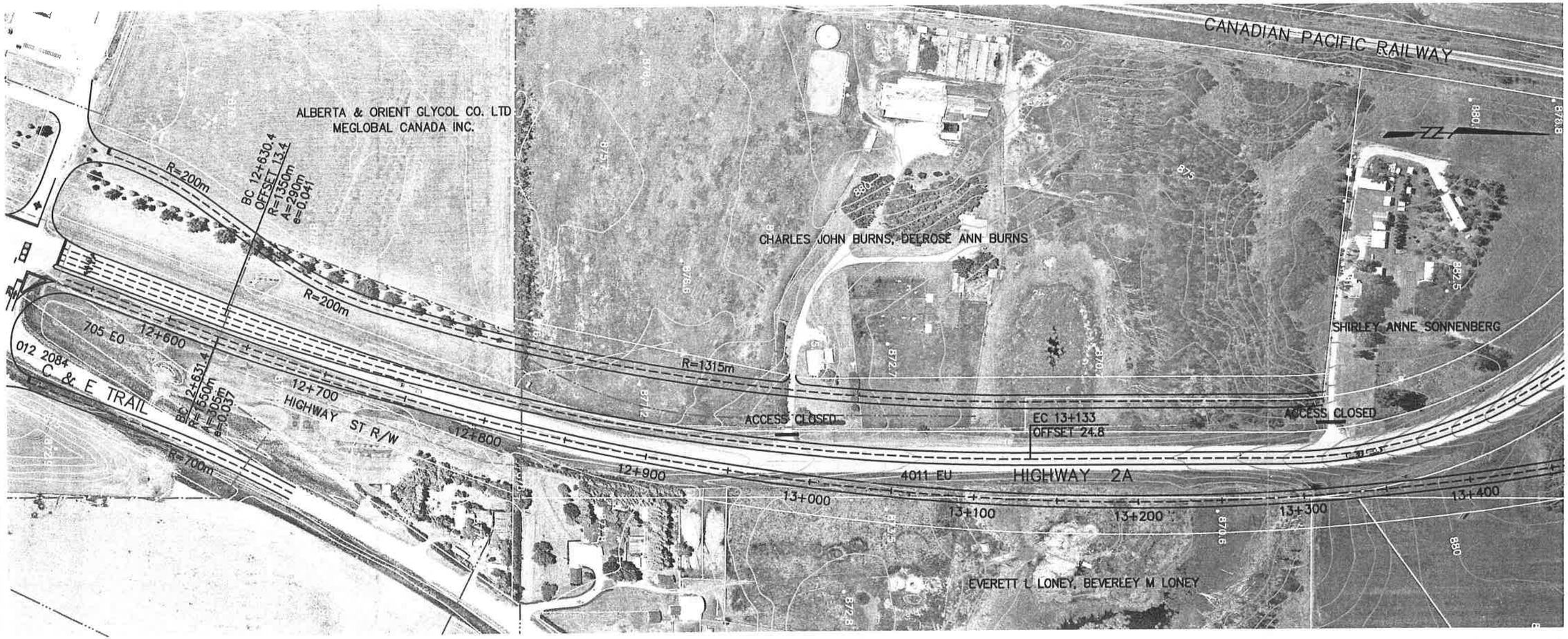

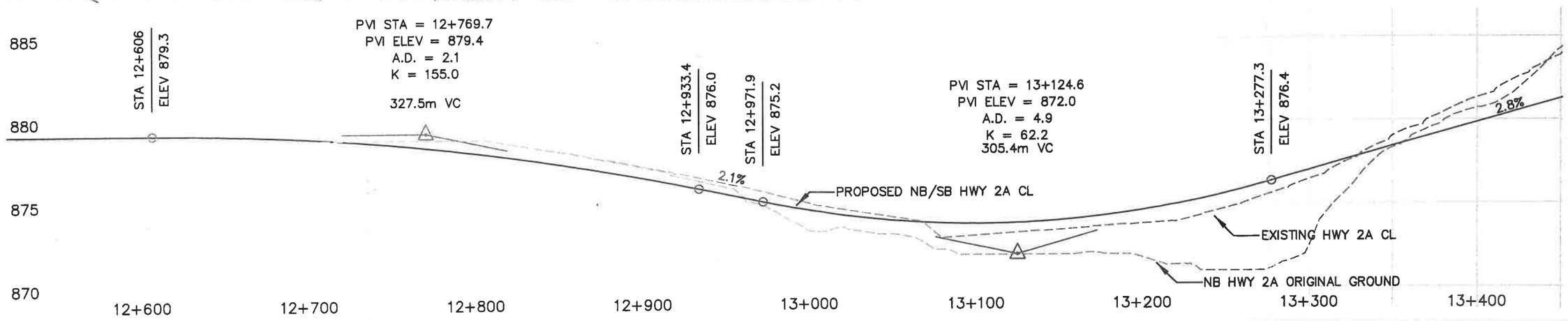

FIGURE : 5
HIGHWAY 2A PROPOSED IMPROVEMENTS
(STA 12+550 – 13+450)
MARCH 2005
BLACKFALDS TO LACOMBE ALBERTA

LEGEND

- PROP. EDGE OF LANE (PLAN)
- APPROX. PROPOSED HIGHWAY PROFILE
- APPROX. EXISTING HIGHWAY PROFILE
- EXISTING LOT LINE
- PROP. RIGHT OF WAY
- EXISTING STREET LIGHT
- LOW PRESSURE GAS LINE
- MED. PRESSURE GAS LINE
- HIGH PRESSURE GAS LINE
- OVERHEAD POWER LINES
- OVERHEAD TELUS LINES
- TELUS UNDERGROUND CABLE
- SHAW UNDERGROUND CABLE
- UNDERGROUND FIBER OPTIC
- DOW CHEMICAL PIPELINE

0 100m
SCALE 1: 2500 HORIZ.
1: 250 VERT.

BLACKFALDS
SHEET INDEX
LACOMBE

FOR CONTINUATION SEE FIGURE 4
FOR CONTINUATION SEE FIGURE 6 & 7

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FOR CONTINUATION SEE FIGURE 5

KENNETH R ATSINGER

NW35 39-27-4

HIGHWAY 2A SB LANES

SW35 39-27-4
MICHAEL DALE ROTH

R=292m

992 0180

992 0180

KENNETH R ATSINGER

PROPOSED RIGHT OF WAY IS ADEQUATE TO ACCOMMODATE FUTURE SOUTHBOUND HIGHWAY 2A LANES IF REQUIRED.

BC 14+111.1
OFFSET 126.3
R=2000m
A=350
e=0.029

CPR

BC 13+957.04
R=600m
A=220m
e=0.06

52°

14+000

14+100

14+200

14+300

14+400

EC 14+238.2
OFFSET 61.5

992 0180

HIGHWAY 2A NB LANES

13+500

13+600

13+700

13+800

13+900

EC 13+784.7

FOR CPR OVERPASS
DETAIL SEE ELEVATION-A
FIG. 1-D

PROPOSED HIGHSPEED TRACK
(PRECISE TRACK ALIGNMENT TO BE DETERMINED)

PROPOSED SIDE TRACK
PER CPR RAIL NETWORK PLAN: PORTION OF LEDUC SUBDIVISION AREA FROM RED DEER TO WOLF CREEK (FEBRUARY 24, 2005)

4011 EU

ACCESS CLOSED

EC 14+398.8

19 MR

(3950 MC) BURIED CABLE AND POLE LINE R/W

KENNETH R ATSINGER

FOR PROFILE DRAWING SEE FIGURE 7

FOR CONTINUATION SEE FIGURE 8

FIGURE : 6
HIGHWAY 2A PROPOSED IMPROVEMENTS
(STA 13+450 - 14+000)
MARCH 2005
BLACKFALDS TO LACOMBE ALBERTA

LEGEND

- PROP. EDGE OF LANE (PLAN)
- APPROX. PROPOSED HIGHWAY PROFILE
- APPROX. EXISTING HIGHWAY PROFILE
- EXISTING LOT LINE
- PROP. RIGHT OF WAY
- EXISTING STREET LIGHT
- LOW PRESSURE GAS LINE
- MED. PRESSURE GAS LINE
- HIGH PRESSURE GAS LINE
- OVERHEAD POWER LINES
- OVERHEAD TELUS LINES
- TELUS UNDERGROUND CABLE
- SHAW UNDERGROUND CABLE
- UNDERGROUND FIBER OPTIC
- DOW CHEMICAL PIPELINE

0 100m
SCALE 1:2500 HORIZ.
1:250 VERT.

BLACKFALDS

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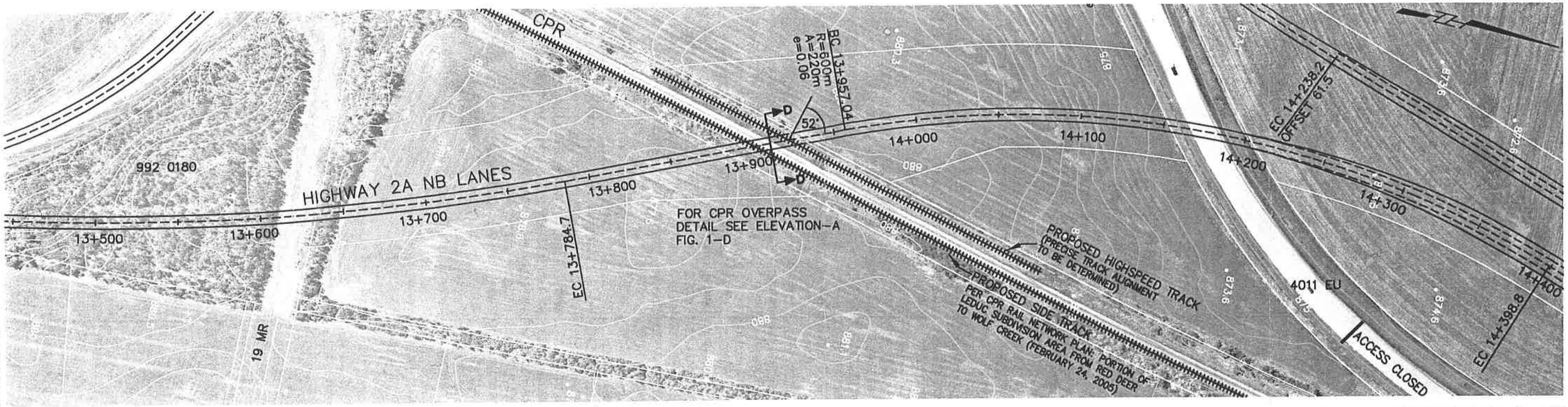


FOR CONTINUATION SEE FIGURE 5

FOR CONTINUATION SEE FIGURE 8

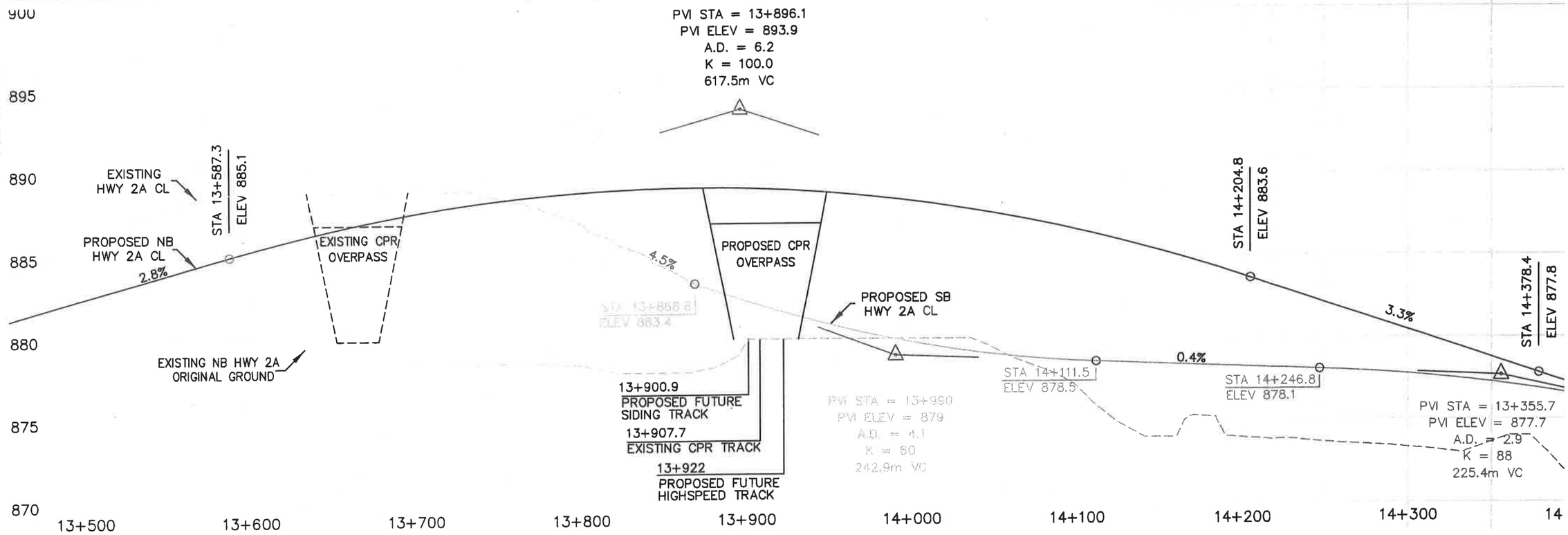
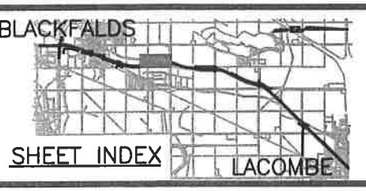


FIGURE : 7
HIGHWAY 2A PROPOSED IMPROVEMENTS
(STA 13+450 – 14+000)
MARCH 2005
BLACKFALDS TO LACOMBE ALBERTA

LEGEND

- PROP. EDGE OF LANE (PLAN)
- APPROX. PROPOSED HIGHWAY PROFILE
- APPROX. EXISTING HIGHWAY PROFILE
- EXISTING LOT LINE
- PROP. RIGHT OF WAY
- EXISTING STREET LIGHT
- LOW PRESSURE GAS LINE
- MED. PRESSURE GAS LINE
- HIGH PRESSURE GAS LINE
- OVERHEAD POWER LINES
- OVERHEAD TELUS LINES
- TELUS UNDERGROUND CABLE
- SHAW UNDERGROUND CABLE
- UNDERGROUND FIBER OPTIC
- DOW CHEMICAL PIPELINE

0 100m
SCALE 1:2500 HORIZ.
1:250 VERT.



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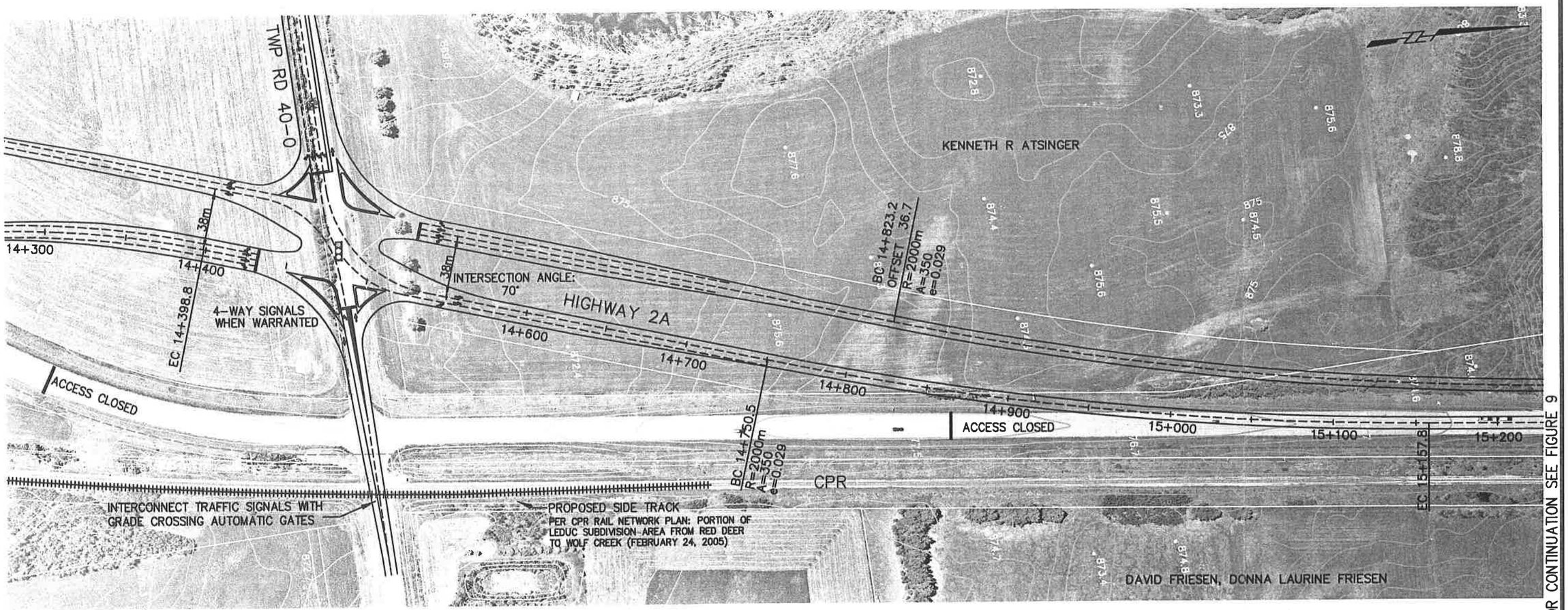

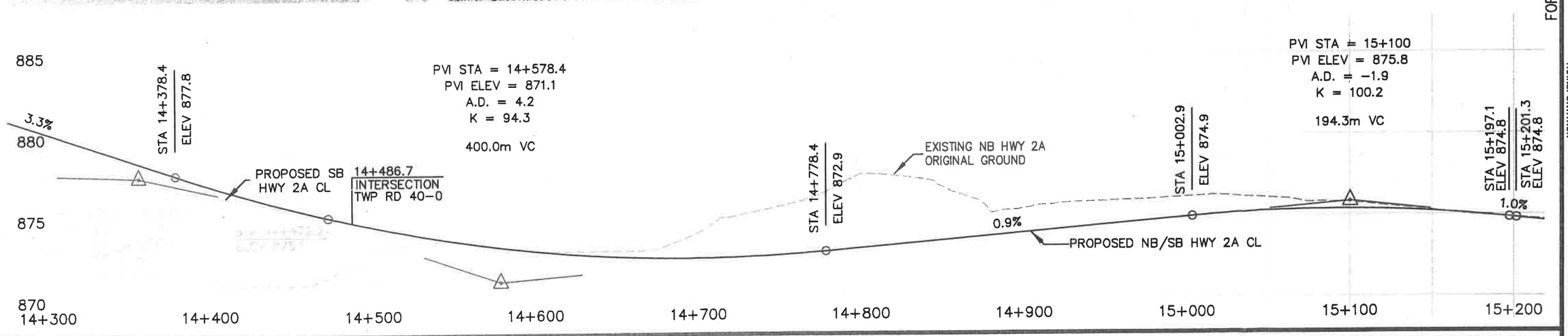

FIGURE : 8
HIGHWAY 2A PROPOSED IMPROVEMENTS
(STA 14+350 – 15+200)
MARCH 2005
BLACKFALDS TO LACOMBE ALBERTA

LEGEND

- PROP. EDGE OF LANE (PLAN)
- APPROX. PROPOSED HIGHWAY PROFILE
- APPROX. EXISTING HIGHWAY PROFILE
- EXISTING LOT LINE
- PROP. RIGHT OF WAY
- EXISTING STREET LIGHT
- LOW PRESSURE GAS LINE
- MED. PRESSURE GAS LINE
- HIGH PRESSURE GAS LINE
- OVERHEAD POWER LINES
- OVERHEAD TELUS LINES
- TELUS UNDERGROUND CABLE
- SHAW UNDERGROUND CABLE
- UNDERGROUND FIBER OPTIC
- DOW CHEMICAL PIPELINE

0 100m
SCALE 1:2500 HORIZ.
1:250 VERT.

BLACKFALDS
SHEET INDEX
LACOMBE

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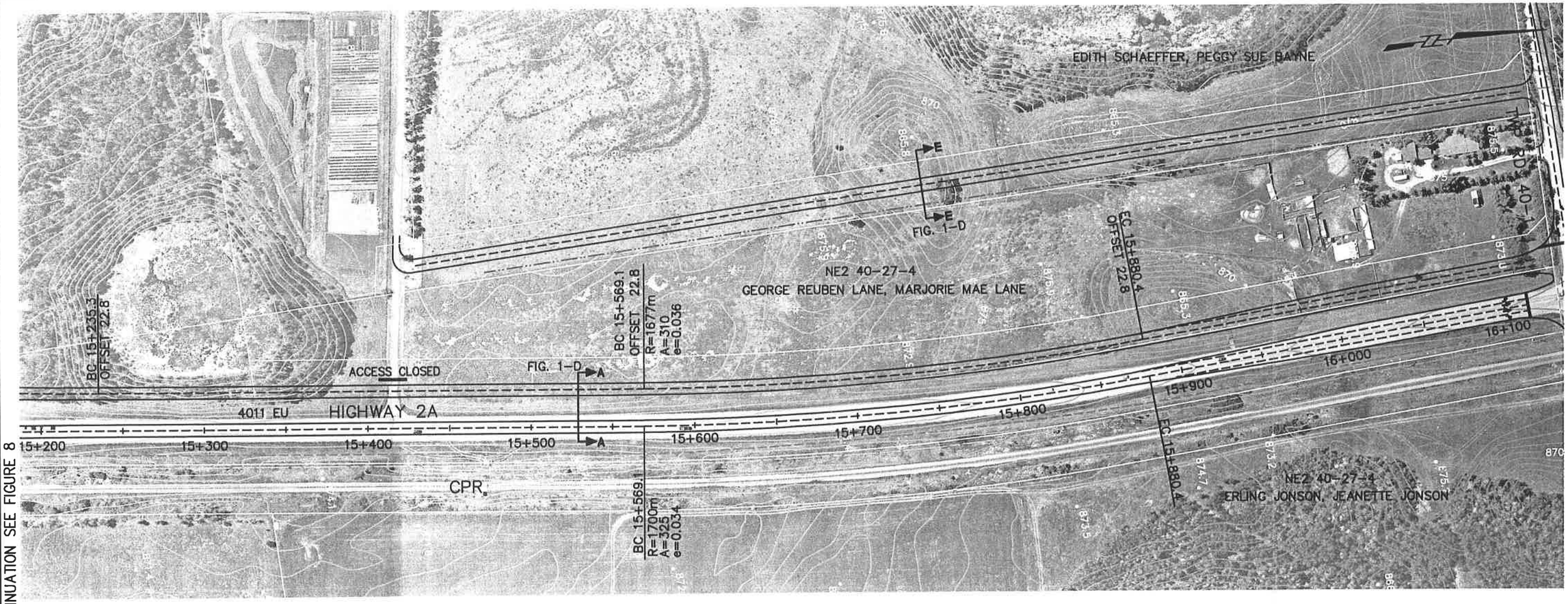
FOR CONTINUATION SEE FIGURE 8



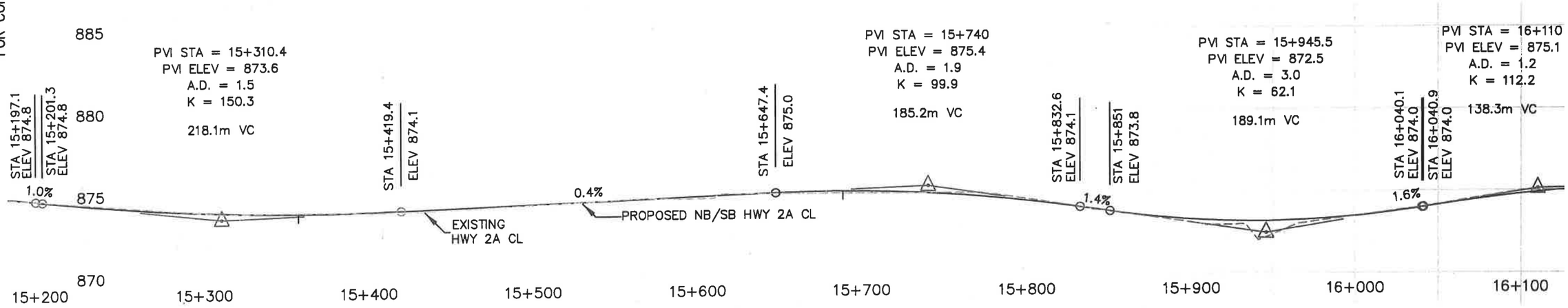


FIGURE : 9
HIGHWAY 2A PROPOSED IMPROVEMENTS
(STA 15+200 – 16+100)
MARCH 2005
BLACKFALDS TO LACOMBE ALBERTA

LEGEND

- PROP. EDGE OF LANE (PLAN)
- APPROX. PROPOSED HIGHWAY PROFILE
- APPROX. EXISTING HIGHWAY PROFILE
- EXISTING LOT LINE
- PROP. RIGHT OF WAY
- EXISTING STREET LIGHT
- LOW PRESSURE GAS LINE
- MED. PRESSURE GAS LINE
- HIGH PRESSURE GAS LINE
- OVERHEAD POWER LINES
- OVERHEAD TELUS LINES
- TELUS UNDERGROUND CABLE
- SHAW UNDERGROUND CABLE
- UNDERGROUND FIBER OPTIC
- DOW CHEMICAL PIPELINE

0 100m
SCALE 1:2500 HORIZ.
1:250 VERT.

BLACKFALDS
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LACOMBE

FOR CONTINUATION SEE FIGURE 10

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FOR CONTINUATION SEE FIGURE 9

FREDERICK BABCHUK

932 0171
R.C. JACOBSON HOLDINGS LTD.

TWP RD 40-1

BC 16+149.9
OFFSET 22.8
R=872.8m
A=250
e=0.053

FIG. 1-D

HIGHWAY 2A

16+100 16+200 16+300 16+400 16+500 16+600 16+700 16+800 16+900 17+000

4-WAY SIGNALS WHEN WARRANTED

INTERCONNECT TRAFFIC SIGNALS WITH GRADE CROSSING AUTOMATIC GATES

CPR

BC 16+149.9
R=850m
A=250
e=0.053

EC 16+589.1
OFFSET 22.8m

SE11 40-27-4
DAVID H G ANDERSON, MARILYN ANDERSON

ACCESS CLOSED

SE11 40-27-4
MAURICE J DEPAUW, HELEN IRENE DEPAUW

TC 16+589.1

885 880 875 870

PVI STA = 16+110
PVI ELEV = 875.1
A.D. = 1.2
K = 112.2
138.3m VC

STA 16+179.2
ELEV 875.4

STA 16+182.4
ELEV 875.4

0.4%

16+143.2
INTERSECTION
HWY 2A/TWP RD 40-1

PVI STA = 16+432.4
PVI ELEV = 876.3
A.D. = -2.0
K = 249.1
500.0m VC

STA 16+682.4
ELEV 872.2

STA 16+683.7
ELEV 872.2

1.6%

PROPOSED NB/SB HWY 2A CL

EXISTING
HWY 2A CL

PVI STA = 16+951.2
PVI ELEV = 867.8
A.D. = 1.5
K = 367
535m VC

FIGURE : 10
HIGHWAY 2A PROPOSED IMPROVEMENTS
(STA 16+000 – 17+000)
MARCH 2005
BLACKFALDS TO LACOMBE ALBERTA

LEGEND

- PROP. EDGE OF LANE (PLAN)
- APPROX. PROPOSED HIGHWAY PROFILE
- APPROX. EXISTING HIGHWAY PROFILE
- EXISTING LOT LINE
- PROP. RIGHT OF WAY
- EXISTING STREET LIGHT
- LOW PRESSURE GAS LINE
- MED. PRESSURE GAS LINE
- HIGH PRESSURE GAS LINE
- OVERHEAD POWER LINES
- OVERHEAD TELUS LINES
- TELUS UNDERGROUND CABLE
- SHAW UNDERGROUND CABLE
- UNDERGROUND FIBER OPTIC
- DOW CHEMICAL PIPELINE

0 100m
SCALE 1:2500 HORIZ.
1:250 VERT.

BLACKFALDS
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LACOMBE

FOR CONTINUATION SEE FIGURE 11

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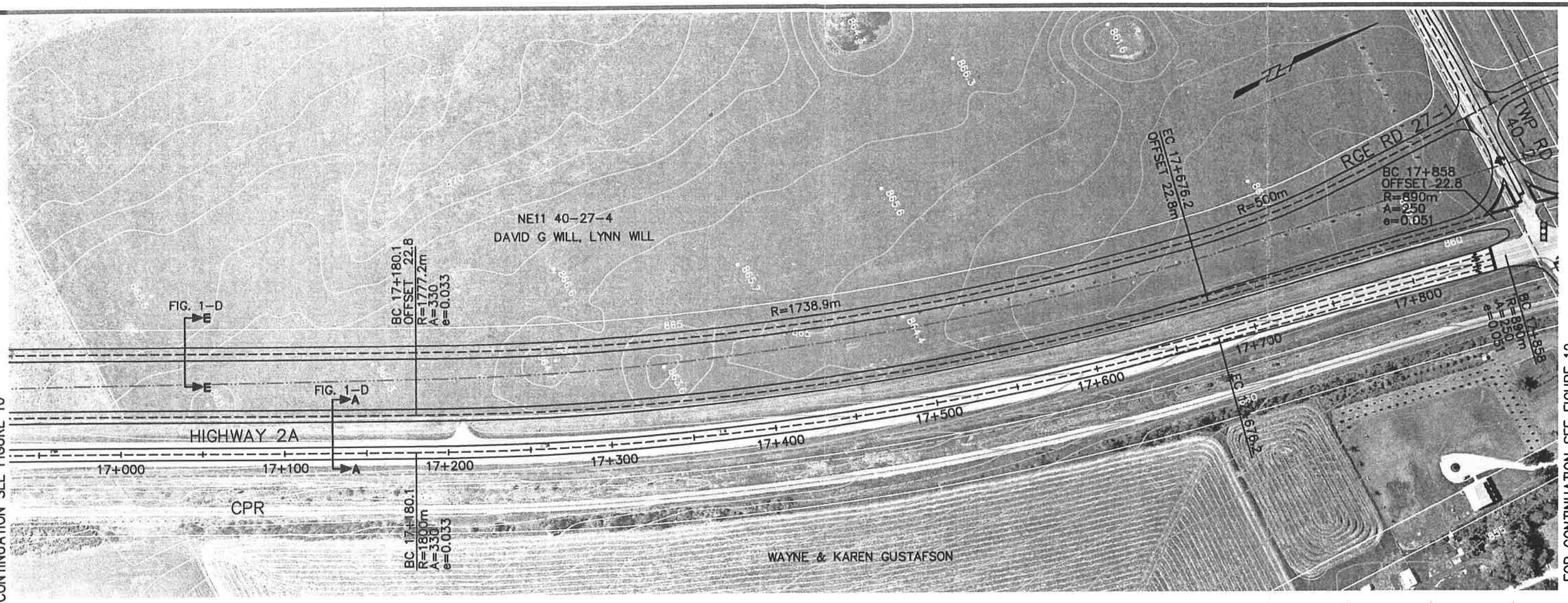
FOR CONTINUATION SEE FIGURE 10



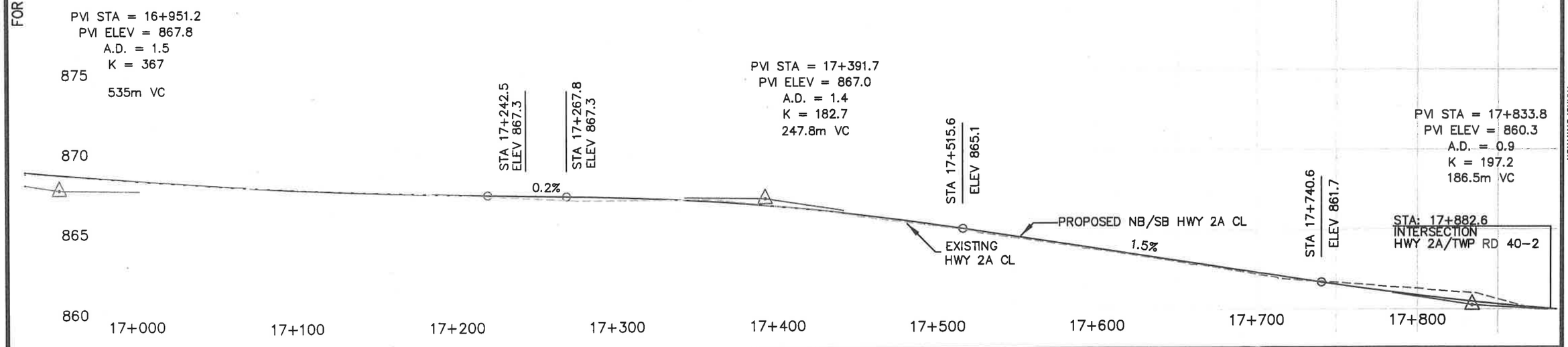
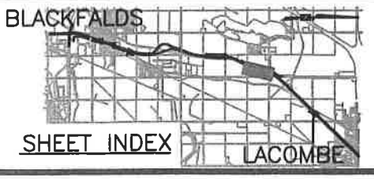


FIGURE : 11
HIGHWAY 2A PROPOSED IMPROVEMENTS
(STA 16+050 – 17+850)
MARCH 2005
BLACKFALDS TO LACOMBE ALBERTA

LEGEND

- PROP. EDGE OF LANE (PLAN)
- APPROX. PROPOSED HIGHWAY PROFILE
- APPROX. EXISTING HIGHWAY PROFILE
- EXISTING LOT LINE
- PROP. RIGHT OF WAY
- EXISTING STREET LIGHT
- LOW PRESSURE GAS LINE
- MED. PRESSURE GAS LINE
- HIGH PRESSURE GAS LINE
- OVERHEAD POWER LINES
- OVERHEAD TELUS LINES
- TELUS UNDERGROUND CABLE
- SHAW UNDERGROUND CABLE
- UNDERGROUND FIBER OPTIC
- DOW CHEMICAL PIPELINE

0 10Cm
SCALE 1:2500 HORIZ.
1:250 VERT.



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FOR CONTINUATION SEE FIGURE 12

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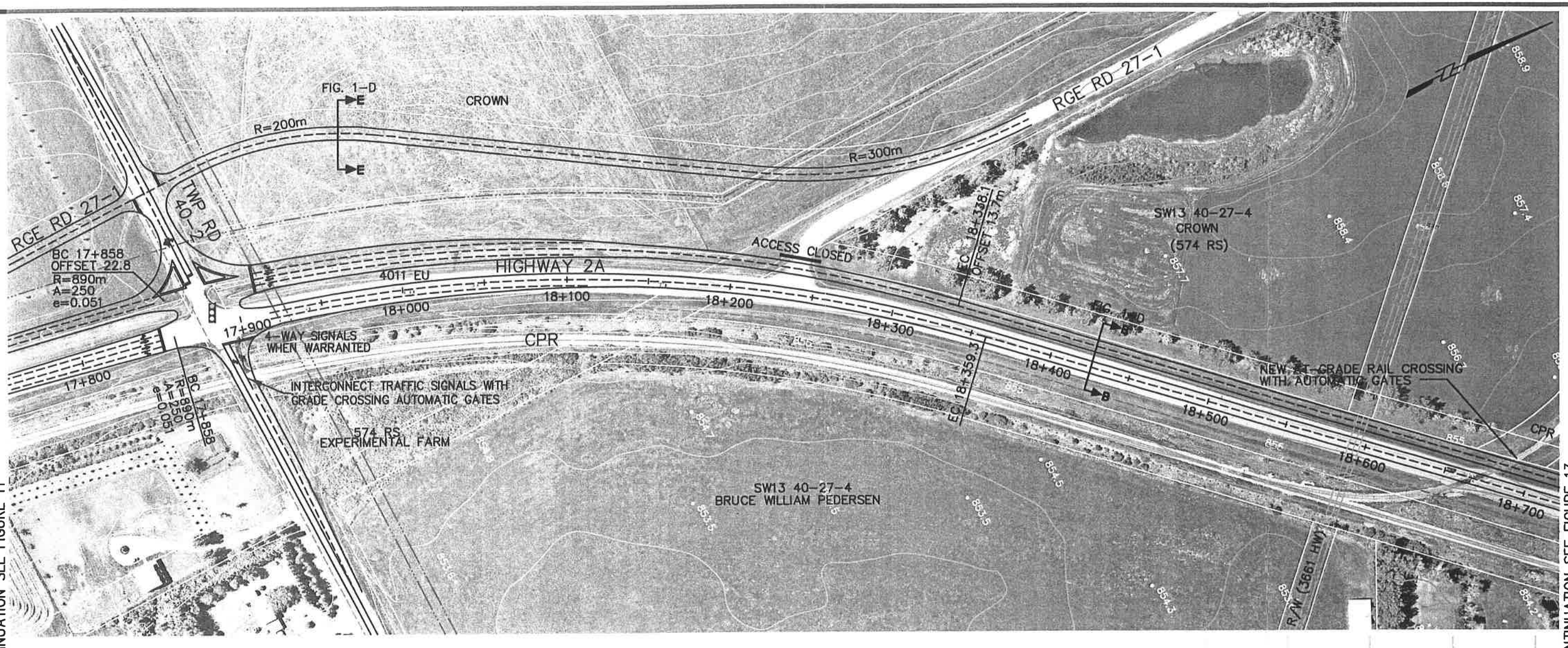


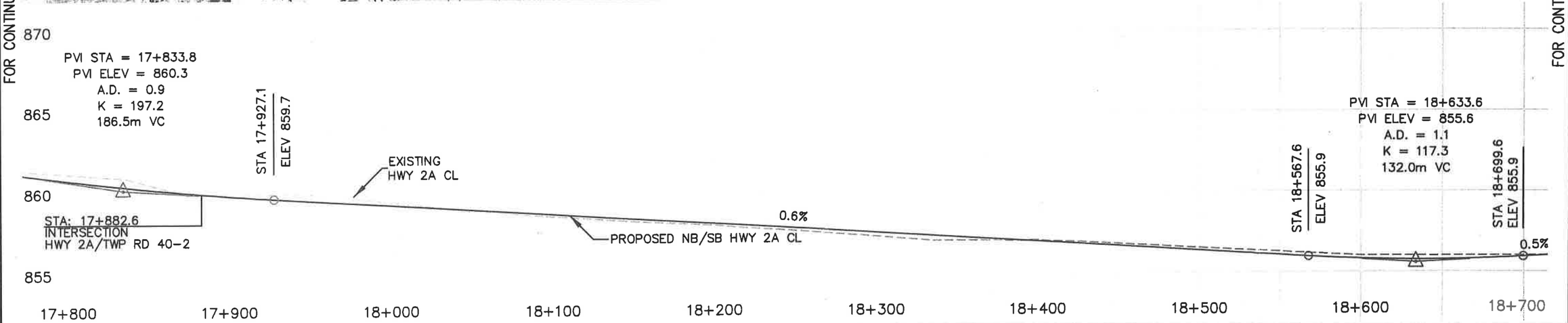
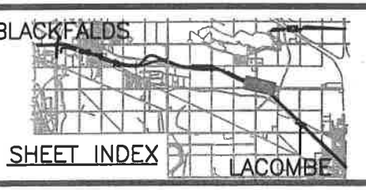


FIGURE : 12
HIGHWAY 2A PROPOSED IMPROVEMENTS
(STA 17+800 – 18+700)
MARCH 2005
BLACKFALDS TO LACOMBE ALBERTA

LEGEND

- PROP. EDGE OF LANE (PLAN)
- APPROX. PROPOSED HIGHWAY PROFILE
- APPROX. EXISTING HIGHWAY PROFILE
- EXISTING LOT LINE
- PROP. RIGHT OF WAY
- EXISTING STREET LIGHT
- LOW PRESSURE GAS LINE
- MED. PRESSURE GAS LINE
- HIGH PRESSURE GAS LINE
- OVERHEAD POWER LINES
- OVERHEAD TELUS LINES
- TELUS UNDERGROUND CABLE
- SHAW UNDERGROUND CABLE
- UNDERGROUND FIBER OPTIC
- DOW CHEMICAL PIPELINE

0 100m
SCALE 1: 2500 HORIZ.
1: 250 VERT.



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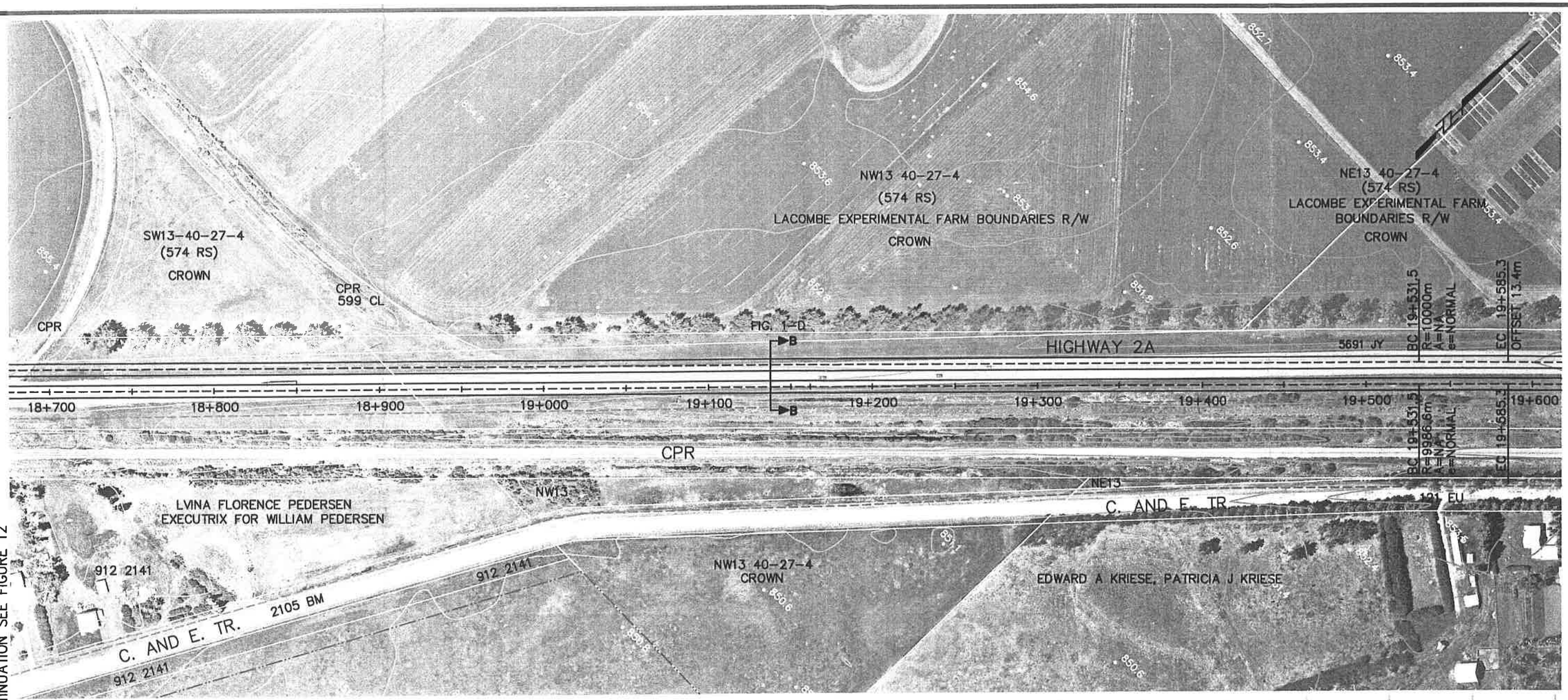


FOR CONTINUATION SEE FIGURE 12

FOR CONTINUATION SEE FIGURE 14

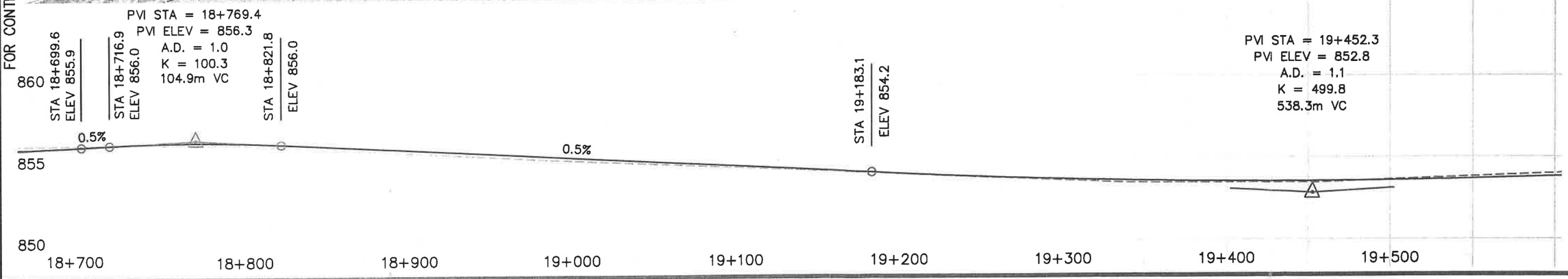
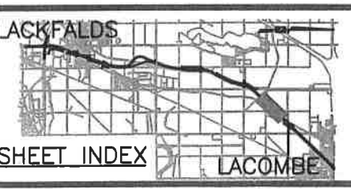


FIGURE : 13
HIGHWAY 2A PROPOSED IMPROVEMENTS
(STA 18+700 – 19+600)
MARCH 2005
BLACKFALDS TO LACOMBE ALBERTA

LEGEND

- PROP. EDGE OF LANE (PLAN)
- APPROX. PROPOSED HIGHWAY PROFILE
- APPROX. EXISTING HIGHWAY PROFILE
- EXISTING LOT LINE
- PROP. RIGHT OF WAY
- EXISTING STREET LIGHT
- LOW PRESSURE GAS LINE
- MED. PRESSURE GAS LINE
- HIGH PRESSURE GAS LINE
- OVERHEAD POWER LINES
- OVERHEAD TELUS LINES
- TELUS UNDERGROUND CABLE
- SHAW UNDERGROUND CABLE
- UNDERGROUND FIBER OPTIC
- DOW CHEMICAL PIPELINE

0 100m
SCALE 1:2500 HORIZ.
1:250 VERT.



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LACOMBE EXPERIMENTAL FARM BOUNDARIES R/W CROWN

CALGARY AND EDMONTON RAILWAY COMPANY

LACOMBE EXPERIMENTAL FARM BOUNDARIES R/W CROWN

C. AND E. TR.

SE24 40-27-4 (574 RS) LACOMBE EXPERIMENTAL FARM BOUNDARIES R/W CROWN

EC 19+585.3 OFFSET 13.4m

FIG. 1-D

HIGHWAY 2A

ACCESS CLOSED

19+600 19+700 19+800 19+900 ACCESS CLOSED 20+000 20+100 20+200 20+300 20+400 20+500

4-WAY SIGNALS WHEN WARRANTED

CPR

INTERCONNECT TRAFFIC SIGNALS WITH GRADE CROSSING AUTOMATIC GATES

NE13 KENNETH RAYMOND ATSINGER

C. AND E. TR.

R=100m

35m

FIG. 1-D

LACOMBE EXPERIMENTAL FARM BOUNDARIES R/W CROWN (574 RS) SE24 40-27-4

R=130m

RGE RD 27-0

ACCESS CLOSED

30m

NE13 40-27-4 CROWN

FUTURE SOUTH TRUCK BYPASS EXACT ALIGNMENT TO BE DETERMINED

FOR CONTINUATION SEE FIGURE 13

FOR CONTINUATION SEE FIGURE 15

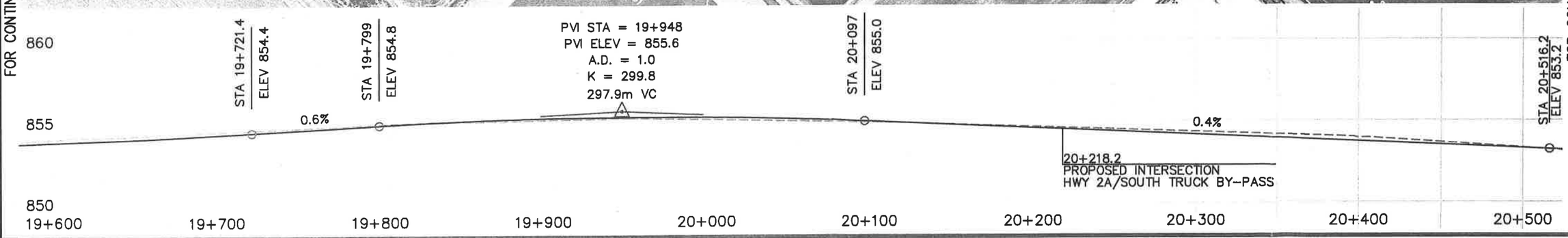

FIGURE : 14
HIGHWAY 2A PROPOSED IMPROVEMENTS
(STA 19+600 – 20+500)
MARCH 2005
BLACKFALDS TO LACOMBE ALBERTA

LEGEND

- PROP. EDGE OF LANE (PLAN)
- APPROX. PROPOSED HIGHWAY PROFILE
- APPROX. EXISTING HIGHWAY PROFILE
- EXISTING LOT LINE
- PROP. RIGHT OF WAY
- EXISTING STREET LIGHT
- LOW PRESSURE GAS LINE
- MED. PRESSURE GAS LINE
- HIGH PRESSURE GAS LINE
- OVERHEAD POWER LINES
- OVERHEAD TELUS LINES
- TELUS UNDERGROUND CABLE
- SHAW UNDERGROUND CABLE
- UNDERGROUND FIBER OPTIC
- DOW CHEMICAL PIPELINE

0 100m
SCALE 1:2500 HORIZ.
1:250 VERT.

BLACKFALDS

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LACOMBE

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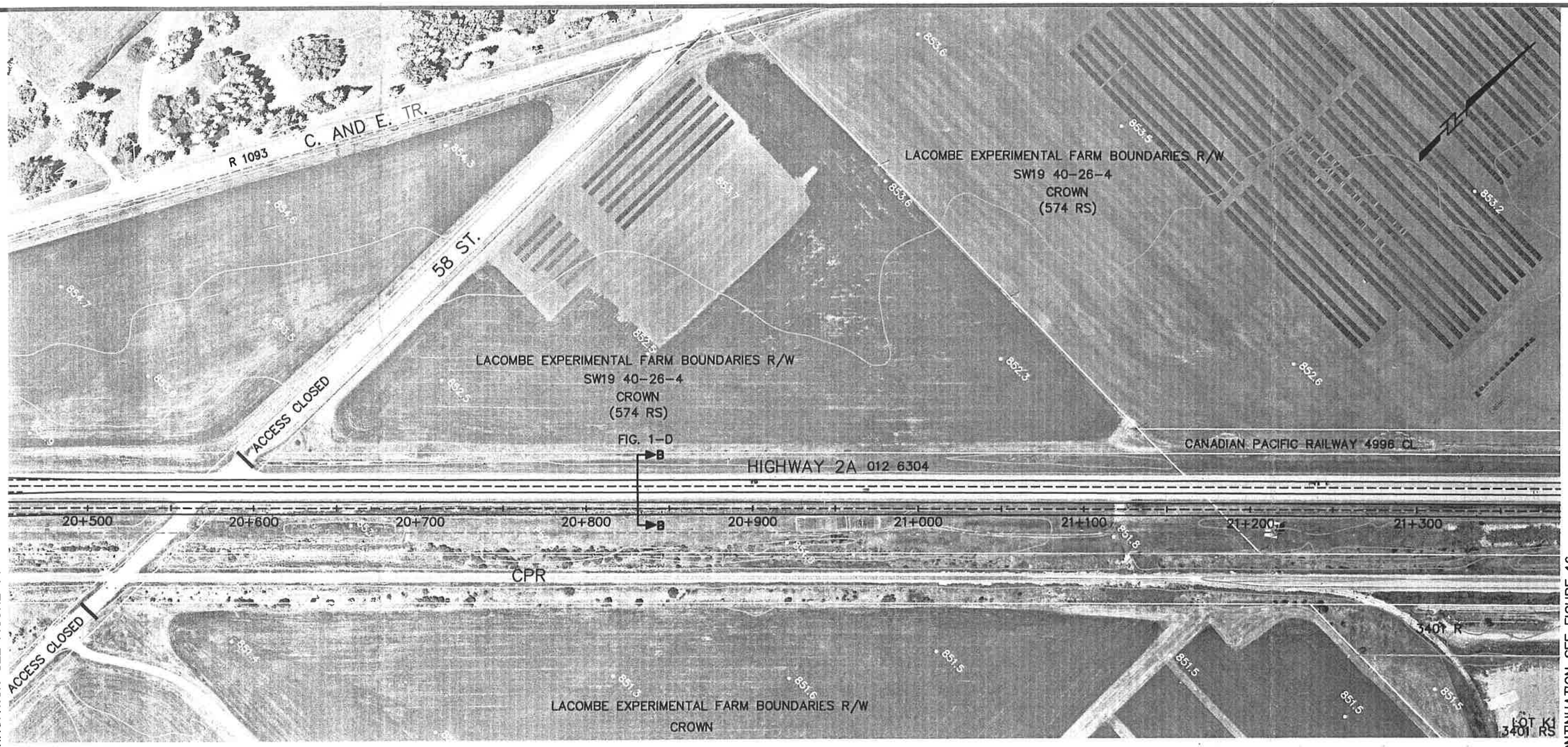


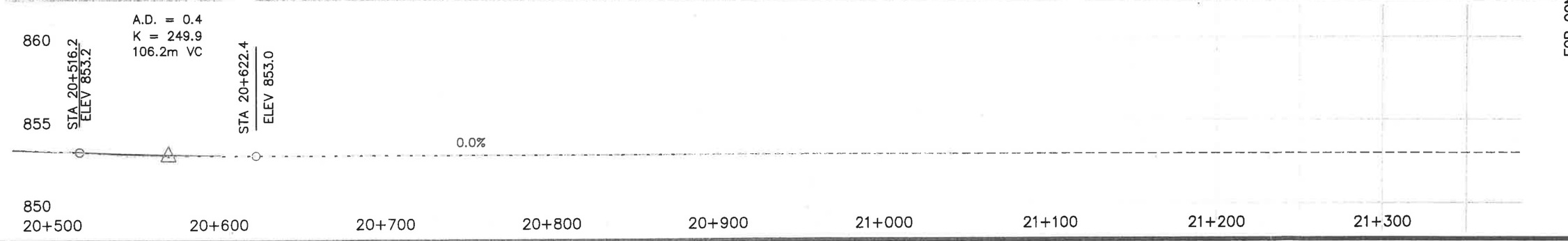
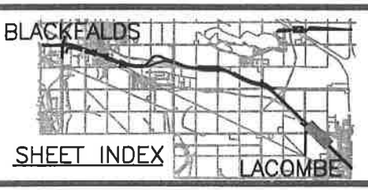


FIGURE : 15
HIGHWAY 2A PROPOSED IMPROVEMENTS
(STA 20+500 – 21+350)
MARCH 2005
BLACKFALDS TO LACOMBE ALBERTA

LEGEND

- PROP. EDGE OF LANE (PLAN)
- APPROX. PROPOSED HIGHWAY PROFILE
- APPROX. EXISTING HIGHWAY PROFILE
- EXISTING LOT LINE
- PROP. RIGHT OF WAY
- EXISTING STREET LIGHT
- LOW PRESSURE GAS LINE
- MED. PRESSURE GAS LINE
- HIGH PRESSURE GAS LINE
- OVERHEAD POWER LINES
- OVERHEAD TELUS LINES
- TELUS UNDERGROUND CABLE
- SHAW UNDERGROUND CABLE
- UNDERGROUND FIBER OPTIC
- DOW CHEMICAL PIPELINE

0 100m
SCALE 1: 2000 HORIZ.
1: 200 VERT.



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LACOMBE EXPERIMENTAL FARM BOUNDARIES R/W
SW19 40-26-4
CROWN
(574 RS)

LACOMBE EXPERIMENTAL FARM BOUNDARIES R/W
SW19 40-26-4
CROWN
(574 RS)

FIG. 1-D

HIGHWAY 2A 012 6304

CANADIAN PACIFIC RAILWAY 4996 CL

46 AVE.

52 ST

47 AVE.

STOP LINE

20+800 20+900 21+000 21+100 21+200 21+300 21+400 21+500

CPR

3401 R

LOT K1

LOT K1
3401 RS

ROAD

45A ST.

LOT 6
3562

LOT 1

LACOMBE EXPERIMENTAL FARM BOUNDARIES R/W
CROWN
PARCEL B
452 HW

FOR CONTINUATION SEE FIGURE 15

855

0.0%

850

20+800 20+900 21+000 21+100 21+200 21+300 21+400 21+500 21+600 21+700

FIGURE : 16
HIGHWAY 2A PROPOSED IMPROVEMENTS
(STA 20+800 – 21+700)
MARCH 2005
BLACKFALDS TO LACOMBE ALBERTA

LEGEND

- PROP. EDGE OF LANE (PLAN)
- APPROX. PROPOSED HIGHWAY PROFILE
- APPROX. EXISTING HIGHWAY PROFILE
- EXISTING LOT LINE
- PROP. RIGHT OF WAY
- EXISTING STREET LIGHT
- LOW PRESSURE GAS LINE
- MED. PRESSURE GAS LINE
- HIGH PRESSURE GAS LINE
- OVERHEAD POWER LINES
- OVERHEAD TELUS LINES
- TELUS UNDERGROUND CABLE
- SHAW UNDERGROUND CABLE
- UNDERGROUND FIBER OPTIC
- DOW CHEMICAL PIPELINE

0 100m
SCALE 1:2000 HORIZ.
1:200 VERT.

BLACKFALDS
SHEET INDEX
LACOMBE

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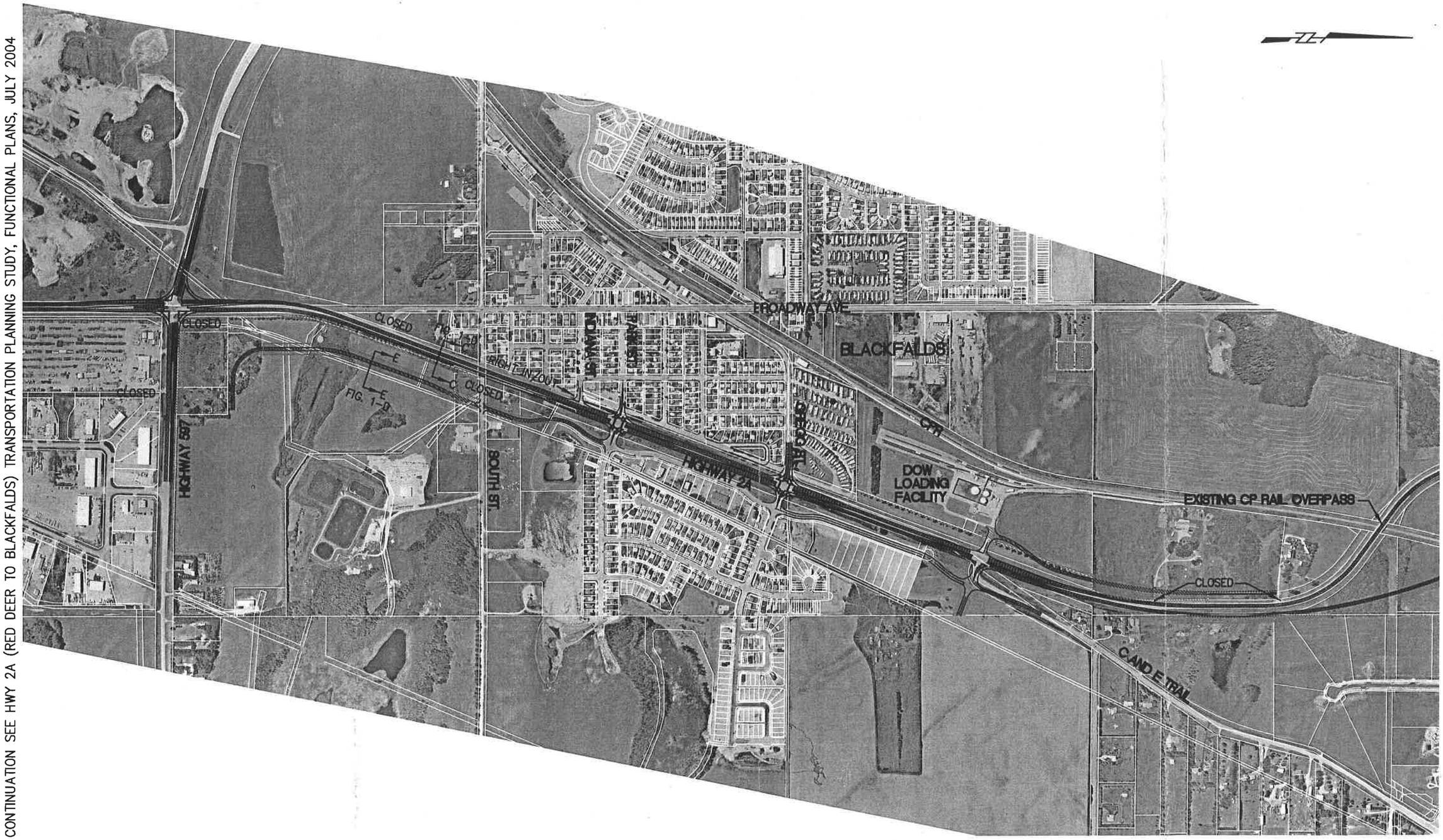
Annex "B": Right of Way Request Plans

Note: Proposed road Right of Way boundaries depicted in the plan are based upon an offset distance from the centerline as specified in Figure 1:D : Typical Cross Sections

FOR CONTINUATION SEE HWY 2A (RED DEER TO BLACKFALDS) TRANSPORTATION PLANNING STUDY, FUNCTIONAL PLANS, JULY 2004



FOR CONTINUATION SEE EXHIBIT 1-B

EXHIBIT : 1-A
HIGHWAY 2A RIGHT OF WAY REQUEST PLANS
MARCH 2005
BLACKFALDS TO LACOMBE ALBERTA

LEGEND

- EXISTING LOT LINE
- PROPOSED RIGHT OF WAY BOUNDARY
- REQUIRED CROWN LAND FOR R.O.W
- REQUIRED PRIVATE LAND FOR R.O.W
- PROPOSED EDGE OF LANE

0m 200m 400m
SCALE 1: 10,000

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FOR CONTINUATION SEE EXHIBIT 1-A

FOR CONTINUATION SEE EXHIBIT 1-C

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EXHIBIT : 1-B
HIGHWAY 2A RIGHT OF WAY REQUEST PLANS
MARCH 2005
BLACKFALDS TO LACOMBE ALBERTA

LEGEND

- EXISTING LOT LINE
- PROPOSED RIGHT OF WAY BOUNDARY
- REQUIRED CROWN LAND FOR R.O.W
- REQUIRED PRIVATE LAND FOR R.O.W
- PROPOSED EDGE OF LANE

0m 200m 400m
SCALE 1: 10,000

C:\JOBS\RED DEER(B-L) \HC.DWG

FOR CONTINUATION SEE EXHIBIT 1-B

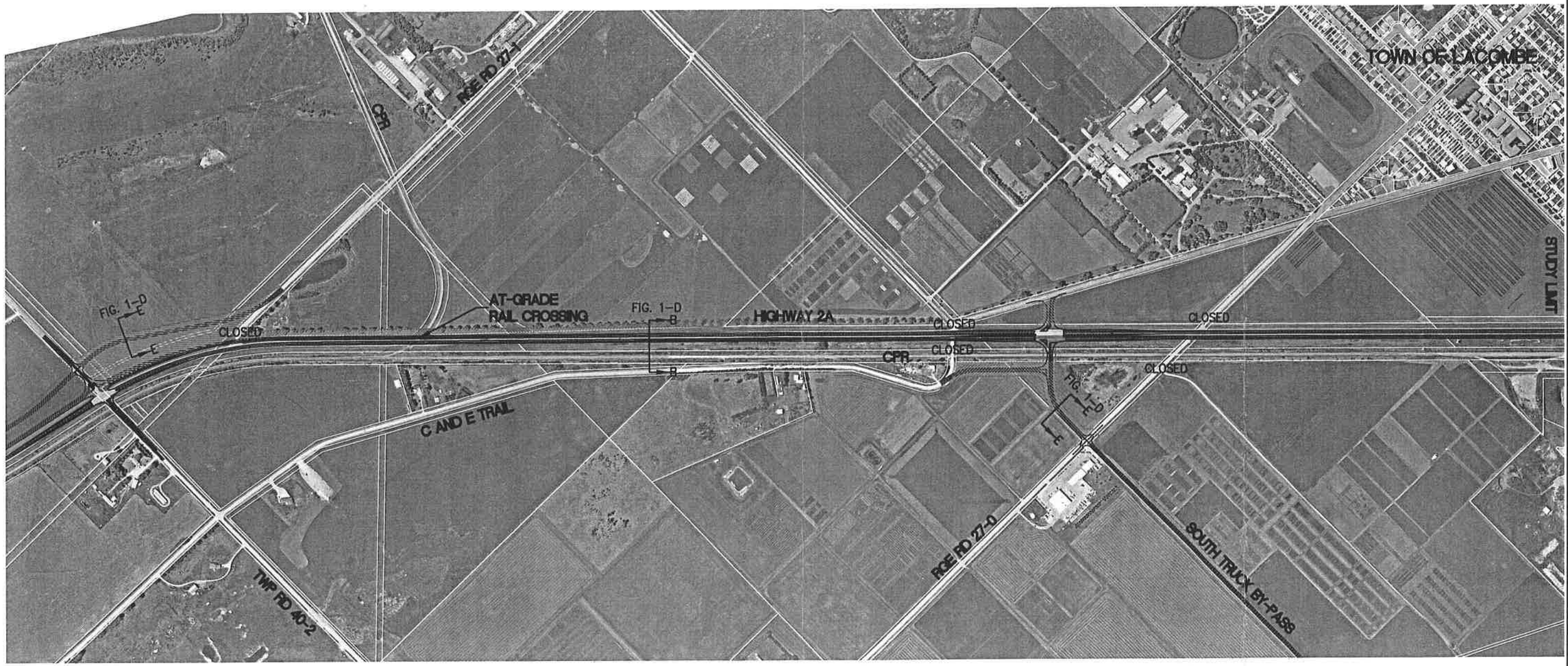

EXHIBIT : 1-C
HIGHWAY 2A RIGHT OF WAY REQUEST PLANS
MARCH 2005
BLACKFALDS TO LACOMBE ALBERTA

LEGEND

- EXISTING LOT LINE
- PROPOSED RIGHT OF WAY BOUNDARY
- REQUIRED CROWN LAND FOR R.O.W
- REQUIRED PRIVATE LAND FOR R.O.W
- PROPOSED EDGE OF LANE

0m 200m 400m
SCALE 1: 10,000

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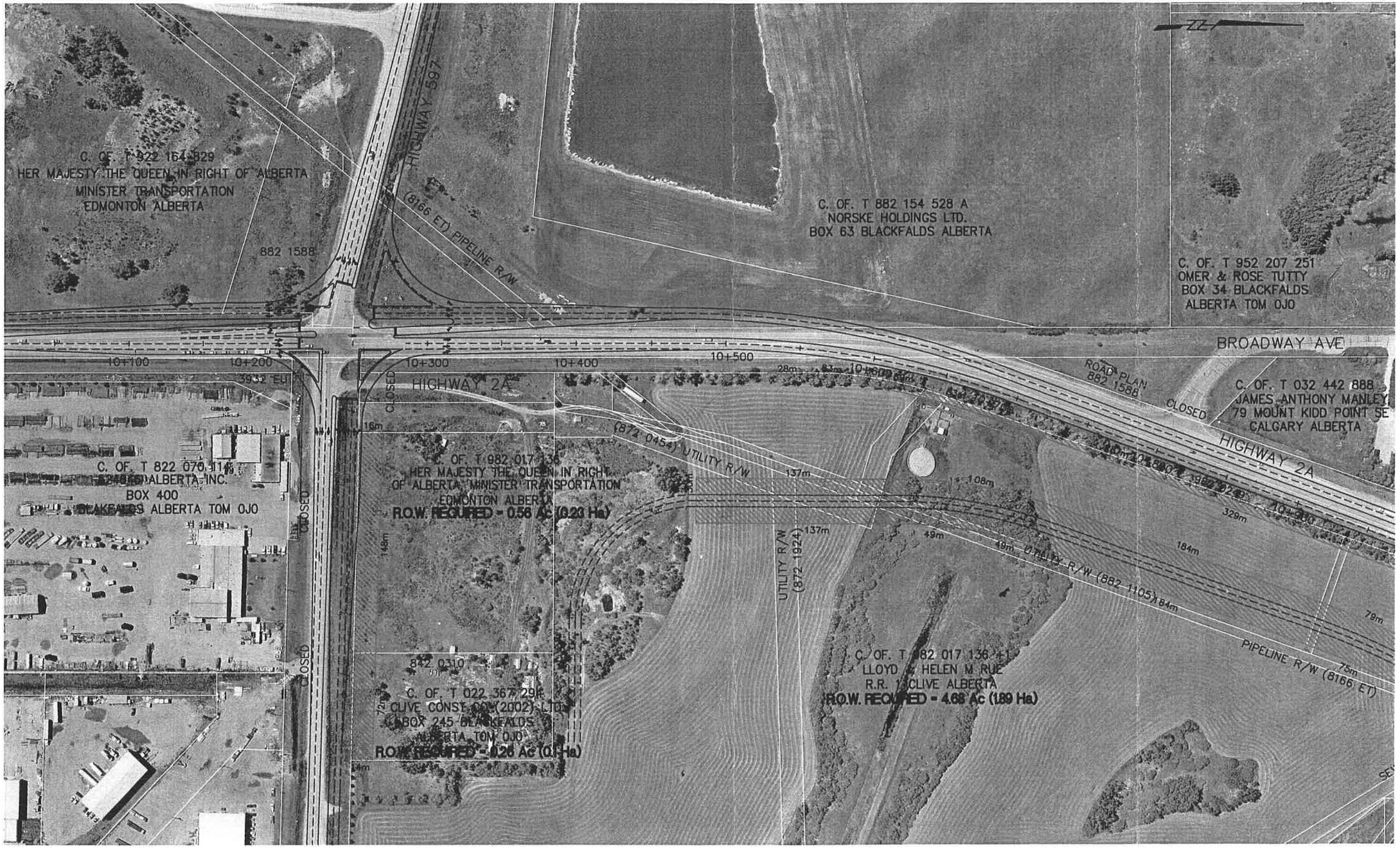
FOR CONTINUATION SEE HWY 2A (RED DEER TO BLACKFALDS) TRANSPORTATION PLANNING STUDY, FUNCTIONAL PLANS, JULY 2004



FOR CONTINUATION SEE EXHIBIT 3

EXHIBIT : 2
HIGHWAY 2A RIGHT OF WAY REQUEST PLANS
(STA 10+100 – 11+000)
MARCH 2005
BLACKFALDS TO LACOMBE ALBERTA

LEGEND

- PROPOSED EDGE OF LANE
- EXISTING LOT LINE
- PROPOSED RIGHT OF WAY BOUNDARY
- REQUIRED CROWN LAND FOR R.O.W
- REQUIRED PRIVATE LAND FOR R.O.W

0 100m
SCALE 1:2500 HORIZ.

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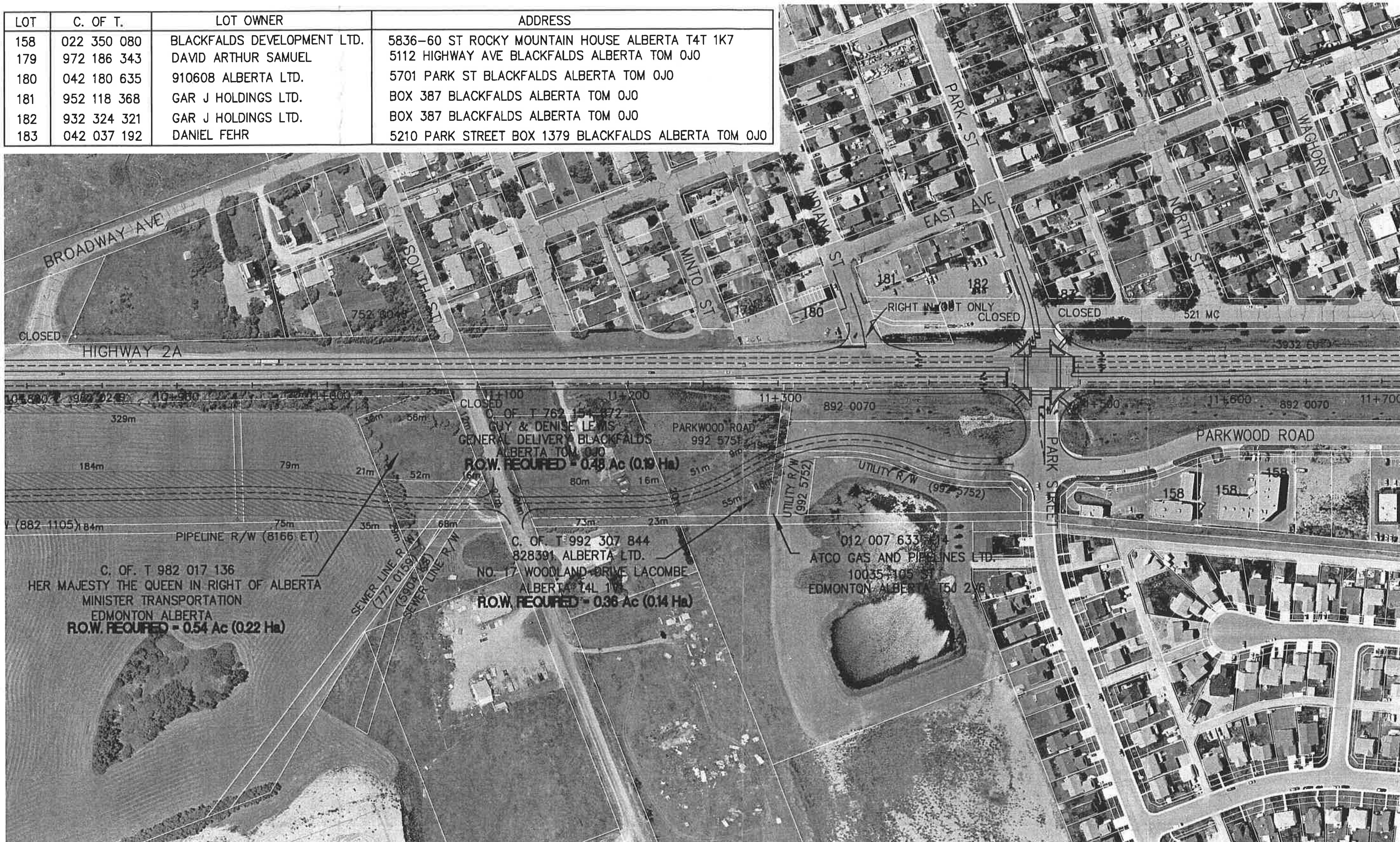
LOT	C. OF T.	LOT OWNER	ADDRESS
158	022 350 080	BLACKFALDS DEVELOPMENT LTD.	5836-60 ST ROCKY MOUNTAIN HOUSE ALBERTA T4T 1K7
179	972 186 343	DAVID ARTHUR SAMUEL	5112 HIGHWAY AVE BLACKFALDS ALBERTA TOM 0J0
180	042 180 635	910608 ALBERTA LTD.	5701 PARK ST BLACKFALDS ALBERTA TOM 0J0
181	952 118 368	GAR J HOLDINGS LTD.	BOX 387 BLACKFALDS ALBERTA TOM 0J0
182	932 324 321	GAR J HOLDINGS LTD.	BOX 387 BLACKFALDS ALBERTA TOM 0J0
183	042 037 192	DANIEL FEHR	5210 PARK STREET BOX 1379 BLACKFALDS ALBERTA TOM 0J0



FOR CONTINUATION SEE EXHIBIT 2

FOR CONTINUATION SEE EXHIBIT 4

EXHIBIT : 3
HIGHWAY 2A PROPOSED IMPROVEMENTS
(STA 10+800 - 11+700)
MARCH 2005
BLACKFALDS TO LACOMBE
ALBERTA

LEGEND

- PROPOSED EDGE OF LANE
- EXISTING LOT LINE
- PROPOSED RIGHT OF WAY BOUNDARY
- REQUIRED CROWN LAND FOR R.O.W
- REQUIRED PRIVATE LAND FOR R.O.W

0 — 100m
SCALE 1:2500 HORIZ.

SHEET INDEX
BLACKFALDS
LACOMBE

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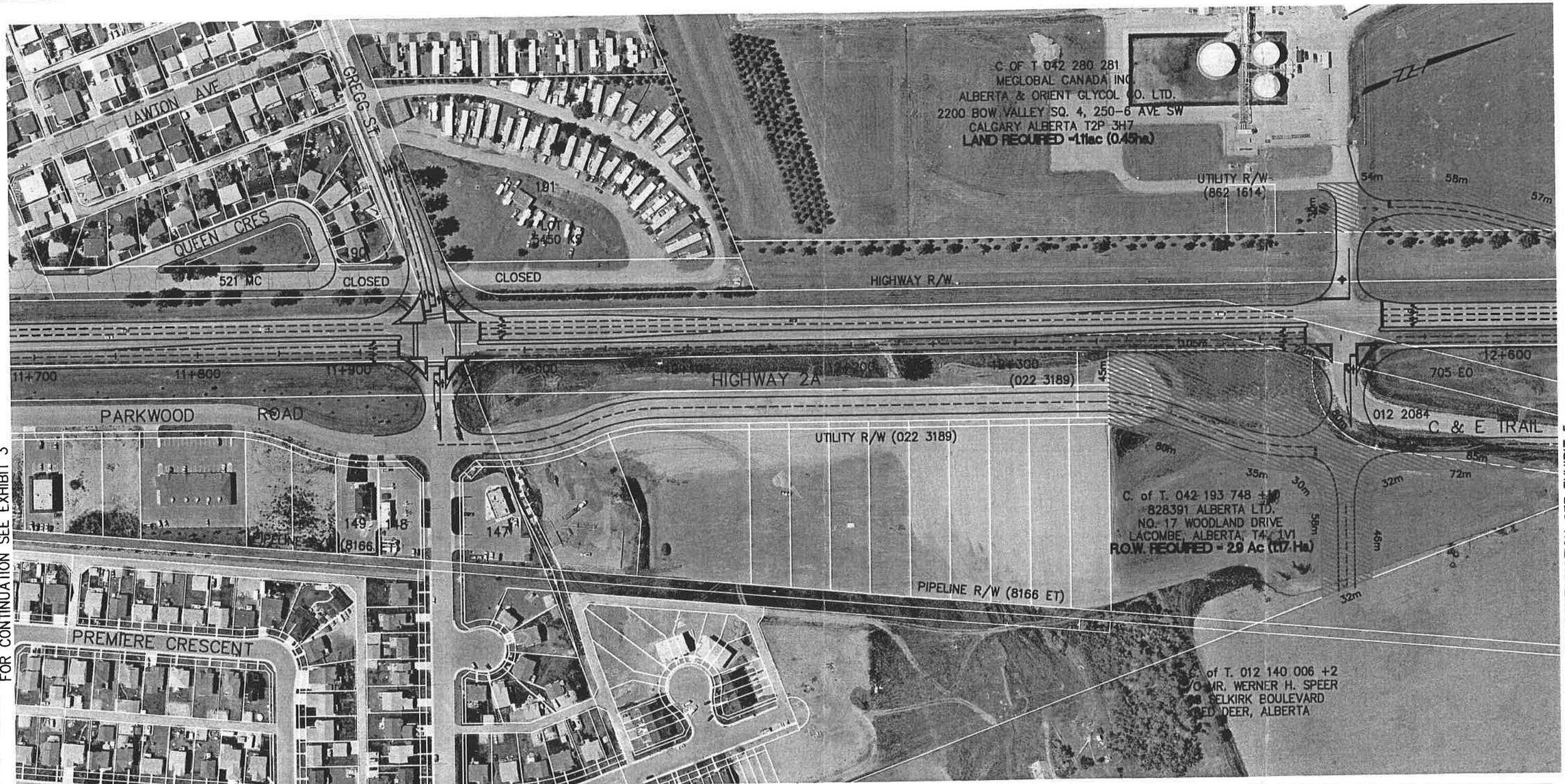

FOR CONTINUATION SEE EXHIBIT 3

FOR CONTINUATION SEE EXHIBIT 5

LOT	C. OF T.	LOT OWNER	ADDRESS
147	042 037 192	BRUSAN ENTERPRISES INC.	CO 12 LAKES CLOSE LACOMBE ALBERTA T4L 1S4
148	002 084 819	DANSON PROPERTIES LTD.	66 WILTSHIRE BLVD RED DEER ALBERTA T4N 6L3
149	032 425 555	594723 ALBERTA LTD.	PO BOX 580 STETTLER ALBERTA T0C 2L0
190	972 193 586	DEREIK PEARSON	5316 QUEENS CRESCENT BLACKFALDS ALBERTA T0M 0J0
191	992 293 522	G.E.N. ENTERPRISES LTD.	2ND FLR, 4811-48 ST RED DEER ALBERTA T4N 1S6

EXHIBIT : 4
HIGHWAY 2A PROPOSED IMPROVEMENTS
(STA 11+700 – 12+600)
MARCH 2005
BLACKFALDS TO LACOMBE ALBERTA

LEGEND

- PROPOSED EDGE OF LANE
- EXISTING LOT LINE
- PROPOSED RIGHT OF WAY BOUNDARY
- REQUIRED CROWN LAND FOR R.O.W
- REQUIRED PRIVATE LAND FOR R.O.W

0 100m
SCALE 1:2500 HORIZ.

BLACKFALDS
SHEET INDEX
LACOMBE

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C:\JOBS\RED DEER\R-1\HC.DWG

FOR CONTINUATION SEE EXHIBIT 4

FOR CONTINUATION SEE EXHIBIT 6

CANADIAN PACIFIC RAILWAY

C. of T. 932 100 103
CHARLES JOHN BURNS, DELROSE ANN BURNS
BOX 398
BLACKFALDS, ALBERTA, T0M 0J0
R.O.W REQUIRED -3.58 Ac (1.45 Ha)

C. of T. 002 316 888
SHIRLEY ANNE SONNENBERG
BLACKFALDS, ALBERTA

012 2084
C & E TRAIL
(8166 ET)

HIGHWAY ST R/W

HIGHWAY 2A

4011 EU

CLOSED 188m

CLOSED

DAVID AINETH BIRO, CONSTANCE ARLENE BIRO
BLACKFALDS, ALBERTA

C. of T. 012 140 006 +1
EVERETT L LONEY, BEVERLEY M LONEY
BOX 557
BLACKFALDS, ALBERTA
R.O.W. REQUIRED -1.55 Ac (0.63 Ha)

C. OF T 042 362 047
DWAYNE H BERLANDO, LAURA L BERLANDO
9 GREY STONE CLOSE, GREY STONE RANCH
BLACKFALDS ALBERTA TOM 0JO
R.O.W. REQUIRED - 0.25 Ac (0.1 Ha)

C. OF T 042 296 546 +17
204397 ALBERTA LTD.
1, 5265-45 ST
LACOMBE ALBERTA T4L 2A2
R.O.W. REQUIRED - 0.14 Ac (0.06 Ha)

EXHIBIT : 5
HIGHWAY 2A PROPOSED IMPROVEMENTS
(STA 12+550 – 13+450)
MARCH 2005
BLACKFALDS TO LACOMBE ALBERTA

LEGEND

- PROPOSED EDGE OF LANE
- EXISTING LOT LINE
- PROPOSED RIGHT OF WAY BOUNDARY
- REQUIRED CROWN LAND FOR R.O.W
- REQUIRED PRIVATE LAND FOR R.O.W

0 100m
SCALE 1:2500 HORIZ.

BLACKFALDS
SHEET INDEX
LACOMBE

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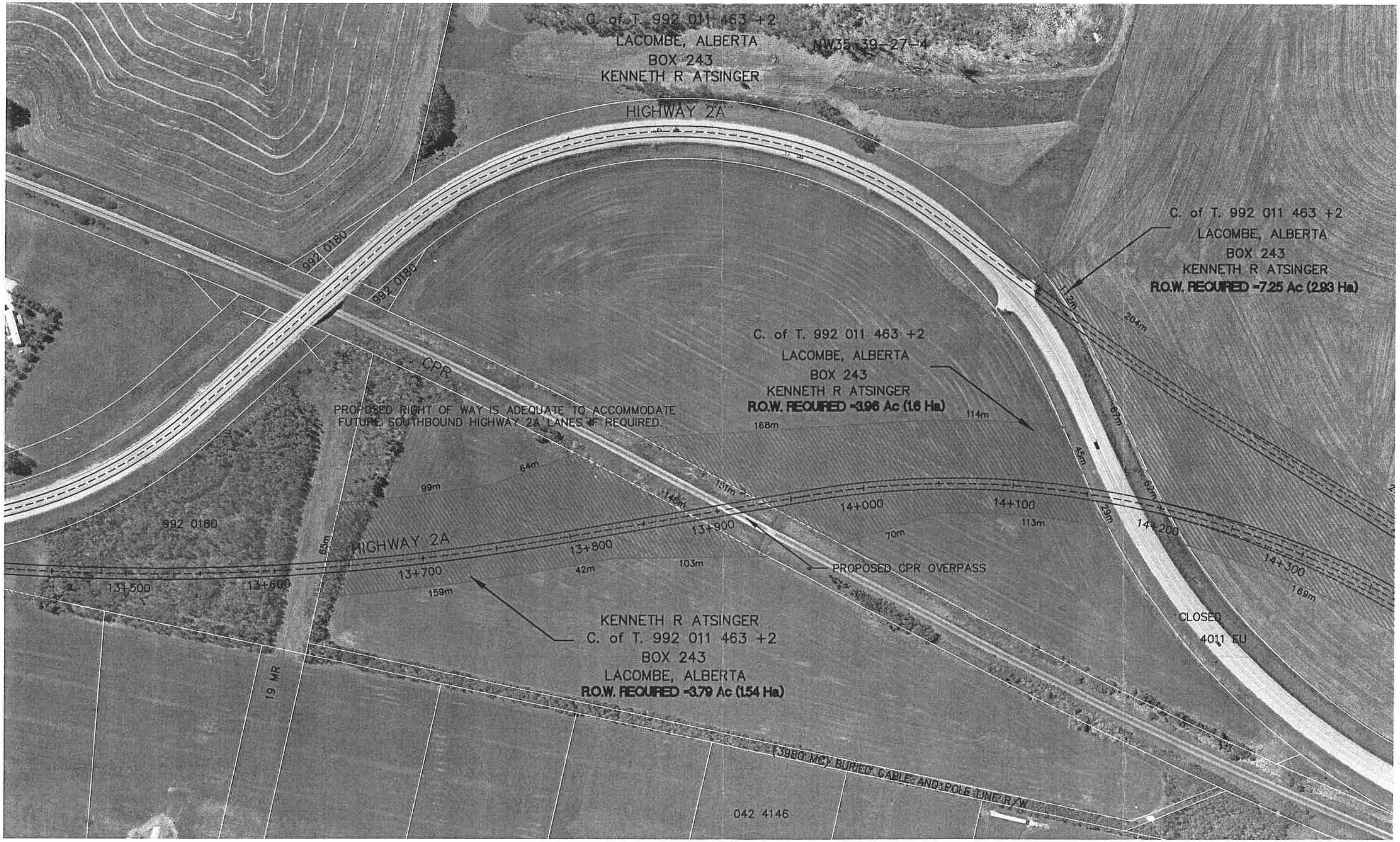
FOR CONTINUATION SEE EXHIBIT 5



C. of T. 992 011 463 +2
LACOMBE, ALBERTA
BOX 243
KENNETH R ATSINGER
NW35-39-27-4
HIGHWAY 2A
992 0180
992 0180
C. of T. 992 011 463 +2
LACOMBE, ALBERTA
BOX 243
KENNETH R ATSINGER
R.O.W. REQUIRED =7.25 Ac (2.93 Ha)
C. of T. 992 011 463 +2
LACOMBE, ALBERTA
BOX 243
KENNETH R ATSINGER
R.O.W. REQUIRED =3.96 Ac (1.6 Ha)
CPR
PROPOSED RIGHT OF WAY IS ADEQUATE TO ACCOMMODATE
FUTURE SOUTHBOUND HIGHWAY 2A LANES IF REQUIRED.
204m
168m
114m
67m
45m
64m
99m
131m
146m
14+000
14+100
113m
29m
60m
14+200
992 0180
HIGHWAY 2A
13+900
13+800
70m
14+300
65m
13+700
42m
103m
PROPOSED CPR OVERPASS
13+500
13+600
159m
169m
CLOSED
4011 EU
KENNETH R ATSINGER
C. of T. 992 011 463 +2
BOX 243
LACOMBE, ALBERTA
R.O.W. REQUIRED =3.79 Ac (1.54 Ha)
19 MR
(3980 MC) BURIED CABLE AND POLE LINE R/W
042 4146

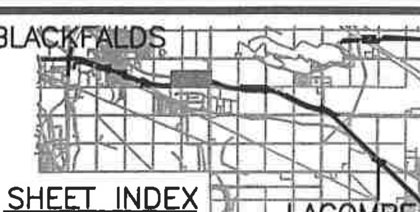
FOR CONTINUATION SEE EXHIBIT 7

EXHIBIT : 6
HIGHWAY 2A PROPOSED IMPROVEMENTS
(STA 13+450 – 14+000)
MARCH 2005
BLACKFALDS TO LACOMBE
ALBERTA

LEGEND

PROPOSED EDGE OF LANE
EXISTING LOT LINE
PROPOSED RIGHT OF WAY BOUNDARY
REQUIRED CROWN LAND FOR R.O.W
REQUIRED PRIVATE LAND FOR R.O.W

0 100m
SCALE 1:2500 HORIZ.



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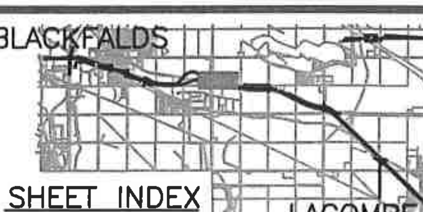
C. of T. 992 011 463 +2
LACOMBE, ALBERTA
BOX 243
KENNETH R ATSINGER
C. of T. 832 034 611 A
KENNETH R ATSINGER
LACOMBE, ALBERTA
LAND REQUIRED =8.67ac (3.51ha)
FOR CONTINUATION SEE EXHIBIT 6
FOR CONTINUATION SEE EXHIBIT 8
14+300
14+400
14+600
14+700
14+800
14+900
15+000
15+100
15+200
217m
169m
69m
328m
238m
243m
CLOSED
HIGHWAY 2A
CLOSED
TWP RD 40-0
CPR
C. of T. 212A254A
DAVID FRIESEN
BOX 772
LACOMBE, ALBERTA
C. of T. 212A254
DAVID FRIESEN, DONNA LAURINE FRIESEN
BOX 772
LACOMBE, ALBERTA
872 1954

EXHIBIT : 7
HIGHWAY 2A PROPOSED IMPROVEMENTS
(STA 14+350 – 15+200)
MARCH 2005
BLACKFALDS TO LACOMBE
ALBERTA

LEGEND
- PROPOSED EDGE OF LANE
- EXISTING LOT LINE
- PROPOSED RIGHT OF WAY BOUNDARY
- REQUIRED CROWN LAND FOR R.O.W
- REQUIRED PRIVATE LAND FOR R.O.W

0 100m
SCALE 1:2500 HORIZ.



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FOR CONTINUATION SEE EXHIBIT 7

NW2 40-27-4

C. of T. 022 097 164
EDITH SCHAEFFER, PEGGY SUE BAYNE
BOX 338
BLACKFALDS, ALBERTA, T0M 0J0
R.O.W. REQUIRED =5.29ac (2.14ha)

C. of T. 832 034 611 A
KENNETH R. ATSINGER
LACOMBE, ALBERTA

C. of T. 832 195 421
GEORGE REUBEN LANE, MARJORIE MAE LANE
LACOMBE, ALBERTA
R.O.W. REQUIRED =4.54ac (1.84ha)

TWP. RD. 40-1

HIGHWAY 2A

C. of T. 212A254
DAVID & DONNA FRIESEN
BOX 772
LACOMBE, ALBERTA

C. of T. 762 121 077
ERLING JONSON, JEANETTE JONSON
LACOMBE, ALBERTA

FOR CONTINUATION SEE EXHIBIT 9

EXHIBIT : 8
HIGHWAY 2A PROPOSED IMPROVEMENTS
(STA 15+200 – 16+100)
MARCH 2005
BLACKFALDS TO LACOMBE ALBERTA

LEGEND
- PROPOSED EDGE OF LANE
- EXISTING LOT LINE
- PROPOSED RIGHT OF WAY BOUNDARY
- REQUIRED CROWN LAND FOR R.O.W
- REQUIRED PRIVATE LAND FOR R.O.W

0 100m
SCALE 1:2500 HORIZ.

BLACKFALDS
SHEET INDEX
LACOMBE

Alberta Infrastructure and Transportation
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FOR CONTINUATION SEE EXHIBIT 8

C. of T. 942 033 570
LEWIS GEORGE CUTHBERTSON, DONYALE CUTHBERTSON
BOX 685
BLACKFALDS, ALBERTA, T0M 0J0

C. of T. 752 176 386
FREDERICK BABCHUK
GENERAL DELIVERY
MEDICINE HAT, ALBERTA

TWP RD. 40-1

16m

C. of T. 932 038 813
R.C. JACOBSON HOLDINGS LTD.
LACOMBE, ALBERTA, T0C 1S0

16m

HIGHWAY 2A

23m

SE 11 40-27-4
C. of T. 972 278 305
DAVID H G ANDERSON, MARILYN ANDERSON
BOX 5425
LACOMBE, ALBERTA, T4L 1X1
R.O.W. REQUIRED =4.21ac (1.70ha)

167m

35m

233m

63m

16+100
16+200
16+300
16+400
16+500
16+600
16+700
16+800
16+900
17+000

CPR

415m

SE 11 40-27-4
C. of T. 94R255
MAURICE J DEPAUW, HELEN I DEPAUW
LACOMBE, ALBERTA

FOR CONTINUATION SEE EXHIBIT 10

EXHIBIT : 9
HIGHWAY 2A PROPOSED IMPROVEMENTS
(STA 16+000 – 17+000)
MARCH 2005
BLACKFALDS TO LACOMBE ALBERTA

LEGEND

- PROPOSED EDGE OF LANE
- EXISTING LOT LINE
- PROPOSED RIGHT OF WAY BOUNDARY
- REQUIRED CROWN LAND FOR R.O.W
- REQUIRED PRIVATE LAND FOR R.O.W

0 100m
SCALE 1:2500 HORIZ.

BLACKFALDS
SHEET INDEX
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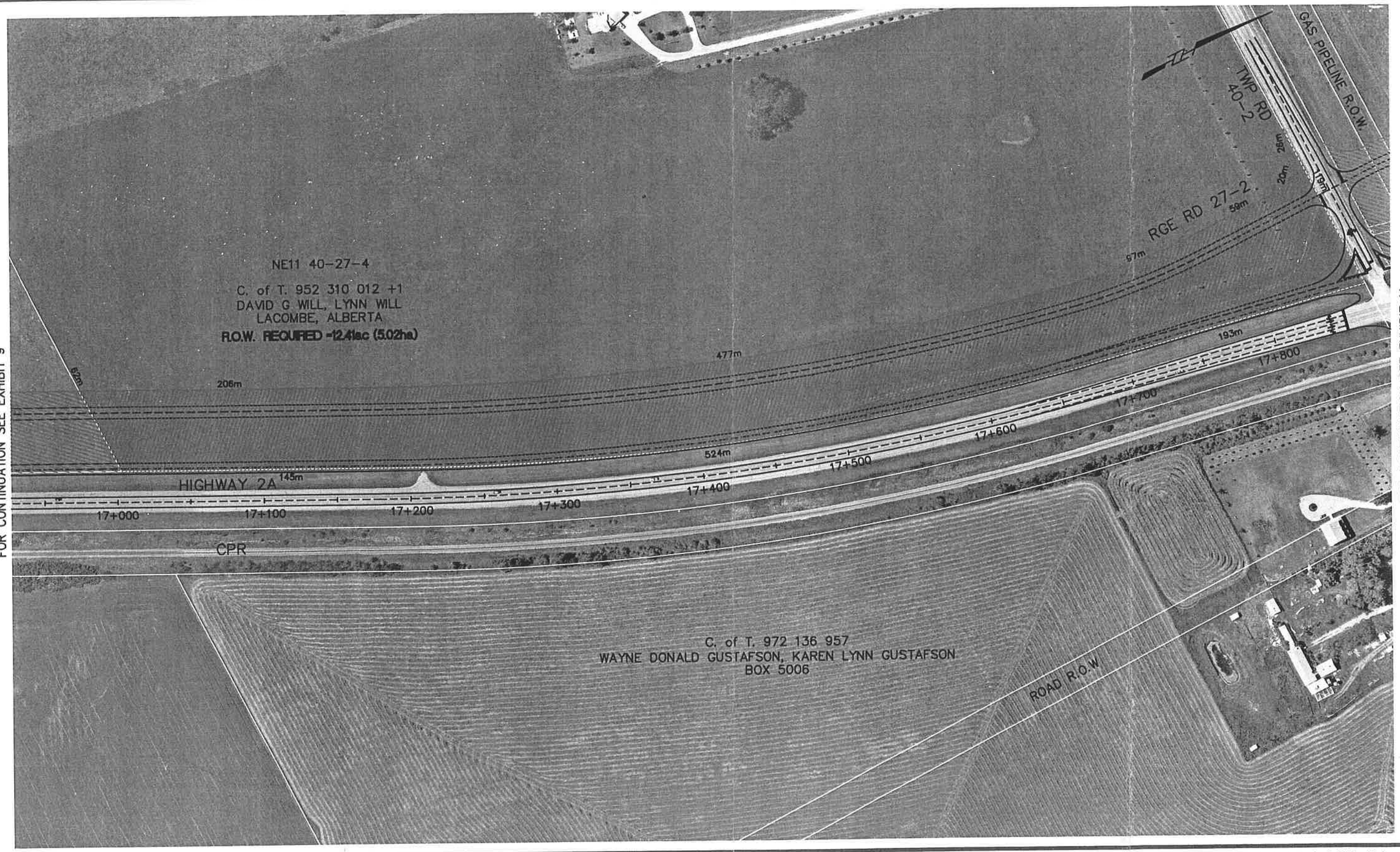
FOR CONTINUATION SEE EXHIBIT 9



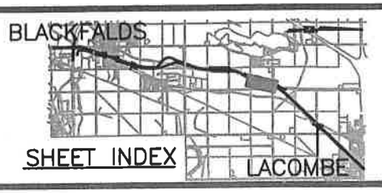
FOR CONTINUATION SEE EXHIBIT 11

EXHIBIT :10
HIGHWAY 2A PROPOSED IMPROVEMENTS
(STA 17+050 – 17+850)
MARCH 2005
BLACKFALDS TO LACOMBE ALBERTA ALBERTA

LEGEND

- PROPOSED EDGE OF LANE
- EXISTING LOT LINE
- PROPOSED RIGHT OF WAY BOUNDARY
- REQUIRED CROWN LAND FOR R.O.W
- REQUIRED PRIVATE LAND FOR R.O.W

0 100m
SCALE 1:2500 HORIZ.



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FOR CONTINUATION SEE EXHIBIT 10

EXPERIMENTAL FARM
574 RS
C. of T. 132N145
CROWN
R.O.W. REQUIRED =8.0ac (3.24ha)

TWP RD 40-2

RGE RD 27-2

HIGHWAY 2A

CLOSED

CPR

574 RS
EXPERIMENTAL FARM

C. of T. 65D122
CROWN
R.O.W. REQUIRED =2.10ac (0.85ha)

SW13 40-27-4
C. of T. 042 363 919
BRUCE WILLIAM PEDERSEN
4 TAY STREET
WHITEHORSE, YUKON, Y1A 4M6

POWER LINE R/W (3661 HW)

C. of T. 042 363 918
LVINA FLORENCE PEDERSEN
EXECUTRIX FOR WILLIAM PEDERSEN
123, 9 AVERN STREET
RED DEER, ALBERTA, T4R 2S8

2105 BM

C AND E TRIAL

FOR CONTINUATION SEE EXHIBIT 12

EXHIBIT : 11
HIGHWAY 2A PROPOSED IMPROVEMENTS
(STA 17+800 – 18+700)
MARCH 2005
BLACKFALDS TO LACOMBE ALBERTA

LEGEND

- PROPOSED EDGE OF LANE
- EXISTING LOT LINE
- PROPOSED RIGHT OF WAY BOUNDARY
- REQUIRED CROWN LAND FOR R.O.W
- REQUIRED PRIVATE LAND FOR R.O.W

0 100m
SCALE 1:2500 HORIZ.

BLACKFALDS

SHEET INDEX

LACOMBE

Alberta Infrastructure and Transportation

CastleGlenn Consultants Inc.
Engineers, Project Managers & Planners

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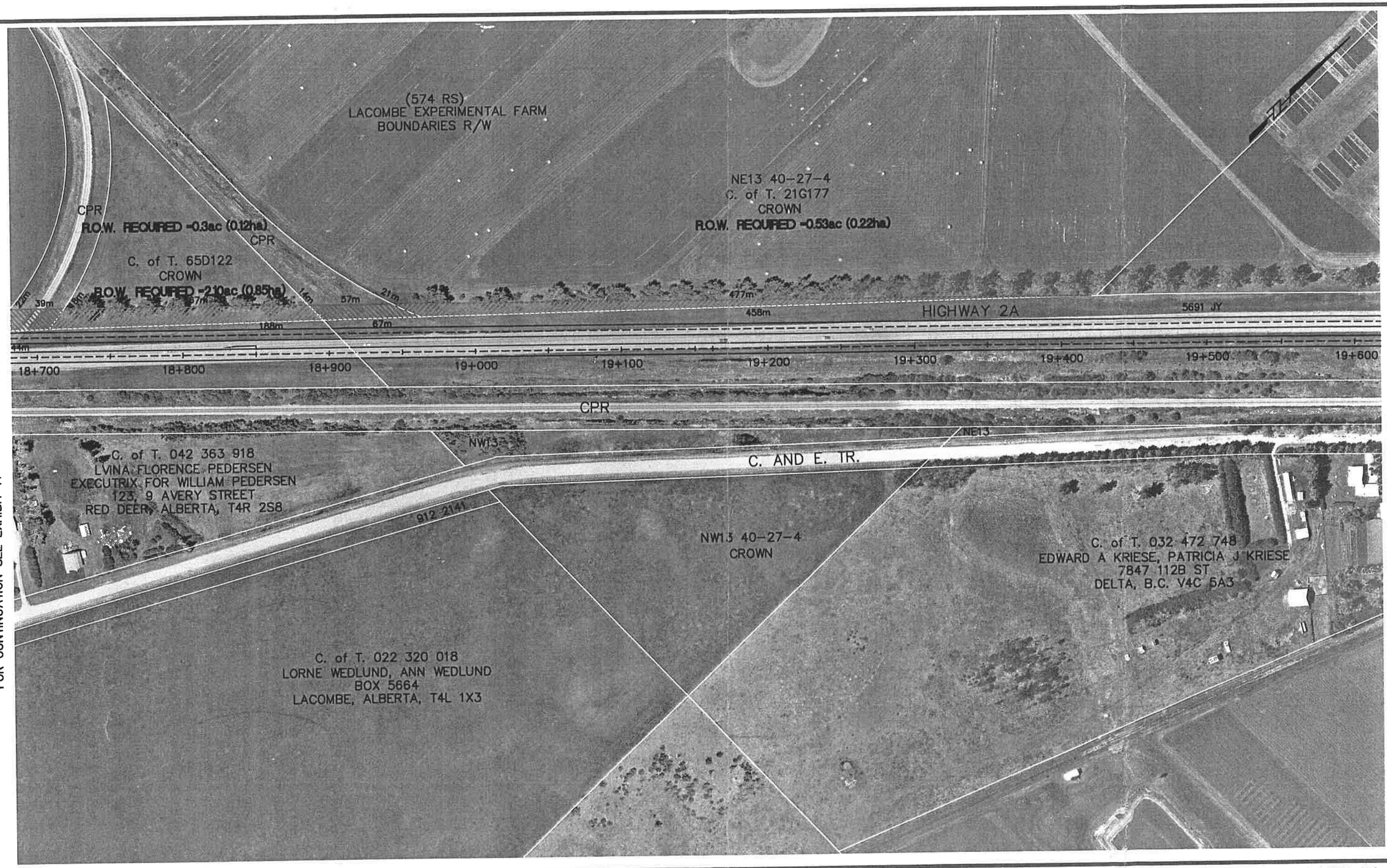

FOR CONTINUATION SEE EXHIBIT 11

FOR CONTINUATION SEE EXHIBIT 13

EXHIBIT : 12
HIGHWAY 2A PROPOSED IMPROVEMENTS
(STA 18+700 – 19+600)
MARCH 2005
BLACKFALDS TO LACOMBE ALBERTA

LEGEND

- PROPOSED EDGE OF LANE
- EXISTING LOT LINE
- PROPOSED RIGHT OF WAY BOUNDARY
- REQUIRED CROWN LAND FOR R.O.W
- REQUIRED PRIVATE LAND FOR R.O.W

0 100m
SCALE 1:2500 HORIZ.

BLACKFALDS
SHEET INDEX
LACOMBE

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FOR CONTINUATION SEE EXHIBIT 12

NO RIGHT-OF-WAY REQUIRED PAST STATION 20+500 TO STUDY LIMITS

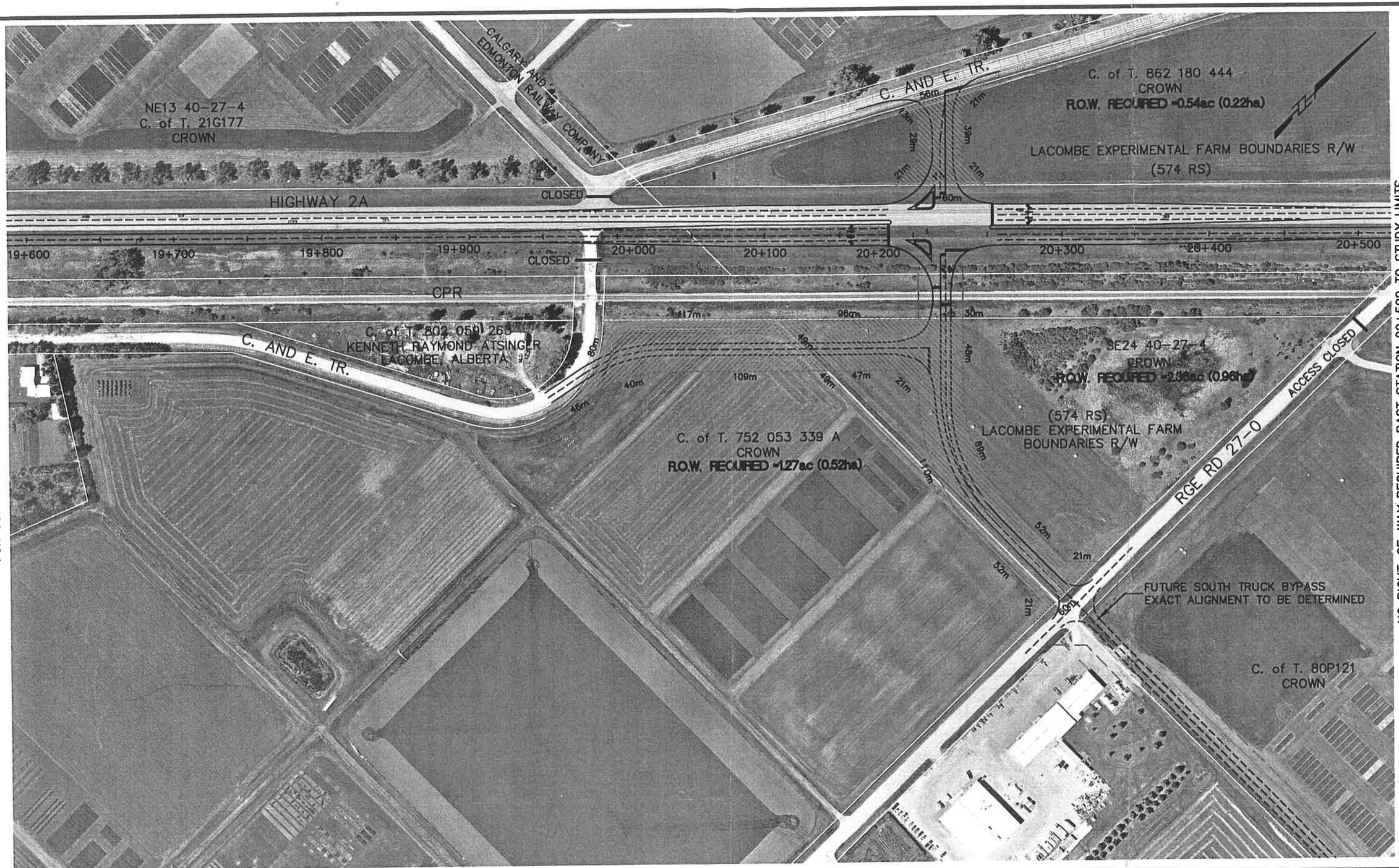

EXHIBIT : 13
HIGHWAY 2A PROPOSED IMPROVEMENTS
(STA 19+600 – 20+500)
MARCH 2005
BLACKFALDS TO LACOMBE ALBERTA

LEGEND

- PROPOSED EDGE OF LANE
- EXISTING LOT LINE
- PROPOSED RIGHT OF WAY BOUNDARY
- REQUIRED CROWN LAND FOR R.O.W
- REQUIRED PRIVATE LAND FOR R.O.W

0 100m
SCALE 1:2500 HORIZ.

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