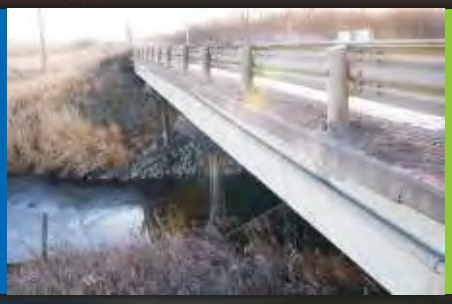
9th Street (Nisku Spine Road) Functional Planning Study

June 2006



Final Report

from Airport Road to the City of Edmonton Corporate Limits

LEDUC COUNTY

Associated Engineering

Executive Summary

ES-1 INTRODUCTION

Nisku Spine Road (locally known as 9 Street) is an important north-south corridor through Nisku in Leduc County. Nisku Spine Road is located within the eastern portion of the Nisku Industrial Business Park. Nisku Spine Road will function as a major arterial roadway connecting the major economic centers in the region including the Edmonton International Airport, Nisku Business Park, the City of Edmonton and the City of Leduc. Nisku Spine Road is identified as an important regional link between the Nisku Industrial Area and other major industrial areas in south Edmonton in the Alberta Capital Region Transportation Plan. Nisku Industrial Business Park is western Canada's largest business and industrial park, encompassing roughly 2200 hectares of industrially zoned land. Currently the Nisku Industrial Business Park has grown to accommodate over 400 companies, employing more than 14000 highly skilled trades and professional workers.

Nisku Spine Road is currently a minor arterial roadway extending from Airport Road (10 Avenue) in the south to Township Road 510 in the north. The future Nisku Spine Road alignment is planned to extend north-east from Township Road 510 along Range Road 244 (101 Street) to 41 Avenue SW at the City of Edmonton's south corporate limits.

Leduc County prepared a Functional Planning Study for the Nisku Spine Road in 1985. At the time that the Functional Planning Study was completed approximately 800 hectares were developed as medium density industrial land. Today there are more than 2000 hectares of developed or developing land in the Nisku area. Therefore the previous functional plan requires updating to reflect the current and future planned development trends in the area. The Leduc County Transportation Master Plan prepared in 2001 identifies Nisku Spine Road as a major north-south arterial roadway in Leduc County connecting the City of Edmonton.

Alberta Infrastructure and Transportation s (AIT) future regional ring road plans identifies Nisku Spine Road as a major connector between Anthony Henday Drive and Highway 625. The plan prepared earlier requires updating to reflect the current geometric design standards.

ES-2 STUDY PURPOSE AND SCOPE

Leduc County retained Associated Engineering (AE) in November 2005 to complete the functional planning study for 9 Street (Nisku Spine Road). The purpose of this study is to recommend improvements to the Nisku Spine Road required to meet immediate and long term traffic flows. This study would provide specific recommendations regarding improvements to the existing roadway structure, design standards, horizontal alignment, profile changes, right-of-way requirements, intersectional treatments and access control.

The scope of work involved preparing 1:2000 scale functional plans for the Nisku Spine Road. The study corridor encompasses the existing 9 Street alignment in the Nisku Industrial Business Park from 10 Avenue (Airport Road) to Township Road 510 and the future spine road alignment extending north-east along Range Road 244 (101 Street) to 41 Avenue SW at the City of Edmonton south corporate limit.

ES-3 REVIEW OF PAST STUDY REPORTS

AE project team reviewed in detail the following study reports and Area Structure Plans:

Relevant Transportation Study Reports

- 9 Street (Nisku Spine Road) Functional Study, Leduc County, 1985;
- Nisku Traffic Analysis and Functional Planning Study, 1997;
- Leduc County, Transportation Master Plan – Final Report, May 2001;
- Highway 625 at Nisku Functional Planning Report, 2004;
- Highway 625:02, Sparrow Drive to 9 Street (Nisku) Preliminary Engineering, Detailed Design, Tender Preparation, Construction Supervision and Contract Administration, Study in progress by Alberta Infrastructure and Transportation;
- City of Leduc Transportation Study, 2000;
- Leduc County North Major Area Structure Plan Traffic Impact Assessment, Final Report, 2005;
- Alberta Capital Region Alliance (ACRA) Transportation Plan;
- Airport Road Outline Plan, Transportation Impact Assessment, City of Leduc, 2005.

Relevant Area Structure Plans

- Ellerslie Area Structure Plan, the City of Edmonton, Office Consolidation December 2005;
- Nisku Area Structure Plan, October 1981;
- Leduc County North Major Area Structure Plan, 2004;
- Blackmud Creek Area Structure Plan, 2004;
- City of Leduc, North Leduc Industrial ASP, 2001;
- Saunders Lake Area Structure Plan, 2005.

Relevant Drainage Studies

- Blackmud Creek Floodplain Study, Saunders Lake to Highway 2, Alberta Department of Environment, June 1985;
- 9 Street (Nisku Spine Road) Functional Planning Study, June 1985;
- Whitemud Creek Watershed Plan Update, 1999;
- Nisku Industrial Business Park Storm Water Drainage Plan, Preliminary Engineering Study, June 2001;
- Nisku Industrial Park Design Flows Review, April 2004;
- Blackmud Creek Area Structure Plan, February 2004;
- Saunders Lake Utility and Stormwater Assessment, November 2004;
- North Major Area Structure Plan Utility and Stormwater Strategy, 2005.

ES-4 TRAFFIC ANALYSIS

AE project team gathered the available traffic volume information for the study area from Leduc County and Alberta Infrastructure and Transportation (AIT). AE project team conducted morning and afternoon peak hour intersection turning movement traffic volumes at the following intersections during November 2005:

- 9 Street/15 Avenue Intersection
- 9 Street/25 Avenue Intersection
- 9 Street/Township Road 510 Intersection
- 41 Avenue SW/101 Street SW Intersection (at the Leduc County and the City of Edmonton boundary)

AE project team obtained the intersection traffic volume information for 9 Street/Highway 625 from AIT and 9 Street/Airport Road from the report “Airport Road Outline Plan, Transportation Impact Assessment, City of Leduc, 2005”.

AE project team balanced the intersection volumes obtained from various sources. AE project team carried out the base year traffic capacity analysis for the balanced intersection volumes using Synchro/SimTraffic software (Version 6.0). This analysis is based on the procedures shown in the Highway Capacity Manual for capacity analysis for arterial roadways. This analysis was done to identify any short term traffic improvements required along 9 Street. The Level of Service (LOS) indicated that all the intersections and individual movements along the study corridor operated at a higher LOS except at the intersection of 9 Street/Highway 625. This intersection is currently operating at a capacity of more than 100% and the LOS of northbound and southbound movements are operating at LOS F. Installation of traffic signals at this intersection would improve the LOS for this intersection.

AE project team carried out the long term traffic analysis based on the traffic forecast information obtained from the City of Edmonton’s Regional Transportation Model (RTM). This information was supplemented by the AE project team’s additional transportation impact analysis carried out based on the future land use and density assumptions for the Nisku Industrial Business Park Area.

The long term Annual Average Daily Traffic (AADT) for the Nisku Spine Road based on the RTM varied between 21,000 and 33,000 along the study corridor. AE project team carried out a broad based transportation impact analysis using the future land use assumptions along the study corridor to arrive at the anticipated daily traffic after the full build out of the Nisku Industrial Business Park. The transportation impact analysis indicated that, by the year 2016, the AADT along 9 Street (Nisku Spine Road) would vary between 10,000 and 12,000. In general, an AADT of 12,000 would be the trigger point for upgrading a 2 lane roadway to 4 lanes. Therefore, year 2016 could be the trigger point for upgrading the Nisku Spine Road to 4 lanes. Based on the long term RTM forecasts and other road network upgrades in the Nisku area, Nisku Spine Road would continue operate at a acceptable LOS with four lanes.

The long term intersection traffic control requirements are arrived at based on the traffic forecast information developed for the important intersections in the study area. Major recommendations include

considerations for traffic signals at the intersections of Airport Road/9 Street and Highway 625/9 Street. For the other major intersections of 9 Street at 15 Avenue, 25 Avenue, Township Road 510 and 41 Avenue SW, AE project team concluded that the traffic growth will need continuous monitoring and signals may be considered when traffic volumes and delay warrants are met.

AE project team reviewed the warrants for installation for warning signals at the at-grade rail crossing (spur line) north of Tuboscope Industries along 9 Street. Plans exist to twin this spur line rail crossing. AE project team reviewed the relevant Transport Canada standards for the Grade Crossing Warning Systems. The warrant analysis for providing gates at the at-grade rail crossing indicated that the gates are not warranted but warrants exists for installation of warning signals.

ES-5 PLAN DEVELOPMENT

AE project team conducted the GPS Center Line Surveys along the existing 9 Street alignment. AE project team conducted off road survey pick ups for miscellaneous sites along the study corridor such as Blackmud Creek Bridge and the major drainage swale along the south side of 15 Avenue. AE project team obtained the required information necessary to prepare the base plans for this study from Leduc County, The base plan information collected from Leduc County is as follows: ortho corrected aerial photography including digital elevation model of the entire study area, cadastral information showing all of the legal boundary information, and utility information. The base plans and drawings are developed based on NAD 83 10TM co-ordinate system using grid coordinates. The AE project team researched available guidelines and design standards to arrive at the design criteria for lane widths, curb extensions, horizontal, and vertical alignment. The Project Steering Committee (PSC) recommended a design speed of 110 km/h for the Nisku Spine Road. AE project team advised to PSC that normally expressways are designed for the higher speed limits. The alignment north and south of Nisku Spine Road (in the City of Leduc and the City of Edmonton limits) would likely be designed for a design speed of 70 km/h. Therefore AE project team suggested to Leduc County to design 9 Street for a design speed of 90 km/h. The PSC accepted this suggestion and asked AE project team to use upper limits/maximum value of the design parameters for horizontal and vertical element in the functional design.

AE project team used the design vehicle of WB-36 for the intersection designs. The intersection design was tested using WB-21 as the off-tracking has been noted to be worse with this vehicle when compared to the double trailer combinations. A design vehicle is a selected motor vehicle which is used to establish highway design controls to accommodate the weight, dimensions and operating characteristics for vehicles of a designated type. WB-36 is a Turnpike Double vehicle type having a minimum turning radius of 18.5 m and vehicle length of 38 m. WB-21 is a Semi-Trailer Combination vehicle type having a minimum turning radius of 15 m and vehicle length of 25 m. The intersection designs were checked for a design vehicle similar for oversized modules (63 m length x 6.5 m wide).

AE project team considered both rural and urban cross-section alternatives for the future Nisku Spine Road. In consultation with PSC it was decided to maintain a rural cross-section along the study corridor. AE project team analyzed the available median treatment options for the study corridor. Both depressed and raised median options are available for a rural cross-section treatment. Raised median was the preferred

option. Raised median was preferred to depressed median to ensure appropriate tie-ins with the proposed cross-section treatments for the arterial roadway connections by the adjacent jurisdictions (the city of Edmonton at 41 Avenue SW, AIT at Highway 625 and the City of Leduc, Airport Road). The preferred cross-section in general has approximately 59 m right-of-way available throughout the study corridor; this could accommodate a future six lane arterial roadway with a raised median. The center line of the existing 9 Street would need to be shifted approximately 9 m to the west to accommodate the proposed roadway cross-section.

AE project team reviewed the available Bridge File Information (AIT Bridge File Number: 00300) to identify the structural upgrades required for the existing Blackmud Creek crossing. A new structure, an integral abutment bridge concrete or steel (single span) with a bridge length of 33.1 m (3 x 8.5 = 7.6) will be required. Heavy girder would be required to account for 25% overweights for the pavement structure. This will result in least environmental effect and adequate load capacity. Another bridge structure would be required during the full development stage to accommodate the stage two development of another 2 lanes along 9 Street. A new bridge structure (as opposed to an arch pipe culvert) is recommended because a bridge would provide better hydraulic capacity to account for the level difference between the creek and bridge structure. A bridge structure would function better from a construction staging perspective to accommodate the stage two development when compared with arch pipe culvert.

AE project team prepared staging plans for the construction of 9 Street. During the first stage the Nisku Spine Road will be a two lane arterial roadway with upgraded intersection treatments (left turn bays with storage) at major intersections at: Airport Road, 15 Avenue, Highway 625, 25 Avenue and Township Road 510. The two lanes on the east side of 9 Street would be constructed first. In the second stage (likely by the year 2016) Leduc County will construct another two lanes on the west side of 9 Street. At this stage 9 Street would be a major arterial roadway with four lanes and 12.6 m wide raised median. The Leduc County will have the option of moving to a six lane rural cross-section with a raised median in the future depending on the traffic growth in the study area.

ES-6 CONCEPTUAL COST ESTIMATES

AE project team generated the conceptual cost estimates for the recommended improvements. The unit prices used for generating the cost estimates was based on the unit prices for bids comparable to this project in Leduc County. The unit prices are based on the 2006 dollars. The conceptual cost estimates have an accuracy of +/- 50%. The land acquisition amount includes the cost for acquiring additional right-of-way by Leduc County. The conceptual cost estimates are as follows:

Considering 25% Overweights for the Pavement Structure

Cost for developing all 4 lanes of Nisku Spine Road:	$ 70 Million
Cost for developing the first two lanes only of Nisku Spine Road:	$ 39 Million

Considering Normal Pavement Structure

Cost for developing all 4 lanes of Nisku Spine Road:	$ 64 Million
Cost for developing the first two lanes only of Nisku Spine Road:	$ 35 Million
Cost for acquiring additional right-of-way:	**$ 4 Million**

ES-7 ACCESS MANAGEMENT

9 Street will be a major arterial roadway in Leduc County. The number of accesses on major roads has significant impacts on traffic operations and safety. Therefore, the number of accesses on 9 Street should be kept to a minimum and limited to intersections. Direct accesses to 9 Street should be restricted. The existing direct access off the 9 Street needs consolidation by relocating access through side streets or by service roads as shown on the functional plans. AE project team recommends that Leduc County consider the following access management standards outlined in the Transportation Association of Canada (TAC) and AIT design standards while approving the future sub division applications along the study area:

Intersection Spacing: Spacing for at-grade arterial all directional intersections of 800 m is ideal, 400 m is desirable and 300 m is minimum under special circumstances only. 9 Street being a major arterial roadway with higher posted speeds, AE project team recommends to maintain an access spacing of 800 m while approving future development applications.

New Development Access: Direct access to new private or commercial development should not be permitted except in cases (this will be determined by Leduc County during the sub division application stage) where alternate indirect access is not feasible. If direct access is deemed necessary, only right-in/right-out access should be allowed. Otherwise, access should be gained from collector or local streets intersecting the 9 Street. An auxiliary lane should be constructed to serve for acceleration and deceleration associated with the right-in/right out movement.

Common Access Point: Where two (2) adjacent properties require direct access, a common access point should be provided to accommodate the needs of both properties.

Geometric Design Features: For new development where direct access is approved under special circumstances, the geometric design features chosen (turning radii, access width, profile, sight distance) should be thoroughly checked to ensure that they will adequately handle the vehicle types known to be the major users at these access locations. Such design encourages efficient exit and entrance movements, thereby minimizing the impact of local traffic on through traffic.

Access Removal Through Development: When redevelopment of property abutting the 9 Street occurs, Leduc County should make every possible effort to remove existing direct access.

The collector roads shown north of Township Road 510 to 41 Avenue SW are conceptual and subject to confirmation during subdivision or rezoning. Leduc County should ensure that the above access

management standards are followed during the subdivision/rezoning of lands north of Township Road 510. The existing direct accesses off 101 Street (farm access/private residence access) north of Township Road 510 would needs to be maintained until the redevelopment is complete in the Nisku Business Industrial Park.

ES-8 IMPLEMENTATION PLAN

AE project team recommends that the Leduc County construct stage one of the Nisku Spine Road for the entire study corridor starting from Airport Road to the City of Edmonton corporate limits under one construction contract. The reasons are as follows:

- Development driven upgrading (especially in the section between Township Road 510 and 41 Avenue SW) would result in a fragmented implementation;
- A corridor long upgrading plan would set the stage for a comprehensive development strategy for the Nisku Industrial Business Park;
- A higher quality end product;
- Overall lower cost of upgrading;
- Best overall value.

9 Street (Nisku Spine Road) roadway construction would be a major roadway reconstruction for the 9 Street. There will be minor traffic disruptions during the construction phase of this project. Leduc County would need to prepare a "Traffic Accommodation" strategy during the construction phase of this project. If 9 Street is the only access to a business, Leduc County should ensure the access would not be affected during construction through a suitable a "Traffic Accommodation" strategy.

ES-9 STORM DRAINAGE ANALYSIS

The Nisku Business Industrial Business Park is drained with a system of ditches and culverts, which drain to Highway 2 or Blackmud Creek. A number of small dry ponds, mostly serving individual lots, provide stormwater management to control runoff from the area to the pre-development rate. Ditches provide additional flood storage as well as conveyance of runoff. The preliminary stormwater concept plan for the 9 Street Nisku Spine Road consists of roadside ditches to carry runoff from the roadway and tributary areas to stormwater management areas. The plan shows the potential locations for these stormwater management facilities based on previous drainage planning for the area. Locations are only tentative and subject to review based on plans for other areas, which remain to be determined, as are the detention pond sizes. Stormwater management is required for all new development areas including the 9 Street Nisku Spine road. Locations and sizes of facilities, their design, and the release rates from these facilities, remain to be determined. These will need to be coordinated with the development area drainage plans. Details of the stormwater management plan for the Nisku Business Industrial Park needs to be confirmed before the 9 Street drainage plan is finalized. Drainage development in Nisku may have previously been done on a piecemeal basis to serve the needs of individual developers, but there is sign of better coordination in recent years. An approved and updated master drainage plan would provide better coordination between

developers which will help to create a better and more efficient drainage system (lower cost), and meet environmental requirements.

ES-10 ENVIRONMENTAL OVERVIEW

AE project team conducted an initial environmental evaluation for the alignment of the proposed Nisku Spine Road. The study area encompasses the existing 9 Street alignment in the Nisku Industrial Business Park from 10 Avenue (Airport Road) to Township Road 510 and the future spine road alignment extending north-east along Range Road 244 (101 Street to 41 Avenue SW) at the City of Edmonton south corporate limit. This initial environmental evaluation was conducted to identify potential impacts or sensitive areas, which might be impacted by the proposed alignment and to identify potential applicable environmental regulations or legislation. In the area north of Blackmud Creek, two potential wetlands area were identified and the crossings at Blackmud Creek. Leduc County should prepare a Phase I ESA, to identify if there are any potential environmental concerns associated with the post or current land uses within the proposed Nisku Spine Road alignment or adjacent to the project.

ES-11 UTILITY OVERVIEW

The study area contains major water and sanitary sewer lines. The South East Regional Trunk Sewer (SERTS) runs adjacent (east side) to 9 Street. In addition to serving the City of Leduc, the Town of Beaumont and the Edmonton International Airport, SERTS importantly services the Nisku Business Park. A Capital Region South West Water Line runs along the quarter line, half a mile south of Township Road 510 servicing the Town of Beaumont. A new reservoir and pump house is proposed north of Blackmud Creek, east of 9 Street in Sec SW 31 50-24-4. Any relocation required for the existing water and sewer lines due to the reconstruction of 9 Street roadway would be determined during the preliminary engineering stage.

An Altalink Substation exists at the south-east quadrant of the Airport Road/9 Street intersection. A new Altalink Substation is proposed north of the 25 Avenue, east of 9 Street in Sec SW 31 50-24-4. The existing utilities includes the presence of underground gas lines crossings (AltaGas), major overhead transmission lines & power lines (Altalink) on both sides along 9 Street and overhead telephone lines (Telus) along east side of 9 Street. Some of the utilities would require relocation (both above ground and underground) utilities during stage one construction. This would be subject to Hydrovac and Topographic survey information that needs to be conducted during the preliminary engineering stage.

The illumination along 9 Street exists only at the important intersections at Airport Road (10th Avenue) and Highway 625 (20th Avenue). The conceptual cost estimates allows for providing illumination all along 9 Street during the reconstruction of 9 Street to an Arterial Roadway standard.

ES-12 STAKEHOLDER AND PUBLIC CONSULTATION

AE project team during the course of the study conducted meetings with key project stakeholders such as landowners, business owners, AIT, City of Edmonton and the City of Leduc. The AE project team

conducted design review meetings with the PSC during 30%, 70% and 95% project completion stage for this project.

AE project team organized and conducted a public open house on March 22, 2006 at the Nisku Inn & Conference Centre between 3.00 pm and 7.00 pm. The open house event was advertised in Wildcatter and Leduc Representative. A copy of the advertisement was posted in the Leduc County website and Nisku Business Association (NBA) website. Individual mail outs were sent to all adjacent landowners and business owners along the 9 Street and the landowners along the Nisku Spine Road.
The draft recommended plans were displayed at the open house event. The public was provided with an attendance slip to sign in and a feedback questionnaire to provide comments on the draft recommended plans. Public were provided an opportunity to respond to the survey by March 29, 2006. A graffiti board (showing the draft recommended plans) was set up to provide an opportunity for the public to comment on the areas of concern using paste it notes.

Following are the highlights of the open house event:

- About 65 people attended the open house;
- About 40 people completed the sign-in slips;
- Attendance include Leduc County Councillors, AIT Staff and the City of Leduc Staff;
- About 10 completed survey forms were received;
- Overwhelming support from public for the construction of Nisku Spine Road.

ES-13 RECOMMENDATIONS

AE project team makes the following recommendation to Leduc County for their consideration for 9 Street (Nisku Spine Road):

1. Leduc County should initiate studies for coming up with a financing strategy for implementing this project.
2. Leduc County should proceed with the process of protecting the right-of-way required for construction of the Nisku Spine Road.
3. Leduc County should proceed with the process of producing detailed design drawings for the stage one construction for 9 Street (Nisku Spine Road) roadway construction.
4. Leduc County should consider constructing stage one of the Nisku Spine Road for the entire study corridor starting from Airport Road to the City of Edmonton corporate limits under one construction contract.
5. Leduc County should consider the access management standards outlined in the Transportation Association of Canada (TAC) and AIT design standards while approving the future sub division applications along the study area. 9 Street being a major arterial roadway with higher posted speeds, AE project team recommends to maintain an access spacing of 800 m while approving future development applications.

6. The proposed 9 Street (Nisku Spine Road) roadway construction project will be a major undertaking. There will be minor traffic disruptions during the construction phase of this project. Leduc County will need to ensure that a "Traffic Accommodation" strategy during the construction phase of this project is prepared. If 9 Street is the only access to a business, Leduc County should ensure the access would not be affected during construction through a suitable "Traffic Accommodation" strategy.
7. Leduc County should consider preparing a comprehensive drainage master plan for the entire Nisku Industrial Business Park. An approved and updated master drainage plan would provide better coordination between developers which will help to create a better and more efficient drainage system (lower cost), and meet environmental requirements.
8. Leduc County should consider preparing a Phase I ESA, to identify if there are any potential environmental concerns associated with the post or current land uses within the proposed Nisku Spine Road alignment or adjacent to the project.

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1 Introduction

1.1 STUDY BACKGROUND

Nisku Spine Road (locally known as 9 Street) is an important north-south corridor through Nisku in Leduc County. Nisku Spine Road is located within the eastern portion of the Nisku Industrial Business Park. Nisku Spine Road will function as a major arterial roadway connecting the major economic centers in the region including the Edmonton International Airport, Nisku Business Park, the City of Edmonton and the City of Leduc. Nisku Spine Road is identified as an important regional link between the Nisku Industrial Area and other major industrial areas in south Edmonton in the Alberta Capital Region Transportation Plan. Nisku Industrial Business Park is western Canada's largest business and industrial park, encompassing roughly 2200 hectares of industrially zoned land. Currently the Nisku Industrial Business Park has grown to accommodate over 400 companies, employing more than 14000 highly skilled trades and professional workers.

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Alberta Infrastructure and Transportation s (AIT) future regional ring road plans identifies Nisku Spine Road as a major connector between Anthony Henday Drive and Highway 625. The plan prepared earlier requires updating to reflect the current geometric design standards.

1.2 STUDY PURPOSE AND SCOPE

Leduc County retained Associated Engineering (AE) in November 2005 to complete the functional planning study for 9 Street (Nisku Spine Road). The purpose of this study is to recommend improvements to the Nisku Spine Road required to meet immediate and long term traffic flows. This study would provide specific recommendations regarding improvements to the existing roadway structure, design standards, horizontal alignment, profile changes, right-of-way requirements, intersectional treatments and access control.
The scope of work involved preparing 1:2000 scale functional plans for the Nisku Spine Road. The study corridor encompasses the existing 9 Street alignment in the Nisku Industrial Business Park from 10 Avenue

(Airport Road) to Township Road 510 and the future spine road alignment extending north-east along Range Road 244 (101 Street) to 41 Avenue SW at the City of Edmonton south corporate limit.

Figure 1-1 shows the limits of the study area.

1.3 PUBLIC CONSULTATION PROCESS

The public consultation process for this study involved individual meetings with important landowners and business owners in the study area. A public open house was held on March 22, 2006 at the Nisku Inn, to provide an opportunity for the public to review and comment on the draft recommended plans.

1.4 REPORT ORGANIZATION

This report is divided into thirteen chapters including this introductory section:

Chapter 2 presents the comprehensive review of all relevant past reports and approved area structure plans.

Chapter 3 details out the traffic analysis carried out for this study.

Chapter 4 describes the process involved in developing the base plans and geometric design criteria for this study.

Chapter 5 details out the recommended functional plan developed for the study corridor. This section highlights the preferred cross-section, roadway staging, intersection plans, access management, traffic control requirements and the conceptual cost estimates. This chapter describes the bridge assessment across the Blackmud Creek Crossing and the future structural requirements. The future right-of-way requirements and the implementation plan are detailed out in this chapter.

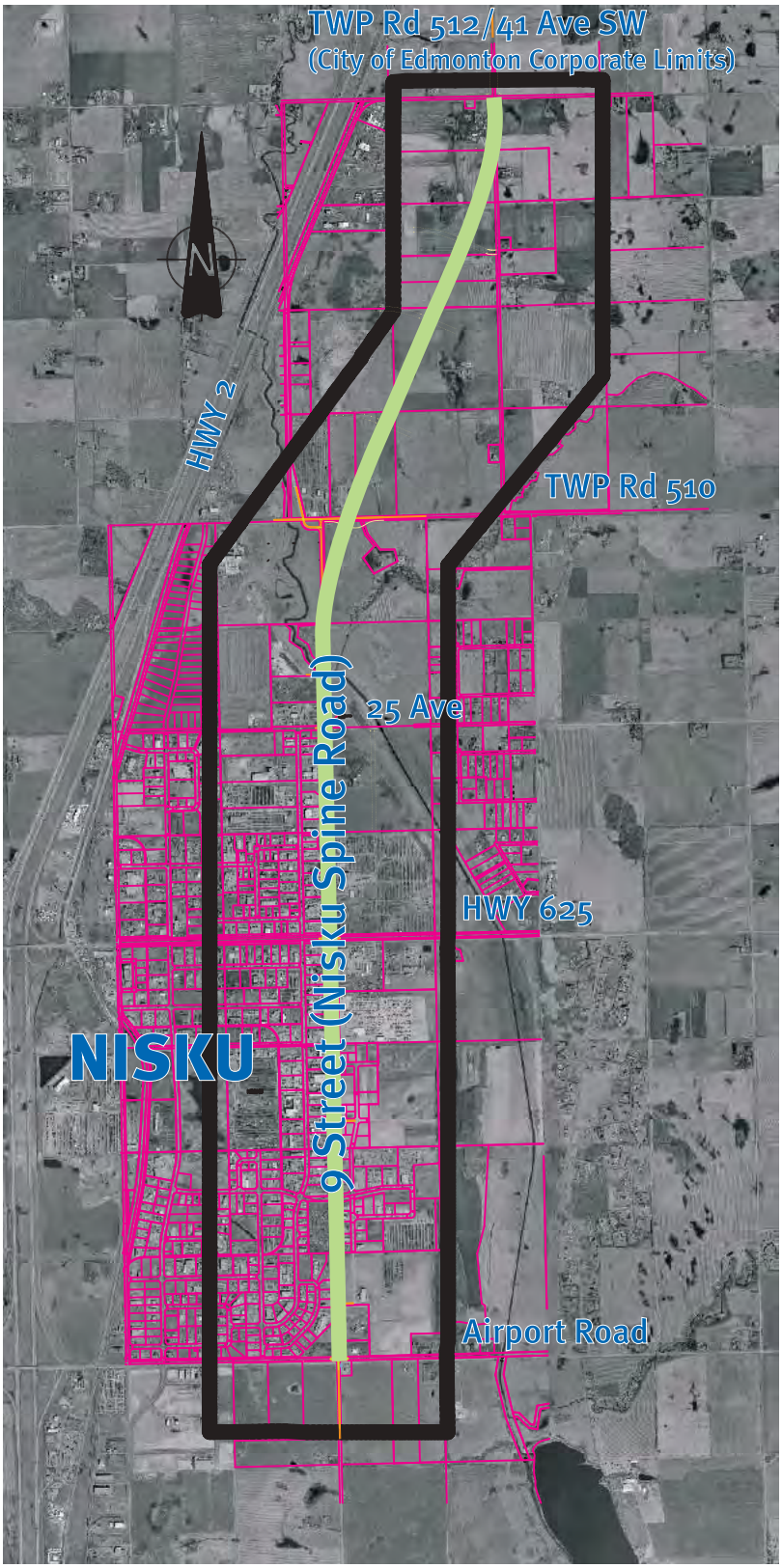
Chapter 6 explains the storm drainage analysis carried out for this study.

Chapters 7 provide a synopsis for the environmental overview conducted as a part of this study.

Chapter 8 presents the project team's overview of underground and franchise utilities along the study corridor.

Chapter 9 outlines the public and stakeholder consultation program undertaken by the project team during this project.

Chapter 10 presents the study recommendations.



9th Street (Nisku Spine Road)
Airport Road to City of Edmonton Limit
Functional Planning Study
May 2006

LEDUC COUNTY

Associated Engineering

Figure 1-1: Study Area

2 Past Studies

2.1 REVIEW OF RELEVANT AVAILABLE AREA STRUCTURE PLANS AND TRANSPORTATION STUDIES

The project team reviewed the relevant study reports and area structure plans (ASP) for the study corridor. The following section summarizes this review:

2.1.1 Transportation Study Reports

Relevant Supporting Policy and Recommendations to Nisku Spine Road are summarized as follows:

9 Street (Nisku Spine Road) Functional Study, Leduc County, 1985

The study recommendations included plans to develop a parallel arterial route east of Highway 2, from the City of Leduc, through the Nisku Industrial Business Park to the City of Edmonton corporate limits. This roadway will provide the first step of an important link between, Nisku, eastern Edmonton and the northeast of the province. The recommended Nisku Spine Road travels south from the boundary with the City of Edmonton at 101 Street (Range Road 244), through Section 5, Township 51, Range 24 W4M and Section 31, Township 50, Range 24 W4M to connect to Range Road 250 and continue south to Township Road 502 (Airport Road).

Nisku Traffic Analysis and Functional Planning Study, 1997

This project included an assessment of traffic operations along Highway 625 and Airport Road in Nisku. The assessment included the intersectional operations along the two corridors. Functional planning recommendations for Highway 625 and Airport Road were developed based on the assessment findings, the results of a survey of businesses in the Nisku Industrial Park, and projected growth in the area.

Leduc County, Transportation Master Plan – Final Report, May 2001

The Nisku Spine Road has been proposed as a link between the Nisku Industrial Business Park and the City of Edmonton 101 Street/91 Street corridor since the late 1970's. The Leduc Area Transportation Study (1981), Nisku General Development Plan (1979), the Nisku Area Structure Plan (1981), the Nisku Industrial Park Roadway Improvements Study (1985), the Highway #2 Industrial Area Structure Plan (1982), and the City of Edmonton's Ellerslie Area Structure Plan all recognize the need to upgrade 9 Street to a major four lane divided arterial as development in Nisku Industrial Business Park continues. The total cost of the Nisku Spine Road had been estimated to cost approximately $11.9 million plus $200,000 for land.

Highway 625 at Nisku Functional Planning Report, 2004

This report outlines the functional planning study and identifies the recommended plans for improvement on Highway 625:02 through Nisku, Alberta. The recommendations included the following intersection

improvements at 9 Street: westbound and eastbound left turn lanes on Highway 625 at 9 Street (Stage 1), with left turn lanes on 9 Street (Stage 3).

Highway 625:02, Sparrow Drive to 9 Street (Nisku) Preliminary Engineering, Detailed Design, Tender Preparation, Construction Supervision and Contract Administration, Study in progress by Alberta Infrastructure and Transportation.

Alberta Infrastructure and Transportation (AIT) is currently undertaking this detailed design study based on the functional plans completed for Highway 625 in the year 2004. In summary, this project is the four laning of Highway 625 with the addition of raised concrete islands through the Nisku Business Park from Sparrow Drive to 9 Street. The construction of this project is not currently on the 3 year program with no confirmed year of construction identified. This study is in progress and AIT is expecting to complete the detailed design by December 2006.

City of Leduc Transportation Study, 2000

The long range road network shown in City of Leduc's Transportation Study indicates 9 Street south of Airport Road (Range Road 250) as a future 4 lane Rural Divided Arterial roadway.

Leduc County North Major Area Structure Plan Traffic Impact Assessment, Final Report, 2005

The development of a significant industrial node on the east side of Highway 2 between 41 Avenue SW and Township Road 510 will significantly increase north-south traffic flows. The major arterial classification for the Nisku Spine Road, identified in the North Major Area Structure Plan is expected to be sufficient to, and is consistent with, the recommendations of the Leduc County Transportation Master Plan. Industrial collector roadways are required to provide convenient access from the industrial area to the Nisku Spine Road, Township Road 510 and 41 Avenue SW. Details of the collector roadway alignments and the intersection locations should be reviewed in detail with the future subdivision and design of the Nisku Spine Road.

Airport Road Outline Plan, Transportation Impact Assessment, City of Leduc, 2005

This transportation assessment was completed for the proposed outline plan for the conceptual subdivision design and land uses anticipated within the NE 12-50-25-W4M (located in the south-west quadrant of Airport Road/9 Street intersection). The transportation analysis indicated that, to accommodate traffic growth associated with the development in the Airport Road Outline Plan and adjacent plan areas the following roadway improvements are required:

- Signalization of the 9 Street/Airport Road intersection;
- Improvements to the 9 Street/Airport Road intersection to facilitate increases in traffic volumes associated with general growth in background traffic.

With respect to the timing of traffic signal installation, the study recommended that traffic growth at the intersections be monitored and that a signal installed when traffic volumes and delay warrants are met.

2.1.2 Relevant Area Structure Plans

Ellerslie Area Structure Plan, the City of Edmonton, Office Consolidation December 2005.

The arterial roadway network internal to the Ellerslie Area Structure Plan (ASP) area includes Ellerslie Road, 25 Avenue SW, the realigned portion of 91 Street, 66 Street and Parsons Road. The key north-south connections include the Parsons Road connecting to the Nisku Spine Road (9 Street) in Leduc County. The implementation plan for the ASP include Neighbourhood Three (Phase C) involving full closure of 91 Street Government Road Allowance between 25 Avenue SW and 41 Avenue SW, possible completion of Parsons Road to 41 Avenue SW based on industrial demand and residential traffic volumes.

Nisku Area Structure Plan, October 1981

The purpose of this Nisku Area Structure Plan was to define evaluate and plan the area suitable for the long term expansion of the Nisku Industrial Park. The study boundary included the areas in the Nisku Industrial Business Park. The Nisku Spine Road is described in the ASP as follows: The only straight north-south road running the whole length of the site area is that on the east side of the Nisku Industrial Business Park. As it is fairly central to the study area, it has obvious significance as a major spine road serving the future industrial area and through traffic traveling between south-east Edmonton and Leduc.

Leduc County North Major Area Structure Plan, 2004

The plan area for the Leduc County North Major Area Structure Plan (NMASP) straddles the Highway 2 Corridor. It is adjacent to the Nisku Business Park area and is in near proximity to the Edmonton International Airport. The plan area contains approximately 8,290 ha. The plan area is bisected by the Highway 2 corridor and included Highway 814 and Highway 625, both of which access the Town of Beaumont. The proposed road pattern responds to the anticipated growth of residential and industrial development in the plan area. In addition to Highways 2 and 814, future major north-south arterials will be Range Road 244 (which to the North will divert connect with 66 Street), the Nisku Spine Road and Range Road 254/170 Street. Depending on the density of development in the Leduc County north plan area, other north-south arterials may be required at one mile spacing. Regarding east-west traffic flow, Highway 625 will be supplemented by Township Road 512 (41 Avenue) and Township Road 510, especially between Highway 814 and the Nisku Spine Road. Nisku Spine Road is designated as a future major arterial (4 Lane) in the plans.

Blackmud Creek Area Structure Plan, 2004

The Blackmud Creek Area Structure Plan lies just south of the Leduc North Major Area Structure Plan. Covering a string of four quarter sections this plan protects the integrity of the Blackmud Creek by maintaining a 400 m (one-quarter mile) buffer of agricultural and natural lands between the Vista residential subdivisions to the east and the business park uses on uplands to the west of the Blackmud Creek Valley.

City of Leduc, North Leduc Industrial ASP, 2001

In May 2001, the City of Leduc approved this area structure plan identifying an area of approximately 720 ha for a future commercial and a range of industrial uses. The plan is bounded by Highway 2 on the west, Airport Road to the north, the municipal boundary (Range Road 250) on the east, and 65 Avenue (Township Road 500) to the south.

Saunders Lake Area Structure Plan, 2005

Saunders Lake extends through the Blackmud Creek Valley from Airport Road south to Highway 623. The area between the Saunders Lake and the City of Leduc is of interest to both municipalities. The Area Structure Plan indicated that 9 Street (RR 250) south of Airport Road should be developed as a 4 lane arterial section. The plan recommended channelization of intersection at 9 Street/Airport Road.

2.2 SUMMARY OF RELEVANT DRAINAGE STUDIES

AE project team reviewed the available studies related to stormwater plans for the study area. The summary of the review is as follows:

Blackmud Creek Floodplain Study, Saunders Lake to Highway 2, Alberta Department of Environment, June 1985

- Channelised section of Blackmud Creek from Saunders Lake to downstream of Highway 2 (designed for 1:3 to 1:5 year flood):
    - originally constructed after 1954 flood, re-built in 1984;
    - flood frequency analysis conducted in 1984;
    - Q100 = 56 m3/s u/s of Irvine Creek and 77 m3/s d/s of Irvine Creek (Irvine Creek Junction is at 9 Street).
- Starting level for backwater model based on observed 1974 HWL of 690.74 u/s of Highway 2 (southbound) culvert (estimated Q=72 m3/s).
- 1:100 yr water level approx 692 m throughout the reach (governed by backwater conditions from downstream);
- Flood limits defined from contour map (1.0 m interval) on west side and estimated from cross-sections and air photos on east side.

9 Street (Nisku Spine Road) Functional Planning Study, June 1985

- Roadside ditches for drainage;
- 400 m of 1200 mm diameter storm sewer south of 15 Avenue;
- Existing SERTS on east side of right-of-way (ROW) south of 15 Avenue to be twinned in future;
- Proposed staged construction with 2 lanes constructed initially and 2 (east) lanes added when traffic demands warrant it;
- Blackmud Creek bridge in poor condition and will need to be replaced;
- Proposed 60 m ROW including 10 m Municipal Reserve (MR) on each side.

Whitemud Creek Watershed Plan Update, 1999

- Master drainage plan for areas within Edmonton draining to Whitemud Creek;
- Computer modelling using QHM (QUALHYMO);
- Used creek design flows from ABENV 1984;
- Proposed release rate 5 L/s/ha (least cost overall);
- City of Edmonton has adopted 8 L/s/ha for first 700 ha with monitoring over 10 years to identify erosion problems.

Nisku Industrial Business Park Storm Water Drainage Plan, Preliminary Engineering Study, June 2001

- Developed a preliminary stormwater management plan for the Nisku Industrial Area;
- According to the report, the area was developed without an overall stormwater management policy (plan); Generally, runoff was supposed to have been controlled to the rate of 1.64 L/s/ha (15 cfs/mi2) which was thought to be the 1:25 year pre-development rate. However, some of the developments did not meet the requirements of their drainage licences;

Study Objectives

- Assess the condition of the storm drainage system and to develop a stormwater management policy that developers will adhere to;
- Develop a stormwater management plan to control runoff to Blackmud Creek;
- Provide information to obtain approvals for drainage of the Nisku area;
- Examine existing drainage and establish the appropriate release rates;
- Evaluate the impact that drainage could have on the basin;
- Develop a conceptual stormwater management plan;
- Recommend a stormwater management plan.

Plan Objectives

- Control runoff to pre-development;
- Meet Alberta Environment's criteria;
- Reduce flooding and drainage problems;
- 14 drainage basins;
- Ditch and culvert drainage system;
- Problem areas - flooding reported at a number of locations;
- Modelling 1:5 year showed flooding at 12 locations;
- Used release rate of 1.64 L/s/ha (1:25) except basin 6 (4 L/s/ha);
- Analysis shows that over 1 million m3 of storage will be required, approx 100,000 existing;
- 10 existing small stormwater management facilities plus existing slough;
- Out of the 817 ha of developed or developing area, approximately 100,000 m3 of storage has been provided, compared with 500,000 m3 that would be required;

- Preliminary drainage concept plan proposed 13 new stormwater management facilities plus replacement of 18 culverts with larger pipes.

Nisku Industrial Park Design Flows Review, April 2004

- Reviewed various estimates of pre-development flow for the Blackmud Creek basin and proposed that the historically accepted value of 1.64 and 4.2 L/s/ha for the 1:100 year storm;
- Noted that these are somewhat higher than the basin average and justified this on the basis that the Nisku area is steeper and better drained. Out of these the Alberta Environment (1983) estimates are the most robust and reliable and indicate a basin average of 1.7 L/s/ha for the 1:100 year flood.

Blackmud Creek Area Structure Plan, February 2004

- ASP for area west of Blackmud Creek;
- Proposed business park for the area west of Blackmud Creek and agricultural/recreational uses (golf course) in the Blackmud Creek valley;
- Proposed stormwater management facilities adjacent to the west side of the creek floodplain to help buffer impact of industrial areas on country residential areas on east side of the floodplain.

Saunders Lake Utility and Stormwater Assessment, November 2004

- To support the ASP for Saunders Lake, south of Nisku;
- Developed a stormwater management concept involving a number of stormwater ponds and ditches discharging to Saunders Lake.

North Major Area Structure Plan Utility and Stormwater Strategy, 2005

- Servicing concept plan for 30 sections of land in the 2-mile wide strip south of the Leduc County boundary with the City of Edmonton;
- Expected to develop over 50-100 years;
- Proposed regional stormwater management facilities discharging at 4.25 L/s/ha;
- Lower rates for the Leblanc Canal and Irvine Creek (does not explain);
- Basin 4 (719 ha) is located on the north side of the project area and has a regional pond of 240,000 m^3 occupying a land area of 16 ha.

3 Traffic Analysis

3.1 BASE YEAR TRAFFIC ANALYSIS

AE project team gathered the available traffic volume information for the study area from Leduc County and Alberta Infrastructure and Transportation (AIT). ***Table 3-1*** summarizes the base year traffic volume information collected for this study.

Table 3-1: Base Year Traffic Volume Information

Location	Base Year Traffic Data
9 Street/Airport Road Intersection	Traffic volumes obtained from the counts done for the Transportation Impact Assessment for the Airport Road Outline Plan.
9 Street/15 Avenue Intersection	AE project team conducted morning and afternoon peak hour intersection turning movement traffic volumes at this intersection during November 2005.
9 Street/Highway 625 Intersection	Traffic volume count information obtained from AIT.
9 Street/25 Avenue Intersection	AE project team conducted morning and afternoon peak hour intersection turning movement traffic volumes at this intersection during November 2005.
9 Street/Township Road 510 Intersection	AE project team conducted morning and afternoon peak hour intersection turning movement traffic volumes at this intersection during November 2005.
41 Avenue SW/101 Street SW Intersection (at the Leduc County and the City of Edmonton boundary)	AE project team conducted morning and afternoon peak hour intersection turning movement traffic volumes at this intersection during November 2005.
Airport Road and Township Road 510	24 hour directional traffic count Information obtained from Automatic Traffic Recorders (ATR) installed on Airport Road and Township Road 510 (at 9 Street).

AE project team balanced the intersection volumes obtained from various sources as summarized in Table 3-1. The morning and afternoon peak hour balanced intersection traffic volumes and Annual Average Daily Traffic (AADT) are depicted in ***Figure 3-1.***

AE project team carried out the base year traffic capacity analysis for the balanced intersection volumes using Synchro/SimTraffic software (Version 6.0). This analysis is based on the procedures shown in the Highway Capacity Manual for capacity analysis for arterial roadways. This analysis was done to identify any short term traffic improvements required along 9 Street. Intersection operations are typically rated by two measures: the volume-to-capacity ratio describes the extent to which the traffic volumes can be accommodated by the physical capacity of the road configuration and traffic control. A value less than 0.90

indicates that generally there is sufficient capacity and good traffic conditions. A value between 0.90 and 1.0 suggests unstable operations may occur as volumes are nearing capacity conditions. A calculated value over 1.0 indicates that traffic volumes are theoretically exceeding capacity. The second measure of performance, Level of Service (LOS), is based on the estimated average delay per vehicle among all traffic passing through the intersection. A low average delay merits a LOS A rating while high average delay merits a LOS of F. ***Figure 3-2*** depicts the summary of base year LOS of the intersections along the study corridor.

The LOS indicated that all the intersections and individual movements along the study corridor operated at a higher LOS except at the intersection of 9 Street/Highway 625. This intersection is currently operating at a capacity of more than 100% and the LOS of northbound and southbound movements are operating at LOS F. Installation of traffic signals at this intersection would improve the LOS for this intersection.

The results of the base year capacity analysis are shown in ***Appendix A.***

3.2 LONG TERM TRAFFIC ANALYSIS

AE project team carried out the long term traffic analysis based on the traffic forecast information obtained from the City of Edmonton's Regional Transportation Model (RTM). This information was supplemented by the AE project team's additional transportation impact analysis carried out based on the future land use and density assumptions for the Nisku Industrial Business Park Area.

The City of Edmonton's Long Term regional model horizon represents full-build out of Edmonton to the current city limits, growth in Sherwood Park, Beaumont, and suburban development south of the Ellerslie ASP area in Leduc County. This horizon represents a City population of 1.5 million and a regional population of 2.5 million, and corresponds to a time frame of 70 to 90 years in future. The traffic forecasts and assumptions based on the RTM would be a fair assumption to arrive at the achievable and sustainable cross-section for the Nisku Spine Road for a 20 year design period.

Appendix B presents information obtained from the City of Edmonton regional traffic model for the study area.

The City of Edmonton's long term road network included assumptions for an interchange at Highway 2 at 41 Avenue SW, a future Outer Ring Road (along existing Township Road 510), systems interchange at Outer Ring Road at Highway 2, and service interchange a Outer Ring Road at Nisku Spine Road. It appears that the alignment assumption for Nisku Spine Road south of 41 Avenue SW shown in the regional model is not consistent with the alignment plans by Leduc County. However, the clarification obtained from the City of Edmonton indicated that the land use assumptions included in the long term RTM would be consistent with the land use plans shown in the Leduc County's NMASP.

3.2.1 Lane Requirements

The long term AADT for the Nisku Spine Road based on the RTM varied between 21,000 and 33,000 along the study corridor. AE project team carried out a broad based transportation impact analysis using the future land use assumptions along the study corridor to arrive at the anticipated daily traffic after the full build out of the Nisku Industrial Business Park. AE project team based on the discussions with the Leduc County made the following assumptions:

- The Nisku Industrial Business Park would be fully build out by the year 2016;
- Background traffic in the Nisku Industrial Business Park would grow at a rate of 6%.

The transportation impact analysis based on the above assumptions indicated that by the year 2016 the AADT along 9 Street (Nisku Spine Road) would vary between 10,000 and 12,000. In general, an AADT of 12,000 would be the trigger point for upgrading a 2 lane roadway to 4 lanes. Therefore, year 2016 could be the trigger point for upgrading the Niksu Spine Road to 4 lanes. Based on the long term RTM forecasts and other road network upgrades in the Nisku area, Nisku Spine Road would continue to operate at an acceptable LOS with four lanes.

3.2.2 Long Term Intersection Traffic Control Requirements

The long term intersection traffic control requirements were arrived at based on the traffic forecast information developed for the important intersections in the study area. ***Table 3-2*** highlights the long term intersection traffic control requirements.

Table 3-2: Long Term Intersection Traffic Control Requirements

Intersection	Long Term Traffic Control Requirements
9 Street/Airport Road (10 Avenue)	Airport Road would be a four lane roadway in the long term. The timing of the intersection upgrades required would depend on the development proposed in the Saunders Lake ASP and the developments proposed in the south-west quadrant of the intersection by the City of Leduc. AE project team arrived at the long term (year 2026) intersection requirements based on updating the traffic forecasts shown in the transportation impact assessment study for the Airport Road Outline Plan. Based on the traffic forecasts this intersection would require traffic signals depending on the timing of the Airport Road Outline Plan improvements.
9 Street/15 Avenue	Upgrades are required for 15 Avenue east and west of 9 Street. Upgrades include providing left turn bays with storage for left turning vehicles. With respect to the timing of traffic signal installation, the traffic growth at this intersection needs continuous monitoring and a signal installed when traffic volumes and delay warrants are met.

Intersection	Long Term Traffic Control Requirements
9 Street/Highway 625	This intersection is under the jurisdiction of AIT. Any upgrades required would be implemented by AIT. Based on the capacity analysis performed by the AE project team a traffic signal installed at this intersection would improve the LOS for the northbound and southbound movements along 9 Street at this intersection.
9 Street/25 Avenue	Upgrades are required for 25 Avenue east and west of 9 Street. Upgrades include providing left turn bays with storage for left turning vehicles. The timing of upgrades depends on the development occurring east and west of 25 Avenue. The traffic growth at this intersection needs continuous monitoring and a signal installed when traffic volumes and delay warrants are met.
9 Street/Township Road 510	Upgrades are required for Township Road 510 east and west of 9 Street. Upgrades include providing left turn bays with storage for left turning vehicles. The timing of upgrades depends on the development occurring on all four quadrants of this intersection. Leduc County will need to undertake a functional planning study for Township Road 510 to arrive at the long term lane requirements for Township Road 510. The traffic growth at this intersection needs continuous monitoring and a signal installed when traffic volumes and delay warrants are met.
Nisku Spine Road/41 Avenue SW	AE project team understands that the Nisku Spine Road north of 41 Avenue SW would be a 5 lane arterial roadway with a center two-way left turn lane. 41 Avenue SW would be a lane divided urban arterial roadway. The timing of upgrades depends on the development occurring on all four quadrants of this intersection. The traffic growth at this intersection needs continuous monitoring and a signal installed when traffic volumes and delay warrants are met.

3.2.3 Traffic Control Requirements at At-Grade Rail Crossing

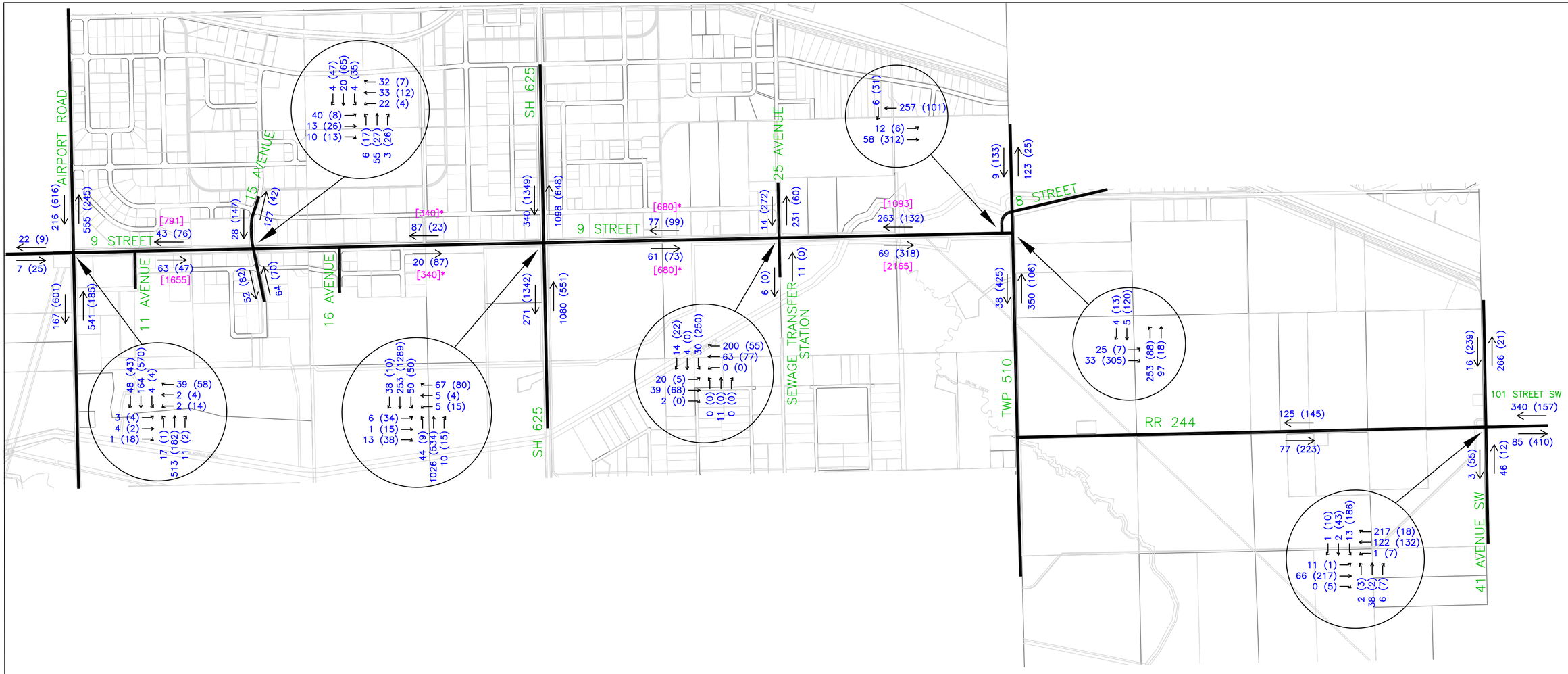
AE project team reviewed the warrants for the installation of warning signals at the at-grade rail crossing (spur line) north of Tuboscope Industries along 9 Street. Plans exist to twin this spur line rail crossing. AE project team reviewed the relevant Transport Canada standards for the Grade Crossing Warning Systems. The warrant analysis for providing gates at the at-grade rail crossing indicated that the gates are not warranted. Following are the trigger points for the warrants for warning signals:

1 The forecast cross-product is 1,000 or more; or
2 The grade crossing does not include a sidewalk and the maximum railway operating speed exceeds 60 mph (100 km/h); or
3 The grade crossing includes a sidewalk and the maximum railway operating speed exceeds 60 mph (100 km/h); or

4 There are two or more tracks and trains may be passing one another; or
5 The sightlines or alternative measures are not provided; including where trains, engines, railway cars, or other railway equipment, standing or stored, may obscure driver or pedestrian sightlines of a train approaching the grade crossing.

The forecast cross-product exceeds 1,000, therefore warning signals are warranted.

Appendix C shows the typical schematic sketch for the desired warning signal type and the location of installation for a two lane roadway and four lane roadway. Leduc County should also consider installation of ***"Prepare to Stop at Railway Crossing"*** sign ahead of the at-grade rail crossing due to a higher posted speed along the Nisku Spine Road.



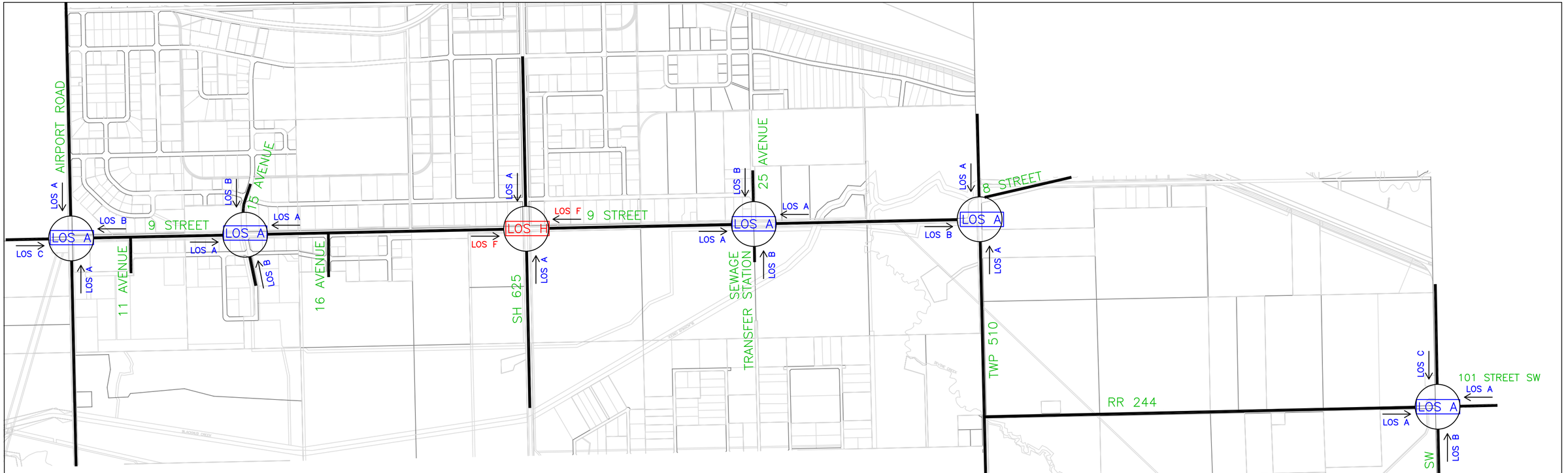
* AADT traffic volumes are for year 2005, estimated from data provided by Leduc County, except for * which were obtained from Alberta Infrastructure and Transportation.

9th Street (Nisku Spine Road)
Airport Road to City of Edmonton Limit
Functional Planning Study
May 2006

LEDUC COUNTY

Associated Engineering

Figure 3-1: Balanced Traffic Movements (Year 2005)
58 - AM PEAK HOUR VOLUME
(58) - PM PEAK HOUR VOLUME
[463] - AVERAGE ANNUAL DAILY TRAFFIC



LOS A

INTERSECTION LEVEL OF SERVICE
(INTESECTION CAPACITY UNTILIZATION)
IS MEASURED IN PERCENTAGE OF TOTAL CAPACITY

LOS	ICU
A	less than 55%
B	55% to 64%
C	64% to 73%
D	73% to 82%
E	82% to 91%
F	91% to 100%
G	100% to 109%
H	greater than 109%

LOS C

APPROACH LEVEL OF SERVICE
(HIGHWAY CAPACITY MANUAL 2000 METHODOLOGY)
IS MEASURED IN AVERAGE DELAY PER VEHICLE

LOS	AVERAGE DELAY	DESCRIPTION
A	less than 10 sec.	Excellent
B	10 sec. to 15 sec.	Very Good
C	15 sec. to 25 sec.	Good
D	25 sec. to 35 sec.	Acceptable
E	35 sec. to 50 sec.	Approaching Capacity
F	more than 50 sec.	Poor

9th Street (Nisku Spine Road)
Airport Road to City of Edmonton Limit
Functional Planning Study
May 2006

LEDUC COUNTY

Associated Engineering

Figure 3-2: Intersection Levels of Service (Year 2005)
58 - AM PEAK HOUR VOLUME
(58) - PM PEAK HOUR VOLUME
[463] - AVERAGE ANNUAL DAILY TRAFFIC

4 Base Plans and Design Criteria

4.1 TOPOGRAPHICAL SURVEYS

AE project team conducted the GPS Center Line Surveys along the existing 9 Street alignment. Prior to conducting the GPS Center Line Surveys, AE project team submitted a Traffic Accommodation Strategy (TAS) during field surveys. This was prepared in the format recommended by Alberta Infrastructure and Transportation. This survey was done under continuous mobility from a ½ ton pick-up truck. AE project team conducted off road survey pick ups for miscellaneous sites along the study corridor such as Blackmud Creek Bridge and the major drainage swale along the south side of 15 Avenue. The survey pick ups included shots off existing edge of pavement and existing culverts at representative locations. These pick ups were done to generate typical cross-sections along the study corridor.

4.2 BASE MAPPING

AE project team obtained the required information necessary to prepare the base plans for this study from Leduc County, The base plan information collected from Leduc County was as follows: ortho corrected aerial photography including digital elevation model of the entire study area, cadastral information showing all of the legal boundary information, and utility information. The base plans and drawings were developed based on NAD 83 10TM co-ordinate system using grid coordinates.

4.3 GEOMETRIC DESIGN CRITERIA

The AE project team researched available guidelines and design standards to arrive at the design criteria for lane widths, curb extensions, horizontal, and vertical alignment. The project team used the following design standards and guidelines for the development of functional plans for Nisku Spine Road:

- TAC Geometric Design Guide for Canadian Roads - September 1999
- AIT Highway Geometric Design Guide – 1999
- AIT Highway Geometric Design Guide Urban Supplement – November 2003

AE project team circulated and discussed the Geometric Design Criteria with the Project Steering Committee (PSC). AE project team discussed the options available for median treatment for the Nisku Spine Road. Both raised median and depressed median options are possible for the rural cross-section. The PSC recommended a design speed of 110 km/h for the Nisku Spine Road. AE project team advised the PSC that normally expressways are designed for the higher speed limits. The alignment north and south of Nisku Spine Road (in the City of Leduc and the City of Edmonton limits) would likely be designed for a design speed of 70 km/h. Therefore AE project team suggested to Leduc County to design 9 Street for a design speed of 90 km/h. The PSC accepted this suggestion and asked AE project team to use upper limits/maximum value of the design parameters for horizontal and vertical element in the functional design.

AE project team used the design vehicle of WB-36 for the intersection designs. The intersections design was tested using WB-21 as the off-tracking has been noted to be worse with this vehicle when compared to the double trailer combinations. A design vehicle is a selected motor vehicle which is used to establish highway design controls to accommodate the weight, dimensions and operating characteristics for vehicles of a designated type. WB-36 is a Turnpike Double vehicle type having a minimum turning radius of 18.5 m and vehicle length of 38 m. WB-21 is a Semi-Trailer Combination vehicle type having a minimum turning radius of 15 m and vehicle length of 25 m. AE project team contacted PCL construction to get information on the overdimensional vehicles. The intersection designs were checked for a design vehicle similar for oversized modules (63 m length x 6.5 m wide).

Appendix D presents the geometric design criteria and the related reference sheets from relevant design standards.

5 Recommended Functional Plan

5.1 PREFERRED CROSS-SECTION

AE project team considered both rural and urban cross-section alternatives for the future Nisku Spine Road. In consultation with PSC it was decided to maintain a rural cross-section along the study corridor. AE project team analyzed the available median treatment options for the study corridor. Both depressed and raised median options are available for a rural cross-section treatment. A raised median was preferred over a depressed median to ensure appropriate tie-ins with the proposed cross-section treatments for the arterial roadway connections by the adjacent jurisdictions (the city of Edmonton at 41 Avenue SW, AIT at Highway 625 and the City of Leduc, Airport Road). Following are the preferred cross-section for tie-ins with other jurisdictions:

- **9 Street/Airport Road (10 Avenue):** The south leg of this intersection (9 Street) will have an urban cross-section (with curb & gutter) and raised median. The urban cross-section on south leg will enable the tie-ins for Airport Road south to City of Leduc's design standards.

- **9 Street/Highway 625:** AIT is currently undertaking the detailed design for the twinning of Highway 625 from Sparrow Drive to East of 9 Street, Nisku. AIT proposes that Highway 625 through Nisku will have a rural cross-section with a raised median.

- **9 Street/41 Avenue SW:** The City of Edmonton's available plans north of 41 Avenue SW shows a five lane urban cross-section with a 37 m right-of-way. The City of Edmonton has future plans to develop 41 Avenue SW as a six lane divided arterial roadway with an urban cross-section. AE project team considered urban cross-section with curb and gutter for all the four legs of the 9 Street/41 Avenue SW to ensure suitable tie-ins with the City of Edmonton's plans. 9 Street will have an urban cross-section up to the intersection of the first collector road intersection south of 41 Avenue SW.

The preferred cross-section in general has a 59 m right-of-way throughout the study corridor; this could accommodate a future six lane arterial roadway with a raised median.

Figure 5-1 to 5-15 shows the preferred functional plans for the study corridor. Plans show horizontal alignment, preliminary vertical alignment showing the centre line profile information, chainage, existing and proposed right-of-way dimensions, turn bay and taper lengths, median width, geometry of the intersections, travel lane width and typical dimensioned cross-sections.

The center line of the existing 9 Street will need to be shifted approximately 9 m to the west to accommodate the proposed roadway cross-section.

5.2 ROADWAY STAGING

AE project team prepared staging plans for the construction of 9 Street. During the first stage, the Nisku Spine Road will be a two lane arterial roadway with upgraded intersection treatments (left turn bays with storage) at major intersections at: Airport Road, 15 Avenue, Highway 625, 25 Avenue and Township Road 510. The two lanes on the east side of 9 Street will be constructed first. In the second stage (likely by the year 2016) Leduc County will construct another two lanes on the west side of 9 Street. At this stage 9 Street will be a major arterial roadway with four lanes and 12.6 m wide raised median. The Leduc County will have an option to for a six lane rural cross-section with a raised median in the future depending on the traffic growth in the study area.

Figure 5-16 shows the staging of the roadway cross-section for the Nisku Spine Road.

5.3 LONG TERM INTERSECTION GEOMETRIC REQUIREMENTS

The long term intersection treatment requirements for the important intersections in the study are already discussed in ***Section 3.2.2 and 5.1*** of this report. ***Table 5-1*** summarizes the long term

Table 5-1: Long Term Intersection Geometric Requirements

Intersection	Long Term Geometric Requirements
9 Street/Airport Road (10 Avenue)	This intersection will be a major arterial/arterial roadway intersection requiring channelization in all four legs of the intersection. The design shows the tie-in to the existing center line of the 9 Street south of Airport Road. The tie-in to the existing center line will occur approximately 420 m south of Airport Road. The cross-section south of Airport Road will include a curb and gutter without any sidewalk. There is an Altalink substation in the south-east corner of the intersection. The study confirmed that the proposed clear zone distance between the edge of roadway and the power poles located outside the substation is within the acceptable design standards.
9 Street/15 Avenue	This intersection will require upgrading which includes providing left turn bays with storage for left turning vehicles.
9 Street/Highway 625	This intersection is under the jurisdiction of AIT. AIT is currently preparing detailed design plans to upgrade this intersection with raised median... The center line of the existing 9 Street will need to be shifted approximately 9 m to the west to accommodate the proposed roadway cross-section. AIT should ensure the design for Highway 625 should tie-in with the future proposed center line for the 9 Street
9 Street/25 Avenue	In the long term, access to Nisku Transfer Station and the proposed new Altalink Substation will be off 25 Avenue (south of 9 Street). This intersection will act as an important intersection for the future developments on the west leg of 25 Avenue. This intersection will require upgrading which includes providing left turn bays with storage for left turning vehicles.
9 Street/Township Road	AE project team reviewed the options for the existing Jug Handle Intersection

Intersection	Long Term Geometric Requirements
510	at west of Township Road 510 at 9 Street. Township Road 510 will be realigned after the construction of Nisku Spine Road. The intersection design considered realignment of Township Road 510 and the removal of the existing Jug Handle Intersection. AE project team arrived at a suitable option that will facilitate the southbound truck traffic turning left at Township Road 510 from 8 Street. AE project team verified that design accounted for adequate sight distance for the southbound left turning traffic at 8 Street.
Nisku Spine Road/41 Avenue SW	Nisku Spine Road should tie-in to the future plans for the Parsons Road (north leg of the intersection at 41 Avenue SW) and 41 Avenue SW by the City of Edmonton. This intersection is designed for urban standards with consideration for channelization, left-turn bays, right-turn bays and raised median to accommodate future growth in the area.

Figures 5-17 to 5-22 shows the long term intersection treatment requirements for the intersections of 9 Street at Airport Road, 15 Avenue, Highway 625, 25 Avenue, Township Road 510 and 41 Avenue SW.

5.4 ACCESS MANAGEMENT PLANS

9 Street will be a major arterial roadway in Leduc County. The number of accesses on major roads has significant impacts on traffic operations and safety. Therefore, the number of accesses on 9 Street should be kept to a minimum and limited to intersections. Direct accesses to 9 Street should be restricted. At present there are 15 direct accesses off 9 Street. Some of the existing accesses to the 9 Street are “temporary” access as per the development agreements and provisions by Public Works Committee.

Figure 5-23 shows the existing direct locations off 9 Street and the “temporary” access points.

The existing direct access off the 9 Street needs consolidation by relocating access through side streets or by service roads as shown in functional plans ***(refer to Figures 5-1 to Figures 5-15)***.

AE project team recommends that Leduc County consider the following access management standards outlined in the Transportation Association of Canada (TAC) and AIT design standards while approving the future sub division applications along the study area:

Intersection Spacing: Spacing for at-grade arterial all directional intersections of 800 m is ideal, 400 m is desirable and 300 m is minimum under special circumstances only. 9 Street being a major arterial roadway with higher posted speeds, AE project team recommends to maintain an access spacing of 800 m while approving future development applications.

New Development Access: Direct access to new private or commercial development should not be permitted except in cases (this will be determined by Leduc County during the sub division application stage) where alternate indirect access is not feasible. If direct access is deemed necessary, only right-in/right-out access should be allowed. Otherwise, access should be gained from collector or local streets

intersecting the 9 Street. An auxiliary lane should be constructed to serve for acceleration and deceleration associated with the right-in/right out movement.

Common Access Point: Where two (2) adjacent properties require direct access, a common access point should be provided to accommodate the needs of both properties.

Geometric Design Features: For new development where direct access is approved under special circumstances, the geometric design features chosen (turning radii, access width, profile, sight distance) should be thoroughly checked to ensure that they will adequately handle the vehicle types known to be the major users at these access locations. Such design encourages efficient exit and entrance movements, thereby minimizing the impact of local traffic on through traffic.

Access Removal Through Development: When redevelopment of property abutting the 9 Street occurs, Leduc County should make every possible effort to remove existing direct access.

The collector roads shown north of Township Road 510 to 41 Avenue SW are conceptual and subject to confirmation during subdivision or rezoning. Leduc County should ensure that the above access management standards are followed during the subdivision/rezoning of lands north of Township Road 510. The existing direct accesses off 101 Street (farm access/private residence access) north of Township Road 510 would needs to be maintained until the redevelopment is complete in the Nisku Business Industrial Park.

5.5 BLACKMUD CREEK CROSSING STRUCTURAL REQUIREMENTS

AE project team reviewed the available Bridge File Information (AIT Bridge File Number: 00300) to identify the structural upgrades required for the existing Blackmud Creek crossing. The existing bridge structure is a HC girder bridge, 3 spans of 8.5 m each. Assuming that the existing waterway opening is adequate, raising the deck level by about 2 m on the north end and 1.8 m on the south end will increase the length of the bridge by 7.6 m at 2:1 slope. Therefore a bridge length of 33.1 m (3 x 8.5 = 7.6) of integral abutment bridge concrete or steel (single span) will be required. This will result in least environmental effect and adequate load capacity. A standard SC girder bridge would also work with 3 – 12 m spans. Heavy girder would be required to account for 25% overweights for the pavement structure. Another bridge structure would be required during the full development stage to accommodate the stage two development of another 2 lanes along 9 Street. A new bridge structure (as opposed to an arch pipe culvert) is recommended because a bridge would provide better hydraulic capacity to account for the level difference between the creek and bridge structure. A bridge structure would function better from a construction staging perspective to accommodate the stage two development when compared with arch pipe culvert.

Appendix E shows the design notes for the Blackmud Creek Crossing structural requirements.

Figures 5-1 to 5-15 shows the new culvert requirements along the 9 Street corridor.

5.6 CONCEPTUAL COST ESTIMATES

AE project team generated the conceptual cost estimates for the Nisku Spine Road functional plans. The conceptual cost estimates are based on the year 2006 dollars. The costs are developed for stage 1 roadway construction (two lanes) and for the overall project (if all four lanes are implemented in one phase). The cost for land acquisition for the construction of Nisku Spine Road is shown separately in the conceptual cost estimates. The conceptual cost estimates have an accuracy of +/- 50%.

The pavement structure assumptions were based on the recommendations shown in the report "**Nisku Industrial Roadway Structure Engineering Design for 25% Overweight**" prepared by Leduc County. The pavement structure assumption included: 300mm of pit run, 300mm of GBC and 180mm of ACP.

Tables 5-2 and 5-3 summarize the conceptual cost estimates with allowance for 25% Overweight for pavement structure. The detailed breakdown of the conceptual cost estimates is shown in ***Appendix F.***

Table 5-2: Conceptual Cost Estimates – (Full Development (All Four Lanes) - Allowance for 25% Overweight)

Item	Description	Street Sections				Amount
		Airport Rd to 15 Ave	15 Ave to Hwy 625	Hwy 625 to 25 Ave	25 Ave to 41 Ave	
1	Roadwork	$7,200,000	$8,400,000	$11,400,000	$20,700,000	$47,700,000
2	Electrical	$700,000	$800,000	$800,000	$1,400,000	$3,700,000
3	Drainage	$100,000	$100,000	$100,000	$200,000	$500,000
4	Bridge Structure	-	-	-	$2,600,000	$2,600,000
Sub-Total		**$8,000,000**	**$9,300,000**	**$12,300,000**	**$24,900,000**	**$54,500,000**
Contingencies (15%)		**$1,200,000**	**$1,400,000**	**$1,900,000**	**$3,800,000**	**$8,300,000**
Total		**$9,200,000**	**$10,700,000**	**$14,200,000**	**$28,700,000**	**$62,800,000**
Engineering and Administration (12.5%)		**$1,200,000**	**$1,400,000**	**$1,800,000**	**$3,600,000**	**$8,000,000**
Grand Total		**$10,400,000**	**$12,100,000**	**$16,000,000**	**$32,300,000**	**$70,800,000**

Table 5-3: Conceptual Cost Estimates – (Stage One Development Only (First Two Lanes) - Allowance for 25% Overweight)

Item	Description	Street Sections				Amount
		Airport Rd to 15 Ave	15 Ave to Hwy 625	Hwy 625 to 25 Ave	25 Ave to 41 Ave	
1	Roadwork	$3,500,000	$4,800,000	$6,300,000	$12,400,000	$27,000,000
2	Electrical	$500,000	$300,000	$300,000	$500,000	$1,600,000
3	Drainage	-	$47,000	$100,000	$200,000	$347,000
4	Bridge Structure	-	-	-	$1,300,000	$1,300,000
Sub-Total		**$4,000,000**	**$5,147,000**	**$6,700,000**	**$14,400,000**	**$30,247,000**
Contingencies (15%)		**$600,000**	**$800,000**	**$1,100,000**	**$2,200,000**	**$4,700,000**
Total		**$4,600,000**	**$6,000,000**	**$7,800,000**	**$16,600,000**	**$35,000,000**
Engineering and Administration (12.5%)		**$600,000**	**$800,000**	**$1,000,000**	**$2,100,000**	**$4,500,000**
Grand Total		**$5,200,000**	**$6,800,000**	**$8,800,000**	**$18,700,000**	**$39,500,000**

Note:

1. All unit prices are based on year 2006 costs.
2. Costs for the removal and relocation power lines to be determined by others during detailed design phase of this project.

3. Cost of water main, sanitary sewer and storm upgrades required in the study area due to 9th Street Roadway Reconstruction is to be determined by others during detailed design phase of this project.
4. The Drainage costs shown are the costs for the upgrades required to the storm sewer system within the road right-of-way.
5. The costs are rounded off to the nearest $ 100,000.
6. These costs do not include the cost of the additional right-of-way that needs to be acquired for constructing the Nisku Spine Road and intersection upgrades.

Table 5-4 and 5-5 shows the cost estimates for constructing the Nisku Spine Road with a normal pavement structure without considering the allowance for 25% overweight. The normal pavement structure assumption included: 300mm of pit run, 300mm of GBC and 125mm of ACP.

Table 5-4: Conceptual Cost Estimates – Full Development (All Four Lanes) – No Allowance for 25% Overweight

Item	Description	Street Sections				Amount
		Airport Rd to 15 Ave	15 Ave to Hwy 625	Hwy 625 to 25 Ave	25 Ave to 41 Ave	
1	Roadwork	$6,500,000	$7,600,000	$10,200,000	$18,600,000	$42,900,000
2	Electrical	$700,000	$800,000	$800,000	$1,400,000	$3,700,000
3	Drainage	$100,000	$100,000	$100,000	$200,000	$500,000
4	Bridge Structure	-	-	-	$2,600,000	$2,600,000
Sub-Total		**$7,300,000**	**$8,500,000**	**$11,100,000**	**$22,800,000**	**$49,700,000**
Contingencies (15%)		**$1,100,000**	**$1,300,000**	**$1,700,000**	**$3,500,000**	**$7,600,000**
Total		**$8,400,000**	**$9,800,000**	**$12,800,000**	**$26,300,000**	**$57,300,000**
Engineering and Administration (12.5%)		**$1,100,000**	**$1,300,000**	**$1,600,000**	**$3,300,000**	**$7,300,000**
Grand Total		**$9,500,000**	**$11,100,000**	**$14,400,000**	**$29,600,000**	**$64,600,000**

Table 5-5: Conceptual Cost Estimates – Stage One Development Only (First Two Lanes) – No Allowance for 25% Overweight

Item	Description	Street Sections				Amount
		Airport Rd to 15 Ave	15 Ave to Hwy 625	Hwy 625 to 25 Ave	25 Ave to 41 Ave	
1	Roadwork	$3,100,000	$4,300,000	$5,600,000	$11,000,000	$24,000,000
2	Electrical	$500,000	$300,000	$300,000	$500,000	$1,600,000
3	Drainage	-	$100,000	$100,000	$200,000	$400,000
4	Bridge Structure	-	-	-	$1,300,000	$1,300,000
Sub-Total		**$3,600,000**	**$4,700,000**	**$6,000,000**	**$13,000,000**	**$27,300,000**
Contingencies (15%)		**$600,000**	**$800,000**	**$900,000**	**$2,000,000**	**$4,300,000**
Total		**$4,200,000**	**$5,500,000**	**$6,900,000**	**$15,000,000**	**$31,600,000**
Engineering and Administration (12.5%)		**$600,000**	**$700,000**	**$900,000**	**$1,900,000**	**$4,100,000**
Grand Total		**$4,800,000**	**$6,200,000**	**$7,800,000**	**$16,900,000**	**$35,700,000**

5.7 RIGHT-OF-WAY REQUIREMENTS

The functional plans shown in ***Figures 5-1 to 5-15*** highlights the additional right-of-way required for the preferred long term cross-section for the Nisku Spine Road. The long term right-of-way requirements at the intersections are shown in ***Figures 5-17 to Figures 5-22***.

The land acquisitions costs are summarized in ***Table 5-6***. A value of $185,000 per acre was assumed for land values for the developed areas in the Nisku Industrial Park and $40,000 per acre was assumed for the undeveloped agricultural lands.

Table 5-6: Land Requirements and Cost Estimates

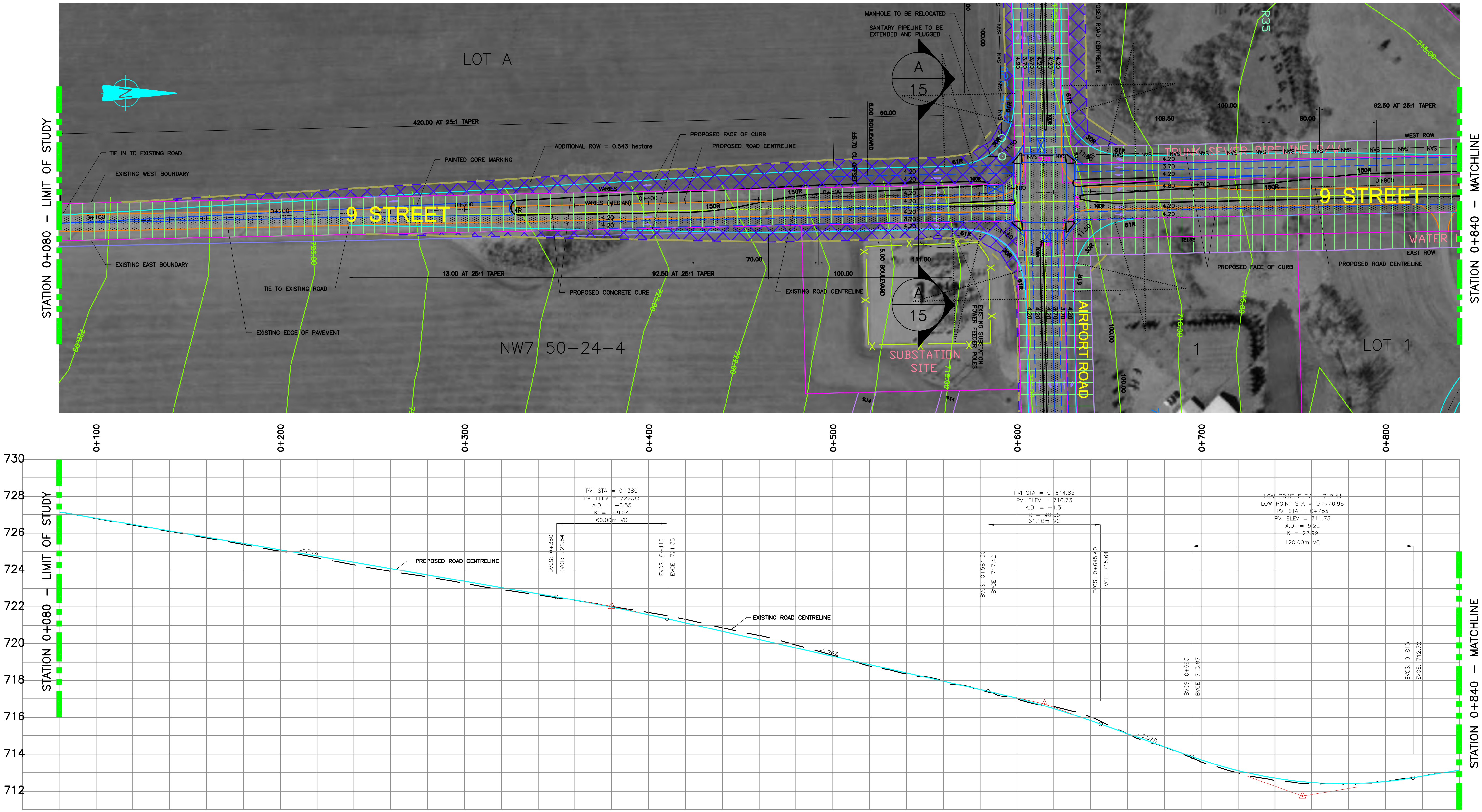
STREET SECTION	DESCRIPTION	AREA REQUIRED		UNIT PRICE	TOTAL
9 Street	Developed industrial area (Airport Road to 25 Avenue)	4.39	acre	$185,000/acre	$812,000
9 Street	New alignment on agricultural land (north of SW31 50-24-4)	62.47	acre	$40,000/acre	$2,500,000
11 Avenue	Developed industrial area	0.06	acre	$185,000/acre	$11,000
15 Avenue	Developed industrial area	0.08	acre	$185,000/acre	$15,000
Highway 625	Developed industrial area	0.96	acre	$185,000/acre	$180,000
25 Avenue	Agricultural land	1.04	acre	$40,000/acre	$42,000
TWP Road 510	Agricultural land	1.45	acre	$40,000/acre	$58,000
Collector 1	Agricultural land	2.13	acre	$40,000/acre	$85,000
Collector 2	Agricultural land	2.13	acre	$40,000/acre	$85,000
Collector 3	Agricultural land	2.13	acre	$40,000/acre	$85,000
Collector 4	Agricultural land	2.09	acre	$40,000/acre	$84,000
				Total	**$4,000,000**

5.8 IMPLEMENTATION PLAN

AE project team recommends that the Leduc County construct stage one of the Nisku Spine Road for the entire study corridor starting from Airport Road to the City of Edmonton corporate limits under one construction contract. The reasons are as follows:

- Development driven upgrading (especially in the section between Township Road 510 and 41 Avenue SW) would result in a fragmented implementation;
- A corridor long upgrading plan would set the stage for a comprehensive development strategy for the Nisku Industrial Business Park;
- A higher quality end product;
- Overall lower cost of upgrading;
- Best overall value.

The proposed 9 Street (Nisku Spine Road) roadway construction project will be a major undertaking. There will be minor traffic disruptions during the construction phase of this project. Leduc County will need to ensure that a "Traffic Accommodation" strategy during the construction phase of this project is prepared. If 9 Street is the only access to a business, Leduc County should ensure the access would not be affected during construction through a suitable "Traffic Accommodation" strategy.



LEGEND:

FIRST STAGE ROAD IMPROVEMENT	MANHOLE
PROPOSED ROAD RIGHT OF WAY	GAS LINE
EXISTING ROAD RIGHT OF WAY	WATER MAIN
	SANITARY MAIN/SERVICE
	PROPOSED RIGHT OF WAY BOUNDARY

LEDUC COUNTY

Associated Engineering

0 20 50 100m

Scale 1:2000

9th Street (Nisku Spine Road)

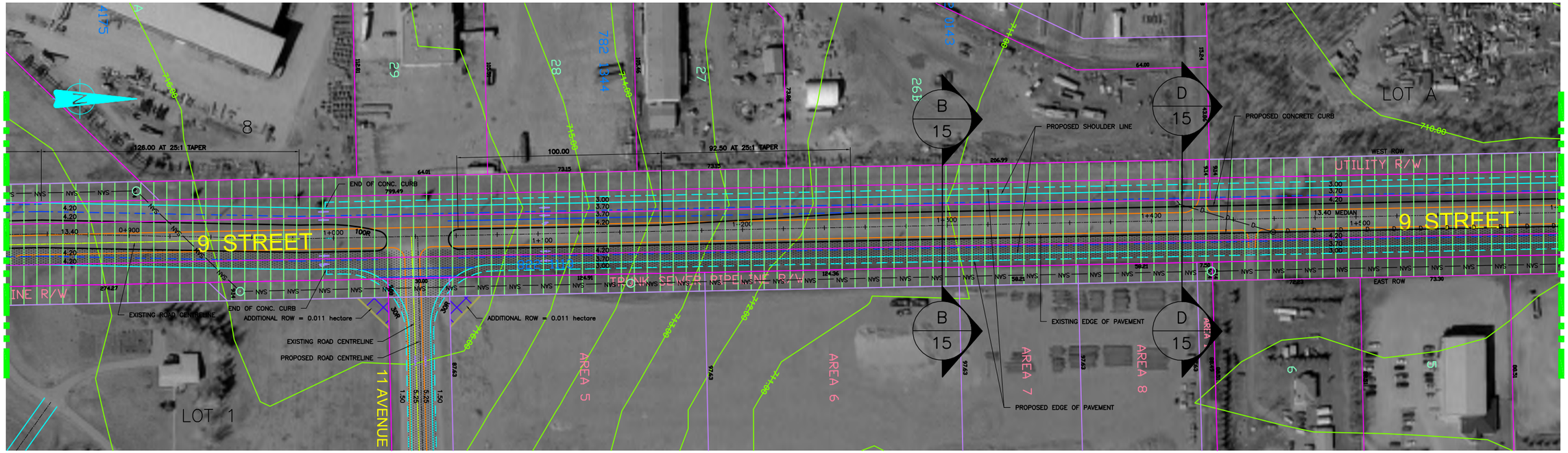
Station 0+080 TO 0+840

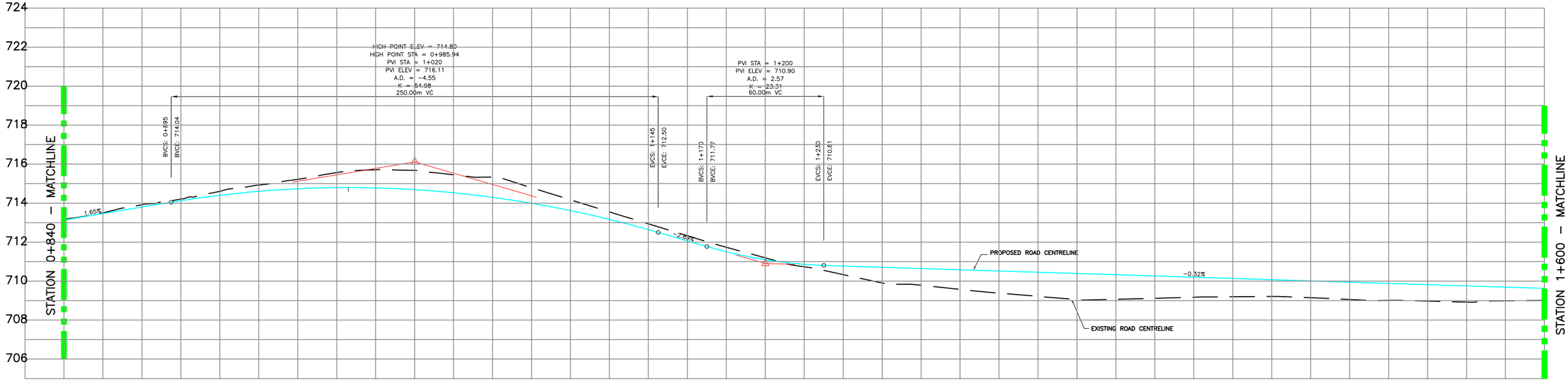
Functional Planning Study

Figure 5-1

STATION 0+840 – MATCHLINE

STATION 1+600 – MATCHLINE





LEGEND:

- FIRST STAGE ROAD IMPROVEMENT
- PROPOSED ROAD RIGHT OF WAY
- EXISTING ROAD RIGHT OF WAY
- MANHOLE
- GAS — GAS LINE
- W — WATER MAIN
- SAN — SANITARY MAIN/SERVICE
- D — STORM PIPE
- PROPOSED RIGHT OF WAY BOUNDARY

LEDUC COUNTY

Associated Engineering

0 20 50 100m

Scale 1:2000

9th Street (Nisku Spine Road)

Station 0+840 TO 1+600

Functional Planning Study

Figure 5-2

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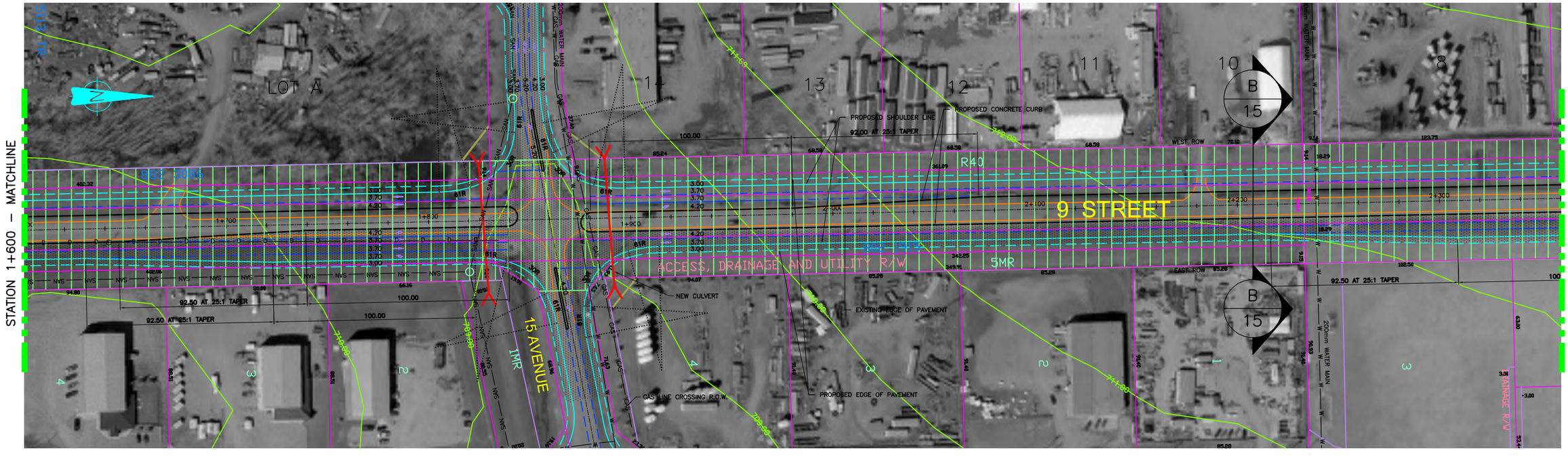

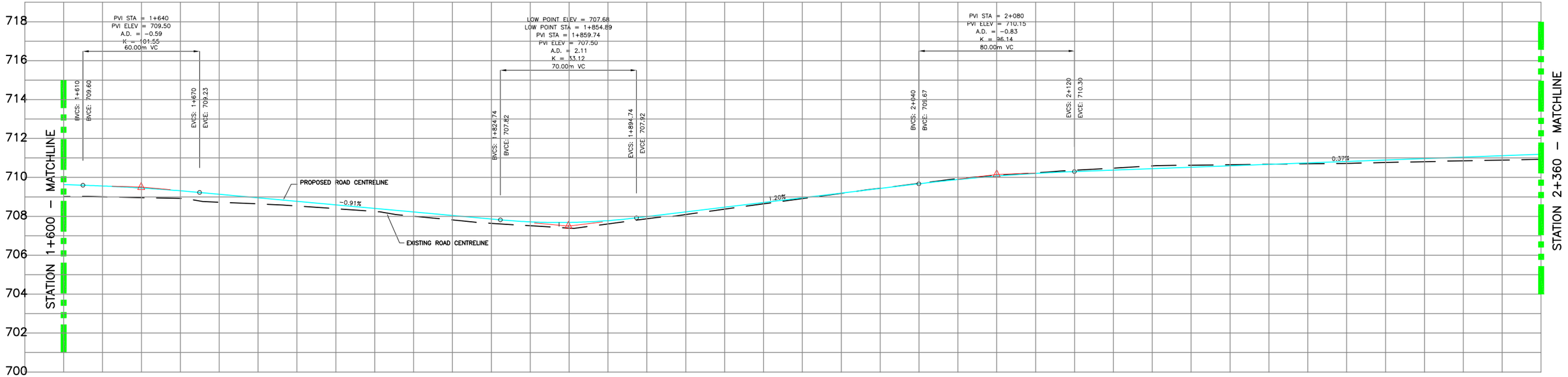

LEGEND:

- FIRST STAGE ROAD IMPROVEMENT
- PROPOSED ROAD RIGHT OF WAY
- EXISTING ROAD RIGHT OF WAY
- MANHOLE
- GAS — GAS LINE
- W — WATER MAIN
- SAN — SANITARY MAIN/SERVICE
- D — STORM PIPE
- PROPOSED RIGHT OF WAY BOUNDARY

LEDUC COUNTY

Associated Engineering

0 20 50 100m

Scale 1:2000

9th Street (Nisku Spine Road)

Station 1+600 TO 2+360

Functional Planning Study

Figure 5-3

Sheet 3 of 16

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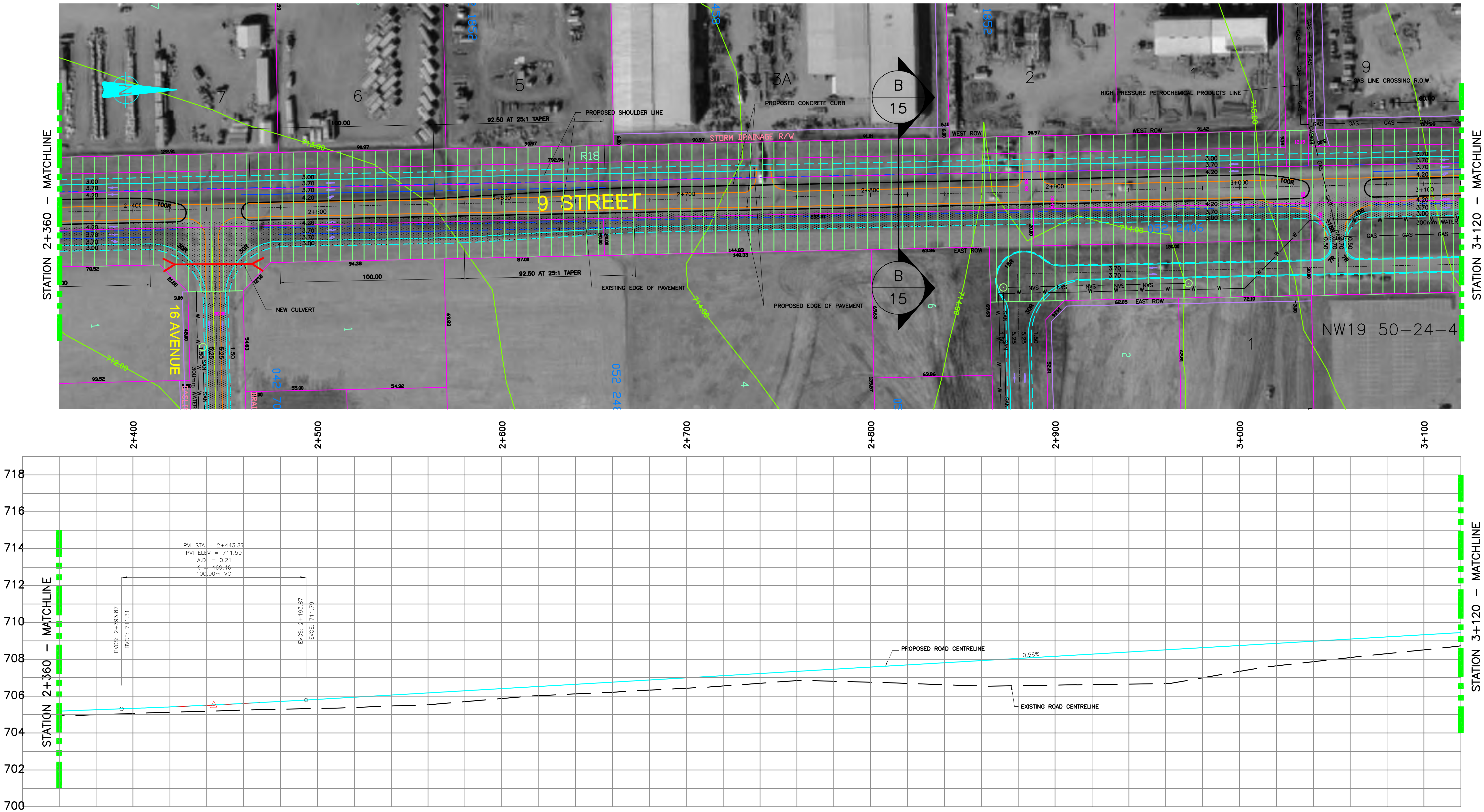


LEGEND:

- FIRST STAGE ROAD IMPROVEMENT
- PROPOSED ROAD RIGHT OF WAY
- EXISTING ROAD RIGHT OF WAY
- MANHOLE
- GAS LINE
- WATER MAIN
- SANITARY MAIN/SERVICE
- PROPOSED RIGHT OF WAY BOUNDARY

LEDUC COUNTY

Associated Engineering

0 20 50 100m

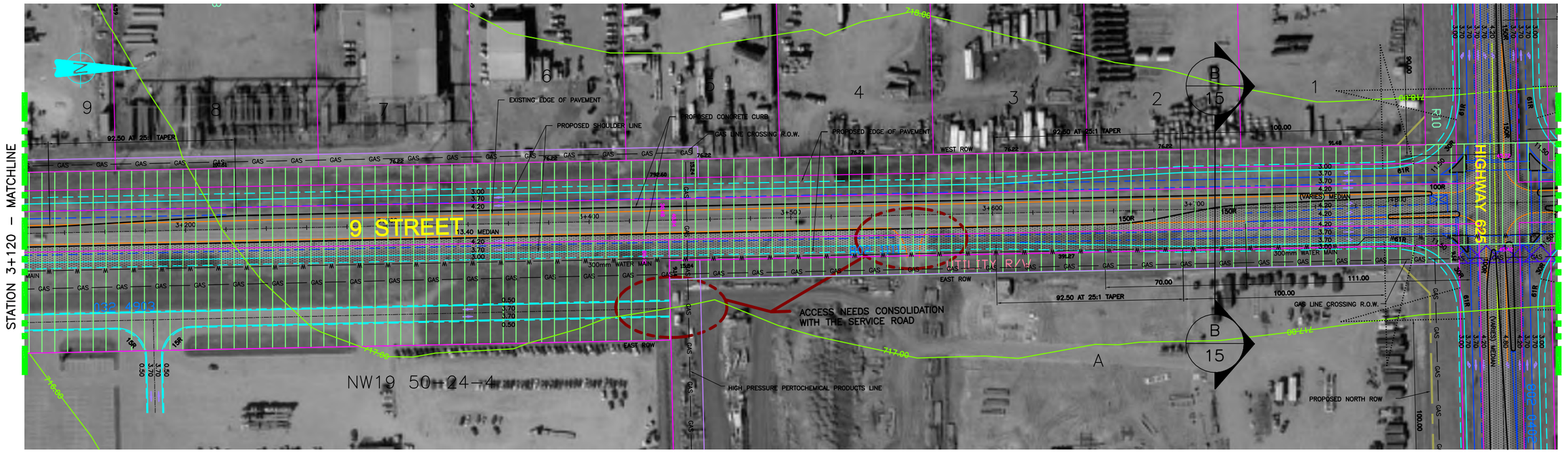
Scale 1:2000

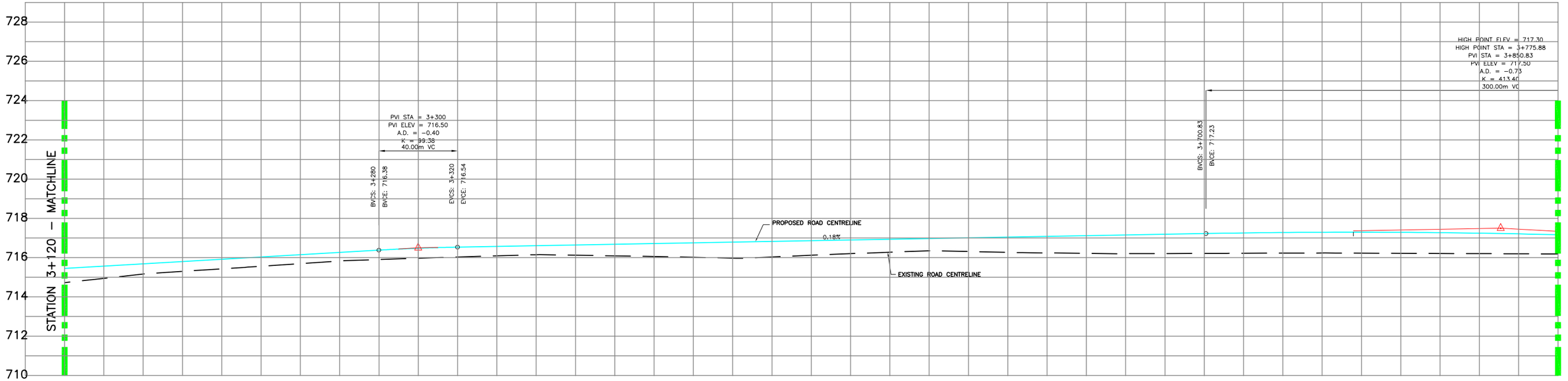
9th Street (Nisku Spine Road)

Station 2+360 TO 3+120

Functional Planning Study

Figure 5-4





LEGEND:

- FIRST STAGE ROAD IMPROVEMENT
- PROPOSED ROAD RIGHT OF WAY
- EXISTING ROAD RIGHT OF WAY
- MANHOLE
- GAS — GAS LINE
- W — WATER MAIN
- SAN — SANITARY MAIN/SERVICE
- PROPOSED RIGHT OF WAY BOUNDARY

LEDUC COUNTY

Associated Engineering

0 20 50 100m

Scale 1:2000

9th Street (Nisku Spine Road)

Station 3+120 TO 3+880

Functional Planning Study

Figure 5-5

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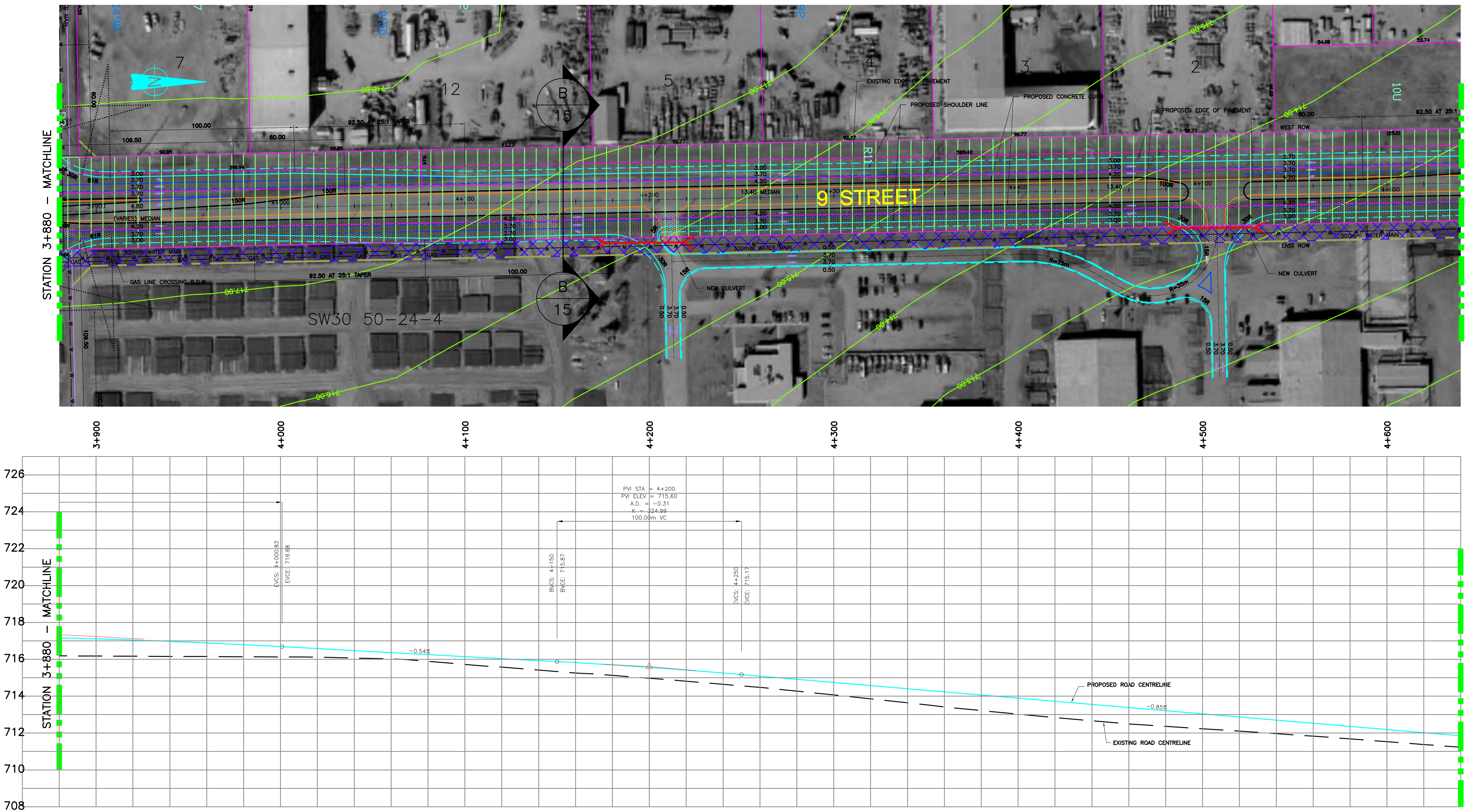


LEGEND:

Symbol	Description
(dotted pattern)	FIRST STAGE ROAD IMPROVEMENT
(blue cross-hatch)	PROPOSED ROAD RIGHT OF WAY
(green vertical lines)	EXISTING ROAD RIGHT OF WAY
○	MANHOLE
— GAS —	GAS LINE
— W —	WATER MAIN
— SAN —	SANITARY MAIN/SERVICE
▬ ▪ ▬	PROPOSED RIGHT OF WAY BOUNDARY

LEDUC COUNTY

Associated Engineering

0 20 50 100m

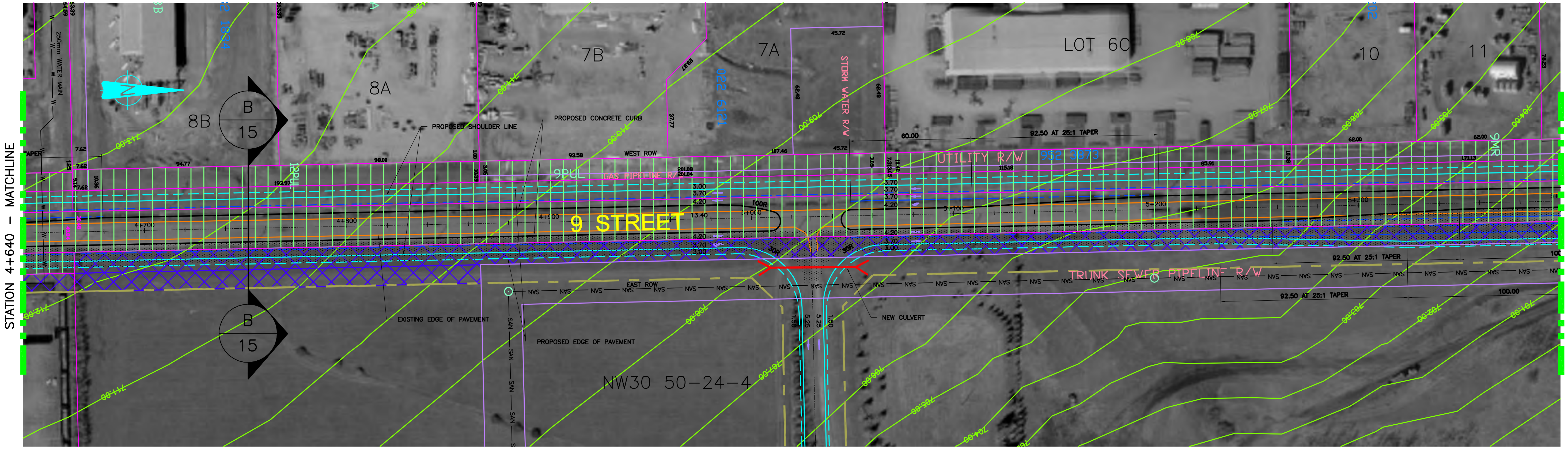
Scale 1:2000

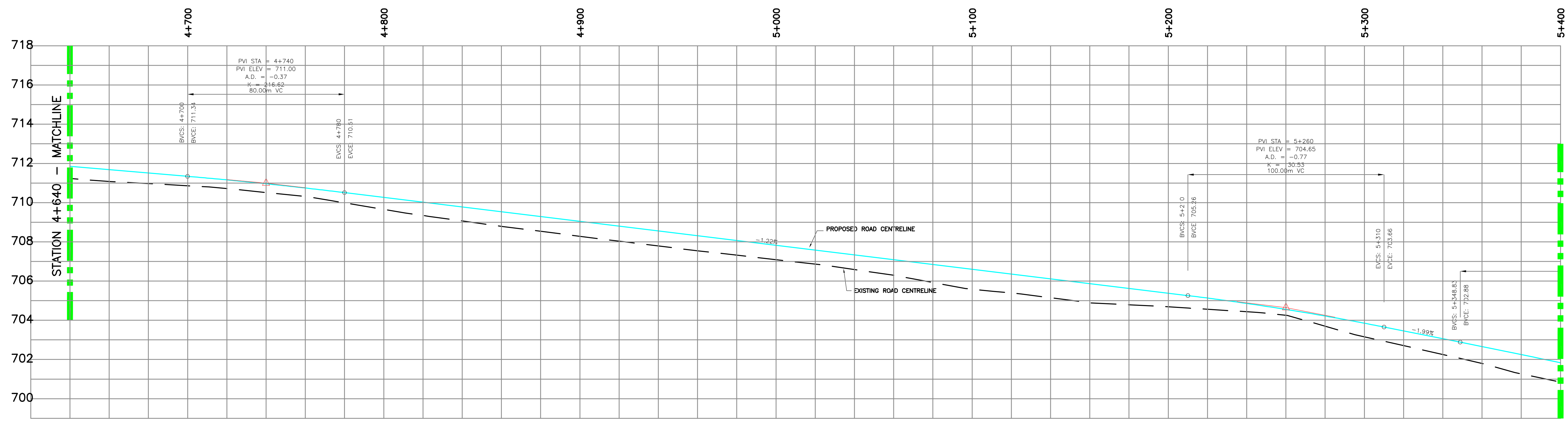
9th Street (Nisku Spine Road)

Station 3+880 TO 4+640

Functional Planning Study

Figure 5-6





LEGEND:

FIRST STAGE ROAD IMPROVEMENT	MANHOLE
PROPOSED ROAD RIGHT OF WAY	GAS LINE
EXISTING ROAD RIGHT OF WAY	WATER MAIN
	SANITARY MAIN/SERVICE
	PROPOSED RIGHT OF WAY BOUNDARY

LEDUC COUNTY

Associated Engineering

0 20 50 100m

Scale 1:2000

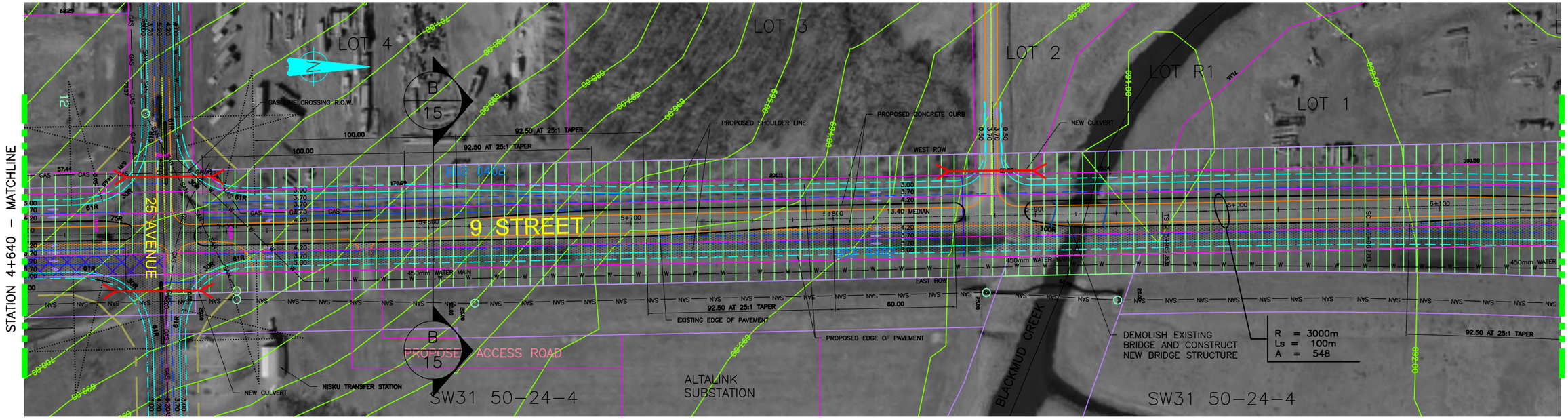
9th Street (Nisku Spine Road)

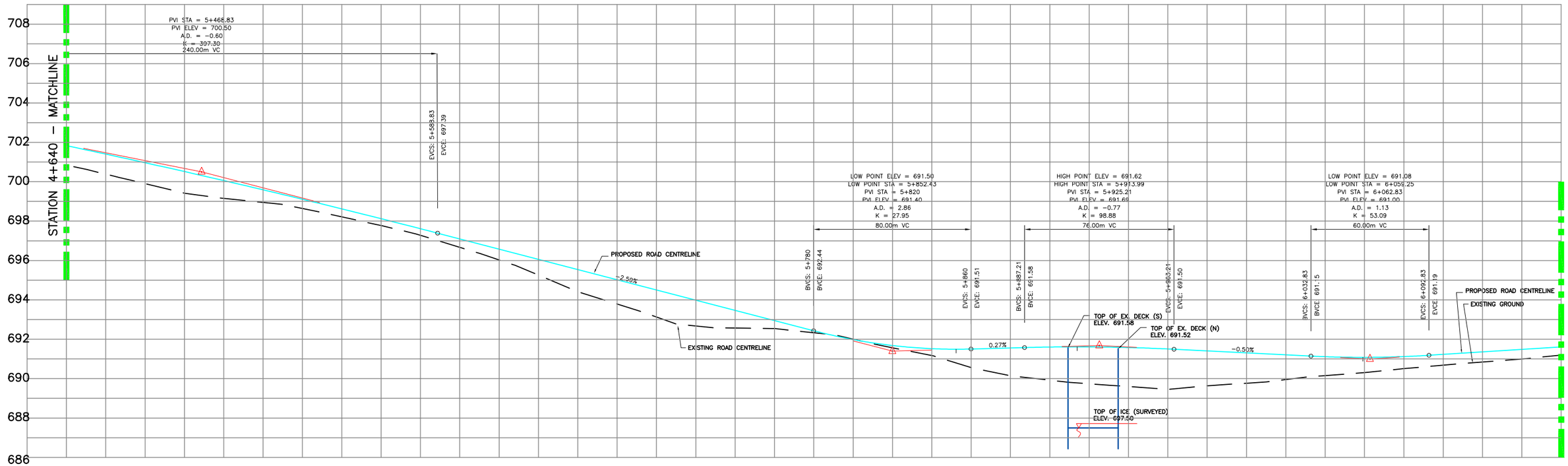
Station 4+640 TO 5+400

Functional Planning Study

Figure 5-7

Sheet 7 of 16





LEGEND:

- FIRST STAGE ROAD IMPROVEMENT
- PROPOSED ROAD RIGHT OF WAY
- EXISTING ROAD RIGHT OF WAY
- MANHOLE
- GAS — GAS LINE
- W — WATER MAIN
- SAN — SANITARY MAIN/SERVICE
- PROPOSED RIGHT OF WAY BOUNDARY

LEDUC COUNTY

Associated Engineering

0 20 50 100m

Scale 1:2000

9th Street (Nisku Spine Road)

Station 5+400 TO 6+160
Functional Planning Study
Figure 5-8

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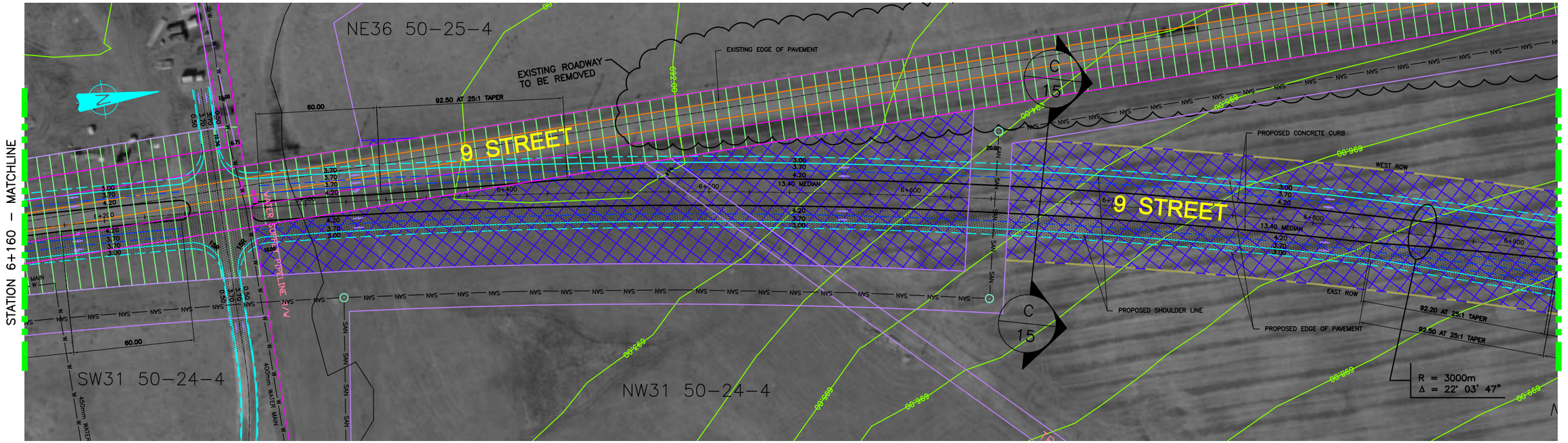
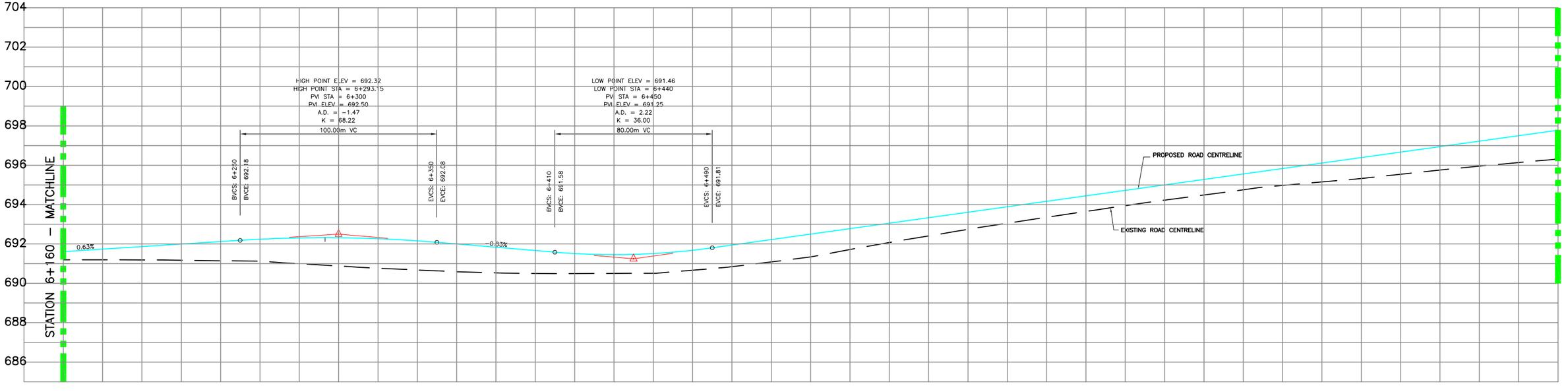




LEGEND:

- FIRST STAGE ROAD IMPROVEMENT
- PROPOSED ROAD RIGHT OF WAY
- EXISTING ROAD RIGHT OF WAY
- MANHOLE
- GAS — GAS LINE
- W — WATER MAIN
- SAN — SANITARY MAIN/SERVICE
- PROPOSED RIGHT OF WAY BOUNDARY

LEDUC COUNTY

Associated Engineering

Scale 1:2000

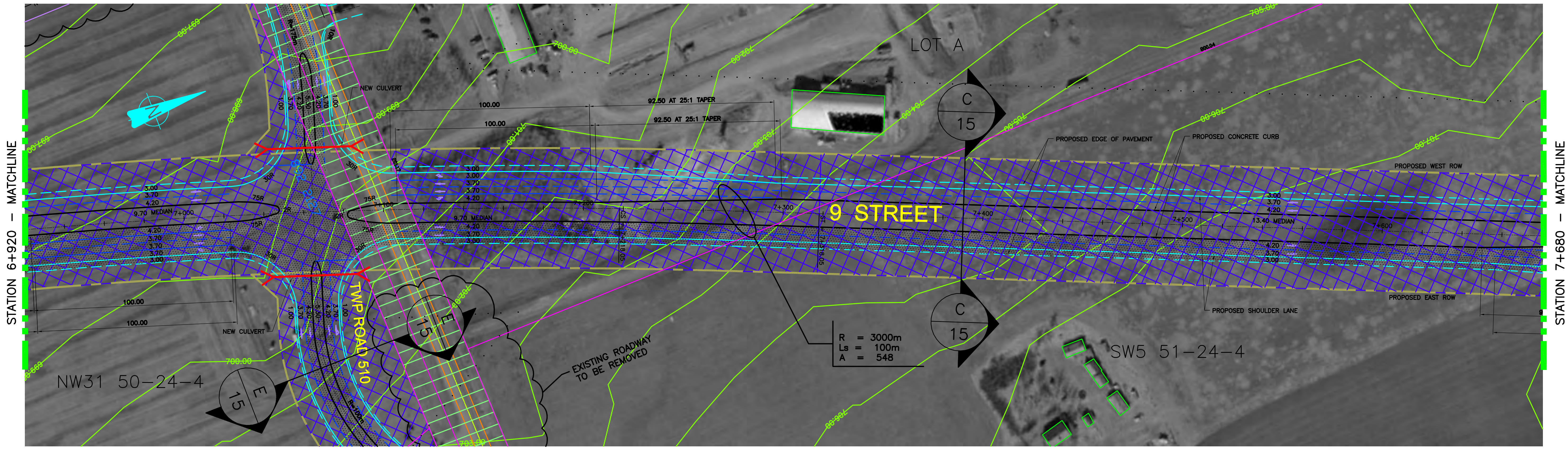
0 20 50 100m

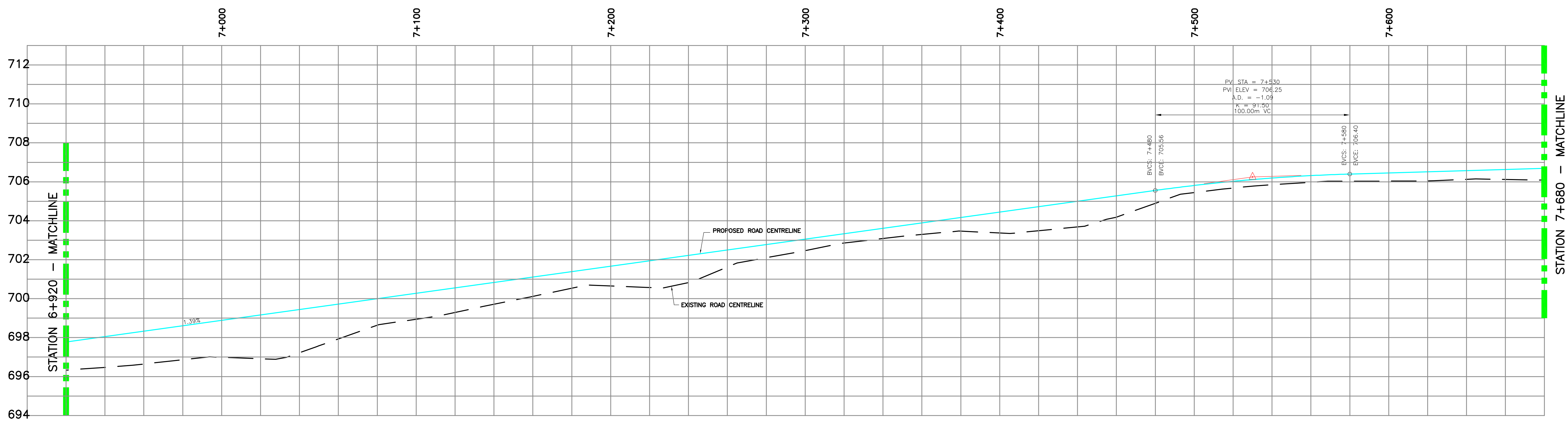
9th Street (Nisku Spine Road)

Station 6+160 TO 6+920

Functional Planning Study

Figure 5-9





LEGEND:

FIRST STAGE ROAD IMPROVEMENT	MANHOLE
PROPOSED ROAD RIGHT OF WAY	GAS — GAS LINE
EXISTING ROAD RIGHT OF WAY	W — WATER MAIN
	SAN — SANITARY MAIN/SERVICE
	PROPOSED RIGHT OF WAY BOUNDARY

LEDUC COUNTY

Associated Engineering

0 20 50 100m

Scale 1:2000

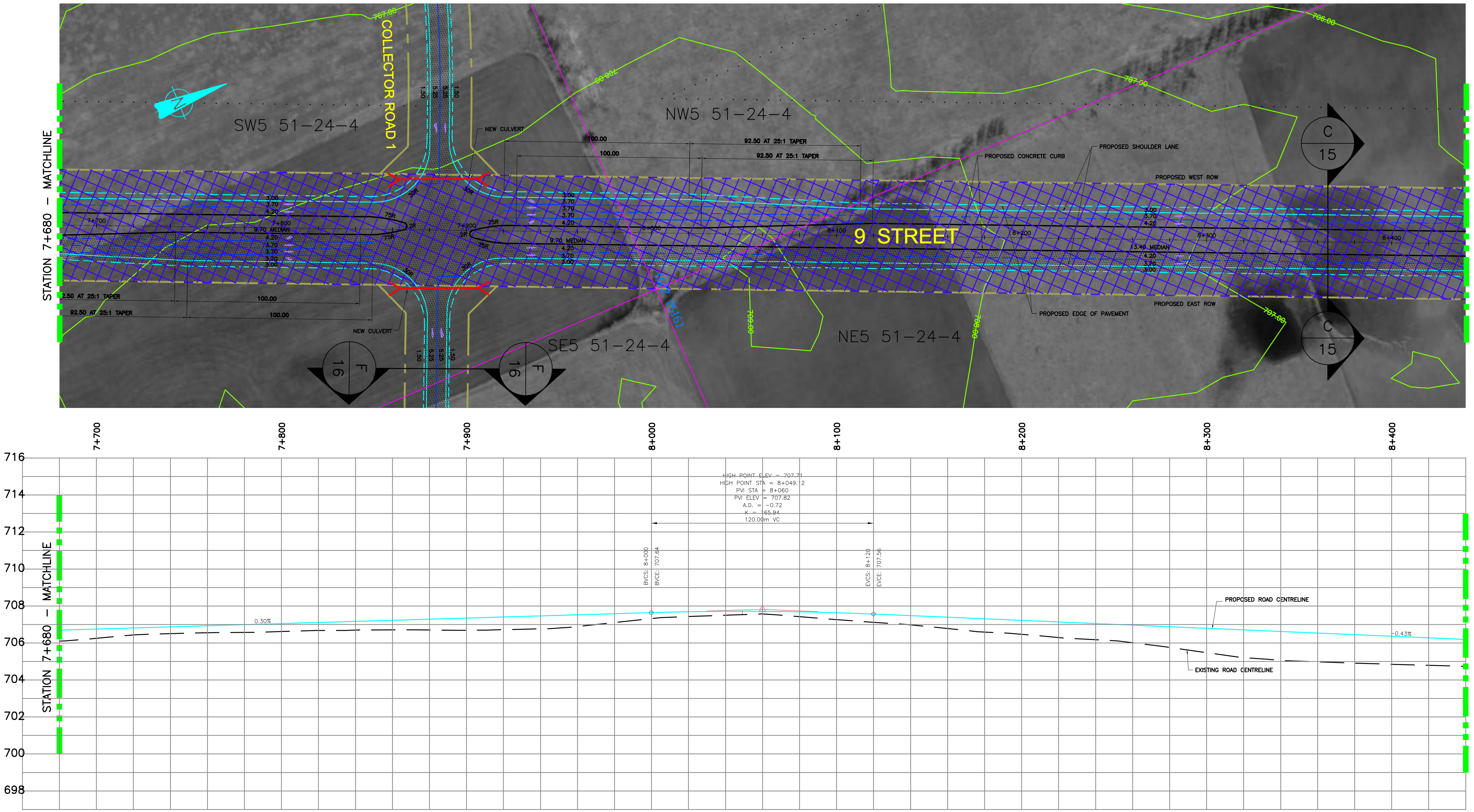
9th Street (Nisku Spine Road)

Station 6+920 TO 7+680

Functional Planning Study

Figure 5-10

Sheet 10 of 16



LEGEND:

FIRST STAGE ROAD IMPROVEMENT	MANHOLE
PROPOSED ROAD RIGHT OF WAY	GAS LINE
EXISTING ROAD RIGHT OF WAY	WATER MAIN
	SANITARY MAIN/SERVICE
	PROPOSED RIGHT OF WAY BOUNDARY

LEDUC COUNTY

Associated Engineering

0 20 50 100m

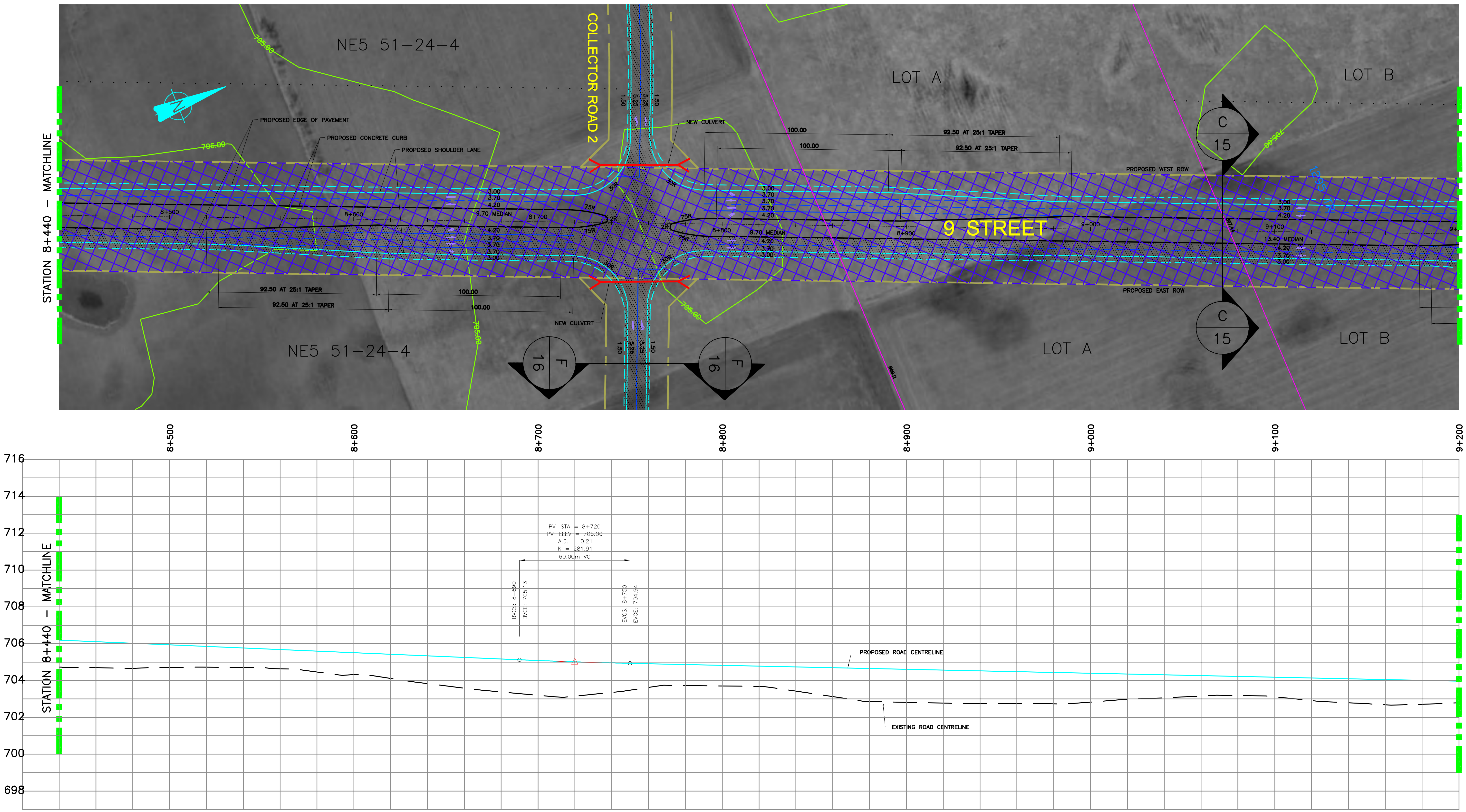
Scale 1:2000

9th Street (Nisku Spine Road)

Station 7+680 TO 8+440

Functional Planning Study

Figure 5-11



LEGEND:

	FIRST STAGE ROAD IMPROVEMENT
	PROPOSED ROAD RIGHT OF WAY
	EXISTING ROAD RIGHT OF WAY
	MANHOLE
GAS	GAS LINE
W	WATER MAIN
SAN	SANITARY MAIN/SERVICE
	PROPOSED RIGHT OF WAY BOUNDARY

LEDUC COUNTY

Associated Engineering

0 20 50 100m

Scale 1:2000

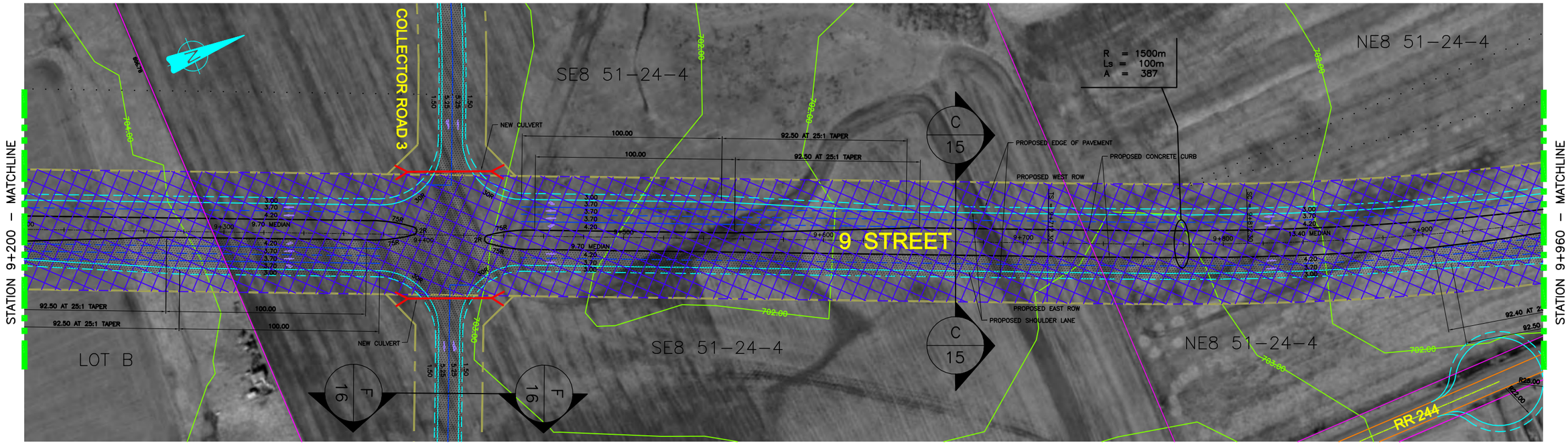
9th Street (Nisku Spine Road)

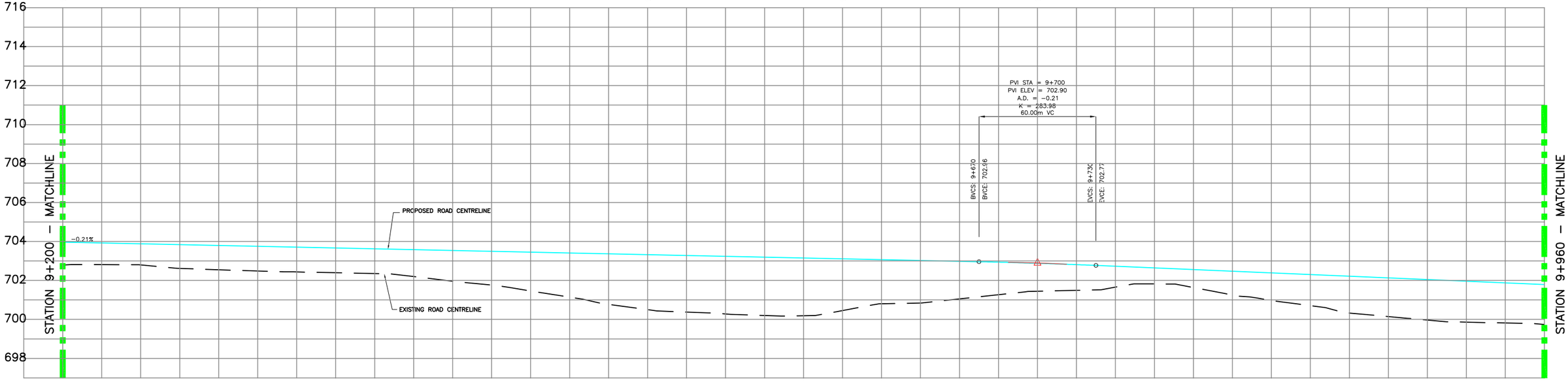
Station 8+440 TO 9+200

Functional Planning Study

Figure 5-12

Sheet 12 of 16





LEGEND:

- FIRST STAGE ROAD IMPROVEMENT
- PROPOSED ROAD RIGHT OF WAY
- EXISTING ROAD RIGHT OF WAY
- MANHOLE
- GAS — GAS LINE
- W — WATER MAIN
- SAN — SANITARY MAIN/SERVICE
- PROPOSED RIGHT OF WAY BOUNDARY

LEDUC COUNTY

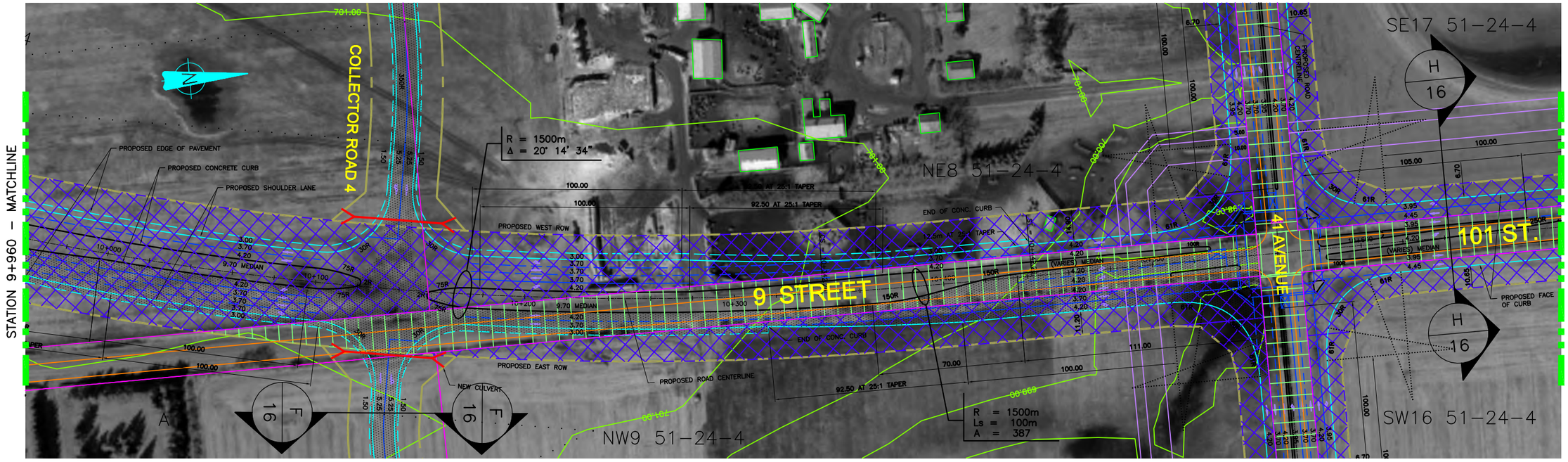
Associated Engineering

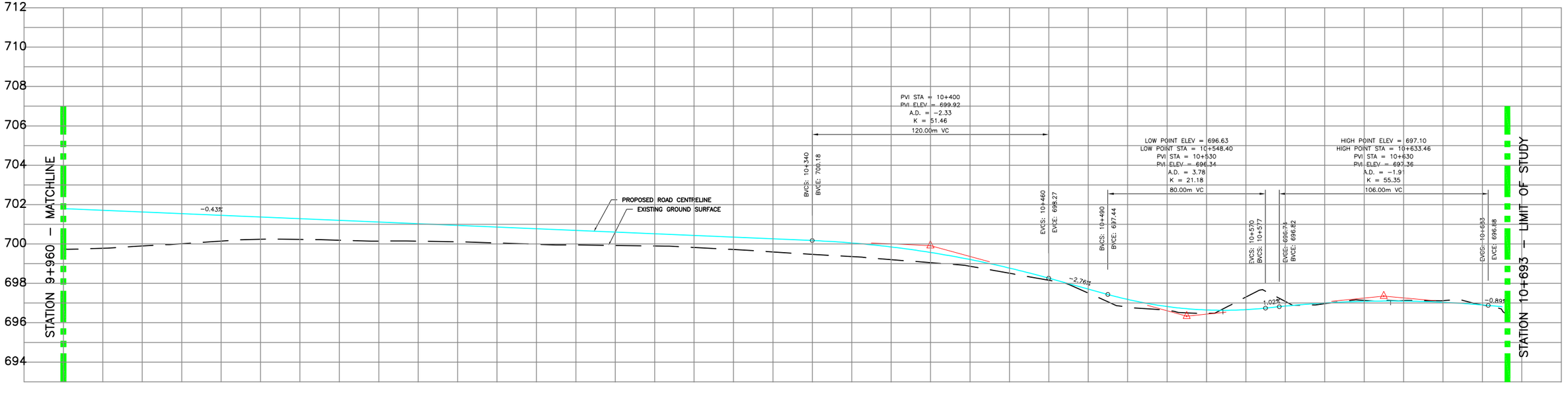
0 20 50 100m

Scale 1:2000

9th Street (Nisku Spine Road)

Station 9+200 TO 9+960
Functional Planning Study
Figure 5-13





LEGEND:

- FIRST STAGE ROAD IMPROVEMENT
- PROPOSED ROAD RIGHT OF WAY
- EXISTING ROAD RIGHT OF WAY
- MANHOLE
- GAS — GAS LINE
- W — WATER MAIN
- SAN — SANITARY MAIN/SERVICE
- PROPOSED RIGHT OF WAY BOUNDARY

LEDUC COUNTY

Associated Engineering

0 20 50 100m

Scale 1:2000

9th Street (Nisku Spine Road)

Station 9+960 TO 10+693

Functional Planning Study

Figure 5-14

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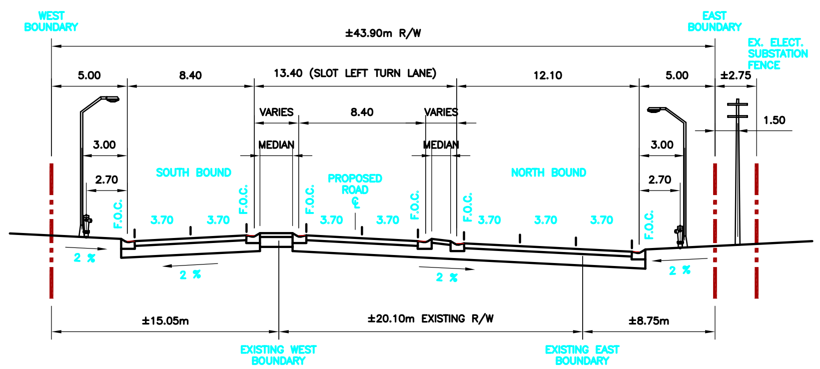
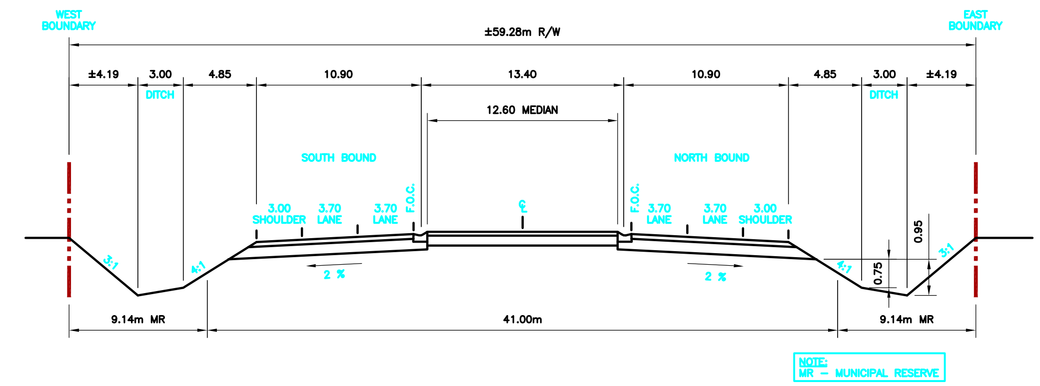


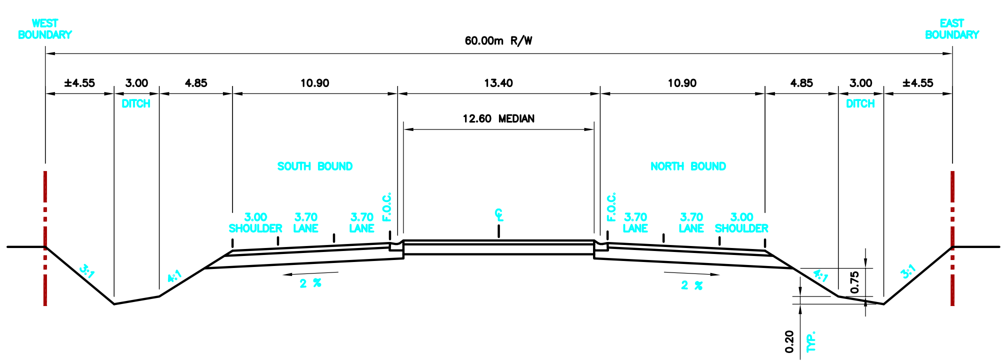
PROPOSED CROSS-SECTION (A / 1)

SCALE: NTS



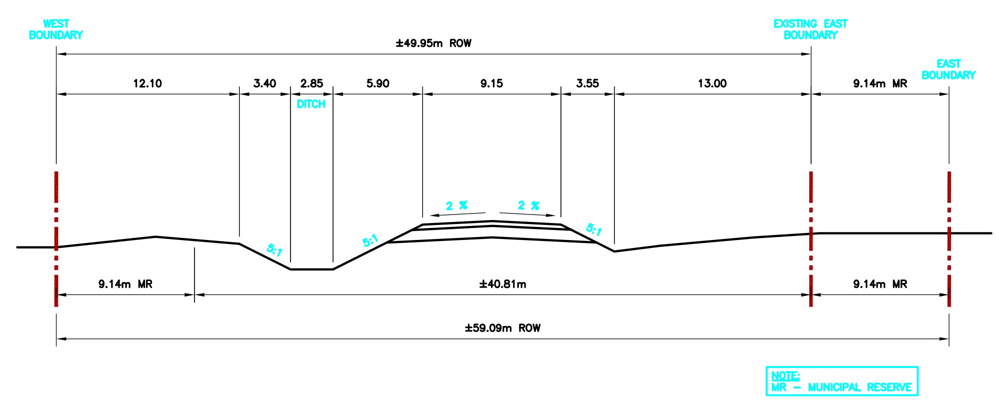
PROPOSED X-SECTION FROM STA. 1+000 TO 6+100 (B / 2–8)

SCALE: NTS



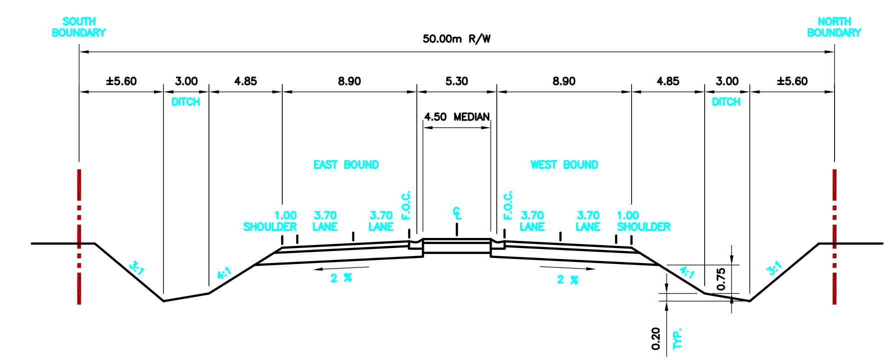
PROPOSED X-SECTION FROM STA. 6+100 TO 10+100 (C / 9–13)

SCALE: NTS



9th STREET EXISTING ROAD CROSS-SECTION (D / 2)

SCALE: NTS



TWP ROAD 510 PROPOSED X-SECTION (E / 10)

SCALE: NTS

LEGEND:

- FIRST STAGE ROAD IMPROVEMENT
- PROPOSED ROAD RIGHT OF WAY
- EXISTING ROAD RIGHT OF WAY
- MANHOLE
- GAS — GAS LINE
- W — WATER MAIN
- SAN — SANITARY MAIN/SERVICE
- PROPOSED RIGHT OF WAY BOUNDARY

LEDUC COUNTY

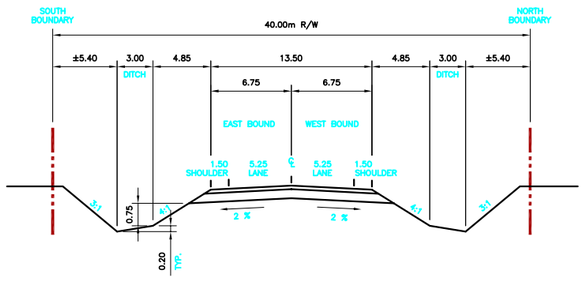
Associated Engineering

9th Street (Nisku Spine Road)

Cross Sections

Functional Planning Study

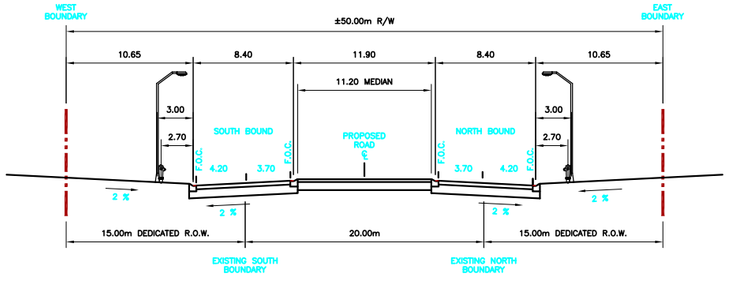
Figure 5-15



PROPOSED INDUSTRIAL COLLECTOR ROAD

SCALE: NTS

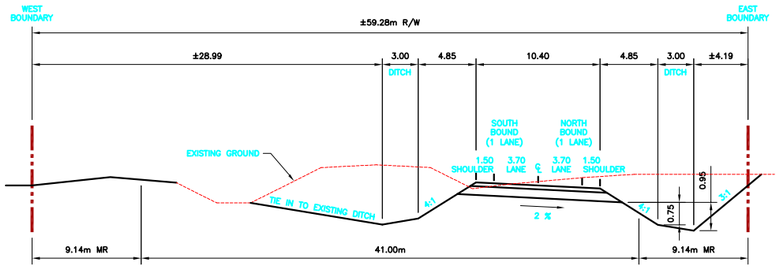
F
11—14



PROPOSED CROSS-SECTION

SCALE: NTS

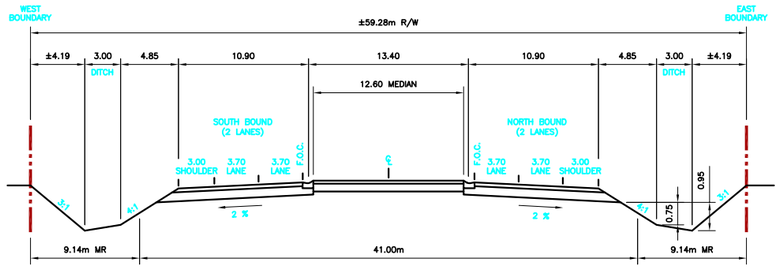
H
14



NOTE:
MR – MUNICIPAL RESERVE

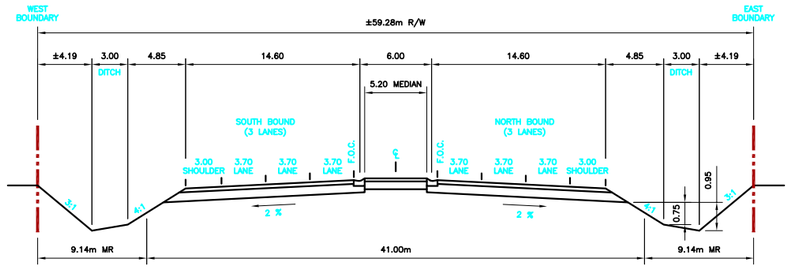
STAGE 1 (YEAR 2007 TO 2016)

SCALE: NTS



STAGE 2 (YEAR 2017 TO 2046)

SCALE: NTS



POTENTIAL (SUBJECT TO FUTURE DEVELOPMENT)

SCALE: NTS

PROPOSED CONSTRUCTION STAGING

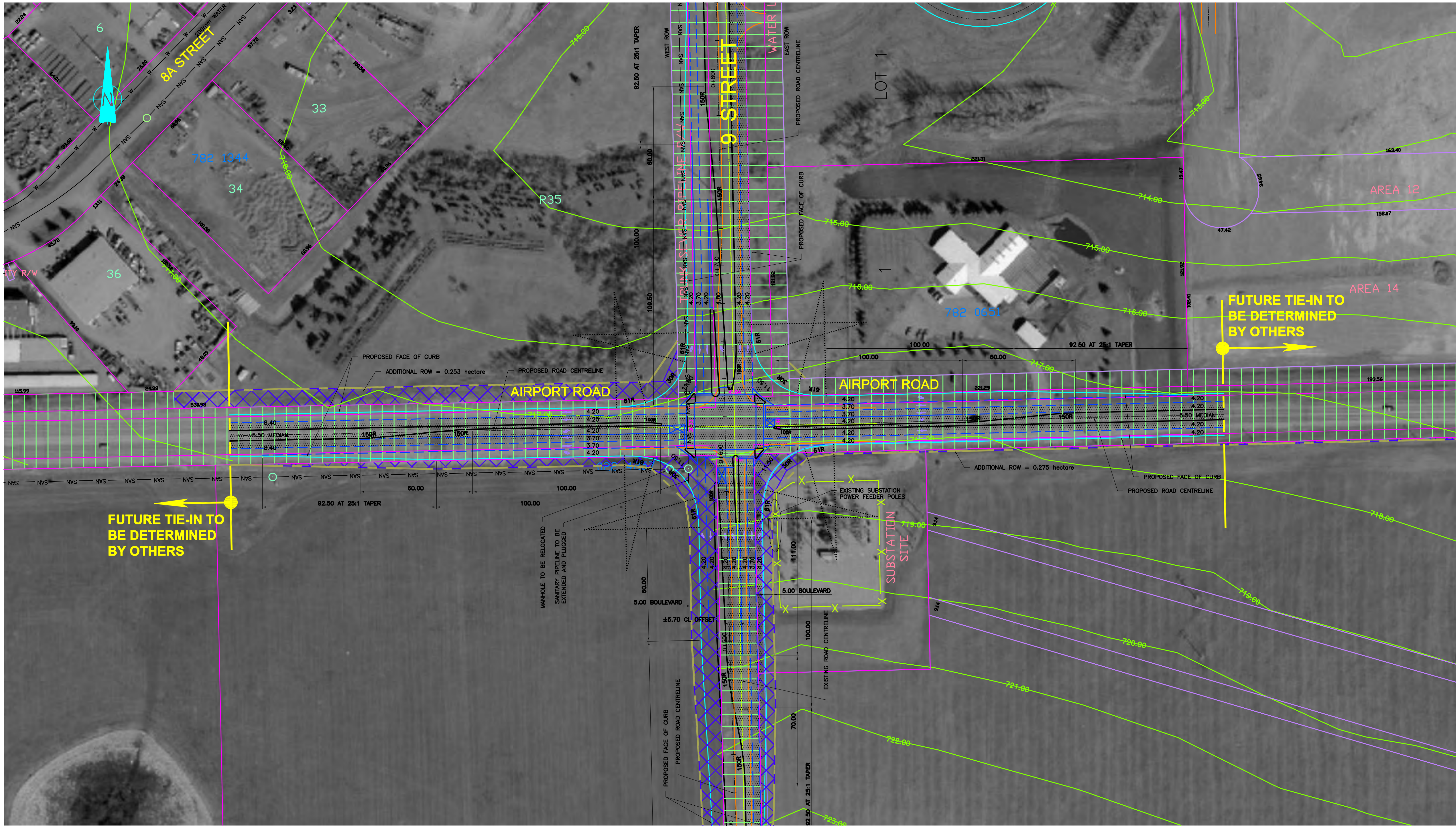
LEGEND:

- FIRST STAGE ROAD IMPROVEMENT
- PROPOSED ROAD RIGHT OF WAY
- EXISTING ROAD RIGHT OF WAY
- MANHOLE
- GAS LINE
- WATER MAIN
- SANITARY MAIN/SERVICE
- PROPOSED RIGHT OF WAY BOUNDARY

Associated Engineering

9th Street (Nisku Spine Road)

Cross Sections
Functional Planning Study
Figure 5-16



LEGEND:

	FIRST STAGE ROAD IMPROVEMENT
	PROPOSED ROAD RIGHT OF WAY
	EXISTING ROAD RIGHT OF WAY
	MANHOLE
GAS	GAS LINE
W	WATER MAIN
SAN	SANITARY MAIN/SERVICE
	PROPOSED RIGHT OF WAY BOUNDARY

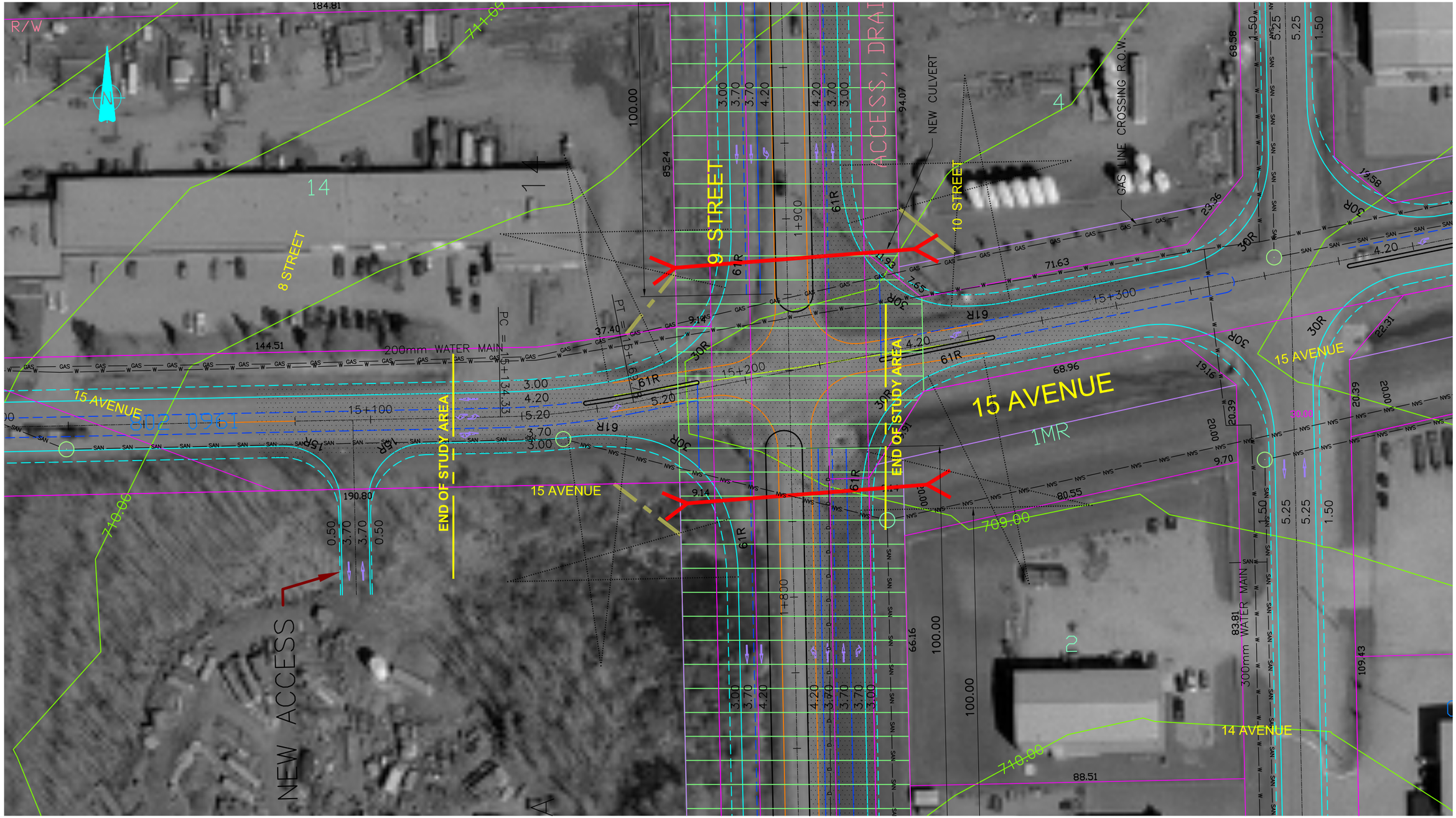
LEDUC COUNTY

Associated Engineering

0 20 50 100m

Scale 1:2000

9th Street (Nisku Spine Road)
Airport Road Intersection Plan
Functional Planning Study
Figure 5-17



LEGEND:

- FIRST STAGE ROAD IMPROVEMENT
- PROPOSED ROAD RIGHT OF WAY
- EXISTING ROAD RIGHT OF WAY
- MANHOLE
- GAS LINE
- WATER MAIN
- SANITARY MAIN/SERVICE
- STORM PIPE
- PROPOSED RIGHT OF WAY BOUNDARY

LEDUC COUNTY

Associated Engineering

0 20 50 100m

Scale 1:2000

9th Street (Nisku Spine Road)

15 Avenue Intersection Plan
Functional Planning Study
Figure 5-18

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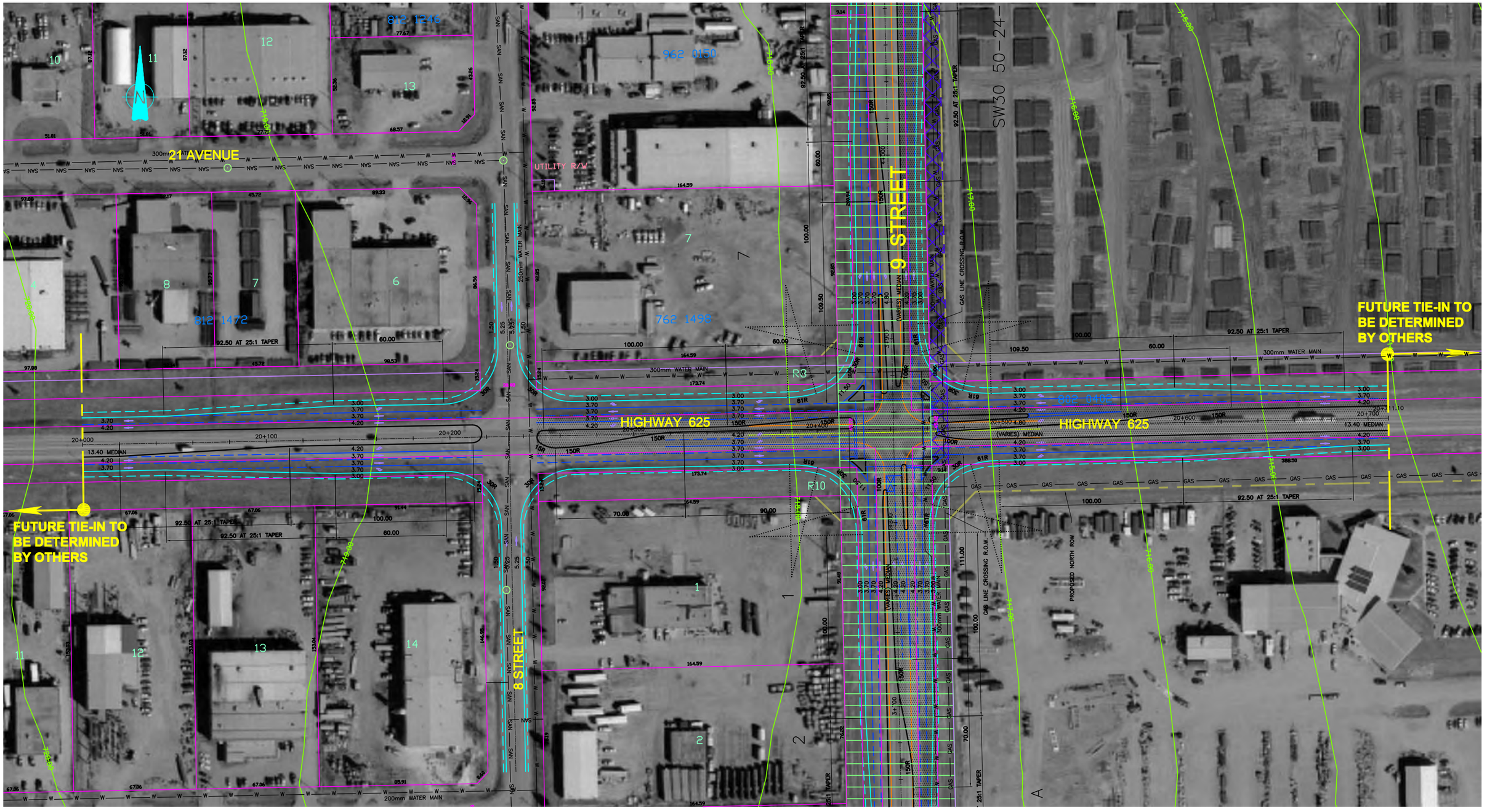

LEGEND:

- FIRST STAGE ROAD IMPROVEMENT
- PROPOSED ROAD RIGHT OF WAY
- EXISTING ROAD RIGHT OF WAY
- MANHOLE
- GAS — GAS LINE
- W — WATER MAIN
- SAN — SANITARY MAIN/SERVICE
- PROPOSED RIGHT OF WAY BOUNDARY

LEDUC COUNTY

Associated Engineering

0 20 50 100m

Scale 1:2000

9th Street (Nisku Spine Road)

Highway 625 Intersection Plan
Functional Planning Study
Figure 5-19

Plot Style: transportation-colour.ctb
Date: April 17, 2006
Author: jeff.c
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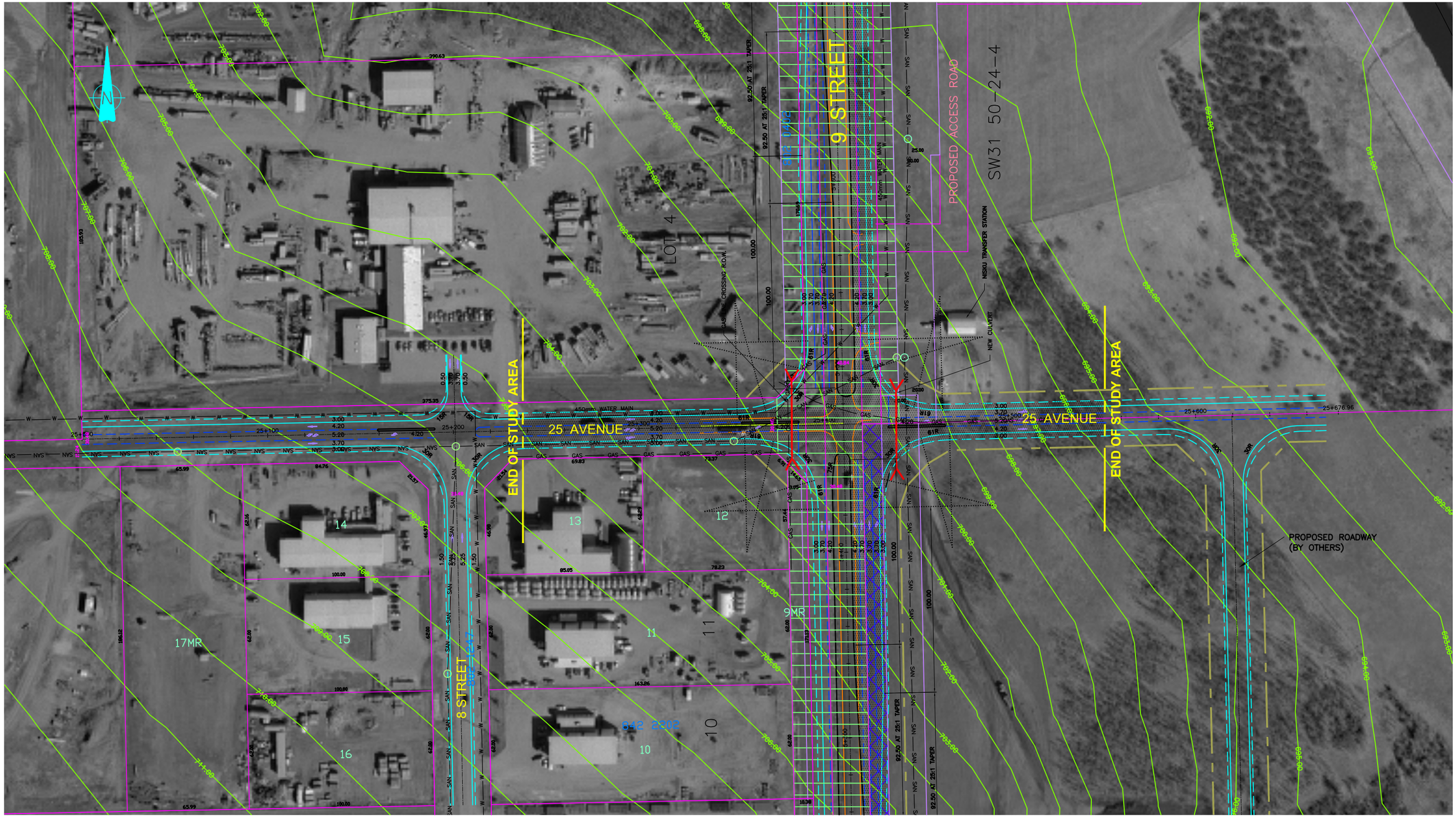

LEGEND:

- FIRST STAGE ROAD IMPROVEMENT
- PROPOSED ROAD RIGHT OF WAY
- EXISTING ROAD RIGHT OF WAY
- MANHOLE
- GAS — GAS LINE
- W — WATER MAIN
- SAN — SANITARY MAIN/SERVICE
- PROPOSED RIGHT OF WAY BOUNDARY

LEDUC COUNTY

Associated Engineering

0 20 50 100m

Scale 1:2000

9th Street (Nisku Spine Road)

25 Avenue Intersection Plan
Functional Planning Study
Figure 5-20

RELOCATED ACCESS ROAD

EXISTING ROAD TO BE RELOCATED

9 STREET

EXISTING ROADWAY TO BE REMOVED

FUTURE TIE-IN TO BE DETERMINED BY OTHERS

TWP ROAD 510

300mm WATER MAIN

TRUNK SEWER PIPELINE R/W

NEW CULVERT

NW31 50-24-4

401.330

LEGEND:

- FIRST STAGE ROAD IMPROVEMENT
- PROPOSED ROAD RIGHT OF WAY
- EXISTING ROAD RIGHT OF WAY
- MANHOLE
- GAS LINE
- WATER MAIN
- SANITARY MAIN/SERVICE
- PROPOSED RIGHT OF WAY BOUNDARY

LEDUC COUNTY

Associated Engineering

0 20 50 100m

Scale 1:2000

9th Street (Nisku Spine Road)

TWP Road 510 Intersection Plan
Functional Planning Study
Figure 5-21

Plot Style: transportation-colour.ctb
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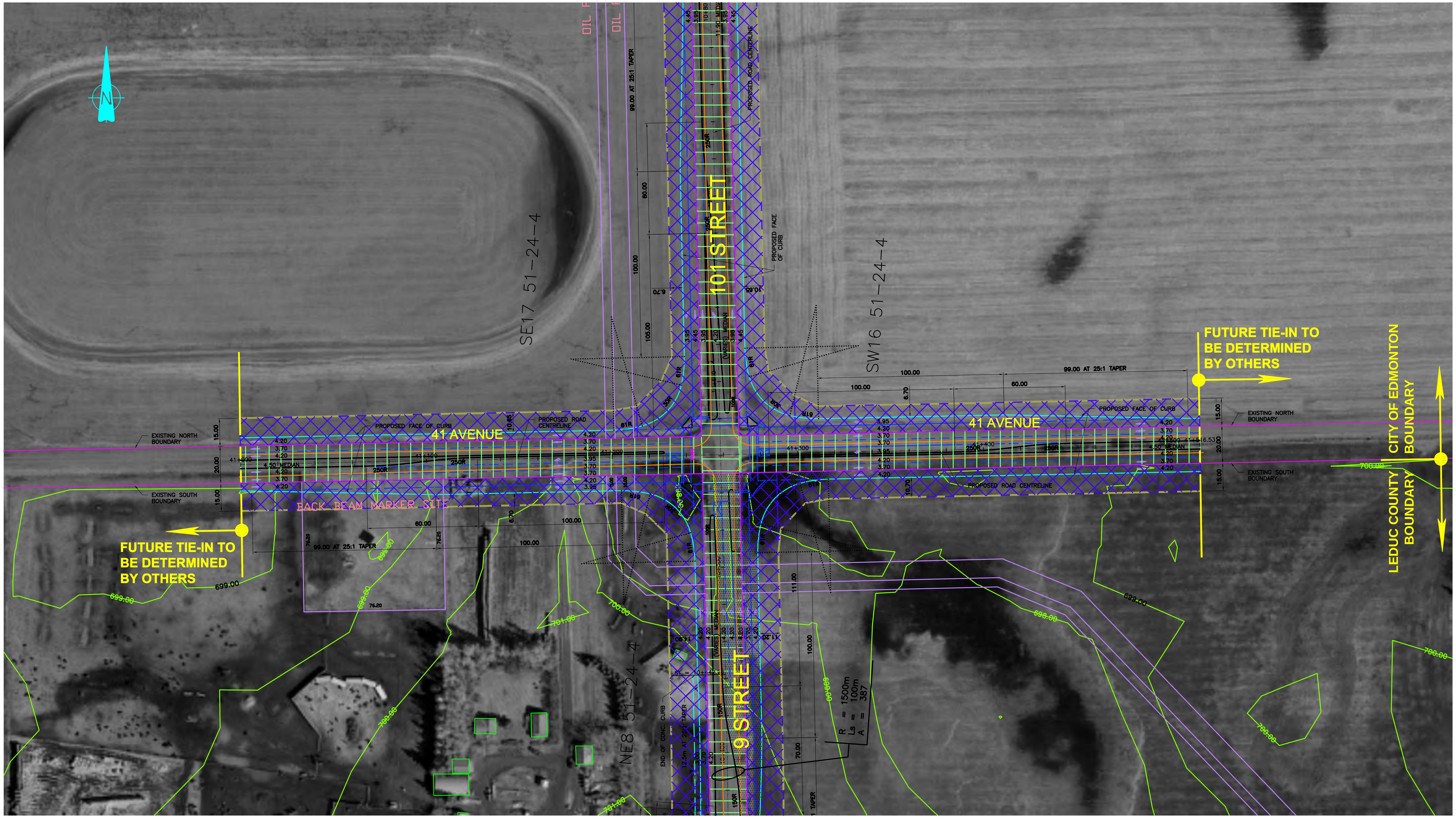


LEGEND:

	FIRST STAGE ROAD IMPROVEMENT
	PROPOSED ROAD RIGHT OF WAY
	EXISTING ROAD RIGHT OF WAY
	MANHOLE
GAS	GAS LINE
W	WATER MAIN
SAN	SANITARY MAIN/SERVICE
	PROPOSED RIGHT OF WAY BOUNDARY

LEDUC COUNTY

Associated Engineering

0 20 50 100m

Scale 1:2000

9th Street (Nisku Spine Road)

41 Avenue Intersection Plan

Functional Planning Study

Figure 5-22

RYAN SCRAP INDUSTRIES (Temporary)

WEATHERFORD AMPSCOTT (Temporary)

TURBOSCOPE

FIRST CLASS PAINTING

MASTCO YARD #3 (Temporary)

OLD ACCESS ROAD

UNKNOWN BACK ACCESS (Temporary)

MASTCO YARD #5

Airport Road

Highway 625

25 Avenue

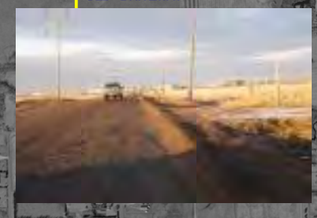
9 Street (Nisku Spine Road)

TWP RD 510

15 Avenue

NABORS DRILLING

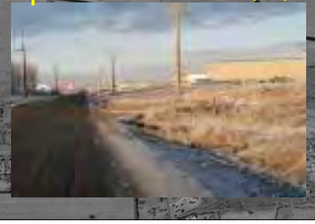
N BAR U RANCH



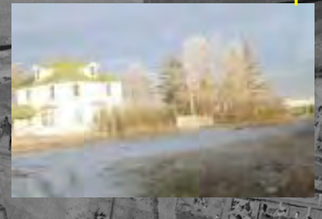
OLD DRIVEWAY

ACCESS TO NEW BUSINESS (Temporary)

ALBERTA SWINE GENETICS CORPORATION

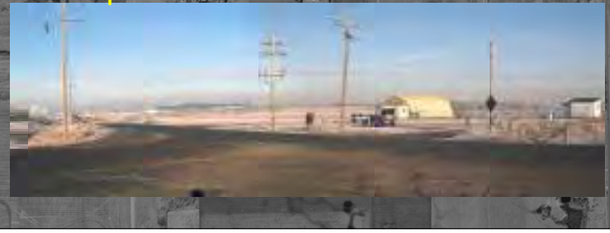


BARRACUDA AUTO SOLUTIONS (Temporary)



MILLER OILFIELD, TURBOSCOPE, AND VAM PREMIUM

MILLER OILFIELD, TURBOSCOPE, AND VAM PREMIUM



NISKU SEWAGE TRANSFER STATION

P:\20065392\000_9thSIFPStudy\Engineering\03.00_Conceptual_Feasibility_Design\Traffic Analysis\SynchroExistingAccess.dwg

9th Street (Nisku Spine Road)
Airport Road to City of Edmonton Limit
Functional Planning Study
May 2006

LEDUC COUNTY

Associated Engineering

Figure 5-23: Existing Direct Access Locations

6 Storm Drainage

6.1 STORM DRAINAGE ANALYSIS

The Nisku Business Industrial Business Park is drained with a system of ditches and culverts which drain to Highway 2 or Blackmud Creek. A number of small dry ponds, mostly serving individual lots, provide stormwater management to control runoff from the area to the pre-development rate. Ditches provide additional flood storage as well as conveyance of runoff.

Figure 6-1 provides a preliminary stormwater concept plan for the 9 Street Nisku Spine Road. It consists of roadside ditches to carry runoff from the roadway and tributary areas to stormwater management areas. The plan shows the potential locations for these stormwater management facilities based on previous drainage planning for the area. Locations are only tentative and subject to review based on plans for other areas which remain to be determined, as are the detention pond sizes. According to Nisku Industrial Business Park Storm Water Drainage Plan, Preliminary Engineering Study, June 2001, a number of culverts will also need to be upgraded; these are shown in the drainage concept plan.

Stormwater management is required for all new development areas including the 9 Street Nisku Spine Road. Locations and sizes of facilities, their design, and the release rates from these facilities, remain to be determined. These will need to be coordinated with the development area drainage plans.

6.2 REQUIREMENT FOR COMPREHENSIVE STORMWATER MASTER PLAN FOR NISKU INDUSTRIAL BUSINESS PARK

Details of the stormwater management plan for the Nisku Business Industrial Park needs to be confirmed before the 9 Street drainage plan is finalized. According to Nisku Industrial Business Park Storm Water Drainage Plan, Preliminary Engineering Study, June 2001 the older area was developed without an overall master drainage concept. Runoff was supposed to have been controlled to pre-development peak rates, but apparently some of the developments did not meet the terms of their licenses. Consequently, in 2001, the study analysis showed that only about 20% of the storage that would be required by present-day standards was provided. A number of small stormwater management facilities existed, mostly to serve the needs of individual lots.

Previous studies also alluded to drainage and flooding problems in Nisku. The modelling done during previous studies shows that the culverts would be overloaded at 12 locations and that flooding would occur at a number of locations. The previous studies recommended upgrading of the ditches and culverts and the construction of 13 new stormwater management facilities that would serve existing and future development areas. It is not clear which, if any, of the proposed upgrades have been completed. Subsequently, very preliminary drainage planning was conducted for the Blackmud Creek Area Structure Plan and North Major Area Structure Plan, on the east and north side of the project area.

These plans and the substantial development which has occurred since 2001 require that the 2001 master drainage plan be updated. Control of runoff water quality is also a concern which had not been addressed previously.

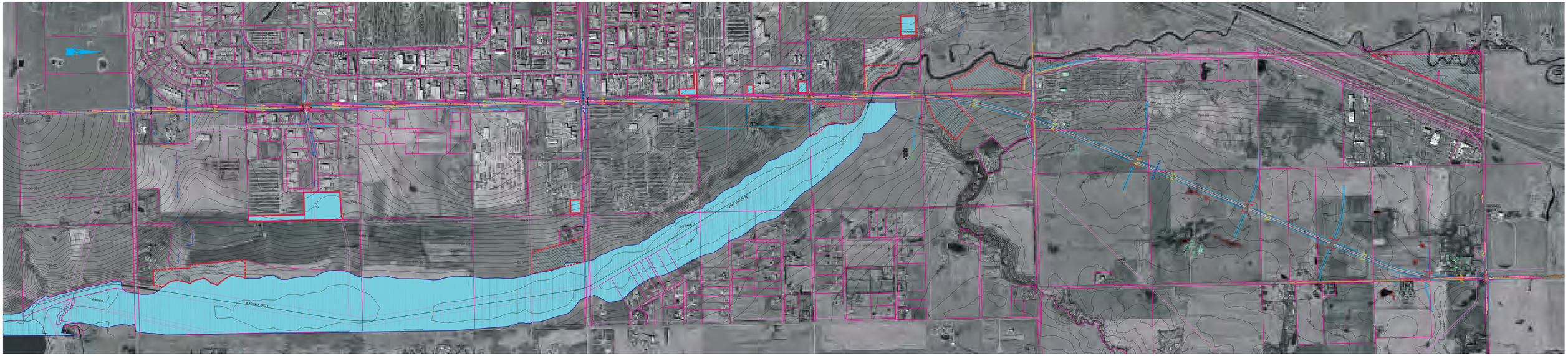
Much of the area south of Blackmud Creek has been developed or is being developed. Likely, development pressures will shift north or Blackmud Creek in the near future. Floodplains of Irvine Creek and Blackmud Creek create development and drainage constraints in this area. A stormwater management master plan will be required to coordinate the drainage needs of development in this area.

The Nisku Spine Road drains to several of the existing and proposed stormwater management facilities which also serve other portions of the development area. In order to permit the design of the roadway drainage the overall drainage plan for existing and future development areas needs to be confirmed.

Specifically, the following information would be required:

- Outlets for 9 Street drainage;
- Locations and capacities of existing dry ponds that will receive the roadway runoff, and the potential impact of additional highway runoff on these facilities;
- Capacities of culverts and ditches downstream of 9 Street and culverts crossing 9 Street;
- Locations, staging, capacities, and sizes of stormwater management facilities for the area north of Blackmud Creek;
- Locations of water mains, sewer lines, and other utilities that may affect the roadway configuration and drainage design.

Drainage development in Nisku may have previously been done on a piecemeal basis to serve the needs of individual developers, but there is sign of better coordination in recent years. An approved and updated master drainage plan would provide better coordination between developers which will help to create a better and more efficient drainage system (lower cost), and meet environmental requirements.



LEGEND:

- POTENTIAL STORM WATER MANAGEMENT (STORAGE SITE)
- EXISTING STORM WATER MANAGEMENT FACILITY (DRY POND)
- BLACKMUD CREEK FLOOD PLAIN (PER ABEW)
- EXISTING DRAINAGE CHANNEL
- PROPOSED DRAINAGE CHANNEL
- EXISTING PIPE OR CULVERT
- PROPOSED PIPE OR CULVERT
- DRAINAGE DIVIDE

LEDUC COUNTY

Associated Engineering

0 100 250 500m

Scale 1:12500

9th Street (Nisku Spine Road)

Preliminary Storm Water Management Concept
Functional Planning Study
Figure 6-1

7 Environmental Overview

7.1 ENVIRONMENTAL OVERVIEW

AE project team conducted an initial environmental evaluation for the alignment of the proposed Nisku Spine Road. The study area encompasses the existing 9 Street alignment in the Nisku Industrial Business Park from 10 Avenue (Airport Road) to Township Road 510 and the future spine road alignment extending north-east along Range Road 244 (101 Street to 41 Avenue SW) at the City of Edmonton south corporate limit. This initial environmental evaluation was conducted to identify potential impacts or sensitive areas, which might be impacted by the proposed alignment and to identify potential applicable environmental regulations or legislation.

The proposed alignment is approximately 10 km in length. The proposed road improvements, within the Nisku Industrial Business Park, will occur predominately within the available/existing right of way ***(refer to Figure 5-1 to 5-16)***. North of the business park the land use is predominately used for grazing and agricultural uses.

The intent of this overview is to provide stakeholders and regulatory bodies with the initial environmental evaluation for the subject area, and provide the opportunity to provide comments prior to the preliminary design stage.

This initial environmental evaluation report discusses the following:

- Vegetation
- Wildlife
- Surface Water
- Ground water
- Special Places
- Noise and Air Quality
- Land and Soil
- Health and safety
- Socio-economic
- Aesthetics

7.1.1 Vegetation

A preliminary vegetation assessment should be conducted to determine if the subject area contains any vegetation species at risk. In the area north of Blackmud Creek, two potential wetlands areas were identified along with the crossing at Blackmud Creek. These areas will require a detailed vegetation assessment. A detailed vegetation assessment will likely not be required for the remaining portion of the alignment as commercial and grazing/cultivated lands are unlikely to contain native vegetation.

The detailed vegetation assessment should identify the quality of the habitat, to assist with the habitat compensation plan.

7.1.2 Wildlife

A preliminary wildlife review should be conducted for the subject area, to identify if species at risk inhabit the area. If a species at risk is identified in the preliminary review a more detailed study will be conducted to determine potential design or compensation issues. The wildlife review will also indicate if there are any potential construction constraints, related to wildlife migration or breeding seasons.

Applicable Environmental Legislations are as follows:

- Species at Risk Act (SARA), Government of Canada, June 2003, identifies species at risks and applies to all wildlife and vegetation species listed as being at risk and their critical habitat;
- Wild Life Act, Alberta Sustainable Resource Development, 1998;
- Migratory Bird Convention Act, Environment Canada, 1994, which regulates activates that are harmful to migratory birds, their eggs or their nest.

7.1.3 Surface Water

Water Course Crossings

Surface water runoff in the area predominately drains towards the Blackmud Creek, which drains north to the North Saskatchewan River. The Blackmud Creek is classified as Class C, waterbody, under Alberta Environment (AENV), Water Act, Code of Practice (CoP) for Water Course Crossings and has a restricted activity period between, April 16 to June 30. The proposed alignment will require a new bridge to be constructed across the Blackmud Creek. The crossing design should incorporate the 1:100 year flood level. It does not appear that the proposed road way crosses any other water courses as define under the Code of Practice for Water Course Crossings.

Prior to the construction of the new bridge the following will be required:

- Notification to Alberta Environment under the Code of Practice for Water Course Crossing, Water Act, for the construction of the bridge. Notification is required minimum of 14 days prior to construction;
- Notification by Department of Fisheries and Oceans, (DFO), Government of Canada, Water Management, for the construction of the bridge;
- An approval from Transport Canada, Navigable Waters Section, for the construction of the new bridge.

Surface Water Management

The surface water management plan will be developed to identify the surface water runoff controls, erosion and sediment control measures, and will include a compensation plan for lost wetland areas if applicable. Surface water runoff from the roadway will be directed to either the Blackmud creek or to another acceptable drainage feature, through drainage ditches and surface facilities. Surface water management will be in compliance with the Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage Systems, published by Alberta Environment in January 2006. Design controls will be put into place to minimize erosion, the siltation of the receiving body and control the rate of storm discharge, to pre-development rates. During construction erosion and sediment control measures will be installed to prevent the siltation of Blackmud Creek. As part of the wetland compensation plan, it should be identified if compensation will occur on-site or off-site. Prior to the detailed design of the project the compensation plan should be discussed with AENV. Currently AENV is requiring a wetland compensation plan to provide a 1:1 compensation plan for lost or removed habitat.

Applicable Environmental Legislation

An approval from Alberta Environment under the Water Act is required for the proposed work within the waterbodies (wetlands). Typical time line for a Water Act approval is 6 to 9 weeks after the public notice period submission, which is typically 30 days. If the wetlands are considered to be part of public lands under the Public Lands Act, Approval may take several months.

An approval under the Environmental Protection and Enhancement Act, Wastewater and Storm Drainage Regulation, as published by Alberta Environment, will be required for the construction of the storm water management facilities.

Groundwater Management

It is not expected that ground water will be impacted by this project. No groundwater impact assessment is proposed for this project.

7.1.4 Special Places

A preliminary archeological review of the area will be conducted prior to the detailed design of the project to identify if there is any historical, cultural or traditional land, within the proposed alignment. If the archeological review identifies significant historical or cultural areas, then the project stakeholders will be contacted prior to proceeding.

7.1.5 Noise and Air Quality

No noise or air quality monitoring is proposed for this project, as the project is located within an existing commercial development area.

7.1.6 Land and Soil

A Phase 1, Environmental Site Assessment (ESA), should be conducted for the entire proposed alignment. The objective of the phase 1 ESA would be to determine if there are any potential, environmental concerns associated with the past or current land used either adjacent to or along the proposed alignment.

A soil assessment will be conducted to determine the stripping requirements in the undistributed agricultural areas.

7.1.7 Health and Safety

Health and safety, issues related to the proposed project will be assessed during the preliminary and detailed design stage of the project.

7.1.8 Socio-Economic Impact

The Nisku Industrial Business Park is western Canada's Largest business and industrial park, encompassing roughly 2200 hectares of industrial zoned land. The Leduc County Transportation Master Plan prepared in 2001 identifies Nisku Spine Road as a major north-south arterial roadway in Leduc County connecting to the City of Edmonton. Alberta Infrastructure and Transportation future regional ring road plans identifies the Nisku Spine road as a major connector between Anthony Henday Drive and Secondary Highway 625. It can be expected that improving the existing Nisku Spine Road from a minor arterial road to a major connecting road to the City of Edmonton will improve the economic status and traffic flow to/from the area from the area. As part of the project, a public open house was held, to gather public feed back regarding the project.

7.1.9 Aesthetics

Disturbed areas associated with the project construction will be landscaped or seeded with grass to re-establish vegetation once construction is completed.

7.1.10 Regulatory Stakeholders

The following regulatory agencies will be contacted regarding project notifications or request for approvals or licenses:

- Alberta Environment;
- Notification under the Codes of Practice for Water Course Crossing, for the Blackmud Creek Bridge;

- Application for an Approval for works within a water body (wetland);
- Application for an Approval for the construction of a storm water management facility.
- Department of Fisheries and Oceans
- Notification for the construction of a bridge across the Blackmud Creek
- Transport Canada, Navigable Water Section
- Notification for the construction of a bridge over Blackmud Creek

7.2 ENVIRONMENTAL OVERVIEW RECOMMENDATIONS

The following work is recommended for the proposed development area:

- A detail vegetation assessment, of the wetland areas and creek crossing area;
- A wild life assessment, to identify if species at risk inhabit the area;
- A soil assessment, to identify the stripping requirements for the project;
- Phase I ESA, to identify if there are any potential environmental concerns associated with the post or current land uses within the proposed alignment or adjacent to the project.

8 Utility Overview

8.1 WATER AND SEWER

The study area contains major water and sanitary sewer lines. The South East Regional Trunk Sewer (SERTS) runs adjacent (east side) to 9 Street. In addition to serving the City of Leduc, the Town of Beaumont and the Edmonton International Airport, SERTS importantly services the Nisku Business Park.

A Capital Region South West Water Line runs along the quarter line, half a mile south of Township Road 510 servicing the Town of Beaumont.

A new reservoir and pump house is proposed north of Blackmud Creek, east of 9 Street in Sec SW 31 50-24-4.

The water and sewer lines adjacent to 9 Street are shown in the ***Figures 5-1 to 5-15.*** Any relocation required for the existing water and sewer lines due to the reconstruction of 9 Street roadway would be determined during the preliminary engineering stage.

8.2 FRANCHISE UTILITIES

An Altalink Substation exists at the south-east quadrant of the Airport Road/9 Street intersection. A new Altalink Substation is proposed north of the 25 Avenue, east of 9 Street in Sec SW 31 50-24-4.

The existing utilities includes the presence of underground gas lines crossings (AltaGas), major overhead transmission lines & power lines (Altalink) on both sides along 9 Street and overhead telephone lines (Telus) along east side of 9 Street. Some of the utilities would require relocation (both above ground and underground) utilities during stage one construction. This would be subject to Hydrovac and Topographic survey information that needs to be conducted during the preliminary engineering stage.

The important franchise utilities adjacent to 9 Street are shown in the ***Figures 5-1 to 5-15.***

8.3 ILLUMINATION

The illumination along 9 Street exists only at the important intersections at Airport Road (10th Avenue) and Highway 625 (20th Avenue). The conceptual cost estimates allows for providing illumination all along 9 Street during the reconstruction of 9 Street to an Arterial Roadway standard.

9 Stakeholder Consultation

9.1 STAKEHOLDER MEETINGS

AE project team, during the course of the study, conducted meetings with key project stakeholders such as landowners, business owners, AIT, City of Edmonton and the City of Leduc. The AE project team conducted design review meetings with the PSC during 30%, 70% and 95% project completion stage for this project. ***Table 9-1*** provides a summary of the stakeholder contact in chronological order and a brief description of the meeting purpose. ***Appendix G*** provides a copy of the "Record of Meeting".

Table 9-1: Details of Stakeholder Meetings

Stakeholder (Meeting Date)	Purpose
Leduc County PSC (10, November 2005)	• Project initiation meeting; • Confirm scope of work; • Confirm project schedule; • Confirm roles and responsibilities.
AIT, Infrastructure Group, Barrhead (17, November 2005)	• Inform AIT about study activities; • Obtain copies of Highway 625 functional planning study report; • Gathered information on the proposed Outer Ring Road.
Leduc County PSC (09, January 2006)	• 30% review • Review study progress; • Review base plans; • Review geometric design criteria; • Review base year traffic analysis; • Stormwater drainage analysis update; • Stakeholder consultation update.
AIT, Construction Group, Stony Plain (13, January 2006)	• Obtained information on Twinning of Highway 625, Sparrow Drive to East of 9 Street in Nisku; • Discussed geometric design criteria for the intersection of Highway 625/9 Street; • Discussed pavement structure and 25% overweights in Nisku Business Park.
City of Edmonton, (18, January 2006)	• Gathered long term traffic forecasts for the study area from Regional Travel Model; • Gathered information on long term plans for 41 Avenue SW and Parsons Road.

Stakeholder (Meeting Date)	Purpose
Leduc County PSC (09, February 2006)	• 70% review; • Review study progress; • Confirm preferred cross-section; • Review long term traffic forecasts; • Review intersection designs; • Review access management options; • Stakeholder consultation update; • Environmental overview update.
City of Leduc (13, February 2006)	• Review study scope of work; • Review intersection design plans for Airport Road/9 Street; • Gather comments from City of Leduc for the intersection design for Airport Road/9 Street.
Arthur Balkan, Landowner, Sec NE5 51-24-4, (13, March 2006)	• Reviewed plans in details; • Informed about public open house.
Tuboscope Canada, (13, March 2006)	• Reviewed plans in details; • Explained access management policies and possible access alternatives; • Discussed access consolidation to Tuboscope Operations and gathered feedback on the preferred option; • Informed about public open house.
Ledcor Industries, (13, March 2006)	• Established telephone contact with Roger Foss, Operation Manager; • Briefed about the study; • Briefed about the intersection reconfiguration at Township Road 510; • Informed about public open house.
Leduc County PSC (13, March 2006)	• 95% design review; • Stakeholder consultation update; • Review of mock-ups for open house displays and questionnaire.
City of Edmonton (16, March 2006)	• Review of intersection design for 41 Avenue SW/Nisku Spine Road; • Provided a copy of the intersection design and functional plan.

9.2 PUBLIC OPEN HOUSE

AE project team organized and conducted a public open house on March 22, 2006 at the Nisku Inn & Conference Centre between 3.00 pm and 7.00 pm. The open house event was advertised in Wildcatter and Leduc Representative. A copy of the advertisement was posted in the Leduc County website and Nisku Business Association (NBA) website. Individual mail outs were sent to all adjacent landowners and business owners along the 9 Street and the landowners along the Nisku Spine Road.

The draft recommended plans were displayed at the open house event. The public was provided with an attendance slip to sign in and a feedback questionnaire to provide comments on the draft recommended plans. Public were provided an opportunity to respond to the survey by March 29, 2006. A graffiti board (showing the draft recommended plans) was set up to provide an opportunity for the public to comment on the areas of concern using paste it notes.

Following are the highlights of the open house event:

- About 65 people attended the open house;
- About 40 people completed the sign-in slips;
- Attendance included Leduc County Councillors, AIT Staff and the City of Leduc Staff;
- About 10 completed survey forms were received;
- Overwhelming support from the public for the construction of Nisku Spine Road.

Appendix H summarizes the relevant information pertaining to the open house event.

10 Recommendations

AE project team makes the following recommendation to Leduc County for their consideration for the upgrading of 9 Street (Nisku Spine Road) from Airport Road (10 Avenue) to 41 Avenue.

1. Leduc County should investigate strategies to finance the implementation of this project.

2. Leduc County should proceed with the process of protecting the right-of-way required for construction of the Nisku Spine Road.

3. Leduc County should proceed with detailed design for the stage one construction of 9 Street (Nisku Spine Road) roadway.

4. Leduc County should consider constructing stage one of the Nisku Spine Road for the entire study corridor starting from Airport Road to the City of Edmonton corporate limits under one construction contract.

5. Leduc County should consider the access management standards outlined in the Transportation Association of Canada (TAC) and AIT design standards while approving the future sub division applications along the study area. As 9 Street is a major arterial roadway with higher posted speeds, AE project team recommends maintaining an access spacing of 800 m while approving future development applications.

6. The proposed 9 Street (Nisku Spine Road) roadway construction will be a major undertaking. There will be minor traffic disruptions during the construction phase of this project. Leduc County should prepare a "Traffic Accommodation" strategy during the construction phase of this project. If 9 Street is the only access to a business, Leduc County should ensure the access would not be affected during construction through a suitable "Traffic Accommodation" strategy.

7. Leduc County should consider preparing a comprehensive drainage master plan for the entire Nisku Industrial Business Park. An approved and updated drainage master plan would provide better coordination between developers which will help to create a better and more efficient drainage system (lower cost), and meet environmental requirements.

8. Leduc County should prepare a Phase I ESA, to identify if there are any potential environmental concerns associated with the post or current land uses within the proposed Nisku Spine Road alignment or adjacent to the project.

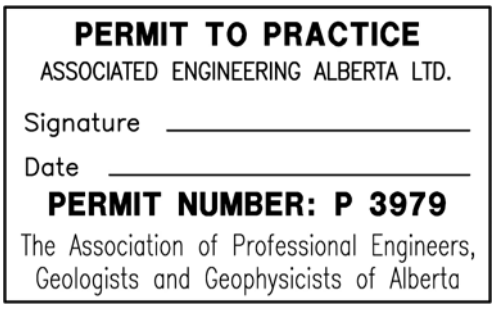
Closure

This report was prepared for Leduc County for the Functional Planning Study of 9 Street (Nisku Spine Road).

The services provided by Associated Engineering Alberta Ltd. in the preparation of this report were conducted in a manner consistent with the level of skill ordinarily exercised by members of the profession currently practising under similar conditions. No other warranty expressed or implied is made.

Respectfully submitted,
Associated Engineering Alberta Ltd.

Subbu Gopalakrishnan, M.Plan., M.A. Sc., P.Eng.
Project Manager



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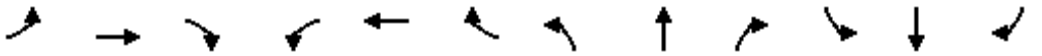
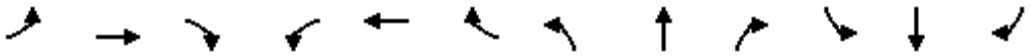
A Appendix A - Intersection Capacity Analysis



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	48	164	4	17	513	11	3	4	1	2	2	39
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	48	164	4	17	513	11	3	4	1	2	2	39
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												2
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	524			168			573	820	84	734	816	262
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	524			168			573	820	84	734	816	262
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
po queue free %	95			99			99	99	100	99	99	95
cM capacity (veh/h)	1039			1407			362	290	958	291	292	737

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1	SB 1
Volume Total	48	109	59	274	268	8	43
Volume Left	48	0	0	17	0	3	2
Volume Right	0	0	4	0	11	1	39
cSH	1039	1700	1700	1407	1700	346	812
Volume to Capacity	0.05	0.06	0.03	0.01	0.16	0.02	0.05
Queue Length 95th (m)	1.2	0.0	0.0	0.3	0.0	0.6	1.3
Control Delay (s)	8.6	0.0	0.0	0.6	0.0	15.6	10.8
Lane LOS	A			A		C	B
Approach Delay (s)	1.9			0.3		15.6	10.8
Approach LOS						C	B

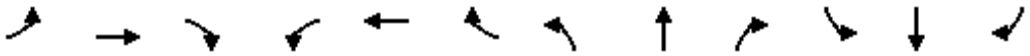
Intersection Summary				
Average Delay	1.4			
Intersection Capacity Utilization	33.0%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	4	20	4	6	55	3	40	13	10	22	33	32
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	4	20	4	6	55	3	40	13	10	22	33	32
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	222	196	49	205	207	18	65			23		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	222	196	49	205	207	18	65			23		
tC, single (s)	7.2	6.6	6.4	7.2	6.6	6.4	4.2			4.2		
tC, 2 stage (s)												
tF (s)	3.6	4.1	3.4	3.6	4.1	3.4	2.3			2.3		
po queue free %	99	97	100	99	91	100	97			99		
cM capacity (veh/h)	639	650	984	684	640	1024	1512			1524		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	28	64	63	87
Volume Left	4	6	40	22
Volume Right	4	3	10	32
cSH	681	656	1512	1524
Volume to Capacity	0.04	0.10	0.03	0.01
Queue Length 95th (m)	1.0	2.6	0.7	0.4
Control Delay (s)	10.5	11.1	4.8	2.0
Lane LOS	B	B	A	A
Approach Delay (s)	10.5	11.1	4.8	2.0
Approach LOS	B	B		

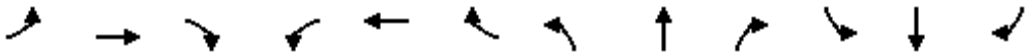
Intersection Summary				
Average Delay	6.1			
Intersection Capacity Utilization	18.5%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	50	253	38	44	1026	10	6	1	13	5	5	67
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	50	253	38	44	1026	10	6	1	13	5	5	67
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)									9			
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1036			291			1560	1496	272	1498	1510	1031
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1036			291			1560	1496	272	1498	1510	1031
tC, single (s)	4.2			4.2			7.2	6.6	6.3	7.2	6.6	6.3
tC, 2 stage (s)												
tF (s)	2.3			2.3			3.6	4.1	3.4	3.6	4.1	3.4
po queue free %	92			96			90	99	98	94	95	75
cM capacity (veh/h)	652			1248			58	106	750	86	102	272

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	341	1080	20	77
Volume Left	50	44	6	5
Volume Right	38	10	13	67
cSH	652	1248	186	218
Volume to Capacity	0.08	0.04	0.11	0.35
Queue Length 95th (m)	2.0	0.9	2.8	12.1
Control Delay (s)	2.5	1.0	29.8	30.3
Lane LOS	A	A	D	D
Approach Delay (s)	2.5	1.0	29.8	30.3
Approach LOS			D	D

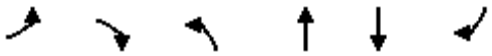
Intersection Summary			
Average Delay	3.2		
Intersection Capacity Utilization	77.3%	ICU Level of Service	D
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	30	4	14	0	11	0	20	39	2	0	63	200
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	30	4	14	0	11	0	20	39	2	0	63	200
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	248	244	163	259	343	40	263			41		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	248	244	163	259	343	40	263			41		
tC, single (s)	7.2	6.6	6.3	8.0	7.4	7.1	4.2			4.1		
tC, 2 stage (s)												
tF (s)	3.6	4.1	3.4	4.3	4.8	4.1	2.3			2.2		
po queue free %	96	99	98	100	98	100	98			100		
cM capacity (veh/h)	674	639	869	531	456	832	1267			1556		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	48	11	61	263
Volume Left	30	0	20	0
Volume Right	14	0	2	200
cSH	718	456	1267	1556
Volume to Capacity	0.07	0.02	0.02	0.00
Queue Length 95th (m)	1.7	0.6	0.4	0.0
Control Delay (s)	10.4	13.1	2.7	0.0
Lane LOS	B	B	A	
Approach Delay (s)	10.4	13.1	2.7	0.0
Approach LOS	B	B		

Intersection Summary				
Average Delay	2.1			
Intersection Capacity Utilization	36.0%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Yield			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	0	6	12	58	257	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	6	12	58	257	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	339	257	257			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	339	257	257			
tC, single (s)	6.5	6.3	4.2			
tC, 2 stage (s)						
tF (s)	3.6	3.4	2.3			
po queue free %	100	99	99			
cM capacity (veh/h)	627	753	1274			

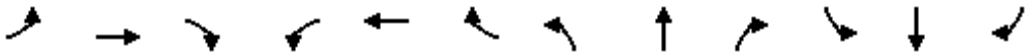
Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total	0	6	70	257
Volume Left	0	0	12	0
Volume Right	0	6	0	0
cSH	1700	753	1274	1700
Volume to Capacity	0.00	0.01	0.01	0.15
Queue Length 95th (m)	0.0	0.2	0.2	0.0
Control Delay (s)	0.0	9.8	1.4	0.0
Lane LOS	A	A	A	
Approach Delay (s)	9.8		1.4	0.0
Approach LOS	A			

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	23.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	5	4	253	97	25	33
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	5	4	253	97	25	33
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			9		610	7
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			9		610	7
tC, single (s)			4.2		6.5	6.3
tC, 2 stage (s)						
tF (s)			2.3		3.6	3.4
po queue free %			84		93	97
cM capacity (veh/h)			1585		378	1061

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	9	350	58
Volume Left	0	253	25
Volume Right	4	0	33
cSH	1700	1585	596
Volume to Capacity	0.01	0.16	0.10
Queue Length 95th (m)	0.0	4.5	2.6
Control Delay (s)	0.0	5.9	11.7
Lane LOS		A	B
Approach Delay (s)	0.0	5.9	11.7
Approach LOS			B

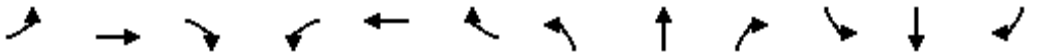
Intersection Summary			
Average Delay	6.6		
Intersection Capacity Utilization	35.9%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	13	2	1	2	38	6	11	66	0	1	122	217
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	13	2	1	2	38	6	11	66	0	1	122	217
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	346	320	230	322	429	66	339			66		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	346	320	230	322	429	66	339			66		
tC, single (s)	7.2	6.6	6.3	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.6	4.1	3.4	3.5	4.0	3.3	2.2			2.2		
po queue free %	98	100	100	100	93	99	99			100		
cM capacity (veh/h)	560	584	799	623	513	998	1204			1517		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	16	46	77	340
Volume Left	13	2	11	1
Volume Right	1	6	0	217
cSH	573	553	1204	1517
Volume to Capacity	0.03	0.08	0.01	0.00
Queue Length 95th (m)	0.7	2.2	0.2	0.0
Control Delay (s)	11.5	12.1	1.2	0.0
Lane LOS	B	B	A	A
Approach Delay (s)	11.5	12.1	1.2	0.0
Approach LOS	B	B		

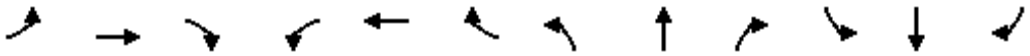
Intersection Summary				
Average Delay	1.8			
Intersection Capacity Utilization	33.3%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	43	570	4	1	182	2	4	2	18	14	4	58
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	43	570	4	1	182	2	4	2	18	14	4	58
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												2
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	184			574			782	844	287	575	845	92
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	184			574			782	844	287	575	845	92
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
po queue free %	97			100			98	99	97	96	99	94
cM capacity (veh/h)	1388			995			258	289	710	379	289	947

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1	SB 1
Volume Total	43	380	194	92	93	24	76
Volume Left	43	0	0	1	0	4	14
Volume Right	0	0	4	0	2	18	58
cSH	1388	1700	1700	995	1700	502	1241
Volume to Capacity	0.03	0.22	0.11	0.00	0.05	0.05	0.06
Queue Length 95th (m)	0.8	0.0	0.0	0.0	0.0	1.2	1.6
Control Delay (s)	7.7	0.0	0.0	0.1	0.0	12.5	10.6
Lane LOS	A			A		B	B
Approach Delay (s)	0.5			0.1		12.5	10.6
Approach LOS						B	B

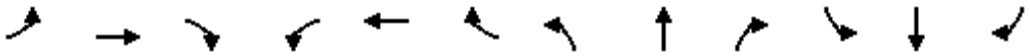
Intersection Summary				
Average Delay	1.6			
Intersection Capacity Utilization	36.0%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	35	65	47	17	27	26	8	26	13	4	12	7
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	35	65	47	17	27	26	8	26	13	4	12	7
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	112	78	16	152	76	32	19			39		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	112	78	16	152	76	32	19			39		
tC, single (s)	7.2	6.6	6.4	7.2	6.6	6.4	4.2			4.2		
tC, 2 stage (s)												
tF (s)	3.6	4.1	3.4	3.6	4.1	3.4	2.3			2.3		
po queue free %	96	92	95	98	97	97	99			100		
cM capacity (veh/h)	789	781	1027	699	784	1005	1572			1503		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	147	70	47	23
Volume Left	35	17	8	4
Volume Right	47	26	13	7
cSH	848	827	1572	1503
Volume to Capacity	0.17	0.08	0.01	0.00
Queue Length 95th (m)	5.0	2.2	0.1	0.1
Control Delay (s)	10.1	9.8	1.3	1.3
Lane LOS	B	A	A	A
Approach Delay (s)	10.1	9.8	1.3	1.3
Approach LOS	B	A		

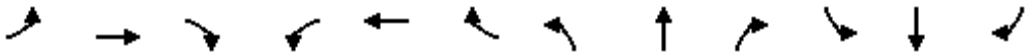
Intersection Summary				
Average Delay	7.9			
Intersection Capacity Utilization	21.0%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	50	1289	10	9	534	8	34	15	38	15	4	80
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	50	1289	10	9	534	8	34	15	38	15	4	80
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)									9			
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	542			1299			2032	1954	1294	1976	1955	538
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	542			1299			2032	1954	1294	1976	1955	538
tC, single (s)	4.2			4.2			7.2	6.6	6.3	7.2	6.6	6.3
tC, 2 stage (s)												
tF (s)	2.3			2.3			3.6	4.1	3.4	3.6	4.1	3.4
po queue free %	95			98			0	74	80	44	93	85
cM capacity (veh/h)	1002			520			31	57	192	27	56	526

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	1349	551	87	99
Volume Left	50	9	34	15
Volume Right	10	8	38	80
cSH	1002	520	69	126
Volume to Capacity	0.05	0.02	1.26	0.79
Queue Length 95th (m)	1.3	0.4	55.5	37.1
Control Delay (s)	2.1	0.5	233.1	96.7
Lane LOS	A	A	F	F
Approach Delay (s)	2.1	0.5	233.1	96.7
Approach LOS			F	F

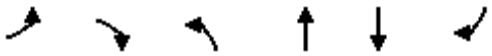
Intersection Summary			
Average Delay	15.8		
Intersection Capacity Utilization	115.3%	ICU Level of Service	H
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	22	0	250	0	0	0	5	68	0	0	77	55
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	22	0	250	0	0	0	5	68	0	0	77	55
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	182	182	104	432	210	68	132			68		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	182	182	104	432	210	68	132			68		
tC, single (s)	7.2	6.6	6.3	8.0	7.4	7.1	4.2			4.1		
tC, 2 stage (s)												
tF (s)	3.6	4.1	3.4	4.3	4.8	4.1	2.3			2.2		
po queue free %	97	100	73	100	100	100	100			100		
cM capacity (veh/h)	766	700	937	301	558	800	1417			1521		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	272	0	73	132
Volume Left	22	0	5	0
Volume Right	250	0	0	55
cSH	920	1700	1417	1521
Volume to Capacity	0.30	0.00	0.00	0.00
Queue Length 95th (m)	9.9	0.0	0.1	0.0
Control Delay (s)	10.5	0.0	0.5	0.0
Lane LOS	B	A	A	
Approach Delay (s)	10.5	0.0	0.5	0.0
Approach LOS	B	A		

Intersection Summary				
Average Delay	6.1			
Intersection Capacity Utilization	31.0%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Yield			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	0	31	6	312	101	0
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	31	6	312	101	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	425	101	101			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	425	101	101			
tC, single (s)	6.5	6.3	4.2			
tC, 2 stage (s)						
tF (s)	3.6	3.4	2.3			
po queue free %	100	97	100			
cM capacity (veh/h)	562	923	1455			

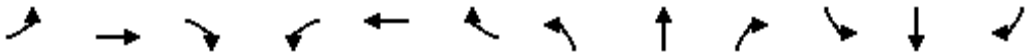
Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total	0	31	318	101
Volume Left	0	0	6	0
Volume Right	0	31	0	0
cSH	1700	923	1455	1700
Volume to Capacity	0.00	0.03	0.00	0.06
Queue Length 95th (m)	0.0	0.8	0.1	0.0
Control Delay (s)	0.0	9.0	0.2	0.0
Lane LOS	A	A	A	
Approach Delay (s)	9.0		0.2	0.0
Approach LOS	A			

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	24.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	120	13	88	18	7	305
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	120	13	88	18	7	305
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			133		320	126
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			133		320	126
tC, single (s)			4.2		6.5	6.3
tC, 2 stage (s)						
tF (s)			2.3		3.6	3.4
po queue free %			94		99	67
cM capacity (veh/h)			1427		622	911

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	133	106	312
Volume Left	0	88	7
Volume Right	13	0	305
cSH	1700	1427	901
Volume to Capacity	0.08	0.06	0.35
Queue Length 95th (m)	0.0	1.6	12.4
Control Delay (s)	0.0	6.5	11.1
Lane LOS		A	B
Approach Delay (s)	0.0	6.5	11.1
Approach LOS			B

Intersection Summary			
Average Delay	7.5		
Intersection Capacity Utilization	42.2%	ICU Level of Service	A
Analysis Period (min)	15		

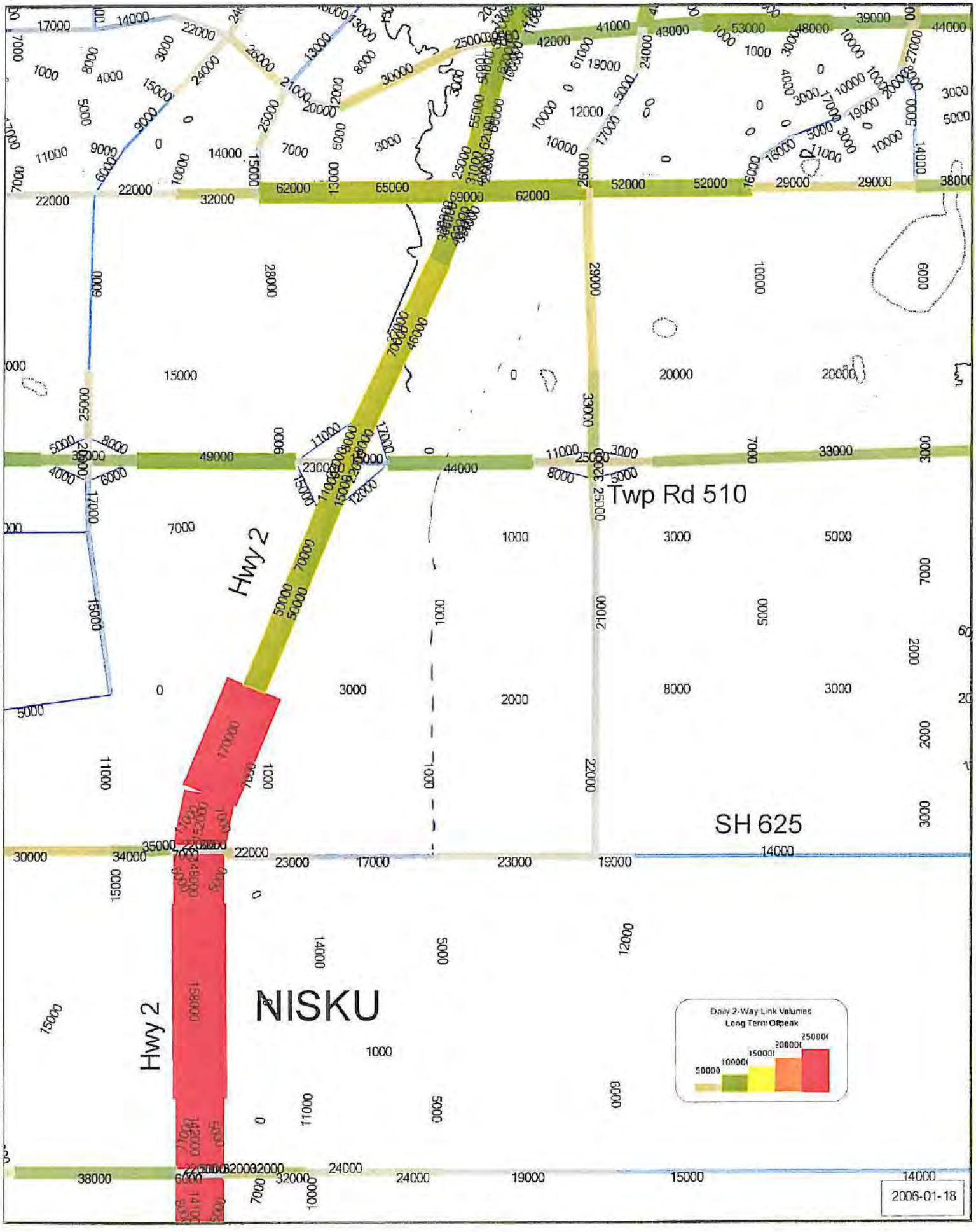


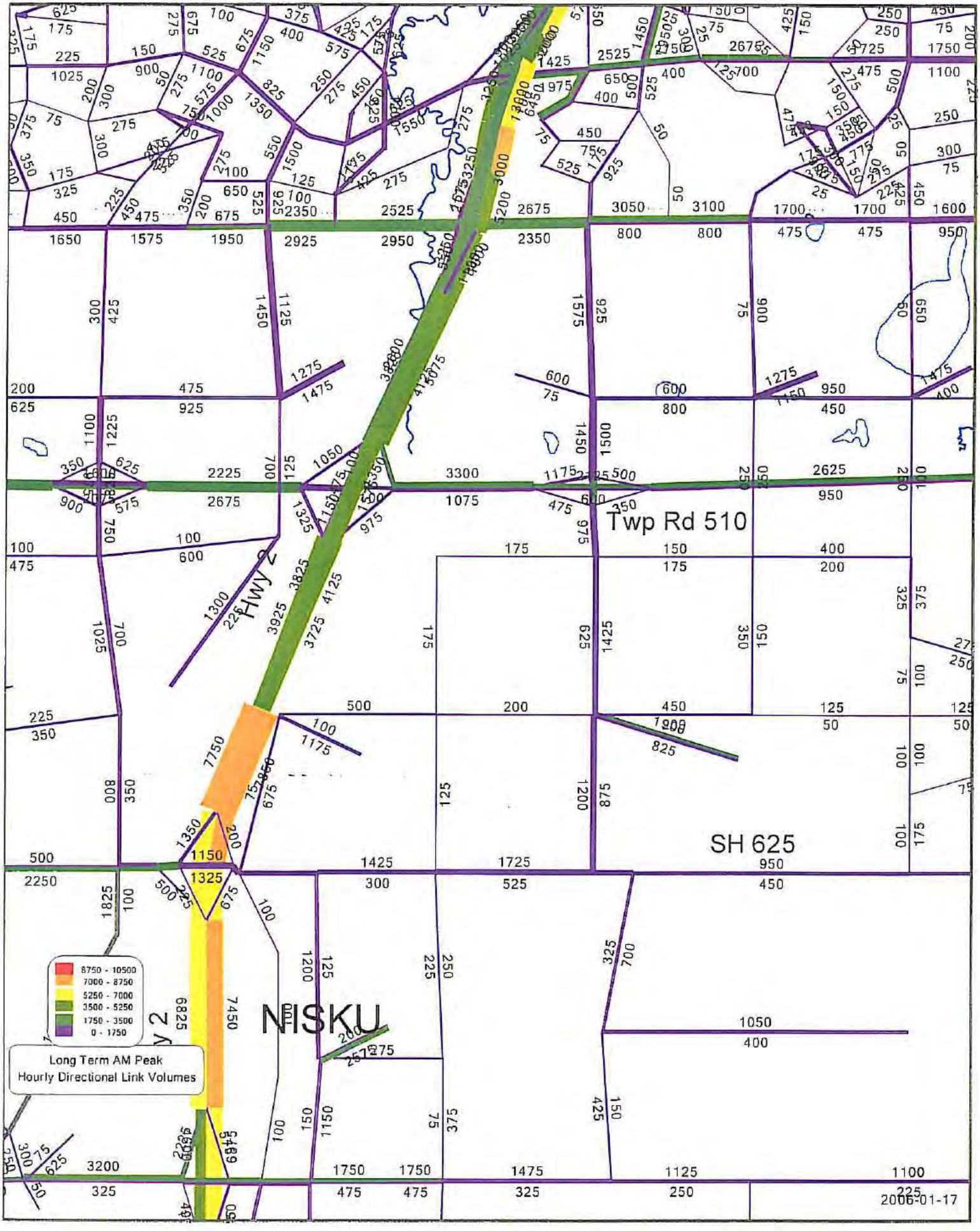
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	186	43	10	3	2	7	1	217	5	7	132	18
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	186	43	10	3	2	7	1	217	5	7	132	18
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	384	379	141	408	386	220	150			222		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	384	379	141	408	386	220	150			222		
tC, single (s)	7.2	6.6	6.3	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.6	4.1	3.4	3.5	4.0	3.3	2.2			2.2		
po queue free %	67	92	99	99	100	99	100			99		
cM capacity (veh/h)	558	544	896	512	545	820	1413			1329		

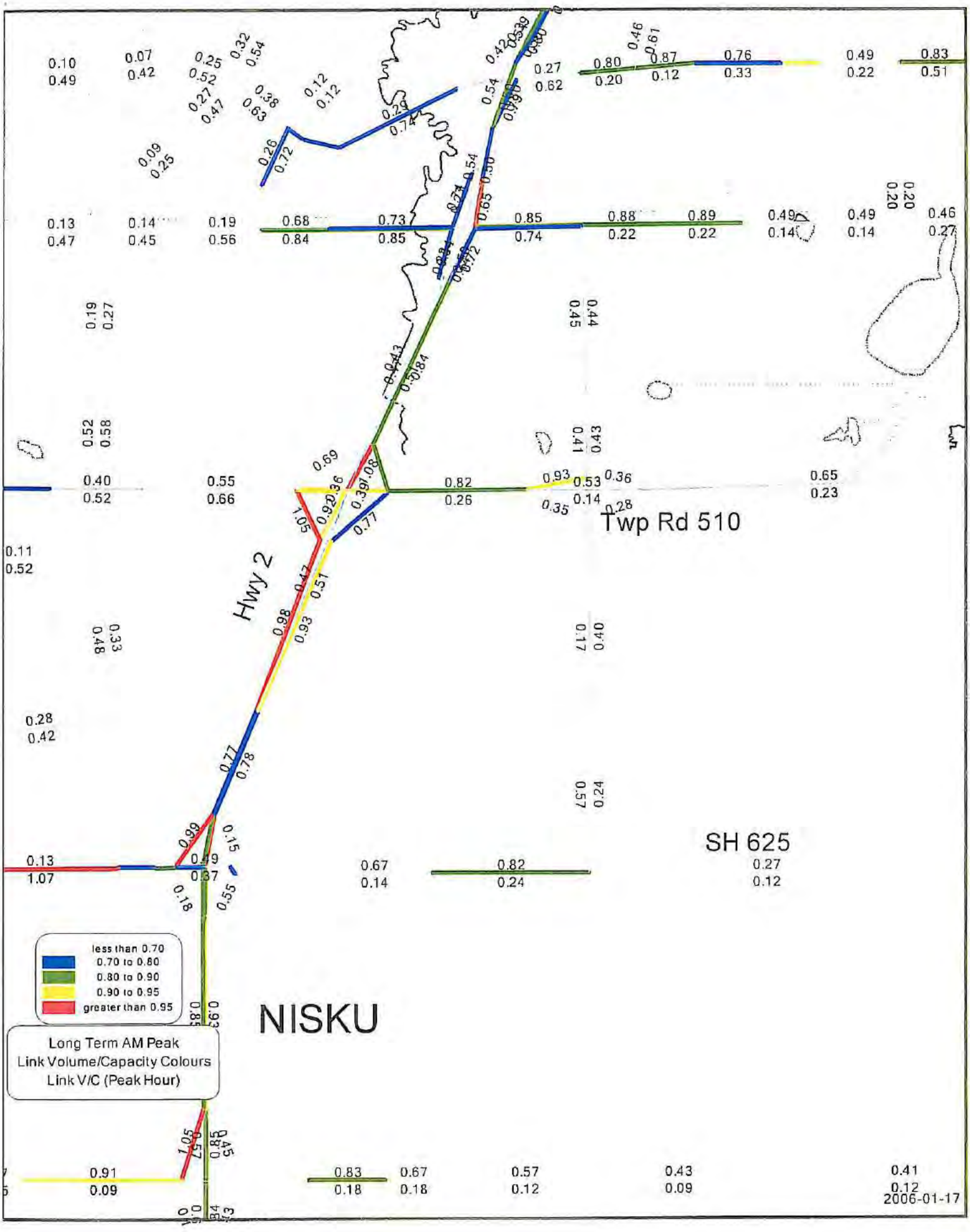
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	239	12	223	157
Volume Left	186	3	1	7
Volume Right	10	7	5	18
cSH	564	664	1413	1329
Volume to Capacity	0.42	0.02	0.00	0.01
Queue Length 95th (m)	16.8	0.4	0.0	0.1
Control Delay (s)	16.0	10.5	0.0	0.4
Lane LOS	C	B	A	A
Approach Delay (s)	16.0	10.5	0.0	0.4
Approach LOS	C	B		

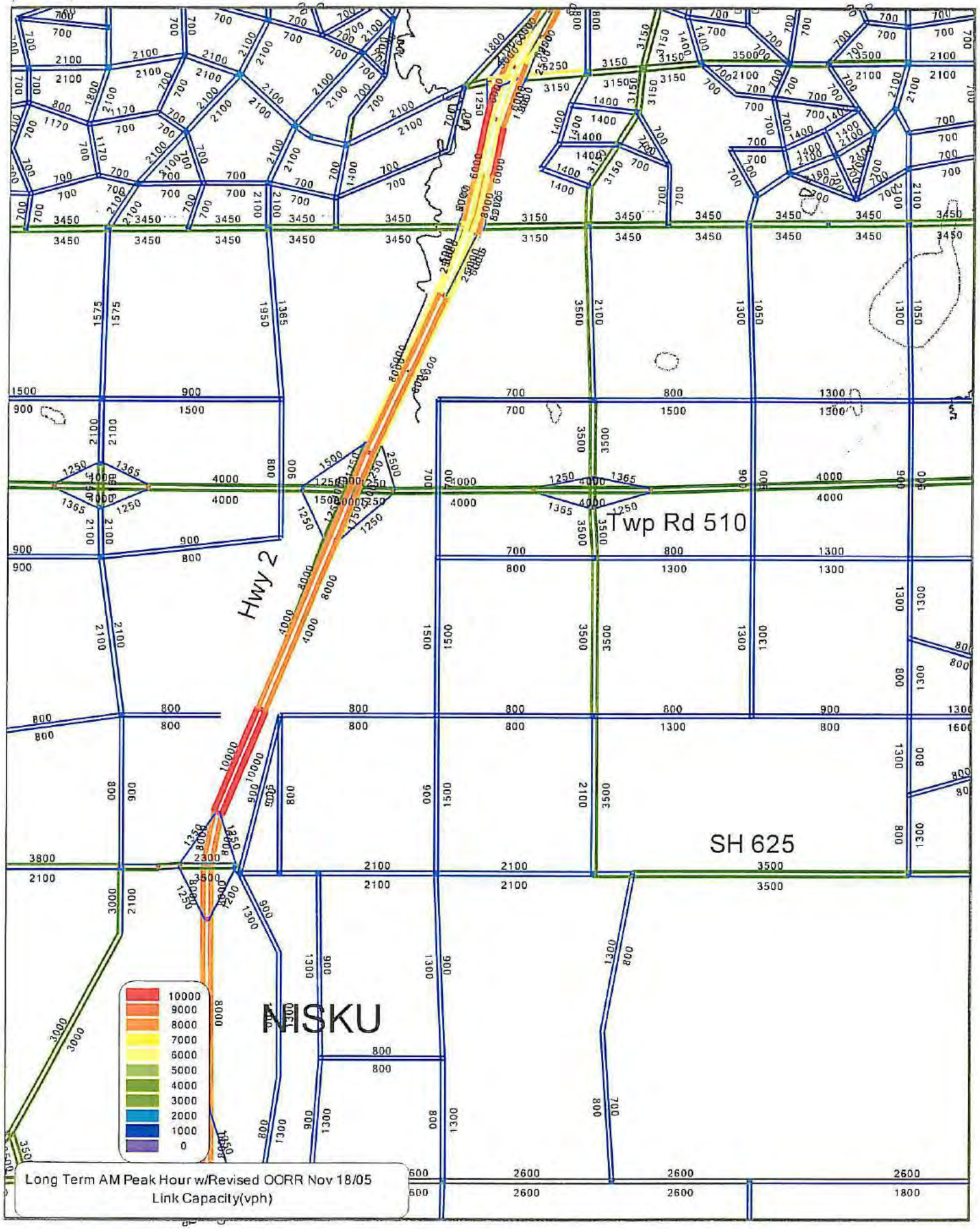
Intersection Summary				
Average Delay	6.4			
Intersection Capacity Utilization	39.7%	ICU Level of Service	A	
Analysis Period (min)	15			

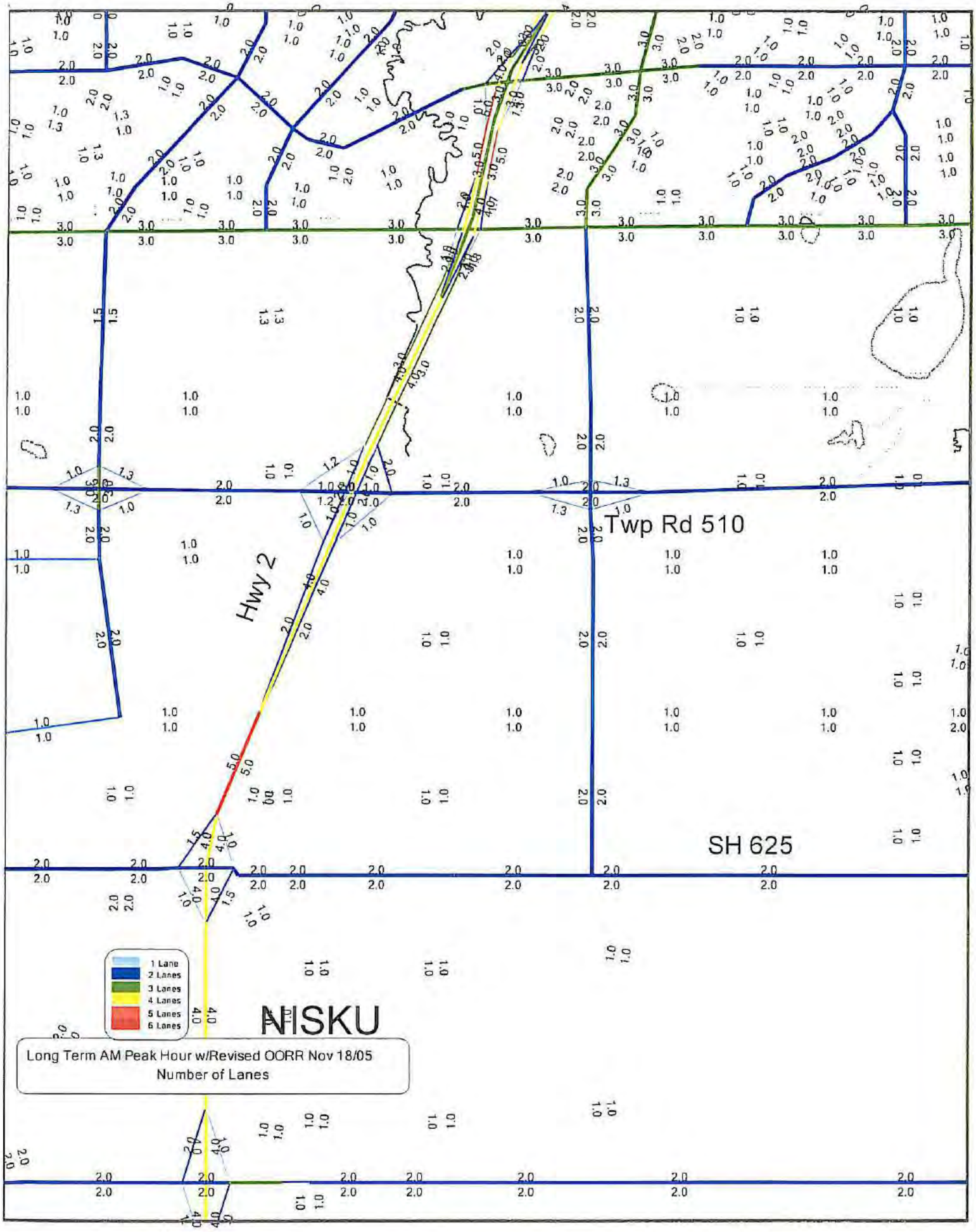
B Appendix B - City of Edmonton – Regional Traffic Model Forecasts

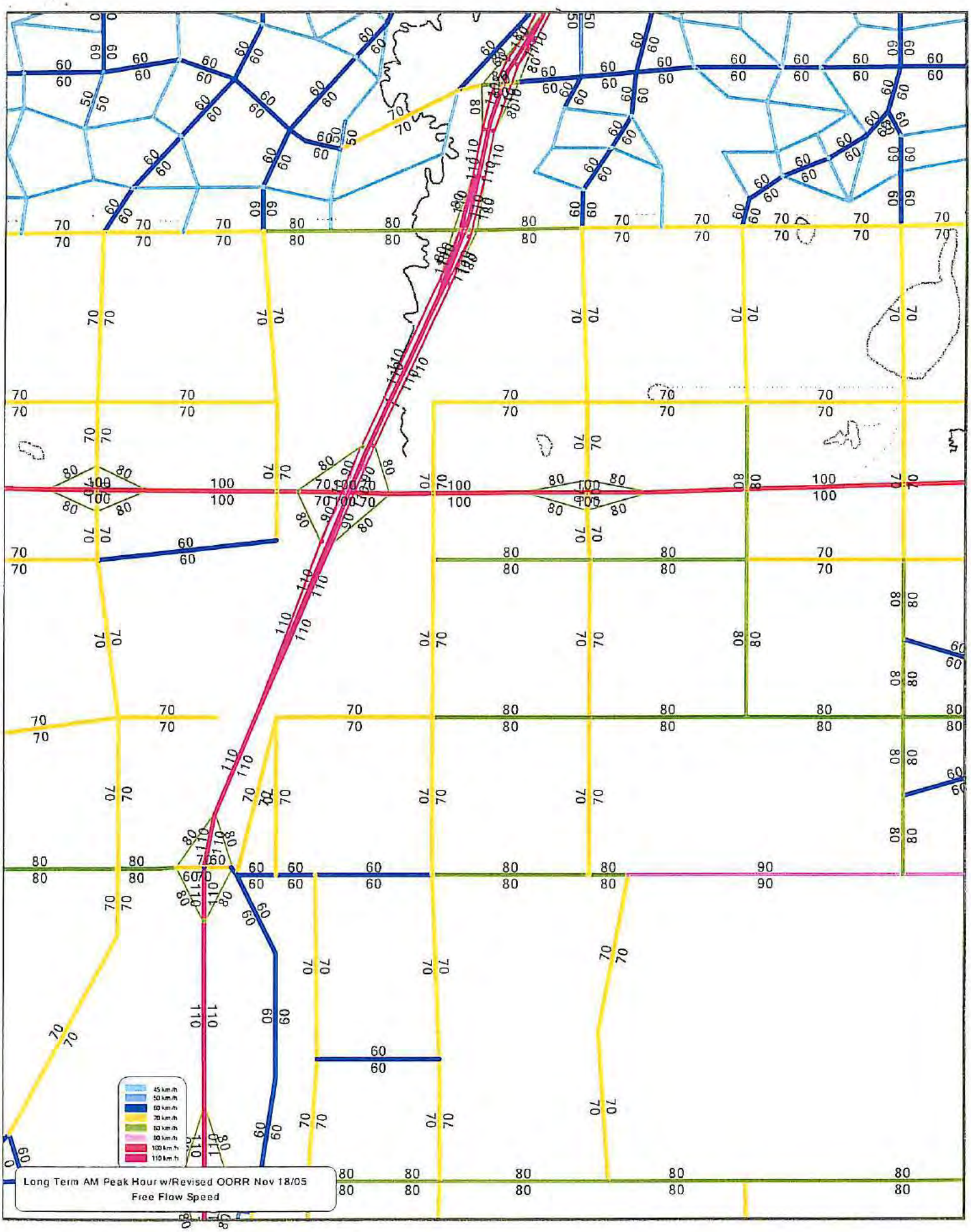

Twp Rd 510
Hwy 2
SH 625
NISKU
Hwy 2
Daily 2-Way Link Volumes
Long Term Offpeak
50000
100000
150000
200000
250000
2006-01-18

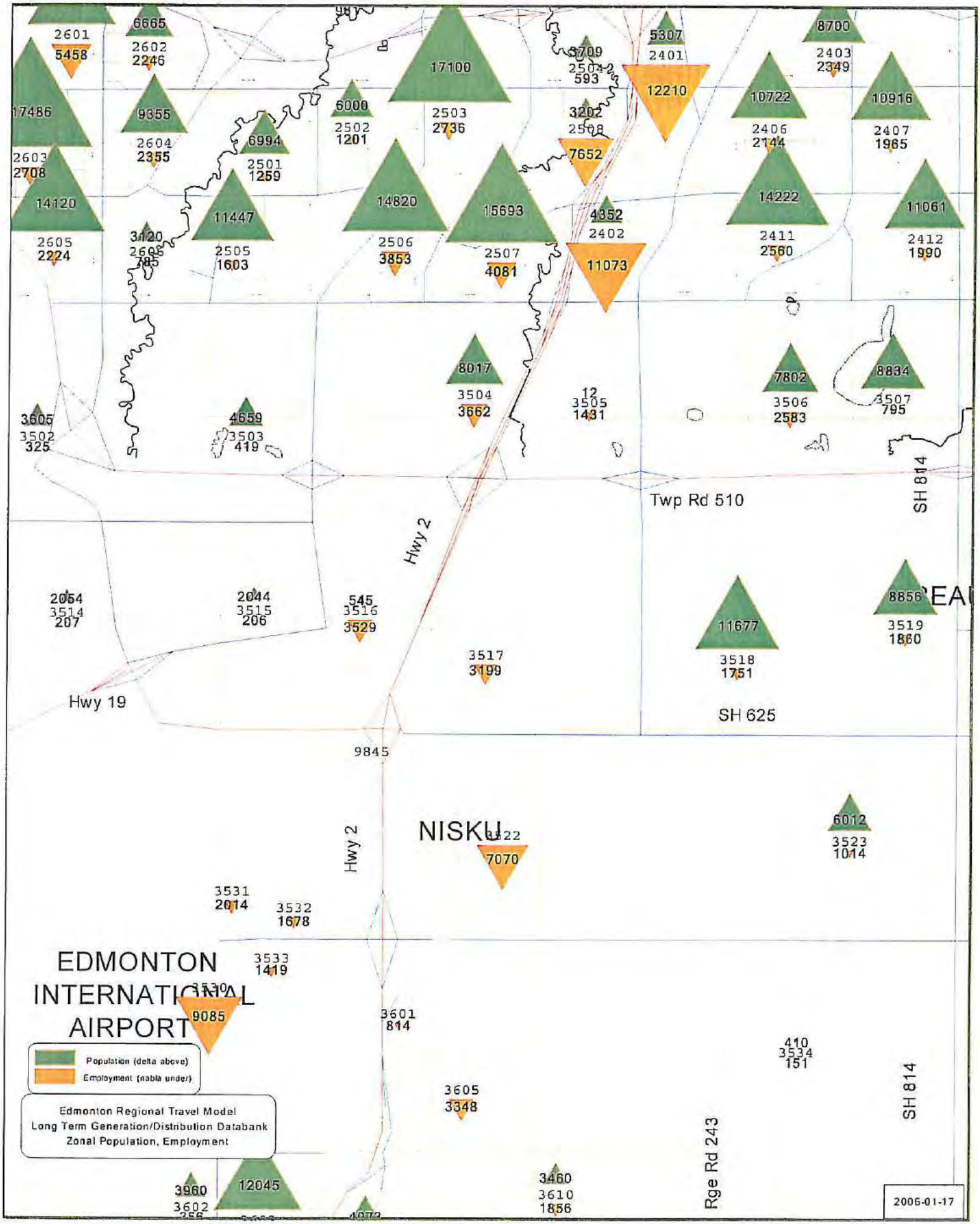

Twp Rd 510
Hwy 2
SH 625
NISKU
8750 - 10500
7000 - 8750
5250 - 7000
3500 - 5250
1750 - 3500
0 - 1750
Long Term AM Peak
Hourly Directional Link Volumes
2006-01-17


Twp Rd 510
Hwy 2
SH 625
NISKU
less than 0.70
0.70 to 0.80
0.80 to 0.90
0.90 to 0.95
greater than 0.95
Long Term AM Peak
Link Volume/Capacity Colours
Link V/C (Peak Hour)
2006-01-17


Hwy 2
Twp Rd 510
SH 625
NISKU
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
Long Term AM Peak Hour w/Revised OORR Nov 18/05
Link Capacity(vph)

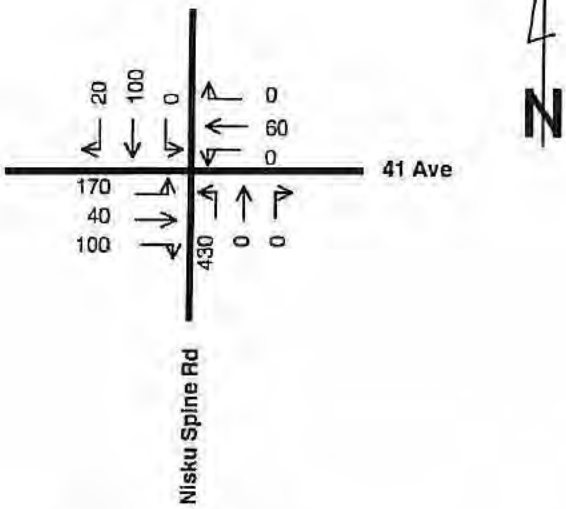

Twp Rd 510
Hwy 2
SH 625
NISKU
1 Lane
2 Lanes
3 Lanes
4 Lanes
5 Lanes
6 Lanes
Long Term AM Peak Hour w/Revised OORR Nov 18/05
Number of Lanes


45 km/h
50 km/h
60 km/h
70 km/h
80 km/h
90 km/h
100 km/h
110 km/h
Long Term AM Peak Hour w/Revised OORR Nov 18/05
Free Flow Speed

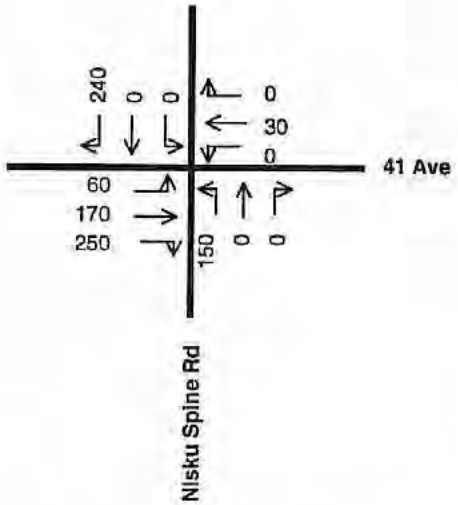

2601
5458
6665
2602
2246
17486
2603
2708
9355
2604
2355
6994
2501
1259
6000
2502
1201
17100
2503
2736
3709
2504-2
593
5307
2401
12210
8700
2403
2349
10722
2406
2144
10916
2407
1965
3202
2508
7652
14120
2605
2224
3120
2606
785
11447
2505
1603
14820
2506
3853
15693
2507
4081
4352
2402
11073
14222
2411
2560
11061
2412
1990
8017
3504
3662
12
3505
1431
7802
3506
2583
8834
3507
795
3605
3502
325
4659
3503
419
Twp Rd 510
SH 814
Hwy 2
2054
3514
207
2044
3515
206
545
3516
3529
3517
3199
11677
3518
1751
8856
3519
1860
Hwy 19
SH 625
9845
NISKU
3522
7070
6012
3523
1014
Hwy 2
3531
2014
3532
1678
EDMONTON
INTERNATIONAL
AIRPORT
3533
1419
3530
9085
3601
814
410
3534
151
SH 814
3605
3348
Rge Rd 243
3460
3610
1856
3960
3602
12045
Population (delta above)
Employment (nabla under)
Edmonton Regional Travel Model
Long Term Generation/Distribution Databank
Zonal Population, Employment
2005-01-17

2030 - 2005 Peak Hour Volume Differences

41 Avenue - Nisku Spine Road

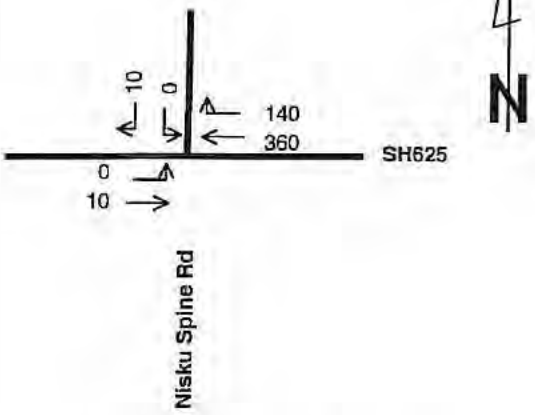


AM Peak Hour 25 Yr Volume Differences
(2030 - 2005)

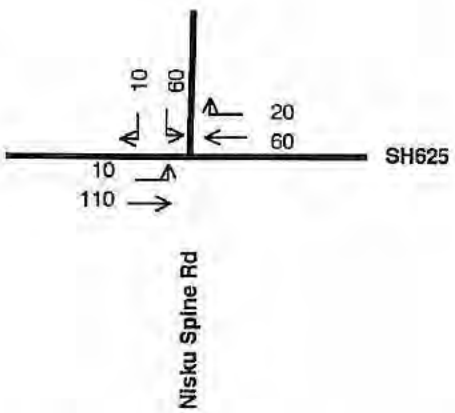


PM Peak Hour 25 Yr Volume Differences
(2030 - 2005)

SH625 - Nisku Spine Road



AM Peak Hour 25 Yr Volume Differences
(2030 - 2005)



PM Peak Hour 25 Yr Volume Differences
(2030 - 2005)

C Appendix C - Warrants for Railways Crossings

Warrants for Railway Crossings from RTD 10 Technical Standard

Warrant for warning signals

A. The forecast cross-product is 1,000 or more; or

B. The grade crossing does not include a sidewalk and the maximum railway operating speed exceeds 80 mph (130km/h); or

C. The grade crossing includes a sidewalk and the maximum railway operating speed exceeds 60 mph (100km/h); or

D. There are two or more tracks and trains may be passing one another; or

E. The sightlines or alternative measures specified in section 8-3 are not provided, including where trains, engines, railway cars, or other railway equipment, standing or stored, may obscure driver or pedestrian sightlines of a train approaching the grade crossing.

Gates for grade crossing warning systems

A. The forecast cross-product is 50,000 or more; or

B. The maximum railway operating speed is 50 mph (80km/h) or more; or

C. There are two or more tracks where trains may be passing one another; or

D. The sightlines along the railway right of way for a driver or pedestrian stopped at the grade crossing are not at least equal to the distance $D_{Stopped}$, determined in accordance with subsection 8.3, including where trains, engines, railway cars or other railway equipment, standing or stored, may obscure the driver's or pedestrain's sightlines of a train approaching the grade crossing; or

E. The maximum railway operating speed exceeds 15 mph (25km/h), and the distance between the front of a vehicle in the first stopped position at a Stop Sign or traffic signal on that part of the road leading away form the grade crossing and a rail in the grade crossing surface is:

1. less than 30 m for a Stop Sign, or less than 60 m for traffic signals; or
2. 30 m or more for a Stop Sign, or 60 m or more for traffic signals, unless a traffic study indicates that queued traffic will not encroach within 2.4 m of the rail nearest the road intersection (refer to Figure 11-1).

Prepare to stop at railway crossing sign

A. On a road approach where at least one set of front light units on a warning signal or on a cantilever at the grade crossing cannot be seen clearly within the minimum distance specified in Table 19-1; or

B. On the road approaches to a grade crossing on a freeway or an expressway, as defined in the *Geometric Design Guide*; or

C. Where adverse local environmental conditions which obscure grade crossing warning signal visibility frequently occur

Preemption of Traffic Signals

A. Where there is less than 60 m between the stop line for the traffic signals and the rail nearest the road intersection; or

B. If it has been determined that traffic queued for the traffic signals regularly encroaches closer than 2.4 m to the rail nearest the road intersection.

Section 18 - Grade Crossing Warning Systems

18.1 Grade crossing warning signals, gates, or cantilevered light units respectively shall have:

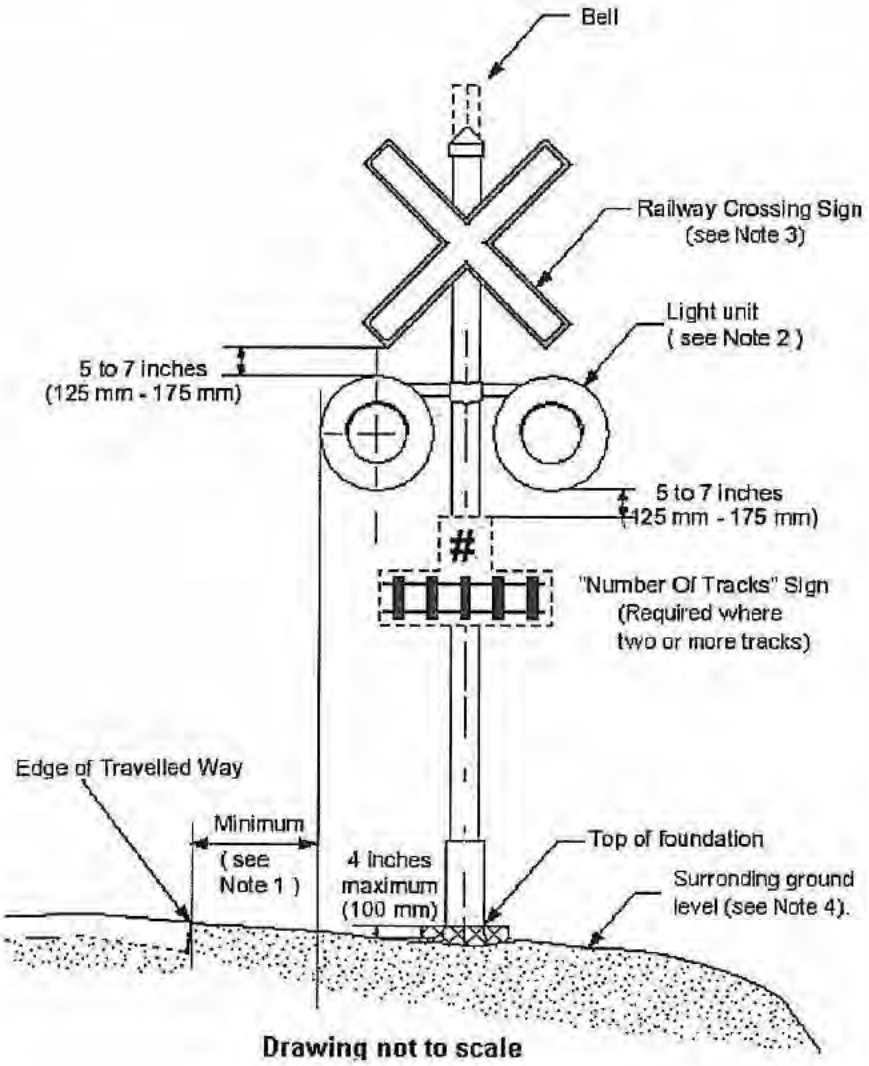
a. warning signals assemblies in accordance with Figure 18-1;
b. gates in accordance with Figure 18-2; and
c. cantilevers in accordance with Figure 18-3.

18.2 Grade crossing warning system instrument housings shall be located:

(a) no closer than 9 m (30 ft.) from the travelled way of the road, and no closer than 8 m (26 ft.) from the nearest rail, unless restricted by the width of the railway right of way, rock cuts, high fills, or water, in which case, they shall be placed as far from the nearest rail as conditions allow; and

(b) on the side of the track to the outside of the curve where there is rail line curvature within the sightline limits, except that where topography such as rock or high fills or the width of the railway right of way prevents such a location, or interconnection of the grade crossing warning system with traffic signals, a Prepare to Stop at Railway Crossing Sign or other equipment of another railway company renders such a location impractical, the housing shall be located as close as possible to these limits.

Figure 18-1: Warning Signal Assemblies



Drawing not to scale

NOTES:

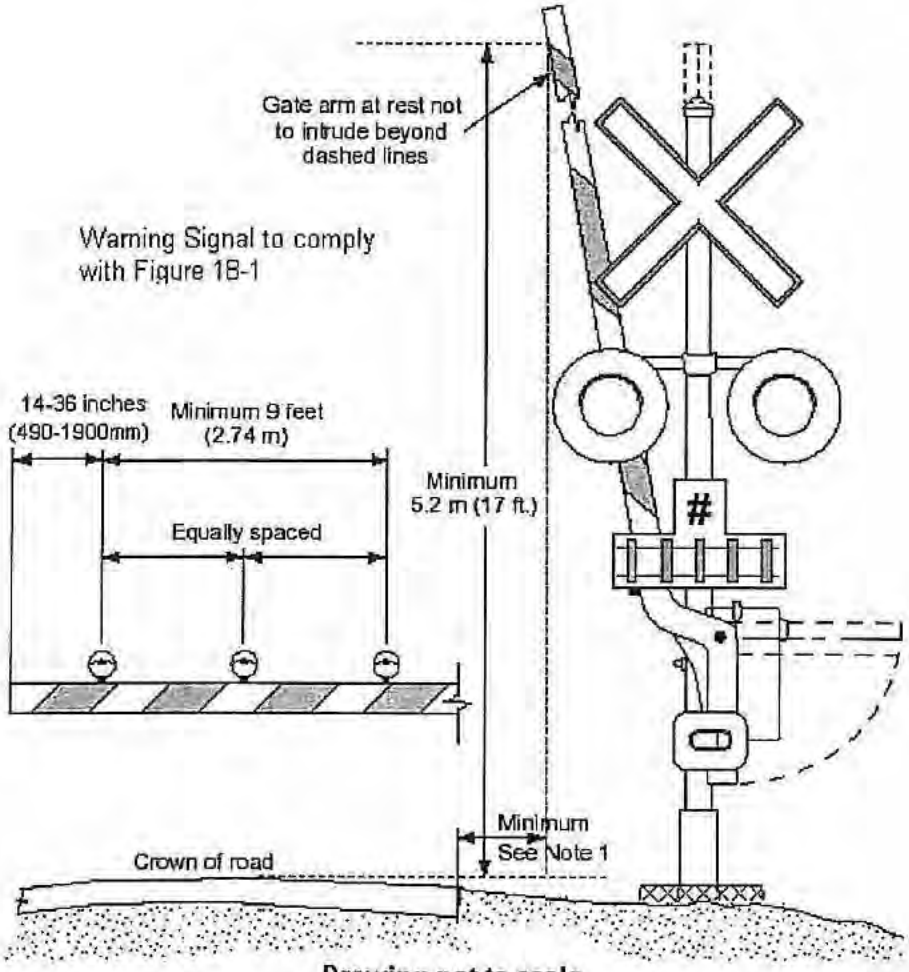
1. Minimum of 625 mm (2 ft) from the face of a curb; minimum of 625 mm (2 ft) from the outer edge of a shoulder and a minimum of 1.875 m (6ft) from the edge of the travelled way.

2. Additional light units on the warning signal may be required in accordance with sections 13 and 19.

3. The Railway Crossing Sign must be clearly visible to all approaching drivers.

4. The top of the warning signal foundation shall be not more than 100 mm (4 inches) above the level of the surrounding ground. The slope away from the foundation of the surrounding ground towards the travelled portion of the road and the road shoulders shall not exceed the ratio of 4:1.

Figure 18-2: Gates



Drawing not to scale

NOTES:

1. Minimum of 625 mm (2 ft.) from the face of a curb; minimum of 625 mm (2 ft.) from the outer edge of a shoulder and a minimum of 1.875 m (6 ft.) from the edge of the travelled way.

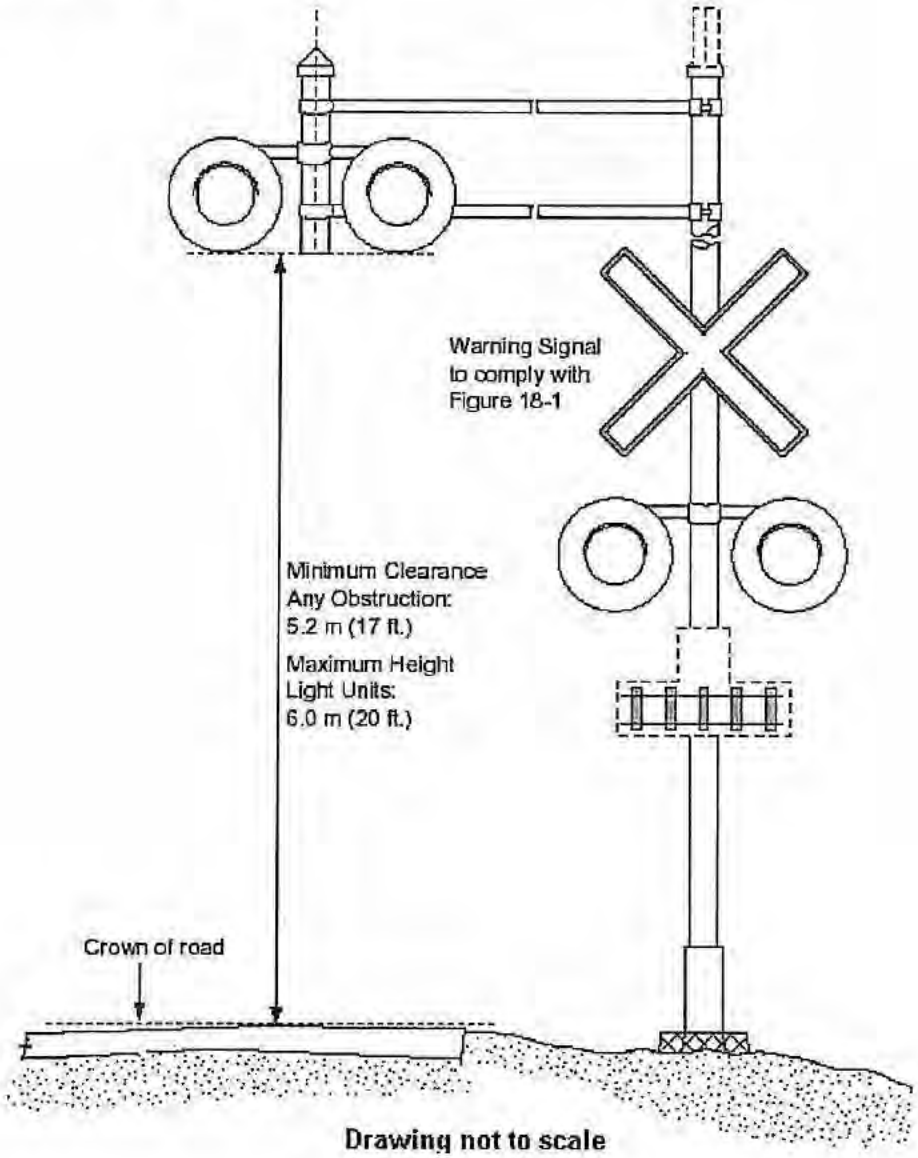
2. Gate arm reflective materials:

   a. Stripes shall be white and red and may be vertical or diagonal.
   b. Sheeting material specification: CGSB 62-GP-11M, Reflectivity Level 1, or better. Red stripes may be red sheeting or transparent red ink, silk screened processed over white sheeting; and
   c. Sheeting shall be replaced before the reflectivity falls below 50 per cent of the reflectivity value of Level 1 material specified in (b).

3. Where gates are installed for grade crossings exclusively for pedestrians, cyclists, or both:

   a. Each gate arm shall extend across the full width of the travelled way.
   b. When the travelled way is less than 3.5 m (11.5 ft.) wide, two lights are required on each gate arm located so that the lights are over the two points dividing the travelled way into thirds. The two gate arm lights shall flash alternately.

Figure 18-3: Cantilevers



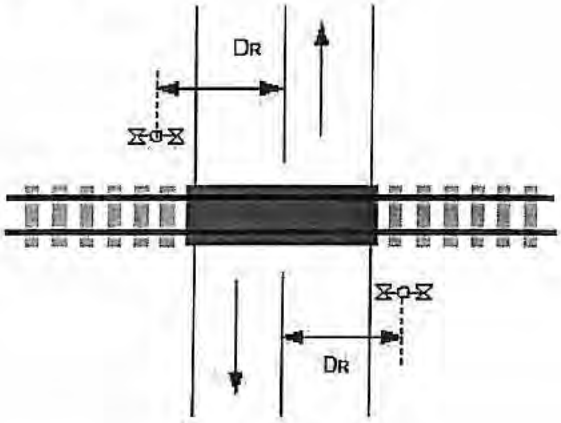
Drawing not to scale

NOTE:

Cantilevered lights are required in accordance with section 13.

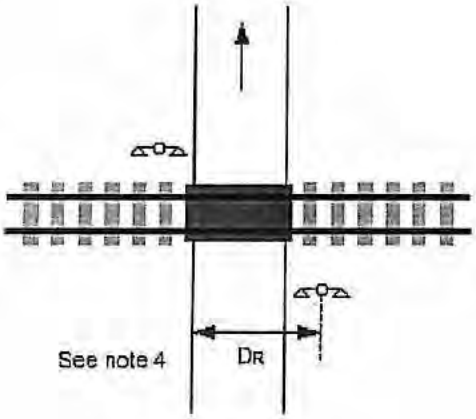
---

a) TWO-WAY

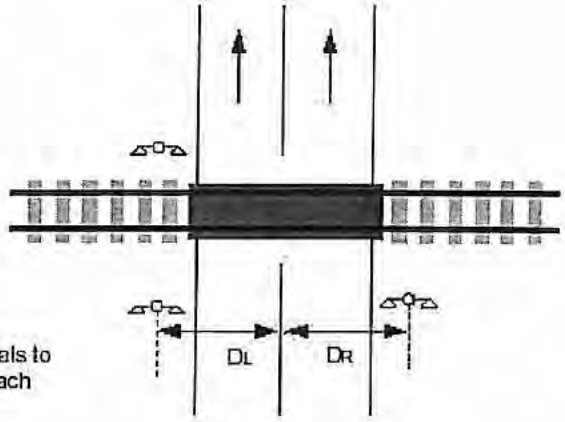


2 - Lane

b) ONE-WAY or DIVIDED



1 - Lane

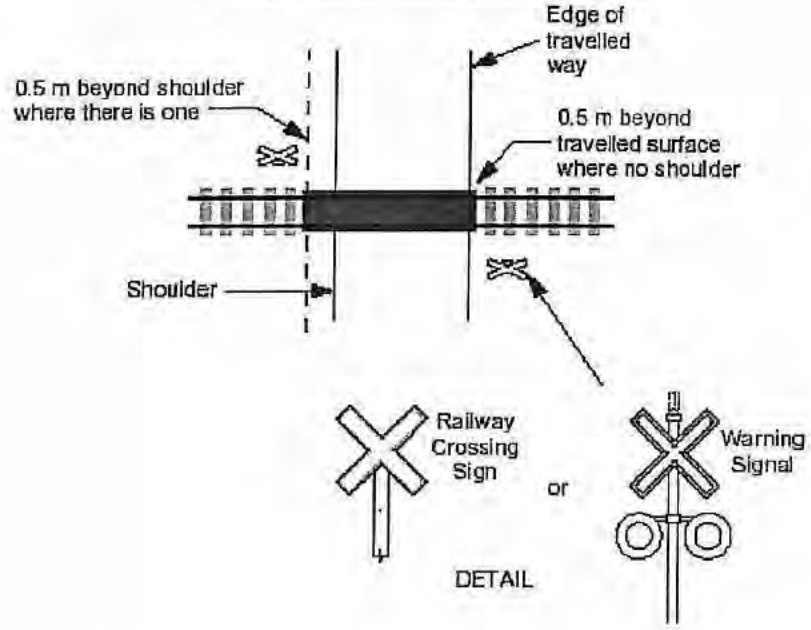


Refer to Note 4, for warning signals to the left of approach

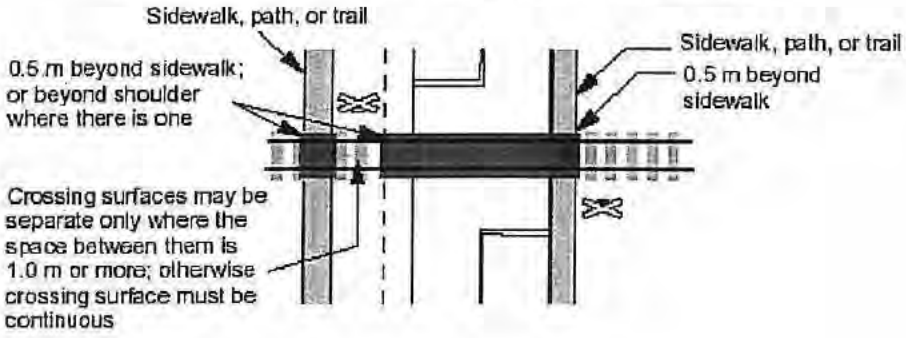
2 - Lane

Drawing not to scale

a) ROAD, INCLUDING A PATH OR TRAIL



b) SIDEWALK, PATH, OR TRAIL ALONGSIDE A ROAD



Drawing not to scale

D Appendix D - Geometric Design Criteria

PROJECT: 9th Street (Nisku Spine Road)
Functional Planning Study
filename: Q:\053920\Transportionl\Functional Study\design parameter.xls

Date: January 4, 2006

	DESIGN PARAMETERS	DESIGN CRITERIA	REFERENCE
1)	**Design Standards and References**	TAC Geometric Design Guide for Canadian Road - September 1999	(1)
		AIT Highway Geometric Design Guide - 1999	(2)
		AIT Highway Geometric Design Guide Urban Supplement (Draft - Nov. 2003)	(3)
2)	**Rural Design Guidelines**		
2a)	**Cross Section**		
	Classification	RAD-90	(1) - Table 1.3.2.1
	Design Speed	90 km/hr	(1) - Table 1.3.2.1
	Design Vehicle	WB-36	(2) - Figure D-5k
	Curve Radius	R = 380m (minimum)	(1) - Table 2.1.2.5
	Spiral Parameter	A = 160 (minimum)	(1) - Table 2.1.2.5
	Superelevation	e = 0.04	(1) - Table 2.1.2.5
	Minimum Curb Radius	R = 18.50m (minimum)	(2) - Figure D-5k
	Lane Widths	3.70 m	(1) - Table 2.2.2.1
	Left Hand Shoulder Width	1.50 m	(1) - Sect. 2.2.4.2
	Right Hand Shoulder Width	3.00 m	(1) - Sect. 2.2.4.2
	No. of Lanes	4 lanes (divided)	
	Finished Pavement Width	11.90 m	
	Median Width	8 m along 9th Street (Station 0+000 to 6+100)	(1) - Sect. 2.2.5.4
		13.40m to New Alignment (Station 6+100 to 10+000)	(2) - Sect. C.6.1 & Fig. C-6.2c
	Cross Slope	2 % from Centreline	(1) - Sect. 2.1.5.3
	Side Slope	4:1	(1) - Sect. 3.1.4.1
	Back Slope	3:1	(1) - Sect. 3.1.4.1
	Ditch Width	3 m	
	Concrete Curb	Mountable Curb	(2) - Figure C-7.4
2b)	**Alignment**		
	Minimum Vertical Crest "K" Value	53	(1) - Table 2.1.3.2
	Miniumum Vertical Sag "K" Value	20	(1) - Table 2.1.3.4
	Maximum Grade	Maximum = 4% and Minimum = 0.60%	(1) - Sect. 2.1.3.2
	Grade Breaks	> 1% algebraic differences	
3)	**Urban Design Guidelines**		
3a)	**Cross Section**		
	Classification	UAD-410.40-90	(3) - Table U.A.7
	Design Speed	90 km/hr	(3) - Table U.A.7
	Design Vehicle	WB-36	(2) - Figure D-5k
	Curve Radius	R = 380m (minimum)	(3) - Table U.B.3.1
	Spiral Parameter	A = 160 (minimum)	(3) - Table U.B.3.1
	Superelevation	e = 0.04	(3) - Table U.A.7
	Minimum Curb Radius	R = 18.50m (minimum)	(2) - Figure D-5k
	Lane Widths	3.70 m	(3) - Table U.A.7
	Left Hand Shoulder Width	1.00 m	(3) - Table U.A.7
	Right Hand Shoulder Width	2.00 m	(3) - Table U.A.7
	No. of Lanes	4 lanes (divided)	
	Finished Pavement Width	10.40 m	
	Median Width	8 m along 9th Street (Station 0+000 to 6+100)	(3) - Figure U.C.8.1d
		13.40m to New Alignment (Station 6+100 to 10+000)	(3) - Figure U.C.6.2c
	Cross Slope	2 % from Centreline	(1) - Sect. 2.1.5.3
	Side Slope	5:1 (normal) 3:1 (maximum on fill)	(3) - Table U.A.7
	Back Slope	5:1 or 4:1 (normal) 3:1 (maximum)	(3) - Table U.A.7
	Ditch Width	4 m (rounded)	(3) - Table U.A.7
	Slotted Left Turn Lane	Typical Slotted Left Turn Lane Designs	(3) - Figure U.D.1.4b
	Concrete Curb	Mountable Curb	(2) - Figure C-7.4
3b)	**Alignment**		
	Minimum Vertical Crest "K" Value	55	(3) - Table U.A.7
	Miniumum Vertical Sag "K" Value	21	(3) - Table U.A.7
	Maximum Grade	Maximum = 6% and Minimum = 0.50%	(3) - Table U.A.7
	Grade Breaks	> 1% algebraic differences	

Table 1.3.2.1 Design Classification

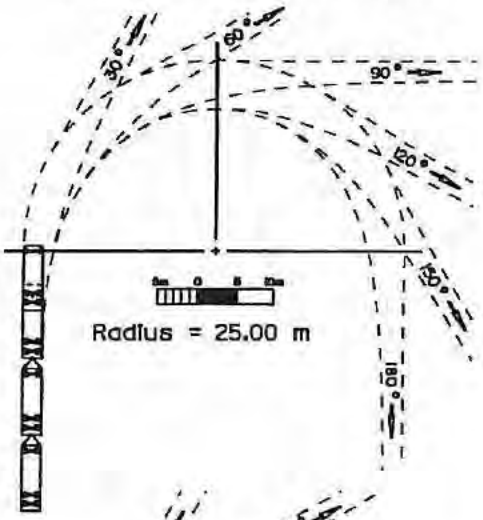
	Design Speed (km/h)	Classification				
		Local	Collector	Arterial	Expressway	Freeway
rural	50	RLU50				
	60	RLU60	RCU60			
	70	RLU70	RCU70			
			RCD70			
	80	RLU80	RCU80	RAU80		
			RCD80	RAD80		
	90	RLU90	RCU90	RAU90		
			RCD90	RAD90		
	100	RLU100	RCU100	RAU100		
			RCD100	RAD100		RFD100
	110	RLU110	RCU110	RAU110		
			RCD110	RAD110		RFD110
	120			RAU120		
				RAD120		RFD120
	130			RAU130		
				RAD130		RFD130
urban	30	ULU30				
	40	ULU40				
	50	ULU50	UCU50	UAU50		
			UCD50			
	60		UCU60	UAU60		
			UCD60	UAD60		
	70		UCU70	UAU70		
			UCD70	UAD70		
	80		UCU80	UAU80		
			UCD80	UAD80	UED80	UFD80
	90			UAD90	UED90	UFD90
	100			UAD100	UED100	UFD100
	110				UED110	UFD110
	120					UFD120

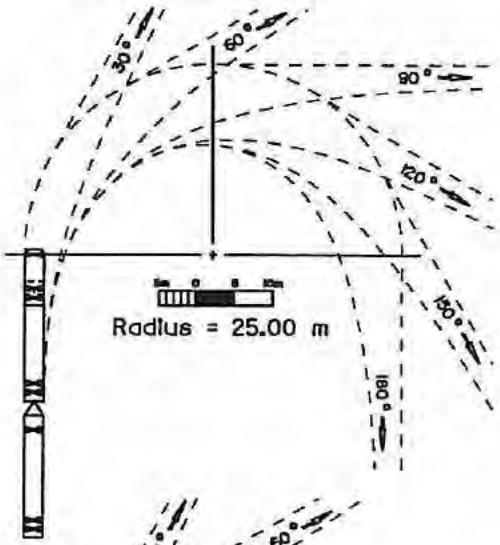
FIGURE D-5k TURNING TEMPLATES (Triple Trailer Combination and Turnpike Double)

WB-33
Triple Trailer Combination

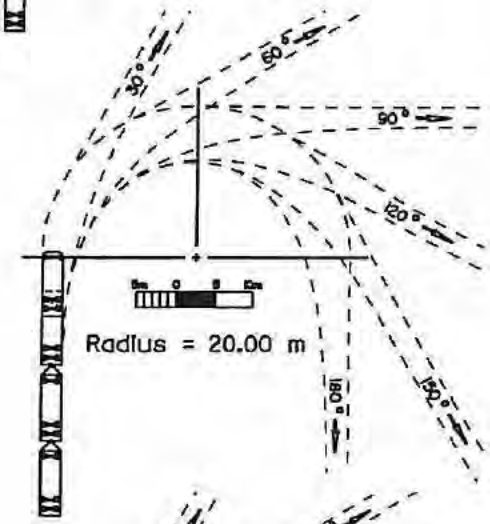
WB-36
Turnpike Double

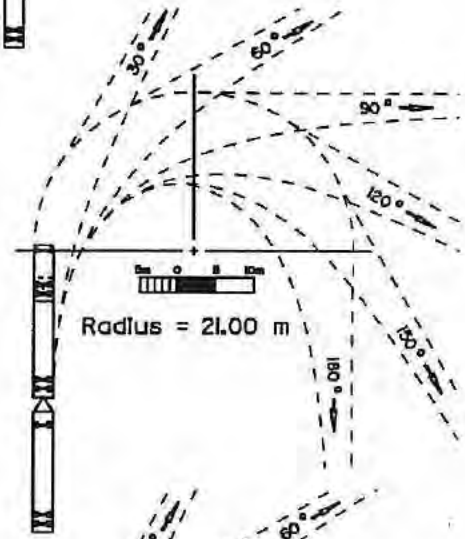
MAXIMUM



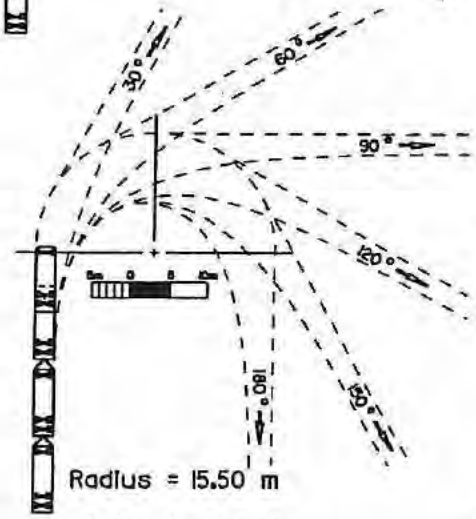


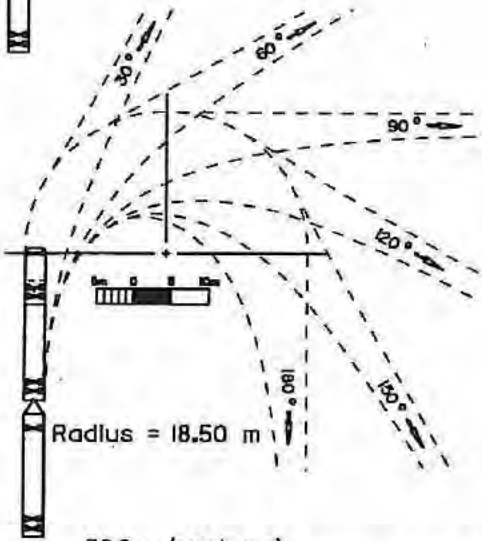
MEDIUM

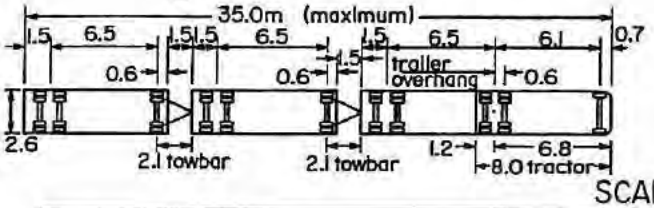


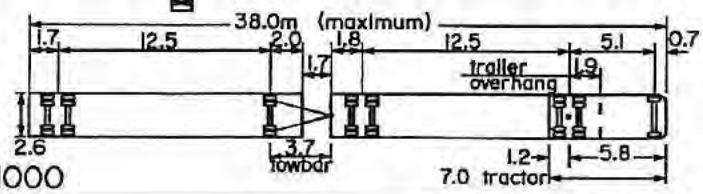


MINIMUM









SCALE 1:1000

Table 2.1.2.5 Superelevation and Minimum Spiral Parameters, e_{max} = 0.04 m/m[1]

Design Speed (km/h)	40			50			60			70			80			90			100		
Radius (m)	e	A 2 lane	A 4 lane	e	A 2 lane	A 4 lane	e	A 2 lane	A 4 lane	e	A 2 lane	A 4 lane	e	A 2 lane	A 4 lane	e	A 2 lane	A 4 lane	e	A 2 lane	A 4 lane
7000	NC			NC			NC			NC			NC			NC			NC		
5000	NC			NC			NC			NC			NC			NC			NC		
4000	NC			NC			NC			NC			NC			NC			NC		
3000	NC			NC			NC			NC			NC			NC			RC	410	410
2000	NC			NC			NC			NC			RC	300	300	RC	315	315	RC	335	335
1500	NC			NC			NC			RC	240	240	RC	260	260	RC	275	275	0.022	290	290
1200	NC			NC			NC			RC	215	215	RC	230	230	0.021	245	245	0.026	260	260
1000	NC			NC			RC	180	180	RC	200	200	0.020	210	210	0.025	225	225	0.030	235	235
900	NC			NC			RC	175	175	RC	190	190	0.021	200	200	0.027	210	210	0.032	225	225
800	NC			NC			RC	165	165	RC	180	180	0.023	190	190	0.029	200	200	0.034	210	210
700	NC			RC	140	140	RC	150	150	0.020	165	165	0.026	175	175	0.032	185	185	0.036	200	200
600	NC			RC	130	130	RC	140	140	0.023	155	155	0.029	165	165	0.035	175	175	0.039	190	190
500	NC			RC	120	120	0.021	130	130	0.026	140	140	0.033	150	150	0.038	160	160	0.040	190	190
400	RC	95	95	RC	105	105	0.025	115	115	0.031	125	125	0.037	135	135	0.040	160	160	0.040	190	190
350	RC	90	90	0.020	100	100	0.027	110	110	0.033	120	120	0.039	135	135	0.040	160	160	min R = 490		
300	RC	80	80	0.023	90	90	0.031	100	100	0.036	110	110	0.040	135	135	min R = 380					
250	RC	75	75	0.026	85	85	0.034	90	90	0.038	110	110	0.040	135	135						
220	RC	70	70	0.029	80	80	0.036	90	90	0.039	110	110	min R = 280								
200	0.021	65	65	0.031	75	75	0.038	90	90	0.040	110	110									
180	0.023	65	65	0.033	70	70	0.039	90	90	0.040	110	110									
160	0.025	60	60	0.035	70	70	0.040	90	90	min R = 200											
140	0.028	55	55	0.037	70	70	0.040	90	90												
120	0.031	50	55	0.039	70	70	min R = 150														
100	0.034	50	50	0.040	70	70															
90	0.036	50	50	0.040	70	70															
80	0.038	50	50	min R = 100																	
70	0.040	50	50																		
60	0.040	50	50																		
	0.040	50	50																		
	min R = 60																				

$e_{max} = 0.04$

Notes:

- *e* is superelevation
- *A* is spiral parameter in metres
- NC is normal cross section
- RC is remove adverse crown and superelevate at normal rate
- Spiral length, L = A2 / Radius
- Spiral parameters are minimum and higher values may be used
- For 6 lane pavement: above the dashed line use 4 lane values,
- below the dashed line, use 4 lane values x 1.15.
- A divided road having a median less than 3 m wide may be treated as a single pavement.

2.2.2 LANE WIDTHS

2.2.2.1 Through Lane Widths

Technical Foundation

Lane width and condition of the roadway surface have a significant influence on the safety and comfort of the travelling public. The capacity of a roadway is markedly affected by lane width, with wider lanes having the ability to carry a larger volume of traffic than a narrower lane. In general, safety increases with wider lanes up to a width of about 3.7 m. There is no further increase in safety for lane widths beyond the 3.7 m range.[3]

Design Domain: Quantitative Aids

Lane widths are dependent upon design speed and the volume of traffic the roadway is intended to carry, and the number and types of trucks on the roadway. Design domain widths for rural two-lane roadways are provided in Table 2.2.2.1 while lane widths for multilane rural roadways are given in Table 2.2.2.2. Lane widths for through lanes on urban roadways are provided in Table 2.2.2.3.

Table 2.2.2.1 Lane Widths for Two-Lane Rural Roadways

Design Speed (km/h)	Classification and Design Hour Volume					
	Local	Collector Design Hour Volume			Arterial Design Hour Volume	
		<250	250-450	>450	<450	>450
30, 40	3.0 - 3.7					
50	3.0 - 3.7	3.3 - 3.7	3.3 - 3.7	3.5 - 3.7		
60	3.0 - 3.7	3.3 - 3.7	3.3 - 3.7	3.5 - 3.7		
70	3.0 - 3.7	3.5 - 3.7	3.5 - 3.7	3.7		
80	3.0 - 3.7	3.5 - 3.7	3.5 - 3.7	3.7	3.5 - 3.7	3.7
90	3.3 - 3.7	3.5 - 3.7	3.5 - 3.7	3.7	3.5 - 3.7	3.7
100	3.3 - 3.7	3.5 - 3.7	3.5 - 3.7	3.7	3.5 - 3.7	3.7
110					3.7	3.7
120					3.7	3.7
130					3.7	3.7

Table 2.2.2.2 Lane Widths for Multilane Rural Roadways

Design Speed	Lane Width (m)
less than 100 km/h	3.5 - 3.7
100 km/h and greater	3.7

2.2.4 SHOULDERS

2.2.4.1 Technical Foundation

Shoulders are a critical element of the roadway cross section. Immediately adjacent to the travel lanes, shoulders provide: a recovery area for errant vehicles, a refuge for stopped or disabled vehicles, an area out of the travel lanes for use by emergency and maintenance vehicles as required, and lateral support of the roadway structure. Factors which influence selection of shoulder width and type include:

- safety considerations
- traffic volume and make-up
- design speed
- surface treatment
- winter conditions
- use of the road by other modes (for example, cyclists and pedestrians)

Shoulders can also offer an opportunity to improve sight distance through cut sections of the road, and may indirectly help improve highway capacity by encouraging uniform speed among vehicles, and promoting a sense of well-being on the part of the driver.

Shoulders are normally provided on rural roads. In urban areas, they are desirable on freeways, expressways, and certain high speed arterials with design speeds in excess of 80 km/h. The high cost of right of way in urban areas makes the provision of shoulders difficult to justify on other streets.

The usable width of shoulder, as shown on Figure 2.2.4.1, is defined as the actual width that can be used when a driver makes an emergency stop and is measured from the edge of the travelled lane.

2.2.4.2 Shoulder Width

Design Domain: Quantitative Aids

For undivided rural roadways, the design domain for shoulder widths is outlined in quantitative form in Table 2.2.4.1.

Guidelines for the design domain for shoulder width in other shoulder applications are provided below:

1. For divided rural roadways shoulder widths are as follows:
   - the right shoulder width for all designations and design speeds, 3.0 m
   - the left shoulder width for all classifications and design speeds for four-lane divided roadways, 1.5 m

Figure 2.2.4.1 Usable Shoulders

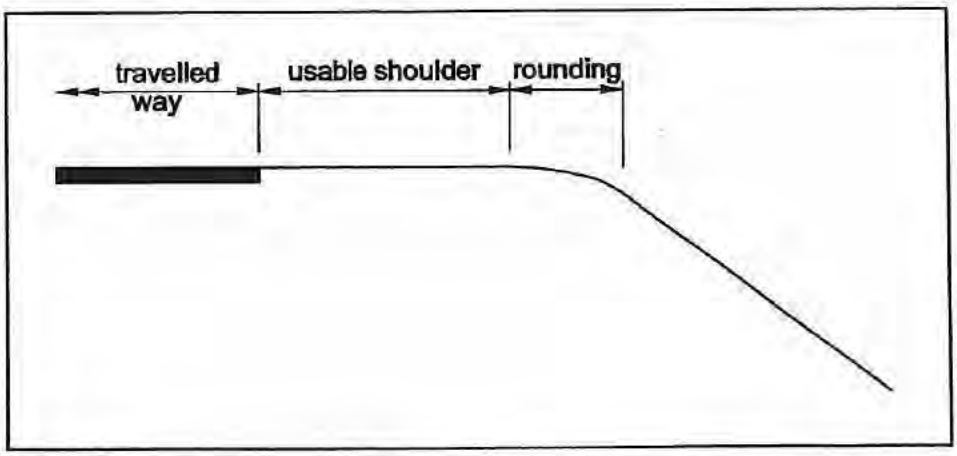
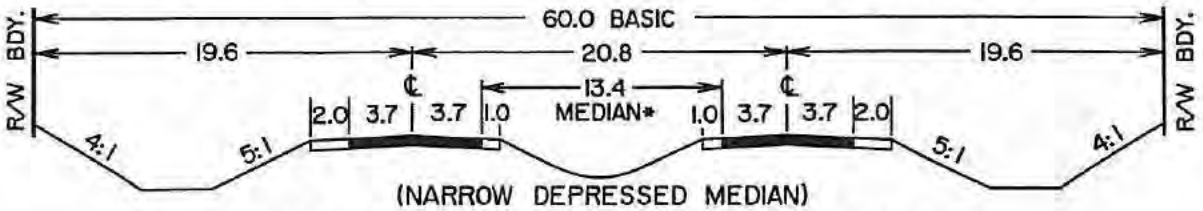


FIGURE C-6.2c RURAL-URBAN MULTI-LANE DIVIDED HIGHWAY TYPICAL CROSS-SECTIONS

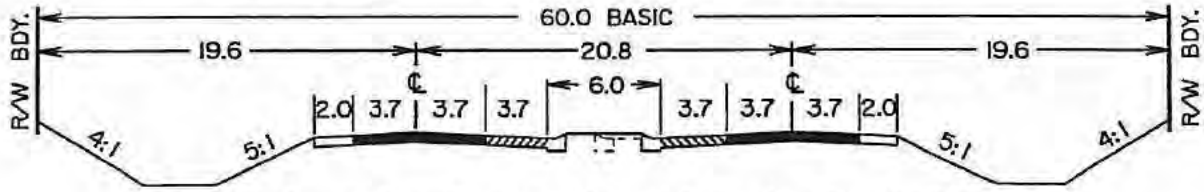
ULTIMATE 6 LANE URBAN ARTERIAL (DESIGN SPEED 110/80 km/h)



(NARROW DEPRESSED MEDIAN)

RURAL - URBAN (RAD/UAD-410.4-110/100/80) STAGE 1

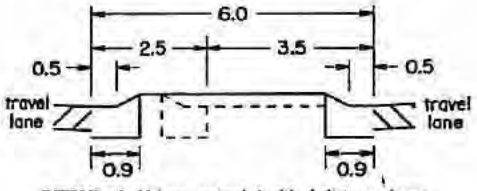
* The stage 1 median will accommodate slotted left turn bays.



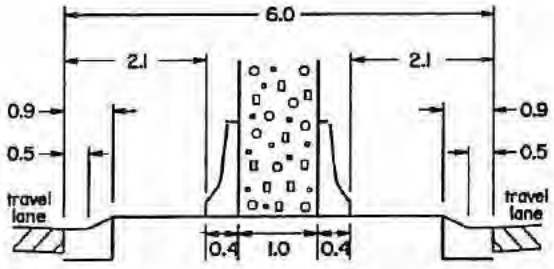
NOTE 1: 6m median will accommodate a left turn lane. (See detail 1 below)
Alternate options for raised medians are shown in details 2 & 3 below.

NOTE 2: A shift of the crown line may be desirable at the six laning stage to enhance surface drainage. This can be achieved through cold-planing, overlay or some other method.

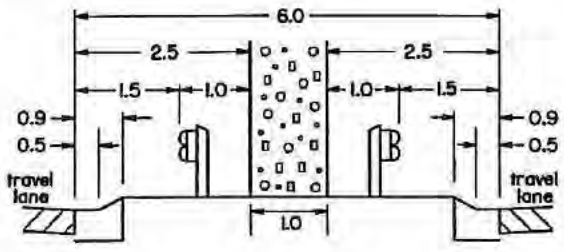
URBAN (UAD-613.1-80/60) STAGE 2



DETAIL 1 Urban arterial with left turn lane



DETAIL 2 Urban arterial with pier and concrete barrier

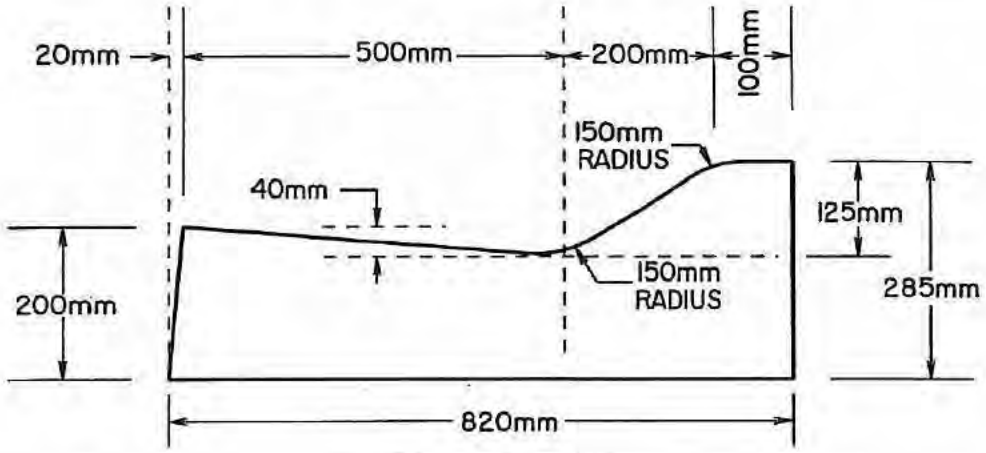


DETAIL 3 Urban arterial with pier and flex beam barrier

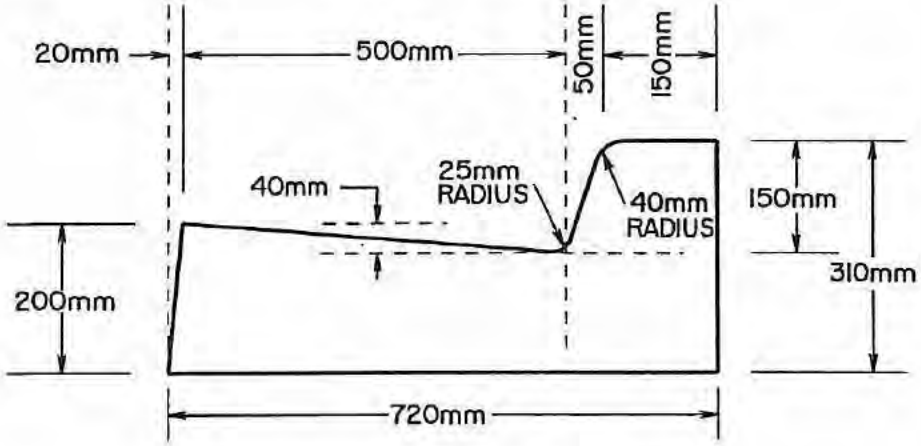
NOTE: Where the design speed exceeds 70 km/h curbs should be mountable type. Where the design speed is 70 km/h or less barrier curb may be used.

Current Construction Previous Construction

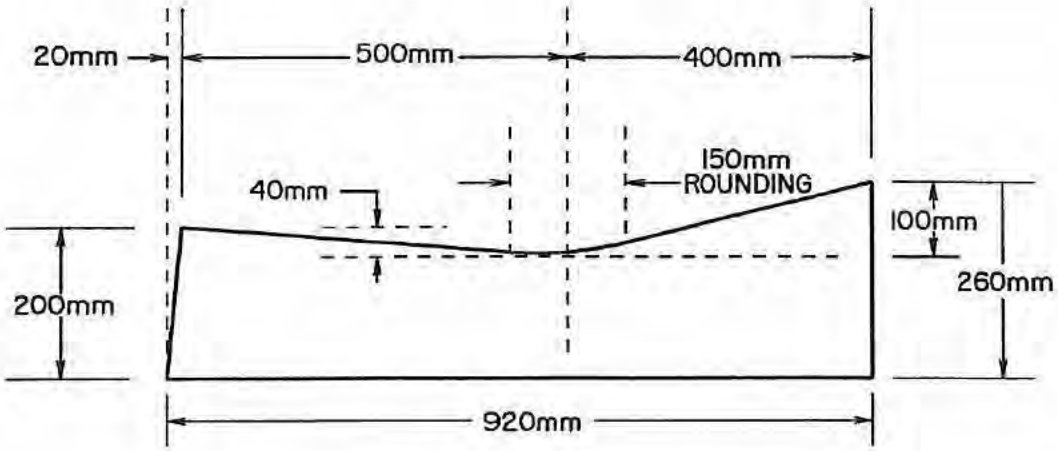
FIGURE C-7.4 CURB AND GUTTER DIMENSIONS



SEMI-MOUNTABLE



BARRIER



MOUNTABLE

In calculating K values for various sight distances, the height of driver's eye is 1.05 m, and the height of object is as outlined following, and discussed in more detail in Chapter 1.2.

- For stopping sight distance the most common object a vehicle has to stop for is another vehicle ahead on the road, the height of tail light is used. The legislated minimum is 0.38 m and is adopted for design. Other heights of objects can be used if necessary.
- For decision sight distance the more common height of object is 0.15 m, although other heights, such as zero for pavement markings, are not uncommon.
- For passing sight distance the height of object is 1.30 m, which represents the height of the opposing vehicle.

Crest Vertical Curves: Design Domain Quantitative Aid

Based on the above most commonly used heights of object, and on sight distances from Tables 1.2.5.3 and 1.2.5.5, the K values for stopping sight distance are provided in Table 2.1.3.2 and for passing sight distance the K values are provided in Table 2.1.3.3. The decision sight distance K values are not included because the vertical curvature depends on the height of object which is variable (depending on what the driver has to see).

The calculated K values are based on the length of curve exceeding the sight distance and they can be used without significant error when the length of curve is less than the sight distance. Appreciable differences occur only where A is small and little or no additional cost is involved in obtaining longer vertical curves.

On undivided roads non-striping sight distance is used to determine when no-passing pavement markings are required[7]. It is desirable to provide passing sight distance wherever possible but non-striping sight distance is generally adequate for safe passing manoeuvres.

Non-striping sight distance is less than passing sight distance, at each design speed. Passing manoeuvres can be completed in less than the full passing sight distance because of the timing of oncoming vehicles.

Table 2.1.3.2 K Factors to Provide Stopping Sight Distance on Crest Vertical Curves

Design Speed (km/h)	Assumed Operating Speed (km/h)	Stopping Sight Distance (m)	Rate of Vertical Curvature (K)	
			Computed	Rounded
30	30	29.6	1.6	2
40	40	44.4	3.7	4
50	47-50	57.4-62.8	6.1-7.3	6-7
60	55-60	74.3-84.6	10.2-13.3	10-13
70	63-70	94.1-110.8	16.4-22.8	16-23
80	70-80	112.8-139.4	23.6-36.1	24-36
90	77-90	131.2-168.7	32.0-52.8	32-53
100	85-100	152.0-205.0	45.8-78.0	45-80
110	91-110	179.5-246.4	59.8-112.7	60-110
120	98-120	202.9-285.6	76.4-151.4	75-150
130	105-130	227.9-327.9	96.4-199.6	95-200

Note: The above are minimum values, use higher K factors whenever possible.

Table 2.1.3.4 K Factors to Provide Minimum Stopping Sight Distance on Sag Vertical Curves[1]

Design Speed (km/h)	Assumed Operating Speed (km/h)	Stopping Sight Distance (m)	Rate of Sag Vertical Curvature (K)			
			Headlight Control		Comfort Control	
			Calculated	Rounded	Calculated	Rounded
30	30	29.6	3.9	4	2.3	2
40	40	44.4	7.1	7	4.1	4
50	47-50	57.4-62.8	10.2-11.5	11-12	5.6-6.3	5-6
60	55-60	74.3-84.6	14.5-17.1	15-18	7.7-9.1	8-9
70	63-70	99.1-110.8	19.6-24.1	20-25	10.0-12.4	10-12
80	70-80	112.8-139.4	24.6-31.9	25-32	12.4-16.2	12-16
90	77-90	131.2-168.7	29.6-40.1	30-40	15.0-20.5	15-20
100	85-100	157.0-205.0	36.7-50.1	37-50	18.3-25.3	18-25
110	91-110	179.5-246.4	43.0-61.7	43-62	21.0-30.6	21-30
120	98-120	202.9-285.6	49.5-72.7	50-73	24.3-36.4	24-36
130	105-130	227.9-327.9	56.7-85.0	57-85	27.9-42.8	28-43

Values for sag curvature based on the comfort criterion are shown in Table 2.1.3.4.

These K values for sag curves are useful in urban situations such as underpasses where it is often necessary for property and access reasons to depart from original ground elevations for as short a distance as possible. Minimum values are normally exceeded where feasible, in consideration of possible power failures and other malfunctions to the street lighting systems. Designing sag vertical curves along curved roadways for decision sight distance is normally not feasible due to the inherent flat grades and resultant surface drainage problems.

2.1.3.4 Vertical Alignment: Design Domain Additional Application Heuristics

Vertical Alignment Principles: Application Heuristics

The following principles generally apply to both rural and urban roads. A differentiation between rural and urban is made in several instances where necessary for clarity.

1. On rural and high speed urban roads a smooth grade line with gradual changes, consistent with the class of road and the character of the terrain, is preferable to an alignment with numerous breaks and short lengths of grade. On lower speed curbed urban roadways drainage design often controls the grade design.

2. Vertical curves applied to small changes of gradient require K values significantly greater than the minimum as shown in Tables 2.1.3.2 and 2.1.3.4. The minimum length in metres should desirably not be less than the design speed in kilometres per hour. For example, if the design speed is 100 km/h, the vertical curve length is at least 100 m.

3. Vertical alignment, having a series of successive relatively sharp crest and sag curves creating a "roller coaster" or "hidden dip" type of profile is not recommended. Hidden dips can be a safety concern, particularly at night. Such profiles generally occur on relatively straight horizontal alignment where the roadway profile closely follows a rolling natural ground line. Such roadways are unpleasant aesthetically and more difficult to drive. This type of profile is avoided by the use of horizontal curves or by more gradual grades.

4. A broken back grade line (two vertical curves in the same direction separated by a short section of tangent grade) is not

Table U.A.7 Design Guidelines for Urban Highways

DESIGN DESIGNATION			UFD-820.8-110 UAD-820.8-110	UFD-616.6-110 UAD-616.6-110	UFD-412.4-110 UAD-412.4-110	UED-614.6-90 UAD-614.6-90	UED-410.4-90 UAD-410.4-90	UAD-611.1-80 UAD-407.4-80	UAD-611.6-70 UAD-407.9-70	UAU-209.0-70 UCU-414.0-70 UCU-209.0-70	ULU-209.0-60 PAVED
DESIGN SPEED (km/h)			110	110	110	90	90	80	70	70	60
HORIZONTAL ALIGNMENT	MIN. CURVE RADIUS (m)		600	600	600	300	300	250	190	190	130
	SPIRAL PARAMETER A		REFER TO SUPERELEVATION TABLES FOR MINIMUM AND DESIRABLE "A" PARAMETERS								
SUPERELEVATION			6%	6%	6%	6%	6%	4% 6%	4% 6%	2% 4%	NOT REQUIRED
VERTICAL ALIGNMENT Limit / Desirable	CREST K	PASSING SIGHT K	WHERE THIS IS A CONSIDERATION, REFER TO THE ALBERTA TRANSPORTATION HIGHWAY GEOMETRIC DESIGN GUIDE.								
		MIN. STOPPING SIGHT K	100	100	100	55	55	35	25	25	15
	SAG K	MINIMUM K	60	60	60	40	40	35	25	25	20
		COMFORT MINIMUM (ILLUMINATED SECTIONS ONLY)	30	30	30	21	21	17	13	13	10
	DECISION SIGHT DISTANCE (m)		330 - 430	330 - 430	330 - 430	280 - 360	300 - 390	230 - 310	200 - 270	200 - 270	170 - 230
	GRADIENT - DESIRABLE MAXIMUM %		3	3	3	6	6	6	6	8	8
CROSS SECTION	LANE WIDTH (m)		3.7, 3.7, 3.7, 3.7	3.7, 3.7, 3.7	3.7, 3.7	3.7, 3.7, 3.7	3.7, 3.7	3.7, 3.7, 3.7 3.7, 3.7	3.7, 3.7, 4.2 3.7, 4.2	4 @ 3.5 4.5, 4.5 4.5, 4.5	4.5, 4.5
	RIGHT SHOULDER WIDTH (m)		3.0	3.0	3.0	2.0	2.0	-	-		-
	LEFT SHOULDER WIDTH (m)		3.0	2.5	2.0	1.5	1.0	-	-	-	-
	FINISHED PAVEMENT WIDTH (m)		2 AT 20.8	2 AT 16.6	2 AT 12.4	2 @ 14.6	2 @ 10.4	2 @ 11.1 2 @ 7.4	2 @ 11.6 2 @ 7.9	14.0 9.0	9.0
	MEDIAN WIDTH RURAL (m)		WHERE RURAL STANDARDS ARE TO BE USED, REFER TO THE ALBERTA TRANSPORTATION HIGHWAY GEOMETRIC DESIGN GUIDE.								
	MEDIAN WIDTH URBAN (m)		7.8 MEDIAN WITH BARRIER	15.2 MEDIAN DEPRESSED	22.6 MEDIAN DEPRESSED	6.0 RAISED MEDIAN	13.4 MEDIAN DEPRESSED	6.0 RAISED MEDIAN	5.0 FOR DIVIDED	NONE	NONE
	DITCH WIDTH - RURAL (m)		4.0 ROUNDED	4.0 ROUNDED	4.0 ROUNDED	4.0 ROUNDED	4.0 ROUNDED	3.5	3.5	3.0	3.0
	SIDESLOPE RATIO - NORMAL		6:1	6:1	6:1	6:1	5:1	4:1	4:1	4:1	4:1
		ON FILLS - MAXIMUM	3:1 OVER 6.5m	3:1 OVER 6.5m	3:1 OVER 6.5m	3:1 OVER 6.5m	3:1 OVER 6.5m	3:1 OVER 4m	3:1 OVER 4m	2:1 WITH BARRIER	2:1 WITH BARRIER
	BACKSLOPE RATIO - NORMAL		5:1	5:1	5:1	5:1	5:1 4:1	3:1	3:1	3:1	3:1
		- MAXIMUM	3:1	3:1	3:1	3:1	3:1	2.5:1	2.5:1	2:1	2:1
BASIC R/W WIDTH	URBAN AREA (m) - MINIMUM		70	60	90	60	50	45	38 - 45	22 - 27	20
	MAX. (THROUGH UNDEVELOPED CROWN OWNED LAND (m))										
	SEMI - URBAN AREA (m)		MAY USE TYPICAL RURAL RIGHT-OF-WAY WIDTHS IF APPROPRIATE								

Note: Table U.A-7 continued on next page

Table U.B.3.1 Superelevation and Minimum Spiral Parameters, $e_{max} = 0.04$ m/m

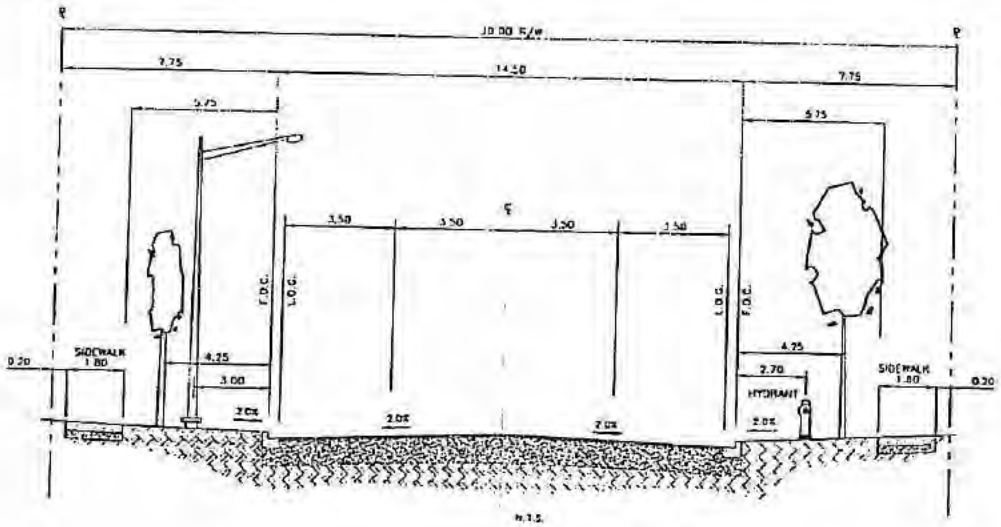
Design Speed (km/h)	40			50			60			70			80			90			100		
Radius (m)	e	A 2 lane	A 4 lane	e	A 2 lane	A 4 lane	e	A 2 lane	A 4 lane	e	A 2 lane	A 4 lane	e	A 2 lane	A 4 lane	e	A 2 lane	A 4 lane	e	A 2 lane	A 4 lane
7000	NC			NC			NC			NC			NC			NC			NC		
5000	NC			NC			NC			NC			NC			NC			NC		
4000	NC			NC			NC			NC			NC			NC			NC		
3000	NC			NC			NC			NC			NC			NC			RC	410	410
2000	NC			NC			NC			NC			RC	300	300	RC	315	315	RC	335	335
1500	NC			NC			NC			RC	240	240	RC	260	260	RC	275	275	0.022	290	290
1200	NC			NC			NC			RC	215	215	RC	230	230	0.021	245	245	0.026	260	260
1000	NC			NC			RC	180	180	RC	200	200	0.020	210	210	0.025	225	225	0.030	235	235
900	NC			NC			RC	175	175	RC	190	190	0.021	200	200	0.027	210	210	0.032	225	225
800	NC			NC			RC	165	165	RC	180	180	0.023	190	190	0.029	200	200	0.034	210	210
700	NC			RC	140	140	RC	150	150	0.020	165	165	0.026	175	175	0.032	185	185	0.036	200	200
600	NC			RC	130	130	RC	140	140	0.023	155	155	0.029	165	165	0.035	175	175	0.039	190	190
500	NC			RC	120	120	0.021	130	130	0.026	140	140	0.033	150	150	0.038	160	160	0.040	190	190
400	RC	95	95	RC	105	105	0.025	115	115	0.031	125	125	0.037	135	135	0.040	160	160	0.040	190	190
350	RC	90	90	0.020	100	100	0.027	110	110	0.033	120	120	0.039	135	135	0.040	160	160	min R = 490		
300	RC	80	80	0.023	90	90	0.031	100	100	0.036	110	110	0.040	135	135	min R = 380					
250	RC	75	75	0.026	85	85	0.034	90	90	0.038	110	110	0.040	135	135						
220	RC	70	70	0.029	80	80	0.036	90	90	0.039	110	110	min R = 280								
200	0.021	65	65	0.031	75	75	0.038	90	90	0.040	110	110									
180	0.023	65	65	0.033	70	70	0.039	90	90	0.040	110	110									
160	0.025	60	60	0.035	70	70	0.040	90	90	min R = 200											
140	0.028	55	55	0.037	70	70	0.040	90	90												
120	0.031	50	55	0.039	70	70	min R = 150														
100	0.034	50	50	0.040	70	70															
90	0.036	50	50	min R = 100																	
80	0.038	50	50																		
70	0.040	50	50																		
60	0.040	50	50																		
	min R = 60																				

$e_{max} = 0.04$

Notes:

- *e* is superelevation
- *A* is spiral parameter in metres
- NC is normal cross section
- RC is remove adverse crown and superelevate at normal rate
- Spiral length, L = A2 / Radius
- Spiral parameters are minimum and higher values may be used
- For 6 lane pavement: above the dashed line use 4 lane values,
- below the dashed line, use 4 lane values x 1.15.
- A divided road having a median less than 3 m wide may be treated as a single pavement.

Figure U.C.8.1c

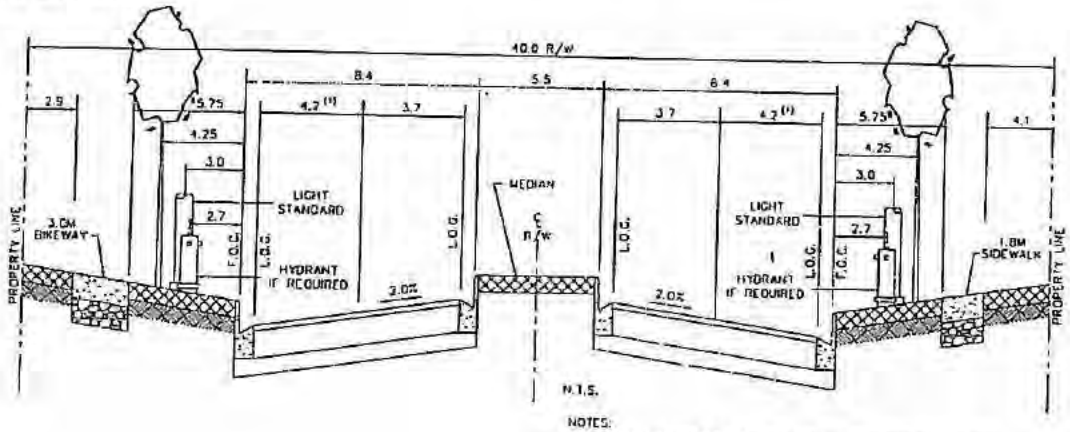


N.T.S.

NOTES:
- GUTTER ASSUMED TO BE 250MM
  F.O.C. = FACE OF CURB
  L.O.G. = LIP OF GUTTER
- STREET FURNITURE SHOULD BE LOCATED OUTSIDE THE CLEAR ZONE OR BE CRASH FRIENDLY (SEE TABLE C.5.2c OF THE HIGHWAY GEOMETRIC DESIGN GUIDE FOR FURTHER GUIDANCE)
- ALL STREET LIGHT POLES TO UTILIZE BREAK-AWAY BASES (SEE FIGURE U.C.5.1)
- HYDRANT LOCATIONS BASED ON PUMPER TRUCK CONNECTION REQUIREMENTS
- SIDEWALKS, PATHWAYS, HYDRANTS AND TREES BY OTHERS

UCU 414.0 – 70

Figure U.C.8.1d

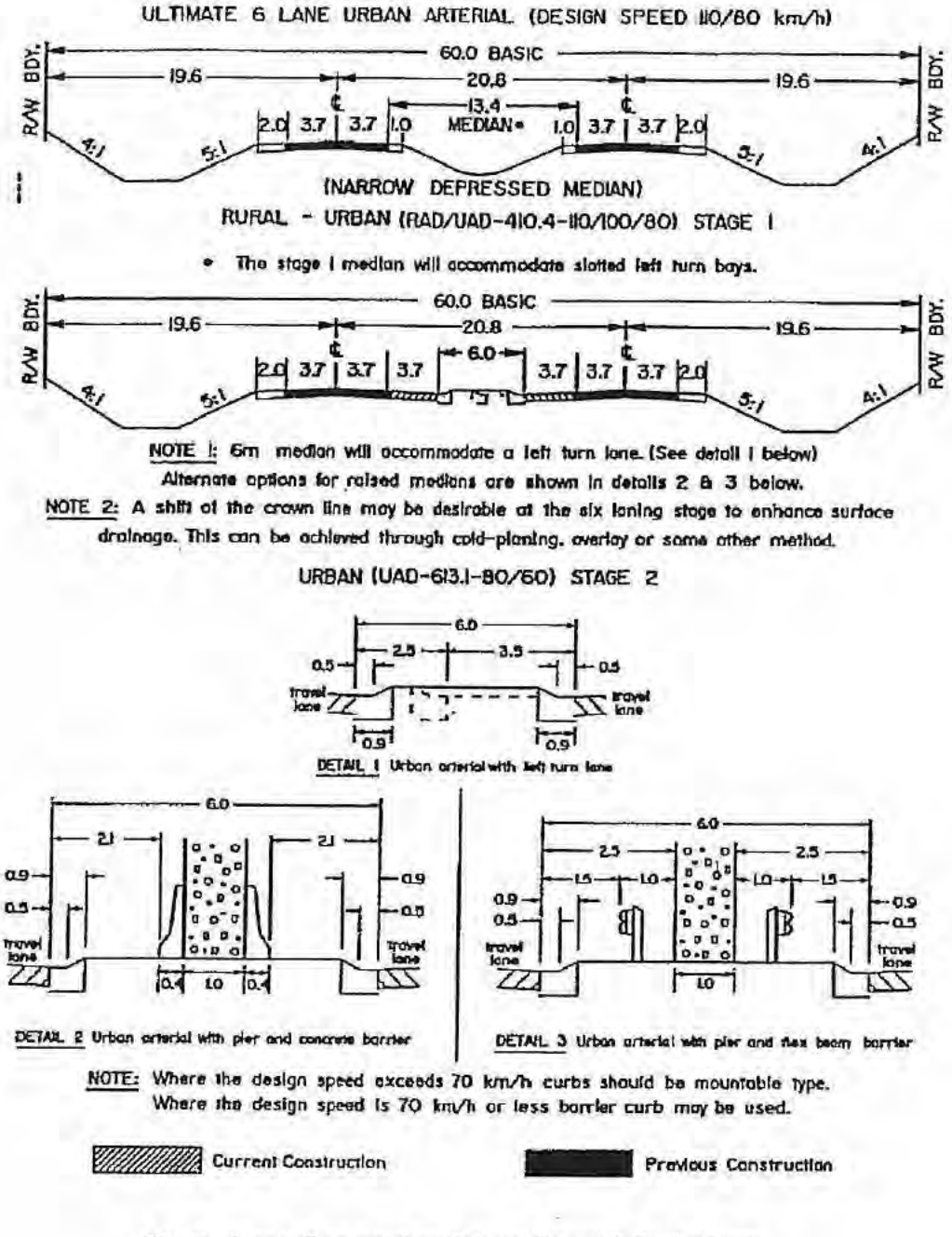


N.T.S.

NOTES:
(1) ON THE UAD 80 SECTION THIS LANE WIDTH MAY BE REDUCED TO 3.7M WHERE SEPARATE BIKE FACILITIES ARE PROVIDED
- GUTTER ASSUMED TO BE 250MM
- USE MOUNTABLE CURB WHEN DESIGN SPEED EXCEEDS 70 KM/H
- STREET FURNITURE SHOULD BE LOCATED OUTSIDE THE CLEAR ZONE OR BE CRASH FRIENDLY (SEE TABLE C.5.2c OF THE HIGHWAY GEOMETRIC DESIGN GUIDE FOR FURTHER GUIDANCE)
- ALL STREET LIGHT POLES TO UTILIZE BREAK-AWAY BASES (SEE FIGURE U.C.5.1)
- HYDRANT LOCATIONS BASED ON PUMPER TRUCK CONNECTION REQUIREMENTS
- SIDEWALKS, PATHWAYS, HYDRANTS AND TREES BY OTHERS
  F.O.C. = FACE OF CURB
  L.O.G. = LIP OF GUTTER

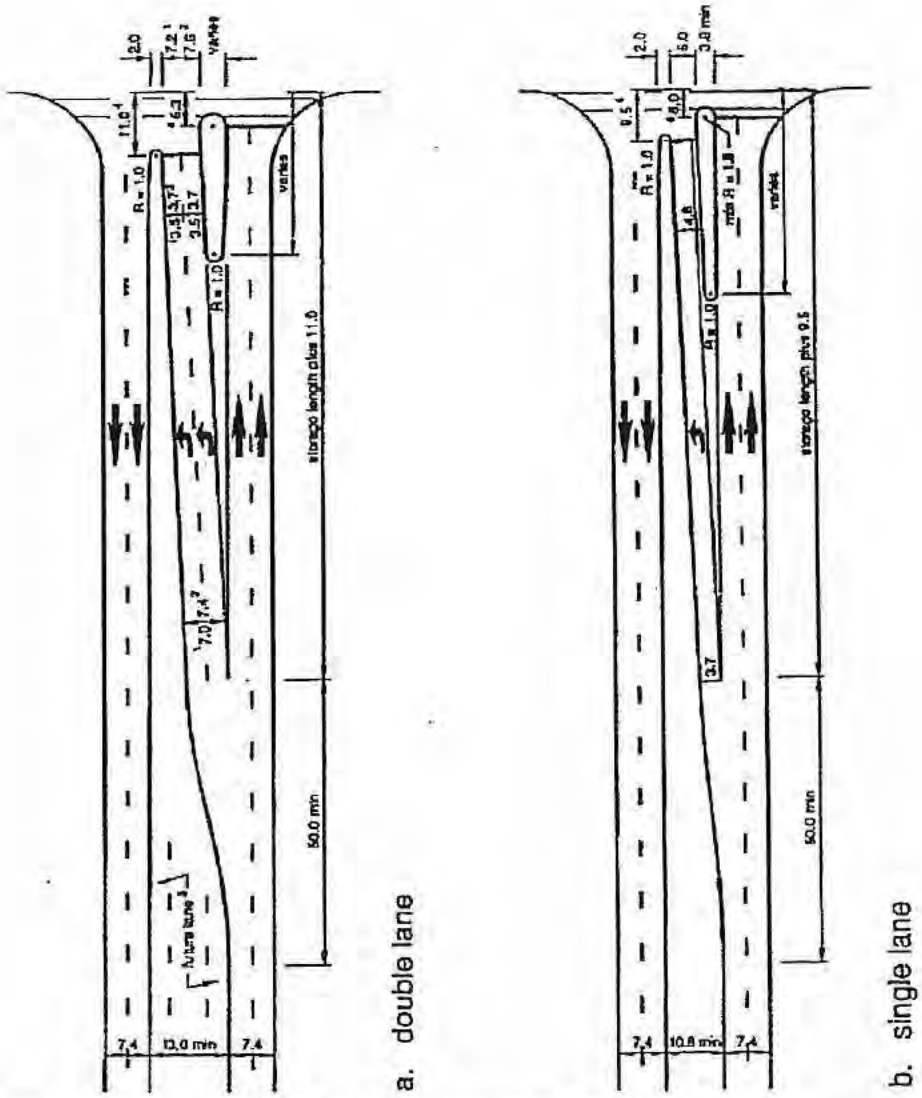
UAD 407.9 – 70
UAD 407.4 – 80 (2)

Figure U.C.6.2c
Rural – Urban Multi-Lane Divided Highway Typical Cross Sections



Source: Alberta Transportation Highway Geometric Design Guide

Figure U.D.1.4b Typical slotted left-turn lane designs



Notes: 1. Based on predominately P vehicles with consideration for SU vehicles.
2. Based on sufficient SU vehicles to govern design.
3. Slot design eliminated when future lanes added in median area.
4. All nose locations to be checked using design vehicle turning templates.

PROJECT: 9th Street (Nisku Spine Road)
Functional Planning Study
~~filename: Q:\053920\Transportation\Functional Study\design parameter.xls~~

Date: December 21, 2005

	DESIGN PARAMETERS	DESIGN CRITERIA		REFERENCE
a)	**Design Standards and References**	TAC Geometric Design Guide for Canadian Road - September 1999		(1)
		AIT Highway Geometric Design Guide - 1999		(2)
		AE Recommended Parameters	Leduc County Desired Parameters	
b)	**Cross Section**			
	Classification	RAD-90	RAD-110	(1) - Table 1.3.2.1
	Design Speed	90 km/hr	110 km/hr	(1) - Table 2.1.2.3
	Design Vehicle	WB-36		(2) - Figure D-5k
	Curve Radius	R = 380m (minimum)	R = 600m (minimum)	(1) - Table 2.1.2.3
	Spiral Parameter	A = 160 (minimum)	A = 220 (minimum)	(1) - Table 2.1.2.5
	Superelevation	e = 0.04	e = 0.06	(1) - Table 2.1.2.3
	Minimum Curb Radius	R = 18.50m (minimum)		(2) - Figure D-5k
	Lane Widths	3.70 m		(1) - Table 2.2.2.1
	Left Hand Shoulder Width	1.50 m		(1) - Sect. 2.2.4.2
	Right Hand Shoulder Width	3.00 m		(1) - Sect. 2.2.4.2
	No. of Lanes	4 lanes (divided)		
	Finished Pavement Width	11.90 m		
	Median Width	8 m along 9th Street (Station 0+000 to 6+100)		(1) - Sect. 2.2.5.4
		13.40m to New Alignment (Station 6+100 to 10+000)		(2) - Sect. C.6.1
	Cross Slope	2 % from Centreline		(1) - Sect. 2.1.5.3
	Side Slope	4:1		(1) - Sect. 3.1.4.1
	Back Slope	3:1		(1) - Sect. 3.1.4.1
	Ditch Width	3 m		
c)	**Alignment**			
	Minimum Vertical Crest "K" Value	53	110	(1) - Table 2.1.3.2
	Miniumum Vertical Sag "K" Value	20	30	(1) - Table 2.1.3.4
	Maximum Grade	Maximum = 4% and Minimum = 0.60%	Maximum = 3% and Minimum = 0.60%	(1) - Sect. 2.1.3.2
	Grade Breaks	> 1% algebraic differences		

Appendix E - Blackmud Creek Crossing Structural Requirements

Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

Project No.: 2005 3920 000 200 File: _____

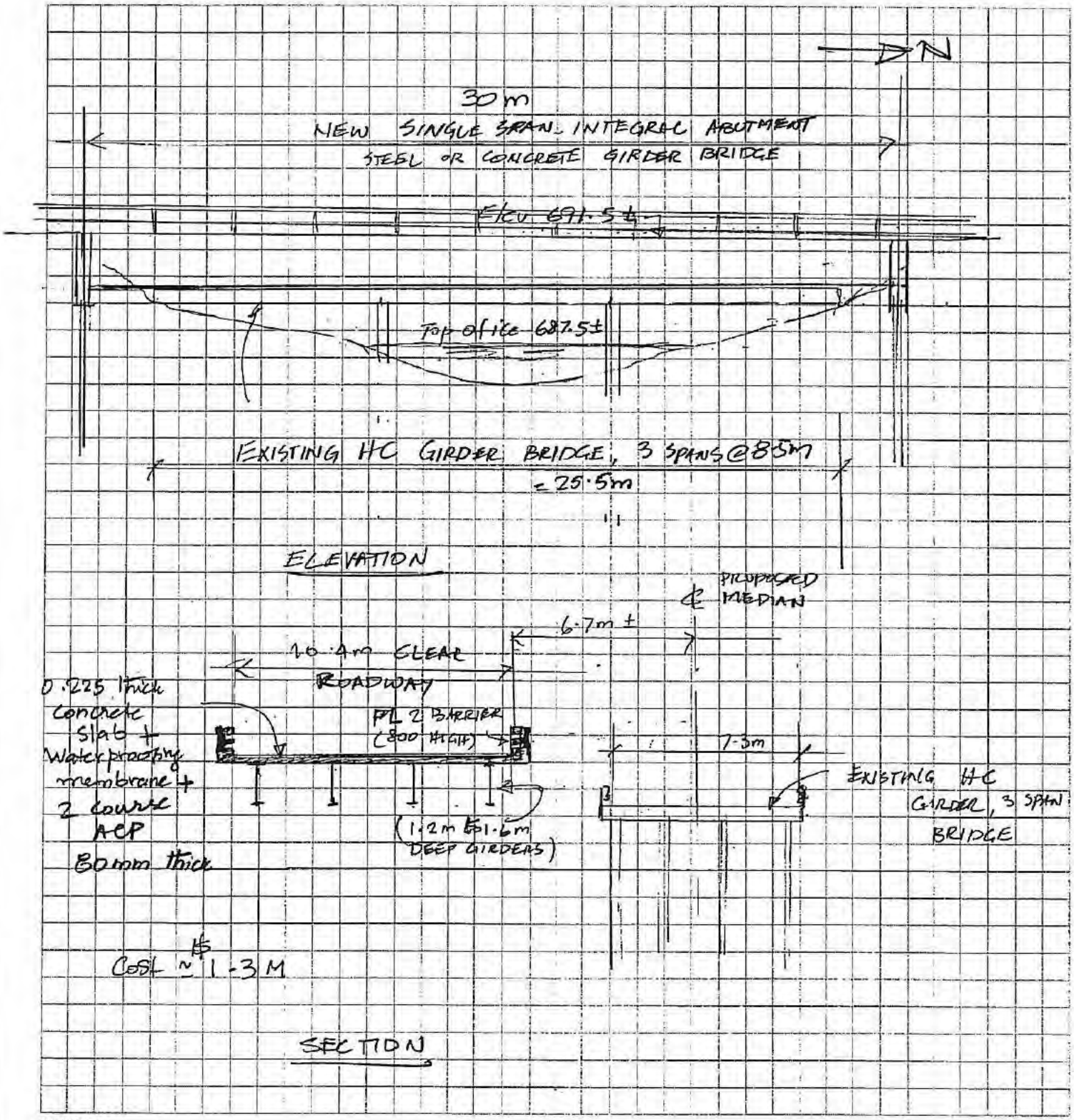
Client: Nisku

Subject: Nisku Spine Road

By: S BALA Date: 2006 MAR 28

DESIGN NOTES

Sheet _____ of _____ Chk'd: _____ Date: _____



Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

Project No.: 2005 3920 000200 File:

Client: Nisku

Subject: 9th Street (Nisku Spine Road) Functional Study – Blackmud Creek Bridge.

By: SBS Date: 2006 Mar 27

DESIGN NOTES

Sheet of Chk'd: Date:

Existing bridge is a HC girder bridge 3 spans 8.5m each.
Roadway width = 7.3m 15° LHF Skew.
(measures 18° on airphoto)

There is an existing pipe bridge on the east (u/s) side of existing bridge, ~~at~~ 4 spans ≃ 65m total length.

Assuming that the existing waterway opening is adequate, raising the deck level by ~~to~~ about 2m on the north end and 1.8m on the south end will increase the length of the bridge by 7.6m at 2:1 slope.

Therefore a bridge length of 3×8.5+7.6 = 33.1m

Say Approx 30m span integral abutment bridge (single span) (NU or steel girder) with result in least environmental effect and adequate load capacity.
A "standard" SC girder bridge will also work with 3-12m spans.

Cost: initial stage 10.4m clear roadway width

10.4 × 36 × 3500 = $1.3M

(4 – 1600 deep NU girders)

2004/00

ALBERTA TRANSPORTATION — BIM SYSTEM FORM - (Rev/92) — FORM ID: PC

Bridge File Number : 00300
Year Built : 65 / ~~65 or~~ 65
Bridge or Town Name: NISKU
Stream Name : BLACKMUD CK
Legal Land Location: WSW31-050-24-4
Road Authority : C25
Highway #:Cntrl Sec: L : 0
Clear Roadway/ Skew: 7.3 m / -15. DEG
Structure Usage : RV
AADT / Year : E-...1000/ 01
Road Classification: RU-2086-090
Detour Length : .6 km
Allowable Load : 30 t CS1, MEMB GIRD; 53 t CS2, MEMB GIRD; 75 t CS3 MEMB GIRD
Design Loading : HS20

LEGEND:

9	Very Good
8	
7	Good
6	
5	Adequate
4	
3	Poor
2	
1	Immediate Action
N	Not Accessible
X	Not Applicable

Last BIS Update: 1996-01

Last BIM Update: 1999-08-19

--> On Critical Spans
--> Critical Member
--> Primary Span

Posting Information:

Posted Loading: Single X tonnes; Semi X tonnes; Truck Train X tonnes;
Posted : N B Lane : At Junction Y/N NO ; In Advance Y/N NO ; At Bridge Y/N NO
: S B Lane : At Junction Y/N NO ; In Advance Y/N NO ; At Bridge Y/N NO
Remarks Posting Not Required.

Hazard Marker : At Bridge Y/N YES; Remarks
Remarks

Other Signs : Type

Utilities (Located at):

AGT GOES THROUGH EAST CURB UNIT GAS
POWER 9.5 M W, 9.5 M E OF CENTER LN. MUNICPL
OTHERS Problems Y/N NO
Remarks

Approach Road:

	Rating Last	Rating Now	Explanation of Condition
Horizontal Alignment	8	7	Farmer's field ent 34m south of bridge deck (West side).
Vertical Alignment	5	5	
Roadway Width (8.0 m)	****	****	
Approach Bump	5	5	Farmer's ~~field~~ Field ent 24m north of bridge deck (East side). Has been removed. New Guardrail
Guardrail Y/N YES	5	8	
(Length ~~7.0~~ 15.5m;)	****	****	
(Meets Std. Y/N ~~NO~~ Yes.)	****	****	
Guardrail Termination	****	****	~~Guardrail is single layer only & is missing 3 posts next to bridge-all corners~~.
(Type TURNDOWN)	****	****	
Drainage	7	7	
Approaches - Gen Rating	5	5	

Item	Date	Initials
Date Inspected	MAY 18/01	T.H.
Date Received	JULY 17/01	
Date Reviewed	JULY 26/01	
Second Review		
Data Input	JULY 27/01	
Lot Number	1 2 3 4	
A.I. Office	Wayne Cappellani	
A.I. Signature		

ALBERTA TRANSPORTATION — BIM SYSTEM FORM - (Rev/92) — FORM ID: PC

Bridge File Number: 00300

Superstructure: 3 SPANS Lengths: 8.5 8.5 8.5 m

Main Span Type: HC

Bridge Component	Rating Last	Rating Now	Explanation of Condition
Special Features	****	****	
Type _____	X	X	
Type _____	X	X	
	****	****	
Wearing Surface / Deck Top	7	7	
(Type CONCRETE)	****	****	
(Thickness ____ mm)	****	****	
(Grout Key Crack Y/N)	****	****	
Deck Rideability	7	7	
Deck Joints	7	N	Concrete over Joints.
Bump Y/N NO	****	****	
Deck Drainage	7	7	
(Drains Clogged Y/N NO)	****	****	
Curbs / Median	6	7	~~These curb units have been patched up in the past.~~
(Scaling 0 % of area)	****	****	
	****	****	
Bridge Rail	7	7	
(Type ~~TIMBER~~ Steel)	****	****	Double layer flexbeam.
Bridge Rail Posts	7	7	
(Type STEEL)	****	****	
Bridge Rail/Posts Coating	7	7	
(Type GALVANIZED)	****	****	
Sidewalk	X	X	
Girders	5	5	17 girder ends have drift-pin pop out.
(Cracking Y/N YES)	****	****	Girders have been patched underneath
(Spalling # 0 %)	****	****	before. Spalls Patched.
	****	****	
Span Alignment Problems	****	****	
(Vertical Y/N NO)	****	****	
(Horizontal Y/N NO)	****	****	
Superstructure - Gen Rating	5	5	

Substructure:

Abutments	****	****	
(No. of Bearing Piles 6)	****	****	
Bearing Seats/Caps/Corbels	6	6	
(Type Timber.....)	****	****	
(Size 300 x 300 mm)	****	****	
Backwalls / Breastwalls	6	6	
(Greatest Height 1.3 m)	****	****	North backwall measured.
Wingwalls	6	6	
Piles	6	6	
Paint / Coating	6	X	
Abutment Stability	6	6	
Scour / Erosion	6	6	

Bridge Component	Rating Last	Rating Now	Explanation of Condition
Piers / Bents	****	****	
(Type TIMBER 1 ROW PILES)	****	****	
(No. of Piles 6 7)	****	****	
Bearing Seats/Caps/Corbels	4	5	North pier bent, sub-cap is cracked
(Type Timber.....)	****	****	vertically the entire length, sounds
(Size 300 x 300 mm)	****	****	punky.) Cored 2000 – No Rot.
Pier Shaft / Piles	6	6	
(Greatest Height ~~3.3~~ 3.6 m)	****	****	~~Measured to ice.~~
Bracing/Struts/Sheathing	6	6	
Nose Plate	X	X	
Paint / Coating	6	X	
Pier Stability	6	6	
Scour	5	6	~~There may be scour under the bridge,~~
Debris Y/N NO	****	****	~~too icy to see.~~
Substructure - Gen Rating	4	5	

Channel:

Channel (U/S and D/S)	****	****	
Alignment	7	7	
Bank Stability	7	7	
HWM _____ m above S.B.	****	****	Can't see HWM.
Drift Y/N NO	****	****	
Slope Protection	7	7	
(Type ROCK RIP-RAP)	****	****	
Guidebanks / Spurs	X	X	
Adequacy of Opening	7	7	
Channel - Gen Rating	7	7	

ALBERTA TRANSPORTATION

BIM SYSTEM FORM - (Rev/92)
Bridge File Number: 00300

FORM ID: PC

Structural Condition Rating (Last) | 50.0 | %

Last Sufficiency Rating | 63.9 | %

Expected remaining life of Structure ? ----> 20 Years

Last coring of Caps and Corbels ? ---->19__

Maintenance Recommendations:

1. Repair/Replace Bridge Rail:	19__
4. Repair/Seal Curbs:	19__
5. Patch Deck:	19__
7. Overlay Deck:	19__
13. Straighten/Replace Members:	19__; Type _____
15. Washing:	19__
16. Shotcrete Repairs:	19__; Location _____
17. Core Timber Caps/Corbels:	~~1998~~
18. Replace Timber Caps/Corbels:	19__
19. Repair Abutment Scour/Erosion:	19__
20. Place Additional Rip Rap:	19__; Quantity/Class _____
21. Remove Drift Accumulation:	19__
24. Install Struts:	19__
28. Other Repairs:	~~1998~~; Type ~~Install 3 posts in guardrail next to~~
	19__; Type ~~bridge on all corners to meet std.~~
	19__; Type _____
	19__; Type _____

Special Comments For Next Inspection :

NO maintenance Required.

Inspection Level: (1) or 2 | By: Travis Hanson | Class: B | Date: May 18/01

Authorized Maintenance by : _____ Date: _____

Items	Target Date	Estimated Cost
NEXT INSPECTION - Date:	- Level: 1 or 2	Total:

PREVIOUS INSPECTION - Date: 19980129

F Appendix F - Cost Estimates

9th STREET (NISKU SPINE ROAD)

FUNCTIONAL PLANNING STUDY

ROAD FULL DEVELOPMENT SUMMARY (25% Overweight)

Filename: Q:\053920\Transportation\Functional Study\Estimate\Nisku Costs 25% Overweight.xls

Item	Description	Street Sections				Amount
		Airport Rd to 15 Ave	15 Ave to Hwy 625	Hwy 625 to 25 Ave	25 Ave to 41 Ave	
1	Roadwork	$7,102,000	$8,361,000	$11,345,000	$20,629,000	$47,437,000
2	Electrical	$650,000	$770,000	$790,000	$1,310,000	$3,520,000
3	Drainage	$20,000	$47,000	$60,000	$131,000	$258,000
4	Bridge Structure	-	-	-	$2,600,000	$2,600,000
Sub-Total		**$7,772,000**	**$9,178,000**	**$12,195,000**	**$24,670,000**	**$53,815,000**
Contingencies (15%)		**$1,166,000**	**$1,377,000**	**$1,830,000**	**$3,701,000**	**$8,074,000**
Total		**$8,938,000**	**$10,555,000**	**$14,025,000**	**$28,371,000**	**$61,889,000**
Engineering and Administration (12.5%)		**$1,118,000**	**$1,320,000**	**$1,754,000**	**$3,547,000**	**$7,739,000**
Grand Total		**$10,056,000**	**$11,875,000**	**$15,779,000**	**$31,918,000**	**$69,628,000**

Note:

(1) All unit prices are based on 2006.

(2) Costs for the removal and relocation power lines to be determined by others during detailed design phase of this project.

(3) Cost of water main, sanitary sewer and storm upgrades required in the study area
due to 9th Street Roadway Reconstruction is to be determined by others during detailed design phase of this project.

(4) The Drainage costs shwon are the costs for the upgrades required to the storm sewer system within the road right-of-way.

9th STREET (NISKU SPINE ROAD)

FUNCTIONAL PLANNING STUDY

STAGE 1 DEVELOPMENT SUMMARY (25% Overweight)

Filename: Q:\053920\Transportation\Functional Study\Estimate\Nisku Costs 25% Overweight.xls

Item	Description	Street Sections				Amount
		Airport Rd to 15 Ave	15 Ave to Hwy 625	Hwy 625 to 25 Ave	25 Ave to 41 Ave	
1	Roadwork	$3,494,000	$4,759,000	$6,300,000	$12,344,000	$26,897,000
2	Electrical	$500,000	$210,000	$220,000	$480,000	$1,410,000
3	Drainage	-	$47,000	$60,000	$131,000	$238,000
4	Bridge Structure	-	-	-	$1,300,000	$1,300,000
Sub-Total		**$3,994,000**	**$5,016,000**	**$6,580,000**	**$14,255,000**	**$29,845,000**
Contingencies (15%)		**$600,000**	**$753,000**	**$987,000**	**$2,139,000**	**$4,479,000**
Total		**$4,594,000**	**$5,769,000**	**$7,567,000**	**$16,394,000**	**$34,324,000**
Engineering and Administration (12.5%)		**$575,000**	**$722,000**	**$946,000**	**$2,050,000**	**$4,293,000**
Grand Total		**$5,169,000**	**$6,491,000**	**$8,513,000**	**$18,444,000**	**$38,617,000**

Note:

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due to 9th Street Roadway Reconstruction is to be determined by others during detailed design phase of this project.

(4) The Drainage costs shwon are the costs for the upgrades required to the storm sewer system within the road right-of-way.

9th STREET (NISKU SPINE ROAD)

FUNCTIONAL PLANNING STUDY

AIRPORT ROAD TO 15 AVENUE – FULL DEVELOPMENT

STATION: 0+080 TO 1+500

May 3, 2006

Filename: Q:\053920\Transportation\Functional Study\Estimate\Nisku Costs 25% Overweight.xls

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1.0 ROADWORK					
1.01	180mm ACP	26166	t	$76.97/t	2,013,987
1.02	300mm Gravel Base Course	47113	t	$27.21/t	1,281,931
1.03	300mm Pit Run	51491	t	$21.25/t	1,094,182
1.04	Sub-grade Preparation	54553	m^2	$0.48/$m^2$	26,185
1.05	600mm Width Concrete Curb and Gutter	0	m	$153.21/m	0
1.06	900mm Width Concrete Curb and Gutter	5941	m	$191.51/m	1,137,761
1.07	150mm Curb and Cutter Gravel Base	0	t	$27.21/t	0
1.08	200mm Curb and Gutter Gravel Base	3508	t	$27.21/t	95,441
1.09	Median Strip	707	m^2	$266.25/$m^2$	188,239
1.10	Pavement Marking	9533	m	$0.70/m	6,673
1.11	100mm Top Soil	65223	m^2	$4.29/$m^2$	279,805
1.12	Seeding	65223	m^2	$0.48/$m^2$	31,307
1.13	Clearing R.O.W.	107481	m^2	$1.90/$m^2$	204,213
1.14	Common Excavation	29596	m^3	$18.77/$m^3$	555,517
1.15	Excess Material	19410	m^3	$9.43/$m^3$	183,036
1.16	Traffic Signs	1	LS	$3,500	3,500
				Sub Total	**$7,101,777**
2.0 ELECTRICAL					
2.01	Illumination	30	lights	$10,000/light	300,000
2.02	Traffic Signals	1	LS	$350,000	350,000
				Sub Total	**$650,000**
3.0 DRAINAGE					
3.01	Sanitary Pipe Extension	12	m	$1,000/m	12,000
3.02	Manhole Relocation	1	ea	$7,500/MH	7,500
				Sub Total	**$19,500**

SUMMARY		
1.0 ROADWORK		7,101,800
2.0 ELECTRICAL		650,000
3.0 DRAINAGE		19,500
	Total	**$7,771,300**

Note:

(1) All unit prices are based on 2006.

(2) Costs for the removal and relocation power lines to be determined by others during detailed design phase of this project.

(3) Cost of water main, sanitary sewer and storm upgrades required in the study area due to 9th Street Roadway Reconstruction is to be determined by others during detailed design phase of this project.

(4) The Drainage costs shwon are the costs for the upgrades required to the storm sewer system within the road right-of-way.

9th STREET (NISKU SPINE ROAD)

FUNCTIONAL PLANNING STUDY

15 AVENUE TO HIGHWAY 625 – FULL DEVELOPMENT

STATION: 1+500 TO 3+600

May 3, 2006

Filename: Q:\053920\Transportation\Functional Study\Estimate\Nisku Costs 25% Overweight.xls

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1.0 ROADWORK					
1.01	180mm ACP	35369	t	$76.97/t	2,722,328
1.02	300mm Gravel Base Course	63375	t	$27.21/t	1,724,443
1.03	300mm Pit Run	68910	t	$21.25/t	1,464,332
1.04	Sub-grade Preparation	72842	m^2	$0.48/$m^2$	34,964
1.05	600mm Width Concrete Curb and Gutter	0	m	$153.21/m	0
1.06	900mm Width Concrete Curb and Gutter	4180	m	$191.51/m	800,512
1.07	150mm Curb and Cutter Gravel Base	0	t	$27.21/t	0
1.08	200mm Curb and Gutter Gravel Base	2468	t	$27.21/t	67,151
1.09	Median Strip	554	m^2	$266.25/$m^2$	147,503
1.10	Pavement Marking	10430	m	$0.70/m	7,301
1.11	100mm Top Soil	85812	m^2	$4.29/$m^2$	368,132
1.12	Seeding	85812	m^2	$0.48/$m^2$	41,190
1.13	Clearing R.O.W.	135101	m^2	$1.90/$m^2$	256,692
1.14	Common Excavation	31847	m^3	$18.77/$m^3$	597,768
1.15	Excess Material	13249	m^3	$9.43/$m^3$	124,938
1.16	Traffic Signs	1	LS	$3,500	3,500
				Sub Total	**$8,360,753**
2.0 ELECTRICAL					
2.01	Illumination	42	lights	$10,000/light	420,000
2.02	Traffic Signals	1	LS	$350,000	350,000
				Sub Total	**$770,000**
3.0 DRAINAGE					
3.01	Culverts (800mm dia C.S.P.)	170	m	$260/m	44,200
3.02	Riprap	18	m^3	$150/$m^3$	2,700
				Sub Total	**$46,900**

SUMMARY		
1.0 ROADWORK		8,360,800
2.0 ELECTRICAL		770,000
3.0 DRAINAGE		46,900
	Total	**$9,177,700**

Note:

(1) All unit prices are based on 2006.

(2) Costs for the removal and relocation power lines to be determined by others during detailed design phase of this project.

(3) Cost of water main, sanitary sewer and storm upgrades required in the study area
due to 9th Street Roadway Reconstruction is to be determined by others during detailed design phase of this project.

(4) The Drainage costs shwon are the costs for the upgrades required to the storm sewer system within the road right-of-way.

9th STREET (NISKU SPINE ROAD)

FUNCTIONAL PLANNING STUDY

HIGHWAY 625 TO 25 AVENUE – FULL DEVELOPMENT

STATION: 3+600 TO 5+800

May 3, 2006

Filename: Q:\053920\Transportation\Functional Study\Estimate\Nisku Costs 25% Overweight.xls

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1.0 ROADWORK					
1.01	180mm ACP	48843	t	$76.97/t	3,759,470
1.02	300mm Gravel Base Course	86644	t	$27.21/t	2,357,571
1.03	300mm Pit Run	93191	t	$21.25/t	1,980,311
1.04	Sub-grade Preparation	98033	m^2	$0.48/$m^2$	47,056
1.05	600mm Width Concrete Curb and Gutter	0	m	$153.21/m	0
1.06	900mm Width Concrete Curb and Gutter	5521	m	$191.51/m	1,057,327
1.07	150mm Curb and Cutter Gravel Base	0	t	$27.21/t	0
1.08	200mm Curb and Gutter Gravel Base	3260	t	$27.21/t	88,694
1.09	Median Strip	2359	m^2	$266.25/$m^2$	628,084
1.10	Pavement Marking	14919	m	$0.70/m	10,443
1.11	100mm Top Soil	95193	m^2	$4.29/$m^2$	408,376
1.12	Seeding	95193	m^2	$0.48/$m^2$	45,692
1.13	Clearing R.O.W.	169270	m^2	$1.90/$m^2$	321,613
1.14	Common Excavation	22153	m^3	$18.77/$m^3$	415,812
1.15	Borrow Excavation	23374	m^3	$9.43/$m^3$	220,417
1.16	Traffic Signs	1	LS	$4,000	4,000
				Sub Total	**$11,344,866**
2.0 ELECTRICAL					
2.01	Illumination	44	lights	$10,000/light	440,000
2.02	Traffic Signals	1	LS	$350,000	350,000
				Sub Total	**$790,000**
3.0 DRAINAGE					
3.01	Culverts (800mm dia C.S.P.)	210	m	$260/m	54,600
3.02	Riprap	36	m^3	$150/$m^3$	5,400
				Sub Total	**$60,000**

SUMMARY		
1.0 ROADWORK		11,344,900
2.0 ELECTRICAL		790,000
3.0 DRAINAGE		60,000
	Total	**$12,194,900**

Note:

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(3) Cost of water main, sanitary sewer and storm upgrades required in the study area
due to 9th Street Roadway Reconstruction is to be determined by others during detailed design phase of this project.

(4) The Drainage costs shwon are the costs for the upgrades required to the storm sewer system within the road right-of-way.

9th STREET (NISKU SPINE ROAD)

FUNCTIONAL PLANNING STUDY

25 AVENUE TO 41 AVENUE – FULL DEVELOPMENT

STATION: 5+800 TO 10+550

May 3, 2006

Filename: Q:\053920\Transportation\Functional Study\Estimate\Nisku Costs 25% Overweight.xls

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1.0 ROADWORK					
1.01	180mm ACP	89032	t	$76.97/t	6,852,790
1.02	300mm Gravel Base Course	159453	t	$27.21/t	4,338,718
1.03	300mm Pit Run	173286	t	$21.25/t	3,682,330
1.04	Sub-grade Preparation	183133	m^2	$0.48/$m^2$	87,904
1.05	600mm Width Concrete Curb and Gutter	736	m	$153.21/m	112,763
1.06	900mm Width Concrete Curb and Gutter	9108	m	$191.51/m	1,744,273
1.07	150mm Curb and Cutter Gravel Base	217	t	$27.21/t	5,912
1.08	200mm Curb and Gutter Gravel Base	5377	t	$27.21/t	146,318
1.09	Median Strip	1131	m^2	$266.25/$m^2$	301,129
1.10	Pavement Marking	26989	m	$0.70/m	18,892
1.11	100mm Top Soil	191977	m^2	$4.29/$m^2$	823,580
1.12	Seeding	191977	m^2	$0.48/$m^2$	92,149
1.13	Clearing R.O.W.	325624	m^2	$1.90/$m^2$	618,685
1.14	Common Excavation	29635	m^3	$18.77/$m^3$	556,249
1.15	Borrow Excavation	130850	m^3	$9.43/$m^3$	1,233,916
1.16	Traffic Signs	1	LS	$13,000	13,000
				Sub Total	**$20,628,607**
2.0 ELECTRICAL					
2.01	Illumination	96	lights	$10,000/light	960,000
2.02	Traffic Signals	1	LS	$350,000	350,000
				Sub Total	**$1,310,000**
3.0 DRAINAGE					
3.01	Culverts (800mm dia C.S.P.)	462	m	$260/m	120,120
3.02	Riprap	66	m^3	$150/$m^3$	9,900
				Sub Total	**$130,020**
4.0 BRIDGE STRUCTURE					
	Includes Railing, Decks, Girders, Abutment and Pavement Structure	2	LS	$1,300,000	**$2,600,000**

SUMMARY	
1.0 ROADWORK	20,628,700
2.0 ELECTRICAL	1,310,000
3.0 DRAINAGE	130,020
4.0 BRIDGE STRUCTURE	2,600,000
Total	**$24,668,720**

Note:

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(4) The Drainage costs shwon are the costs for the upgrades required to the storm sewer system within the road right-of-way.

9th STREET (NISKU SPINE ROAD)

FUNCTIONAL PLANNING STUDY

AIRPORT ROAD TO 15 AVENUE – STAGE 1 DEVELOPMENT

STATION: 0+080 TO 1+500

May 3, 2006

Filename: Q:\053920\Transportation\Functional Study\Estimate\Nisku Costs 25% Overweight.xls

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1.0 ROADWORK					
1.01	180mm ACP	17008	t	$76.97/t	1,309,091
1.02	300mm Gravel Base Course	30623	t	$27.21/t	833,255
1.03	300mm Pit Run	33469	t	$21.25/t	711,218
1.04	Sub-grade Preparation	35459	m^2	$0.48/$m^2$	17,021
1.05	Pavement Marking	6196	m	$0.70/m	4,338
1.06	100mm Top Soil	18294	m^2	$4.29/$m^2$	78,481
1.07	Seeding	18294	m^2	$0.48/$m^2$	8,781
1.08	Clearing R.O.W.	25070	m^2	$1.90/$m^2$	47,633
1.09	Common Excavation	19237	m^3	$18.77/$m^3$	361,086
1.10	Excess Material	12617	m^3	$9.43/$m^3$	118,974
1.11	Traffic Signs	1	LS	$3,500	3,500
				Sub Total	**$3,493,378**
2.0 ELECTRICAL					
2.01	Illumination	15	lights	$10,000/light	150,000
2.02	Traffic Signals	1	LS	$350,000	350,000
				Sub Total	**$500,000**

SUMMARY	
1.0 ROADWORK	3,493,400
2.0 ELECTRICAL	500,000
Total	**$3,993,400**

Note:

(1) All unit prices are based on 2006.

(2) Costs for the removal and relocation power lines to be determined by others during detailed design phase of this project.

(3) Cost of water main, sanitary sewer and storm upgrades required in the study area due to 9th Street Roadway Reconstruction is to be determined by others during detailed design phase of this project.

(4) The Drainage costs shwon are the costs for the upgrades required to the storm sewer system within the road right-of-way.

9th STREET (NISKU SPINE ROAD)

FUNCTIONAL PLANNING STUDY

15 AVENUE TO HIGHWAY 625 – STAGE 1 DEVELOPMENT

STATION: 1+500 TO 3+600

May 3, 2006

Filename: Q:\053920\Transportation\Functional Study\Estimate\Nisku Costs 25% Overweight.xls

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1.0 ROADWORK					
1.01	180mm ACP	22990	t	$76.97/t	1,769,513
1.02	300mm Gravel Base Course	41194	t	$27.21/t	1,120,888
1.03	300mm Pit Run	44791	t	$21.25/t	951,816
1.04	Sub-grade Preparation	47348	m^2	$0.48/$m^2$	22,727
1.05	Pavement Marking	6780	m	$0.70/m	4,746
1.06	100mm Top Soil	45179	m^2	$4.29/$m^2$	193,818
1.07	Seeding	45179	m^2	$0.48/$m^2$	21,686
1.08	Clearing R.O.W.	105294	m^2	$1.90/$m^2$	200,059
1.09	Common Excavation	20701	m^3	$18.77/$m^3$	388,549
1.10	Excess Material	8612	m^3	$9.43/$m^3$	81,210
1.11	Traffic Signs	1	LS	$3,500	3,500
				Sub Total	**$4,758,511**
2.0 ELECTRICAL					
2.01	Illumination	21	lights	$10,000/light	210,000
				Sub Total	**$210,000**
3.0 DRAINAGE					
3.01	Culverts (800mm dia C.S.P.)	170	m	$260/m	44,200
3.02	Riprap	18	m^3	$150/$m^3$	2,700
				Sub Total	**$46,900**

SUMMARY		
1.0 ROADWORK		4,758,600
2.0 ELECTRICAL		210,000
3.0 DRAINAGE		46,900
	Total	**$5,015,500**

Note:

(1) All unit prices are based on 2006.

(2) Costs for the removal and relocation power lines to be determined by others during detailed design phase of this project.

(3) Cost of water main, sanitary sewer and storm upgrades required in the study area
due to 9th Street Roadway Reconstruction is to be determined by others during detailed design phase of this project.

(4) The Drainage costs shwon are the costs for the upgrades required to the storm sewer system within the road right-of-way.

9th STREET (NISKU SPINE ROAD)

FUNCTIONAL PLANNING STUDY

HIGHWAY 625 TO 25 AVENUE – STAGE 1 DEVELOPMENT

STATION: 3+600 TO 5+800

May 3, 2006

Filename: Q:\053920\Transportation\Functional Study\Estimate\Nisku Costs 25% Overweight.xls

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1.0 ROADWORK					
1.01	180mm ACP	31748	t	$76.97/t	2,443,656
1.02	300mm Gravel Base Course	56318	t	$27.21/t	1,532,421
1.03	300mm Pit Run	60574	t	$21.25/t	1,287,202
1.04	Sub-grade Preparation	63722	m^2	$0.48/$m^2$	30,586
1.05	Pavement Marking	9697	m	$0.70/m	6,788
1.06	100mm Top Soil	61875	m^2	$4.29/$m^2$	265,445
1.07	Seeding	61875	m^2	$0.48/$m^2$	29,700
1.08	Clearing R.O.W.	110026	m^2	$1.90/$m^2$	209,048
1.09	Common Excavation	14399	m^3	$18.77/$m^3$	270,278
1.10	Borrow Excavation	23374	m^3	$9.43/$m^3$	220,417
1.11	Traffic Signs	1	LS	$4,000	4,000
				Sub Total	**$6,299,541**
2.0 ELECTRICAL					
2.01	Illumination	22	lights	$10,000/light	220,000
				Sub Total	**$220,000**
3.0 DRAINAGE					
3.01	Culverts (800mm dia C.S.P.)	210	m	$260/m	54,600
3.02	Riprap	36	m^3	$150/$m^3$	5,400
				Sub Total	**$60,000**

SUMMARY	
1.0 ROADWORK	6,299,600
2.0 ELECTRICAL	220,000
3.0 DRAINAGE	60,000
Total	**$6,579,600**

Note:

(1) All unit prices are based on 2006.

(2) Costs for the removal and relocation power lines to be determined by others during detailed design phase of this project.

(3) Cost of water main, sanitary sewer and storm upgrades required in the study area
due to 9th Street Roadway Reconstruction is to be determined by others during detailed design phase of this project.

(4) The Drainage costs shwon are the costs for the upgrades required to the storm sewer system within the road right-of-way.

9th STREET (NISKU SPINE ROAD)

FUNCTIONAL PLANNING STUDY

25 AVENUE TO 41 AVENUE – STAGE 1 DEVELOPMENT

STATION: 5+800 TO 10+550

May 3, 2006

Filename: Q:\053920\Transportation\Functional Study\Estimate\Nisku Costs 25% Overweight.xls

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1.0 ROADWORK					
1.01	180mm ACP	57871	t	$76.97/t	4,454,314
1.02	300mm Gravel Base Course	103644	t	$27.21/t	2,820,167
1.03	300mm Pit Run	112636	t	$21.25/t	2,393,515
1.04	Sub-grade Preparation	119036	m^2	$0.48/$m^2$	57,137
1.05	Pavement Marking	17543	m	$0.70/m	12,280
1.06	100mm Top Soil	124785	m^2	$4.29/$m^2$	535,327
1.07	Seeding	124785	m^2	$0.48/$m^2$	59,897
1.08	Clearing R.O.W.	211655	m^2	$1.90/$m^2$	402,145
1.09	Common Excavation	19263	m^3	$18.77/$m^3$	361,562
1.10	Borrow Excavation	130850	m^3	$9.43/$m^3$	1,233,916
1.11	Traffic Signs	1	LS	$13,000	13,000
				Sub Total	**$12,343,259**
2.0 ELECTRICAL					
2.01	Illumination	48	lights	$10,000/light	480,000
				Sub Total	**$480,000**
3.0 DRAINAGE					
3.01	Culverts (800mm dia C.S.P.)	462	m	$260/m	120,120
3.02	Riprap	66	m^3	$150/$m^3$	9,900
				Sub Total	**$130,020**
4.0 BRIDGE STRUCTURE					
	Includes Railing, Decks, Girders, Abutment and Pavement Structure	1	LS	$1,300,000	**$1,300,000**

SUMMARY	
1.0 ROADWORK	12,343,300
2.0 ELECTRICAL	480,000
3.0 DRAINAGE	130,020
4.0 BRIDGE STRUCTURE	1,300,000
Total	**$14,253,320**

Note:

(1) All unit prices are based on 2006.

(2) Costs for the removal and relocation power lines to be determined by others during detailed design phase of this project.

(3) Cost of water main, sanitary sewer and storm upgrades required in the study area due to 9th Street Roadway Reconstruction is to be determined by others during detailed design phase of this project.

(4) The Drainage costs shwon are the costs for the upgrades required to the storm sewer system within the road right-of-way.

9th STREET (NISKU SPINE ROAD)

FUNCTIONAL PLANNING STUDY

ROAD FULL DEVELOPMENT SUMMARY

Filename: Q:\053920\Transportation\Functional Study\Estimate\Nisku Costs.xls

Item	Description	Street Sections				Amount
		Airport Rd to 15 Ave	15 Ave to Hwy 625	Hwy 625 to 25 Ave	25 Ave to 41 Ave	
1	Roadwork	$6,487,000	$7,529,000	$10,197,000	$18,535,000	$42,748,000
2	Electrical	$650,000	$770,000	$790,000	$1,310,000	$3,520,000
3	Drainage	$20,000	$47,000	$60,000	$131,000	$258,000
4	Bridge Structure	-	-	-	$2,600,000	$2,600,000
Sub-Total		**$7,157,000**	**$8,346,000**	**$11,047,000**	**$22,576,000**	**$49,126,000**
Contingencies (15%)		**$1,074,000**	**$1,252,000**	**$1,658,000**	**$3,387,000**	**$7,371,000**
Total		**$8,231,000**	**$9,598,000**	**$12,705,000**	**$25,963,000**	**$56,497,000**
Engineering and Administration (12.5%)		**$1,029,000**	**$1,200,000**	**$1,589,000**	**$3,246,000**	**$7,064,000**
Grand Total		**$9,260,000**	**$10,798,000**	**$14,294,000**	**$29,209,000**	**$63,561,000**

Note:

(1) All unit prices are based on 2006.

(2) Costs for the removal and relocation power lines to be determined by others during detailed design phase of this project.

(3) Cost of water main, sanitary sewer and storm upgrades required in the study area
due to 9th Street Roadway Reconstruction is to be determined by others during detailed design phase of this project.

(4) The Drainage costs shwon are the costs for the upgrades required to the storm sewer system within the road right-of-way.

9th STREET (NISKU SPINE ROAD)

FUNCTIONAL PLANNING STUDY

STAGE 1 DEVELOPMENT SUMMARY

Filename: Q:\053920\Transportation\Functional Study\Estimate\Nisku Costs.xls

Item	Description	Street Sections				Amount
		Airport Rd to 15 Ave	15 Ave to Hwy 625	Hwy 625 to 25 Ave	25 Ave to 41 Ave	
1	Roadwork	$3,094,000	$4,218,000	$5,553,000	$10,983,000	$23,848,000
2	Electrical	$500,000	$210,000	$220,000	$480,000	$1,410,000
3	Drainage	-	$47,000	$60,000	$131,000	$238,000
4	Bridge Structure	-	-	-	$1,300,000	$1,300,000
Sub-Total		**$3,594,000**	**$4,475,000**	**$5,833,000**	**$12,894,000**	**$26,796,000**
Contingencies (15%)		**$540,000**	**$672,000**	**$875,000**	**$1,935,000**	**$4,022,000**
Total		**$4,134,000**	**$5,147,000**	**$6,708,000**	**$14,829,000**	**$30,818,000**
Engineering and Administration (12.5%)		**$517,000**	**$644,000**	**$839,000**	**$1,854,000**	**$3,854,000**
Grand Total		**$4,651,000**	**$5,791,000**	**$7,547,000**	**$16,683,000**	**$34,672,000**

Note:

(1) All unit prices are based on 2006.

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(3) Cost of water main, sanitary sewer and storm upgrades required in the study area
due to 9th Street Roadway Reconstruction is to be determined by others during detailed design phase of this project.

(4) The Drainage costs shwon are the costs for the upgrades required to the storm sewer system within the road right-of-way.

9th STREET (NISKU SPINE ROAD)

FUNCTIONAL PLANNING STUDY

AIRPORT ROAD TO 15 AVENUE – FULL DEVELOPMENT

STATION: 0+080 TO 1+500

May 3, 2006

Filename: Q:\053920\Transportation\Functional Study\Estimate\Nisku Costs.xls

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1.0 ROADWORK					
1.01	125mm ACP	18170	t	$76.97/t	1,398,545
1.02	300mm Gravel Base Course	47113	t	$27.21/t	1,281,931
1.03	300mm Pit Run	51491	t	$21.25/t	1,094,182
1.04	Sub-grade Preparation	54553	m²	$0.48/m²	26,185
1.05	600mm Width Concrete Curb and Gutter	0	m	$153.21/m	0
1.06	900mm Width Concrete Curb and Gutter	5941	m	$191.51/m	1,137,761
1.07	150mm Curb and Cutter Gravel Base	0	t	$27.21/t	0
1.08	200mm Curb and Gutter Gravel Base	3508	t	$27.21/t	95,441
1.09	Median Strip	707	m²	$266.25/m²	188,239
1.10	Pavement Marking	9533	m	$0.70/m	6,673
1.11	100mm Top Soil	65223	m²	$4.29/m²	279,805
1.12	Seeding	65223	m²	$0.48/m²	31,307
1.13	Clearing R.O.W.	107481	m²	$1.90/m²	204,213
1.14	Common Excavation	29596	m³	$18.77/m³	555,517
1.15	Excess Material	19410	m³	$9.43/m³	183,036
1.16	Traffic Signs	1	LS	$3,500	3,500
				Sub Total	**$6,486,335**
2.0 ELECTRICAL					
2.01	Illumination	30	lights	$10,000/light	300,000
2.02	Traffic Signals	1	LS	$350,000	350,000
				Sub Total	**$650,000**
3.0 DRAINAGE					
3.01	Sanitary Pipe Extension	12	m	$1,000/m	12,000
3.02	Manhole Relocation	1	ea	$7,500/MH	7,500
				Sub Total	**$19,500**

SUMMARY	
1.0 ROADWORK	6,486,400
2.0 ELECTRICAL	650,000
3.0 DRAINAGE	19,500
Total	**$7,155,900**

Note:

(1) All unit prices are based on 2006.

(2) Costs for the removal and relocation power lines to be determined by others during detailed design phase of this project.

(3) Cost of water main, sanitary sewer and storm upgrades required in the study area due to 9th Street Roadway Reconstruction is to be determined by others during detailed design phase of this project.

(4) The Drainage costs shwon are the costs for the upgrades required to the storm sewer system within the road right-of-way.

9th STREET (NISKU SPINE ROAD)

FUNCTIONAL PLANNING STUDY

15 AVENUE TO HIGHWAY 625 – FULL DEVELOPMENT

STATION: 1+500 TO 3+600

May 3, 2006

Filename: Q:\053920\Transportation\Functional Study\Estimate\Nisku Costs.xls

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1.0 ROADWORK					
1.01	125mm ACP	24562	t	$76.97/t	1,890,537
1.02	300mm Gravel Base Course	63375	t	$27.21/t	1,724,443
1.03	300mm Pit Run	68910	t	$21.25/t	1,464,332
1.04	Sub-grade Preparation	72842	m^2	$0.48/$m^2$	34,964
1.05	600mm Width Concrete Curb and Gutter	0	m	$153.21/m	0
1.06	900mm Width Concrete Curb and Gutter	4180	m	$191.51/m	800,512
1.07	150mm Curb and Cutter Gravel Base	0	t	$27.21/t	0
1.08	200mm Curb and Gutter Gravel Base	2468	t	$27.21/t	67,151
1.09	Median Strip	554	m^2	$266.25/$m^2$	147,503
1.10	Pavement Marking	10430	m	$0.70/m	7,301
1.11	100mm Top Soil	85812	m^2	$4.29/$m^2$	368,132
1.12	Seeding	85812	m^2	$0.48/$m^2$	41,190
1.13	Clearing R.O.W.	135101	m^2	$1.90/$m^2$	256,692
1.14	Common Excavation	31847	m^3	$18.77/$m^3$	597,768
1.15	Excess Material	13249	m^3	$9.43/$m^3$	124,938
1.16	Traffic Signs	1	LS	$3,500	3,500
				Sub Total	**$7,528,962**
2.0 ELECTRICAL					
2.01	Illumination	42	lights	$10,000/light	420,000
2.02	Traffic Signals	1	LS	$350,000	350,000
				Sub Total	**$770,000**
3.0 DRAINAGE					
3.01	Culverts (800mm dia C.S.P.)	170	m	$260/m	44,200
3.02	Riprap	18	m^3	$150/$m^3$	2,700
				Sub Total	**$46,900**

SUMMARY		
1.0 ROADWORK		7,529,000
2.0 ELECTRICAL		770,000
3.0 DRAINAGE		46,900
	Total	**$8,345,900**

Note:

(1) All unit prices are based on 2006.

(2) Costs for the removal and relocation power lines to be determined by others during detailed design phase of this project.

(3) Cost of water main, sanitary sewer and storm upgrades required in the study area due to 9th Street Roadway Reconstruction is to be determined by others during detailed design phase of this project.

(4) The Drainage costs shwon are the costs for the upgrades required to the storm sewer system within the road right-of-way.

9th STREET (NISKU SPINE ROAD)

FUNCTIONAL PLANNING STUDY

HIGHWAY 625 TO 25 AVENUE – FULL DEVELOPMENT

STATION: 3+600 TO 5+800

May 3, 2006

Filename: Q:\053920\Transportation\Functional Study\Estimate\Nisku Costs.xls

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1.0 ROADWORK					
1.01	125mm ACP	33919	t	$76.97/t	2,610,745
1.02	300mm Gravel Base Course	86644	t	$27.21/t	2,357,571
1.03	300mm Pit Run	93191	t	$21.25/t	1,980,311
1.04	Sub-grade Preparation	98033	m^2	$0.48/$m^2$	47,056
1.05	600mm Width Concrete Curb and Gutter	0	m	$153.21/m	0
1.06	900mm Width Concrete Curb and Gutter	5521	m	$191.51/m	1,057,327
1.07	150mm Curb and Cutter Gravel Base	0	t	$27.21/t	0
1.08	200mm Curb and Gutter Gravel Base	3260	t	$27.21/t	88,694
1.09	Median Strip	2359	m^2	$266.25/$m^2$	628,084
1.10	Pavement Marking	14919	m	$0.70/m	10,443
1.11	100mm Top Soil	95193	m^2	$4.29/$m^2$	408,376
1.12	Seeding	95193	m^2	$0.48/$m^2$	45,692
1.13	Clearing R.O.W.	169270	m^2	$1.90/$m^2$	321,613
1.14	Common Excavation	22153	m^3	$18.77/$m^3$	415,812
1.15	Borrow Excavation	23374	m^3	$9.43/$m^3$	220,417
1.16	Traffic Signs	1	LS	$4,000	4,000
				Sub Total	**$10,196,141**
2.0 ELECTRICAL					
2.01	Illumination	44	lights	$10,000/light	440,000
2.02	Traffic Signals	1	LS	$350,000	350,000
				Sub Total	**$790,000**
3.0 DRAINAGE					
3.01	Culverts (800mm dia C.S.P.)	210	m	$260/m	54,600
3.02	Riprap	36	m^3	$150/$m^3$	5,400
				Sub Total	**$60,000**

SUMMARY	
1.0 ROADWORK	10,196,200
2.0 ELECTRICAL	790,000
3.0 DRAINAGE	60,000
Total	**$11,046,200**

Note:

(1) All unit prices are based on 2006.

(2) Costs for the removal and relocation power lines to be determined by others during detailed design phase of this project.

(3) Cost of water main, sanitary sewer and storm upgrades required in the study area
due to 9th Street Roadway Reconstruction is to be determined by others during detailed design phase of this project.

(4) The Drainage costs shwon are the costs for the upgrades required to the storm sewer system within the road right-of-way.

9th STREET (NISKU SPINE ROAD)

FUNCTIONAL PLANNING STUDY

25 AVENUE TO 41 AVENUE – FULL DEVELOPMENT

STATION: 5+800 TO 10+550

May 3, 2006

Filename: Q:\053920\Transportation\Functional Study\Estimate\Nisku Costs.xls

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1.0 ROADWORK					
1.01	125mm ACP	61828	t	$76.97/t	4,758,901
1.02	300mm Gravel Base Course	159453	t	$27.21/t	4,338,718
1.03	300mm Pit Run	173286	t	$21.25/t	3,682,330
1.04	Sub-grade Preparation	183133	m^2	$0.48/$m^2$	87,904
1.05	600mm Width Concrete Curb and Gutter	736	m	$153.21/m	112,763
1.06	900mm Width Concrete Curb and Gutter	9108	m	$191.51/m	1,744,273
1.07	150mm Curb and Cutter Gravel Base	217	t	$27.21/t	5,912
1.08	200mm Curb and Gutter Gravel Base	5377	t	$27.21/t	146,318
1.09	Median Strip	1131	m^2	$266.25/$m^2$	301,129
1.10	Pavement Marking	26989	m	$0.70/m	18,892
1.11	100mm Top Soil	191977	m^2	$4.29/$m^2$	823,580
1.12	Seeding	191977	m^2	$0.48/$m^2$	92,149
1.13	Clearing R.O.W.	325624	m^2	$1.90/$m^2$	618,685
1.14	Common Excavation	29635	m^3	$18.77/$m^3$	556,249
1.15	Borrow Excavation	130850	m^3	$9.43/$m^3$	1,233,916
1.16	Traffic Signs	1	LS	$13,000	13,000
				Sub Total	**$18,534,718**
2.0 ELECTRICAL					
2.01	Illumination	96	lights	$10,000/light	960,000
2.02	Traffic Signals	1	LS	$350,000	350,000
				Sub Total	**$1,310,000**
3.0 DRAINAGE					
3.01	Culverts (800mm dia C.S.P.)	462	m	$260/m	120,120
3.02	Riprap	66	m^3	$150/$m^3$	9,900
				Sub Total	**$130,020**
4.0 BRIDGE STRUCTURE					
	Includes Railing, Decks, Girders, Abutment and Pavement Structure	2	LS	$1,300,000	**$2,600,000**

SUMMARY	
1.0 ROADWORK	18,534,800
2.0 ELECTRICAL	1,310,000
3.0 DRAINAGE	130,020
4.0 BRIDGE STRUCTURE	2,600,000
Total	**$22,574,820**

Note:

(1) All unit prices are based on 2006.

(2) Costs for the removal and relocation power lines to be determined by others during detailed design phase of this project.

(3) Cost of water main, sanitary sewer and storm upgrades required in the study area due to 9th Street Roadway Reconstruction is to be determined by others during detailed design phase of this project.

(4) The Drainage costs shwon are the costs for the upgrades required to the storm sewer system within the road right-of-way.

9th STREET (NISKU SPINE ROAD)

FUNCTIONAL PLANNING STUDY

AIRPORT ROAD TO 15 AVENUE – STAGE 1 DEVELOPMENT

STATION: 0+080 TO 1+500

May 3, 2006

Filename: Q:\053920\Transportation\Functional Study\Estimate\Nisku Costs.xls

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1.0 ROADWORK					
1.01	125mm ACP	11811	t	$76.97/t	909,093
1.02	300mm Gravel Base Course	30623	t	$27.21/t	833,255
1.03	300mm Pit Run	33469	t	$21.25/t	711,218
1.04	Sub-grade Preparation	35459	m^2	$0.48/$m^2$	17,021
1.05	Pavement Marking	6196	m	$0.70/m	4,338
1.06	100mm Top Soil	18294	m^2	$4.29/$m^2$	78,481
1.07	Seeding	18294	m^2	$0.48/$m^2$	8,781
1.08	Clearing R.O.W.	25070	m^2	$1.90/$m^2$	47,633
1.09	Common Excavation	19237	m^3	$18.77/$m^3$	361,086
1.10	Excess Material	12617	m^3	$9.43/$m^3$	118,974
1.11	Traffic Signs	1	LS	$3,500	3,500
				Sub Total	**$3,093,379**
2.0 ELECTRICAL					
2.01	Illumination	15	lights	$10,000/light	150,000
2.02	Traffic Signals	1	LS	$350,000	350,000
				Sub Total	**$500,000**

SUMMARY	
1.0 ROADWORK	3,093,400
2.0 ELECTRICAL	500,000
Total	**$3,593,400**

Note:

(1) All unit prices are based on 2006.

(2) Costs for the removal and relocation power lines to be determined by others during detailed design phase of this project.

(3) Cost of water main, sanitary sewer and storm upgrades required in the study area due to 9th Street Roadway Reconstruction is to be determined by others during detailed design phase of this project.

(4) The Drainage costs shwon are the costs for the upgrades required to the storm sewer system within the road right-of-way.

9th STREET (NISKU SPINE ROAD)

FUNCTIONAL PLANNING STUDY

15 AVENUE TO HIGHWAY 625 – STAGE 1 DEVELOPMENT

STATION: 1+500 TO 3+600

May 3, 2006

Filename: Q:\053920\Transportation\Functional Study\Estimate\Nisku Costs.xls

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1.0 ROADWORK					
1.01	125mm ACP	15965	t	$76.97/t	1,228,826
1.02	300mm Gravel Base Course	41194	t	$27.21/t	1,120,888
1.03	300mm Pit Run	44791	t	$21.25/t	951,816
1.04	Sub-grade Preparation	47348	m^2	$0.48/$m^2$	22,727
1.05	Pavement Marking	6780	m	$0.70/m	4,746
1.06	100mm Top Soil	45179	m^2	$4.29/$m^2$	193,818
1.07	Seeding	45179	m^2	$0.48/$m^2$	21,686
1.08	Clearing R.O.W.	105294	m^2	$1.90/$m^2$	200,059
1.09	Common Excavation	20701	m^3	$18.77/$m^3$	388,549
1.10	Excess Material	8612	m^3	$9.43/$m^3$	81,210
1.11	Traffic Signs	1	LS	$3,500	3,500
				Sub Total	**$4,217,824**
2.0 ELECTRICAL					
2.01	Illumination	21	lights	$10,000/light	210,000
				Sub Total	**$210,000**
3.0 DRAINAGE					
3.01	Culverts (800mm dia C.S.P.)	170	m	$260/m	44,200
3.02	Riprap	18	m^3	$150/$m^3$	2,700
				Sub Total	**$46,900**

SUMMARY		
1.0 ROADWORK		4,217,900
2.0 ELECTRICAL		210,000
3.0 DRAINAGE		46,900
	Total	**$4,474,800**

Note:

(1) All unit prices are based on 2006.

(2) Costs for the removal and relocation power lines to be determined by others during detailed design phase of this project.

(3) Cost of water main, sanitary sewer and storm upgrades required in the study area
due to 9th Street Roadway Reconstruction is to be determined by others during detailed design phase of this project.

(4) The Drainage costs shwon are the costs for the upgrades required to the storm sewer system within the road right-of-way.

9th STREET (NISKU SPINE ROAD)

FUNCTIONAL PLANNING STUDY

HIGHWAY 625 TO 25 AVENUE – STAGE 1 DEVELOPMENT

STATION: 3+600 TO 5+800

May 3, 2006

Filename: Q:\053920\Transportation\Functional Study\Estimate\Nisku Costs.xls

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1.0 ROADWORK					
1.01	125mm ACP	22047	t	$76.97/t	1,696,958
1.02	300mm Gravel Base Course	56318	t	$27.21/t	1,532,421
1.03	300mm Pit Run	60574	t	$21.25/t	1,287,202
1.04	Sub-grade Preparation	63722	m^2	$0.48/$m^2$	30,586
1.05	Pavement Marking	9697	m	$0.70/m	6,788
1.06	100mm Top Soil	61875	m^2	$4.29/$m^2$	265,445
1.07	Seeding	61875	m^2	$0.48/$m^2$	29,700
1.08	Clearing R.O.W.	110026	m^2	$1.90/$m^2$	209,048
1.09	Common Excavation	14399	m^3	$18.77/$m^3$	270,278
1.10	Borrow Excavation	23374	m^3	$9.43/$m^3$	220,417
1.11	Traffic Signs	1	LS	$4,000	4,000
				Sub Total	**$5,552,843**
2.0 ELECTRICAL					
2.01	Illumination	22	lights	$10,000/light	220,000
				Sub Total	**$220,000**
3.0 DRAINAGE					
3.01	Culverts (800mm dia C.S.P.)	210	m	$260/m	54,600
3.02	Riprap	36	m^3	$150/$m^3$	5,400
				Sub Total	**$60,000**

SUMMARY	
1.0 ROADWORK	5,552,900
2.0 ELECTRICAL	220,000
3.0 DRAINAGE	60,000
Total	**$5,832,900**

Note:

(1) All unit prices are based on 2006.

(2) Costs for the removal and relocation power lines to be determined by others during detailed design phase of this project.

(3) Cost of water main, sanitary sewer and storm upgrades required in the study area
due to 9th Street Roadway Reconstruction is to be determined by others during detailed design phase of this project.

(4) The Drainage costs shwon are the costs for the upgrades required to the storm sewer system within the road right-of-way.

9th STREET (NISKU SPINE ROAD)

FUNCTIONAL PLANNING STUDY

25 AVENUE TO 41 AVENUE – STAGE 1 DEVELOPMENT

STATION: 5+800 TO 10+550

May 3, 2006

Filename: Q:\053920\Transportation\Functional Study\Estimate\Nisku Costs.xls

ITEM	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL
1.0 ROADWORK					
1.01	125mm ACP	40188	t	$76.97/t	3,093,270
1.02	300mm Gravel Base Course	103644	t	$27.21/t	2,820,167
1.03	300mm Pit Run	112636	t	$21.25/t	2,393,515
1.04	Sub-grade Preparation	119036	m^2	$0.48/$m^2$	57,137
1.05	Pavement Marking	17543	m	$0.70/m	12,280
1.06	100mm Top Soil	124785	m^2	$4.29/$m^2$	535,327
1.07	Seeding	124785	m^2	$0.48/$m^2$	59,897
1.08	Clearing R.O.W.	211655	m^2	$1.90/$m^2$	402,145
1.09	Common Excavation	19263	m^3	$18.77/$m^3$	361,562
1.10	Borrow Excavation	130850	m^3	$9.43/$m^3$	1,233,916
1.11	Traffic Signs	1	LS	$13,000	13,000
				Sub Total	**$10,982,215**
2.0 ELECTRICAL					
2.01	Illumination	48	lights	$10,000/light	480,000
				Sub Total	**$480,000**
3.0 DRAINAGE					
3.01	Culverts (800mm dia C.S.P.)	462	m	$260/m	120,120
3.02	Riprap	66	m^3	$150/$m^3$	9,900
				Sub Total	**$130,020**
4.0 BRIDGE STRUCTURE					
	Includes Railing, Decks, Girders, Abutment and Pavement Structure	1	LS	$1,300,000	**$1,300,000**

SUMMARY	
1.0 ROADWORK	10,982,300
2.0 ELECTRICAL	480,000
3.0 DRAINAGE	130,020
4.0 BRIDGE STRUCTURE	1,300,000
Total	**$12,892,320**

Note:

(1) All unit prices are based on 2006.

(2) Costs for the removal and relocation power lines to be determined by others during detailed design phase of this project.

(3) Cost of water main, sanitary sewer and storm upgrades required in the study area due to 9th Street Roadway Reconstruction is to be determined by others during detailed design phase of this project.

(4) The Drainage costs shwon are the costs for the upgrades required to the storm sewer system within the road right-of-way.

G Appendix G - Record of Stakeholders Meetings

Date:	2005-11-10	**File:**	05-151
Time:	9.30 AM to 11.00 AM	**Page:**	1 of 3
Project:	9th Street (Nisku Spine Road) Functional Planning Study		
Client:	Leduc County		
Location:	Meeting Room, Leduc County Office		
Present:	John Schonewille, Councillor Ward 3, Leduc County Des Mryglod, Manager, Engineering, Leduc County Janis Fong, Manager, Public Works & Infrastructure, Leduc County Bryan Petzold, Alberta Manager Transportation, Associated Engineering Subbu Gopalakrishnan, Senior Transportation Engineer, Associated Engineering		
Distribution:	Those Present, Ken Kalirai, Planning & Development Department, Leduc County		

RECORD OF MEETING

These minutes are considered to be complete and correct. Please advise the writer within one week of any errors or omissions, otherwise these minutes will be considered to be an accurate record of the discussions.

Action By: **Discussion:**

1. Introductions/Roles and Responsibilities

Info

1.1. Introductions by all present. Project Steering Committee (PSC) will be comprised of John Schonewille, Des Mryglod, Janis Fong and Ken Kalirai. Ken Kalirai is the representative from Planning and Development. Ken could not attend today's meeting.

1.2. Record of PSC Meetings to be circulated to all PSC members.

2. Review Assignment Methodology

Project Team

2.1. Subbu provided an overview of the study methodology.

2.2. Leduc County asked AE to consider an Urban Section for 9th Street as an option.

2.3. Leduc County asked AE to arrive at the Design Vehicle for the study taking in to consideration the oversize modules using the 9th Street. Consideration to be given in the pavement structure to account for heavy loads (while preparing the cost estimates).

2.4. 9th Street to be considered as a "High Load Corridor".

2.5. Access Management Strategy to identify the need for Service Roads.

2.6. The traffic modeling results, Regional Travel Model (RTM) data from the City of Edmonton and traffic capacity analysis for the study will provide the trigger points for 9th Street Corridor redevelopment.

2.7. AE project team to review Blackmud Creek Flood Plain Study Report. Storm Water

Action By: **Discussion:**

Management/Drainage is one of the critical issues to be addressed during this study. Stormwater Management for the existing development is still an issue.

2.8. Nisku Business Association (NBA), Landowners along 9th Street, Alberta Infrastructure & Transportation (AIT), the City of Edmonton and the City of Leduc will be the primary stakeholders for this project.

2.9. AE team to meet with the key NBA Board Members to discuss the study activities and obtain inputs. This project can be discussed in NBA's January 2006 meeting.

2.10. Open House during third of February 2006 should be convenient for the various stakeholders. Open House could be held in Nisku Recreation Centre or Nisku Inn.

2.11. Format for the open house will be decided as the study progresses.

2.12. Direct mail-out for open house to be provided all stakeholders/landowners along new alignment.

2.13. Advertisements for open house will be placed in Nisku Business Association (NBA), Landowners along 9th Street, Road Signs at key locations, advertisements in LaNouvelle Beaumont, the Wildcatter and other local papers.

2.14. 15 Copies of the Draft Functional Planning Report will be submitted to Leduc County.

3. Review Project Schedule

Project Team

3.1. AE to submit revised Project Schedule to reflect the revised project start date and revised open house date.

4. Establish Assignment Communication and Reporting Strategy

4.1. Des Mryglod will be the primary contact from Leduc County. All project correspondence/information requests should be addressed to Des.

Info

4.2. Bryan Petzold will be the Corporate Sponsor for Associated Engineering's (AE) Project Team. Bryan will ensure the Project Manager receive all of necessary resources and corporate support. Bryan will conduct Quality Assurance/Quality Control of Project Deliverables.

4.3. Subbu Gopalakrishnan will be the Project Manager for AE's Project Team. Subbu will be the primary contact for AE's Project Team for day-to-day activities.

5. Collection of Relevant Study Reports

Project Team/Leduc County

5.1. Leduc County provided a copy of the relevant study reports and traffic count data to project team.

5.2. Project team to provide a list of electronic data requirements such as air photo

Action By: **Discussion:**

information, cadastral information, Digital Elevation Model (DEM) etc. to Leduc County.

5.3. Project team to review the available traffic count data and to conduct additional traffic counts to cover data gaps.

5.4. Leduc County to provide the project team a copy of recent Traffic Impact Assessment (TIA) done for a development South-West of Airport Road/9th Street Intersection.

5.5. Project team to meet with AIT to obtain information on the study in progress for the Twinning of SH 625 between Sparrow Drive and 9th Street.

5.6. Project team to meet with AIT to obtain information on future interchange plans for Highway 2 and 25 Avenue SW.

6. Review Traffic Accommodation and Safety Requirements during Field Survey

6.1. Project team will conduct GPS Center Line Surveys.

6.2. Project team's preference is for Grid Coordinates.

6.3. Project team to produce 1:2000 scale plans in 10TM NAD83 Formats.

6.4. Project to submit a Traffic Accommodation Strategy (TAS) during field surveys in the format recommended by Alberta Infrastructure and Transportation (AIT) for Leduc County's approval.

Project Team

6.5. Field surveys can be conducted during night as long as traffic accommodation through appropriate lighting is provided. Safety of road users and survey crew would be the important factor.

6.6. Project team to obtain written permission from landowners prior to surveys for right-of-entry.

6.7. Project team to provide 24 hours notice to Leduc County prior to commencing the field surveys.

7. Review Consultant Agreement Conditions

Project Team

7.1. Leduc County provided a draft copy of the Consultant Agreement for this study to the Project Team for review.

Date:	2006-01-09	**File:**	05-3920
Time:	1.30 PM to 3.30 PM	**Page:**	1 of 4
Project:	9th Street (Nisku Spine Road) Functional Planning Study		
Client:	Leduc County		
Location:	Meeting Room, Leduc County Office		
Present:	John Schonewille, Councillor Ward 3, Leduc County Des Mryglod, Manager, Engineering, Leduc County Janis Fong, Manager, Public Works & Infrastructure, Leduc County Ken Kalirai, Planner, Planning & Development, Leduc County Bryan Petzold, Alberta Manager Transportation, Associated Engineering Subbu Gopalakrishnan, Senior Transportation Engineer, Associated Engineering Mapalad Santera Jr., Senior Transportation Design Technologist, Associated Engineering		
Distribution:	All Present, Larry Bodnaruk (Associated Engineering)		

RECORD OF MEETING

These minutes are considered to be complete and correct. Please advise the writer within one week of any errors or omissions, otherwise these minutes will be considered to be an accurate record of the discussions.

Action By:	**Discussion:**
	1. Study Progress Update
	1.1. Introductions by all present.
Info	1.2. Subbu presented the study progress to date. Subbu reviewed the Monthly Progress Report for the January 2006 and mentioned that most of the study activities are proceeding according to schedule.
	2. Review of Topographical Surveys & Base Plans
	2.1. Subbu provided an overview of the topographical surveys conducted for this study. Subbu mentioned that the topographical surveys are complete.
Project Team	2.2. Subbu reviewed the base plan information with Leduc County. Subbu indicated that the proposed alignment shown in the north end of the 9th Street is still under review and work in progress.
	2.3. Leduc County asked Associated Engineering (AE) project team to revise the proposed alignment (North of Twp Rd 510) shown in the base plans to match the alignment

Action By: **Discussion:**

shown in the 1985 Functional Planning Study for Nisku Spine Road.

2.4. AE Study Team presented a plan showing the existing direct access off 9th Street. Leduc County reviewed the plan and indicated the temporary access locations off 9th Street.

3. Review of Geometric Design Criteria

3.1. AE Study Team discussed the Geometric Design Criteria (prepared and circulated during December 2005) in detail with the Leduc County.

3.2. AE Study Team discussed the options available for the median treatment. Both raised median and depressed median options are possible for the rural cross-section.

3.3. AE Study Team mentioned that the proposed depressed 13.4m median for the alignment North of Twp Rd 510 would allow for future widening of 9th Street to 6 lanes with an urban cross section.

3.4. All present discussed in detail the Leduc County proposal to design 9th Street for a design speed for 110 km/h. AE Study Team explained that normally expressways are designed for the higher speed limits. The alignment North and South of Nisku Spine Road (in the City of Leduc and City of Edmonton limits) would likely be designed for a design speed of 80 km/h. Therefore AE Study Team suggested to Leduc County to design 9th Street for a design speed of 90 km/h. Leduc County asked AE Study Team to proceed with a design speed of 90 km/h and suggested to use upper limits/maximum value of the design parameters for horizontal and vertical alignment in the functional design.

Project Team

3.5. Leduc County asked AE Study Team to verify the existing vertical alignment along 9th Street at 25 Avenue SW and North of 10 Avenue SW.

3.6. Leduc County asked AE Study Team to confirm the long term right-of-way requirements at the key intersections of 9th Street with Airport Road, 25 Avenue (SH 625) and Twp Rd 510. Leduc County wants to proceed with protecting the right-of-way for 9th Street/Airport Road as soon as possible. AE Study Team will arrive at the future intersection configuration based on the year 2020 Traffic Projections shown in the Traffic Impact Assessment (TIA) report for Saurabh Park Light Industrial Estate Development and TIA report for Saunders Lake Area Structure Plan. Leduc County indicated that the Airport Road/9th Street Intersection may have to be shifted West during future upgrades since the right-of-way availability in the South-East Quadrant is limited due to the presence of the Electrical Sub Station.

3.7. The design vehicle for this study was discussed in detail. The AE Study Team suggested the use of WB-36 design vehicle. Slot – left turn lanes at intersections may be required to accommodate concurrent left turn lanes to accommodate WB-36 design vehicle. Leduc County asked the study team to contact PCL Construction and Ledcor Industries to get more information on the Long Combination Vehicles accessing their site.

Action By: **Discussion:**

4. Review of Base Year Traffic Analysis

4.1. The base year traffic analysis for the morning and afternoon peak hour was reviewed in detail. Except the 9th Street/SH 625 intersection all intersections are operating well.

Info

4.2. The AE Study Team is still awaiting information on the available long term regional travel model Projections from the City of Edmonton to start the long term traffic analysis.

4.3. Leduc County asked AE Study team to confirm the land use parameters assumptions in the regional travel model for the Nisku Area.

5. Stormwater Drainage Analysis Update

5.1. AE Study Team mentioned that the stormwater drainage analysis for the functional planning study of 9th Street is almost complete. AE Study Team presented a draft plan showing potential areas for stormwater retention along the 9th Street corridor.

Project Team/Leduc County

5.2. AE Study Team submitted a proposal to Leduc County for a comprehensive drainage plan for the Nisku Area. This proposal was submitted based on the AE Study Team's understanding of the review of available studies and reports.

5.3. AE Study Team suggested to Leduc County that this comprehensive drainage plan would help the Leduc County to deal with the future development applications in the Nisku Area.

5.4. AE Study Team offered to meet with Leduc County to discuss this proposal in detail.

5.5. AE Study Team mentioned that they will be starting work on the Environmental Overview for this study from the week starting January 16.

6. Stakeholder Consultation Update

6.1. AE Study Team briefed on the meeting with Alberta Infrastructure & Transportation (Barrhead) and the department's proposal for Outer Ring Road. Leduc County will be attending the presentation by the department at the Alberta Capital Regional Alliance (ACRA) meeting on January 13.

Project Team/Leduc County

6.2. AE Study Team and Des from Leduc County will be attending the meeting at Alberta Infrastructure & Transportation's Stony Plain office (January 13) to get an update on the Detailed Design Study for the Twinning of Highway 625 through Nisku.

6.3. AE Study Team will set up a meeting with Jody Hancock, Transportation Planning Group, the City of Edmonton to discuss City's plans for Nisku Spine Road North of 41 Avenue.

6.4. AE Study Team will contact the affected land owners after getting the approval from Leduc County for the alignment for Nisku Spine Road.

Action By:	Discussion:
	7. Project Schedule
Project Team/Leduc County	7.1. The next design review meeting is scheduled for February 9, 2006 @ 1.30 PM in Leduc County offices.

CE270/05 - Highway 625, Sparrow Drive to E of 9th Street, Nisku (PR05937A)

ATTENDEES:

Alberta Infrastructure and Transportation (INFTRA)
Don Chan, Neal Reynolds, Michael Botros, Murray Armitage, Wilf Cousineau and Linda Murtha

Leduc County
Des Mryglod

Associated Engineering
Bryan Petzold and Subbu Golapakrishnan

Magna IV
Mike Field and Sean Paterson

CH2M Hill
John O'Brien, Michael Chen, Ahmad Shala and Terry Gee

COPIES: Rob Lonson, Kevan Sharp, Michael McLean and Janis Fong

FROM: CH2M HILL

DATE: January 13, 2005

The above noted met at the Stony Plain Offices of Alberta Infrastructure and Transportation (INFTRA). A copy of the Agenda and Project Schedule are attached. The meeting commenced at 10.05h. Don Chan called the meeting to order, beginning with introductions of the people represented at the meeting as some new attendees have been invited to this meeting.

For the benefit of the new attendees Don provided a brief description of the project. In summary, this project is the four-laning of Highway 625 with the addition of raised concrete islands through the Nisku Business Park from Sparrow Drive to 9th Street. The work corresponds to the Stages 1 through 3 improvements as identified in Earth Tech's functional planning study. The construction of this project is not currently on the 3 year program with no confirmed year of construction identified. The focus of the assignment for CH2M HILL is to complete the design and tender package preparation. The preliminary design report has been received from CH2M HILL; the purpose of this meeting is to review and discuss the report.

1.0 Project Progress Review

Ahmad reported on the project progress completed to date as follows:

- The preliminary survey is approximately 90%. HyRoad Surveys is still picking up some information related to culverts in the area of Sparrow Drive and tying in the remaining hydrovac utility exposures.
- The remaining hydrovac exposures are being picked up and will be incorporated with the other survey information once the data has been processed.

- The preliminary soils investigation has been completed by J.R. Paine. The logs have been processed, logs are being processed for incorporation on to the plans and the preliminary soils investigation report is being completed.
- All utility companies in the project area have been contacted. Three major gas lines are encountered within the project limits: a high pressure AltaGas line in the vicinity of 9th Street, an Imperial Oil line in the vicinity of 4th Street, and a low pressure ATCO line in the vicinity of Centre Street. Coordination for the watermain and sewers owned by Leduc County has been difficult. Des suggested that either he or Dave McPhee (780.955.4541) be contacted for future coordination.

Mike Chen provided a summary of the traffic and intersection review. He provided the following summary:

- the biggest change that he found in reviewing the Earth Tech study is that from his analysis of the same data provided in that report a six lane section is required between Sparrow Drive and 5th Street.
- He noted that the analysis outputs are essentially the same, but the report seems to focus on the level of service (LOS) indications rather than the capacity.
- The analysis is based upon the Stage 3 improvements, however, the traffic projections are only to 2010.

Mike Field provided a summary of the illumination review for this section of Highway 625 as follows:

- His review noted that with the exception of a few steel poles west of the railway tracks, all the streetlighting along Highway 625 were on wooden poles.
- Based upon the Department's Highway Lighting Guide, the system will require full replacement to meet the requirements of a suburban highway. The Department does not own the present system.
- If the six lane configuration is adopted, the lights will need to be installed in pairs. This will also be required due to the signals and intersection channelization.
- The suggested system is a screw in base type system with steel davits. This system will be reconfigurable and can be optimized for the four lane and six lane configurations as required.
- The preliminary cost estimate to upgrade the streetlighting for Highway 625 is in the order of $900,000. He can confirm further details pending receipt of a finalized electronic base plan. *(Action: CH2M HILL)*

Other questions and comments include:

<u>Streetlighting</u>

Bryan questioned if the corridor will need to accommodate high loads due to oversized loads from manufacturers such as Ledcor and TIC. The signals will need swivels to accommodate these loads. *(Note: The signals along Highway 625 already have swivel bases, but may need modifications depending upon improvements)*

Neal indicated that a tender is being prepared for modifications to the streetlighting for the Nisku interchange (Highway 2 and Highway 19/625). Expected completion date for the

lighting upgrade is October, 2006. *CH2M HILL can contact Earth Tech for design details. (Action: CH2M HILL)*

Six Laning

A confirmation was requested for the comment on Appendix E, page 2 which indicates that for the 4th Street intersection "2 lanes is adequate but not recommended". Mike indicated that the analysis output show as V/C ratio of 0.9 which while meeting the requirements, it does not provide any capacity for growth. It should also be noted that the traffic project horizon is for 2010, which is only a few years away.

Bryan suggested that the design should provide a projection horizon of at least 20 years (2027) given the significant growth noted in the business park. Don indicated that the original terms of reference do not require further traffic projections and only require construction of the Stages 1, 2 and 3 improvements from the functional planning report.

After some discussion, it was felt that the Department should review and revisit the decision to construct the Stages 1, 2 and 3 improvements. Consideration to possibly construct the six lanes between Sparrow Drive and 5th Street along with the 4 laning or construction of the ultimate stage or some modification of the ultimate stage or Stage 3 should be reviewed. *(Action: Don to review with Regional Management Team)*

2.0 Preliminary Design Report Review

Ahmad reported on the Preliminary Design Report submitted as follows:

Plan Preparation

- The plans submitted are prepared based upon the Stages 1, 2 and 3 improvements in accordance with the Terms of Reference.
- The surfacing strategy used as suggested by EBA, however, no strategy has been provided for the side roads (Sparrow Drive, 4th, 5th, 6th, 8th and 9th Streets).
- The intersection designs have used the WB-21 as the off-tracking has been noted to be worse with this vehicle when compared to the double trailer combinations. A design vehicle similar for oversized modules (63m length x 6.5m wide) has been checked. Detailed analysis may require modifications to the raised traffic islands or the raised concrete medians.
- 25% overweight loading on the roadways as suggested by Leduc County in conjunction with Inspection Services has not been incorporated as of yet.
- Discussions with Doug Younger of Canadian Pacific Railways have been initiated. He indicates that the existing crossing is at the limit for its configuration and if a six lane crossing is required, then new crossing hardware is required – with a minimum one year lead time required to undertake the engineering and construction.

Des reported that Leduc County plans to reconstruct 8th Street this year with likely a full strength pavement. Other intersecting roads will follow in subsequent years. Don suggested that CH2M HILL coordinate with Leduc County to ensure the finished widths, lane configurations and limits of construction at the intersections correspond. *(Actions: Leduc County should coordinate with Linda regarding the rights-of-way acquisitions at the*

intersections and Associated Engineering should coordinate with CH2M HILL regarding the intersection details.)

Design Guidelines

Ahmad highlighted the following design guidelines applied:

- The raised concrete islands are a "slab-on" type with a straight faced curb.
- A design speed of 70 km/hr is used for Highway 625 and 90 km/hr is used for 9th Street.

Bryan commented that they were using a WB-36 design vehicle for their intersection designs.

Intersection Design, Illumination and Railway Crossing details have already been discussed previously.

Bridge Culverts

John O'Brien reported on the bridge sized culvert installations within this project.

He noted that BF 78363 is an installation with 3 smooth-walled steel pipes, each 1,200 mm in diameter. There is no evidence of problems with this installation, however the culverts are nearly full and probably operating under a head of 3-4 metres. The capacities seem adequate. If six laning is to be provided, the culverts will require extension on the inlet end (south ends). There is a bench on the north side, so extension on the north end could possibly be not required or could be minimal. It should be noted that due to the 'steep' existing side slope on the south side and the culverts through Sparrow Drive in this area, that work would be recommended on the south side even if only four lanes are to be provided and no roadway widening is needed.

BF 79690 (1 – 2,280mm Dia) was not discussed at this meeting as it is not expected to be impacted by the work.

Quantity and Cost Estimates

Ahmad indicated that the cost estimates were completed using quantities generated out of the CaiCE program. It was noted that common excavation prices were up significantly from last year. The resulting estimated costs include approximately $3.3M for grading, $5.0M for surfacing, totalling approximately $8.5M for the recommended upgrades. Don noted that the suggested unit prices of $54.48/tonne for ACP and $18.97/tonne for GBC were okay. Terry indicated that 'really rough' estimates would suggest the six laning between Sparrow Drive and 5th Avenue could add in the order of $1M or more.

3.0 Project Schedule Review

Terry commented that although the project was kicked off almost two months late, the project team has made up the time and the project is back on schedule. With the submission of the preliminary engineering package prior to the end of December, 2005 and this review meeting, the detailed design can commence in February, 2006 as planned. This will certainly be dependent upon follow up items requiring resolution discussed during this meeting.

4.0 Other Items

Other items and closing remarks included the following:

Bryan reiterated on behalf of the County the need to consider an appropriate traffic projection horizon, and the confirmation of accommodation of a WB-36 design vehicle and the overdimensional vehicles.

Des indicated that the County and business park would oppose closure of 8th Street as an all-directional intersection even at the Ultimate Stage.

Neal indicated that the 125% loading needs to be confirmed with the commercial vehicles group of the Department (Inspection Services). Should we be providing the structure to accommodate this? *(Action: Don to confirm with Alvin Moroz)*

It was reiterated that a presentation to the Regional Managers needs to be made to request an decision pertaining to the design horizon for this work.

Murray suggested that CH2M HILL review the Development Permits file. It was noted that the access in the sign pullout may no longer be required.

Linda inquired when the right-of-way requirements would be finalized. Terry indicated that if no changes to the preliminary plan and therefore the schedule, right-of-way requirements could be reasonably identified by May of this year.

The meeting adjourned at 11.35h.

TO:	Rob Lonson, Don Chan, Neal Reynolds, Wilf Cousineau, Linda Murtha (INFTRA) Michael McLean, Janis Fong, Des Myrglod (Leduc County) Bryan Petzold, Sabbu Gopalakrishnan (Associated Engineering) Oscar Jofre, Ahmad Shala (CH2M HILL)
FROM:	Terry Gee
SUBJECT:	Highway 625:02, Sparrow Drive to 9th Street (Nisku) Preliminary Engineering Design Review Preliminary Engineering, Detailed Design, Tender Preparation, Construction Supervision and Contract Administration Grading, Granular Base Course, Asphalt Concrete Pavement (EPS) and Other Work
MEETING DATE:	January 13, 2005
MEETING TIME:	10.00-12.00h
DIAL-IN INFORMATION:	
VENUE:	INFTRA Office, Stony Plain, AB

1.0 Project Progress

- Survey
- Soils Investigation
- Utilities Coordination
- Traffic and Intersection Review
- Illumination Review

2.0 Preliminary Design Report

- Plan Preparation
- Design Guidelines
- Intersection Design and Design Vehicle
- Illumination
- Railway Crossing
- Bridge Files (BF 78363 and BF 79690)
- Surfacing Strategy
- Quantity and Cost Estimate ("B" Estimate)

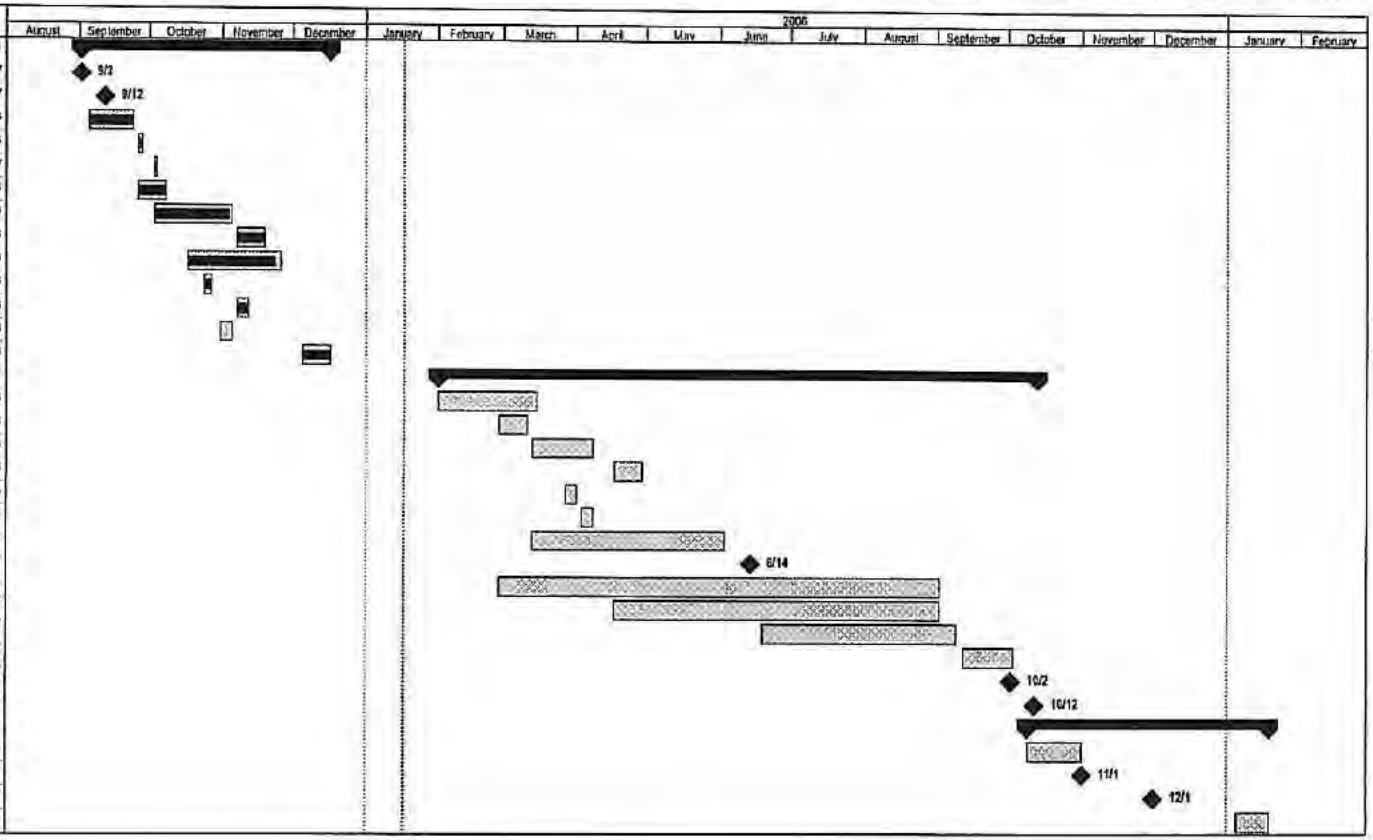
3.0 Project Schedule

4.0 Other Items

Alberta
INFRASTRUCTURE AND TRANSPORTATION

CE270/05
Hwy 625:02, Sparrow Drive - 9th Street (Nisku) (PR00856B)
Preliminary Engineering, Detailed Design and Tender Package Preparation
Grading, Granular Base Course, Asphalt Concrete Pavement (EPS) and Other Work

ID	Task Name	Duration
1	Preliminary Engineering	76 days
2	Project Award	1 day
3	Project Initiation Meeting	1 day
4	Data Collection	15 days
5	Predesign Inspection	2 days
6	Pavement Condition Inspection	1 day
7	Review Surfacing Strategy and Functional Plan	10 days
8	Preliminary Survey and Geotechnical Testing	25 days
9	Intersection and Traffic Operation Analysis	10 days
10	Preliminary Geometric Design	30 days
11	Bridge Culvert Review	3 days
12	Streetlighting Review	5 days
13	Legal Survey - Reference Survey Evidence	5 days
14	Prepare Preliminary Engineering Package	10 days
15	Detailed Design	183 days
16	Detailed Roadway Design	30 days
17	Intersection Design	10 days
18	Streetlighting Design and Coordination	20 days
19	Detailed Surfacing Design	10 days
20	Determine Right-of-way Requirements	5 days
21	Determine Utility Impacts	5 days
22	Plan Preparation, Cost Estimates	60 days
23	Design Review Meeting (Tentative)	1 day
24	Utility Coordination	135 days
25	Land Acquisition	101 days
26	Finalize Design	60 days
27	Prepare Detailed Design Package	15 days
28	Submit Design Package to Region	1 day
29	Design Review Meeting	1 day
30	Tender Package Preparation	74 days
31	Prepare Tender Package	17 days
32	Submit Tender Package to Region	1 day
33	Submit Tender Package to Professional Services	1 day
34	Assistance During Tender Period	10 days



Task
Split
Progress
Milestone
Summary
Rolled Up Task
Rolled Up Split
Rolled Up Milestone
Rolled Up Progress
External Tasks
Project Summary
External Milestone
Deadline

EXHIBIT 4-1
Proposed Design Schedule

Estimated Construction Cost:
Grading - 62,000 m3 at $10 per m3 = $620,000
GBC - 33,000 tonnes at $15 per tonne = $495,000
ACP(EPS) - 31,000 tonnes at $45 per tonne = $1,395,000
Ancillary Items - Estimate $500,000
Total Estimated Construction- $3,010,000

CH2MHILL
Responsible Solutions for a Sustainable Future

Date:	2006-01-18	**File:**	05-3920
Time:	3.00 PM to 4.30 PM	**Page:**	1 of 3
Project:	Nisku Spine Road Functional Planning Study		
Client:	Leduc County		
Location:	The City of Edmonton, 13th Floor, Century Place, 9803-102A Avenue, Edmonton AB T5J 3A3		
Present:	Des Mryglod, Leduc County Ken Kalirai, Leduc County Jody Hancock, City of Edmonton Lorraine Doblanko, City of Edmonton Ben Poole, City of Edmonton Subbu Gopalakrishnan, Associated Engineering		
Distribution:	Those Present		

RECORD OF MEETING

These minutes are considered to be complete and correct. Please advise the writer within one week of any errors or omissions, otherwise these minutes will be considered to be an accurate record of the discussions.

Background

Associated Engineering (AE) has been retained by the Leduc County for completing the Functional Planning Study of Nisku Spine Road (9 Street) from Airport Road to the City of Edmonton Corporate Limits at 41 Avenue SW. The Ellerslie Area Structure Plan shows 91 Street/Parsons Road as the future connection to Nisku Spine Road. This meeting was held to confirm whether the City of Edmonton has done any concept plans or concept design for Parsons Road south of 25 Avenue SW and to collect available information on the "Long Term" or "Year 2025" EMME/2 regional model forecasts for Parsons Road/Nisku Spine Road.

Action By:	**Discussion:**
	1. Introductions
Info	**1.1** Subbu provided an overview of the Nisku Spine Road Functional Planning Study to the City of Edmonton. Subbu mentioned that Parsons Road (Nisku Spine Road)/41 Avenue SW Intersection would be located in the boundary of the City of Edmonton and Leduc County. The intersection treatment required would dictate the right-of-way requirements at this location.
	2. Available Plans
Info	**2.1** The City of Edmonton showed a concept plan prepared in the Year 2000 for the Parsons Road South of 25 Avenue SW with tie-ins to the existing 101 Street at 41 Avenue SW.
	2.2 Parsons Road would have a 7 lane urban cross-section (based on the City of Edmonton design standards) up to 25 Avenue SW. South of 25 Avenue SW the future roadway would have a 5 lane cross-section with the center lane acting as a two-way left turn lane (based on the City

Action By: **Discussion:**

of Edmonton design standards) and a 37 m right-of-way. Three lanes will be constructed during the first stage of construction. No timeline has been set for the construction and it depends on the future development in the area.

2.3 41 Avenue SW would be a 6 lane divided urban arterial roadway. There will likely be no direct access/collector road off 41 Avenue SW between the future proposed interchange at Highway 2/41 Avenue SW and 41 Avenue SW/Parsons Road Intersection. In this section all access/collector roads to the parcels North/South of 41 Avenue SW will be off Parsons Road/Nisku Spine Road. 41 Avenue SW would be a designated truck route and should have allowance for berm on both sides.

2.4 41 Avenue SW/Parsons Road-Nisku Spine Road Intersection needs to be built for urban standards with consideration for channelization, left-turn bays, right-turn bays and raised median to accommodate future growth in the area.

2.5 The City of Edmonton would like to design the intersection for a design speed of 70 kph (posted at 60 kph). The design vehicle for the City of Edmonton's design standards would be WB-21.

2.6 The City of Edmonton's preferred access management would be 200m spacing to accommodate right-in/right-out access.

3. Available Traffic Forecast Information

3.1 The City of Edmonton's Long Term regional model horizon represents full-build out of Edmonton to the current city limits, growth in Sherwood Park, Beaumont, suburban development South of the Ellerslie ASP Area in Leduc County. This horizon represents a City population of 1.5 million and a regional population of 2.5 million, and corresponds to a timeframe of 70 to 90 years in the future.

All

3.2 The City of Edmonton's long term road network included assumptions for an interchange at Highway 2/41 Avenue SW, Outer Ring Road (Twp Rd 510), systems interchange at Outer Ring Road/Highway 2, and service interchange at Outer Ring Road/101 Street.

3.3 It appears that the alignment assumption for Nisku Spine Road South of 41 Avenue SW shown in the regional model is not consistent with the alignment plans by Leduc County. The alignment shown for the Outer Ring Road through Nisku area needs confirmation and will have an impact on the Nisku Spine Road Functional Planning Study. The alignment plan for the Outer Ring Road provided to AE by AIT shows the alignment half mile North of Twp Rd 510, which is different from the alignment assumed in the regional model.

Action By: **Discussion:**

3.4 Bob Ishani is the Alberta Infrastructure and Transportation (AIT) contact for any discussion on the future road network shown in the regional model outside the City boundaries. Leduc County and AE will contact Bob Ishani to discuss this issue further.

3.5 The City of Edmonton mentioned that the land use assumptions included in the long term regional model would be consistent with the land use plans shown in the Leduc County's "North Major Area Structure Plan".

3.6 The City of Edmonton provided long term daily 2-way link volumes, long term AM peak hourly directional volumes, long term AM peak volume/capacity ratios and model input data for the Nisku Area.

3.7 Subbu requested the City of Edmonton to provide long term AM & PM intersection turning movements for the 41 Avenue/Parsons Road Intersection and Highway 625/9 Street Intersection in the Nisku area.

4. Any other Business

4.1 The City of Edmonton provided comments on the Traffic Impact Assessment for the "North Major Area Structure Plan" to Leduc County. Some of the comments are relevant to the assumptions for the future plans for 41 Avenue SW. Leduc County would forward a copy of this comments to AE.

4.2 AE will prepare a concept plan for the 41 Avenue SW/Parsons Road Intersection based on the long term peak hour intersection turning volumes. The concept plan will establish the right-of-way/land requirements for this intersection.

AE **4.3** AE will circulate the draft of the concept plans for the 41 Avenue SW/Parsons Road intersection to the City of Edmonton and Leduc County for review and approval.

4.4 Subbu mentioned that the landowners on the North-East and North-West quadrant of the 41 Avenue SW/Parsons Road Intersection would be part of the Stakeholder Consultation process for the Nisku Spine Road Functional Planning Study.

4.5 Subbu mentioned that there will be a Public Open House for the Nisku Spine Road Functional Planning Study scheduled in March 2006.

4.6 The City of Edmonton asked AE and Leduc County to keep them informed of the study progress.

Date:	2006-02-09	**File:**	05-3920
Time:	1.30 PM to 3.30 PM	**Page:**	1 of 4
Project:	9th Street (Nisku Spine Road) Functional Planning Study		
Client:	Leduc County		
Location:	Meeting Room, Leduc County Office		
Present:	John Schonewille, Councillor Ward 3, Leduc County Des Mryglod, Manager, Engineering, Leduc County Janis Fong, Manager, Public Works & Infrastructure, Leduc County Ken Kalirai, Planner, Planning & Development, Leduc County Subbu Gopalakrishnan, Senior Transportation Engineer, Associated Engineering Mapalad Santera Jr., Senior Transportation Design Technologist, Associated Engineering		
Distribution:	All Present, Bryan Petzold, Alberta Manager Transportation, Associated Engineering		

RECORD OF MEETING

These minutes are considered to be complete and correct. Please advise the writer within one week of any errors or omissions, otherwise these minutes will be considered to be an accurate record of the discussions.

Action By: | **Discussion:**

1. Study Progress Update

Info

1.1. AE Study Team presented the study progress to date. Subbu reviewed the work done so far in traffic analysis, intersection design, selection of preferred cross-section, staging plans, and access management.

2. Review of Base Plans & Proposed Cross-sections

Project Team/Leduc County

2.1. AE Study Team mentioned that the base plans showing the alignment of the future Nisku Spine Road between Twp Rd 510 and 41 Avenue SW was revised based on the comments from the Project Steering Committee (PSC).

2.2. The alignment design was revised reflecting closely based on the plans prepared during the 1985 Functional Planning Studies.

2.3. Maximum design parameter for radius etc. for a design speed of 90 k/h was used.

2.4. AE Study Team requested Leduc County to provide CAD Files for the existing Water/Sewer lines along 9th Street. This information will be shown in the base plans.

2.5. AE Study Team suggested to Leduc County to initiate detailed Area Structure Plans for areas north of Twp Rd 510 along the future spine road alignment to ensure the collector

Action By: **Discussion:**

roads shown in the base plans are appropriate to the future development.

2.6. AE Study Team showed options for the proposed cross-sections during Stage 1 (2 lane rural section), Ultimate (4 lane rural section with raised median), and potential (6 lane rural section with raised median). AE Study Team mentioned that the rural cross-section would be cost effective compared to urban cross-section and raised median is proposed keeping up with the requirements from adjacent jurisdictions (City of Edmonton, Alberta Infrastructure and Transportation, and City of Leduc) at 41 Avenue SW, SH 625, and Airport Road.

3. Review of Long-Term Traffic Forecasts

3.1. AE Study Team briefed the PSC about the meeting they had with the City of Edmonton's Transportation Planning Group.

3.2. AE Study Team mentioned that the study budget for the long term traffic forecasts was based on the assumption that the City of Edmonton's regional model forecasts would be used for the long term traffic capacity analysis. AE Study Team indicated that the alignment of Nisku Spine Road and the proposed Outer Ring Road (by Alberta Infrastructure & Transportation) was shown incorrectly in the regional model network. Therefore, AE Study Team is currently working on a Year 2030 traffic forecasts based on the available land use information from the Area Structure Plans. This exercise will result in arriving the Year 2030 morning and afternoon peak hour traffic volumes for the intersections along Nisku Spine Road.

Project Team

3.3. AE Study Team is using a growth rate of 3% to project the background traffic for future years. Leduc County expressed concerns that this may be on the lower side considering the rapid growth in Nisku Area and asked the AE Study Team to revisit the background traffic growth rates.

3.4. Leduc County mentioned that with the current economic growth in Alberta Nisku Industrial Business Park could be fully build out in the next 5 years.

4. Review of Intersection Design (Airport Road, Twp Rd 510 Realignment & Collector Roads)

4.1. Leduc County asked the AE Study Team to look into the options for the existing Jug Handle Intersection at west of Twp Rd 510 at 9th Street. Twp Rd 510/9th Street Intersection will be relocated further east during the construction of Nisku Spine Road. AE Study Team to come up with a suitable option that will facilitate the southbound truck traffic turning left at Twp Rd 510 from 8th Street.

Leduc County/Project Team

4.2. Leduc County asked the AE Study Team to take into account the potential sight distance issues along Twp Rd 510 West of 8th Street and proximity of SERTS Line at 8th Street/Twp Rd 510 Intersection.

4.3. The plans prepared by AE Study Team showing the long term right-of-way

Action By: **Discussion:**

requirements for the Airport Road/9th Street Intersection will be discussed during the meeting with the City of Leduc, Leduc County, and AE Study team on February 13. AE Study Team to confirm the Airport Road/9th Street Intersection with Altalink for their access requirements to the sub station.

4.4. AE Study team indicated that the AE Study Team will arrive at the required intersection treatment for 9th Street/SH 625 Intersection to identify the long term right-of-way requirements and will provide plans to Alberta Infrastructure & Transportation for review.

4.5. The intersection treatment for 9th Street and 15 Avenue, 25 Avenue, Twp Rd 510, and 41 Avenue SW will be finalized after the long term traffic capacity analysis are complete.

5. Access Management Options

5.1. AE Study Team provided an overview of the long term access management along 9th Street.

5.2. Leduc County mentioned that all direct access to 9th Street off individual property should be eliminated in the long term and access should be consolidated where possible.

5.3. Leduc County asked AE Study Team to provide interim access management plan (Stage 1) and ultimate access management plan.

5.4. Leduc County asked AE Study Team to show one collector road access off Nisku Spine Road to Range Rd 244 in the interim access plan.

Project Team

5.5. Leduc County to provide information to AE Study on the location of new Alta Link Sub Station (next to Transfer Station and Nisku Reservoir) and both facilities needs access.

5.6. Leduc County asked AE Study Team to show one consolidated access to Tuboscope Industries in the long term access management plan.

5.7. AE Study Team to review the contour information for the proposed access road south of 25 Avenue behind the Bar U Ranch Facility.

5.8. AE Study Team to come up with options to provide all directional access to “First Class Painting” and Mastco Yard.

5.9. Existing direct access to Nabors Drilling from 9th Street will be off the Service Road between 17 Avenue and 19 Avenue.

6. Stakeholder Consultation Update

Project Team/Leduc County

6.1. AE Study Team and Leduc County will organize and conduct a public open house for this study on March 22, 2006. The timings for the open house would be 3 PM to 8 PM.

6.2. AE Study Team to prepare a draft copy of the Advertisement for this open house for Leduc County’s approval.

6.3. Advertisement for open house will appear in Nisku Wildcatter and Leduc Representative.

Action By: **Discussion:**

6.4. Individual mail-outs will be sent to all the adjacent landowners and important stakeholders (like Nisku Business Association) for this study.

6.5. AE Study Team will meet with Leduc County on March 13 to review the mock-ups of displays for the public open house.

7. Environmental Overview

Project Team

7.1. AE Study Team indicated that the Environmental Overview for this study is complete and no major concerns are identified.

7.2. AE Study Team to circulate a copy of the base plans to all the concerned regulatory agencies including Alberta Capital Region Waste Water Commission and SERTS.

Date:	2006-03-13	**File:**	05-3920
Time:	1.30 PM to 3.30 PM	**Page:**	1 of 3
Project:	9th Street (Nisku Spine Road) Functional Planning Study		
Client:	Leduc County		
Location:	Meeting Room, Leduc County Office		
Present:	John Schonewille, Councillor Ward 3, Leduc County Des Mryglod, Manager, Engineering, Leduc County Janis Fong, Manager, Public Works & Infrastructure, Leduc County Ken Kalirai, Planner, Planning & Development, Leduc County Bryan Petzold, Group Manager Transportation, Associated Engineering Subbu Gopalakrishnan, Senior Transportation Engineer, Associated Engineering Mapalad Santera Jr., Senior Transportation Design Technologist, Associated Engineering		
Distribution:	All Present, Bryan Petzold, Alberta Manager Transportation, Associated Engineering		

RECORD OF MEETING

These minutes are considered to be complete and correct. Please advise the writer within one week of any errors or omissions, otherwise these minutes will be considered to be an accurate record of the discussions.

Action By: **Discussion:**

1. Study Progress Update

1.1. AE Study Team presented the study progress to date. Subbu reviewed the work done so far in Document Review, Data Gathering and Analysis, Short-Tem Improvements Analysis, Long-Term Improvements Analysis, Intersection Design, Staging Plans, and Access Management.

1.2. Leduc County mentioned that the existing separation between edge of the road and power pole locations at the Altalink Substation South of Airport Road on 9th Street is based on the County's requirements.

Info

1.3. AE Study Team mentioned that the revised intersection design for the Airport Road/9th Street would be based on the acceptable clear zone distances.

1.4. AE Study Team mentioned that the review of Bridge Structure requirements across Blackmud Creek is in progress.

Action By: **Discussion:**

2. Stakeholder Consultation Update

2.1. AE Study Team briefed the Leduc County about the stakeholder meetings they had with Mr. Arthur Balkan and Tuboscope.

2.2. AE Study mentioned the discussions with Tuboscope about their requirements for access locations off 9th Street.

2.3. Leduc County informed about the relocation of the rail (spur line) to East between Tuboscope and future industrial development on the properties currently owned by Norma & Cheryl Harbottle. Leduc County to provide more information on the site plans for this development to AE Study Team. AE Study to revise the access management plans for this property by not showing the service road with Cul-de-Sac.

Leduc County/Project Team

2.4. Leduc County asked AE Study Team to provide the Warrants for Traffic Control for at-grade rail crossings. Leduc County wants to include in the study, minimum requirements/standards for at-grade rail crossings that are consistent with the functionality of the roadway which in turn would lead to policy development for at-grade rail crossings along 9th Street.

2.5. AE Study Team mentioned that the intersection plans for Highway 625/9th Street shows the long-term right-of-way requirements. No additional right-of-way is required to accommodate the long-term intersection treatment required.

2.6. AE Study Team has contacted Roger Foss, at Ledcor to confirm the intersection treatment proposed for the Twp Rd 510/9th Street. Ledcor will contact AE Study Team to discuss the treatment.

2.7. AE Study team will be meeting with the City of Edmonton (second meeting) on March 16 to discuss intersection design plans for Nisku Spine Road at 41 Avenue SW. AE Study team has already met with City of Leduc to discuss intersection design plans for 9th Street at Airport Road.

3. Review of Mock-ups for Open House Displays

3.1. AE Study Team reviewed the displays to be shown at the Open House scheduled on March 22.

Project Team /Leduc County

3.2. Leduc County asked AE Study Team to show the existing cross-section in the cross-section story board.

3.3. Leduc County asked AE Study Team to be consistent with the responses to the open house participants.

4. Review of Open House Questionnaire

Project Team

4.1. Leduc County mentioned that the draft questionnaire circulated appears good. Leduc County asked the AE Study Team to change the last date for submission of the completed questionnaire to March 29, 2006 and that the date be included and

Action By: **Discussion:**

prominently stated along with the response instructions.

5. Open House Arrangements

5.1. Leduc County to confirm whether a room bigger than Beaumont Room would be available for the Open House.

5.2. AE Study Team will organize the name tags for the project people participating in the open House from AE Study Team and Leduc County.

5.3. Leduc County to make arrangements to send out individual mail outs to all business owners in the Nisku Business Park.

Leduc County/Project Team

5.4. AE Study Team mentioned that individual mail outs were send to all the adjacent business owners/land owners along 9th Street/Nisku Spine Road.

5.5. Leduc County to advertise the Open House on the Leduc County's Electronic Sign Board.

5.6. AE Study Team mentioned that the discussions they had with Nisku Business Association to advertise about the Open House in their web site and e-mails to members.

6. Project Schedule

Info

6.1. AE Study Team would submit the draft study report to Leduc County for review and comments by end of April 2006.

H Appendix H - Public Open House Summary

OPEN HOUSE

9TH STREET (NISKU SPINE ROAD)

Functional Planning Study

Airport Road to TWP Rd 512 / 41 Avenue SW (City of Edmonton Corporate Limit)

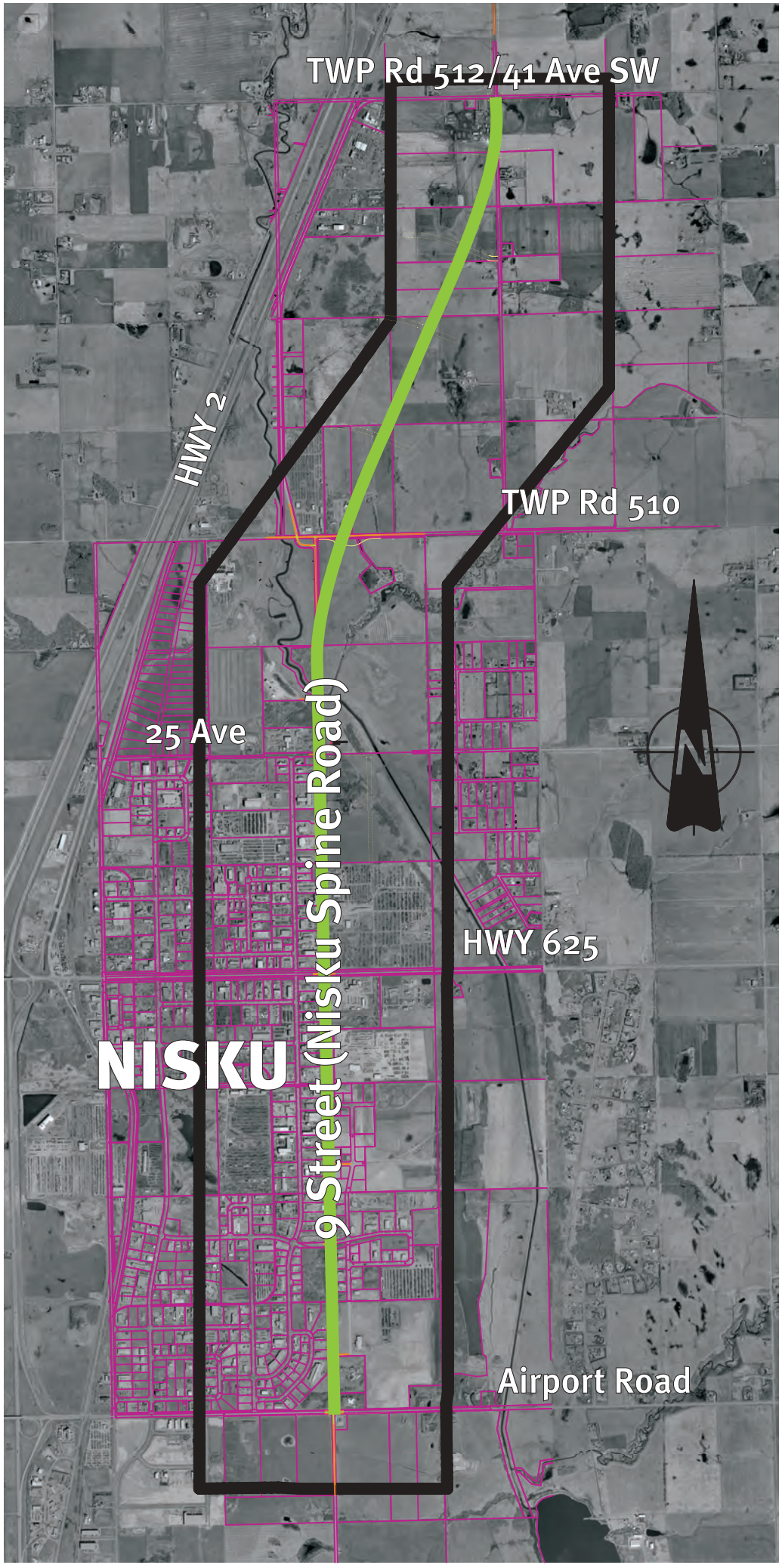
March 22, 2006
3:00 PM to 7:00 PM
The Nisku Inn & Conference Centre - Beaumont Room
1101-4th Street
Nisku, Alberta
T9E 7N1

Leduc County, Public Works and Engineering Department, is undertaking a functional planning study to recommend improvements to 9th Street (Nisku Spine Road) from Airport Road to 41 Avenue SW (City of Edmonton Corporate Limit) to meet immediate and long term traffic flows. The recommendations will include long term right-of-way requirements and access management requirements along the study corridor.

You are invited to review and comment on the draft recommended plans for this corridor at this Open House event. Resource people from the design team and Leduc County will be on hand to discuss the project with you.

For more information:
Phone Des Mryglod, Manager, Engineering at (780) 955-6418

LEDUC COUNTY


TWP Rd 512/41 Ave SW
HWY 2
TWP Rd 510
25 Ave
9 Street (Nisku Spine Road)
HWY 625
NISKU
Airport Road
N

9th Street (Nisku Spine Road) Functional Planning Study Open House Sign-In

Name	Address	Postal Code

Daytime Phone	Evening/Cell Phone	E-Mail Address

This information is protected under the authority of section 33(c) of the Freedom of Information and Protection of Privacy Act of 2000. Your name and contact information WILL NOT be released to third parties, nor be used by Leduc County for unrelated purposes, without your express written consent.

To ensure your privacy, please drop this form into the secured box provided.

Should you have questions regarding the use of personal information collected, please speak to any staff present at this meeting or contact the Leduc County.

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Should you have questions regarding the use of personal information collected, please speak to any staff present at this meeting or contact the Leduc County.

Please complete a feedback form and leave it in the box at the door, or send to:
Associated Engineering, Suite 1000, Associated Engineering Plaza
10909 Jasper Avenue, Edmonton, Alberta T5J 5B9
Fax: 780.454.7698, e-mail: gopalakrishnans@ae.ca

PLEASE SEND THE FEEDBACK FORM BY MARCH 29, 2006

9th Street (Nisku Spine Road) Functional Planning Study Open House Participant Survey

1. How did you hear about the open house?

_____

_____

2. Were the displays helpful in explaining the plans for the 9th Street functional planning study?

☐ Yes ☐ No

Why?

_____

_____

3. Were staff helpful in answering questions?

☐ Yes ☐ No

4. The information provided at today's open house was:

☐ Adequate ☐ Too Much ☐ Too Little

☐ Too Technical ☐ Too Conceptual ☐ Other: _____

5. What are your general comments about the project and the plans displayed at this open house?

_____

_____

_____

_____

_____

_____

_____

_____

Please complete a feedback form and leave it in the box at the door, or send to:
Associated Engineering, Suite 1000, Associated Engineering Plaza
10909 Jasper Avenue, Edmonton, Alberta T5J 5B9
Fax: 780.454.7698, e-mail: gopalakrishnans@ae.ca

PLEASE SEND THE FEEDBACK FORM BY MARCH 29, 2006

9th Street (Nisku Spine Road) Functional Planning Study
Open House Participant Survey

6. The study area has been divided into four major sections. What are your comments about the proposed designs for these specific sections?

a. Airport Road to Highway 625?

b. Highway 625 to 25 Avenue?

c. 25 Avenue to Township Road 510?

d. Township Road 510 to Township Road 512 (41 Avenue SW, Edmonton)?

*if you need more room for comments, please use the back of the page

Please complete a feedback form and leave it in the box at the door, or send to:
Associated Engineering, Suite 1000, Associated Engineering Plaza
10909 Jasper Avenue, Edmonton, Alberta T5J 5B9
Fax: 780.454.7698, e-mail: gopalakrishnans@ae.ca

PLEASE SEND THE FEEDBACK FORM BY MARCH 29, 2006

9th Street (Nisku Spine Road) Functional Planning Study
Open House Participant Survey

7. Do you have any other comments, suggestions, ideas, or concerns that will help the project team with the functional planning study?

Please complete a feedback form and leave it in the box at the door, or send to:
Associated Engineering, Suite 1000, Associated Engineering Plaza
10909 Jasper Avenue, Edmonton, Alberta T5J 5B9
Fax: 780.454.7698, e-mail: gopalakrishnans@ae.ca

PLEASE SEND THE FEEDBACK FORM BY MARCH 29, 2006

9th Street (Nisku Spine Road) Functional Planning Study Open House Participant Survey

If you wish, on an optional basis, please provide us with your name, and telephone number or e-mail address to ensure that we are able to reach you as the study proceeds.

Name: _____ Phone: _____

E-mail: _____

This information is protected under the authority of section 33(c) of the Freedom of Information and Protection of Privacy Act of 2000. Your name and contact information WILL NOT be released to third parties, nor be used by Leduc County for unrelated purposes, without your express written consent. If you have any questions about the collection of this data, contact Des Mryglod at 780.955.6418.

9th Street (Nisku Spine Road) Functional Planning Study
Open House Participant Survey

If you require follow-up to this survey, please call:

Des Mryglod – Leduc County, Public Works & Engineering, 780.955.6418

Subbu Gopalakrishnan – Associated Engineering, 780.451.7673 ex. 3266

9th Street (Nisku Spine Road) Functional Planning Study
Open House – March 22, 2006 (Ballroom II, Nisku Inn)
Compilation of Comments

Total Attendance at the Open House (Estimated): **65**

Completed Sign-In Slips Received from Attendees: **40**

Completed Participant Survey Forms Received: **10**

1. How did you hear about the open house?

- Was advised by a landowner in the area of the road (1 response).
- Received open house notice by mail (3 responses).
- NBA Newsletter (3 responses).
- E-mail from Associated Engineering (1 response).
- Leduc County web site (1 response).

2. Were the displays helpful in explaining the plans for the 9th Street functional planning study?

"Yes" from all 10 responses.

Why ?

- Explain what's happening.
- Gives a clear picture of the plan.
- Clearly illustrated location and scope.
- Clearly explained the plan.
- They showed very clearly the existing conditions and exactly what the proposals are.
- Clearly marked and of right size to see details of the area.

3. Were staff helpful in answering questions?

- "Yes" from 9 responses.
- One response mentioned "yes" for the "County" staff were helpful in answering the questions and "no" for engineering firm.

4. The information provided at today's open house was:

- "Adequate" from 8 responses
- "Other" from 2 responses. One response mentioned, "perfect" under others.

9th Street (Nisku Spine Road) Functional Planning Study
Open House – March 22, 2006 (Ballroom II, Nisku Inn)
Compilation of Comments

5. What are your general comments about the project and the plans displayed at this open house?

- Good quality.
- Very good. Need to start building entrances of road. Need to be discussed.
- This project can only benefit the Nisku Industrial Area. Congestion is a huge problem at this time and movement of traffic is somewhat restricted. If possible I would like to receive a handout containing the information on display.
- It works very well. Just needs to be done, sooner than later.
- It would be nice to see a bit bigger picture. It is great to finally see some plans for 9th Street. But what about the routes/streets that will feed 9th Street. Interconnenction with Highway 2 and movement within the park to feed onto 9th Street.
- This seems to be a timely project to be undertaking. It will be interesting to know what the financing strategy will be soon.
- The project was well laid out and clear in description. Presenters were professional.
- We have land within one half mile of the road and our values will be increased by this road improvement, as will all of the East hold of the Nisku Business Park. This road will take traffic congestion away from the Nisku and Airport Road intersections on Highway 2, improving traffic flow. This new road will encourage development of the East side of the park. It is badly needed.
- Interesting: need to have integrated planning. Found questions often not answered by reference to another party – i.e. Alberta Transportation. Representation from Alberta Transportation would have been helpful in order to obtain a complete picture.
- I look forward to the project being implemented and completed. The area require these type of projects.

6. The study area has been divided into four major sections. What are your comments about the proposed designs for these specific sections?

a. Airport Road to Highway 625?

- Good
- Good should be the first phase.
- Alex Micheau at this time is blocking access across his quarter from the East.

b. Highway 625 to 25 Avenue?

- Good
- Is 25th Avenue going to go somewhere or just provide a link between 9th Street and 8th Street.

c. 25 Avenue to Township Road 510?

- Should acquire the Right of Way as soon as possible. Should construct the first 2 lanes as soon as possible to facilitate development of the land.
- Good
- Good
- Parcel access requirements will be important to complete development applications.

d. Township Road 510 to Township Road 512 (41 Avenue SW, Edmonton)?

- Should acquire the Right of Way as soon as possible. Should construct the first 2 lanes as soon as possible.
- Good

7. Do you have any other comments, suggestions, ideas, or concerns that will help the project team with the functional planning study?

- Report should contain a section on implementation. This section should include a discussion on the next steps, timing of construction, staging, preliminary costing, method of funding. Should discuss and show how the roadway ties into the City's roadway system.
- Driveway to property development NW-30-50-24W4 needs to be discussed.
- Lets get this project underway.
- Since we are the developer of the SW-19-50-24W4 and have contributed to the 9th Street upgrade we would look at this section as soon as possible. Everyone we sell a lot to has asked the same question "when will 9th Street be done".
- Nice work, good info and well presented.
- The 9th Street proposal will no doubt make access to Nisku much better but 8th Street north south must remain open. There have been rumour of blocking access to 625 on 8th Street from the north and south. This will be met with much resistance.
- Good access, suitable for industrial application and movement of goods, must be given high priority for Nisku. Accesses at 10, 15, 20, 25 Avenues appear good but the distances between these points is considerable. Properties in the Grayson Subdivision (ADESA etc) appear to have a service road only and poor access onto to 9th at uncontrolled points. With growth, this may prove to be a bottle neck and area of difficulty.
- Possibly poll businesses in the area to determine their expansion and access needs to eliminate any disruptions once the project is completed.

9th Street (Nisku Spine Road) Functional Planning Study
Open House – March 22, 2006 (Ballroom II, Nisku Inn)
Compilation of Comments

Comments from Graffiti Board

- Should acquire the road right-of-way as soon as possible.
- Should commence development of the roadway from north to the south.
- Report should include a section on implementation including, staging, preliminary costs, timing, possible levy, cost sharing with developer.
- ADESA access @ Grayson Industrial need for traffic controls @ service road intersection.
- How will the future drainage be accommodated in my land ? (Arthur Balkan).

Welcome to the

9th Street (Nisku Spine Road) Functional Planning Study

Open House

March 22, 2006 – Nisku Inn (Ballroom One) – 3pm to 7pm

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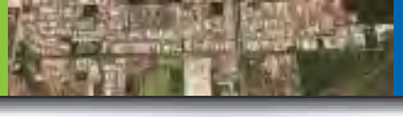

9th Street (Nisku Spine Road) Functional Planning Study

Public Communication Strategy

Key stakeholders along the study area include:

- adjacent landowners
- Nisku business owners
- the Nisku Business Association
- Alberta Infrastructure and Transportation
- the City of Edmonton
- the City of Leduc
- AltaLink
- Leduc/Nisku EDA (Economic Development Association)
- Interested citizens

This Open House is being held to gather the public's comments about plans developed in the 9th Street Functional Planning Study.

If you have any comments regarding any of the plans, **please fill out a comment form** and either drop it off before you leave, mail, fax, or e-mail it to Associated Engineering by March 29, 2006.

The public is also encouraged to use the Graffiti Board to post comments along the 9th Street Corridor near areas of interest.

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9th Street (Nisku Spine Road) Functional Planning Study

Study Area

The functional planning study includes the area from Airport Road in the south to Township Road 512 (Edmonton's 41 Avenue SW) along the 9th Street Corridor.

South of Township Road 510 (30 Avenue), 9th Street will approximately keep its existing alignment.

To the north, 9th Street will jog east to continue as Edmonton's 101 Street, and will ultimately connect with Edmonton's future Parsons Road/91 Street.

Study Purpose

This study will recommend improvements to the Nisku Spine Road that are required to meet immediate and long-term traffic flows.

The study will provide specific recommendations regarding improvements to the existing roadway structure design standards, horizontal alignment, vertical alignment, right-of-way requirements, intersection requirements, and access control.

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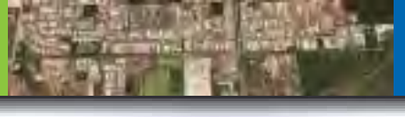

9th Street (Nisku Spine Road) Functional Planning Study

Previous Approved Studies and Plans

"The Nisku Spine Road has been proposed as link between the Nisku Industrial Business Park and the City of Edmonton 101 Street/91 Street corridor since the late 1970s. The Leduc Area Transportation Study (1981), Nisku General Development Plan (1979), the Nisku Area Structure Plan (1981), the Nisku Industrial Park Roadway Improvements Study (1985), the Highway #2 Industrial Area Structure Plan (1982) and the recently published Ellerslie Area Structure Plan all recognize the need to upgrade 9th Street to a major four lane divided arterial as development in Nisku Industrial Business Park continues. At the time that the Functional Study was completed in 1985, approximately 800 hectares were developed as medium density industrial land. Today there are more than 2000 hectares of developed or developing land in the Nisku area."

– Leduc County Transportation Master Plan, May 2001

Major studies and plans reviewed for the Functional Planning Study include:

- 9th Street (Nisku Spine Road) Functional Study, June 1985
- Leduc County Transportation Master Plan, May 2001
- Leduc County Municipal Development Plan
- North Major Area Structure Plan, October 2004
- Saunders Lake Area Structure Plan, August 2005
- The City of Edmonton's Ellerslie Area Structure Plan

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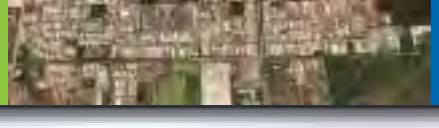
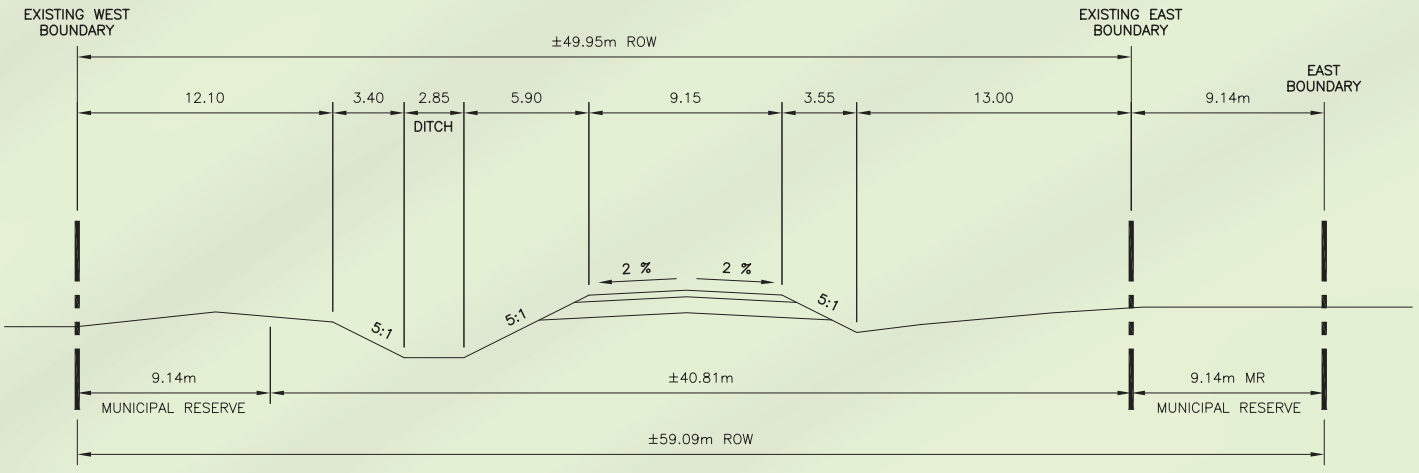
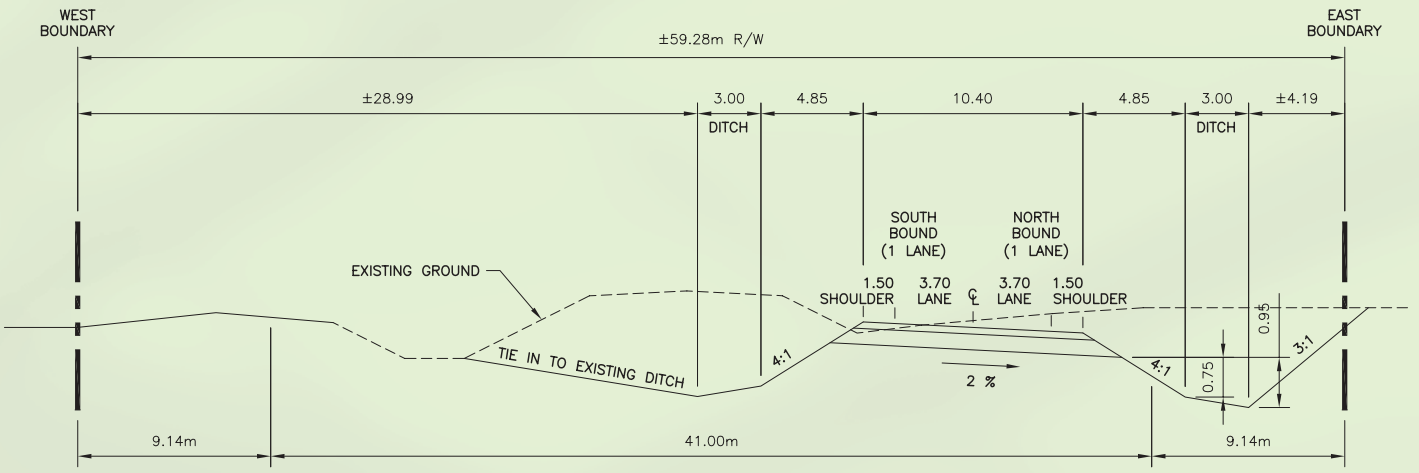


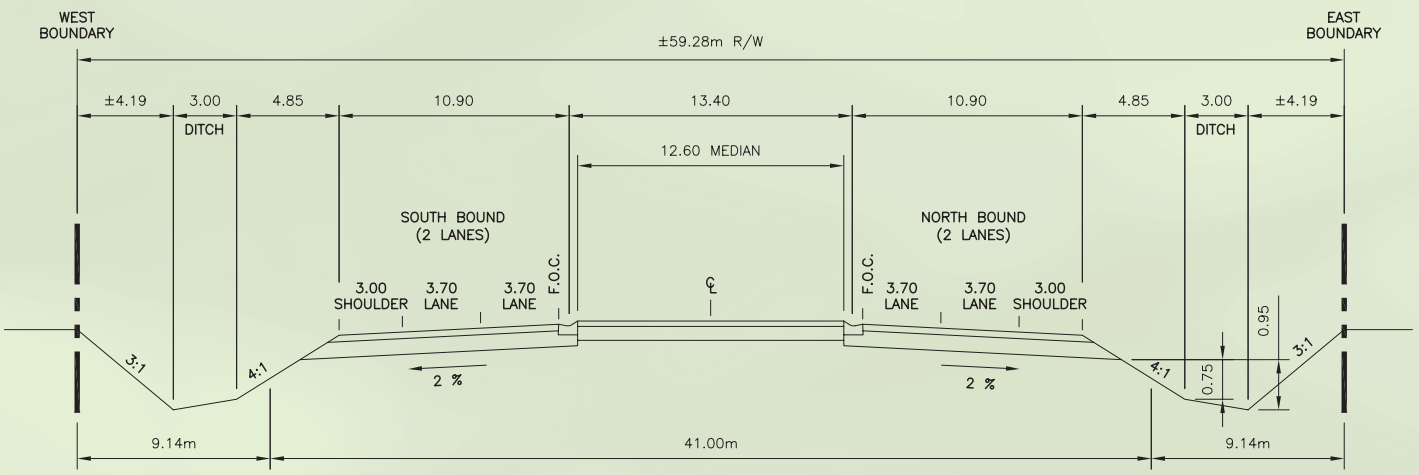
9th Street (Nisku Spine Road) Functional Planning Study



9th STREET EXISTING ROAD CROSS–SECTION
SCALE H = 1:100
V = 1:40



STAGE 1 (YEAR 2007 TO 2016)
SCALE H = 1:100
V = 1:40



STAGE 2 (YEAR 2017 TO 2046)
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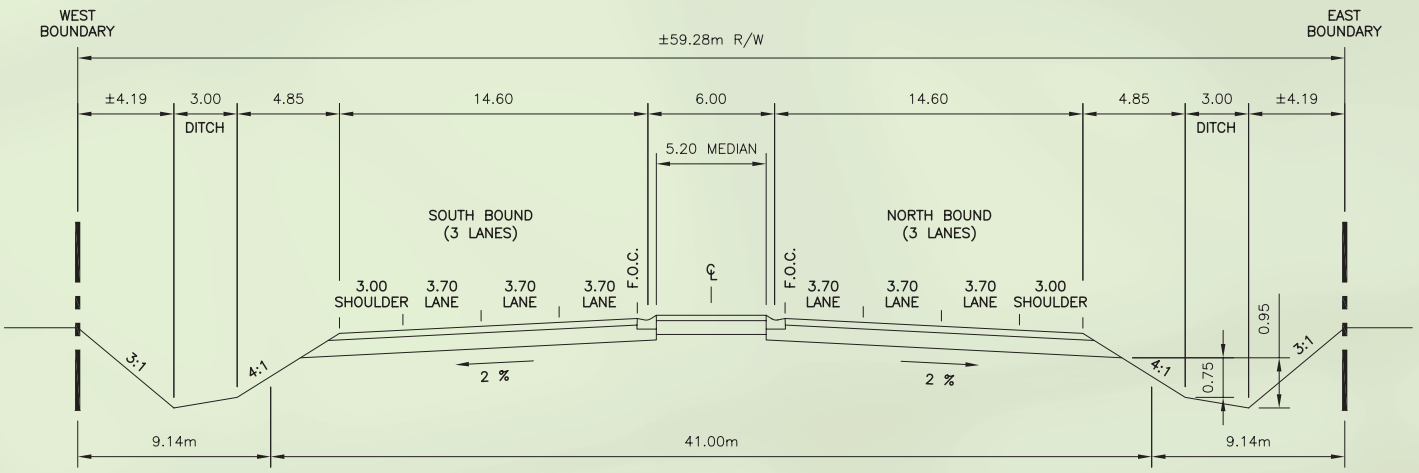

DRAFT

POTENTIAL (SUBJECT TO FUTURE DEVELOPMENT)
SCALE H = 1:100
V = 1:40

Proposed Staged Cross-sections

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9th Street (Nisku Spine Road) Functional Planning Study

Existing Direct Access Locations

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9TH STREET (NISKU SPINE ROAD) FUNCTIONAL PLANNING STUDY

DRAFT FUNCTIONAL PLAN (PART 1)

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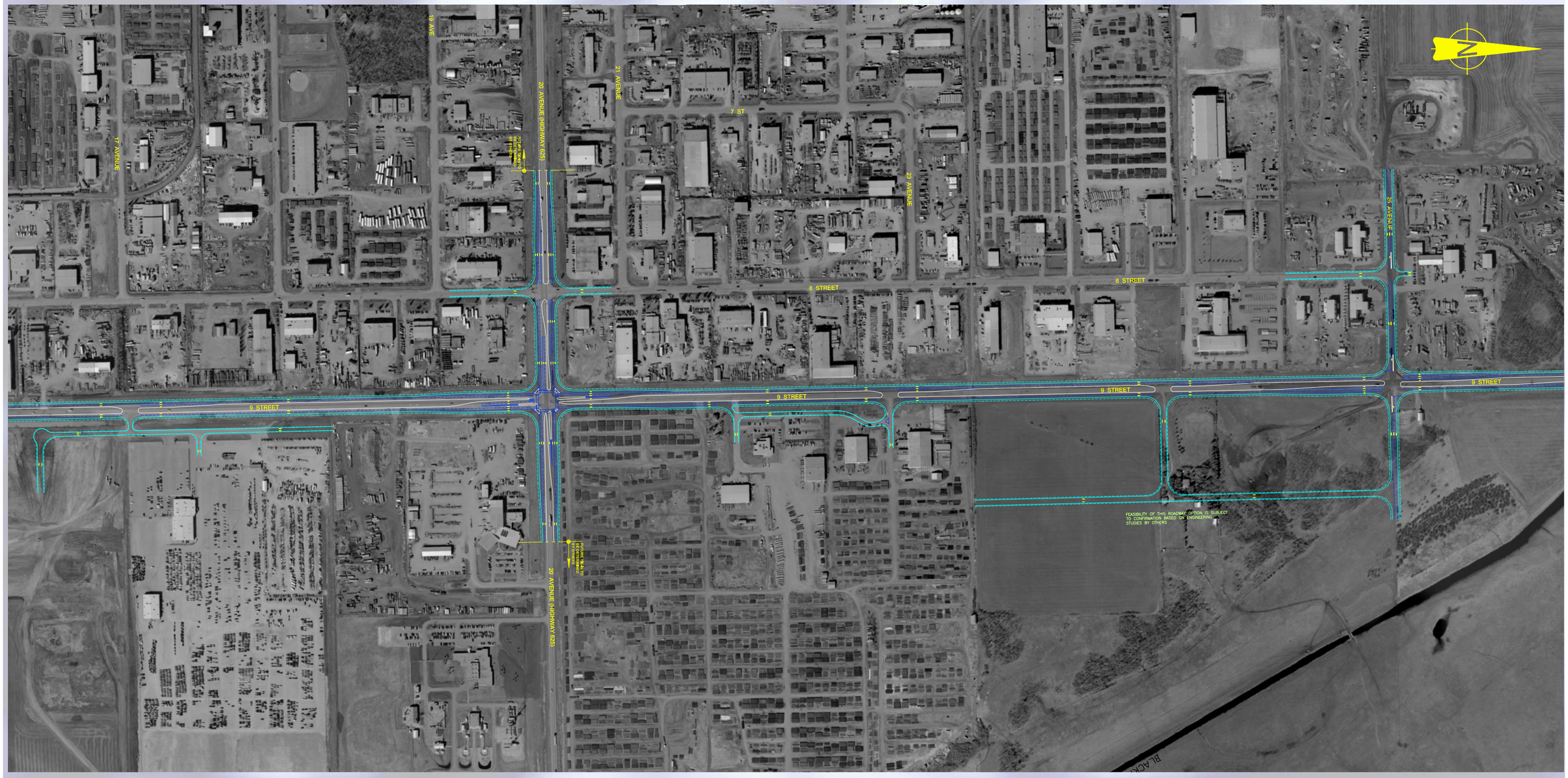
9TH STREET (NISKU SPINE ROAD) FUNCTIONAL PLANNING STUDY

DRAFT FUNCTIONAL PLAN (PART 2)



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9TH STREET (NISKU SPINE ROAD) FUNCTIONAL PLANNING STUDY

DRAFT FUNCTIONAL PLAN (PART 3)

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9TH STREET (NISKU SPINE ROAD) FUNCTIONAL PLANNING STUDY

DRAFT FUNCTIONAL PLAN (PART 4)

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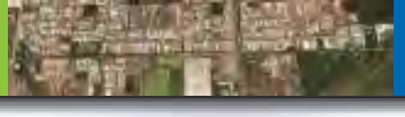

9th Street (Nisku Spine Road) Functional Planning Study

Next Steps

- comments gathered from the Open House will be reviewed and adapted in final plan development
- the Functional Planning Study will be completed in April 2006
- the final report should go before council in May 2006
- timeframe for detailed design is to be determined
- timeframe for stage one construction is to be determined

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