Appendix A

Roadway Inventory

Appendix B

Structural Condition Assessment

THURBER ENGINEERING LTD.
GEOTECHNICAL • ENVIRONMENTAL • MATERIALS

July 18, 2005

File: 19-598-200

Infrastructure Systems Ltd.
Suite 100, 7909 - 51 Avenue
Edmonton, Alberta T6E 5L9

Attention: Mr. Barry Jamieson, P.Eng

LEDUC COUNTY
2005 BENKELMAN BEAM DEFLECTION READINGS

Dear Sir,

As requested, Thurber Engineering Ltd (Thurber) has completed the Benkelman Beam deflection testing program on paved roads within Leduc County. The purpose of the testing was to provide information for a Pavement Management System.

The deflection testing was conducted between May 24 and June 7, 2005. A single axle water truck equipped with 8,160 kg of rear axle loading which was used as the reaction vehicle for the Benkelman Beam testing. Thurber's field representative, Ms. Ellen Morrison, conducted all deflection readings.

A total of 576 individual Benkelman Beam deflection tests were conducted, with between 1 and 130 readings on a given section or roadway, depending on its length. The deflection readings were obtained in the outer wheel path of the roadway, with the points alternating from one side of the street to the other where practical. Pavement temperatures were periodically obtained by drilling a hole into the pavement and determining the temperature about 50 mm below surface. Both temperature and seasonal correction factors were applied to the deflection readings.

The results of the deflection testing were analyzed in the office, and summarized on the attached tables (Appendix A). The data sheets present both the average deflection and the Representative Rebound Deflection (RRD) which may be used as the basis of overlay thickness design.

UTM coordinates were obtained at each test location and they are provided in the attached data sheets. The coordinates were used to plot the results along the road section, and the results are presented in Appendix B. Please note that where there were less than 2 readings within the road section, a plot was not generated.

Based on both the average deflection and the RRD, a relative ranking of the road section was provided, with the lowest (best) deflection given a rank of "1" and higher deflections getting successively lower ranking. The results of the ranking are provided in Table 1 below.

TABLE 1
SUMMARY OF BENKELMAN BEAM TEST RESULTS

LOCATION	NO. OF TESTS	AVERAGE DEFLECTION (mm)	STANDARD DEVIATION (mm)	R.R.D. (average +2*st.dev)	Ranking based on Average Deflection	Ranking based on R.R.D.
Range Road 221	46	1.19	0.43	2.05	11	10
Range Road 223	38	1.20	0.30	1.79	12	8
Range Road 272	7	1.57	0.65	2.88	22	18
Range Road 275	11	1.04	0.33	1.69	6	6
Township Road 490	130	1.09	0.50	2.08	8	12
Township Road 502	8	1.36	0.39	2.14	19	14
Township Road 504	63	1.20	0.44	2.08	13	11
Rabbit Hill Road	12	1.08	0.40	1.89	7	9
Range Road 12	8	1.28	0.61	2.51	15	16
Township Road 474	9	1.12	0.28	1.68	10	5
Township Road 474A	12	1.11	0.22	1.56	9	3
Range Road 13	1	1.60			23	
Township Road 500	51	0.90	0.34	1.58	2	4
Township Road 481	6	1.97	0.64	3.25	26	20
Range Road 271	3	1.93	0.70	3.32	25	21
Airport Road	68	1.02	0.35	1.72	4	7
Sparrow Drive, Nisku	18	1.64	0.85	3.35	24	22
5 Street, Nisku	4	1.01	0.20	1.40	3	2
5A Street, Nisku	1	1.33			16	
24 Ave, Nisku	3	1.45	0.76	2.97	20	19
23A Ave, Nisku	1	1.35			18	
10 Street, Nisku	2	1.26	0.02	1.29	14	1
14 Ave, Nisku	2	1.03	0.56	2.14	5	15
12 Street, Nisku	1	0.64			1	
4 Street, Nisku	1	2.97			28	
7 Street, Nisku	1	2.08			27	
9 Street, Nisku	3	1.34	0.39	2.12	17	13
Access Rd E of 9 Street, Nisku	2	1.53	0.53	2.59	21	17

NOTES:

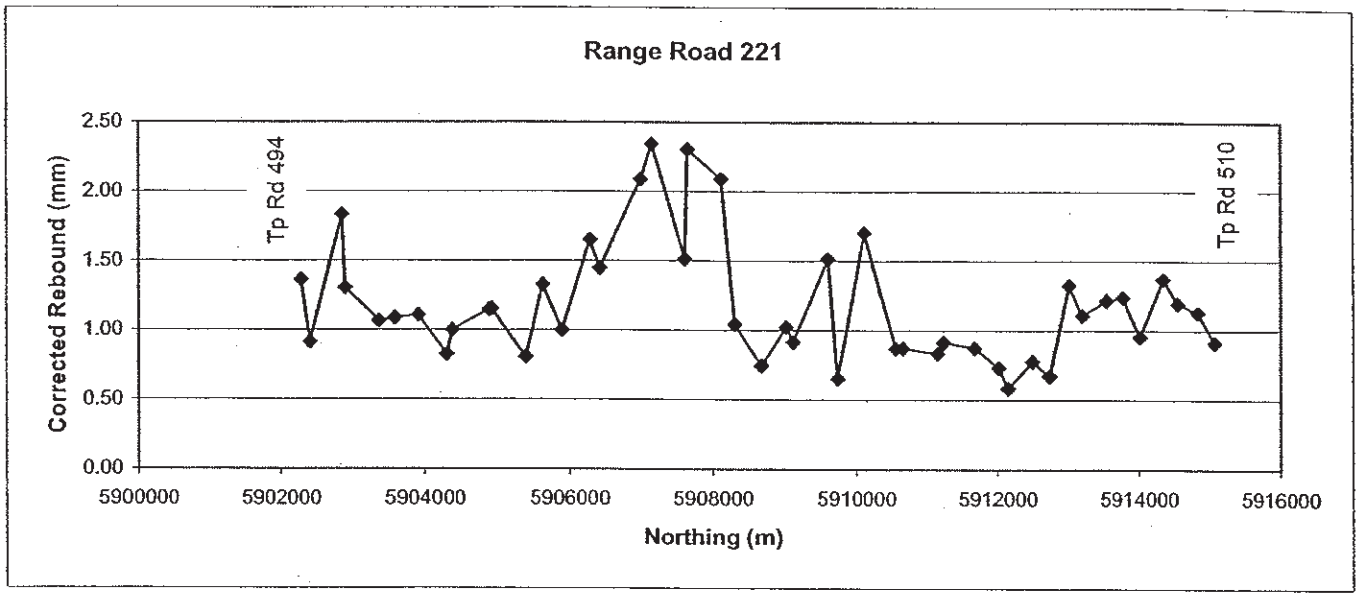
1. R.R.D. = Representative Rebound Deflection = average + 2*standard deviation
2. Rank is based on minimum to maximum deflection (lower deflection = higher rank)
3. Standard deviation requires more than one test. No. R.R.D. can be determined if test section has only one test

We trust the enclosed satisfies your requirements at this time. Should you have any questions, please contact the undersigned at your convenience.

Yours very truly,
Thurber Engineering Ltd.
D. Papanicolas, P.Eng.
Review Principal

Andrew Coe, P. Eng.
Project Engineer
/slp

Enclosure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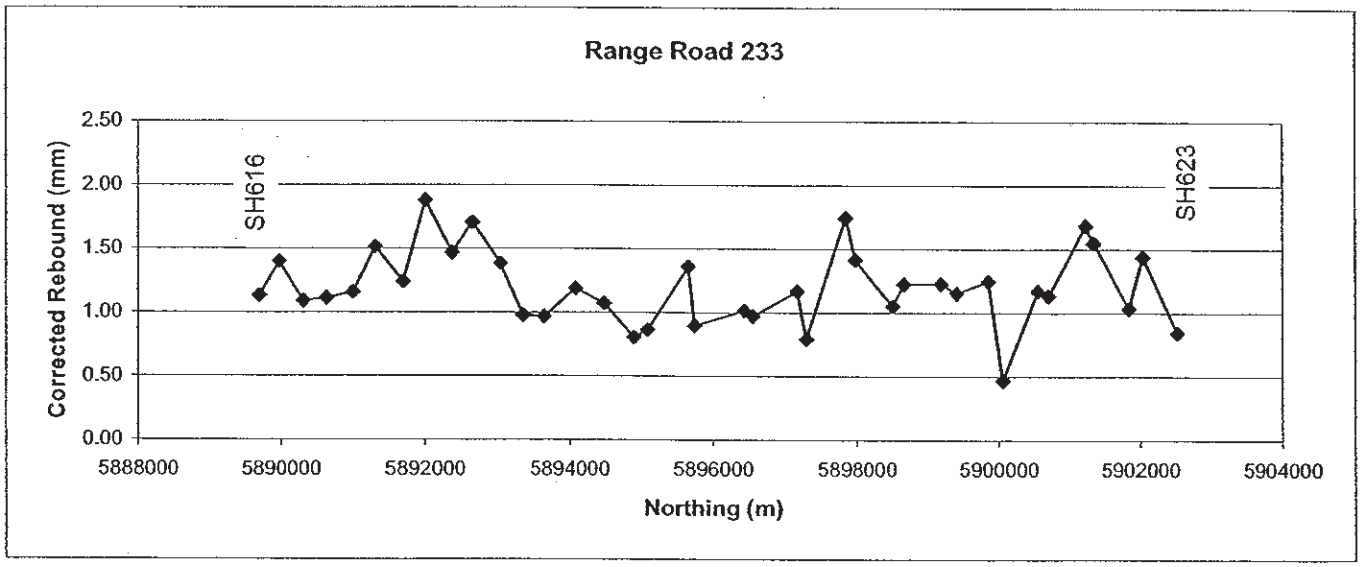
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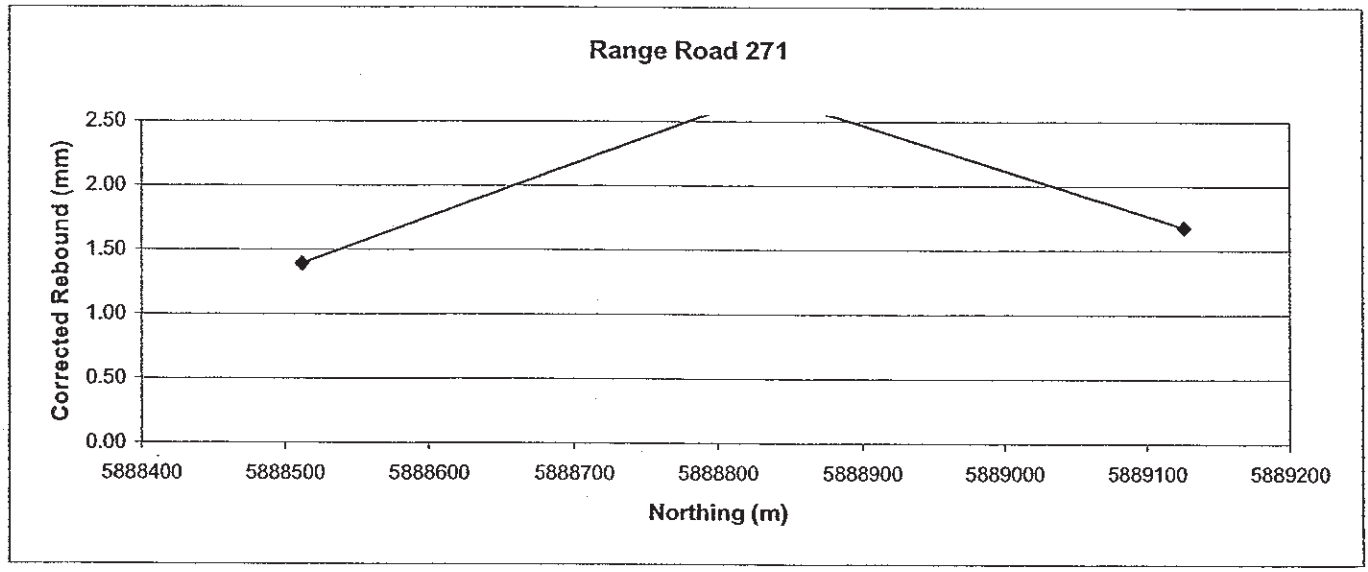
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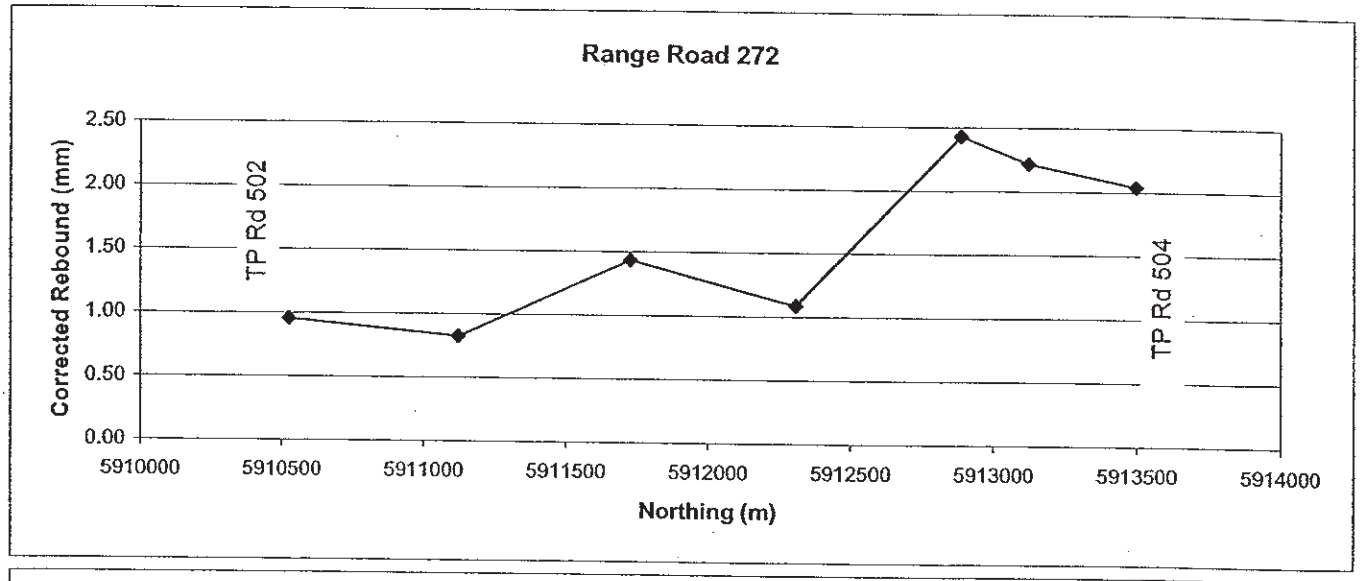
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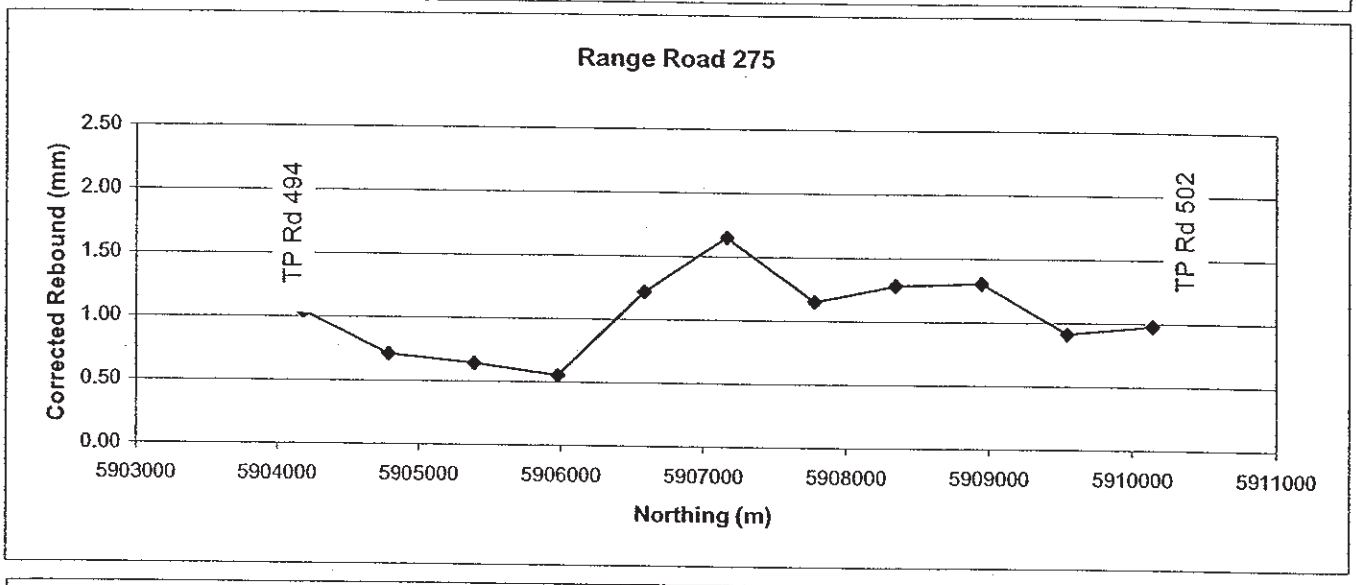
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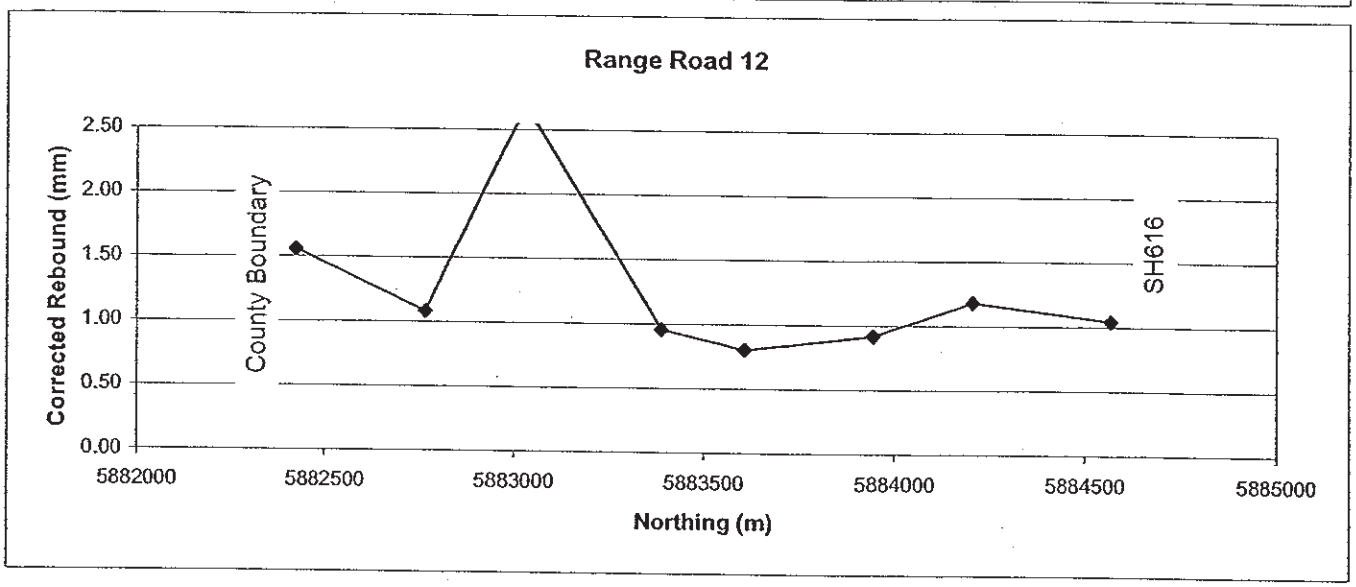
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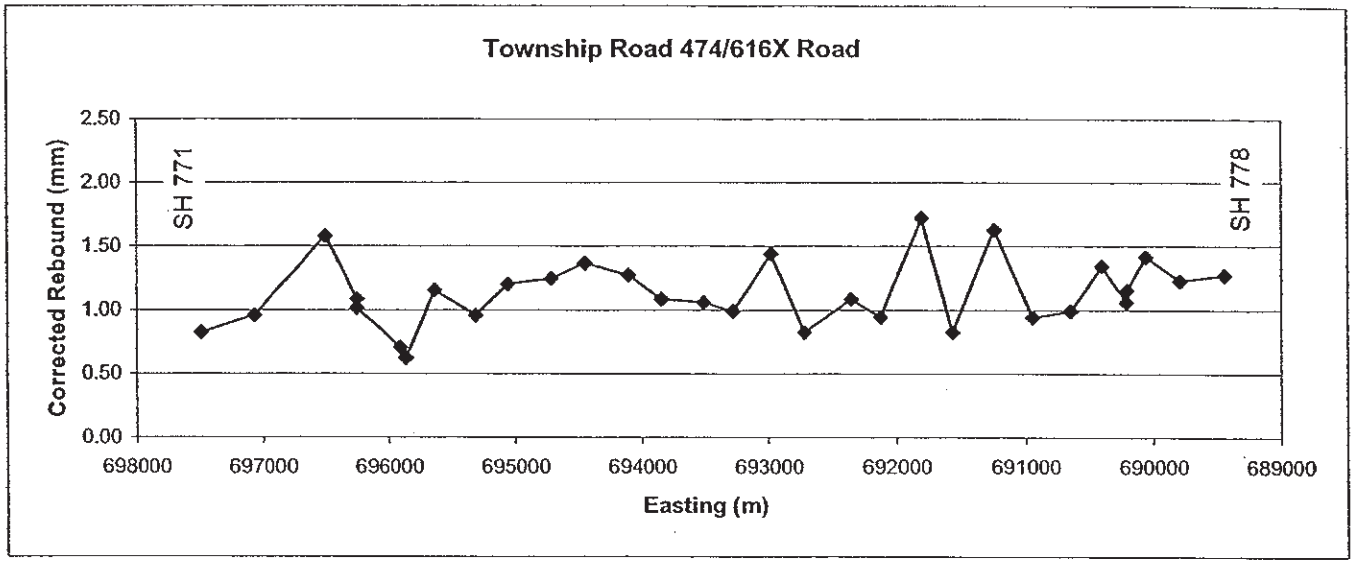
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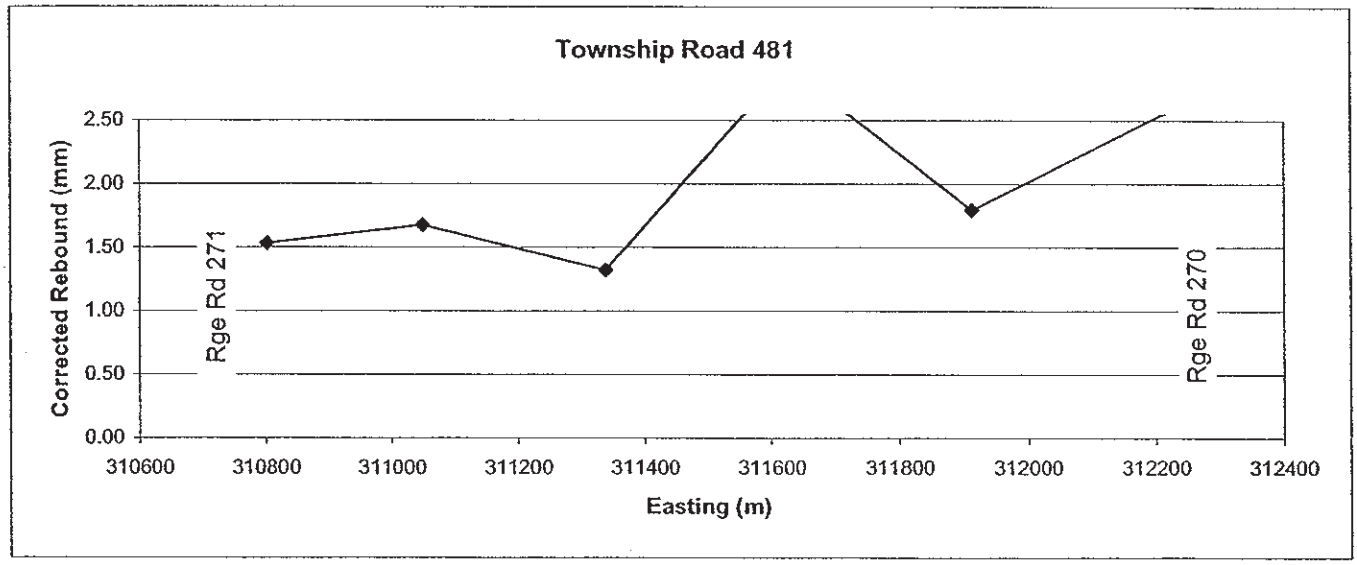
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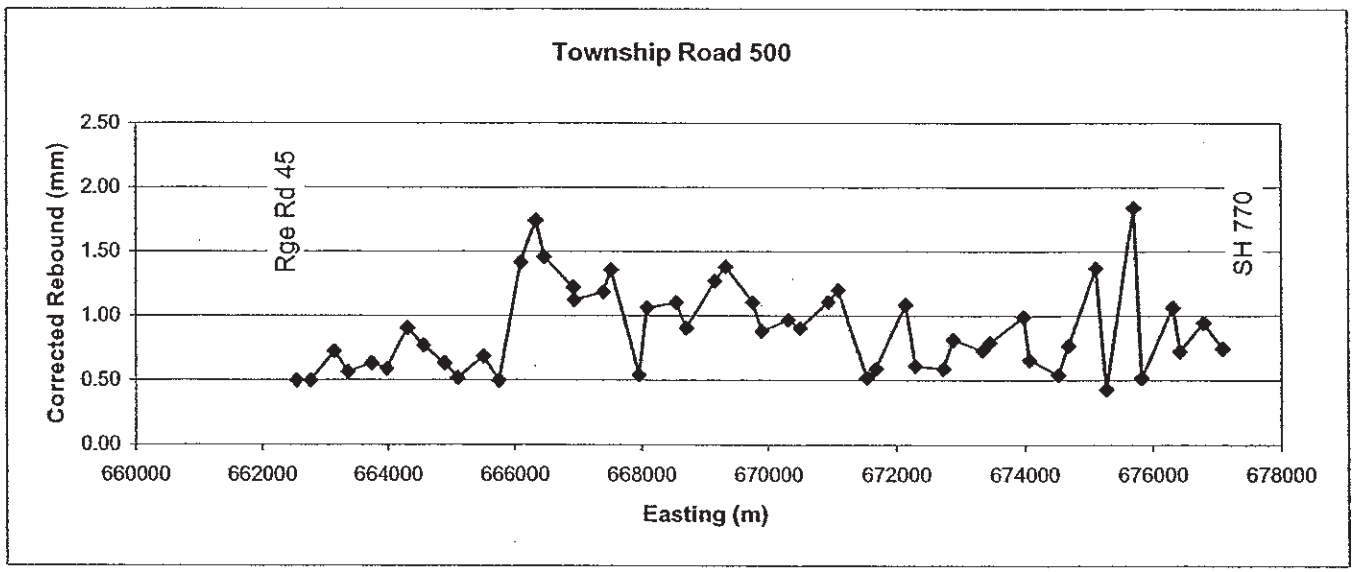
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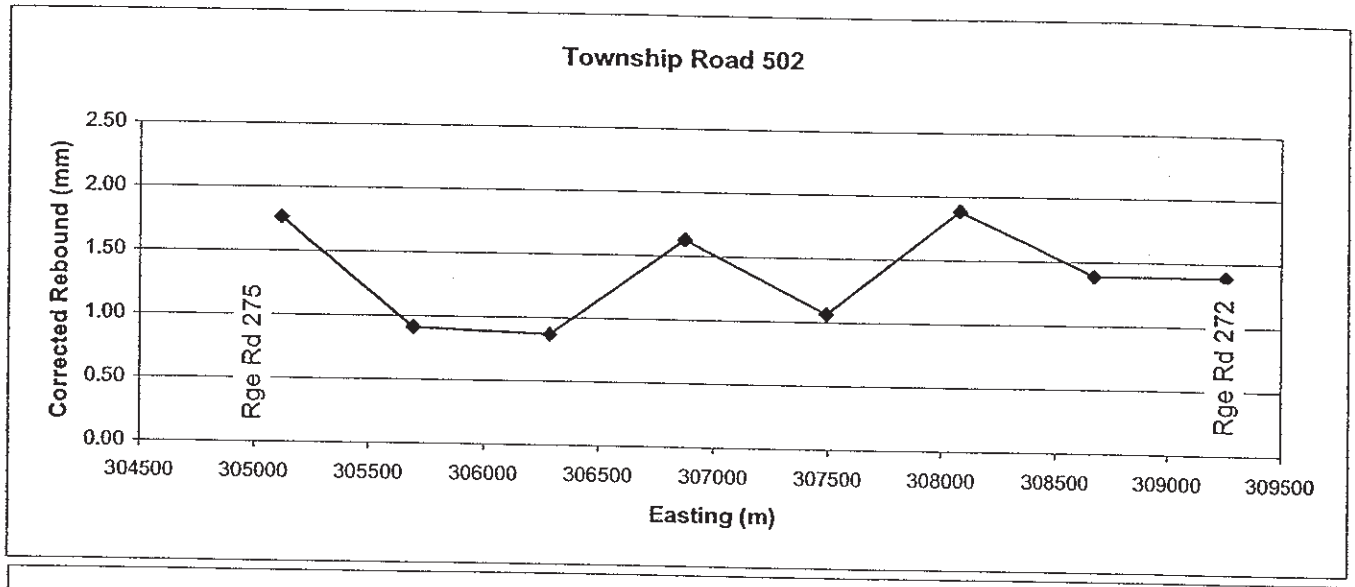
Easting (m)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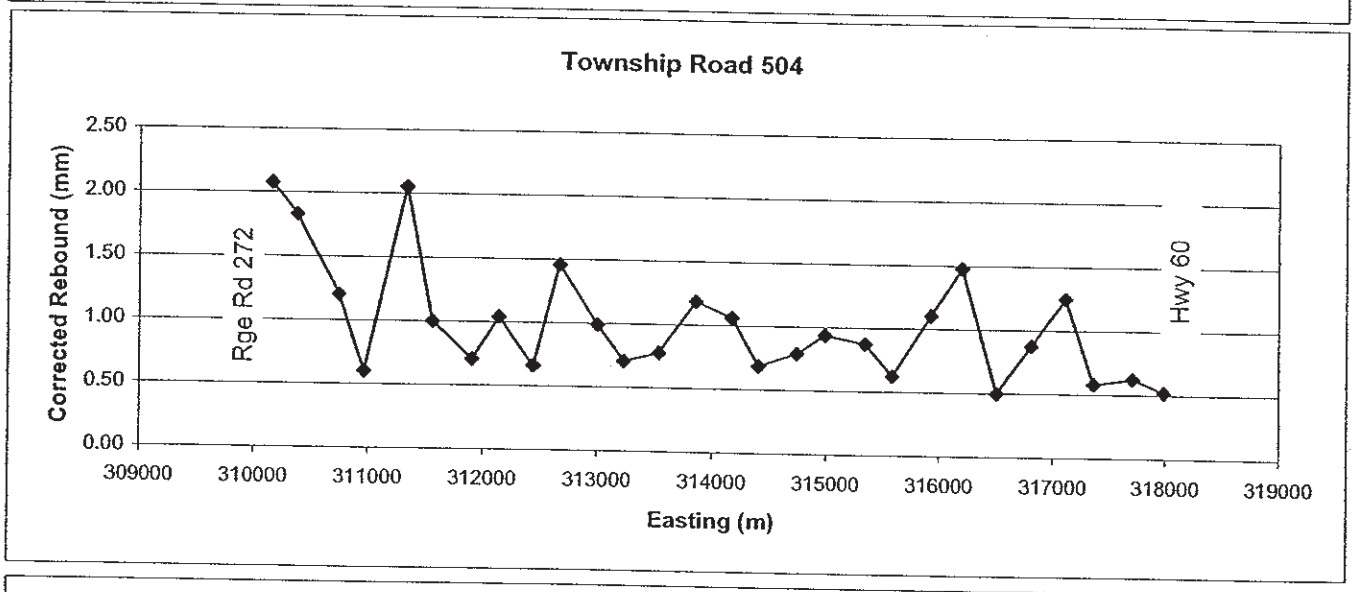
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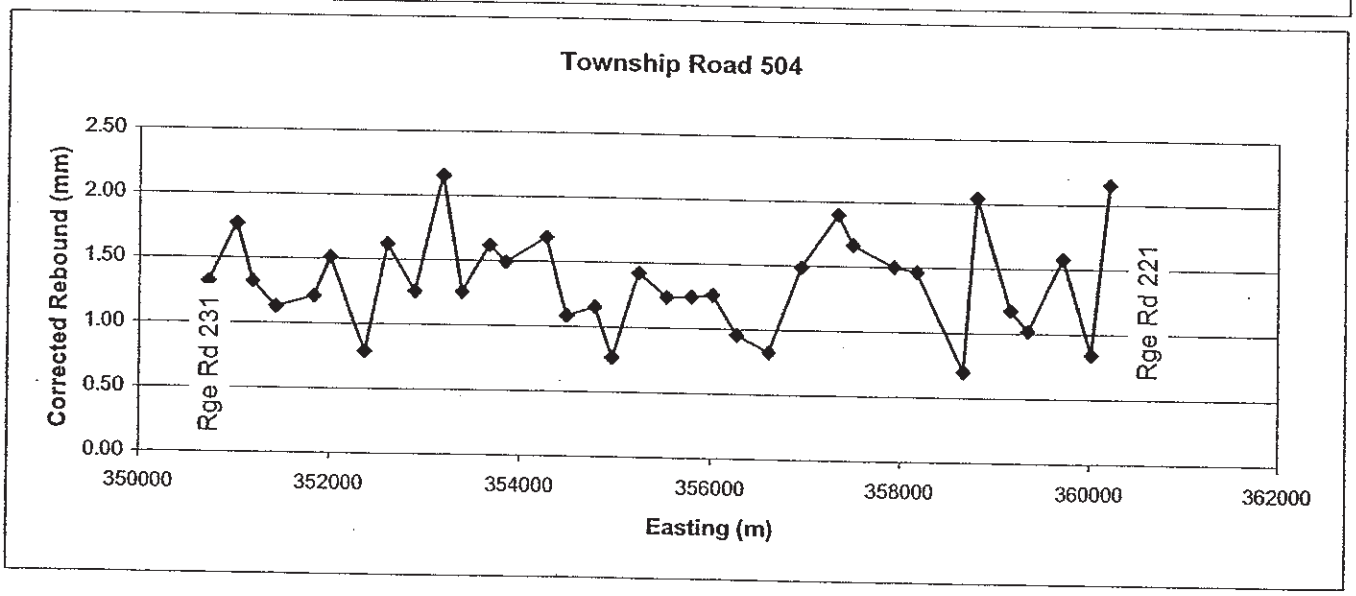
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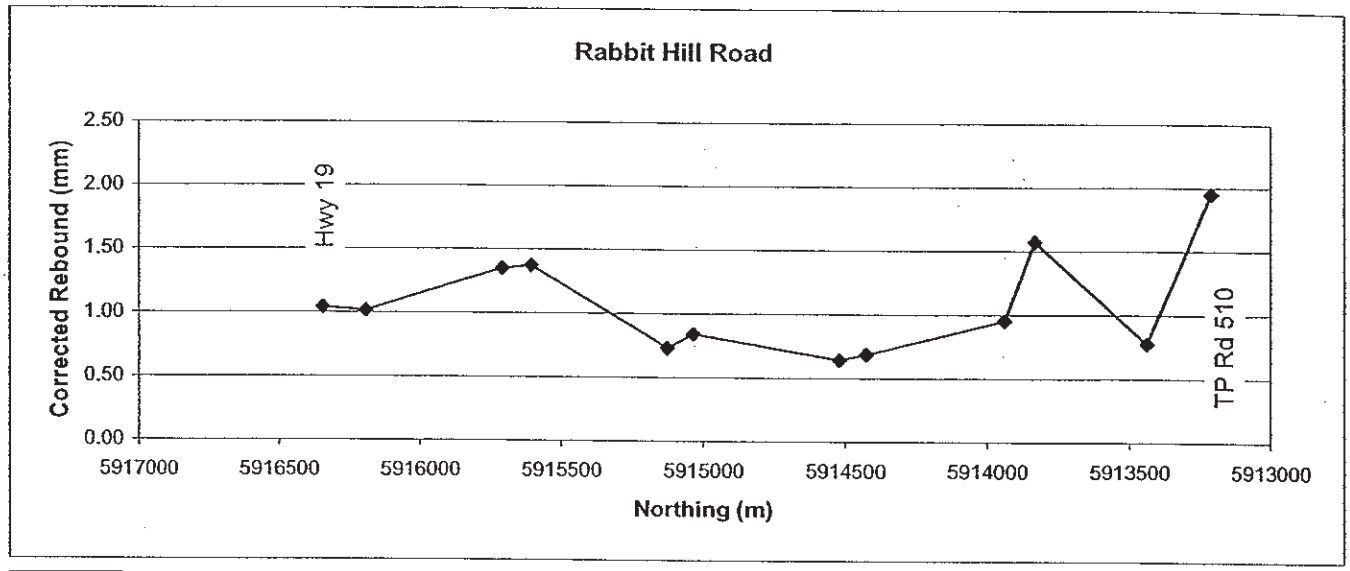
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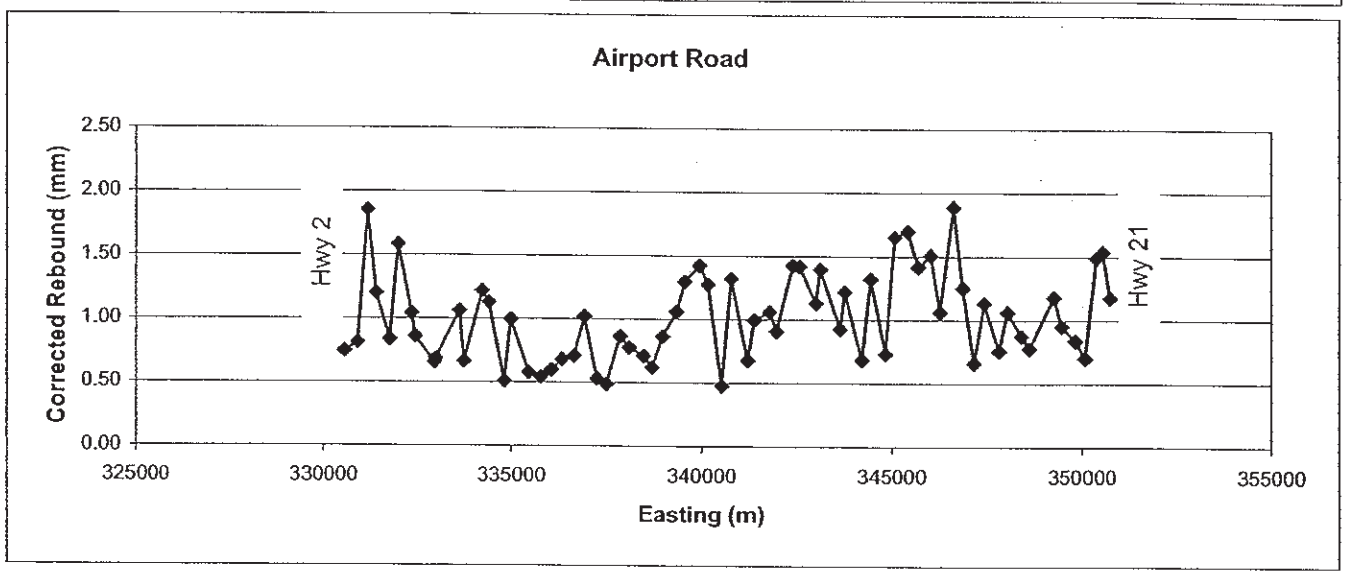
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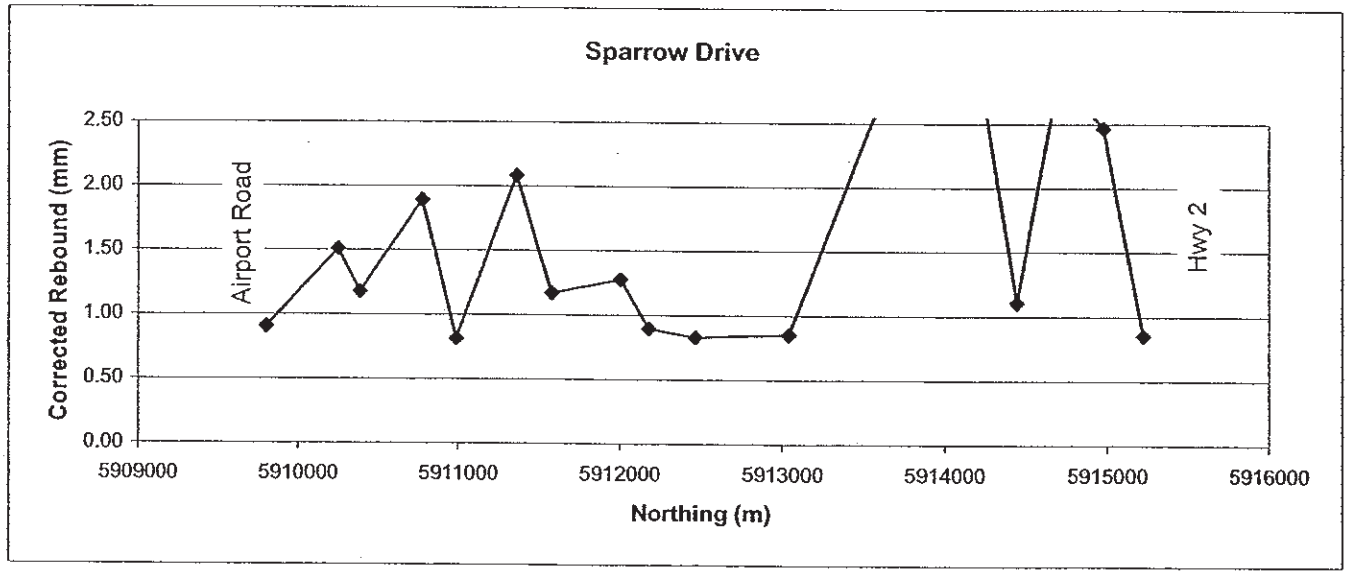
Easting (m)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5915000
5916000
Northing (m)

Appendix C

Historical Resources Report

Final Report

HISTORICAL RESOURCE MANAGEMENT

LEDUC COUNTY ROADWAY MANAGEMENT SYSTEM

Prepared for

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June 2005

REPORT ABSTRACT

At the request of Barry Jamieson of ISL Group in Edmonton, an assessment of Historical Resource concerns was carried out for the Leduc County Roadway Management System study project. The research and assessment work was carried out between January and May 2005. All work was designed and completed by staff of Altamira Consulting Ltd under the direction of Bruce F. Ball.

The specific subject of this report is Historical Resources. The specific objective of this study was to identify Historical Resource concerns or associated interests that might effect future planning and management activities for the County's roadway system. Three data sets are provided which together detail specific Historical Resource concerns for the Leduc County Roadway Management System study project.

Four sources of information were used: a review of the current Historical Resource Inventories; reviews of previous study reports; the current (2005) Listing of Significant Historical Sites and Areas; and a Historical Resource Site Prediction model.

The results of the study are provided in two formats: 1) lists of sites locations and areas of interests (see Appendix 2 & 3); and, 2) digital (GIS) maps showing distributions and specific locations. The GIS data are contained on an accompanying CD.

A list of 891 archaeological site locations is provided along with 52 areas of interest as delineated in *Alberta Community Development's 'Listing of Significant Historical Sites and Areas'*. A predictive model is presented which identifies Historical Resource potential for all remaining portions of the County. Specific directions are also provided for associated concerns with historic sites, palaeontological sites and historical cemeteries.

It is recommended proposed developments that risk effecting historical resources as identified in this document be reviewed by a qualified Historical Resource consultant to determine the significance of the threat, need for further assessment and the general nature of additional Historical Resource work requirements.

PROJECT PERSONNEL

Project Manager
Bruce F. Ball

Report Authors
Bruce F. Ball
Keila Johnston

Project Research
Bruce F. Ball
Robin Woywitka
Courtney Cameron
Ryan Spady

Mapping & GIS Modeling
Keila Johnston

Assessment, Analysis & Report Preparation
Bruce F. Ball
Keila Johnston

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1.0 INTRODUCTION

1.1 PROJECT DESCRIPTION

At the request of Barry Jamieson of ISL Group in Edmonton, an assessment of Historical Resource concerns was carried out for the Leduc County Roadway Management System study project (Figure 1). The overall objective of the project was to develop a management system aimed at preserving and enhancing roadway infrastructure needs for the next 20 years. The specific objectives of the Historical Resource portion of the study was to " . . . identify immediate and future environmental, archaeological [Historical Resource] concerns and other sensitivities that may impact the management of the County's roadway system"[1].

Leduc County is located south of the City of Edmonton and is recognized as one of the fastest growing areas of the Capital Region. Rapidly changing demographics in response to economic growth is impacting the County's transportation infrastructure with increased inter-municipal traffic on commuter routes between the various activity centres.

The County's present roadway system is comprised of approximately 2,200 kms of paved and gravel roadways that service a large agricultural community, oil and gas and other resource industries, industrial centres, as well as several hamlets and residential subdivisions. Future growth within the County will require the upgrading of these existing roadways and the construction of new ones. Such future development will require the management of historical resource concerns within the County under the *Alberta Historical Resources Act.*

This study provides a list of all known historical resource sites within the County as of March 2005, a predictive model that identifies the historical resource potential for all land parcels within the County, and a list of all areas identified in *Alberta Community Development*'s "Significant Sites List". By listing specific site locations, special interest areas and providing predictions of the Historical Resource potential within the County, it is possible to identify issues and concerns for future planning strategies.

1 RFP – Leduc County Roadway Management System, Janis Fong November 2004.

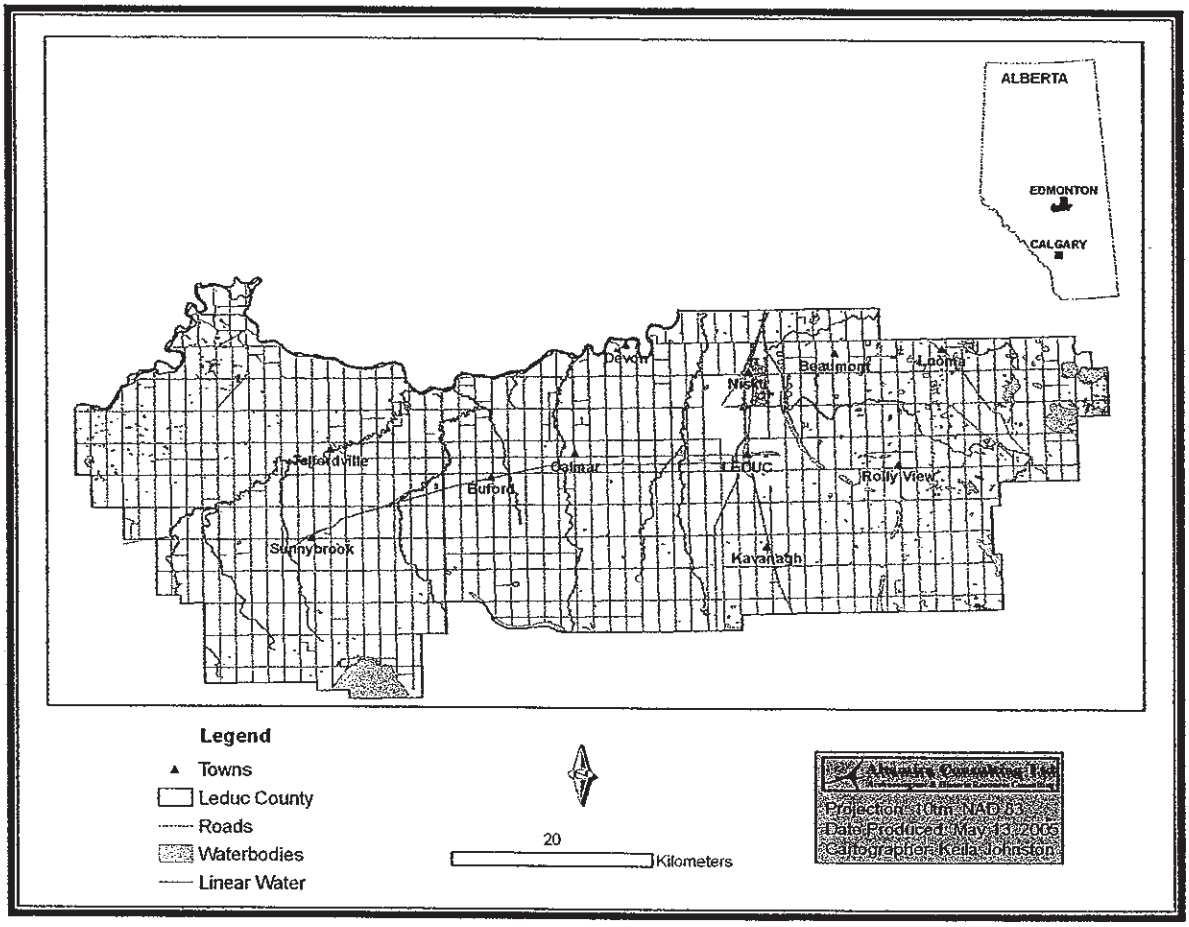

Figure 1. Map of Leduc County showing the roadway network.

Staff of the *Heritage Resource Management Branch* of *Alberta Community Development* did not review this project to initiate the study. The work was triggered by Leduc County Public Works and Engineering Department.

The review and digitizing of site forms and report documents were carried out during January and February of 2005. The assimilation of GIS data and preparation of the database were undertaken in March and April of 2005. The modeling was undertaken in April and May 2005.

This is the final report for the Historical Resource Management task for the Leduc County Roadway Management System Project. This report lists specific historical resource concerns relative to the County's roadway system and provides predictive estimates of historical resource potential for lands where other information is not available. All work was completed

designed and carried out by staff of Altamira Consulting Ltd. under the direction of Bruce F. Ball. This report was prepared in accordance with and adheres to the intent and objectives of the *Historical Resources Act* (1987) and its respective regulations, and the *Guidelines for Archaeological Permit Holders in Alberta* (Archaeological Survey of Alberta 1989).

1.2 GENERAL ENVIRONMENT

Leduc County is located in central Alberta south of the City of Edmonton along the margins of the North Saskatchewan River in the West and below the Beaver Hills in the Aspen Parkland and Boreal Transition Ecoregions of Alberta (Figure 2). The Parkland is found, in general, between the grasslands of the Plains and the treed regions of the Boreal Forest.

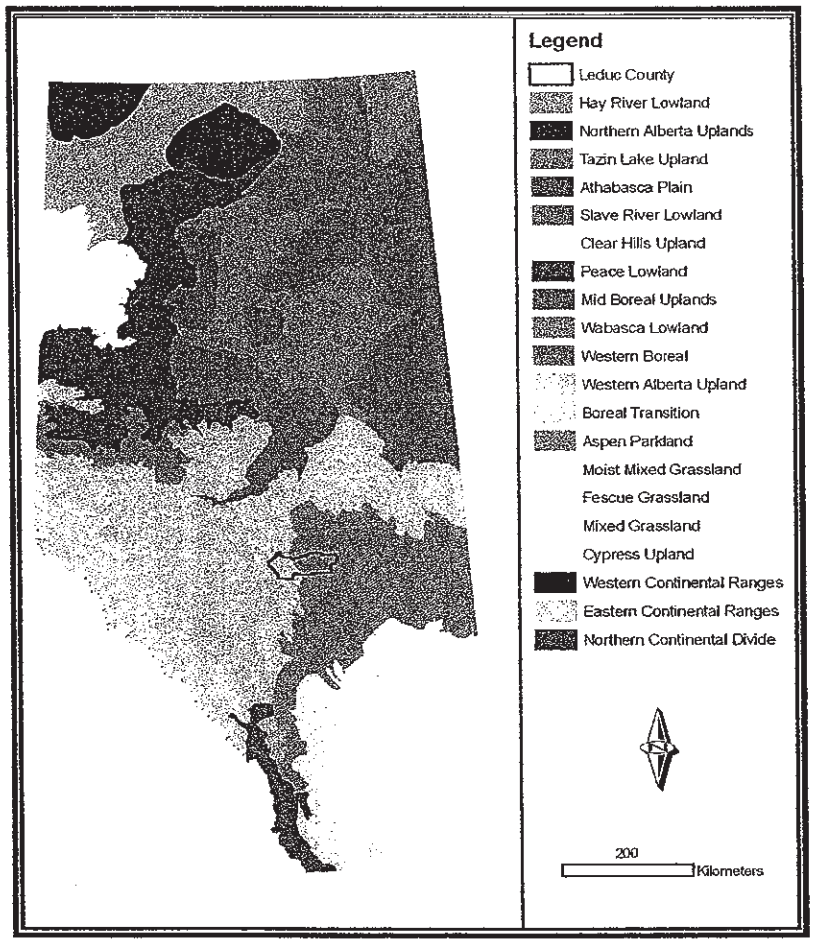

Figure 2. The Ecoregions of Alberta.

The Aspen Parkland Ecoregion may be described as a subtle mosaic of aspen woodlands,

fescue grasslands, shrublands and wetlands on a gently rolling landscape. This region comprises approximately 12 percent, or 37,000 km^2 of Alberta and is considered to be an ecotone, an area of transition between the Grasslands and the Boreal Forest. The aftermath of the last glaciation is particularly evident in the gently rolling disintegration moraines that overlay parts of the region. In the past Aspen Parkland Ecoregion has displayed a diversity in vegetation and wildlife. Over half of Leduc County is situated in Canada's Aspen Parkland Ecoregion.

The Aspen Parkland Ecoregion is the one of the most densely populated parts of Alberta. It displays a rich ecosystem diverse in both vegetation and wildlife. Since 1754 when Henday first explored the region, development and farming have drastically altered the vegetation and landscape. Native vegetation is now almost nonexistent.

The Boreal Transition Ecoregion is found in the western quarter of the County (Figure 2). This ecoregion extends across the Canadian Plains from southern Manitoba to central Alberta. It is characterized by warm summers and cold winters and is classified as having a subhumid low boreal 'ecoclimate'. It is characterized by a mix of dominating deciduous boreal forest species and farmland.

The Boreal Transition Ecoregion marks the southern limit of closed boreal forest and northern advance of arable agriculture. Predominant vegetation includes tall, trembling aspen with secondary quantities of balsam poplar, a thick understory of mixed herbs, and tall shrubs. White spruce and balsam fir are the climax species but are not well represented due to the effects of fires. Poorly drained areas are usually covered with sedges, willow, some black spruce, and tamarack.

The typical landscape of the Boreal Transition Ecoregion may be described as hummocky with the land surface mantled by calcareous, glacial till and significant inclusions of relatively level lacustrine deposits. Associated with the more diverse morainal areas are a large number of small lakes, ponds, and sloughs occupying shallow depressions.

The region drains northeastward via the Saskatchewan River system.

Well to imperfectly drained Gray Luvisols and Dark Gray Chernozemic soils are predominant. Local areas of Black Chernozemic, peaty Gleysolic, and Mesisolic soils also occur.

The region provides habitat for white-tailed deer, black bear, moose, beaver, coyote, snowshoe hare, and cottontail and critical habitat for large numbers of neotropical migrant bird species, as well as ruffed grouse and waterfowl.

Over 70% of the ecoregion is farmland, spring wheat and other cereals, oilseeds, and hay are the dominant crops. Other land uses include forestry, hunting, fishing, and recreation.

2.0 HISTORICAL RESOURCES

2.1 INTRODUCTION

Historical Resources are recognized in the Province of Alberta as nonrenewable resources, subject to protective measures and defined under the *Historical Resources Act* (Province of Alberta 1987). The *Province of Alberta Historical Resources Act* defines historical resources as:

> ...any work of nature or of man that is primarily of value for its palaeontological, archaeological, prehistoric, historic, cultural, natural, scientific or aesthetic interest including but not limited to, a palaeontological, archaeological, prehistoric, historic, or natural site, structure or object...(*Province of Alberta 1987*)

In Alberta, Historical Resources are generally separated into four different categories archaeological, historic, palaeontological and natural. **Archaeological** resources usually include all prehistoric or historic cultural phenomena for which no written record exists. **Historic** resources consist of cultural remains relating to that period of Alberta's history for which historic documents exist. Historic period sites are usually more visible features or structures (e.g., standing buildings). **Palaeontological** resources consist of natural features containing evidence of extinct multicellular beings. These are most commonly referred to as fossils and include such things as dinosaur bones. And while it is not common, there have been instances where **Natural** phenomena (e.g., areas, trees) have been managed under the provisions of the *Historical Resources Act*.

Historical Resource sites are fragile and precious and easily suffer damage or destruction from any construction or development activities that affect the land surface. Such activities may include road and pipeline construction, route realignments, logging, construction activities, mining, gravel pit operations, landscaping, soil and gravel removal, recreational activities, and landfill development. Once the original context is disturbed or destroyed, the informational and interpretive value of historical resources are seriously affected and in some cases lost forever.

Historical resources that are most likely to be present within the study area are prehistoric

archaeological sites, historic structures/artifacts and fossils.

2.2 PALAEONTOLOGICAL RESOURCES

Palaeontological resources usually occur in geological formations lying below the ground's surface. They are composed of the fossilized remains of natural items such as animal bones, plants, shells, and the fossilized impressions of such things as plant matter and animal tracks. Palaeontological resources are most commonly found along stream and valley margins where the bedrock formations have been exposed. Palaeontological resources also occur in unconsolidated glacial deposits, the result of glacial re-deposition.

2.3 HISTORIC SITES

Historic resources usually comprise cultural phenomena that relate to the historic period and include such things as documents, buildings or structures as well as the various artifacts of man's historic past. Historic resources can also be archaeological in nature where the written record is missing – hence historic archaeology. These can include the artifacts and remains of structures and buildings of both aboriginal and European people, collapsed cabins, house pits, campsites, graves, roadways, trails, towns, villages or other habitation areas and the garbage dumps or middens of past historic period occupation.

2.4 ARCHAEOLOGICAL RESOURCES

More commonly, archaeological resources refer to the remains of the prehistoric occupations of Alberta. These include such things as the remains of houses (e.g., tipis), hearths and fire pits, pecked and chipped stone tools (projectile points – arrow and spear heads) and the remains of stone tool making (flakes, cores and other stone detritus), charcoal, carved and modified wood, bone, and antler, ceramics and pottery, and the plant, animal and other remains found in the remains of their trails, structures, villages and garbage.

2.5 AUTHORITY

The Province of Alberta first passed Heritage Resource legislation in 1973 in the form of the *Alberta Heritage Act* (Province of Alberta 1973). Revision of this Act in the 1980s resulted in the passage of the *Historical Resources Act* in 1987 (Province of Alberta 1987) and it is this version of the Act that currently governs Historical Resource management activities in the Province of Alberta.

Management and protection of Historical Resources is currently the responsibility of *Alberta Community Development. The Heritage Resource Management Branch, Cultural Facilities and Historical Resources Division* is largely responsible for the management of these resources. Within this Branch, the two sections that take on the majority of the liability and workload are *Archaeology and History* and *Protection and Stewardship*.

The Archaeology and History Section maintains inventories of archaeological and historic sites and geographical names, staffs archaeologists and historians that make evaluations of the need for Historical Resources Impact Assessment work, issues **Permits** for field inspections, reviews the results of all work carried out in the province, and in general assesses the needs for management of historical resource concerns in the Province.

The Protection and Stewardship Section is responsible for the management and protection of historical resources in the province. This section reviews proposed developments, consults with developers and informs them of requirements or actions required, and serves as the primary communication portal for development in the province. The Protection and Stewardship Section serves as the main contact point for almost all historical resource management concerns. And, while the Archaeology and History Section staff reviews Archaeology and History issues, Palaeontological concerns are the responsibility of staff from the Royal Tyrrell Museum of Palaeontology. A list of contact numbers for these agencies is provided in Appendix 1.

One of the main responsibilities of the *Heritage Resource Management Branch* is the review and assessment of development areas within the province. Once a review has been completed and it is established that there is a chance that historical resources may exist within the

proposed development's zone of impact, under the Act, the proponent is required to enlist the services of **a qualified archaeologist** to undertake a Historical Resources Impact Assessment (HRIA). As noted above, all Historical Resources Impact Assessment work carried out in the Province is done under a Permit system. Permits are granted only to qualified individuals and are known to the *Cultural Facilities and Historical Resources Division, Alberta Community Development*. The permit system provides assurances of qualifications, standards and quality. There are three types of permits issued: one is for work undertaken for specific research and is referred to as the Research Permit; the second is for HRIA and mitigation projects and is referred to as the Mitigative Permit; and the third is for Palaeontological excavation work. The vast majority of Permits issued in a year are the Mitigation type. The Permits usually cover a specific project area and refer to a specific time period. Any historical resource assessment work for County roadway systems that involves field inspection work will require a qualified archaeologist and a Permit.

A HRIA provides an assessment of the "effect of the proposed operation or activity on historic resources in the area where the operation is carried on" (Province of Alberta 1987). This assessment usually includes a field survey that entails visual inspection and subsurface testing of the area for historical resources. Following the completion of fieldwork, a report detailing the results of the HRIA is submitted to the *Cultural Facilities and Historical Resources Division, Alberta Community Development*. The HRIA report evaluates the significance of all historical resources located within the development area and formulates recommendations regarding the management of any significant sites identified and the necessity for mitigative action. Mitigation may involve avoidance or further study.

All work involving surface disturbance that occurs within or near an area of interest should be reviewed by a qualified archaeologist.

2.0 ASSESSMENT

2.1 THE RESOURCE BASE

There were a total of 891 known archaeological sites and numerous historic and palaeontological sites recorded within the boundaries of Leduc County as of March 2005. Records of these sites are maintained by *Alberta Community Development.* Together these records along with research estimates provide the resource base for the assessment of historical resource concerns. The assessment of historical resource concerns for the Leduc County Roadway Management Project involved four kinds of information gathering:

1. Inventory reviews;
2. Review of previous study reports;
3. Review of the Significant Sites List[2]; and,
4. Historical Resource Site Prediction.

2.1.1 Inventory Reviews

The study began with a search of *Alberta Community Development's* Inventory records. *Alberta Community Development* maintains inventories of all historical resource sites recorded in the Province. While most records are produced as a result of historical resource research carried out under Permit, there are some sites that are recorded as a result of other means. These include historic and palaeontological sites as well as archaeological, although the majority of sites recorded in the province are archaeological. A search of the Archaeological Survey Sites inventory files produced a list of all known archaeological site locations in Leduc County.

The *Heritage Resource Management Branch* of *Alberta Community Development* also maintains an inventory of Historic Sites. Like the Archaeological Sites Inventory, the

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[2] Listing of Significant Historical Sites and Areas by Meridian, Township, Range and Section. *Heritage Resource Management Branch, Cultural Facilities and Historical Resources Division.* 5th Edition, Restricted Version. January 2005.

Historic Sites Inventory is dependent on records that result from specific development projects. Thus, there is no guarantee that Historic Sites found on the landscape are inventoried. Each record contains approximately one page of information, including a picture. Unfortunately, the nature of the locational information collected for these records precluded their use for this project. Specific point location (e.g., UTM) is not used to record site locations. All Historic Site locations are recorded using the legal (LSD) system. As a result it would be almost impossible to determine the exact location of the sites relative to road allowances without field inspections. Since field inspections were beyond the scope of this project, the Historic Sites inventory was not used for this project.

The main source for Historic Sites was the Significant Sites listing (Alberta Community Development 2005).

There are few known sources for palaeontological site location information currently available. Two sources for Palaeontological Resources were used, the Significant Sites Listing and the Palaeontological Resources Sensitivity Zones Map (Tyrrell Museum of Paleontology 1984).

2.1.2 Review of Previous Study Reports

Copies of reports from previous Historical Resource studies undertaken in the County were reviewed to identify the areas that have been surveyed previously.

2.1.3 Review of the Significant Sites List

Alberta Community Development has developed a Significant Sites Listing primarily for historical resources management programs in the petroleum and natural gas industry. However, use of this list has been extended to other management areas and now exists as a basic tool for historical resource evaluation throughout the province. The list provides an official evaluation of Historical Resource concerns within selected legal parcels of land. A review of *Alberta Community Development's* "Significant Sites List" was undertaken to identify all portions of County that have been assessed as having significant HRV values.

2.1.4 Historical Resource Site Prediction

The final method to identify historical resource concerns for Leduc County was Historical Resource Site Prediction or predictive modeling. While the previous three methods of identifying historical resource concern used existing records, Site Prediction Modeling is used for archaeological sites and is based on the use of attributes used to describe known site location to predict the occurrence of archaeological sites.

2.2 PREDICTIVE MODELING

Historical Resource predictive modeling for this project is confined to prehistoric or archaeological sites. Historic sites are usually distinctly obvious on the landscape and as a result are a known commodity. Palaeontological sites are most commonly found within deeply buried geologic strata and therefore are not in danger of impact. By comparison, archaeological sites are not easily noticeable to the untrained eye and really require special methods in their detection. Through the use of predictive attributes, it is possible to predict the occurrence of archaeological site location and by so doing control or cut down on the time needed to look for them.

The assessment of archaeological site potential involves the evaluation of previously recorded sites, coupled with information from ethnographic studies, local topography, and ecological or biogeographical features of the region. From these studies, a set of predictive variables can be selected to characterize a defined area of interest. Commonly used environmental variable categories include slope, proximity to water, aspect, drainage, elevation, proximity to known archaeological sites, and proximity to historic settlements. The specific variables used in this study are presented later.

The archaeological sites recorded in Leduc County were organized into simple categories of site type. Site types that were determined to be in some way questionable or the site information was judged to be suspect were deleted. Toward this end, isolated find sites, sites that are so small as to be insignificant, and sites where the data base was suspect were excluded from the model. A total of 707 sites were used in the modeling process.

2.3 DATA CONSIDERATIONS

The success of any modeling process is dependent on the availability of pertinent data. The origins of the base data used to produce the Leduc County model are as follows.

- The Leduc County perimeter, roads, hamlets, township grid, and Altalis water layers were provided by ISL.
- The slope layer and topographic features layer were derived from a Shuttle Radar Topography Mission (SRTM) 90 m DEM (http://www2.jpl.nasa.gov/srtm/).
- Topographic features were generated using the topocrop extension for ArcView (www.fs-privat.de/diss.htm).
- The Canada Land Inventory Land Use layer was acquired from the Geoconnections Discovery Portal (http://geogratis.cgdi.gc.ca/CLI/index_landuse.html).
- The sand and gravel layer was acquired from the Alberta Geological Survey (http://www.ags.gov.ab.ca/GIS/gis_and_mapping.shtml).
- The landscape model layer is from Agrasid (Agricultural Region of Alberta Soil Inventory Database) http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/sag3249?opendocument.

2.4 MAPPING AND RESOLUTION

The raster resolution is 25 meters. For layers based on the SRTM DEM, it is 25 meters, re-sampled from 90 meters. All vector data were converted to 25 meter rasters.

An adequate resolution that amply defines the topography of a given study area is defined by the measure of variability within the area. In the case of Leduc County, there is relatively little variation in relief. Where variation does occur it does so at a small scale over a small area. The 90 metre resolution of the available mapping does not adequately capture the variation in this area. Better resolution in the base data would increase the precision of the results.

2.5 ARCHAEOLOGICAL SITE DATA BASE

Review of the known site database resulted in the following descriptive categories (i.e., the essence of what we know about archaeological sites at the time that this document was prepared). As noted above this information originates from the files and records of *the*

Archaeological Survey of Alberta, Alberta Community Development as of March 2005. For the most part, these data exist as locational information only. Because of the process of recording, which is largely inventory in nature, there exists little description as to the nature or contents of the sites.

Based on the files and records of *the Archaeological Survey of Alberta,* sites in Leduc County tend to be found in the following settings.

Table 1. Environmental Setting of sites in Leduc County based on known site locations.

	Close to Linear water	Close to Lake/pond	On terrace	On slope	On raised area	sand	Flat/ undulating	Near marsh
Sites	**58%**	**9%**	**7%**	**16%**	**49%**	**9%**	**18%**	**25%**

As noted above, there were 891 known archaeological sites recorded in Leduc County in March 2005. Economic development largely dictates whether archaeological inventory and research is carried out and as a result the distribution of sites found is a reflection of where work is carried out rather than actual variation and densities. The distribution of archaeological sites in Leduc County is shown in Figure 3. Note: the high concentration of sites shown in the northwest corner of the County to some extent reflects the intensity and amount of fieldwork carried out in this region. Similar statistics might be discovered in other parts of the County given opportunities of similar survey coverage. A total of 707 sites were used in the modeling process.

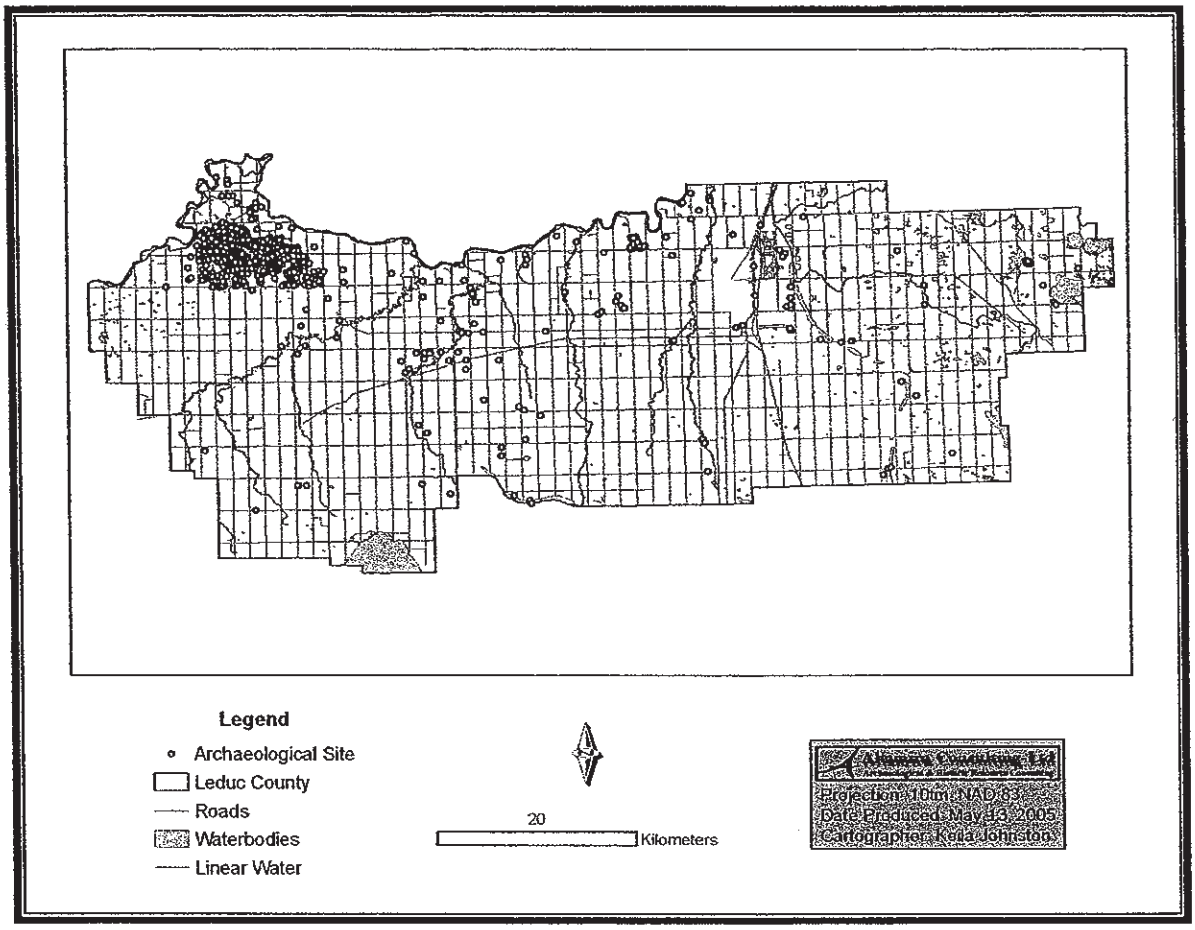

Figure 3. Distribution of recorded archaeological sites in Leduc County as of March 2005.

2.4 PREDICTION CRITERIA

Using data from associated research and known archaeological sites within Leduc County, a set of environmental attributes or variables found to be commonly associated with site location can be determined. The geographical variables that are found most commonly associated with archaeological site location in the County are:

1. Raised areas such as knolls or hills;
2. River and Stream terraces;
3. Areas close to linear water including both streams and rivers;
4. Areas close to water bodies such as lakes and ponds;
5. Sandy areas;

6. Generally flat to undulating ground (but not in all cases because 16% of sites are found on slopes);
7. Generally dry ground, but many sites are located in close proximity to marshes/sloughs (25%).

A list of potential resource variables was established from these criteria. These are shown in Table 2.

Table 2. List of Potential Prediction Variables.

Predictive Variable
Slope
Proximity to major water source
Drainage
Sandy area
Valley Rim or terrace
High Prominence
Proximity to a minor water source

The digital data were then examined to determine which of these variables could be used in the predictive model based on availability of information. Variables included in the model are distance to linear water sources, distance to water bodies, distance to major linear water sources, slope, presence of sand or gravel, land use, topographic features, and landscape model. The land use layer was chosen because it incorporates swampy areas, which are not suitable for habitation. The topographic feature variable is a division of the topography into landform shapes: convex-converging, straight-converging, straight-parallel (flat), concave-converging, convex-parallel, convex-diverging, straight-diverging, concave-parallel, and concave-diverging. Concave and converging areas are basin like and therefore potentially wet, convex and diverging areas are raised areas that are generally dry. The Landscape Model is a combination of soil morphology, soil genesis, relief, slope class and surface form. These two layers were chosen in the hopes of delineating valley rim/terrace areas and raised areas such as knolls or hills.

Many of the variables chosen are commonly found in inductive predictive models. Dry ground is a necessity of comfort, so settlements are usually located away from damp or wet areas (Dalla Bona and Larcombe 1996). Water is a frequent necessity of life, therefore settlements are generally located in close proximity to a water source. It is difficult to conduct daily activities on a steep slope, so settlements tend to be found on shallower slopes,

usually under 10 degrees. Ridges or terraces are good locations for campsites because the ground is raised and therefore usually dry, and a highpoint is also a good vantage point for viewing the surrounding terrain (Kvamme 1985).

2.5 MODELING AND ANALYSIS

Several GIS-based approaches to archaeological predictive modeling have been attempted over the past two decades. Choosing the appropriate method for any given area is dependent upon several factors including the culture history and settlement patterns of the region, availability and quality of digital data, and software/hardware constraints.

Bo Ejstrud (2003) compared four methods of archaeological predictive modelling across six site type categories. The methods tested were Boolean multi-criteria evaluation (MCE), weighted Boolean MCE, logistic regression, and Dempster-Shafer theory. Each of these methods has it's own unique assumptions and limitations. For example, logistic regression requires accurate known site locations, while Dempster-Shafer theory is statistically complex and provides an output that requires further analysis. Overall, Dempster-Shafer Theory provided the best results. Weighted Boolean MCE was the highest ranked method in three cases. Both of these methods, along with logistic regression were chosen to produce models for Leduc County.. This insured that both models with a statistical basis (logistic regression and Dempster-Shafer Theory) and models based on expert opinion (MCE) were included for consideration. Because logistic regression requires known site locations, the regression models were dependent on site location, while the MCE and Dempster-Shafer models were not.

The IDRISI Kilimanjaro Multi-Criteria/Multi-Objective Decision Wizard was used to generate the model. The weighted linear combination method was chosen. Presence of sand or gravel, land cover, landscape model and topographic features are all categorical data. Distance to major linear water sources, distance to linear water sources, distance to water bodies and slope are continuous data. Continuous data are reclassified using the fuzzy module, which allows for the data range of highest suitability to be allocated and the rest of the map to be scaled accordingly in either an increasing or decreasing manner.

Weights were assigned to each variable subjectively before running the final model. The analytical hierarchy process in IDRISI is used to assign these weights. The method is based on Saaty's pairwise comparison technique (Saaty 1977), which involves a direct comparison of importance between each variable and every other variable, one by one (see Tables 3 and 4).

Table 3. Saaty's Pairwise Comparison Chart

less important					more important			
extremely	very strongly	strongly	moderately	equally	moderately	strongly	very strongly	extremely
1/9	1/7	1/5	1/3	1	3	5	7	9

Table 4. Pairwise Comparison Matrix. The row is rated relative to the column. The top half of the chart mirrors the bottom half.

	Species	Intwater	Permwater	Slope	Moisture	Landcover	Toposhape
Water bodies	1						
Linear water	1	1					
Major water	5	5	1				
Slope	7	7	5	1			
Land use	7	7	1	1	1		
Land model	1	1	1/3	1/5	1/5	1	
Topo shape	3	3	1/3	1/3	1	5	1

The principal eigenvector (equivalent: sum the column and divide each entry by the sum) of these values is then taken and the resulting weights are multiplied with each raster cell and added together to achieve a final result (Eastman 2003; Table 5).

Table 5. Eigenvector values for each variable. They must sum to 1.

Variable	Weight
Water bodies	0.0368

Linear water	0.0368
Major water	0.1543
Slope	0.3315
Land use	0.2896
Land model	0.0425
Toposhape	0.1085

The final result is scaled from 0 to 255, with 0 indicating areas completely unsuitable for archaeological sites, and 255 indicating areas very suitable for archaeological sites (Figure 3).

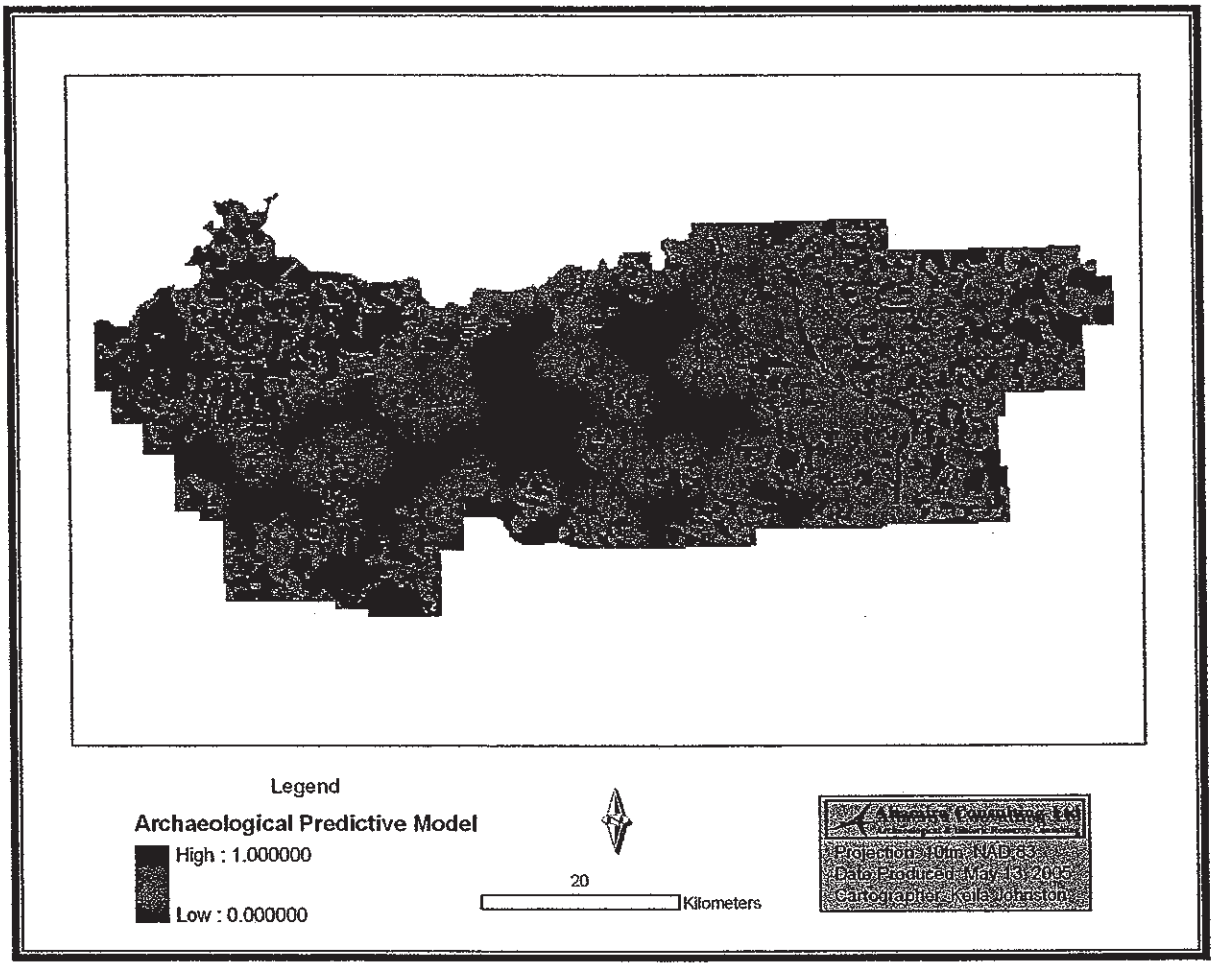

Figure 4. Map showing the results of the scaled archaeological potential model for Leduc County.

2.5.1 Logistic Regression and Akaike's Information Criteria

Regression allows for the prediction of the presence or absence of a characteristic, in this

case archaeological site presence/absence, based on the values of certain predictor variables, such as slope, proximity to water, and vegetation type. Logistic regression has certain advantages over other statistical methods. It accommodates the dichotomous (binary) dependent data that settlement location studies produce (for instance, presence-absence data). Categorical data, among the independent variables, are allowed; something that cannot be done with ordinary regression. There are no associated assumptions about the distributions of the predictor variables; they do not have to be linearly related or normally distributed and an equal variance within each possible group of variables is not necessary. Binary data will not produce probabilities greater than 1 or less than 0. In fact the logistic transformation that is performed on the regression ensures that the final result is between 0 and 1.

The Idrisi module LOGISTICREG was used to calculate logistic regression. In this module, the dependent variable must be binary (a 0 or 1 value). The formula used is:

$$P(y = 1/X) = \frac{\exp(\Sigma BX)}{1 + \exp(\Sigma BX)}$$

where:

P is the probability of the dependent variable being 1;

X is the independent variables;

$X = (x_0, x_1, x_2 \ldots x_x)$ $X_0 = 1$;

B is the estimated parameters; and,

$B = (b_0, b_1, b_2 \ldots b_x)$.

The outcome is on a continuous scale between 0 and 1 with 1 being highly suitable (Eastman 2003; Hosmer and Lemeshow).

A series of logistic regression models are produced and Akaike's information criteria (AIC) is used to rank the models and select the best one (see Table 6). The degree of truth of each

model is evaluated and the best one is chosen. The best model has the best combination of goodness of fit and model complexity.

Table 6: Results of Akaike's Information Criteria. Variable key: a=land use, f=topographic feature, m=landscape model, w=linear water, g=sand & gravel, s=slope, t=major stream, b=water body.

Parameters	#	K	LL	n	AIC	AICc	Diff_AIC(Δi)	Exp (Δi)	sum of Δi	Weight (wi)	Rank
a,f,m,w,g,s,t,b	1	10	8629.7451	670	8649.745	8650.079	3.05674232	0.216888657	4.4067144	0.04921777	8
a,f,m,w,g,s,t	2	9	8652.1689	670	8670.169	8670.442	23.4194304	8.21363E-06	4.4067144	1.86389E-06	23
a,f,m,w,g,s,b	3	9	8634.2783	670	8652.278	8652.551	5.52883044	0.063012937	4.4067144	0.014299301	11
a,f,m,w,g,t,b	4	9	8637.5967	670	8655.597	8655.869	8.84723044	0.011990804	4.4067144	0.002721031	20
a,f,m,w,s,t,b	5	9	8631.7139	670	8649.714	8649.987	2.96443044	0.227133979	4.4067144	0.051542705	7
a,f,m,g,s,t,b	6	9	8630.4209	670	8648.421	8648.694	1.67143044	0.433564277	4.4067144	0.098387197	4
a,f,w,g,s,t,b	7	9	8631.5098	670	8649.51	8649.783	2.76033044	0.251536991	4.4067144	0.057080393	6
a,m,w,g,s,t,b	8	9	8629.7256	670	8647.726	8647.998	0.97613044	0.613812839	4.4067144	0.139290361	3
f,m,w,g,s,t,b	9	9	8673.4541	670	8691.454	8691.727	44.7046304	1.96116E-10	4.4067144	4.45039E-11	26
f,w,g,s,t,b	10	8	8676.5977	670	8692.598	8692.816	45.7933549	1.13789E-10	4.4067144	2.58217E-11	29
a,w,g,s,t,b	11	8	8631.4971	670	8647.497	8647.715	0.69275491	0.707245484	4.4067144	0.160492699	2
f,w,g,s,b	12	7	8677.8896	670	8691.89	8692.059	45.0365875	1.66123E-10	4.4067144	3.76977E-11	27
a,f,w,g,s,b	13	8	8636.7695	670	8652.77	8652.987	5.96515491	0.050662086	4.4067144	0.011496567	12
a,b	14	4	8645.4355	670	8653.436	8653.496	6.47345354	0.039292298	4.4067144	0.008916461	15
a,w,g	15	5	8670.7188	670	8680.719	8680.809	33.7869646	4.60526E-08	4.4067144	1.04505E-08	25
a,w,g,b	16	6	8643.5381	670	8655.538	8655.665	8.6426	0.013282605	4.4067144	0.003014174	19
a,w,g,b,f	17	7	8643.6396	670	8657.64	8657.809	10.7865875	0.004546972	4.4067144	0.001031828	21
w,g,b,f	18	6	8684.5029	670	8696.503	8696.63	49.6074	1.69001E-11	4.4067144	3.83509E-12	32
m,g,s,t	19	6	8713.4082	670	8725.408	8725.535	78.5127	8.93684E-18	4.4067144	2.028E-18	34
m,g,s,t,b,f	20	8	8675.8975	670	8691.898	8692.115	45.0931549	1.6149E-10	4.4067144	3.66464E-11	28
a,w,g,s,t	21	7	8653.2783	670	8667.278	8667.447	20.4252875	3.67033E-05	4.4067144	8.32895E-06	22
a,t,b,f	22	6	8642.0742	670	8654.074	8654.201	7.1787	0.027616275	4.4067144	0.006266863	17
a,t,b,f,s	23	7	8634.8438	670	8648.844	8649.013	1.99078746	0.369577902	4.4067144	0.083866997	5
a,t,b,f,g	24	7	8639.251	670	8653.251	8653.42	6.39798746	0.040803242	4.4067144	0.009259334	14
a,t,b	25	5	8642.3262	670	8652.326	8652.417	5.39436461	0.067395144	4.4067144	0.01529374	10
w	26	3	8725.9355	670	8731.936	8731.972	84.9493392	3.57672E-19	4.4067144	8.11653E-20	35
w,b	27	4	8686.6807	670	8694.681	8694.741	47.7186535	4.34536E-11	4.4067144	9.86078E-12	30
t,b	28	4	8688.248	670	8696.248	8696.308	49.2859535	1.98468E-11	4.4067144	4.50377E-12	31
a,w,b	29	5	8645.1729	670	8655.173	8655.263	8.24106461	0.01623587	4.4067144	0.003684348	18
a,t,b,m	30	6	8640.8672	670	8652.867	8652.994	5.9717	0.050496563	4.4067144	0.011459005	13
a,t,b,s	31	6	8634.8955	670	8646.896	8647.022	0	1	4.4067144	0.226926438	1
m,g,s	32	5	8714.1621	670	8724.162	8724.252	77.2302646	1.69692E-17	4.4067144	3.85076E-18	33
a,m,g,s,b,w	33	8	8634.335	670	8650.335	8650.553	3.53065491	0.17113074	4.4067144	0.038834089	9
a,m,g,t,b,w	34	8	8637.7881	670	8653.788	8654.006	6.98375491	0.030443662	4.4067144	0.006908472	16
a,w	35	4	8671.3623	670	8679.362	8679.422	32.4002535	9.21243E-08	4.4067144	2.09054E-08	24
							Sum of Δi =	4.406714384		Sum of wi = 1	

2.5.2 Dempster-Shafer Theory

At the center of Dempster-Shafer theory is the notion of belief or modeling various degrees of belief. For example, consider the authenticity of a five-dollar bill. Either the money is genuine (hypothesis 1) or it is counterfeit (hypothesis 2). The holder of the money may suspect that there is a certain likelihood of the bill being genuine and a certain likelihood of the bill being counterfeit. It is also possible that the holder has no idea which of the two possibilities is most likely. The belief afforded to the two possibilities must equal 1, for instance a 0.9 chance of the bill being genuine and a 0.1 chance of the bill being counterfeit. If the evidence to support either hypothesis is lacking the belief values are low. If the evidence to support one hypothesis is high then it is set close to 1 while the other hypothesis is set close to 0.

Dempster's rule allows for the combination of these belief functions providing the available evidence is not contradictory. The outcome is the orthogonal sum of the input, or the final degrees of belief based on the combined evidence. Input values can be chosen on the basis of statistical methods or personal opinion. The method allows for ignorance to be incorporated into the combination of evidence. A low belief value, or in fact a value of 0 can be assigned if there is little or no evidence to support a hypothesis. This stems from the fact that there is a degree of uncertainty involved in most interpretations. Uncertainty can be caused by some random factor or lack of information about some aspect of the model. There are many variations and interpretations of the idea of belief, which has led to the creation of many models based on Dempster-Shafer theory (Shafer 1976; Smets 1994).

The Belief module in Idrisi is used to model archaeological site location. The following describes the basic notions behind the Belief module. First, a frame of discernment (Figure 5) is used to build all possible combinations of hypotheses. Uncertainty is accounted for in these combinations. For instance, while trying to construct a land cover map, it may be discovered that tree type is not differentiated in the available data, but tree covered areas in general are provided. It would still be possible to delineate treed areas as a whole by using a combination hypothesis [deciduous, coniferous], which expresses the fact that trees are present, but shows the uncertainty about actual tree type (Eastman 2001; Smets 1994).

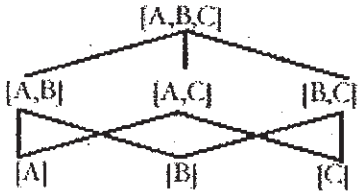

Figure 5. Frame of Discernment for 3 Basic Hypotheses {A,B,C}

The basic probability assignment (BPA), shows the support that certain evidence has for a hypothesis [site, non-site] and not any subset of the hypothesis [site]. Personal judgement or data can be used to derive the BPA, and since the outcome is a fuzzy measure, the FUZZY module can be used to make a BPA. The sum of BPAs is 1 (Eastman 2001; Shafer 1976).

The Belief module will be used to determine likely presence and/or absence of archaeological sites. This requires the hypotheses [site] which indicates that the evidence used in any given layer supports site presence, and [non-site] which indicates that the evidence used in any given layer supports site absence. Each variable theme must be classified to show probabilities for site presence [site] or absence [non-site] depending on which of the two is best supported by the evidence at hand. For instance, take the example of a distance to water variable. It is likely that settlements will be found close to water because it is a necessity of daily life. It is less likely, however still possible, that sites will be found at some distance from water. Therefore it makes sense to classify areas close to water as being more probable for site location than areas far from water. Areas far from water become evidence for [non-site] because humans cannot survive without water, while areas close to water are evidence for [site, non-site] because these areas can contain sites but do not have to, therefore the hypothesis is only plausible, not a fact.

It is important to take uncertainty into account when complete knowledge of presence/absence data for an area is not available. It is also possible that absence data is not entirely accurate. A surveyor could miss a site at a certain location, so in fact, it would not be considered an absence location. Rarely does a survey cover a whole area, so in fact absence

data may cover presence areas due to uncertainty. In any situation involving data uncertainty, Dempster-Shafer theory can be used (Eastman 2001).

2.5.3 Model Validation

The models were compared using the Relative Operating Characteristic (ROC) module in Idrisi (Tables 7, 8, and 9). ROC compares the actual location of a class (binary image of presence/absence), in this case the archaeological sites, with a probability model of class occurrence, in this case the output from the MCE Module.

> The ROC statistic is the area under the curve that connects the plotted points. Idrisi uses the trapezoidal rule from integral calculus to compute the area, where x_i is the rate of false positives for threshold i, y_i is the rate of true positives for threshold i, and n is the number of thresholds group (Eastman 2001).

$$AreaUnderCurve = \sum_{i=1}^{n} [x_{i+1} - X_i] \times [y_i + (y_{i+1} - y_i)/2]$$

A value of 1 indicates that there is perfect spatial agreement between the actual locations and the model, while a value of 0.5 indicates that there is no agreement, or the spatial patterning is random (Eastman 2001).

Table 7. ROC results for Logistic Regression models. Variable key: a=land use, f=topographic feature, m=landscape model, w=linear water, g=sand & gravel, s=slope, t=major stream, b=water body.

Model	Method	Variables	ROC
1	LR	A,f,m,w,g,s,t,b	.6163
2	LR	A,f,m,w,g,s,t	.5989
3	LR	A,f,m,w,g,s,b	.6119
4	LR	A,f,m,w,g,t,b	.7687
5	LR	A,f,m,w,s,t,b	.6136
6	LR	A,f,m,g,s,t,b	.6154
7	LR	A,f,w,g,s,t,b	.6162
8	LR	A,m,w,g,s,t,b	.6164
9	LR	F,m,w,g,s,t,b	.5889
10	LR	F,w,g,s,t,b	.5893
11	LR	A,w,g,s,t,b	.6163
12	LR	W,g,s,b,f	.5938
13	LR	A,f,w,g,s,b	.6184
14	LR	A,w,g	.5832

Model	Method	Variables	ROC
15	LR	A,w,g,b	.6147
16	LR	A,w,g,b,f	.6143
17	LR	W,g,b,f	.5912
18	LR	T,s,m,g	.5382
19	LR	T,s,m,g,b,f	.5922
20	LR	A,t,s,g,w	.5996
21	LR	A,t,b,f	.6087
22	LR	A,t,b,f,s	.6125
23	LR	A,t,b,f,g	.6114
24	LR	A,t,b	.6086
25	LR	w	.5239
26	LR	W,b	.5879
27	LR	T,b	.5862
28	LR	A,w,b	.6122
29	LR	A,t,b,m	.6087
30	LR	A,t,b,s	.6125
31	LR	M,g,s	.5347
32	LR	A,m,g,s,b,w	.6168
33	LR	A,m,g,t,b,w	.6117
34	LR	A,w	.5810
35	LR	a	.5779

Table 8. ROC results for MCE models. Variable key: a=land use, f=topographic feature, m=landscape model, w=linear water, g=sand & gravel, s=slope, t=major stream, b=water body, (=)=variables equally weighted.

Model	Method	Variables	ROC
1	MCE	A,f,m,g,w,s,t,b	.577
2	MCE	A,f,m,g,w,s,t,b	.578
3	MCE	A,f,m,g,w,s,b	.580
4	MCE	A,f,m,g,s,t,b	.593
5	MCE	A,g,t,b	.589
6	MCE	A,f,g,w,s,b	.544
7	MCE	A,f,g,w,s,b(=)	.561
8	MCE	A,g,w,b(=)	.582
9	MCE	M,s,t,b	.569
10	MCE	M,s,t,b(=)	.567
11	MCE	A,f,m,g,s,t,b(=)	.570
12	MCE	A,f,g,t,b	.576
13	MCE	A,f,m,t,b	.581
14	MCE	W,s,t,b	.539
15	MCE	W,s,t,b(=)	.547
16	MCE	A,f,m,g,w,b	.517
17	MCE	A,f,m,w,g,s,t,b	.518
18	MCE	A,f,m,g,s,t,b	.523
19	MCE	A,f,m,w,g,s,t,b	.552
20	MCE	A,f,m,g,w,b	.570
21	MCE	A,f,m,g,w,b(=)	.558
22	MCE	A,f,m,w,g,s,t,b (=)	.561
23	MCE	A,f,m,g,s,t,b	.589
24	MCE	A,f,m,g,w,s,b	.575

Table 9. ROC results for Belief models. Variable key: a=land use, f=topographic feature, m=landscape model, w=linear water, s=slope, t=major stream, b=water body.

Model	Method	Variables	ROC
1	B	W,s,a,f,m,b	.570
2	B	S,a,f,m,b,t	.570
3	B	S,a,b,w	.591
4	B	S,a,b,w,f	.558
5	B	S,a,b,w,m	.587
6	B	S,a,b,t,m	.586
7	B	S,a,b,t,f	.559
8	B	S,a,b,t	.595
9	B	A,b,t	.598
10	B	A,b,w	.595
11	B	A,b,f,m	.571
12	B	A,t,f,m	.567
13	B	A,w,f,m	.567
14	B	W,b,m	.541
15	B	T,b,m	.538
16	B	T,b,m,w,s,a,f	.571
17	B	W,b	.559
18	B	T,b	.564
19	B	A,b	.610
20	B	A,t	.583

3.0 RESULTS

Results of the assessment are presented in Appendices 2 and 3 and on an accompanying CD as ArcView 'shape files'. With regard to the digital files, there are three distinct layers that are pertinent to future planning activities. Two of these layers refer specifically to archaeological sites. Historic Sites and palaeontological concerns are listed in the Significant Sites List and are identified in the Significant Sites map layer. These are labeled 'leduccounty_archsites_10tm', 'arkypredmodel' and 'hrv_values' and consist of a map showing all known archaeological site locations as of March 2005 (Figure 3), a map showing archaeological potential (Figure 6) and a map showing all parcels of land listed in ACD's Significant Sites List (Figure 7) respectively.

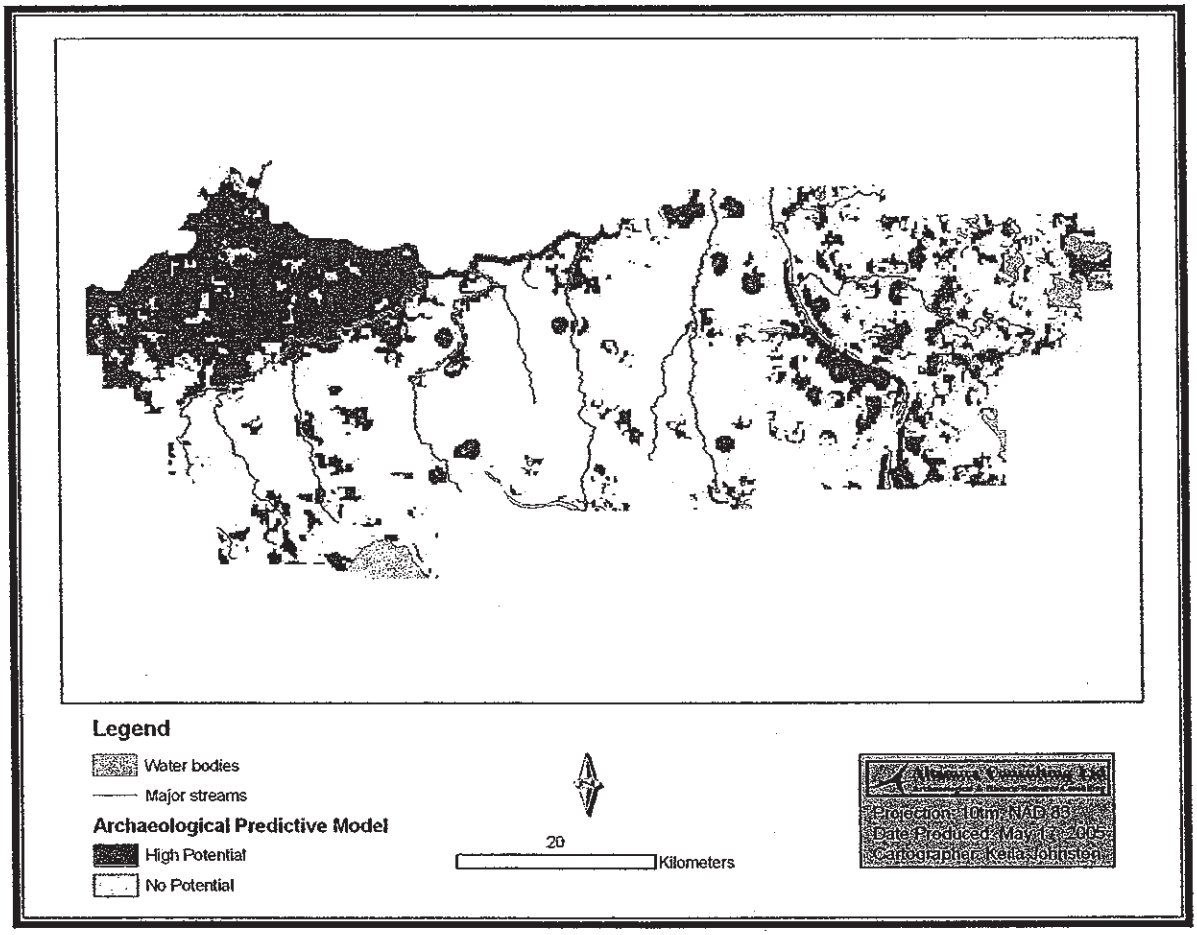

Figure 6. The best predictive model for Leduc County.

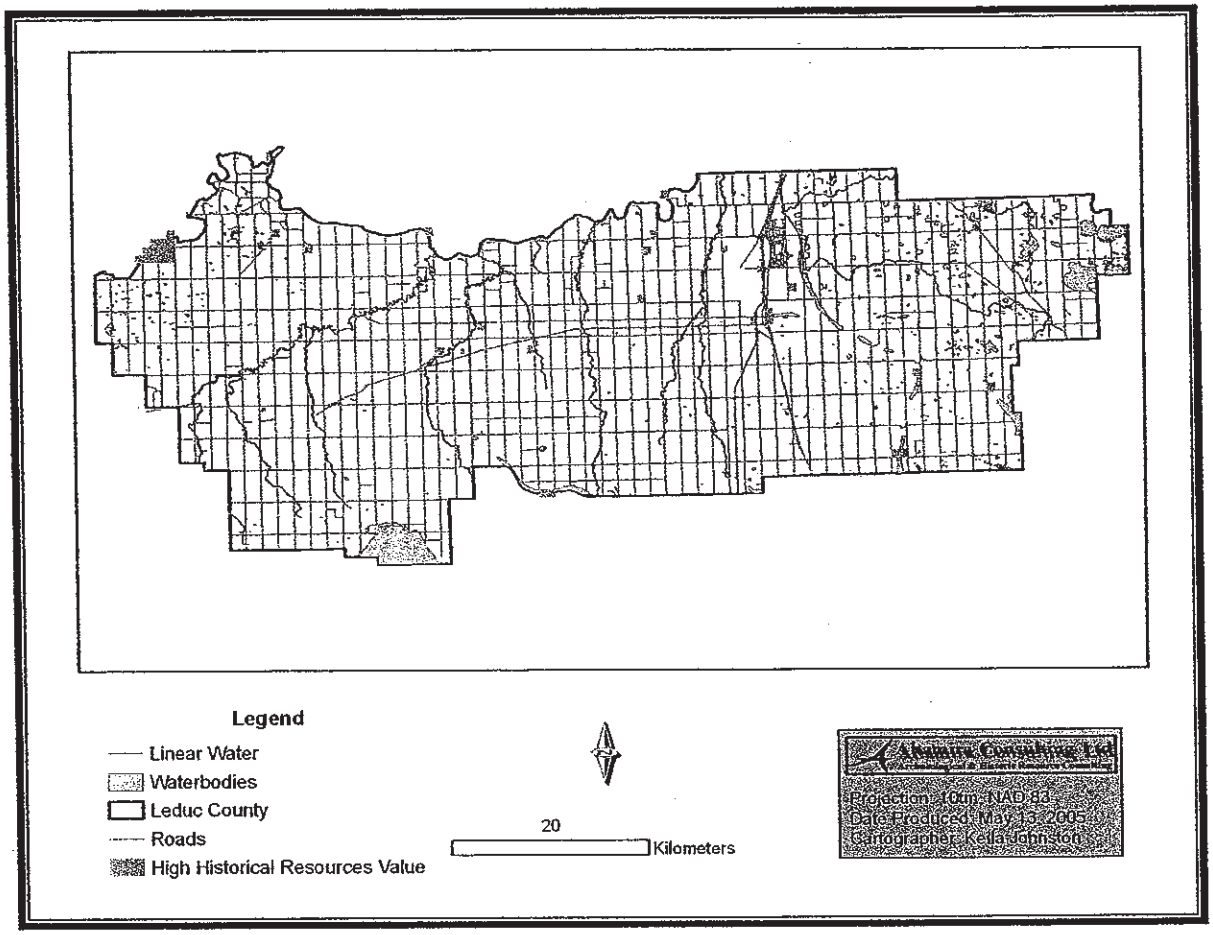

Figure 7. Areas of high historical resources value.

3.1 KNOWN HISTORIC RESOURCE LOCATIONS

Figure 3 shows the distribution of recorded archaeological sites in Leduc County as of March 2005. Not surprisingly, there are no known historic or palaeontological sites recorded within any existing roadway. Historic Sites and palaeontological concerns are listed in the Significant Sites List and details of specific land parcels are available in the listing for each area shown in Figure 7 in Appendix 2.

3.2 MODELING RESULTS

The best logistic regression and Belief models had very similar validation scores; 0.6184 for the regression model versus 0.61 for the Belief model. Visual comparison and analysis revealed the Belief model to be the best choice of those presented.

The Belief model is a non-site model. The results of the non-site model are shown in the original scaling for the model in Figure 4 where a value of 1 indicated areas least likely for site location and values approaching 0 indicated areas most likely for site location. The variables that proved to be the most significant in this model are land use and distance to water bodies.

A histogram of site potential distribution (Figure 8) was used to divide the results into categories of low potential and high potential.

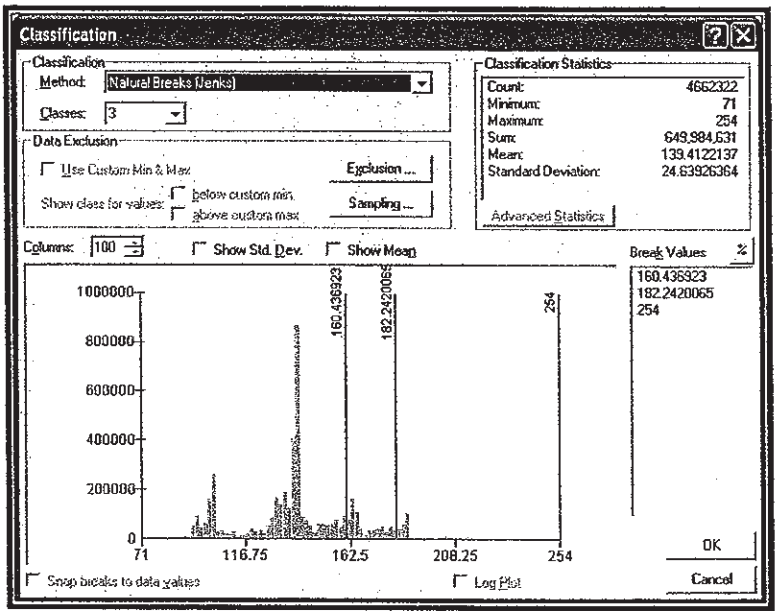

Figure 8. Histogram of pixel values for potential for archaeological site distribution.

Figure 6 shows the final mapping of the Model following re-classification of the non-site distribution and applying the results of dividing the values shown in the histogram.

2.6.1 Data Error

Error is inherent in all forms of digital data. Data error is an important consideration because the final product based on any digital data analysis will also have an associated level of error proportionate to the level of error associated with each layer involved in producing the model. If all levels of data error were available, it would be appropriate to buffer the boundaries between suitability categories by the average error to ensure correct classifications.

The SRTM data has ≤ 20 m absolute horizontal circular accuracy, ≤ 16 m absolute vertical height accuracy and ≤ 10 m relative vertical height accuracy. Accuracies are quoted at the 90% level. The Altalis water data has a +/- 5 m positional accuracy. The rest of the data has an unknown level of data accuracy. Figure 9 provides a visual representation of a +/- 20 metre error for a high potential area.

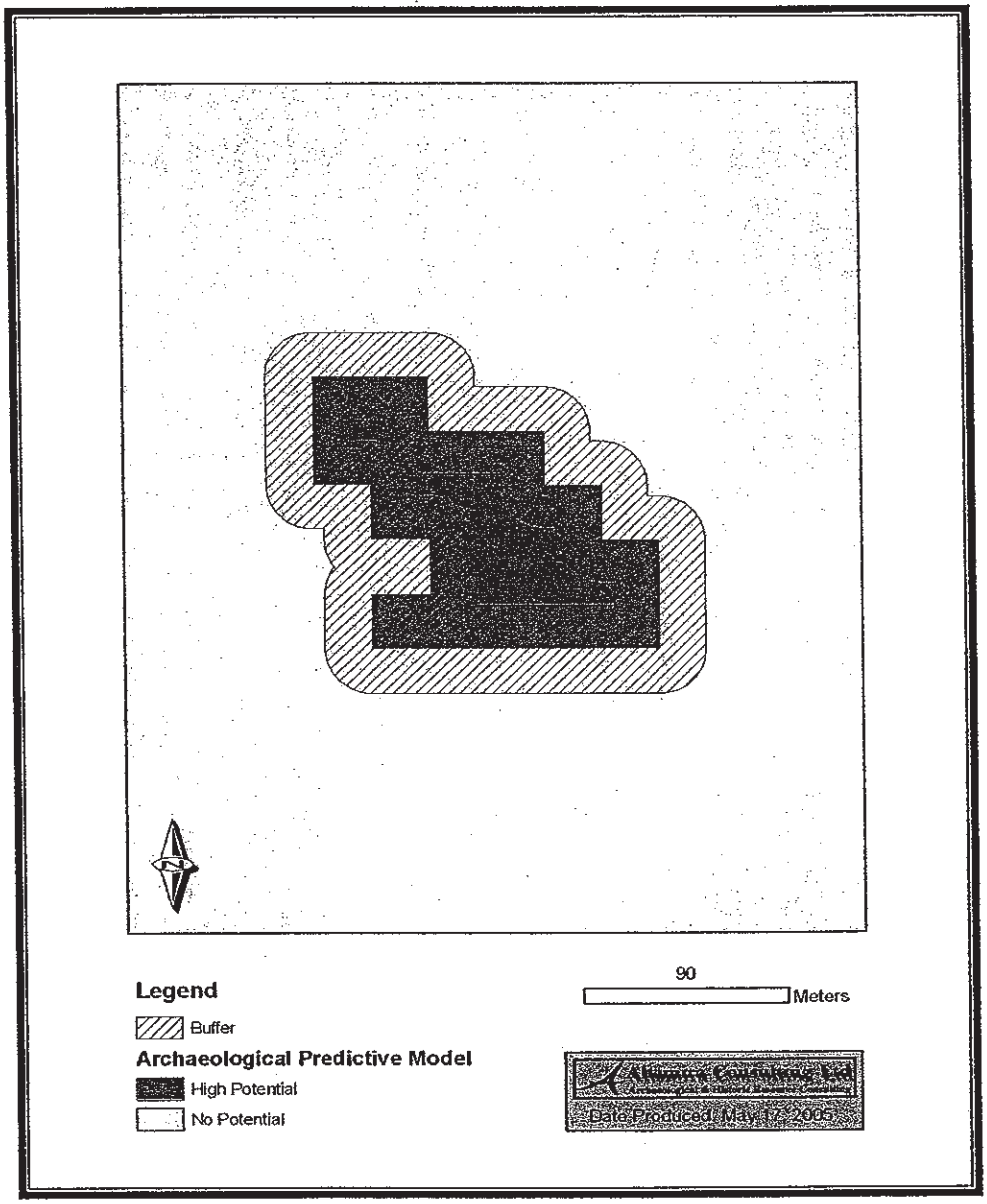

Figure 9. This figure shows a 20 meter inner and 20 meter outer buffer of the high potential area. Using a 20 meter known error as an example, the real boundary of the block could fall anywhere within the hatched area.

4.0 MANAGEMENT DIRECTIONS

Three data sets are provided which together detail specific Historical Resource concerns in Leduc County. The list of known Historical Resources identifies specific, recorded Historical Resource sites (Appendix 1, Figure 3). The Significant Sites List identifies specific LSD's that have been highlighted by ACD as being of historical interest and carry with it the need to assess (Appendix 2, Figure 9). The third data set exists as a predictive model that identifies the archaeological potential within the County (Figure 7). The model predicts whether or not there are historical resource concerns for all portions of the County. Areas marked as 'High Potential' indicate that there are concerns, that there exists a reasonable likelihood for an archaeological site to be present. The 'Low Potential' areas signify that there are no concerns for archaeological sites for that area. Developments that are planned within zones or crossing zones of High Potential should be reviewed by a qualified Historical Resource consultant. The results of that review would indicate the direction that management should take.

Proposed developments that will involve surface disturbance should be compared with the lists, mapping and predictive model to determine whether Historical Resource concerns exist. Proposed developments that overlap areas of Historical Resource concern should be referred to a qualified Historical Resource consultant who can assess the significance of the concern and make appropriate recommendations. For those areas for which there is no Historical Resource concern identified, further assessment is not warranted.

The presence of an existing or known archaeological site or a Significant Sites List area of interest indicates a need for further Historical Resource assessment work regardless of whether or not the area is identified in the predictive model as having high archaeological potential. Proposed developments that will impinge on such sites or areas of interest should be referred to a qualified Historical Resource consultant who can assess the significance of the concern and make appropriate recommendations.

While it is unlikely that Historic structures, buildings and other remains exist within existing roadway allowances, it is possible that Historic Sites occur near or adjacent to existing right-of-ways. Upgrading and modifying existing roadways could affect such Historic Sites and

while these Historical Resources may not be identified in ACD's Significant Sites List, they may be of local, regional or provincial significance. Proposed developments that may affect such Historic Sites should be referred to a qualified Historical Resource consultant who can assess the significance of the concern and make appropriate recommendations.

With regard to Palaeontological Resources, there are a few areas of interest, however the main concern with this type of resource is when impact occurs below the surficial landscape. Proposed developments that will or potentially impact deeply buried geological strata risk the loss or disturbance of palaeontological resources. Such developments should be reviewed by a qualified Historical Resource consultant, or by staff of the Tyrrell Museum of Paleontology to determine the need for or nature of mitigative work.

Finally, there is a category of historic site that is sometimes overlooked because it falls into a grey area in terms of provincial responsibilities. This category is cemeteries. Cemeteries fall under the *Alberta Cemeteries Act* and not the *Historical Resources Act*, however, Historical Resource consultants are sometimes called on to research background information for cemeteries, excavate and repatriate, search for and analyse burial contents. There are several different types of cemeteries found in the province ranging from known, registered cemeteries, to old cemeteries attached to a specific Hamlet but not registered, unregistered family cemeteries, unregistered ethnic cemeteries and archaeological burials. Of particular interest for this study would be the local cemeteries of a small Hamlet or old community. These sites are not listed in ACD's Significant Sites List. These sites may be found associated with old church structures or foundations. Proposed developments that might potentially affect such areas of interest should be referred to a qualified Historical Resource consultant to determine the existence of such sites and provide appropriate direction for the project and planners.

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Tyrrell Museum of Paleontology

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APPENDIX 1

LIST OF CONTACT NUMBERS

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Provincial Museum of Alberta
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Edmonton, Alberta T5N 0M6
Tel: (780) 453-9100
Provincial Museum of Alberta

Royal Tyrrell Museum of Palaeontology
Box 7500
Drumheller, Alberta T0J 0Y0
Tel: (403) 823-7707
Royal Tyrrell Museum of Palaeontology

Appendix D

Stakeholder Meeting

Leduc County
Stakeholder Group Meeting No. 1

East - Gravel Roads

Section	Road Name	From	To	Comment
1	Rge 240, 235	Twp 504	Twp 512	Poor Structural Condition, High Traffic - Bypass of Beaumont
2	Twp 505	Rge 243	Rge 250	Poor Structural Condition - Reconst. In 2006???
3	Rge 245	Twp 494	Twp 500	High Truck Traffic to dump
	Twp 500	Rge 245	Rge 250	High Truck Traffic to dump
	Rge 250	Twp 500	Twp 502	High Truck Traffic to dump
4	Rge 233	Twp 494	Twp 510	Poor Standard of Roadway for Main Gravel road
5	Twp 492	Rge 234	0.5 mi W.	Poor Drainage, No ditches
6	Rge 241, 240 A	Twp 493	0.5 mi E.	Poor Structural Condition, Poor drainage
7	Rge 241	Twp 482	Twp 490	Major Snow Clearing requirements, Poor Structural Condition
8	Rge 234	Twp 494	Twp 502	Poor Structural Condition
9	Rge 235	Twp 494	Twp 495	Poor Drainage, Soft Road Base
23	Rge 252	Twp 512	Twp 510	Poor Structural Condition, Poor Drainage
24	Twp 482	Rge 251	Hwy 2	Poor Structural Condition - Reconstructed in 1997
25	Rge 250	Twp 490	Twp 492	Poor Drainage - Scheduled for Reconstruct in 2006
27	Rge 234	Twp 484	Twp 490	Low Design Speed (Posted at 30 kph) Safety
	Twp 490	Rge 234	Rge 233	Low Design Speed (Posted at 30 kph) Safety
28	Twp 503	Rge 221	Rge 220& 0.5 mi E	New Residential Subdivision
	Rge 220	Twp 502	Twp 503	New Residential Subdivision
29	Rge 223	Twp 501	Twp 501A	Poor Drainage, Poor Structural Condition, High Cut/ Fill Sections
30	Rge 254	Twp 505	Twp 505A	Poor Horizontal Geometry - Sharp Curves
31	Rge 254	Twp 511A	Twp 511A	Poor Soil Conditions, Erosion ($200k, spent in previous years)

Leduc County
Stakeholder Group Meeting No. 1

West - Gravel Roads

Section	Road Name	From	To	Comment
11	Rge 40	Twp 490	Twp 500	Oilfield Truck traffic
12	Rge 33	Twp 483	Twp 484	Oilfield Truck traffic
	Rge 32	Twp 484	Twp 490	Oilfield Truck traffic
	Twp 484	Rge 33	Rge 32	Oilfield Truck traffic
	Twp 485	Rge 32	0.5 mi E.	Oilfield Truck traffic
13	Rge 32, 33	Twp 473A	Twp 480	75% Road Ban Year Long - Poor Structural condition
14	Rge 23	Twp 474	Twp 480	Oilfield Truck traffic
	Twp 474	Rge 23	Rge 21	Oilfield Truck traffic
15	Twp 474	Rge 20	0.5 mi W.	High Traffic Volumes from Pigeon Lake Recreation
	Twp 474	Rge 13	0.5 mi W.	High Traffic Volumes from Pigeon Lake Recreation
16	Twp 492	Rge 11	Rge 12	Truck Traffic from Hot Tub Manufactor
17	Ritter Hill	Rge 12A	Rge 12	Poor Geometry, Safety, Poor Drainage and Ground Erosion
18	Rge 273	Twp 494	Twp 495	High Truck Traffic To Train Loading Facility
19	Rge 273	Twp 482	Twp 483	Truck Traffic to Gas Plants
20,21	Twp 482	Rge 273	Rge 263	Truck Traffic to Gas Plants
22	Rge 263	Twp 492	Twp 495	Wide Roadway Width - Designed for Asphalt Structure

West - Cold-Mix/ Paved Roads

32	Twp 490	Rge 13A	Rge 14A	Road Settlements at Bridge Approaches
	Twp 492	Rge 12A	Rge 13A	Road Settlements at Bridge Approaches
33				Frost Heave
34				Soft Spot
35	Twp 504	Rge 265A	Rge 271	Poor Structural Condition

East - Cold-Mix/ Paved Roads

37	Rge 254	Twp 511A	Twp 512	Poor Structural Condition
38	Twp 510	Rge 243	Rge 250	Poor Structural Condition, High Traffic Volumes

Leduc County
Stakeholder Group Meeting No. 1

Section	Road Name	From	To	Comment
39	Twp 510	Rge 255	0.5 mi E.	Poor Structural Condition
40	Twp 502	Rge 231	Rge 242	Asphalt Overlay Required
41	Rge 233, 234 Twp 505	Twp 504 Rge 234	Twp 510 Rge 235	High Traffic Volumes High Traffic Volumes
42	Rge 221	Twp 510	Twp 510	Poor Sightlines, Safety

East - Road Drainage

43	Rge 230 Twp 490	Twp 483 Rge 225	Twp 491 Rge 232	Poor Overland Drainage Poor Overland Drainage
44	Rge 240	S of Twp 495		Flooding at Creek Crossing
45	Rge 251	Twp 491	Twp 493	Poor Overland Drainage
46	Twp 492	Rge 253	0.5 mi W.	Poor Overland Drainage
47	Twp 492	Rge 243	0.5 mi W.	Poor Overland Drainage

West - Road Drainage

48	Rge 20	Twp 480	Twp 481	Poor Overland Drainage
49	Rge 20/ Twp 492			Poor Overland Drainage
50	Rge 22	Twp 500	0.5 mi N.	Inadequate Culvert Capacity
52	Rge 10	Twp 582	0.5 mi S.	Inadequate Culvert Capacity
53	Rge 275 Twp 484 Twp 485	Twp 485 Twp 275 Twp 275	Twp 484 0.5 mi W&E. 0.5 mi E.	Poor Overland Drainage Poor Overland Drainage Poor Overland Drainage
54	Rge 273	Twp 495	Twp 502	Poor Overland Drainage (Rehab Scheduled for 2006)
55	Twp 500	Rge 272	Rge 272	Inadequate Culvert Capacity
56	Rge 264/ Twp 482			Inadequate Culvert Capacity
57	Rge 263	Twp 484	Twp 483	Poor Overland Drainage to East
58	Rge 222	Twp 494	Twp 495	Safety, Poor Sightlines and Roadway Geometry at Railway

Leduc County
Roadway Management System

Nisku Business Association - Stakeholder Meeting
April 13, 2005

Top Priority

- Rehabilitate 5th Street and 8th Street (major north/south roadway in Nisku) to a paved industrial standard.

High Priority

- Upgrade intersections to Airport Road and to Highway 625 to include turn lanes (7th St. and Airport Road).
- Rehabilitate major East/West roads (15 Avenue) in Nisku to a paved industrial standard.

Lower Priority

- Rehabilitate all other roadways in Nisku to a paved industrial standard.

Issues Raised

- Roadways to be designed for truck loading factors of 1.25 legal weight limits. All Nisku roadways are intended to support over-weight loads. Over-size load are causing damage to the edges of roadways when meeting on-coming traffic. Larger over-size loads use pilot vehicles and flag persons to limit conflicts with other vehicles.
- Narrow roadways create problems with the passing of large trucks. Existing County Industrial roadway standard calls for an 11.5m wide road. Some roadway sections of Nisku have been developed to a 13.0m wide standard.
- Improved ditch drainage/grading required for both functionality and aesthetics.
- Proposed upgrading of 9th Street to be promoted as a cost shared project with the City of Leduc and Edmonton.
- Possible new roadway link is proposed from Hwy 2 to Nisku Industrial Business Park at County/ City of Edmonton boundary (41 Avenue S.).
- Completion of 25 Avenue to the west is proposed with adjacent future development.

Leduc County
Roadway Management System

Genesee Generator Station - Stakeholder Meeting
May 10, 2005

Meet with Paula Schinck, Land Services Coordinator, on Tuesday May 19 at 2:00 pm at the Genesee Generator Station. Purpose of the stakeholder meeting was to develop an understanding of the existing roadway network in and around the Genesee site, determine future activities of the site that may affect the roadway network and review any existing deficiencies.

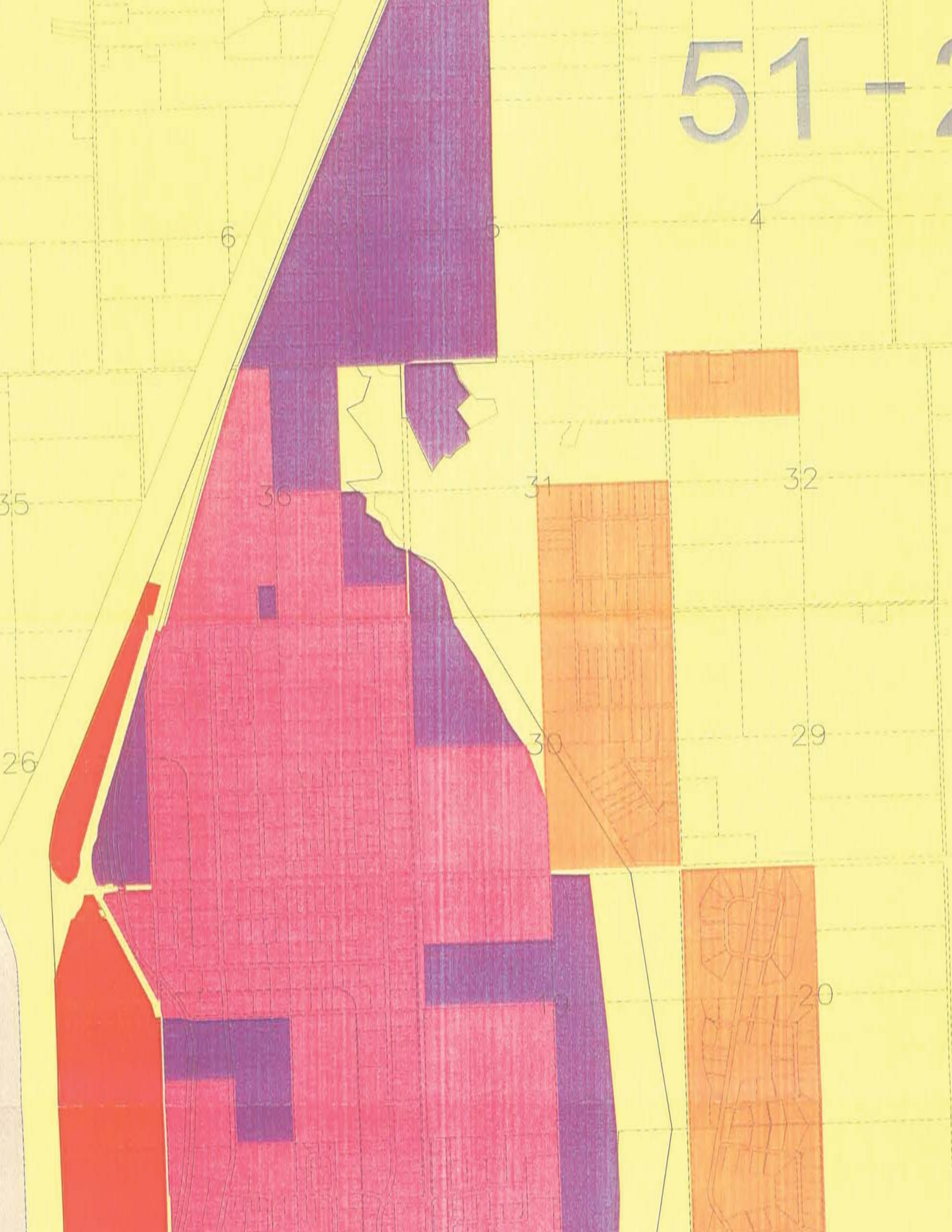
A brief overview of the Roadway Management System project was given.

Discussion on various topics took place with the following information of note:

- Existing roads in and around the Genesee site were generally considered to be in good condition.
- Twp Rd 502 from Rge Rd 30 to 31 was noted to have a soft base and in poor structural condition.
- Two bridges on Twp 504 from Rge Rd 34 to 35 had narrow bridge decks were traffic is reduced to one way across the bridge.
- Twp Rd 502 and Hwy 770 have poor sightlines from the highway with existing highway signing indicating a hidden intersection. The hidden intersection signs on 502 were noted to be down and not in service.
- The Genesee site generates little truck traffic to the adjacent County roads with most of the truck traffic confined to on-site activities or truck traffic utilizing Hwy 770 for off-site activities. With the recently completed plant upgrading, (March 2005) a majority of the construction traffic utilized Hwy 770 to the north as the trucking route.
- With approval from Leduc County, sections of Rge Rd 30 and 31 will be closed to allow for mining of the area. Twp Rd 502 is not considered for road closures in any of the sites long term plans. Future mining plans for the west side of Hwy 770 include for the closures of Rge Rd 33 and 34. Detour routes would involve Twp Rd 504 west of Rge Rd 33.
- Logging activities could start as early as 2007 for the proposed west mining site.
- Rge Rd 22 has increased truck traffic from the oil and gas industry as it is the shortest route around the east side of the site.
- Twp Rd 510 from Rge Rd 30 to 32 has dust control and maintenance issues. The area gravel company roadway maintenance commitments are not being met.
- Genesee By-Pass road has steep side slopes at the Rge Rd 25 intersection (Somewhat of a safety issue). Dust control is also an issue on the newly aligned sections of roadway.

Appendix E

Existing Land Use Plans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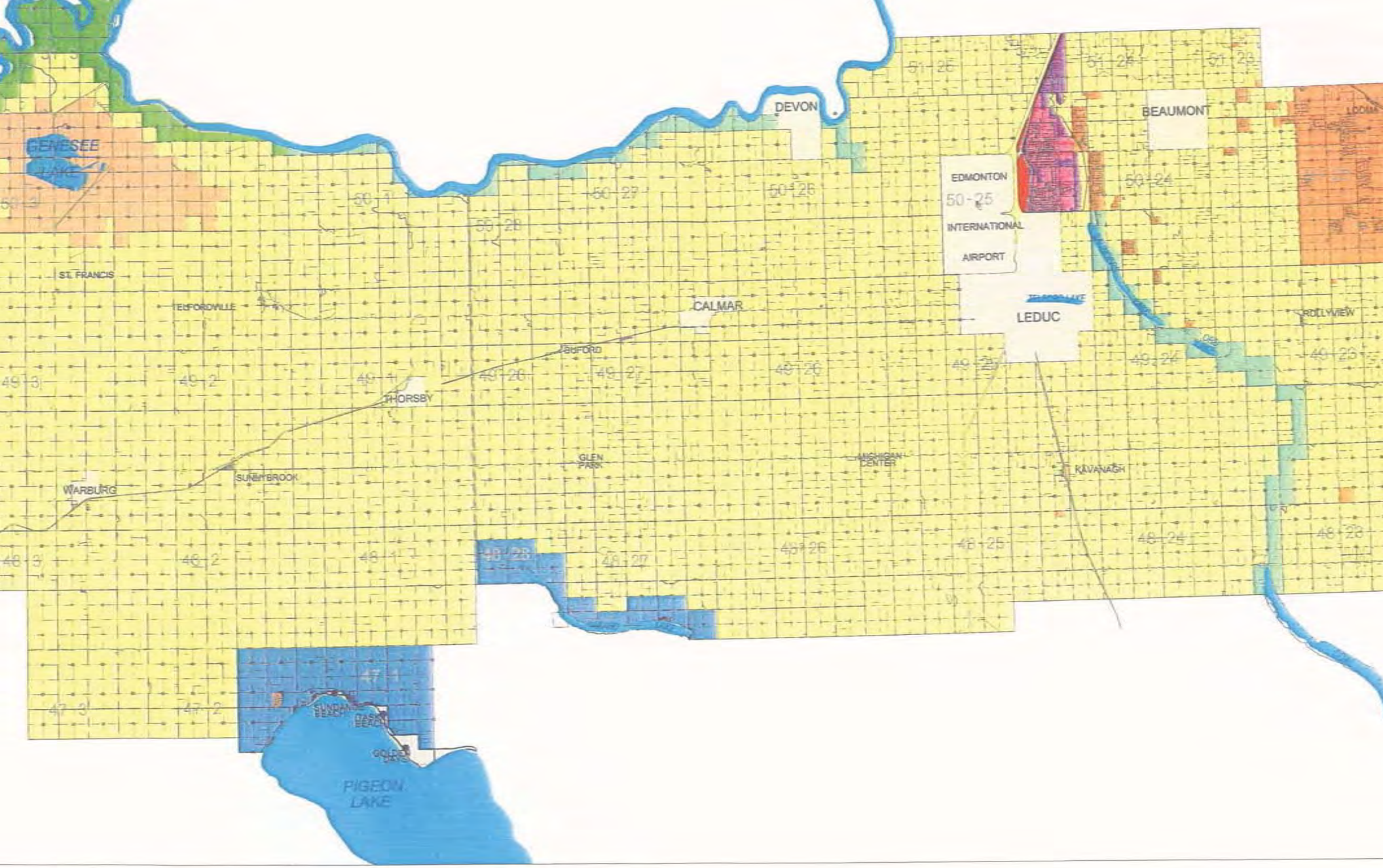

DISTRICTS

RAL

RAL/ COUNTRY RESIDENTIAL

ESIDENTIAL/ MOBILE HOME

RESTRICTED INDUSTRIAL

DIRECT CONTROL/ INDUSTRIAL

GENERAL INDUSTRIAL

DIRECT CONTROL/ BARELAND CONDOMINIUM

RECREATION/ OPEN SPACE

LAKE SHORELAND

GEN
PRO

WILD

Appendix F

Road Ban Information

LEDUC COUNTY

FILE 950-A01

ORDER BY THE VEHICLE AXLE WEIGHT COMMITTEE

ORDER NO. L.S. 116 DEFINING THE MAXIMUM ALLOWABLE WEIGHTS PERMITTED ON LOCAL ROADS.

Pursuant to the authority granted under the provisions of By-Law No. 15-87, the Vehicle Axle Weight Committee orders that effective **8:00 a.m., Monday, March 21, 2005** the following maximum allowable weights will be permitted on Local roads in Leduc County:

DESCRIPTION	PERCENTAGE - AXLE WEIGHTS
Gravel Surfaced	
- Local Roads West of Sections 23, 26 & 35 & 22, 27 & 34-47-3-W5th	75%
- Local Road, RR 263, Junction Of Highway 39, south (800m) to C.P. Rail Crossing	90%
- All Other Local Roads	75%
- Range Road 245 North of Township Road 510 (1 mile), Ledcor/Bannister Access	100%
- Range Road 250 (9th Street) From Township Road 502 to Township Road 510	100%
- All Roads Within the Nisku Industrial Park	100%
Pavement Surfaced	
- **Airport Road** - Junction 9th Street Nisku Industrial Park to Junction Highway 21	75%
- **Thorsby West Access** - Junction Highway 39 to Junction S.H. 778	75%
- **Buford Access** - Junction Highway 39 South of Canadian Pacific Railway	75%
- **Wizard Lake Jubilee Park Access** - Junction S.H. 795 to Park	75%
- **New Sarepta South Access** - Junction Highway 21 to New Sarepta	75%
- **Glen Park Road** - S.H. 814 to Junction Highway 39 (except adjacent to Sunnybrook)	90%
- **Rabbit Hill Access Road (Range Road 260)** - Junction Highway 19 to Junction Township Road 510	75%
- **St. Francis West Road (Township Road 500)** - Junction S.H. 770 to Junction Range Road 45	75%
- **Joseph Lake Road** - Junction S.H. 623 to Junction Township Road 510	75%
- **Looking Back Lake Road** - Junction Highway 21 East to Junction Joseph Lake Road (Range Road 221)	75%
- **Clover Lawn North Main Road** (Range Road 233), Junction S.H. 616 to Junction S.H. 623	75%
- **616X Local Road**, Junction S.H. 771 to Junction S.H. 778 at Sandholm	75%
- **Range Road 12**, Junctions S.H. 616 and S.H. 778 at Sandholm Store South to County Boundary	75%
- **Devon West Road** (Township Road 504 from Junction Highways 19 & 60 West to Range Road 272, Range Road 272 from Township Road 504 South to Township Road 502, Township Road 502 From Range Road 272 to Range Road 275, Range Road 275 South to Highway 39	75%
- **Sparrow Drive**, from Junction Airport Road north to Junction Highway 2	100%
- All Roads Within the Nisku Industrial Park	100%
- **All Other Local Roads**	75%
Oil Surfaced	
- All Local Roads Excepting Those Within The Nisku Industrial Park	75%
- All Roads Within the Nisku Industrial Park	100%
- Range Road 245 North of Township Road 510 (1 Mile), Ledcor/Bannister Access)	100%

COMPLETE EXEMPTIONS

1. GVW not greater than 5000 kg's.
2. School bus.
3. Rubber tired farm tractor NOT pulling a trailer.
4. A vehicle crossing a highway.
5. A vehicle being operated by the Government for the purpose of road testing.
6. A vehicle transporting fresh milk and cream from the place of production.
7. A vehicle transporting pregnant mare urine from the place of production.
8. A vehicle required by the local authority to transport material that is required for emergency maintenance.
9. A vehicle required by the local authority for snow/ice removal.
10. A vehicle required for the transportation of equipment to a forest fire, flood, train derailment, pipeline spill or other emergency.

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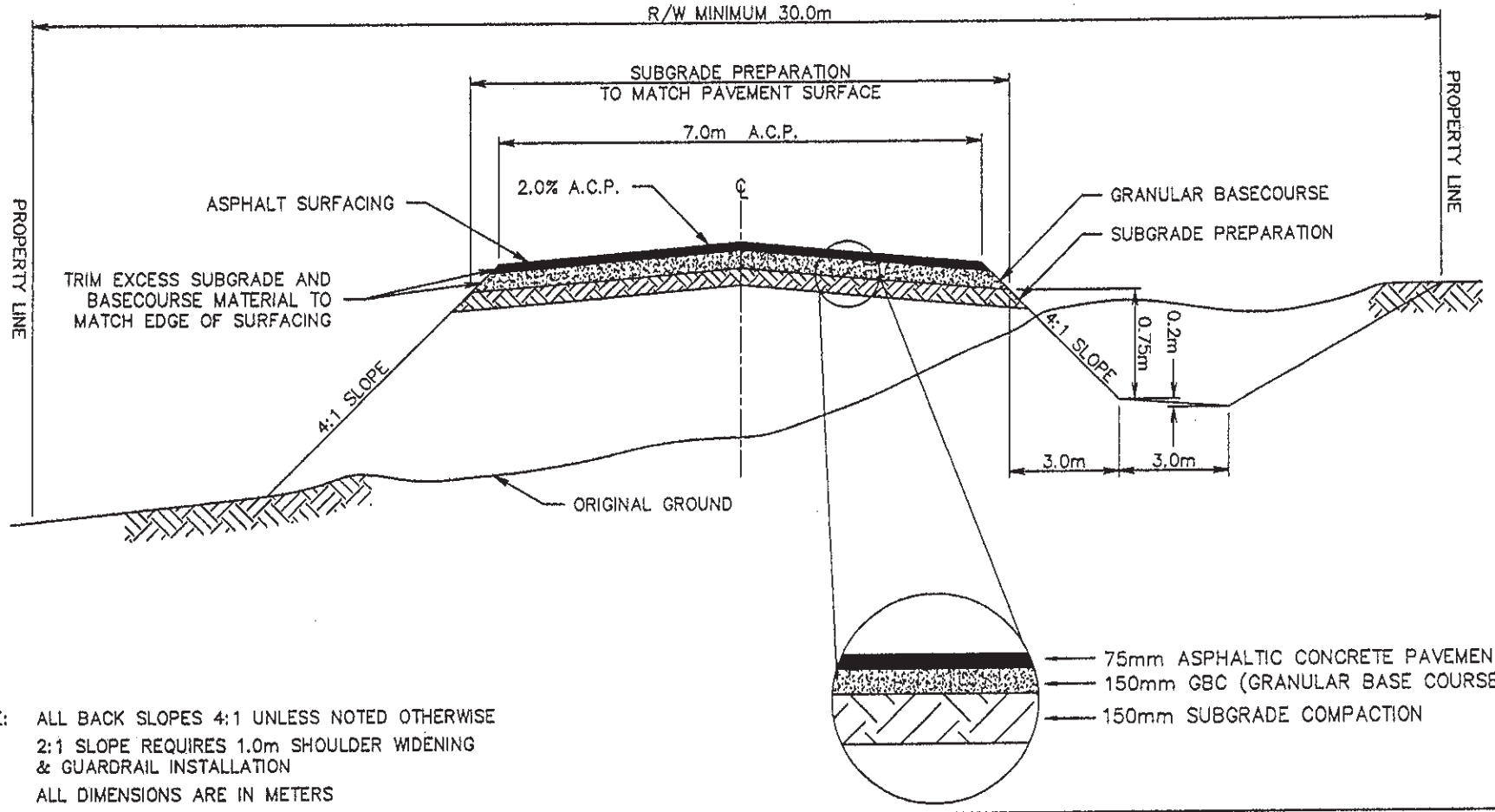
Appendix G

County Roadway Standards



NOTE: ALL BACK SLOPES 4:1 UNLESS NOTED OTHERWISE
2:1 SLOPE REQUIRES 1.0m SHOULDER WIDENING
& GUARDRAIL INSTALLATION
ALL DIMENSIONS ARE IN METERS

DATE	REVISIONS	APP
SEPT. 2004	REVISED	JPB
DEC. 2003	REVISED	GEL

REV. 1

LEDUC COUNTY

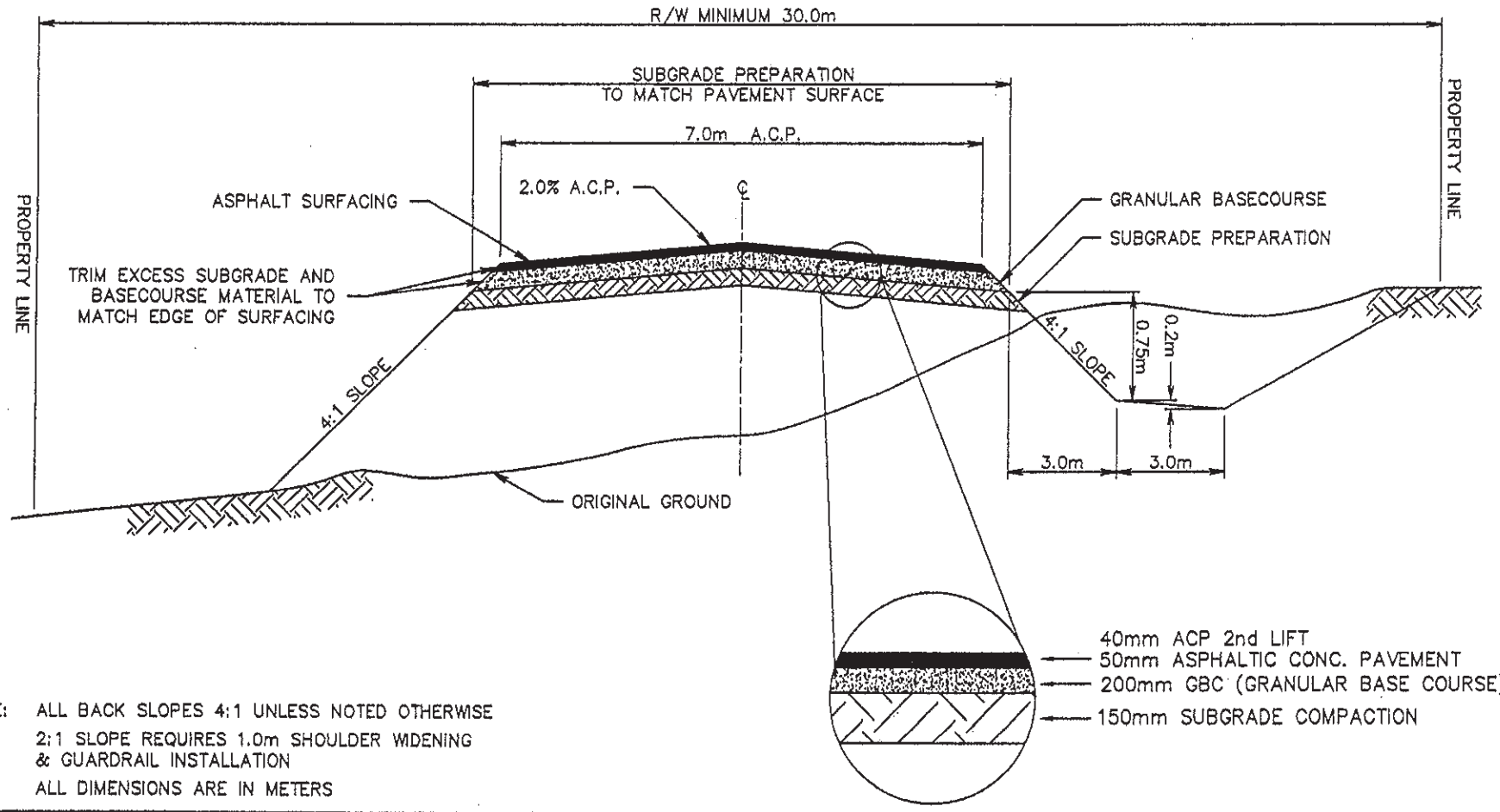
Public Works and Engineering Department

TYPICAL CROSS-SECTION RESIDENTIAL ACCESS AND LOCAL LOW DENSITY ROAD

SCALE NTS
DATE DEC 2003
DES JPB DWN RJP
CKD JPB APP GEL
PROJ. No.

DWG. No. 7.1

EXH Engineering Services Ltd.



NOTE: ALL BACK SLOPES 4:1 UNLESS NOTED OTHERWISE
2:1 SLOPE REQUIRES 1.0m SHOULDER WIDENING
& GUARDRAIL INSTALLATION
ALL DIMENSIONS ARE IN METERS

DATE	REVISIONS	APP
SEPT. 2004	REVISED	JPB
DEC 2003	REVISED	GEL

REV. 1

LEDUC COUNTY

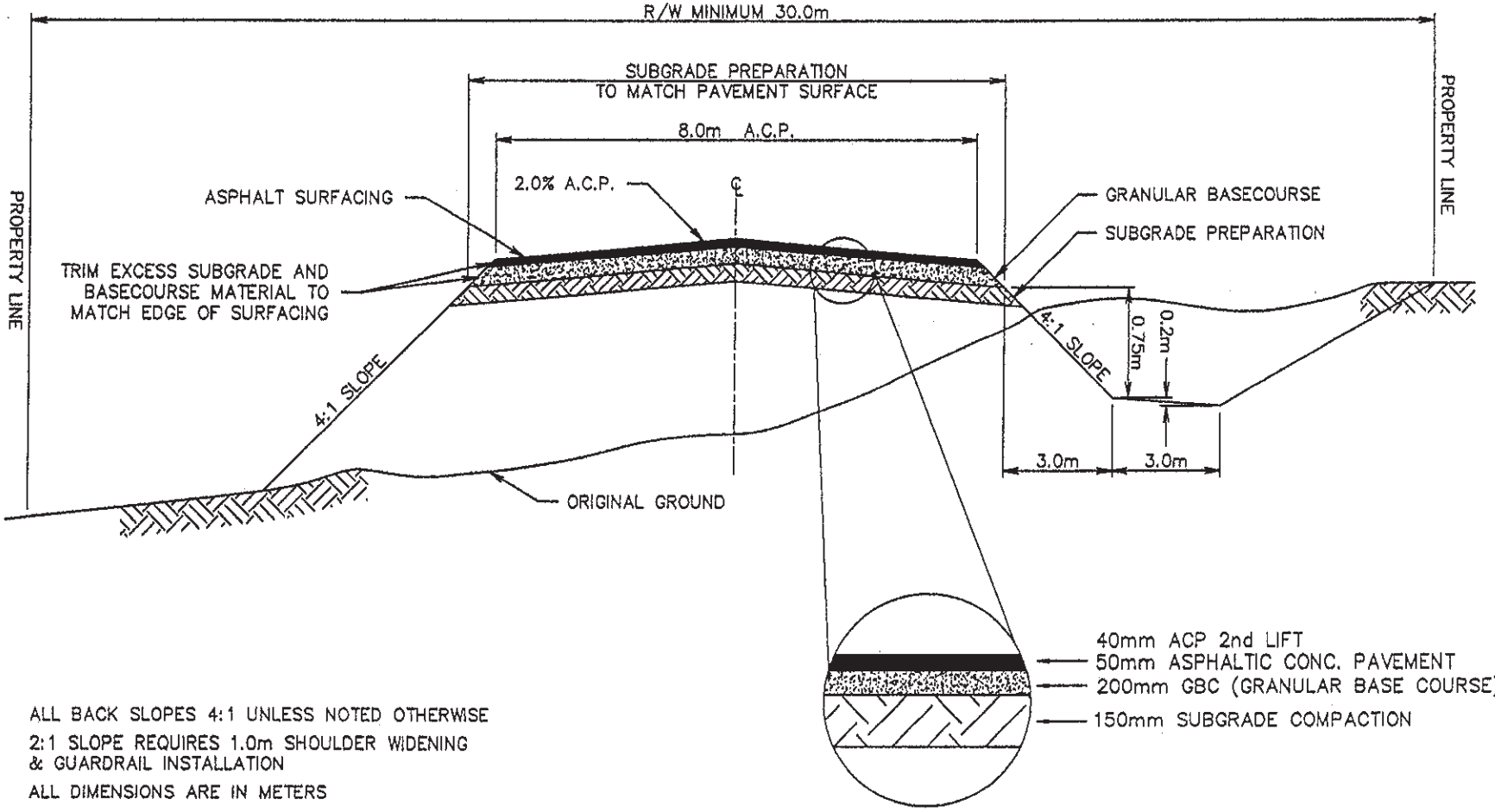
Public Works and Engineering Department

TYPICAL CROSS-SECTION RESIDENTIAL ACCESS AND LOCAL HIGH DENSITY ROAD

SCALE NTS
DATE DEC 2003
DES JPB DWN RJP
CKD JPB APP GEL
PROJ. No.

DWG. No. 7.1.1

EXH Engineering Services Ltd.



NOTE: ALL BACK SLOPES 4:1 UNLESS NOTED OTHERWISE
2:1 SLOPE REQUIRES 1.0m SHOULDER WIDENING
& GUARDRAIL INSTALLATION
ALL DIMENSIONS ARE IN METERS

DATE	REVISIONS	APP
SEPT. 2004	REVISED	JPB
DEC. 2003	REVISED	GEL

REV. 1

LEDUC COUNTY

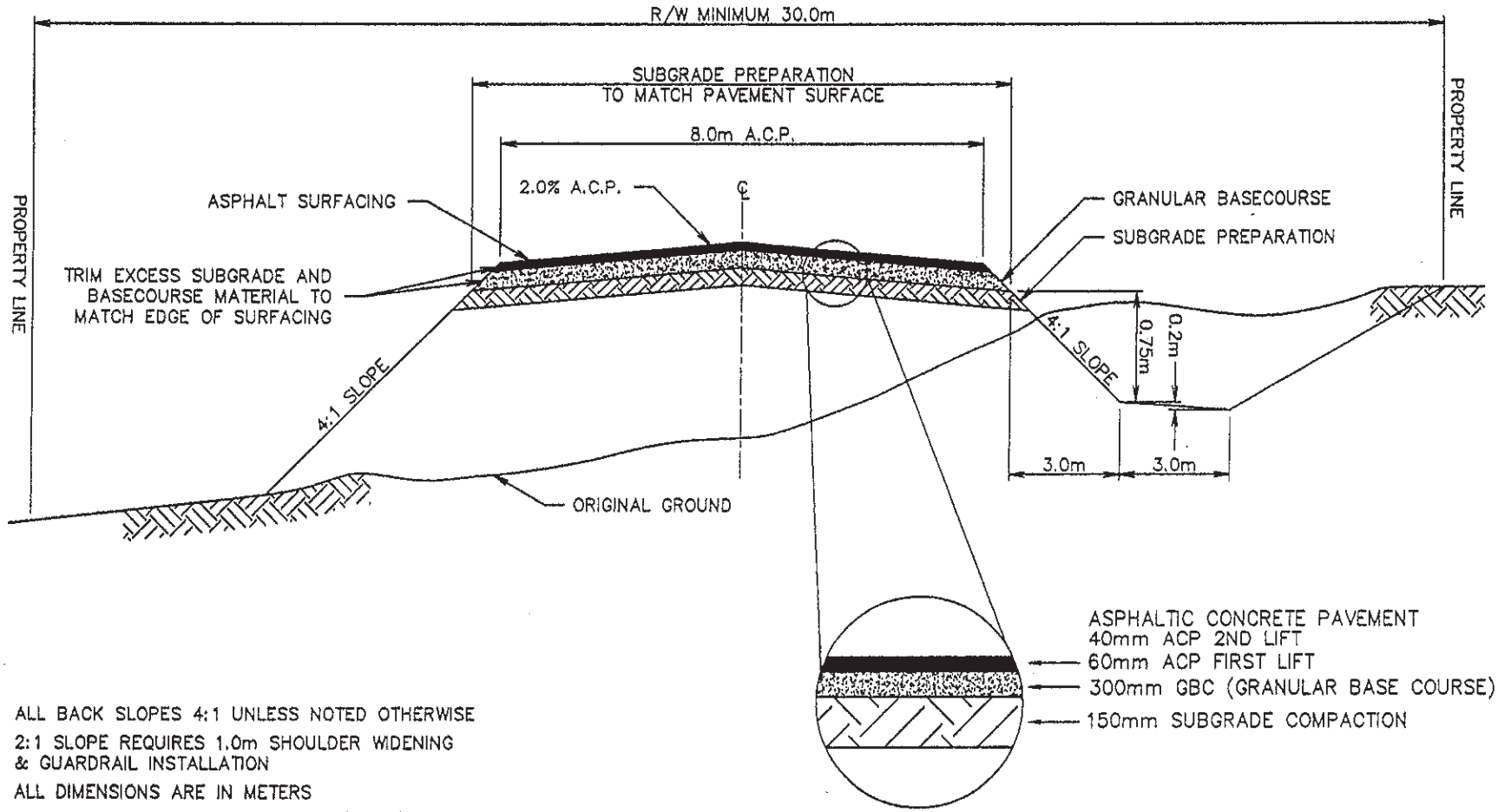
Public Works and Engineering Department

TYPICAL CROSS-SECTION RESIDENTIAL LOW DENSITY COLLECTOR ROAD

SCALE NTS
DATE DEC 2003
DES JPB DWN RJP
CKD JPB APP GEL
PROJ. No.

DWG. No. 7.2

EXH Engineering Services Ltd.



NOTE: ALL BACK SLOPES 4:1 UNLESS NOTED OTHERWISE
2:1 SLOPE REQUIRES 1.0m SHOULDER WIDENING
& GUARDRAIL INSTALLATION
ALL DIMENSIONS ARE IN METERS

DATE	REVISIONS	APP
SEPT. 2004	REVISED	JPB
DEC. 2003	REVISED	GEL

REV. 1

LEDUC COUNTY

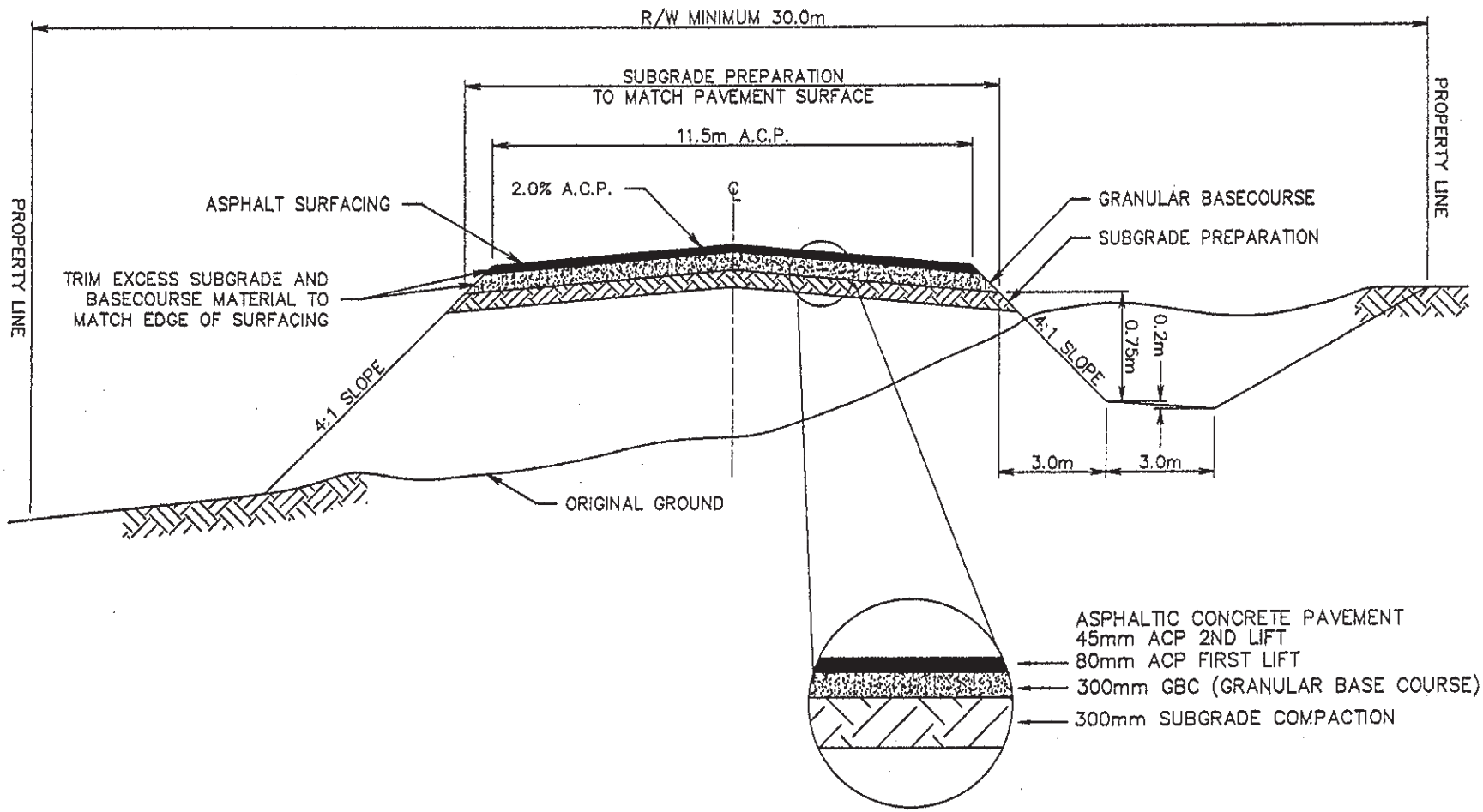
TYPICAL CROSS-SECTION RESIDENTIAL HIGH DENSITY COLLECTOR ROAD

Public Works and Engineering Department

SCALE NTS
DATE DEC 2003
DES JPB DWN RJP
CKD JPB APP GEL
PROJ. No.

DWG. No. 7.2.1

EXH Engineering Services Ltd.



NOTE: ALL BACK SLOPES 4:1 UNLESS NOTED OTHERWISE

2:1 SLOPE REQUIRES 1.0m SHOULDER WIDENING & GUARDRAIL INSTALLATION

ALL DIMENSIONS ARE IN METERS

DATE	REVISIONS	APP	REV.
SEPT. 2004	REVISED	JPB	1
DEC 2003	REVISED	GEL	

LEDUC COUNTY

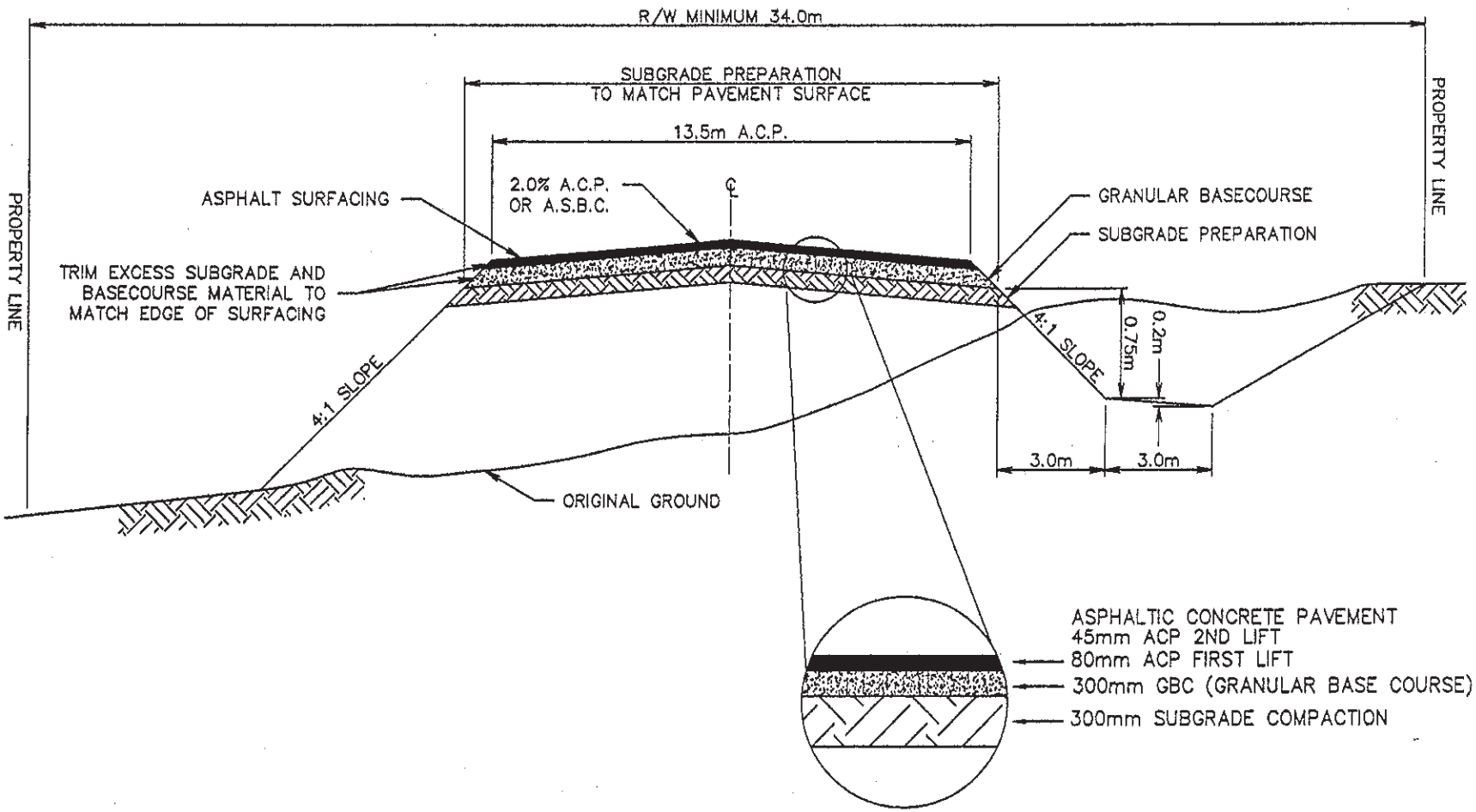
Public Works and Engineering Department

TYPICAL CROSS-SECTION COMM./INDUST. LOCAL ROAD

SCALE NTS
DATE DEC 2003
DES JPB DWN RJP
CKD JPB APP GEL
PROJ. No.

DWG. No. 7.3

EXH Engineering Services Ltd.



NOTE: ALL BACK SLOPES 4:1 UNLESS NOTED OTHERWISE
2:1 SLOPE REQUIRES 1.0m SHOULDER WIDENING
& GUARDRAIL INSTALLATION
ALL DIMENSIONS ARE IN METERS

DATE	REVISIONS	APP	REV.
SEPT. 2004	REVISED	JPB	1
DEC 2003	REVISED	GEL	

LEDUC COUNTY

TYPICAL CROSS-SECTION INDUSTRIAL COLLECTOR ROAD

Public Works and Engineering Department

SCALE NTS
DATE DEC 2003
DES JPB DWN RJP
CKD JPB APP GEL
PROJ. No.

DWG. No. 7.4

EXH Engineering Services Ltd.

Appendix H

Cost Estimates

Leduc County - Roadway Management System

Cost Estimates

Paved Road Capital Projects

Nisku Spine Road from Airport Road to 15 Avenue Length - 1,225
Initial Two Lanes of Four Lane Divided

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	12,250	5.00	$61,250
300mm Granular Base Course	m^2	12,250	16.00	$196,000
125mm Asphalt Concrete Pavement	m^2	12,250	24.00	$294,000
Land Acquisition	m^2	12,250	30.00	$367,500
Landscaping	m^2	18,375	3.00	$55,125
Drainage and Culvert Improvement	%	10%		$91,875
Contingency	%	25%		$228,375
Engineering	%	10%		$91,875
				$1,386,000

Nisku Spine Road from 15 Avenue to 17 Avenue Length - 1,180
Initial Two Lanes of Four Lane Divided

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	11,800	5.00	$59,000
300mm Granular Base Course	m^2	11,800	16.00	$188,800
125mm Asphalt Concrete Pavement	m^2	11,800	24.00	$283,200
Land Acquisition	m^2	11,800	30.00	$354,000
Landscaping	m^2	17,700	3.00	$53,100
Drainage and Culvert Improvement	%	10%		$88,500
Contingency	%	25%		$226,900
Engineering	%	10%		$88,500
				$1,342,000

Twp Road 510 from Rge 240 to 242 Length - 3,200

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	32,000	5.00	$160,000
300mm Granular Base Course	m^2	32,000	16.00	$512,000
125mm Asphalt Concrete Pavement	m^2	32,000	24.00	$768,000
Drainage and Culvert Improvement	%	10%		$144,000
Contingency	%	25%		$410,000
Engineering	%	10%		$144,000
				$2,138,000

Leduc County - Roadway Management System

Cost Estimates

Paved Road Capital Projects

Twp Road 510 from Rge 235 to 240 Length - 3,200

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	32,000	5.00	$160,000
300mm Granular Base Course	m^2	32,000	16.00	$512,000
125mm Asphalt Concrete Pavement	m^2	32,000	24.00	$768,000
Drainage and Culvert Improvement	%	10%		$144,000
Contingency	%	25%		$410,000
Engineering	%	10%		$144,000
				$2,138,000

Nisku Spine Road from 20 Avenue to 25 Avenue Length - 1,600
Initial Two Lanes of Four Lane Divided

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	16,000	5.00	$80,000
300mm Granular Base Course	m^2	16,000	16.00	$256,000
125mm Asphalt Concrete Pavement	m^2	16,000	24.00	$384,000
Land Acquisition	m^2	16,000	30.00	$480,000
Landscaping	m^2	24,000	3.00	$72,000
Drainage and Culvert Improvement	%	10%		$120,000
Contingency	%	25%		$300,000
Engineering	%	10%		$120,000
				$1,812,000

Twp Road 510 from Rge 252 to 254 Length - 3,200

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	32,000	5.00	$160,000
300mm Granular Base Course	m^2	32,000	16.00	$512,000
125mm Asphalt Concrete Pavement	m^2	32,000	24.00	$768,000
Drainage and Culvert Improvement	%	10%		$144,000
Contingency	%	25%		$410,000
Engineering	%	10%		$144,000
				$2,138,000

Leduc County - Roadway Management System

Cost Estimates

Paved Road Capital Projects

Nisku Spine Road from 25 Avenue to Twp 510 Length - 3,200
Initial Two Lanes of Four Lane Divided

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	32,000	5.00	$160,000
300mm Granular Base Course	m^2	32,000	16.00	$512,000
125mm Asphalt Concrete Pavement	m^2	32,000	24.00	$768,000
Land Acquisition	m^2	32,000	30.00	$960,000
Bridge Improvements	m^2	200	4000.00	$800,000
Drainage and Culvert Improvement	%	10%		$320,000
Contingency	%	25%		$800,000
Engineering	%	10%		$320,000
				$4,640,000

Twp Road 510 from Rge 242 to 244 Length - 3,200

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	32,000	5.00	$160,000
300mm Granular Base Course	m^2	32,000	16.00	$512,000
125mm Asphalt Concrete Pavement	m^2	32,000	24.00	$768,000
Drainage and Culvert Improvement	%	10%		$144,000
Contingency	%	25%		$410,000
Engineering	%	10%		$144,000
				$2,138,000

Twp Road 510 from Rge 244 to 245 Length - 1,600

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	16,000	5.00	$80,000
300mm Granular Base Course	m^2	16,000	16.00	$256,000
125mm Asphalt Concrete Pavement	m^2	16,000	24.00	$384,000
Drainage and Culvert Improvement	%	10%		$72,000
Contingency	%	25%		$206,000
Engineering	%	10%		$72,000
				$1,070,000

Leduc County - Roadway Management System

Cost Estimates

Paved Road Capital Projects

Nisku Spine Road from Twp 510 to Twp 512
Initial Two Lanes of Four Lane Divided

Length - 3,200

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	32,000	5.00	$160,000
300mm Granular Base Course	m^2	32,000	16.00	$512,000
125mm Asphalt Concrete Pavement	m^2	32,000	24.00	$768,000
Land Acquisition	m^2	144,000	30.00	$4,320,000
Drainage and Culvert Improvement	%	10%		$576,000
Contingency	%	25%		$1,418,000
Engineering	%	10%		$576,000
				$8,330,000

Twp Road 510 from Rge 250 to 252

Length - 3,200

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	32,000	5.00	$160,000
300mm Granular Base Course	m^2	32,000	16.00	$512,000
125mm Asphalt Concrete Pavement	m^2	32,000	24.00	$768,000
Drainage and Culvert Improvement	%	10%		$144,000
Contingency	%	25%		$410,000
Engineering	%	10%		$144,000
				$2,138,000

Rge 253 from Twp 510 to 512
Initial Two Lanes of Four Lane Divided

Length - 3,200

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	32,000	5.00	$160,000
300mm Granular Base Course	m^2	32,000	16.00	$512,000
125mm Asphalt Concrete Pavement	m^2	32,000	24.00	$768,000
Land Acquisition	m^2	34,240	30.00	$1,027,200
Drainage and Culvert Improvement	%	10%		$246,720
Contingency	%	25%		$617,360
Engineering	%	10%		$246,720
				$3,578,000

Leduc County - Roadway Management System

Cost Estimates

Paved Road Capital Projects

Rge 254 from Twp 504 to 510 Length - 3,200
Initial Two Lanes of Four Lane Divided

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	32,000	5.00	$160,000
300mm Granular Base Course	m^2	32,000	16.00	$512,000
125mm Asphalt Concrete Pavement	m^2	32,000	24.00	$768,000
Land Acquisition	m^2	32,000	30.00	$960,000
Bridge Improvements	m^2	200	4000.00	$800,000
Drainage and Culvert Improvement	%	10%		$320,000
Contingency	%	25%		$818,000
Engineering	%	10%		$320,000
				$4,658,000

Nisku Spine Road from Twp 494 to Twp 500 Length - 3,200
Initial Two Lanes of Four Lane Divided

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	32,000	5.00	$160,000
300mm Granular Base Course	m^2	32,000	16.00	$512,000
125mm Asphalt Concrete Pavement	m^2	32,000	24.00	$768,000
Land Acquisition	m^2	144,000	30.00	$4,320,000
Drainage and Culvert Improvement	%	10%		$576,000
Contingency	%	25%		$1,418,000
Engineering	%	10%		$576,000
				$8,330,000

Rge 243 from Twp 510 to 512 Length - 3,200
Initial Two Lanes of Four Lane Divided

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	32,000	5.00	$160,000
300mm Granular Base Course	m^2	32,000	16.00	$512,000
125mm Asphalt Concrete Pavement	m^2	32,000	24.00	$768,000
Land Acquisition	m^2	34,240	30.00	$1,027,200
Drainage and Culvert Improvement	%	10%		$246,720
Contingency	%	25%		$617,360
Engineering	%	10%		$246,720
				$3,578,000

Leduc County - Roadway Management System

Cost Estimates

Paved Road Capital Projects

Rge Road 235 from Twp 510 to 512 Length - 3,200

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	32,000	5.00	$160,000
300mm Granular Base Course	m^2	32,000	16.00	$512,000
125mm Asphalt Concrete Pavement	m^2	32,000	24.00	$768,000
Drainage and Culvert Improvement	%	10%		$144,000
Contingency	%	25%		$410,000
Engineering	%	10%		$144,000
				$2,138,000

Rge Road 240 from Twp 504 to 510 Length - 3,200

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	28,800	5.00	$144,000
150mm Granular Base Course	m^2	28,800	12.00	$345,600
125mm Asphalt Concrete Pavement	m^2	28,800	24.00	$691,200
Drainage and Culvert Improvement	%	10%		$118,080
Contingency	%	25%		$294,040
Engineering	%	10%		$118,080
				$1,711,000

Twp Road 510 from Rge 254 to 255 Length - 1,600

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	16,000	5.00	$80,000
300mm Granular Base Course	m^2	16,000	16.00	$256,000
125mm Asphalt Concrete Pavement	m^2	16,000	24.00	$384,000
Drainage and Culvert Improvement	%	10%		$72,000
Contingency	%	25%		$206,000
Engineering	%	10%		$72,000
				$1,070,000

Leduc County - Roadway Management System

Cost Estimates

Paved Road Capital Projects

Rge Road 240 from Twp 502 to 504 Length - 3,200

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	28,800	5.00	$144,000
150mm Granular Base Course	m^2	28,800	12.00	$345,600
125mm Asphalt Concrete Pavement	m^2	28,800	24.00	$691,200
Drainage and Culvert Improvement	%	10%		$118,080
Contingency	%	25%		$293,040
Engineering	%	10%		$118,080
				$1,710,000

Rge Road 252 from Twp 510 to 512 Length - 3,200

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	32,000	5.00	$160,000
300mm Granular Base Course	m^2	32,000	16.00	$512,000
125mm Asphalt Concrete Pavement	m^2	32,000	24.00	$768,000
Drainage and Culvert Improvement	%	10%		$144,000
Contingency	%	25%		$410,000
Engineering	%	10%		$144,000
				$2,138,000

Rge Road 253 from Twp 504 to 510 Length - 3,200

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	32,000	5.00	$160,000
300mm Granular Base Course	m^2	32,000	16.00	$512,000
125mm Asphalt Concrete Pavement	m^2	32,000	24.00	$768,000
Drainage and Culvert Improvement	%	10%		$144,000
Contingency	%	25%		$410,000
Engineering	%	10%		$144,000
				$2,138,000

Leduc County - Roadway Management System

Cost Estimates

Paved Road Capital Projects

Rge Road 244 from Twp 504 to 510 Length - 3,200

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	28,800	5.00	$144,000
150mm Granular Base Course	m^2	28,800	12.00	$345,600
125mm Asphalt Concrete Pavement	m^2	28,800	24.00	$691,200
Drainage and Culvert Improvement	%	10%		$118,080
Contingency	%	25%		$294,040
Engineering	%	10%		$118,080
				$1,711,000

Rge Road 32 from Twp 484 to 490 Length - 3,200

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	28,800	5.00	$144,000
150mm Granular Base Course	m^2	28,800	12.00	$345,600
125mm Asphalt Concrete Pavement	m^2	28,800	24.00	$691,200
Drainage and Culvert Improvement	%	10%		$118,080
Contingency	%	25%		$294,040
Engineering	%	10%		$118,080
				$1,711,000

Twp Road 505 from Rge 243 to 245 Length - 3,200

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	28,800	5.00	$144,000
150mm Granular Base Course	m^2	28,800	12.00	$345,600
125mm Asphalt Concrete Pavement	m^2	28,800	24.00	$691,200
Drainage and Culvert Improvement	%	10%		$118,080
Contingency	%	25%		$294,040
Engineering	%	10%		$118,080
				$1,711,000

Leduc County - Roadway Management System

Cost Estimates

Paved Road Capital Projects

Twp Road 505 from Rge 235 to 241 Length - 3,200

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	28,800	5.00	$144,000
150mm Granular Base Course	m^2	28,800	12.00	$345,600
125mm Asphalt Concrete Pavement	m^2	28,800	24.00	$691,200
Drainage and Culvert Improvement	%	10%		$118,080
Contingency	%	25%		$294,040
Engineering	%	10%		$118,080
				$1,711,000

Rge Road 233 from Twp 502 to 504 Length - 3,200

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	28,800	5.00	$144,000
150mm Granular Base Course	m^2	28,800	12.00	$345,600
125mm Asphalt Concrete Pavement	m^2	28,800	24.00	$691,200
Drainage and Culvert Improvement	%	10%		$118,080
Contingency	%	25%		$294,040
Engineering	%	10%		$118,080
				$1,711,000

Rge Road 233 from Twp 504 to 510 Length - 3,200

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	28,800	5.00	$144,000
150mm Granular Base Course	m^2	28,800	12.00	$345,600
125mm Asphalt Concrete Pavement	m^2	28,800	24.00	$691,200
Drainage and Culvert Improvement	%	10%		$118,080
Contingency	%	25%		$294,040
Engineering	%	10%		$118,080
				$1,711,000

Leduc County - Roadway Management System

Cost Estimates

Paved Road Capital Projects

Rge Road 233 from Twp 502 to 504 Length - 3,200

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	28,800	5.00	$144,000
150mm Granular Base Course	m^2	28,800	12.00	$345,600
125mm Asphalt Concrete Pavement	m^2	28,800	24.00	$691,200
Drainage and Culvert Improvement	%	10%		$118,080
Contingency	%	25%		$294,040
Engineering	%	10%		$118,080
				$1,711,000

Twp Road 505 from Rge 234 to 235 Length - 1,600

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	14,400	5.00	$72,000
150mm Granular Base Course	m^2	14,400	12.00	$172,800
125mm Asphalt Concrete Pavement	m^2	14,400	24.00	$345,600
Drainage and Culvert Improvement	%	10%		$59,040
Contingency	%	25%		$146,520
Engineering	%	10%		$59,040
				$855,000

Rge Road 11 from Twp 495 to 500 Length - 1,600

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	14,400	5.00	$72,000
150mm Granular Base Course	m^2	14,400	12.00	$172,800
125mm Asphalt Concrete Pavement	m^2	14,400	24.00	$345,600
Drainage and Culvert Improvement	%	10%		$59,040
Contingency	%	25%		$146,520
Engineering	%	10%		$59,040
				$855,000

Leduc County - Roadway Management System

Cost Estimates

Paved Road Capital Projects

Rge Road 241 from Twp 502 to 504 Length - 3,200

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	28,800	5.00	$144,000
150mm Granular Base Course	m^2	28,800	12.00	$345,600
125mm Asphalt Concrete Pavement	m^2	28,800	24.00	$691,200
Drainage and Culvert Improvement	%	10%		$118,080
Contingency	%	25%		$294,040
Engineering	%	10%		$118,080
				$1,711,000

Rge Road 233 from Twp 500 to 502 Length - 3,200

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	28,800	5.00	$144,000
150mm Granular Base Course	m^2	28,800	12.00	$345,600
125mm Asphalt Concrete Pavement	m^2	28,800	24.00	$691,200
Drainage and Culvert Improvement	%	10%		$118,080
Contingency	%	25%		$294,040
Engineering	%	10%		$118,080
				$1,711,000

Rge Road 11 from Twp 500 to 502 Length - 3,200

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	28,800	5.00	$144,000
150mm Granular Base Course	m^2	28,800	12.00	$345,600
125mm Asphalt Concrete Pavement	m^2	28,800	24.00	$691,200
Drainage and Culvert Improvement	%	10%		$118,080
Contingency	%	25%		$294,040
Engineering	%	10%		$118,080
				$1,711,000

Leduc County - Roadway Management System

Cost Estimates

Paved Road Capital Projects

Rge Road 241 from Twp 500 to 502 Length - 3,200

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	28,800	5.00	$144,000
150mm Granular Base Course	m^2	28,800	12.00	$345,600
125mm Asphalt Concrete Pavement	m^2	28,800	24.00	$691,200
Drainage and Culvert Improvement	%	10%		$118,080
Contingency	%	25%		$294,040
Engineering	%	10%		$118,080
				$1,711,000

Rge Road 233 from Twp 494 to 500 Length - 3,200

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	28,800	5.00	$144,000
150mm Granular Base Course	m^2	28,800	12.00	$345,600
125mm Asphalt Concrete Pavement	m^2	28,800	24.00	$691,200
Drainage and Culvert Improvement	%	10%		$118,080
Contingency	%	25%		$294,040
Engineering	%	10%		$118,080
				$1,711,000

Rge Road 253 from Twp 510 to 512 Length - 3,200
Final Two Lanes of Four Lane Divided

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	32,000	5.00	$160,000
300mm Granular Base Course	m^2	32,000	16.00	$512,000
125mm Asphalt Concrete Pavement	m^2	32,000	24.00	$768,000
Drainage and Culvert Improvement	%	10%		$144,000
Contingency	%	25%		$410,000
Engineering	%	10%		$144,000
				$2,138,000

Leduc County - Roadway Management System

Cost Estimates

Paved Road Capital Projects

Nisku Spine Road from Airport Road to 15 Avenue Length - 1,225
Initial Two Lanes of Four Lane Divided

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	12,250	5.00	$61,250
300mm Granular Base Course	m^2	12,250	16.00	$196,000
125mm Asphalt Concrete Pavement	m^2	12,250	24.00	$294,000
Landscaping	m^2	6,738	3.00	$20,213
Drainage and Culvert Improvement	%	10%		$57,146
Contingency	%	25%		$142,245
Engineering	%	10%		$57,146
				$828,000

Rge Road 240 from Twp 510 to 512 Length - 3,200

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	28,800	5.00	$144,000
150mm Granular Base Course	m^2	28,800	12.00	$345,600
125mm Asphalt Concrete Pavement	m^2	28,800	24.00	$691,200
Drainage and Culvert Improvement	%	10%		$118,080
Contingency	%	25%		$294,040
Engineering	%	10%		$118,080
				$1,711,000

Nisku Spine Road from 15 Avenue to 20 Avenue Length - 1,980
Final Two Lanes of Four Lane Divided

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	19,800	5.00	$99,000
300mm Granular Base Course	m^2	19,800	16.00	$316,800
125mm Asphalt Concrete Pavement	m^2	19,800	24.00	$475,200
Landscaping	m^2	10,890	3.00	$32,670
Drainage and Culvert Improvement	%	10%		$92,367
Contingency	%	25%		$228,596
Engineering	%	10%		$92,367
				$1,337,000

Leduc County - Roadway Management System

Cost Estimates

Paved Road Capital Projects

Rge Road 263 from Twp 494 to 495 Length - 1,600

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	14,400	5.00	$72,000
150mm Granular Base Course	m^2	14,400	12.00	$172,800
125mm Asphalt Concrete Pavement	m^2	14,400	24.00	$345,600
Drainage and Culvert Improvement	%	10%		$59,040
Contingency	%	25%		$146,520
Engineering	%	10%		$59,040
				$855,000

Rge Road 223 from Twp 500 to 502 Length - 3,200

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	28,800	5.00	$144,000
150mm Granular Base Course	m^2	28,800	12.00	$345,600
125mm Asphalt Concrete Pavement	m^2	28,800	24.00	$691,200
Drainage and Culvert Improvement	%	10%		$118,080
Contingency	%	25%		$294,040
Engineering	%	10%		$118,080
				$1,711,000

Rge Road 40 from Twp 490 to 492 Length - 3,200

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	28,800	5.00	$144,000
150mm Granular Base Course	m^2	28,800	12.00	$345,600
125mm Asphalt Concrete Pavement	m^2	28,800	24.00	$691,200
Drainage and Culvert Improvement	%	10%		$118,080
Contingency	%	25%		$294,040
Engineering	%	10%		$118,080
				$1,711,000

Leduc County - Roadway Management System

Cost Estimates

Paved Road Capital Projects

Nisku Spine Road from 20 Avenue to 25 Avenue
Final Two Lanes of Four Lane Divided

Length - 1,600

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	16,000	5.00	$80,000
300mm Granular Base Course	m^2	16,000	16.00	$256,000
125mm Asphalt Concrete Pavement	m^2	16,000	24.00	$384,000
Landscaping	m^2	6,400	3.00	$19,200
Drainage and Culvert Improvement	%	10%		$73,920
Contingency	%	25%		$182,960
Engineering	%	10%		$73,920
				$1,070,000

Rge Road 263 from Twp 492 to 494

Length - 3,200

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	28,800	5.00	$144,000
150mm Granular Base Course	m^2	28,800	12.00	$345,600
125mm Asphalt Concrete Pavement	m^2	28,800	24.00	$691,200
Drainage and Culvert Improvement	%	10%		$118,080
Contingency	%	25%		$294,040
Engineering	%	10%		$118,080
				$1,711,000

Rge Road 244 from Twp 492 to 494

Length - 3,200

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	28,800	5.00	$144,000
150mm Granular Base Course	m^2	28,800	12.00	$345,600
125mm Asphalt Concrete Pavement	m^2	28,800	24.00	$691,200
Drainage and Culvert Improvement	%	10%		$118,080
Contingency	%	25%		$294,040
Engineering	%	10%		$118,080
				$1,711,000

Leduc County - Roadway Management System

Cost Estimates

Paved Road Capital Projects

Nisku Spine Road from 25 Avenue to Twp 510 Length - 3,200
Final Two Lanes of Four Lane Divided

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	32,000	5.00	$160,000
300mm Granular Base Course	m^2	32,000	16.00	$512,000
125mm Asphalt Concrete Pavement	m^2	32,000	24.00	$768,000
Bridge Improvements	m^2	214	4000.00	$856,000
Drainage and Culvert Improvement	%	10%		$229,600
Contingency	%	25%		$570,800
Engineering	%	10%		$229,600
				$3,326,000

Rge Road 263 from Twp 490 to 492 Length - 3,200

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	28,800	5.00	$144,000
150mm Granular Base Course	m^2	28,800	12.00	$345,600
125mm Asphalt Concrete Pavement	m^2	28,800	24.00	$691,200
Drainage and Culvert Improvement	%	10%		$118,080
Contingency	%	25%		$294,040
Engineering	%	10%		$118,080
				$1,711,000

Rge Road 244 from Twp 490 to 492 Length - 3,200

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	28,800	5.00	$144,000
150mm Granular Base Course	m^2	28,800	12.00	$345,600
125mm Asphalt Concrete Pavement	m^2	28,800	24.00	$691,200
Drainage and Culvert Improvement	%	10%		$118,080
Contingency	%	25%		$294,040
Engineering	%	10%		$118,080
				$1,711,000

Leduc County - Roadway Management System

Cost Estimates

Paved Road Capital Projects

Rge Road 254 from Twp 504 to 510 Length - 3,200
Final Two Lanes of Four Lane Divided

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	32,000	5.00	$160,000
300mm Granular Base Course	m^2	32,000	16.00	$512,000
125mm Asphalt Concrete Pavement	m^2	32,000	24.00	$768,000
Bridge Improvements	m^2	214	4000.00	$856,000
Drainage and Culvert Improvement	%	10%		$229,600
Contingency	%	25%		$570,800
Engineering	%	10%		$229,600
				$3,326,000

Nisku Spine Road from Twp 510 to 512 Length - 3,200
Final Two Lanes of Four Lane Divided

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	32,000	5.00	$160,000
300mm Granular Base Course	m^2	32,000	16.00	$512,000
125mm Asphalt Concrete Pavement	m^2	32,000	24.00	$768,000
Drainage and Culvert Improvement	%	10%		$144,000
Contingency	%	25%		$410,000
Engineering	%	10%		$144,000
				$2,138,000

Twp Road 500 from Rge 221 to 223 Length - 3,200

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	28,800	5.00	$144,000
150mm Granular Base Course	m^2	28,800	12.00	$345,600
125mm Asphalt Concrete Pavement	m^2	28,800	24.00	$691,200
Drainage and Culvert Improvement	%	10%		$118,080
Contingency	%	25%		$294,040
Engineering	%	10%		$118,080
				$1,711,000

Leduc County - Roadway Management System

Cost Estimates

Paved Road Capital Projects

Rge Road 244 from Twp 484 to 490 Length - 3,200

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	28,800	5.00	$144,000
150mm Granular Base Course	m^2	28,800	12.00	$345,600
125mm Asphalt Concrete Pavement	m^2	28,800	24.00	$691,200
Drainage and Culvert Improvement	%	10%		$118,080
Contingency	%	25%		$294,040
Engineering	%	10%		$118,080
				$1,711,000

Rge Road 263 from Twp 484 to 490 Length - 3,200

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	28,800	5.00	$144,000
150mm Granular Base Course	m^2	28,800	12.00	$345,600
125mm Asphalt Concrete Pavement	m^2	28,800	24.00	$691,200
Drainage and Culvert Improvement	%	10%		$118,080
Contingency	%	25%		$294,040
Engineering	%	10%		$118,080
				$1,711,000

Nisku Spine Road from Twp 500 to Airport Road Length - 3,200
Final Two Lanes of Four Lane Divided

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	32,000	5.00	$160,000
300mm Granular Base Course	m^2	32,000	16.00	$512,000
125mm Asphalt Concrete Pavement	m^2	32,000	24.00	$768,000
Drainage and Culvert Improvement	%	10%		$144,000
Contingency	%	25%		$410,000
Engineering	%	10%		$144,000
				$2,138,000

Leduc County - Roadway Management System

Cost Estimates

Paved Road Capital Projects

Rge Road 263 from Twp 482 to 484 Length - 3,200

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	28,800	5.00	$144,000
150mm Granular Base Course	m^2	28,800	12.00	$345,600
125mm Asphalt Concrete Pavement	m^2	28,800	24.00	$691,200
Drainage and Culvert Improvement	%	10%		$118,080
Contingency	%	25%		$294,040
Engineering	%	10%		$118,080
				$1,711,000

Rge Road 244 from Twp 482 to 484 Length - 3,200

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	28,800	5.00	$144,000
150mm Granular Base Course	m^2	28,800	12.00	$345,600
125mm Asphalt Concrete Pavement	m^2	28,800	24.00	$691,200
Drainage and Culvert Improvement	%	10%		$118,080
Contingency	%	25%		$294,040
Engineering	%	10%		$118,080
				$1,711,000

Nisku Spine Road from Twp 494 to 500
Final Two Lanes of Four Lane Divided Length - 3,200

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	32,000	5.00	$160,000
300mm Granular Base Course	m^2	32,000	16.00	$512,000
125mm Asphalt Concrete Pavement	m^2	32,000	24.00	$768,000
Drainage and Culvert Improvement	%	10%		$144,000
Contingency	%	25%		$410,000
Engineering	%	10%		$144,000
				$2,138,000

Leduc County - Roadway Management System

Cost Estimates

Paved Road Capital Projects

Rge Road 244 from Twp 481 to 482 Length - 1,600

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	14,400	5.00	$72,000
150mm Granular Base Course	m^2	14,400	12.00	$172,800
125mm Asphalt Concrete Pavement	m^2	14,400	24.00	$345,600
Drainage and Culvert Improvement	%	10%		$59,040
Contingency	%	25%		$146,520
Engineering	%	10%		$59,040
				$855,000

Rge Road 252 from Twp 490 to 494 Length - 3,200

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	28,800	5.00	$144,000
150mm Granular Base Course	m^2	28,800	12.00	$345,600
125mm Asphalt Concrete Pavement	m^2	28,800	24.00	$691,200
Drainage and Culvert Improvement	%	10%		$118,080
Contingency	%	25%		$294,040
Engineering	%	10%		$118,080
				$1,711,000

Rge Road 224 from Twp 504 to 510 Length - 3,200

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	28,800	5.00	$144,000
150mm Granular Base Course	m^2	28,800	12.00	$345,600
125mm Asphalt Concrete Pavement	m^2	28,800	24.00	$691,200
Drainage and Culvert Improvement	%	10%		$118,080
Contingency	%	25%		$294,040
Engineering	%	10%		$118,080
				$1,711,000

Leduc County - Roadway Management System

Cost Estimates

Paved Road Capital Projects

Rge Road 243 from Twp 510 to 512 Length - 3,200
Final Two Lanes of Four Lane Divided

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	32,000	5.00	$160,000
300mm Granular Base Course	m^2	32,000	16.00	$512,000
125mm Asphalt Concrete Pavement	m^2	32,000	24.00	$768,000
Drainage and Culvert Improvement	%	10%		$144,000
Contingency	%	25%		$410,000
Engineering	%	10%		$144,000
				$2,138,000

Rge Road 252 from Twp 484 to 490 Length - 3,200

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	28,800	5.00	$144,000
150mm Granular Base Course	m^2	28,800	12.00	$345,600
125mm Asphalt Concrete Pavement	m^2	28,800	24.00	$691,200
Drainage and Culvert Improvement	%	10%		$118,080
Contingency	%	25%		$294,040
Engineering	%	10%		$118,080
				$1,711,000

Rge Road 224 from Twp 502 to 504 Length - 3,200

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	28,800	5.00	$144,000
150mm Granular Base Course	m^2	28,800	12.00	$345,600
125mm Asphalt Concrete Pavement	m^2	28,800	24.00	$691,200
Drainage and Culvert Improvement	%	10%		$118,080
Contingency	%	25%		$294,040
Engineering	%	10%		$118,080
				$1,711,000

Leduc County - Roadway Management System

Cost Estimates

Paved Road Capital Projects

Rge Road 252 from Twp 482 to 484 Length - 3,200

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	28,800	5.00	$144,000
150mm Granular Base Course	m^2	28,800	12.00	$345,600
125mm Asphalt Concrete Pavement	m^2	28,800	24.00	$691,200
Drainage and Culvert Improvement	%	10%		$118,080
Contingency	%	25%		$294,040
Engineering	%	10%		$118,080
				$1,711,000

Twp Road 502 from Rge 223 to 224 Length - 1,600

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	14,400	5.00	$72,000
150mm Granular Base Course	m^2	14,400	12.00	$172,800
125mm Asphalt Concrete Pavement	m^2	14,400	24.00	$345,600
Drainage and Culvert Improvement	%	10%		$59,040
Contingency	%	25%		$146,520
Engineering	%	10%		$59,040
				$855,000

Rge Road 260 from Twp 484 to 490 Length - 3,200

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	28,800	5.00	$144,000
150mm Granular Base Course	m^2	28,800	12.00	$345,600
125mm Asphalt Concrete Pavement	m^2	28,800	24.00	$691,200
Drainage and Culvert Improvement	%	10%		$118,080
Contingency	%	25%		$294,040
Engineering	%	10%		$118,080
				$1,711,000

Leduc County - Roadway Management System

Cost Estimates

Paved Road Capital Projects

Rge Road 252 from Twp 481 to 482 Length - 1,600

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	14,400	5.00	$72,000
150mm Granular Base Course	m^2	14,400	12.00	$172,800
125mm Asphalt Concrete Pavement	m^2	14,400	24.00	$345,600
Drainage and Culvert Improvement	%	10%		$59,040
Contingency	%	25%		$146,520
Engineering	%	10%		$59,040
				$855,000

Rge Road 260 from Twp 482 to 484 Length - 3,200

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	28,800	5.00	$144,000
150mm Granular Base Course	m^2	28,800	12.00	$345,600
125mm Asphalt Concrete Pavement	m^2	28,800	24.00	$691,200
Drainage and Culvert Improvement	%	10%		$118,080
Contingency	%	25%		$294,040
Engineering	%	10%		$118,080
				$1,711,000

Leduc County - Roadway Management System

Cost Estimates

Gravel Road Capital Projects

Rge Road 243 from Twp 504 to 510 Length - 3,200

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	26,400	5.00	$132,000
150mm Granular Base Course	m^2	26,400	12.00	$316,800
Drainage and Culvert Improvement	%	10%		$44,880
Contingency	%	25%		$107,440
Engineering	%	10%		$44,880
				$646,000

Rge Road 223/ Twp 510 intersection

Item	Unit	Quantity	Unit Price	Total
Intersection Improvements	Lump sum	1	135000.00	$135,000

Note: Amount shown is the County portion of the Cost Sharing with Strathcona County **$135,000**

Rge Road 232 from Twp 484 to 490 Length - 3,200

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	26,400	5.00	$132,000
150mm Granular Base Course	m^2	26,400	12.00	$316,800
Drainage and Culvert Improvement	%	10%		$44,880
Contingency	%	25%		$107,440
Engineering	%	10%		$44,880
				$646,000

Rge Road 15 from Twp 482 to 484 Length - 3,200

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	26,400	5.00	$132,000
150mm Granular Base Course	m^2	26,400	12.00	$316,800
Drainage and Culvert Improvement	%	10%		$44,880
Contingency	%	25%		$107,440
Engineering	%	10%		$44,880
				$646,000

Leduc County - Roadway Management System

Cost Estimates

Gravel Road Capital Projects

Rge Road 262 from Twp 500 to 501 Length - 1,600

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	13,200	5.00	$66,000
150mm Granular Base Course	m^2	13,200	12.00	$158,400
Drainage and Culvert Improvement	%	10%		$22,440
Contingency	%	25%		$53,720
Engineering	%	10%		$22,440
				$323,000

Twp Road 502A from Rge 12 to 12A Length - 900

Item	Unit	Quantity	Unit Price	Total
Roadway Grading	m	900	300	$270,000
Subgrade Preparation	m^2	7,200	5.00	$36,000
150mm Granular Base Course	m^2	7,200	12.00	$86,400
Bridge Structure	m^2	70	4000.00	$280,000
Drainage and Culvert Improvement	%	10%		$67,240
Contingency	%	25%		$163,120
Engineering	%	10%		$67,240
				$700,000

Rge Road 262 from Twp 501 to 502 Length - 1,600

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	13,200	5.00	$66,000
150mm Granular Base Course	m^2	13,200	12.00	$158,400
Drainage and Culvert Improvement	%	10%		$22,440
Contingency	%	25%		$53,720
Engineering	%	10%		$22,440
				$323,000

Leduc County - Roadway Management System

Cost Estimates

Gravel Road Capital Projects

Rge Road 262 from Twp 502 to 504 Length - 3,200

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	26,400	5.00	$132,000
150mm Granular Base Course	m^2	26,400	12.00	$316,800
Drainage and Culvert Improvement	%	10%		$44,880
Contingency	%	25%		$111,440
Engineering	%	10%		$44,880
				$650,000

Rge Road 234 from Twp 502 to 504 Length - 3,200

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	26,400	5.00	$132,000
150mm Granular Base Course	m^2	26,400	12.00	$316,800
Drainage and Culvert Improvement	%	10%		$44,880
Contingency	%	25%		$111,440
Engineering	%	10%		$44,880
				$650,000

Rge Road 234 from Twp 500 to 502 Length - 3,200

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	26,400	5.00	$132,000
150mm Granular Base Course	m^2	26,400	12.00	$316,800
Drainage and Culvert Improvement	%	10%		$44,880
Contingency	%	25%		$111,440
Engineering	%	10%		$44,880
				$650,000

Leduc County - Roadway Management System

Cost Estimates

Gravel Road Capital Projects

Rge Road 220 from Twp 502 to 503 Length - 1,600

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	13,200	5.00	$66,000
150mm Granular Base Course	m^2	13,200	12.00	$158,400
Drainage and Culvert Improvement	%	10%		$22,440
Contingency	%	25%		$53,720
Engineering	%	10%		$22,440
				$323,000

Twp Road 503 from East of Rge 220 to 221 Length - 2,400

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	20,400	5.00	$102,000
150mm Granular Base Course	m^2	20,400	12.00	$244,800
Drainage and Culvert Improvement	%	10%		$34,680
Contingency	%	25%		$88,840
Engineering	%	10%		$34,680
				$505,000

Twp Road 493A from Rge 240A to 241 Length - 500

Item	Unit	Quantity	Unit Price	Total
Grading	m	430	300.00	$129,000
Subgrade Preparation	m^2	4,250	5.00	$21,250
150mm Granular Base Course	m^2	4,250	12.00	$51,000
Drainage and Culvert Improvement	%	10%		$20,125
Contingency	%	25%		$49,500
Engineering	%	10%		$20,125
				$291,000

Leduc County - Roadway Management System

Cost Estimates

Gravel Road Capital Projects

Twp Road 492 from Rge 234 to 0.8km West of 234 Length - 850

Item	Unit	Quantity	Unit Price	Total
Grading	m	850	380.00	$323,000
Subgrade Preparation	m^2	7,225	5.00	$36,125
150mm Granular Base Course	m^2	7,225	12.00	$86,700
Drainage and Culvert Improvement	%	10%		$44,583
Contingency	%	25%		$112,010
Engineering	%	10%		$44,583
				$647,000

Twp Road 485/ Rge Road 234 Intersection 200

Item	Unit	Quantity	Unit Price	Total
Grading	m	200	300.00	$60,000
Subgrade Preparation	m^2	1,700	5.00	$8,500
150mm Granular Base Course	m^2	1,700	12.00	$20,400
Drainage and Culvert Improvement	%	10%		$8,890
Contingency	%	25%		$28,320
Engineering	%	10%		$8,890
				$135,000

Rge Road 273 from Twp 482 to 484 Length - 3,200

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	26,400	5.00	$132,000
150mm Granular Base Course	m^2	26,400	12.00	$316,800
Drainage and Culvert Improvement	%	10%		$44,880
Contingency	%	25%		$111,440
Engineering	%	10%		$44,880
				$650,000

Leduc County - Roadway Management System

Cost Estimates

Gravel Road Capital Projects

Rge Road 241 from Twp 481 to 484 Length - 4,800

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	39,600	5.00	$198,000
150mm Granular Base Course	m^2	39,600	12.00	$475,200
Drainage and Culvert Improvement	%	10%		$67,320
Contingency	%	25%		$162,160
Engineering	%	10%		$67,320
				$970,000

Twp Road 474 from Rge 21 to 23 Length - 3,200

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	26,400	5.00	$132,000
150mm Granular Base Course	m^2	26,400	12.00	$316,800
Drainage and Culvert Improvement	%	10%		$44,880
Contingency	%	25%		$111,440
Engineering	%	10%		$44,880
				$650,000

Rge Road 241 from Twp 484 to 490 Length - 3,200

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	26,400	5.00	$132,000
150mm Granular Base Course	m^2	26,400	12.00	$316,800
Drainage and Culvert Improvement	%	10%		$44,880
Contingency	%	25%		$111,440
Engineering	%	10%		$44,880
				$650,000

Leduc County - Roadway Management System

Cost Estimates

Gravel Road Capital Projects

Rge Road 33 from Twp 473 to 480 Length - 4,800

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	39,600	5.00	$198,000
150mm Granular Base Course	m^2	39,600	12.00	$475,200
Drainage and Culvert Improvement	%	10%		$67,320
Contingency	%	25%		$162,160
Engineering	%	10%		$67,320
				$970,000

Rge Road 32 from Twp 473 to 474 Length - 1,600

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	13,200	5.00	$66,000
150mm Granular Base Course	m^2	13,200	12.00	$158,400
Drainage and Culvert Improvement	%	10%		$22,440
Contingency	%	25%		$53,720
Engineering	%	10%		$22,440
				$323,000

Rge Road 32 from Twp 474 to 480 Length - 3,200

Item	Unit	Quantity	Unit Price	Total
Subgrade Preparation	m^2	26,400	5.00	$132,000
150mm Granular Base Course	m^2	26,400	12.00	$316,800
Drainage and Culvert Improvement	%	10%		$44,880
Contingency	%	25%		$111,440
Engineering	%	10%		$44,880
				$650,000

Leduc County - Roadway Management System

Cost Estimates

Nisku Paved Road Capital Projects

5 Street from 12 to 15 Avenue Length - 945

Item	Unit	Quantity	Unit Price	Total
Remove Cold Mix	m^2	10,395	12.00	$124,740
Subgrade Preparation	m^2	12,758	5.00	$63,788
300mm Granular Base Course	m^2	12,758	16.00	$204,120
125mm Asphalt Concrete Pavement	m^2	12,758	24.00	$306,180
Landscaping	m^2	5%		$34,941
Drainage and Culvert Improvement	%	10%		$69,883
Contingency	%	25%		$216,466
Engineering	%	10%		$69,883
				$1,090,000

8 Street from 23 to 25 Avenue Length - 925

Item	Unit	Quantity	Unit Price	Total
Remove Cold Mix	m^2	10,175	12.00	$122,100
Subgrade Preparation	m^2	12,488	5.00	$62,438
300mm Granular Base Course	m^2	12,488	16.00	$199,800
125mm Asphalt Concrete Pavement	m^2	12,488	24.00	$299,700
Landscaping	m^2	5%		$34,202
Drainage and Culvert Improvement	%	10%		$68,404
Contingency	%	25%		$214,953
Engineering	%	10%		$68,404
				$1,070,000

5 Street from 15 to 17 Avenue Length - 1,125

Item	Unit	Quantity	Unit Price	Total
Remove Cold Mix	m^2	12,375	12.00	$148,500
Subgrade Preparation	m^2	15,188	5.00	$75,938
300mm Granular Base Course	m^2	15,188	16.00	$243,000
125mm Asphalt Concrete Pavement	m^2	15,188	24.00	$364,500
Landscaping	m^2	5%		$41,597
Drainage and Culvert Improvement	%	10%		$83,194
Contingency	%	25%		$260,078
Engineering	%	10%		$83,194
				$1,300,000

Leduc County - Roadway Management System

Cost Estimates

Nisku Paved Road Capital Projects

8 Street from 20 to 23 Avenue Length - 700

Item	Unit	Quantity	Unit Price	Total
Remove Cold Mix	m^2	7,700	12.00	$92,400
Subgrade Preparation	m^2	9,450	5.00	$47,250
300mm Granular Base Course	m^2	9,450	16.00	$151,200
125mm Asphalt Concrete Pavement	m^2	9,450	24.00	$226,800
Landscaping	m^2	5%		$25,883
Drainage and Culvert Improvement	%	10%		$51,765
Contingency	%	25%		$166,938
Engineering	%	10%		$51,765
				$814,000

5 Street from 17 to 20 Avenue Length - 810

Item	Unit	Quantity	Unit Price	Total
Remove Cold Mix	m^2	8,910	12.00	$106,920
Subgrade Preparation	m^2	10,935	5.00	$54,675
300mm Granular Base Course	m^2	10,935	16.00	$174,960
125mm Asphalt Concrete Pavement	m^2	10,935	24.00	$262,440
Landscaping	m^2	5%		$29,950
Drainage and Culvert Improvement	%	10%		$59,900
Contingency	%	25%		$187,186
Engineering	%	10%		$59,900
				$936,000

15 Avenue from 5 to 7 Street Length - 580

Item	Unit	Quantity	Unit Price	Total
Remove Cold Mix	m^2	6,380	12.00	$76,560
Subgrade Preparation	m^2	7,830	5.00	$39,150
300mm Granular Base Course	m^2	7,830	16.00	$125,280
125mm Asphalt Concrete Pavement	m^2	7,830	24.00	$187,920
Landscaping	m^2	5%		$21,446
Drainage and Culvert Improvement	%	10%		$42,891
Contingency	%	25%		$130,863
Engineering	%	10%		$42,891
				$667,000

Leduc County - Roadway Management System

Cost Estimates

Nisku Paved Road Capital Projects

15 Avenue from 7 to 9 Street Length - 600

Item	Unit	Quantity	Unit Price	Total
Remove Cold Mix	m^2	6,600	12.00	$79,200
Subgrade Preparation	m^2	8,100	5.00	$40,500
300mm Granular Base Course	m^2	8,100	16.00	$129,600
125mm Asphalt Concrete Pavement	m^2	8,100	24.00	$194,400
Landscaping	m^2	5%		$22,185
Drainage and Culvert Improvement	%	10%		$44,370
Contingency	%	25%		$141,375
Engineering	%	10%		$44,370
				$696,000

7/8 Street from 8A St. to 13 Avenue Length - 770

Item	Unit	Quantity	Unit Price	Total
Remove Cold Mix	m^2	8,470	12.00	$101,640
Subgrade Preparation	m^2	10,395	5.00	$51,975
300mm Granular Base Course	m^2	10,395	16.00	$166,320
125mm Asphalt Concrete Pavement	m^2	10,395	24.00	$249,480
Landscaping	m^2	5%		$28,471
Drainage and Culvert Improvement	%	10%		$56,942
Contingency	%	25%		$176,231
Engineering	%	10%		$56,942
				$888,000

5 Street from 20 to N. of 22 Avenue Length - 800

Item	Unit	Quantity	Unit Price	Total
Remove Cold Mix	m^2	8,800	12.00	$105,600
Subgrade Preparation	m^2	10,800	5.00	$54,000
300mm Granular Base Course	m^2	10,800	16.00	$172,800
125mm Asphalt Concrete Pavement	m^2	10,800	24.00	$259,200
Landscaping	m^2	5%		$29,580
Drainage and Culvert Improvement	%	10%		$59,160
Contingency	%	25%		$187,500
Engineering	%	10%		$59,160
				$927,000

Leduc County - Roadway Management System

Cost Estimates

Nisku Paved Road Capital Projects

8 Street from 13 to 15 Avenue Length - 705

Item	Unit	Quantity	Unit Price	Total
Remove Cold Mix	m^2	7,755	12.00	$93,060
Subgrade Preparation	m^2	9,518	5.00	$47,588
300mm Granular Base Course	m^2	9,518	16.00	$152,280
125mm Asphalt Concrete Pavement	m^2	9,518	24.00	$228,420
Landscaping	m^2	5%		$26,067
Drainage and Culvert Improvement	%	10%		$52,135
Contingency	%	25%		$162,316
Engineering	%	10%		$52,135
				$814,000

8 Street from 15 to 17 Avenue Length - 1,210

Item	Unit	Quantity	Unit Price	Total
Remove Cold Mix	m^2	13,310	12.00	$159,720
Subgrade Preparation	m^2	16,335	5.00	$81,675
300mm Granular Base Course	m^2	16,335	16.00	$261,360
125mm Asphalt Concrete Pavement	m^2	16,335	24.00	$392,040
Landscaping	m^2	5%		$44,740
Drainage and Culvert Improvement	%	10%		$89,480
Contingency	%	25%		$276,506
Engineering	%	10%		$89,480
				$1,395,000

8 Street from 17 to 20 Avenue Length - 805

Item	Unit	Quantity	Unit Price	Total
Remove Cold Mix	m^2	8,855	12.00	$106,260
Subgrade Preparation	m^2	10,868	5.00	$54,338
300mm Granular Base Course	m^2	10,868	16.00	$173,880
125mm Asphalt Concrete Pavement	m^2	10,868	24.00	$260,820
Landscaping	m^2	5%		$29,765
Drainage and Culvert Improvement	%	10%		$59,530
Contingency	%	25%		$185,878
Engineering	%	10%		$59,530
				$930,000

Leduc County - Roadway Management System

Cost Estimates

Nisku Paved Road Capital Projects

14 Avenue/ 6 Street from 5 St to 15 Avenue Length - 670

Item	Unit	Quantity	Unit Price	Total
Remove Cold Mix	m^2	7,370	12.00	$88,440
Subgrade Preparation	m^2	7,370	5.00	$36,850
300mm Granular Base Course	m^2	7,370	16.00	$117,920
125mm Asphalt Concrete Pavement	m^2	7,370	24.00	$176,880
Landscaping	m^2	5%		$21,005
Drainage and Culvert Improvement	%	10%		$42,009
Contingency	%	25%		$132,888
Engineering	%	10%		$42,009
				$658,000

8A Street from 7 to 8 Street Length - 920

Item	Unit	Quantity	Unit Price	Total
Remove Cold Mix	m^2	10,120	12.00	$121,440
Subgrade Preparation	m^2	10,120	5.00	$50,600
300mm Granular Base Course	m^2	10,120	16.00	$161,920
125mm Asphalt Concrete Pavement	m^2	10,120	24.00	$242,880
Landscaping	m^2	5%		$28,842
Drainage and Culvert Improvement	%	10%		$57,684
Contingency	%	25%		$180,250
Engineering	%	10%		$57,684
				$901,300

15 Avenue from 9 to 11 Street Length - 610

Item	Unit	Quantity	Unit Price	Total
Remove Cold Mix	m^2	6,710	12.00	$80,520
Subgrade Preparation	m^2	8,235	5.00	$41,175
300mm Granular Base Course	m^2	8,235	16.00	$131,760
125mm Asphalt Concrete Pavement	m^2	8,235	24.00	$197,640
Landscaping	m^2	5%		$22,555
Drainage and Culvert Improvement	%	10%		$45,110
Contingency	%	25%		$139,131
Engineering	%	10%		$45,110
				$703,000

Leduc County - Roadway Management System

Cost Estimates

Nisku Paved Road Capital Projects

10 Street from 15 to 16 Avenue Length - 325

Item	Unit	Quantity	Unit Price	Total
Remove Cold Mix	m^2	3,575	12.00	$42,900
Subgrade Preparation	m^2	3,575	5.00	$17,875
300mm Granular Base Course	m^2	3,575	16.00	$57,200
125mm Asphalt Concrete Pavement	m^2	3,575	24.00	$85,800
Landscaping	m^2	5%		$10,189
Drainage and Culvert Improvement	%	10%		$20,378
Contingency	%	25%		$61,281
Engineering	%	10%		$20,378

$316,000

4 Street from 11 to 15 Avenue Length - 1,255

Item	Unit	Quantity	Unit Price	Total
Remove Cold Mix	m^2	13,805	12.00	$165,660
Subgrade Preparation	m^2	13,805	5.00	$69,025
300mm Granular Base Course	m^2	13,805	16.00	$220,880
125mm Asphalt Concrete Pavement	m^2	13,805	24.00	$331,320
Landscaping	m^2	5%		$39,344
Drainage and Culvert Improvement	%	10%		$78,689
Contingency	%	25%		$246,394
Engineering	%	10%		$78,689

$1,230,000

4 Street from 15 to 17 Avenue Length - 1,105

Item	Unit	Quantity	Unit Price	Total
Remove Cold Mix	m^2	12,155	12.00	$145,860
Subgrade Preparation	m^2	12,155	5.00	$60,775
300mm Granular Base Course	m^2	12,155	16.00	$194,480
125mm Asphalt Concrete Pavement	m^2	12,155	24.00	$291,720
Landscaping	m^2	5%		$34,642
Drainage and Culvert Improvement	%	10%		$69,284
Contingency	%	25%		$216,956
Engineering	%	10%		$69,284

$1,083,000

Leduc County - Roadway Management System

Cost Estimates

Nisku Paved Road Capital Projects

4 Street from 17 to 20 Avenue Length - 850

Item	Unit	Quantity	Unit Price	Total
Remove Cold Mix	m^2	9,350	12.00	$112,200
Subgrade Preparation	m^2	9,350	5.00	$46,750
300mm Granular Base Course	m^2	9,350	16.00	$149,600
125mm Asphalt Concrete Pavement	m^2	9,350	24.00	$224,400
Landscaping	m^2	5%		$26,648
Drainage and Culvert Improvement	%	10%		$53,295
Contingency	%	25%		$166,547
Engineering	%	10%		$53,295
				$833,000

4 Street from 20 to 22 Avenue Length - 600

Item	Unit	Quantity	Unit Price	Total
Remove Cold Mix	m^2	6,600	12.00	$79,200
Subgrade Preparation	m^2	6,600	5.00	$33,000
300mm Granular Base Course	m^2	6,600	16.00	$105,600
125mm Asphalt Concrete Pavement	m^2	6,600	24.00	$158,400
Landscaping	m^2	5%		$18,810
Drainage and Culvert Improvement	%	10%		$37,620
Contingency	%	25%		$120,750
Engineering	%	10%		$37,620
				$591,000

4 Street from 22 to 25 Avenue Length - 1,100

Item	Unit	Quantity	Unit Price	Total
Remove Cold Mix	m^2	12,100	12.00	$145,200
Subgrade Preparation	m^2	12,100	5.00	$60,500
300mm Granular Base Course	m^2	12,100	16.00	$193,600
125mm Asphalt Concrete Pavement	m^2	12,100	24.00	$290,400
Landscaping	m^2	5%		$34,485
Drainage and Culvert Improvement	%	10%		$68,970
Contingency	%	25%		$220,875
Engineering	%	10%		$68,970
				$1,083,000

Leduc County - Roadway Management System

Cost Estimates

Nisku Paved Road Capital Projects

18A Ave/ 4A St/ 19 Avenue Length - 450

Item	Unit	Quantity	Unit Price	Total
Remove Cold Mix	m^2	4,950	12.00	$59,400
Subgrade Preparation	m^2	4,950	5.00	$24,750
300mm Granular Base Course	m^2	4,950	16.00	$79,200
125mm Asphalt Concrete Pavement	m^2	4,950	24.00	$118,800
Landscaping	m^2	5%		$14,108
Drainage and Culvert Improvement	%	10%		$28,215
Contingency	%	25%		$88,313
Engineering	%	10%		$28,215
				$441,000

11 Ave/ 12 Avenue from 4 to 7 Street Length - 1,810

Item	Unit	Quantity	Unit Price	Total
Remove Cold Mix	m^2	19,910	12.00	$238,920
Subgrade Preparation	m^2	19,910	5.00	$99,550
300mm Granular Base Course	m^2	19,910	16.00	$318,560
125mm Asphalt Concrete Pavement	m^2	19,910	24.00	$477,840
Landscaping	m^2	5%		$56,744
Drainage and Culvert Improvement	%	10%		$113,487
Contingency	%	25%		$357,413
Engineering	%	10%		$113,487
				$1,776,000

13 Avenue from 4 to 7 Street Length - 1,050

Item	Unit	Quantity	Unit Price	Total
Remove Cold Mix	m^2	11,550	12.00	$138,600
Subgrade Preparation	m^2	11,550	5.00	$57,750
300mm Granular Base Course	m^2	11,550	16.00	$184,800
125mm Asphalt Concrete Pavement	m^2	11,550	24.00	$277,200
Landscaping	m^2	5%		$32,918
Drainage and Culvert Improvement	%	10%		$65,835
Contingency	%	25%		$203,063
Engineering	%	10%		$65,835
				$1,026,000

Leduc County - Roadway Management System

Cost Estimates

Nisku Paved Road Capital Projects

7 Street from 12 to 15 Avenue Length - 1,340

Item	Unit	Quantity	Unit Price	Total
Remove Cold Mix	m^2	14,740	12.00	$176,880
Subgrade Preparation	m^2	14,740	5.00	$73,700
300mm Granular Base Course	m^2	14,740	16.00	$235,840
125mm Asphalt Concrete Pavement	m^2	14,740	24.00	$353,760
Landscaping	m^2	5%		$42,009
Drainage and Culvert Improvement	%	10%		$84,018
Contingency	%	25%		$262,775
Engineering	%	10%		$84,018
				$1,313,000

15A Avenue/ 6 Street Length - 400

Item	Unit	Quantity	Unit Price	Total
Remove Cold Mix	m^2	4,400	12.00	$52,800
Subgrade Preparation	m^2	4,400	5.00	$22,000
300mm Granular Base Course	m^2	4,400	16.00	$70,400
125mm Asphalt Concrete Pavement	m^2	4,400	24.00	$105,600
Landscaping	m^2	5%		$12,540
Drainage and Culvert Improvement	%	10%		$25,080
Contingency	%	25%		$79,500
Engineering	%	10%		$25,080
				$393,000

17 Avenue from 4 to 8 Street Length - 1,260

Item	Unit	Quantity	Unit Price	Total
Remove Cold Mix	m^2	13,860	12.00	$166,320
Subgrade Preparation	m^2	13,860	5.00	$69,300
300mm Granular Base Course	m^2	13,860	16.00	$221,760
125mm Asphalt Concrete Pavement	m^2	13,860	24.00	$332,640
Landscaping	m^2	5%		$39,501
Drainage and Culvert Improvement	%	10%		$79,002
Contingency	%	25%		$248,475
Engineering	%	10%		$79,002
				$1,236,000

Leduc County - Roadway Management System

Cost Estimates

Nisku Paved Road Capital Projects

18 Avenue from 4 to 5 Street Length - 400

Item	Unit	Quantity	Unit Price	Total
Remove Cold Mix	m^2	4,400	12.00	$52,800
Subgrade Preparation	m^2	4,400	5.00	$22,000
300mm Granular Base Course	m^2	4,400	16.00	$70,400
125mm Asphalt Concrete Pavement	m^2	4,400	24.00	$105,600
Landscaping	m^2	5%		$12,540
Drainage and Culvert Improvement	%	10%		$25,080
Contingency	%	25%		$78,500
Engineering	%	10%		$25,080
				$392,000

18 Avenue from 5 to 8 Street Length - 1,005

Item	Unit	Quantity	Unit Price	Total
Remove Cold Mix	m^2	11,055	12.00	$132,660
Subgrade Preparation	m^2	11,055	5.00	$55,275
300mm Granular Base Course	m^2	11,055	16.00	$176,880
125mm Asphalt Concrete Pavement	m^2	11,055	24.00	$265,320
Landscaping	m^2	5%		$31,507
Drainage and Culvert Improvement	%	10%		$63,014
Contingency	%	25%		$199,331
Engineering	%	10%		$63,014
				$987,000

19 Avenue from 5 to 8 Street Length - 1,005

Item	Unit	Quantity	Unit Price	Total
Remove Cold Mix	m^2	11,055	12.00	$132,660
Subgrade Preparation	m^2	11,055	5.00	$55,275
300mm Granular Base Course	m^2	11,055	16.00	$176,880
125mm Asphalt Concrete Pavement	m^2	11,055	24.00	$265,320
Landscaping	m^2	5%		$31,507
Drainage and Culvert Improvement	%	10%		$63,014
Contingency	%	25%		$197,331
Engineering	%	10%		$63,014
				$985,000

Leduc County - Roadway Management System

Cost Estimates

Nisku Paved Road Capital Projects

6 Street from 20 to 22 Avenue Length - 600

Item	Unit	Quantity	Unit Price	Total
Remove Cold Mix	m^2	6,600	12.00	$79,200
Subgrade Preparation	m^2	6,600	5.00	$33,000
300mm Granular Base Course	m^2	6,600	16.00	$105,600
125mm Asphalt Concrete Pavement	m^2	6,600	24.00	$158,400
Landscaping	m^2	5%		$18,810
Drainage and Culvert Improvement	%	10%		$37,620
Contingency	%	25%		$121,750
Engineering	%	10%		$37,620
				$592,000

22 Avenue from 4 to 7 Street Length - 1,100

Item	Unit	Quantity	Unit Price	Total
Remove Cold Mix	m^2	12,100	12.00	$145,200
Subgrade Preparation	m^2	12,100	5.00	$60,500
300mm Granular Base Course	m^2	12,100	16.00	$193,600
125mm Asphalt Concrete Pavement	m^2	12,100	24.00	$290,400
Landscaping	m^2	5%		$34,485
Drainage and Culvert Improvement	%	10%		$68,970
Contingency	%	25%		$217,875
Engineering	%	10%		$68,970
				$1,080,000

21 Avenue from 6 to 8 Street Length - 750

Item	Unit	Quantity	Unit Price	Total
Remove Cold Mix	m^2	8,250	12.00	$99,000
Subgrade Preparation	m^2	8,250	5.00	$41,250
300mm Granular Base Course	m^2	8,250	16.00	$132,000
125mm Asphalt Concrete Pavement	m^2	8,250	24.00	$198,000
Landscaping	m^2	5%		$23,513
Drainage and Culvert Improvement	%	10%		$47,025
Contingency	%	25%		$145,188
Engineering	%	10%		$47,025
				$733,000

Leduc County - Roadway Management System

Cost Estimates

Nisku Paved Road Capital Projects

7 Street from 21 to 23 Avenue Length - 600

Item	Unit	Quantity	Unit Price	Total
Remove Cold Mix	m^2	6,600	12.00	$79,200
Subgrade Preparation	m^2	6,600	5.00	$33,000
300mm Granular Base Course	m^2	6,600	16.00	$105,600
125mm Asphalt Concrete Pavement	m^2	6,600	24.00	$158,400
Landscaping	m^2	5%		$18,810
Drainage and Culvert Improvement	%	10%		$37,620
Contingency	%	25%		$119,750
Engineering	%	10%		$37,620
				$590,000

23 Avenue from 7 to 8 Street Length - 310

Item	Unit	Quantity	Unit Price	Total
Remove Cold Mix	m^2	3,410	12.00	$40,920
Subgrade Preparation	m^2	3,410	5.00	$17,050
300mm Granular Base Course	m^2	3,410	16.00	$54,560
125mm Asphalt Concrete Pavement	m^2	3,410	24.00	$81,840
Landscaping	m^2	5%		$9,719
Drainage and Culvert Improvement	%	10%		$19,437
Contingency	%	25%		$61,038
Engineering	%	10%		$19,437
				$304,000

25 Avenue from 6 to 9 Street Length - 800

Item	Unit	Quantity	Unit Price	Total
Remove Cold Mix	m^2	8,800	12.00	$105,600
Subgrade Preparation	m^2	8,800	5.00	$44,000
300mm Granular Base Course	m^2	8,800	16.00	$140,800
125mm Asphalt Concrete Pavement	m^2	8,800	24.00	$211,200
Landscaping	m^2	5%		$25,080
Drainage and Culvert Improvement	%	10%		$50,160
Contingency	%	25%		$157,000
Engineering	%	10%		$50,160
				$784,000

Leduc County - Roadway Management System

Cost Estimates

Nisku Paved Road Capital Projects

Sparrow Drive Service Road from 20 to 25 Avenue Length - 1,600

Item	Unit	Quantity	Unit Price	Total
Remove Cold Mix	m^2	17,600	12.00	$211,200
Subgrade Preparation	m^2	17,600	5.00	$88,000
300mm Granular Base Course	m^2	17,600	16.00	$281,600
125mm Asphalt Concrete Pavement	m^2	17,600	24.00	$422,400
Landscaping	m^2	5%		$50,160
Drainage and Culvert Improvement	%	10%		$100,320
Contingency	%	25%		$314,000
Engineering	%	10%		$100,320

$1,568,000

4 Street from 25 Avenue to 1/4 Line Length - 800

Item	Unit	Quantity	Unit Price	Total
Remove Cold Mix	m^2	8,800	12.00	$105,600
Subgrade Preparation	m^2	8,800	5.00	$44,000
300mm Granular Base Course	m^2	8,800	16.00	$140,800
125mm Asphalt Concrete Pavement	m^2	8,800	24.00	$211,200
Landscaping	m^2	5%		$25,080
Drainage and Culvert Improvement	%	10%		$50,160
Contingency	%	25%		$157,000
Engineering	%	10%		$50,160

$784,000

4 Street from 1/4 Line to 30 Avenue Length - 810

Item	Unit	Quantity	Unit Price	Total
Remove Cold Mix	m^2	8,910	12.00	$106,920
Subgrade Preparation	m^2	8,910	5.00	$44,550
300mm Granular Base Course	m^2	8,910	16.00	$142,560
125mm Asphalt Concrete Pavement	m^2	8,910	24.00	$213,840
Landscaping	m^2	5%		$25,394
Drainage and Culvert Improvement	%	10%		$50,787
Contingency	%	25%		$160,163
Engineering	%	10%		$50,787

$795,000

Leduc County - Roadway Management System

Cost Estimates

Roadway Mainetance Capital Projects

7 Street from 8A to 10 Avenue Length - 75

Item	Unit	Quantity	Unit Price	Total
Asphalt Overlay	tonne	148	90.00	$13,320
Contingency	%	10%		$1,332
				$14,700

Wizard Lake Road from Rge 270 to 271 & Twp 480 to 481 Length - 2,600

Item	Unit	Quantity	Unit Price	Total
Asphalt Overlay	tonne	4,929	90.00	$443,610
Contingency	%	10%		$44,361
				$488,000

Airport Road from Rge 242 to 250 Length - 6,400

Item	Unit	Quantity	Unit Price	Total
Asphalt Overlay	tonne	10,525	90.00	$947,250
Contingency	%	10%		$94,725
				$1,042,000

West Devon Main Road from Twp 502 to 504 Length - 3,200

Item	Unit	Quantity	Unit Price	Total
Asphalt Overlay	tonne	5,263	90.00	$473,670
Contingency	%	10%		$47,367
				$521,000

Leduc County - Roadway Management System

Cost Estimates

Roadway Mainetance Capital Projects

Sparrow Drive from Twp 504 to 510 Length - 3,200

Item	Unit	Quantity	Unit Price	Total
Asphalt Overlay	tonne	5,263	90.00	$473,670
Contingency	%	10%		$47,367
				$521,000

4 Street from 10 to 11 Avenue Length - 75

Item	Unit	Quantity	Unit Price	Total
Asphalt Overlay	tonne	148	90.00	$13,320
Contingency	%	10%		$1,332
				$14,700

9 Street from 17 to 20 Avenue Length - 805

Item	Unit	Quantity	Unit Price	Total
Asphalt Overlay	tonne	1,323	90.00	$119,070
Contingency	%	10%		$11,907
				$131,000

Looking Back Lake Main Road from Rge 221 to 231 Length - 9,600

Item	Unit	Quantity	Unit Price	Total
Asphalt Overlay	tonne	15,788	90.00	$1,420,920
Contingency	%	10%		$142,092
				$1,563,000

Leduc County - Roadway Management System

Cost Estimates

Roadway Mainetance Capital Projects

Glen Park Main Road from Rge 250 to 260 Length - 9,600

Item	Unit	Quantity	Unit Price	Total
Asphalt Overlay	tonne	15,788	90.00	$1,420,920
Contingency	%	10%		$142,092
				$1,563,000

Glen Park Main Road from Rge 260 to 270 Length - 9,600

Item	Unit	Quantity	Unit Price	Total
Asphalt Overlay	tonne	15,788	90.00	$1,420,920
Contingency	%	10%		$142,092
				$1,563,000

Sparrow Drive from Twp 502 to 504 Length - 3,200

Item	Unit	Quantity	Unit Price	Total
Asphalt Overlay	tonne	5,263	90.00	$473,670
Contingency	%	10%		$47,367
				$521,000

24 Avenue from 4 to 5A Street Length - 520

Item	Unit	Quantity	Unit Price	Total
Asphalt Overlay	tonne	859	90.00	$77,310
Contingency	%	10%		$7,731
				$85,000

Leduc County - Roadway Management System

Cost Estimates

Roadway Mainetance Capital Projects

Joseph Lake Main Road from Twp 494 to 502 Length - 6,400

Item	Unit	Quantity	Unit Price	Total
Asphalt Overlay	tonne	10,525	90.00	$947,250
Contingency	%	10%		$94,725
				$1,042,000

Joseph Lake Main Road from Twp 502 to 510 Length - 6,400

Item	Unit	Quantity	Unit Price	Total
Asphalt Overlay	tonne	10,525	90.00	$947,250
Contingency	%	10%		$94,725
				$1,042,000

5A Street from 23A to 24 Avenue Length - 450

Item	Unit	Quantity	Unit Price	Total
Asphalt Overlay	tonne	737	90.00	$66,330
Contingency	%	10%		$6,633
				$73,000

23A Avenue from 4 to 5A Street Length - 200

Item	Unit	Quantity	Unit Price	Total
Asphalt Overlay	tonne	343	90.00	$30,870
Contingency	%	10%		$3,087
				$34,000

Leduc County - Roadway Management System

Cost Estimates

Roadway Mainetance Capital Projects

9 Street Service Road from 17 to 18 Avenue Length - 260

Item	Unit	Quantity	Unit Price	Total
Asphalt Overlay	tonne	424	90.00	$38,160
Contingency	%	10%		$3,816
				$42,000

616X from Rge 12 to 21 Length - 9,000

Item	Unit	Quantity	Unit Price	Total
Asphalt Overlay	tonne	14,808	90.00	$1,332,720
Contingency	%	10%		$133,272
				$1,466,000

Clover Lawn Main Road from Twp 482 to 490 Length - 6,400

Item	Unit	Quantity	Unit Price	Total
Asphalt Overlay	tonne	10,525	90.00	$947,250
Contingency	%	10%		$94,725
				$1,042,000

Clover Lawn Main Road from Twp 490 to 494 Length - 6,400

Item	Unit	Quantity	Unit Price	Total
Asphalt Overlay	tonne	10,525	90.00	$947,250
Contingency	%	10%		$94,725
				$1,042,000

Leduc County - Roadway Management System

Cost Estimates

Roadway Mainetance Capital Projects

Glen Park Main Road from Rge 242 to 250 Length - 6,400

Item	Unit	Quantity	Unit Price	Total
Asphalt Overlay	tonne	10,525	90.00	$947,250
Contingency	%	10%		$94,725
				$1,042,000

Glen Park Main Road from Rge 280 to 12 Length - 6,400

Item	Unit	Quantity	Unit Price	Total
Asphalt Overlay	tonne	10,525	90.00	$947,250
Contingency	%	10%		$94,725
				$1,042,000

Glen Park Main Road from Rge 270 to 280 Length - 9,600

Item	Unit	Quantity	Unit Price	Total
Asphalt Overlay	tonne	15,788	90.00	$1,420,920
Contingency	%	10%		$142,092
				$1,563,000

Glen Park Main Road from Rge 12 to 22 Length - 9,600

Item	Unit	Quantity	Unit Price	Total
Asphalt Overlay	tonne	15,788	90.00	$1,420,920
Contingency	%	10%		$142,092
				$1,563,000

Leduc County - Roadway Management System

Cost Estimates

Roadway Mainetance Capital Projects

West Devon Main Road from Rge 263 to 272 Length - 8,000

Item	Unit	Quantity	Unit Price	Total
Asphalt Overlay	tonne	13,152	90.00	$1,183,680
Contingency	%	10%		$118,368
				$1,302,000

West Devon Main Road from Rge 272 to 275 Length - 4,800

Item	Unit	Quantity	Unit Price	Total
Asphalt Overlay	tonne	7,889	90.00	$710,010
Contingency	%	10%		$71,001
				$781,000

St. Francis Main Road from Rge 32 to 40 Length - 6,400

Item	Unit	Quantity	Unit Price	Total
Asphalt Overlay	tonne	10,525	90.00	$947,250
Contingency	%	10%		$94,725
				$1,042,000

St. Francis Main Road from Rge 40 to 45 Length - 8,000

Item	Unit	Quantity	Unit Price	Total
Asphalt Overlay	tonne	13,162	90.00	$1,184,580
Contingency	%	10%		$118,458
				$1,303,000

Leduc County - Roadway Management System

Cost Estimates

Roadway Mainetance Capital Projects

Rabbit Hill Road from Twp 504 to 510 Length - 3,200

Item	Unit	Quantity	Unit Price	Total
Asphalt Overlay	tonne	5,263	90.00	$473,670
Contingency	%	10%		$47,367
				$521,000

14 Avenue from 10 to 11 Street Length - 460

Item	Unit	Quantity	Unit Price	Total
Asphalt Overlay	tonne	758	90.00	$68,220
Contingency	%	10%		$6,822
				$75,000

West Devon Main Road from Twp 500 to 502 Length - 6,400

Item	Unit	Quantity	Unit Price	Total
Asphalt Overlay	tonne	10,606	90.00	$954,540
Contingency	%	10%		$95,454
				$1,050,000

5 Street from 10 to 12 Avenue Length - 440

Item	Unit	Quantity	Unit Price	Total
Asphalt Overlay	tonne	657	90.00	$59,130
Contingency	%	10%		$5,913
				$65,000

Leduc County - Roadway Management System

Cost Estimates

Roadway Mainetance Capital Projects

5 Street from 23A to 25 Avenue Length - 800

Item	Unit	Quantity	Unit Price	Total
Asphalt Overlay	tonne	1,313	90.00	$118,170
Contingency	%	10%		$11,817
				$130,000

10 Street from S. of 14 to 15 Avenue Length - 450

Item	Unit	Quantity	Unit Price	Total
Asphalt Overlay	tonne	727	90.00	$65,430
Contingency	%	10%		$6,543
				$72,000

11 Street from 14 to 15 Avenue Length - 220

Item	Unit	Quantity	Unit Price	Total
Asphalt Overlay	tonne	364	90.00	$32,760
Contingency	%	10%		$3,276
				$36,000

Airport Road from Rge 231 to 242 Length - 11,200

Item	Unit	Quantity	Unit Price	Total
Asphalt Overlay	tonne	18,424	90.00	$1,658,160
Contingency	%	10%		$165,816
				$1,824,000