The City of Edmonton
41 Avenue SW Concept Planning Study
50 Street to 170 Street

volume one

report

January 2011

THE CITY OF Edmonton

Associated Engineering

Table of Contents

List of Tables

PAGE NO.

List of Figures

1 Introduction and Overview

1.1 BACKGROUND INFORMATION

41 Avenue SW is planned as an arterial roadway at the south limits of the City of Edmonton. The legal boundary between the City of Edmonton and Leduc County is located along the south limit of the present roadway right of way; therefore the current roadway is within the City of Edmonton's jurisdiction. However, because 41 Avenue SW is currently and will ultimately be accessed from lands both to the north and south, the City of Edmonton and Leduc County have partnered to develop a concept plan for the long-term roadway requirements.

41 Avenue SW currently exists with a rural cross-section with open ditch drainage and has relatively low traffic volumes. The existing roadway is currently bisected by the Queen Elizabeth II Highway – there is no access to or from 41 Avenue SW at the highway; therefore, the 41 Avenue SW corridor is split into two major segments. Major intersections occur along 41 Avenue SW at each Range Road, and there are several private accesses to agricultural and residential lands both to the north and south along the corridor.

Alberta Infrastructure and Transportation is currently developing a functional plan for an interchange at the Queen Elizabeth II Highway (Highway 2) and 41 Avenue SW. This proposed interchange will serve to fuse 41 Avenue SW into one continuous corridor, and will provide access to the Queen Elizabeth II Highway from 41 Avenue SW.

Associated Engineering was retained by the City of Edmonton and Leduc County to develop long-term concept plans for 41 Avenue SW between 50 Street and 184 Street. Associated Engineering was in contact with Alberta Transportation and their consultant throughout the study to ensure that the 41 Avenue SW plans accurately tied-in to the QEII interchange design. Additionally, in the summer of 2009, the City of Edmonton began a study for a freeway design of 170 Street, including an interchange at 41 Avenue. As the 41 Avenue SW study preceded the 170 Street interchange planning project, Associated Engineering has identified a future interchange to be determined by others at 170 Street.

1.1 STUDY AREA

The 41 Avenue SW Concept Plan corridor is about 14 kilometres long, spanning between 50 Street and 184 Street, and is bordered by a number of area structure plans and development concepts. The concept plans developed for the 41 Avenue SW corridor will assist the City of Edmonton and Leduc County in reviewing development plans near 41 Avenue SW and protecting the appropriate right-of-way for the ultimate roadway configuration.

1.2 STUDY PURPOSE AND SCOPE

The City of Edmonton and Leduc County have outlined that the 41 Avenue SW Concept Plan was commissioned to provide guidance to respond to development applications and access requests along the

study area. The concept plans will allow both Edmonton and Leduc County to protect the appropriate right-of-way and intersection spacing for the ultimate roadway configuration.

Long-term functional roadway plans, showing the horizontal and vertical layout of 41 Avenue SW have been developed through this study. The concept plans include:

- Centre line alignment elements
- Existing and proposed right-of-way dimensions
- Turn bay and taper lengths
- Corner and intersection radii at arterial and collector side streets
- Lane widths
- Sidewalks, multi-use trails, bus stops, street lighting, and other boulevard elements
- Design speeds
- Existing access locations

The 41 Avenue SW Concept Plan project also included:

- A comprehensive review of available approved and draft development plans near the study area
- A detailed site investigation to identify key issues and considerations
- A geotechnical desktop assessment
- An environmental review including identification of sensitive areas, habitats, and documented locations of rare and endangered species, as well as wetlands, watercourses, and noxious weeds screening
- A historical resources overview
- An overview of existing utilities and potential constraints
- A bridge assessment and upgrade/replacement strategy for the Whitemud Creek structure
- An access management strategy
- Cost estimates
- Public consultation including individual landowner meetings and a public open house in summer 2008

1.3 PROJECT TEAM

The 41 Avenue SW Concept Planning Study was a collaborative effort from a project team led by Associated Engineering.

Associated Engineering was the lead consultant and principal consultant contact for this project. Associated Engineering's primary responsibilities included plan development, traffic analysis, and public consultation, as well as developing the access management strategy, bridge review for the Whitemud Creek structure, and stormwater management concepts. **Bryan Petzold** was the project manager and one of the principal contacts at Associated Engineering. Bryan's role included quality control and assurance, stakeholder engagement, and liaison with the subconsultant team. **Shawn Benbow** was the deputy project manager and the other principal contact at Associated Engineering. Shawn's role included managing the internal Associated Engineering project team, stakeholder engagement, and leading the technical design team. **Ryan Batty** and **Steven Schmidt** are transportation engineers and provided planning and design activities throughout the project. **Jessica Peters** and **Elizabeth Flores** are design technologists and were responsible for the production of all drawings and figures for this project.

Armin A. Preiksaitis & Associates was the subconsultant for land use planning and stakeholder engagement support. **Armin Preiksaitis** was the principal contact and was responsible for providing land use advice. **Mary-Jane Laviolette** was responsible for stakeholder engagement support.

Thurber Engineering was the subconsultant responsible for the geotechnical review aspect of the 41 Avenue SW Concept Plan. **Don Proudfoot** was the principal contact and was responsible for overseeing the geotechnical desktop review of the study corridor.

Altamira was the subconsultant responsible for assessing the historical resources within the 41 Avenue SW corridor. **Bruce Ball** was the principal contact and was responsible for developing the historical resources overview.

EnviroMak Inc. was the subconsultant responsible for the environmental review of the 41 Avenue SW corridor. **Ray Makowecki** was the principal contact and was responsible for overseeing the environmental screening assessment.

1.4 PROJECT STEERING COMMITTEE

The project steering committee (PSC) consisted of several members of the City of Edmonton, Leduc County, and Alberta Infrastructure and Transportation.

Representatives from the City of Edmonton on the PSC include:
- **Brian Latte,** Director, Development and Capital Planning, Transportation Planning
- **Adam Laughlin,** Director, Facility and Capital Planning
- **Ahmad Shala**, Development and Capital Planning, Transportation Planning
- **Mohammed Imran**, Development and Capital Planning, Transportation Planning
- **Robin Cassavant,** Facility and Capital Planning
- **Natalie de Montarnal**, Facility and Capital Planning

Representatives from Leduc County on the PSC include:
- **Des Mryglod**, Engineering Manager
- **Rick Stuckenberg**, Planning Manager

The representative from Alberta Infrastructure and Transportation is **Emil Nelson** from Highway Planning and Design, Technical Standards Branch.

Over the course of the study, several guests attended the PSC meetings. These included:
- **Jody Hancock**, Transportation Planning, City of Edmonton
- **Ryan Betker**, Transportation Planning, City of Edmonton
- **Jason Meliefste**, Roadways Design, City of Edmonton
- **Peter Ohm**, Planning and Policy Services, City of Edmonton
- **Marica Clarke**, Planning and Policy Services, City of Edmonton
- **John Wilson,** Property Acquisitions, Corporate Properties, City of Edmonton

2 Project Evaluation

2.1 EXISTING CONDITIONS

2.1.1 Existing Land Use

The existing land along the 41 Avenue SW corridor consists mainly of private agricultural and residential areas. Whitemud Creek is located near the west end of the study area, and is an important environmental corridor.

2.1.2 Existing Traffic Volume

The existing 2 lanes along 41 Avenue SW provide sufficient levels of service given the current roadway volumes. The area is mostly agricultural and therefore traffic volumes are minimal. However, there will be a large amount of development around the corridor in the future and the roadway will need to accommodate the increase in traffic volumes.

2.1.3 Existing Road Geometry

The existing 41 Avenue SW is a 2-lane undivided rural roadway with open drainage ditches.

2.1.4 Existing Operation

41 Avenue SW is currently unsignalized along the entire corridor with major intersections occurring at each range road. There are also a number of private accesses to agricultural and residential lands to the north and south along the corridor. The existing roadway is currently bisected by the Queen Elizabeth II Highway – there is no access to or from 41 Avenue SW at the highway; therefore, the 41 Avenue SW corridor is split into two major segments.

2.1.5 Existing Infrastructure Condition

The existing roadway along the 41 Avenue SW corridor has not been repaved or overlayed recently and consequently there are a number of issues with the pavement structure. However, because the study recommends a complete reconstruction of the existing roadway, the existing condition is irrelevant to the study.

2.1.6 Existing Pedestrian and Bicycle Circulation

Currently, there is very little pedestrian and bicycle circulation along 41 Avenue SW. The main reason for this is due to the fact that there is no pedestrian or bicycle accommodation throughout the corridor (i.e. sidewalks, multi-use trails, dedicated bike lanes).

2.1.7 Collision History

Collision history information for the 41 Avenue SW corridor is sparse because of the relatively low traffic volumes; however, due to the fact that the future development and traffic volume along the 41 Avenue corridor will be substantially different than what exists today, the current collision information is irrelevant to the study.

2.1.8 Site Investigation

The project team conducted detailed site investigations at the start-up phase of the project. During the site visits, issues and considerations within the study area were identified in order to address any major concerns early on in the study. The project team took site photographs representative of the existing corridor conditions. A number of these photos are included in **Appendix A**.

2.2 FUTURE CONDITIONS

2.2.1 Projected Land Use

Through the initial phase of the 41 Avenue SW Concept Planning Study a number of documents and other information were gathered to provide a background for developing the concept plan. This section serves to provide a comprehensive review of this collected data. Presented below are overviews, reviews, and discussions about each document. Where appropriate, excerpts have been presented from those documents when relevant to this study.

2.2.1.1 Southeast Area Structure Plan (Office Consolidation July 2007)

The Southeast Area Structure Plan (ASP) was originally adopted by the City of Edmonton in June 2005. The ASP is defined by 50 Street to the east, Anthony Henday Drive/Transportation Utility Corridor to the north, roughly the existing 66 Street to the west, and 41 Avenue SW to the south.

The Southeast ASP neighbourhoods are planned as generally low density residential with pockets of commercial and higher density residential development. Near 41 Avenue SW, the ASP proposes several collector road accesses to 50 Street and 66 Street, as well as one collector road access onto 41 Avenue SW about halfway between 50 Street and 66 Street. The ASP identifies 25 Avenue SW as an east-west arterial roadway approximately 1.6 kilometres north of 41 Avenue SW, and illustrates a realignment of the existing 66 Street south of 25 Avenue SW. Although the existing 66 Street is proposed to be realigned, an intersection is still illustrated on 41 Avenue SW at the existing 66 Street intersection.

At full development, the Southeast ASP indicates a total residential population of about 35,000 people (low density residential population of 23,000; medium/high density residential population of 12,000) in its total 664 hectares. Commercial areas are generally

to the north along Ellerslie Road with smaller commercial pockets near 41 Avenue SW; and municipal reserves, parks, and stormwater facilities are generally located within the middle of the plan area.

Figure 2-1 illustrates the land use concept and Figure 2-2 illustrates the transportation network concept presented in the Southeast Area Structure Plan.

Figure 2-1: Southeast ASP Land Use Concept

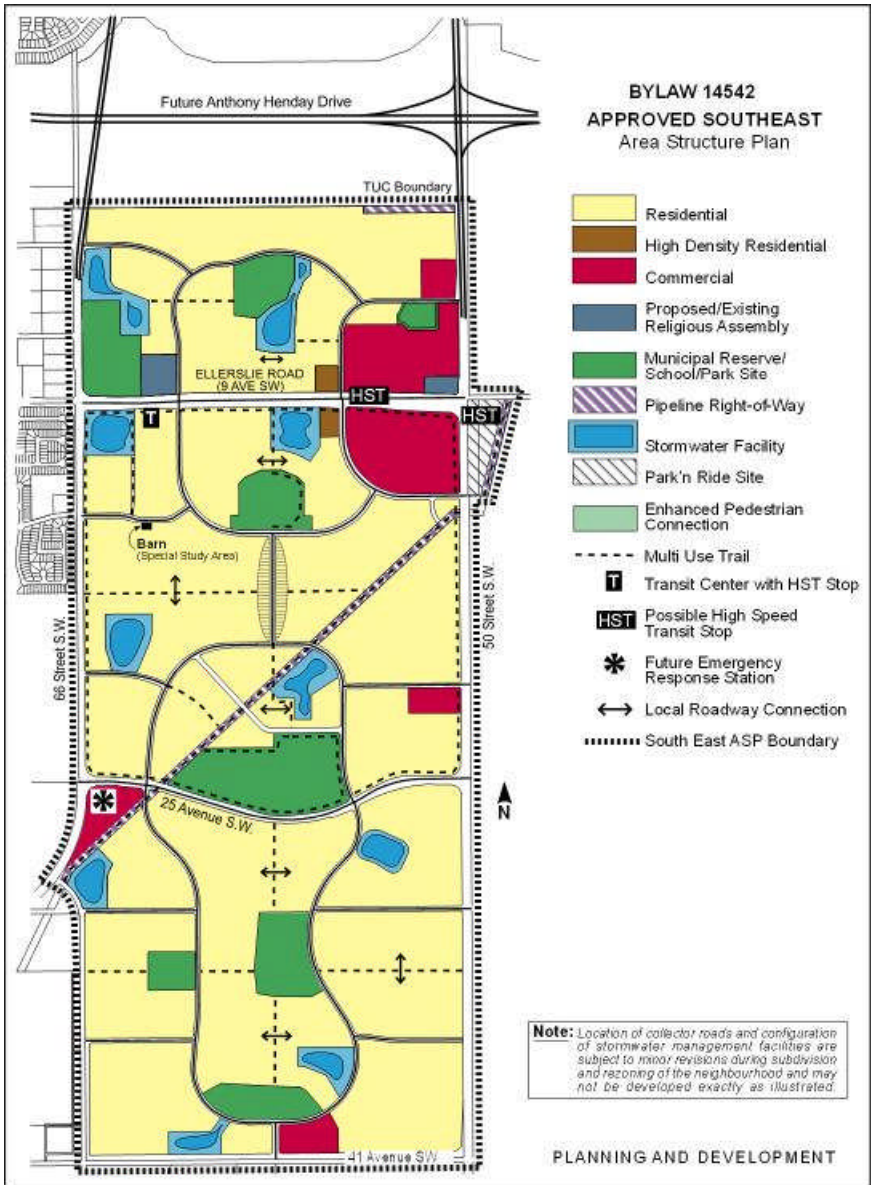
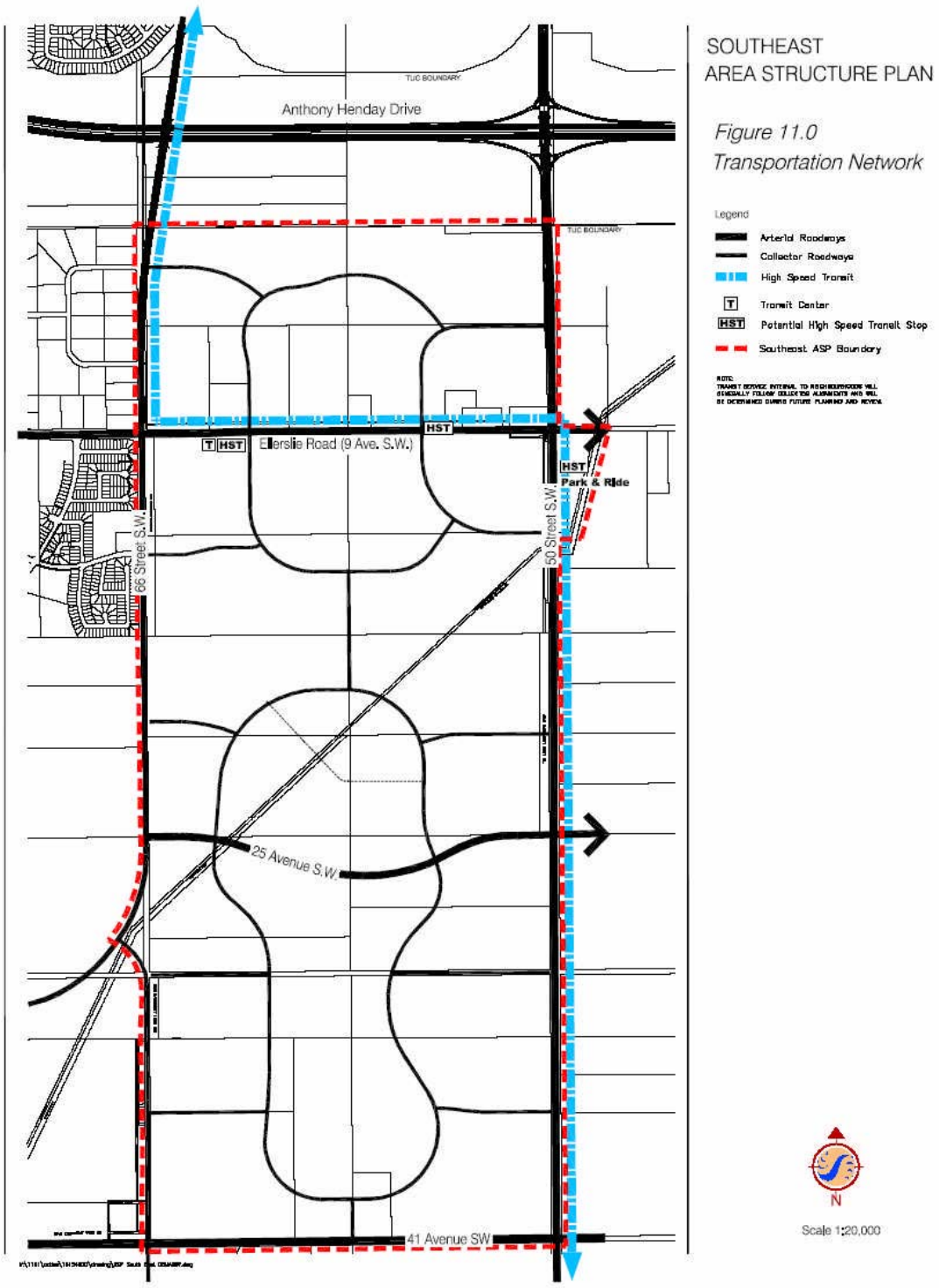


Figure 2-2: Southeast ASP Transportation Network Concept



2.2.1.2 Ellerslie Area Structure Plan

The Ellerslie ASP was originally adopted by the City of Edmonton in January 1999. The ASP is defined by 66 Street to the east, Anthony Henday Drive to the north, the Queen Elizabeth II Highway (QEII; Calgary Trail/Gateway Boulevard) to the west, and 41 Avenue SW to the south.

The Ellerslie neighbourhoods are planned as generally low density residential developments with pockets of commercial and higher density development. The west portion of the Ellerslie ASP, from east of the future Parsons Road/91 Street to the QEII, is planned for industrial development. The ASP illustrates three major accesses to 41 Avenue SW – the existing 66 Street, the existing 91 Street (future 66 Street), and the existing 101 Street (future Parsons Road/91 Street). The ASP notes, however, that the existing 66 Street may not ultimately connect to 41 Avenue. No collector roadways or other accesses are proposed in the Ellerslie ASP.

At full development, the Ellerslie ASP indicates a total residential population of about 39,000 people (low density residential population of 28,000 people; medium/high density population of 11,000 people) in its total 1450 hectares, and 366 hectares of industrial development. Commercial areas are generally along Ellerslie Road west of 91 Street, though small commercial development pockets are scattered throughout the ASP area. Municipal reserves and stormwater facilities are generally scattered throughout the ASP area.

Figure 2-3 illustrates the land use concept and illustrates the transportation network concept presented in the Southeast Area Structure Plan.

Figure 2-3: Ellerslie ASP Land Use Concept

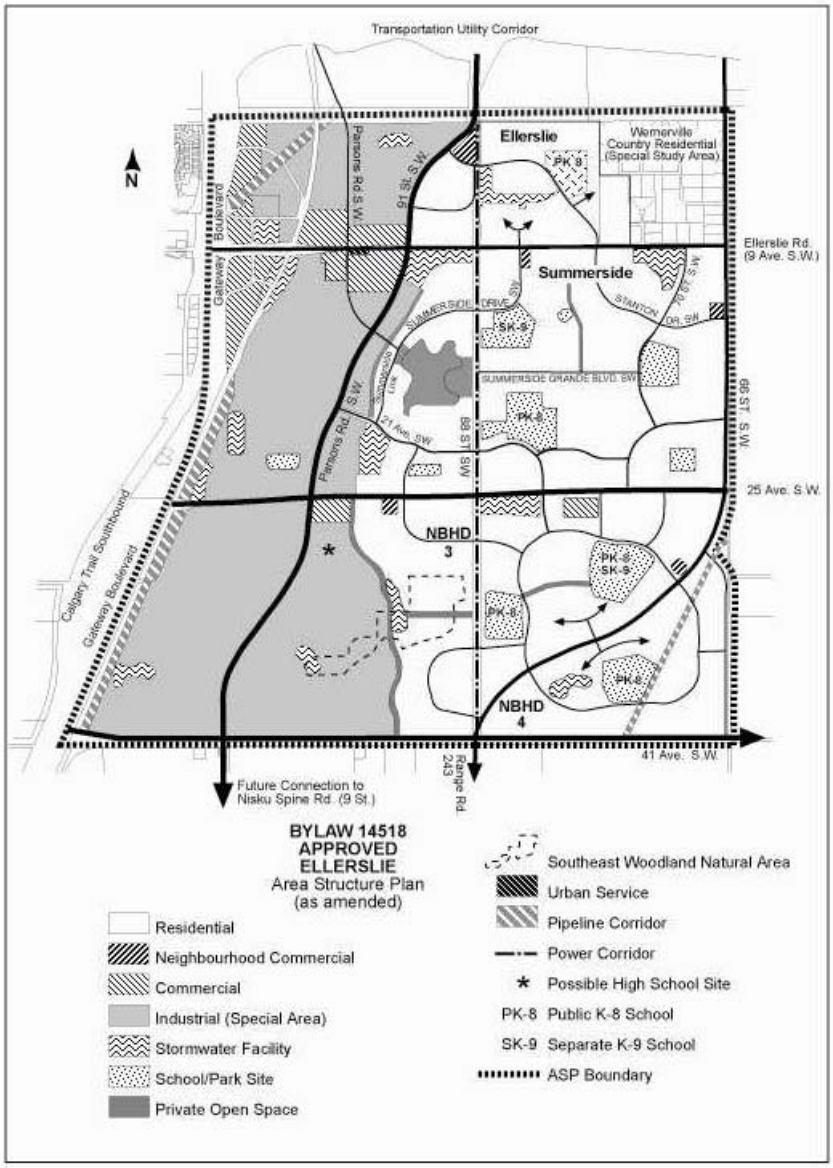
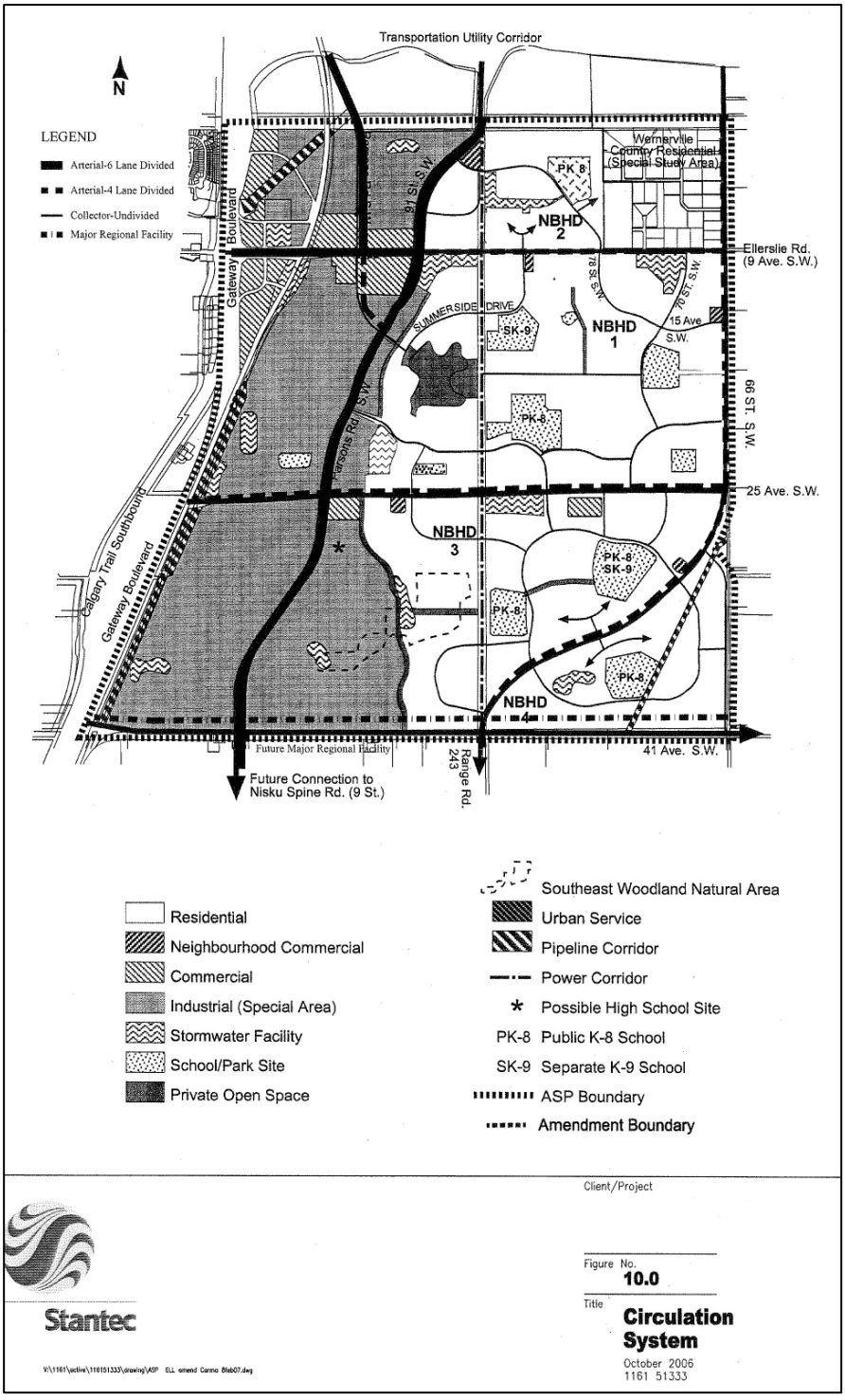


Figure 2-4: Ellerslie ASP Transportation Network Concept



2.2.1.3 Heritage Valley Servicing Concept Design Brief

The Heritage Valley Servicing Concept Design Brief (SCDB) was originally adopted by the City of Edmonton in April 2001. The SCDB area is defined by the QEII (Calgary Trail/Gateway Boulevard) to the east, Anthony Henday Drive and the Blackmud Creek to the north, Whitemud Creek to the west, and 41 Avenue SW to the south.

The Heritage Valley neighbourhoods are planned as a mix of low and medium density residential development. Approximately 200 hectares in the middle of the SCDB area are currently controlled by the University of Alberta; this area has been marked as a special study area. A mixed-use town centre development has been planned next to a potential post-secondary district campus towards the south of the study area, and a business employment area is planned between Blackmud Creek and the QEII highway. The ASP illustrates three major accesses to 41 Avenue – at the existing 127 Street, the existing 141 Street, and the existing 156 Street. No collector roadways or other accesses are indicated. The SCDB indicates that 41 Avenue will be developed as a limited access expressway, and therefore no direct access will be permitted.

The Heritage Valley SCDB proposes two development scenarios – a lower density concept and a higher density concept – in its total 2142 hectares. The two concept scenarios indicate a total population within the Heritage Valley area of between 63,000 and 78,000 people (low density population of between 41,000 and 47,000 people; high density population of between 22,000 and 40,000 people). Commercial areas are centred around 111 Street at Ellerslie Road and 111 Street at 25 Avenue SW (the mixed-use town centre). Some small community commercial developments are scattered throughout the SCBD area. About 100 hectares are set aside for business employment/industrial land uses immediately adjacent to the QEII highway. Municipal reserves and stormwater facilities are scattered throughout the study area, however there are two significant municipal reserves/natural areas along both Whitemud Creek and Blackmud Creek.

Figure 2-5 illustrates the land use concept and illustrates the transportation network concept presented in the Heritage Valley Servicing Concept Design Brief.

The Heritage Valley Servicing Concept Design Brief is an overview plan that outlines several individual neighbourhoods. Local Neighbourhood Area Structure Plans (NASPs) have since been developed for a number of the Heritage Valley neighbourhoods. Summaries of these NASPs are included in the following subsections.

Figure 2-5: Heritage Valley SCDB Land Use Concept

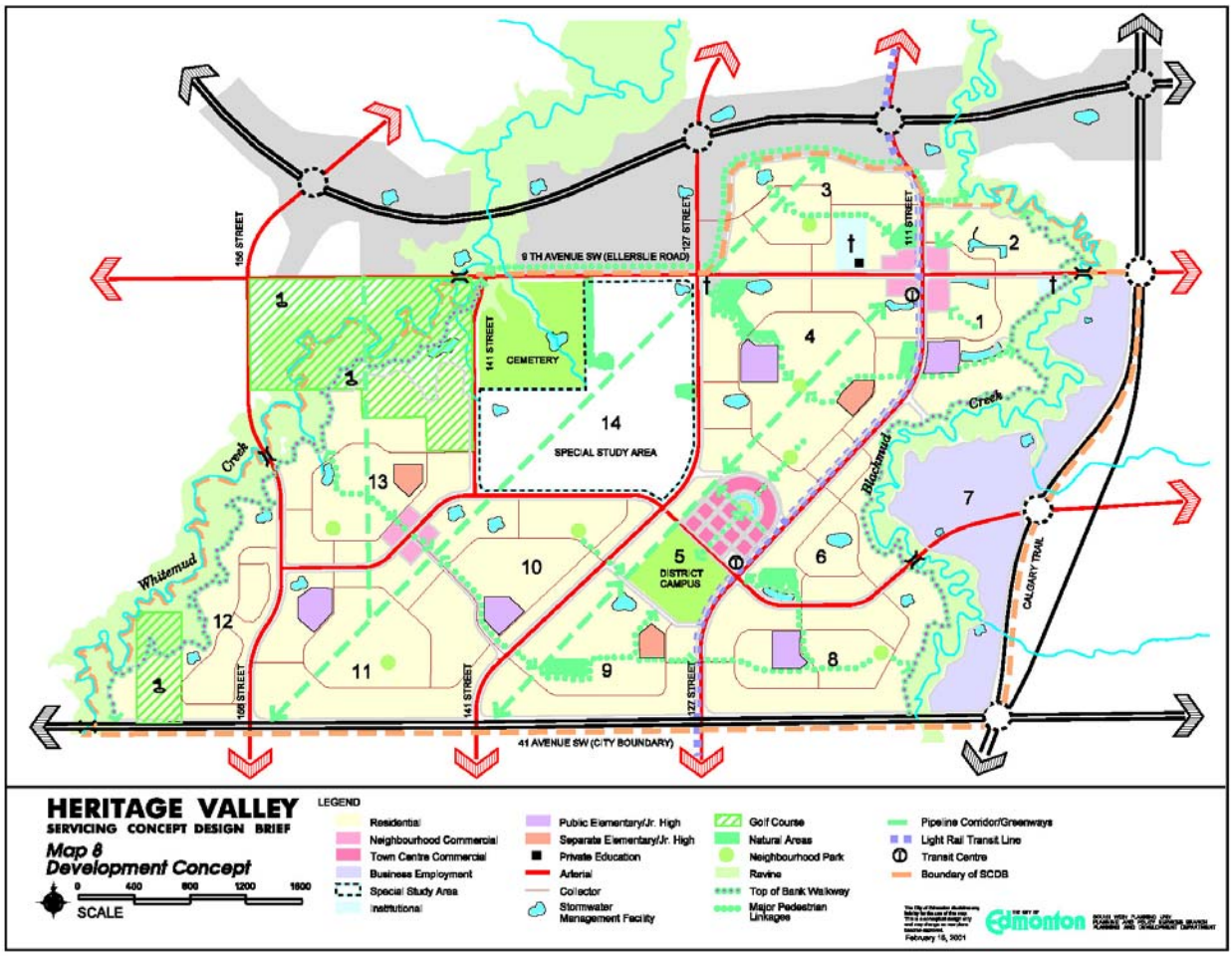
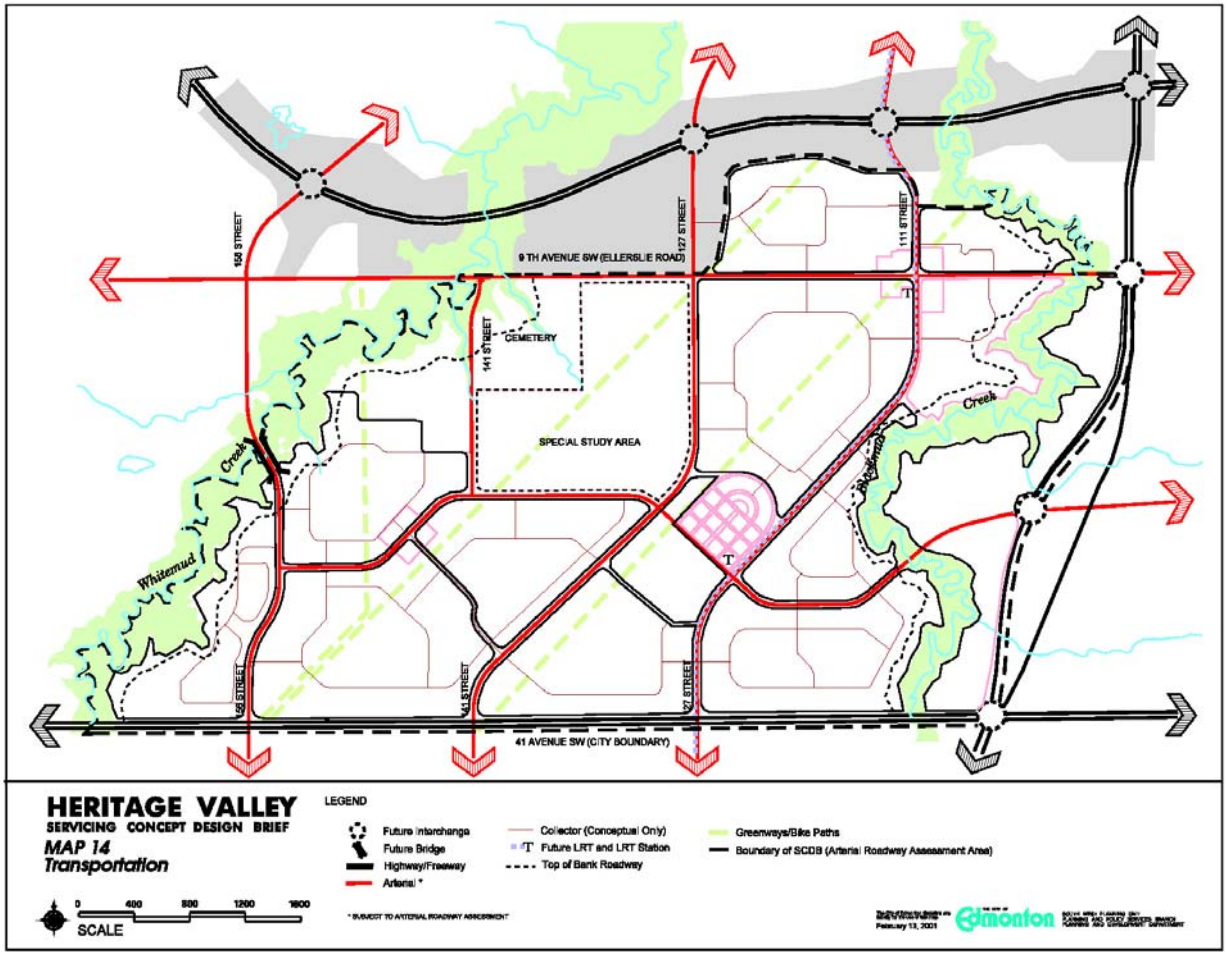


Figure 2-6: Heritage Valley SCDB Transportation Network Concept



2.2.1.4 Allard Neighbourhood Area Structure Plan

The Allard Neighbourhood Area Structure Plan (NASP) was adopted by the City of Edmonton in May 2007. The NASP is contained within the Heritage Valley SCDB area, and is identified as neighbourhood 8 in the SCDB. The Allard NASP is bound by Blackmud Creek to the east, 25 Avenue SW to the north, the existing 127 Street to the west, and 41 Avenue SW to the south.

The Allard neighbourhood is generally low density residential development with some higher density residential and commercial development near the arterial roadways. The total area of the Allard NASP is about 164 hectares, and is planned to contain about 7600 people (low density residential population of 4500; medium/high density residential population of 3100).

The Allard NASP notes that 41 Avenue SW 'is anticipated to be upgraded to a limited access Major Arterial status to ensure provision of a major east-west corridor.' However, the NASP illustrates two collector road accesses to 41 Avenue SW between 127 Street at Blackmud Creek (in addition to the 127 Street connection). The NASP also illustrates three other collector road accesses – two on 25 Avenue SW and one on the future James Mowatt Trail.

Figure 2-7 illustrates the land use concept and Figure 2-8 illustrates the transportation network concept proposed in the Allard NASP.

Figure 2-7: Allard NASP Development Concept

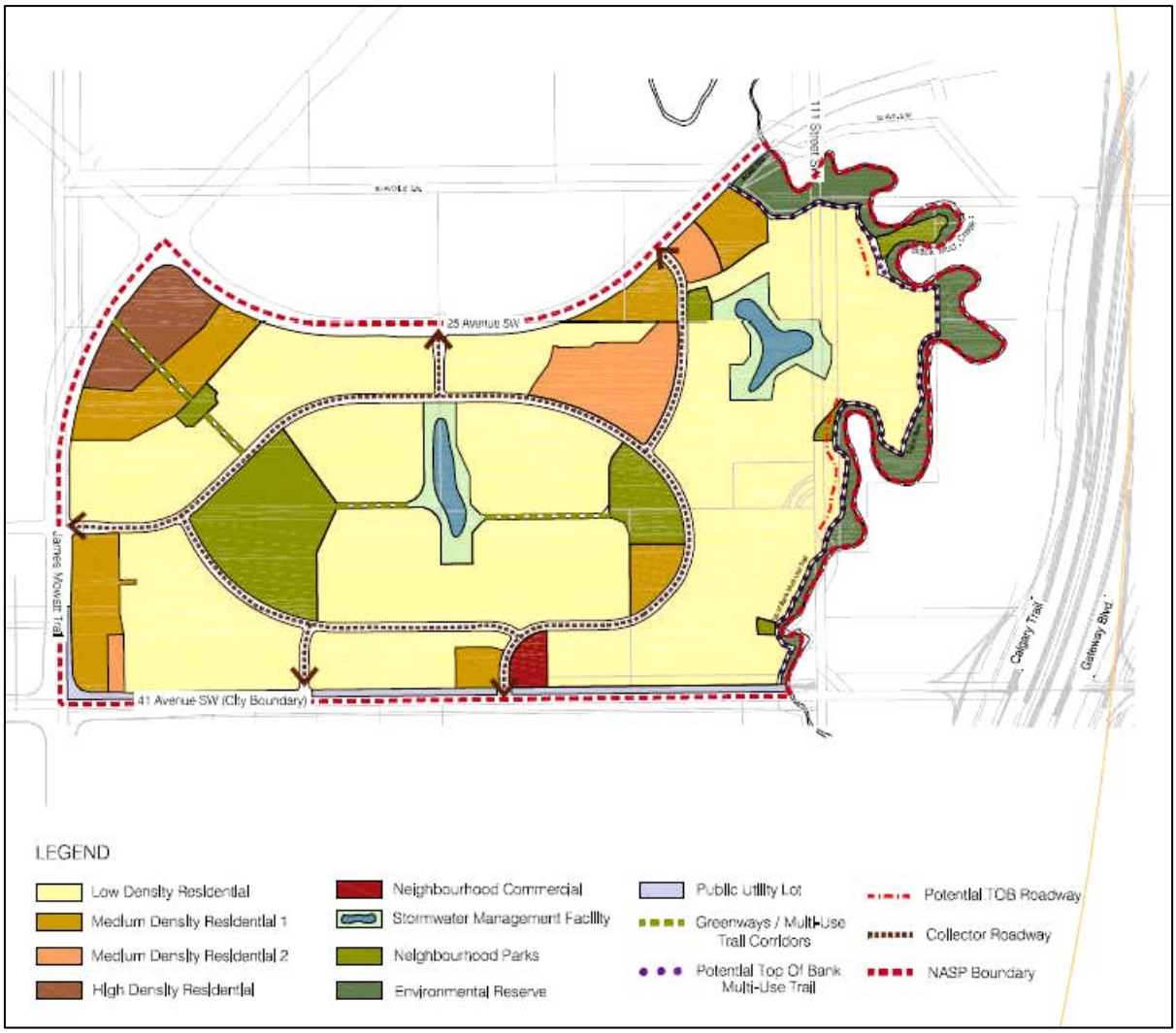
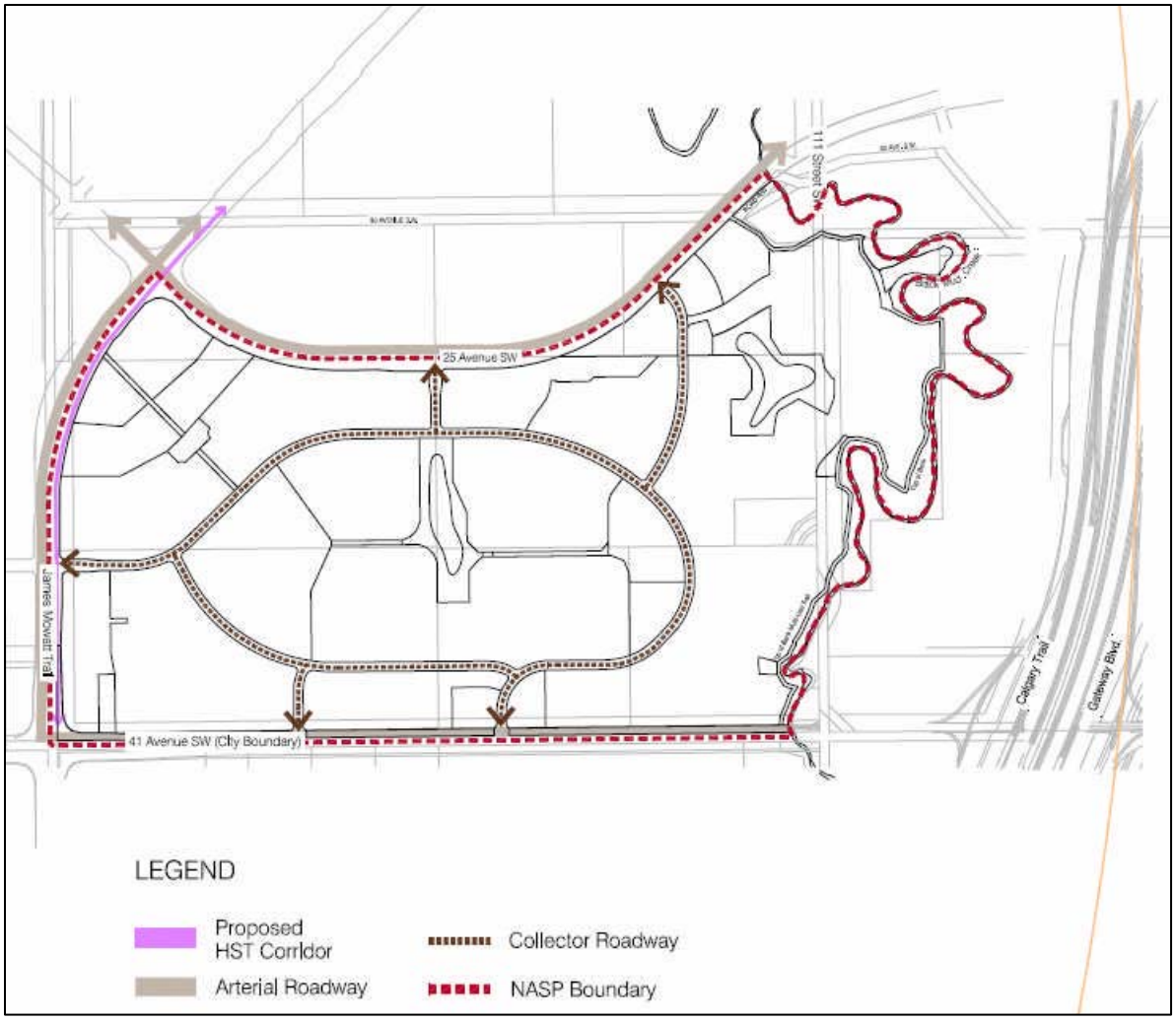


Figure 2-8: Allard NASP Transportation Network Concept



2.2.1.5 Chappelle Neighbourhood Area Structure Plan

The Chappelle NASP has not yet been adopted by the City of Edmonton, but has been presented to council in February 2008. The NASP is identified as Heritage Valley SCDB's neighbourhood 10; however, the Chappelle NASP includes areas identified in the Heritage Valley SCDB as neighbourhood 10, 11, 12 and part of 13. The NASP is defined by the proposed 127 Street realignment to the east, the future 25 Avenue SW to the north, Whitemud Creek to the west, and 41 Avenue SW to the south.

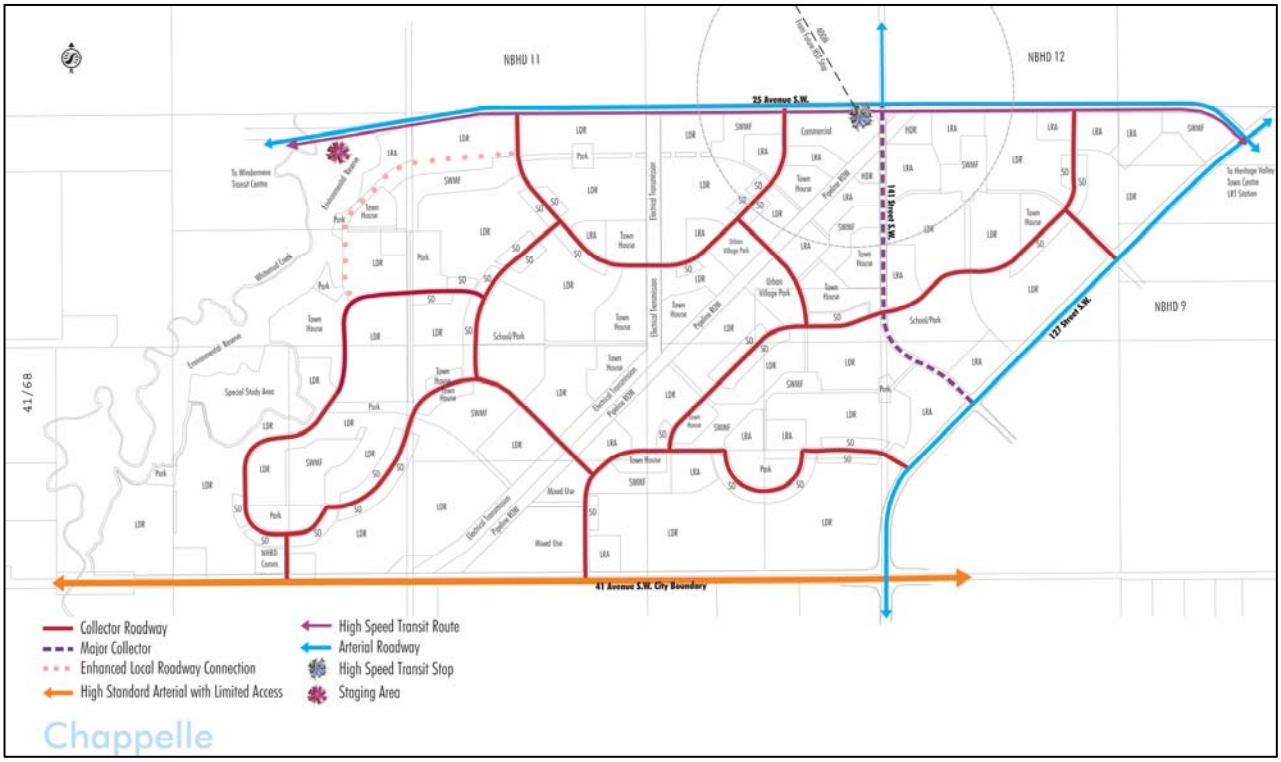
The Chappelle neighbourhood is a mix of low and higher density residential developments with a few small commercial and mixed-use development areas. The total area of the Chappelle NASP is about 475 hectares and is planned to contain about 20,000 people (low density residential population of 10,000; medium/high density residential population of 10,000).

The Chappelle NASP notes that 41 Avenue SW will be upgraded to a limited access high standard arterial, and only proposes two collector road accesses in addition to the arterial intersection at 127 Street. The proposed intersections are spaced greater than 800 metres apart along 41 Avenue SW. The NASP also illustrates several other collector road accesses to other arterials – three on the existing 127 Street and three on 25 Avenue SW.

Figure 2-9 illustrates the land use concept and Figure 2-10 illustrates the transportation network concept proposed in the Chappelle NASP.

Figure 2-9: Chappelle NASP Land Use Concept

Figure 2-10: Chappelle NASP Transportation Network Concept



2.2.1.6 Windermere Area Structure Plan

The Windermere ASP was adopted by the City of Edmonton in April 2004. The ASP is defined by Whitemud Creek to the east, Anthony Henday Drive to the north, the North Saskatchewan River to the west, and 41 Avenue SW to the south.

The Windermere neighbourhoods are planned to be about two thirds low density residential with some higher density residential units. Commercial and institutional developments are generally planned near Anthony Henday Drive and along 170 Street north of 41 Avenue SW.

184 Street is illustrated with an alignment about 600 metres east of its existing location near 41 Avenue SW. The Windermere ASP also notes that 41 Avenue SW will 'ultimately function as a major arterial roadway with access generally limited to major road intersections (i.e. 170 Street and 184 Street).' However, the transportation network concept illustrates access to 41 Avenue at 170 Street, 184 Street, and a potential collector roadway between the two major streets – at a spacing of about 400 metres. The Windermere ASP also notes that 170 Street will ultimately function as an expressway; however, the transportation network concept also shows multiple accesses to 170 Street through the ASP area.

At full development, the Windermere ASP indicates a total residential population of about 63,000 people (low density residential population of 38,000 people; medium/high density population of 25,000 people) in its total 1800 hectares, with about 180 hectares of commercial development. Commercial areas are generally located along 170 Street just north of 41 Avenue SW, and near Anthony Henday Drive.

Figure 2-11 illustrates the land use concept and Figure 2-12 illustrates the transportation network concept presented in the Windermere Area Structure Plan.

Figure 2-11: Windermere ASP Development Concept

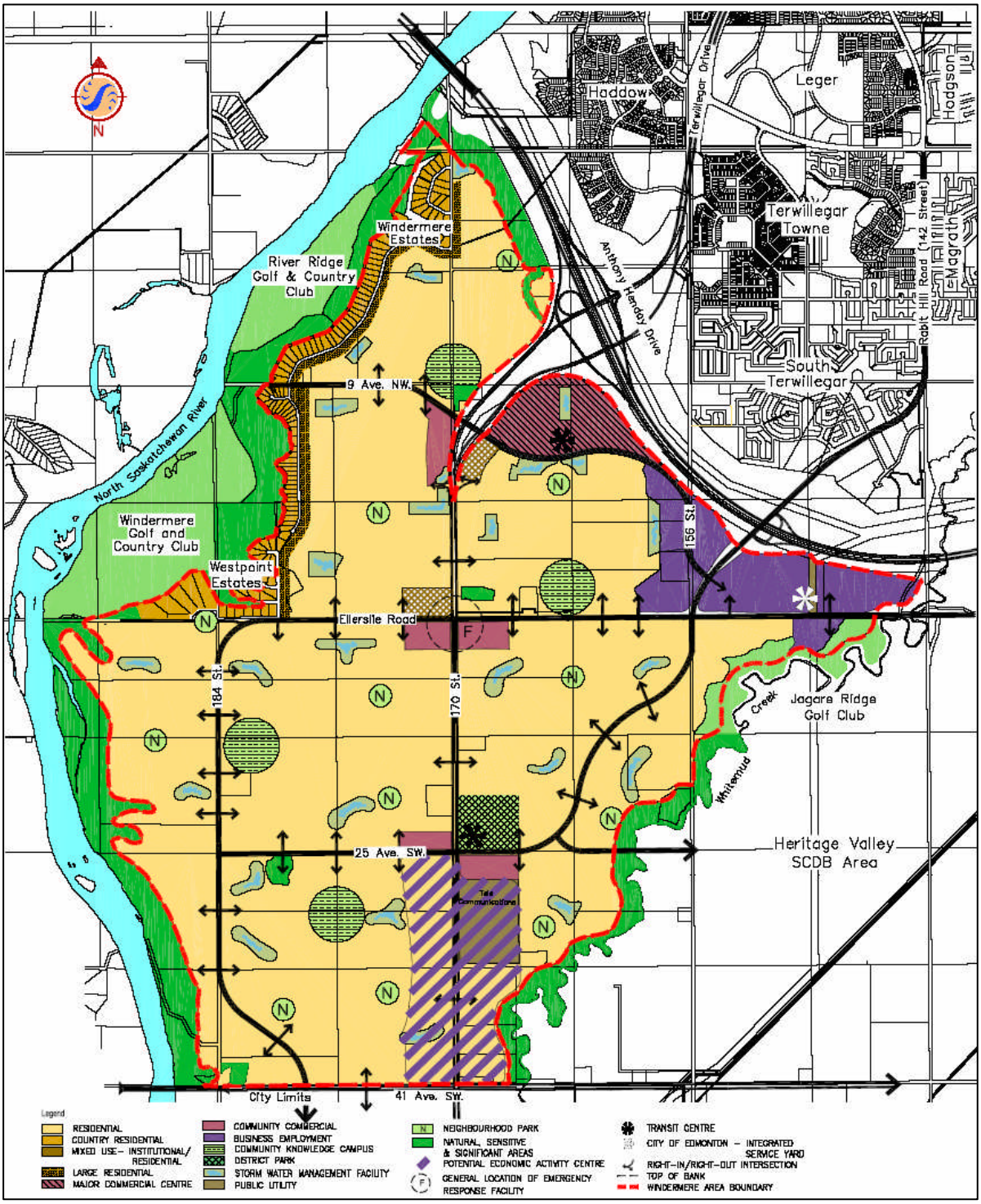
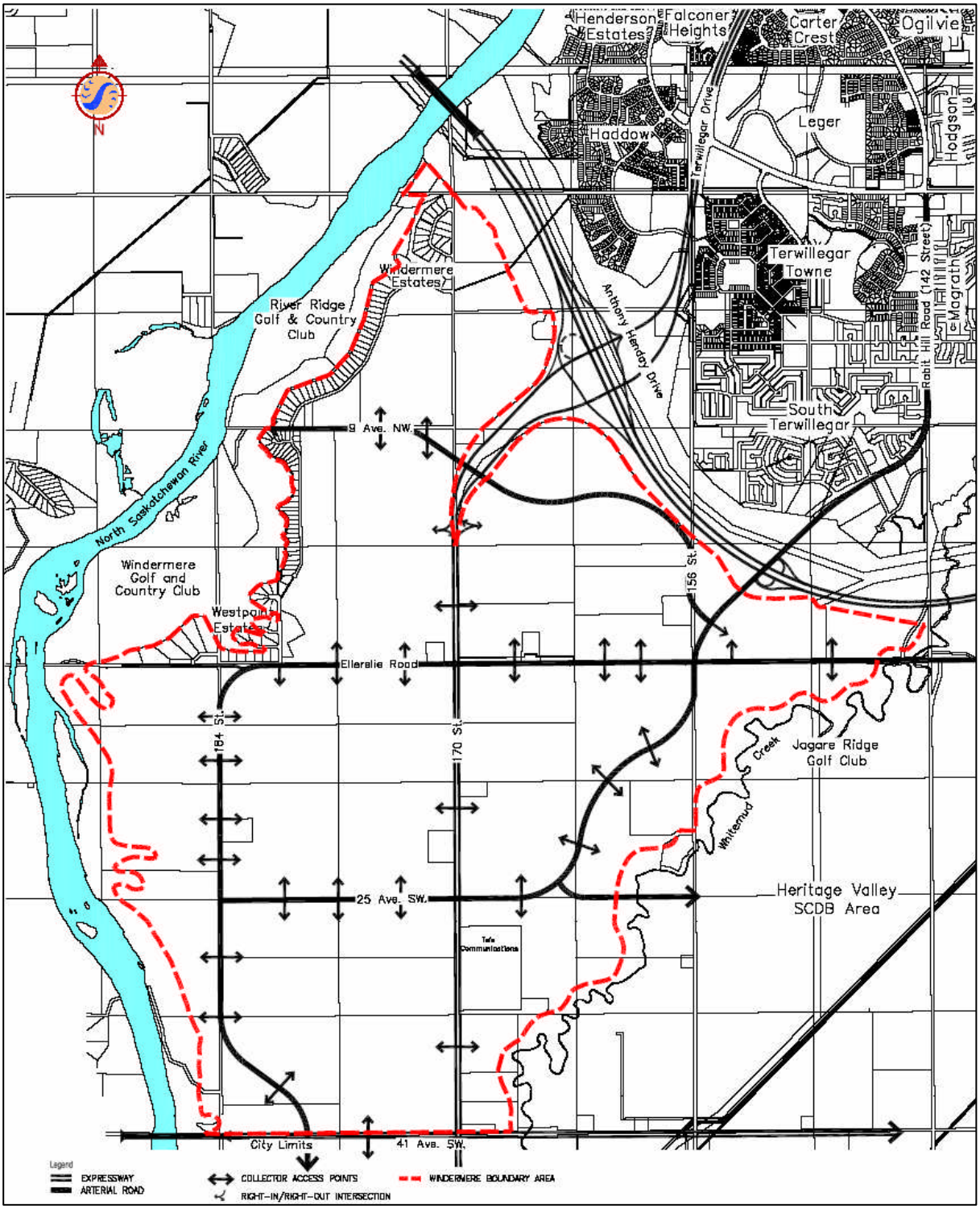


Figure 2-12: Windermere ASP Transportation Network Concept



2.2.1.7 North Major Area Structure Plan

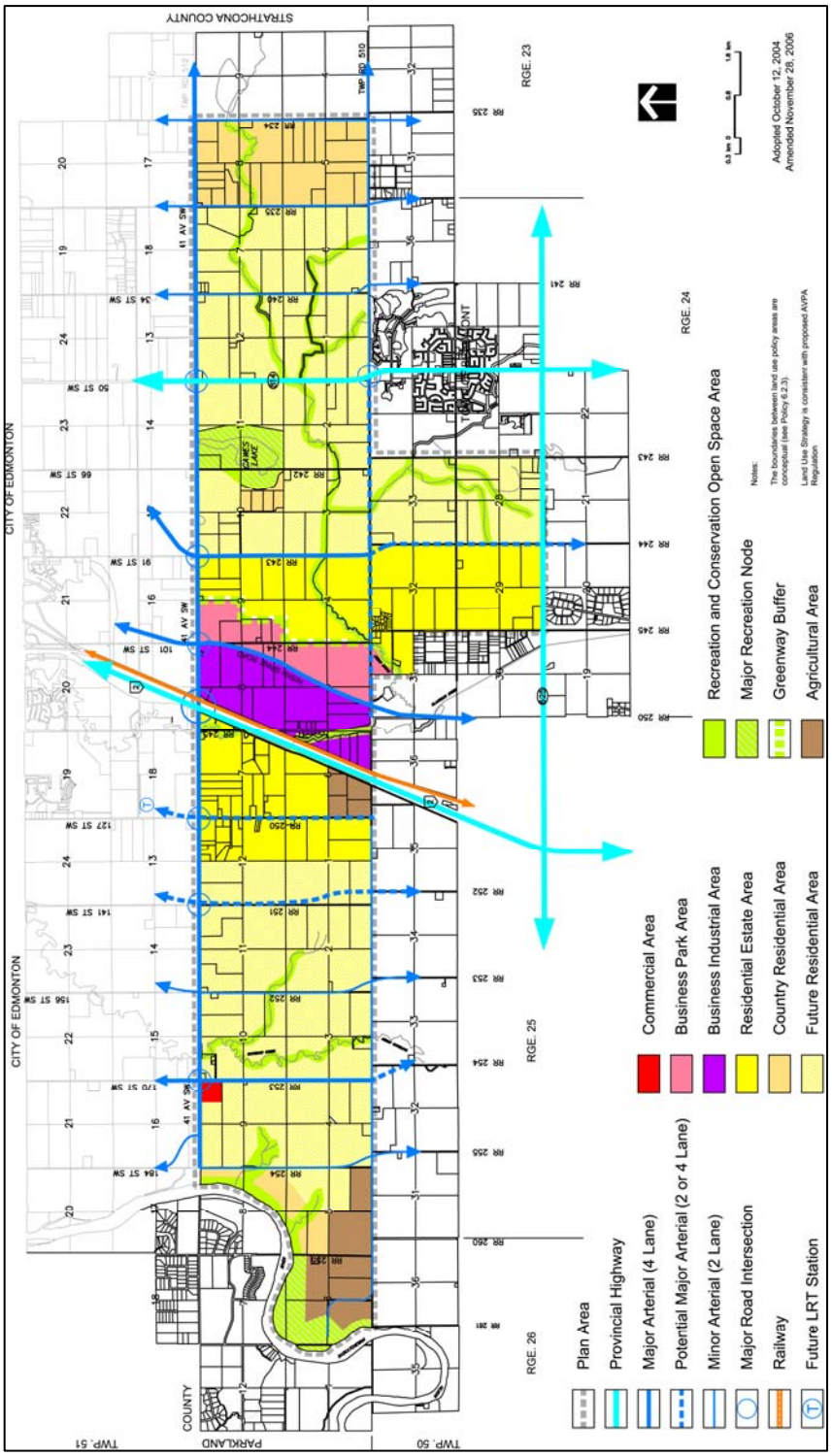
The North Major Area Structure Plan was originally adopted by Leduc County in October 2004. The ASP is defined by Range Road 235 (the City of Edmonton's Meridian Street) to the east, 41 Avenue SW to the north, the North Saskatchewan River to the west, and generally Township Road 510 to the south (except for the portion between Range Road 243 and Range Road 245 where the south boundary is Highway 625).

The North Major ASP lands are generally planned for low density country residential estate development with some industrial development just east of the Queen Elizabeth II highway. Country residential estate development is defined in the North Major ASP to consist of a maximum development of 320 units per quarter section (4.94 units per hectare) The ASP identifies the Queen Elizabeth II highway and Highway 814 (50 Street) as major provincial highways; Range Road 243 (future 66 Street), the Nisku Spine Road, and Range Road 253 (170 Street) as major arterial roads; and the remaining existing range roads as minor arterial or potential major arterial roads.

Through project steering committee meetings and discussions with Leduc County planning staff, the Associated Engineering project team has been notified that the expected residential development in the North Major Area Structure Plan area may be significantly higher than proposed in the approved plan. For example, the East Vistas ASP (see Section 2.1.5.2), within the North Major ASP and currently under development, proposes significantly higher development densities than are planned in the North Major ASP. Leduc County planning staff noted that they expect to see residential densities and population even higher than the East Vistas ASP development, especially as the development nears 41 Avenue SW. The Associated Engineering project team understands from these discussions that the development densities in Leduc County near 41 Avenue SW will be similar to those developments within the City of Edmonton near 41 Avenue SW.

Figure 2-13 illustrates both the land use concept and the transportation network concept presented in the Leduc County North Major Area Structure Plan.

Figure 2-13: North Major ASP Land Use and Transportation Network Concepts



2.2.1.8 Western Asset Management (WAM) Local Area Structure Plan

The WAM Industrial Park is located in Leduc County immediately adjacent to the south boundary of the City of Edmonton and within Leduc County's North Major Area Structure Plan. The Local Area Structure Plan is defined by 41 Avenue SW to the north, Queen Elizabeth II Highway to the west, and rural farmland to the east and south. The total amount of land in the LASP is approximately 316 hectares.

Recently, Canadian Pacific Railways announced the development of an intermodal yard east of the QEII Highway and north of 41 Avenue SW adjacent to the north boundary of the Leduc County North Major ASP Area. With the development of the intermodal yard, it was anticipated that industrial land uses in the area would increase. Because of this, the WAM LASP was prepared for the development of industrial businesses in an area very close to a key hub in the Edmonton region's transportation network.

The WAM LASP defines 41 Avenue SW as a roadway that will ultimately be part of the major regional transportation facility. The LASP also states that the primary access into the WAM Industrial Park is provided by the proposed Nisku Spine Road. No direct access to the area will be allowed from the QEII Highway.

Figure 2-14 illustrates the land use concept and Figure 2-15 illustrates the transportation network concept presented in the Western Asset Management Local Area Structure Plan.

Figure 2-14: WAM LASP Land Use Concept

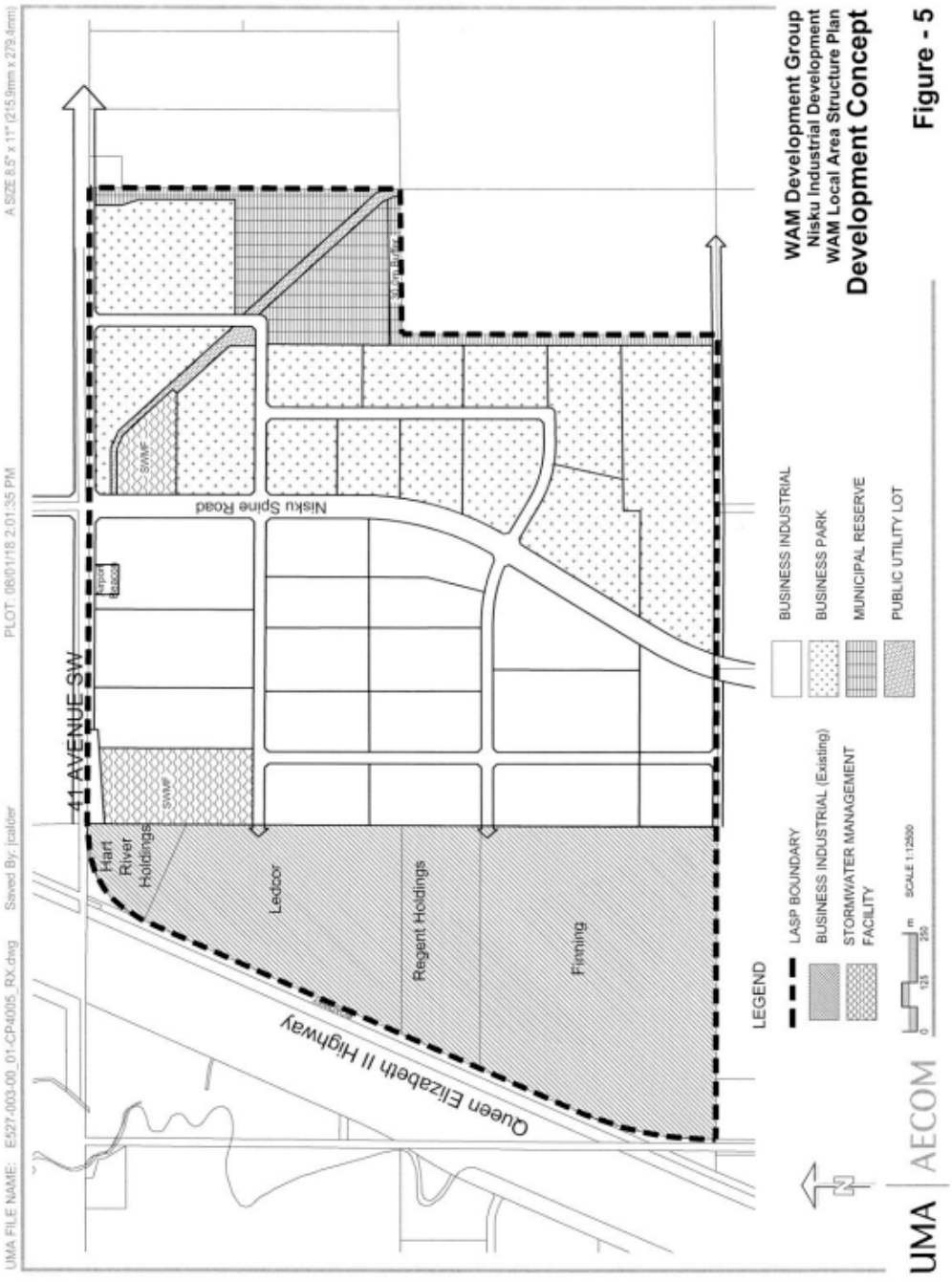
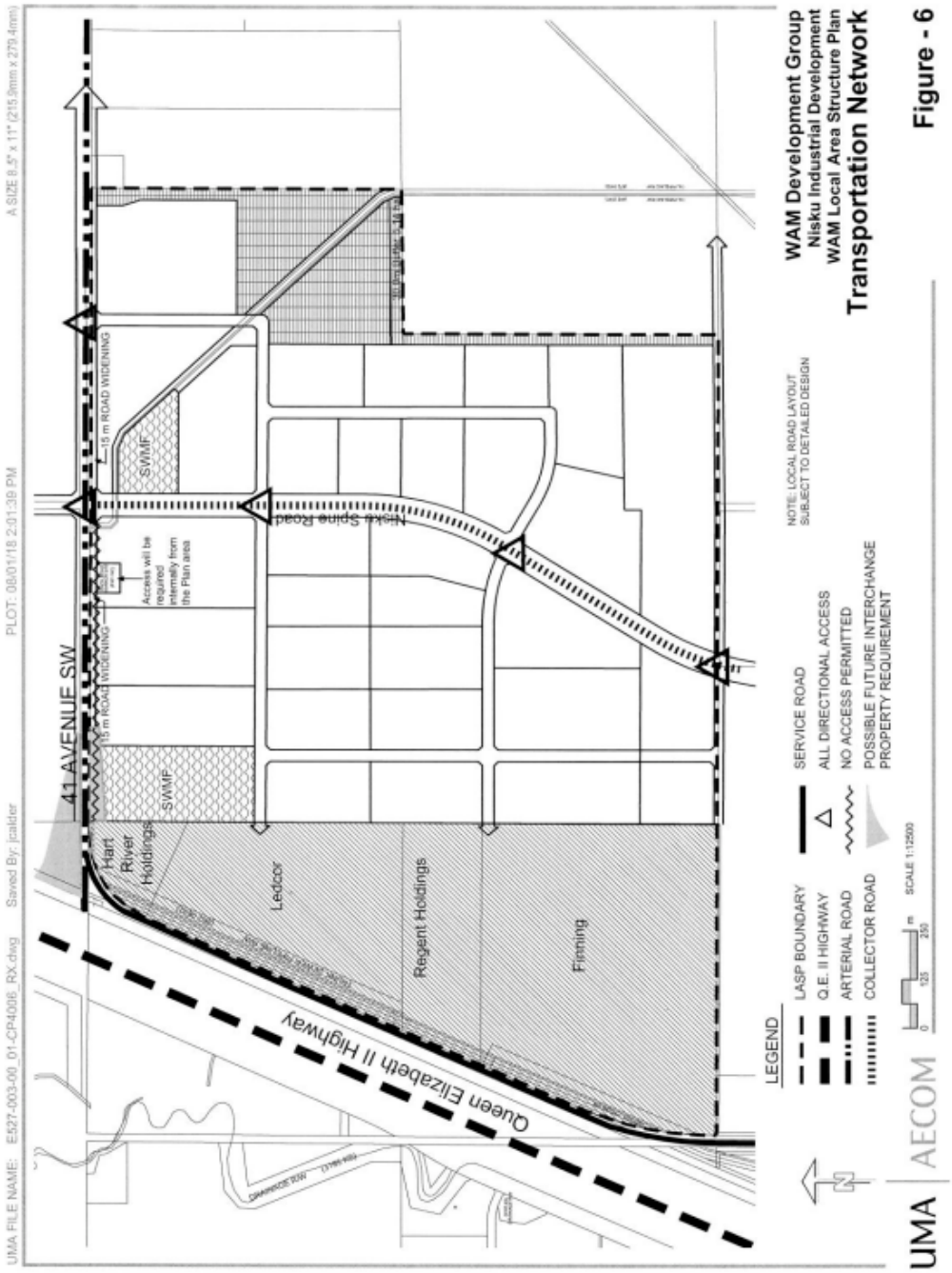


Figure 2-15: WAM LASP Transportation Network Concept



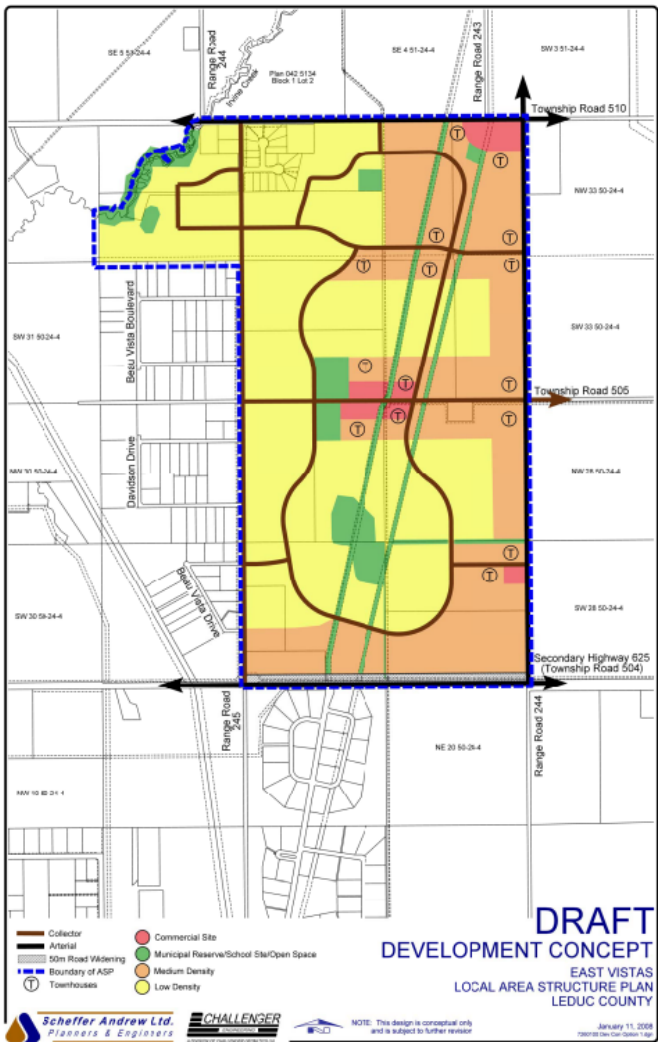
2.2.1.9 East Vistas Areas Structure Plan

The East Vistas Area Structure Plan is defined by Range Road 244 to the east, Township Road 510 to the north, Range Road 245 to the west, and Township Road 504 to the south.

The East Vistas ASP lands are generally planned for low and medium density development with some municipal reserve / open space development and commercial sites scattered throughout the area. The ASP identifies a collector roadway network within the area and access into the area via Range Road 244, Range Road 245 and Township Road 504, 505, and 510.

Figure 2-16 displays the land use concept and transportation network concept for the East Vistas Area Structure Plan.

Figure 2-16: East Vistas ASP Land Use and Transportation Network Concepts



2.2.1.10 Heritage Valley Trail Concept Plan

The Heritage Valley Trail Concept Plan was being developed at the same time the 41 Avenue SW Concept Plan was being developed. Heritage Valley Trail crosses 41 Avenue SW at the existing 141 Street location; the project team coordinated tie-in points with the developer's consultants to ensure a seamless tie-in point north of 41 Avenue SW.

2.2.1.11 Canadian Pacific Railway Intermodal Facility

Canadian Pacific Railways is developing an intermodal facility east of the Queen Elizabeth II Highway and north of 41 Avenue SW within the City of Edmonton. The proposed rail yard does not have direct access to 41 Avenue SW; all site traffic access 41 Avenue SW from Parsons Road

This Intermodal Facility will create a larger demand for industrial and business park land uses in the area.

2.2.1.12 Ellerslie Industrial

The Ellerslie Industrial area is defined in the Ellerslie Area Structure Plan as an industrial/commercial area bounded roughly by 41 Avenue SW to the south, Anthony Henday Drive to the north, and the Queen Elizabeth II highway to the west. The eastern boundary varies between the existing 91 Street and the future 91 Street/Parsons Road. Near 41 Avenue SW, the lands west of Parsons Road will be part of the Canadian Pacific Railway Intermodal Facility, identified previously. East of Parsons Road, the lands north of 41 Avenue within the Ellerslie Industrial area are expected to be developed as a future commercial/industrial business park.

2.2.1.13 Leduc County Municipal Development Plan

Leduc County Council adopted the Leduc County Municipal Development Plan in 1999. The purpose of this plan is to manage development land use and subdivisions to increase the present and future quality of life for the people of Leduc County. This plan is a basis for the land use within Leduc County, including all area structure plans and subdivisions. If there is any conflict with existing area structure or redevelopment plans, the specifications of the Leduc County Municipal Development Plan are to govern. The Municipal Development Plan is also required to follow the Edmonton/Devon Restricted Development Area Regulations of October 1974, and the Edmonton International Airport Vicinity Protection Area Regulation.

The Leduc County Municipal Development Plan includes the Edmonton Inter-municipal Fringe area, which refers to the area adjacent to the City of Edmonton boundaries. The plan regulates that any intensive development has the ability to grow and that the

development in the fringe area can be absorbed into the local areas' growth and be done in a cost effective manner. As described in the transportation section of the plan, the future planning is to be laid out in a compatible manner with existing road, rail and air transportation infrastructure.

2.2.1.14 Queen Elizabeth II Highway Functional Planning Study

Alberta Transportation has been developing plans for an interchange on the Queen Elizabeth II Highway (QEII, Highway 2) at 41 Avenue SW since before the 41 Avenue SW Concept Planning Study began in 2007. Several iterations of this interchange were provided to the Associated Engineering project team over the course of this study, including a diamond interchange with directional ramps, a simple diamond interchange, and a parclo-A variation. In addition, the first two interchange plans identified 41 Avenue to have a significant skew from its current alignment to accommodate a 90 degree crossing of the Queen Elizabeth II highway. The third iteration of the interchange significantly altered this skew so that 41 Avenue remained much closer to its existing alignment.

The partial cloverleaf interchange was identified by Alberta Transportation as the most up to date interchange plan. Often referred to as a parclo-A4 interchange, this interchange provides loop ramps from 41 Avenue eastbound to the QEII northbound and from 41 Avenue westbound to the QEII southbound. Other ramps are provided in all four quadrants to accommodate an all-moves interchange. This interchange configuration will require two 3-leg intersections – one on each side of the bridge carrying 41 Avenue over the QEII.

Accommodation for non-motorized transportation modes has also changed over various versions of this interchange plan. Although early drafts of the interchange plan did not accommodate for non-motorized users, an agreement between the 41 Avenue SW steering committee and Alberta Transportation's Interchange plan steering committee saw development of non-motorized user accommodation on a subsequent draft via a multi-use trail crossing the QEII interchange on the south side of 41 Avenue SW. Although the multi-use trail along 41 Avenue SW is planned for the north side of the corridor, Alberta Transportation placed a multi-use trail across the interchange on the south side of 41 Avenue due to safety issues. The 41 Avenue SW plans were adjusted to ensure a continuous trail connection along the corridor. In mid-2009, however, Alberta Transportation released an updated plan (the parclo-A4 version) that did not allow for any pedestrian accommodation across the interchange.

There is sufficient right-of-way along the north side of 41 Avenue to allow for a multi-use trail in the vicinity of the QEII interchange. As it is unlikely that an at-grade multi-use trail will be provided across the interchange, an option to continue the multi-use trail across the interchange could be to grade separate it from the QEII. This would eliminate the issue of a discontinuous trail along the corridor and would increase pedestrian safety substantially.

A potential trail crossing of the Queen Elizabeth II Highway could be accommodated via a separate pedestrian overpass constructed north of the 41 Avenue SW interchange. This would eliminate the need for trail users to cross at-grade any ramps or roadways in the vicinity of the QEII highway. Because the area around the QEII interchange was excluded from this study, further details of this potential pedestrian crossing have not been developed. However, there is sufficient right of way identified along the north side of 41 Avenue SW between Parsons Road and the Allard neighbourhood to accommodate a future multi-use trail should future plans be developed to complete the missing link between the east and west sides of the QEII highway. This potential crossing would have to be analyzed further in later stages of design.

2.2.1.15 Beaumont 50 Street Functional Plan

The 50 Street Functional Planning Study was created for the Town of Beaumont to address increasing demands for traffic accommodation throughout the area. In 2004 Alberta Transportation transferred the jurisdiction for the 6.4 km of 50 Street between 41 Avenue SW and Township Road 510 to the Town of Beaumont. The 50 Street Functional Plan study area includes this 6.4 km of roadway and the length of 50 Street within the Town of Beaumont's corporate limits. The existing route serves as means of connections between Wetaskiwin, Rollyview, Leduc, Beaumont, Nisku, and the residents in the area. Previous minor improvements include selective surface widening, addition of intersection controls, and curb replacements which have helped with the overall look of the town.

Average Annual Daily Traffic (AADT) to the north of Township Road 510 averages 14,000 vehicles. According to the Alberta Transportation's warrants system, this stretch of two-lane highway merits an upgrade.

The 50 Street Functional Plan recommends that upgrades be completed between the south limits and Town Center to widen the right-of-way and create a 4-lane undivided roadway. Between the Town Center and Township Road 510, the study recommends a 4-lane divided roadway with special considerations given for access to the commercial businesses on the west side of the roadway. While maintaining the small town setting, a solution was found that would increase the capacity of the road within the study area. The study proposed reduced roadway dimensions within the Town of Beaumont and the cross-section be limited to 2 lanes in each direction. This would consequently slow traffic and preserve the secure feel of a small town roadway while providing adequate traffic capacity. North of Township Road 510 a 4-lane cross-section is proposed that includes a wide median and turning lanes at major intersections. The Intersection with 41 Avenue SW is proposed to be 4 lanes (including left and right turning lanes) running north-south, spanning across a 67m wide right-of-way.

2.2.1.16 Beaumont 50 Street Upgrades

The Town of Beaumont hired an engineering consultant in 2009 to complete design and tender for upgrades to 50 Street between Township Road 510 and 41 Avenue SW. The project team has obtained the town's most recent updates to the 50 Street plans south of 41 Avenue to ensure that Associated Engineering's ultimate design ties in appropriately with Beaumont's long-term plans.

2.2.1.17 Capital Region Integrated Growth Management Plan Report on Core Infrastructure

Prepared for Alberta Transportation and adopted in November 2007, the Capital Region Integrated Growth Management Plan (CRIGMP) was developed with the purpose of identifying and providing a solution for the short and long term infrastructure requirements in the Edmonton region. The report includes the areas of Edmonton, Leduc County, Lamont County, Strathcona County, Sturgeon County, Parkland County, and 25 municipalities within these areas. Study recommendations were determined by using future population and employment forecasts provided by each municipality and comparing them to existing and proposed infrastructure. On-site interviews were conducted to determine the needs of each municipality in regards to the different types of infrastructure. Additional information was gathered in some cases from companies to obtain future growth and employment forecasts.

Future plans for highways and roads were based on the dominance of the City of Edmonton as a major employment center in the region; future 10 and 35 year plans show the improvements concentrated within that influence. Two exceptions to this are the industrial developments in the Alberta Industrial Heartland in the northeast and growth near the Edmonton international Airport to the south.

One recommendation was the need for another ring road in addition to the Anthony Henday Drive. Introducing the Edmonton Regional Ring Road will require creating an entirely new highway section running East to West between Highway 21 and Highway 60. The proposed ring road alignment may significantly affect the West end of the 41 Avenue SW alignment, 170 Street/Terwillegar Drive, 184 Street, and a portion of the southern Windermere area. Plans presented in the CRIGMP report identify the future Edmonton Regional Ring Road crossing the North Saskatchewan River just north of 41 Avenue SW.

2.2.1.18 Integrated South LRT Corridor Development – Conceptual Planning Study Final Report

For guidance on the future growth of the City of Edmonton, the City's Municipal Development Plan and Transportation Master Plan have been recently updated. These plans provide a recommendation on the future land use policies within certain areas with

respect to different types of allowances (for example, those for infrastructure and residential development). The South LRT Study contributes to both the Municipal Development Plan and Transportation Master Plan. It was initiated to create a chosen alignment and to allow for the required planning associated with it. This study encompasses the area from the Century Park Station to the South City Limits.

This report includes a number of recommendations for future alignments and proposes one to City Council which was endorsed in December 2007. The Council was given an additional list of recommendations to accompany the single alignment. These recommendations include possible restraints, options for staging of construction, other construction issues, and additional costs of the project.

Extensive growth and future development provide a number of specific areas for possible alignments. Alignment options presented include:

- South from Century Park, west along 23 Ave to 119 Street and then south on 119 Street across Blackmud Creek to Anthony Henday Drive, south on the existing 127 Street to Heritage Valley Town Centre, and south to the City Limit.
- South on 111 Street across Blackmud Creek and Anthony Henday Drive to Ellerslie Road, diagonally on the existing James Mowatt Trail to the existing 127 Street to the south City Limit. An alternate begins at Ellerslie Road and continues until the existing 127 Street to Heritage Valley Town Centre, and then to the south City Limit.
- South on 111 Street across Blackmud Creek and Anthony Henday Drive before turning west along the south side of Anthony Henday Drive to the existing 127 Street and then south down 127 Street to Heritage Valley Town Centre continuing to the City Limit. An alternate begins immediately after crossing the Anthony Henday Drive and follows diagonally down the utility right-of-way through the MacEwan community between the 111 Street interchange and the Ellerslie Road/ 127 Street intersection where it reconnects with route 3.
- South on 111 Street across Blackmud Creek and Anthony Henday Drive, west along the south side of Anthony Henday Drive and across the existing 127 Street entering provincial land and turning south approximately 300 metres west of 127 Street travelling southeast to Heritage Valley Town Centre and continuing south to the City Limit.

A set of rating criteria was created by a workshop with City Staff and all options were weighed accordingly. The fourth option fit the requirements best and is the recommendation of this study. At the existing 127 Street the proposed LRT would meet 41 Avenue SW.

2.2.2 Projected Traffic Volume

2.2.2.1 Existing/Future Volumes

The existing 2 lanes along 41 Avenue SW provide sufficient levels of service given the current roadway volumes. The area is fairly undeveloped and because of this traffic volumes are minimal. However, there will be a large amount of development around the corridor in the future and the roadway will need to accommodate the increase in traffic volumes.

The City of Edmonton provided Associated Engineering with link volumes along 41 Avenue SW for both a mid-term (year 2041) and long-term (approximately 100 years) time frame. From these volumes, the project team determined the number of lanes required along the corridor and the approximate time frame in which they would be required.

2.2.2.2 Edmonton Regional Travel Model

The City of Edmonton provided Associated Engineering with turning movement volumes at select intersections along 41 Avenue SW based on their Regional Travel Model (RTM). These volumes considered long-term growth (approximately 100 years) to a regional population of about 3.2 million. These volume estimates were based on a typical suburban buildout of all City of Edmonton lands north of 41 Avenue, as well as typical suburban development within Leduc County south of 41 Avenue SW.

Morning (AM) and afternoon (PM) peak hour turning movements were provided at the following intersections:

- 50 Street
- 66 Street (existing)
- 91 Street (existing)
- Parsons Road/Nisku Spine Road
- Allard Access (labelled in model as James Mowatt Trail)
- 127 Street/James Mowatt Trail (on existing 127 Street alignment)
- 142 Street
- 156 Street
- 170 Street

Associated Engineering reviewed the data obtained from the RTM and noted some inconsistencies between the available data and the approved plans. Two locations were identified with major inconsistencies between the approved plans and the RTM data.

Chappelle Neighbourhood Connections

The first location with inconsistencies between the RTM and the approved plans was south of the Chappelle neighbourhood between 142 Street and Whitemud Creek. The RTM

information identified a single major intersection at 156 Street. However, the approved Chappelle Neighbourhood Area Structure Plan identifies two major collector accesses from 41 Avenue north to the community. Upon consultation with the project steering committee, Associated Engineering has adjusted the RTM turning movements by splitting the 156 Street intersection evenly into two intersections with exactly half the volumes of the original single intersection. For the purposes of this study, they have been identified as 156A Street (eastern intersection) and 156B Street (western intersection). These new intersections have been assumed to connect south to Leduc County thereby completely eliminating the existing 156 Street alignment near 41 Avenue SW.

Allard Neighbourhood Connections

The second location with inconsistencies between the RTM and the approved plans is at the Allard Neighbourhood. The RTM output identifies 127 Street as a major arterial roadway – this is the future James Mowatt Trail. However, the RTM identifies a collector road access to the Allard neighbourhood about 600 metres east of 127 Street/James Mowatt Trail as James Mowatt Trail. However, the approved Allard NASP identifies two collector accesses from 41 Avenue SW north to the Allard neighbourhood. Associated Engineering has maintained two accesses to the Allard neighbourhood in the 41 Avenue plans. The western access has been developed based on the traffic volumes provided at the 'James Mowatt Trail' Intersection, and the eastern access has been developed based on a template intersection that provides major access to the Allard neighbourhood to the north, and minor access to a service road to the south. Upon redevelopment of the Leduc County lands to the south, the Associated Engineering project team recommends that this eastern access be completely closed from the south to help maintain traffic flow along 41 Avenue SW. Therefore in the long-term, there will be a major all-directional collector road at the western Allard access to 41 Avenue SW, and a minor access to only the Allard neighbourhood at the eastern Allard access.

Southeast Area

The City of Edmonton's Southeast Area Structure Plan identifies a collector access to 41 Avenue SW 800 metres west of the 50 Street intersection. As there are no forecast traffic volumes for this approved access, the project team has assumed a template intersection for this location to determine conceptual right-of-way requirements. Further study will be required to determine final lane requirements on the major collector road and intersection configuration.

Western Access Management (WAM) Area

The WAM Local Area Structure Plan identifies a minor access to 41 Avenue SW 400 metres east of the Nisku Spine Road. There are no forecast traffic volumes from the RTM; however, the project team has reviewed the development concept and traffic impact assessment for the WAM LASP. The WAM LASP identifies a relatively small number of vehicles utilizing this access to 41 Avenue SW; for this reason the access was not analyzed from a capacity standpoint.

2.2.3 Geometric Consideration

2.2.3.1 Functionality

The City of Edmonton/Alberta Transportation's Regional Travel Model group met with project steering committee members in the spring of 2008 and indicated that there would be no model output that could be used in the 41 Avenue SW concept planning study at the time. They noted that the previous model developed for an Edmonton regional population of 2.7 million indicated that 41 Avenue SW would require six lanes in the long term scenario. The regional travel model has since then been updated to include an Edmonton regional population of about 3.2 million. These updates included additional densification, especially in south Edmonton and Leduc County. The project steering committee discussed the benefits of protecting for an ultimate six or eight lane roadway along 41 Avenue SW. The consensus amongst steering committee members was that it is almost certain that six lanes will be required, and at certain locations eight may be necessary. Therefore, the project steering committee agreed to protect for an ultimate eight lane cross-section over the entire study area.

Associated Engineering developed the concept plan using an 8-lane urban cross-section with provisions for street lighting, landscaping, and boulevard walks (based on the City of Edmonton's Standard Drawing 4042: Six Lane Divided Arterial). A 3.0 metre multi-use trail was developed along the north side of the corridor with the exception of the length of roadway between Parsons Road and the east Allard access where there is no multi-use trail planned. However, right-of-way is still protected should a multi-use trail over the QE II Highway be provided. An 11.9 metre median width was used to account for double slotted left turn bays at intersections. Two typical cross-sections were developed with slight differences between residential and industrial neighbourhoods. The cross-section through residential neighbourhoods was designed with adequate right-of-way limits available to construct noise walls on both sides of the roadway in order to provide noise mitigation for the adjacent neighbourhoods. Further noise mitigation factors, including height and material of the potential sound barrier wall, may be determined in the future by a more detailed sound analysis.

Associated Engineering recommends developing a 3.0 metre multi-use trail along the north side of 41 Avenue SW through the entire study corridor, except between the existing 101 Street (future Parsons Road) and the East Allard Access. This trail connection will serve to provide a pedestrian/trail connection between neighbourhoods along the corridor. The trail is proposed on the north side of the roadway because neighbourhoods within the City of Edmonton are anticipated to develop before neighbourhoods in Leduc County (near 41 Avenue SW), and therefore the multi-use trail will be easily accessible from these first-developed neighbourhoods. The steering committee looked at providing a multi-use trail along the south side of the roadway as well. However, there were two main considerations that factored into the decision to provide only one multi-use trail: first, the only access from

the residential neighbourhoods to 41 Avenue SW will potentially be at the major north-south roads where crosswalks will be provided, and secondly, the additional right-of-way required would increase an already significant cross-section width.

The project steering committee discussed the feasibility of providing for bicycle accommodation within the curb lanes on 41 Avenue SW. The City of Edmonton's sustainable transportation group wishes to develop wide curb lanes (additional 0.5 metres; total of 4.45 metres including gutter) to accommodate bicyclists along all major roadways. This bicycle accommodation is in addition to any multi-use trail. As such, cyclists are able to use either the wide curb lane or the multi-use trail. According to the sustainable transportation group, commuter cyclists typically use the wide curb lanes while recreational cyclists typically use the multi-use trails. The steering committee also noted that they believe they cannot legally force cyclists off the road and onto the trail system.

Ultimately, 41 Avenue SW is planned as a high-speed, high-volume major arterial that will accommodate four through traffic lanes in each direction. TAC's *Geometric Design Guide for Canadian Roads* provides a guideline for pedestrian and cyclist accommodation (among a number of other criteria) in Table 1.3.4.2. In a major arterial corridor, the TAC guideline recommends a facility (sidewalk or trail) separated from the roadway for both cyclists and pedestrians, or a widened lane for cyclist accommodation within the road surface, or both.

The steering committee wishes to accommodate sustainable transportation and alternative transportation modes along the 41 Avenue SW corridor. Associated Engineering recommends that pedestrians and cyclists be accommodated via the 3.0 metre multi-use trail, as well as providing wide curb lanes (additional 0.5 metres) for additional bicycle accommodation. This will allow for non-motorized movement along the corridor, but will separate most of these users from the high-volume, high-speed roadway. Commuter cyclists, who still wish to utilize the road surface, will be provided with a wide outer lane in the ultimate stage. In the interim stages, if curb and gutter is not installed on the outer lanes, bicycle accommodation on the road surface will be via a 1.0 metre right hand shoulder.

As outlined above, the 41 Avenue SW concept planning study does not include design of the future interchange at the Queen Elizabeth II Highway, which is being undertaken by Alberta Transportation. Project steering committee members met with Alberta Transportation and their consultants who are currently developing the functional plan for the interchange. Discussions were held to determine a preferred location for the multi-use trail across the interchange. A consensus was initially reached that the multi-use trail would be best located on the south side of the QEII interchange overpass because there is expected to be fewer vehicular turning movements to/from the south. Therefore, a multi-use trail on the south side of the roadway would introduce fewer conflict points than if it was located on the north side of the road. In mid-2009, however, Alberta Transportation released an updated plan for the interchange (the parclo-A4 version) that did not allow for

any pedestrian accommodation across the interchange.

From the above discussions, the project steering committee determined that the multi-use trail will be located on the north side of 41 Avenue SW except for in the vicinity of the QEII interchange. There will be no multi-use trail between the existing 101 Street (future Parsons Road) and the East Allard Access. However, as outlined above, further analysis can be conducted to determine the feasibility of a grade separated structure that would carry the multi-use trail across the QEII interchange; this would allow for a continuous trail along the entire corridor. Right-of-way has been identified along 41 Avenue SW between the existing 101 Street and the East Allard Access such that a multi-use trail could be developed using the same cross-section as for the rest of the 41 Avenue SW corridor. This would allow for a future multi-use trail up to the 41 Avenue SW interchange at the QEII highway should a future pedestrian/multi-use trail bridge structure be developed.

2.2.3.2 Geometric Design Criteria

Design Standards and Guides:

All roadway geometry has been designed to conform to the City of Edmonton's Design and Construction Standards, where possible. All turning movements have been analyzed and designed to accommodate the turning envelope of both WB-21 and WB-36 design vehicles. Additional standards or guidelines have been taken from Alberta Transportation's Highway Geometric Design Guide and the Highway Geometric Design Guide Urban Supplement, the Transportation Association of Canada (TAC)'s Geometric Design Guide, or relevant American Association of State Highway and Transportation Officials (AASHTO) recommendations, where necessary.

Design Speed:

Based on the steering committee consensus, 41 Avenue SW will function as a high class major arterial roadway, classified as UAD. The primary function of 41 Avenue SW will be to collect traffic generated within the adjacent neighbourhoods and carry them to the higher standard north-south routes along the study area (50 Street, Highway 2/QEII, and 170 Street/Terwillegar Drive). The steering committee agreed upon a 90 km/h design speed and a 70 km/h posted speed for 41 Avenue SW. In some cases due to geometric restrictions or intersection requirements, the design speed may be reduced if necessary. In such cases, Associated Engineering has used a design speed of no less than 80 km/h. In instances where the design speed has been reduced to 80 km/h, the posted operating speed can remain at 70km/h. Typically, the City of Edmonton posts high standard arterials and expressways with signalized intersections at 70 km/h, so the roadway speeds will be consistent with similar facilities within the City, and the design speed will provide an appropriate safety factor along the roadway corridor. Some comparable roadways with posted speeds of 70km/h in the City include Yellowhead Trail, 97 Street north of 137 Avenue, Baseline Road east of 50 Street, and 50 Street between 76 Avenue and Whitemud Drive.

Sound Mitigation:

The City of Edmonton's Urban Traffic Noise Policy identifies noise limits and mitigation strategies for residential development near major transportation corridors. As 41 Avenue SW is being planned as a major arterial roadway with high-speed, high-volume traffic, consideration for noise mitigation has been incorporated into the proposed cross-section. The City of Edmonton typically allows for noise mitigation through the use of a berm in combination with a sound fence. Leduc County has indicated that for the purposes of this study, the county will accept recommendations made with the City of Edmonton's noise policy along 41 Avenue SW.

Associated Engineering initially recommended berms 1.0 metres in height on both sides of 41 Avenue SW when adjacent to residential development, based on the City of Edmonton's standard Drawing 1010. However, discussions within the steering committee and with local developers lead the steering committee to attempt to minimize the required right-of-way where possible. Typical berms, as initially proposed, require 10-15 metres of right-of-way. Options for accommodating a berm with sound wall, a staged retaining wall, and a simple sound wall were investigated.

Ultimately, the steering committee concluded that accommodation for a simple noise wall, with a typical right-of-way requirement of about 2.0 metres, shall be incorporated into the 41 Avenue SW cross-section. Requirements for the height, material, and staging of the sound wall will need to be investigated at the roadway detailed design phase.

For the portion of 41 Avenue SW through the industrial areas near the QEII highway (between the QEII highway and 800 metres west of the existing 91 Street), Associated Engineering recommends a typical cross-section without noise walls or other provisions for sound attenuation within the road right of way.

Right-of-Way:

Associated Engineering produced right-of-way plans based on the recommended cross-sections. At all locations along the study corridor, Associated Engineering has attempted to split land requirements equally between the north and the south side of the existing right-of-way. This means that additional land requirements will be equally shared between landowners on the north and south sides of 41 Avenue SW. As such, the future roadway centreline will be offset from the existing roadway centreline but the future and existing right-of-way centrelines will be at the same location.

Additional right-of-way was required at intersections along 41 Avenue SW. In addition to the typical right-of-way required, Associated Engineering identified the future right-of-way required throughout the entire corridor, including all identified future or potential intersections.

The right-of-way plans are included in **Appendix B**.

Median Width:

Throughout the 41 Avenue SW corridor, the typical cross-section illustrates an 11.9 metre median (from face of curb). This allows for slotted single or double left turn bays to be developed at any crossroad intersection. Associated Engineering presented a conceptual drawing to the steering committee that illustrated a median reduction from 11.9 metres (near intersections) to the typical 4.5 metre median (City of Edmonton drawing #4042). Based on average 800 metre intersection spacing, the average right-of-way saved by tapering the median was about 0.25 hectares per 800 metres. Due to the long taper lengths (because of the high design speed), such median tapering would not even be feasible if the intersection spacing was less than 500 metres.

A literature review of industry practices found that the AASHTO *Geometric Design of Highways and Streets* (2004) advises against tapering medians between intersections: "Where intersections are relatively infrequent (e.g. 1.0km or more apart), the median width may be varied by using a narrow width between intersections for economy and then gradually widening the median on the intersection approaches to accommodate left-turn lanes. This solution is rarely practiced, however, and should generally not be used where intersections are closely spaced because the curved alignment of the lane lines may result in excessive manoeuvrings by drivers to stay within the lanes. It is far more desirable that the median be of uniform width."

Due to the relatively small right-of-way saved, inconsistent cross-sections, and industry recommendations, Associated Engineering has maintained an 11.9 metre median throughout most of the 41 Avenue SW study area.

Alberta Transportation has illustrated a 6 metre median across the QEII Highway on 41 Avenue SW, so Associated Engineering needed to tie the 11.9 metre 41 Avenue median into the proposed median from Alberta Transportation. For this reason the median tapers from 11.9 metres to 6 metres approximately 100 metres west of the existing 91 Street (future 66 Street) in order to tie into Alberta Transportation's design. The 6 metre median tapers back to 11.9 metres between the QEII Highway and the East Allard Access.

Cross-Section Elements:

41 Avenue SW is planned to be an ultimate eight lane major arterial with typical landscaping, street lighting, and accommodation for pedestrians and non-motorized users. Sound wall accommodation will be provided when adjacent to residential lands.

The typical cross-section is based on the City of Edmonton's standard drawing #4042: Six Lane Divided Arterial. However, because 41 Avenue SW will have additional lanes and will be required to provide accommodation for noise attenuation, some elements have been altered to develop the typical 41 Avenue SW cross-section. Some elements have been identified in detail in the previous sections.

The project steering committee directed the Associated Engineering project team to minimize the right-of-way required for 41 Avenue SW, considering that this proposed 8-lane major facility was slightly larger than a typical 4 or 6 lane major arterial. Due to pressures from area landowners and developers, the project team identified that the cross-section of the proposed 41 Avenue SW should be designed as to fit within the right-of-way required for a typical major arterial roadway within the City of Edmonton. The project team developed a typical standard cross-section for a major 6-lane arterial with double left turns and sound attenuation berms – this cross-section requires 60.0 metres of right of way. The project team then attempted to fit the ultimate 8 lane configuration within a 60 metre right of way. As discussed previously, most of the land savings was obtained from reducing the sound berms to sound walls. As a result, the Associated Engineering project team developed a cross-section for the ultimate development of 41 Avenue to fit within a 57.0 metre right of way. Highlights of the cross-section are detailed below.

Lanes: eight core lanes (four in each direction); width of 3.7 metres (inner lanes) or 4.2 metres (curb lanes), not including gutters
Median: 11.9 metres from face of curb to face of curb
Hydrants: The steering committee directed Associated Engineering to exclude hydrants from the typical cross-sections as they would likely be accommodated in adjacent neighbourhood development rather than along 41 Avenue SW.
Street Lighting: Alberta Transportation's Lighting Design Guide identifies a minimum pole offset from the roadway. At a 90 km/h design speed the minimum offset for breakaway poles is 3.5 metres. The proposed cross-section identifies a minimum 3.5 metre offset from the face of curb to the light poles. A preliminary lighting assessment identified that in addition to street lighting on the north and south sides of the roadway, additional lights will be required in the median. The Associated Engineering project team has recommended the median lights be installed in the first stage along with pedestrian-scaled lighting along the multi-use trail. In subsequent phases, street lighting would be added to the pedestrian light poles, and the street lighting on the opposite side of the road would be installed.
Landscaping/Trees: The City of Edmonton's standard drawing for an arterial roadway identifies an offset of 2.0 metres from the roadway to the trees (which is 1.0 metre from the light poles). Associated Engineering recommends maintaining the trees 1.0 metre in front of the light poles. This is reflected in the proposed typical cross-section as a minimum 2.5 metre offset from the roadway to the trees.
Multi-use Trail: 3.0 metres in width, provided on the north side everywhere along the corridor except between the future Parsons Road and the east Allard access. The trail will be offset a minimum 0.6 metres from the light poles and 0.9 metres from the sound wall. These offsets fall within the TAC recommended bikeway horizontal clearance of 0.6 – 1.0 metres (TAC Table 3.4.6.3).
Sound Attenuation: 1.0 metre right of way on each side of the residential cross-section to accommodate potential sound wall and offset from property line.
Roadway Drainage: A preliminary review by the Associated Engineering project team determined that roadway and corridor drainage will be handled by storm sewers connected

to the City's stormwater system. In the ultimate 8-lane stage, catch basins along the roadway gutters will collect water and convey it to stormwater management facilities that could be developed in conjunction with area development. In the interim stages, catch basins in gutters along the median will collect water from the inner two lanes of the roadway, and small ditches on the north and south sides of the roadway will convey water to catch basins for the outer lanes and the rest of the right-of-way. Based on requirements to minimize the roadway cross-section, these interim ditches will not be able to provide stormwater storage; the ditches will function for conveyance only.

Plan number A041-0932 illustrates the typical cross-section proposed for the 41 Avenue SW corridor through residential areas. Plan number A041-0933 illustrates the typical cross-section proposed through the industrial areas (encompassing the area from about 800 metres west of the existing 91 Street (future 66 Street) to the Queen Elizabeth II highway). Both figures illustrate a three stage development approach. Initially, four lanes would be constructed, with an additional lane built in each direction when traffic volumes warrant it. The staged approach recommended minimizes throwaway costs and allows for ease of construction when future upgrades are required.

Plan numbers A041-0940, A041-0941, and A041-0942 illustrate a typical intersection staging plan that correspond to the proposed roadway staging plan. These plans illustrate that the intersections can be constructed to the ultimate design, and then slightly modified with raised concrete to delineate the narrower road width in the first and second stages.

Design Parameters:

Tables 2-1, 2-2, and 2-3 present Associated Engineering's recommended geometric design parameters for the 41 Avenue SW Concept Planning Study. Reference Materials are also indicated for the criteria.

Table 2-1: Horizontal Alignment Design Parameters

Horizontal Alignment		
Design Parameters	**Design Criteria**	**Reference**
Classification	UED90 / UAD90	(1) Table 1.3.2.1
Design Speed	90 km/h desired, but no less than 80km/h	(2) U.A.7
Posted Speed	70 km/h	
Design Vehicle	WB-21 & WB-36	(3) Figure D-5i & D-5k
Curve Radius	R = 300 m (minimum)	(2) U.A.7
Superelevation	e = 0.06 (maximum)	(2) U.A.7
Minimum Curb Radius	R = 15.0 m (minimum) R = 18.5 m (minimum)	(3) Figure D-5i & D-5k

Table 2-2: Vertical Alignment Design Parameters

Vertical Alignment		
Design Parameters	**Design Criteria**	**Reference**
Minimum Vertical Crest "K" Value	45	(2) U.A.7
Minimum Vertical Sag "K" Value	18	(2) U.A.7
Grade	Maximum 5% and Minimum 0.60%	(2) U.A.7

Table 2-3: Cross-Section Design Parameters

Cross Section		
Design Parameters	**Design Criteria**	**Reference**
Lane Widths	3.7 m (inner) and 4.2 m (right curb lane)	(4) Drawing 4042
Shoulder Width	1.0 m (if no curb and gutter)	
No. of Lanes	6 lanes or 8 lanes (divided)	
Finished Pavement Width	2 @ 15.3 m (8 lanes) or 2 @ 12.1 m (6 lanes)	
Median Width	11.9 m	(3) Drawing 4076
Right of Way	57.0 m (adjacent to residential) 56.0 m (adjacent to industrial)	
Cross Slope	2.5 % from Centerline	(4) Drawing 4042

(1) Transportation Association of Canada Geometric Design Guide for Canadian Roads (September 1999)
(2) AIT Highway Geometric Design Guide Urban Supplement (Draft - November 2003)
(3) AIT Highway Geometric Design Guide (1999)
(4) City of Edmonton Design and Construction Standards Volume 2: Roadways (March 2004)

2.2.3.3 MODELLING CRITERIA, OBJECTIVES, AND ADJUSTMENTS

Modelling Criteria:

The Associated Engineering project team performed traffic analysis on the forecast traffic volumes using methods for roadway and intersection levels of service and volume-to-capacity ratios as outlined in the Transportation Research Board's 2000 Highway Capacity Manual primarily using Trafficware's Synchro/SimTraffic 7 software. Intersection operations are typically rated by two measures: level of service (LOS) and volume-to-capacity ratios (v/c).

Level of service is based on the estimated average delay per vehicle for all traffic passing through an intersection. Delays can be calculated for all traffic through an intersection, and can be averaged for each approach or for the intersection as a whole. It is important to investigate average approach delays as well as overall delays, because significant free-flow through movements may significantly reduce delay on stop-controlled or turning movements, causing an apparent high level of service for an intersection when some approaches may be unacceptable. A high level of service is a result of very low average delays; the highest level of service is identified as LOS A. A low level of service is a result of a large average delay; typically, the lowest level of service is identified as LOS F. The level of service categories also vary depending on whether an intersection is signalized or stop- or yield- controlled. The Highway Capacity Manual justifies this difference by noting that drivers stopped at a signal light will have more tolerance for delays because they will perceive that eventually they will get their turn. The following table identifies the level of service criteria for intersections.

Table 2-4: Level of Service Criteria

Level of Service	Average Signalized Control Delay per Vehicle (s)	Average Stop Control Delay per Vehicle (s)
A	less than 10	less than 10
B	10 – 20	10 – 15
C	20 – 35	15 – 25
D	35 – 55	25 – 35
E	55 – 80	35 – 50
F	greater than 80	greater than 50

The volume-to-capacity ratio of an intersection describes the extent to which the traffic volumes can be accommodated by the theoretical physical capacity of the road configuration and traffic control. As with levels of service, volume-to-capacity ratios can be calculated for an intersection approach or for an intersection as a whole. A value less than 0.9 indicates that there is generally sufficient capacity to accommodate the traffic on the approach or at the intersection. A value between 0.9 and 1.0 suggest unstable operations and congestion may occur as volumes are nearing the theoretical capacity of the roadway.

A calculated value over 1.0 indicates that volumes are theoretically exceeding capacity. The following table identifies the volume-to-capacity criteria for intersections.

Table 2-5: Volume-to-Capacity Criteria

Volume-to-Capacity Ratio	Indication
less than 0.9	sufficient intersection capacity
0.9 to 1.0	volumes approaching intersection capacity
greater than 1.0	volumes exceed theoretical intersection capacity

The City of Edmonton's *Roadway Planning and Design Objectives* (February 2005 Edition) further defines a relationship between level of service and volume-to-capacity ratios. This relationship can be used to develop an approximate level of service based on a volume-to-capacity ratio. The following table is an excerpt from Table 5 of the *City of Edmonton Roadway Planning and Design Objectives*.

Table 2-6: Level of Service and Volume-to-Capacity Relationship

Level of Service	Volume-to-Capacity Ratios	
	Non-signalized Roadway	Signalized Arterial
A	less than 0.30	n/a
B	0.3 to 0.5	less than 0.5
C	0.5 to 0.75	0.5 to 0.75
D	0.85 to 0.9	0.75 to 0.9
E	0.9 to 1.0	0.9 to 1.0
F	greater than 1.0	greater than 1.0

Modelling Design Objectives:

The City of Edmonton's *Roadway Planning and Design Objectives* discusses methodology behind selecting a target level of service for roadways in Edmonton. These targets are based on a synthesis of material from the Institute of Transportation Engineers (ITE) *Traffic Engineering Handbook*, the American Association of State Highway and Transportation Officials (AASHTO) *A Policy on Geometric Design of Highways and Streets*, and the City of Edmonton's Transportation Master Plan.

The City's design objectives are presented in two time horizons – medium term and long term. Medium term is defined when the City of Edmonton has a population less than one million residents; long term is defined when the City of Edmonton has a population greater than one million residents. The City's guidelines recommend a peak level of service design objective for the medium term to be a LOS D or better. The recommended long term design objective is a LOS E or better. The following table presents the peak hour level of service design objectives adapted from the *City of Edmonton Roadway Planning and Design Objectives*.

Table 2-7: Level of Service Design Objectives

Time Frame	Level of Service (LOS)	
	Non-signalized Roadway	Signalized Arterial
Medium Term (population < 1 million)	LOS D or better	LOS D or better (LOS E or better, where existing LOS E)
Long Term (population > 1 million)	LOS E or better	LOS E or better

The 41 Avenue SW concept planning study is defining the long-term requirements for 41 Avenue SW with RTM data identifying a regional population of over three million residents. The Associated Engineering project team has therefore used a design level of service objective of LOS E or better. This corresponds to signalized intersection designs that obtain an average vehicular delay of less than 80 seconds, and a volume-to-capacity ratio of less than 1.0.

Synchro Modelling Adjustments:

The *City of Edmonton Roadway Planning and Design Objectives* suggests a number of adjustment factors be applied to the traffic model in order to achieve a more accurate depiction of how the roadway will actually function. Many of these adjustments are based on studies completed within the City of Edmonton, and the adjustments are recommended to improve the reliability of any Synchro model developed for roadways within the City of Edmonton. The project team made adjustments to the default values in the Synchro/SimTraffic analysis for the lane utilization factor, right turn factor, protected left turn factor, and the growth factors to account for heavy vehicles.

Lane Utilization Factor

The lane utilization factor is a determination of how well the vehicles in the model make use of the available lanes. According to the *City of Edmonton Roadway Planning and Design Objectives,* the lane utilization factors should be set to 1.0 unless there is a lane imbalance that has been identified. Lane imbalances may result because of a lane drop or heavy turning movement downstream of the intersection. Because the intersection spacing in the model is fairly substantial and all designs are to a relatively high geometric design, the Associated Engineering project team assumed that no lane imbalances would occur. Therefore, the lane utilization factors in the 41 Avenue SW model were set to 1.0.

Right Turn Factor

The right turn factor is a measure of how efficiently vehicles in the model make right turns at intersections. Synchro includes a default right turn factor of 0.85. The *City of Edmonton Roadway Planning and Design Objectives* note that a factor of 1.0 should be used on all right turns which are not free-flowing. Because all of the right turns in the model are yield controlled (i.e. not free-flowing), the right turn factors were set to 1.0.

Left Turn Factor

The protected left turn factor is a measure of how efficiently vehicles in the model make left turns at intersections during the protected left turn phase of the signals. Synchro uses a default protected left turn factor of 0.95. The *City of Edmonton Roadway Planning and Design Objectives* note that as protected left turns tend to follow closer together, especially in saturated conditions, a factor of 1.0 is recommended. The protected left turn factors in the 41 Avenue SW model were therefore set to 1.0.

Heavy Vehicle Adjustment

Heavy vehicles were accounted for in the model by converting vehicle volumes into passenger car units (PCUs), and subsequently into a growth factor which was applied to the model. The Associated Engineering project team, based on comparisons of other roadways in the City of Edmonton, assumed a 4% truck volume on 41 Avenue SW and Parsons Road, and a 2% truck volume on all other connecting roadways. The project team also assumed a 50/50 split between single-unit and multi-unit trucks. This ratio, according to the *City of Edmonton Roadway Planning and Design Objectives,* provides a PCU equivalent of 3.0. Using this PCU equivalent and the assumed truck percentages in the calculation outlined in the *Roadway Planning and Design Objectives,* growth factors were identified and applied to the model. A growth factor of 1.08 was used for 41 Avenue SW and Parsons Road, and a growth factor of 1.04 was used for all other connecting roadways to account for heavy vehicles.

Other Adjustment Factors

Synchro provides a number of other adjustment factors to account for other modelling parameters. The factors identified above were modified from the default in the 41 Avenue SW model; all other factors used in the model were left at the default Synchro values, as suggested in the *City of Edmonton Roadway Planning and Design Objectives*.

2.2.4 Option Evaluation

2.2.4.1 LONG-TERM TRAFFIC ANALYSIS

The Associated Engineering project team developed a Synchro/SimTraffic 7 model for the AM and PM peak hours based on the long-term forecast volumes obtained from the City of Edmonton, and made the necessary adjustments as identified in the previous section. Each intersection was investigated, adjusted, and analyzed to obtain an acceptable level of service as identified in section 2.2.3.3 of this report. Right and left turn lanes (double lanes, in some cases) were provided on a case-by-case basis in an attempt to optimize the overall intersection level of service while maintaining a LOS E or better and v/c ratio of less than 1.0 for all movements. The project team also investigated intersection timing and phasing alternatives at each location.

In summary, the project team obtained acceptable levels of service at all intersections

except 41 Avenue SW at Parsons Road. At Parsons Road, there were several movements with LOS F and v/c ratios greater than 1.0 in both the AM and PM peak periods.

41 Avenue requires a minimum of six lanes throughout the entire corridor, with eight lanes from just east of the existing 91 Street (future 66 Street) to just west of the existing 127 Street (future James Mowatt Trail).

The results of the Synchro analysis are included in **Appendix C**. The following tables present a summary of the traffic analysis as outlined above.

Table 2-8: 50 Street

Control		Signalized											
Travel Direction		Eastbound			Westbound			Northbound			Southbound		
Geometry													
Movement		L	T	R	L	T	R	L	T	R	L	T	R
AM Peak	Volume	170	1030	570	880	2090	330	160	860	110	260	1470	320
	v/c	0.58	0.67	0.83	0.89	0.83	0.30	0.61	0.59	0.06	0.58	0.90	0.45
	LOS	D	D	E	D	C	C	D	D	C	C	D	D
	Approach LOS	D			C			D			D		
	Intersection v/c	0.88											
	Intersection LOS	D											
PM Peak	Volume	250	1870	500	450	1160	300	180	1060	200	310	960	170
	v/c	0.47	0.87	0.21	0.81	0.48	0.25	0.52	0.76	0.17	0.80	0.65	0.10
	LOS	B	C	C	D	C	B	C	D	C	D	D	C
	Approach LOS	C			C			D			D		
	Intersection v/c	0.81											
	Intersection LOS	C											

Table 2-9: Existing 66 Street

Control		Signalized											
Travel Direction		Eastbound			Westbound			Northbound			Southbound		
Geometry													
Movement		L	T	R	L	T	R	L	T	R	L	T	R
AM Peak	Volume	10	900	10	120	2310	570	80	490	160	580	190	280
	v/c	0.16	0.40	0.01	0.39	0.83	0.35	0.33	0.65	0.12	0.73	0.13	0.37
	LOS	C	B	B	B	C	C	D	D	D	C	C	C
	Approach LOS	B			C			D			C		
	Intersection v/c	0.78											
	Intersection LOS	C											
PM Peak	Volume	140	1880	0	170	870	450	180	410	260	800	210	10
	v/c	0.46	0.89		0.88	0.41	0.24	0.47	0.63	0.48	0.86	0.20	0.01
	LOS	C	D		D	B	E	D	D	D	D	C	C
	Approach LOS	D			D			D			C		
	Intersection v/c	0.86											
	Intersection LOS	D											

Table 2-10: Existing 91 Street (Future 66 Street)

Control		Signalized											
Travel Direction		Eastbound			Westbound			Northbound			Southbound		
Geometry													
Movement		L	T	R	L	T	R	L	T	R	L	T	R
AM Peak	Volume	410	750	760	210	2390	70	620	70	10	160	410	1440
	v/c	0.88	0.33	0.30	0.49	0.93	0.06	0.87	0.04	0.01	0.34	0.31	0.87
	LOS	D	C	C	C	D	C	D	B	B	C	C	D
	Approach LOS	C			D			D			D		
	Intersection v/c	0.89											
	Intersection LOS	D											
PM Peak	Volume	1160	1840	700	30	850	180	660	250	70	110	140	590
	v/c	0.89	0.46	0.19	0.40	0.56	0.10	0.76	0.20	0.10	0.51	0.19	0.16
	LOS	C	B	B	D	D	C	C	C	C	D	C	C
	Approach LOS	B			D			C			D		
	Intersection v/c	0.82											
	Intersection LOS	C											

Table 2-11: Existing 101 Street (Future Parsons Road – Nisku Spine Road)

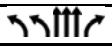
Control		Stop Controlled											
Travel Direction		Eastbound			Westbound			Northbound			Southbound		
Geometry													
Control		Stop			Stop			Stop			Stop		
Movement		L	T	R	L	T	R	L	T	R	L	T	R
AM Peak	Volume	510	1900	1510	730	2830	660	250	1230	170	60	340	310
	v/c	1.10	0.81	1.09	1.17	1.06	0.88	0.42	1.00	0.11	0.22	0.30	0.10
	LOS	F	D	F	F	E	D	C	E	C	C	C	C
	Approach LOS	E			E			D			C		
	Intersection v/c	0.98											
	Intersection LOS	E											
PM Peak	Volume	340	2380	340	220	1940	110	940	580	620	540	1280	550
	v/c	1.01	1.12	0.14	0.89	0.99	0.07	1.17	0.31	0.90	0.92	1.07	0.52
	LOS	E	F	C	E	E	C	F	C	D	D	F	D
	Approach LOS	F			E			E			E		
	Intersection v/c	1.15											
	Intersection LOS	E											

Table 2-12: West Allard Access (Identified as James Mowatt Trail in the RTM)

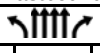
Control		Signalized											
Travel Direction		Eastbound			Westbound			Northbound			Southbound		
Geometry													
Movement		L	T	R	L	T	R	L	T	R	L	T	R
AM Peak	Volume	10	3310	10	10	2280	150	10	10	710	630	10	230
	v/c	0.13	0.82	0.01	0.13	0.57	0.08	0.02	0.02	0.56	0.66	0.02	0.36
	LOS	B	B	A	B	B	B	C	C	C	C	C	C
	Approach LOS	B			B			C			C		
	Intersection v/c	0.76											
	Intersection LOS	B											
PM Peak	Volume	200	2760	10	110	3230	560	10	10	10	290	50	50
	v/c	0.62	0.63	0.01	0.52	0.82	0.35	0.04	0.03	0	0.60	0.15	0.03
	LOS	D	B	A	C	B	B	C	C	C	D	D	C
	Approach LOS	B			B			C			D		
	Intersection v/c	0.72											
	Intersection LOS	B											

Table 2-13: Existing 127 Street (Future James Mowatt Trail)

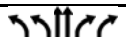
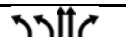
Control		Signalized											
Travel Direction		Eastbound			Westbound			Northbound			Southbound		
Geometry													
Movement		L	T	R	L	T	R	L	T	R	L	T	R
AM Peak	Volume	730	2150	250	1040	1290	180	120	440	640	530	170	190
	v/c	0.75	0.94	0.23	0.95	0.51	0.10	0.28	0.87	0.17	0.88	0.19	0.10
	LOS	D	D	C	E	C	C	D	E	D	D	D	D
	Approach LOS	D			D			D			D		
	Intersection v/c	0.89											
	Intersection LOS	D											
PM Peak	Volume	250	1360	70	920	1860	510	300	270	1200	420	530	600
	v/c	0.65	0.86	0.04	0.87	0.65	0.41	0.54	0.25	0.39	0.49	0.44	0.82
	LOS	D	D	C	D	C	C	C	C	C	C	C	D
	Approach LOS	D			C			C			D		
	Intersection v/c	0.81											
	Intersection LOS	D											

Table 2-14: Existing 141 Street (Future Heritage Valley Trail)

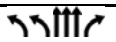
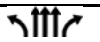
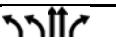
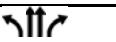
Control		Signalized											
Travel Direction		Eastbound			Westbound			Northbound			Southbound		
Geometry													
Movement		L	T	R	L	T	R	L	T	R	L	T	R
AM Peak	Volume	410	1540	330	150	750	50	310	460	390	200	270	370
	v/c	0.55	0.79	0.21	0.56	0.37	0.03	0.45	0.55	0.51	0.54	0.25	0.35
	LOS	C	C	C	D	C	B	C	D	D	C	C	C
	Approach LOS	C			C			D			C		
	Intersection v/c	0.61											
	Intersection LOS	C											
PM Peak	Volume	320	720	210	290	1560	210	430	460	160	80	600	490
	v/c	0.69	0.55	0.12	0.64	0.85	0.14	0.69	0.36	0.09	0.23	0.52	0.59
	LOS	D	C	C	D	D	C	C	C	C	C	C	C
	Approach LOS	D			C			C			C		
	Intersection v/c	0.78											
	Intersection LOS	C											

Table 2-15: 156A Street – East Chappelle Access

Control		Signalized											
Travel Direction		Eastbound			Westbound			Northbound			Southbound		
Geometry													
Movement		L	T	R	L	T	R	L	T	R	L	T	R
AM Peak	Volume	60	560	240	100	640	65	420	25	255	100	25	155
	v/c	0.31	0.70	0.13	0.39	0.63	0.04	0.45	0.46	0.24	0.28	0.04	0.08
	LOS	B	C	B	B	C	B	C	C	C	C	B	B
	Approach LOS	C			C			C			C		
	Intersection v/c	0.60											
	Intersection LOS	C											
PM Peak	Volume	140	315	385	140	770	180	245	20	100	55	80	105
	v/c	0.49	0.28	0.24	0.32	0.72	0.10	0.42	0.42	0.05	0.19	0.18	0.06
	LOS	B	B	B	B	B	B	C	C	C	C	C	C
	Approach LOS	B			B			C			C		
	Intersection v/c	0.65											
	Intersection LOS	B											

Table 2-16: 156B Street – West Chappelle Access

Control		Signalized											
Travel Direction		Eastbound			Westbound			Northbound			Southbound		
Geometry													
Movement		L	T	R	L	T	R	L	T	R	L	T	R
AM Peak	Volume	60	560	240	100	640	65	420	25	255	100	25	155
	v/c	0.27	0.58	0.13	0.40	0.74	0.04	0.56	0.56	0.32	0.36	0.05	0.09
	LOS	B	B	B	C	C	D	C	C	C	C	C	C
	Approach LOS	B			C			C			C		
	Intersection v/c	0.61											
	Intersection LOS	C											
PM Peak	Volume	140	315	385	140	770	180	245	20	100	55	80	105
	v/c	0.46	0.47	0.21	0.42	0.79	0.10	0.41	0.41	0.05	0.18	0.17	0.06
	LOS	B	B	B	B	B	B	C	C	C	C	C	C
	Approach LOS	B			B			C			C		
	Intersection v/c	0.63											
	Intersection LOS	B											

2.2.4.2 PARSONS ROAD / NISKU SPINE ROAD INTERSECTION

Due to the high long term volumes at the intersection of 41 Avenue SW and Parsons Road, Associated Engineering had originally planned the intersection as a single point urban interchange. However, based on an audit of the City's modelling practises recently completed, the City modified the approach to developing conceptual plans. Rather than using the long-term modelling information the City decided to employ the 2041 forecast for all development plans. Because of the fact that this information became available in the late stages of concept design and due to the large footprint required based on the long-term traffic volumes only the Parsons Road intersection used the 2041 forecast volumes; all other intersections throughout the corridor still used the volumes from the long-term model.

The staging plans developed by the project team provide opportunity for 4, 6, and 8 lanes to be developed; these staging opportunities can be implemented as required throughout the development of the corridor. Because of this it is still acceptable to use the long term volumes for the remainder of the corridor due to the fact that the number of through lanes and turning lanes can be adjusted as volumes warrant it.

The Associated Engineering project team developed a Synchro/SimTraffic 7 model for the AM and PM peak hours based on the 2041 forecast link volumes obtained from the City of Edmonton. The project team used the WAM TIA as a template for estimating the turning volumes. The turning ratios in the WAM TIA were calculated and then applied to the 2041 link volumes in order to develop the 2041 turning volumes at the intersections. However, there were a number of differences between the WAM TIA volumes and the 2041 volumes, so the turning ratios had to be adjusted so that the volumes entered into the model matched the 2041 link volumes.

The volumes in the WAM TIA were estimated for a horizon year of 2012 and showed substantially less through traffic on 41 Avenue SW than the 2041 volumes provided by the City, so the ratios were adjusted to accommodate for this. As well, the AM westbound left volume was decreased in the model (compared to what was shown in the WAM TIA) in order to match the 2041 link volumes. The rest of the volumes in the AM and PM peak hour either increased or stayed relatively the same from the volumes estimated in the WAM TIA.

The Parsons Road intersection was investigated, adjusted, and analyzed to obtain acceptable levels of service and volume-to-capacity ratios. Right and left turn lanes were provided in an attempt to optimize the overall intersection level of service while maintaining a LOS E or better and v/c ratio of less than 1.0 for all movements. The project team also investigated intersection signal timing and phasing alternatives to optimize traffic flow as well.

The following table presents a summary of the traffic analysis as outlined above.

Table 2-17: 2041 Traffic Forecast – Existing 101 Street (Parsons Road – Nisku Spine Road)

Control		Signalized											
Travel Direction		Eastbound			Westbound			Northbound			Southbound		
Geometry													
Movement		L	T	R	L	T	R	L	T	R	L	T	R
AM Peak	Volume	209	406	545	123	1178	69	106	191	33	8	182	190
	v/c	0.55	0.19	0.46	0.47	0.70	0.04	0.16	0.16	0.02	0.03	0.15	0.12
	LOS	C	B	C	C	C	B	B	C	B	B	C	C
	Approach LOS	C			C			B			C		
	Intersection v/c	0.42											
	Intersection LOS	C											
PM Peak	Volume	201	817	322	132	495	33	462	82	136	71	77	442
	v/c	0.58	0.54	0.20	0.48	0.33	0.02	0.48	0.05	0.09	0.15	0.05	0.43
	LOS	C	C	C	C	C	C	B	B	B	B	B	C
	Approach LOS	C			C			B			B		
	Intersection v/c	0.53											
	Intersection LOS	C											

In summary, the project team obtained acceptable levels of service and v/c ratios at the intersection of Parsons Road and 41 Avenue SW.

The WAM Industrial Park access is located approximately 450m east of the Parsons Road intersection. This access is proposed in the WAM LASP to be an all-directional access to 41 Avenue SW. However, direction from the project steering committee indicated that intersection spacing of 800 metres was required along the roadway; therefore, an all-directional intersection was not feasible. To maintain access to the WAM Industrial Park from 41 Avenue SW, the Associated Engineering project team recommends providing a right-in right-out access to the proposed development.

2.2.4.3 MID-TERM TRAFFIC ANALYSIS

MODEL AND VOLUME INFORMATION:

The City of Edmonton provided the Associated Engineering project team with year 2041 link volumes for the 41 Avenue SW corridor. The project team was required to develop an appropriate staging plan that will accommodate these volumes. The project team was not provided with turning movement volumes at the intersections and was asked to come up with an appropriate alternative to determine the required number of lanes at the

intersections and along 41 Avenue SW.

The 2041 peak hour traffic volumes along 41 Avenue SW range from approximately 100 to 2100 vehicles. The largest volumes occur between the existing 91 Street (future 66 Street) and the existing 127 Street (future James Mowatt Trail). In the AM Peak Hour, the eastbound volumes are generally greater than the westbound volumes west of Highway 2 and the westbound volumes are generally greater than the eastbound volumes east of Highway 2. In the PM peak hour the eastbound volumes are generally less than the westbound volumes west of Highway 2 and the westbound volumes are generally less than the eastbound volumes east of Highway 2. The smallest volumes occur west of the existing 127 Street (future James Mowatt Trail) and east of the existing 91 Street (future 66 Street).

The Associated Engineering project team concluded that determining the number of through lanes and turning lanes at each intersection would not be feasible using either the available Traffic Impact Assessment (TIA) data or the existing traffic volumes. The available TIAs provide volumes at a number of different locations, however, they all estimate traffic volumes at different horizon years. The land use and population at the horizons represented in the various TIAs varies dramatically from one to the next. Using these volumes and/or turning movement ratios in the model would not give a consistent result. Moreover, the development and population projected for the study area in year 2041, as shown in the RTM provided by the City, is vastly different than what exists today. Using the existing information would not provide an adequate representation either.

LANE REQUIREMENTS:

According to the *City of Edmonton Roadway Planning and Design Objectives*, a roadway in Edmonton has a saturation flow rate of 1900 pc/hr/lane. The Planning and Design Objectives manual defines saturation flow rate as “the maximum steady flow rate – expressed in passenger cars per hour per lane – at which previously stopped passenger cars can cross the stop line of a signalized intersection under base conditions, assuming that the green signal is available and no lost times are experienced”.

Assuming a 50/50 split of green time between 41 Avenue SW and any of the connecting roadways, the saturation flow rates would be about 850-950 pc/hr/lane when factoring in lost time. With one lane provided in each direction (i.e. a 2-lane roadway), the link capacity would be about 900 pc/hr and the maximum volume entering an intersection on intersecting movements would be about 1800 pc/hr (i.e. the larger volume between the northbound and southbound directions plus the larger volume between the eastbound and westbound directions cannot equal more than 1800 pc/hr). The predicted 2041 RTM volumes east of the existing 91 Street (future 66 Street) and west of the existing 127 Street (future James Mowatt Trail) are less than the calculated theoretical capacity volumes as defined above. Therefore, east of the existing 91 Street (future 66 Street) and west of the existing 127 Street (future James Mowatt Trail), a 2-lane roadway would be sufficient within the 2041 horizon. Such a roadway should provide adequate levels of service and volume-to-capacity ratios.

With two lanes provided in each direction (i.e. a 4-lane roadway), the link capacity would be about 1900 pc/hr and the maximum volume entering an intersection on intersecting movements would be about 3800 pc/hr (i.e. the larger volume between the northbound and southbound directions plus the larger volume between the eastbound and westbound directions cannot equal more than 3800 pc/hr). The predicted 2041 RTM volumes west of the existing 91 Street (future 66 Street) and east of the existing 127 Street (future James Mowatt Trail) are less than the calculated theoretical capacity volumes. If only one lane was provided in each direction in this area, the link volumes would exceed the saturation flow rates and the intersections would likely fail. Therefore, west of the existing 91 Street (future 66 Street) and east of the existing 127 Street (future James Mowatt Trail), a 4-lane roadway should be sufficient within the 2041 horizon.

Regardless of through lanes, the intersections along 41 Avenue SW should be built within the ultimate footprint at the 4-lane stage. The channelized right-turn lane(s) will be constructed to their ultimate location and the median will be built to its ultimate location to provide for the necessary lane widths required for two slotted left turn lanes. As well, the channelized islands will be constructed wide enough to provide for 4, 6, or 8 through lanes on 41 Avenue SW. These additional lanes on 41 Avenue SW and additional turn lanes could therefore be developed as required along the corridor.

The project team's traffic analysis on the long-term model information indicate adequate levels of service and volume-to-capacity ratios with the intersection configurations identified in the recommended plan. Due to the fact that the intersections will be constructed within the ultimate footprint, the required number of turning lanes for the 2041 volumes can be accommodated when necessary. Because the intersections provide adequate levels of service and volume-to-capacity ratios using the long term volumes, they will be able to do the same with the 2041 volumes when the appropriate number of turning lanes are utilized. The exact number and location of the interim turning lanes will have to be determined at the detailed design stage when additional volume and turning movement information is available.

When more turning lanes and/or through lanes are necessary, the only required changes are the size of the channelized islands and the amount of space provided for slotted left turn lanes. To provide for more through lanes, the channelized islands get cut back to accommodate for the necessary additional lanes. Moreover, the median will be constructed wide enough to provide sufficient space for two slotted left turn lanes at all intersections. If only one left turn lane is identified in the long-term recommendations, a double slotted left could still be accommodated if required in the future. The cost of cutting the concrete back at any specific intersection along 41 Avenue would be a small percentage of the total project cost.

3 Concept Plan Development

3.1 PLANNING, DESIGN, CONSTRUCTION, OPERATION ELEMENTS

3.1.1 Access

From an access management perspective, Associated Engineering has designed intersections at minimum 800 metre spacing wherever possible. The existing approved ASPs and NASPs generally conform to this intersection spacing requirement. However, there are a few locations within the existing approved development plans where all-directional intersection spacing of less than 800 metres is planned or illustrated in the areas' development concepts. These are:

- WAM Industrial Park (south of 41 Avenue SW between 91 Street and Highway 2/QEII). The development plans indicate an access south from 41 Avenue SW about 400 metres east of the future 91 Street/Nisku Spine Road.
- Allard NASP (north of 41 Avenue SW between Highway 2/QEII and the existing 127 Street). This NASP illustrates two accesses to 41 Avenue between the existing 127 Street and Blackmud Creek – at a conceptual intersection spacing of about 500 metres.
- Windermere ASP (north of 41 Avenue SW between Whitemud Creek and the North Saskatchewan River). This ASP illustrates a realignment of 184 Street to the east, and the proposed alignment provides approximate 400 metre intersection spacing to an illustrated midpoint access to the east.

The Capital Region Integrated Growth Management Plan identifies a future regional road (often referred to as the East-West Freeway or the Edmonton Regional Ring Road [ERRR]) south of 41 Avenue SW. The Capital Region Integrated Growth Management Plan's Interim Report on Core Infrastructure identifies in *Exhibit 2.6: Major Road/Highway Upgrades – 2017 to 2041* the Regional Ring Road alignment south of the City of Edmonton. This exhibit illustrates the proposed Regional Ring Road crossing 41 Avenue SW west of 170 Street and crossing the North Saskatchewan River north of 41 Avenue SW. Until further detail is known, the 41 Avenue plans will only illustrate 41 Avenue SW east of 170 Street.

Major north-south roads across the 41 Avenue SW study area include 50 Street, the existing 91 Street (future 66 Street), the existing 101 Street (future 91 Street/Parsons Road/Nisku Spine Road), the existing 127 Street (future James Mowatt Trail), the existing 141 Street (future Heritage Valley Trail), and 170 Street/Terwillegar Drive. Highway 2/QEII is a major facility but is not included in this study. The existing 66 Street will likely be developed into a minor arterial to the north of 41 Avenue SW to service the Ellerslie and Southeast areas. The existing 156 Street is proposed to be removed, as indicated in the Chappelle NASP, and replaced with two intersections on either side of the existing 156 Street. The 41 Avenue SW concept plans assume that the development of two major collector accesses to the Chappelle NASP which will be mirrored south of 41 Avenue SW in Leduc County when those lands are redeveloped. The plans also assume a future collector roadway between the existing 141 Street and the existing 127 Street to service the Desrochers neighbourhood.

The steering committee discussed the possibility of interchanges at strategic locations along 41 Avenue SW. The City of Edmonton is developing a conceptual interchange configuration for 41 Avenue SW at 170 Street as part of a greater study of 170 Street. For the purposes of this study, the project team has indicated on the plans that an interchange configuration at 170 Street will be determined by others.

3.1.2 Transit

Transit was another issue that the project team had to consider when developing the concept plan for 41 Avenue. Edmonton Transit provided comments to Associated Engineering that outlined recommendations for transit along the corridor. The recommendations included placing bus pads and shelter pads 70 metres from the yield points of the channelized islands at each intersection. Edmonton Transit had initially suggested that bus stops be located along the north-south collector and arterial roads on the far side of the intersections as well as along 41 Avenue. However, because 41 Avenue is a high design speed major arterial, the steering committee discussed the issue and recommends that transit stops not be included along 41 Avenue SW; this is consistent with many new arterial roadways in the City of Edmonton. Bus stops are, however, recommended along the north and south sides of the intersections in order to accommodate service in both the City of Edmonton and Leduc County.

The inclusion of the bus pads and shelter pads cause a deflection in the multi-use trail / sidewalk alignment along the collector roads in order to maintain the minimum amount of right-of-way required. This trail deflection does not occur on the connecting arterial roads, however, due to the larger right-of-way allocated for these higher road designations. The bus pads and shelter pads are noted on the concept plans for 41 Avenue SW included with this report.

The bus pads and shelter pads conform to drawing number 4094 of the City of Edmonton Roadway Design and Construction Standards manual.

3.1.3 Urban Design, Landscaping, and Aesthetics

Aesthetics of a roadway is another important factor that needs to be addressed when developing a plan for a roadway. Two key elements that contribute to roadway aesthetics are landscaping and urban design.

The project team addressed this issue with the use of trees and street lights lining the median and boulevards of the roadway (as shown on the roadway cross-sections). These additions to the cross-section provide not only an increase in roadway safety, but a more aesthetically pleasing roadway as well. Moreover, in residential areas, the project team proposes sound walls as a noise mitigation technique. These sound walls have the potential for aesthetically pleasing designs without sacrificing the main function of sound attenuation. These sound walls are discussed in more detail in section 3.2.6 of this report.

3.1.4 Traffic Operations

3.1.4.1 Traffic Control Methods

At all of the intersections along the 41 Avenue SW corridor with the exception of the WAM access east of the Parsons Road intersection, the project team recommends signalization as the traffic control method. Each intersection, when adjusted for the proper number of lanes and lane configurations, operated acceptably as a signalized intersection when needed with the long-term volumes.

3.1.4.2 Right Turn Cut-Offs

A study was conducted by ISL Engineering in 2009 that developed a number of alternative geometric design solutions for right turn geometry. The study was in response to a growing concern from the City of Edmonton over the safety performance of right turn geometry at arterial and freeway intersections; currently in the City there is a significantly higher number of collisions at channelized intersections using a 3-centered curve design compared to simple radius designs.

A number of geometric design solutions for right turn geometry were developed including a simple corner radius design, a high entry angle design, and a low exit angle design. A set of criteria was developed in order to assist in the selection of the ideal geometry for any given roadway. The Associated Engineering project team analyzed each intersection along the 41 Avenue SW corridor and determined which right turn cut-off would be best suited for each right turn.

The simple corner radius design consists of either a 15 m radius curve or a 2-centred radius curve. This design eliminates the pork-chop island and the associated factors that drivers must pay attention to, improves the visibility of pedestrians and reduces the number of possible conflict points with pedestrians, reduces the turning speed and the variability of driver behaviour at a yield control, and reduces the number of collisions. The simple radius design, however, is not recommended for a high right turn volume or high approach volume.

The low exit angle design consists of a 25 m radius approaching the pork-chop island followed by a 100m radius exiting the turn. This design is used when a right turn lane enters an auxiliary lane where vehicles do not have to yield to through traffic. This design, in comparison to the existing lane-away design, reduces driver hesitation by lengthening the exit end of the pork-chop so that the turning vehicle is more obviously sheltered from through traffic and more readily notices the free-flow operation. This design is well suited to larger vehicles and has an expected lower collision record than the current design.
The high entry angle design consists of a large initial radius of 100 m followed by a comparatively small radius of 12 m as the turning lane joins the receiving roadway. The

high entry angle design reduces the angle the drivers must turn their heads to check approaching traffic for an appropriate gap to turn into, consequently reducing the number of rear end collisions at the intersection. The design also improves the visibility of pedestrians as vehicles approach the turn. With this design, however, turning movements for WB-21 vehicles could not be executed without encroachment into the second lane of the receiving roadway.

The project team recommends that the high entry angle design be used at all intersections along 41 Avenue SW. Because there are no auxiliary lane to auxiliary lane configurations along the corridor, the low entry angle design is not recommended. Moreover, the simple radius design is not recommended because there are no instances where a high turning volume or high through volume is not present.

To provide adequate space for a WB-21 design vehicle to make the turn with minimal encroachment, a right-turn lane width of 6 metres is recommended. In the few instances where a double right turn was required (50 Street eastbound, future 66 Street eastbound and southbound, future Parsons Road eastbound, the West Allard access northbound, and future James Mowatt Trail northbound), the WB-21 design vehicles could not make the turn at the same time without encroaching on one another's lanes using the desired high entry angle geometry. Because this particular situation is highly unlikely to occur, the project team used a WB-21 as the design vehicle for the inside lane (with a lane width of 6 metres) and an A-Bus as the design vehicle for the outside lane (with a lane width of 5 metres). In this situation the vehicles made the turn without encroachment using the recommended high entry angle design.

The high entry angle design will increase both vehicle and pedestrian safety and will work very effectively at right turns throughout the corridor.

3.1.5 Construction and Detour Staging

41 Avenue SW is planned to be an ultimate eight lane major arterial with typical landscaping, street lighting, and accommodation for pedestrians and non-motorized users. For the interim stages, however, 6-lane and 4-lane cross-sections have been developed as well. All stages are able to fit within the same right-of-way.

Regardless of through lanes, the intersections along 41 Avenue SW should be built within the ultimate footprint at the 4-lane stage. The channelized right-turn lane(s) will be constructed to their ultimate location and the median will be built to its ultimate location to provide for the necessary lane widths required for two slotted left turn lanes. As well, the channelized islands will be constructed wide enough to provide for 4, 6, or 8 through lanes on 41 Avenue SW. These additional lanes on 41 Avenue SW and additional turn lanes could therefore be developed as required along the corridor.

When more turning lanes and/or through lanes are necessary, the only required changes are the size of the channelized islands and the amount of space provided for slotted left turn lanes. To provide for more through lanes, the channelized islands get cut back to accommodate for the necessary additional lanes. Moreover, the median will be constructed wide enough to provide sufficient space for two slotted left turn lanes at all intersections. If only one left turn lane is identified in the long-term recommendations, a double slotted left could still be accommodated if required in the future. The cost of cutting the concrete back at any specific intersection along 41 Avenue would be a small percentage of the total project cost.

Plan numbers A041-0940, A041-0941, and A041-0942 illustrate a typical intersection staging plan that corresponds to the proposed roadway staging plan. These plans illustrate that the intersections can be constructed to the ultimate design, and then slightly modified with raised concrete to delineate the narrower road width in the first and second stages.

3.2 SUPPORTING STUDIES

3.2.1 Utility

The project team identified potential utility conflicts along the corridor, most notably underground pipelines that could potentially need to be relocated before the construction phase. An Edmonton Area Pipeline Map is attached in **Appendix D** of this report. The map displays all major pipelines along the study area. All utilities should be identified in more detail in the preliminary and detailed design phases of the project.

3.2.2 Drainage – Stormwater Management Concept

The 41 Avenue SW upgrades will be constructed in stages beginning with four lanes and increasing to six lanes and then eight lanes at some point in the future when required to accommodate increased traffic volumes. Each stage of the upgrades will increase the amount of runoff from the roadway due to an increased paved surface area. In order to minimize the construction costs, throw away costs, and traffic disruption, a drainage concept has been developed for the ultimate road configuration.

The ultimate configuration of 41 Avenue SW includes eight lanes with a curb and gutter design that will replace the existing road and roadside ditches. Storm sewers and catch basins will be required to convey the runoff from the roadway. Storm sewers should be designed to convey the peak discharge from a 1:5 year storm event, as per the current design standards. Runoff from the upgraded roadway will have to be controlled to pre-development rates; storage will be provided in the stormwater management facilities constructed as part of the adjacent developments. Water quality improvements to stormwater runoff will also be required. Available area structure plan documents were reviewed to ensure that the drainage concept for the road is consistent with future development plans.

Figure 3-1 shows the overall drainage concept for 41 Avenue SW; this will be discussed in more detail in the following sections. Figure 3-2 and Figure 3-3 show the drainage concept in more detail. Conceptual storage volumes and pipe sizes have been calculated for the roadway only. Requirements for the adjacent areas will be determined when those areas develop.

3.2.2.1 Interim Drainage

The drainage concept for ultimate development conditions assumes that the storage required for the road will be provided for in adjacent developments. However, the timing of the 41 Avenue SW upgrades relative to the adjacent developments is unknown. In addition the areas south of the road, in Leduc County, are expected to develop after the areas to the north within the City of Edmonton.

An interim drainage plan may be required for all or part of the road. Interim drainage may include:

- Constructing the first phase of one or more stormwater management facilities and related outlet works.
- Temporarily accommodating offsite drainage from the adjacent lands in the 41 Avenue SW drainage system, depending on the drainage area and peak flow.
- Intercepting and conveying offsite drainage in a ditch parallel to the road, depending on the drainage area and peak flow.

Figure 3-1 shows the locations where ditches may be required to intercept offsite flows from the south.

3.2.2.2 Methodology

The development of the 41 Avenue SW drainage concept included the following tasks:

- Review available planning documents to determine the location of future stormwater management facilities.
- Review the concept plan for the road, in particular the ultimate road cross section and proposed high and low points along the road.
- Review the allowable release rates for the downstream water bodies (Whitemud Creek and Blackmud Creek).
- Size storm sewers based on the 1:5 year peak flow calculated using the IDF parameters for the Edmonton International Airport.
- Determine the 1:100 year storage requirements (m3/km and m3/ha of road) for the ultimate road configuration using the IDF parameters for the Edmonton International Airport.
- Drainage requirements for the future QE2 interchange from station 7+716 to 9+422 are outside the scope of this analysis.

3.2.2.3 Design Criteria

The following summarizes the design criteria and assumptions used in the 41 Avenue SW drainage assessment:

- Runoff from the road will ultimately be discharged to Blackmud Creek and Whitemud Creek. The allowable release rate for areas tributary to these drainage courses is 5 L/s/ha as per current practice in the City of Edmonton.
- The 1:100 year required storage for 41 Avenue SW will be accommodated in the facilities constructed in the adjacent neighbourhoods. Future pond locations are based on available drainage planning information and planning documents.
- Conceptual storage volumes and pipe sizes are based on the IDF parameters for the Edmonton International Airport and the ultimate road cross section.
- The conceptual storm sewer sizing is based on the 41 Avenue SW concept plan.
- Pipe sizes were calculated for the 1:5 year peak flows for the roadway only. No allowance has been made for flows from adjacent areas. It has been assumed that the flow from adjacent areas will be accommodated in the drainage systems developed for those areas. Interim drainage may be accommodated in the 41 Avenue SW system or intercepted depending on the timing of development and the magnitude of the peak flows.
- The conceptual storage volumes are based on:
    - 1:100 year 24 hour volume based on IDF parameters for the Edmonton International Airport
    - Allowable release rate of 5 L/s/ha
    - Runoff coefficient (C) for the road right-of-way (ROW) of 0.70, based on a ROW width of 57 m and a pavement width of 35.1 m
- The conceptual pipe design is based on:
    - 1:5 year peak flows based on IDF parameters for the Edmonton International Airport
    - Runoff coefficient (C) for the road ROW of 0.63
    - 10 minute time of concentration
    - Manhole spacing of 120 m
    - Minimum pipe sizes and slopes as defined in the City of Edmonton Design Standards
    - Minimum and maximum velocity criteria as defined in the City of Edmonton Design Standards

3.2.2.4 Existing Drainage Features

Within the current project limits, the 41 Avenue SW right of way falls within the Blackmud Creek and Whitemud Creek basins. Runoff from the road will ultimately discharge to these water bodies at predevelopment rates with storage provided in adjacent developments.

In addition to the creeks, there are a number of wetlands and significant drainage features

that will be impacted by the road upgrades including Cawes Lake which is a large wetland located immediately south of the road (at station 14+100). Future developments, including the road upgrades, will be required to minimize their impact and protect and preserve these drainage features. Approvals will be required for any alterations to existing wetlands and drainage features, depending on the type and magnitude of the alterations compensation may also be required.

3.2.2.5 Topography

The general direction of drainage in the area is to the west and north towards Blackmud Creek, Whitemud Creek and eventually to the North Saskatchewan River. While the roadway generally follows the natural topography, the drainage system is impacted by the proposed road elevations and high and low points identified in the concept plan. There are a number of high points along 41 Avenue SW that will split the flow to the east and west towards the low points in the road. From the low points flows will be directed to the north or south to stormwater management facilities (typically to the north to facilities within the City of Edmonton), depending on the timing of the adjacent development.

The low points are located at:

2+100

Whitemud Creek is located at station 2+100. Runoff from station 1+800 to 2+860 will discharge to the creek; approximately 1,060 m of storm sewers will be required. Two stormwater management facilities will be required to service this section of road, one on each side of the creek. The available planning documents do not show ponds in this area and therefore dedicated facilities for the roadway drainage may be required.

3+290

Runoff from 2+860 to 4+300 will drain to the low point at 3+290. Flows will then be directed to the north to an existing stormwater management facility at the Whitemud Creek Golf Course or to a future facility proposed as part of the Chappelle neighbourhood. Approximately 1,880 m of storm sewer will be required to service this section of road.

5+090

Runoff from 4+300 to 5+720 will drain to the low point at 5+090. Flows will be directed to the north. Approximately 1,770 m of storm sewers will be required. The available planning documents for Heritage Valley do not slow a pond in the vicinity of this low spot. The design of the future drainage system will be developed in more detail as the planning for this area continues.

6+170

Runoff from 5+720 to 6+630 will drain to the low point at 6+170. Flows will be directed to the north. Approximately 1,260 m of storm sewers will be required. The available planning

documents for Heritage Valley do not show a pond in the vicinity of this low spot. The design of the future drainage system will be developed in more detail as the planning for this area continues.

7+710

Runoff from 6+630 will drain east towards Blackmud Creek. At about station 7+710 flows will be directed to a future stormwater management facility located in Heritage Valley Neighbourhood 8. Approximately 1,880 m of storm sewer will be required.

9+800

Runoff from the east ramp of the Calgary Trail overpass (9+660) to 11+290 will discharge to the low point at 9+800. Approximately 2,010 m of storm sewers are required. From here flows can be directed to the north to a future facility within the Ellerslie ASP area or possibly to the south to the facility proposed as part of the Nisku Industrial Development. Development is currently underway in the Nisku Industrial Area. Drainage planning for the area would have to be coordinated with the developer in the near future for the facility and outlet works to be able to accommodate all or part of the road drainage in this area.

11+580

Runoff from 11+290 to 12+200 will drain to the low point at 11+580 and then to the north to a future stormwater management facility in the Ellerslie Neighbourhood 3. Approximately 1,600 m of storm sewers will be required to convey runoff from the road to the future pond.

12+690

Runoff from 12+200 to 13+380 will drain to the low point at 12+690. Approximately 1,230 m of storm sewers are required for this section of road. At this location there are two existing wetlands on the north and south sides of the road that could possibly be incorporated into the 41 Avenue SW drainage system. Approvals and compensation may be required for any alterations required to accommodate the ultimate road configuration and roadway runoff. A sediment forebay should be included in the drainage design to improve the water quality and minimize the impact of the wetlands. Alternately, runoff could be directed to the north to a future stormwater management facility located in Ellerslie Neighbourhood 4.

14+030

Runoff from 13+380 to 15+400 will drain to Cawes Lake, which is a large wetland located immediately south of 41 Avenue SW. Approvals will be required in order to discharge to the wetland. A sediment forebay should be included in the drainage design to improve water quality thereby minimizing the impact on the wetland. Compensation may be required if the wetland is going to be altered to accommodate the ultimate road configuration. Approximately 2,030 m of storm sewers are required to service this section of road.

3.2.2.6 Storage Requirements

The required storage volume for the 1:100 year 24 hour storm event was calculated using the Modified Rational Method, based on a release rate of 5 L/s/ha. Table 3-1 summarizes the calculations. The required storage is difference between the total runoff volume and the outflow volume over the duration of the storm event. The outflow is assumed to peak at the end of the storm, and therefore the time averaged outflow rate during the storm is approximately one half of the peak rate. The required storage volume is:

- 2720 m3/km of roadway (one kilometer of road covers a 5.7 ha area, based on the 57 m right of way), or
- 480 m3/ha, one hectare representing 175 m of road

3.2.2.7 Conceptual Pipe Sizing

Preliminary pipe sizes have been calculated as part of the 41 Avenue SW drainage concept and are provided in Table 3-2. The pipe sizes are based on the available information including proposed road grades, planning documents and design standards. The storm sewers will follow the road grades to minimize the depth of installation. A minimum depth of cover of 2 m has been used along with 120 m manhole spacing. Approximately 14.7 km of storm sewers are required to service 41 Avenue SW within the limits of the current project. Storm sewers will generally range in diameter from 300 mm to 750 mm.

3.2.2.8 Staging of Drainage Facilities

Figure 3-4 provides a conceptual cross section of the roadway showing the staging of storm drainage facilities. Storm sewers would be constructed in the first stage of the roadway (four lanes) but would be sized for the ultimate roadway to minimize throw away costs and traffic disruption. Road side ditches will intercept and convey the offsite drainage in the interim condition; these ditches will be abandoned in the future as the road is expanded or as the adjacent development areas are completed and their stormwater drainage systems are constructed. Stormwater ponds would be constructed in conjunction with the adjacent development, or the initial stages of these facilities could be constructed to serve the roadway.

3.2.2.9 Conclusions

Runoff from 41 Avenue SW will discharge to Whitemud Creek and Blackmud Creek. In addition, there are a number of existing wetlands that may be impacted by the road widening. Compensation may be required for any alterations or filling required to accommodate the road.

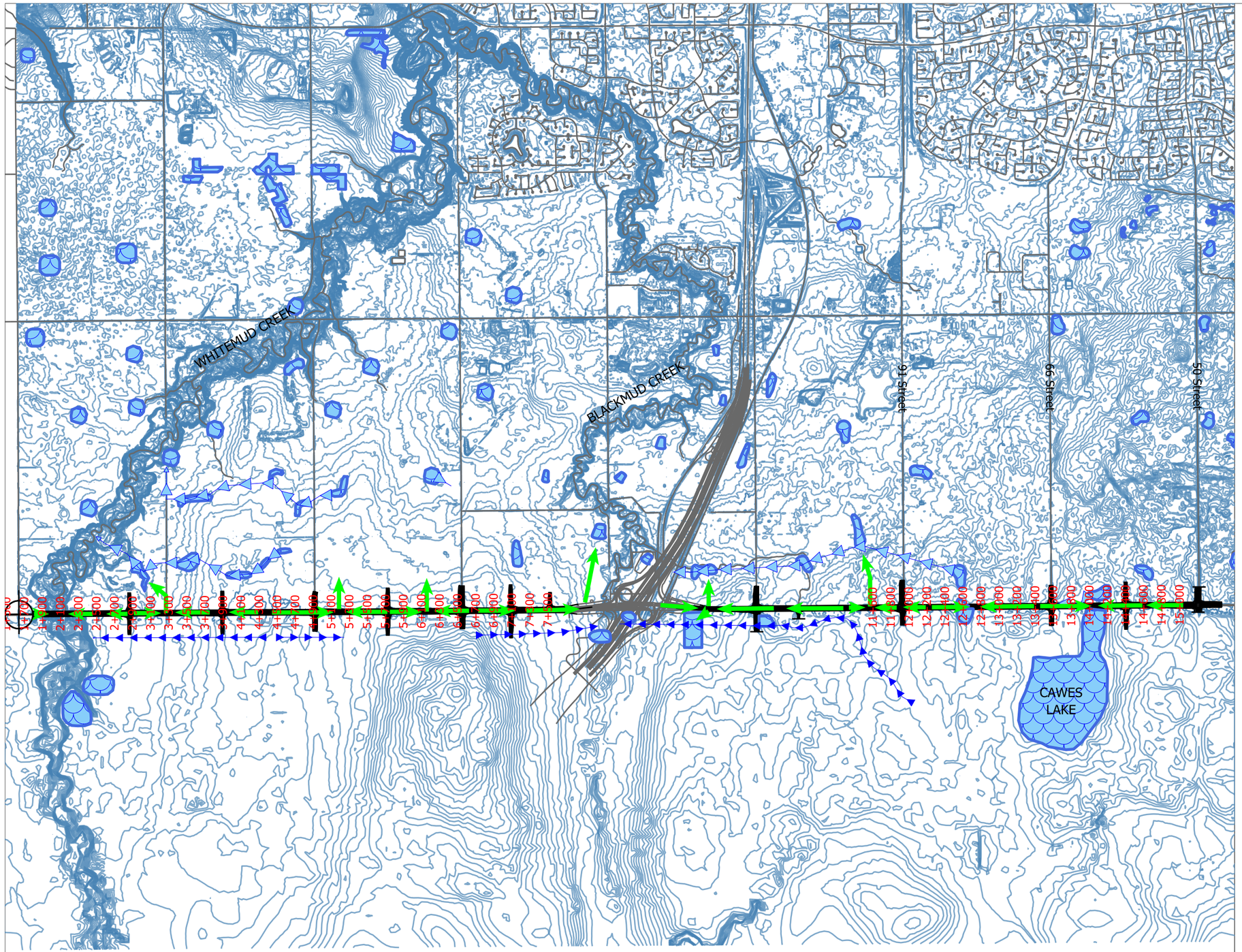
The required storage is 2720 m^3 for each kilometer of road (5.7 ha) to control flows to 5

L/s/ha. Storage will be provided in the adjacent developments.

The timing of future developments is unknown. If 41 Avenue SW is upgraded prior to development on the north and/or south sides of the road, an interim servicing concept will be required to handle runoff from the road as well as the offsite areas. The offsite drainage may have to be accommodated in the 41 Avenue SW drainage system or intercepted in a ditch parallel to the road.

Based on the proposed road grades, about 14.7 km of storm sewers will be required ranging in diameter from 300 mm to 750 mm.

Design and construction of the 41 Avenue SW drainage system should be coordinated with the drainage plans of adjacent developments to minimize the length of storm sewer required to service those areas and to facilitate the staged development of stormwater management facilities.



THE CITY OF Edmonton

41 AVENUE CONCEPT PLAN

CONCEPTUAL DRAINAGE REQUIREMENTS

LEGEND

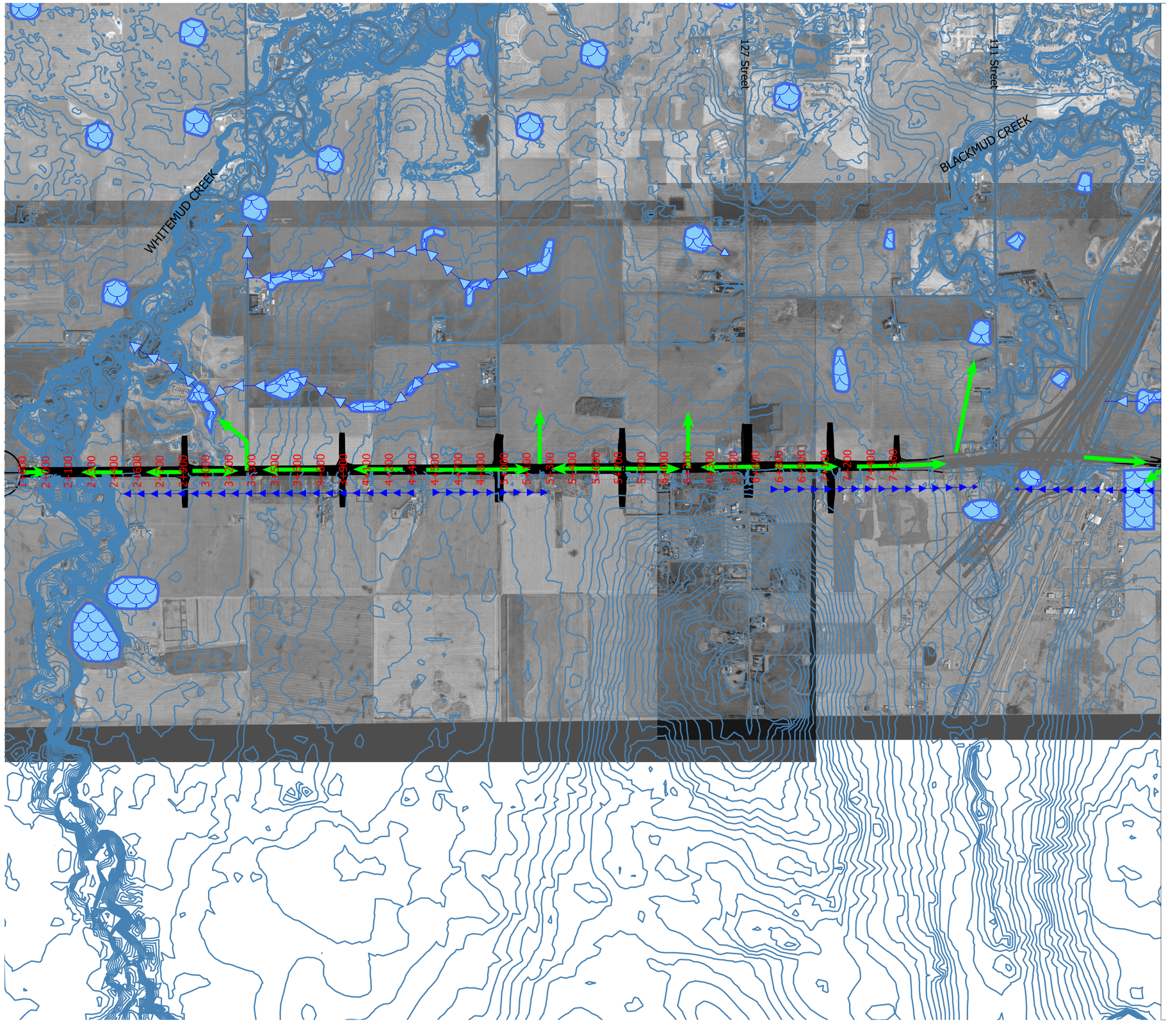
- 41 AVENUE STORM SEWERS
- FUTURE SWM FACILITIES
- PROPOSED DRAINAGE (FROM ASPs)
- INTERCEPT OFFSITE DRAINAGE
- CONTOURS
- BASE PLAN

Scale: 1:45,000

January 2011

Figure 3-1

P:\20073483\00_COE_41_Ave\Engineering\03.00_Conceptual_Feasibility_Design\Drainage\GIS\GIS.map:[Component]
[Coordinate System] [Datum] [Projection] Scale [Scale Numeric] 1/7/2011



THE CITY OF Edmonton

41 AVENUE CONCEPT PLAN

CONCEPTUAL DRAINAGE REQUIREMENTS

LEGEND

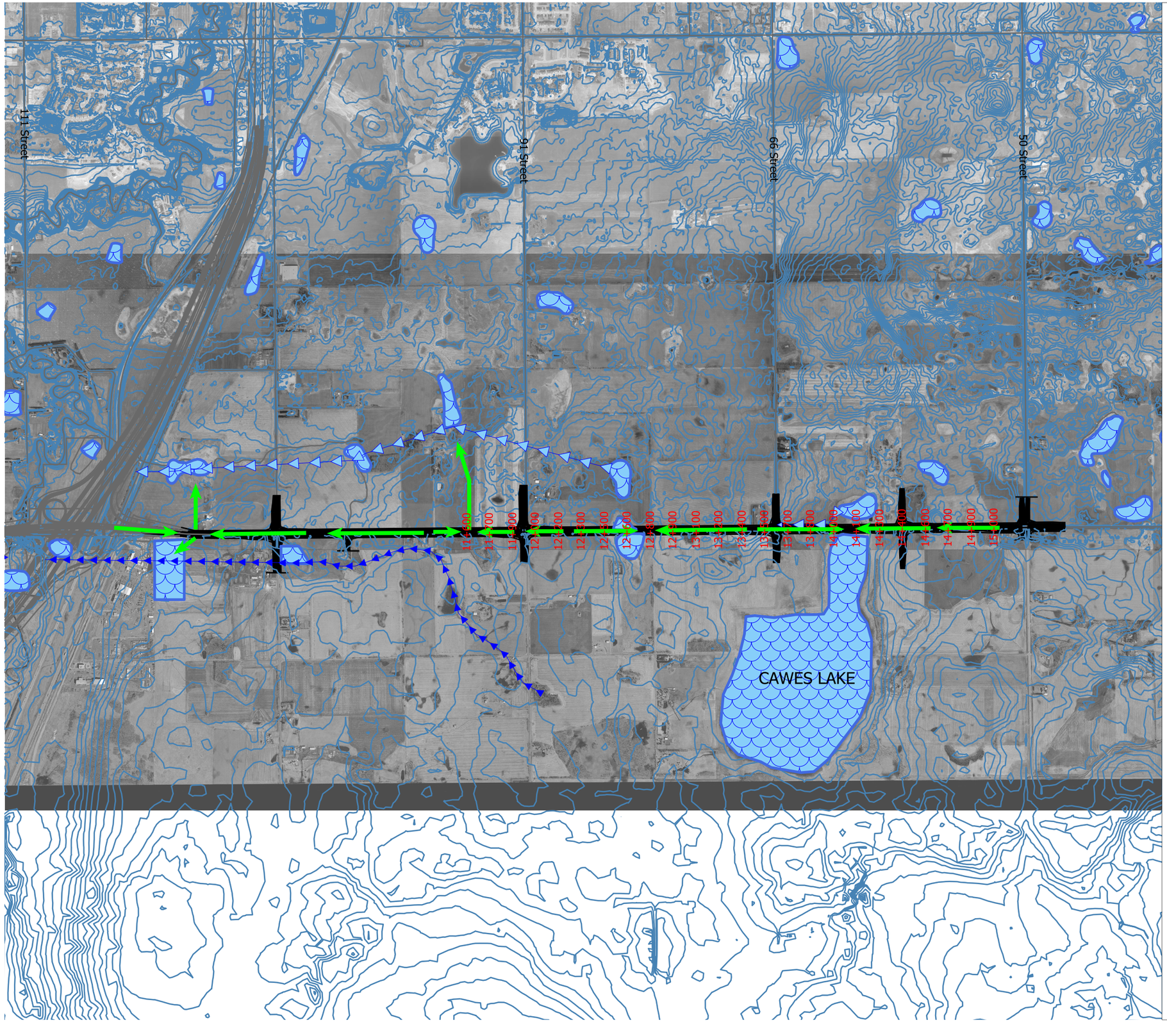
- 41 AVENUE STORM SEWERS
- FUTURE SWM FACILITIES
- PROPOSED DRAINAGE (FROM ASPs)
- INTERCEPT OFFSITE DRAINAGE
- CONTOURS

Scale: 1:25,000

January 2011

Figure 3-2

P:\200734831\00_COE_41_Ave\Engineering\03.00_Conceptual_Feasibility_Design\Drainage\GIS\GIS.map:[Component] [Coordinate System] [Datum] [Projection] Scale [Scale Numeric] 1/7/2011



THE CITY OF Edmonton

41 AVENUE CONCEPT PLAN

CONCEPTUAL DRAINAGE REQUIREMENTS

LEGEND

- 41 AVENUE STORM SEWERS
- FUTURE SWM FACILITIES
- PROPOSED DRAINAGE (FROM ASPs)
- INTERCEPT OFFSITE DRAINAGE
- CONTOURS

Scale: 1:25,000

January 2011

Figure 3-3

P:\200734831\00_COE_41_Ave\Engineering\03.00_Conceptual_Feasibility_Design\Drainage\GIS\GIS.map:[Component] [Coordinate System] [Datum] [Projection] Scale [Scale Numeric] 1/7/2011

Table 3-1: Storage Requirements for 41 Avenue SW
Simplified storage analysis using the Modified Rational Method
Version 29/09/2008
For storm durations 1 to 24 hours

Location: 41 Avenue
Project # 2007-3483 Date: 10/20/10

Project Number:
Computed by: AD

NOTE: USE YELLOW AREAS ONLY FOR DATA INPUT

IDF Curve Edmonton Intl A (AES, 1990)

	Area (ha)	Cv
Commercial		0.9
Industrial		0.8
Residential		0.55
Pond		1
Road	5.7	0.7
Total area =	5.7 ha	
Cv =	0.70	
Return period	100 years	
Peak outflow rate	5 l/s/ha	

Pipe Design:

Return Period	5	years
Tc	10	minutes
Q	128.4	l/s/ha

Storage Parameters		
Peak inflow	1.33	m^3/s
Peak outflow	28.5	l/s
Storage volume	2720	m^3
Critical storm event	24	hours
Time to drain	53	hours
	2	days

Rainfall parameters for storage		
Return period	100	years
IDF Curve	Edmonton Intl A (AES, 1990)	
IDF Curve Number	6	
a	35.6	(t in hours)
b	-0.678	
c	0	hours

Rainfall parameters for pipe design		
Return period	5	years
IDF Curve	Edmonton Intl A (AES, 1990)	
IDF Curve Number	2	
a	20.2	(t in hours)
b	-0.661	
c	0	hours

Storage volume for Edmonton Intl A (AES, 1990) 1:100 year storm Cv = 0.70

Duration (minutes) minutes	Duration (hours)	Rainfall (mm)	Runoff (m^3/ha)	Storage per ha for various peak flow rates (l/s) 0.5	1.2	2.5	5	10	Design value 5	Duration hours
10	0.17	19.99	140	140	140	139	138	137	138	0.1667
15	0.25	23	159	159	159	158	157	155	157	0.25
30	0.5	28	199	199	198	197	195	190	195	0.5
45	0.75	32	227	226	226	224	220	214	220	0.75
60	1	36	249	248	247	245	240	231	240	1
	2	45	312	310	307	303	294	276	294	2
	3	51	355	352	348	341	328	301	328	3
	4	56	389	386	381	371	353	317	353	4
	6	63	444	438	431	417	390	336	390	6
	12	79	555	544	529	501	447	339	447	12
	18	90	632	616	593	551	470	308	470	18
	24	99	693	672	642	585	477	261	477	24
Maximum storage req'd (m^3/ha)				672	642	585	477	339	477	
			mm	67.2	64.2	58.5	47.7	33.9	47.7	
Critical storm duration (hours)				24	24	24	24	12	24	
Critical event				24	24	24	24	12	24	
Time to drain			hours	746.4	297.0	130.1	53.0	18.8	53.0	
			days	31.1	12.4	5.4	2.2	0.8	2.2	

TABLE 3-2: CONCEPTUAL STORM SEWER SIZING

**NOTE: ONLY ENTER DATA IN THE HIGHLIGHTED CELLS.
CHOOSE PROJECT LOCATION FROM THE DROP-DOWN MENU. FILL IN THE RETURN PERIOD AND INITIAL TIME OF CONCENTRATION. RATIONAL METHOD CALCULATION DONE USING MANNING'S EQUATION.
TRIBUTARY AREAS WILL BE AUTOMATICALLY SUMMED, BUT FORMULAS WILL

ASSOCIATED ENGINEERING ALBERTA LTD.
MUNICIPAL ENGINEERING GROUP

STORM SEWER DESIGN CHART
RATIONAL METHOD FOR CIRCULAR PIPE

LOCATION: Edmonton Intl A
CLIENT: City of Edmonton
PROJECT: 41 Avenue Storm Sewers
PROJECT NO: 2007-3483

INITIAL CONCENTRATION TIME: 10 min
RETURN PERIOD: 5 year

IDF PARAMETERS:
a= 20.200
b= -0.661
c= 0.0000

DESIGNED BY: AD
REVISED BY:
PAGE: 1 OF 1
DATE DESIGN/CHECK: 20-Oct-10

CATCHMENT DATA											PIPE DESIGN DATA											PIPE PROFILE				
CATCHMENT NO.	FROM MH	TO MH	LOCAL AREA (A) ha	RUNOFF COEFF (C)	EQUIVALENT AREA INCR. (AXC)	EQUIVALENT AREA TOTAL ha	TIME OF CONC. INCR. min	TIME OF CONC. TOTAL min	RAIN INT. I mm/hr	FLOW Q= AC*I 360 m^3/s	PIPE TYPE	n	SLOPE (%)	SIZE mm	SIZE mm	FLOW AREA m^2	WETTED PERIMETER m	HYDRAULIC RADIUS	CAP. m^3/s	VEL. m/s	LENGTH m	TIME IN PIPE min	UPSTREAM MH INVERT m	UPSTREAM MH RIM m	DROP IN PIPE m	DOWNSTREAM MH INVERT m	DOWNSTREAM MH RIM m
1	1+800	1+920	0.68	0.63	0.428	0.428	0	10	66.03	0.079	conc	0.013	0.12	450	450	0.159	1.414	0.113	0.099	0.62	120	3.221	693.10	695.6	0.144	692.96	695.5
2	1+920	2+040	0.68	0.63	0.428	0.857	3.221	13.22	54.9	0.131	conc	0.013	0.12	525	525	0.216	1.649	0.131	0.149	0.69	120	2.906	692.88	695.5	0.144	692.74	695.5
3	2+040	2+100	0.68	0.63	0.428	1.285	2.906	16.13	48.14	0.172	conc	0.013	0.12	600	600	0.283	1.885	0.150	0.213	0.75	60	1.329	692.66	695.5	0.072	692.59	695.4
4	2+860	2+740	0.68	0.63	0.428	0.428	0	10	66.03	0.079	conc	0.013	0.49	375	375	0.110	1.178	0.094	0.123	1.11	120	1.8	694.50	697	0.588	693.91	696.4
5	2+740	2+620	0.68	0.63	0.428	0.857	1.8	11.8	59.18	0.141	conc	0.013	0.49	450	450	0.159	1.414	0.113	0.200	1.25	120	1.594	693.84	696.4	0.588	693.25	695.7
6	2+620	2+500	0.68	0.63	0.428	1.285	1.594	13.39	54.43	0.194	conc	0.013	0.48	450	450	0.159	1.414	0.113	0.198	1.24	120	1.61	693.25	695.7	0.576	692.67	695.3
7	2+500	2+380	0.68	0.63	0.428	1.714	1.61	15	50.49	0.241	conc	0.013	0.16	600	600	0.283	1.885	0.150	0.246	0.87	120	2.302	692.52	695.3	0.192	692.33	695.3
8	2+380	2+260	0.68	0.63	0.428	2.142	2.302	17.31	45.95	0.274	conc	0.013	0.15	675	675	0.358	2.121	0.169	0.326	0.91	120	2.198	692.26	695.3	0.180	692.08	695.4
9	2+260	2+140	0.68	0.63	0.428	2.57	2.198	19.5	42.45	0.303	conc	0.013	0.15	675	675	0.358	2.121	0.169	0.326	0.91	120	2.198	692.08	695.4	0.180	691.90	695.4
10	2+140	2+100	0.68	0.63	0.428	2.999	2.198	21.7	39.56	0.330	conc	0.013	0.16	675	675	0.358	2.121	0.169	0.336	0.94	40	0.71	691.90	695.4	0.064	691.83	695.4
11	2+861	2+980	0.68	0.63	0.428	0.428	0	10	66.03	0.079	conc	0.013	0.51	375	375	0.110	1.178	0.094	0.125	1.13	120	1.764	694.10	697	0.612	693.49	696.1
12	2+980	3+100	0.68	0.63	0.428	0.857	1.764	11.76	59.3	0.141	conc	0.013	0.51	450	450	0.159	1.414	0.113	0.204	1.28	120	1.562	693.41	696.1	0.612	692.80	695.4
13	3+100	3+220	0.68	0.63	0.428	1.285	1.562	13.33	54.61	0.195	conc	0.013	0.51	450	450	0.159	1.414	0.113	0.204	1.28	120	1.562	692.80	695.4	0.612	692.189	694.8
14	3+220	3+290	0.68	0.63	0.428	1.714	1.562	14.89	50.75	0.242	conc	0.013	0.51	525	525	0.216	1.649	0.131	0.307	1.42	70	0.822	692.11	694.8	0.357	691.757	694.3
TO POND	3+290	SWMF	0	0	0	5.569	0.822	15.71	48.98	0.758	conc	0.013	0.52	750	750	0.442	2.356	0.188	0.803	1.82	440	4.036	691.53	694.3	2.288	689.244	692
15	4+295	4+175	0.68	0.63	0.428	0.428	0	10	66.03	0.079	conc	0.013	1	300	300	0.071	0.942	0.075	0.097	1.37	120	1.462	701.90	704.4	1.200	700.70	703
16	4+175	4+055	0.68	0.63	0.428	0.857	1.462	11.46	60.33	0.144	conc	0.013	1	375	375	0.110	1.178	0.094	0.175	1.59	120	1.26	700.63	703	1.200	699.43	702
17	4+055	3+935	0.68	0.63	0.428	1.285	1.26	12.72	56.31	0.201	conc	0.013	1	450	450	0.159	1.414	0.113	0.285	1.79	120	1.116	699.35	702	1.200	698.15	700.8
18	3+935	3+815	0.68	0.63	0.428	1.714	1.116	13.84	53.27	0.254	conc	0.013	1	450	450	0.159	1.414	0.113	0.285	1.79	120	1.116	698.15	700.8	1.200	696.95	699.6
19	3+815	3+695	0.68	0.63	0.428	2.142	1.116	14.95	50.61	0.301	conc	0.013	1	525	525	0.216	1.649	0.131	0.430	1.99	120	1.007	696.88	699.6	1.200	695.68	698.4
20	3+695	3+575	0.68	0.63	0.428	2.57	1.007	15.96	48.47	0.346	conc	0.013	1	525	525	0.216	1.649	0.131	0.430	1.99	120	1.007	695.68	698.4	1.200	694.48	697.2
21	3+575	3+455	0.68	0.63	0.428	2.999	1.007	16.97	46.55	0.388	conc	0.013	1	525	525	0.216	1.649	0.131	0.430	1.99	120	1.007	694.48	697.2	1.200	693.28	696
22	3+455	3+335	0.68	0.63	0.428	3.427	1.007	17.97	44.81	0.427	conc	0.013	1	525	525	0.216	1.649	0.131	0.430	1.99	120	1.007	693.28	696	1.200	692.07	695
23	3+335	3+290	0.68	0.63	0.428	3.856	1.007	18.98	43.23	0.463	conc	0.013	1	600	600	0.283	1.885	0.150	0.614	2.17	45	0.345	692.00	695	0.450	691.55	694.3
24	4+300	4+420	0.68	0.63	0.428	0.428	0	10	66.03	0.079	conc	0.013	0.55	375	375	0.110	1.178	0.094	0.130	1.18	120	1.699	701.70	704.4	0.660	701.04	703.5
25	4+420	4+540	0.68	0.63	0.428	0.857	1.699	11.7	59.52	0.142	conc	0.013	0.55	450	450	0.159	1.414	0.113	0.211	1.33	120	1.504	700.97	703.5	0.660	700.31	703
26	4+540	4+660	0.68	0.63	0.428	1.285	1.504	13.2	54.95	0.196	conc	0.013	0.55	450	450	0.159	1.414	0.113	0.211	1.33	120	1.504	700.31	703	0.660	699.65	702.2

TABLE 3-2: CONCEPTUAL STORM SEWER SIZING

**NOTE: ONLY ENTER DATA IN THE HIGHLIGHTED CELLS.
CHOOSE PROJECT LOCATION FROM THE DROP-DOWN MENU. FILL IN THE RETURN PERIOD AND INITIAL TIME OF CONCENTRATION. RATIONAL METHOD CALCULATION DONE USING MANNING'S EQUATION.
TRIBUTARY AREAS WILL BE AUTOMATICALLY SUMMED, BUT FORMULAS WILL

ASSOCIATED ENGINEERING ALBERTA LTD.
MUNICIPAL ENGINEERING GROUP

STORM SEWER DESIGN CHART
RATIONAL METHOD FOR CIRCULAR PIPE

LOCATION Edmonton Intl A
CLIENT City of Edmonton
PROJECT 41 Avenue Storm Sewers
PROJECT NO 2007-3483

INITIAL CONCENTRATION TIME 10 min
RETURN PERIOD 5 year

IDF PARAMETERS:
a= 20.200
b= -0.661
c= 0.0000

DESIGNED BY AD
REVISED BY
PAGE 1 OF 1
DATE DESIGN/CHECK 20-Oct-10

CATCHMENT DATA											PIPE DESIGN DATA												PIPE PROFILE				
27	4+660	4+780	0.68	0.63	0.428	1.714	1.504	14.71	51.16	0.244	conc	0.013	0.5	525	525	0.216	1.649	0.131	0.304	1.4	120	1.424	699.57	702.2	0.600	698.97	701.5
28	4+780	4+900	0.68	0.63	0.428	2.142	1.424	16.13	48.13	0.287	conc	0.013	0.5	525	525	0.216	1.649	0.131	0.304	1.4	120	1.424	698.97	701.5	0.600	698.37	700.9
29	4+900	5+020	0.68	0.63	0.428	2.57	1.424	17.55	45.52	0.325	conc	0.013	0.6	525	525	0.216	1.649	0.131	0.333	1.54	120	1.3	698.37	700.9	0.720	697.65	700.2
30	5+020	5+090	0.68	0.63	0.428	2.999	1.3	18.85	43.42	0.362	conc	0.013	0.5	600	600	0.283	1.885	0.150	0.434	1.54	70	0.76	697.58	700.2	0.350	697.23	700
TO POND	5+090	SWMF	0	0	0	5.569	0.76	19.61	42.3	0.655	conc	0.013	0.35	600	750	0.442	2.356	0.188	0.659	1.49	350	3.913	697.23	700	1.225	696.00	699.5
31	5+720	5+600	0.68	0.63	0.428	0.428	0	10	66.03	0.079	conc	0.013	0.35	375	375	0.110	1.178	0.094	0.104	0.94	120	2.13	700.30	703	0.420	699.88	702.5
32	5+600	5+480	0.68	0.63	0.428	0.857	2.13	12.13	58.11	0.138	conc	0.013	0.45	450	450	0.159	1.414	0.113	0.191	1.2	120	1.663	699.81	702.5	0.540	699.27	701.8
33	5+480	5+360	0.68	0.63	0.428	1.285	1.663	13.79	53.38	0.191	conc	0.013	0.45	450	450	0.159	1.414	0.113	0.191	1.2	120	1.663	699.27	701.8	0.540	698.73	701.2
34	5+360	5+240	0.68	0.63	0.428	1.714	1.663	15.46	49.51	0.236	conc	0.013	0.5	525	525	0.216	1.649	0.131	0.304	1.4	120	1.424	698.65	701.2	0.600	698.05	700.6
35	5+240	5+120	0.68	0.63	0.428	2.142	1.424	16.88	46.71	0.278	conc	0.013	0.5	525	525	0.216	1.649	0.131	0.304	1.4	120	1.424	698.05	700.6	0.600	697.45	700
36	5+120	5+090	0.68	0.63	0.428	2.57	1.424	18.3	44.28	0.316	conc	0.013	0.3	600	600	0.283	1.885	0.150	0.336	1.19	30	0.42	697.38	700	0.090	697.29	700
37	5+721	5+840	0.68	0.63	0.428	0.428	0	10	66.03	0.079	conc	0.013	0.35	375	375	0.110	1.178	0.094	0.104	0.94	120	2.13	700.30	703	0.420	699.88	702.5
39	5+840	5+960	0.68	0.63	0.428	0.857	2.13	12.13	58.11	0.138	conc	0.013	0.65	375	375	0.110	1.178	0.094	0.141	1.28	120	1.563	699.88	702.5	0.780	699.10	701.7
39	5+960	6+080	0.68	0.63	0.428	1.285	1.563	13.69	53.64	0.192	conc	0.013	0.55	450	450	0.159	1.414	0.113	0.211	1.33	120	1.504	699.03	701.7	0.660	698.37	701
40	6+080	6+170	0.68	0.63	0.428	1.714	1.504	15.2	50.07	0.239	conc	0.013	0.55	525	525	0.216	1.649	0.131	0.319	1.47	90	1.018	698.29	701	0.495	697.80	700.5
TO POND	6+170	SWMF	0	0	0	3.427	1.018	16.21	47.97	0.457	conc	0.013	0.55	750	750	0.442	2.356	0.188	0.826	1.87	350	3.121	697.57	700.5	1.925	695.65	698.5
41	6+625	6+505	0.68	0.63	0.428	0.428	0	10	66.03	0.079	conc	0.013	0.43	375	375	0.110	1.178	0.094	0.115	1.04	120	1.921	700.10	702.8	0.516	699.58	702.2
42	6+505	6+385	0.68	0.63	0.428	0.857	1.921	11.92	58.78	0.140	conc	0.013	0.41	450	450	0.159	1.414	0.113	0.183	1.15	120	1.742	699.51	702.2	0.492	699.02	701.6
43	6+385	6+265	0.68	0.63	0.428	1.285	1.742	13.66	53.72	0.192	conc	0.013	0.46	450	450	0.159	1.414	0.113	0.193	1.22	120	1.645	699.02	701.6	0.552	698.47	701
44	6+265	6+170	0.68	0.63	0.428	1.714	1.645	15.31	49.83	0.237	conc	0.013	0.45	525	525	0.216	1.649	0.131	0.288	1.33	95	1.188	698.39	701	0.428	697.96	700.5
45	6+630	6+750	0.68	0.63	0.428	0.428	0	10	66.03	0.079	conc	0.013	1	375	375	0.110	1.178	0.094	0.175	1.59	120	1.26	700.10	702.8	1.200	698.90	701.5
46	6+750	6+870	0.68	0.63	0.428	0.857	1.26	11.26	61.04	0.145	conc	0.013	1	375	375	0.110	1.178	0.094	0.175	1.59	120	1.26	698.90	701.5	1.200	697.70	700.3
47	6+870	6+990	0.68	0.63	0.428	1.285	1.26	12.52	56.91	0.203	conc	0.013	0.8	450	450	0.159	1.414	0.113	0.255	1.6	120	1.247	697.63	700.3	0.960	696.67	699.2
48	6+990	7+110	0.68	0.63	0.428	1.714	1.247	13.77	53.45	0.255	conc	0.013	0.6	525	525	0.216	1.649	0.131	0.333	1.54	120	1.3	696.59	699.2	0.720	695.87	698.7
49	7+110	7+230	0.68	0.63	0.428	2.142	1.3	15.07	50.35	0.300	conc	0.013	0.5	525	525	0.216	1.649	0.131	0.304	1.4	120	1.424	695.87	698.7	0.600	695.27	698.4
50	7+230	7+350	0.68	0.63	0.428	2.57	1.424	16.49	47.44	0.339	conc	0.013	0.4	525	600	0.283	1.885	0.150	0.388	1.37	120	1.456	695.27	698.4	0.480	694.79	698
51	7+350	7+470	0.68	0.63	0.428	2.999	1.456	17.95	44.86	0.374	conc	0.013	0.4	525	600	0.283	1.885	0.150	0.388	1.37	120	1.456	694.79	698	0.480	694.31	697.6
52	7+470	7+590	0.68	0.63	0.428	3.427	1.456	19.4	42.6	0.406	conc	0.013	0.45	600	600	0.283	1.885	0.150	0.412	1.46	120	1.373	694.24	697.6	0.540	693.70	697.2
53	7+590	7+710	0.68	0.63	0.428	3.856	1.373	20.78	40.72	0.436	conc	0.013	0.6	600	600	0.283	1.885	0.150	0.476	1.68	120	1.189	693.70	697.2	0.720	692.98	696
TO POND	7+710	SWMF	0	0	0	3.856	1.189	21.96	39.25	0.421	conc	0.013	0.6	600	600	0.283	1.885	0.150	0.476	1.68	800	7.926	692.98	696	4.800	688.18	692

TABLE 3-2: CONCEPTUAL STORM SEWER SIZING

**NOTE: ONLY ENTER DATA IN THE HIGHLIGHTED CELLS.
CHOOSE PROJECT LOCATION FROM THE DROP-DOWN MENU. FILL IN THE RETURN PERIOD AND INITIAL TIME OF CONCENTRATION. RATIONAL METHOD CALCULATION DONE USING MANNING'S EQUATION.
TRIBUTARY AREAS WILL BE AUTOMATICALLY SUMMED, BUT FORMULAS WILL

ASSOCIATED ENGINEERING ALBERTA LTD.
MUNICIPAL ENGINEERING GROUP

STORM SEWER DESIGN CHART
RATIONAL METHOD FOR CIRCULAR PIPE

LOCATION Edmonton Intl A
CLIENT City of Edmonton
PROJECT 41 Avenue Storm Sewers
PROJECT NO 2007-3483

INITIAL CONCENTRATION TIME 10 min
RETURN PERIOD 5 year

IDF PARAMETERS:
a= 20.200
b= -0.661
c= 0.0000

DESIGNED BY AD
REVISED BY
PAGE 1 OF 1
DATE DESIGN/CHECK 20-Oct-10

CATCHMENT DATA											PIPE DESIGN DATA												PIPE PROFILE				
54	9+660	9+780	0.68	0.63	0.428	0.428	0	10	66.03	0.079	conc	0.013	2.8	300	300	0.071	0.942	0.075	0.162	2.29	120	0.874	698.40	701.2	3.360	695.04	697.7
55	9+780	9+800	0.68	0.63	0.428	0.857	0.874	10.87	62.47	0.149	conc	0.013	2.7	300	300	0.071	0.942	0.075	0.159	2.25	20	0.148	695.04	697.7	0.540	694.50	697
TO POND	9+800	SWMF	0	0	0	6.426	0.148	11.02	61.91	1.106	conc	0.013	1.01	750	750	0.442	2.356	0.188	1.119	2.53	380	2.501	694.05	697	3.838	690.21	693
56	11+290	11+170	0.68	0.63	0.428	0.428	0	10	66.03	0.079	conc	0.013	0.5	375	375	0.110	1.178	0.094	0.124	1.12	120	1.782	700.80	703.5	0.600	700.20	703.1
57	11+170	11+050	0.68	0.63	0.428	0.857	1.782	11.78	59.24	0.141	conc	0.013	0.5	450	450	0.159	1.414	0.113	0.202	1.27	120	1.578	700.13	703.1	0.600	699.53	702.5
58	11+050	10+930	0.68	0.63	0.428	1.285	1.578	13.36	54.52	0.195	conc	0.013	0.5	450	450	0.159	1.414	0.113	0.202	1.27	120	1.578	699.53	702.5	0.600	698.93	702
59	10+930	10+810	0.68	0.63	0.428	1.714	1.578	14.94	50.64	0.241	conc	0.013	0.4	525	525	0.216	1.649	0.131	0.272	1.26	120	1.592	698.85	702	0.480	698.37	701.4
60	10+810	10+690	0.68	0.63	0.428	2.142	1.592	16.53	47.36	0.282	conc	0.013	0.4	600	600	0.283	1.885	0.150	0.388	1.37	120	1.456	698.30	701.4	0.480	697.82	701
61	10+690	10+570	0.68	0.63	0.428	2.57	1.456	17.99	44.79	0.320	conc	0.013	0.4	600	600	0.283	1.885	0.150	0.388	1.37	120	1.456	697.82	701	0.480	697.34	700.3
62	10+570	10+450	0.68	0.63	0.428	2.999	1.456	19.44	42.55	0.355	conc	0.013	0.4	600	600	0.283	1.885	0.150	0.388	1.37	120	1.456	697.34	700.3	0.480	696.86	699.8
63	10+450	10+330	0.68	0.63	0.428	3.427	1.456	20.9	40.56	0.386	conc	0.013	0.4	600	600	0.283	1.885	0.150	0.388	1.37	120	1.456	696.86	699.8	0.480	696.38	699.4
64	10+330	10+210	0.68	0.63	0.428	3.856	1.456	22.35	38.8	0.416	conc	0.013	0.4	675	675	0.358	2.121	0.169	0.532	1.49	120	1.346	696.30	699.4	0.480	695.82	698.8
65	10+210	10+090	0.68	0.63	0.428	4.284	1.346	23.7	37.33	0.445	conc	0.013	0.4	675	675	0.358	2.121	0.169	0.532	1.49	120	1.346	695.82	698.8	0.480	695.34	698.2
66	10+090	9+970	0.68	0.63	0.428	4.712	1.346	25.05	35.99	0.471	conc	0.013	0.4	675	675	0.358	2.121	0.169	0.532	1.49	120	1.346	695.34	698.2	0.480	694.86	697.6
67	9+970	9+850	0.68	0.63	0.428	5.141	1.346	26.39	34.76	0.497	conc	0.013	0.4	675	675	0.358	2.121	0.169	0.532	1.49	120	1.346	694.86	697.6	0.480	694.38	697.3
68	9+850	9+800	0.68	0.63	0.428	5.569	1.346	27.74	33.64	0.521	conc	0.013	0.4	675	675	0.358	2.121	0.169	0.532	1.49	50	0.561	694.38	697.3	0.200	694.18	697
69	11+295	11+410	0.68	0.63	0.428	0.428	0	10	66.03	0.079	conc	0.013	0.4	375	375	0.110	1.178	0.094	0.111	1	120	1.992	701.10	703.5	0.480	700.62	703
70	11+410	11+530	0.68	0.63	0.428	0.857	1.992	11.99	58.55	0.139	conc	0.013	0.4	450	450	0.159	1.414	0.113	0.180	1.13	120	1.764	700.55	703	0.480	700.07	702.6
71	11+530	11+580	0.68	0.63	0.428	1.285	1.764	13.76	53.48	0.191	conc	0.013	0.4	525	525	0.216	1.649	0.131	0.272	1.26	50	0.663	699.99	702.6	0.200	699.79	702.5
TO POND	11+580	SWMF	0	0	0	3.856	0.663	14.42	51.84	0.556	conc	0.013	0.7	675	675	0.358	2.121	0.169	0.703	1.97	700	5.936	699.59	702.5	4.900	694.69	697.5
72	12+200	12+080	0.68	0.63	0.428	0.428	0	10	66.03	0.079	conc	0.013	0.7	300	300	0.071	0.942	0.075	0.081	1.14	120	1.747	704.30	707	0.840	703.46	706
73	12+080	11+960	0.68	0.63	0.428	0.857	1.747	11.75	59.36	0.141	conc	0.013	0.7	375	375	0.110	1.178	0.094	0.147	1.33	120	1.506	703.39	706	0.840	702.55	705.1
74	11+960	11+840	0.68	0.63	0.428	1.285	1.506	13.25	54.81	0.196	conc	0.013	0.7	450	450	0.159	1.414	0.113	0.239	1.5	120	1.333	702.47	705.1	0.840	701.63	704.4
75	11+840	11+720	0.68	0.63	0.428	1.714	1.333	14.59	51.44	0.245	conc	0.013	0.7	525	525	0.216	1.649	0.131	0.360	1.66	120	1.203	701.56	704.4	0.840	700.72	703.4
76	11+720	11+600	0.68	0.63	0.428	2.142	1.203	15.79	48.82	0.291	conc	0.013	0.7	525	525	0.216	1.649	0.131	0.360	1.66	120	1.203	700.72	703.4	0.840	699.88	702.6
77	11+600	11+580	0.68	0.63	0.428	2.57	1.203	16.99	46.5	0.332	conc	0.013	0.7	525	525	0.216	1.649	0.131	0.360	1.66	20	0.201	699.88	702.6	0.140	699.74	702.5
78	12+205	12+320	0.68	0.63	0.428	0.428	0	10	66.03	0.079	conc	0.013	0.4	375	375	0.110	1.178	0.094	0.111	1	120	1.992	704.50	707	0.480	704.02	706.5
79	12+320	12+440	0.68	0.63	0.428	0.857	1.992	11.99	58.55	0.139	conc	0.013	0.4	450	450	0.159	1.414	0.113	0.180	1.13	120	1.764	703.95	706.5	0.480	703.47	706
80	12+440	12+560	0.68	0.63	0.428	1.285	1.764	13.76	53.48	0.191	conc	0.013	0.4	525	525	0.216	1.649	0.131	0.272	1.26	120	1.592	703.39	706	0.480	702.91	705.5
81	12+560	12+680	0.68	0.63	0.428	1.714	1.592	15.35	49.74	0.237	conc	0.013	0.4	525	525	0.216	1.649	0.131	0.272	1.26	120	1.592	702.91	705.5	0.480	702.43	705.2
TO POND	12+680	SWMF	0	0	0	4.284	1.592	16.94	46.6	0.555	conc	0.013	0.4	750	750	0.442	2.356	0.188	0.704	1.59	50	0.523	702.13	705.2	0.200	701.93	705

TABLE 3-2: CONCEPTUAL STORM SEWER SIZING

**NOTE: ONLY ENTER DATA IN THE HIGHLIGHTED CELLS.
CHOOSE PROJECT LOCATION FROM THE DROP-DOWN MENU. FILL IN THE RETURN PERIOD AND INITIAL TIME OF CONCENTRATION. RATIONAL METHOD CALCULATION DONE USING MANNING'S EQUATION.
TRIBUTARY AREAS WILL BE AUTOMATICALLY SUMMED, BUT FORMULAS WILL

ASSOCIATED ENGINEERING ALBERTA LTD.
MUNICIPAL ENGINEERING GROUP

STORM SEWER DESIGN CHART
RATIONAL METHOD FOR CIRCULAR PIPE

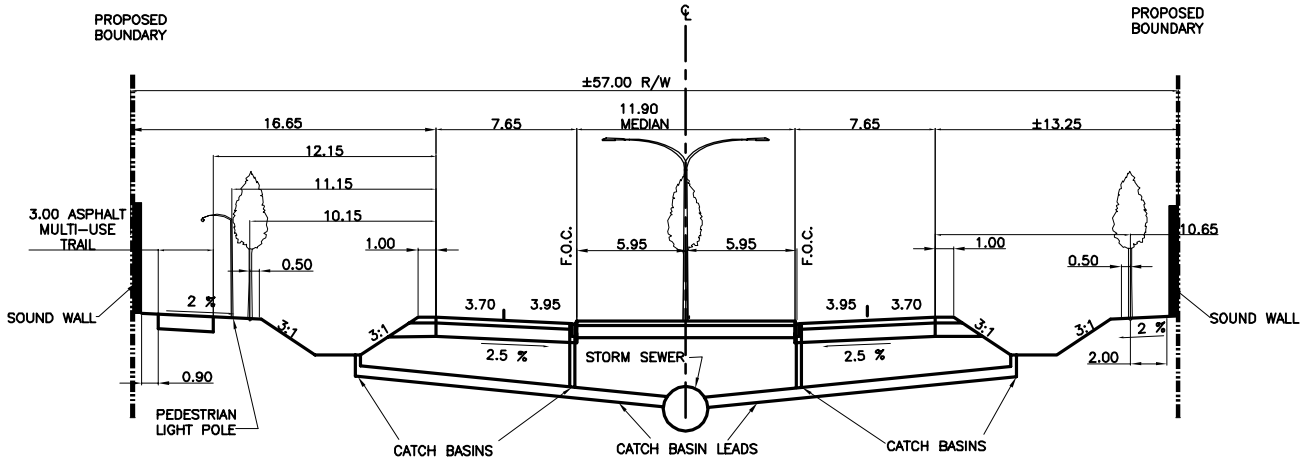
LOCATION Edmonton Intl A
CLIENT City of Edmonton
PROJECT 41 Avenue Storm Sewers
PROJECT NO 2007-3483

INITIAL CONCENTRATION TIME 10 min
RETURN PERIOD 5 year

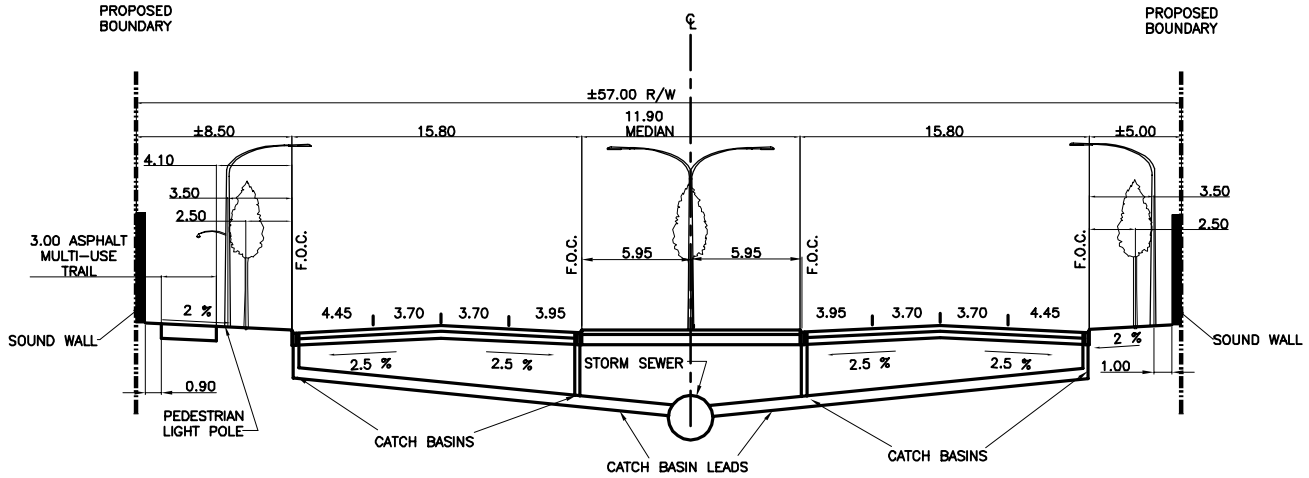
IDF PARAMETERS:
a= 20.200
b= -0.661
c= 0.0000

DESIGNED BY AD
REVISED BY
PAGE 1 OF 1
DATE DESIGN/CHECK 20-Oct-10

CATCHMENT DATA											PIPE DESIGN DATA											PIPE PROFILE				
82	13+380	13+260	0.68	0.63	0.428	0.428	0	10	66.03	0.079	conc	0.013	0.5	375	375	0.110	1.178	0.094	0.124	1.12	120	1.782	706.00	708.5	0.600	705.40	708
83	13+260	13+140	0.68	0.63	0.428	0.857	1.782	11.78	59.24	0.141	conc	0.013	0.5	450	450	0.159	1.414	0.113	0.202	1.27	120	1.578	705.33	708	0.600	704.73	707.3
84	13+140	13+020	0.68	0.63	0.428	1.285	1.578	13.36	54.52	0.195	conc	0.013	0.5	450	450	0.159	1.414	0.113	0.202	1.27	120	1.578	704.73	707.3	0.600	704.13	706.6
85	13+020	12+900	0.68	0.63	0.428	1.714	1.578	14.94	50.64	0.241	conc	0.013	0.5	525	525	0.216	1.649	0.131	0.304	1.4	120	1.424	704.05	706.6	0.600	703.45	706.1
86	12+900	12+780	0.68	0.63	0.428	2.142	1.424	16.36	47.68	0.284	conc	0.013	0.5	525	525	0.216	1.649	0.131	0.304	1.4	120	1.424	703.45	706.1	0.600	702.85	705.5
87	12+780	12+680	0.68	0.63	0.428	2.57	1.424	17.78	45.13	0.322	conc	0.013	0.5	600	600	0.283	1.885	0.150	0.434	1.54	100	1.085	702.78	705.5	0.500	702.28	705.2
88	13+385	13+500	0.68	0.63	0.428	0.428	0	10	66.03	0.079	conc	0.013	1	300	300	0.071	0.942	0.075	0.097	1.37	120	1.462	705.70	708.5	1.200	704.50	707.3
89	13+500	13+620	0.68	0.63	0.428	0.857	1.462	11.46	60.33	0.144	conc	0.013	1	375	375	0.110	1.178	0.094	0.175	1.59	120	1.26	704.43	707.3	1.200	703.23	706
90	13+620	13+740	0.68	0.63	0.428	1.285	1.26	12.72	56.31	0.201	conc	0.013	1	450	450	0.159	1.414	0.113	0.285	1.79	120	1.116	703.15	706	1.200	701.95	704.8
91	13+740	13+860	0.68	0.63	0.428	1.714	1.116	13.84	53.27	0.254	conc	0.013	1	450	450	0.159	1.414	0.113	0.285	1.79	120	1.116	701.95	704.8	1.200	700.75	703.4
92	13+860	13+980	0.68	0.63	0.428	2.142	1.116	14.95	50.61	0.301	conc	0.013	1	525	525	0.216	1.649	0.131	0.430	1.99	120	1.007	700.68	703.4	1.200	699.48	702.5
93	13+980	14+030	0.68	0.63	0.428	2.57	1.007	15.96	48.47	0.346	conc	0.013	1	525	525	0.216	1.649	0.131	0.430	1.99	50	0.419	699.48	702.5	0.500	698.98	701.6
TO POND	14+030	SWMF	0	0	0	7.711	0.419	16.38	47.65	1.021	conc	0.013	1	750	750	0.442	2.356	0.188	1.113	2.52	50	0.331	698.75	701.6	0.500	698.25	703
94	15+400	15+280	0.68	0.63	0.428	0.428	0	10	66.03	0.079	conc	0.013	1	300	300	0.071	0.942	0.075	0.097	1.37	120	1.462	713.70	716.7	1.200	712.50	715.4
95	15+280	15+160	0.68	0.63	0.428	0.857	1.462	11.46	60.33	0.144	conc	0.013	1	375	375	0.110	1.178	0.094	0.175	1.59	120	1.26	712.43	715.4	1.200	711.23	714
96	15+160	15+040	0.68	0.63	0.428	1.285	1.26	12.72	56.31	0.201	conc	0.013	1	450	450	0.159	1.414	0.113	0.285	1.79	120	1.116	711.15	714	1.200	709.95	712.7
97	15+040	14+920	0.68	0.63	0.428	1.714	1.116	13.84	53.27	0.254	conc	0.013	0.5	525	525	0.216	1.649	0.131	0.304	1.4	120	1.424	709.88	712.7	0.600	709.28	712
98	14+920	14+800	0.68	0.63	0.428	2.142	1.424	15.26	49.93	0.297	conc	0.013	0.5	525	525	0.216	1.649	0.131	0.304	1.4	100	1.186	709.28	712	0.500	708.78	711.9
99	14+800	14+680	0.68	0.63	0.428	2.57	1.186	16.45	47.52	0.340	conc	0.013	0.5	600	600	0.283	1.885	0.150	0.434	1.54	120	1.302	708.70	711.9	0.600	708.10	711.8
100	14+680	14+560	0.68	0.63	0.428	2.999	1.302	17.75	45.18	0.377	conc	0.013	0.5	600	600	0.283	1.885	0.150	0.434	1.54	120	1.302	708.10	711.8	0.600	707.50	711.5
101	14+560	14+440	0.68	0.63	0.428	3.427	1.302	19.05	43.12	0.411	conc	0.013	1.5	600	600	0.283	1.885	0.150	0.752	2.66	120	0.752	707.00	711.5	1.800	705.20	709.5
102	14+440	14+320	0.68	0.63	0.428	3.856	0.752	19.8	42.03	0.450	conc	0.013	1.6	600	600	0.283	1.885	0.150	0.777	2.75	120	0.728	705.20	709.5	1.920	703.28	707.3
103	14+320	14+200	0.68	0.63	0.428	4.284	0.728	20.53	41.04	0.489	conc	0.013	1.6	600	600	0.283	1.885	0.150	0.777	2.75	120	0.728	703.28	707.3	1.920	701.36	705.3
104	14+200	14+080	0.68	0.63	0.428	4.712	0.728	21.26	40.1	0.525	conc	0.013	1.6	600	600	0.283	1.885	0.150	0.777	2.75	100	0.607	701.36	705.3	1.600	699.76	703
105	14+080	14+030	0.68	0.63	0.428	5.141	0.607	21.87	39.36	0.563	conc	0.013	1.6	600	600	0.283	1.885	0.150	0.777	2.75	50	0.303	699.76	703	0.800	698.96	701.6



1 – TYPICAL STAGE 1 CROSS SECTION – 4 LANE



3 – TYPICAL STAGE 3 CROSS SECTION – 8 LANE

CITY OF EDMONTON

41 AVENUE SW CONCEPT PLANNING STUDY

DRAINAGE CONCEPT PLAN

Associated Engineering

FIGURE 3-4

Time: 5:32pm
Date: Jan 10, 2011
File: \\a-edm-fs-01\projects\200734B3\00_COE_41_Ave\Working_Dwgs\100_Civil\073483-SECTION_DRAINAGE.dwg by
Xrefs: 073483TB01_TITLEBLOCK1

3.2.3 Environmental

In developing a roadway, special consideration must be taken in dealing with the effects of the roadway on the environment. An environmental study was conducted by EnviroMak Inc. on January 16, 2007 on the area surrounding 41 Avenue SW from 50 Street to 184 Street. The initial focus was on gathering sufficient information on both the aquatic and terrestrial ecosystem to determine the possible effects of the roadway improvements on the environment and creating a plan for environmental protection. The next task was to develop a monitoring plan for a more long term effect.

Contacting government agencies, namely the Canadian Government Department of Fisheries and Oceans (DFO), revealed that determining the possible effects of the project on the fish and their habitats would be required. While legislation requires a terrestrial ecosystem assessment when dealing with rare and endangered wildlife, it is not necessary with their habitats under the *Alberta Wildlife Act*. Under the Wildlife Act and Wildlife Regulation, protection of both nests and dens of endangered animals are covered. All relevant Acts were investigated with respect to habitat and the long term effects on them.

A host of geological information was compiled including soil descriptions, landscape features, precipitation averages (rain and snow), temperatures, growing season lengths, and soil capability classification, which was generally class 1 in the study area. Class 1 soils are fertile and unrestricted to crop production, class 4 soils are restricted to certain crops only, and class 6 soils are capable of supporting perennial crops only.

With respect to environmentally significant areas within the study region, no special wildlife projects or environmentally sensitive areas exist. The Alberta Natural Heritage Information Center (ANHIC) does identify the Whitemud Creek, however, which passes through the study area.

The current recommendations of the initial environmental report indicate that fish and fish habitats are present within the identified waterways and that a complete assessment should be done. In addition to the examination of the fish and fish habitat, assessments should also include an evaluation of the rare, endangered, or threatened plant or animal species even though none were said to be in the study area but were still recorded in the region. The wetlands should be classified by type, assessed for rare amphibians, and assessed according to bed ownership status.

The environmental report completed by EnviroMak Inc. is attached in **Appendix E**.

3.2.4 Geotechnical

Thurber Engineering Ltd conducted the preliminary geotechnical assessment on the entire project length of 41 Avenue SW. The assessment was conducted by analyzing information from Associated Engineering, The City of Edmonton, and Thurber's archive files which consisted of aerial photography, urban development files, and geological maps and references.

Using air photo interpretation, site conditions were determined; oxbows from the Whitemud Creek were found roughly 100m south of 41 Avenue SW which indicates abandoned river beds. Blackmud Creek runs just west of the QEII Highway.

Land along 41 Avenue SW is used primarily for farming and stock grazing with an industrial area located on the south side of 41 Avenue SW bordering the QEII Highway. On the east side of the QEII the existing ground is very flat with no major variances and a few minor depressions, most notably Cawes Lake, located roughly 1 km west of 50 Street; other smaller depressions are spread out between 50 Street and 101 Street. West of the QEII there are 2 major creeks, Blackmud and Whitemud Creek, which meander until reaching the North Saskatchewan River to the north of the study area. Blackmud Creek is located approximately 500 m west of the QEII Highway and has a shallow creek bed near 41 Avenue. Whitemud Creek is located approximately 7 km west of the QEII Highway and ranges from 200m to 300m wide and 15m to 18m deep.

Soil conditions determined by reviewing test hole information showed a general overlying structure of a lacustrine clay on top of a layer of glacial till, both of which lie on top of a layer of bedrock. Both the clay and till were hard and medium plastic material with sufficient moisture contents. The glacial till occasionally contained layers of sand and coal fragments with pockets of cobbles and boulders. Bedrock ranged from 3m to 12m from the surface and was closer to the surface at Blackmud Creek. The bedrock was generally composed of clay shale and sandstone. The moisture content was consistent within bedrock material and is classified as hard to very hard. According to the test holes the average ground water depth is 1.2 m below grade and is supported by the shallow small bodies of water in the area.

The potential constraints found in the study are minimal because of the relatively flat ground and the material to be used is desirable as a road base. Because of the high water table, however, larger cuts are not encouraged. Whitemud Creek has some areas of concern because of the width and depth of the ravine itself and separate suggestions are made on how to address them. The low-lying areas near Cawes Lake are expected to contain muskeg materials and organics which may be problematic and it is recommended to conduct other test holes to determine the extent of these materials. Depending on the depth of the muskeg, the options could be to remove and replace the material or have geogrid placed overtop and an engineered backfill used. There are 2 ravines just west of 184 Street and 41 Avenue SW and if caution is not exercised in design, the slopes of the ravines could become unstable because of the extra runoff.

The geotechnical report completed by Thurber Engineering is included in **Appendix F**.

3.2.5 Structural

3.2.5.1 Whitemud Creek Bridge Assessment and Considerations

CONSIDERATIONS:

Associated Engineering has developed a strategy to replace the 41 Avenue SW Whitemud Creek crossing. Because there are multi-use trails and pathways planned to run along the Whitemud Creek, consideration has been taken to allow for a multi-use trail connection north-south underneath the 41 Avenue SW crossing. Additionally, a potential connection from the multi-use trail along 41 Avenue to the Whitemud Creek trail system could be confirmed in detailed design. The exact location of the trail is to be determined at a later stage; coordination with the City of Edmonton Parks Department would be required in this process.

ASSESSMENT:

To create a viable functional plan, existing structures needed to be taken into account. For instance, the Whitemud Bridge which is located at the crossing of the Whitemud Creek and 41 Avenue SW was assessed. Under Bridge File (BF) 00137 an Assessment Report was conducted to determine the current condition of the bridge. The existing structure, built in 1960, is a 36.6 metre long concrete arch with a diameter of 5.3 m. Alberta Transportation Maintenance System Reference Manual observes that this design is relatively effective and does not require excessive maintenance; the only drawback is the lightly reinforced floor which does not resist heaving well and is prone to cracking.

A short site history review shows previous examples of extreme environmental events which caused the washout of previous structures and approaches. The existing structure has carried flood waters as high as 770mm under the inlet crown and has been relatively free of problems. Site inspection records dating back to August 10, 1992 show a consistent assessment making note of mainly spilling and cracking issues to the structure itself. To control erosion at the ends of the culvert, a section of the sidewall at the ends was broken off and used as additional rip rap.

Controlling factors considered in this assessment are structural, hydrotechnical, geotechnical, environmental, roadway geometrics and traffic usage, future development, other bridges or culverts, and traffic accommodations. Of the list of considerations only a select few were identified as influencing factors. The first controlling factor is geometrics, which is related to the orientation of the crossing of the Creek which flows northeast at this location. Traffic usage and future developments is considered a factor because of the extensive future development planned in the area which will be primarily residential.

Using the previously stated controlling factors, 3 different options have been created:

- Do-Nothing - Allow structure to use remaining 16 years of service; not an option because of the anticipation of future traffic loads.
- Rehabilitation - Would include requirements to meet future traffic needs by extending length by 25m. This would require a long term maintenance plan to address the initial structures degradation. With the future interests in pedestrian access under the bridge deck, accommodating fish passageways, and possible structure cover issues, this is not considered further.
- Replacement – Initial glance is to replace the culvert with a 3 span bridge totalling 50m in length. To improve the needed alignment the structure would need to be raised, which would bring the total length to 80m.

The project team recommends repairing the culvert to keep it in service until the road is upgraded. At this point the culvert should be replaced with a new bridge structure. The estimated cost for a new bridge structure is $9,975,000.

The structural report completed by Associated Engineering is included in **Appendix G**.

3.2.6 Noise

The City of Edmonton's Urban Traffic Noise Policy identifies noise limits and mitigation strategies for residential development near major transportation corridors. As 41 Avenue SW is being planned as a major arterial roadway with high-speed, high-volume traffic, consideration for noise mitigation has been incorporated into the proposed cross-section. The City of Edmonton typically allows for noise mitigation through the use of a berm in combination with a sound fence. Leduc County has indicated that for the purposes of this study, the county will accept recommendations made with the City of Edmonton's noise policy along 41 Avenue SW.

Associated Engineering initially recommended berms 1.0 metres in height on both sides of 41 Avenue SW when adjacent to residential development, based on the City of Edmonton's standard Drawing 1010. However, discussions within the steering committee and with local developers lead the steering committee to attempt to minimize the required right-of-way where possible. Typical berms, as initially proposed, require 10-15 metres of right-of-way. Options for accommodating a berm with sound wall, a staged retaining wall, and a simple sound wall were investigated.

Ultimately, the steering committee concluded that accommodation for a simple noise wall, with a typical right-of-way requirement of about 2.0 metres, shall be incorporated into the 41 Avenue SW cross-section. Requirements for the height, material, and staging of the sound wall will need to be investigated at the roadway detailed design phase.

For the portion of 41 Avenue SW through the industrial areas near the QEII highway (between the QEII highway and 800 metres west of the existing 91 Street), AE recommends a typical cross-section without noise walls or other provisions for sound attenuation within the road right of way.

3.2.7 Historical Resources

The Government of Alberta, after consulting with Altamira Consulting Ltd, provided a list of existing Historic and Archaeological sites in the area of 41 Avenue SW. There is both a single historic and archaeological site on the list that is directly impacted by the improvements proposed. Within the report there are considerable risks identified with disturbing paleontological materials and human burial concerns and it recommends that a Historical Resources Impact Assessment (HRIA) be done before any construction takes place.

The historical resources report completed by Altamira Consulting Ltd is attached in **Appendix H**.

4 Final Concept Plan

4.1 DESIGN

The Associated Engineering project team has prepared draft concept plans for the 41 Avenue SW corridor. These plans illustrate the lane and intersection requirements, multi-use trail location, right-of-way requirements, typical cross-sections for the 4-lane, 6-lane, and 8-lane stage, and typical intersection plans for each stage.

The concept plans are included in this section of the report.

4.2 PROPERTY REQUIREMENT

The project steering committee directed the Associated Engineering project team to minimize the right-of-way required for 41 Avenue SW, considering that the proposed 8-lane major facility was slightly larger than a typical 4 or 6 lane major arterial. Due to pressures from area landowners and developers, the project team identified that the cross-section of the proposed 41 Avenue SW should be designed as to fit within the right-of-way required for a typical major arterial roadway within the City of Edmonton. The project team developed a typical standard cross-section for a major 6-lane arterial with double left turns and sound attenuation berms – this cross-section requires 60.0 metres of right of way. The project team then attempted to fit the ultimate 8 lane configuration within a 60 metre right of way. As discussed previously, most of the land savings was obtained from reducing the sound berms to sound walls. As a result, the Associated Engineering project team developed a cross-section for the ultimate development of 41 Avenue to fit within a 57.0 metre right of way.

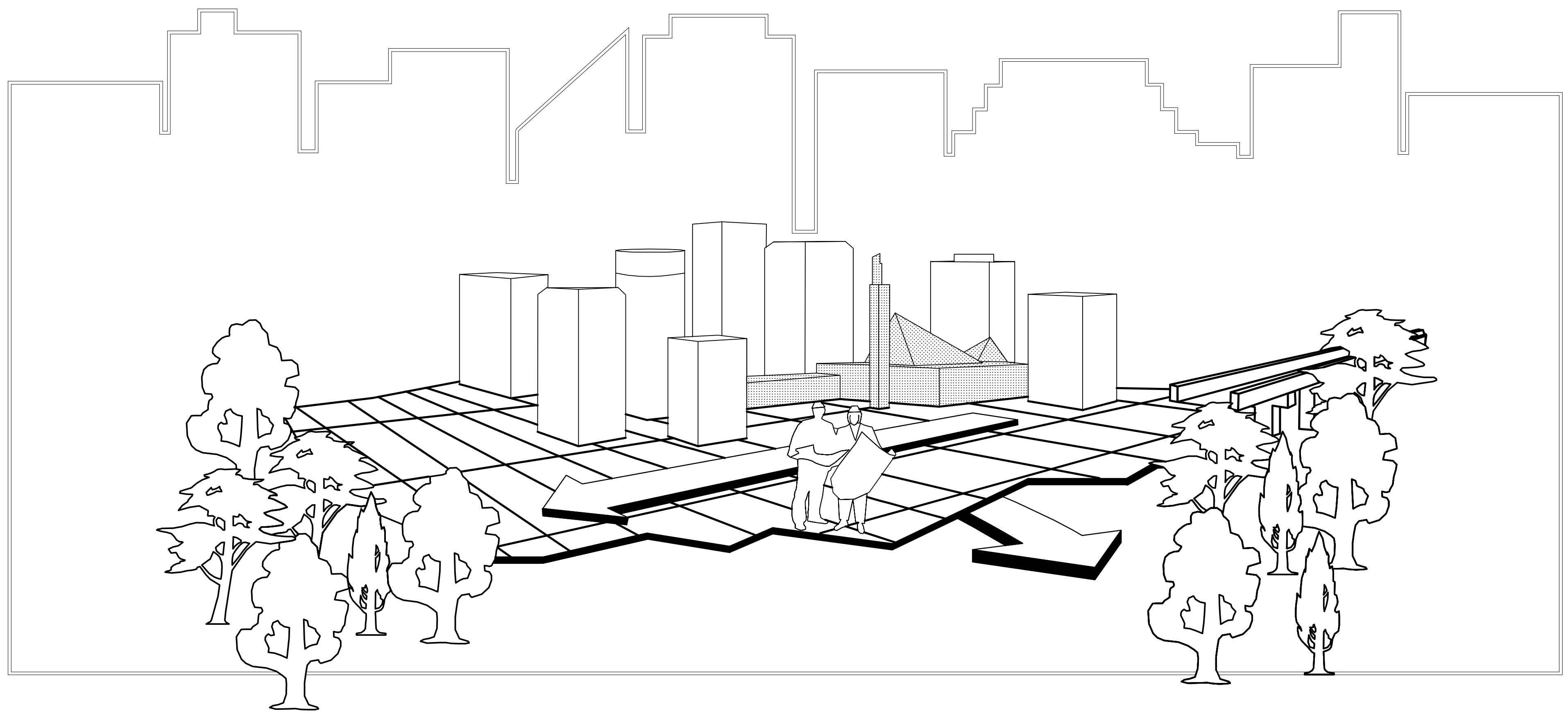
At all locations along the study corridor, Associated Engineering has attempted to split land requirements equally between the north and the south side of the existing right-of-way. This means that additional land requirements will be equally shared between landowners on the north and south sides of 41 Avenue SW. As such, the future roadway centreline will be offset from the existing roadway centreline but the future and existing right-of-way centrelines will be at the same location.

Additional right-of-way was required at intersections along 41 Avenue SW. In addition to the typical right-of-way required, Associated Engineering has identified the future right-of-way required throughout the entire corridor, including all identified future or potential intersections.

The right-of-way plans are included in **Appendix B**.

THE CITY OF Edmonton

TRANSPORTATION DEPARTMENT



41 AVENUE CONCEPT PLAN

170 STREET TO 50 STREET

DRAWING INDEX

41 AVENUE CONCEPT PLAN

170 STREET TO 50 STREET

NO.	DRAWING TITLE

KEY PLAN

NO.	DRAWING TITLE
A041-0901	KEY PLAN

PLAN AND PROFILES

NO.	DRAWING TITLE
A041-0902	PLAN-PROFILE - STATION 1+750 TO STATION 2+500
A041-0903	PLAN-PROFILE - STATION 2+500 TO STATION 3+250
A041-0904	PLAN-PROFILE - STATION 3+250 TO STATION 4+000
A041-0905	PLAN-PROFILE - STATION 4+000 TO STATION 4+750
A041-0906	PLAN-PROFILE - STATION 4+750 TO STATION 5+500
A041-0907	PLAN-PROFILE - STATION 5+500 TO STATION 6+250
A041-0908	PLAN-PROFILE - STATION 6+250 TO STATION 7+000
A041-0909	PLAN-PROFILE - STATION 7+000 TO QE II INTERCHANGE (BY OTHERS)
A041-0910	PLAN-PROFILE - QE II INTERCHANGE (BY OTHERS) TO STATION 9+950
A041-0911	PLAN-PROFILE - STATION 9+950 TO STATION 10+700
A041-0912	PLAN-PROFILE - STATION 10+700 TO STATION 11+450
A041-0913	PLAN-PROFILE - STATION 11+450 TO STATION 12+200
A041-0914	PLAN-PROFILE - STATION 12+200 TO STATION 12+950
A041-0915	PLAN-PROFILE - STATION 12+950 TO STATION 13+700
A041-0916	PLAN-PROFILE - STATION 13+700 TO STATION 14+300
A041-0917	PLAN-PROFILE - STATION 14+300 TO STATION 15+000
A041-0918	PLAN-PROFILE - STATION 15+000 TO STATION 15+479

INTERSECTION PLANS

NO.	DRAWING TITLE
A041-0920	INTERSECTION PLAN FOR 156B STREET
A041-0921	INTERSECTION PLAN FOR 156A STREET
A041-0922	INTERSECTION PLAN FOR FOR FUTURE HERITAGE VALLEY ROAD
A041-0923	INTERSECTION PLAN FOR FUTURE DESROCHERS ACCESS
A041-0924	INTERSECTION PLAN FOR FUTURE JAMES MOWATT TRAIL
A041-0925	INTERSECTION PLAN FOR FUTURE ALLARD ACCESS 1
A041-0926	INTERSECTION PLAN FOR FUTURE ALLARD ACCESS 2
A041-0927	INTERSECTION PLAN FOR FUTURE 91 STREET

INTERSECTION PLANS

NO.	DRAWING TITLE
A041-0928	INTERSECTION PLAN FOR FUTURE 66 STREET
A041-0929	INTERSECTION PLAN FOR EXISTING 66 STREET
A041-0930	INTERSECTION PLAN FOR FUTURE SOUTHEAST ACCESS
A041-0931	INTERSECTION PLAN FOR 50 STREET

SECTIONS

NO.	DRAWING TITLE
A041-0932	TYPICAL 41 AVENUE SW CROSS SECTION WITH SOUND ATTENUATION
A041-0933	TYPICAL 41 AVENUE SW CROSS SECTION WITHOUT SOUND ATTENUATION

STAGING PLANS

NO.	DRAWING TITLE
A041-0940	TYPICAL INTERSECTION PLAN FOR 4 LANE STAGE
A041-0941	TYPICAL INTERSECTION PLAN FOR 6 LANE STAGE
A041-0942	TYPICAL INTERSECTION PLAN FOR 8 LANE STAGE

LEGEND

PROPOSED RIGHT OF WAY (R.O.W.)

EXISTING RIGHT OF WAY (R.O.W.)

EXISTING EDGE OF PAVEMENT

EXISTING ACCESS TO BE REMOVED UNLESS OTHERWISE NOTED

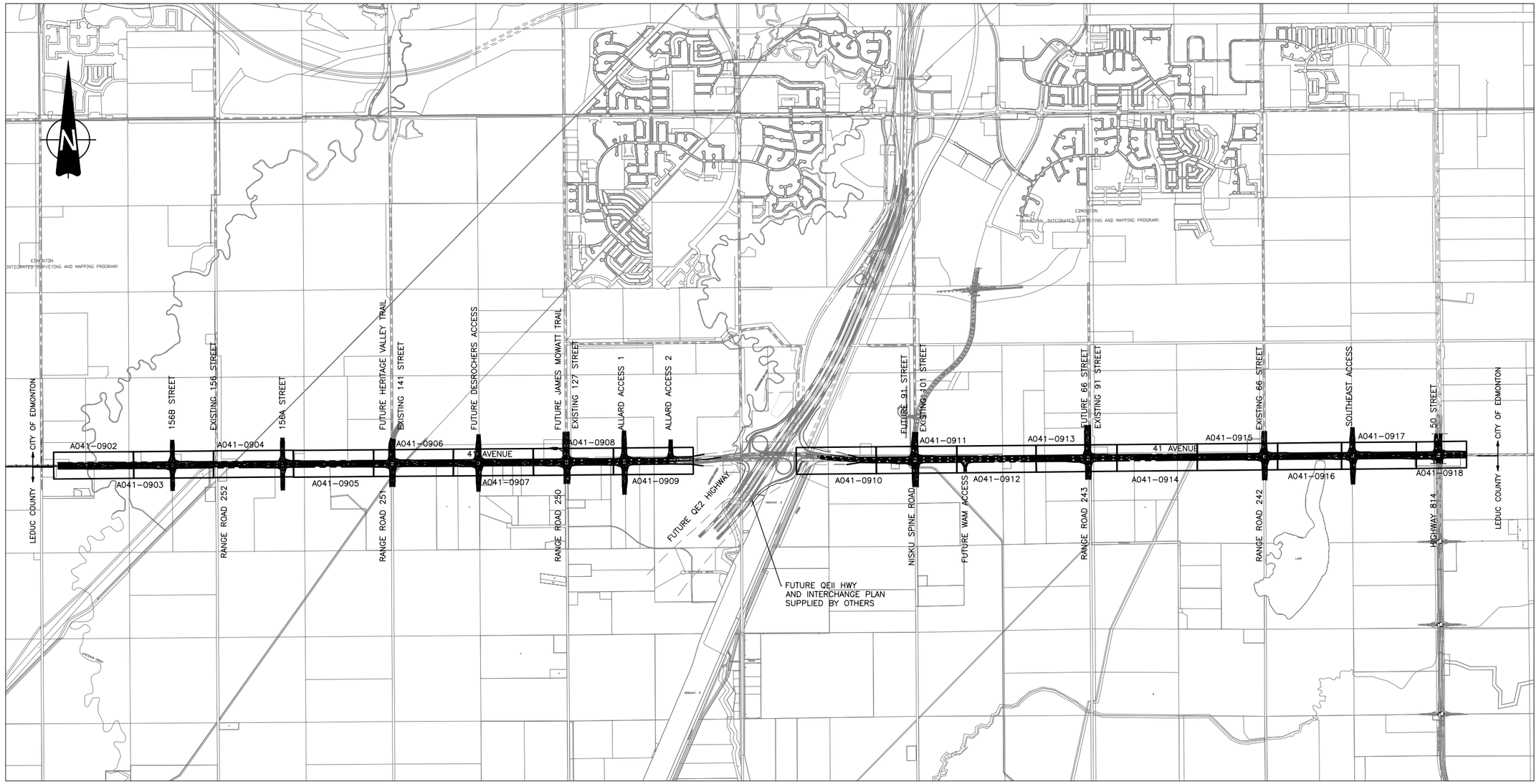
PROPOSED CURB AND GUTTER

PROPOSED SHOULDER

PROPOSED LANE LINES

PROPOSED CROSSWALKS AND STOP BARS

3.95 PROPOSED LANE CONFIGURATION AND WIDTHS



PERMIT TO PRACTICE

ASSOCIATED ENGINEERING
QUALITY MANAGEMENT SIGN-OFF
Signature: _____
Date: _____
APEGGA Permit to Practice P 3979

DESIGNER

PROFESSIONAL ENGINEER ALBERTA
SHAWN BENBOW
P ENG
DATE _____

CHECKER

PROFESSIONAL ENGINEER ALBERTA
RYAN BATTY
P ENG
DATE _____

THE CITY OF Edmonton TRANSPORTATION

LEDUC COUNTY

Associated Engineering

_____
Manager, Transportation Planning Branch

_____
Director, Facility and Capital Planning

_____
Manager, Engineering, Leduc County

CONCEPT PLAN - SUBJECT TO PRELIMINARY DESIGN

41 AVENUE SW CONCEPT PLANNING STUDY

KEY PLAN

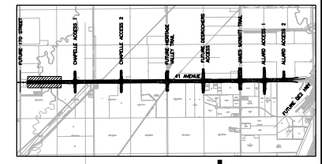
NOTE:
ALL DIMENSIONS
ARE IN METRES

SCALE: 1:20,000

PLAN NO.
A041-0901

MATCHLINE AT STATION 1+750- TIE INTO FUTURE 170 STREET CONCEPT PLANING STUDY (BY OTHERS)

MATCHLINE AT STATION 2+500 - SEE A041-0903



POTENTIAL 170 STREET INTERCHANGE LOCATION AND FOOTPRINT TO BE DETERMINED BY OTHERS

WHITEMUD CREEK

BRIDGE PLANNING/WATERCOURSE CROSSING AREA
BRIDGE PLANNING STUDY AREA REQUIRED

PROPOSED R.O.W.

3.0m MUT

3.70
3.70
3.95
11.9m MEDIAN
3.95
3.70
3.70

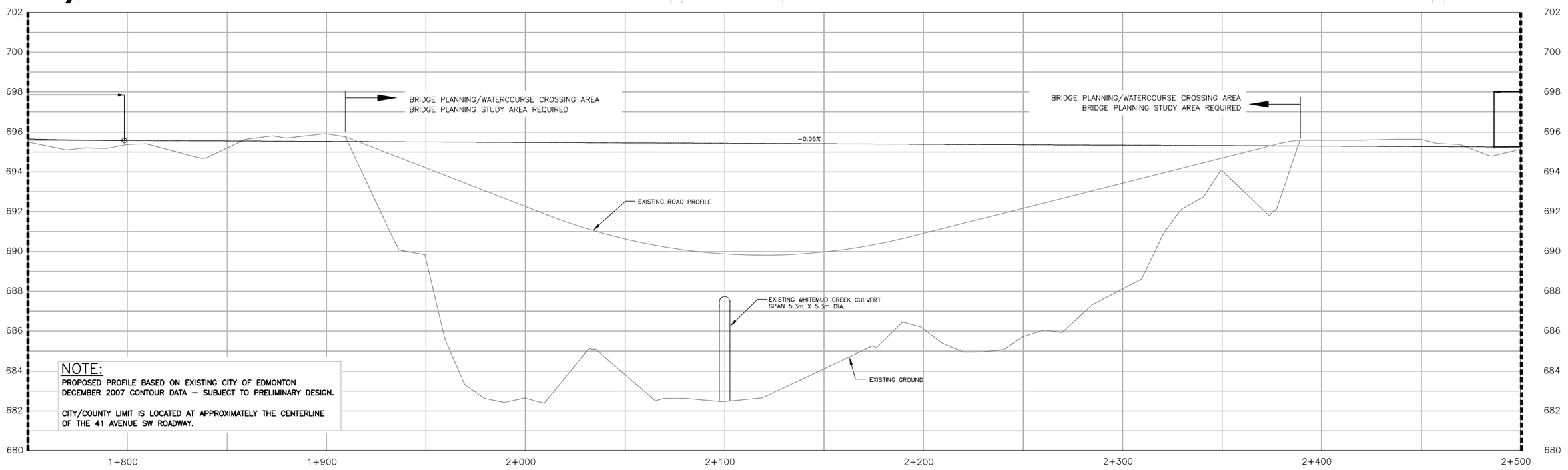
PROPOSED R.O.W.

41 AVE (MAJOR ARTERIAL)

BRIDGE PLANNING/WATERCOURSE CROSSING AREA
BRIDGE PLANNING STUDY AREA REQUIRED

1+800 1+900 2+000 2+100 2+200 2+300 2+400

NOTE:
REFER TO DRAWING INDEX FOR LINEWORK LEGEND



NOTE:
PROPOSED PROFILE BASED ON EXISTING CITY OF EDMONTON DECEMBER 2007 CONTOUR DATA – SUBJECT TO PRELIMINARY DESIGN.

CITY/COUNTY LIMIT IS LOCATED AT APPROXIMATELY THE CENTERLINE OF THE 41 AVENUE SW ROADWAY.

41 AVENUE
DESIGN SPEED: 90 km/hr
POSTED SPEED: 70 km/hr

PERMIT TO PRACTICE

ASSOCIATED ENGINEERING
QUALITY MANAGEMENT SIGN-OFF
Signature: _____
Date: _____
APEGGA Permit to Practice P 3879

DESIGNER
PROFESSIONAL ENGINEER ALBERTA — SHAWN BENBOW
P ENG
DATE _____

CHECKER
PROFESSIONAL ENGINEER ALBERTA — RYAN BATTY
P ENG
DATE _____

THE CITY OF Edmonton TRANSPORTATION
LEDUC COUNTY
Associated Engineering

_____
Manager, Transportation Planning Branch

_____
Director, Facility and Capital Planning

_____
Manager, Engineering, Leduc County

CONCEPT PLAN - SUBJECT TO PRELIMINARY DESIGN

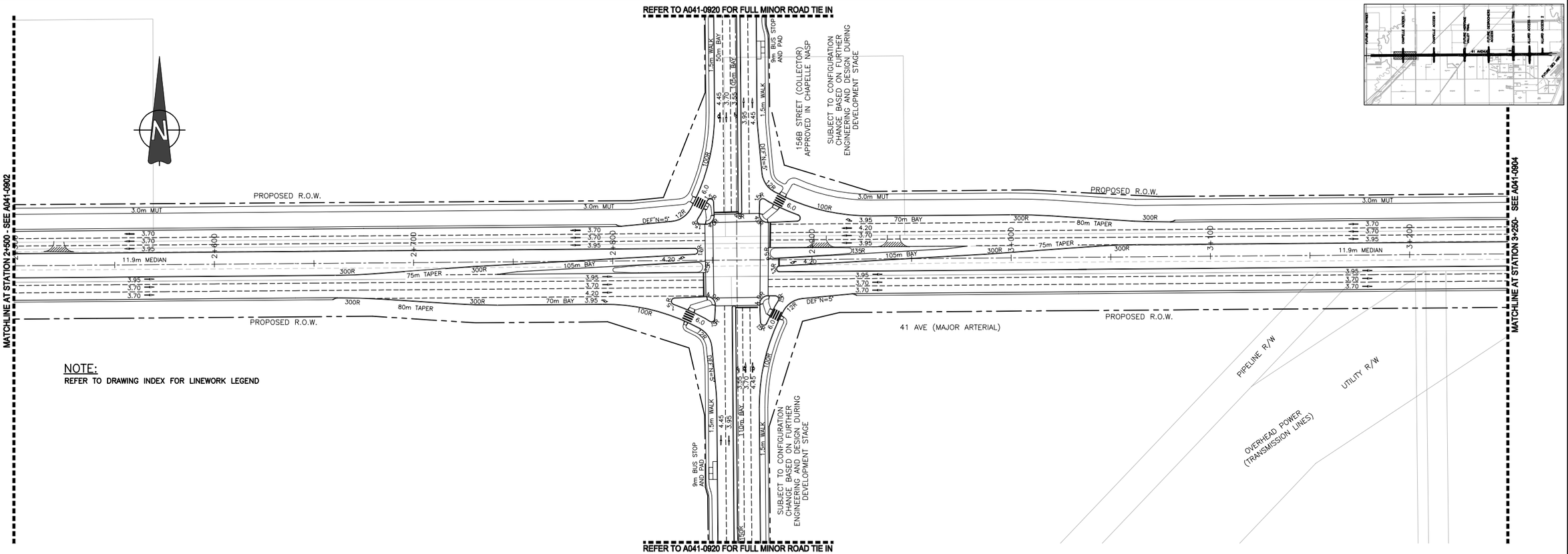
41 AVENUE SW CONCEPT PLANNING STUDY

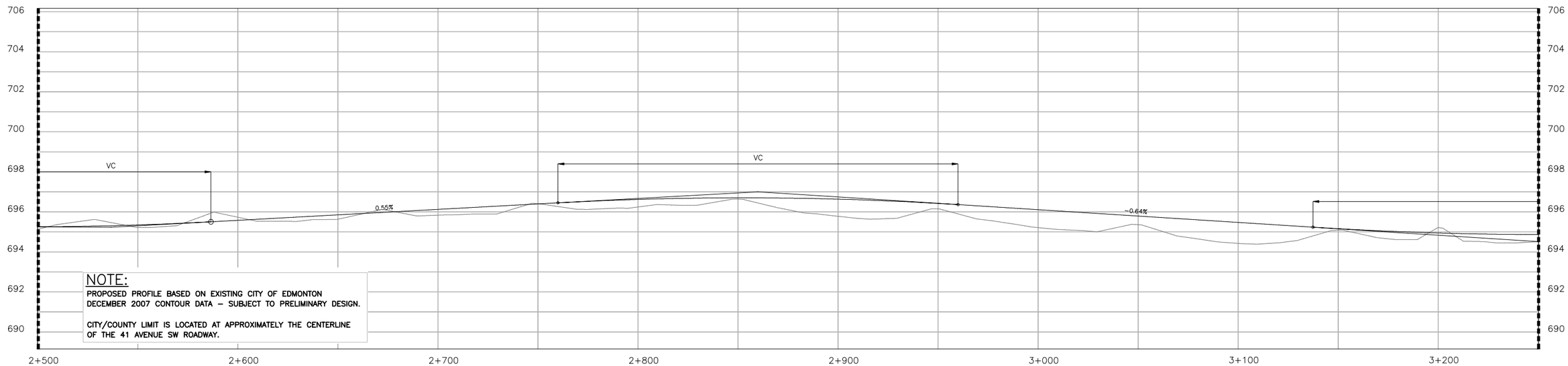
PLAN - PROFILE
STATION 1+750 TO STATION 2+500

NOTE:
ALL DIMENSIONS ARE IN METRES

SCALE: V=1:100 H=1:1000

PLAN NO.
A041-0902





NOTE:
PROPOSED PROFILE BASED ON EXISTING CITY OF EDMONTON DECEMBER 2007 CONTOUR DATA – SUBJECT TO PRELIMINARY DESIGN.

CITY/COUNTY LIMIT IS LOCATED AT APPROXIMATELY THE CENTERLINE OF THE 41 AVENUE SW ROADWAY.

41 AVENUE
DESIGN SPEED: 90 km/hr
POSTED SPEED: 70 km/hr

PERMIT TO PRACTICE
ASSOCIATED ENGINEERING
QUALITY MANAGEMENT SIGN-OFF
Signature:
Date:
APEGGA Permit to Practice P 3879

DESIGNER
PROFESSIONAL ENGINEER ALBERTA SHAWN BENBOW
P ENG
DATE

CHECKER
PROFESSIONAL ENGINEER ALBERTA RYAN BATTY
P ENG
DATE

THE CITY OF Edmonton TRANSPORTATION
LEDUC COUNTY
Associated Engineering

Manager, Transportation Planning Branch
Director, Facility and Capital Planning
Manager, Engineering, Leduc County

CONCEPT PLAN - SUBJECT TO PRELIMINARY DESIGN

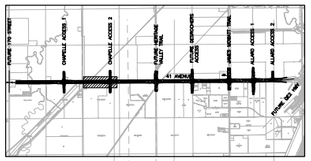
41 AVENUE SW CONCEPT PLANNING STUDY

PLAN - PROFILE
STATION 2+500 TO STATION 3+250

NOTE:
ALL DIMENSIONS ARE IN METRES

SCALE: V=1:100 H=1:1000

PLAN NO.
A041-0903



REFER TO A041-0921 FOR FULL MINOR ROAD TIE IN

MATCHLINE AT STATION 3+250 - SEE A041-0903

MATCHLINE AT STATION 4+000 - SEE A041-0905

EXISTING 156 STREET

RANGE ROAD 252

PROPOSED R.O.W.

3.0m MUT

11.9m MEDIAN

3.70
3.70
3.95

3.95
3.70
4.20
3.95

300R
75m TAPER
105m BAY
80m TAPER
70m BAY

DEF'N=5°

100R

1.5m WALK

50m BAY
105m BAY
60m BAY

9m BUS STOP AND PAD

156A STREET (COLLECTOR)
APPROVED IN CHAPELLE NASP

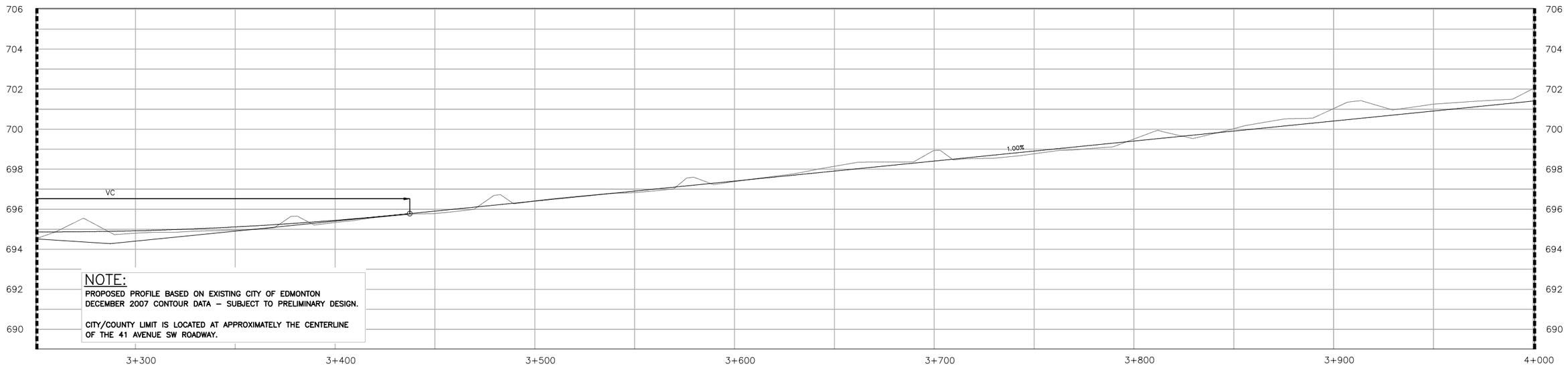
SUBJECT TO CONFIGURATION CHANGE BASED ON FURTHER ENGINEERING AND DESIGN DURING DEVELOPMENT STAGE

41 AVE (MAJOR ARTERIAL)

PIPELINE R/W

NOTE: HIGH PRESSURE PIPELINE IN AREA. CROSSING PERMITS REQUIRED.

NOTE:
REFER TO DRAWING INDEX FOR LINEWORK LEGEND



NOTE:
PROPOSED PROFILE BASED ON EXISTING CITY OF EDMONTON DECEMBER 2007 CONTOUR DATA – SUBJECT TO PRELIMINARY DESIGN.

CITY/COUNTY LIMIT IS LOCATED AT APPROXIMATELY THE CENTERLINE OF THE 41 AVENUE SW ROADWAY.

41 AVENUE
DESIGN SPEED: 90 km/hr
POSTED SPEED: 70 km/hr

PERMIT TO PRACTICE

ASSOCIATED ENGINEERING
QUALITY MANAGEMENT SIGN-OFF
Signature:
Date:
APEGGA Permit to Practice P 3879

DESIGNER
PROFESSIONAL ENGINEER ALBERTA
SHAWN BENBOW
P ENG
DATE

CHECKER
PROFESSIONAL ENGINEER ALBERTA
RYAN BATTY
P ENG
DATE

THE CITY OF Edmonton TRANSPORTATION
LEDUC COUNTY
Associated Engineering

Manager, Transportation Planning Branch
Director, Facility and Capital Planning
Manager, Engineering, Leduc County

CONCEPT PLAN - SUBJECT TO PRELIMINARY DESIGN

41 AVENUE SW CONCEPT PLANNING STUDY

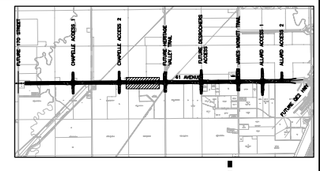
PLAN - PROFILE
STATION 3+250 TO STATION 4+000

NOTE:
ALL DIMENSIONS ARE IN METRES

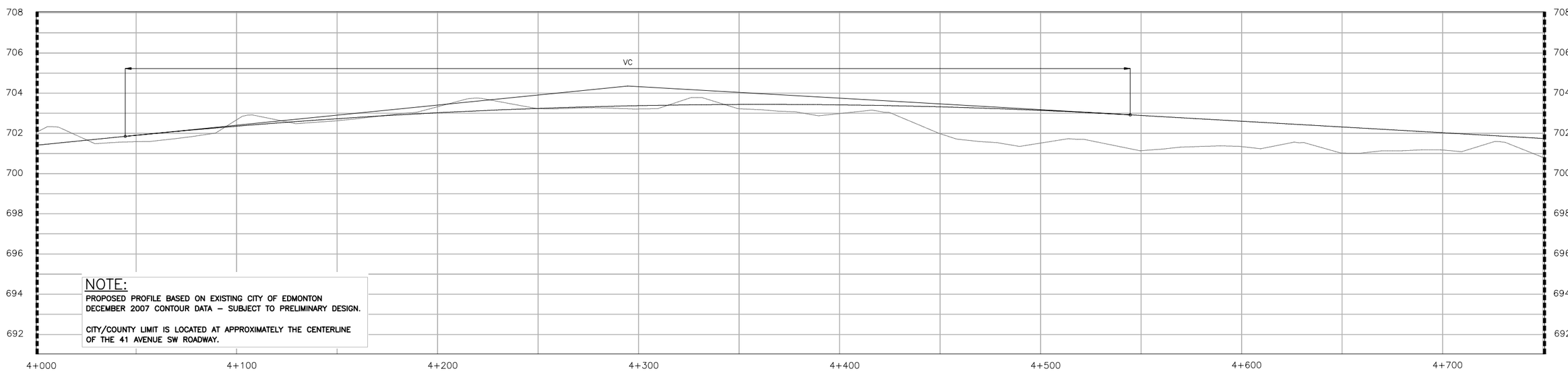
SCALE: V=1:100 H=1:1000

PLAN NO.
A041-0904

Date: Jan 12, 2011 Time: 2:54pm
File: P:\20073483\00_CDE_41_Ave\Working_Dwgs\100_Civil\073483_PLAN_PROFILES.dwg by
Xrefs: 30807891_TITLEBLOCK1, utilities, legal



NOTE:
REFER TO DRAWING INDEX FOR LINEWORK LEGEND



NOTE:
PROPOSED PROFILE BASED ON EXISTING CITY OF EDMONTON DECEMBER 2007 CONTOUR DATA – SUBJECT TO PRELIMINARY DESIGN.

CITY/COUNTY LIMIT IS LOCATED AT APPROXIMATELY THE CENTERLINE OF THE 41 AVENUE SW ROADWAY.

41 AVENUE
DESIGN SPEED: 90 km/hr
POSTED SPEED: 70 km/hr

PERMIT TO PRACTICE

ASSOCIATED ENGINEERING
QUALITY MANAGEMENT SIGN-OFF
Signature:
Date:
APEGGA Permit to Practice P 3879

DESIGNER
PROFESSIONAL ENGINEER ALBERTA SHAWN BENBOW
P ENG
DATE

CHECKER
PROFESSIONAL ENGINEER ALBERTA RYAN BATTY
P ENG
DATE

THE CITY OF Edmonton TRANSPORTATION
LEDUC COUNTY
Associated Engineering

Manager, Transportation Planning Branch
Director, Facility and Capital Planning
Manager, Engineering, Leduc County

CONCEPT PLAN - SUBJECT TO PRELIMINARY DESIGN

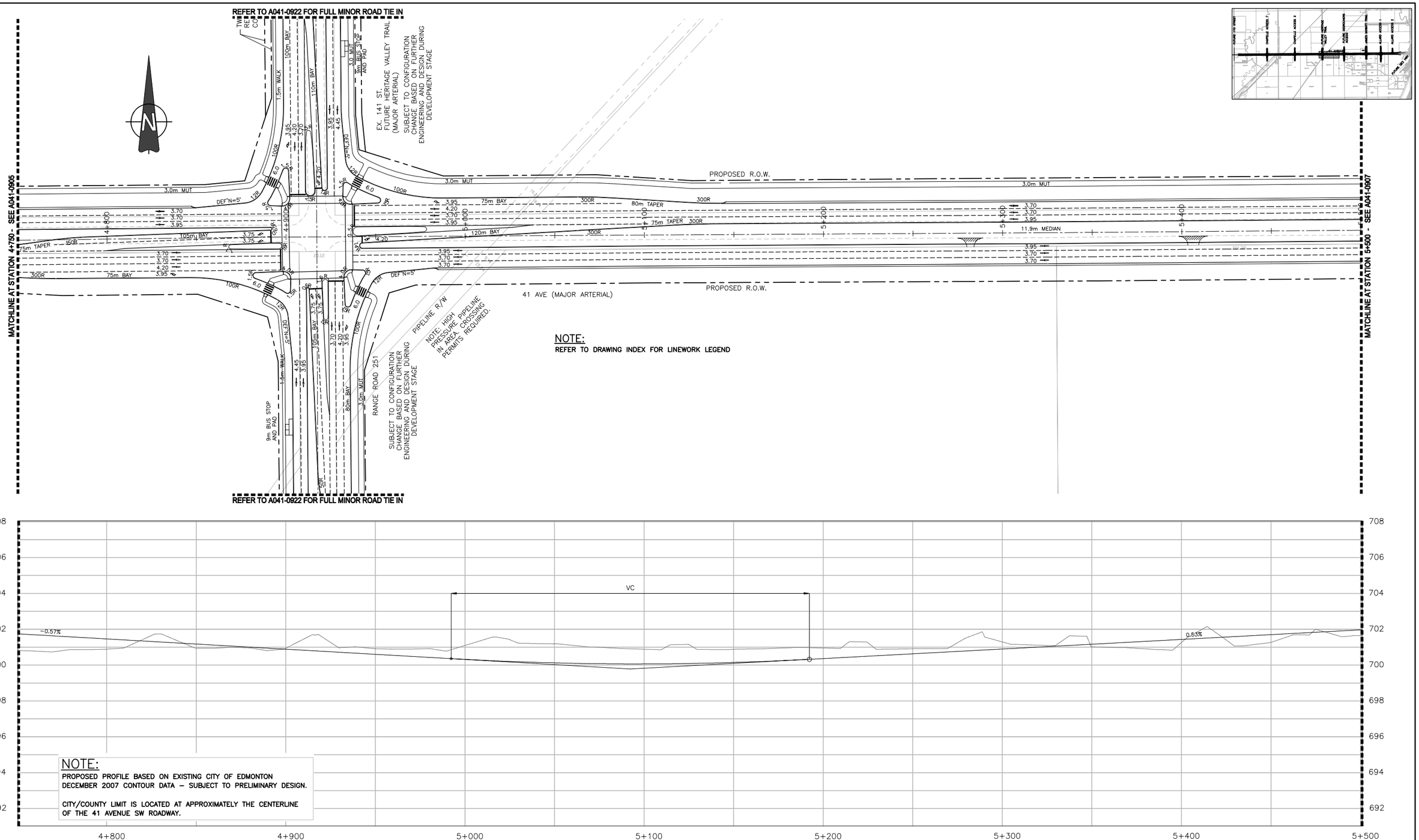
41 AVENUE SW CONCEPT PLANNING STUDY

PLAN - PROFILE
STATION 4+000 TO STATION 4+750

NOTE:
ALL DIMENSIONS ARE IN METRES

SCALE: V=1:100 H=1:1000

PLAN NO.
A041-0905



41 AVENUE
DESIGN SPEED: 90 km/hr
POSTED SPEED: 70 km/hr

PERMIT TO PRACTICE
ASSOCIATED ENGINEERING
QUALITY MANAGEMENT SIGN-OFF
Signature:
Date:
APEGGA Permit to Practice P 3979

DESIGNER
PROFESSIONAL ENGINEER ALBERTA SHAWN BENBOW
P ENG
DATE

CHECKER
PROFESSIONAL ENGINEER ALBERTA RYAN BATTY
P ENG
DATE

THE CITY OF Edmonton TRANSPORTATION
LEDUC COUNTY
Associated Engineering

Manager, Transportation Planning Branch
Director, Facility and Capital Planning
Manager, Engineering, Leduc County

CONCEPT PLAN - SUBJECT TO PRELIMINARY DESIGN

41 AVENUE SW CONCEPT PLANNING STUDY

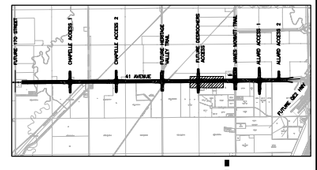
PLAN - PROFILE
STATION 4+750 TO STATION 5+500

NOTE:
ALL DIMENSIONS
ARE IN METRES

SCALE: V=1:100
H=1:1000

PLAN NO.
A041-0906

REFER TO A041-0923 FOR FULL MINOR ROAD TIE IN



MATCHLINE AT STATION 5+500 - SEE A041-0906

MATCHLINE AT STATION 6+250 - SEE A041-0908

DESROCHERS ACCESS (COLLECTOR)

SUBJECT TO CONFIGURATION CHANGE BASED ON FURTHER ENGINEERING AND DESIGN DURING DEVELOPMENT STAGE

9m BUS STOP AND PAD

1.5m WALK

70m BAY

105m BAY

60m BAY

3.0m MUT

PROPOSED R.O.W.

252m AT 60:1 TAPER

80m TAPER

75m TAPER

11.9m MEDIAN

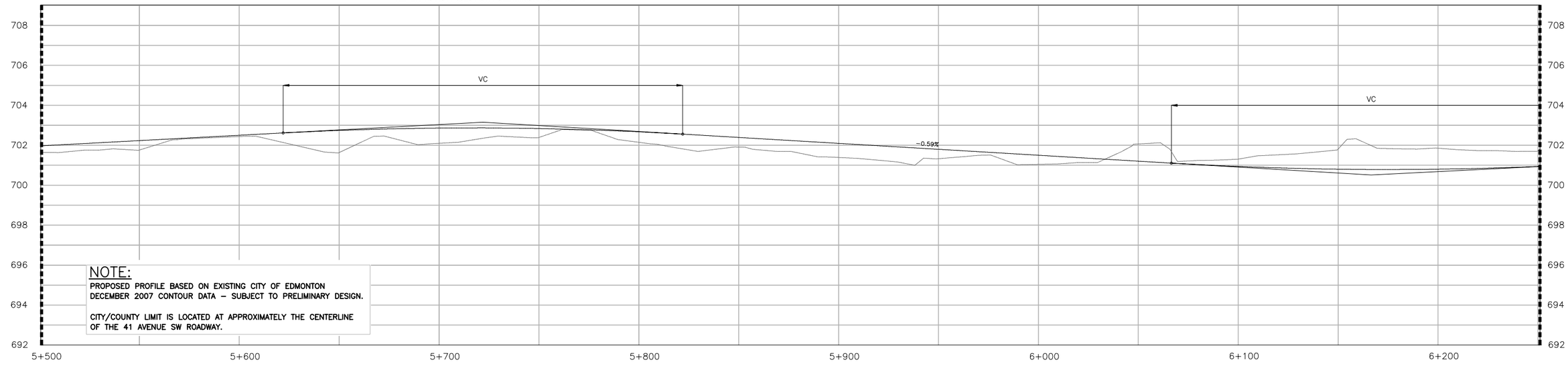
41 AVE (MAJOR ARTERIAL)

DEF'N=5°

NOTE:

REFER TO DRAWING INDEX FOR LINEWORK LEGEND

REFER TO A041-0923 FOR FULL MINOR ROAD TIE IN



NOTE:

PROPOSED PROFILE BASED ON EXISTING CITY OF EDMONTON DECEMBER 2007 CONTOUR DATA – SUBJECT TO PRELIMINARY DESIGN.

CITY/COUNTY LIMIT IS LOCATED AT APPROXIMATELY THE CENTERLINE OF THE 41 AVENUE SW ROADWAY.

41 AVENUE
DESIGN SPEED: 90 km/hr
POSTED SPEED: 70 km/hr

PERMIT TO PRACTICE

ASSOCIATED ENGINEERING
QUALITY MANAGEMENT SIGN-OFF
Signature:
Date:
APEGGA Permit to Practice P 3979

DESIGNER
PROFESSIONAL ENGINEER ALBERTA SHAWN BENBOW
P ENG
DATE

CHECKER
PROFESSIONAL ENGINEER ALBERTA RYAN BATTY
P ENG
DATE

THE CITY OF Edmonton TRANSPORTATION

LEDUC COUNTY

Associated Engineering

Manager, Transportation Planning Branch

Director, Facility and Capital Planning

Manager, Engineering, Leduc County

CONCEPT PLAN - SUBJECT TO PRELIMINARY DESIGN

41 AVENUE SW CONCEPT PLANNING STUDY

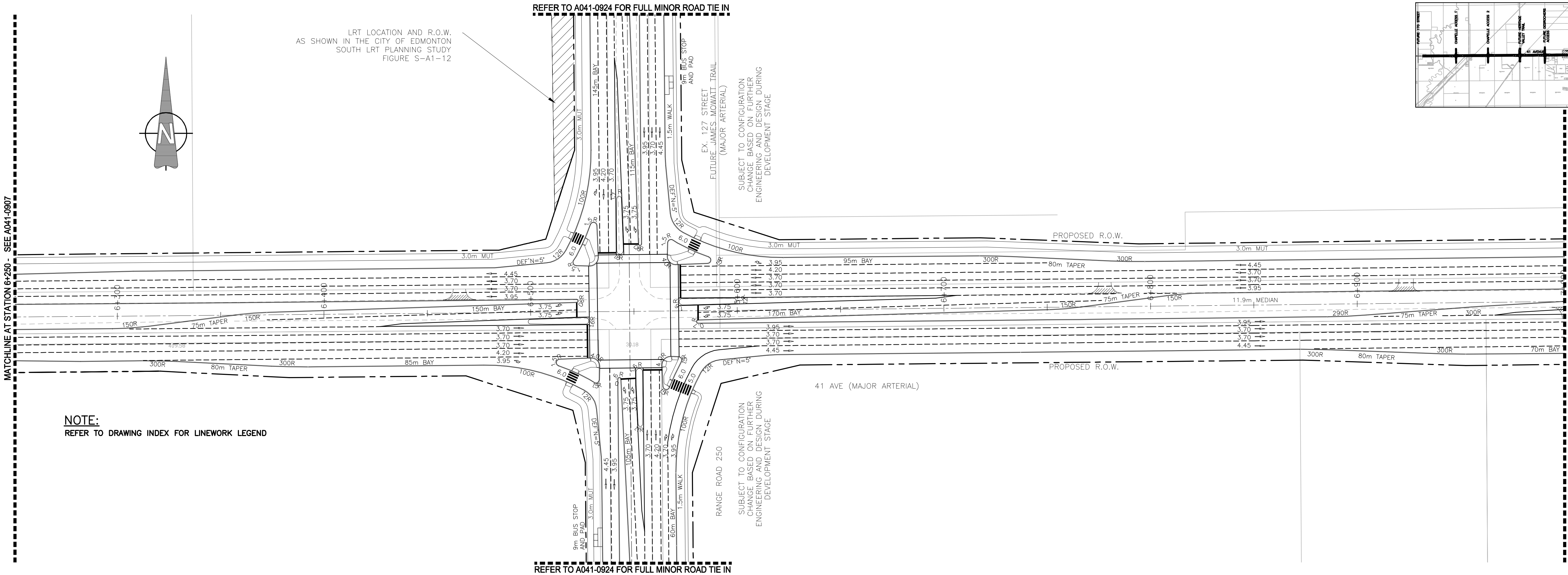
PLAN - PROFILE
STATION 5+500 TO STATION 6+250

NOTE: ALL DIMENSIONS ARE IN METRES

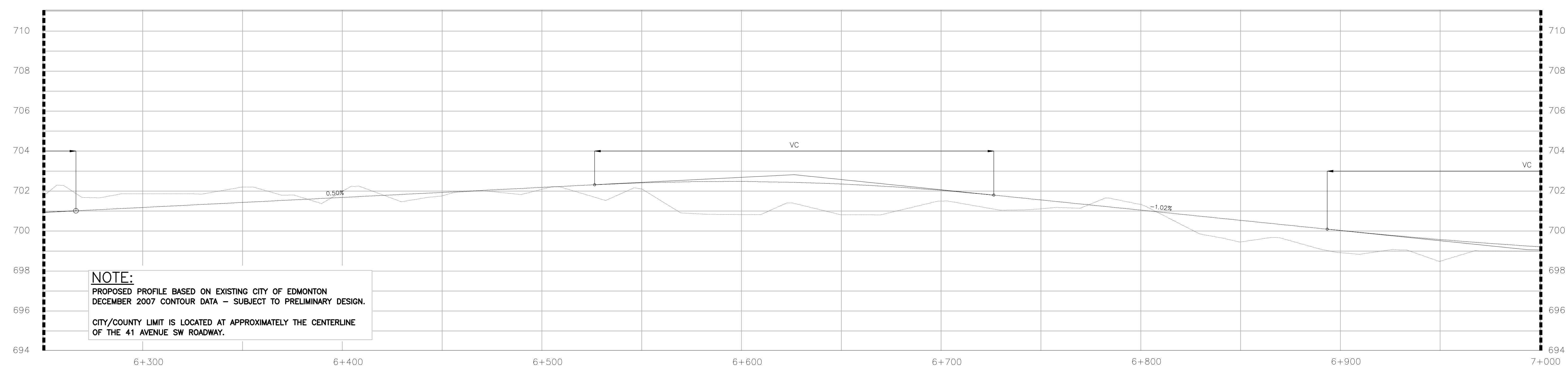
SCALE: V=1:100 H=1:1000

PLAN NO. A041-0907

Date: Jan 12, 2011 Time: 2:55pm
File: P:\20073483\00_CDE_41_Ave\Working_Dwgs\100_Civil\073483_PLAN_PROFILES.dwg by
Xrefs: 30807801_TITLEBLOCK1; utilities, legal



NOTE:
REFER TO DRAWING INDEX FOR LINEWORK LEGEND



NOTE:
PROPOSED PROFILE BASED ON EXISTING CITY OF EDMONTON DECEMBER 2007 CONTOUR DATA – SUBJECT TO PRELIMINARY DESIGN.

CITY/COUNTY LIMIT IS LOCATED AT APPROXIMATELY THE CENTERLINE OF THE 41 AVENUE SW ROADWAY.

41 AVENUE
DESIGN SPEED: 90 km/hr
POSTED SPEED: 70 km/hr

PERMIT TO PRACTICE
ASSOCIATED ENGINEERING
QUALITY MANAGEMENT SIGN-OFF
Signature:
Date:
APEGGA Permit to Practice P 3979

DESIGNER
PROFESSIONAL ENGINEER ALBERTA — SHAWN BENBOW
P ENG
DATE

CHECKER
PROFESSIONAL ENGINEER ALBERTA — RYAN BATTY
P ENG
DATE

THE CITY OF Edmonton TRANSPORTATION
LEDUC COUNTY
Associated Engineering

Manager, Transportation Planning Branch
Director, Facility and Capital Planning
Manager, Engineering, Leduc County

CONCEPT PLAN - SUBJECT TO PRELIMINARY DESIGN

41 AVENUE SW CONCEPT PLANNING STUDY

PLAN - PROFILE
STATION 6+250 TO STATION 7+000

NOTE: ALL DIMENSIONS ARE IN METRES
SCALE: V=1:100 H=1:1000
PLAN NO. A041-0908

REFER TO A041-0925 FOR FULL MINOR ROAD TIE IN

REFER TO A041-0926 FOR FULL MINOR ROAD TIE IN

MATCHLINE AT STATION 7+000 - SEE A041-0908

MATCHLINE AT STATION 7+716 - TIE INTO FUTURE QE2 INTERCHANGE PLANS (BY OTHERS)

ALLARD ACCESS 1
(COLLECTOR)
APPROVED IN ALLARD NASP

SUBJECT TO CONFIGURATION CHANGE BASED ON FURTHER ENGINEERING AND DESIGN DURING DEVELOPMENT STAGE

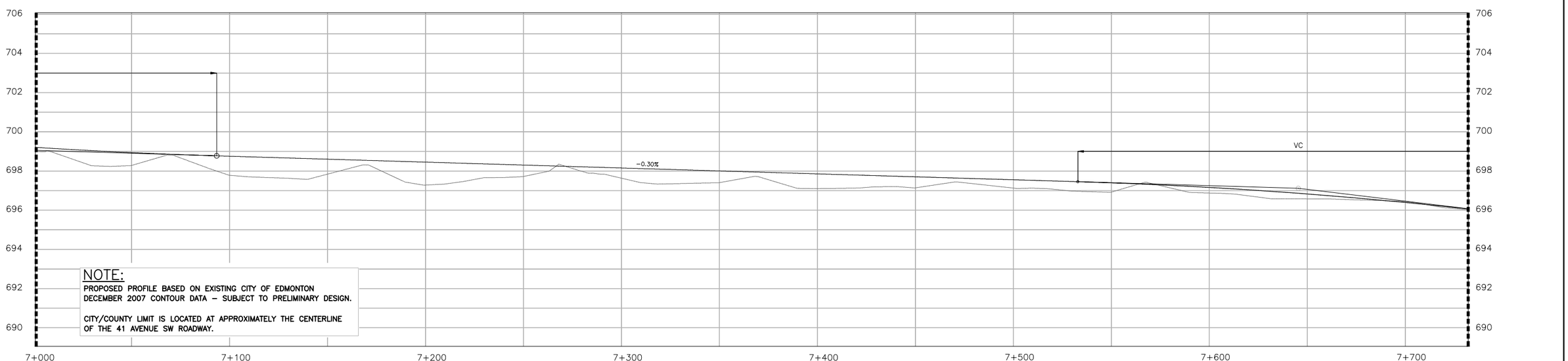
ALLARD ACCESS 2
(COLLECTOR)
APPROVED IN ALLARD NASP

SUBJECT TO LOCATION CHANGE BASED ON FURTHER ENGINEERING AND DESIGN DURING DEVELOPMENT STAGE AND DIRECTION FROM ALBERTA TRANSPORTATION

PROPOSED R.O.W.

41 AVE (MAJOR ARTERIAL)

NOTE:
REFER TO DRAWING INDEX FOR LINEWORK LEGEND



NOTE:
PROPOSED PROFILE BASED ON EXISTING CITY OF EDMONTON DECEMBER 2007 CONTOUR DATA – SUBJECT TO PRELIMINARY DESIGN.

CITY/COUNTY LIMIT IS LOCATED AT APPROXIMATELY THE CENTERLINE OF THE 41 AVENUE SW ROADWAY.

41 AVENUE
DESIGN SPEED: 90 km/hr
POSTED SPEED: 70 km/hr

PERMIT TO PRACTICE

ASSOCIATED ENGINEERING
QUALITY MANAGEMENT SIGN-OFF
Signature:
Date:
APEGGA Permit to Practice P 3979

DESIGNER
PROFESSIONAL ENGINEER ALBERTA SHAWN BENBOW
P ENG
DATE

CHECKER
PROFESSIONAL ENGINEER ALBERTA RYAN BATTY
P ENG
DATE

THE CITY OF Edmonton TRANSPORTATION
LEDUC COUNTY
Associated Engineering

Manager, Transportation Planning Branch
Director, Facility and Capital Planning
Manager, Engineering, Leduc County

CONCEPT PLAN - SUBJECT TO PRELIMINARY DESIGN

41 AVENUE SW CONCEPT PLANNING STUDY

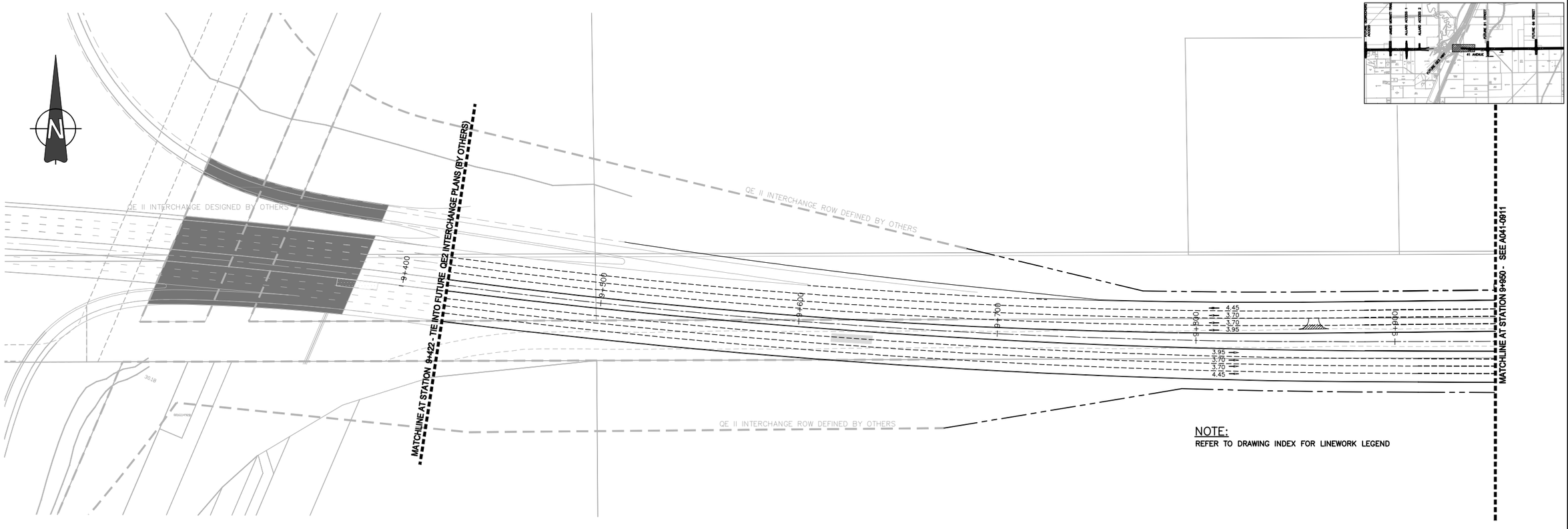
PLAN - PROFILE
STATION 7+000 TO QE II INTERCHANGE (BY OTHERS)

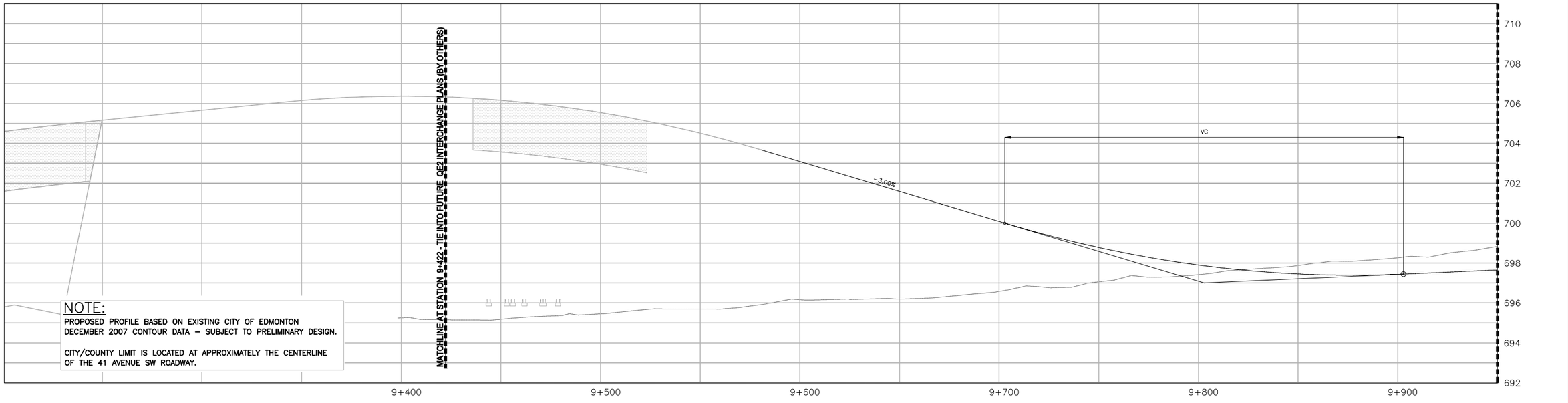
NOTE:
ALL DIMENSIONS ARE IN METRES

SCALE: V=1:100 H=1:1000

PLAN NO.
A041-0909

Date: Jan 12, 2011 Time: 2:58pm
File: P:\20073483\00_COE_41_Ave\Working_Dwgs\100_civil\073483_PLAN_PROFILES.dwg by
Xrefs: 30807801_TITLEBLOCK1, utilities, legal





NOTE:
PROPOSED PROFILE BASED ON EXISTING CITY OF EDMONTON DECEMBER 2007 CONTOUR DATA – SUBJECT TO PRELIMINARY DESIGN.

CITY/COUNTY LIMIT IS LOCATED AT APPROXIMATELY THE CENTERLINE OF THE 41 AVENUE SW ROADWAY.

41 AVENUE
DESIGN SPEED: 90 km/hr
POSTED SPEED: 70 km/hr

PERMIT TO PRACTICE

ASSOCIATED ENGINEERING
QUALITY MANAGEMENT SIGN-OFF
Signature:
Date:
APEGGA Permit to Practice P 3979

DESIGNER
PROFESSIONAL ENGINEER ALBERTA SHAWN BENSON
P ENG
DATE

CHECKER
PROFESSIONAL ENGINEER ALBERTA RYAN BATTY
P ENG
DATE

THE CITY OF Edmonton TRANSPORTATION
LEDUC COUNTY
Associated Engineering

Manager, Transportation Planning Branch
Director, Facility and Capital Planning
Manager, Engineering, Leduc County

CONCEPT PLAN - SUBJECT TO PRELIMINARY DESIGN

41 AVENUE SW CONCEPT PLANNING STUDY

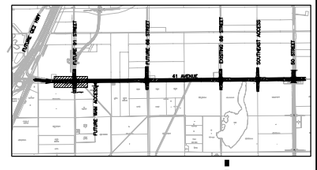
PLAN - PROFILE
QE II INTERCHANGE (BY OTHERS) TO STATION 9+950

NOTE:
ALL DIMENSIONS ARE IN METRES

SCALE: V=1:100 H=1:1000

PLAN NO.
A041-0910

REFER TO A041-0927 FOR FULL MINOR ROAD TIE IN



MATCHLINE AT STATION 9+950 - SEE A041-0910

MATCHLINE AT STATION 10+700 - SEE A041-0912

PROPOSED R.O.W.

PROPOSED R.O.W.

EXISTING 101 ST/PARSONS ROAD (MAJOR ARTERIAL)

FUTURE 91 ST/PARSONS ROAD (MAJOR ARTERIAL)

SUBJECT TO CONFIGURATION CHANGE BASED ON FURTHER ENGINEERING AND DESIGN DURING DEVELOPMENT STAGE

41 AVE (MAJOR ARTERIAL)

RANGE ROAD 244 (FUTURE NISKU SPINE ROAD)

NOTE: HIGH PRESSURE PIPELINE IN AREA. CROSSING PERMITS REQUIRED.

PIPELINE R/W

9m BUS STOP AND PAD

3.0m MUT

1.5m WALK

65m BAY

105m BAY

70m BAY

80m BAY

80m TAPER

75m TAPER

300R

150R

100R

11.9m MEDIAN

DEF'N=5°

S=N 39°

10+000

10+100

10+200

10+300

10+400

10+500

10+600

10+700

NOTE:
REFER TO DRAWING INDEX FOR LINEWORK LEGEND

REFER TO A041-0927 FOR FULL MINOR ROAD TIE IN

706
704
702
700
698
696
694
692
690

0.44%

NOTE:
PROPOSED PROFILE BASED ON EXISTING CITY OF EDMONTON DECEMBER 2007 CONTOUR DATA – SUBJECT TO PRELIMINARY DESIGN.

CITY/COUNTY LIMIT IS LOCATED AT APPROXIMATELY THE CENTERLINE OF THE 41 AVENUE SW ROADWAY.

41 AVENUE
DESIGN SPEED: 90 km/hr
POSTED SPEED: 70 km/hr

PERMIT TO PRACTICE

ASSOCIATED ENGINEERING
QUALITY MANAGEMENT SIGN-OFF
Signature:
Date:
APEGGA Permit to Practice P 3979

DESIGNER
PROFESSIONAL ENGINEER ALBERTA SHAWN BENSON
P ENG
DATE

CHECKER
PROFESSIONAL ENGINEER ALBERTA RYAN BATTY
P ENG
DATE

THE CITY OF Edmonton TRANSPORTATION
LEDUC COUNTY
Associated Engineering

Manager, Transportation Planning Branch

Director, Facility and Capital Planning

Manager, Engineering, Leduc County

CONCEPT PLAN - SUBJECT TO PRELIMINARY DESIGN

41 AVENUE SW CONCEPT PLANNING STUDY

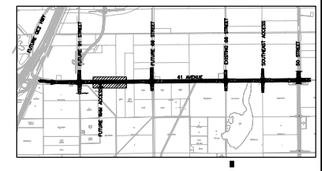
PLAN - PROFILE
STATION 9+950 TO STATION 10+700

NOTE:
ALL DIMENSIONS ARE IN METRES

SCALE: V=1:100 H=1:1000

PLAN NO.
A041-0911

Date: Jan 12, 2011 Time: 3:00pm
File: P:\2007\3483\00_CDE_41_Ave\Working_Dwgs\100_Civil\073483_PLAN_PROFILES.dwg by
Xrefs: 3080780I_TITLEBLOCK1, utilities, legal



MATCHLINE AT STATION 10+700 - SEE A041-0911

MATCHLINE AT STATION 11+450 - SEE A041-0913

41 AVE (MAJOR ARTERIAL)

PROPOSED R.O.W.

3.0m MUT

4.45
3.95
3.70
3.70
3.95

11.9m MEDIAN

3.95
3.70
3.70
4.45

10+800 10+900 11+000 11+100 11+200 11+300 11+400

PROPOSED R.O.W.

25R 6.0 ROAD 6.0 12R DEF'N=5'

5.75 5.75

WAM ACCESS (10 ST)
(COLLECTOR)
APPROVED IN WAM LASP

SUBJECT TO CONFIGURATION CHANGE BASED ON FURTHER ENGINEERING AND DESIGN DURING DEVELOPMENT STAGE

TIE IN TO WAM ASP

NOTE:
REFER TO DRAWING INDEX FOR LINEWORK LEGEND

NOTE:
PROPOSED PROFILE BASED ON EXISTING CITY OF EDMONTON DECEMBER 2007 CONTOUR DATA – SUBJECT TO PRELIMINARY DESIGN.

CITY/COUNTY LIMIT IS LOCATED AT APPROXIMATELY THE CENTERLINE OF THE 41 AVENUE SW ROADWAY.

41 AVENUE
DESIGN SPEED: 90 km/hr
POSTED SPEED: 70 km/hr

PERMIT TO PRACTICE

ASSOCIATED ENGINEERING
QUALITY MANAGEMENT SIGN-OFF
Signature:
Date:
APEGGA Permit to Practice P 3979

DESIGNER
PROFESSIONAL ENGINEER ALBERTA SHAWN BENBOW
P ENG
DATE

CHECKER
PROFESSIONAL ENGINEER ALBERTA RYAN BATTY
P ENG
DATE

THE CITY OF Edmonton TRANSPORTATION
LEDUC COUNTY
Associated Engineering

Manager, Transportation Planning Branch
Director, Facility and Capital Planning
Manager, Engineering, Leduc County

CONCEPT PLAN - SUBJECT TO PRELIMINARY DESIGN

41 AVENUE SW CONCEPT PLANNING STUDY

PLAN - PROFILE
STATION 10+700 TO STATION 11+450

NOTE:
ALL DIMENSIONS ARE IN METRES

SCALE: V=1:100 H=1:1000

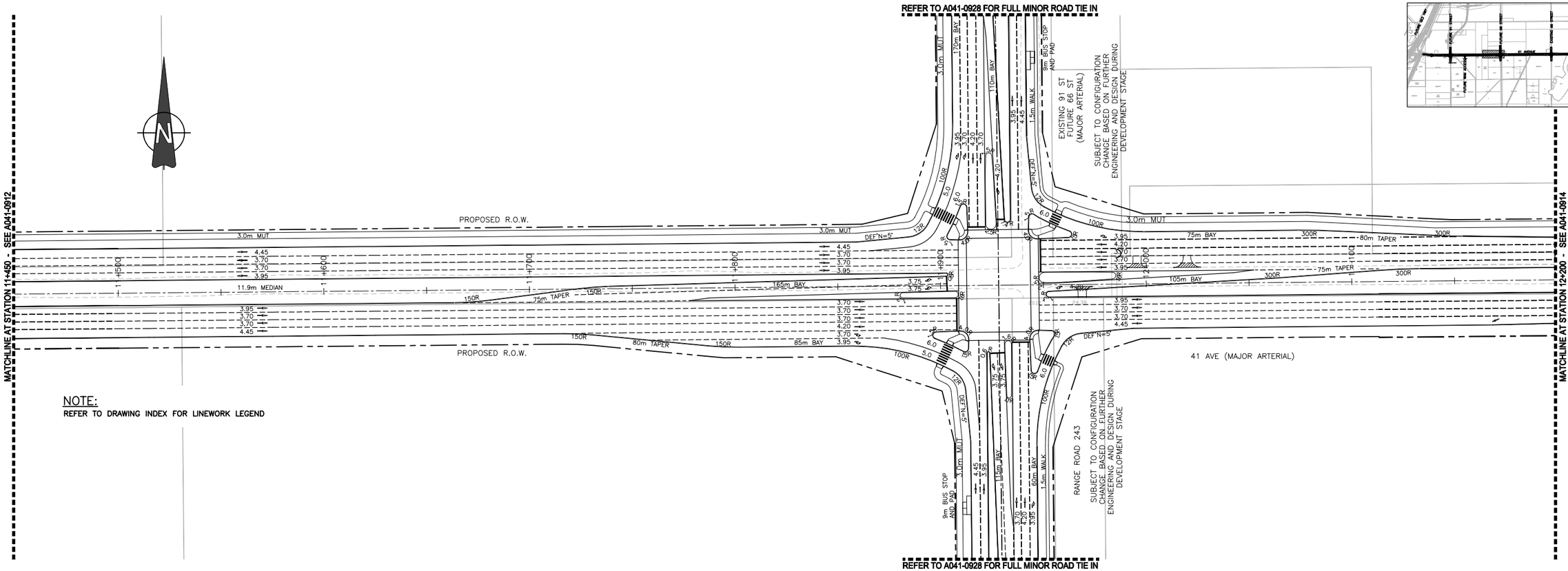
PLAN NO.
A041-0912

Date: Jan 12, 2011 Time: 3:01pm
File: P:\207348\3\00_CDE_41_Ave\Working_Dwgs\100_civil\073483_PLAN_PROFILES.dwg by
Xrefs: 308078801_TITLEBLOCK1; utilities, legal

REFER TO A041-0928 FOR FULL MINOR ROAD TIE IN

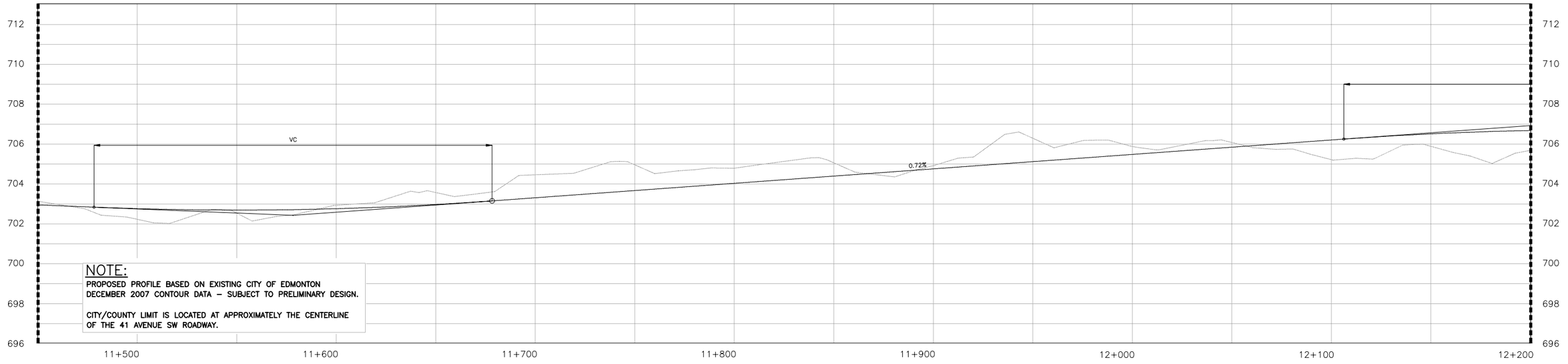
MATCHLINE AT STATION 11+450 - SEE A041-0912

MATCHLINE AT STATION 12+200 - SEE A041-0914



NOTE:
REFER TO DRAWING INDEX FOR LINEWORK LEGEND

REFER TO A041-0928 FOR FULL MINOR ROAD TIE IN



NOTE:
PROPOSED PROFILE BASED ON EXISTING CITY OF EDMONTON DECEMBER 2007 CONTOUR DATA – SUBJECT TO PRELIMINARY DESIGN.

CITY/COUNTY LIMIT IS LOCATED AT APPROXIMATELY THE CENTERLINE OF THE 41 AVENUE SW ROADWAY.

41 AVENUE
DESIGN SPEED: 90 km/hr
POSTED SPEED: 70 km/hr

PERMIT TO PRACTICE

ASSOCIATED ENGINEERING
QUALITY MANAGEMENT SIGN-OFF
Signature:
Date:
APEGGA Permit to Practice P 3979

DESIGNER
PROFESSIONAL ENGINEER ALBERTA SHAWN BENBOW
P ENG
DATE

CHECKER
PROFESSIONAL ENGINEER ALBERTA RYAN BATTY
P ENG
DATE

THE CITY OF Edmonton TRANSPORTATION
LEDUC COUNTY
Associated Engineering

Manager, Transportation Planning Branch
Director, Facility and Capital Planning
Manager, Engineering, Leduc County

CONCEPT PLAN - SUBJECT TO PRELIMINARY DESIGN

41 AVENUE SW CONCEPT PLANNING STUDY

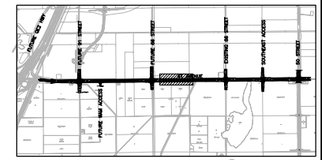
PLAN - PROFILE
STATION 11+450 TO STATION 12+200

NOTE:
ALL DIMENSIONS ARE IN METRES

SCALE: V=1:100 H=1:1000

PLAN NO.
A041-0913

Date: Jan 12, 2011 Time: 3:02pm
File: P:\20073483\00_CDE_41_Ave\Working_Dwgs\100_civil\073483_PLAN_PROFILES.dwg by
Xrefs: 30807801_TITLEBLOCK1; utilities, legal



MATCHLINE AT STATION 12+200 - SEE A041-0913

MATCHLINE AT STATION 12+950 - SEE A041-0915

PROPOSED R.O.W.

3.0m MUT

252m AT 60:1 TAPER

3.70
3.70
3.95

12+300 12+400 12+500 12+600 12+700 12+800 12+900

11.9m MEDIAN

11.9m MEDIAN

3.95
3.70
3.70

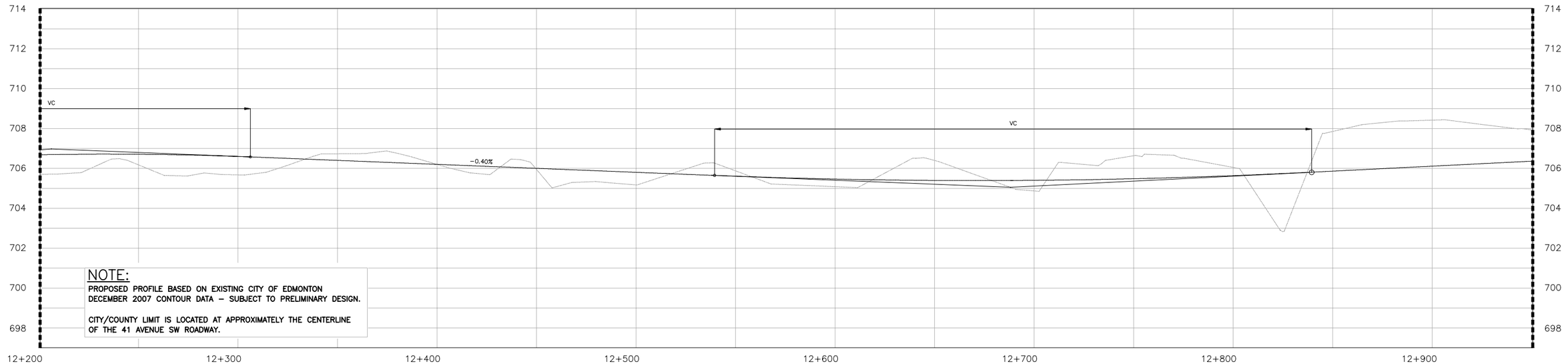
252m AT 60:1 TAPER

PROPOSED R.O.W.

NOTE: HIGH PRESSURE PIPELINE IN AREA. CROSSING PERMITS REQUIRED.

PIPELINE R/W

NOTE:
REFER TO DRAWING INDEX FOR LINEWORK LEGEND



NOTE:
PROPOSED PROFILE BASED ON EXISTING CITY OF EDMONTON DECEMBER 2007 CONTOUR DATA – SUBJECT TO PRELIMINARY DESIGN.

CITY/COUNTY LIMIT IS LOCATED AT APPROXIMATELY THE CENTERLINE OF THE 41 AVENUE SW ROADWAY.

41 AVENUE
DESIGN SPEED: 90 km/hr
POSTED SPEED: 70 km/hr

PERMIT TO PRACTICE

ASSOCIATED ENGINEERING
QUALITY MANAGEMENT SIGN-OFF
Signature:
Date:
APEGGA Permit to Practice P 3879

DESIGNER
PROFESSIONAL ENGINEER ALBERTA SHAWN BENBOW
P ENG
DATE

CHECKER
PROFESSIONAL ENGINEER ALBERTA RYAN BATTY
P ENG
DATE

THE CITY OF Edmonton TRANSPORTATION
LEDUC COUNTY
Associated Engineering

Manager, Transportation Planning Branch

Director, Facility and Capital Planning

Manager, Engineering, Leduc County

CONCEPT PLAN - SUBJECT TO PRELIMINARY DESIGN

41 AVENUE SW CONCEPT PLANNING STUDY

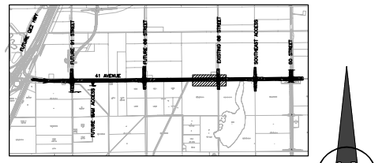
PLAN - PROFILE
STATION 12+200 TO STATION 12+950

NOTE:
ALL DIMENSIONS ARE IN METRES

SCALE: V=1:100 H=1:1000

PLAN NO.
A041-0914

Date: Jan 12, 2011 Time: 3:02pm
File: P:\20073483\00_COE_41_Ave\Working_Dwgs\100_Civil\073483_PLAN_PROFILES.dwg by
Xrefs: 30807897_TITLEBLOCK1, utilities, legal



MATCHLINE AT STATION 12+950 - SEE A041-0914

MATCHLINE AT STATION 13+700 - SEE A041-0916

REFER TO A041-0929 FOR FULL MINOR ROAD TIE IN

REFER TO A041-0929 FOR FULL MINOR ROAD TIE IN

PROPOSED R.O.W.

PROPOSED R.O.W.

3.0m MUT

3.0m MUT

11.9m MEDIAN

75m TAPER

80m TAPER

105m BAY

70m BAY

105m BAY

105m BAY

8.0m BAY

300R

100R

DEF'N=5°

1.5m WALK

1.5m BVK

9m BUS STOP AND PAD

EXISTING 66 ST (FUTURE COLLECTOR)

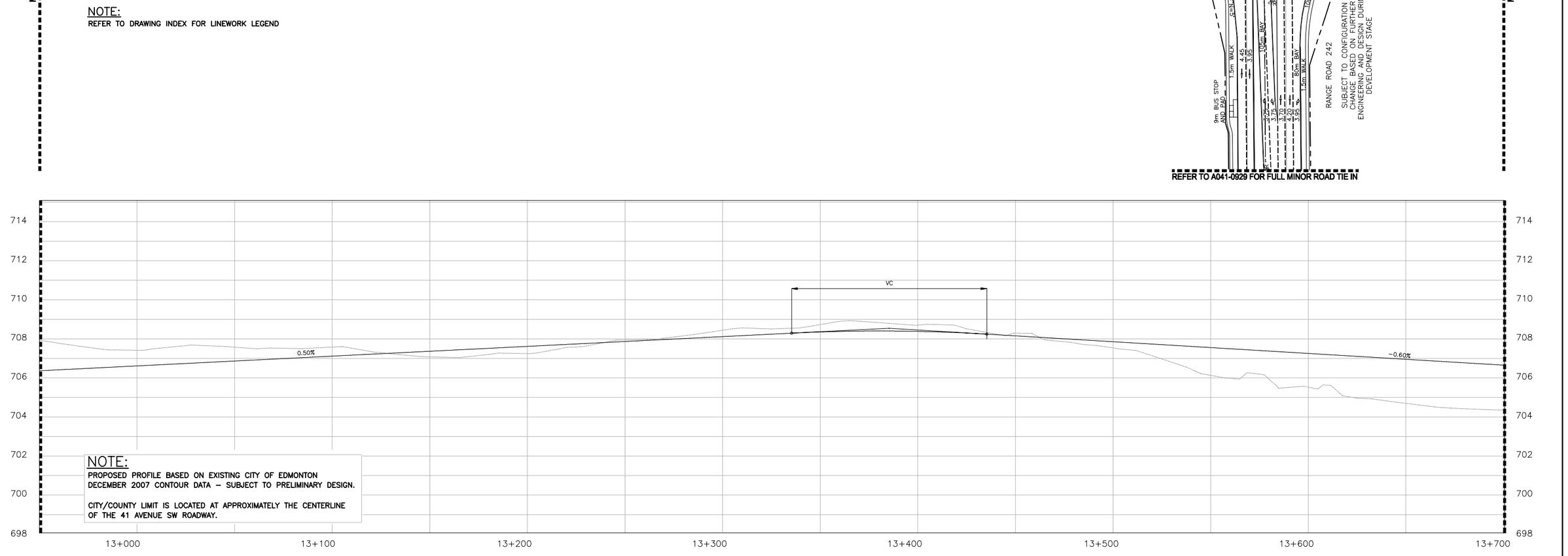
SUBJECT TO CONFIGURATION CHANGE BASED ON FURTHER ENGINEERING AND DESIGN DURING DEVELOPMENT STAGE

41 AVE (MAJOR ARTERIAL)

RANGE ROAD 242

SUBJECT TO CONFIGURATION CHANGE BASED ON FURTHER ENGINEERING AND DESIGN DURING DEVELOPMENT STAGE

NOTE:
REFER TO DRAWING INDEX FOR LINEWORK LEGEND



NOTE:
PROPOSED PROFILE BASED ON EXISTING CITY OF EDMONTON DECEMBER 2007 CONTOUR DATA – SUBJECT TO PRELIMINARY DESIGN.

CITY/COUNTY LIMIT IS LOCATED AT APPROXIMATELY THE CENTERLINE OF THE 41 AVENUE SW ROADWAY.

41 AVENUE
DESIGN SPEED: 90 km/hr
POSTED SPEED: 70 km/hr

PERMIT TO PRACTICE

ASSOCIATED ENGINEERING
QUALITY MANAGEMENT SIGN-OFF
Signature:
Date:
APEGGA Permit to Practice P 3979

DESIGNER
PROFESSIONAL ENGINEER ALBERTA SHAWN BENBOW
P ENG
DATE

CHECKER
PROFESSIONAL ENGINEER ALBERTA RYAN BATTY
P ENG
DATE

THE CITY OF Edmonton TRANSPORTATION
LEDUC COUNTY
Associated Engineering

Manager, Transportation Planning Branch

Director, Facility and Capital Planning

Manager, Engineering, Leduc County

CONCEPT PLAN - SUBJECT TO PRELIMINARY DESIGN

41 AVENUE SW CONCEPT PLANNING STUDY

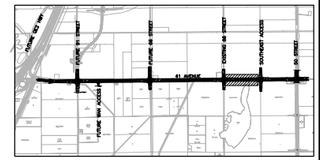
PLAN - PROFILE
STATION 12+950 TO STATION 13+700

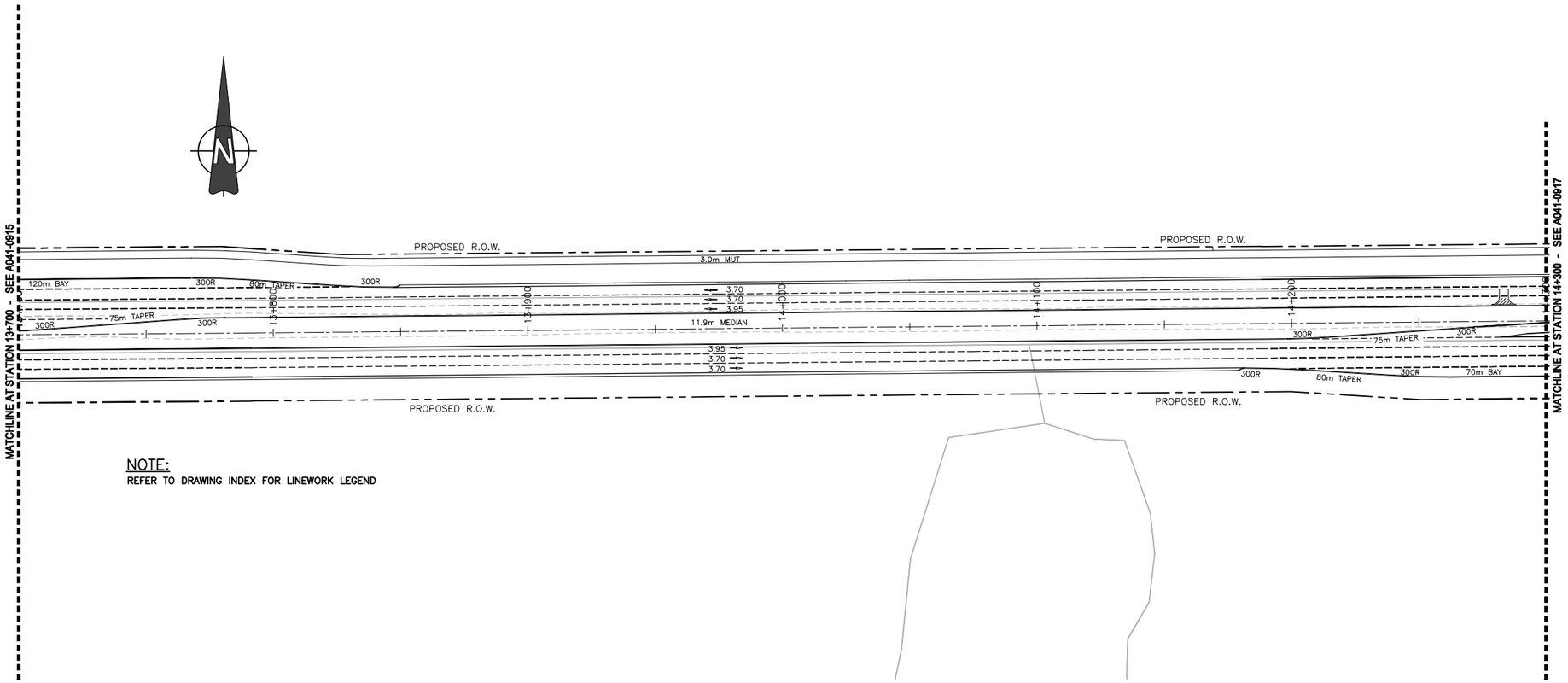
NOTE:
ALL DIMENSIONS ARE IN METRES

SCALE: V=1:100 H=1:1000

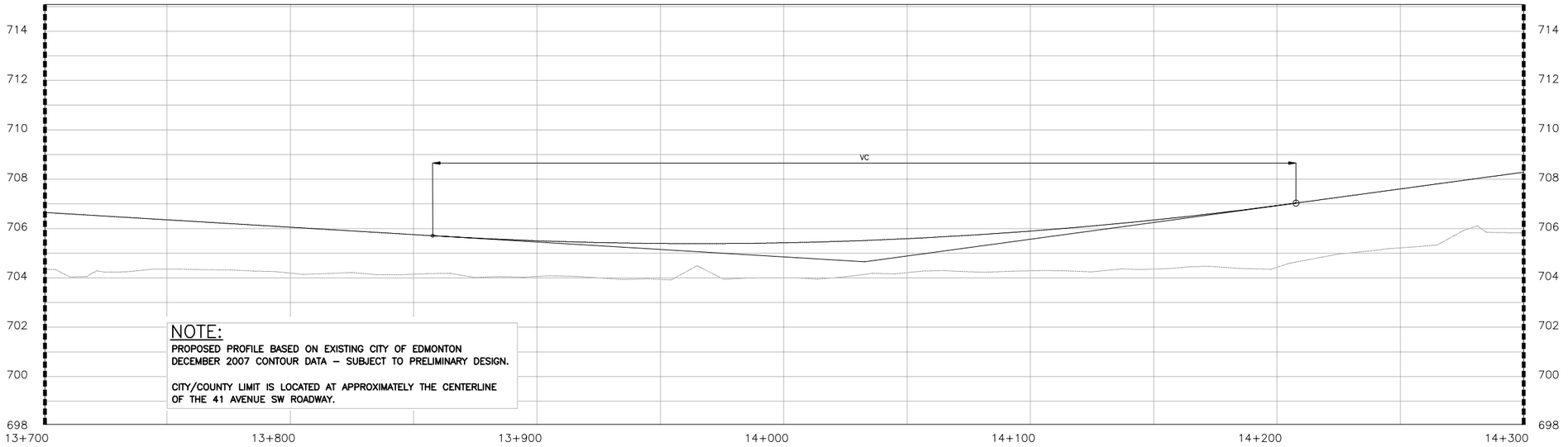
PLAN NO.
A041-0915

Date: Jan 19, 2011 Time: 5:05pm
File: P:\20073483\00_CDE_41_Ave\Working_Dwgs\100_Civil\073483_PLAN_PROFILES.dwg by
Xrefs: 30807801_TITLEBLOCK1; utilities, legal





NOTE:
REFER TO DRAWING INDEX FOR LINEWORK LEGEND



NOTE:
PROPOSED PROFILE BASED ON EXISTING CITY OF EDMONTON DECEMBER 2007 CONTOUR DATA – SUBJECT TO PRELIMINARY DESIGN.

CITY/COUNTY LIMIT IS LOCATED AT APPROXIMATELY THE CENTERLINE OF THE 41 AVENUE SW ROADWAY.

41 AVENUE
DESIGN SPEED: 90 km/hr
POSTED SPEED: 70 km/hr

PERMIT TO PRACTICE

ASSOCIATED ENGINEERING
QUALITY MANAGEMENT SIGN-OFF
Signature:
Date:
APEGGA Permit to Practice P 3979

DESIGNER
PROFESSIONAL ENGINEER ALBERTA — SHAWN BENBOW
P ENG
DATE

CHECKER
PROFESSIONAL ENGINEER ALBERTA — RYAN BATTY
P ENG
DATE

THE CITY OF Edmonton TRANSPORTATION
LEDUC COUNTY
Associated Engineering

Manager, Transportation Planning Branch
Director, Facility and Capital Planning
Manager, Engineering, Leduc County

CONCEPT PLAN - SUBJECT TO PRELIMINARY DESIGN

41 AVENUE SW CONCEPT PLANNING STUDY

PLAN - PROFILE
STATION 13+700 TO STATION 14+300

NOTE:
ALL DIMENSIONS ARE IN METRES

SCALE: V=1:100 H=1:1000

PLAN NO.
A041-0916

REFER TO A041-0930 FOR FULL MINOR ROAD TIE IN

MATCHLINE AT STATION 14+300 - SEE A041-0916

MATCHLINE AT STATION 15+000 - SEE A041-0916

SOUTHEAST ACCESS (COLLECTOR) APPROVED IN SOUTHEAST ASP

SUBJECT TO CONFIGURATION CHANGE BASED ON FURTHER ENGINEERING AND DESIGN DURING DEVELOPMENT STAGE

9m BUS STOP AND PAD

1.5m WALK

70m BAY

105m BAY

60m BAY

3.0m MUT

PROPOSED R.O.W.

DEF'N=5°

100R

300R

80m TAPER

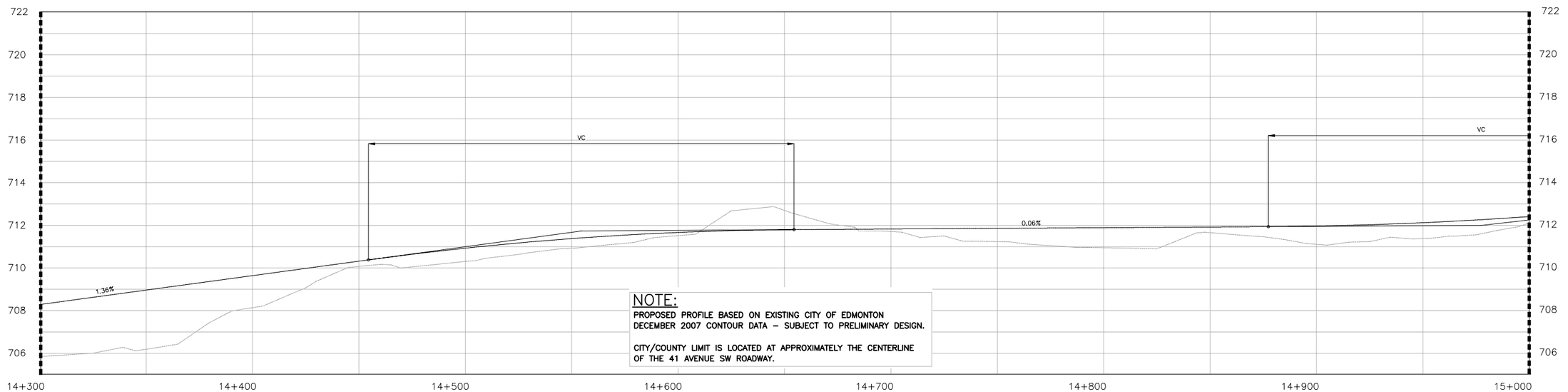
75m TAPER

150R

11.9m MEDIAN

41 AVE (MAJOR ARTERIAL)

NOTE:
REFER TO DRAWING INDEX FOR LINEWORK LEGEND



NOTE:
PROPOSED PROFILE BASED ON EXISTING CITY OF EDMONTON DECEMBER 2007 CONTOUR DATA – SUBJECT TO PRELIMINARY DESIGN.

CITY/COUNTY LIMIT IS LOCATED AT APPROXIMATELY THE CENTERLINE OF THE 41 AVENUE SW ROADWAY.

41 AVENUE
DESIGN SPEED: 90 km/hr
POSTED SPEED: 70 km/hr

PERMIT TO PRACTICE

ASSOCIATED ENGINEERING
QUALITY MANAGEMENT SIGN-OFF
Signature:
Date:
APEGGA Permit to Practice P 3979

DESIGNER
PROFESSIONAL ENGINEER ALBERTA SHAWN BENBOW
P ENG
DATE

CHECKER
PROFESSIONAL ENGINEER ALBERTA RYAN BATTY
P ENG
DATE

THE CITY OF Edmonton TRANSPORTATION
LEDUC COUNTY
Associated Engineering

Manager, Transportation Planning Branch
Director, Facility and Capital Planning
Manager, Engineering, Leduc County

CONCEPT PLAN - SUBJECT TO PRELIMINARY DESIGN

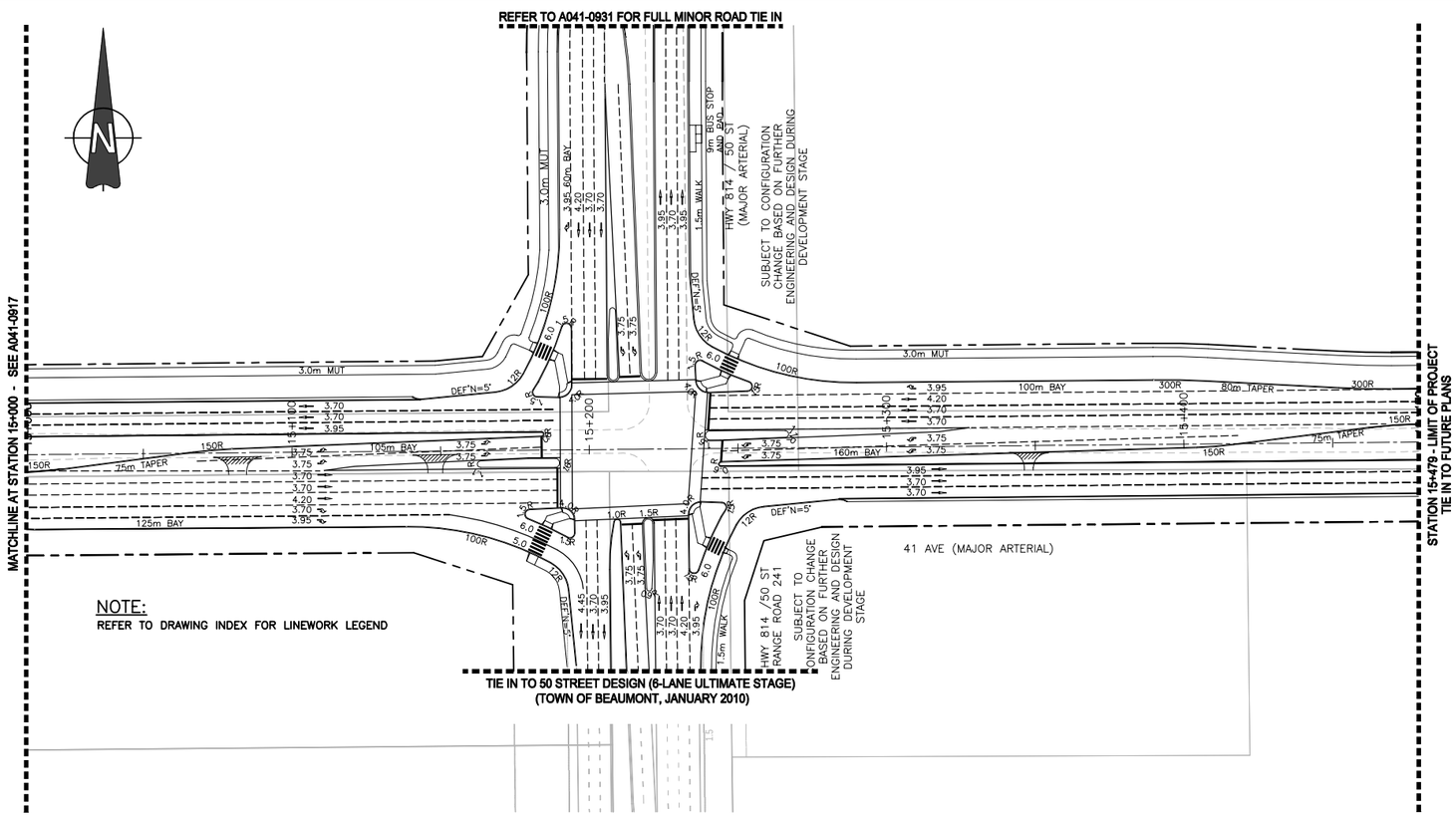
41 AVENUE SW CONCEPT PLANNING STUDY

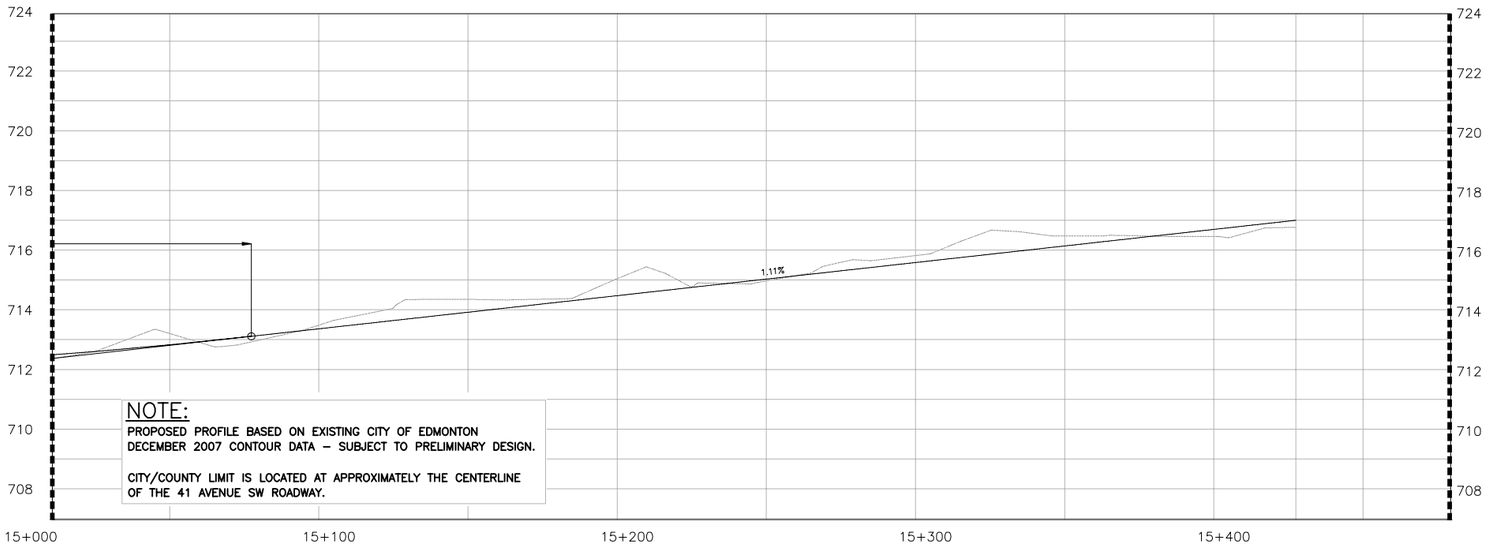
PLAN - PROFILE
STATION 14+300 TO STATION 15+000

NOTE:
ALL DIMENSIONS ARE IN METRES

SCALE: V=1:100 H=1:1000

PLAN NO.
A041-0917





41 AVENUE
DESIGN SPEED: 90 km/hr
POSTED SPEED: 70 km/hr

PERMIT TO PRACTICE
ASSOCIATED ENGINEERING
QUALITY MANAGEMENT SIGN-OFF
Signature: _____
Date: _____
APEGGA Permit to Practice P 3979

DESIGNER
PROFESSIONAL ENGINEER ALBERTA SHAWN BENSOW
P ENG
DATE _____

CHECKER
PROFESSIONAL ENGINEER ALBERTA RYAN BATTY
P ENG
DATE _____

THE CITY OF Edmonton TRANSPORTATION
LEDUC COUNTY
Associated Engineering

_____ Manager, Transportation Planning Branch
_____ Director, Facility and Capital Planning
_____ Manager, Engineering, Leduc County

CONCEPT PLAN - SUBJECT TO PRELIMINARY DESIGN

41 AVENUE SW CONCEPT PLANNING STUDY

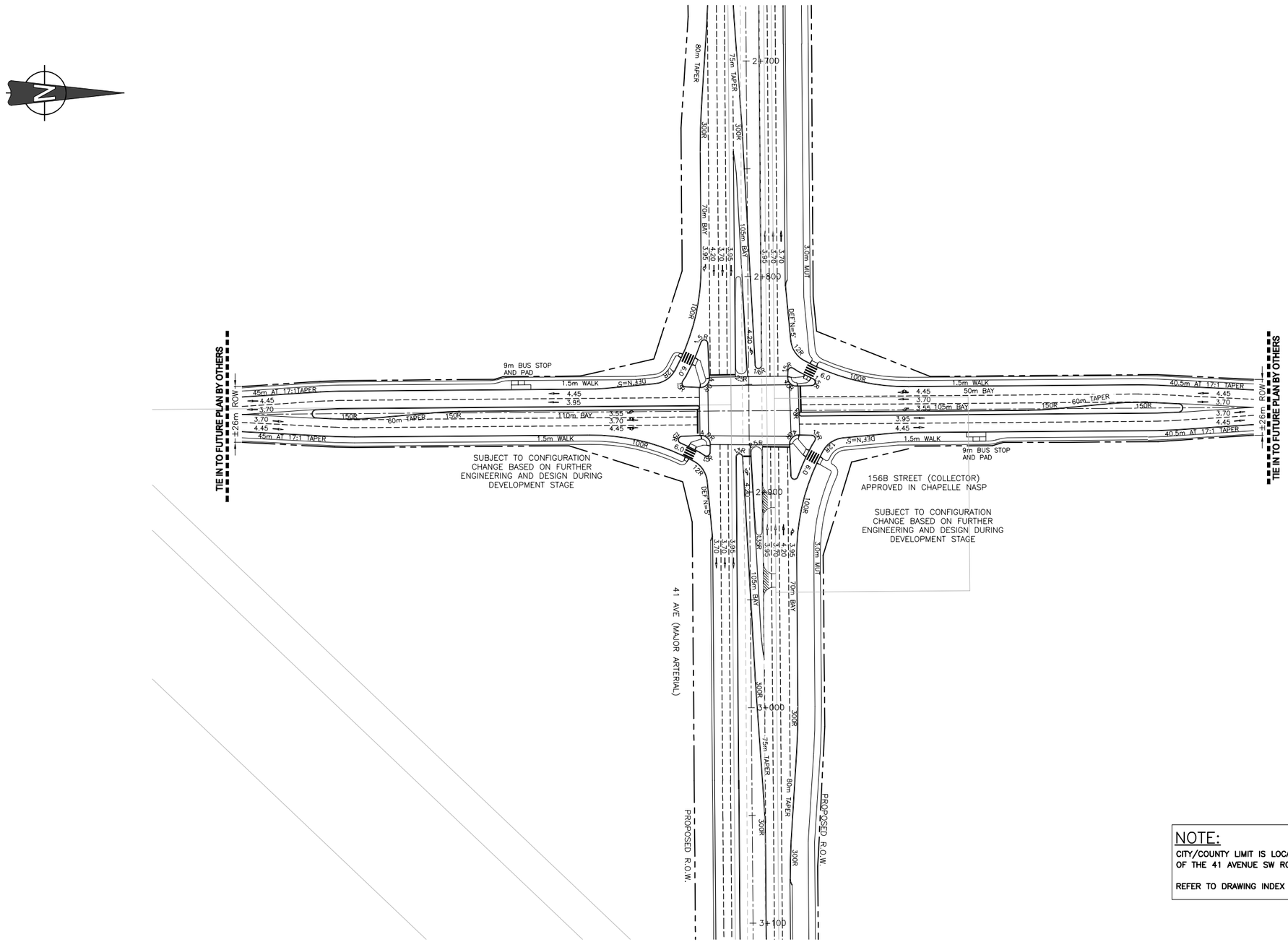
PLAN - PROFILE
STATION 15+000 TO STATION 15+479

NOTE: ALL DIMENSIONS ARE IN METRES

SCALE: V=1:100 H=1:1000

PLAN NO. A041-0918

Date: Jan 12, 2011 Time: 3:12pm
File: P:\20073483\00_CGE_41_Ave\Working_Dwgs\100_civil\073483_PLAN_PROFILES.dwg by
Xrefs: 30807801_TITLEBLOCK1, utilities, legal



NOTE:

CITY/COUNTY LIMIT IS LOCATED AT APPROXIMATELY THE CENTERLINE OF THE 41 AVENUE SW ROADWAY.

REFER TO DRAWING INDEX FOR LINEWORK LEGEND.

PERMIT TO PRACTICE

ASSOCIATED ENGINEERING
QUALITY MANAGEMENT SIGN-OFF
Signature:
Date:
APEGGA Permit to Practice P 3879

DESIGNER
PROFESSIONAL ENGINEER ALBERTA SHAWN BENSON
P ENG
DATE

CHECKER
PROFESSIONAL ENGINEER ALBERTA RYAN BATTY
P ENG
DATE

THE CITY OF Edmonton TRANSPORTATION
LEDUC COUNTY
Associated Engineering

Manager, Transportation Planning Branch
Director, Facility and Capital Planning
Manager, Engineering, Leduc County

CONCEPT PLAN - SUBJECT TO PRELIMINARY DESIGN

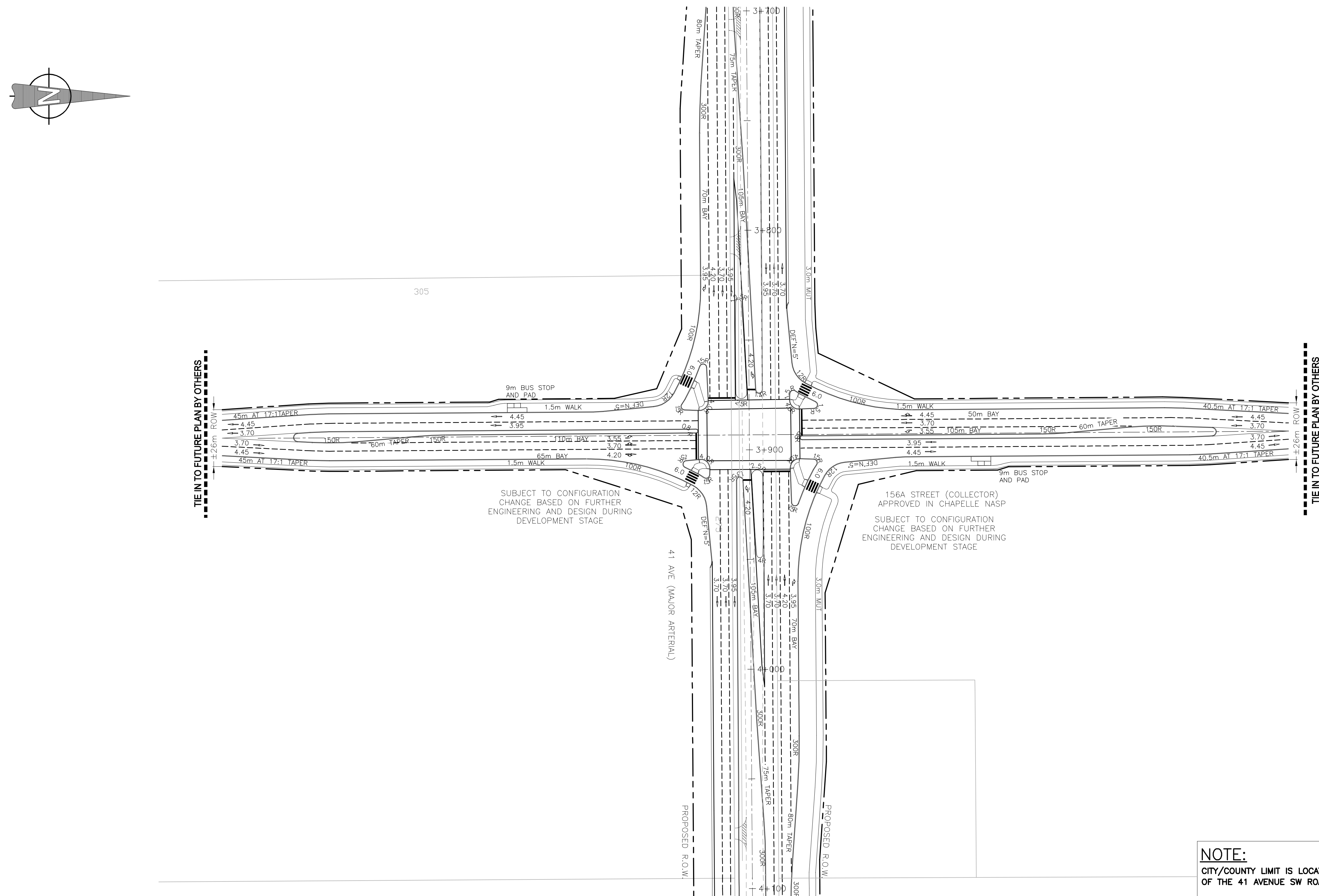
41 AVENUE SW CONCEPT PLANNING STUDY

INTERSECTION PLAN FOR 156B STREET (COLLECTOR)

NOTE: ALL DIMENSIONS ARE IN METRES

SCALE: 1:1000

PLAN NO.
A041-0920



NOTE:

CITY/COUNTY LIMIT IS LOCATED AT APPROXIMATELY THE CENTERLINE OF THE 41 AVENUE SW ROADWAY.

REFER TO DRAWING INDEX FOR LINEWORK LEGEND.

PERMIT TO PRACTICE	DESIGNER	CHECKER
ASSOCIATED ENGINEERING QUALITY MANAGEMENT SIGN-OFF Signature: Date: APEGGA Permit to Practice P 3979	PROFESSIONAL ENGINEER ALBERTA SHAWN BENBOW P ENG DATE	PROFESSIONAL ENGINEER ALBERTA RYAN BATTY P ENG DATE

THE CITY OF Edmonton TRANSPORTATION

LEDUC COUNTY

Associated Engineering

Manager, Transportation Planning Branch

Director, Facility and Capital Planning

Manager, Engineering, Leduc County

CONCEPT PLAN - SUBJECT TO PRELIMINARY DESIGN

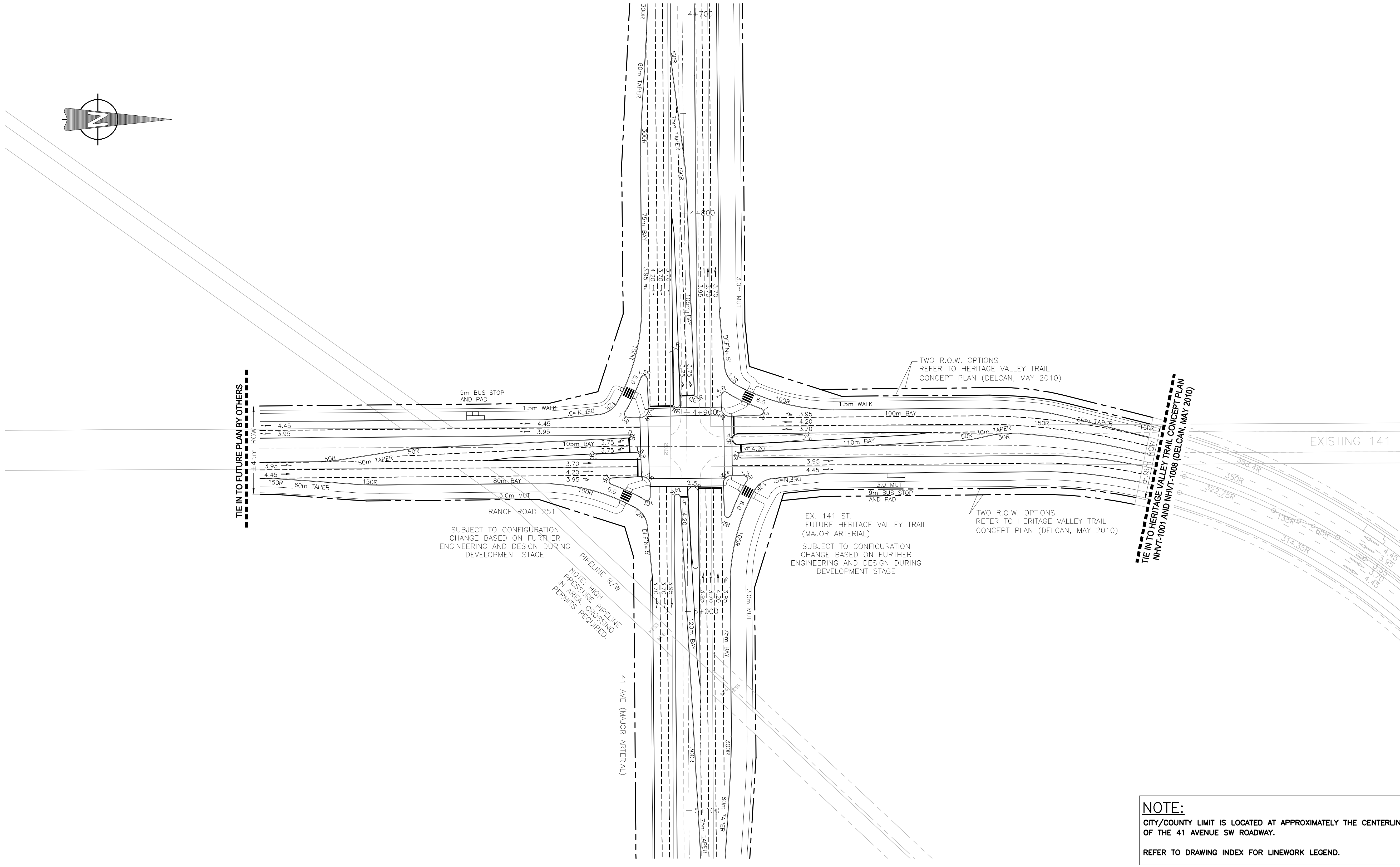
41 AVENUE SW CONCEPT PLANNING STUDY

INTERSECTION PLAN FOR 156A STREET (COLLECTOR)

NOTE: ALL DIMENSIONS ARE IN METRES

SCALE: 1:1000

PLAN NO. A041-0921



NOTE:

CITY/COUNTY LIMIT IS LOCATED AT APPROXIMATELY THE CENTERLINE OF THE 41 AVENUE SW ROADWAY.

REFER TO DRAWING INDEX FOR LINEWORK LEGEND.

PERMIT TO PRACTICE	DESIGNER	CHECKER
ASSOCIATED ENGINEERING QUALITY MANAGEMENT SIGN-OFF Signature: Date: APEGGA Permit to Practice P 3979	PROFESSIONAL ENGINEER ALBERTA — SHAWN BENBOW P ENG DATE	PROFESSIONAL ENGINEER ALBERTA — RYAN BATTY P ENG DATE

THE CITY OF Edmonton TRANSPORTATION

LEDUC COUNTY

Associated Engineering

Manager, Transportation Planning Branch

Director, Facility and Capital Planning

Manager, Engineering, Leduc County

CONCEPT PLAN - SUBJECT TO PRELIMINARY DESIGN

41 AVENUE SW CONCEPT PLANNING STUDY

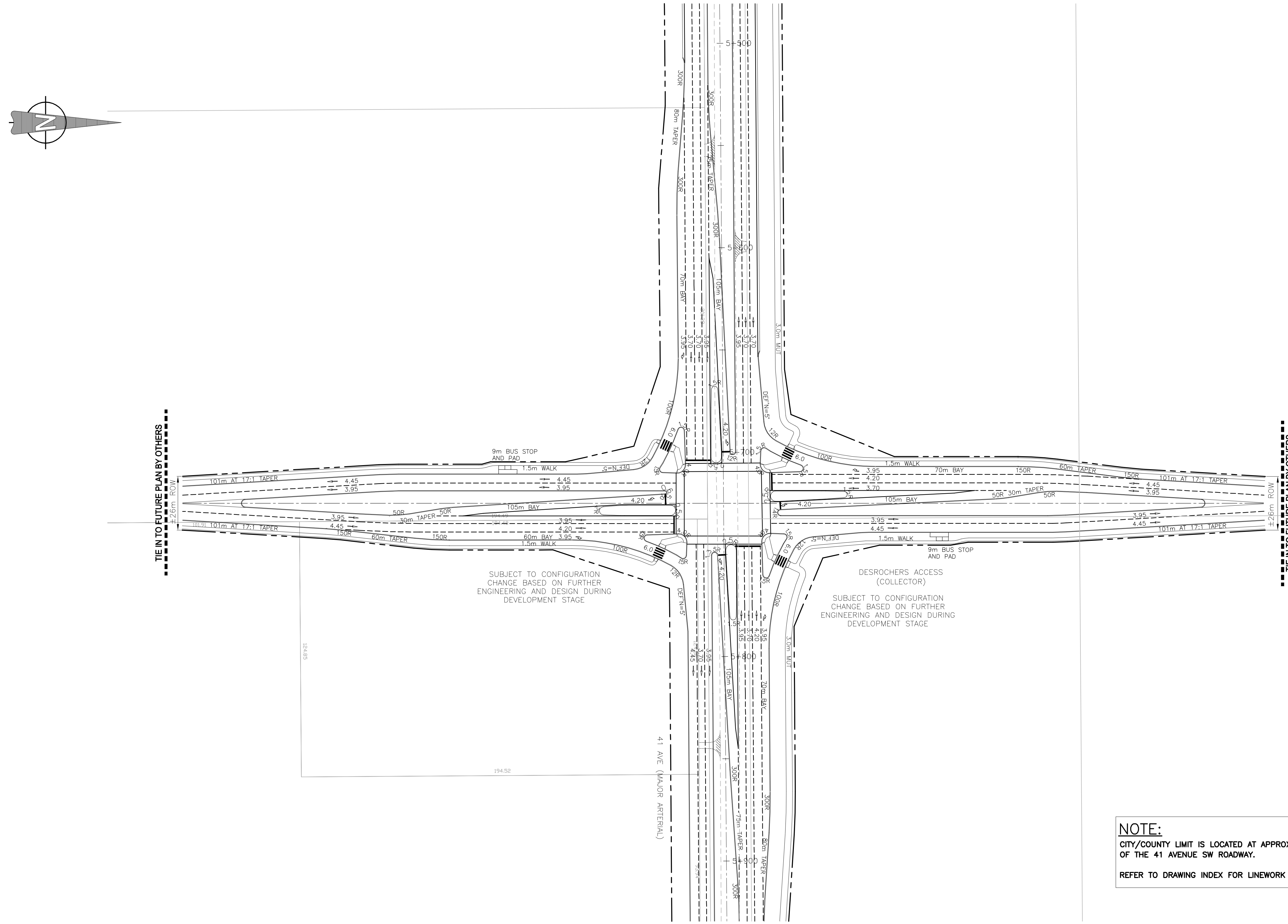
INTERSECTION PLAN
FOR FUTURE HERITAGE VALLEY TRAIL (MAJOR ARTERIAL)

NOTE: ALL DIMENSIONS ARE IN METRES

SCALE: 1:1000

PLAN NO. A041-0922

Date: Jun 12, 2011 Time: 2:47pm
File: P:\20073483\00_00E_41_Ave\Working_Dwgs\100_Civil\073483_INTERSECTION.dwg by
Xrefs: 30807B01_TITLEBLOCK1, utilities, legal



NOTE:

CITY/COUNTY LIMIT IS LOCATED AT APPROXIMATELY THE CENTERLINE OF THE 41 AVENUE SW ROADWAY.

REFER TO DRAWING INDEX FOR LINEWORK LEGEND.

PERMIT TO PRACTICE	DESIGNER	CHECKER
ASSOCIATED ENGINEERING QUALITY MANAGEMENT SIGN-OFF Signature: Date: APEGGA Permit to Practice P 3979	PROFESSIONAL ENGINEER ALBERTA — SHAWN BENBOW P ENG DATE	PROFESSIONAL ENGINEER ALBERTA — RYAN BATTY P ENG DATE

THE CITY OF Edmonton TRANSPORTATION

LEDUC COUNTY

Associated Engineering

Manager, Transportation Planning Branch

Director, Facility and Capital Planning

Manager, Engineering, Leduc County

CONCEPT PLAN - SUBJECT TO PRELIMINARY DESIGN

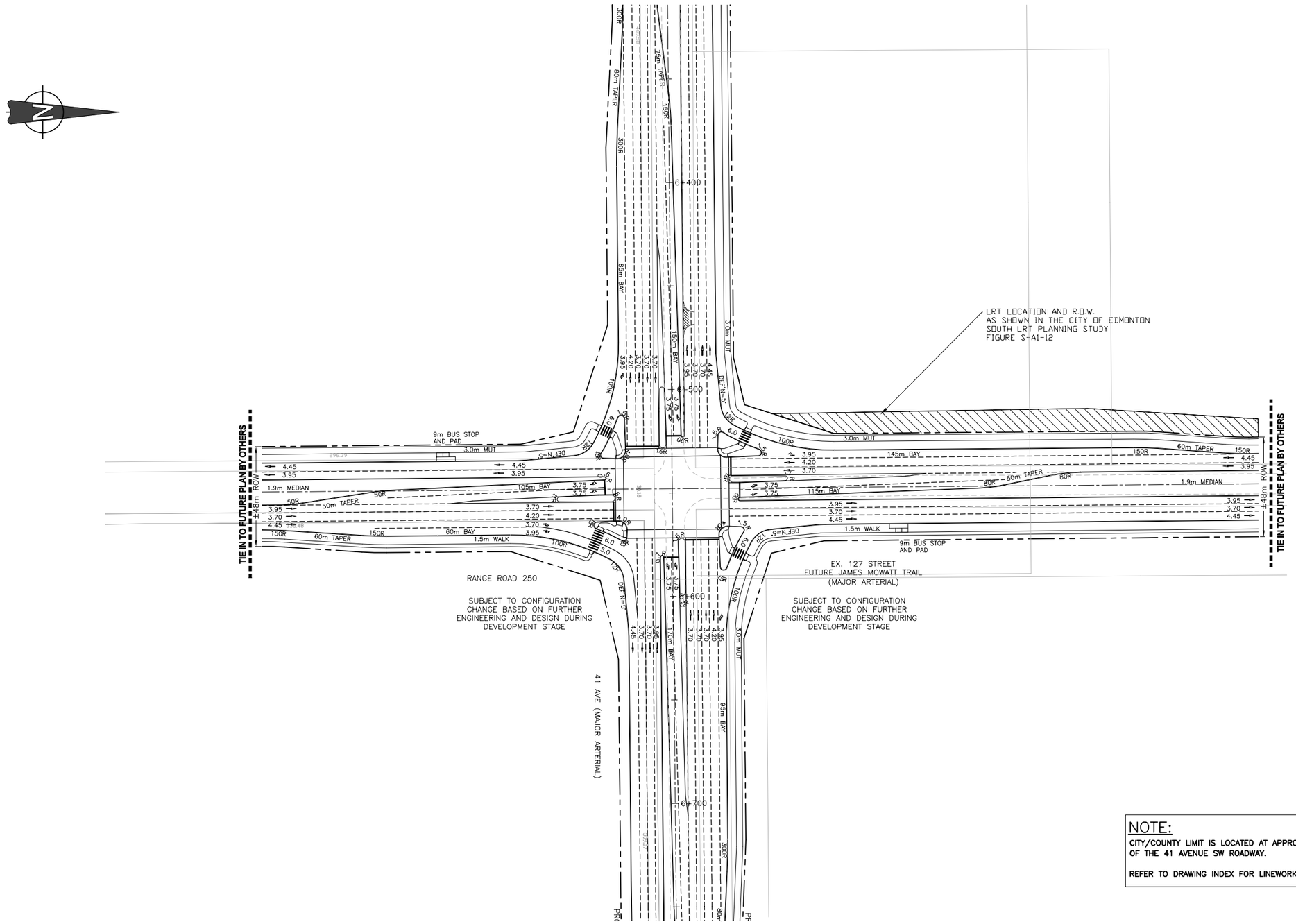
41 AVENUE SW CONCEPT PLANNING STUDY

TYPICAL INTERSECTION PLAN FOR FUTURE DESROCHERS ACCESS (COLLECTOR)

NOTE: ALL DIMENSIONS ARE IN METRES

SCALE: 1:1000

PLAN NO. A041-0923



NOTE:
CITY/COUNTY LIMIT IS LOCATED AT APPROXIMATELY THE CENTERLINE OF THE 41 AVENUE SW ROADWAY.

REFER TO DRAWING INDEX FOR LINEWORK LEGEND

PERMIT TO PRACTICE

ASSOCIATED ENGINEERING
QUALITY MANAGEMENT SIGN-OFF
Signature:
Date:
APEGGA Permit to Practice P 3979

DESIGNER
PROFESSIONAL ENGINEER ALBERTA SHAWN BENSON
P ENG
DATE

CHECKER
PROFESSIONAL ENGINEER ALBERTA RYAN BATTY
P ENG
DATE

THE CITY OF Edmonton TRANSPORTATION
LEDUC COUNTY
Associated Engineering

Manager, Transportation Planning Branch
Director, Facility and Capital Planning
Manager, Engineering, Leduc County

CONCEPT PLAN - SUBJECT TO PRELIMINARY DESIGN

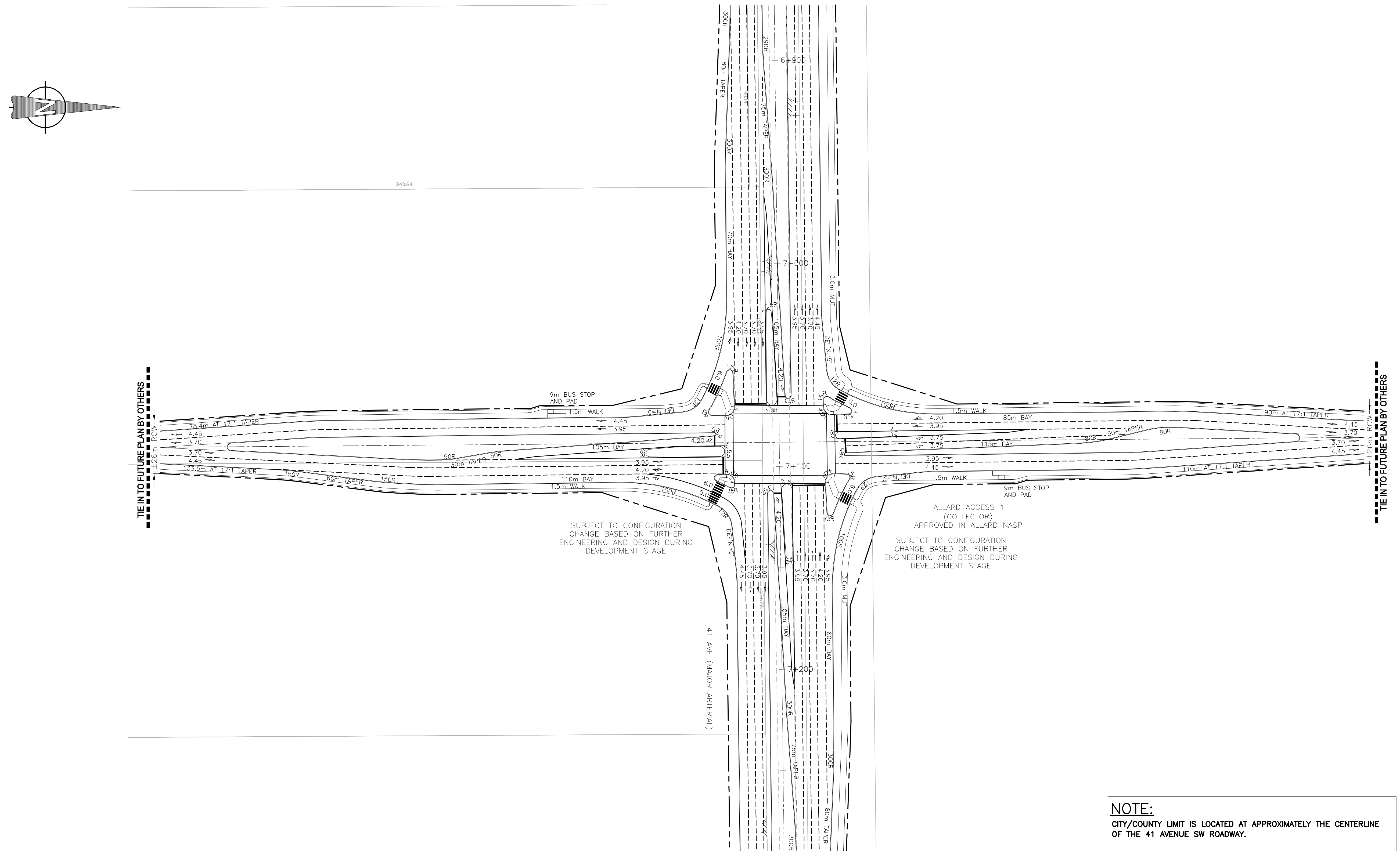
41 AVENUE SW CONCEPT PLANNING STUDY

INTERSECTION PLAN
FOR FUTURE JAMES MOWATT TRAIL (MAJOR ARTERIAL)

NOTE:
ALL DIMENSIONS ARE IN METRES

SCALE: 1:1000

PLAN NO.
A041-0924



NOTE:

CITY/COUNTY LIMIT IS LOCATED AT APPROXIMATELY THE CENTERLINE OF THE 41 AVENUE SW ROADWAY.

REFER TO DRAWING INDEX FOR LINEWORK LEGEND.

PERMIT TO PRACTICE

ASSOCIATED ENGINEERING
QUALITY MANAGEMENT SIGN-OFF
Signature:
Date:
APEGGA Permit to Practice P 3979

DESIGNER
PROFESSIONAL ENGINEER ALBERTA — SHAWN BENBOW
P ENG
DATE

CHECKER
PROFESSIONAL ENGINEER ALBERTA — RYAN BATTY
P ENG
DATE

THE CITY OF Edmonton TRANSPORTATION

LEDUC COUNTY

Associated Engineering

Manager, Transportation Planning Branch

Director, Facility and Capital Planning

Manager, Engineering, Leduc County

CONCEPT PLAN - SUBJECT TO PRELIMINARY DESIGN

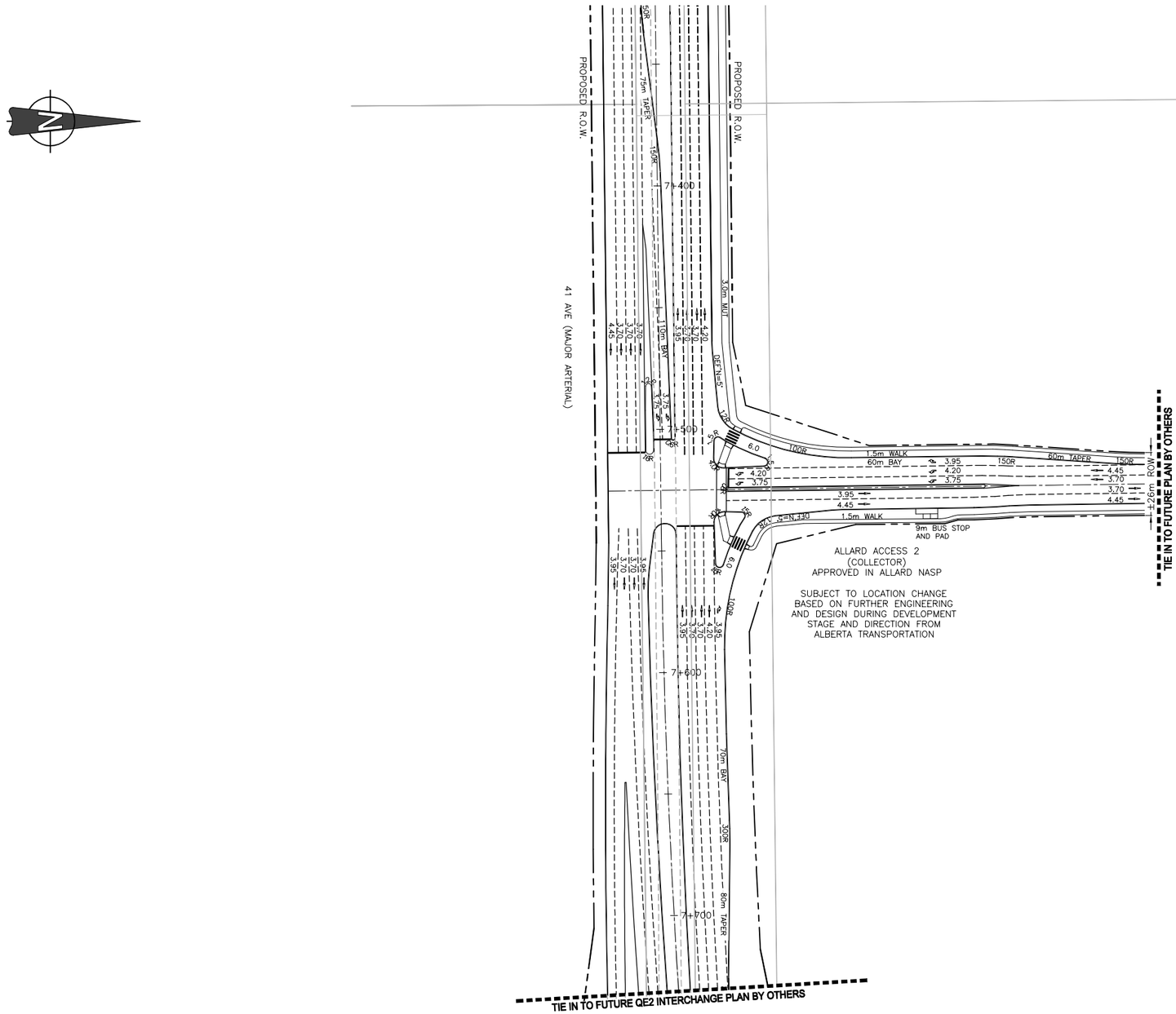
41 AVENUE SW CONCEPT PLANNING STUDY

INTERSECTION PLAN FOR FUTURE ALLARD ACCESS 1(COLLECTOR)

NOTE: ALL DIMENSIONS ARE IN METRES

SCALE: 1:1000

PLAN NO. A041-0925



NOTE:

CITY/COUNTY LIMIT IS LOCATED AT APPROXIMATELY THE CENTERLINE OF THE 41 AVENUE SW ROADWAY.

REFER TO DRAWING INDEX FOR LINEWORK LEGEND.

PERMIT TO PRACTICE

ASSOCIATED ENGINEERING
QUALITY MANAGEMENT SIGN-OFF
Signature:
Date:
APEGGA Permit to Practice P 3979

DESIGNER
PROFESSIONAL ENGINEER ALBERTA SHAWN BENSON
P ENG
DATE

CHECKER
PROFESSIONAL ENGINEER ALBERTA RYAN BATTY
P ENG
DATE

THE CITY OF Edmonton TRANSPORTATION
LEDUC COUNTY
Associated Engineering

Manager, Transportation Planning Branch
Director, Facility and Capital Planning
Manager, Engineering, Leduc County

CONCEPT PLAN - SUBJECT TO PRELIMINARY DESIGN

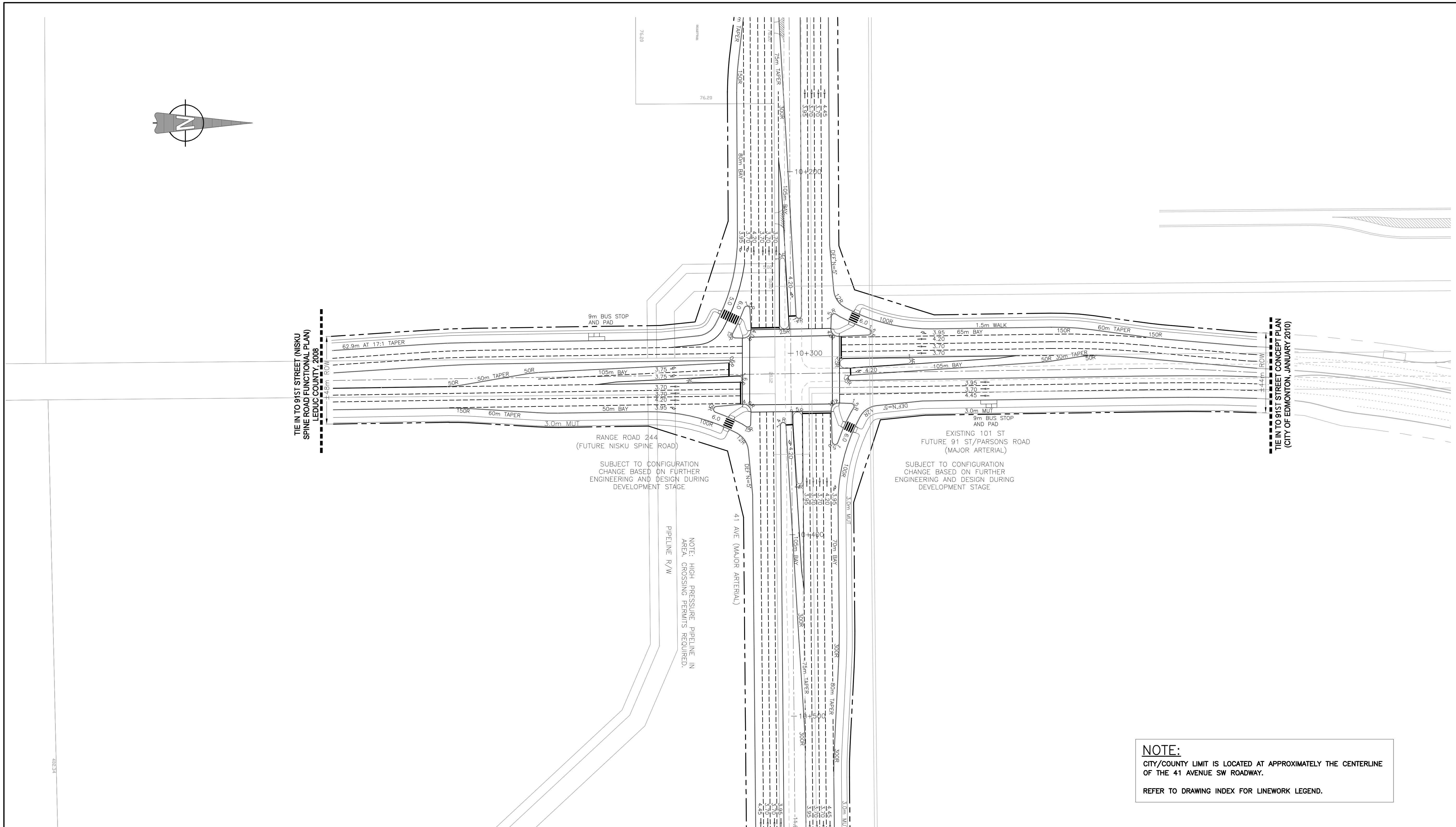
41 AVENUE SW CONCEPT PLANNING STUDY

INTERSECTION PLAN
FOR FUTURE ALLARD ACCESS 2 (COLLECTOR)

NOTE:
ALL DIMENSIONS
ARE IN METRES

SCALE: 1:1000

PLAN NO.
A041-0926



NOTE:

CITY/COUNTY LIMIT IS LOCATED AT APPROXIMATELY THE CENTERLINE OF THE 41 AVENUE SW ROADWAY.

REFER TO DRAWING INDEX FOR LINEWORK LEGEND.

PERMIT TO PRACTICE

ASSOCIATED ENGINEERING
QUALITY MANAGEMENT SIGN-OFF
Signature:
Date:
APEGGA Permit to Practice P 3979

DESIGNER
PROFESSIONAL ENGINEER ALBERTA — SHAWN BENBOW
P ENG
DATE

CHECKER
PROFESSIONAL ENGINEER ALBERTA — RYAN BATTY
P ENG
DATE

THE CITY OF Edmonton TRANSPORTATION
LEDUC COUNTY
Associated Engineering

Manager, Transportation Planning Branch
Director, Facility and Capital Planning
Manager, Engineering, Leduc County

CONCEPT PLAN - SUBJECT TO PRELIMINARY DESIGN

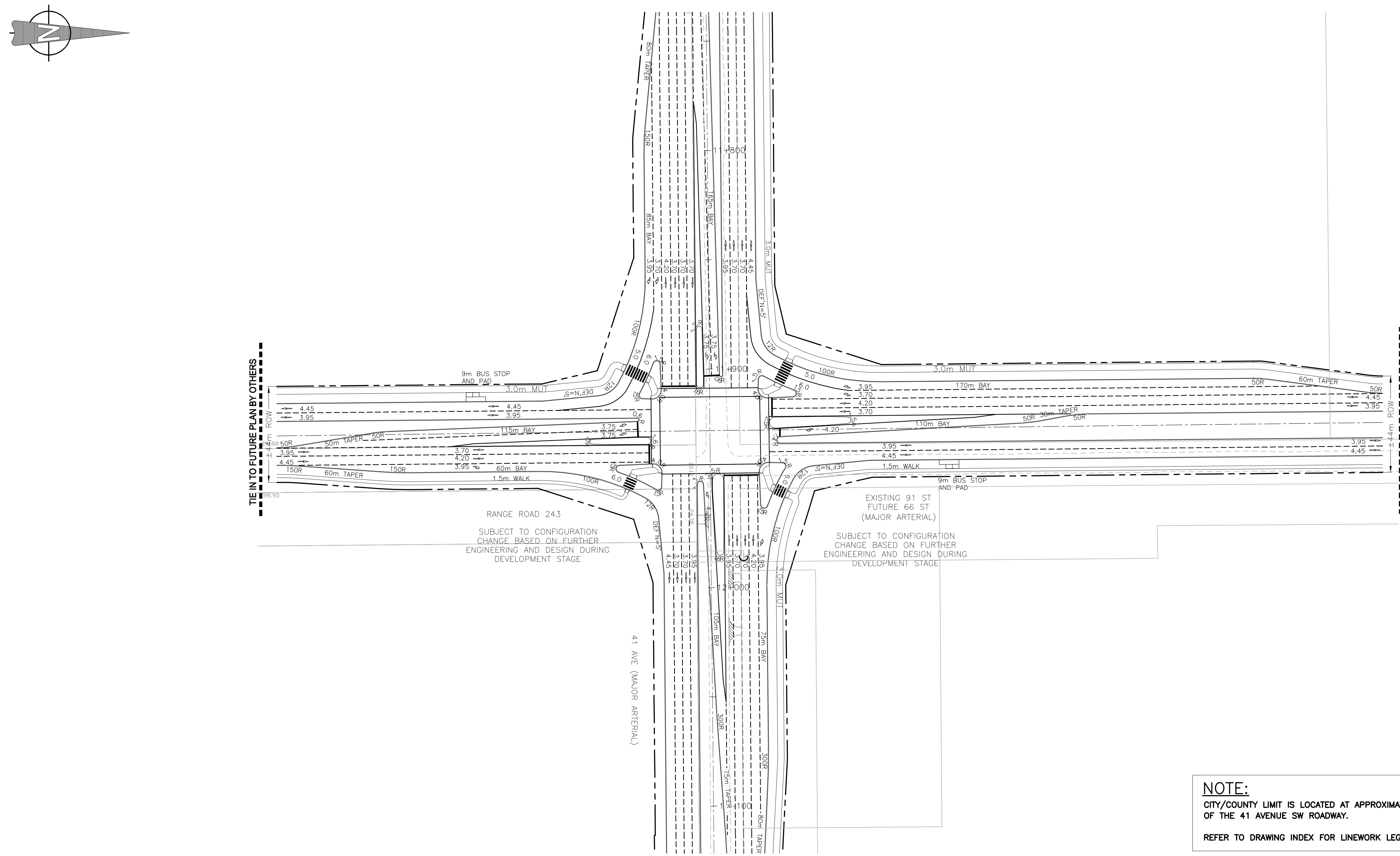
41 AVENUE SW CONCEPT PLANNING STUDY

INTERCHANGE PLAN FOR FUTURE 91 STREET (MAJOR ARTERIAL)

NOTE: ALL DIMENSIONS ARE IN METRES

SCALE: 1:1000

PLAN NO. A041-0927



NOTE:

CITY/COUNTY LIMIT IS LOCATED AT APPROXIMATELY THE CENTERLINE OF THE 41 AVENUE SW ROADWAY.

REFER TO DRAWING INDEX FOR LINEWORK LEGEND.

PERMIT TO PRACTICE	DESIGNER	CHECKER
ASSOCIATED ENGINEERING QUALITY MANAGEMENT SIGN-OFF Signature: Date: APEGGA Permit to Practice P 3979	PROFESSIONAL ENGINEER ALBERTA SHAWN BENBOW P ENG DATE	PROFESSIONAL ENGINEER ALBERTA RYAN BATTY P ENG DATE

THE CITY OF Edmonton TRANSPORTATION

LEDUC COUNTY

Associated Engineering

Manager, Transportation Planning Branch

Director, Facility and Capital Planning

Manager, Engineering, Leduc County

CONCEPT PLAN - SUBJECT TO PRELIMINARY DESIGN

41 AVENUE SW CONCEPT PLANNING STUDY

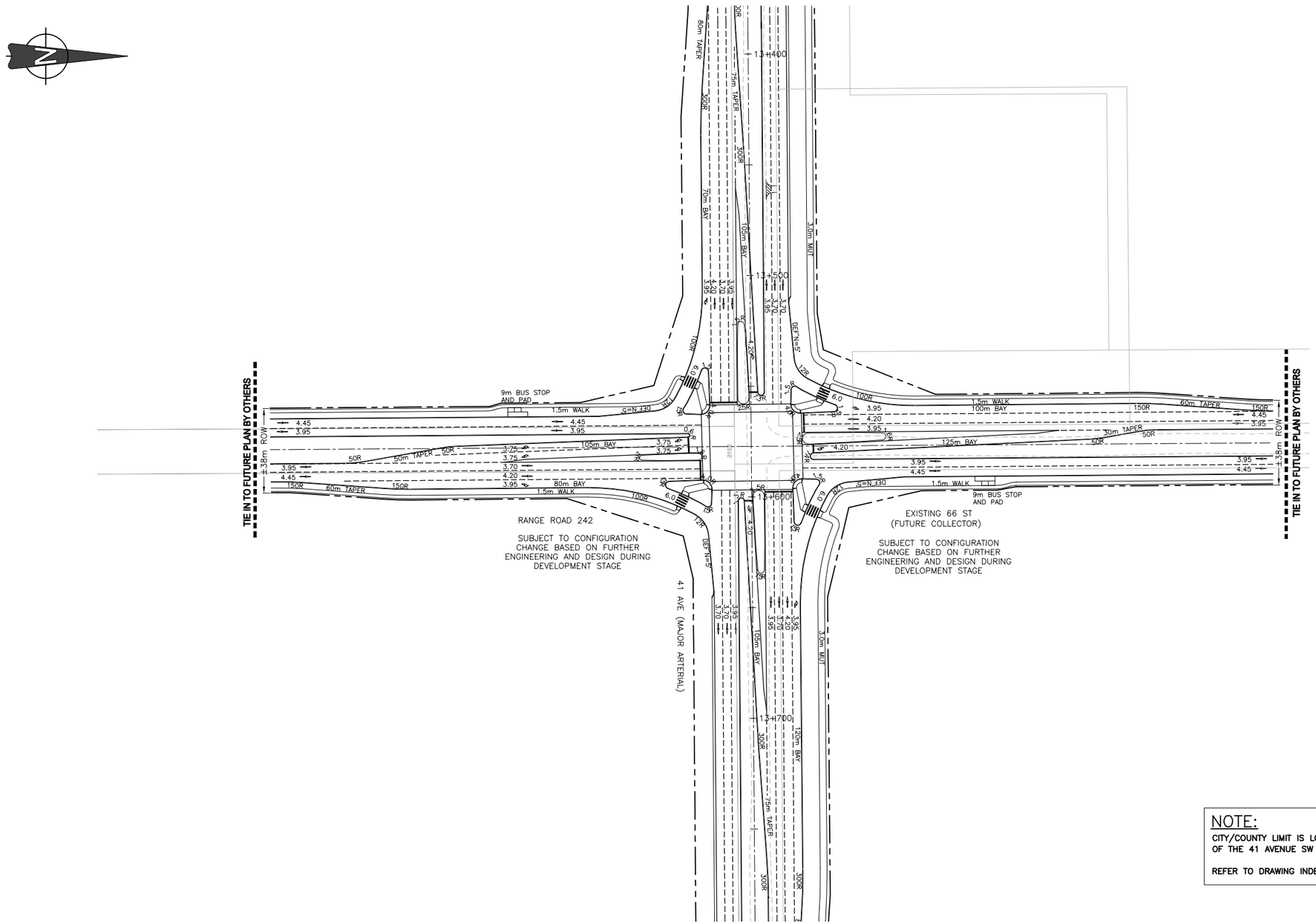
INTERSECTION PLAN FOR FUTURE 66 STREET (MAJOR ARTERIAL)

NOTE: ALL DIMENSIONS ARE IN METRES

SCALE: 1:1000

PLAN NO. A041-0928

Date: Jan 12, 2011 Time: 2:49pm
File: P:\20073483\00_COE_41_Ave\Working_Dwgs\100_Civil\073483_INTERSECTION.dwg



NOTE:
CITY/COUNTY LIMIT IS LOCATED AT APPROXIMATELY THE CENTERLINE OF THE 41 AVENUE SW ROADWAY.

REFER TO DRAWING INDEX FOR LINEWORK LEGEND.

PERMIT TO PRACTICE

ASSOCIATED ENGINEERING
QUALITY MANAGEMENT SIGN-OFF
Signature:
Date:
APEGGA Permit to Practice P 3979

DESIGNER
PROFESSIONAL ENGINEER ALBERTA SHAWN BENSON
P ENG
DATE

CHECKER
PROFESSIONAL ENGINEER ALBERTA RYAN BATTY
P ENG
DATE

THE CITY OF Edmonton TRANSPORTATION
LEDUC COUNTY
Associated Engineering

Manager, Transportation Planning Branch
Director, Facility and Capital Planning
Manager, Engineering, Leduc County

CONCEPT PLAN - SUBJECT TO PRELIMINARY DESIGN

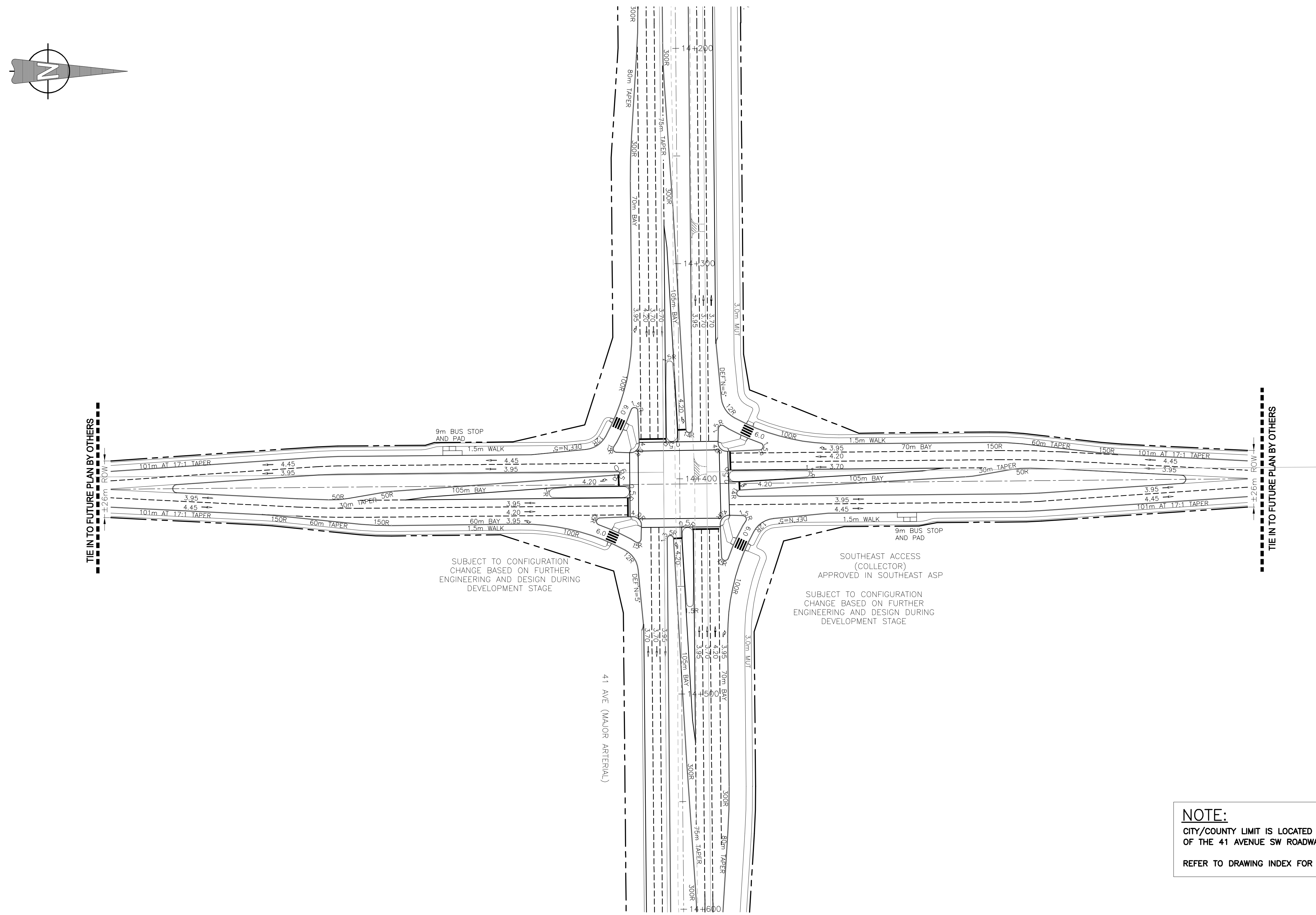
41 AVENUE SW CONCEPT PLANNING STUDY

INTERSECTION PLAN FOR EXISTING 66 STREET (COLLECTOR)

NOTE:
ALL DIMENSIONS ARE IN METRES

SCALE: 1:1000

PLAN NO.
A041-0929



NOTE:

CITY/COUNTY LIMIT IS LOCATED AT APPROXIMATELY THE CENTERLINE OF THE 41 AVENUE SW ROADWAY.

REFER TO DRAWING INDEX FOR LINEWORK LEGEND.

PERMIT TO PRACTICE

ASSOCIATED ENGINEERING
QUALITY MANAGEMENT SIGN-OFF
Signature:
Date:

APEGGA Permit to Practice P 3979

DESIGNER

PROFESSIONAL ENGINEER ALBERTA — SHAWN BENBOW
P ENG
DATE

CHECKER

PROFESSIONAL ENGINEER ALBERTA — RYAN BATTY
P ENG
DATE

THE CITY OF Edmonton TRANSPORTATION

LEDUC COUNTY

Associated Engineering

Manager, Transportation Planning Branch

Director, Facility and Capital Planning

Manager, Engineering, Leduc County

CONCEPT PLAN - SUBJECT TO PRELIMINARY DESIGN

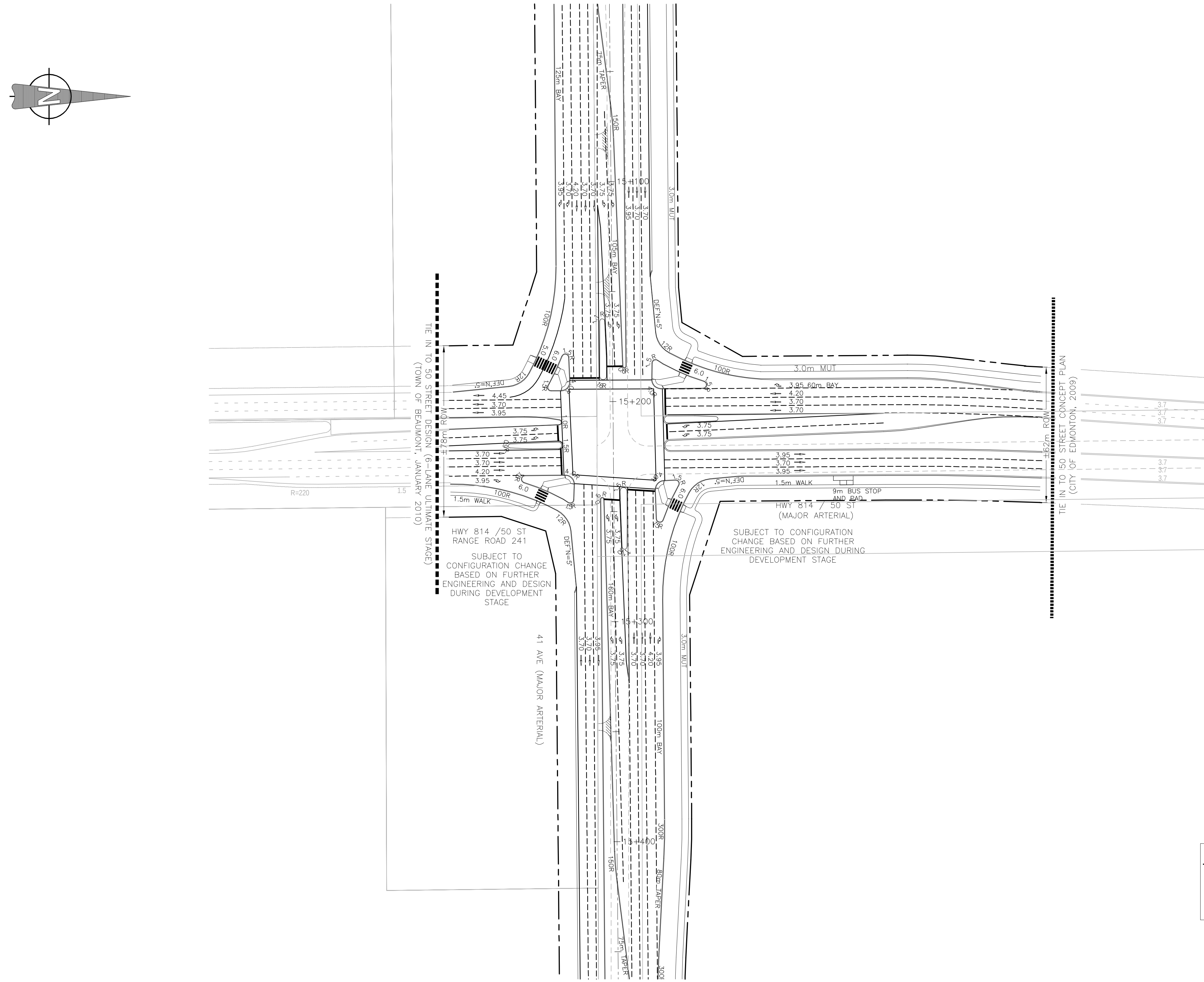
41 AVENUE SW CONCEPT PLANNING STUDY

TYPICAL INTERSECTION PLAN FOR FUTURE SOUTHEAST ACCESS (COLLECTOR)

NOTE: ALL DIMENSIONS ARE IN METRES

SCALE: 1:1000

PLAN NO. A041-0930



NOTE:

CITY/COUNTY LIMIT IS LOCATED AT APPROXIMATELY THE CENTERLINE OF THE 41 AVENUE SW ROADWAY.

REFER TO DRAWING INDEX FOR LINEWORK LEGEND.

PERMIT TO PRACTICE	DESIGNER	CHECKER
ASSOCIATED ENGINEERING QUALITY MANAGEMENT SIGN-OFF Signature: Date: APEGGA Permit to Practice P 3979	PROFESSIONAL ENGINEER ALBERTA SHAWN BENBOW P ENG DATE	PROFESSIONAL ENGINEER ALBERTA RYAN BATTY P ENG DATE

THE CITY OF Edmonton TRANSPORTATION

LEDUC COUNTY

Associated Engineering

Manager, Transportation Planning Branch

Director, Facility and Capital Planning

Manager, Engineering, Leduc County

CONCEPT PLAN - SUBJECT TO PRELIMINARY DESIGN

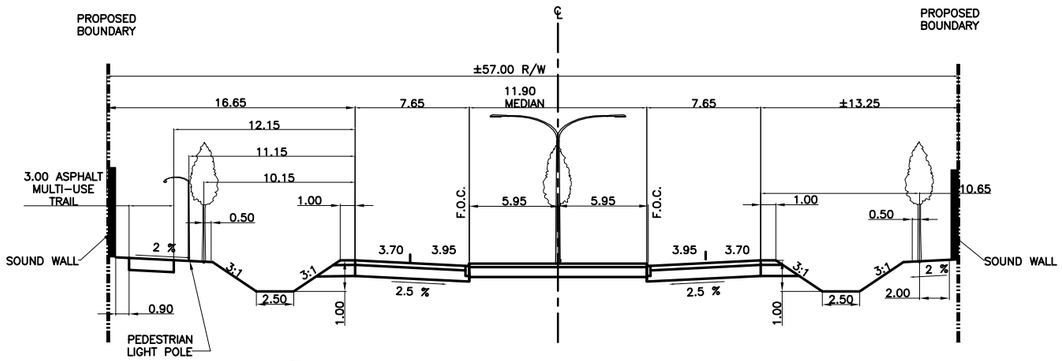
41 AVENUE SW CONCEPT PLANNING STUDY

INTERSECTION PLAN FOR 50 STREET (MAJOR ARTERIAL)

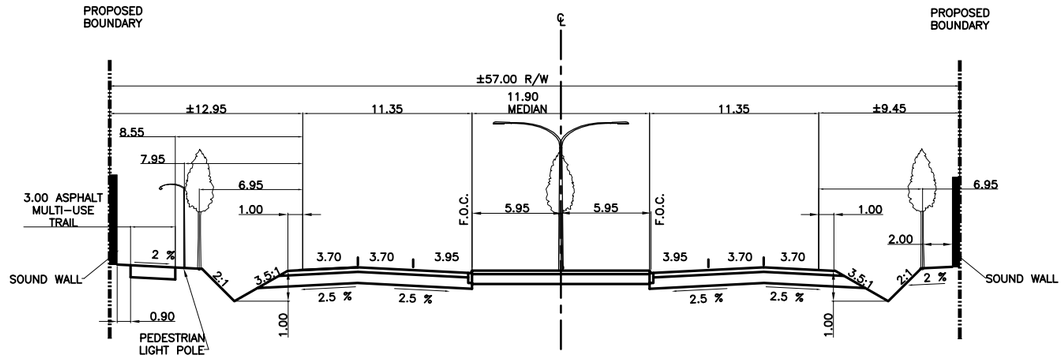
NOTE: ALL DIMENSIONS ARE IN METRES

SCALE: 1:1000

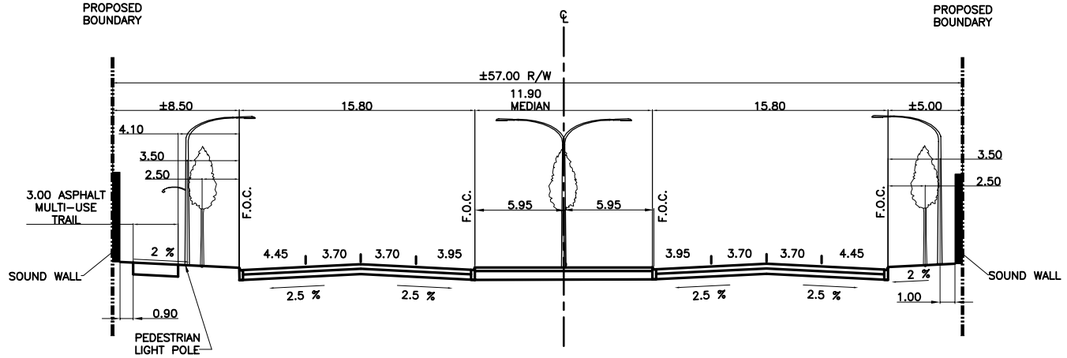
PLAN NO. A041-0931



1 — TYPICAL STAGE 1 CROSS SECTION – 4 LANE



2 — TYPICAL STAGE 2 CROSS SECTION – 6 LANE



3 — TYPICAL STAGE 3 CROSS SECTION – 8 LANE

NOTE:
SEMI–MOUNTABLE CURB AND GUTTER SHOULD BE USED WHEN DESIGN SPEED IS ABOVE 70Km/Hr.

PERMIT TO PRACTICE

ASSOCIATED ENGINEERING
QUALITY MANAGEMENT SIGN-OFF
Signature:
Date:
APEGGA Permit to Practice P 3979

DESIGNER
PROFESSIONAL ENGINEER ALBERTA SHAWN BENSON
P ENG
DATE

CHECKER
PROFESSIONAL ENGINEER ALBERTA RYAN BATTY
P ENG
DATE

THE CITY OF Edmonton TRANSPORTATION
LEDUC COUNTY
Associated Engineering

Manager, Transportation Planning Branch
Director, Facility and Capital Planning
Manager, Engineering, Leduc County

CONCEPT PLAN - SUBJECT TO PRELIMINARY DESIGN

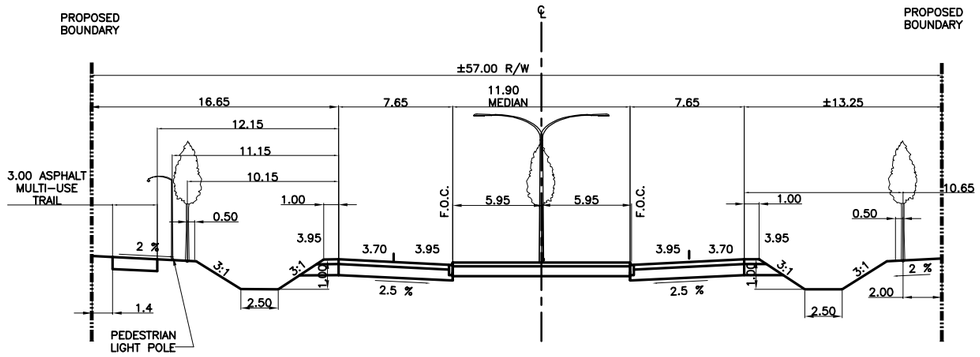
41 AVENUE SW CONCEPT PLANNING STUDY

TYPICAL 41 AVENUE SW CROSS SECTION WITH SOUND ATTENUATION (RESIDENTIAL)

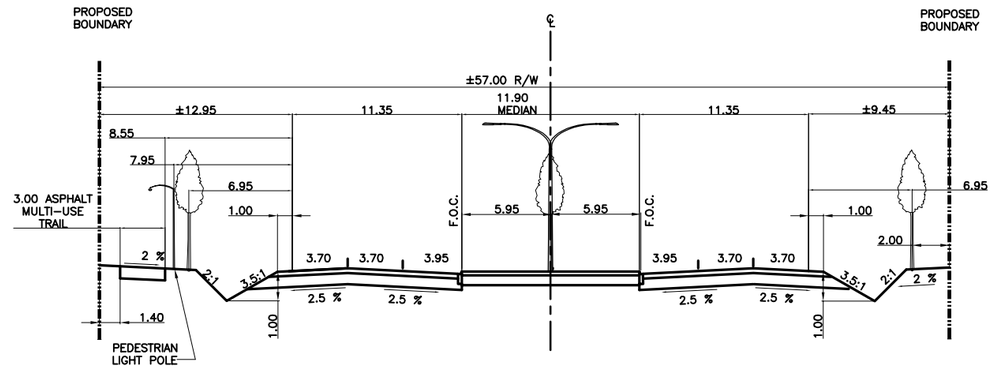
NOTE:
ALL DIMENSIONS ARE IN METRES

SCALE: V: 1:200 H: 1:100

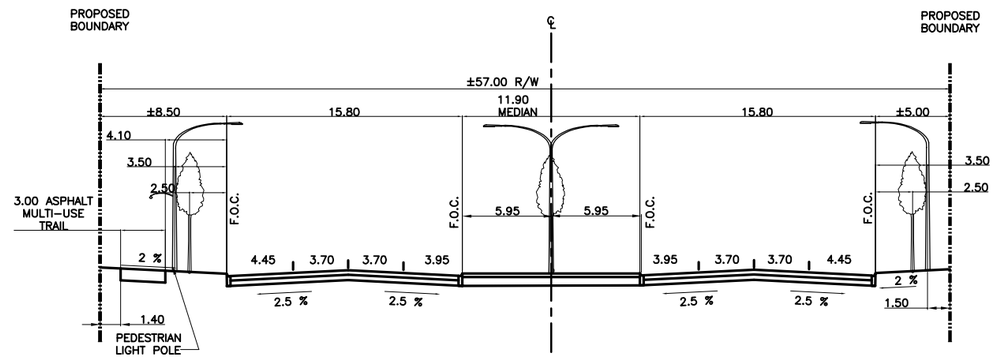
PLAN NO.
A041-0932



4 — TYPICAL STAGE 1 CROSS SECTION – 4 LANE



5 — TYPICAL STAGE 2 CROSS SECTION – 6 LANE



6 — TYPICAL STAGE 3 CROSS SECTION – 8 LANE

NOTE:
SEMI–MOUNTABLE CURB AND GUTTER SHOULD BE USED WHEN DESIGN SPEED IS ABOVE 70Km/Hr.

PERMIT TO PRACTICE

ASSOCIATED ENGINEERING
QUALITY MANAGEMENT SIGN-OFF
Signature:
Date:
APEGGA Permit to Practice P 3979

DESIGNER
PROFESSIONAL ENGINEER ALBERTA SHAWN BENSON
P ENG
DATE

CHECKER
PROFESSIONAL ENGINEER ALBERTA RYAN BATTY
P ENG
DATE

THE CITY OF Edmonton TRANSPORTATION
LEDUC COUNTY
Associated Engineering

Manager, Transportation Planning Branch
Director, Facility and Capital Planning
Manager, Engineering, Leduc County

CONCEPT PLAN - SUBJECT TO PRELIMINARY DESIGN

41 AVENUE SW CONCEPT PLANNING STUDY

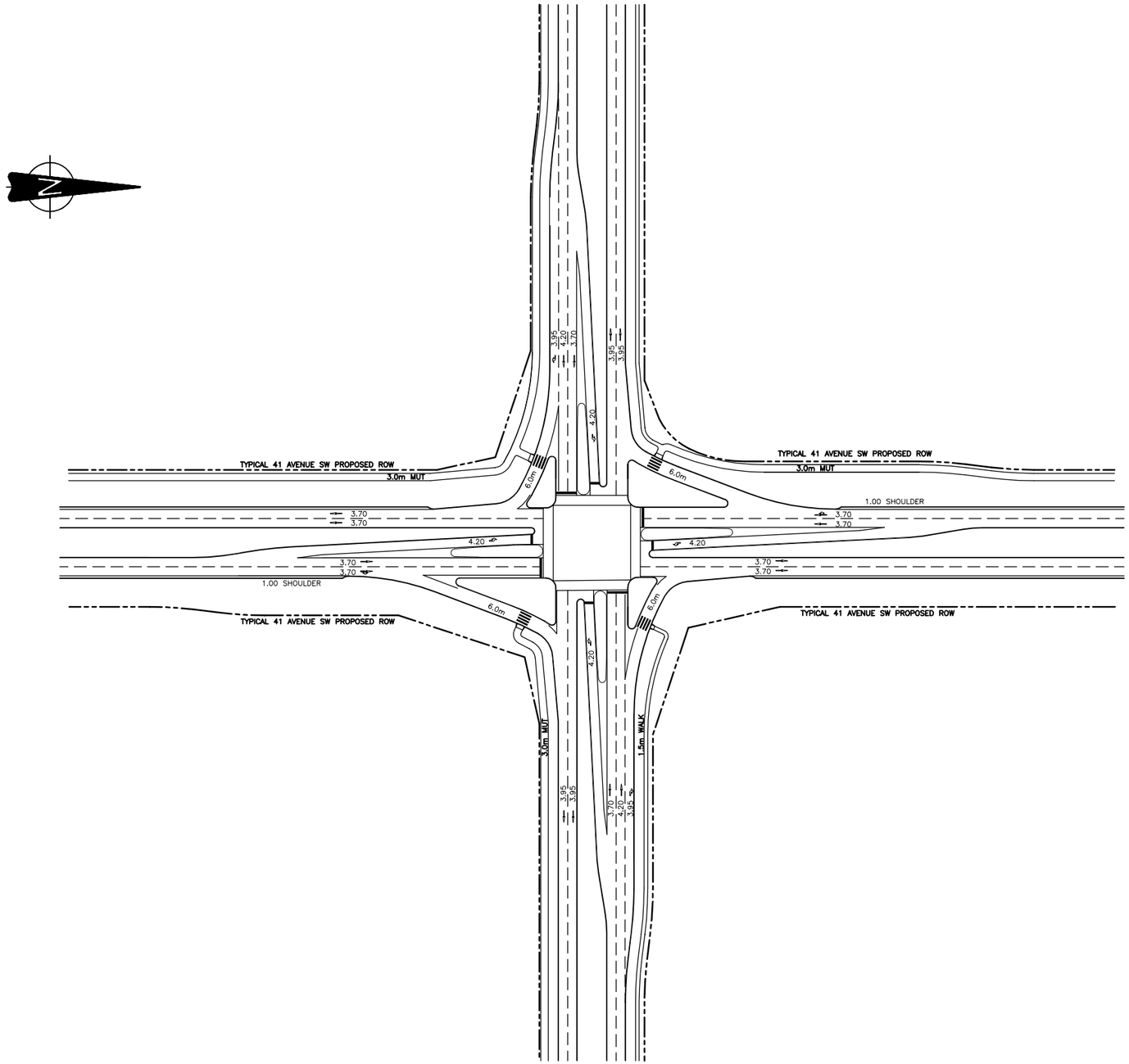
TYPICAL 41 AVENUE SW CROSS SECTION WITHOUT SOUND ATTENUATION (INDUSTRIAL)

NOTE:
ALL DIMENSIONS ARE IN METRES

SCALE: V: 1:200 H: 1:100

PLAN NO.
A041-0933

Date: Jan 12, 2011 Time: 6:15pm
File: \\s-edm-fs-01\projects\200734B3\00_COE_41_Ave\Working_Dwgs\100_Civil\073483-SECTION(NO SPU).dwg by EF
Xrefs: 3080TB01_TITLEBLOCK1, utilities, legal



PERMIT TO PRACTICE

ASSOCIATED ENGINEERING
QUALITY MANAGEMENT SIGN-OFF
Signature: _____
Date: _____
APEGGA Permit to Practice P 3979

DESIGNER

PROFESSIONAL ENGINEER ALBERTA
SHAWN BENBOW
P ENG
DATE _____

CHECKER

PROFESSIONAL ENGINEER ALBERTA
RYAN BATTY
P ENG
DATE _____

THE CITY OF Edmonton TRANSPORTATION
LEDUC COUNTY
Associated Engineering

Manager, Transportation Planning Branch

Director, Facility and Capital Planning

Manager, Engineering, Leduc County

CONCEPT PLAN - SUBJECT TO PRELIMINARY DESIGN

41 AVENUE SW CONCEPT PLANNING STUDY

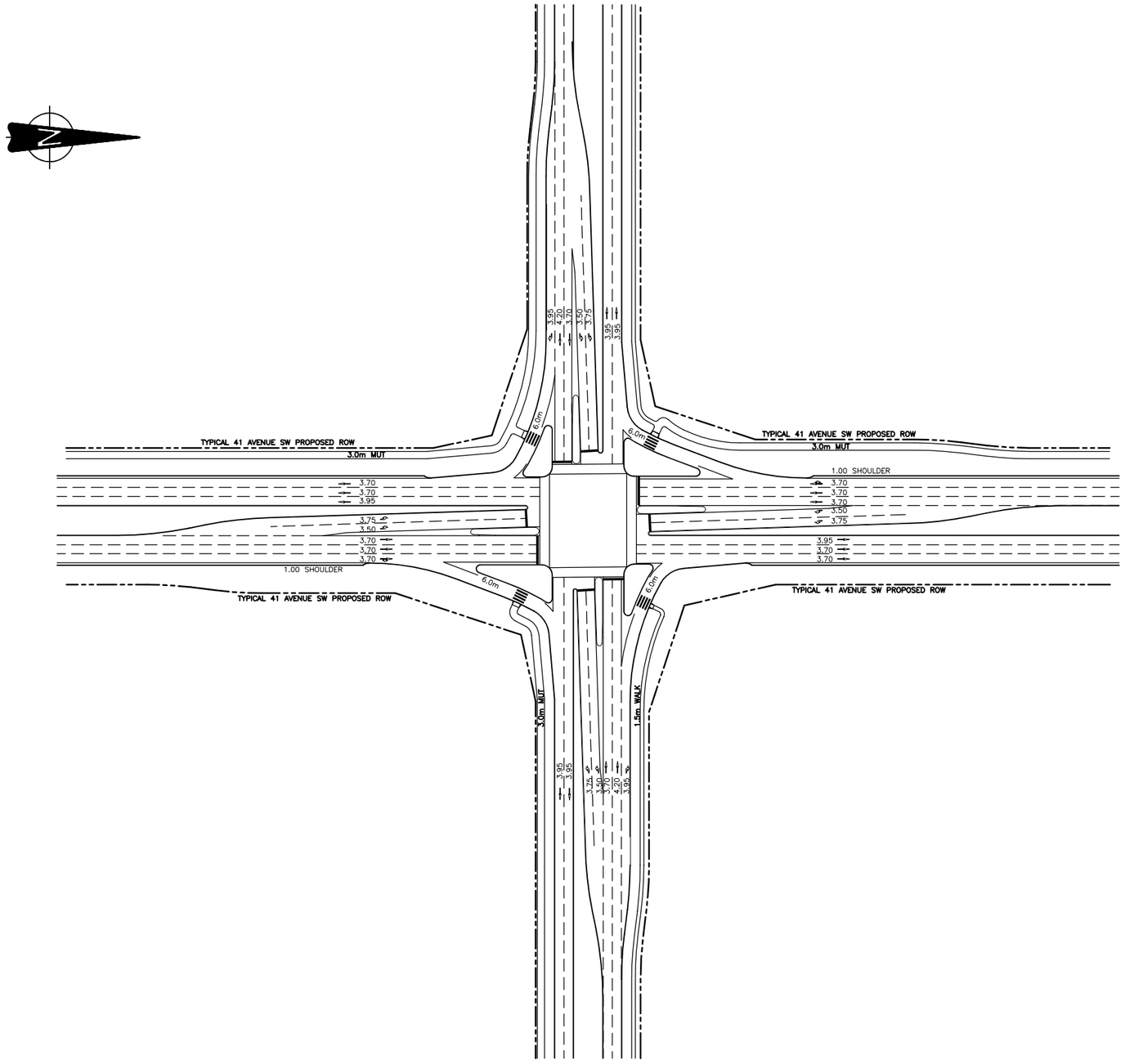
TYPICAL INTERSECTION PLAN FOR 4 LANE STAGE

NOTE:
ALL DIMENSIONS
ARE IN METRES

SCALE: 1:1000

PLAN NO.
A041-0940

Date: Jan 12, 2011 Time: 6:15pm
File: \\s-edm-fs-01\projects\20073483\00_COE_41_Ave\Working_Dwgs\100_Civil\073483-SECTION(NO SPU).dwg by EF
Xrefs: 3080780_TITLEBLOCK1, utilities, legal



PERMIT TO PRACTICE

ASSOCIATED ENGINEERING
QUALITY MANAGEMENT SIGN-OFF
Signature:
Date:
APEGGA Permit to Practice P 3979

DESIGNER
PROFESSIONAL ENGINEER ALBERTA
SHAWN BENBOW
P ENG
DATE

CHECKER
PROFESSIONAL ENGINEER ALBERTA
RYAN BATTY
P ENG
DATE

THE CITY OF Edmonton TRANSPORTATION
LEDUC COUNTY
Associated Engineering

Manager, Transportation Planning Branch
Director, Facility and Capital Planning
Manager, Engineering, Leduc County

CONCEPT PLAN - SUBJECT TO PRELIMINARY DESIGN

41 AVENUE SW CONCEPT PLANNING STUDY

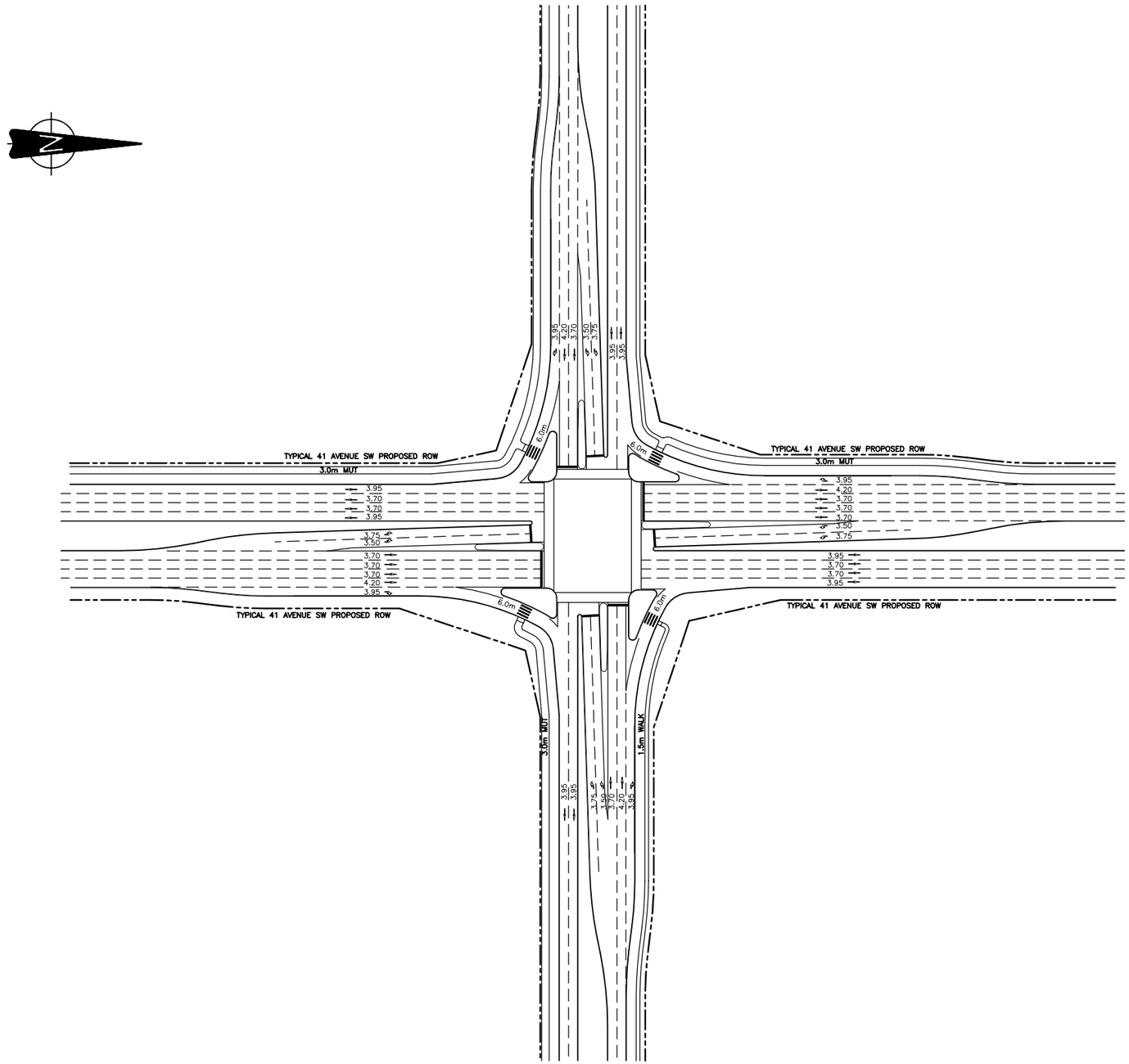
TYPICAL INTERSECTION PLAN FOR 6 LANE STAGE

NOTE:
ALL DIMENSIONS
ARE IN METRES

SCALE: 1:1000

PLAN NO.
A041-0941

Date: Jan 12, 2011 Time: 6:16pm
File: \\ys-edm-fs-01\projects\207734\83\00_COE_41_Ave\Working_Dwgs\100_Civil\073483-SECTION(NO SPUI).dwg by EF
Xrefs: 3080180_TITLEBLOCK1, utilities, legal



PERMIT TO PRACTICE

ASSOCIATED ENGINEERING
QUALITY MANAGEMENT SIGN-OFF
Signature: _____
Date: _____
APEGGA Permit to Practice P 3979

DESIGNER
PROFESSIONAL ENGINEER ALBERTA
SHAWN BENBOW
P ENG
DATE _____

CHECKER
PROFESSIONAL ENGINEER ALBERTA
RYAN BATTY
P ENG
DATE _____

THE CITY OF Edmonton TRANSPORTATION
LEDUC COUNTY
Associated Engineering

_____
Manager, Transportation Planning Branch

_____
Director, Facility and Capital Planning

_____
Manager, Engineering, Leduc County

CONCEPT PLAN - SUBJECT TO PRELIMINARY DESIGN

41 AVENUE SW CONCEPT PLANNING STUDY

TYPICAL INTERSECTION PLAN FOR 8 LANE STAGE

NOTE:
ALL DIMENSIONS
ARE IN METRES

SCALE: 1:1000

PLAN NO.
A041-0942

Date: Jan 12, 2011 Time: 6:16pm
File: \\s-edm-fs-01\projects\20073483\00_COE_41_Ave\Working_Dwgs\100_Civil\073483-SECTION(NO SPUD).dwg by EF
Xrefs: 3080YBD_TITLEBLOCK, utilities, legal

5 Cost Summary

As part of the 41 Avenue Concept Planning Study the project team developed a conceptual cost estimate for the ultimate stage of the roadway. The unit prices were based off of 2008 unit prices provided by the City of Edmonton. To obtain 2010 costs the unit prices were increased 5% per year over two years to account for inflation.

Items contained in the cost estimate include roadworks, landscaping, street lighting, power, drainage, and costs for the replacement of the Whitemud Creek bridge. Costs for utility relocates and land acquisition were not included in the estimate.

A detailed breakdown of items included in the cost estimate can be found in **Appendix I**.

The table, on the following page, is a summary of the ultimate roadway cost estimate:

Mainline	Length (m)	$ / m	Total Cost
50 Street to Southeast Access	295	$ 11,800.00	$ 3,481,000
Southeast Access to Existing 66 Street	335	$ 11,800.00	$ 3,953,000
Existing 66 Street to Existing 91 Street	1203	$ 11,800.00	$ 14,195,400
Existing 91 Street to Existing 101 Street	1130	$ 13,600.00	$ 15,368,000
Existing 101 Street to Future QEII Interchange	403	$ 13,600.00	$ 5,480,800
Future QEII Interchange to Allard Access 2	246	$ 13,600.00	$ 3,345,600
Allard Access 1 to Existing 127 Street	47	$ 13,600.00	$ 639,200
Existing 127 Street to Future Desrochers Access	359	$ 11,800.00	$ 4,236,200
Future Desrochers Access to Existing 141 Street	367	$ 11,800.00	$ 4,330,600
Existing 141 Street to 156A Street	582	$ 11,800.00	$ 6,867,600
156A Street to 156B Street	597	$ 11,800.00	$ 7,044,600
156B Street to West Project Limit	870	$ 11,800.00	$ 10,266,000
		Mainline Subtotal	**$ 79,208,000**

Intersections	No. of Intersections	$ / Intersection	Total Cost
8 lane intersection	5	$ 8,486,000.00	$ 42,430,000.00
6 lane intersection	7	$ 7,957,000.00	$ 55,699,000.00
		Intersections Subtotal	**$ 98,129,000.00**

Whitemud Creek Bridge Replacement		Total Cost
	Structural Subtotal	**$ 9,975,000.00**

Drainage		Total Cost
	Drainage Subtotal	**$ 5,387,000.00**

Mainline Subtotal	$	79,208,000.00
Intersections Subtotal	$	98,129,000.00
Structural Subtotal	$	9,975,000.00
Drainage Subtotal	$	5,387,000.00
Construction Subtotal	$	192,699,000.00
Contingency (50%)	$	96,349,500.00
Engineering and Administration (12.5%)	$	24,087,375.00
Grand Total	**$**	**313,200,000.00**

6 Public Involvement

Gathering input from local residents and stakeholders for the 41 Avenue SW Functional Planning Study was a key component of the project. Getting feedback from stakeholders allowed the project team to gather outside input and opinions on local issues and concerns along 41 Avenue SW and get a better understanding of the desires of the public in terms of the future plans for the roadway.

The project team conducted stakeholder profiling interviews and an open house as part of the public engagement portion of the study.

The stakeholder engagement and public consultation process was a successful component of the project and provided the project team with valuable information that was extremely beneficial to the study. Findings from the stakeholder interview process and public open house is described in detail in subsections outlined below. The open house survey form and display boards as well as a summary of the stakeholder interview process are included in **Appendix J**.

6.1 STAKEHOLDER PROFILING INTERVIEWS

A telephone script was prepared before phoning private property owners to arrange for interviews. Mary-Jane Laviolette of Armin A. Preiksaitis & Associates Ltd. contacted the property owners during December 2007 and January 2008. Phone calls were made to a total of 48 private property owners along 41 Avenue SW. Three attempts were made to contact each landowner and messages were left requesting a call back. Some property owners could not be contacted and others declined to participate.

After explaining the purpose of the call, individuals were invited to participate in a 45 minute interview with the consultants at the location of their choice. To accommodate as many individuals as possible, the consultants met with most residents at their homes or businesses. Two project team members - Shawn Benbow of Associated Engineering and Mary-Jane Laviolette of Armin A. Preiksaitis & Associates Ltd. - attended each interview. The project team met with a total of 40 stakeholders which included 23 within Leduc County (including 1 developer) and 17 within the City of Edmonton (including 6 developers).

After making introductions, the consultant team provided information on the study purpose and timelines. Property owners were shown a map of the study area and asked to identify the location of their property. To ensure consistency, each interview was guided by an interview outline and respondent comments were recorded. The following is a summary of the responses received to each interview question.

INITIAL AWARENESS AND KNOWLEDGE

What have you heard about transportation plans for this area to date?

Developers:

- All were aware of the proposed interchange at QE II and 41 Avenue SW. One developer commented that they believed there would be no access to QE II from 41 Avenue SW.
- All had heard of possible plans for a ring road to the south.
- Regarding future plans to widen 41 Avenue SW, developers commented that it would range from four to six lanes.
- A variety of isolated comments were made about other transportation-related plans in the area: a high pressure gas line approved for the centre of 41 Avenue, 170 Street becoming a major six lane road to the airport, rebuilding 141 Street, and 50 Street becoming six lanes.

Residential / Business Property Owners:

- Many property owners on both the City and County side were aware of the proposed interchange at QE II and 41 Avenue SW.
- There was mixed awareness of future plans for 41 Avenue SW. A number were unaware of any plans and those who had heard something said future road widening might be four to eight lanes.
- Some property owners were aware of plans for a ring road to the south.
- Comments were made by a few that the City was planning to annex land from the County.
- Some County residents commented on the realignment of 111 Street and 127 Street.
- A few Edmonton residents noted plans for an interchange or overpass at 170 Street.
- A variety of isolated comments were made about other transportation-related plans in the area, such as:
    - Comments from Leduc County land owners that included the possible expansion of 91 Street and Highway 19, a new bridge across the North Saskatchewan River near 184 Street, an intersection at 141 Street and the City annexing a 2 mile strip of land south of 41 Avenue SW for suburban development.
    - Comments from Edmonton property owners included the realignment of Highways 2 and 19, 50 Street expansion and potential interchange, access points from Heritage Valley development, and the Nisku Spine Road east of the QE II highway.

What would be the impact or results of these plans on your property or business?

Developers:

- Most commented that the City will require them to pay for all 41 Avenue SW roadway upgrades, including upgrades beyond two lanes.
- The approved plan for Heritage Valley Neighbourhood 8 is based on 41 Avenue SW as four lanes with three access points. Other neighbourhood plans are going to City Council soon.
- One commented that the City should require 41 Avenue SW to be built with Heritage Valley's

Neighbourhood 10, as Neighbourhood 9 will create pressures on the road.

- Some developers felt that six lanes were not necessary for 41 Avenue SW with the future ring road nearby.
- A few commented that County land should not be developed to a rural standard when land north of the road is at urban densities.

Residential / Business Property Owners:

- Generally residents were aware of the pace of development in southwest Edmonton and know that it is only a matter of time before they see change.
- Concerns were expressed by some residents on both sides of 41 Avenue SW (west of QE II) that road widening would result in their houses and/or garages having to be moved. Some homes are only 100 ft off the road. These people are concerned with a drop in quality of life, reduced property values and loss of farmland. Access was also a concern for those whose property is landlocked with their only access from 41 Avenue SW.
- Some property owners said they will move if 41 Avenue becomes six lanes. They don't want to live near a major roadway.
- A number of Leduc County property owners commented that there are fewer impacts to landowners on the City side as more land is developer-owned and there are fewer residences.
- Property owners closer to the QE II felt that future QE II Highway plans and the proposed interchange will result in the biggest impacts to 41 Avenue SW. It is believed that building this interchange will drive change and development of 41 Avenue SW.
- A few commented that local traffic disruptions would be a problem while the road was being built.
- One property owner felt that land values would increase with an improved 41 Avenue SW.
- A business owner east of the QE II highway is concerned with lost access to 41 Avenue once the QE II interchange is built. This will be a big issue for their trucks and they believe their land value will drop.
- A landowner near 170 Street said road widening will be a challenge for the area near the creek and ravine – care should be taken to preserve it.

LOCAL TRANSPORTATION ISSUES AND PERCEPTION

Please describe your general impression of traffic conditions (volumes, speeds, congestion) in the study area.

Developers:

- Comments on traffic conditions were limited. One developer noted that east of the QE II Highway there is little traffic on 41 Avenue SW – it is a typical rural road.

Residential / Business Property Owners:

- Longer-term residents commented that traffic had generally increased over the years with fewer farmers in the area and more development, particularly in the west study area. It was

also noted that since the opening of Anthony Henday, traffic had decreased in the area.

- West of the QE II Highway, traffic is busy on 127 and 141 Streets. It was noted that 41 Avenue traffic is higher west of 127 Street with very little between 127 Street and the highway. There are also some seasonal variations – summer traffic includes vehicles going to the Golf Course/RV Park and Amberlea Meadows Equestrian Centre (via 156 Street), while Rabbit Hill is a winter destination (via 170 Street).
- Development of Heritage Valley has resulted in many construction vehicles. Parts of 41 Avenue SW are in bad shape because it is being used by trucks.
- East of the QE II Highway, peak hour traffic is high on 50 Street (Beaumont commuters) and 101 Street (Nisku commuters). The closing of 91 Street has diverted more traffic to 41 Avenue.

What do you forecast traffic conditions to be in your area in the next 10 years?

Developers:

- Traffic will depend on the speed of new development. The QE II interchange may speed development on both sides of the Highway. The west side will develop faster beginning with Heritage Valley.
- The QE II interchange will likely help accommodate new traffic generated from Heritage Valley development and the CP intermodal yard.
- Future traffic levels on 41 Avenue SW will in part be determined by what happens with the Anthony Henday.
- If 41 Avenue SW is developed to an expressway, this will force more traffic into new neighbourhoods and put pressure on the interior neighbourhood collector roads.

Residential / Business Property Owners:

- Most property owners on both sides of 41 Avenue SW commented that traffic will increase significantly in the next 10 years if development continues. 41 Avenue traffic will be similar to that on Ellerslie Road and 23 Avenue. It was felt that 41 Avenue SW will have to be a good road to handle City expansion.
- The QE II Highway interchange will bring more traffic, including trucks. 41 Avenue SW will have to be a minimum of four lanes and will probably be like 50 Street in 10 years. One person noted that with the QE II interchange 41 Avenue will have to be rebuilt – sections of it are currently patched each year (between 50 and 66 Streets).
- Some thought that in 10 years 41 Avenue might have to be 6 to 8 lanes to accommodate all new development.
- Traffic levels at the west end of 41 Avenue SW will increase once the Windermere area develops.
- Truck traffic will increase considerably on the east side of the QE II Highway with the CP intermodal yard and new industrial development being planned.
- A few commented that 41 Avenue SW should be developed properly from the start – four lanes up front (avoid the Ellerslie Road scenario).
- Most traffic pressures will be in a north-south direction in 10 years.

USAGE AND ACCESS NEEDS

What are your plans for your property in the next five to ten years?

Developers:

- Development plans along 41 Avenue SW are specific to each property and developer. Some provided concept plans or drawings of their proposed developments. Most development is planned for the north side of 41 Avenue SW. Development plans west of the highway are primarily low density residential. Heritage Valley neighbourhoods are in various stages of planning, approval and/or construction.
- East of the QE II Highway, industrial development plans are in various stages of planning, approval and/or construction both north and south of 41 Avenue SW. These include CP's intermodal yards, WAM's industrial park and other industrial business park developments**.**
- North of 41 Avenue SW, low density residential development is underway in The Orchards neighbourhood near 91 Street - full buildout is expected in 10 years. Residential development east of 66 Street could be 10 years away or as the market requires.

Residential / Business Property Owners:

- There are more residents (acreage owners and farmers) on the County side of 41 Avenue SW than the City side. A number are third or fourth generation land owners. Some are younger families who have recently built new homes and garages. Many love the area and want to stay as long as possible; some may stay depending on what develops around them. Some will stay long term if future development is a lower-density acreage type development.
- A number of County residents commented that they will hold their land until the right development opportunity presents itself. Some may consider subdividing a parcel out before selling.
- It was noted by one property owner that County farmland values are not high enough for farmers to sell yet. Currently there is a 3 to 1 price differential between City and County land values, although the differential is smaller on the east side of the study area.
- Business owners interviewed on property near the QE II Highway plan on staying and possibly expanding their operations.

What changes to the current roadway would you like to see happen…

For your land?

Developers:

- Some developers showed approved or proposed development plans with access points along 41 Avenue SW. Some also offered information on their traffic estimates.
- Industrial developers have some flexibility with access points, although one noted that industrial uses generally need more access. Two developers indicated that their industrial sites would need two access points. One commented that the right in-right out will be

important for future commercial development being considered.

- Residential developers generally prefer 41 Avenue SW as an arterial road with collector access from neighbourhoods every 200 m to 300 m. They want to avoid traffic bottlenecks for residents getting out of neighbourhoods – the road has to benefit the daily users and 400 m to 600 m spacing is inadequate. Some commented that it was too late to plan for an expressway as many Heritage Valley communities are designed around 41 Avenue as a four lane arterial. Residential developers also want direct access to businesses in commercial areas along 41 Avenue SW. Both right in-right out and some all-directional access would be ideal.
- Many commented that an expressway is not needed for 41 Avenue given the surrounding network of major roads and a ring road possibly two miles away. The City is over-designing roads and costs are being passed on to home buyers. Some were concerned that the City's traffic analyses are using incorrect base numbers.
- One suggested that two lanes of 41 Avenue be developed now before the QE II Highway interchange is built.

Residential / Business Property Owners:

- There were mixed views on what future changes should be made to 41 Avenue SW. Many residents felt it was important to move traffic efficiently without creating a high traffic road, particularly for areas where residential is the main land use. However, others thought that a higher-speed expressway was preferable.
- Access to their property was important for many residents as was minimizing the amount of land lost to road right of way.
- Some landowners stated no preference for arterial or expressway in relation to their land.
- A few people wanted a road design that would result in the highest property values.
- If commercial development occurs next to the road, one property owner felt all-directional access would be important.
- One property owner who farmed the area suggested that 41 Avenue be wider to accommodate farm equipment.
- To avoid disruptions experienced with past road work in the area, it was suggested that 41 Avenue SW be built to its full width at once rather than staging it.

For the area in general?

Developers:

- A few developers felt that 41 Avenue SW does not need to be an expressway because of its proximity to Anthony Henday Drive and the QEII Highway. It will serve more local traffic than regional trips. As well, arterial roads have good capacity.
- One developer felt that whatever type of road is planned, 41 Avenue SW should accommodate all commuters (including truckers) not just residents. The road should start at a minimum of four lanes with trigger points identified for expanding it to six lanes.
- Upgrades to 41 Avenue on the west side of the QE II Highway will be needed in the next five years to prepare for the interchange at the QEII.

- One developer wanted to know what was planned in the County's North Major ASP before making suggestions on 41 Avenue SW.
- One comment was to plan three lanes for 41 Avenue with one being convertible during rush hour – the maximum should be four lanes.

Residential / Business Property Owners:

- A number of property owners indicated a preference for an expressway to achieve better traffic flows. However, others preferred an arterial road for 41 Avenue. Some property owners indicated they would rather see intersections than interchanges along 41 Avenue SW – this was felt to be more appropriate for a road that services residential communities.
- Some commented that four lanes should be adequate for 41 Avenue SW given its proximity to nearby roads. Most traffic will travel north and south so 41 Avenue will be only a feeder road.
- A few commented that the speed of building the new road will be more important than the type of road – build all lanes at once.
- Access to the QE II Highway will be important.

6.2 PUBLIC OPEN HOUSE

The 41 Avenue SW Concept Plan Open House #1 was held on June 24, 2008 at the Ellerslie Rugby Park Banquet Facility at 11004 Ellerslie Road SW. The open house was held as an informal drop-in format. Several large format display boards were provided in the venue to explain the study background and purpose.

Among the information presented were lists of stakeholders and relevant planning documents, a consolidated future land use plan, proposed access control information, and environmental considerations.

The proposed roadway cross-section and draft functional plan were provided for the public to view. Information detailed the proposed geometric standards and key roadway characteristics. Refreshments and a light snack were also provided.

Nine project staff attended the open house: Shawn Benbow, Bryan Petzold, Wai Cheung, and Jessica Peters from Associated Engineering; Ryan Betker, Jodi Hancock, and Brian Latte from the City of Edmonton; and Des Mryglod and Rick Stuckenberg from Leduc County.

Staff circulated throughout the room and engaged in discussions with the public, and provided supplemental information to answer questions presented.

The open house attendees were each given a comment form that asked for input, general comments, and specific likes and dislikes of the recommended plan, as well as any recommendations for staff to consider as the project proceeds. People were encouraged to fill out the forms before they left, or if necessary to fax or email the completed forms to Associated Engineering by July 4, 2008.

Overall, approximately 150 people attended the open house. 136 attendants completed sign-in forms. Sixteen comment forms were received, including one by email.

This section of the report summarizes the comment forms and provides all the comments received from stakeholders and the public who attended Open House #1.

Open House #1 Questions:

How did you hear about the open house?

Signage	9
Sign and newspaper	1
41 Avenue Interchange	1
Word of mouth	1
Blank	4

Were the displays helpful?

Yes	14
No	1
“Friendly, yes. Helpful, to a degree.”	1

Were project staff helpful?

Yes	15
No	1

The information provided was:

Adequate	7
Just Right	3
Too Little	1
Too Conceptual, Too Little	1
Too Technical	1
“Too Little, Too Late”	1

General Comments:

Great. Keep the people moving. Need roads & bridges.

Good information at this conceptual stage.

Very basic - thought there would be more, but I guess it is the first open house.

There should have been a handout with the maps that were on display.

Adequate for introduction.

"The public consultation component consists of three stages. Through the first stage, landowners adjacent to the study area were interviewed to obtain their local issues and comments." Could you please provide the documentation behind this statement? We are adjacent landowners on the east side of 50 Street where the intersection will overlap and were not interviewed or consulted in any form.

No food or drinks.

Need traffic lights, left turn arrow lights, and lanes to ease driving on new roads to be developed.

Good layout, not too formal.

It would be helpful if the maps on display would show the number of each section on the maps.

Well Done!

Has the City truly studied the long term costs of urban sprawl? I live in the County and am being affected by the 41 Ave developments. This City should look at the long term servicing, transportation, social, and environmental costs of further urban sprawl.

Glad to see planning for the wider roadways prior to over development of surrounding area.

Urban Sprawl!

A more complete overview of the area should have been shown, i.e. the conceptual 41 Avenue roadway should have continued east past 50 Street. The display board does not truly reflect what that corner will look like. For the attending consultants to say "we weren't asked to study past that point," is not an adequate answer. We all know there will be an upgraded intersection of some sort at the time the roadway is built - why not include it in the drawings?

Concept Likes:

Well displayed and informative.

Great idea to get land now, especially for a new ring road.

Gives a general idea of what factors will be involved in the planning. Gives the big picture of what may be in place in the future.

Clearly presented.

Planning study well represented immediate needs, plus future development.

Will be good to have south access to QE II other than Ellerslie Road.

Concept Dislikes:

None.

Too much emphasis on east/west - should be more on north/south.

Impacts access to business property. However, there is a plan to work around.

Does not address the 50 Street upgrading issue. Hard to get the impact of the proposal when key pieces, such as an upgraded 50 Street, are not included in the plan.

Additional Issues and Ideas for the Project Team to Consider:

What about north/south routes; i.e.: 170 Street extension through area? QE2 is already at capacity, as is 50 Street; should have more freeways north/south.

I think you've covered most of the required concerns.

Ensure space allotted for LRT line. Ensure multiuse bike trail space. As little number of lights (traffic) as can.

Build the wider roads before development, rather than playing "catch-up" after.

To ensure that the proposed interchange at 41 Avenue SW & QE II does not re-route great amounts of additional traffic west to 111 Street and north through the "Twin Brooks residential area" already impacted by the Anthony Henday and again by the proposed LRT extension!

The costs of urban sprawl, and the costs of not redeveloping the urban core.

Use a display board to list the time lines when the project is proposed to begin. The consultants (and City and County officials) don’t sound very convincing when they say they don’t know – maybe 30, 40 years?

Additional Comments:

I look forward to the next open house when a more formal plan will be unveiled.

This study is about an east/west road that in the present has relatively little traffic. 50 Street from Ellerslie Road to Beaumont is over capacity now. It needs to be twinned on the west side of the existing road now. Other north/south roads from Edmonton to Beaumont have been systematically closed or made into winding residential roads. 50 Street is essentially the only road in & out of Beaumont & Beaumont keeps growing. It is a current problem.

Twin Brooks resident living at the corner of 111 Street and 9 Avenue NW

Make handouts of the display boards available for the public to take home for further study. It would assist in processing the information presented and make it easier for people to complete the feedback forms in a timely manner. There doesn't have to be reams of them --- only about 20 copies, double sided, given out to those who ask for them. It would assist those folks who aren't computer savvy or those who had difficulty finding the information on the web.

On your feedback sheet, give the site (i.e. City of Edmonton – Transportation – 41 Avenue Study) where the information will be found and a date it will be there by. If you're not an engineer or planning department type, trying to find this information on your own is nearly impossible. Plus, internet access in the country can be very hit and miss – some days it works great, others not so good.

Extend the hours. 3:00 p.m. to 9:00 p.m. would have helped those individuals who couldn't get there by 7:00 p.m. Two extra hours would have allowed people to get home, do 'the family thing', then go to the open house and spend quality time going over the displays.

Common Themes Identified by Stakeholders:

Throughout the open house and via the open house comments forms, project staff compiled a selection of common themes – issues or ideas brought up by several stakeholders or community members. This list is presented below.

- capacity of north/south routes (e.g. 50 Street/Highway 814 and 170 Street)
- plan promotes sprawl over urban development
- make space available for LRT and multi-use trails

7 Conclusion and Recommendation

41 Avenue SW currently exists as a rural 2-lane roadway at the south limits of the City of Edmonton. The roadway is planned as a major arterial in the future. Currently traffic volumes along 41 Avenue SW are relatively low.

Associated Engineering was retained by the City of Edmonton and Leduc County to develop long-term concept plans for 41 Avenue SW between 50 Street and 184 Street. The City of Edmonton and Leduc County have outlined that the 41 Avenue SW Concept Plan was commissioned to provide guidance to respond to development applications and access requests along the study area. The concept plans will allow both Edmonton and Leduc County to protect the appropriate right-of-way and intersection spacing for the ultimate roadway configuration.

The City of Edmonton provided Associated Engineering with turning movement volumes at select major intersections along 41 Avenue SW based on their Regional Travel Model (RTM). These volumes considered long-term growth (approximately 100 years) to a regional population of about 3.2 million. These volume estimates were based on a typical suburban buildout of all City of Edmonton lands north of 41 Avenue, as well as typical suburban development within Leduc County south of 41 Avenue SW.

Using the projected traffic volumes, the project team analyzed the intersections in terms of their capacity. Adjustments were made at each intersection in terms of the number of lanes and lane configurations required to accommodate the projected traffic volumes.

With direction from the project steering committee and public input, coupled with the intersection capacity analysis outlined above, the project team developed a set of long term functional roadway plans for 41 Avenue SW showing the horizontal and vertical layout. The plans identified proposed cross-sections, intersection configurations, and staging plans.

When development pressures require a widening of the existing roadway, the project team recommends that detail design begin for the roadway upgrades based on the ultimate plans and staging developed as part of this study.

Closure

This report was prepared for the City of EdmontonCity of Edmonton to develop functional plans for long-term development of 41 Avenue SW between 50th Street and 170th Street in South Edmonton.

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

Respectfully submitted,
Associated Engineering Alberta Ltd.

PROFESSIONAL ENGINEER ALBERTA
SHAWN BENBOW
January 19.2010

Shawn Benbow
Project Manager

Steven Schmidt
Project Engineer
January 19 . 2011

ASSOCIATED ENGINEERING
QUALITY MANAGEMENT SIGN-OFF
Signature:
Date: January 19 2011
APEGGA Permit to Practice P 3979

THE CITY OF Edmonton

Associated Engineering

GLOBAL PERSPECTIVE.
LOCAL FOCUS.

www.ae.ca