



17 Street Functional Planning

(Whitemud Drive to Knightsbridge Rd.)

FINAL REPORT



McElhanney

A Report To:



17 Street Functional Planning

(Whitemud Drive to Knightsbridge Road)

FINAL REPORT

December 2012



McElhanney

EXECUTIVE SUMMARY

The functional planning for the widening and improvement of 17 Street from Whitemud Drive to Knightsbridge Road (105 Avenue) has been undertaken by the City of Edmonton and Strathcona County to facilitate an efficient goods movement within the industrial areas bordering 17 Street, as well as to provide an accessible thoroughfare for local traffic and commuters. The study includes the development of concept plans, as well as access management plans and the identification of right-of-way requirements for the ultimate widening of 17 Street.

This planning study is consistent with the current Transportation Master Plan (TMP) of the City of Edmonton and the Integrated Transportation Master Plan (ITMP) for Strathcona County, while both addressing future growth/development along the 17 Street corridor and accommodating the interim of interchange improvements at 17 Street and Sherwood Park Freeway being administered by Alberta Transportation. The study area includes 17 Street, from Whitemud Drive to Knightsbridge Road (105 Avenue), excluding the interchange of Sherwood Park Freeway and 17 Street.

17 Street is currently classified as an arterial roadway through both the City of Edmonton and Strathcona County and is also a goods movement corridor, specifically designed to accommodate traffic from local and collector roads as well as to distribute traffic to higher level facilities including highways and freeways. 17 Street is a designated 24-hour truck route throughout the entire project length, a dangerous goods route specifically north of Sherwood Park Freeway, and provides a route for over-weight and over-dimensional vehicles.

The primary objective of this study was to develop concept plans for the upgrade of 17 Street between Whitemud Drive and Knightsbridge Road from its existing two-lane undivided rural roadway standard to an ultimate urban arterial standard. The key objectives of this study include:

- Identification of the roadway cross section and design criteria required for 17 Street within City and County limits;
- Identification of right-of-way requirements for widening;
- Identification of utility and railway crossings;
- Identification/development of a stormwater strategy for the roadway;
- Identification of intersection and access locations;
- Development of concept plans and cost estimates for the roadway improvements;
- Development of a conceptual implementation plan for 17 Street;
- Identification of future studies and requirements for 17 Street prior to construction; and
- Development of an interim transition on 17 Street, from 76 Avenue north to connect with Alberta Transportation's interchange design for 17 Street at Sherwood Park Freeway.

Consistency is important for the 17 Street corridor; many of the design criterion were developed and organized into project priorities through an initial project chartering exercise, with representatives from both the City of Edmonton and Strathcona County and based on their respective design guidelines. A major objective between both jurisdictions was to provide an asphalt shared-use path (or multi-use trail) on the west side through the length of 17 Street, as well as sidewalk between Whitemud Drive and 76 Avenue on the east side of 17 Street.

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An important aspect of planning goods movement corridors is to balance the movement of vehicles and access to businesses and land owners. For 17 Street, providing for the movement of people and goods along the corridor is the main objective; access is provided at intersections and consolidated as appropriate through the corridor in order to provide reasonable access to all businesses and landowners adjacent to the corridor while maintaining adequate spacing. Although development accesses have been noted within the Concept Plans, many of these accesses will be finalized as future development is continually introduced with detailed zoning, site plans and traffic impact assessments and could possibly require modifications or revisions based on approvals from the City of Edmonton and Strathcona County.

Both the long term traffic volume forecasts (including rationalization with the Maple Ridge Area Structure Plan and Traffic Impact Assessment) and the Synchro results for intersections along the 17 Street corridor providing for a Level of Service (LOS) that meets or exceeds a LOS of “E”, indicate acceptable long term operating conditions along the corridor. As well, the calculated queuing lengths confirm that standard turn bay lengths for both left turns and right turns will be sufficient. The longest queuing and delays occur on 17 Street for the through movements, and the largest delays are between Roper Road and Whitemud Drive - in the AM peak hour in the northbound direction and in the PM peak hour in the southbound direction.

The following general geometric conditions were applied to the corridor:

- A six-lane urban cross section between Whitemud Drive and Roper Road and through the intersection of Baseline Road;
- A modified four-lane urban cross section between Roper Road and Knightsbridge Road;
- Consistent lane widths through the corridor;
- Traffic signals included at most intersections, based on traffic projections along 17 Street;
- For intersections along 17 Street with all directional legs (4-way intersections) and traffic signals south of Sherwood Park Freeway, left turn slot bays were developed;
- Other intersections along 17 Street (3-way intersections and those north of Sherwood Park Freeway) were developed with conventional left turn bays;
- Major arterial intersections (Roper Road, 90 Avenue) include “Aussie-style” right turns, to and from 17 Street;
- Roper Road was developed to include double left turns in all directions;
- An asphalt shared-use path was developed throughout the corridor on the west side;
- For the portion south of 76 Avenue, a concrete sidewalk was included on the east side of 17 Street;
- Transit stops were included at most intersections, with sidewalk connections; and
- New industrial collector roadways were matched with the existing road network within the area.

There are two rail crossings along the 17 Street corridor within the study limits; one is operated by CN Rail and the other operated by CP Rail. It was determined that neither rail crossing will require grade separation within the planning horizon of this study.

An environmental overview and wildlife passage review on Fulton Creek was also completed to identify future requirements through this section of 17 Street. Recommendations include consideration for wildlife signage and reflectors, fencing, natural vegetation, altered lighting and an additional culvert for the passage of small mammals and/or amphibians. It was determined that the Fulton Creek Crossing and the wetland area just west of Maple Ridge Drive are both important ecological resources; although as part of this planning study an environmental overview was completed, additional environmental studies (screening reports) will be required in future project phases.

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A cost estimate for the improvements has been developed to a planning level of detail (+/- 40%). The overall project cost estimate totals **\$64.6M** as seen within the comprehensive breakdown provided in **Appendix I**. During construction, it is understood that maintaining traffic safely throughout the 17 Street corridor is vitally important to the movement of goods and for accessibility reasons. Therefore, the ultimate improvements along 17 Street are recommended to be implemented in stages; firstly, building the new northbound lanes, then moving traffic to the new lanes so that the existing 17 Street can be reconstructed as the ultimate southbound lanes. It is expected that private development will largely dictate the timing of the 17 Street improvements with this planning study identifying the key requirements and considerations as 17 Street develops.

As part of this project, an interim transition from Sherwood Park Freeway to south of 76 Avenue was also developed. This transition includes an interim four lane 17 Street that connects to the planned Sherwood Park Freeway and 17 Street interchange upgrades, being competed as part of the Northeast Anthony Henday Project by Alberta Transportation. This transition ultimately expands south of 76 Avenue to create the widening through the intersection of 17 Street and 76 Avenue, while maintaining a shared use path from 76 Avenue north to Sherwood Park Freeway on the west side of 17 Street. This transition will ultimately use primarily rural (ditch) drainage, which is the existing condition; however, it is recommended that curb and gutter be considered south of 77 Avenue, with curb opening and/or shallow catchbasins that open to the ditch. The estimated cost for this transition south of Sherwood Park Freeway is \$4.7M; however there is a major utility crossing contingency within that estimate as well as work that could be included within the scope of the interchange and completed by Alberta Transportation.

An important aspect of any planning project is the public consultation and public involvement process. For this study, two public events were held as well as ongoing communication and availability to the public by the Project Team through email and telephone as required. Mail-outs (fact sheets), website updates and road signs were all used to advertise these events. In addition to public consultation, there was also ongoing discussion with internal City and County staff, as well as other key stakeholders. At the second public event, there was general acceptance of the widened 17 Street as the recommended concept plans were presented. Common themes identified by the public at the event and through the life of the project included:

- Access to public transportation and bus stop locations;
- Concerns over the number of large trucks;
- Condition and maintenance of the existing 17 Street;
- Concerns over the overall traffic network (Baseline Road, Anthony Henday Drive);
- Safety and security, specifically at or near traffic signals;
- Timing of construction; and
- Existing operations at the intersection of 17 Street and 76 Avenue.

In the end, the recommendations and concept plans for the ultimate widening of 17 Street between Whitemud Drive and Knightsbridge Road will accommodate the anticipated traffic volume growth beyond 2044 to the ultimate build-out scenario of the corridor. This planning study does accommodate existing development plans to date, however, updating may be required as development occurs. The recommended improvements will also enhance or provide the necessary transit, pedestrian and cycling facilities along 17 Street, while maintaining design consistency and driver expectations throughout the corridor.

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CORPORATE AUTHORIZATION

This report "17 Street, Whitemud Drive to Knightsbridge Road, Functional Planning" was prepared by McElhanney Consulting Services Ltd. under the joint authorization of The City of Edmonton and Strathcona County.

The report, plans, concept designs and recommendations put forward reflect the Consultants' best judgment with the available information. Any use of this information in a manner not intended, or with knowledge that situations have changed, shall not be the responsibility of McElhanney Consulting Services Ltd. or the undersigned.

<p>PERMIT TO PRACTICE McElhanney Consulting Services Ltd.</p> <p>Signature </p> <p>Date <u>DEC 20, 2012</u></p> <p>PERMIT NUMBER: P06383 The Association of Professional Engineers, Geologists and Geophysicists of Alberta</p>



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1 INTRODUCTION

1.1 PROJECT PURPOSE

The functional planning for the widening and improvement of 17 Street from Whitemud Drive to Knightsbridge Road (105 Avenue) has been undertaken by the City of Edmonton (the “City”) and Strathcona County (the “County”) to facilitate efficient goods movement within the industrial areas bordering 17 Street as well as to provide an accessible thoroughfare to local traffic and commuters. This functional planning study included the development of concept plans, including access management plans and identification of right-of-way requirements for the widening of 17 Street.

This planning study is consistent with the current Transportation Master Plan of the City of Edmonton (TMP) and the Integrated Transportation Master Plan for Strathcona County (ITMP), while predominantly addressing two timely issues:

1. The construction of interchange improvements at 17 Street and Sherwood Park Freeway that will begin in 2012 and be completed by 2016 as part of the Public/Private/Partnership Northeast Anthony Henday Drive (Ring Road) (P3) being administered by Alberta Transportation (AT) as primary owner; and
2. Future development along the 17 Street corridor, which is expected to occur in a more immediate time frame based on market conditions that indicate a shortage of serviced and available industrial land within the Capital Region.

1.2 STUDY AREA

Overall, the study area includes 17 Street, from Whitemud Drive to Knightsbridge Road / 105 Avenue, excluding the interchange of Sherwood Park Freeway and 17 Street. The study area is shown in graphic form within **Figure 1-1**.

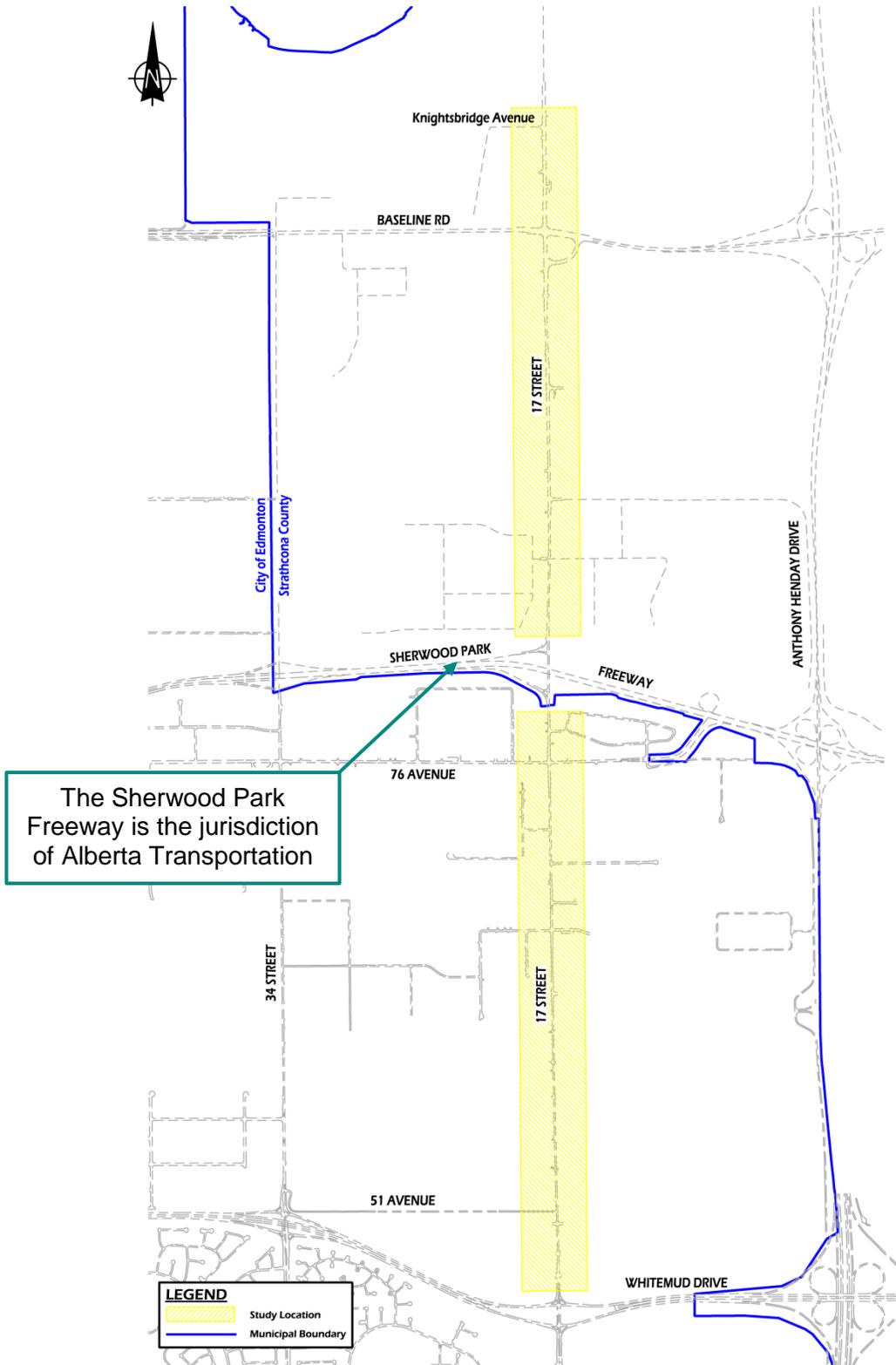
The total corridor length for this planning study is approximately 6.7 kilometers, of which 3.6 kilometers is south of Sherwood Park Freeway to Whitemud Drive (City portion) and 3.1 kilometers is north of Sherwood Park Freeway to Knightsbridge Road (County portion).

Within the project area, 17 Street is currently classified as an arterial roadway through both of the Transportation Systems Bylaws of the City of Edmonton and Strathcona County. As an active arterial road, 17 Street is a goods movement corridor, specifically designed to accommodate traffic from local and collector roads as well as to distribute traffic to higher level facilities including highways and freeways. 17 Street is also a designated 24-hour truck route throughout the entire project length as well as a dangerous goods route specifically north of Sherwood Park Freeway.

Presently, the only Arterial Road crossing 17 Street is Baseline Road, however 76 Avenue (classified as a collector road) is both a truck route and dangerous goods route. Roper Road, west of 17 Street, is classified as a future arterial road under the City of Edmonton's Transportation Systems Bylaw. All other connections to / from 17 Street through the project area are classified as either collector or local roadways.

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Figure 1-1: Study Area



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1.3 SCOPE & OBJECTIVES

The primary objective of this study was to develop concept plans for the upgrade of 17 Street between Whitemud Drive and 105 Avenue from the existing two-lane undivided rural roadway standard to an ultimate urban arterial standard, either four-lane divided, six-lane divided or five-lane undivided, in accordance with both City of Edmonton and Strathcona County design standards. The specific key objectives of this study include:

- Identification of the roadway cross section and design criteria required for 17 Street within City and County limits;
- Identification of right-of-way requirements for widening;
- Identification of utility and railway crossings and liaise with owners as required;
- Identification / development of a stormwater strategy for the roadway;
- Identification of intersection and access locations;
- Development of concept plans and cost estimates for the roadway improvements;
- Development of a conceptual implementation plan for 17 Street; and
- Development of an interim transition on 17 Street, from 76 Avenue north to connect with Alberta Transportation's design the interchange of 17 Street at Sherwood Park Freeway.

The planning of 17 Street was initially based the 2044 time horizon; however, in review of previous land use and area structure plans it was decided that the time horizon for this project would be a full built-out scenario as compared to a long term or specific time horizon.

Through an initial project chartering and priority exercise with both City and County representatives present, the 17 Street corridor was determined to require the consideration and integration of several aspects, as described and ranked by importance in **Table 1-1**.

Table 1-1: Project Priorities

Project Consideration	Description	Rank
Safety	Driver, pedestrian & cyclist protection	1
Efficient Traffic Movement	Reduction of traffic delays along corridor for vehicles and goods movement	2
Over-Dimensional Loads	Accommodation of heavy vehicles at intersections and access points, including large vessels	3
Intersection Treatment	Intersection channelization and signalization, optimizing efficiencies and turn movements	4
Access Management	Provide adequate access to all properties without sacrificing minimum access spacing along corridor	4
Utility Coordination	Avoid disturbance of major utility infrastructure and impacts to existing utilities	4

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Cross Section	A cross section that meets City and County standards, including both rural and urban aspects	5
Wetland Protection	Mitigation, compensation, and avoidance of environmentally sensitive areas	5
Sustainability & Mobility	Pedestrian, cyclist and transit integration through the corridor	6
Public Involvement	Keeping stakeholders involved and informed	7
Stormwater & Drainage	Stormwater and Drainage that best suits the corridor from a cost and property impact perspective	8
AT Coordination	Scheduling and design consistencies with the NE Anthony Henday Drive P3 Project and the reconfiguration of the 17 Street interchange with Sherwood Park Freeway	9
Land Acquisition	Minimize impacts to existing properties	9
Stageability & Implementation	Ensure feasibility to accommodate traffic growth until ultimate design volumes	9
Capital Cost	Create cost effective solutions to the corridor	9
Railway Crossings	Coordination with railway companies for possible upgrades to existing crossings	10

All work related to this project conforms to both City of Edmonton and Strathcona County standards and guidelines unless otherwise supplemented within this report. The specific standards and guidelines followed include:

- City of Edmonton Design and Construction Standards (2011);
- Strathcona County Design and Construction Standards (December 2011);
- City of Edmonton Wildlife Passages Guidelines;
- North Saskatchewan River Valley Area Redevelopment Plan Bylaw No. 7188 (June 2010 Office Consolidation);
- City of Edmonton's Urban Traffic Noise Policy C506;
- City of Edmonton Public Involvement Policy C513 Involving Edmonton: A Public Involvement Initiative;
- Strathcona County Policy GOV-002-025 (Public Engagement);
- Strathcona County Public Engagement Framework; and
- Strathcona County Traffic Noise Policy SER-009-027.

1.4 PLANNING PROCESS & APPROACH

This study was jointly sponsored by the City and the County, and the entire approach has been inclusive across jurisdictional boundaries. As a focused objective, consistency in the approach and design across jurisdictions has been maintained as much as practical.

This project was also jointly managed by a Project Manager from the City of Edmonton (Natalie Lazurko), Strathcona County (Tony Maghee) and McElhanney (Ryan Betker). All three Project

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Managers were involved in the project from the start through completion and were supported by their own internal work groups and internal stakeholders. Led by these Project Managers, the report recommendations and outcomes of this study were developed collaboratively within the project team.

An initial concept plan, cross sections and other design criteria were established early in the project, and then iterated through a planning process that began at a high level and focused in on technical aspects and details of the corridor as information became available or decisions were made. Plans and Technical memorandums were regularly circulated for comments and review through the project by the project team and internal stakeholders in the County and the City. The recommended plans (**Appendix A**) are reflective of this approach, as they were uniquely developed from preliminary sketches to detailed concept plans.

The governing framework of the project was completed within three concurrent project phases – Technical, Stakeholder and Project Management. This report is a summary of the findings and recommendations from the technical portions of the study, with some added references to the stakeholder phase, which is more formally documented in a supplementary Stakeholder Summary Report.

2 BACKGROUND INFORMATION

This section provides an overview of the existing physical conditions of the 17 Street corridor that were used in the planning of all future improvements. Previously approved environmental and geotechnical reports are discussed in more technical sections (Section 5.5 and 5.7, respectively). Also of important note, the Maple Ridge Traffic Impact Assessment (Bunt and Associates, 2009) is discussed in greater detail as it directly relates to the traffic evaluation in Section 5.1 of this report.

2.1 BACKGROUND TRAFFIC & COLLISION HISTORY

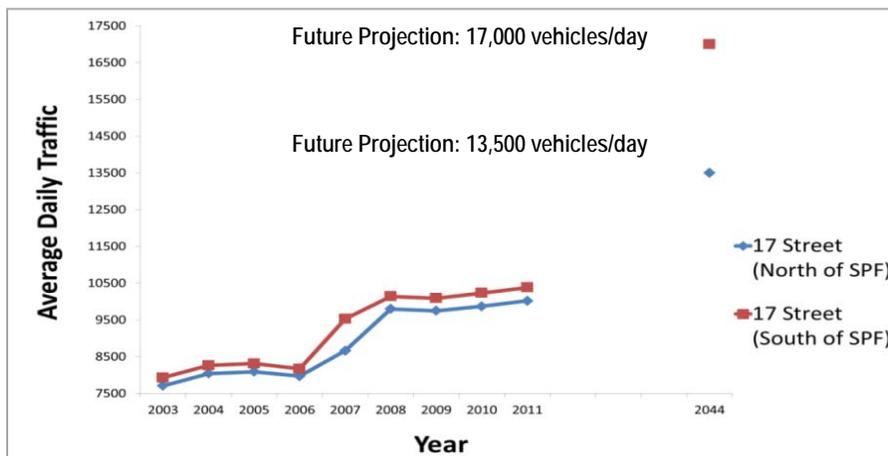
Traffic along 17 Street has been steadily increasing, most notably since the opening of the southeast leg of Anthony Henday Drive in 2006. It is now reaching capacity constraints for a two-lane arterial and has had recent upgrades to create turning lanes at intersections to improve capacity (90 Avenue, 76 Avenue & Oak Ridge Drive), including recent improvements directly north of Whitemud Drive as part of its interchange construction at 17 Street and Whitemud Drive. These more recent improvements have been completed on an as-required basis or as part of new development (90 Avenue).

17 Street is currently a rural cross section, originally designated as a rural Range Road, servicing heavy industrial, light industrial, residential and commuter traffic.

2.1.1 Traffic Volumes & Composition

Traffic volumes along 17 Street have grown steadily with increasing industrial and commercial development along the corridor, as well as with respect to major roadway connections. **Figure 2-1** shows the historical traffic growth at 17 Street and Sherwood Park Freeway, as well as the anticipated 2044 volumes (according to City projections). Based solely on these projections, additional capacity will be required along 17 Street to meet the demand (and associated level of service).

Figure 2-1: Historical Traffic Volumes at 17 Street and Sherwood Park Freeway



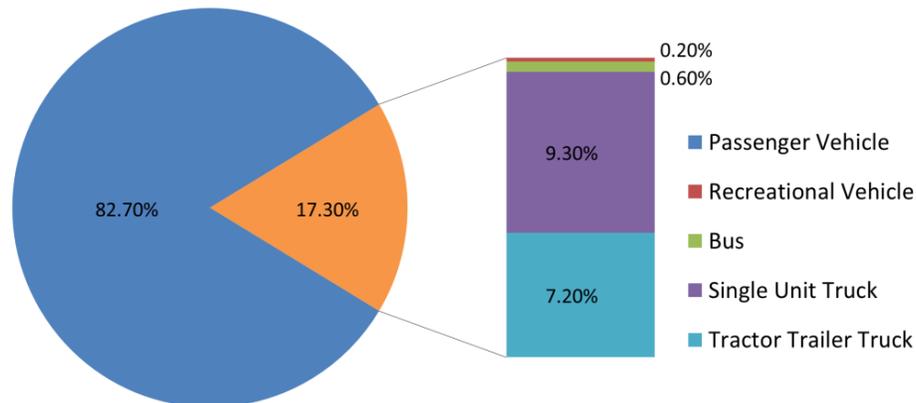
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Existing traffic on 17 Street ranges from 9,500 to 11,000 vehicles per day, both north and south of Sherwood Park Freeway. With growth and development north of Sherwood Park Freeway, traffic is expected to grow over 50% to range between 13,000 to 15,000 vehicles per day. South of Sherwood Park Freeway, should the Maple Ridge Area grow (as estimated by the Maple Ridge Traffic Impact Assessment, Bunt, 2009), there would be an increase of over 25,000 trips per day near 76 Avenue and over 40,000 vehicles per day near Whitemud Drive. This would put daily traffic volumes on 17 Street, south of Sherwood Park Freeway in the range of 35,000 to 50,000 vehicles per day.

Traffic along 17 Street is comprised primarily of passenger vehicles, with a significant number of heavy vehicles such as single unit and tractor trailer trucks as shown in **Figure 2-2**. This percentage of large vehicles confirms the importance of 17 Street as a goods movement corridor.

Figure 2-2: Traffic Composition at 17 Street and Sherwood Park Freeway



Given the predominately industrial nature of the corridor, and to accommodate the large volume of heavy vehicles, special consideration has been given to these large vehicles, both as a percentage of traffic and as a design vehicle for the corridor.

The latest traffic turning movement data, as supplied by both the City and County for major intersections along the 17 Street corridor, was used to analyze existing conditions and identify areas where improvements are necessary, as well as the extents of any required improvements. **Figure 2-3** shows both the existing AM and PM peak volumes along the corridor.

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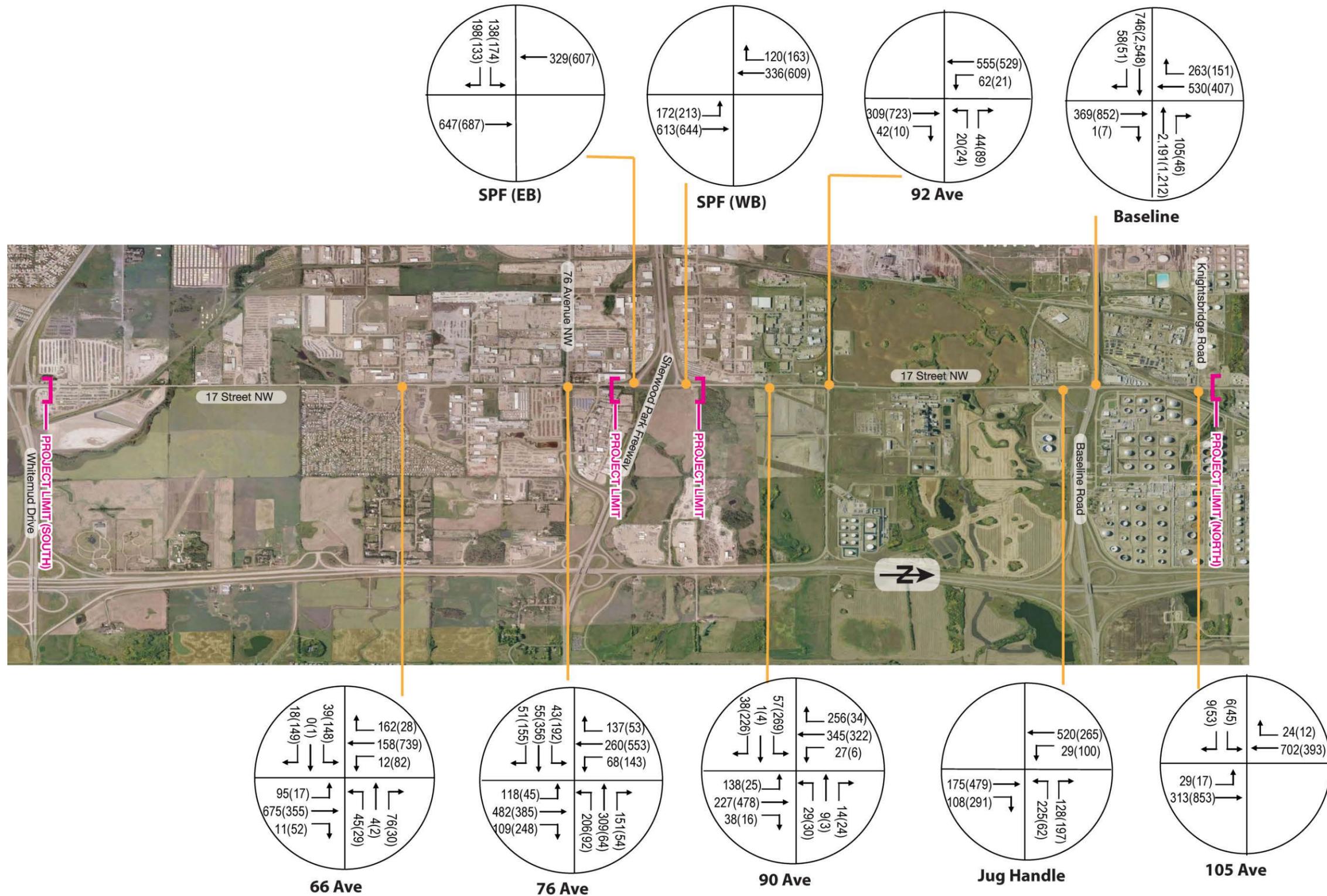


Figure 2-3: Existing AM (PM) Peak Volumes

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2.1.2 Collision History

Reported collisions along the 17 Street corridor based on City and County provided data, between 2007 and 2011, are summarized in **Figure 2-4** and presented in detail in **Appendix C**. Common collision types include: “followed too closely”, “traffic control violations” and “improper turning/ passing”. There is potential to reduce these collisions with design upgrades such as separating opposing directions of traffic through widening to four lanes, signalization and channelization at intersections as well as efficient access management solutions. The following is a discussion on common collision causes through the 17 Street corridor.

Following Too Closely – The most common collision in urban areas, and likewise on 17 Street, is following too closely to the vehicle ahead, typically resulting in a rear end collision. Common causes of collisions are driver distraction, speeding, and in some cases directly related to poor weather conditions. These collisions occur primarily at intersections, a result of a sudden stop or maneuver in many cases in the through lanes. Another common location for vehicles following too closely is in right turn cut offs, where a vehicle rolls out to complete the turn and decides not to go, whereas the car behind can be looking to find the next gap and ends up in a collision. Improved sightlines can reduce this type of collision. Sightlines along the 17 Street project limits are not constrained, aside from the crest curve at 92 Avenue. There are also no specific intersections or patterns with the collision history that would indicate a unique problem related to this type of collision.

Traffic Control Violations and Improper Turning/ Passing – These collisions are the result of a driver error, often with drivers selecting insufficient gaps to complete turns or violating stop and other regulatory signs and intersection signals and is also common at intersections. Higher numbers (as a percent of collisions at a location) can reflect heavy congestion, where drivers are violating controls or taking chances based on frustration. On 17 Street, there are no collision patterns that would indicate a systematic problem related to turns and controls; however, improving channelization and traffic signal coordination, allowing for additional roadway capacity and an overall efficient access management strategy that reduces conflict points, including left turns onto the busier roadway, can significantly reduce this collision type.

Road Run-offs – This is not a common collision cause in urban situations; however, it is a top collision cause on 17 Street, specifically between the intersections of 66 Avenue and 76 Avenue. These collisions are likely attributed to the current rural cross section on 17 Street (and in some cases combined with weather conditions and impatient drivers who may use the shoulder area to avoid turning vehicles) and would be reduced with an urban cross section that includes curbing and better roadway delineation (including a wider cross section and improved street lighting). There are specific locations (76 Avenue) where the travel path of large vehicles has reduced the definition of the roadway edge through over-tracking, which can cause uncertainty about the road edge, resulting in vehicles leaving the travel surface.

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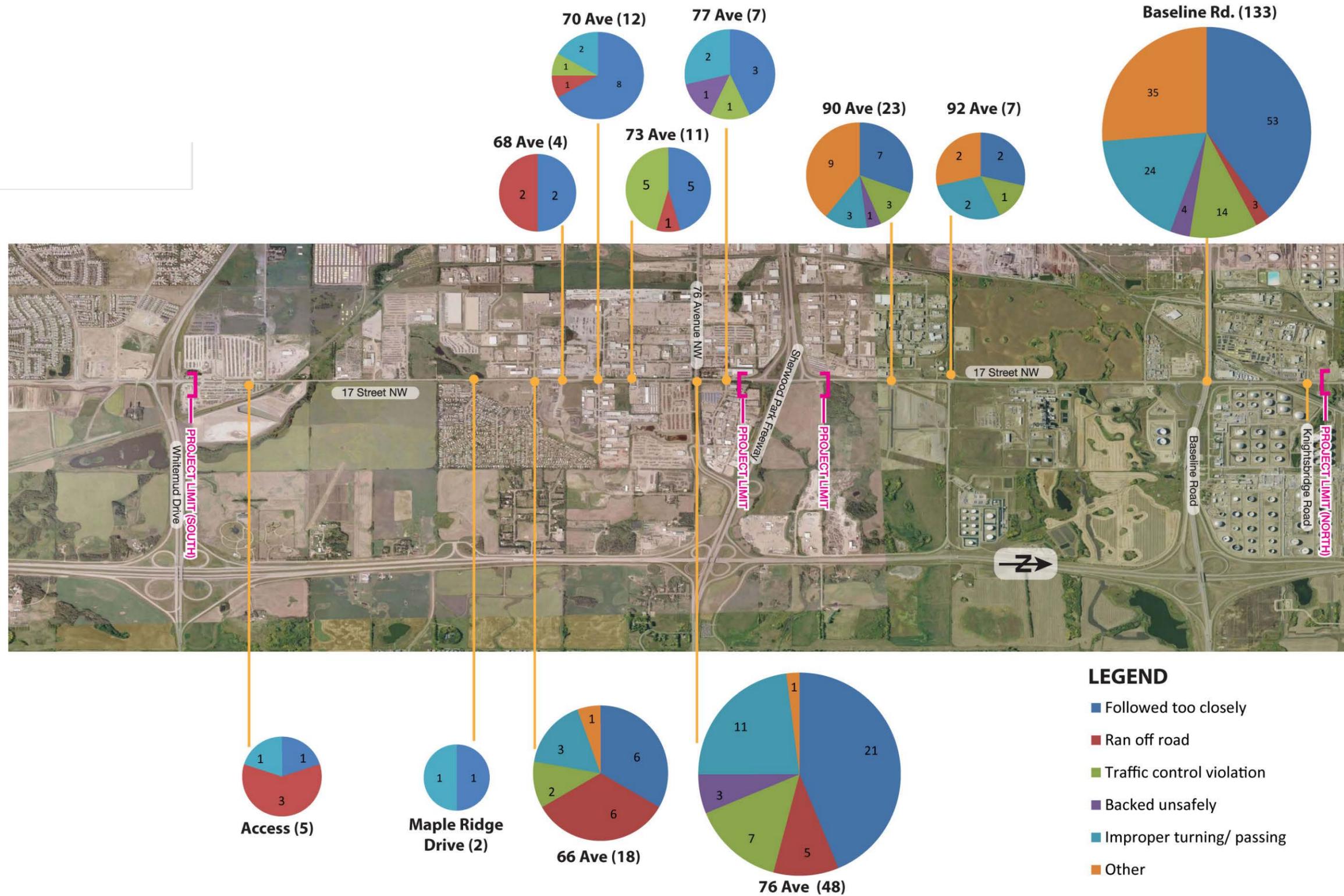


Figure 2-4: Collision History

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2.2 EXISTING LAND USE & ZONING

This corridor is unique from an existing land use perspective as bordering the corridor there are land uses from residential to heavy industrial. The current land use also has large areas of agricultural use; however, these specific pieces of land are planned for future development and have been zoned accordingly. The current zoning is not expected to significantly change; however, as the Maple Ridge area develops, there may be opportunities for more intensive development.

2.3 FUTURE LAND USE & DEVELOPMENT

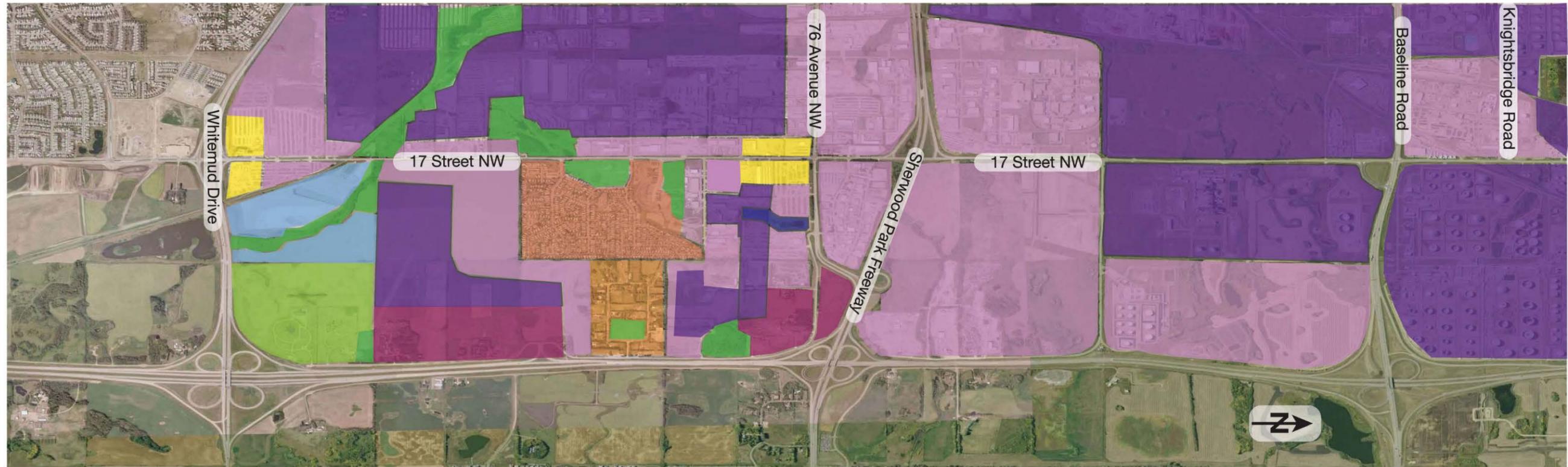
Land use and development plans were provided by both the City of Edmonton and Strathcona County along the 17 Street corridor. A Consolidated Area Structure Plan for Maple Ridge (2010) was also provided by the City of Edmonton, which outlines plans for future land use, environmental features, eco-industrial development features, infrastructure requirements and development phasing. Specific Area Structure Plans in Strathcona County include Sherwood Industrial Park West and the Laurin Industrial Park.

Figure 2-5 summarizes findings from the provided City and County land use and development plans. The majority of land adjacent to 17 Street is designated as light and heavy industrial, making the requirement to accommodate heavy vehicles and oversized loads a priority for the planning study. There are also small pockets of “Business Service” zones near Whitemud Drive and south of 76 Avenue. Due to recent commercial development south of Whitemud Drive on 17 Street, it is anticipated that the lands adjacent to 17 Street between Whitemud Drive and the CN Rail spurline may be rezoned through redevelopment to a more intensive commercial land use.

The preservation of the natural areas is important from a land use perspective, including maintenance of an existing local amenity. Although the residential area (Maple Ridge and Oak Ridge) is inconsistent with typical zoning in a more industrialized area, there are no known plans to revise the residential zoning or to redevelop the community.

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North of Whitemud Drive to Knightsbridge Road (105 Avenue)



LEGEND

- | | |
|---|--|
|  Heavy Industrial |  Natural Area/ Open Sapce |
|  Medium Industrial (with restrictions) |  Urban Service |
|  Light Industrial |  Maple Ridge/Oak Ridge Community |
|  Business Service |  Hurstwood Special Development Area |
|  Public Works (Snow Dump) |  Stormwater Management Facility |

Figure 2-5: Future Land Use and Development

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North of Whitemud Drive to Knightsbridge Road (105 Avenue)

2.4 PREVIOUS REPORTS

Several reports over the last decade have been completed along the 17 Street corridor, ranging from land use planning to geotechnical and environmental. The critical previous reports for this study are documented as the AI-Terra Functional Planning Study for 17 Street (2004) and the Maple Ridge Area Structure Plan (including the Traffic Impact Assessment and Area Servicing Master Plan) completed by Focus in 2009.

2.4.1 Functional Planning Study for 17 Street (AI-Terra, 2004)

AI-Terra Engineering completed a short term Functional Planning Study (FPS) for 17 Street between Sherwood Park Freeway and Baseline Road in 2004, with an ultimate design year of 2020. **Table 2-1** highlights and summarizes the most applicable assumptions and recommendations made by the study, and their relevance to the current project:

Table 2-1: Summary of Recommendations by AI-Terra (2004)

FPS Assumption/ Recommendation	Implemented	Comments/ Action to Address Previous Study
Access Restrictions: 90 Avenue, 92 Avenue, EnviroFuels access, Railway Street	No	Review access management including recommendations to ensure all properties have adequate access. 90 Avenue and 92 Avenue have been identified as major access points, with collector and arterial road status.
5 lane undivided cross section	No	Review cross section options & requirements, The 5 lane cross section adequately addresses over-dimensional vehicles, however may be reconsidered based on access requirements.
Jug Handle intersections at Baseline Road	Yes	Review operational adequacy & possible upgrades for capacity increases.

2.4.2 Maple Ridge Industrial Area Structure Plan & TIA (Focus, 2009)

As a part of the 2009 Maple Ridge Area Structure Plan (ASP) prepared by Focus Corporation, a Traffic Impact Assessment (TIA) was prepared to project ultimate traffic volumes for the full potential development of the 17 Street corridor between Whitemud Drive and Sherwood Park Freeway, as previously discussed in **Section 2.1** of this report. These projected volumes were based on a long term horizon and were analyzed to recommend improvements for existing and future intersections within the entire roadway network, including the future connections to 34 Street via Roper Road and 51 Avenue.

In review of these recommendations, several key issues were identified in regard to their applicability to the current corridor planning project:

- The design year used in the TIA is beyond the 2044 design year for City and County planning;

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- Traffic projections were inflated due to assumptions such as equating the small “business service” and “neighbourhood commercial” areas to “shopping centers” for traffic generation purposes; and
- Access management concepts for the 17 Street corridor were not considered, such as closing and consolidating accesses at 77 Avenue, 70 Avenue & 73 Avenue.

As a result of these assumptions, several of the recommended intersection elements and cross sections will require further review and analysis, as indicated in **Table 2-2**. The traffic implications of this report are further discussed in **Section 5.1**.

Table 2-2: 2009 Focus ASP (Bunt TIA) Recommendations and Response

Location along 17 Street	TIA Recommendation	Comments/ Action to Address Previous Studies
Whitemud Dr to Roper Road Business Service Access	6 - lane urban cross section Dual left turn bays NB to WB & WB to SB	Traffic projections are for business service land use; however, it is likely that this area may be rezoned for development to more intensive commercial uses that will require a 6 lane cross section and dual left turn bays to accommodate traffic volumes in this section.
51 Avenue	Unsignalized	Review signalization requirement and intersection spacing for consistency, although currently planned as a collector roadway; based on the land use, it is likely to require signalization.
Roper Road	Dual left turn bays NB to WB & WB to SB; free-flow right turn EB to SB	Review cross section requirements and traffic projections; consider single left turn lanes and confirm free flow right turn movement (EB to SB)
Maple Ridge Road	Signalized	Review signalization requirements & spacing
66 Avenue	Through-right NB to EB	Provide separate NB to EB right turn bay for corridor consistency
70 Avenue 73 Avenue	Remain open Remain open	Consolidate accesses to maintain adequate intersection spacing and traffic flow
76 Avenue	Through-right EB & WB	Review projections; consider separate right turn bays
77 Avenue	All directional	Close access or provide RI/RO only for adequate spacing prior to the interchange at 17 Street and Sherwood Park Freeway.

2.4.3 Environmental & Geotechnical

Table 2-3 is a summary of pertinent background environmental and geotechnical reports gathered to date for the 17 Street corridor. These reports aided in the determination of existing conditions and helped to indicate where further investigation was required.

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Table 2-3: Previous Environmental & Geotechnical Reports

Report Title	Year	Summary
<i>Roadway Reconstruction – 17 Street from Whitemud to Sherwood Park Freeway</i>	1985	<ul style="list-style-type: none"> Assessment of subsurface conditions Fill overlaying native lacustrine deposits and glacial till; no groundwater found
<i>Limited Natural Site Assessment – Maple Ridge Natural Area</i>	2002	<ul style="list-style-type: none"> Review of proposed subdivision boundary Deemed adequate to protect suitable plant and wildlife habitat in area
<i>SE Aggregate Recycling Facility Geotechnical Report</i>	2003	<ul style="list-style-type: none"> Assessment of subsurface conditions Recommendation to remove all topsoil and organics from gravel roadway
<i>Southeast Snow Storage Facility Environmental Screening Assessment</i>	2004	<ul style="list-style-type: none"> Analysis of environmental issues and impacts of snow storage facility
<i>Southeast Snow Storage Facility Geotechnical Investigation</i>	2004	<ul style="list-style-type: none"> Conditions deemed suitable for construction of facility and settlement pond
<i>Environmental Site Assessment – Parts of Lot 24, Block 2, Plan 9322161</i>	2006	<ul style="list-style-type: none"> Assessment of environmental impacts Identified concerns deemed negligible
<i>Rut Mitigation at 17 Street and baseline Road</i>	2006	<ul style="list-style-type: none"> Pavement review and analysis of treatment options
<i>Spring 2011 Groundwater Monitoring Program</i>	2011	<ul style="list-style-type: none"> Chloride levels higher than allowable No hydrocarbon or metal impacts
<i>Rut Mitigation at 17 Street and baseline Road</i>	2012	<ul style="list-style-type: none"> Pavement review and analysis of treatment options

2.4.4 Stormwater & Drainage

Background information related to stormwater and drainage included the plans for the interchange at 17 Street and Whitemud Drive as well as the Area Master Plan Stormwater Servicing for the Maple Ridge Area. Although this previous work does not define stormwater management on 17 Street, it provides the context for drainage in the area.

2.5 EXISTING UTILITIES

City and County provided utility data was combined and owners were identified using internal sources to locate potential utility constraints along the corridor. **Table 2-4** summarizes the utility types, owners and crossing locations along 17 Street.

There are additional overhead utilities including power (both sides of 17 Street), telecom, street lighting and other communications (Shaw, which crosses at 92 Avenue). These utilities will need to be relocated (either aerial or underground) to accommodate the widening of 17 Street. The overhead utilities can be more easily relocated from a timing and cost perspective, when compared to the underground utilities. For that reason they were not determining criteria in the recommendations on the widening of 17 Street.

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Table 2-4: Utility Crossing Locations

Utility Type	Owner(s)	Approximate Crossing Locations
Cable	Telus	Business service access, Maple Ridge Dr, Oak Ridge Dr, 70 Ave, north of 73 Ave, south of 92 Ave, north of Baseline, and south of 105 Ave
Gas	ATCO	South of Maple Ridge Dr, north of Oak Ridge Dr, south of 70 Ave, south of 73 Ave, south of 76 Ave and Baseline Rd
	Air Liquide	South of Railway St
Oil	Alberta Products	North of 70 Ave
	Terasen	South of 90 Ave
	Pembina Pipeline	North of 70 Ave, south of Railway St, south of Baseline, Baseline Rd
	Imperial Oil	South of Railway St
	Plains Midstream Canada	South of Baseline, Baseline Rd
	Keyera Energy	Baseline Rd
HPV Products	Nova Chemicals	South of Railway St
	BP Canada	North of 70 Ave
	Keyera Energy	North of 70 Ave
Water	City/County	North of business service access, Maple Ridge Dr, 66 Ave, 68 Ave, 73 Ave, 76 Ave, south of SPF, north of SPF, south of Railway St, 90 Ave
Sanitary	City/County	Maple Ridge Dr, Oak Ridge Dr, 68 Ave, 70 Ave, 73 Ave, 76 Ave, 77 Ave, north of SPF, 90 Ave, Baseline

Major utility crossing locations, which will require special attention during future design phases of the project to minimize potential impacts of the roadway widening, include:

- Between 73 Avenue and 76 Avenue
- South of Railway Street
- Between 90 Avenue and 92 Avenue (water)
- South of Baseline Road

Additional treatments at these crossings will include but are not limited to; cover (both depth and structure), casing protection, cathodic protection, proximity mitigation (vertical sheet protection). This protection will need to be determined during design phases of the 17 Street widening.

Existing utilities are presented in **Appendix C**.

3 CROSS SECTIONS & DESIGN CRITERIA

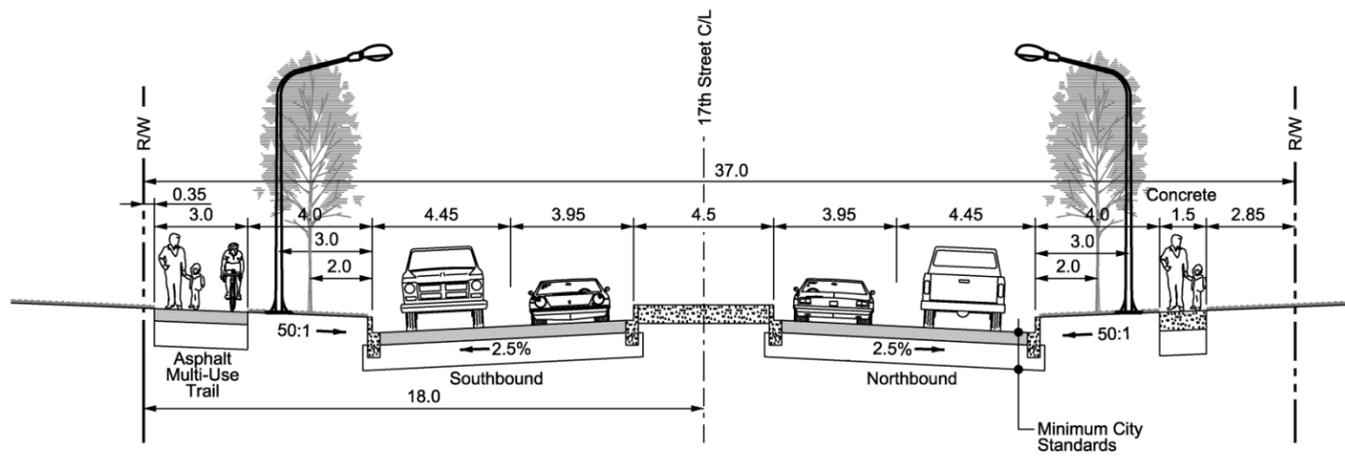
3.1 CROSS SECTION

The cross section of 17 Street ultimately determines the eventual right-of-way requirements for the corridor. As was originally documented, the current cross section is rural in nature with two lanes of travel for traffic (one in each direction) and adjacent roadside ditches; both the ditch and road width vary through the corridor. At many intersections, “ad-hoc” widening has occurred to accommodate turning traffic and heavy through movements. Traffic projections indicate the need for 17 Street to be widened to four lanes in most sections, and expanded to six lanes in areas with more activity, based in many cases on future land use and development patterns which were confirmed with the traffic analysis portion of the project (see **Section 5.1**).

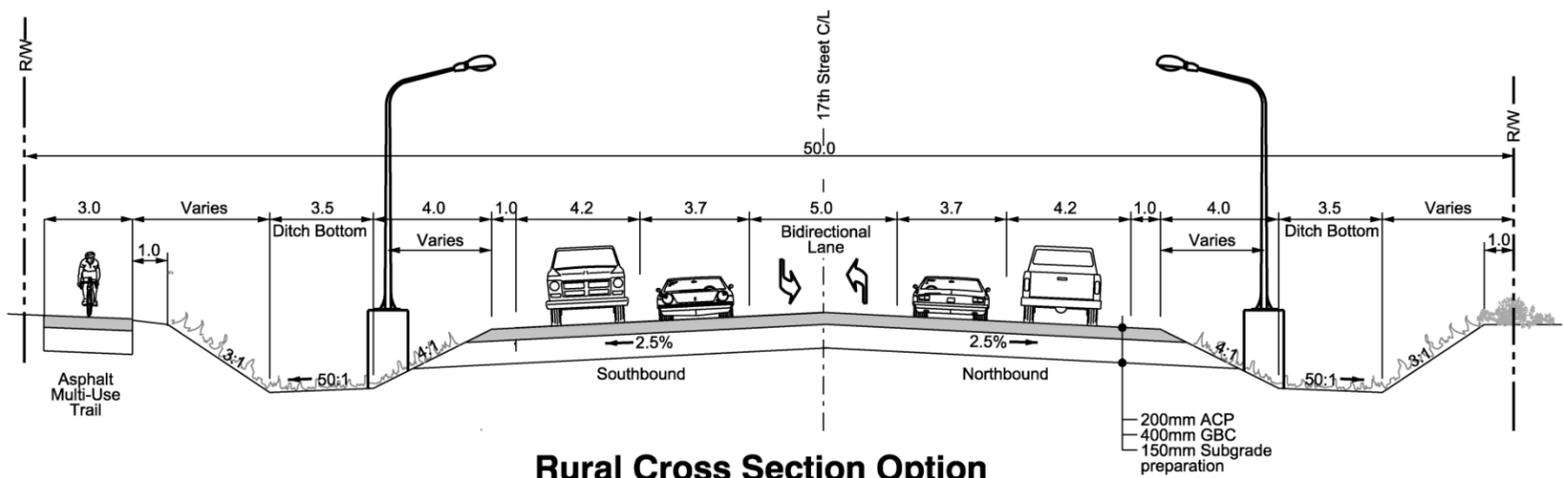
3.1.1 Option Evaluation

Four typical cross sections were proposed for 17 Street, ranging from complete urban to rural, as well as options with a combination of both urban and rural. These four options for cross sections are presented in **Figure 3-1**. Of note, all proposed cross sections include pedestrian facilities.

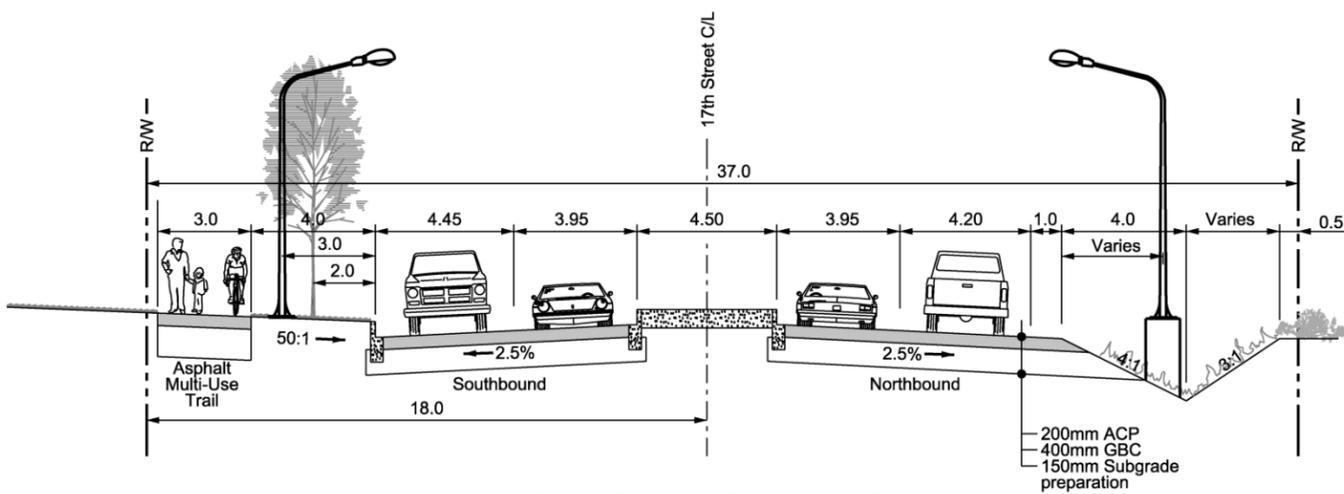
These cross sections were then qualitatively evaluated against the evaluation criteria determined by the Project Team (refer to **Section 1.2**). They were evaluated as if they were applied to the entire corridor as a whole. A summary of this evaluation with discussion is presented in **Table 3-1**.



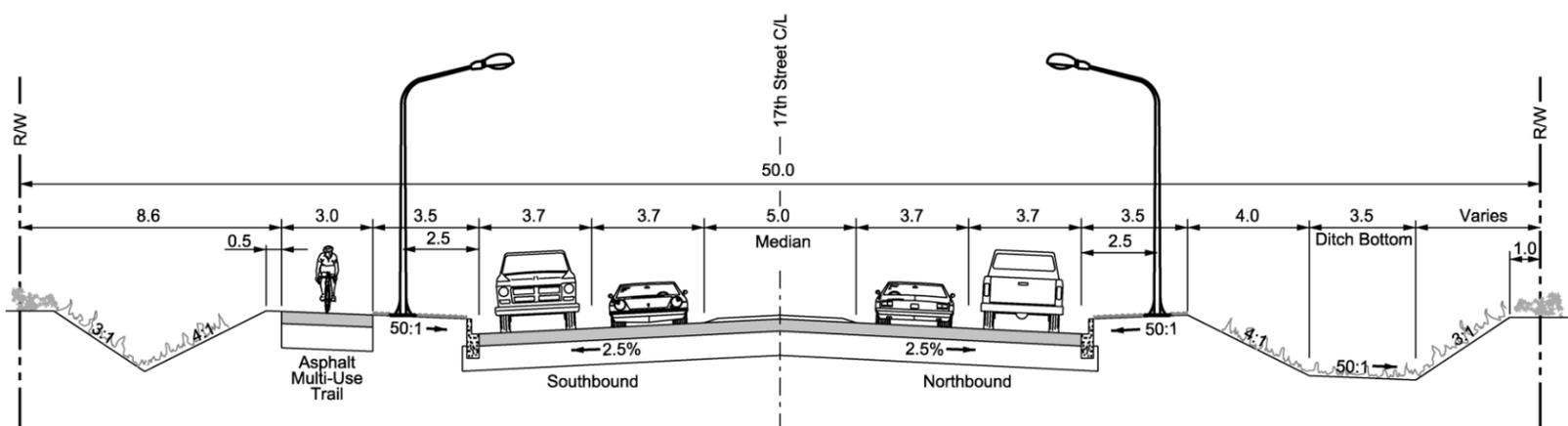
Urban Standard Cross Section Option



Rural Cross Section Option



**Modified Cross Section Option
 (one side rural, one side urban)**



**Modified Cross Section Option
 (curb & gutter w/ overland drainage)**

Figure 3-1: Typical Cross Section Options

Table 3-1: Cross Section Evaluation

EVALUATION CRITERIA	Urban Standard Cross Section		Rural Standard Cross Section		Modified Cross Section (one side rural, one side urban)		Modified Cross Section (curb and gutter, with overland drainage)	
Safety	●	Cross Section provides a high level of safety	◐	Cross Section is safe, however increased chances of vehicles leaving the roadway surface	◐	Cross Section is safe, however increased chances of vehicles leaving the roadway surface	●	Cross Section provides a high level of safety, improved sightlines
Traffic and Goods Movement	◐	Urban curbs and boulevards impact large vehicle movements, modifications will permit over dimensional loads	●	With shoulders and no curbs, there is more "open" pavement space for larger vehicles	◐	With shoulder on one side, there is more "open" pavement space for larger vehicles	◐	Curbs impact large vehicle movements, modifications will permit over imensional loads
Utility Impacts	◐	Utility impacts are reduced with tight right-of-way requirements, but conflicts may occur with stormwater drainage	◐	Wider shoulders and ditches may impact parallel utilities	◐	Utility impacts are reduced with less right-of-way requirements, ditch on one side could impact parallel utilities	◐	Utility impacts are reduced with less right-of-way requirements through the provision of curbs, however ditches on one side could impact parallel utilities
Driver Expectations based on Existing Roadways	●	Drivers are expecting an urban cross section in the southern sections to match other developed corridors (50 St, 75 St) and 17 St to the south	◐	Current road is an existing rural cross section	◐	Current road is an existing rural cross section, there are few examples of this cross section	●	Drivers in the northern portion expect the rural drainage features and curbs (which currently exists for 17 St north and south of Baseline Road
Environmental Impacts / Wetland Protection	◐	Stormwater is managed through storm sewer, parallel with 17 Street with outfall locations. Changes existing drainage pattern	◐	Open ditches could feed water to wetlands, risk of contamination through spills	◐	Open ditch could feed water to wetlands, risk of contamination through spills on one side of roadway	●	Stormwater is managed through open ditches and could provide water to wet areas for storage. Spills contained through curb and gutter, with catchbasins providing primary water quality improvement
Stormwater Processing	●	Stormwater is managed through storm sewer, parallel with 17 Street with outfall locations. No storage, but will accommodate design storm event	◐	Ditch drainage will provide storage and outfall to areas as required, higher risk of flooding	◐	Ditch drainage will provide storage and outfall to areas as required, high risk of flooding, with all water collected in a single ditch on one side	◐	Ditch drainage will provide storage and outfall to areas as required, higher risk of flooding
Sidewalks and Shared Use Paths	●	Defined sidewalks and Shared Use Paths, with boulevard and off sets	◐	Rural Paths are more difficult to construct and connect to roadways and other pedestrian facilities	◐	Path or sidewalk in rural on one side, with boulevard on the other	◐	Defined sidewalks and Shared Use Paths, with boulevard and off sets
Land Acquisition	●	Smallest cross section requirements minimizes land requirements	◐	Widest Cross Section requires largest land requirements	◐	Cross section requirements are reduced as compared with a full rural cross section with urban on one side	◐	Curb and gutter reduce the cross section when compared with shoulders - best suited for areas with existing wide right-of-ways
Constructability	◐	Underground stormwater requires more construction; maintaining access more challenging	◐	Ditch construction requires more space; can build one half, then flip the construction	◐	Ditch construction requires more space; can build one half, then flip the construction	◐	Ditch construction requires more space; can build one half, then flip the construction; more concrete, less asphalt to place
Operations and Maintenance	●	Long term maintenance and operation costs are reduced with full urban cross section	◐	Ditch and culvert maintenance required	◐	Ditch and culvert maintenance required	◐	Ditch and culvert maintenance required
Cost	◐	Highest cost - largely attributed to underground stormwater requirements	◐	Traditionally a full rural cross section is cheapest, however land costs could be significant	◐	Reduced land costs as compared with rural, however some underground stormwater and concrete works, property impacts could increase costs	◐	Higher concrete costs are off set by surface drainage and smaller catch basin leads, however property impacts can increase costs
More Preferred ● ◐ ◐ ◐ ◐ ◐ ◐ ◐ ◐ Less Preferred								

17 Street Functional Planning Study

North of Whitemud Drive to Knightsbridge Road (105 Avenue)

3.1.2 Recommended Cross Sections

The evaluation of the cross section options was then applied to each of the sections within the study area of 17 Street. Sections were determined based on existing traffic patterns, and constraints including major intersections and environmentally sensitive areas. The resulting sections of 17 Street are:

1. Whitemud Drive to (future) Roper Road
2. Roper Road to 66 Avenue
3. 66 Avenue to Sherwood Park Freeway
4. North of Sherwood Park Freeway to Railway Avenue
5. Railway Avenue to Knightsbridge Road

Although the initial evaluation of cross sections was applied to the corridor as a whole, it became apparent that there was not a single cross section that could be applied to the entire corridor. The two most responsive cross sections to the evaluation criteria were the urban cross section and the modified cross section (curb and gutter with overland drainage) and these were applied to the various sections of 17 Street, with recommendations as follows:

Whitemud Drive to the Future Roper Road: Whitemud Drive to the future extension of Roper Road is expected to carry heavy volumes of vehicles (based on traffic forecasts from the Maple Ridge Traffic Impact Assessment) as the land to the west is redeveloped into a commercial center as it is implied in the Maple Ridge Area Structure Plan. This future development will require upgrading 17 Street to a full urban six lane cross section with opposing left turn slot bays (single and double) and right turn bays where required. The notable exception will be the access to the City of Edmonton snow storage where conventional left turn bays will be utilized due to the low turning volumes accessing the site. The advantages to the urban cross section include the minimization of land acquisition requirements and the flexibility to respond to development impacts at intersections. Through most of this six lane section, the curb lane will function as an auxiliary lane for right turns into developments.

Future Roper Road to 66 Avenue: The corridor north of the future Roper Road must balance wetland preservation with traffic and pedestrian requirements. Currently the wetland collects water through surface run-off from 17 Street and surrounding areas. Furthermore, the wetland is close to the existing road, which reduces the space available for pedestrian and drainage facilities. A four lane basic cross section that incorporates surface drainage on one side (wetland side on the west), with urban on the other side (east) is recommended to accommodate these constraints. It is further recommended that the proposed shared use path on the west side in the wetland area be developed as a 3.6 metre wide monowalk, which further reduces the right-of-way requirements.

66 Avenue to Sherwood Park Freeway: This area is currently fully developed, which places right-of-way at a premium, especially considering access management requirements and intersection operations. The interchange at Sherwood Park Freeway is planned to be upgraded, however that will be designed and constructed by Alberta Transportation and is not included within this project. An urban, four-lane cross section will best accommodate the traffic while maintaining driver consistency and is therefore recommended through this section.

North of Sherwood Park Freeway to Railway Avenue: There is more available right-of-way north of Sherwood Park Freeway (within Strathcona County) which allows for a more cost-effective drainage solution, while maintaining the expectation of drivers. For this section, a modified four lane cross section that comprises of curb and gutter (matching 17 Street to the south) and ditches to utilize overland flow is recommended. This cross section is currently being utilized north and south of Baseline

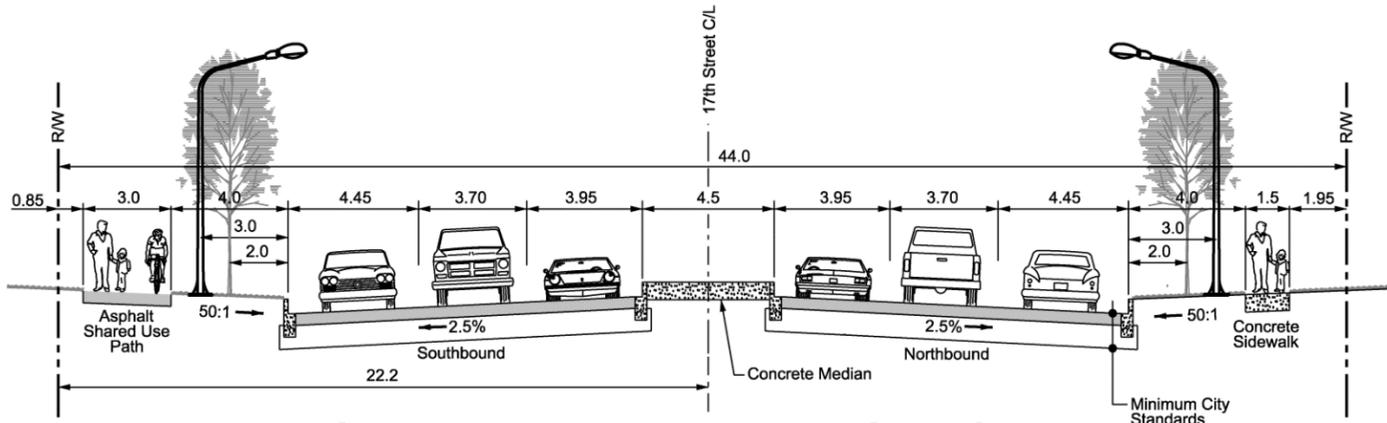
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North of Whitemud Drive to Knightsbridge Road (105 Avenue)

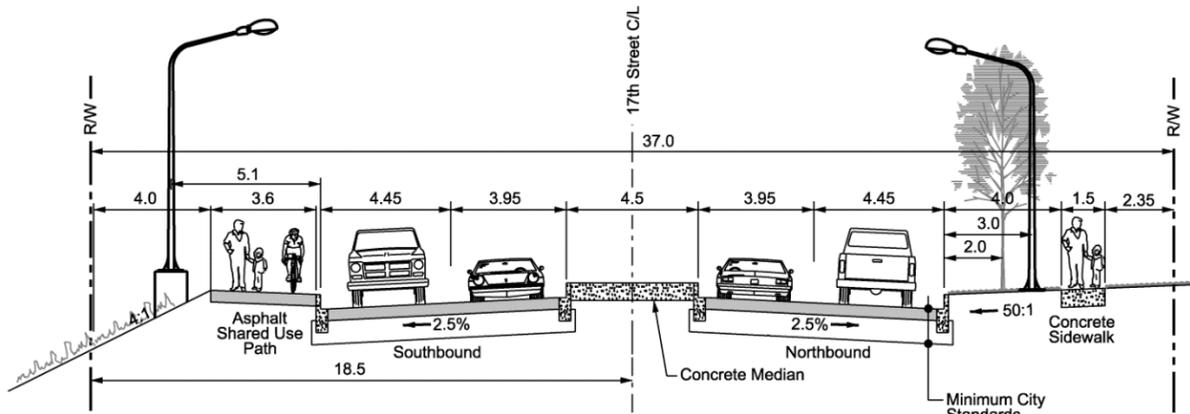
Road; the major difference will be the drainage accommodation through catch basins (with sediment controls) and culverts into the ditches (the current drainage spills at corners, accesses and intersections into the ditches).

Railway Avenue to Knightsbridge Road: Similar to the section to the south, a modified cross section that includes overland drainage with curb and gutter is recommended. The lane configurations will vary based on the intersection requirements for Baseline Road.

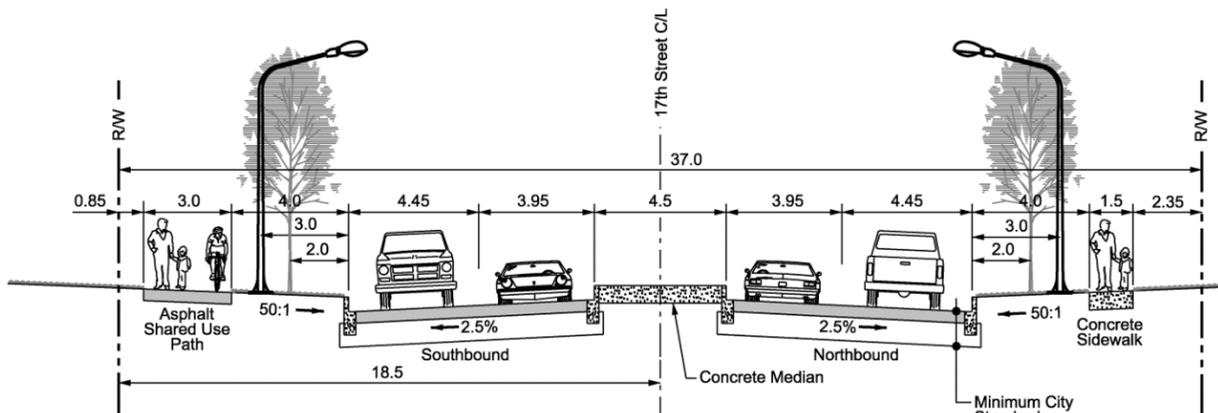
Figure 3-2 presents the recommended cross section for each section along 17 Street.



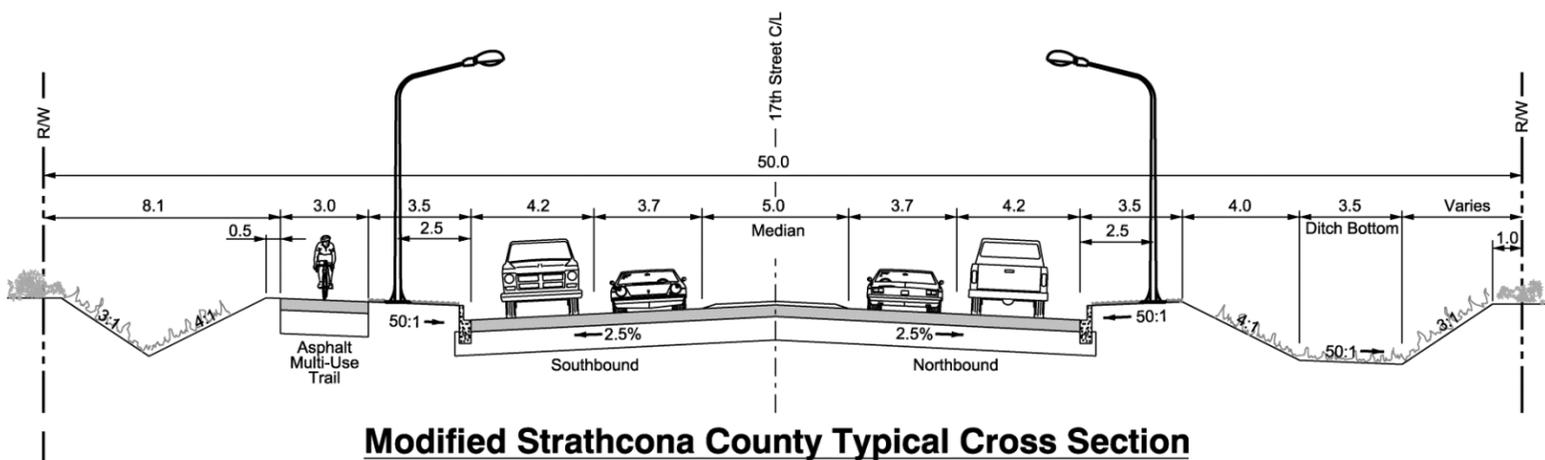
**City of Edmonton Typical 6-lane Cross Section
 (Whitemud Drive to Future Roper Road)**



**Modified City of Edmonton Typical Cross Section
 (Future Roper Road to 66 Avenue)**



**City of Edmonton Typical 4-lane Cross Section
 (66 Avenue To Sherwood Park Freeway)**



**Modified Strathcona County Typical Cross Section
 (N. of Sherwood Park Freeway to 105 Ave)**

Figure 3-2: Recommended Typical Cross Sections

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North of Whitemud Drive to Knightsbridge Road (105 Avenue)

3.2 RECOMMENDED DESIGN CRITERIA

Design criteria were developed for 17 Street following the review of previous studies (Section 2), cross section evaluations (Section 3.1), and specific discussions with developers in the area (Section 7).

Consistency is important for the 17 Street corridor, and therefore many of the design criterion have been developed through a consolidation of both City of Edmonton and Strathcona design guidelines. As a result, it is recommended that lane widths remain constant between sections. The Strathcona standard lane width of 3.7m was chosen over the City of Edmonton standard 3.5m width in order to better accommodate the high percentage of trucks through the corridor. Curb and gutter is also recommended through the entire length of 17 Street, although the drainage treatments will vary based on the roadway sections. An asphalt shared-use path (multi-use trail) is recommended through the length of 17 Street, which is reflected in the design criteria.

Table 3-2 specifies the design designations and right-of-way widths for intersecting avenues along 17 Street: For existing crossing roadways, the cross sections will not be modified, rather matched to the existing.

Table 3-2: Intersecting Roadway Classification

Intersecting Roadway	Classification	Existing / New	R/W Width (m)	17 Street Cross Section
51 Avenue	Collector	New		Urban
Roper Road	Arterial	New	37	Urban
Maple Ridge Drive	Collector	Existing	25	Modified
66 Avenue/ Oak Ridge Drive	Collector	Existing	30/25	Modified
68 Avenue	Local	Revised	20	Modified
70 Avenue	Local (RI/RO)	Revised	24	Urban
73 Avenue	Collector	Removed	30	Urban
76 Avenue	Collector	Existing	40	Urban
77 Avenue	Local (RI/RO)	Revised	24	Urban
90 Avenue	Collector	Existing	24	Rural
92 Avenue	Collector	Revised	30	Rural
Railway Street	Collector	Revised	24	Modified
Jug Handle	Arterial	Existing	varies	Modified
Baseline Road	Arterial	Existing	varies	Modified
Knightsbridge Road	Collector	Existing	20	Modified

The recommended design criteria have been split into the five sections of 17 Street (as per the cross section recommendations) and are summarized in **Table 3-3**.

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North of Whitemud Drive to Knightsbridge Road (105 Avenue)

Table 3-3: Recommended Design Criteria

17 Street Section:		Whitemud to Roper Road	Roper Road to 66 Ave	66 Ave to SPF	N of SPF to Railway St.	Railway St. to Knightsbridge
Design	Design Classification	Urban	Modified	Urban	Rural	Modified Rural
	Design Speed (km/h)	70	70	70	70	70
	Posted Speed (km/h)	60	60	60	60	60
	Design Vehicle	WB-21	WB-21	WB-21	WB-36 ⁽⁴⁾	WB-36 ⁽⁴⁾
Horizontal Alignment	Intersection Spacing (m)	200 ⁽²⁾	200	200	200	200
	Minimum Curve Radius (m)	190	190	190	190	190
	Preferred Curve Radius (m)	500	500	500	500	500
	Max Superelevation Rate	0.06	0.06	0.06	0.06	0.06
Vertical Alignment	Crest (K Value)	23	23	23	23	23
	Sag (K Value)	12	12	12	15	15
	Stopping Sight Distance (m)	110	110	110	110	110
	Grades (max.)	5%	6%	6%	6%	6%
Cross Section	Number of Basic Lanes	6	4	4	4	4
	Basic Lane Widths ⁽¹⁾ (m)	3.7 ⁽³⁾	3.7 ⁽³⁾	3.7 ⁽³⁾	3.7	3.7
	Right Curb Lane ⁽¹⁾ (m)	4.2	4.2	4.2	4.2	4.2
	Right Turn Bay ⁽¹⁾	3.5	3.5	3.5	3.5	3.5
	Left Turn Lane ⁽¹⁾ (excl. slot bay)	3.5 ⁽⁵⁾	3.5 ⁽⁵⁾	3.5 ⁽⁵⁾	3.5	3.5
	Left Turn Lane ⁽¹⁾ slot bays (m) single, double	4.2 / 3.7	4.2 / 3.7	4.2 / 3.7	4.2 / 3.7	4.2 / 3.7
	Right Turn Cut Off (when required)	"Aussie" 2 Centre Curve (R110, R22)				
	R/W Width (m)	44.0	Varies	37.0	50.0	50.0
	Cross Fall (%)	2.5	2.5	2.5	2.5	2.5
	Outside Shoulder Width (m)	N/A	N/A	N/A	1.5	1.5
	Sidewalk / SUP (m)	1.5 / 3.0	2.0 / 3.0	1.5 / 3.0	NA / 3.0	NA / 3.0

(1) All lane widths are noted to front of curb (FoC)

(2) Standard minimum spacing for a 6-lane divided arterial is 400m, however due to constraints in the area and the short span of this section, 200m was deemed acceptable

(3) City of Edmonton Standards are 3.5m, however due to high percentage of trucks through the corridor, and to maintain consistency with Strathcona County standards, a 3.7m basic lane width is recommended

(4) A larger design vehicle is recommended for heavy industrial zoning north of Sherwood Park Freeway

(5) For left turn bays, City of Edmonton Standards re 3.3m, however due to high percentage of trucks through the corridor, and to maintain consistency with Strathcona County standards, a 3.5m left turn bay is recommended

4 ACCESS MANAGEMENT

An important aspect of planning goods movement corridors is to balance the movement of vehicles and access to businesses and land owners. For 17 Street providing for the movement of people and goods along the corridor is an objective, access is provided at intersections and consolidated as appropriate through the corridor, providing reasonable access to the roadway system for all businesses and landowners within the corridor.

4.1 PRINCIPLES & OBJECTIVES

The objective of access management along 17 Street is to reduce the number and frequency of traffic delays by removing and/or relocating private accesses, consolidating existing avenue accesses (where possible), and maintaining adequate spacing between access points. Special consideration for accesses along 17 Street include the accommodation of large vehicles through measures such as extra turning storage and larger intersection radii where required.

Generally, access management along 17 Street is accommodated through access relocation or reconfiguration; with many large industrial sites, in some cases there is space to realign and consolidate access to full intersections as required. 17 Street has also been generally protected as a major corridor and the majority of recent development access has been from intersecting collector roads, which can also be applied to future development or redevelopment.

There are no significant changes to access management north of Sherwood Park Freeway; with only a few accesses recommended to be relocated (Strathcona Water Reservoir, Suncor Refinery) and possible future accesses identified for undeveloped lands along the west side of 17 Street.

4.2 70 AVENUE TO 76 AVENUE OPTION EVALUATION

Within the section between 70 Avenue and 76 Avenue, there are several parcels for which access must be maintained. Currently there are too many al-directional accesses, and many of these access are too closely spaced and do not meet the objectives of balancing access with traffic. To maintain intersection spacing for adequate safety and operation of the corridor, some modifications to the existing direct access locations were required.

A review of the area was undertaken, during which three access management options were developed and evaluated to determine a sufficient access management solution for the area. The three evaluated options are presented in **Figure 4-1**, **Figure 4-2** and **Figure 4-3**, followed by the evaluation results (**Table 4-1**).

The recommended access management plan for the section between 70 Avenue and 76 Avenue was developed as a combination of options 2 & 3 and is evaluated in **Table 4-1** against the same criteria as the original options. This recommendation is presented as **Figure 4-4**, which is also included within the concept plans (**Appendix A**).

17 Street Functional Planning Study
North of Whitemud Drive to Knightsbridge Road (105 Avenue)

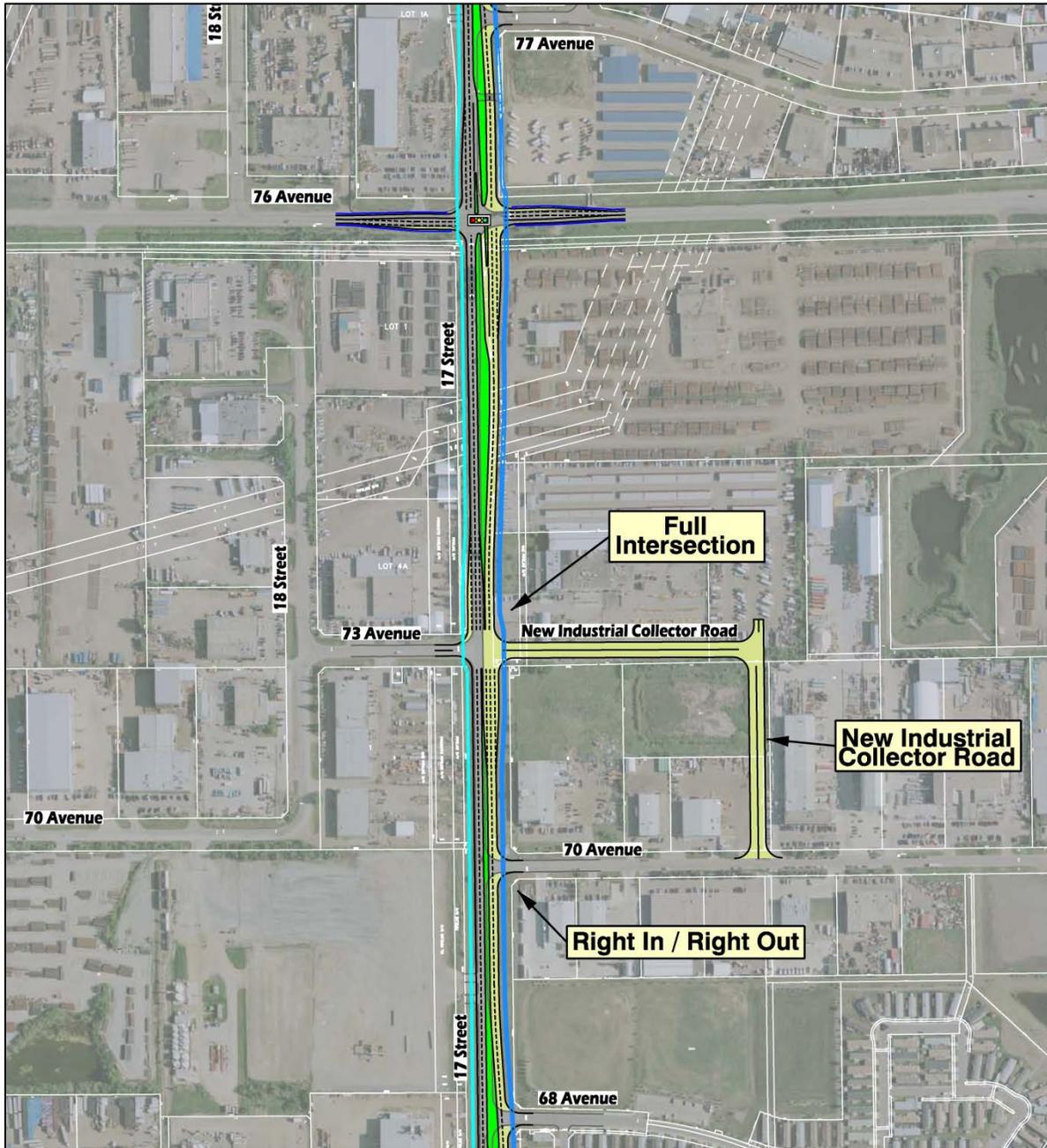


Figure 4-1: Access Management Option 1 - 70 Ave to 76 Ave

17 Street Functional Planning Study
North of Whitemud Drive to Knightsbridge Road (105 Avenue)

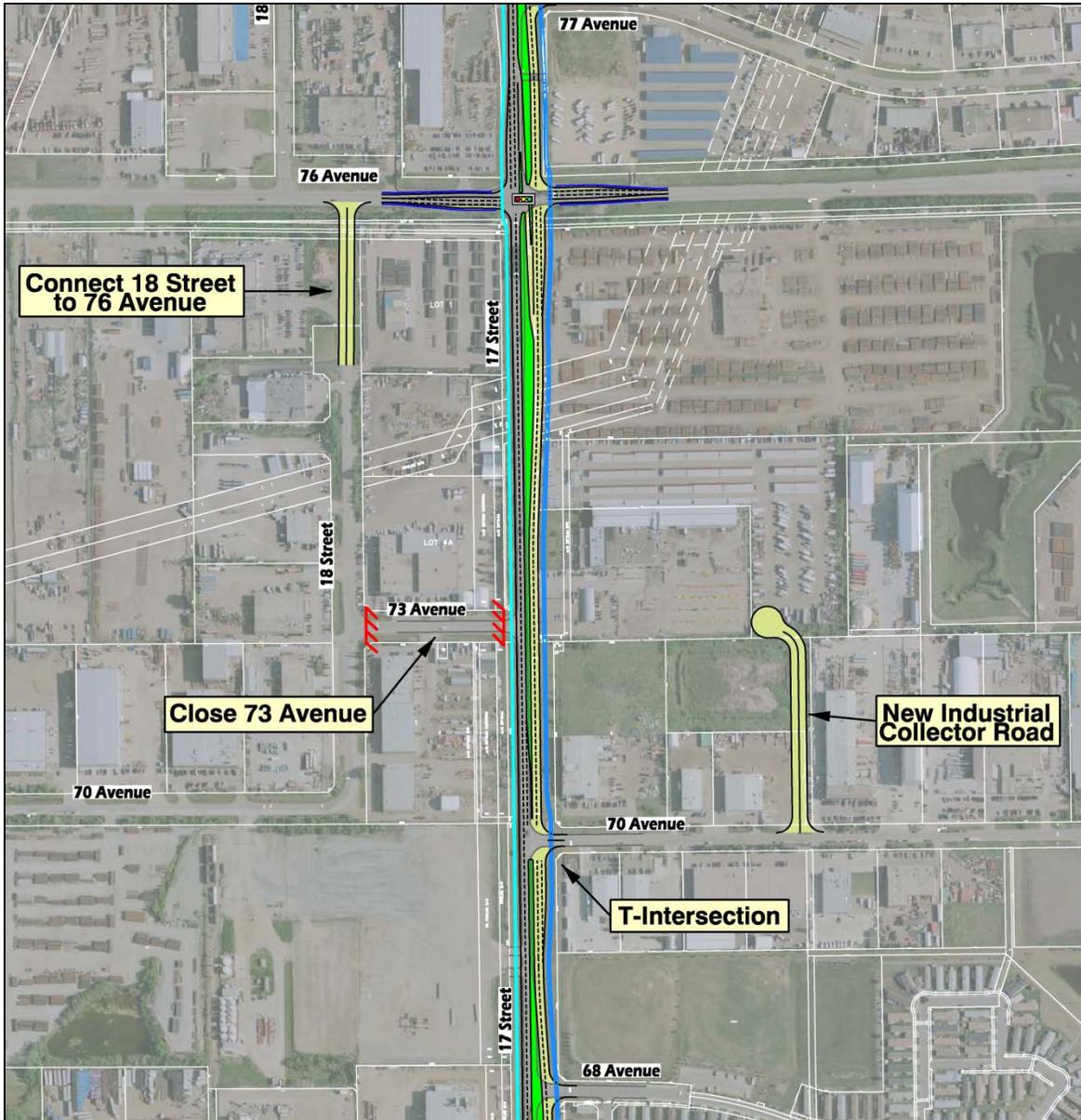


Figure 4-2: Access Management Option 2 - 70 Ave to 76 Ave

17 Street Functional Planning Study
North of Whitemud Drive to Knightsbridge Road (105 Avenue)

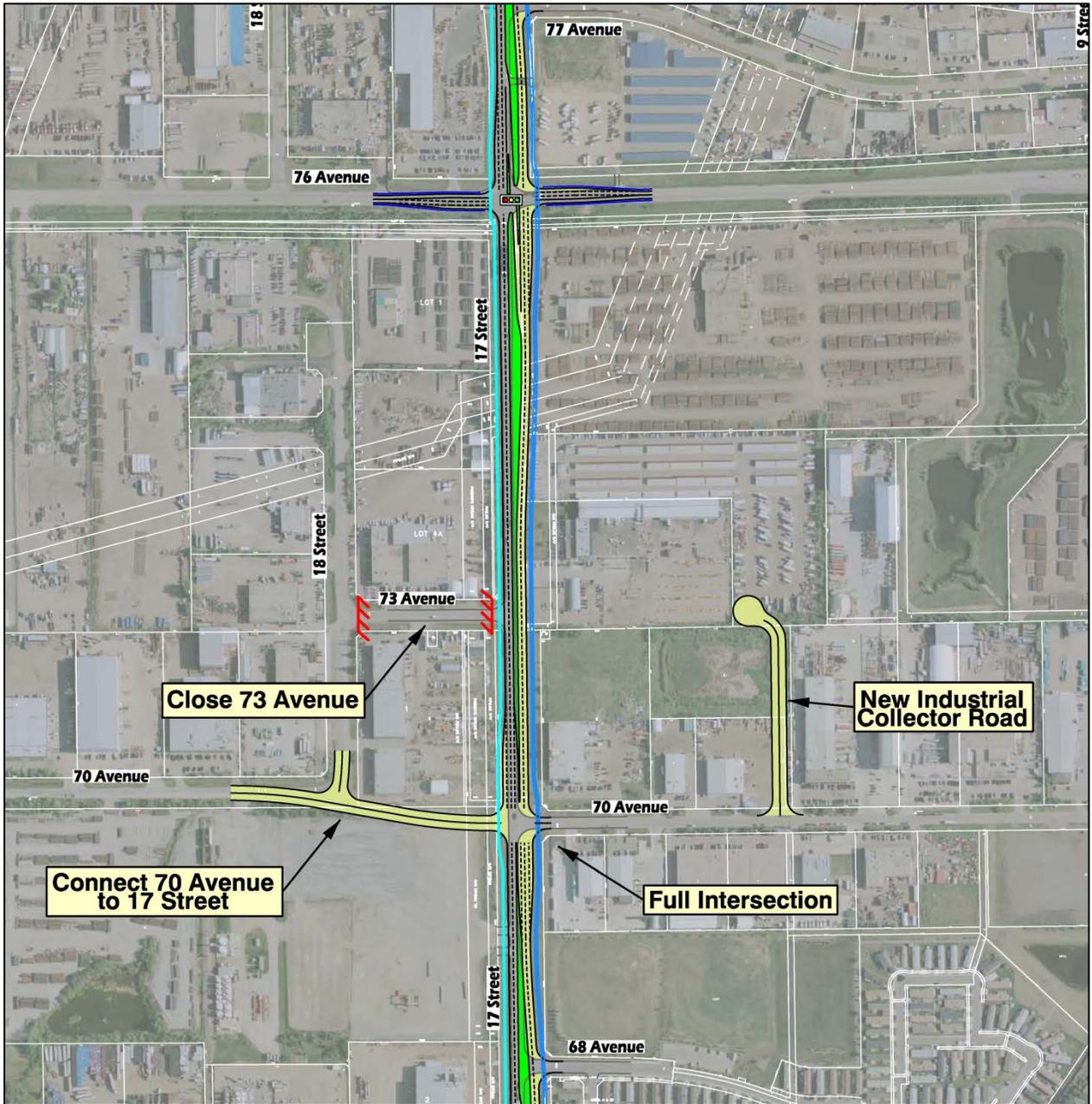


Figure 4-3: Access Management Option 3 - 70 Ave to 76 Ave

17 Street Functional Planning Study
North of Whitemud Drive to Knightsbridge Road (105 Avenue)

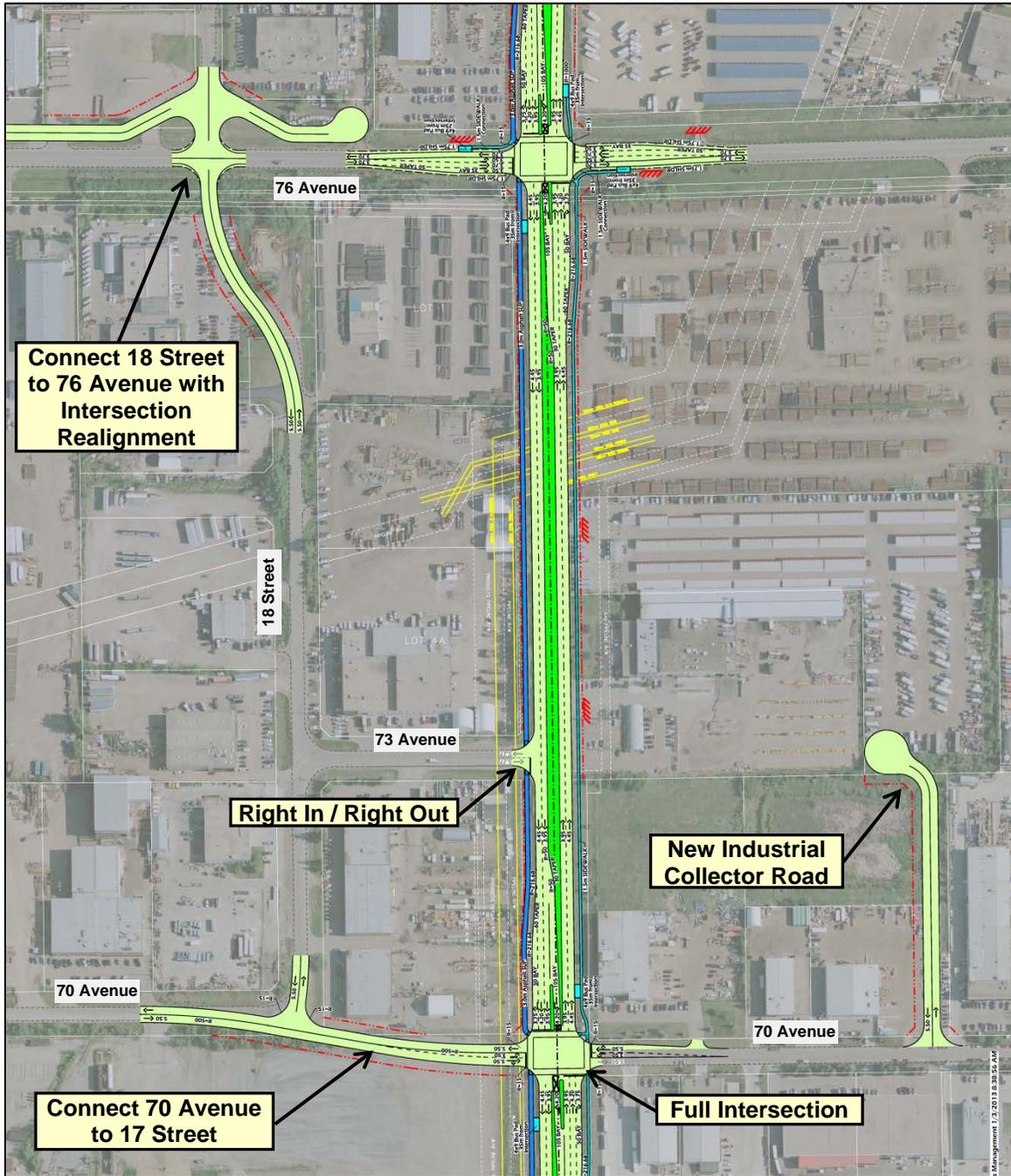


Figure 4-4: Recommended Access Management – 70 Ave to 76 Ave

Table 4-1: 70 Avenue to 76 Avenue Access Management Option Evaluation

EVALUATION CRITERIA	Option 1		Option 2		Option 3		Recommended Access Plan	
	Preference	Description	Preference	Description	Preference	Description	Preference	Description
Access Maintained to Property Owners	●	All access is maintained to Property Owners	●	All access is maintained to Property Owners	●	All access is maintained to Property Owners	●	All access is maintained to Property Owners
Direct Accesses to 17 Street	●	Access is direct to property owners east of 17 Street, no changes to the west.	◐	73 Avenue is closed, which has impacts to the properties to the west side. East side properties are difficult to access	◑	With the extension of 70 Avenue, businesses to the west are maintained, east side is more difficult with cul-de-sac extension	◑	Access is improved from 17 Street with the extension of 18 Street and 70 Avenue
Intersection Alignment (Full intersections vs. off-set intersections)	◑	One major intersection at 73 Avenue, Right-in, Right-out remains at 70 Avenue	◑	Consistent intersections on 17 Street, existing 73 Avenue access removed	●	Consistent intersections on 17 Street, 4-way intersection created at 70 Avenue, 73 Avenue access removed west of 17 Street	●	Most consistent intersection approach, including 18 Street intersection at 76 Avenue
Cost	◑	Significant cost for industrial collector roads	◑	Less cost with cul-de-sac and road extensions	◑	Less cost with cul-de-sac and road extensions	◑	Significant cost for industrial collector roads
Business Impacts due to Access Changes	◑	Minor impacts to property owners on the east side with existing access to 17 Street, minor yard reconfigurations	◑	Impacts to property owners on the east side with cul-de-sac access to 17 Street via 76 Avenue, minor yard reconfigurations	◑	Impacts to property owners on the east side with cul-de-sac access to 17 Street via 76 Avenue, minor yard reconfigurations	◑	Impacts to property owners on the east side with cul-de-sac access to 17 Street via 76 Avenue, minor yard reconfigurations, improves access on the west side
Emergency Response	◑	Good access maintained east of 17 Street, there are no improvements to access on the west side of 17 Street	◑	Less preferred with the closure of 73 Avenue, cul-de-sac provides access, but is less desirable for emergency response	◑	Extension of 70 Avenue provides response, cul-de-sac provides access, but is less desirable for emergency response	◑	West side access from both 18 Street extension and 70 Avenue extension, cul-de-sac provides access, but is less desirable for emergency response
Land Severance & Acquisition Requirements	◑	Significant land required to create an industrial collector road	●	Acquisition required for cul-de-sac and 18 Street extension, surplus 73 Avenue	◑	Acquisition required for cul-de-sac and 70 Avenue extension, surplus 73 Avenue	◑	Acquisition required for cul-de-sac, 70 Avenue and 18 Street extension, surplus 73 Avenue
Compatibility with Ultimate Functional Plan	●	All components of the Ultimate Functional Plan can be developed in the future as required	●	All components of the Ultimate Functional Plan can be developed in the future as required	●	All components of the Ultimate Functional Plan can be developed in the future as required	●	All components of the Ultimate Functional Plan can be developed in the future as required
Constructability	◑	New access road can be constructed prior to access closures	◑	New access road can be constructed prior to access closures	◑	New access road can be constructed prior to access closures	◑	New access road can be constructed prior to access closures
Utilization of Existing Infrastructure	◑	Significant new road work is required	◑	Some new roadwork required	◑	Some new roadwork required	◑	Some new roadwork required

More Preferred	●	◑	◐	◒	○	Less Preferred
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17 Street Functional Planning Study

North of Whitemud Drive to Knightsbridge Road (105 Avenue)

4.3 RECOMMENDED ACCESS MANAGEMENT

Table 4-2 summarizes the recommendations for existing and future access connections that will remain intact or be modified with upgrades to the 17 Street corridor. Refer to the concept plans in **Appendix A** for locations of private access closures along 17 Street and resulting accommodation strategies.

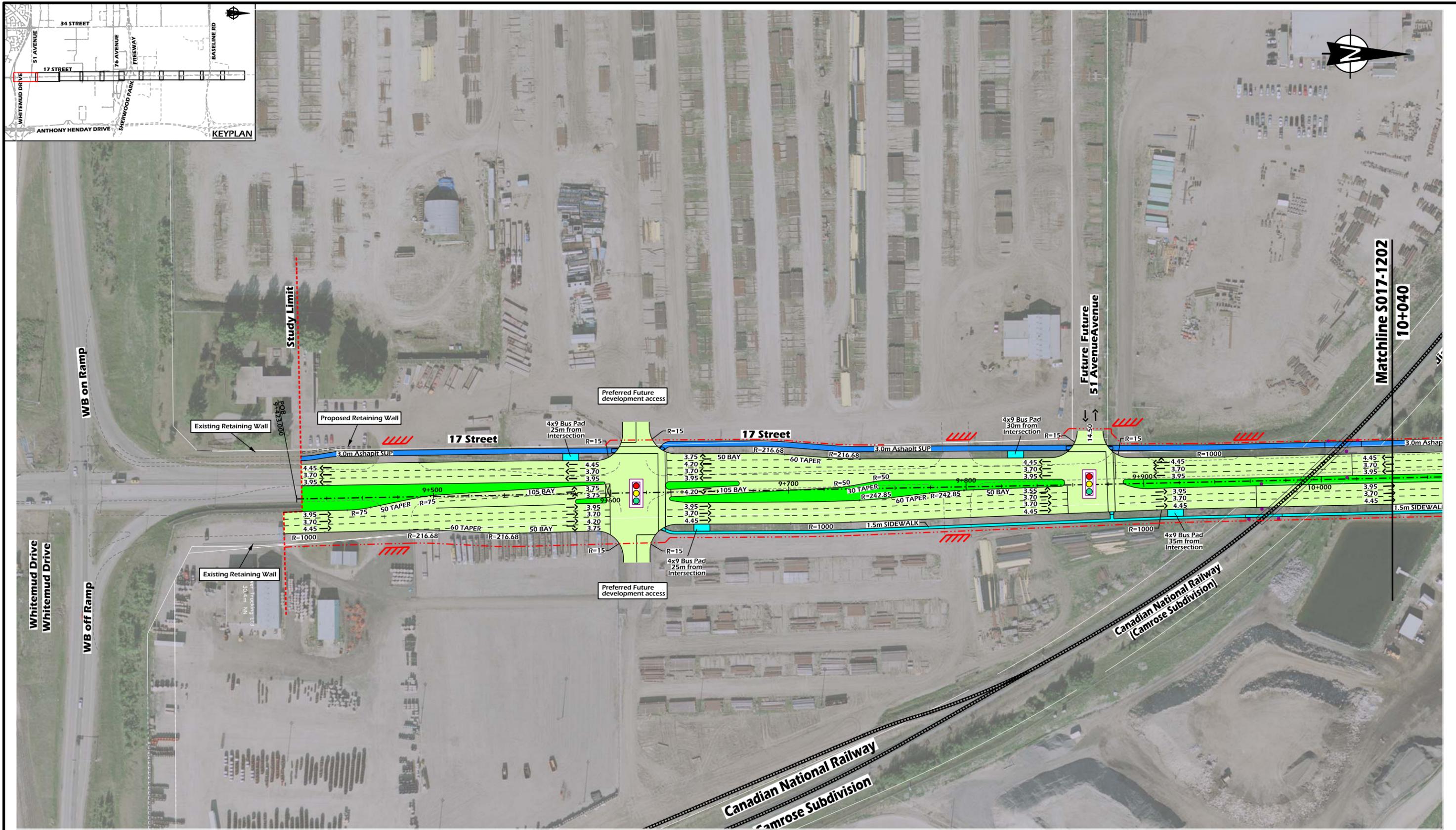
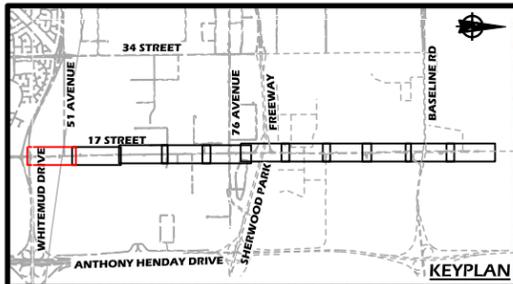
Table 4-2: Recommended Access Management

Access Point	Maintain / Revise / New	Comments
Business Access	Revise	<ul style="list-style-type: none"> Consolidate existing accesses to achieve 200m spacing from Whitemud and to future 51 Ave
51 Avenue	New	<ul style="list-style-type: none"> Located to achieve minimum 100m spacing from railway crossing to the north and 200m spacing with business access
Snow Dump	Maintain	<ul style="list-style-type: none"> Adequate spacing Provides access to parcel (residential) to the west
Roper Road	New	<ul style="list-style-type: none"> Existing private accesses to be relocated to Roper
Maple Ridge Drive	Maintain	<ul style="list-style-type: none"> Intersection improvements
66 Avenue/ Oak Ridge Drive	Maintain	<ul style="list-style-type: none"> Intersection improvements
68 Avenue	Revise	<ul style="list-style-type: none"> Right-in / Right-out
70 Avenue/ 73 Avenue	Revise	<ul style="list-style-type: none"> 73 Avenue revised to a right-in, right-out access Continue 70 Avenue west of existing Extend 18 Street north to connect with 76 Avenue
76 Avenue	Maintain	<ul style="list-style-type: none"> Intersection improvements Access to property in NW quadrant through parallel service road from 18 Street
77 Avenue	Revise	<ul style="list-style-type: none"> Right-in / Right-out
Private Access	Revise	<ul style="list-style-type: none"> Right-in / Right-out
90 Avenue	Maintain	<ul style="list-style-type: none"> No improvements to existing conditions
92 Avenue	Revise	<ul style="list-style-type: none"> Continue west of existing Move access to water reservoir to west extension
Private Access	New	<ul style="list-style-type: none"> Close existing field access Future development access planned north of existing
Railway Street	Revise	<ul style="list-style-type: none"> Realign 75m south to improve intersection spacing with jug handle to the north
Jug Handle	Maintain	<ul style="list-style-type: none"> No improvements to existing conditions
Baseline Road	Maintain	<ul style="list-style-type: none"> No improvements to existing conditions
Tank Farm	Revise	<ul style="list-style-type: none"> Align with north railway access
Knightsbridge Road	Maintain	<ul style="list-style-type: none"> Intersection improvements

5 RECOMMENDED CONCEPT PLANS

In development of the recommended concept plan of the entire study area, there were several technical areas that determine the recommendations within the plans, ranging from traffic analysis through to environmental and stormwater management. The recommended plans were developed, then refined and updated throughout the ongoing planning process. The following scaled drawings, labelled as Plan No. S017-1201 to S017-1211 (the comprehensive set collectively as **Figure 5-1**) presents the recommended plans over the existing aerial photos. Scaled drawings of plans and profiles are presented in **Appendix A**.

The following sections are organized into specific technical areas of 17 Street, with supplementary reports presented in the Appendices.



DESIGN SPEED = 70 km/h
 POSTED SPEED = 60 km/h

Note: Road dimensions for the City of Edmonton are to the Face of Curb

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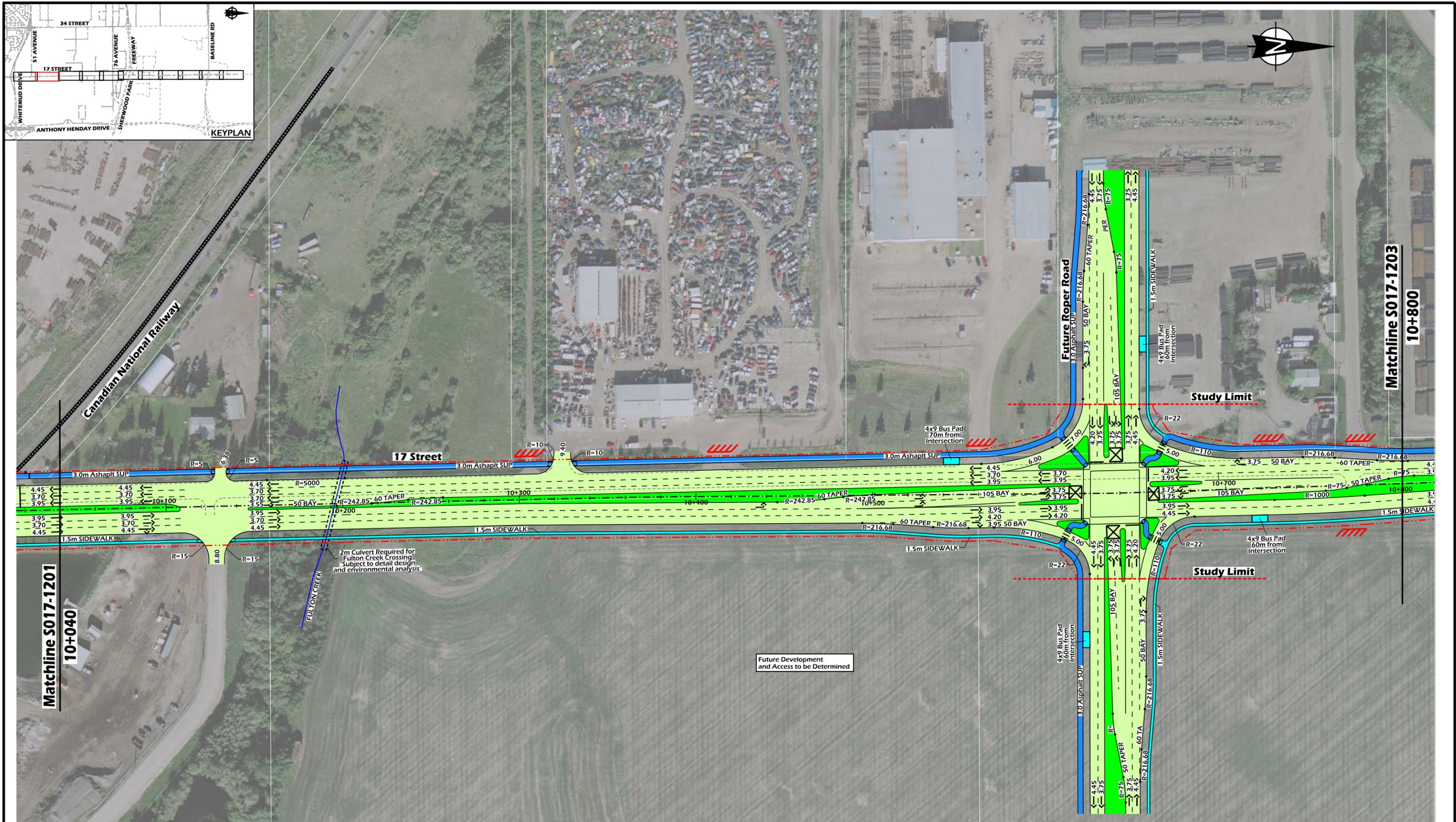
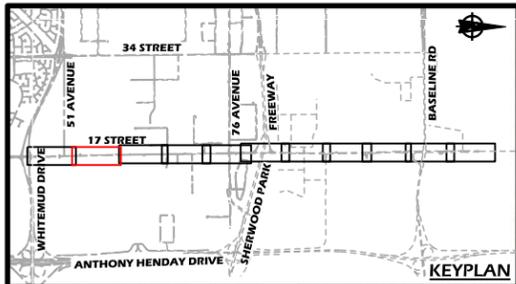
CONCEPT - SUBJECT TO PRELIMINARY SURVEY AND DESIGN

Figure 5-1
17 Street, Whitemud Dr to Knightsbridge Rd
Conceptual Alignment

20m 0 40m

DRAWN: TD
REVIEWED:
DATE: 2013.04.09

PLAN NO.
S017-1201



LEGEND

- Proposed Right of Way
- Proposed Roadway
- Existing Roadway
- Railway
- 3m Asphalt SUP
- 1.5m Concrete Sidewalk
- /// Access Closure
- 4x9 Bus Stop Pad

DESIGN SPEED = 70 km/h
 POSTED SPEED = 60 km/h

Note:
Road dimensions for the City of Edmonton are to the Face of Curb

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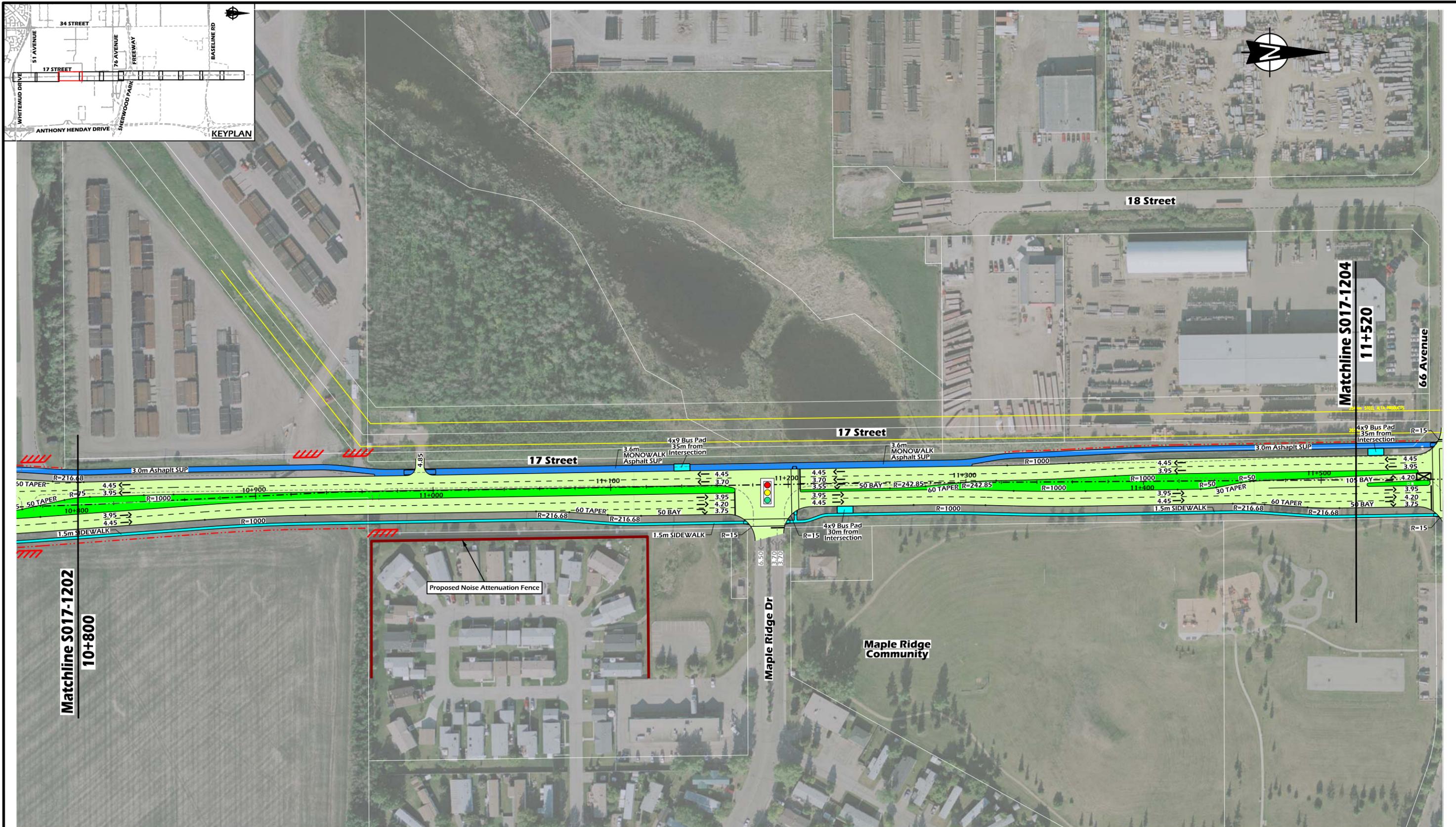
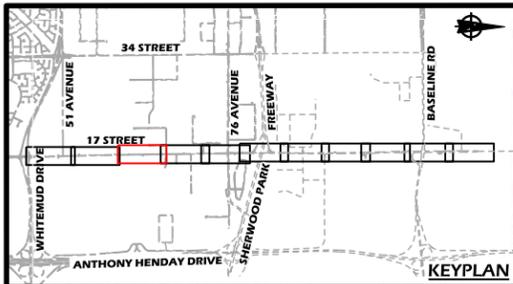
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CONCEPT - SUBJECT TO PRELIMINARY SURVEY AND DESIGN

Figure 5-1
17 Street, Whitemud Dr to Knightsbridge Rd
Conceptual Alignment

DRAWN: TD
 REVIEWED:
 DATE: 2013.04.09

PLAN NO.
S017-1202



LEGEND

- Proposed Right of Way
- Proposed Roadway
- Existing Roadway
- Railway
- 3m Asphalt SUP
- 1.5m Concrete Sidewalk
- Access Closure
- 4x9 Bus Stop Pad

DESIGN SPEED = 70 km/h
 POSTED SPEED = 60 km/h

Note: Road dimensions for the City of Edmonton are to the Face of Curb

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STRATHCONA
COUNTY

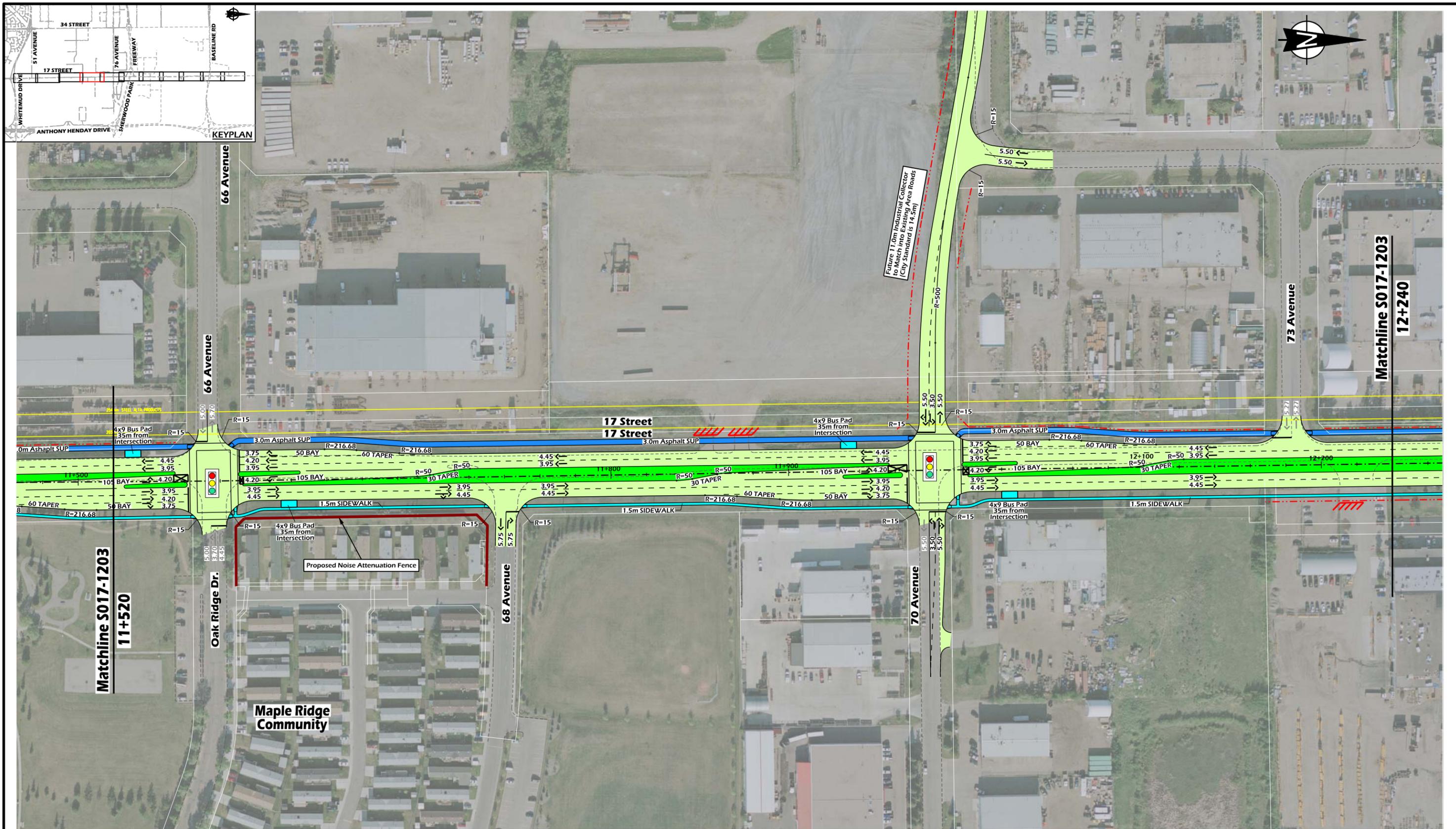
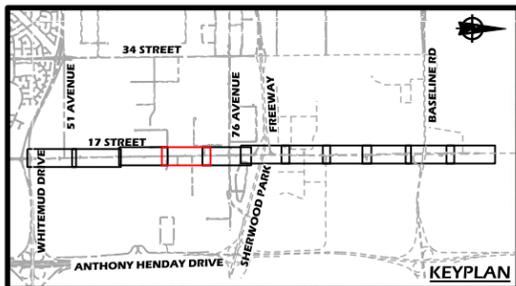
PERMIT TO PRACTICE P6383

CONCEPT - SUBJECT TO PRELIMINARY SURVEY AND DESIGN

Figure 5-1
17 Street, Whitemud Dr to Knightsbridge Rd
Conceptual Alignment

DRAWN: TD
 REVIEWED:
 DATE: 2013 04 09

PLAN NO.
S017-1203



LEGEND

	Proposed Right of Way		Access Closure
	Proposed Roadway		4x9 Bus Stop Pad
	Existing Roadway		
	Railway		
	3m Asphalt SUP		
	1.5m Concrete Sidewalk		

DESIGN SPEED = 70 km/h
POSTED SPEED = 60 km/h

Note: Road dimensions for the City of Edmonton are to the Face of Curb

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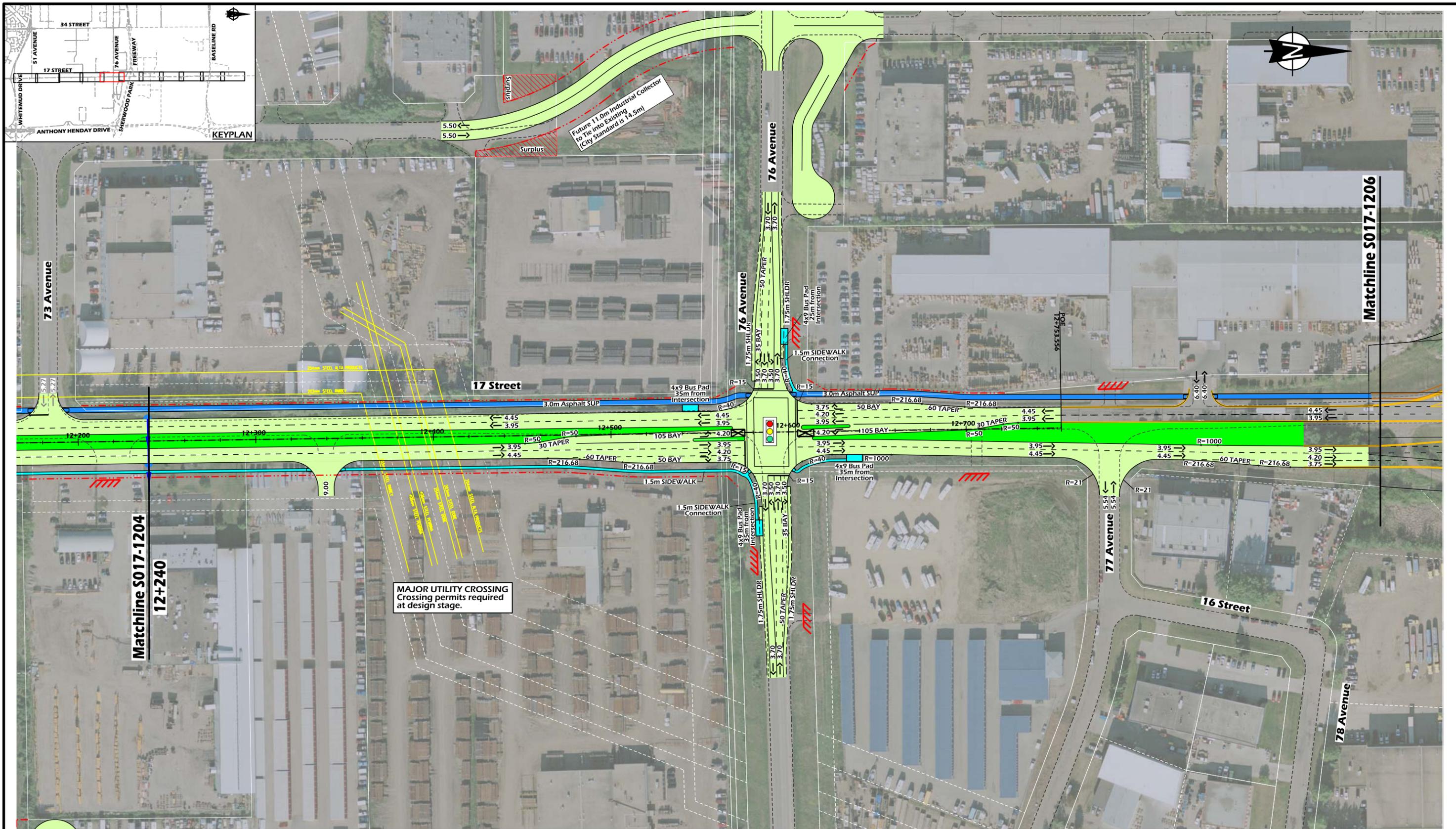
CONCEPT - SUBJECT TO PRELIMINARY SURVEY AND DESIGN

Figure 5-1
17 Street, Whitemud Dr to Knightsbridge Rd
Conceptual Alignment

20m 0 40m

DRAWN: TD
REVIEWED:
DATE: 2013 04 09

PLAN NO.
S017-1204



LEGEND

	Proposed Right of Way		Access Closure
	Proposed Roadway		4x9 Bus Stop Pad
	Existing Roadway		
	Railway		
	3m Asphalt SUP		
	1.5m Concrete Sidewalk		

DESIGN SPEED = 70 km/h
POSTED SPEED = 60 km/h

Note: Road dimensions for the City of Edmonton are to the Face of Curb

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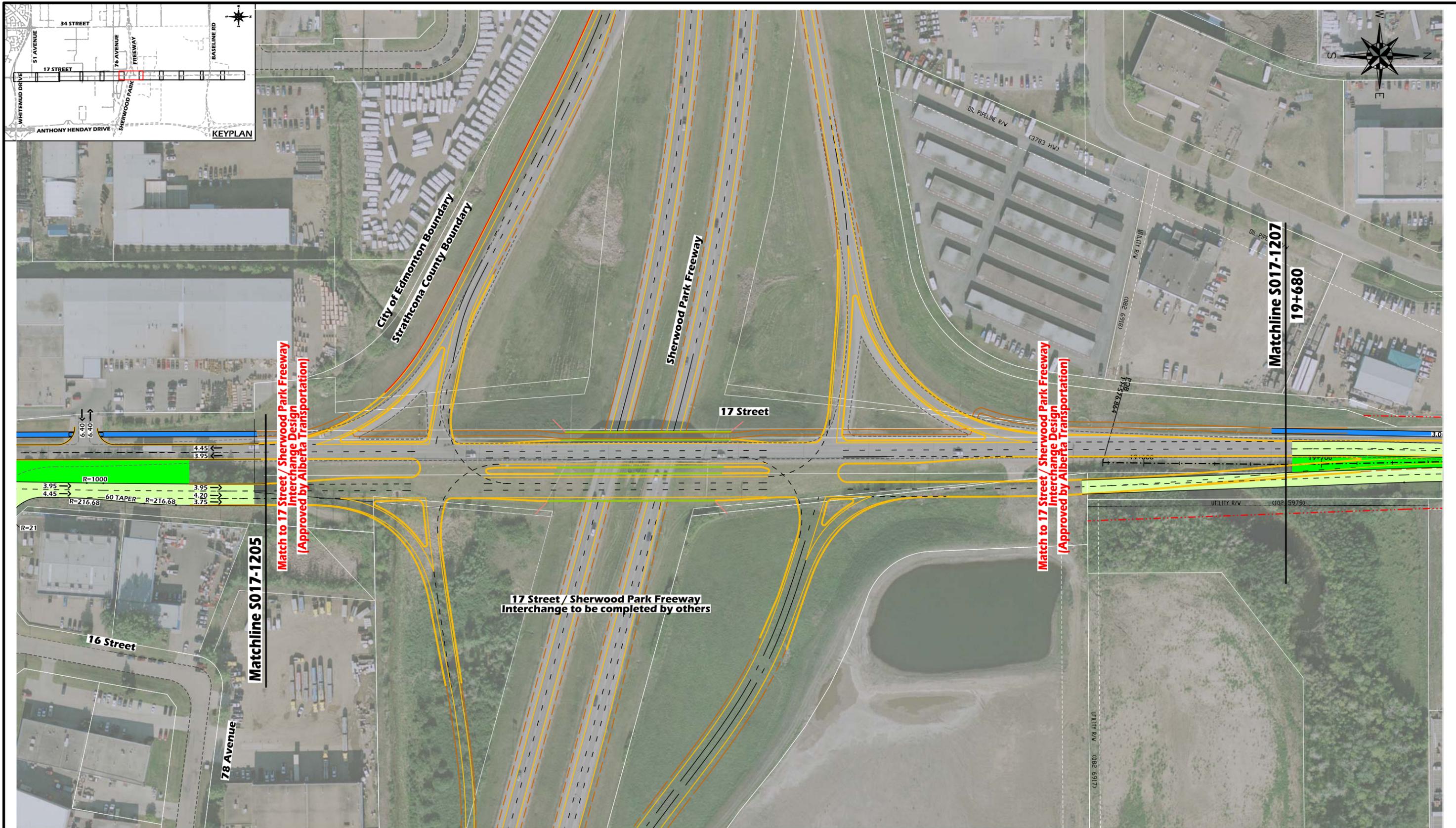
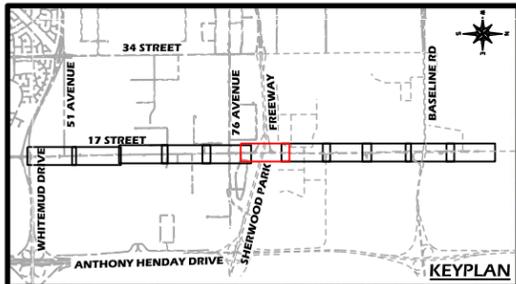
CONCEPT - SUBJECT TO PRELIMINARY SURVEY AND DESIGN

Figure 5-1
17 Street, Whitemud Dr to Knightsbridge Rd
Conceptual Alignment

20m 0 40m

DRAWN: TD
REVIEWED:
DATE: 2013 04 09

PLAN NO.
S017-1205



LEGEND

	Proposed Right of Way		1.5m Concrete Sidewalk
	Proposed Roadway		Access Closure
	Existing Roadway		4x9 Bus Stop Pad
	Railway		
	3m Asphalt SUP		

DESIGN SPEED = 70 km/h
POSTED SPEED = 60 km/h

Note: Road dimensions for Strathcona County are to the lip of gutter

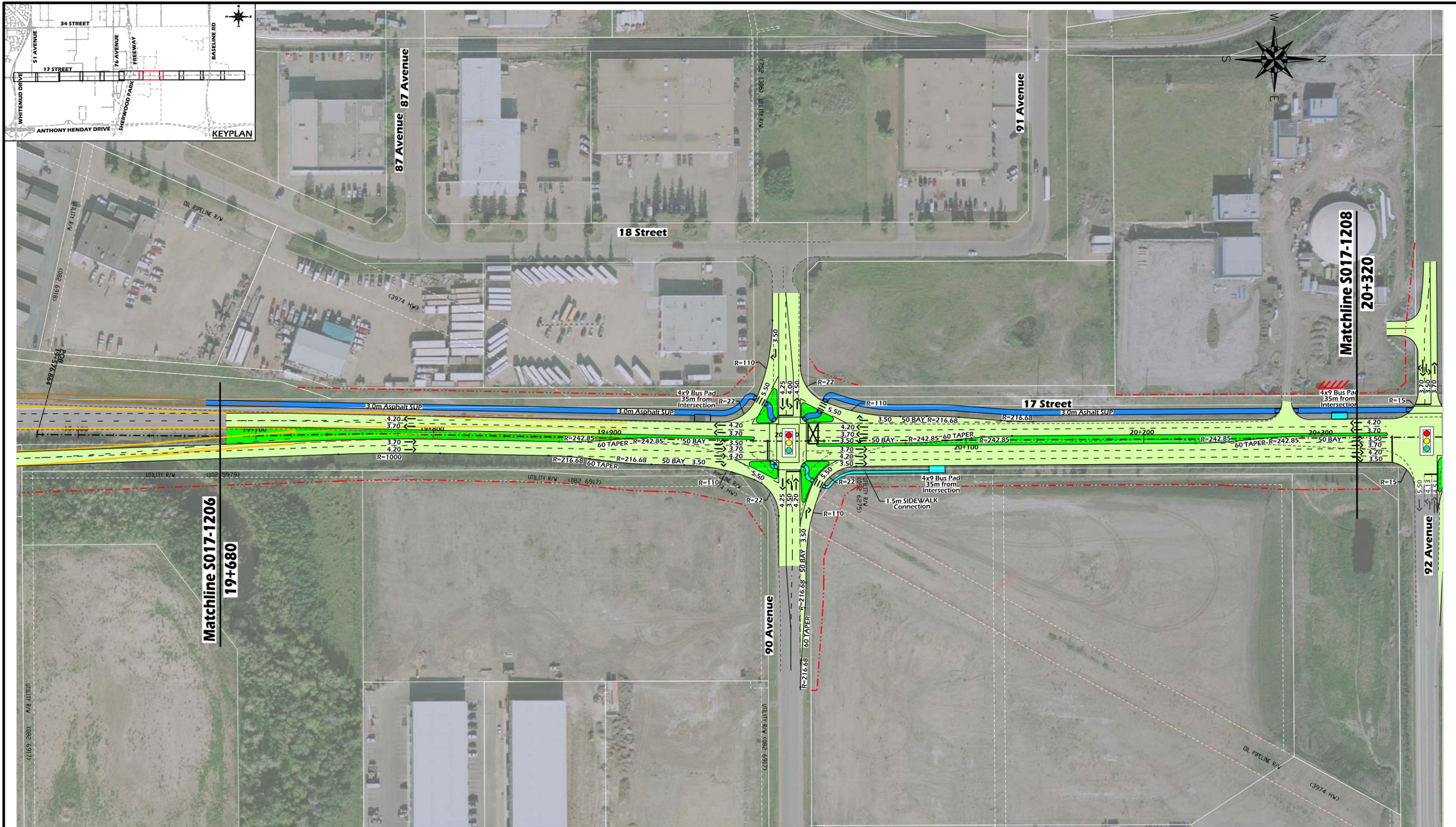
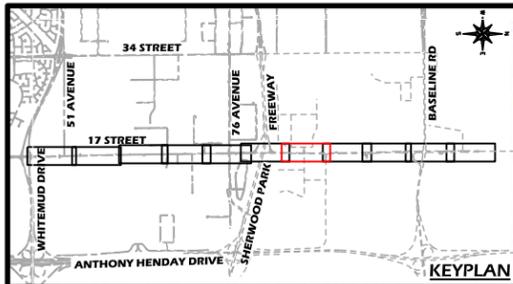
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SURVEY BY:		DRAWN BY: Tony Deahoy	
DESIGN BY: Tony Deahoy		CHECKED BY: Andy Heath	
APPROVED BY: Ryan Belker		PROJECT MANAGER: Tony Moghee	
DRAWING/PROJECT No.:		REV. No.:	
SHEET No.:		S017-1206	

CONCEPT - SUBJECT TO PRELIMINARY SURVEY AND DESIGN

Figure 5-1

17 Street, Whitemud Dr to Knightsbridge Rd
Conceptual Alignment

CAPITAL PLANNING AND CONSTRUCTION
2001 SHERWOOD DRIVE SHERWOOD PARK, ALBERTA, T8A 3W7



LEGEND

- Proposed Right of Way
- Proposed Roadway
- Existing Roadway
- Railway
- 3m Asphalt SUP
- 1.5m Concrete Sidewalk
- Access Closure
- 4x9 Bus Stop Pad

DESIGN SPEED = 70 km/h
 POSTED SPEED = 60 km/h

Note:
Road dimensions for Strathcona County are to the lip of gutter

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STRATHCONA COUNTY

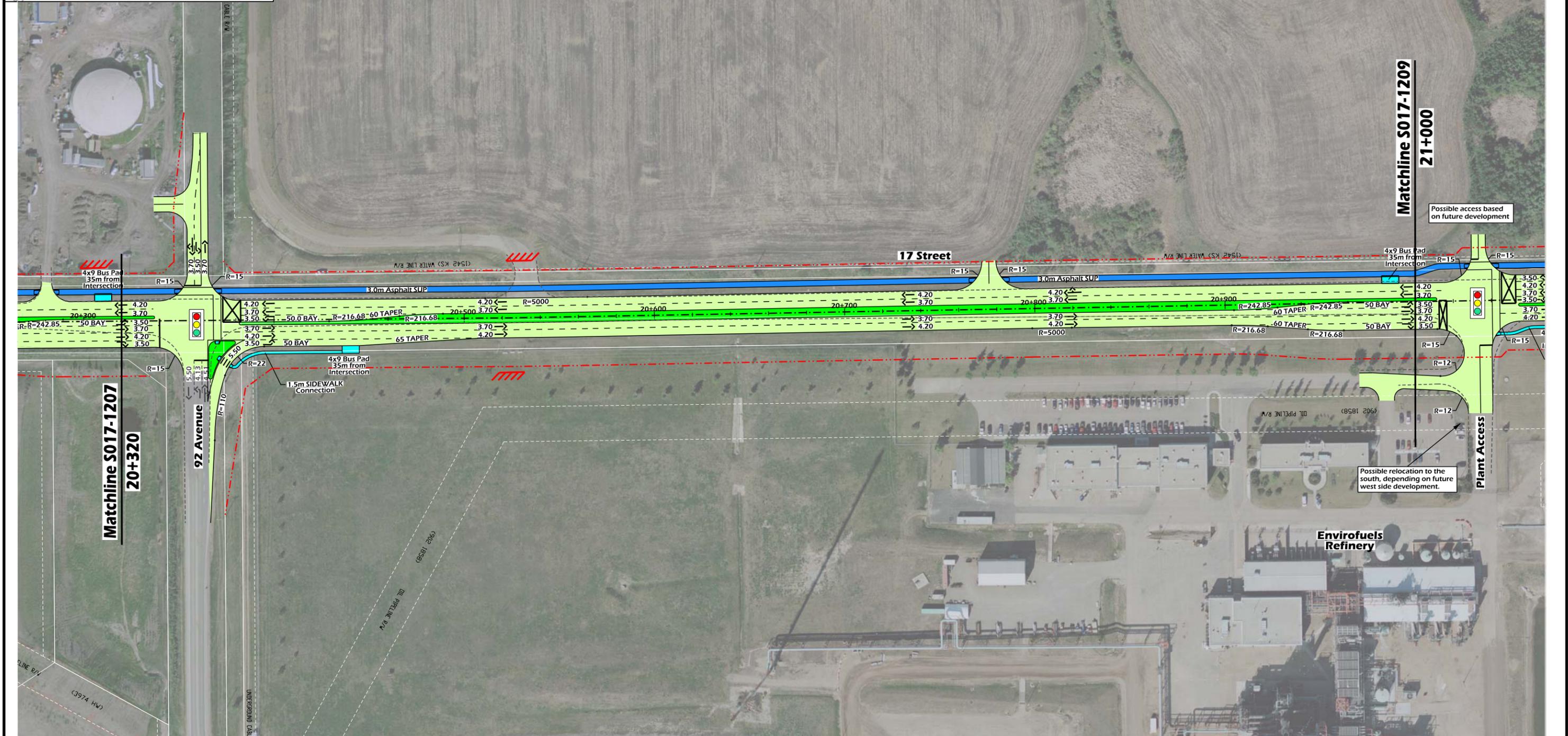
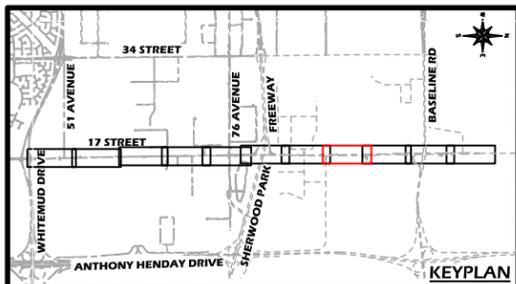
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COORDINATES:
SCALE (m): Horz: 1:1000
DATE: Dec 18, 2012
PROJECT LOCATION: 17 St from Sherwood Park Freeway to Knightsbridge Ave

SURVEY BY:	DRAWN BY: Tony Dealhoj
DESIGN BY: Tony Dealhoj	CHECKED BY: Andy Health
APPROVED BY: Ryan Belker	PROJECT MANAGER: Tony Moghee
DRAWING/PROJECT No.:	REV. No.:
	SHEET No.:
	S017-1207

CONCEPT - SUBJECT TO PRELIMINARY SURVEY AND DESIGN

Figure 5-1
17 Street, Whitemud Dr to Knightsbridge Rd
Conceptual Alignment

CAPITAL PLANNING AND CONSTRUCTION
2001 SHERWOOD DRIVE SHERWOOD PARK, ALBERTA, T8A 3W7



LEGEND

	Proposed Right of Way		1.5m Concrete Sidewalk
	Proposed Roadway		Access Closure
	Existing Roadway		4x9 Bus Stop Pad
	Railway		
	3m Asphalt SUP		

DESIGN SPEED = 70 km/h
POSTED SPEED = 60 km/h

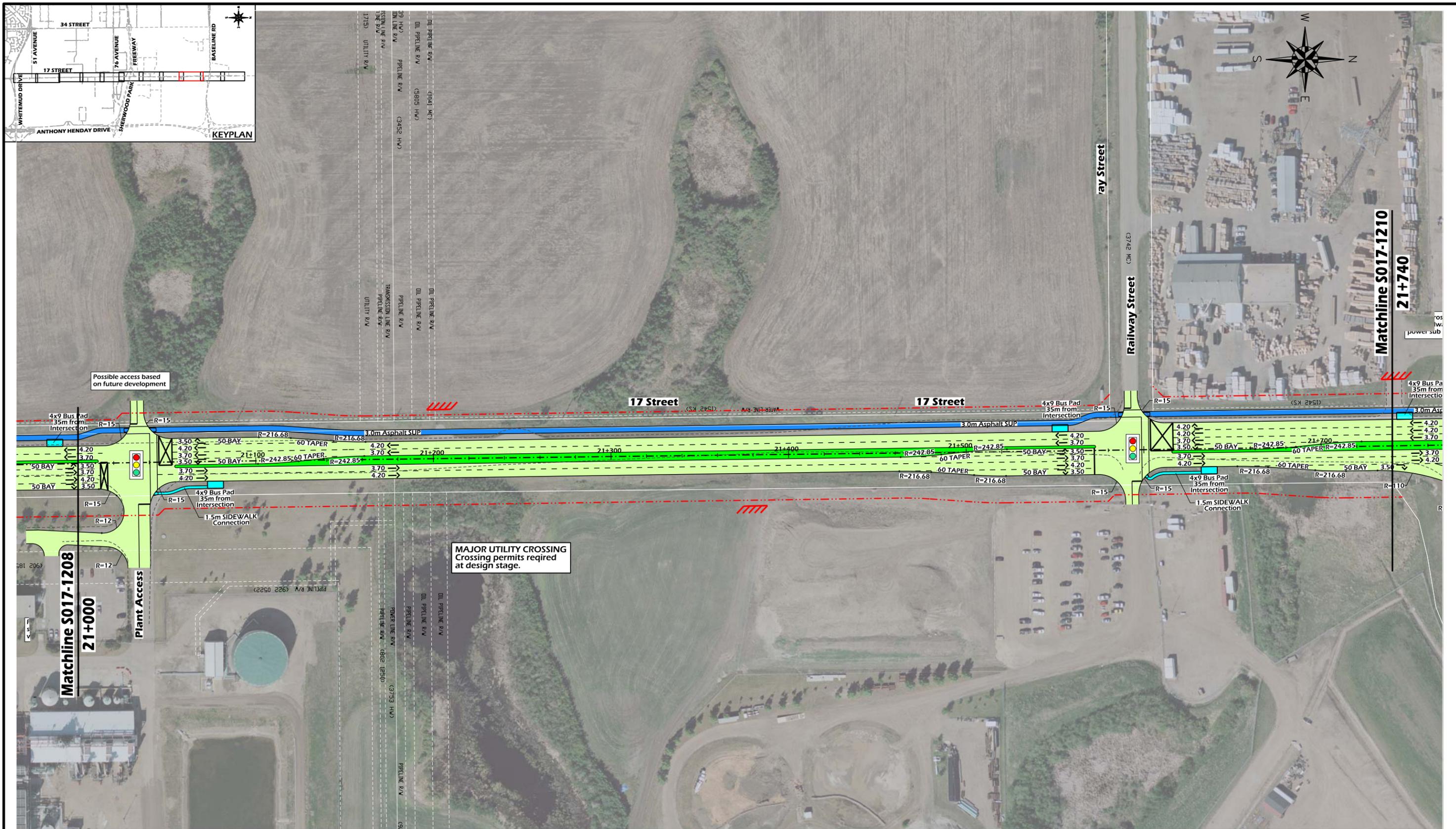
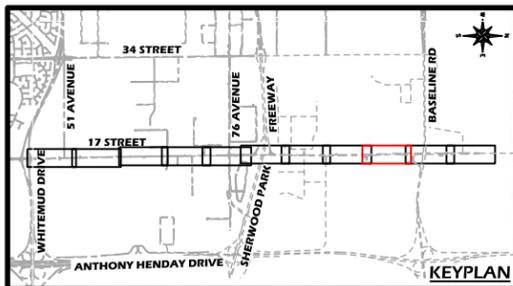
Note: Road dimensions for Strathcona County are to the lip of gutter

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COORDINATES:		CONTOUR INTERVAL:	
SCALE (m):	Horz: 1:1000	DATE:	Dec 18, 2012
PROJECT LOCATION: 17 St from Sherwood Park Freeway to Knightsbridge Ave			
SURVEY BY:	TD	DRAWN BY:	TD
DESIGN BY:	TD	CHECKED BY:	AH
APPROVED BY:	RB	PROJECT MANAGER:	
DRAWING/PROJECT No.:	REV. No.:	SHEET No.:	S017-1208

CONCEPT - SUBJECT TO PRELIMINARY SURVEY AND DESIGN

Figure 5-1
17 Street, Whitemud Dr to Knightsbridge Rd
Conceptual Alignment

CAPITAL PLANNING AND CONSTRUCTION
2001 SHERWOOD DRIVE SHERWOOD PARK, ALBERTA, T8A 3W7



LEGEND

- Proposed Right of Way
- Proposed Roadway
- Existing Roadway
- Railway
- 3m Asphalt SUP
- 1.5m Concrete Sidewalk
- Access Closure
- 4x9 Bus Stop Pad

DESIGN SPEED = 70 km/h
POSTED SPEED = 60 km/h

Note: Road dimensions for Strathcona County are to the lip of gutter

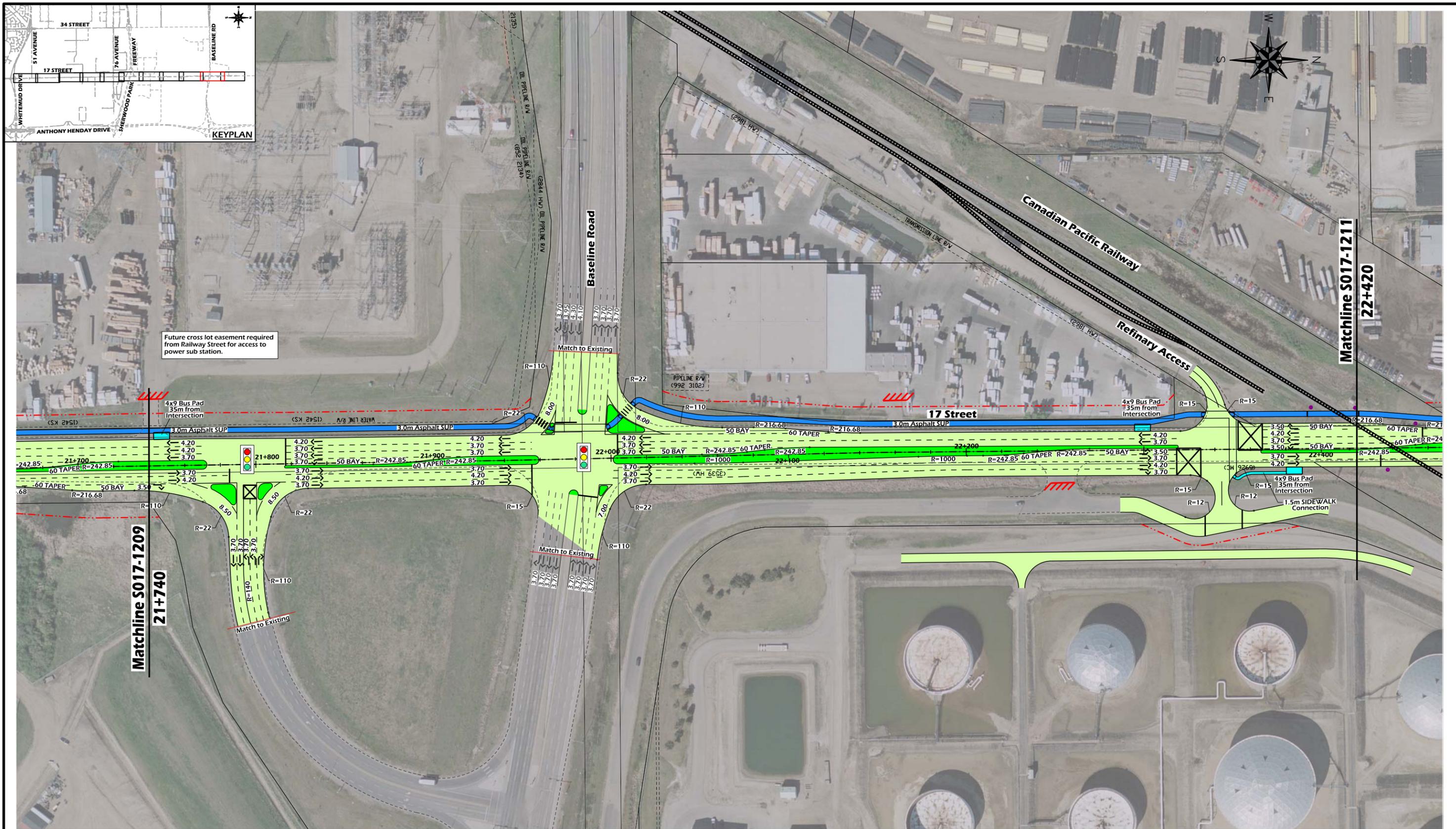
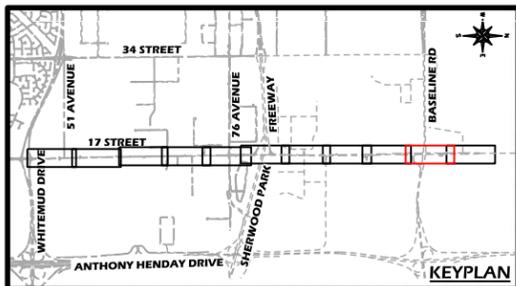
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DESIGN BY: RB	CHECKED BY: AH	
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DRAWING/PROJECT No.: _____	REV. No.: _____	SHEET No.: S017-1209

CONCEPT - SUBJECT TO PRELIMINARY SURVEY AND DESIGN

Figure 5-1

17 Street, Whitemud Dr to Knightsbridge Rd
Conceptual Alignment

CAPITAL PLANNING AND CONSTRUCTION
2001 SHERWOOD DRIVE SHERWOOD PARK, ALBERTA, T8A 3W7



Future cross lot easement required from Railway Street for access to power sub station.

LEGEND

- Proposed Right of Way
- Proposed Roadway
- Existing Roadway
- Railway
- 3m Asphalt SUP
- 1.5m Concrete Sidewalk
- Access Closure
- 4x9 Bus Stop Pad

DESIGN SPEED = 70 km/h
POSTED SPEED = 60 km/h

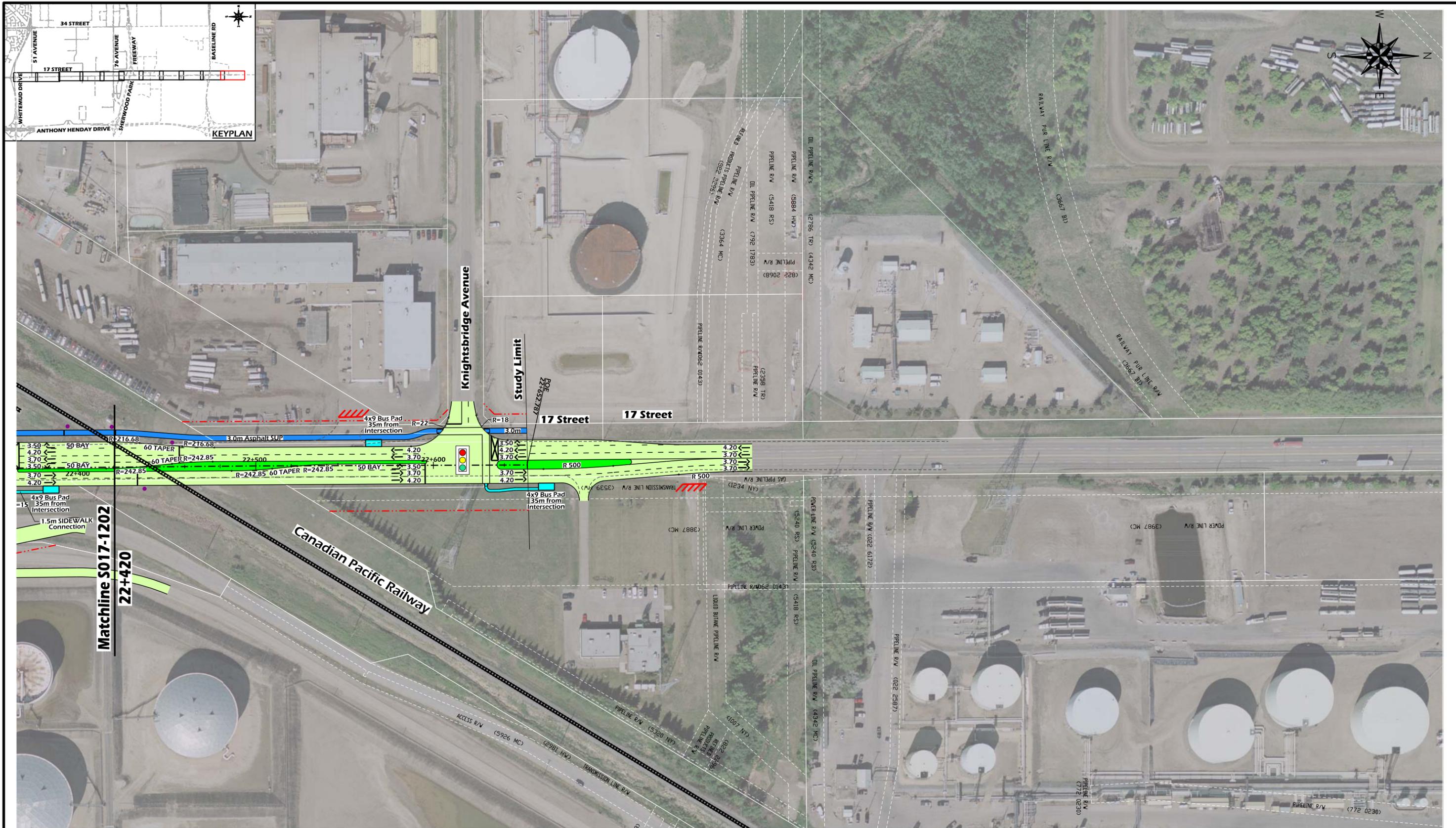
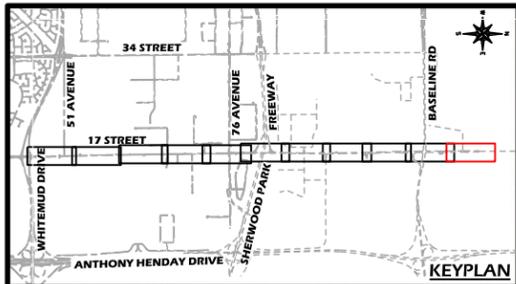
Note: Road dimensions for Strathcona County are to the lip of gutter

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PROJECT LOCATION: 17 St from Sherwood Park Freeway to Knightsbridge Ave			
SURVEY BY:	DESIGNED BY:	DRAWN BY:	TD
DESIGN BY:	TD	CHECKED BY:	AH
APPROVED BY:	RB	PROJECT MANAGER:	
DRAWING/PROJECT No.:	REV. No.:	SHEET No.:	S017-1210

CONCEPT - SUBJECT TO PRELIMINARY SURVEY AND DESIGN

Figure 5-1
17 Street, Whitemud Dr to Knightsbridge Rd
Conceptual Alignment

CAPITAL PLANNING AND CONSTRUCTION
2001 SHERWOOD DRIVE SHERWOOD PARK, ALBERTA, T8A 3W7



LEGEND	
	Proposed Right of Way
	Proposed Roadway
	Existing Roadway
	Railway
	3m Asphalt SUP
	1.5m Concrete Sidewalk
	Access Closure
	4x9 Bus Stop Pad
Note: Road dimensions for Strathcona County are to the lip of gutter DESIGN SPEED = 70 km/h POSTED SPEED = 60 km/h	

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PERMIT TO PRACTICE P6383	

CONCEPT - SUBJECT TO PRELIMINARY SURVEY AND DESIGN

Figure 5-1
17 Street, Whitemud Dr to Knightsbridge Rd
Conceptual Alignment

CAPITAL PLANNING AND CONSTRUCTION
 2001 SHERWOOD DRIVE SHERWOOD PARK, ALBERTA, T8A 3W7

17 Street Functional Planning Study

North of Whitemud Drive to Knightsbridge Road (105 Avenue)

5.1 TRAFFIC EVALUATION

This Section provides an overview of the traffic analysis completed for 17 Street, between Whitemud Drive and Knightsbridge Road. The traffic analysis completed was not conventional; it was developed to incorporate previous traffic impact assessments (development based) as well as future traffic forecasts from the Capital Region's Regional Travel Model (RTM). As well, traffic projections were determined in areas based on future land use scenarios.

5.1.1 Regional Travel Model Projections

Regional Travel Model Projections for 17 Street were provided by the City of Edmonton for a 2044 future scenario as presented in **Appendix C**. The 2044 model forecasts approximately 50% increase in traffic from current traffic volumes based largely on population and employment growth forecasts in both the Maple Ridge and Strathcona Industrial Areas. The long term traffic models vary in outcomes based on the scenario, but volumes range 3 to 4 times larger than the 2044 traffic projections. The long term traffic scenario is closer to a representation of a full build-out of development in the area than what is presented by the 2044 RTM, which is confirmed with land use assumptions as well as the Maple Ridge Traffic Impact Assessment.

5.1.2 Previous Land Use & Transportation Plans

Land use and development plans from 2001 to 2011 were provided by both the City of Edmonton and Strathcona County along the 17 Street corridor. A Consolidated Area Structure Plan for Maple Ridge (2010) was also provided by the City, which outlines plans for future land use, environmental features, eco-industrial development features, infrastructure requirements and development phasing. Land use plans were consolidated and discussed in Section 2 of this report.

17 Street, Sherwood Park Freeway to Baseline Road (Al-Terra 2004) - Overall, this study identified medium term improvements for 17 Street, between Sherwood Park Freeway and Baseline Road. Traffic was forecasted to a 2020 base horizon (including a background growth rate of 0.5% and 1% for light and heavy industrial use respectively). This study also assumed that the 17 Street corridor would be fully built-out within that time horizon. Intersections were maintained at 90 Avenue, 92 Avenue, EnviroFuels and Railway Street. Traffic was forecasted based on accepted ITE Trip Generation Rates, with a traffic split as follows:

- 84% inbound, 16% outbound in the AM Peak;
- 28% inbound, 72% outbound in the PM Peak; and
- 40% traffic to/from Baseline Road, 60% to/from Sherwood Park Freeway.

In addition to these forecasts, assumptions were also made for the distribution of traffic within the development areas of 90 Avenue, 92 Avenue as well as EnviroFuels and Railway Street. The resultant recommendation of this study was to upgrade 17 Street from a 2 lane rural road to a 5 lane road, with opposing left turns and a cross section that was generally urban in nature. This study also identified the 17 Street/Baseline Road jug handle, which after being implemented has significantly improved traffic processing through the intersection.

Applicability to this study: This previous study was used to confirm the access locations, which remain generally consistent. The approach to traffic forecasting was similar, using the traffic generation and assignment to the network. However; the assumptions based on existing traffic patterns and future employment estimates have been updated and changed the overall build-out numbers of the corridor. The recommended cross section was utilized as a starting point for the required widening, including confirming the recommendation of two core lanes in each direction.

17 Street Functional Planning Study

North of Whitemud Drive to Knightsbridge Road (105 Avenue)

Laurin Industrial Park Area Structure Plan (2008) - This Area Structure Plan (ASP) was finalized in 2009, and was immediately implemented from a development perspective. Primarily zoned as medium industrial, the area encompasses the ¼ section east of 17 Street, between Sherwood Park Freeway and 92 Avenue. This area was also formerly identified as Sherwood Industrial Park West. This ASP does identify specific improvements for the intersection of 90 Avenue and 17 Street (which is primary access to the development) including the creation of acceleration and deceleration lanes, left turning lanes as well as the requirement for a traffic signal at the intersection. These improvements have been subsequently completed and the intersection of 90 Avenue and 17 Street is currently operating at a high Level of Service (LOS).

Applicability to this study: This ASP confirmed the zoning and the access locations for the development from 17 Street, including incorporation of previous recommended improvements into the long term plan for 17 Street.

Sherwood Industrial Park West Area Structure Plan (2001) - This Area Structure Plan (ASP) was completed in 2001, and has been updated (superseded) by the Laurin Industrial park ASP. That being stated, this ASP confirms the approved traffic impact assessment for the development, which in addition to the 90 Avenue intersection improvements, included recommendations to the requirement of 4 lanes along 17 Street for full build-out consideration of the development.

Applicability to this study: This ASP identified the long term requirement for 4 lanes on 17 Street, with intersection improvements at both 90 Avenue and 92 Avenue.

Maple Ridge Industrial Area Structure Plan (2010) - This Area Structure Plan (ASP) was completed and refined over a period of several years (2007 – 2010) as design decisions were made through design option refinement. Most notable to the 17 Street Planning Study is the Traffic Impact Assessment (TIA) completed in 2008 by Bunt and Associates. This TIA developed the traffic framework for a full build-out scenario of the entire Maple Ridge Area, bordered by 34 Street (west), Sherwood Park Freeway (north), Highway 216 (Anthony Henday Drive, east) and Whitemud Drive (south). From the TIA, a road network was recommended, including 4 and 6 lane cross sections for 17 Street between Whitemud Drive and Sherwood Park Freeway as well as access, lane configuration, turning movement recommendations and intersection performance.

Applicability to this study: This ASP (and TIA) set the initial traffic design criteria and provided a starting point as follows:

- Land Use, existing and proposed;
- Long Term Traffic Projections for 17 Street, based on full build-out as opposed to a specific time horizon;
- 17 Street widening requirements between Whitemud Drive and Sherwood Park Freeway;
- Recommended road geometry, including turning lanes;
- Trip distribution estimates;
- Access management; and
- Intersection performance (LOS)

This TIA was used as the basis for the traffic forecasts for 17 Street, through the Maple Ridge Area. It was reviewed extensively and generally accepted and relied on for information. Although not applied in its entirety to this study, much of the concept planning work was based on the recommendations within this TIA and ASP.

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Northeast Anthony Henday Drive Functional Planning Study (ISL Engineering & Land Services, updated 2010) - This functional planning study (and subsequent preliminary engineering) was developed as part of the Ring Road Strategy for Edmonton. The northeast section was approved for funding in late 2009, with completion for 2016 as part of a “public/private/partnership” or “P3”. The Northeast Anthony Henday Drive plan includes improvements to the interchange at 17 Street and Sherwood Park Freeway, which will significantly modify traffic patterns in the Maple Ridge Area. Fortunately, these traffic pattern changes were identified previously and have been included in the Maple Ridge Industrial ASP/TIA.

Applicability to this study: The Northeast Anthony Henday Drive Project is currently under contract by Alberta Transportation. As a result, all 17 Street concept plans, both north and south of Sherwood Park Freeway will connect directly to the proposed works at the Transportation and Utility Corridor (TUC) Boundary on 17 Street. Nonetheless, preliminary engineering designs (north of Sherwood Park Freeway) will require constant updates from the widening improvements as they are implemented at this location.

5.1.3 Consolidation of Traffic Forecasts and Future Turning Movements

Forecasted traffic volumes, including future turning movements for both the AM and PM peak design hours, along the 17 Street corridor are summarized in **Figure 5-2**. The following sections detail the approach used in determining these turning volumes for the areas south and north of Sherwood Park Freeway.

City of Edmonton Section – Whitemud Drive to Sherwood Park Freeway

With the 2044 RTM representative of a short term forecast and for the purposes of this study, the traffic on 17 Street south of Sherwood Park Freeway was forecasted based on the Maple Ridge Industrial Park TIA for the following reasons:

1. Analysis of the complete Maple Ridge Area, including 17 Street;
2. Included a full build-out scenario of the Maple Ridge Industrial Area;
3. Provided analysis based on turning movements at intersections developed from a trip distribution that is consistent with what would be expected within the development;
4. Intersections were fairly consistent when compared with the recommendations of this concept planning study;
5. Recommendations were based on the full build-out, not specific to a horizon year; and
6. Overall forecasted traffic estimates were similar to the long term RTM model

Contained within the Maple Ridge TIA, Exhibit 8-1 provided the lane geometry recommendations for 17 Street, Exhibit 2-2 presents the background traffic forecast and Exhibit 4-1 presents the site generated traffic based on a full build-out of the area. These were used as the initial forecasted volumes for 17 Street. These Exhibits are included in **Appendix C** of this report.

Upon review of the Maple Ridge TIA, including applying the traffic forecasts to the 17 Street plans, there were changes and iterations made to both the network (17 Street lane and turning geometry) as well as the traffic assumptions and forecasts, to include:

- The ultimate intersection of Roper Road was developed with double left turns (slot) bays, right turn bays and two through lanes in all directions. This is more than what was previously recommended in the maple Ridge TIA, however it is being recommended in order to improve the intersection Level of Service (LOS).

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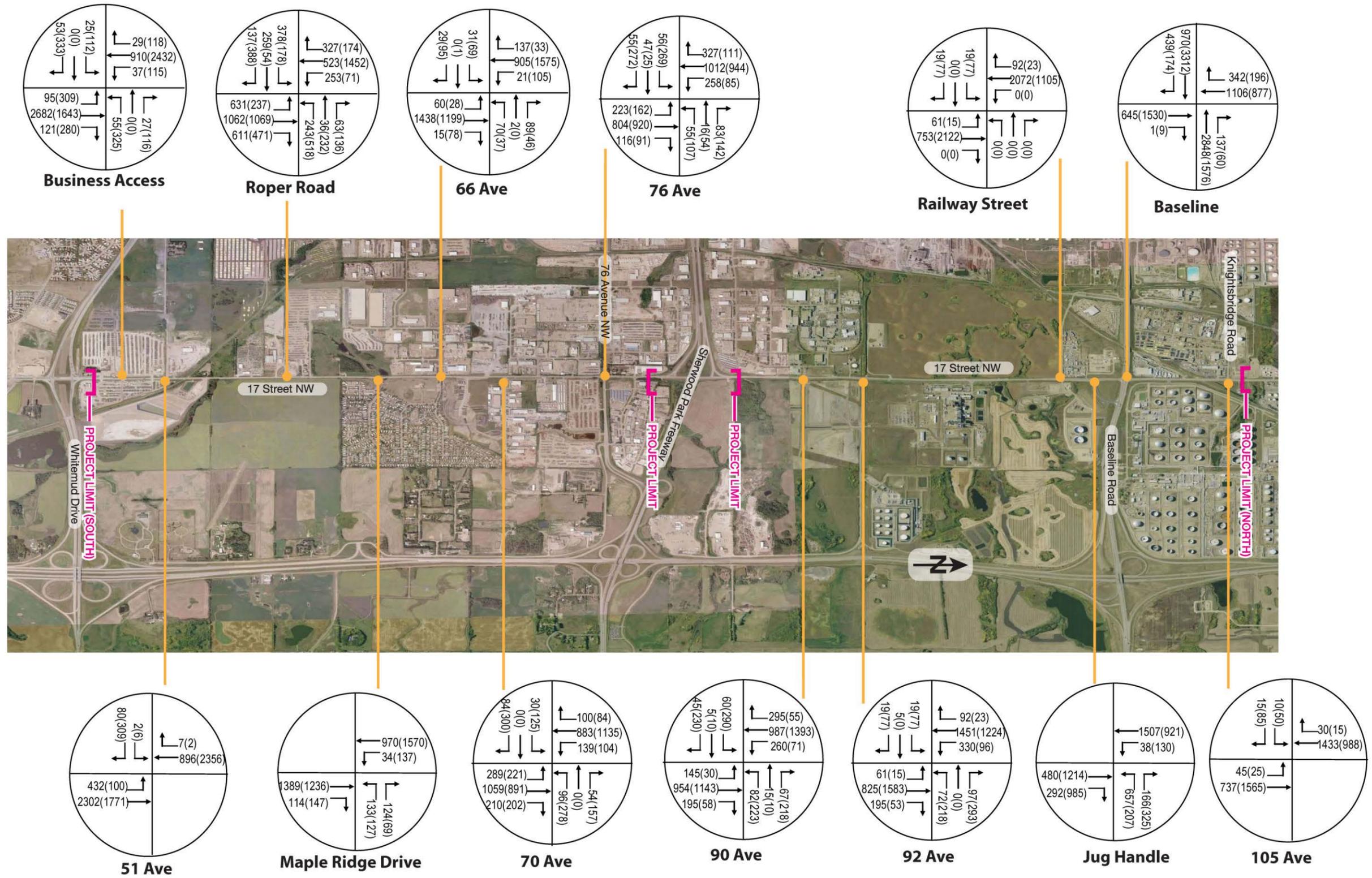


Figure 5-2: 17 Street Projected Traffic: AM (PM) Peak

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- A 20% reduction in the forecasted traffic volumes to/from the undeveloped areas east of 17 Street, including traffic on 76 Avenue, 70 Avenue and Roper Road. Within the TIA, there were land use assumptions regarding densities (25 and 35 persons per acre for light and medium densities, respectively). Based from the TIA, overall employment would be 20,000 persons in the Maple Ridge industrial zoned area. The City of Edmonton is currently forecasting an overall employment (including existing developed areas) of 10,360 in 2044 based on the RTM (which should include the full build-out from Maple Ridge based on the proposed timelines) (**Appendix C**). A 20% reduction of employment (16,000 persons) is a conservative average of these conflicting assumptions.
- A total of 150 vehicles to 17 Street (PM) and from 17 Street (AM), who would turn to/from Roper Road east of 17 Street, were redistributed to Roper Road to/from the west (34 Street, 50 Street) to a through movement, which provides a better balance of the traffic in Maple Ridge to/from the south between 17 Street and 34 Street. This redistribution also considers the capacity constraints on the Whitemud Drive terminal intersections, and the opportunity to utilize Roper Road as an alternative. No trips were redistributed to 51 Avenue; however, this is also likely to occur based on possible future congestion levels.
- With the recommended access management changes, 70 Avenue will ultimately require improvements, including additional turning lanes for eastbound traffic.
- The Maple Ridge TIA assumed a 5% heavy vehicle (HV) percentage; currently 17 Street is at 17% heavy vehicles. While this percentage may decrease as employees and general background traffic increases, it will still be much higher than most corridors within the Capital Region. For the purposes of traffic analysis, the following is therefore being recommended:
 - 10% HV on through movements (17 Street);
 - 10% HV for turning traffic (Roper Road, 66 Avenue, 70 Avenue and 76 Avenue);
 - 5% HV for turning traffic other intersections (on and off 17 Street); and
 - 2% HV to/from residential areas (Twin Parks Communities).
- A peak hour factor of 1.0 was used for the Maple Ridge TIA. For this 17 Street Planning Study, a peak hour factor of 0.92 is being recommended, as it is commonly used within common intersection analysis practices.
- Limited existing volume information for 51 Avenue (eastbound direction) and the business access south of 51 Avenue (east – west through movement) have limited volumes, likely due to the unknown traffic patterns as neither the road nor the access currently exists. For the purposes of this analysis, we have included forecasted numbers from the Maple Ridge TIA. Although these numbers appear low, even a substantial increase (+50 vehicles in the peak hour) would have relatively minor impacts to overall intersection performance.
- 17 Street at Sherwood Park Freeway will be ultimately built to a full diamond interchange, as compared to the current configuration of 8 Street (76 Avenue) providing access to the east to and from 17 Street; it is assumed that the volume drop/gain between 17 Street and 8 Street on 76 Avenue would re-distribute to the new interchange. The drop/gain is as follows, and it is assumed that it will distribute proportionally from the future interchange based on the current turning movements at the intersection of 17 Street and 76 Avenue:
 - In the AM peak hour, there is an eastbound loss of 295 vehicles
 - In the AM peak hour, there is a westbound gain of 106 vehicles

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- In the PM peak hour, there is an eastbound loss of 328
- In the PM peak hour, there is a westbound gain of 441.

Strathcona County Section – Sherwood Park Freeway to Knightsbridge Road

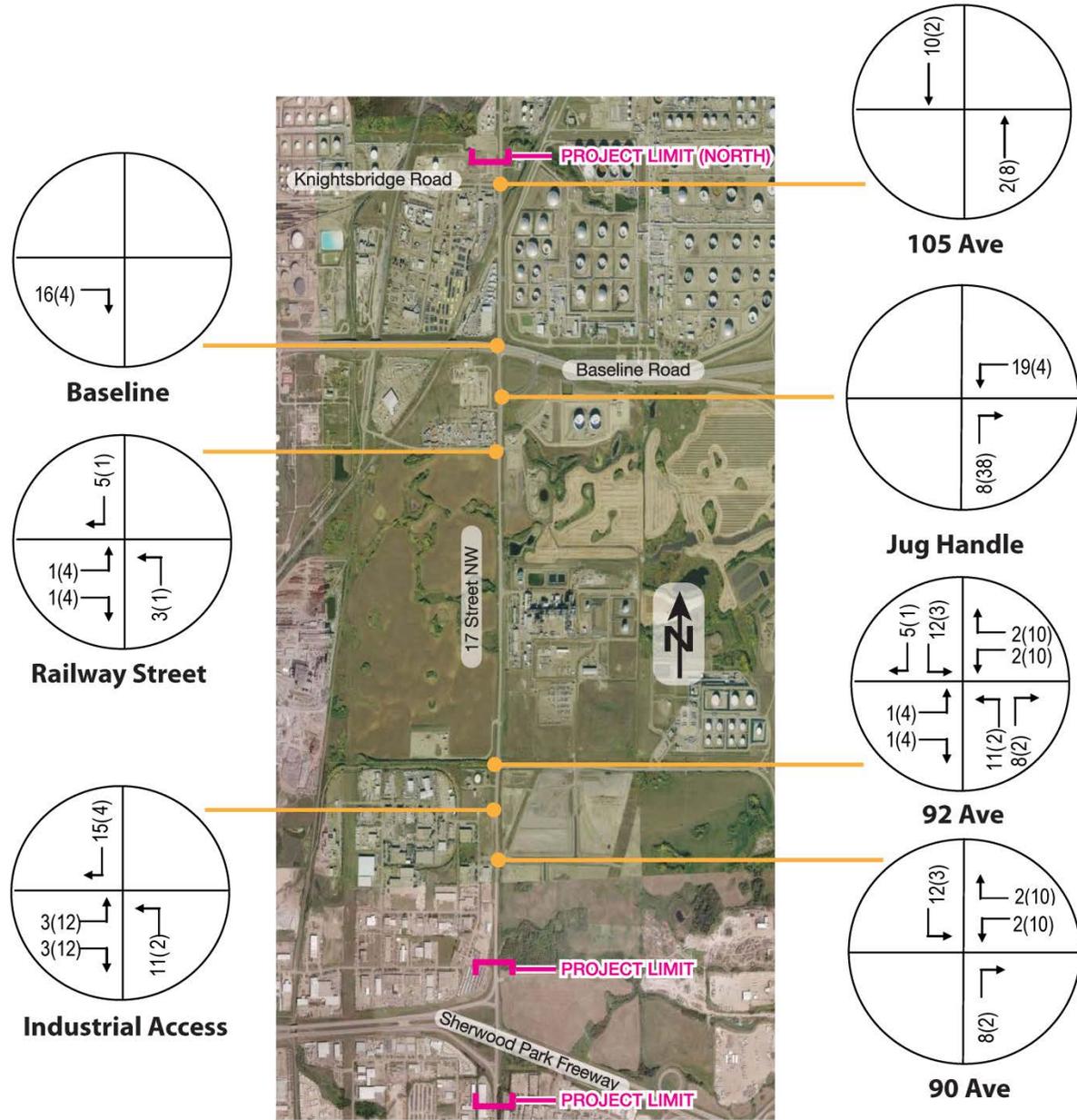
The approach for developing future traffic volumes on 17 Street north of Sherwood Park Freeway was similar to the approach used in the 2004 Planning Study by Al-Terra Engineering, which included a background growth forecast and a TIA projection for undeveloped lands on 17 Street. Without a recent development based TIA to compare results to validate or to provide detailed direction as to future development (as was the case with the area south of Sherwood Park Freeway), a new TIA was developed, based on current information and available development plans. The methodology includes a forecast of existing traffic (background traffic) added to the projection of traffic from undeveloped lands. The following projections and assumptions were made in developing the future traffic volumes to a full build-out scenario.

- An overall growth factor of 1.6 times (the equivalent of 1.5% growth over 30 years to represent full build-out) for all traffic on 17 Street. All side-street and turning movement traffic remained constant, as future growth is represented in the development traffic increases.
- For the undeveloped land, the following assumptions were made:
 - 96 hectares and 75 hectares of heavy and light Industrial land, respectively.
 - A density of 20 and 25 employees/hectare for Heavy and Light, respectively, and a rate of 0.5 trips/employee/peak hour.
 - Light industrial would be based primarily in the Laurin Industrial Park, turning to/from 17 Street at 90 Avenue and 92 Avenue.
 - Heavy industrial would be the lands west of 17 Street and would use 17 Street from either Railway Street, a future access (extension of the access from Envirofuels), and 92 Avenue.
 - An assumed inbound directional distribution of 60/40 (North/South) and an outbound distribution of 50/50.
 - For distribution to the south, assumed 40% east on Sherwood Park Freeway, 40% west on Sherwood Park Freeway, and 20% continuing south on 17 Street.
 - For distribution to the north, assumed 40% east on Baseline Road, 40% west on Baseline Road and 20% continuing north on 17 Street (to Yellowhead Trail).
 - Assumed 80/20 in/out distribution in the AM and 20/80 in the PM.

The percentage of future development traffic on 17 Street specifically between Sherwood Park Freeway and Baseline Road is summarized in **Figure 5-3**.

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Directional Distribution

AM:	PM:	Inbound:	Outbound:
80% In	20% In	60% North	50% North
20% Out	80% Out	40% South	50% South

Figure 5-3: AM(PM) Trip Distribution North of SPF (%)

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5.1.4 Analysis and Results

The forecasted traffic volumes for AM peak and PM peak design hours were analyzed using Synchro 8, a software calculation tool, based on the Highway Capacity Manual (HCM) that will determine the indicators of traffic performance, including Level of Service (LOS), volume to capacity (v/c) ratios and the 95 percentile for traffic lane queuing.

Synchro results ultimately aid in the identification of problem areas and capacity constraints. Synchro does not iterate or adjust travel patterns as compared to a micro-simulation software package such as VISSIM or PARAMICS. For this reason, the results are often conservative, and in some cases will calculate a lower LOS than what may be expected based on the traffic volumes, especially on high volume roadways. As well, intersection signal timings can be optimized in Synchro, improving LOS results in the direction of a main corridor, which would be the case in field operations.

The City of Edmonton requires a LOS of “E” or better for intersection operations, and Strathcona County requires a LOS of “D”.

For the purposes of this functional planning study, Synchro is the appropriate software tool to utilize, as it will confirm lane configurations, LOS, identify capacity constraints and provide confirmation of turning bay lengths and queue lengths. However, Synchro will not adjust for network constraints and outputs are derived from the manual calculation of traffic volume forecasts.

The Synchro results for signalized intersections, including the performance (LOS, v/c) for the overall intersection as well as the intersection movement for 17 Street are summarized in **Table 5-1**. **Figure 5-4** presents the recommended intersection geometry and overall LOS for each intersection. Also, all of the Synchro results for the AM peak hour and PM peak hour are presented within **Appendix C**.

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Table 5-1: Summary of Synchro Results

Intersection	Intersection Performance AM/PM	Movement	AM Peak			PM Peak		
			LOS	v/c	95% Q (m)	LOS	v/c	95% Q (m)
Business Access	C/E	EBL	D	0.18	11	D	0.34	34.1
		EBT	-	-	-	-	-	-
		EBR	D	0.04	0	F	0.89	95.8
		WBL	D	0.28	20	D	0.81	114.2
		WBT	D	0.02	0	D	0.08	0
		WBR	-	-	-	-	-	-
		NBL	D	0.42	17.2	E	0.79	57.4
		NBT	C	0.94	244.1	C	0.75	143.4
		NBR	A	0.11	13.1	B	0.26	31.9
		SBL	D	0.28	9.2	C	0.64	19.7
		SBT	A	0.34	4.9	F	1.23	306.5
SBR	A	0.02	0.3	A	0.14	5.4		
51 Avenue	A/B	EBL	D	0.02	2.5	D	0.02	4.8
		EBR	D	0.05	13.6	E	0.81	77.2
		NBL	B	0.77	85.7	D	0.59	28.9
		NBT	A	0.60	105.4	A	0.52	92.2
		SBT	A	0.31	66.8	A	0.81	180.2
		SBR	-	-	-	-	-	-
Roper Road	C/D	EBL	D	0.55	51.7	D	0.58	32.8
		EBT	D	0.53	37.9	E	0.33	13.6
		EBR	A	0.10	0	A	0.27	0
		WBL	D	0.60	36.2	D	0.83	85
		WBT	D	0.18	8.3	D	0.47	40.7
		WBR	C	0.10	13.9	D	0.25	32.5
		NBL	D	0.79	93.9	D	0.61	39.2
		NBT	D	0.88	160.3	B	0.67	88.4
		NBR	C	0.70	131.1	E	0.32	52.3
		SBL	D	0.64	37.1	D	0.34	13.8
		SBT	C	0.66	51.2	E	1.02	266.8
		SBR	C	0.21	8.1	B	0.12	12.2
Maple Ridge	B/A	WBL	D	0.60	42.5	E	0.63	48.5
		WBR	D	0.14	17.5	D	0.05	12.9
		NBT	A	0.65	72	A	0.57	90.4
		NBR	A	0.08	4.7	A	0.11	3.4
		SBT	A	0.15	5.4	B	0.43	21.9
		SBL	A	0.40	41	A	0.62	112

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Table 5-1: Summary of Synchro Results (cont'd)

Intersection	Intersection Performance AM/PM	Movement	AM Peak			PM Peak		
			LOS	v/c	95% Q (m)	LOS	v/c	95% Q (m)
66 Avenue	A/A	EBL	-	-	-	-	-	-
		EBT	D	0.26	17.7	E	0.7	49
		EBR	-	-	-	-	-	-
		WBL	-	-	-	-	-	-
		WBT	D	0.5	27.1	D	0.3	17.8
		WBR	D	0.06	13.5	D	0.03	9.9
		NBL	A	0.15	0.3	A	0.17	0.8
		NBT	A	0.63	53.1	A	0.56	12.8
		NBR	A	0.01	0	A	0.06	0.3
		SBL	A	0.1	4.3	A	0.34	10.4
		SBT	A	0.41	68.1	A	0.71	89.2
		SBR	B	0.1	13.1	A	0.03	2.3
70 Avenue	B/D	EBL	D	0.21	13.2	C	0.38	41.5
		EBT	D	0.06	0	C	0.43	46.5
		EBR	-	-	-	-	-	-
		WBL	D	0.69	33.1	F	0.84	90.3
		WBT	D	0.04	0	C	0.11	1.9
		WBR	-	-	-	-	-	-
		NBL	C	0.63	50.3	E	0.74	84.6
		NBT	A	0.52	34	C	0.52	94.5
		NBR	A	0.15	2.8	D	0.16	29.3
		SBL	B	0.4	24.6	C	0.33	24.7
		SBT	A	0.46	107.8	D	0.75	177.9
		SBR	A	0.07	6.7	D	0.08	22.2
76 Avenue	B/C	EBL	D	0.28	18.9	D	0.78	82.4
		EBT	D	0.39	19.7	D	0.11	13.8
		EBR	D	0.04	11.3	D	0.19	25.2
		WBL	D	0.28	18.5	D	0.43	34
		WBT	D	0.13	9.4	D	0.42	25.8
		WBR	D	0.06	13.6	D	0.1	19
		NBL	B	0.63	32.2	C	0.52	27.6
		NBT	B	0.49	109.8	B	0.55	64.4
		NBR	B	0.09	17.6	A	0.09	1.7
		SBL	A	0.58	32.7	B	0.29	15.4
		SBT	B	0.59	108.9	C	0.6	120.4
		SBR	B	0.25	20.2	B	0.1	15.7

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Table 5-1: Summary of Synchro Results (cont'd)

Intersection	Intersection Performance AM/PM	Movement	AM Peak			PM Peak		
			LOS	v/c	95% Q (m)	LOS	v/c	95% Q (m)
90 Avenue	C/D	EBL	C	0.25	20.2	C	0.62	85.5
		EBT	D	0.08	11.9	D	0.3	31
		EBR	-	-	-	-	-	-
		WBL	D	0.41	26.1	D	0.69	57.9
		WBT	D	0.21	9.2	E	0.16	7.1
		WBR	C	0.04	8.9	D	0.64	51.4
		NBL	B	0.6	29.3	C	0.31	9
		NBT	C	0.69	114.6	D	0.95	200.8
		NBR	B	0.13	9.5	B	0.04	5.2
		SBL	B	0.69	31.1	C	0.35	19.6
		SBT	C	0.84	190	D	1.02	264.2
		SBR	-	-	-	-	-	-
92 Avenue	B/C	EBL	D	0.24	9.4	D	0.46	23.5
		EBT	D	0.01	0	D	0.06	0
		EBR	-	-	-	-	-	-
		WBL	D	0.41	25	D	0.75	60.8
		WBT	D	0.07	0	D	0.59	49.5
		WBR	-	-	-	-	-	-
		NBL	B	0.35	10.9	B	0.1	2
		NBT	C	0.57	115.2	C	0.99	299.4
		NBR	D	0.16	44.9	B	0.06	4.8
		SBL	C	0.66	47	C	0.61	31.2
		SBT	A	0.81	55.8	C	0.71	200.2
		SBR	-	-	-	-	-	-
Railway Street	B/B	EBL	-	-	-	-	-	-
		EBT	D	0.31	13.4	E	0.71	48.6
		EBR	-	-	-	-	-	-
		WBL	-	-	-	-	-	-
		WBT	-	-	-	-	-	-
		WBR	-	-	-	-	-	-
		NBL	C	0.44	16.7	A	0.06	0.7
		NBT	A	0.3	73.2	A	0.92	330.4
		NBR	-	-	-	-	-	-
		SBL	-	-	-	-	-	-
		SBT	B	0.94	287.2	B	0.52	87.7
		SBR	A	0.08	4.7	A	0.02	3

17 Street Functional Planning Study

North of Whitemud Drive to Knightsbridge Road (105 Avenue)

Table 5-1: Summary of Synchro Results (cont'd)

Intersection	Intersection Performance AM/PM	Movement	AM Peak			PM Peak		
			LOS	v/c	95% Q (m)	LOS	v/c	95% Q (m)
Jug Handle	B/A	WBL	D	0.79	75.9	D	0.62	36.8
		WBR	A	0.13	0	A	0.24	0
		NBT	A	0.31	22.4	A	0.59	67.2
		NBR	A	0.22	0	A	0.74	31
		SBT	A	0.09	2.5	D	0.45	38.3
		SBL	A	0.58	32.8	A	0.27	32.4
Baseline Road	D/F	EBT	A	0.36	39.3	F	1.33	414.3
		EBR	B	0.52	69.9	B	0.21	28.6
		WBT	D	1.06	263.2	B	0.63	104.5
		WBR	A	0.15	15.2	B	0.08	12.3
		NBT	C	0.56	44.1	E	1.09	185.7
		NBR	-	-	-	-	-	-
		SBT	D	0.96	111.2	C	0.62	82.5
		SBR	A	0.26	0	A	0.15	0
105 Avenue	A/A	EBL	D	0.18	10.1	E	0.57	36.9
		EBR	-	-	-	-	-	-
		NBL	A	0.20	4.5	A	0.07	0.1
		NBT	A	0.29	2.5	A	0.65	1.7
		SBT	A	0.63	102.2	A	0.45	75
		SBR	A	0.02	2.8	A	0.01	2.3

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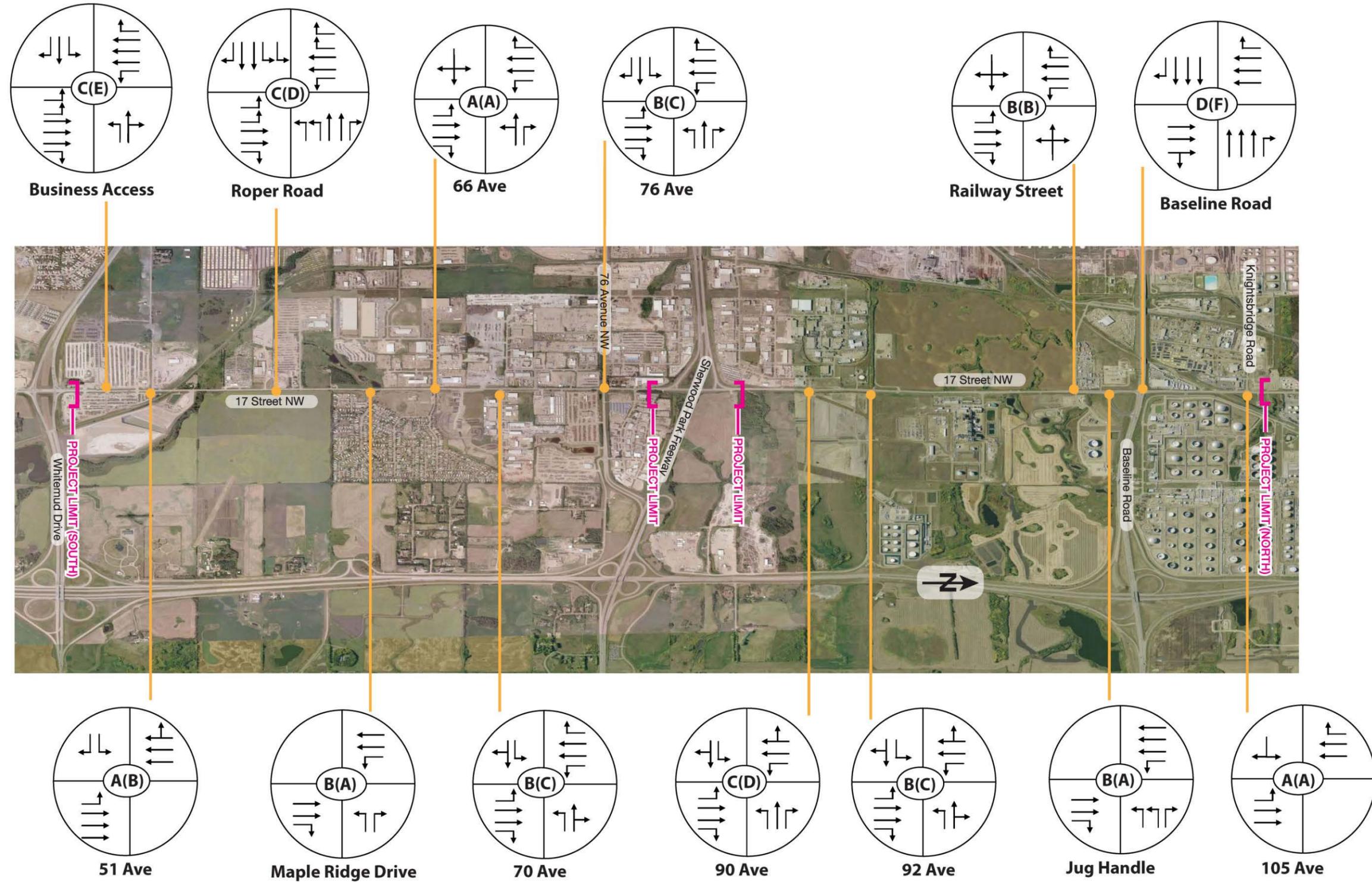


Figure 5-4: Recommended Intersection Configurations & Projected Level of Service (LOS): AM(PM) Peak

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North of Whitemud Drive to Knightsbridge Road (105 Avenue)

Based on the long term traffic volume forecast, the Synchro results for intersections along the 17 Street corridor provide LOS that meet or exceed a LOS of “E”, indicating acceptable long term operating conditions. Calculated queuing lengths confirm that standard turn bay lengths for both left turns and right turns will be sufficient.

The longest queuing and delays occur on 17 Street in the through movements, notable the northbound direction in the AM peak hour, and southbound direction in the PM peak hour between Roper Road and Whitemud Drive. In the long term, the network will balance the through movements, especially considering that there are alternatives in Anthony Henday Drive and 34 Street for travel patterns that do not require access to locations directly off of 17 Street.

However, the detailed traffic analysis did highlight future challenges through this corridor as follows:

1. The ramp terminal intersections on Sherwood Park Freeway were not analyzed. With the future construction of NE Anthony Henday Drive, this includes the re-configuration of the interchange at 17 Street and Sherwood Park Freeway. Due to the unknown traffic patterns, any results would not reflect accurate traffic numbers. Instead; Sherwood Park Freeway was used as the traffic balance for 17 Street, between the City and County Sections.
2. With the traffic volumes on 17 Street coming to and from the interchange at Whitemud Drive, is expected that there could be significant delays at 17 Street and Whitemud Drive in the long term. Again, this interchange and improvements related to the interchange are under construction at this time and are difficult to quantify and are outside the scope of this study.
3. Consideration should be given to consider a double left turn (left with through-left) in both eastbound and westbound directions at 70 Avenue, this would require protected/prohibited phasing eastbound and westbound to avoid interlock of turning vehicles
4. There will be a gradual network balance between 17 Street, NE Anthony Henday Drive and 34 Street, in the Maple Ridge Area between Whitemud Drive and Sherwood Park Freeway. This balancing will occur based on development, improvement construction and employment in the area. This balancing will also occur based on future residential developments to the south and east as commuting traffic seeks the most effective travel routes. To some extent, this balancing has been manually assigned, however it does not consider the interim effects of development and roadway improvements
5. Consideration should be given to consider a double left turn (left with through-left) in both eastbound and westbound directions at 90 Avenue, this would require protected/prohibited phasing eastbound and westbound to avoid interlock of turning vehicles; and
6. The intersection of 17 Street and Baseline Road nears (and could exceed) capacity in the long term based on the Synchro results. The east-west through movements will exceed capacity, resulting in delays longer than expected queue lengths. Although Synchro is an appropriate tool, it does not consider the gains from the “jughandle” operations and the efficient two-phase traffic signals. Should Baseline Road reach the projected capacity, commuters will seek alternative routes (including Sherwood Park Freeway, Yellowhead Trail and Anthony Henday Drive) which could result in network changes beyond this study area.

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North of Whitemud Drive to Knightsbridge Road (105 Avenue)

7. There are several areas of undeveloped and under-developed (the development is less than what future anticipated development will be) land along 17 Street. Actual development will have considerable long term impacts to 17 Street. For the purposes of this planning study, a approach has been taken, balancing the highest expected use (or “worst-case scenario”) of the lands, with the assumptions within the Regional Travel Model. This may provide higher level of service in operation, should these areas develop with less intensity than anticipated in the long term.

This traffic analysis is based solely on current volumes and current future land use forecasts. As the 17 Street corridor develops, the following are recommendations that will maintain the validity of this analysis, or conversely provide better detail to modify these results:

- For all future developments that would impact (provide access) the 17 Street corridor, Traffic Impact Assessments should be completed and compared to the 17 Street Concept Plans. This is especially important for the west side of 17 Street between 92 Avenue and Railway Street, where the development could range from light to heavy industrial;
- The under-developed area directly north of Whitemud Drive is a major generator of future traffic volumes and will significantly impact the long term traffic processing of the intersections of 51 Avenue, Roper Road, Whitemud Drive (interchange ramp terminals) as well as any accesses to this future development. A detailed Traffic Impact Assessment will ultimately be required, not just for any specific access, but for this entire section of 17 Street;
- The ramp terminal intersections for both Whitemud Drive and Sherwood Park Freeway should be monitored and analyzed in the future, once construction of the Northeast Anthony Henday Drive is complete; and
- A micro-simulation of the Maple Ridge Area (bordered by 34 Street, Sherwood Park Freeway, Anthony Henday Drive and Whitemud Drive) should be completed based on the results of the 17 Street Planning Study, 34 Street Planning Study, Roper Road Planning Study and the Area Structure planning along 51 Avenue. This would address the uncertainty of the future interchange performance (Sherwood Park Freeway, Whitemud Drive) as well as provide confirmation of the manual traffic forecasts of the ongoing studies, with the ability to balance the overall network based on available capacities.

5.2 GEOMETRY/ INTERSECTION CONFIGURATIONS

With the initial lane geometry identified through the Maple Ridge ASP and the Al-Terra Functional Planning Study, several improvements or objectives were added within the concept design as part of this Planning Study as traffic analysis was completed and plans developed. The following general geometric conditions were applied to the corridor and the intersections:

- Lane widths were applied consistently through the corridor (design criteria);
- With the traffic projections on 17 Street, traffic signals will be required at most intersections;
- For intersections with all directional legs (4-way intersections) and traffic signals north of Whitemud Drive, left turn slot bays on 17 Street were developed;
- Other intersections (3-way intersections and those north of Sherwood Park Freeway) were developed with conventional left turn bays on 17 Street;
- Major arterial intersections (Roper Road, 90 Avenue) include “Aussie-style” right turns, to and from 17 Street;
- Roper Road was developed with double left turns in all directions;

17 Street Functional Planning Study

North of Whitemud Drive to Knightsbridge Road (105 Avenue)

- A shared-use path (SUP) was developed through the corridor; for the portion south of 76 Avenue, a sidewalk was included on the opposite side of 17 Street;
- Transit stops were included at most intersections, and as directed by Edmonton Transit staff, as well as bus stops planned for the section within Strathcona County; and
- Industrial collector roadways (access management) were matched the existing road network within the area (typically a 11 metre roadway within a 24 metre right-of-way).

5.3 OVER DIMENSIONAL VEHICLES

An important goods movement corridor, 17 Street provides access for over-weight and over-dimensional vehicles. A designated “high load corridor” through the City of Edmonton includes Whitemud Drive east to Highway 14 and then to areas north and east of the Capital Region. There are major moves of these vehicles currently transported to Fort McMurray along this corridor. Currently over-dimensional vehicles in the Maple Ridge area utilize 66 Avenue and 76 Avenue, then move south on 17 Street to Whitemud Drive. In the future, Roper Road or 51 Avenue may provide a route for over-dimensional vehicles. Over-dimensional moves north of Sherwood Park Freeway, often utilize 17 Street north to Baseline Road, then east to Highway 216.

It is recommended that all traffic signals be constructed with swinging pole bases to accommodate over-dimensional moves. Additionally, should the future 51 Avenue or Roper Road be identified as an over-dimensional route, mountable curbs in the median south of these intersections (as well as 66 Avenue and 76 Avenue) should be considered to allow for vehicles that will need to swing wide. A similar approach is recommended for the areas north of Sherwood Park Freeway. Due to the uncertainty and the heavy industrial zoning in the area, a rolled-face or mountable curb for the median in this section should be considered.

A cross-over area north of Whitemud Drive should also be considered, through the inclusion of mountable median curbs and/or removable fence to allow for vehicles that will be swinging wide to head eastbound (counter-flow) on Whitemud Drive.

Placement of streetlight masts should be considered at intersections and streetlights should not be placed in medians. Utilities should be placed underground as the corridor is improved to a more urban standard.

Pavement structures may also be improved (additional base course) in consideration of the heavy truck movements. With the corridor improvements, spring road bans will not be required.

5.4 RAIL CROSSINGS

There are two rail crossings on 17 Street, one is operated by CN Rail and the other operated by CP Rail. Schematic Plans of each of the crossings are shown on the following pages, represented as **Figure 5-5** (Plan No. S017-1213) and **Figure 5-6** (Plan No. S017-1214); also seen within **Appendix A**.

CN Rail (near 53 Avenue) – This crossing is located between 51 Avenue and the Fulton Creek Crossing. This rail line is a subdivision from Camrose and connects to the CN Rail mainline north of Yellowhead Trail. Discussions with CN Rail confirmed that there is an average frequency of 8.7 trains per day and no plans to significantly increase rail traffic on this line. There is no requirement to grade separate this crossing based on the frequency of trains, and the availability of alternative routes (Anthony Henday Drive). The City of Edmonton has also confirmed that this crossing is not on the list of priority locations that would be considered for rail grade separation. Traffic signal coordination at 51

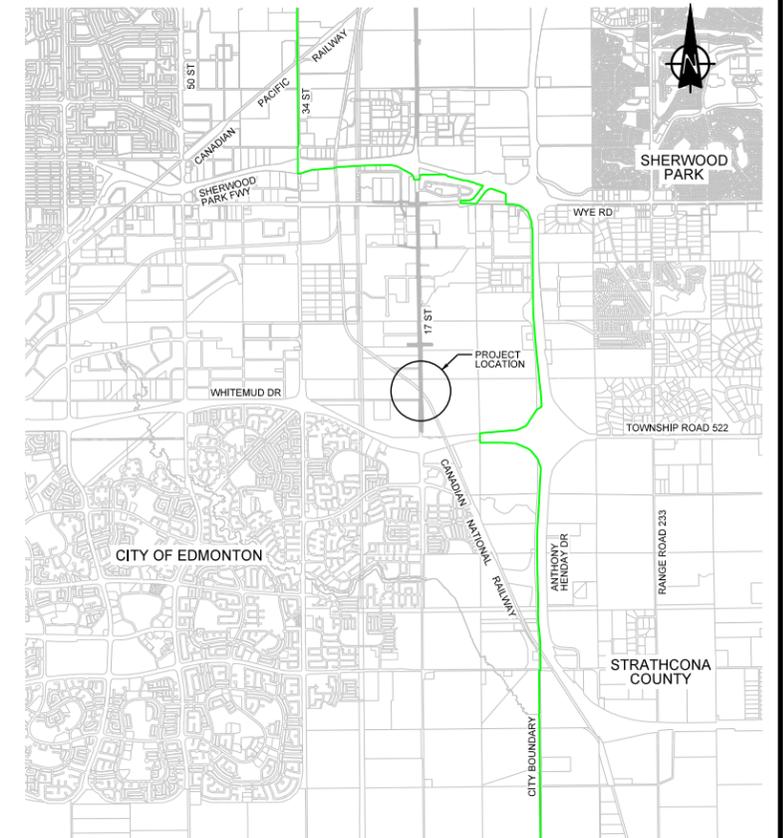
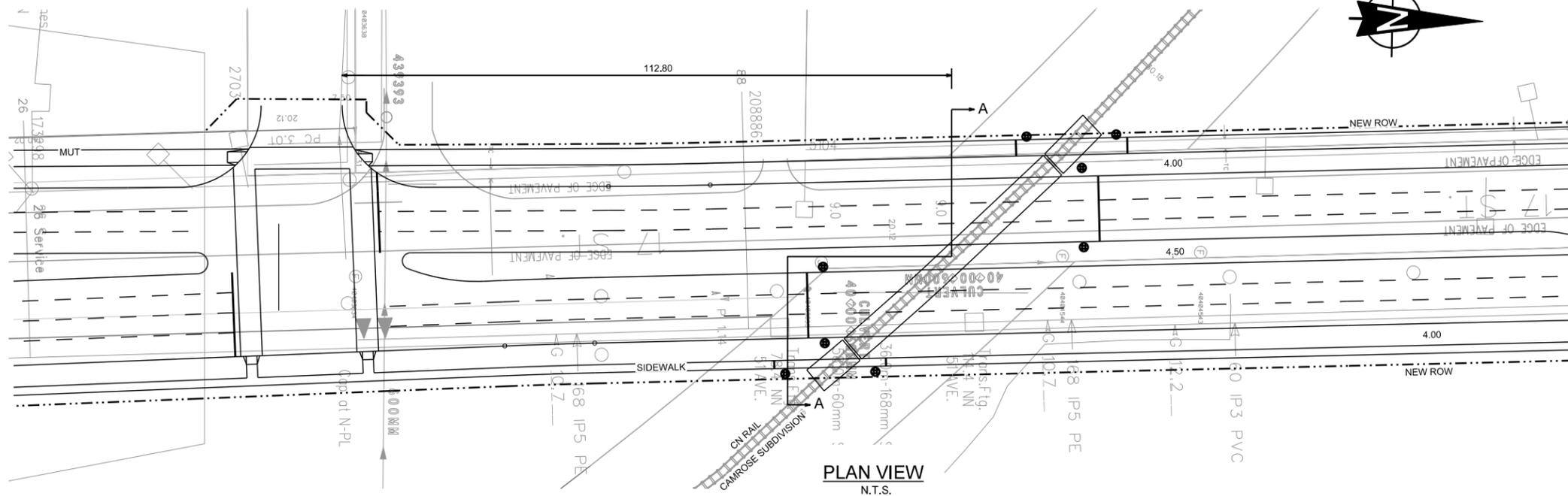
17 Street Functional Planning Study

North of Whitemud Drive to Knightsbridge Road (105 Avenue)

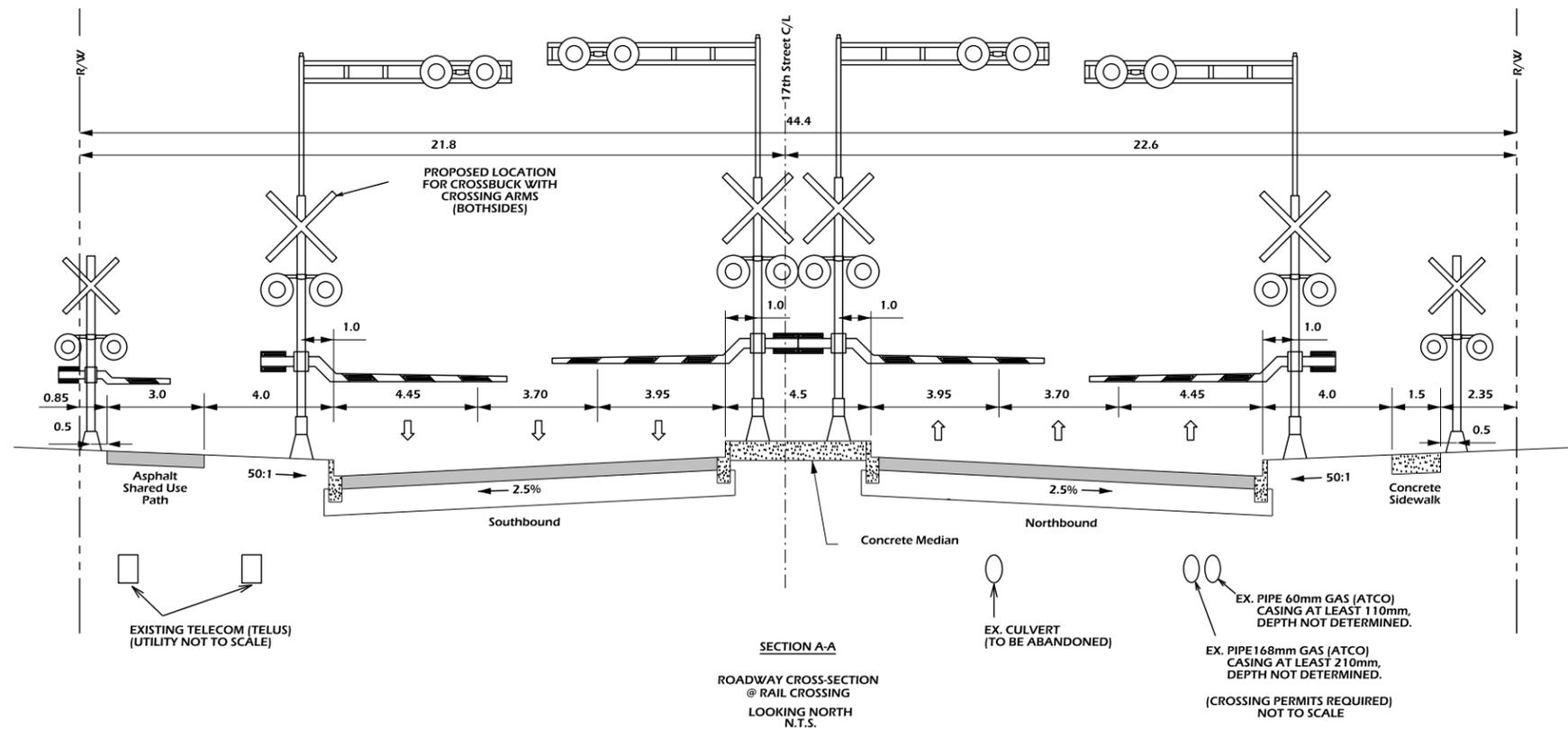
Avenue with the rail crossing signal should be considered to manage delays as a result of train crossings, as well as the traffic signals at Roper Road and the business access south of 51 Avenue.

CP Rail (near 105 Avenue) – The CP Rail crossing is located between Baseline Road and Knightsbridge Road (105 Avenue). This is a mainline route to the north, and is grade separated (under) Baseline Road directly west of 17 Street. Contact with CP Rail has gone unanswered to date, however discussions with Strathcona County provided an estimate of 16 trains per day (from their discussions with CP Rail). Without knowing future train volumes it is difficult to recommend a grade separation, however due to the network alternatives (Baseline Road, Anthony Henday Drive) there are multiple nearby roadways that will not conflict with a train crossing. The tentative recommendation is to not grade separate, however that will need to be confirmed once CP Rail provides information related to this rail line.

CN RAIL CROSSING PLAN - PRELIMINARY



KEY PLAN
SCALE : 1:50,000



DISTANCE FROM CL OF ROAD (m)	EXISTING SIGHTLINES			
	VEHICLES TRAVELLING FROM NORTH		VEHICLES TRAVELLING FROM SOUTH	
	WEST ALONG TRACK	EAST ALONG TRACK	WEST ALONG TRACK	EAST ALONG TRACK
25m	N/A	N/A	N/A	N/A
50m	N/A	N/A	N/A	N/A
100m	N/A	N/A	N/A	N/A

- NOTES:**
1. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
 2. ELEVATIONS ARE BASED ON GEODETIC INFORMATION, PROVIDED BY CITY OF EDMONTON.
 3. CONSTRUCTION TO BE IN ACCORDANCE WITH CTC 1980-8-RAIL AND SIGHT LINES TO BE CLEARED AND MAINTAINED IN ACCORDANCE WITH TRANSPORT CANADA G4-A GUIDELINES.
 4. ALL UNDERGROUND UTILITY LOCATIONS TO BE PROTECTED AS PER TC-E10 FOR RAILWAY LOADING AND OVERHEAD UTILITIES AS PER G.O. E-11.
 5. POSTED ROAD SPEED: 60KM/H
 6. TRAFFIC VOLUMES: PROJECTED , 35,000 AADT
 7. TRAIN SPEED: NA
 8. TRAIN FREQUENCY: 8-9 PER DAY (AS PROVIDED BY CN RAIL)

LEGEND

- Proposed Right of Way
- Proposed Roadway
- Railway
- Proposed Crossbuck Locations

DESIGN SPEED = 70 km/h
POSTED SPEED = 60 km/h

Note: Road dimensions for the City of Edmonton are to the Face of Curb

McElhanney
Consulting Services Ltd.

THE CITY OF **Edmonton** TRANSPORTATION SERVICES

STRATHCONA COUNTY

PROFESSIONAL ENGINEER ALBERTA
P. ENG. DATE
PERMIT TO PRACTICE P6383

Manager, Transportation Planning Branch
Director, Facility & Capital Planning

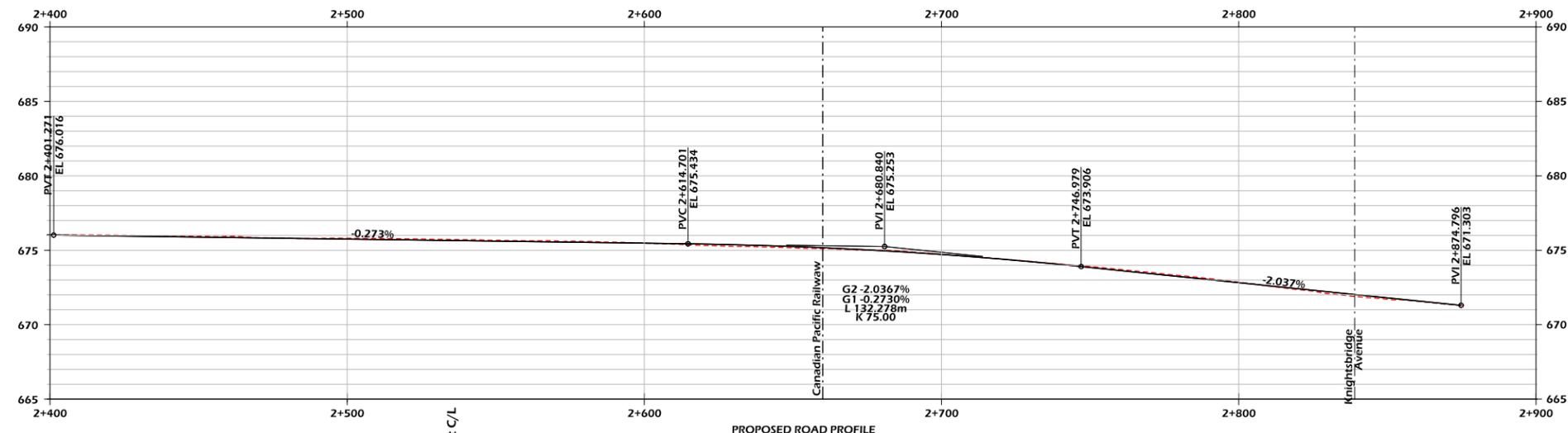
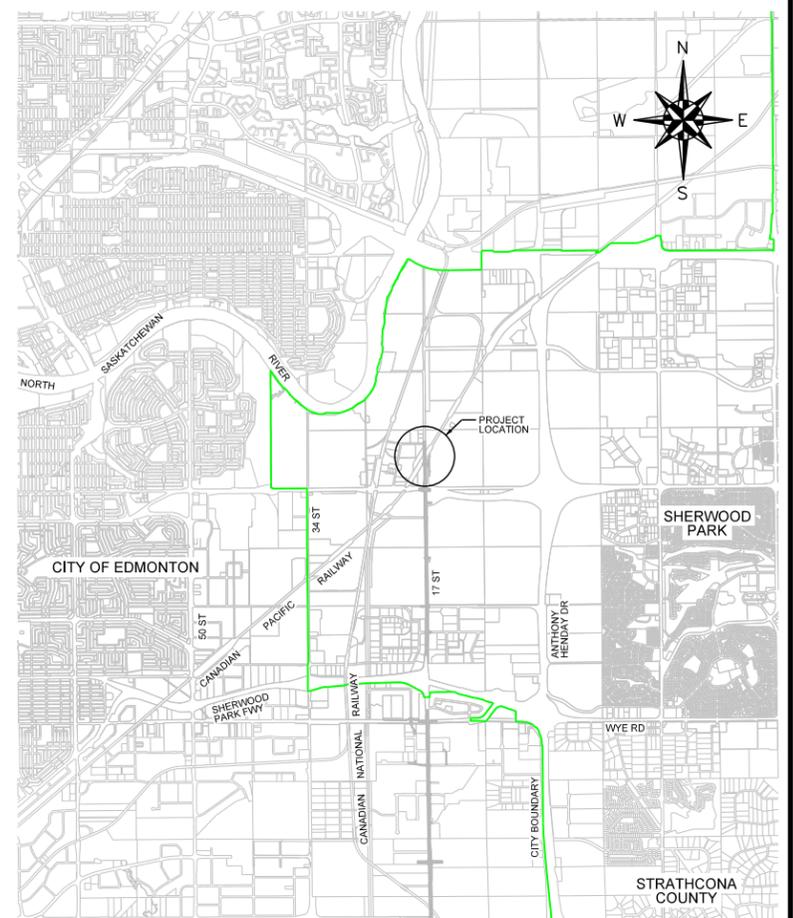
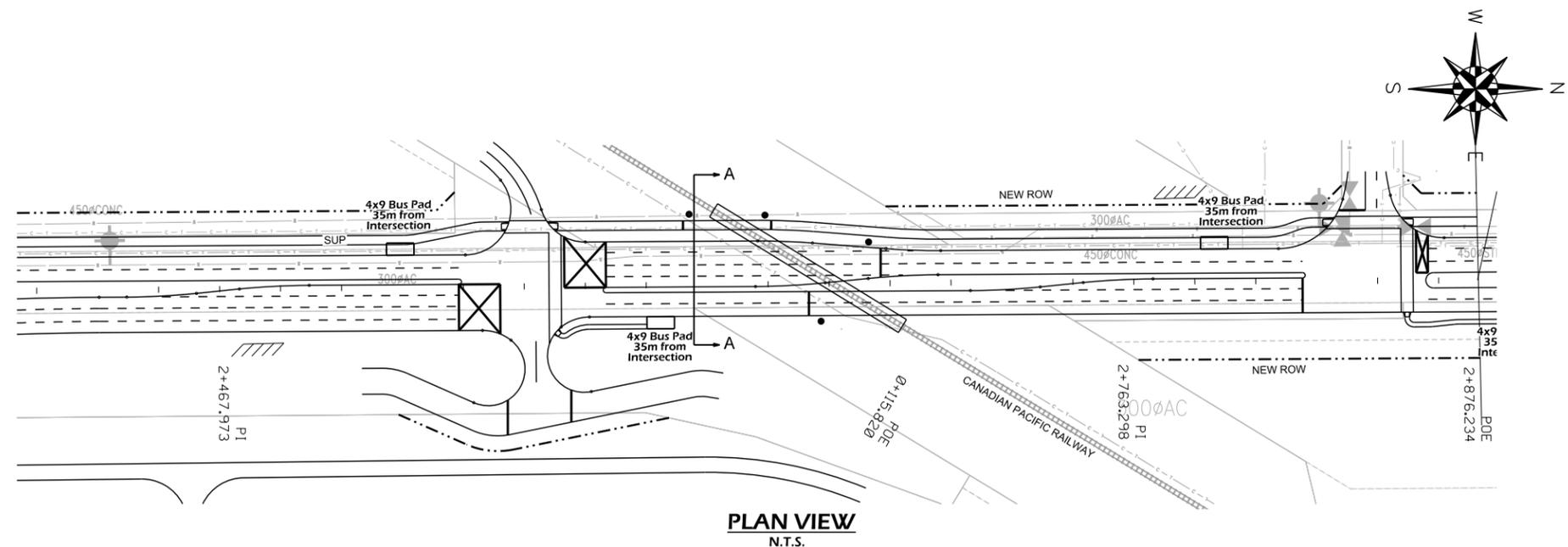
CONCEPT - SUBJECT TO PRELIMINARY SURVEY AND DESIGN

Figure 5-5
17 Street, Whitemud Dr to Knightsbridge Rd
CN Rail Crossing (53 Avenue Approx)

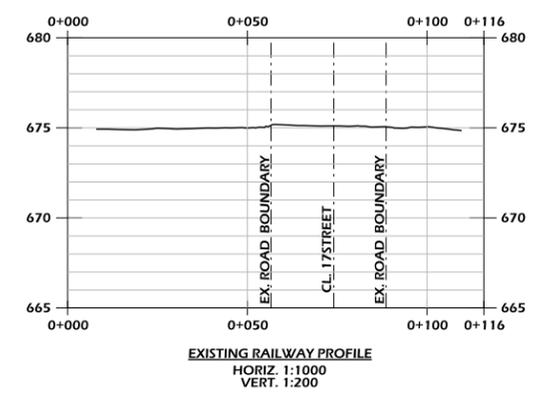
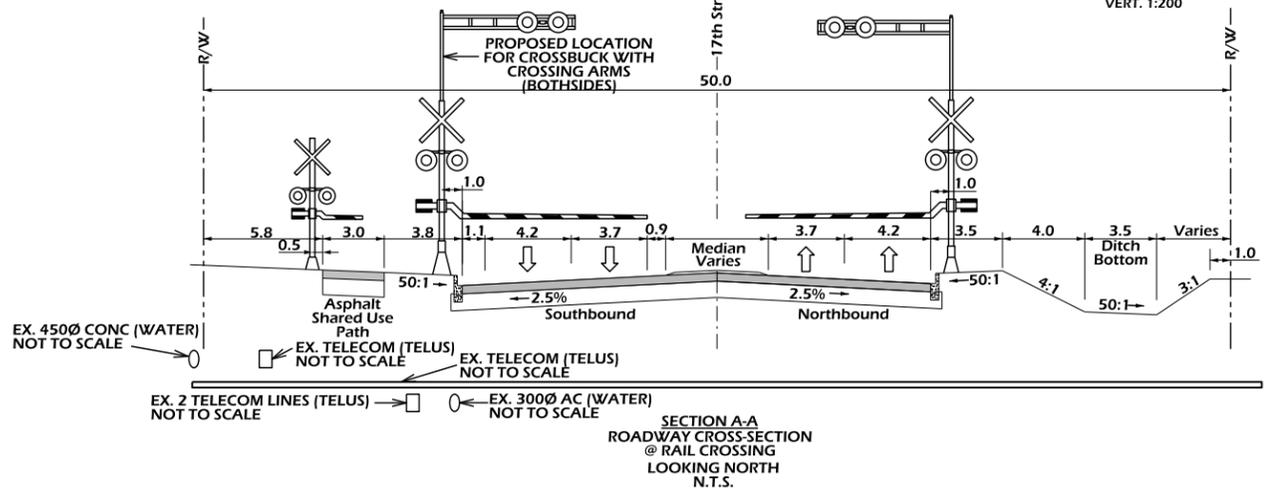
20m 0 40m

DRAWN: TD
REVIEWED:
DATE: 2012 12 17

PLAN NO.
S017-1213



DISTANCE FROM CL OF ROAD (m)	EXISTING SIGHTLINES			
	VEHICLES TRAVELLING FROM NORTH		VEHICLES TRAVELLING FROM SOUTH	
	WEST ALONG TRACK	EAST ALONG TRACK	WEST ALONG TRACK	EAST ALONG TRACK
25m	N/A	N/A	N/A	N/A
50m	N/A	N/A	N/A	N/A
100m	N/A	N/A	N/A	N/A



- NOTES:**
- ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
 - ELEVATIONS ARE BASED ON PRELIMINARY, SURVEYED BY STRATHCONA COUNTY.
 - CONSTRUCTION TO BE IN ACCORDANCE WITH CTC 1980-8-RAIL AND SIGHT LINES TO BE CLEARED AND MAINTAINED IN ACCORDANCE WITH TRANSPORT CANADA G4-A GUIDELINES.
 - ALL UNDERGROUND UTILITY LOCATIONS TO BE PROTECTED AS PER TC-E10 FOR RAILWAY LOADING AND OVERHEAD UTILITIES AS PER G.O. E-11.
 - POSTED ROAD SPEED: 60KM/H
 - TRAFFIC VOLUMES: PROJECTED, 20,000 AADT
 - TRAIN SPEED: NA
 - TRAIN FREQUENCY: TBD (AS PROVIDED BY CR RAIL)

- LEGEN / NOTES:**
- Proposed Right of Way
 - Proposed Roadway
 - Railway
 - Proposed Crossbuck Locations

DESIGN SPEED = 70 km/h
POSTED SPEED = 60 km/h

Note:
Road dimensions Strathcona County are to the lip of gutter



DATUM:	AIR PHOTO:
PROJECTION:	CONTOUR INTERVAL:
SCALE FACTOR:	
COORDINATES:	
SCALE (m):	Horz: 1:1000 Vert: 1:10000 DATE: Dec 17, 2012
PROJECT LOCATION:	17 St from Sherwood Park Freeway to Knightsbridge Ave
SURVEY BY:	DRAWN BY: TD
DESIGN BY: TD	CHECKED BY: AH
APPROVED BY: RB	PROJECT MANAGER:
DRAWING/PROJECT No.:	REV. No.:
	SHEET No.:
	S017-1214

CONCEPT - SUBJECT TO PRELIMINARY SURVEY AND DESIGN

Figure 5-6

17 Street, Whitemud Dr to Knightsbridge Rd CN Rail Crossing (103 Avenue Approx)

CAPITAL PLANNING AND CONSTRUCTION
2001 SHERWOOD DRIVE SHERWOOD PARK, ALBERTA, T8A 3W7

17 Street Functional Planning Study

North of Whitemud Drive to Knightsbridge Road (105 Avenue)

5.5 INTELLIGENT TRANSPORTATION SYSTEMS

There are opportunities for implementing Intelligent Transportation Systems (ITS) along 17 Street, including traveler information. Variable or dynamic message signs (VMS, DMS) should be considered to advise of emergency incidents, or rail crossings for the motorist. This information system would need to be included as part of a network information system, including Whitemud Drive, Sherwood park Freeway, Baseline Road, Anthony Henday Drive and 34 Street. Key locations on 17 Street would be; north of Whitemud Drive, 76 Avenue, 90 Avenue and Baseline Road.

Adaptive traffic control systems (ATCS) and intelligent signal coordination and signal activation could be implemented to improve travel times along 17 Street as well as manage turning signal phases, including truncation of turning phases based on queues and extension of green time for through movements (most notably between Roper Road and Whitemud Drive).

5.6 ENVIRONMENTAL OVERVIEW

The Alberta Sustainable Resources Development (ASRD) and Department of Fisheries and Oceans Canada (DFO) require that work conducted in and around a watercourse must avoid harmful alteration, disruption or destruction of fish and fish habitat (HADD) (Alberta Environment 2000a, 2000b; Department of Fisheries and Oceans 1991). Both provincial and federal government agencies abide by a 'No Net Loss' guiding principle for fish habitat. As such, following construction, the quantity and productive capacity of the aquatic environment, including fish and riparian habitat at and adjacent to any in-stream works, must be equivalent to or exceed that which existed prior to the commencement of works.

An environmental overview report (**Appendix E**) was completed and provides information collected during the assessment of the proposed 17 Street Corridor Planning project and general recommendations to ensure that ecosystems, wildlife, vegetation, fish and fish habitat values are protected and included a search information for wildlife and fish species for the proposed project. A footprint area was generated using a 2 kilometer buffer radius from where Fulton and Goldbar Creeks cross 17 Street.

Given the historical disturbance level associated with the initial construction of 17 Street, industrial development and the increase in transportation use, the majority of the plant and wildlife species and sensitive ecosystem associations identified as rare or threatened are very unlikely to be found within the proposed development area. Site assessments confirmed low habitat suitability for all listed plant and wildlife species, and determined that no listed ecosystem associations are present. Furthermore, the lack of any suitable fish bearing watercourses within the work footprint limits any potential impacts, but water quality will need to be monitored during construction as both watercourses lead to the North Saskatchewan River.

The environmental areas along 17 Street of significance are presented in **Figure 5-7**.

Future environmental work will be required for the Fulton Creek Crossing, which will include an Environmental Screening Report. Typically these reports can take two (2) to four (4) months to complete and an additional two (2) months for the necessary reviews and approvals.

17 Street Functional Planning Study
 North of Whitemud Drive to Knightsbridge Road (105 Avenue)

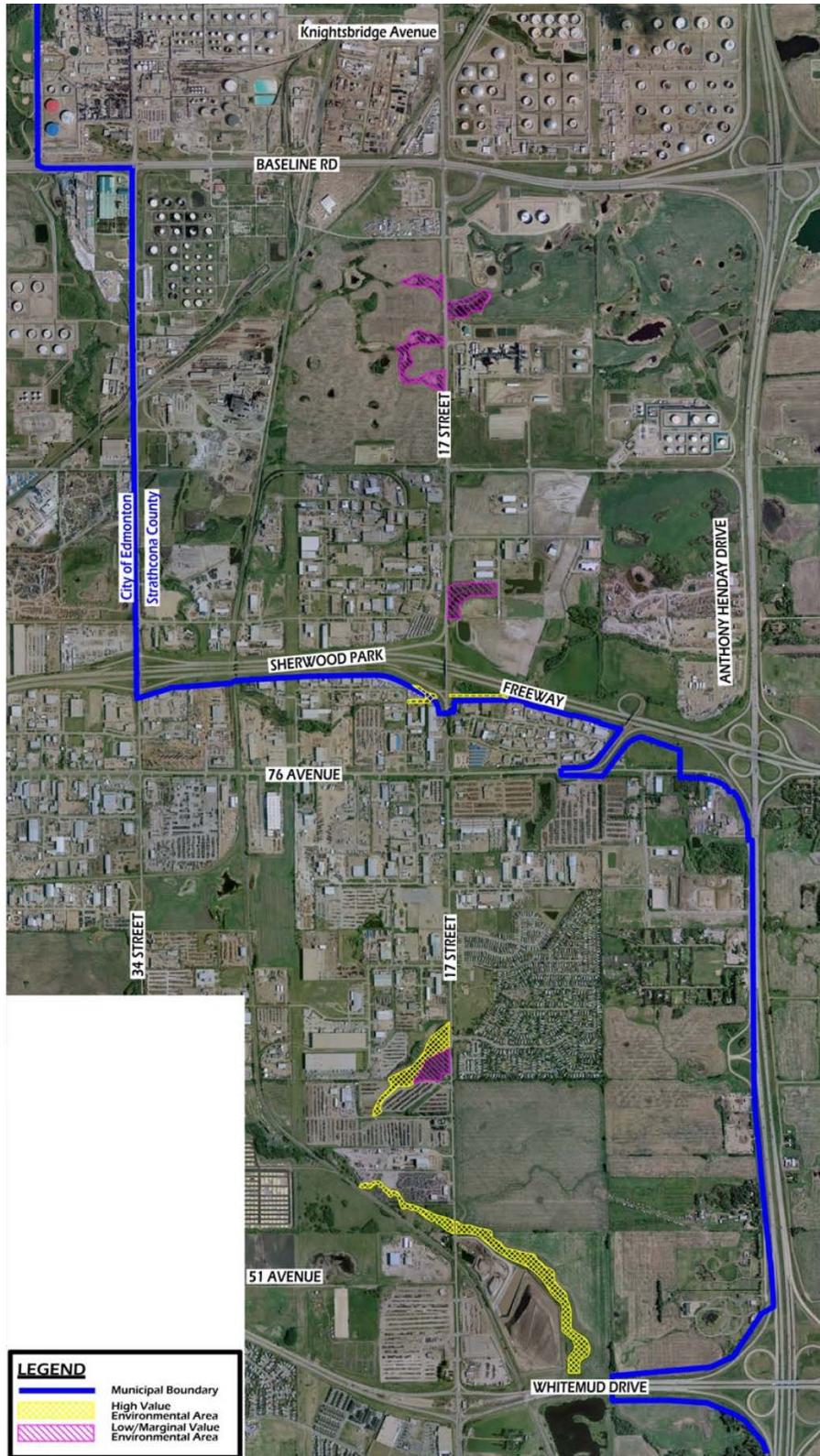


Figure 5-7: Environmental Areas of Interest

5.7 WILDLIFE PASSAGE AT FULTON CREEK

17 Street Functional Planning Study

North of Whitemud Drive to Knightsbridge Road (105 Avenue)

A wildlife passage review on Fulton Creek was completed for the purposes of documenting the wildlife crossing recommendations for the works around Fulton Creek. This memo aligns with the City of Edmonton *Wildlife Passage Engineering Design Guideline* (Stantec 2012).

The Fulton Creek Drainage Basin incorporates 17 Street between the Canadian National Railway to approximately 160m north of the north property line of Roper Road. The approximate length of road is 820m. Fulton Creek was classified as a small permanent watercourse located just north of the City's Snow disposal area. This watercourse flowed through a primary 1500mm round bottomed culvert with a 1000mm overflow round bottom culvert, located just north of the primary structure. Immediately downstream of the culverts, the watercourse was located on private property, which was fenced so this portion of the creek was not investigated more thoroughly.

In following the Decision Tree 1 of the City of Edmonton's Wildlife Passage Guidelines (Stantec 2010), during the planning stages of the project an environmental overview of the area has been conducted; which identified and addressed fisheries, wildlife and bird issues (**Appendix E**).

Wildlife that might frequent the Fulton Creek area would include: medium to small terrestrial animals and amphibians as defined in Table 4.1 of the Stantec guideline (2010).

Larger mammals, including deer & moose in the area are rare, and would require a sufficiently large wildlife crossing, likely a structure and although they can be present in the area and would be more likely to travel and forage on higher ground with tree and brush cover that occurs naturally on the top of the ravine banks. Although the crossing of 17 Street for larger mammals would be in conflict with motorists, due to the travel speeds and low number of large mammals in the area, the likelihood of an animal collision is rare. Collision statistics provided by the City of Edmonton along 17 Street, between Whitemud Drive and Sherwood Park Freeway (2007 – 2011) confirm that there were no collisions with an animal collision identified as the specific cause, however there were three collisions (one in the Fulton Creek Area) that were identified as having involved an animal over that 5 year period.

Based on the Wildlife Passage Guidelines (Stantec, 2010) There should be consideration for wildlife signage and reflectors, fencing and altered lighting. There are also two mitigation options that are specifically recommended as part of this planning study in order to aid facilitating safe passage of wildlife:

Option #11. Vegetation Management, which was discussed in the MCSL (2012) Environmental Assessment:

... any disturbances that occur along the banks and farther up the slopes will be revegetated as soon as possible with cuttings and/or plantings to restore the riparian vegetation to original condition. If there are time constraints within the current growing season, revegetation will occur on or before June of the following year.

The standard prescribed roadway landscaping seed mixture is Canada #1 Mix which is made up of 30% Argyll Kentucky Bluegrass, 30% Kentucky Bluegrass, 30% Creeping Red Fescue and 10% annual Rye Grass.

17 Street Functional Planning Study

North of Whitemud Drive to Knightsbridge Road (105 Avenue)

Option #14. Closed Bottom Culvert, would compliment the existing structures and facilitate the movement of medium to small terrestrial animals, An important part of this type of culvert would be the availability of dry space along side of the flowing water to help create the movement of terrestrial animals. - This type of culvert could also be considered an amphibian tunnel. This structure follows all of the requirements for this option: no critical fish habitat or species at risk, the stream width is less than 2.5 m and a gradient less than 6%. Communications with ASRD, confirmed that neither this watercourse or the watershed support fish but the structure should not diminish water quality as it does flow into the North Saskatchewan. An open bottom culvert may also be considered based on future analysis of the water channel.

5.8 GEOTECHNICAL OVERVIEW & PAVEMENT STRUCTURE

A number of supporting documents (as introduced in **Section 2.4**) were received from the City and the County for the purposes of validating the existing subsurface conditions that can be expected throughout the 17 Street corridor within the project limits of this functional planning study. No current geotechnical investigations or asphalt corings were performed specifically for this project at the time of the writing of this report. Thus, this section serves to highlight the reviewed background information which solely forms the basis for any assumptions and/or recommendations being made in regards to geotechnical / pavement structure considerations.

5.8.1 Geotechnical Overview (Review of Background Documents)

Roadway Reconstruction – 17 Street (City of Edmonton, Materials & Testing, 1985 – In August of 1985, the City of Edmonton, performed a series of 6 asphalt cores along 17 Street between Whitemud Drive to Sherwood Park Freeway evenly spaced throughout the corridor at every 500m intervals. The overall purpose of this investigation was to assess the subsurface conditions with regards to the eventual reconstruction of 17 Street, which later occurred and forms the basis for the assumed existing conditions for this project.

The following general items were the existing conditions that were found within the representative cores:

- Subsurface stratigraphy consisted of fill overlying native lacustrine deposits and glacial till;
- The fill was found to contain organic materials varying in depths from 1.0m to 2.5m;
- Directly below the fill, either black organic soil to depths of 0.3m to 0.6m or additional lacustrine deposits to depths of 2.0m to 3.8m were discovered;
- California Bearing Ratios (CBR) varied from 1.0 to 6.8 throughout the corridor; and
- Groundwater levels at each of the test holes were measured to be nil.

Southeast Snow Storage & Aggregate Recycling Facilities (Various) – The following desktop studies in report form were reviewed for their applicability in highlighting the existing regional geotechnical / topography conditions specific to the Southeast Snow Storage Facility and Aggregate Recycling Facility directly adjacent to the 17 Street corridor (NE of Whitemud Drive):

- *Southeast Aggregate Recycling Facility – Geotechnical Report* (UMA, 2003);
- *Southeast Edmonton Snow Storage Facility – Geotechnical Report* (Thurber, 2004);
- *Southeast Snow Storage Facility – Environmental Screening Assessment* (Spencer Environmental, 2004); and
- *Southeast Snow Storage Facility – Spring 2011 Groundwater Monitoring Program* (WorleyParsons, 2011).

17 Street Functional Planning Study

North of Whitemud Drive to Knightsbridge Road (105 Avenue)

The following general items were the existing conditions that were found within the representative investigations and applicable soil bores:

- The surficial soils consisted of topsoil between 175mm and 300mm thick, overlying a sandy, silty, medium plastic clay till, characterized as stiff to very stiff, moist and mottled grey and brown;
- Occasional thin, wet, sand seams were noted within a portion of the test holes;
- Clay extended to depths varying from 0.6m to 3.1m below the existing ground surface;
- Groundwater levels at each of the test holes were measured at varying depths from 1.2m to 10.1; however, levels can vary substantially in response to seasonal factors and precipitation;
- Clay fill, which will ultimately be used for fill construction is moderate to highly erodible material and relatively pervious with respect to surface infiltration from pavement runoffs;
- Numerous natural wetlands reside within this area with specific plant types residing which indicate permanently or temporarily inundated soils.
- Low lying areas would also indicate deeper than expected topsoil adjacent to 17 Street, specifically on its east side. Topsoil was encountered in most test holes and thicknesses ranged from 210mm to 275mm. Topsoil mixed with clay (or unsuitable materials) ranged in thicknesses between 335mm to 450mm.
- Additional shallow test holes or test pits were recommended to be conducted to confirm topsoil thicknesses; and
- Slow moving area groundwater was interpreted to flow generally to the north-northeast, although there was an easterly component to flow in the southern portion of the site.

Maple Ridge Area (Various) – The following desktop studies in report form were reviewed for their applicability in highlighting the existing regional geotechnical / topography conditions specific to the Maple Ridge Area (between Sherwood Park Freeway and Whitemud Drive) along the 17 Street corridor:

- *Maple Ridge Natural Area – Limited Natural Site Assessment* (UMA, 2002);
- *Maple Ridge Area Master Plan Amendment* (Focus, 2009);
- *Maple Neighborhood Structure Plan* (City of Edmonton, Planning and Development Department, 2010); and
- *Maple Ridge Industrial Area Structure Plan* (Focus, 2010).

Although these specific plans were instrumental in creating a comprehensive plan for how the area is to be implemented, they only help to characterize the general geotechnical make-up of the area. The following items assist in describing in general terms some of the observed existing conditions:

- The area soils are generally characterized by tills made up of sand and clay, which is overlaying glacial sand and gravel, which are typical of the Edmonton region as a whole;
- The upland soils have been characterized as Angus Ridge Loam, an eluviated black chernozemic soil that typically develops on glacial till;
- The area is underlain by glaciolacustrine sediments with pebbles and till-like layers, overlying glacial till consisting of clay, silt, and sand with pebbles, coal and gravel. This is then underlain by bedrock (consisting of bentonitic shales and sandstones, with numerous coal seams) of the Edmonton formation;
- The native clay subgrade support conditions are generally favourable for conventional trench excavation procedures and most construction purposes;
- It is expected that the native near-surface clay and till soils could be graded and placed using conventional equipment and procedures;

17 Street Functional Planning Study

North of Whitemud Drive to Knightsbridge Road (105 Avenue)

- Engineered fill will likely be required to obtain design grades; and
- Local areas of thick sand or poor conditions may be encountered. Thicker sand deposits should be expected in the northeast and southwest parts of the study area.

5.8.2 Pavement Structure Analysis

The assumed pavement structure for upgrading the entire 17 Street corridor is based upon typical City of Edmonton standards for arterial roadways (the County section will match accordingly) and has been utilized within the context of this study according to the following:

- *100mm ACO over 100mm ACB over 350mm GBC over 150mm Cement Stabilized Subgrade.*

However, due to the significant amount of truck traffic anticipated throughout the corridor and past experience with other similar roadway upgrades of a similar nature, a recommended pavement structure to consider would be as follows:

- *80mm ACO over 120 ACB over 300mm GBC over 200mm Pit-Run (recycled granulars) over 150mm – 300mm Cement Stabilized Subgrade.*

As was stated previously, no specific geotechnical or pavement structure analysis was specifically performed for this study; however, future testings / investigations are recommended beyond the scope of this concept planning assignment. Pavement structure and details should be determined during the design phases, based on borehole results and a complete geotechnical study, rather than this overview.

5.9 STORMWATER MANAGEMENT

A review of the storm water drainage basins and discharge locations resulted in three distinct basins (Fulton Creek, Wetland and Gold Bar Creek). Each of these basins will be required to meet the requirements identified in this section. A storm water report for each drainage basin will be required at the time of detailed design to determine the amount of surface run-off from 17 Street.

The Maple Ridge Area Master Plan Amendment – Final Report, Revised November 2009 by Focus identifies the proposed storm water servicing concepts for the Maple Ridge area. 17 Street from Whitemud Drive to the Sherwood Park Freeway is included in the study area of this report. The report identifies in Section 4.2 Existing Drainage System, that storm water requirements are dependent on the size of the undeveloped parcel. Parcels less than 10 hectares (which is the case for all three drainage basins along 17 Street) will be required to control discharge to 35 L/s/ha for the 1:100 year rainfall, however it is preferred from a cost perspective that the minor system for the roadway be designed for the 1:5 year event. The proposed storm water drainage concepts presented in this technical memorandum have incorporated the information contained in the report.

The proposed drainage system within Strathcona County (from the Sherwood Park Freeway to Knightsbridge Road) is proposed to be conveyed by surface drainage. As there are no anticipated piped systems, a restricted run-off rate is not proposed.

The storm systems will need to be designed with consideration for both the minor system and the major system. The minor system consists of the pipe network, curbs and gutters, and inlets that provide rapid conveyance of the storm run-off from road surfaces during minor rainfall events (the 1:5 year storm).

17 Street Functional Planning Study

North of Whitemud Drive to Knightsbridge Road (105 Avenue)

The major system conveys run-off rates and volumes for rainfall events up to the 1:100 year storm. The run-off from these events exceeds the capacity of the piped systems and thus will consist mainly of overland drainage conveyance.

The detailed storm water design will need to ensure that the minor system design and major system design adheres to the City of Edmonton and Strathcona County's current edition of the Sewer Design Standards and Guidelines. These guidelines identify the detailed design criteria including but not limited to the spacing requirements for catch basins, inlets and manholes, minimum pipe velocity requirements, allowable ponding depths, approved pipe materials, and allowable pipe depths. The attached drawings show the conceptual storm pipe network, inlets/catch basins and discharge locations. The storm mains will be located within the road right of way, but have been schematically shown outside the right of way for clarity on the drawings.

The set of drainage concept plans (11) are located at the end of this section and represent **Figure 5-8**.

All future development on 17 Street, including the provision for drainage should consider the roadway in the context of the overall drainage, realizing opportunities to jointly use stormwater management facilities and piping systems.

5.9.1 *Whitemud (Fulton Creek Wetland) Drainage Basin*

The Whitemud Drainage Basin incorporates 17 Street between Whitemud Drive and the Canadian National Railway (located approximately 120m north of 51 Avenue). The area considered starts approximately 70m north of the north property line of the Whitemud Drive. The approximate length of road is 575m. Within this section, a 6-lane urban road cross section is proposed with a 44m road right of way. The affected area is 2.53 hectares which results in a maximum discharge rate of approximately 89 L/s.

Drainage would flow north from Whitemud Drive to the railway crossing. At the intersection of 51 Avenue, catch basins and catch basin leads would be installed. The storm water collected would be conveyed through a storm main located along the east side of 17 Street (located within the 17 Street right of way) which would convey the water northward. Additional catch basins would be located where required to meet the design standards including the future development access. The 17 Street storm main would ultimately cross the rail crossing, connecting to the proposed storm main that will be installed along Roper Road

The Whitemud Drive interchange and piping is being undertaken by another engineering consultant. As such, the City of Edmonton will need to communicate the proposed drainage concept and flow requirements to the this selected consultant to ensure adequate capacity is provided within the system downstream of the proposed connection point.

Recent upgrades on 17 Street (north of Whitemud Drive) included a drainage design (Aecom, 2012) for widening, which included the construction of pipe on the east side of 17 Street, discharging the stormwater north to Fulton Creek in existing and modified ditches south of the CN Rail crossing. Included with this work was the installation of a 1200mm culvert under the crossing. Although with a fully urbanized storm system in the future, this culvert may be abandoned, the recently constructed storm pipes may be utilized with future widening on 17 Street.

17 Street Functional Planning Study

North of Whitemud Drive to Knightsbridge Road (105 Avenue)

The current concept assumes that any required storm water treatment is provided downstream of the proposed connection point. Additionally, off-stream storage to reduce or minimize the discharge flows has not been considered as it is assumed that the downstream piping can handle the 89 L/s flow rate.

5.9.2 *Fulton Creek Drainage Basin*

The Fulton Creek Drainage Basin incorporates 17 Street between the Canadian National Railway to approximately 160m north of the north property line of Roper Road. The approximate length of road is 820m. Within this section, a 6-lane urban road cross section is proposed with a 44m road right of way. The affected area is 3.61 hectares which results in a maximum discharge rate of approximately 126 L/s.

Drainage would flow north from the railway to Roper Road. The first set of catch basins would be located near the existing access just north of the railway and would flow into a proposed storm main located on the south side of 17 Street. The storm main would be installed to Roper Road with a number of catch basins located along 17 Street as required to meet the design standards. At Roper Road, the storm main would flow west along Roper Road with ultimate discharge into the future Fulton Creek Storm Water Management Facility (by others).

The storm water from 160m north of Roper Road would flow overland southward to the Roper Road intersection. At the intersection of Roper Road, catch basins and catch basin leads would be installed to pick up the overland drainage and convey the water to the proposed storm main on Roper Road.

In order to restrict flows to the allowable 35 L/s/ha flow rate, it is anticipated that the storm mains may need to be oversized to allow for storage or alternatively that off-stream underground storage chambers be provided.

As the storm water from this section of 17 Street will ultimately discharge to a future storm water management facility, storm water treatment is not provided. The Fulton Creek facility should be designed to accommodate treatment of all storm water entering the facility. This Fulton Creek system does ultimately connect with the Pylypow stormwater management facility (34 Street) and this facility has been design to manage the water from this basin (City of Edmonton, Drainage Services).

5.9.3 *Wetland Drainage Basin*

The Wetland Drainage Basin incorporates 17 Street from approximately 160m north of the north property line of Roper Road to approximately 65m north of the north property line of 66 Avenue. The approximate length of road is 840m.

Within this section, a 4-lane urban road cross section is proposed with a 37m road right of way. Although the majority of the roadway will be an urban section, it is proposed that a conveyance ditch also be provided on the west side of the roadway. The affected area is 3.11 hectares which results in a maximum discharge rate of approximately 109 L/s.

Drainage would flow northward from approximately 160m north of Roper Road to Maple Ridge Drive. Catch basins would be installed as required to meet the standards. The storm water from the catch basins would flow into a proposed storm main located on the south side of 17 Street. The storm main would discharge to the wetland located on the north side of 17 Street.

17 Street Functional Planning Study

North of Whitemud Drive to Knightsbridge Road (105 Avenue)

The storm water from approximately 65m north of 66 Avenue would flow southward toward Maple Ridge Drive. Again, catch basins would be located at intersection and at proper spacing to meet the design standards. The catch basins would be connected to a storm main located on the south side of 17 Street. The storm main would discharge to the wetland located on the north side of 17 Street.

As the storm water from this section of 17 Street will ultimately discharge to an existing wetland, storm water treatment from the piped system is recommended prior to discharge. Treatment would consist of typical oil/grit separators used in the market place, such as Stormceptor and Vortechs units. Storm water from the ditch system should not require treatment as it will undergo natural filtration through the ditch system.

This wetland does ultimately outlet to Fulton Creek and the Pylypow Stormwater management Facility through a series of ditches and culverts, that would be utilized in a major storm event, should the water levels exceed the capacity of the wetland.

5.9.4 Gold Bar Creek Drainage Basin

The Gold Bar Creek Drainage Basin incorporates 17 Street from approximately 65m north of the north property line of 66 Avenue to 77 Avenue. The approximate length of road is 1,110m. Within this section, a 4-lane urban road cross section is proposed with a 37m road right of way. The affected area is 4.11 hectares which results in a maximum discharge rate of approximately 144 L/s.

The proposed drainage concept would flow northward from approximately 65 meters north of 66 Avenue to 76 Avenue. Catch basins would be installed as required to meet the standards. The storm water from the catch basins would flow into a proposed storm main located on the south side of 17 Street. The storm main would connect to a proposed storm main that would be installed west on 76 Avenue. The storm main would head west on 76 Avenue to 25 Street where the main would be installed north on 25 Street. The main would ultimately discharge into Gold Bar Creek.

As the storm water from this section of 17th Street will ultimately discharge to Gold Bar Creek, storm water treatment from the piped system is recommended prior to discharge. Treatment would consist of typical oil/grit separators used in the market place. In order to restrict flows to the allowable 35 L/s/ha flow rate, it is anticipated that the storm mains may need to be oversized to allow for storage or alternatively that off-stream underground storage chambers be provided.

5.9.5 Strathcona County Drainage Basin

The Strathcona County Drainage Basin incorporates 17 Street from the Sherwood Park Freeway to Knightsbridge Avenue. The approximate length of road is 3,000m. As outfall from the 17 Street corridor is problematic to the North Saskatchewan River due to existing utilities and natural terrain, the drainage system for 17 Street is being planned without a primary discharge, rather with the plan to manage stormwater within the right-of-way as well as utilize existing low spots for storage facilities.

Within this section, a 4-lane urban road cross section is proposed with a 50m road right of way. However, the cross section will provide for drainage ditches on both sides of 17 Street as compared with underground storm sewer. The west side ditch will be a more standard ditch cross section, used to convey water to storage facilities, with natural filtration and absorption. The east side ditch is planned to be wider, with a varying bottom width (1.5 – 3.5m) to hold and absorb water. This type of ditch is

17 Street Functional Planning Study

North of Whitemud Drive to Knightsbridge Road (105 Avenue)

commonly referred to as a “bio-swale”. The east side ditch will also connect to stormwater management facilities to accommodate water for major storm events. Drainage would be picked up via catch basins at the required spacing to meet the design standards. The catch basins would discharge directly into the proposed ditches on either side of 17 Street

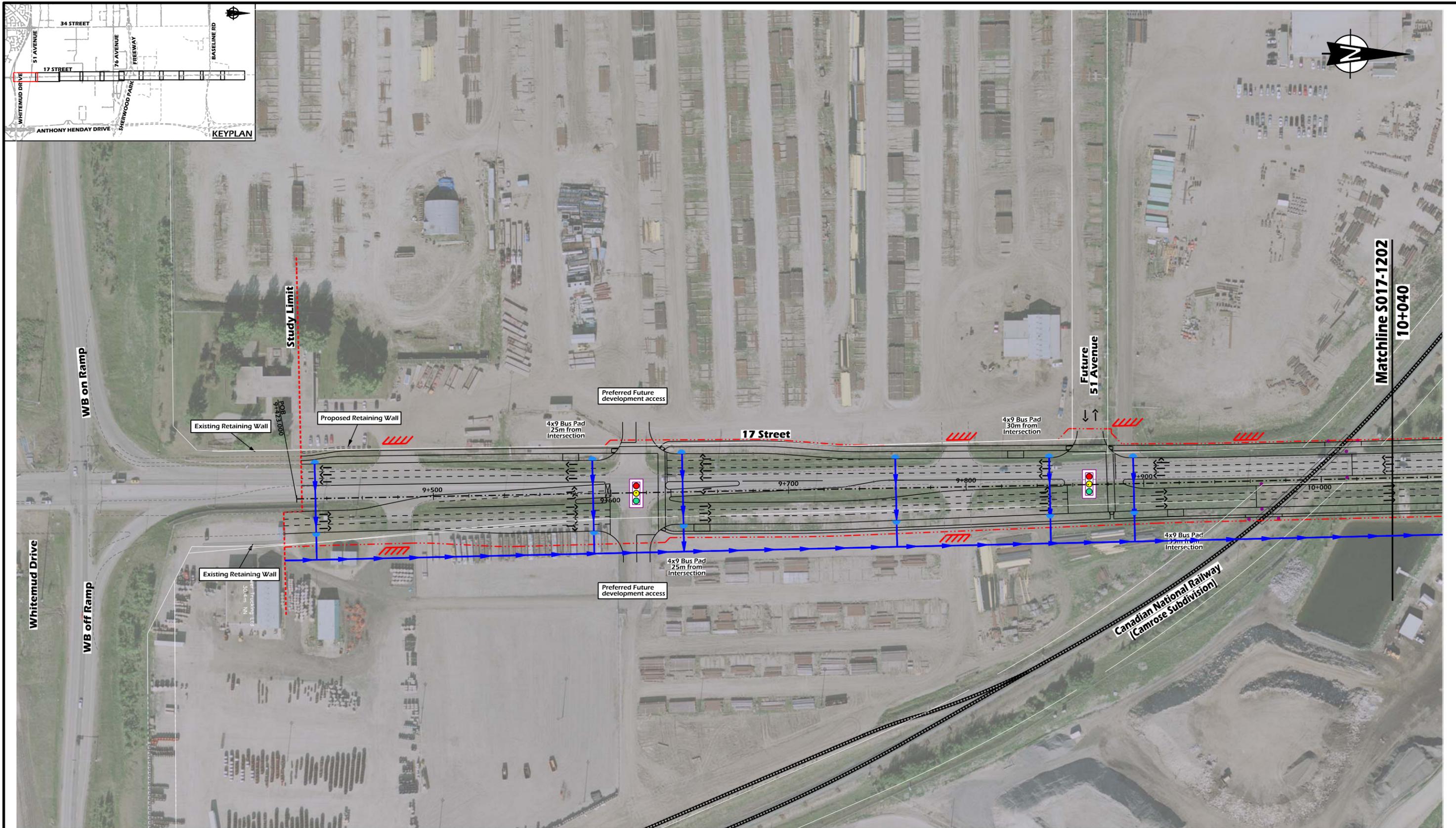
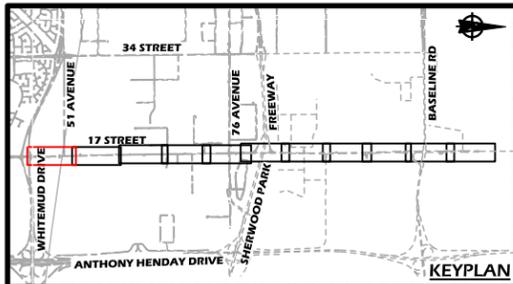
There are three proposed discharge locations for the ditches where wetlands presently exist as follows:

- East side of 17 Street just north of the Sherwood Park Freeway (this location ultimately connects within the Gold Bar Creek Basin) however it is interrupted by the Interchange at 17 Street and Sherwood park Freeway
- West side of 17 Street across from Envirofuels Refinery
- East side of 17 Street just north of Railway Avenue

Additionally, there is an existing low point on the east side of 17 Street just south of Baseline Road. Storm water would flow to this location and the area would act as an evaporation pond. There is minimal area that will drain to this location and it is expected that the area will be able to handle the minor increase in volume.

There will be a second discharge location for the area north of Baseline road. The east ditch will convey the flow northward and ultimately discharge north towards the Canadian Pacific Railway right of way. This is where the current storm water is also conveyed. Discussions with Canadian Pacific Railway will be required to receive approval to discharge increased flow into their right of way. Should approval be problematic, a control structure could be installed in the ditch to restrict the flow to predevelopment rates. The ditch would then act a small detention area for the storm water.

As natural filtration will occur within the ditches, no treatment of storm water is proposed through this section of 17 Street.



LEGEND

- Proposed Right of Way
- Proposed Roadway
- Railway
- Access Closure
- 4x9 Bus Stop Pad
- Catch Basin
- Underground Culvert
- Culvert Outlet
- Open Ditch

DESIGN SPEED = 70 km/h
POSTED SPEED = 60 km/h

Note: Road dimensions for the City of Edmonton are to the Face of Curb

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THE CITY OF
Edmonton TRANSPORTATION SERVICES

STRATHCONA COUNTY

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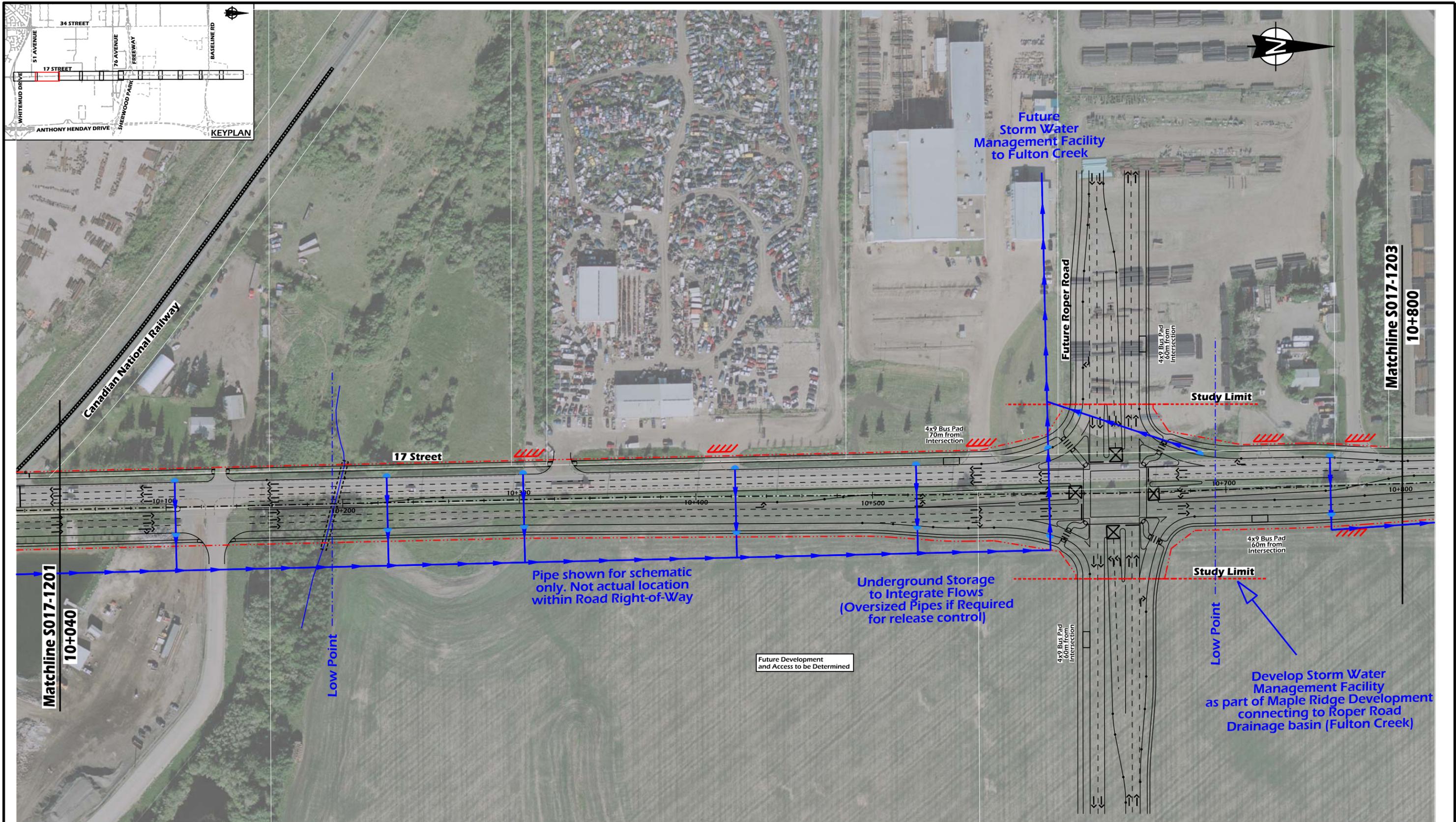
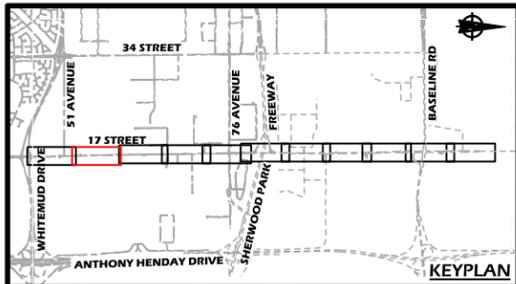
CONCEPT - SUBJECT TO PRELIMINARY SURVEY AND DESIGN

Figure 5-8
17 Street, Whitemud Dr to Knightsbridge Rd
Conceptual Drainage Plan

20m 0 40m

DRAWN: TD
REVIEWED:
DATE: 2013.04.09

PLAN NO.
S017-1201



LEGEND

- Proposed Right of Way
- Proposed Roadway
- Railway
- Access Closure
- 4x9 Bus Stop Pad
- Catch Basin
- Underground Culvert
- Culvert Outlet
- Open Ditch

DESIGN SPEED = 70 km/h
POSTED SPEED = 60 km/h

Note:
Road dimensions for the City of
Edmonton are to the Face of Curb

McElhanney
Consulting Services Ltd.

THE CITY OF
Edmonton TRANSPORTATION SERVICES

STRATHCONA
COUNTY

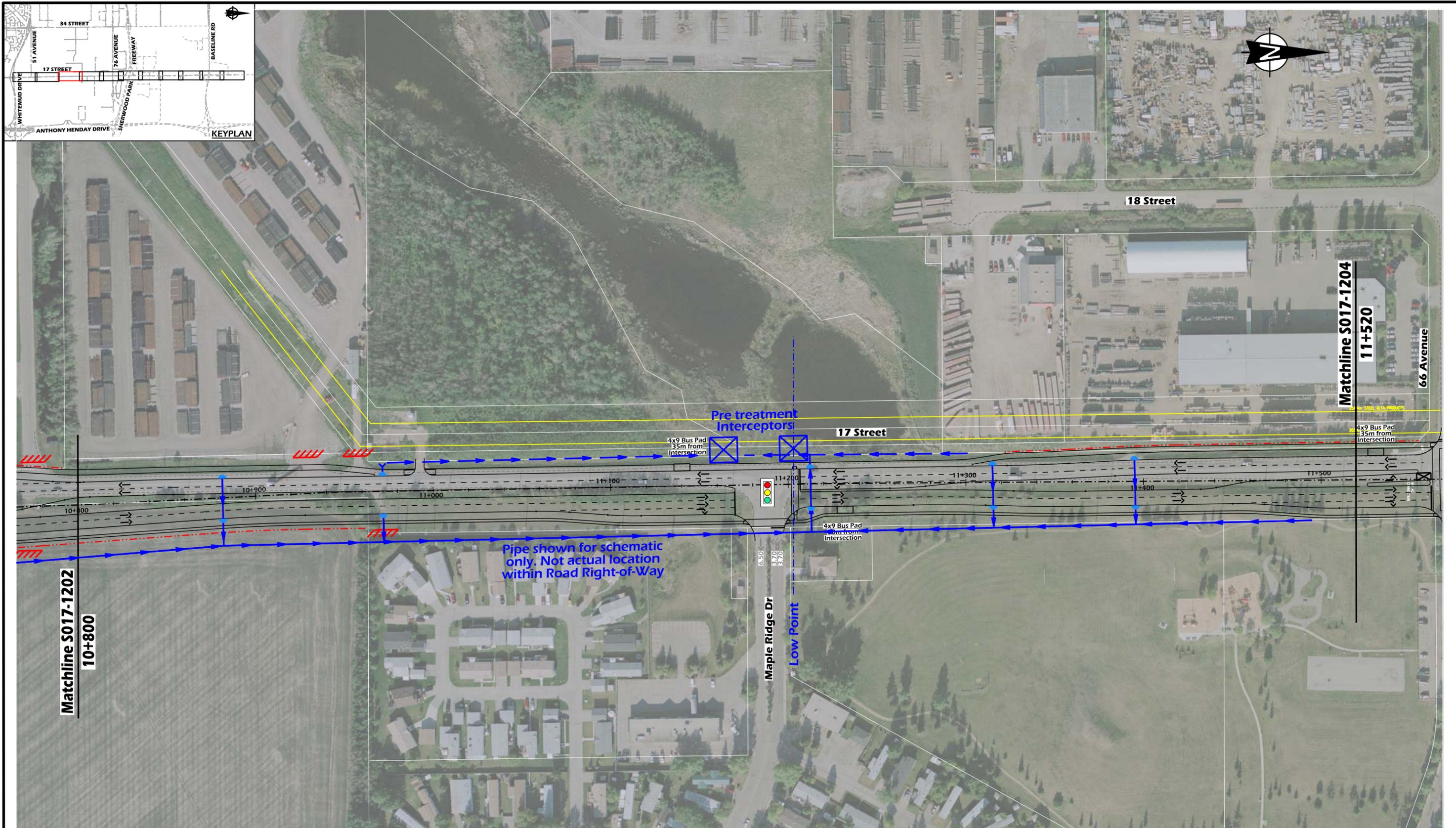
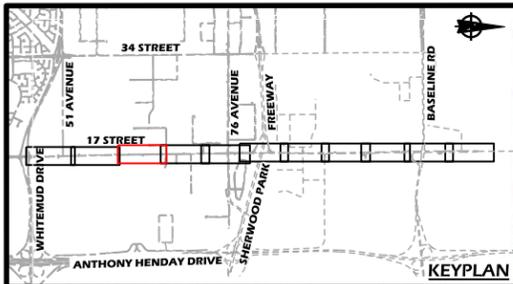
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CONCEPT - SUBJECT TO PRELIMINARY SURVEY AND DESIGN

Figure 5-8
17 Street, Whitemud Dr to Knightsbridge Rd
Conceptual Drainage Plan

DRAWN: TD
REVIEWED:
DATE: 2013.04.09

PLAN NO.
S017-1202



- Proposed Right of Way
- Proposed Roadway
- Railway
- Access Closure
- 4x9 Bus Stop Pad

- Catch Basin
- Underground Culvert
- Culvert Outlet
- Open Ditch

DESIGN SPEED = 70 km/h
POSTED SPEED = 60 km/h

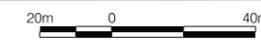
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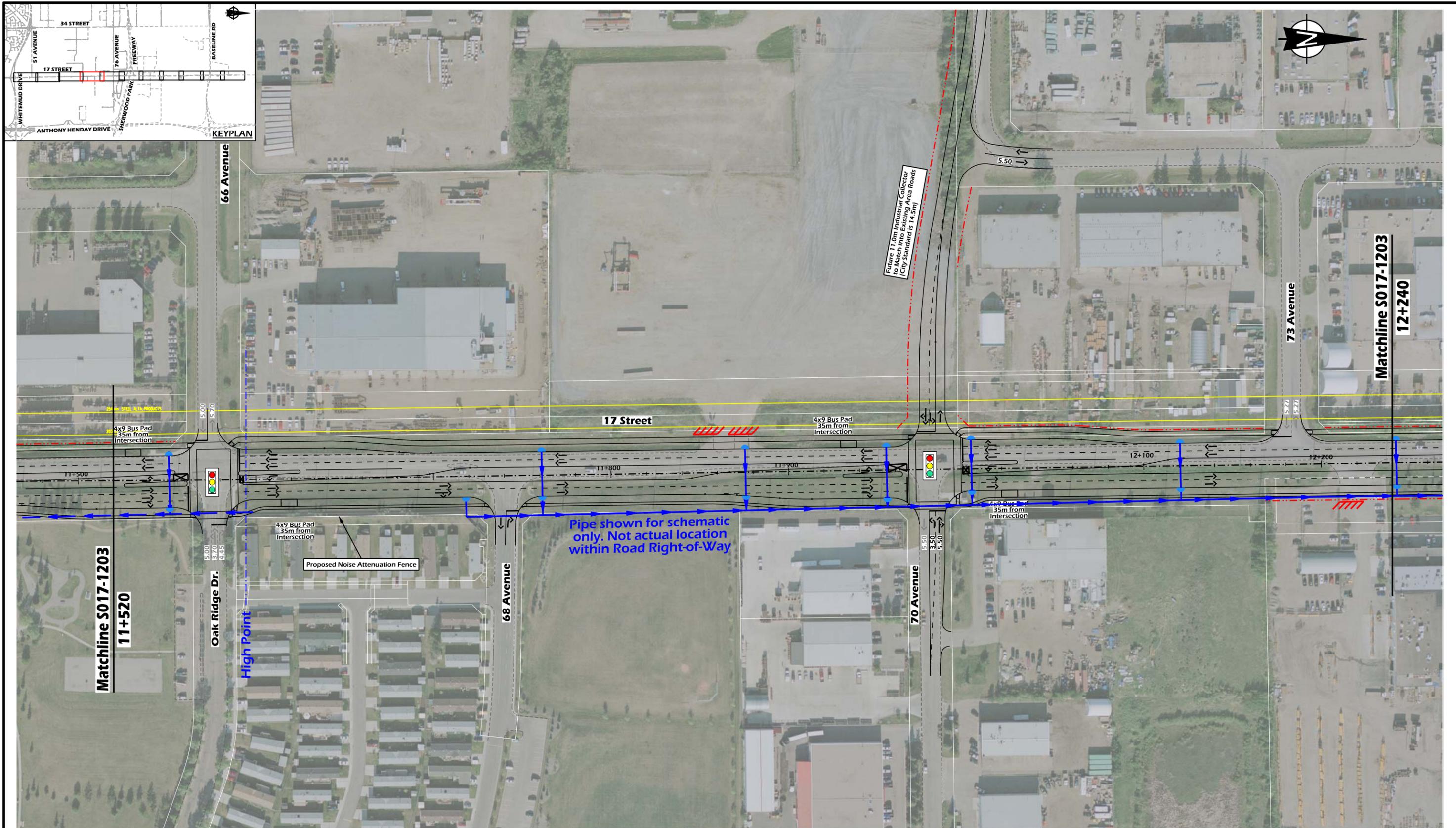
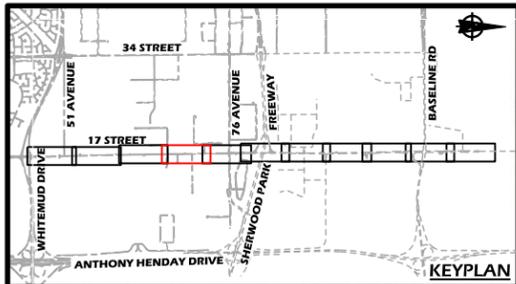
CONCEPT - SUBJECT TO PRELIMINARY SURVEY AND DESIGN

Figure 5-8
17 Street, Whitemud Dr to Knightsbridge Rd
Conceptual Drainage Plan



DRAWN: TD
REVIEWED:
DATE: 2013 04 09

PLAN NO.
S017-1203



LEGEND

- Proposed Right of Way
- Proposed Roadway
- Railway
- Access Closure
- 4x9 Bus Stop Pad
- Catch Basin
- Underground Culvert
- Culvert Outlet
- Open Ditch

DESIGN SPEED = 70 km/h
POSTED SPEED = 60 km/h

Note: Road dimensions for the City of Edmonton are to the Face of Curb

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COUNTY

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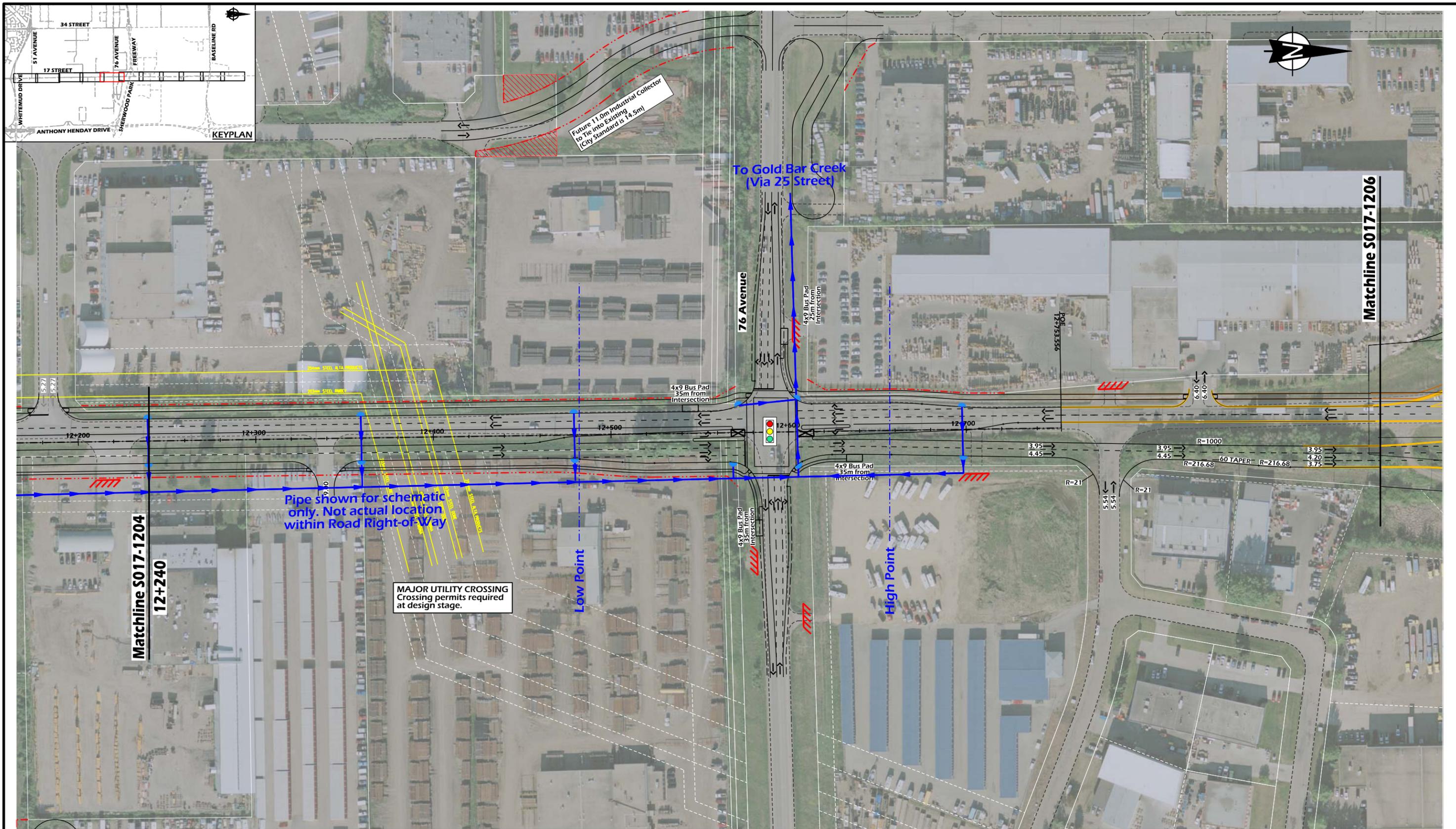
CONCEPT - SUBJECT TO PRELIMINARY SURVEY AND DESIGN

Figure 5-8
17 Street, Whitemud Dr to Knightsbridge Rd
Conceptual Drainage Plan

20m 0 40m

DRAWN: TD
REVIEWED:
DATE: 2013 04 09

PLAN NO.
S017-1204



LEGEND

	Proposed Right of Way
	Proposed Roadway
	Railway
	Access Closure
	4x9 Bus Stop Pad

	Catch Basin
	Underground Culvert
	Culvert Outlet
	Open Ditch

DESIGN SPEED = 70 km/h
 POSTED SPEED = 60 km/h

Note: Road dimensions for the City of Edmonton are to the Face of Curb



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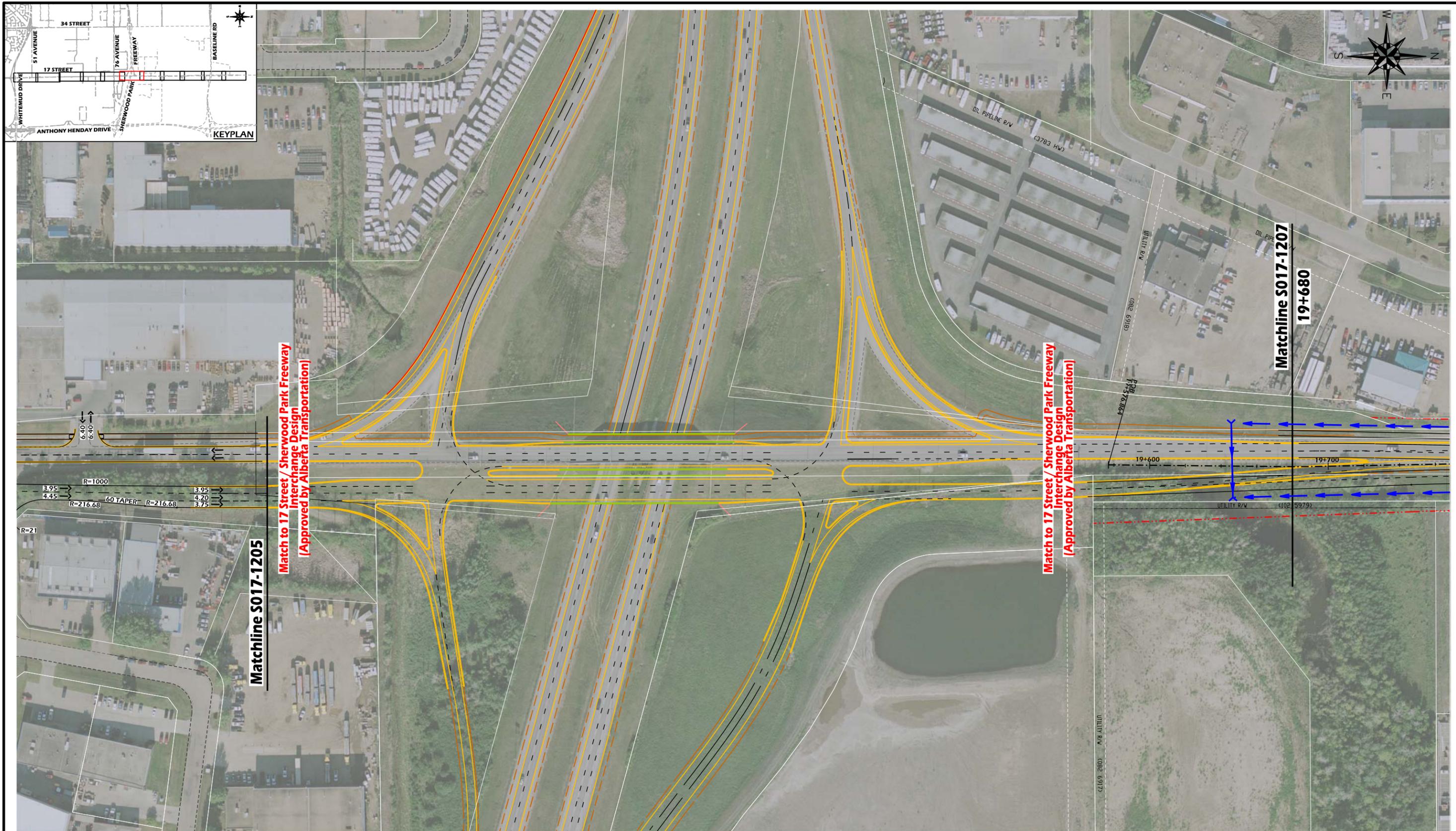
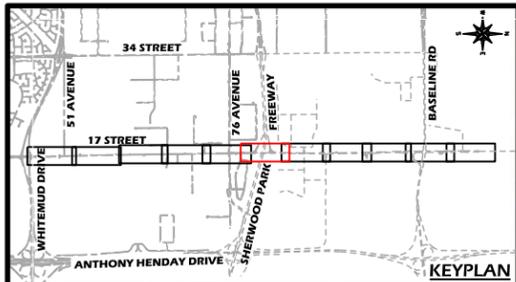
CONCEPT - SUBJECT TO PRELIMINARY SURVEY AND DESIGN

Figure 5-8
 17 Street, Whitemud Dr to Knightsbridge Rd
 Conceptual Drainage Plan



DRAWN: TD
 REVIEWED:
 DATE: 2013 04 09

PLAN NO.
S017-1205



LEGEND

	Proposed Right of Way
	Proposed Roadway
	Railway
	Access Closure
	Catch Basin
	Underground Culvert
	Culvert Outlet
	Open Ditch
	4x9 Bus Stop Pad

DESIGN SPEED = 70 km/h
POSTED SPEED = 60 km/h

Note: Road dimensions for the City of Edmonton are to the Face of Curb



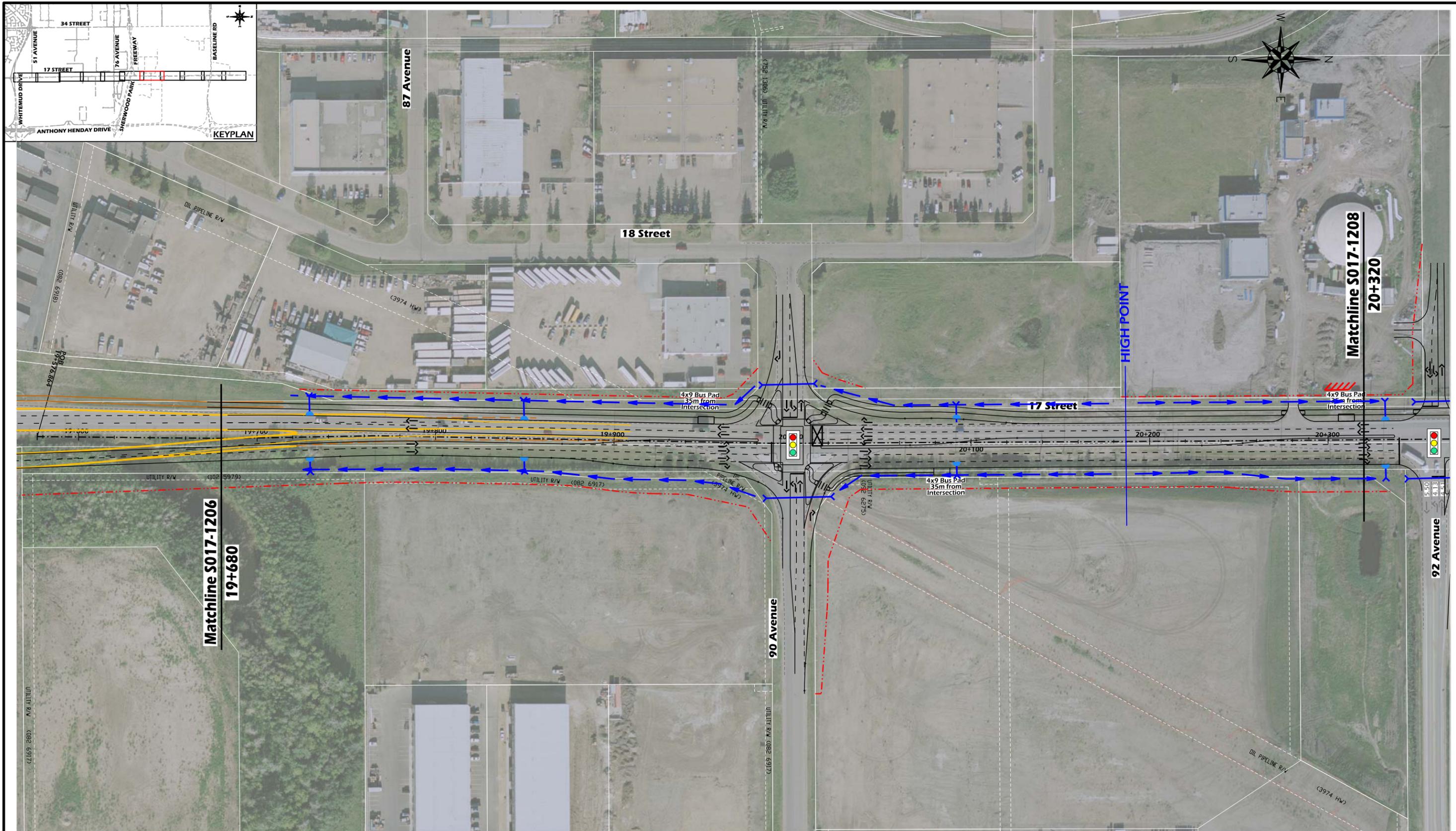
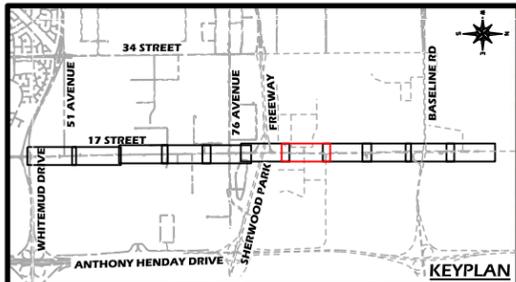
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SCALE (m):		COORDINATES:	
Horz: 1:1000		DATE: Dec 18, 2012	
PROJECT LOCATION: 17 St from Sherwood Park Freeway to Knightsbridge Ave			
SURVEY BY:		DRAWN BY: Tony Dealhoj	
DESIGN BY: Tony Dealhoj		CHECKED BY: Andy Health	
APPROVED BY: Ryan Belker		PROJECT MANAGER: Tony Moghee	
DRAWING/PROJECT No.:		REV. No.:	
S017-1206		SHEET No.:	
		S017-1206	

CONCEPT - SUBJECT TO PRELIMINARY SURVEY AND DESIGN

Figure 5-8
17 Street, Whitemud Dr to Knightsbridge Rd
Conceptual Drainage Plan

CAPITAL PLANNING AND CONSTRUCTION
2001 SHERWOOD DRIVE SHERWOOD PARK, ALBERTA, T8A 3W7



LEGEND

- Proposed Right of Way
- Proposed Roadway
- Railway
- Access Closure
- Catch Basin
- Underground Culvert
- Culvert Outlet
- Open Ditch
- 4x9 Bus Stop Pad

DESIGN SPEED = 70 km/h
POSTED SPEED = 60 km/h

Note: Road dimensions for the City of Edmonton are to the Face of Curb

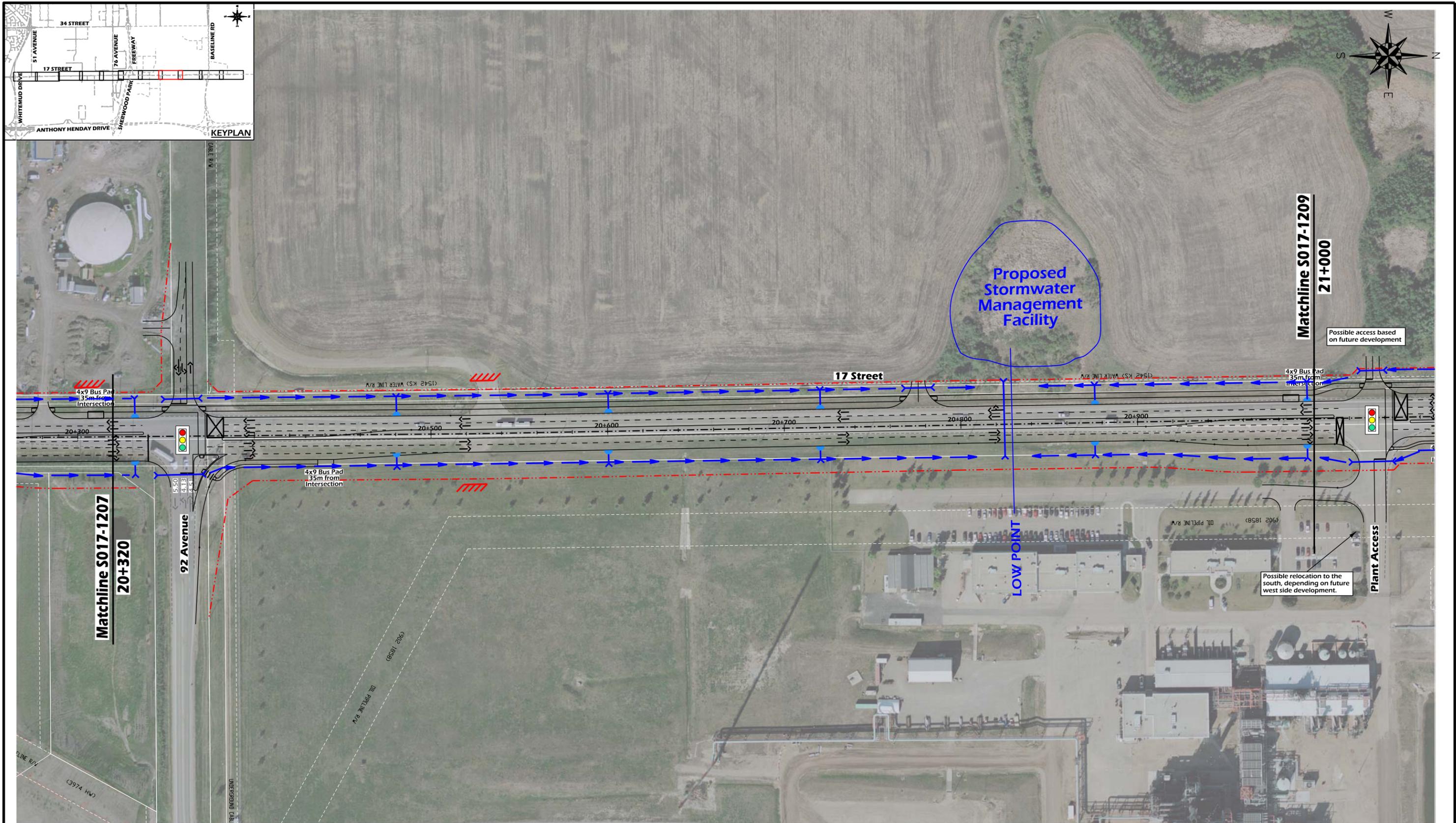
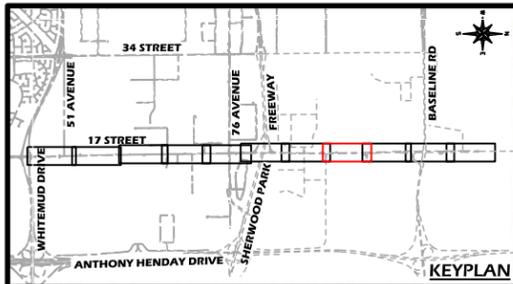
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COORDINATES:		DATE: Dec 18, 2012	
PROJECT LOCATION: 17 St from Sherwood Park Freeway to Knightsbridge Ave		CONTOUR INTERVAL:	
SURVEY BY:	DESIGNED BY:	CHECKED BY:	PROJECT MANAGER:
DESIGN BY: Tony Dealhoy	APPROVED BY: Ryan Belker	PROJECT MANAGER: Tony Moghee	
DRAWING/PROJECT No.:	REV. No.:	SHEET No.:	
		S017-1207	

CONCEPT - SUBJECT TO PRELIMINARY SURVEY AND DESIGN

Figure 5-8
17 St, Whitemud Dr to Knightsbridge Rd
Conceptual Drainage Plan

CAPITAL PLANNING AND CONSTRUCTION
2001 SHERWOOD DRIVE SHERWOOD PARK, ALBERTA, T8A 3W7



LEGEND

- Proposed Right of Way
- Proposed Roadway
- Railway
- Access Closure
- Catch Basin
- Underground Culvert
- Culvert Outlet
- Open Ditch
- 4x9 Bus Stop Pad

DESIGN SPEED = 70 km/h
POSTED SPEED = 60 km/h

Note:
Road dimensions for the City of
Edmonton are to the Face of Curb

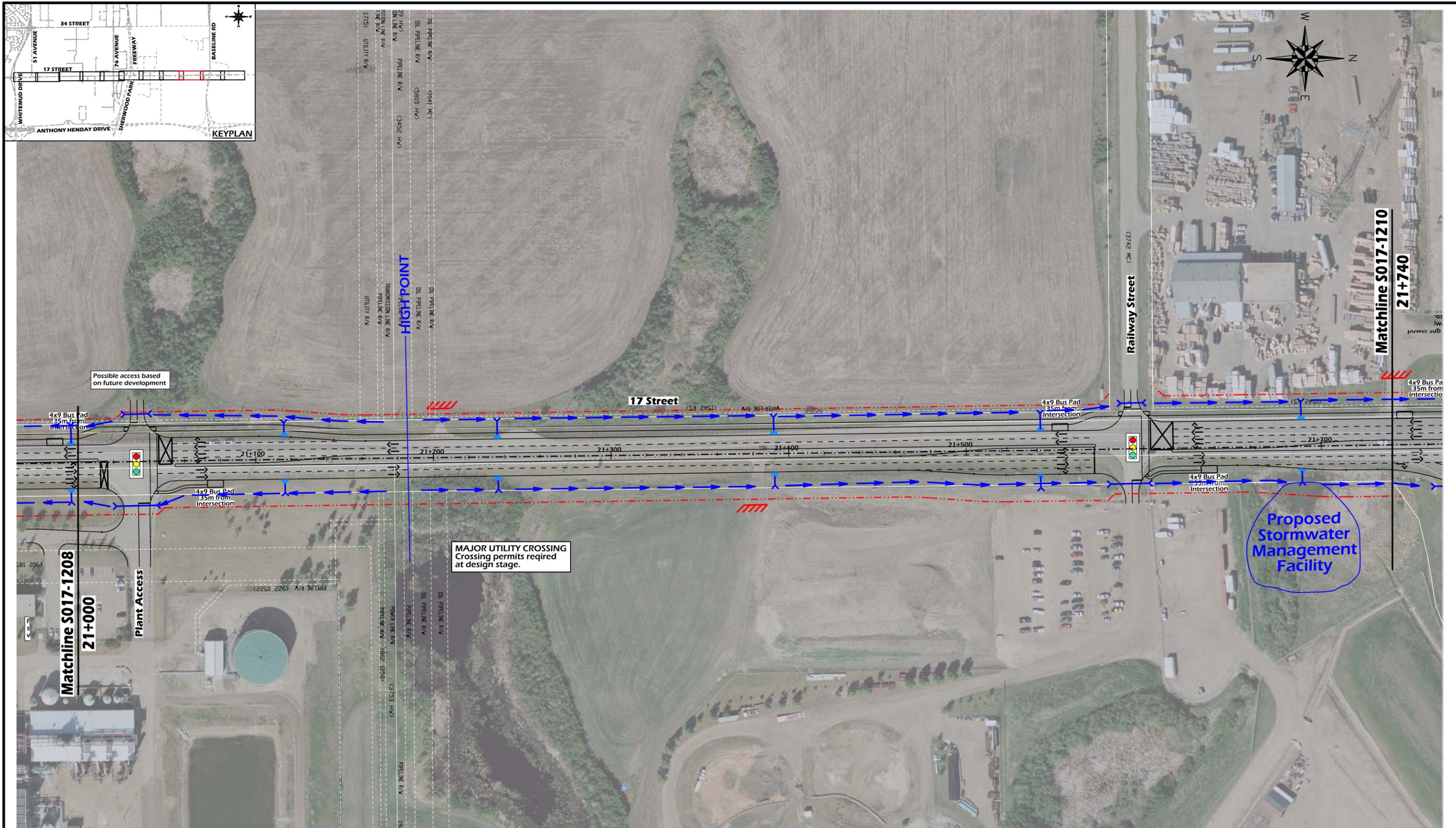
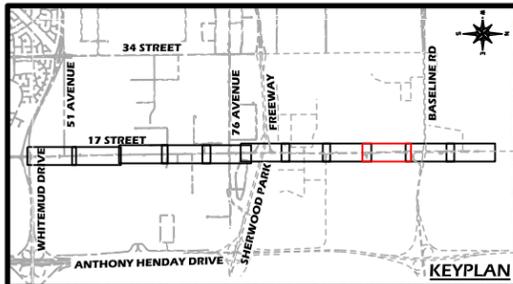
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PROJECT LOCATION: 17 St from Sherwood Park Freeway to Knightsbridge Ave		CONTOUR INTERVAL:	
SURVEY BY: TD	DRAWN BY: TD		
DESIGN BY: TD	CHECKED BY: AH		
APPROVED BY: RB	PROJECT MANAGER:		
DRAWING/PROJECT No.:	REV. No.:	SHEET No.:	S017-1208

CONCEPT - SUBJECT TO PRELIMINARY SURVEY AND DESIGN

Figure 5-8

17 Street, Whitemud Dr to Knightsbridge Rd
Conceptual Drainage Plan

CAPITAL PLANNING AND CONSTRUCTION
2001 SHERWOOD DRIVE SHERWOOD PARK, ALBERTA, T8A 3W7



LEGEND

- Proposed Right of Way
- Proposed Roadway
- Railway
- Access Closure
- Catch Basin
- Underground Culvert
- Culvert Outlet
- Open Ditch
- 4x9 Bus Stop Pad

DESIGN SPEED = 70 km/h
POSTED SPEED = 60 km/h

Note: Road dimensions for the City of Edmonton are to the Face of Curb

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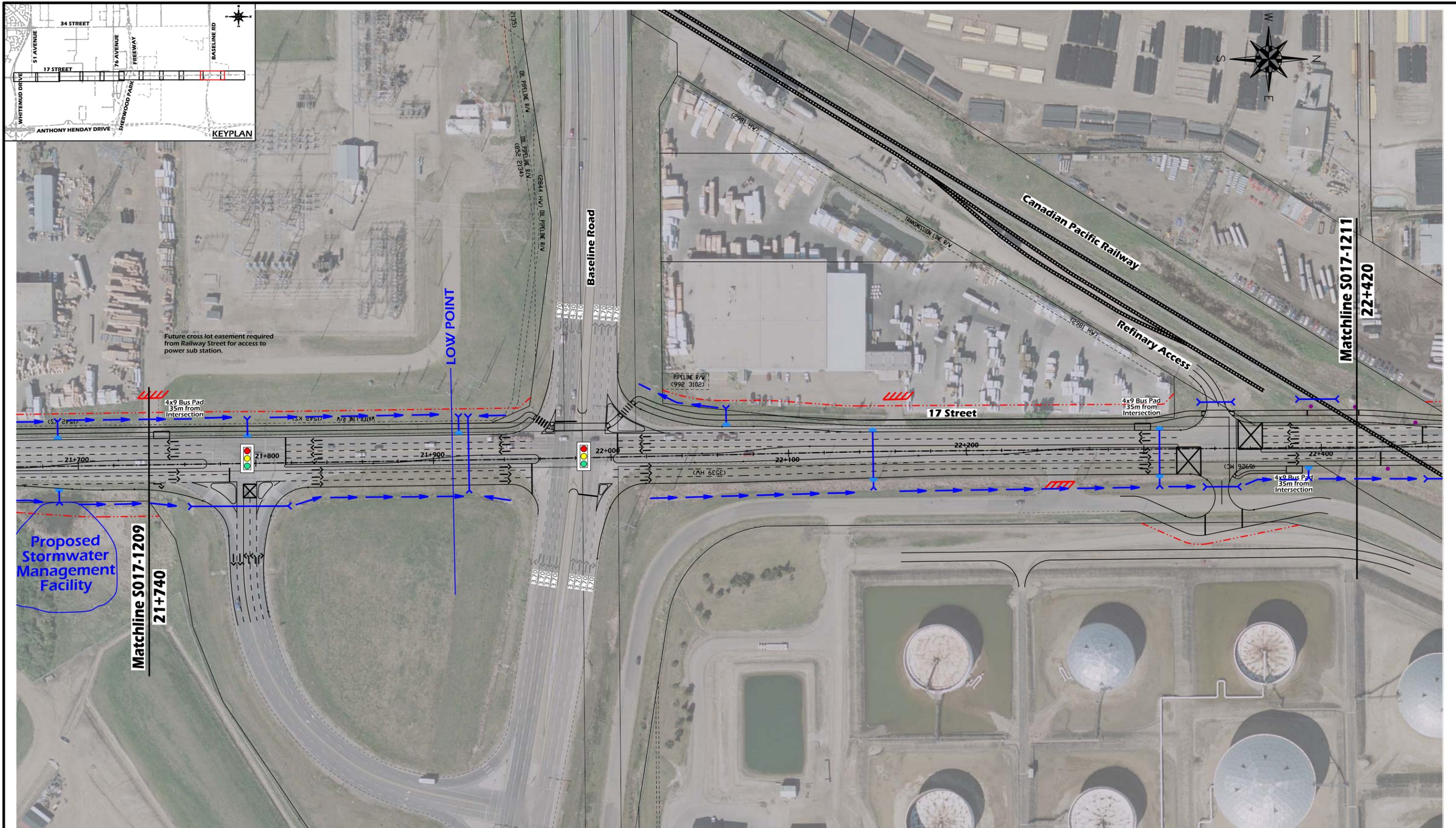
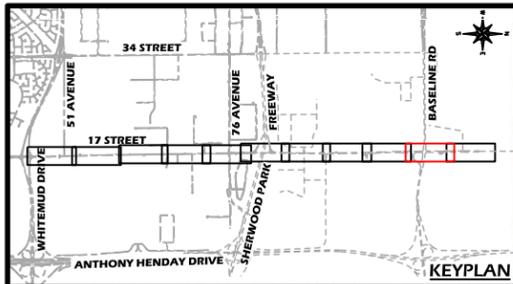
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SURVEY BY:	DRAWN BY: TD	CHECKED BY: AH	
DESIGN BY: TD	APPROVED BY: RB	PROJECT MANAGER:	
DRAWING/PROJECT No.:	REV. No.:	SHEET No.: S017-1209	

CONCEPT - SUBJECT TO PRELIMINARY SURVEY AND DESIGN

Figure 5-8

17 Street, Whitemud Dr to Knightsbridge Rd
Conceptual Drainage Plan

CAPITAL PLANNING AND CONSTRUCTION
2001 SHERWOOD DRIVE SHERWOOD PARK, ALBERTA, T8A 3W7



LEGEND

- - - - - Proposed Right of Way
- - - - - Proposed Roadway
- - - - - Railway
- ||||| Access Closure
- () Catch Basin
- () Underground Culvert
- () Culvert Outlet
- () Open Ditch
- () 4x9 Bus Stop Pad

DESIGN SPEED = 70 km/h
 POSTED SPEED = 60 km/h

Note:
Road dimensions for the City of Edmonton are to the Face of Curb

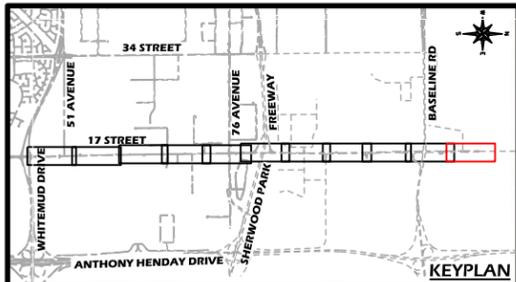
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PROJECT LOCATION: 17 St from Sherwood Park Freeway to Knightsbridge Ave			
SURVEY BY:	DRAWN BY: TD		
DESIGN BY: TD	CHECKED BY: AH		
APPROVED BY: RB	PROJECT MANAGER:		
DRAWING/PROJECT No.:	REV. No.:	SHEET No.: S017-1210	

CONCEPT - SUBJECT TO PRELIMINARY SURVEY AND DESIGN

Figure 5-8

17 Street, Whitemud Dr to Knightsbridge Rd
Conceptual Drainage Plan

CAPITAL PLANNING AND CONSTRUCTION
2001 SHERWOOD DRIVE SHERWOOD PARK, ALBERTA, T8A 3W7



LEGEND	
	Proposed Right of Way
	Proposed Roadway
	Railway
	Access Closure
	Catch Basin
	Underground Culvert
	Undercut Outlet
	Open Ditch
	4x9 Bus Stop Pad

DESIGN SPEED = 70 km/h
 POSTED SPEED = 60 km/h

Note:
 Road dimensions for the City of
 Edmonton are to the Face of Curb



DATUM:	AIR PHOTO:
PROJECTION:	SCALE FACTOR:
COORDINATES:	DATE: Dec 18, 2012
PROJECT LOCATION: 17 St from Sherwood Park Freeway to Knightsbridge Ave	
SURVEY BY:	DRAWN BY: TD
DESIGN BY: TD	CHECKED BY: AH
APPROVED BY: RB	PROJECT MANAGER:
DRAWING/PROJECT No.:	REV. No.:
	SHEET No.:
	S017-1211

CONCEPT - SUBJECT TO PRELIMINARY SURVEY AND DESIGN

Figure 5-8
17 Street, Whitemud Dr to Knightsbridge Rd
Conceptual Drainage Plan

CAPITAL PLANNING AND CONSTRUCTION
 2001 SHERWOOD DRIVE SHERWOOD PARK, ALBERTA, T8A 3W7

17 Street Functional Planning Study

North of Whitemud Drive to Knightsbridge Road (105 Avenue)

5.10 NOISE STUDY & RECOMMENDATIONS

A noise and vibration analysis and barrier design study was completed for the proposed widening of 17 Street between Whitemud Drive (in Edmonton) and Knightsbridge Road (in the County of Strathcona). Both the City's and the County's traffic noise policies address the potential noise impact on residential development only, and do not specify any limits on traffic noise in commercial and industrial areas. The only residential area along the subject road is the Maple Ridge Community in Edmonton, and so this study focused on the future noise and current vibration levels affecting this area.

One of the purposes of this study is to predict the level of traffic noise that would be received at residences adjacent to the proposed upgraded roadway and to determine the height of attenuation required to comply with the Edmonton Urban Traffic Noise Policy (C506) target noise level of 60 dBA Leq (24 Hour). Noise predictions for road traffic were developed using the Federal Highway Administration's Traffic Noise Model computer program based on traffic volume conservative projections, road and land profiles as well as field readings in both open areas and private amenity space.

The Noise and Vibration Report is presented in **Appendix F**.

The predicted Leq (24 Hour) noise levels with the existing fence attenuation for the residential developments (Maple Ridge and Oak Ridge Communities) in the study area range from 56 to 69 dBA for the upgraded 17 Street design. The analysis predicts that additional attenuation will be required to meet the Edmonton Urban Traffic Noise Policy (C506) target noise level of 60 dBA Leq (24 Hour). For consistency purposes a 2.0 metre noise attenuation fence is recommended as a replacement for the existing fences on 17 Street. The City's current noise policy is under review and may be amended; these recommendations may therefore require adjustment during future design phases.

5.11 HISTORICAL RESOURCES OVERVIEW

A Historical Resources Overview (HRO) was completed for 17 Street, including a review of the area and submission to the Government of Alberta, Culture Department. A copy of this HRO submission as well as the letter of clearance from Alberta Culture is provided in **Appendix G**.

A total of 8 archaeological sites have been previously recorded in the immediate vicinity of the project area, however, no known sites are located within the project impact zone. All of the located archaeological sites were found in cultivated fields. In the case of each site, the artifacts found were in a disturbed context, no significant historical remains were found, no paleontological materials were found, and none of the located sites were considered significant and no further work was recommended for any of these sites. Most of the proposed new right-of-way lands have been cultivated for much of the last century, and some have since been disturbed further by business development, infrastructure emplacement, or road construction. The only significant hydrologic feature within the project area is Fulton Creek which crosses 17 Street. The Fulton Creek crossing was the only area considered to have any potential for undisturbed archaeological sites, but a previous field survey (permit 09-189) was conducted of the creek area, and no sites were found along its margins within the project area at the 17 Street crossing. The previously disturbed nature of the study area lands suggest that there is little potential for finding undisturbed historical resources sites and no further Historical Resources work is considered warranted for this study area.

17 Street Functional Planning Study

North of Whitemud Drive to Knightsbridge Road (105 Avenue)

5.12 TRAFFIC SAFETY AUDIT & MOBILITY REVIEW

As part of the planning process, an independent traffic safety and mobility review was completed on the recommended concept plan and profiles for 17 Street (October 2012). This review is presented in **Appendix H**. A response to the traffic safety and mobility review is detailed in **Table 5-2**. Many of the recommendations can be carried into future phases on the project, while some recommendations are not feasible due to physical constraints.

Table 5-2 Designer's Response to Safety & Mobility Issues

	Issue	Response
1	Short weaving distance for vehicles exiting off Whitemud Drive who wish to turn left into existing / future development accesses in close proximity.	No Action. Although the weaving distance is short, the proposed location of the access is per the Maple Ridge TIA, which was approved by Development Planning. Moving its location northward is a possibility; however, it is seen as the most optimal location between Whitemud Drive and 51 Avenue.
2	Bus stops located close to intersections, which could cause rear-end collisions or queuing into the intersections	No Action. All bus locations conform to ETS standards and the exact spacing requirements at each intersection have been provided directly from ETS.
3	No sidewalk connection to bus stop in the NE quadrant of 76 Avenue.	Agreed; a connector walk is included within the design to connect the bus stop directly to the intersection.
4	Wide lanes of 3.7m and 4.2m could encourage speeding.	No Action. The widths of the travel lanes within the typical section have been unanimously agreed upon by the Project Team due to the high percentage of truck traffic.
5	Uncontrolled left turns across several lanes, for example, at the existing snow dump access, could cause difficulties for motorists (especially large trucks) in all directions. Lack of NB left turn lane may also catch through vehicles off-guard.	Agreed; a modified standard left turn bay, due to the limited distance of 100m length in this section, has been included at this location for NB left turn movements to this residential property. (A slotted left turn bay is not warranted based on the projected traffic volumes into the site.)
6	Sharp change in alignment to get into left turn lanes; potential for loss of control, side swipes and challenges for trucks	No Action. The design conforms to design standards.
7	Right through lane, south of Roper Road, ends after being present for a long time; could catch drivers off guard (even with signage) as horizontal alignment reduces driver ability to see that the lane exits. May lead to sudden lane changes, side swipes and challenges for trucks. Consider ending lane further south and reintroducing it as an exclusive right turn bay.	No Action. The location of the right-lane drop is satisfactory based on the existing conditions. Additional signage and pavement marking delineations should be added for increased awareness and overall safety during the Preliminary Design stage.

17 Street Functional Planning Study

North of Whitemud Drive to Knightsbridge Road (105 Avenue)

8	Reduced separation provided between travel lanes and sidewalk (due to constraint to the west) near the Maple Ridge Development. Width increase is good, however risk increases as it goes across intersections.	No Action. In either case – boulevard walk or monowalk – proposed outside curb & gutter forms a barrier between the sidewalk and vehicular traffic.
9	Alignment of ramps directs cyclists and pedestrians into roadway. However, a straight alignment could discourage cyclists from stopping/slowing to look for traffic at intersection. Consider using straight alignment with speed reduction gates.	Agreed; a more direct (north-south) alignment approach at the curb ramps for crossing locations is appropriate, however the suggestion for speed reduction gates is not warranted. The plans have been updated to reflect a more direct approach.
10	Short weaving distance for right turning vehicles from 68 Avenue who wish to turn left at 70 Avenue	No Action. The short weaving distance (300m +/-) from 68 Ave to 70 Avenue is not perceived to be a major issue for the future manoeuvre in question coming directly from the residential development.
11	Limited separation between intersections and skewed intersection near industrial service road bulb entrances resulting in large pavement area; will be difficult for drivers to identify proper turning paths, and queues could extend into adjacent intersection	No Action. The current design conforms to City Standard Drawing #3000 for an industrial service road bulb entrance.
12	Sharp curvature radius along the service road accessing 17 Street west of 76 Avenue. Consider straightening out the road.	No Action. The current design conforms to City Standard Drawing #3000 for an industrial service road bulb entrance.
13	Shared path is disjointed at the 76 Avenue intersection, which could in turn displace NB cyclists to 17 Street and could cause SB cyclists to continue onto sidewalk. Appropriate measures required to inform users of change of path locations	Agreed; the shared-use path (SUP) is disjointed, and has been relocated to the west side for the length of 17 Street, between Whitemud Drive and Baseline Road.
14	Vertical curve k values along the 17 Street profile at Baseline Road do not meet minimum design standards.	No Action. The current design conforms to the existing conditions at the Baseline Road intersection. Adjustments to the profile is recommended to be explored during the Preliminary Design stage.
15	Cross walks/ramps provided that don't lead to a pedestrian facility; may encourage pedestrians to stray from available walkways etc.	Agreed; crosswalks and ramps that lead to nowhere at the porkchop islands of various intersections have been eliminated from the concept plans.
16	The proposed access west of the 92 Avenue intersection is located in the middle of a proposed turning lane. Could have NB-WB and WB-SB turns across the left turn bay. Access is also in close proximity to 17 Street. Consider relocating access further west.	No Action. The current location of the proposed access aligns with the existing conditions of the County's water distribution site.
17	Limited separation between intersections could result in unexpected braking/turns and operational issues	No Action. The current geometry of the proposed access aligns with the existing conditions of the Envirofues Refinery.

17 Street Functional Planning Study

North of Whitemud Drive to Knightsbridge Road (105 Avenue)

18	Large crossing distance for pedestrians and cyclists at uncontrolled access locations. Consider splitter island with refuge	No Action. The use of splitter islands would interfere with the truck turning movements maneuvering through the various accesses and intersections.
19	Stop boxes could cause confusion among motorists. Consider reducing stop boxes to left turn lanes only to make their purpose more clear. Otherwise, signal timing may require special consideration (longer green and yellow times for clearance)	No Action. For design consistency, all lanes have been delineated with stop boxes to allow for the wide truck turning movements within the intersections and to ensure that there is no overlapping of traffic movements.
20	Short weaving distance for EBL vehicles between Railway Street and the entrance to the jug handle who wish to turn right at jug handle	No Action. This is a perceived safety issue as there is a signal controlling the intersection with Railway Avenue that will provide for any left turning vehicles to decide a lane, or move to the right without being in the mainstream traffic of 17 Street.
21	Added through lane could be mistaken for a left turn bay, which could cause confusing as no left turns are permitted. Consider eliminating through lane and using a channelized left at jug handle	No Action. There are sufficient volumes that will warrant the extension of the left turn through Baseline Road. This is also required to balance the lanes through the intersection.
22	SB right lane ends unexpectedly at Railway Avenue; was previously a core lane. May lead to sudden lane changes, side swipes and challenges for trucks.	This is a result of trying to balance the lanes through the intersection with Baseline Road, which carries an additional lane. Laning requirements should be reviewed with Preliminary Design, as there may be a way to create the additional lanes without having a forced right. Additional signing and pavement markings should be used and potentially the inclusion of a merge south of the intersection.
23	Sharp curves and winding alignment. Could be difficult for motorists to navigate (particularly WB-36). While this may be to provide storage, it may be a worthwhile tradeoff to align the road better, as adequate storage is not likely provided by the current configuration	No Action. The current geometry of the proposed access restricts the ability to have the intersection pushed further away from 17 Street. As a note, this is a significant improvement from the existing configuration of the access.

6 COSTING & IMPLEMENTATION

6.1 COST ESTIMATES

6.1.1 Methodology

Quantities have been derived from the proposed City of Edmonton and Strathcona County typical cross sections for 17 Street, based on the November 5, 2012 concept drawings. The planning-level CAD model was also used for quantity takeoffs based on segments as defined below between roadways along 17 Street. Quantities for items that are typically quantified in plan view such as lineal meter of curb and gutter, square meter of roadway and concrete median, etc. were done so by use of the CAD model. Bid items that are typically quantified by use of 3D model such as grading per cubic meter were done so by area/end method based on compared cross-sections of the existing and new urban roadway.

Proposed unit rates as provided in **Appendix I** are based on average tender unit rates from sample McElhanney 2012 projects and provided 2012 City of Edmonton Bid Tab project spreadsheet. In general, averages of the various source projects unit rates were used to calculate the projected construction cost for the project. However, where large quantities were observed, the lower of unit rates were used, whereas for small quantity bid items, the higher rate was used. This method was used in order to accurately project the method in which the low bidding contractor will estimate the project in order to acquire the work.

Roadway quantities are based on the typical City of Edmonton divided arterial pavement design of 100mm ACO, 100mm ACB, 350mm GBC and 150mm cement stabilized sub-base., including the reconstruction of the existing 17 Street. Alternative pavement designs may be considered (refer to **Section 5.8**) however for estimate purposes at this level, the standard has been assumed.

6.1.2 Assumptions

The following assumptions have been considered within 17 Street's Corridor cost estimate:

- Assumed 2014 tender price increase of 6% for material and labour adjustment;
- Engineering and material testing fees are assumed at 15%, which is normal for many consulting firms and the City of Edmonton;
- Assume 150mm depth retrieval of useable granular material from existing 17 Street pavement area. A geotechnical investigation will help determine volume of reusable granular material;
- Assume 1m depth of reusable common fill material between the 3.0m shared use path and the 1.5m sidewalk for the entire length of the project;
- Assume borrow fill material is isolated to a 4m wide x 2m deep ditch fill required to create the urban arterial profile;
- Assume 5% unsuitable volume from estimated common excavation to take into account; potential poor/contaminated soils found onsite. A geotechnical investigation will determine magnitude of volume; and
- Allowed 20% project contingency, which is industry standard.

Items not covered in the cost estimate includes railway crossing design and construction, contractor mobilization/demobilization, traffic accommodation, utility relocation, mill/overlay of existing pavement, and sawcutting of existing asphalt.

17 Street Functional Planning Study

North of Whitemud Drive to Knightsbridge Road (105 Avenue)

6.1.3 Total Cost Estimate

This preliminary cost estimate has been broken down into segments of 17 Street between crossing roadways. Segments include:

- South Study Limit to CNR (Camrose Subdivision) Crossing;
- CNR (Camrose Subdivision) Crossing to Future Roper Road;
- Future Roper Road to Oak Ridge Drive;
- Oak Ridge Drive to 73 Avenue;
- 73 Avenue to 76 Avenue;
- 90 Avenue to 92 Avenue;
- 92 Avenue to Plant Access;
- Plant Access to Railway Street;
- Railway Street to Refinery Access; and
- Refinery Access to Knightsbridge Avenue.

Within these segments along 17 Street, the cost estimate has also been broken down into a total of nine (9) major construction headings which include:

- Removals;
- Concrete work;
- Earthworks;
- Roadworks;
- Drainage;
- Streetlighting;
- Landscaping;
- Pavement Markings; and
- Traffic Signals

This cost estimate has been developed to a planning level of detail (+/- 40%). The overall project cost estimate totals **\$64.6M** as seen within the comprehensive breakdown within **Appendix I. Table 6-1** below also provides a summary of the separate costs for each component of work per segment of the project.

Table 6-1: 17 Street Segment Estimate Summary

ITEM	Whitemud to CNR Camrose	CNR Camrose to Roper	Roper to Oakridge Drive	Oakridge Drive to 73 Ave	73 Ave to 77 Ave	90 Ave to 92 Ave	92 Ave to Plant Access	Plant Access to Railway Street	Railway Street to Refinery Access	Refinery Access to Knightsbridge Road	TOTAL COST	
Removals	\$37,200	\$41,400	\$24,600	\$39,000	\$40,800	\$34,800	\$38,100	\$40,200	\$36,720	\$12,600	\$345,420	
Concrete Work	\$393,670	\$843,190	\$353,320	\$471,320	\$499,980	\$348,080	\$281,720	\$401,740	\$367,580	\$101,410	\$4,062,010	
Earthwork	\$870,950	\$1,063,062	\$579,040	\$990,964	\$1,064,262	\$841,218	\$947,666	\$1,093,988	\$1,096,816	\$321,626	\$8,869,592	
Roadwork	\$1,686,400	\$2,472,200	\$1,181,300	\$1,781,400	\$2,668,500	\$1,367,100	\$1,090,500	\$1,420,200	\$1,212,700	\$315,100	\$15,195,400	
Drainage - CB & Leads	\$212,200	\$606,700	\$171,700	\$290,100	\$580,200	\$185,200	\$235,400	\$198,700	\$230,300	\$71,800	\$2,782,300	
Streetlighting	\$148,080	\$182,400	\$108,000	\$172,800	\$182,400	\$153,600	\$163,200	\$177,600	\$163,200	\$55,200	\$1,506,480	
Landscaping - Topsoil & Seed	\$91,000	\$113,750	\$81,250	\$121,875	\$101,563	\$162,500	\$101,563	\$162,500	\$216,125	\$73,125	\$1,225,250	
Landscaping - Trees	\$123,400	\$152,000	\$90,000	\$144,000	\$152,000	\$128,000	\$136,000	\$148,000	\$136,000	\$46,000	\$1,255,400	
Pavement Markings	\$27,765	\$34,200	\$20,250	\$32,400	\$34,200	\$28,800	\$30,600	\$33,300	\$30,600	\$10,350	\$282,465	
Signals	\$500,000	\$250,000	\$250,000	\$330,000	\$80,000	\$330,000	\$250,000	\$250,000	\$160,000	\$250,000	\$2,650,000	
Utilities	\$120,000	\$120,000	\$120,000	\$120,000	\$1,320,000	\$1,320,000	\$1,320,000	\$120,000	\$120,000	\$120,000	\$4,800,000	
Land Acquisitions	\$356,240	\$724,600	\$634,000	\$422,240	\$572,400	\$294,000	\$484,200	\$284,000	\$290,000	\$132,000	\$4,193,680	
ESTIMATED COST	\$4,566,905	\$6,603,502	\$3,613,460	\$4,916,099	\$7,296,305	\$5,193,298	\$5,078,949	\$4,330,228	\$4,060,041	\$1,509,211	\$47,200,000	
Traffic Control	2%	\$91,338	\$132,070	\$72,269	\$98,322	\$145,926	\$103,866	\$101,579	\$86,605	\$81,201	\$30,184	\$900,000
Engineering & Testing	15%	\$685,036	\$990,525	\$542,019	\$737,415	\$1,094,446	\$778,995	\$761,842	\$649,534	\$609,006	\$226,382	\$7,100,000
Contingency	20%	\$913,381	\$1,320,700	\$722,692	\$983,220	\$1,459,261	\$1,038,660	\$1,015,790	\$866,046	\$812,008	\$301,842	\$9,400,000
TOTAL ESTIMATED COST	\$6,256,660	\$9,046,798	\$4,950,440	\$6,735,056	\$9,995,937	\$7,114,818	\$6,958,159	\$5,932,412	\$5,562,256	\$2,067,619	\$64,600,000	

17 Street Functional Planning Study

North of Whitemud Drive to Knightsbridge Road (105 Avenue)

A separate estimate has been developed for the proposed transition of 17 Street, from the Sherwood Park Freeway to south of 76 Avenue. This transition and estimate of the transition are discussed in **Section 6.3**.

6.2 STAGING & IMPLEMENTATION

A key aspect for the successful implementation of the project is to sufficiently and safely maintain traffic throughout the 17 Street corridor while construction efforts are underway. Overall, the infrastructure improvements along 17 Street are recommended to be implemented within three (3) separate stages, as generally described within the following subsections. The first two (2) stages are graphically depicted along the corridor through both plan and typical section views within the drawing labelled as “Staging”, referenced as **Figure 6-1**, arbitrarily between the intersections of Oak Ridge Drive and 73 Avenue.

6.2.1 Implementation Stage 1

The initial implementation stage would require the construction of the ultimate east side of the 17 Street corridor. The following are general highlights of the implementation strategies and projected work to be completed throughout the corridor within Stage 1:

- Existing through lanes and left/right turn bays remain open as 2-way traffic (1 through lane in each direction) is maintained within existing pavement limits;
- Construction of the ultimate north bound lanes, including right turn bays, concrete medians and/or intersection islands (where allowable), underground stormwater infrastructure, ultimate asphalt shared use path, landscaping and light standards;
- Intersections and accesses to remain open and accessible at all time during construction operations, unless otherwise permitted to remain closed;
- Protection of existing traffic through the installation of concrete barrier walls, temporary paint lines and lane channelization measures, directly adjacent to the construction work zone and at key intersections; and
- Initial utility coordination and relocation work, where applicable.

6.2.2 Implementation Stage 2

Implementation Stage 2 would require the removal of existing pavement and construction of the ultimate west side improvements along 17 Street. The following are general highlights of the implementation strategies and projected work to be completed throughout the corridor within Stage 2:

- 2-way traffic (1 through lane in each direction) is maintained on the previously constructed, ultimate northbound lanes;
- Removal of the existing pavement, including curb & gutter, medians/islands and stormwater infrastructure, where applicable;
- Construction of the ultimate south bound lanes, including right turn bays, concrete medians and/or intersection islands, underground stormwater infrastructure, ultimate concrete sidewalk or asphalt shared use path, landscaping and light standards;
- Intersections and accesses to remain open and accessible at all time during construction operations, unless otherwise permitted to remain closed;
- Use of lane channelization measures, especially at intersection, in order to safely delineate opposing traffic lanes; and
- Continued utility coordination and relocation work, where applicable.

17 Street Functional Planning Study

North of Whitemud Drive to Knightsbridge Road (105 Avenue)

6.2.3 Implementation Stage 3

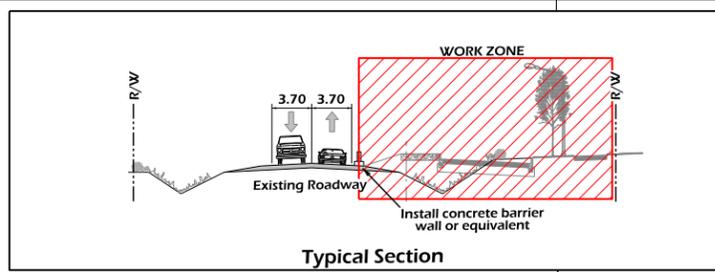
The third and final stage (unless otherwise indicated through preliminary design stage details) would involve making the necessary connections at all intersections, access management related upgrades and tie-in locations. The following are general highlights of the implementation strategies and projected work to be completed throughout the corridor within Stage 3:

- 2-way traffic (minimally maintaining at least 1 lane of traffic in each direction or 2 to 3 lanes in each direction where allowable) is maintained within the ultimate limits of both the newly constructed southbound and northbound lanes;
- Intersections should be fully operational to ultimate laning configurations, with minimal amounts of work to finalize the installations of all concrete median and intersection islands;
- Placement of the final lift of pavement (ACO);
- Intersection and project limit tie-ins, where applicable;
- Final utility relocation work and tie-ins, where applicable; and
- Overall signal coordination with the final erection of signal poles, intersection infrastructure and final paint (thermoplastic) lines placed.

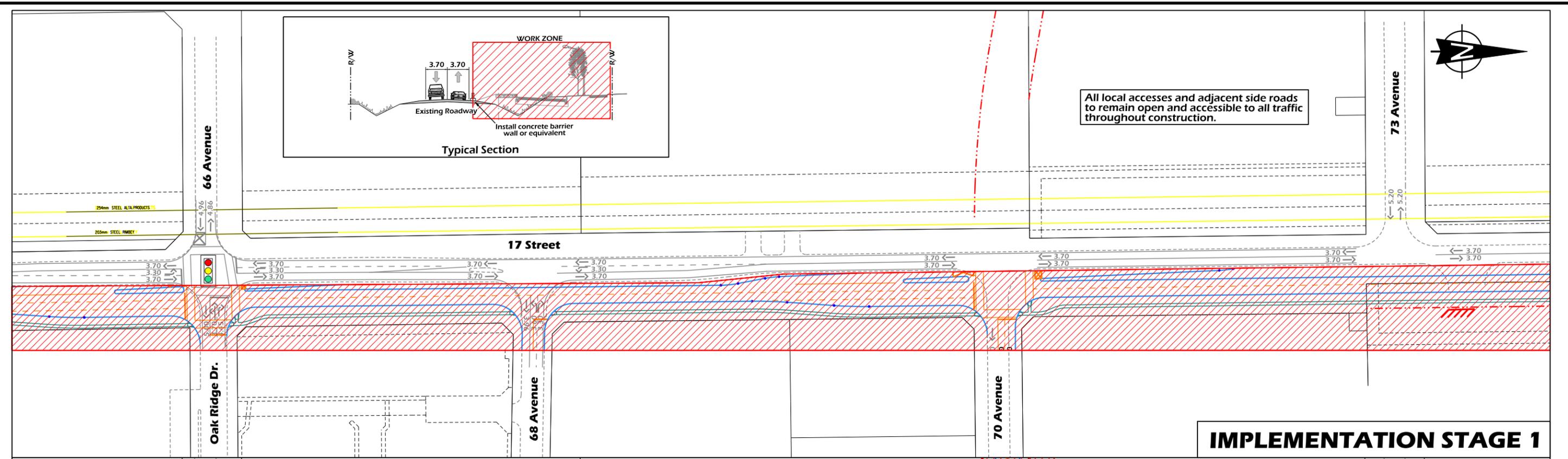
6.2.4 Additional Notes

The following notes apply overall to the recommended implementation strategies, as discussed above:

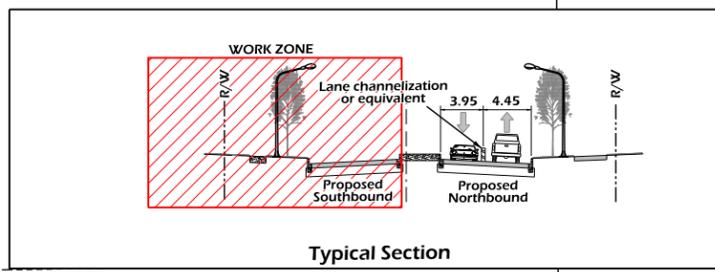
- It is likely that 17 Street (specifically between Whitemud Drive and 76 Avenue) will occur in stages as development occurs, which will influence staging and implementation of the corridor. Transitions (cross overs) may have to be constructed as interim staging, and stages should be constructed in sequential order to avoid lane confusion through multiple transitions between existing and newly constructed roadway;
- A more detailed and comprehensive implementation / staging program is recommended within the preliminary design phase along the 17 Street corridor;
- All traffic control measures shall adhere to all City of Edmonton and Strathcona County policies. As well, the Alberta Transportation publication named "Traffic Accommodation in Work Zones, 2008" is recommended to be used as a reference; and
- Depending on the timeframe when this project is constructed, special care must be taken in order to sufficiently coincide with the staging plans for adjacent road works, specifically the interchange improvements of both Whitemud Drive and Sherwood Park Freeway.



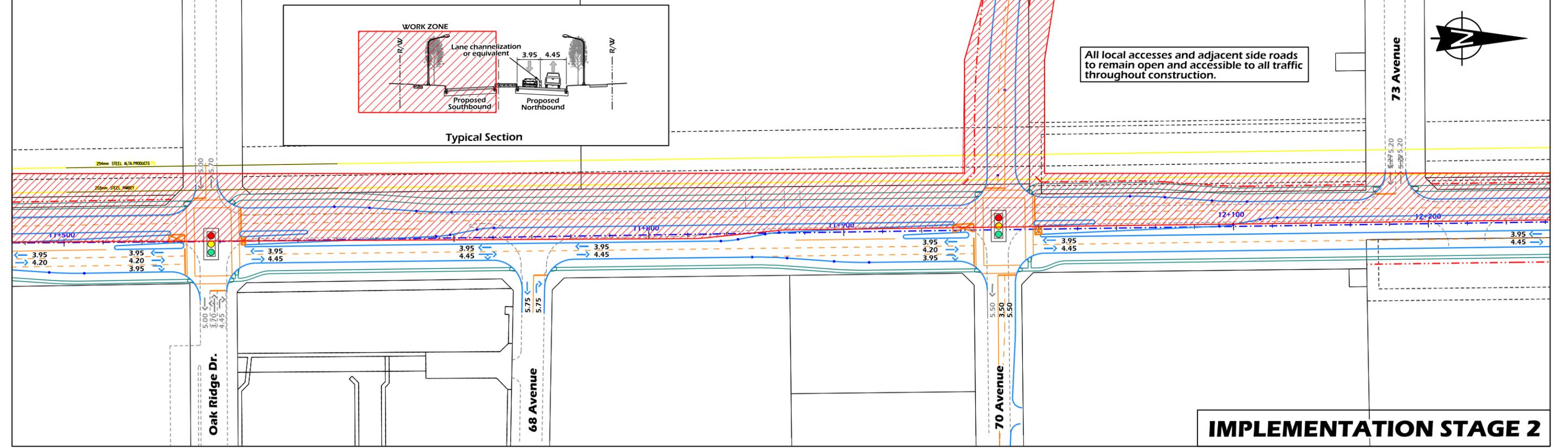
All local accesses and adjacent side roads to remain open and accessible to all traffic throughout construction.



IMPLEMENTATION STAGE 1



All local accesses and adjacent side roads to remain open and accessible to all traffic throughout construction.



IMPLEMENTATION STAGE 2

LEGEND

- - - - - Proposed Right of Way
 - — — — — Proposed Face of Curb
 - - - - - Proposed Pavement Markings
 - Railway
 - Existing Roadway
 - 4x9 Bus Stop Pad
 - Guide Arrows Only
 - / / / / / Access Closure
 - Work Zone
- DESIGN SPEED = 50 km/h
 DURING CONSTR.

<p>McElhanney Consulting Services Ltd.</p>	<p>THE CITY OF Edmonton TRANSPORTATION SERVICES</p>	<p>PROFESSIONAL ENGINEER ALBERTA RYAN T. BETHEK P. ENG. DATE PERMIT TO PRACTICE P6383</p>	<p>Manager, Transportation Planning Branch</p> <hr/> <p>Director, Facility & Capital Planning</p>	<p>CONCEPT - SUBJECT TO PRELIMINARY SURVEY AND DESIGN</p> <p>Figure 6-1 17 Street Arterial Widening Whitemud Dr to Knightsbridge Rd Implementation Strategy</p>	<p>PLAN NO. Staging</p>
					<p>DRAWN: TD REVIEWED: DATE: 2013 04 09</p>

17 Street Functional Planning Study

North of Whitemud Drive to Knightsbridge Road (105 Avenue)

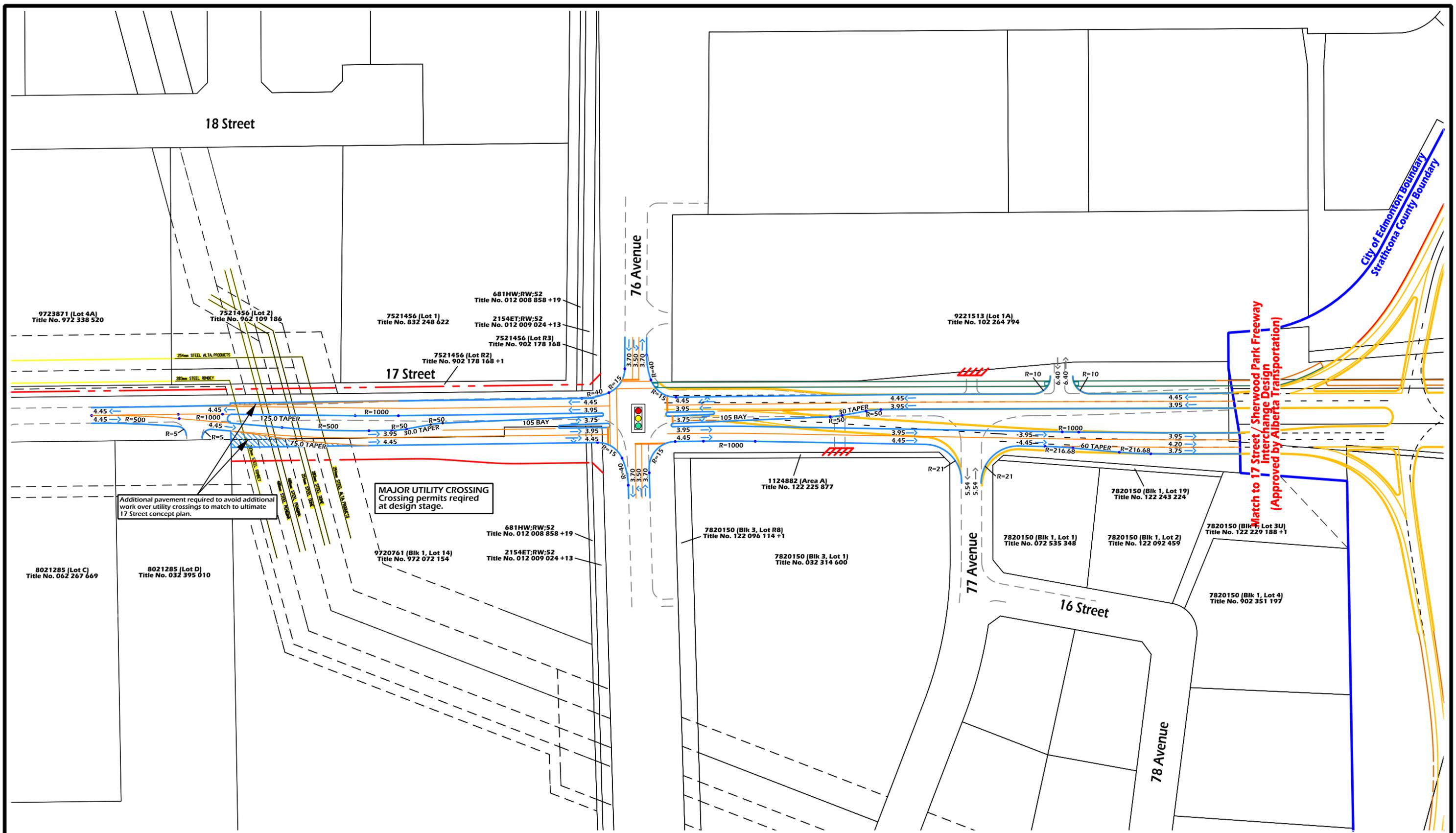
6.3 TRANSITIONS TO SHERWOOD PARK FREEWAY (INTERIM)

As part of this project, an interim transition from Sherwood Park Freeway to south of 76 Avenue (**Figure 6-2**) was developed. This transition would build an interim four lane 17 Street that would connect to the work on the Sherwood Park Freeway and 17 Street Interchange, being competed as part of the Northeast Anthony Henday Project by Alberta Transportation (Owner). This transition widens south of 76 Avenue to create the widening through the intersection of 17 Street and 76 Avenue. A Shared Use Path is included from 76 Avenue north to Sherwood Park Freeway on the west side of 17 Street. This transition uses primarily rural (ditch) drainage, which is the existing condition; however it is recommended that curb and gutter be considered south of 77 Avenue, with curb opening and/or shallow catchbasins that open to the ditch. The estimated cost for this transition is 4.7M; summarized as follows:

Roadworks:	\$1,640,000
Traffic Operations:	\$260,000
Utilities:	\$1,320,000
Land Requirements:	\$210,000
Engineering & Contingencies:	\$1,270,000
Total:	\$4.7 Million

Utilities and contingencies are major cost items, largely due to the unknowns around the utility crossing as well as the minimal geotechnical information available at the planning phase. At future phases of design, this estimate is likely to be refined. A detailed estimate for this transition is presented in **Appendix I**.

This work will also need to be coordinated with the construction on the interchange of 17 Street and Sherwood Park Freeway.



LEGEND

- Proposed Right of Way
 - Proposed Lip of Gutter
 - Proposed Pavement Markings
 - Railway
 - Gas Pipeline
 - Proposed 17 Street / Sherwood Park Freeway Interchange Design (By Alberta Transportation)
 - Additional Pavement Required
 - Guide Arrows Only
 - ▨ Access Closure
- DESIGN SPEED = 70 km/h
 POSTED SPEED = 60 km/h

Note:
 Road dimensions for the City of Edmonton are to the Face of Curb

McElhanney
 Consulting Services Ltd.

THE CITY OF
Edmonton TRANSPORTATION SERVICES

STRATHCONA
 COUNTY

PROFESSIONAL ENGINEER ALBERTA
 RYAN T. BETTER
 P. ENG. DATE
 PERMIT TO PRACTICE P6383

Manager, Transportation Planning Branch

Director, Facility & Capital Planning

CONCEPT - SUBJECT TO PRELIMINARY SURVEY AND DESIGN

Figure 6-2

17th Street - 76 Avenue Interim Transition to 17 Street / Sherwood Park Freeway Interchange

20m 0 40m

DRAWN: TD
 REVIEWED:
 DATE: 2012.12.17

PLAN NO.
S017-1215

17 Street Functional Planning Study

North of Whitemud Drive to Knightsbridge Road (105 Avenue)

6.4 NEXT STEPS & FOLLOW-ON WORK FOR FUTURE STAGES

As this is a planning report, future design phases (i.e. additional work) will be required to sufficiently confirm the recommendations within this report or create alternative design options based on changing priorities, funding and future development. Future work is suggested to include (but not limited to):

- Survey;
- Utility investigation, hydrovacating and survey;
- Detailed geotechnical reporting, including drill / core samples and test pits;
- Detail design of rail crossings;
- Detailed review of drainage and stormwater management;
- Environmental Screening Report (follow on from the Environmental Overview) which will be required for the Fulton Creek Crossing, including wildlife passage;
- Detailed Fish Habitat Assessment (Fulton Creek);
- Review of the Risk Registry;
- Property acquisition;
- Stakeholder involvement (information sharing);
- Relocation of aerial utilities; and
- Cost estimates developed from survey and three dimensional modeled quantities.

6.5 RISK REGISTRY

A risk registry was developed as a living document through the project. Beginning at the start of the project and reviewed every eight to twelve weeks, the Risk Registry quantifies risk items for the project. Risk items are quantified by assigning a frequency and impact score and when multiplied a score is created, the higher the score, the higher the risk. The risk is also described as well as possible mitigation measures identified.

The Risk Registry for 17 Street is presented in **Figure 6-3**.

Figure 6-3: 17 Street Risk Registry

Probability Categories

Score	Descriptor	Description
1	Improbable	about 1 in 1000
2	Remote	about 1 in 100
3	Unlikely	about 1 in 10
4	Likely	more likely to happen than not
5	Certain	expect it to happen

Risk Profile

Likelihood Score	Severity Score				
	1	2	3	4	5
5					
4					
3					
2					
1					

LOW MEDIUM HIGH

Score	Severity
1	<ul style="list-style-type: none"> Insignificant or negligible impact on Project or Schedule Minor design detail changes and minor impact on Project
2	<ul style="list-style-type: none"> Minor impact accomplishing Project objectives or delay within Schedule Minor design detail changes applied extensively or to multiple locations
3	<ul style="list-style-type: none"> Significant impact accomplishing Project objectives or delay within Schedule Moderate detail changes applied throughout or to multiple locations.
4	<ul style="list-style-type: none"> Major impact accomplishing Project objectives or delay within Schedule - Fundamental re-work required (e.g., Project re-design or re-approval)
5	<ul style="list-style-type: none"> Redefine Scope of Work / Mitigate Risk before proceeding



List of Risk Types:	
U	Utilities
E	Environment / Geotechnical
A	Approvals and Permits
P	Property and Agreements
S	Scope / Schedule
F	Financial
M	Project Management
Q	Quality

Last Updated August 16, 2012, by Ryan Betker

No.	Nature of Risk	Risk Type	Discussion	Likelihood	Severity	Risk	Mitigation	Responsible Party	Comments	Status
1	Water supply/ utility disruption	U	Interruption of water services to Strathcona County, should the line crossing 17 Street (approx 92 Avenue) be impacted	1	5	5	Alberta One Call, locates and avoid geotechnical work in the area for the Planning Study	Field Staff	No Action Required at the Planning Phase - Move forward to Preliminary Engineering	Ongoing
2	Public misunderstanding/ conflict	S	Public misinformation can lead to lack of project buy-in as and ultimately not be approved by City or County Councils, requiring additional efforts	2	2	4	Completion of a Public Involvement Plan, Timely Public Events, information presented on website.	All	Careful review of public information is required, anticipate public issues	Ongoing
3	Misestimation of traffic projections	S	Traffic volumes are based on the Regional Travel Model (2044) and Traffic Impact Assessments (TIA)	5	1	5	Compile all information, make a recommendation that may include longer time horizons to protect for right-of-way	Traffic Analyst	Requires monitoring in future phases of the project	Review between Phases
4	Schedule overruns	S	Planning Phase over Runs schedule due to project delays	1	1	1	Timely decisions, regular project tracking	Project Manager	Regular Earned Value Reports as well as progress motoring is part of the PMP	Ongoing Monitoring
5	Budget overruns	S	Project exceeds budget (planning phase)	1	2	2	Regular Project Tracking	Project Manager	Regular Earned Value Reports as well as progress motoring is part of the PMP	Ongoing Monitoring
6	Lack of jurisdiction project team cooperation	M	Conflicts between the City and County on project decisions	1	2	2	Project meetings, open communication, clear documentation of decisions	ALL		Ongoing
7	Political differences	M	Differing political agendas at the Council level, could leave the project at risk	2	4	8	City and County team members to disseminate information to political interests	City/County Staff	Must be monitored for action by Project Team, depending on issues that flare up	Ongoing
8	Alberta Transportation/ P3	A	AT has jurisdiction over 17 Street and Sherwood Park Freeway Interchange improvements as part of the P3 NE AHD Project	2	3	6	Discussions with AT and the P3 Consortium - make sure plans are consistent between projects	Project Manager / AT Liasion		Ongoing
9	CN/CP Rail	A	Rail companies have jurisdiction over rail crossings	2	2	4	Prepare Rail Crossing plans as part of the planning Study for future implementation - Ongoing dialogue with CN Rail and CP Rail	Project Manager	More applicable in future project phases	Ongoing
10	Staff Changes	S	Staff Changes can impact the project is key people leave the Project Team	2	2	4	Make sure there is a back up for all staff, so that there is redundancy in the Project Team	ALL		Ongoing
11	Access Changes	P	Business may incur access change recommendations, could lead to political reluctance to approve plans	5	2	10	Communication with landowners, access management plans in place to transition access changes with development/redevelopment	Project Team		Ongoing
12	Implementation strategy	S	Risk that an implementation strategy may not be possible with the ultimate corridor plans	1	2	2	Look at options to maintain existing road, while new portions of the road are constructed, traffic management plans if reconstruction is required	Project Manager		To be addressed
13	Land Acquisition	P	Risk that land may not be able to be acquired	2	3	6	Right-of-way plans will identify land requirements, including portions that can be acquired through subdivision or during development/ redevelopment, minimize land requirements	Project Manager		To be addressed
14	Cross section consistency	M	Cross Sections and Design Criteria should be consistenat across the entire 17 Street Corridor	3	1	3	Less of a risk than anticipated, there are no requirements to be 100% consistent be tween jurisdictions	All	Would be a nice to have, but not critical - allowing for flexibility to respond to other constraints	Ongoing

7 PUBLIC CONSULTATION

An important aspect of any planning project is public consultation and involvement. For 17 Street, there were two public events (Open Houses) as well as ongoing availability to the public by the Project Team, who were available through email and telephone as required. Mailouts (Fact Sheet), websites and road signs were used to advertise events. In addition to public consultation, there was also ongoing discussion with internal (City and County staff) and other key stakeholders. Public consultation results are documented in the Supplementary Stakeholder Report.

7.1 KEY STAKEHOLDER MEETINGS

A corridor workshop was held on June 7, 2012 with internal stakeholders from the City of Edmonton and Strathcona County. The workshop was used to confirm project objectives and priorities, discuss cross sections, alternatives, access management and develop a risk registry. There were also ongoing meetings and circulations with internal staff, including development, drainage and utility representatives.

There was one landowner meeting held on July 27, 2012 between a concerned landowner and representatives from the Project Team (Consultant, City Staff). Details of this meeting are included in the Supplementary Stakeholder Report. This was the only landowner that requested a specific meeting, however there were some questions and inquiries from a few residents of the Maple Ridge and Oak Ridge residential community.

7.2 PUBLIC EVENT 1

Held on June 21, 2012 the object of first Open House was to gain input on the project objectives, issues and other concerns of residents, land owners and businesses who utilize the 17 Street Corridor. There were 68 attendees at the event and there were 14 responses or comment cards returned at or following the event. The themes of the comments included the following:

- Access to public transportation and bus stop locations;
- Concerns over the number of large trucks;
- Condition and maintenance of the existing 17 Street;
- Concerns over the overall network (Baseline Road, Anthony Henday Drive); and
- Safety and security, specifically traffic signals.

All of the responses are included within the Supplementary Stakeholder Report. Along with the Open House displays (**Figure 7-1**) there was an aerial photo of 17 Street, and open house attendees were invited to place post-it notes with concerns, issues and comments directly on the photo.

7.3 PUBLIC EVENT 2

The second public event (information session) was held on September 27, 2012 to present the findings and recommendations of the planning study. There were 81 attendees of the event, and 14 comment sheets were returned at the open house or through the City of Edmonton website and mail following the event. Common themes for this event included:

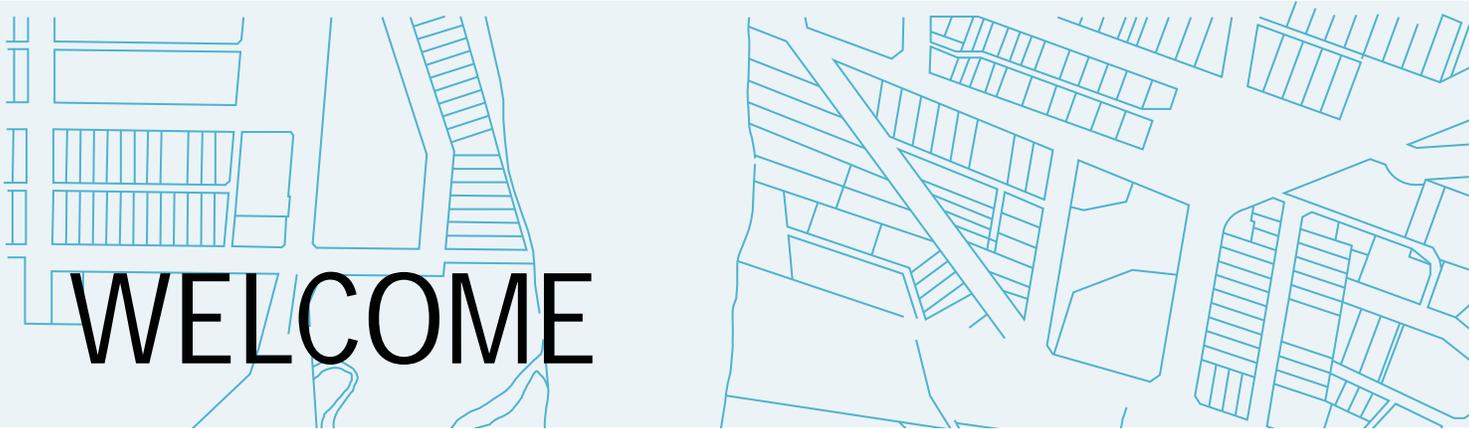
- Timing of construction;
- General acceptance of the widened 17 Street and the plans presented;

17 Street Functional Planning Study

North of Whitemud Drive to Knightsbridge Road (105 Avenue)

- Condition and maintenance of the existing 17 Street; and
- Existing operations on 17 Street and 76 Avenue.

All of the responses as well as a detailed summary of the responses is included within the Supplementary Stakeholder Report. Along with the Open House displays (**Figure 7-2**) there was an aerial photo of 17 Street, which showed the planned improvements to 17 Street.



WELCOME

17 Street Corridor Planning Whitemud Drive to Knightsbridge Road (105 Avenue)

June 21, 2012



MEETING PURPOSE

To gather your thoughts and ideas for 17 Street concept plans between Whitemud Drive and Knightsbridge Road (105 Avenue).



Have Your Say!

Look for this icon to provide your input

PROJECT PURPOSE

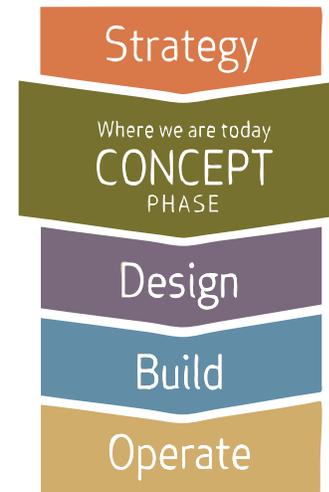
To develop concept plans for 17 Street between Whitemud Drive and Knightsbridge Road (105 Avenue) in order to ensure that the corridor functions well in the future.

17 Street provides:

- An important route to move goods
- Industrial and commercial business opportunities
- Access to established businesses along the corridor

17 Street requires upgrades to:

- Accommodate traffic growth
- Improve connection to Sherwood Park Freeway
- Meet current standards and guidelines for both City of Edmonton and Strathcona County



FUTURE LAND USE AND DEVELOPMENT

City & County land use plans:

- Outline how developed and undeveloped industrial land will evolve through:
 - Land use and allocation
 - Environmental features
 - Infrastructure requirements
 - Development timing
- Incorporate transportation requirements such as:
 - Transportation network
 - Pedestrian and cyclist links
 - Transit access

Future development and land use plans help to determine areas that may require truck accommodation or greater access to businesses.

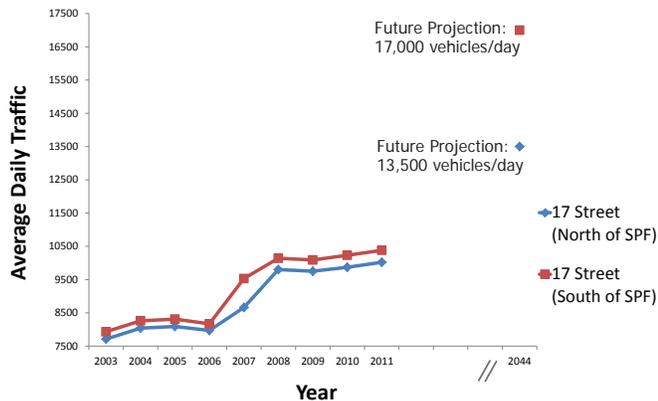


- Heavy Industrial
- Medium Industrial (with restrictions)
- Light Industrial
- Business Service
- Public Works (snow dump)
- Natural Area/ Open Sapce
- Urban Service
- Maple Ridge/ Oak Ridge Community
- Hurstwood Special Development Area
- Stormwater Management Facility

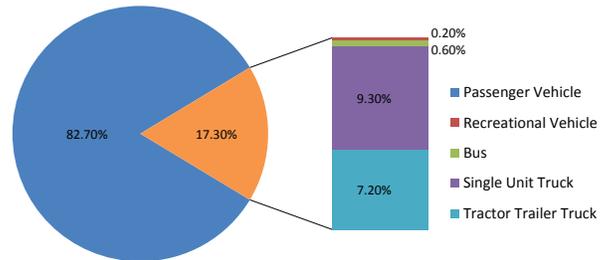
TRAFFIC GROWTH AND COMPOSITION

17 Street at Sherwood Park Freeway (SPF)

Average Historical Daily Traffic Volumes



17 Street Traffic Composition



Have Your Say!

Please indicate if traffic is a concern for you on Part 1: Question 1 of the questionnaire

Historical average annual growth: 3.5%

KEY ISSUES AND CONSTRAINTS



- A** Access management for businesses and residents
- B** CN Rail crossing/Fulton Creek crossing/snow storage
- C** Future development opportunities
- D** Environmentally sensitive wetlands
- E** Maple Ridge Community: traffic and noise
- F** Future connections to major freeways
- G** Heavy truck traffic accommodation
- H** Utility crossings: overhead and underground
- I** Work with/around existing infrastructure at 76 Avenue
- J** North East Anthony Henday design coordination

*Continued on next display board

KEY ISSUES AND CONSTRAINTS (continued)



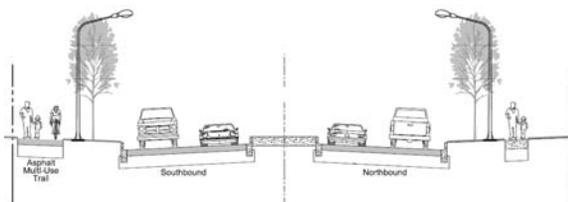
- J** North East Anthony Henday design coordination
- K** Land acquisition & right-of-way for construction
- L** Major industrial areas
- M** Stormwater management
- N** 17 Street “Jug Handle” (accommodates left turns onto Baseline Road)
- O** Existing four-lane sections
- P** CP Rail crossing



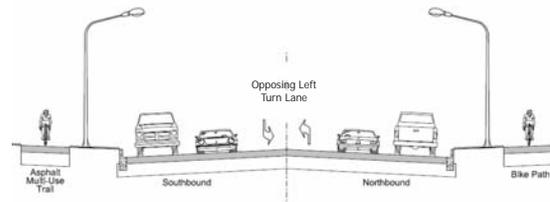
Have Your Say!
Please list any additional concerns on Part 1: Question 3 of the questionnaire

CROSS SECTION

- Cross sections include the number and width of lanes for a roadway, as well as left/right turning lanes, curbs, gutters, sidewalks and medians
- City of Edmonton and Strathcona County standard cross sections will be combined to best suit the needs of different areas along the corridor, while maintaining consistency throughout



City of Edmonton Standard Cross Section



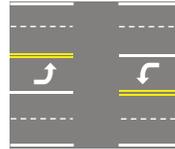
Strathcona County Standard Cross Section

CORRIDOR OPTIONS

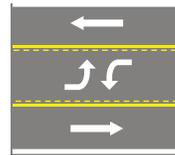
Several options for 17 Street exist that may be implemented along the corridor where the need is identified through traffic and safety analysis.

17 Street may include:

- Two or three lanes in each direction
- Single or opposing left turn bays
- Sidewalks and/or shared use path to accommodate:
 - Pedestrians and cyclists
 - Improved access to bus stops
- Stormwater management for wetland preservation
- CN Rail, CP Rail and utility crossings



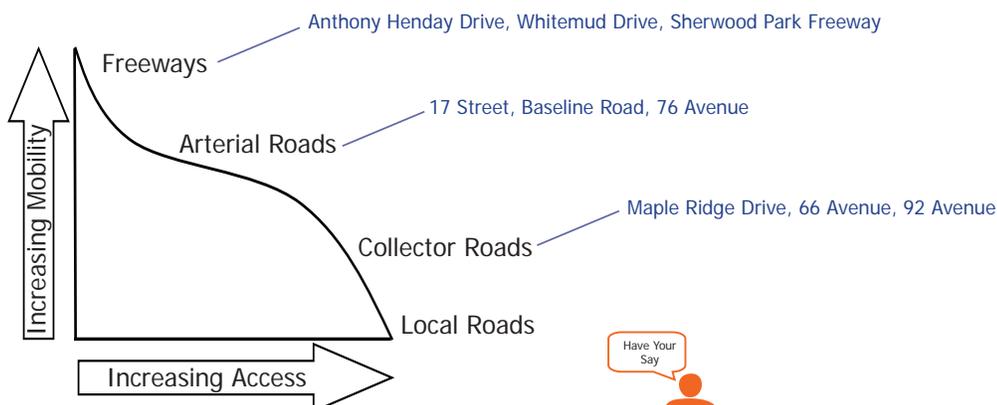
Single Left Turn Bays
More common and user friendly



Opposing Left Turn Lane
Allows greater access to properties

ACCESS MANAGEMENT

- Access management: the control of location, spacing, design and operation of driveways, intersections and street connections to a roadway
- Access to businesses along 17 Street will be determined based on efficient traffic movement and safety
- Where practical, access to properties will be moved to intersecting avenues along 17 Street



Have Your Say!

Please indicate if access to businesses is a concern for you on Part 1: Question 1 of the questionnaire

NOISE IMPACTS

- A Noise Assessment Report will be completed that includes:
 - Determination of existing noise levels with actual readings
 - Prediction of future noise levels based on traffic forecasts
 - Recommendation of additional noise barriers (if required)
- The noise study will be in accordance with City of Edmonton's Urban Traffic Noise Policy (2004)
- Strathcona County Traffic Noise Policy (2007) applies to residential areas only

Existing Fence at Maple Ridge:



Have Your Say

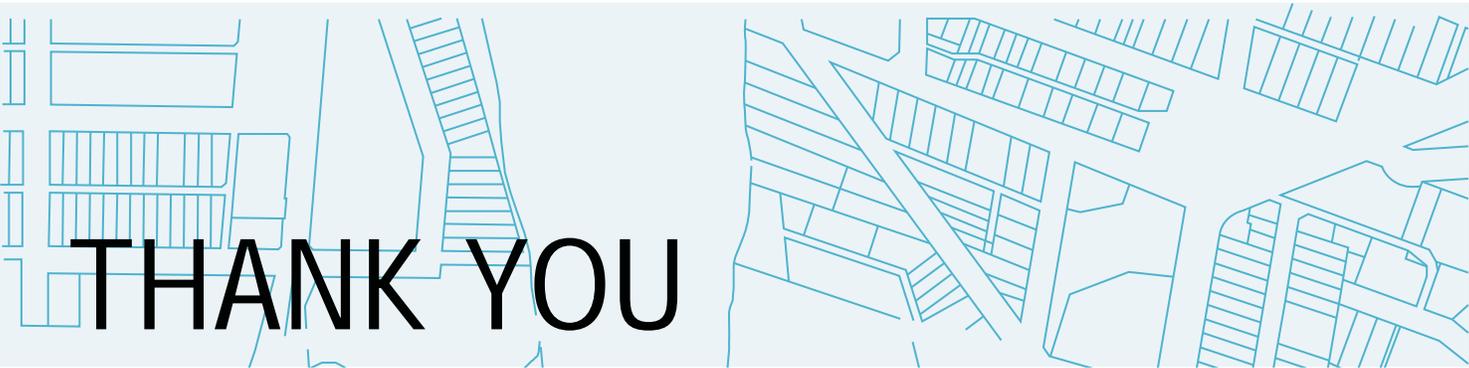


Have Your Say!

Please indicate if noise is a concern for you on Part 1: Question 1 of the questionnaire

PROJECT TIMELINE

- Public Event #1 June 21, 2012
- Stakeholder Interviews..... Summer 2012
- Development of Concept Plans June - September 2012
- Noise Testing and Sampling..... July 2012
- Presentation of Recommended Concept (Public Event #2)..... September 2012
- Presentations to Elected Officials..... Ongoing (2012)
- Completion of Planning Study..... December 2012
- Preliminary Engineering (North of SPF)..... January - April 2013
- Construction..... Future (Beyond 2013)



THANK YOU

We need your input!

Please complete a questionnaire or, if you prefer, take one to fill in and submit by July 6, 2012.

Also available to be completed online at www.edmonton.ca/roadplans





WELCOME

17 Street Corridor Planning Whitemud Drive to Knightsbridge Road (105 Avenue)

September 27, 2012

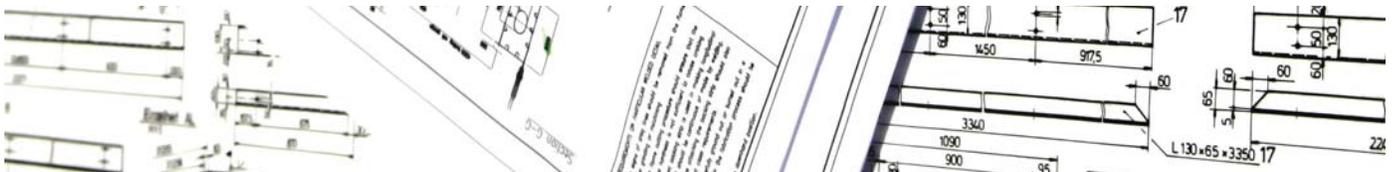


MEETING PURPOSE

To present the recommended concept plan for 17 Street between Whitemud Drive and Knightsbridge Road (105 Avenue).

To share the results from the Public Event held on June 21, 2012.

To show how your concerns were addressed in the development of the concept plan for 17 Street.



PROJECT PURPOSE

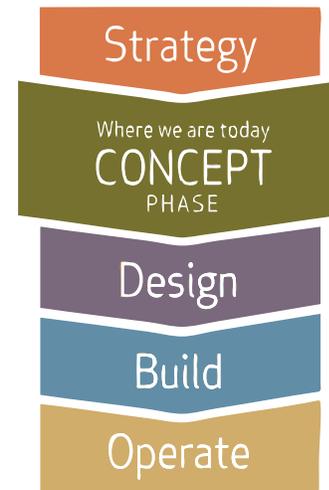
To develop a concept plan for 17 Street between Whitemud Drive and Knightsbridge Road (105 Avenue) to ensure that the corridor functions well in the future.

17 Street provides:

- An important route to move goods
- Industrial and commercial business opportunities
- Access to established businesses along the corridor

17 Street requires upgrades to:

- Accommodate traffic growth
- Improve connection to Sherwood Park Freeway
- Meet current standards and guidelines for both City of Edmonton and Strathcona County



RESULTS FROM PUBLIC EVENT #1

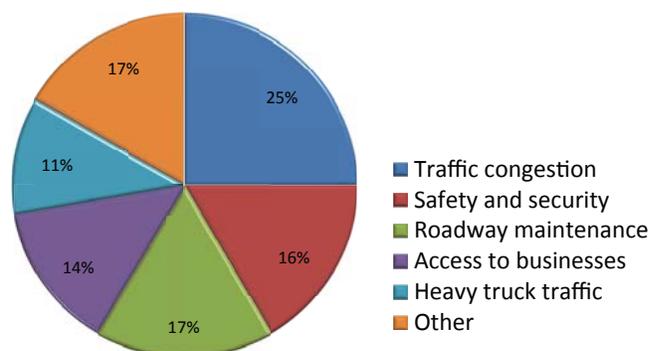
Top Five Concerns:

1. Traffic congestion
2. Roadway maintenance
3. Safety and security
4. Access to businesses
5. Heavy truck traffic

Other Concerns Included:

- Environmentally sensitive wetlands
- Noise and vibration
- Access to public transportation
- Pedestrian and cyclist access
- Signalization at major intersections
- Connections to major freeways

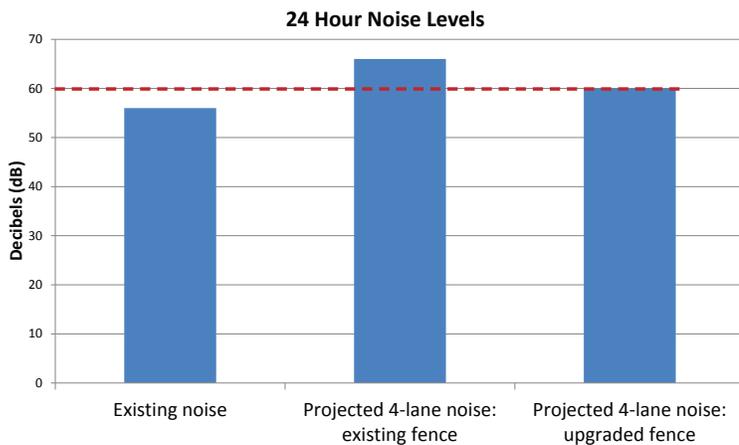
Public Responses for 17 Street Concerns



RESPONSE TO STAKEHOLDER CONCERNS

Public Concern	Actions and Design Features
Traffic congestion.....	Upgrade to four lanes (six lanes where needed)
Roadway maintenance.....	New pavement, median/boulevard snow storage
Safety and security.....	Roadway safety audit of plans is scheduled
Access to businesses.....	Access to all businesses will be provided/maintained
Heavy truck traffic.....	Wide lanes, mountable median in industrial areas
Environmentally sensitive wetlands.....	Minimized impacts on identified wetlands
Noise and vibration.....	Noise testing and analysis complete (see next display)
Access to public transportation.....	Bus stops to be included according to City/County plans
Pedestrian and cyclist access.....	Sidewalk and shared use path along corridor
Signalization at major intersections.....	Signals included where required
Connections to major freeways.....	17 Street design connects to future interchange plans

MAPLE RIDGE NOISE STUDY RESULTS



----- City of Edmonton residential noise level objective: 60 dBA Leq24

Location of sampling:



Location of recommended 2.0m noise attenuation fence:



Example of a typical noise attenuation fence:

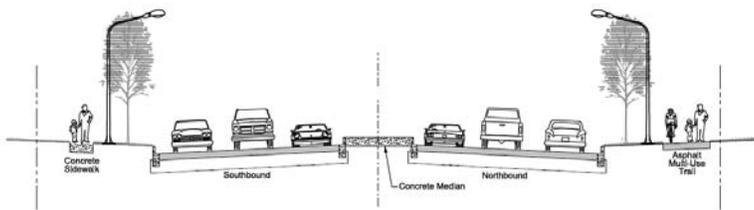


RECOMMENDED CONCEPT: SECTION 1

Whitemud Drive to a future connection with Roper Road



Cross section looking north:



Concept features:

- 3 lanes in each direction
- Sidewalk and shared use path
- Turning lanes at intersections and access points

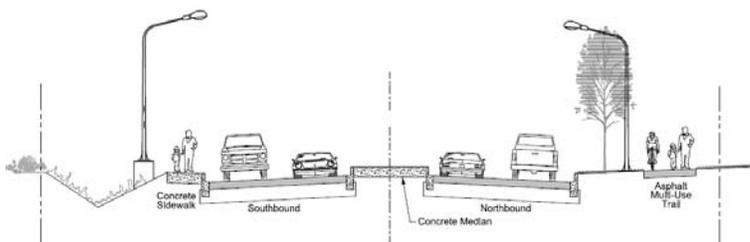
Please refer to large plan for details

RECOMMENDED CONCEPT: SECTION 2

Future connection with Roper Road to 66 Avenue



Cross section looking north:



Concept features:

- 2 lanes in each direction
- Ditch on west side to minimize wetland impacts
- Sidewalk and shared use path
- Turning lanes at intersections and access points

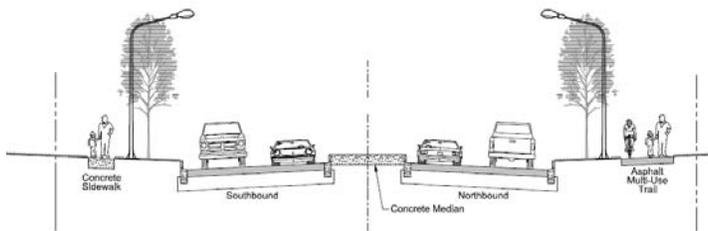
Please refer to large plan for details

RECOMMENDED CONCEPT: SECTION 3

66 Avenue to Sherwood Park Freeway



Cross section looking north:



Concept features:

- 2 lanes in each direction
- Sidewalk and shared use path
- Turning lanes at intersections and access points

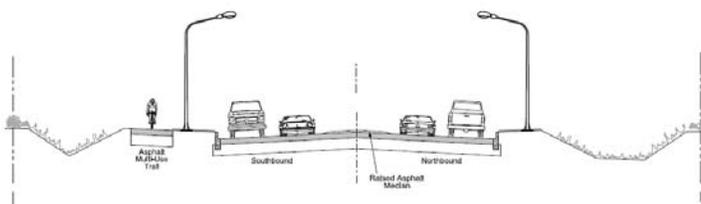
Please refer to large plan for details

RECOMMENDED CONCEPT: SECTION 4

Sherwood Park Freeway to Knightsbridge Road (105 Avenue)



Cross section looking north:



Concept features:

- 2 lanes in each direction
- Mountable median for large trucks
- Shared use path on west side
- Turning lanes at intersections and access points

Please refer to large plan for details

PROJECT TIMELINE

COMPLETED TASKS

- Public Event #1 June 2012
- Stakeholder interviews..... July 2012
- Development of concept plan..... July/August 2012
- Noise testing and sampling..... August 2012
- Presentation of recommended concept (Public Event #2) September 2012

TODAY



FUTURE TASKS

- Presentations to elected officials Ongoing 2012
- Completion of planning study..... December 2012
- Preliminary engineering (north of Sherwood Park Freeway)..... January - April 2013
- Construction..... Future (Beyond 2013)

CONSTRUCTION TIMELINES

Construction of upgrades to 17 Street will be prioritized according to:

- Future development and redevelopment along the corridor
- Upgrades to existing interchange at Sherwood Park Freeway, which will occur within the next few years as part of the Northeast Anthony Henday Drive project

This project is at the planning stage and therefore exact construction timelines are unknown





THANK YOU

Tell us how we did!

Please complete a questionnaire or, if you prefer, take one to fill in and submit by October 10. Questionnaires can also be completed online at www.edmonton.ca/roadplans, or submitted through one of the following methods:

Mail: McElhanney Consulting Services Ltd.
14904 121A Ave
Edmonton, AB T5V 1A3

Email: Project Team: rbetker@mcelhanney.com
City of Edmonton: natalie.lazurko@edmonton.ca
Strathcona County: tony.maghee@strathcona.ca

Fax: 780.809.3212



8 CONCLUSIONS & RECOMMENDATIONS

The widening of 17 Street between Whitemud Drive and Knightsbridge Road will accommodate the anticipated traffic volume growth beyond 2044 to a build-out scenario of the corridor. This widening will also provide transit, pedestrian and cycling facilities along 17 Street, which is a key component of the transportation policies of both the City of Edmonton and Strathcona County. Cross sections for 17 Street and other design elements were developed through a consolidation of both Strathcona County and City of Edmonton standards, with the intent to maintain consistency and driver expectations.

The addition of an all directional interchange at 17 Street and Sherwood Park Freeway as part of the Northeast Anthony Henday Drive program (Alberta Transportation) will also become a development catalyst for 17 Street, in combination with the need for industrial land within the Capital Region. It is expected that private development will largely dictate the timing of the 17 Street improvements, with this planning study identifying the requirements and considerations as 17 Street develops. Although development accesses have been noted within the Concept Plans, many of these accesses will be finalized as development comes forward with detailed zoning, site plans and traffic impact assessments and could be revised based on approvals from the City of Edmonton and Strathcona County.

A transition for 17 Street was also created to utilize the Sherwood Park Freeway interchange improvements as an opportunity to improve the existing conditions on 17 Street, north of 76 Avenue. To that end, a transition from 76 Avenue to the interchange was detailed, providing an interim stage between the existing conditions and the ultimate 17 Street corridor, while minimizing the amount of throwaway investment.

An access management plan was developed to balance traffic movement with access to businesses and land. Although the access management was focused on existing developed areas, the access management strategy considered future possibilities for development and long term build-out of the area. Additional access for the movement of oversize manufacturing loads to or from 17 Street directly may be considered for specific use, including the use of locked gates and removable fencing.

The Fulton Creek Crossing and the wetland area (west of Maple Ridge Drive) are important ecological resources, and although as part of this planning study an environmental overview was completed, additional environmental studies (screening reports) will be required in future project phases. Through this planning study, a stated objective was to minimize impact to these specific locations, but also to minimize the impacts for all of the environmentally sensitive areas along the corridor, including those of less significance.

Based on the completed work, outcomes and results of the 17 Street Functional Planning Study, it is recommended that:

1. The plans and profiles (Appendix A) of the ultimate 17 Street be protected for implementation as funding becomes available or as development occurs;
2. The access management plans be protected for implementation as 17 Street is improved or as opportunity occurs to provide for the plans, based on re-development;
3. Franchise utilities be relocated on an opportunity basis to avoid conflicts with the ultimate 17 Street plans;

17 Street Functional Planning Study

North of Whitemud Drive to Knightsbridge Road (105 Avenue)

4. Future land use zoning and development plans be updated to reflect this functional planning study;
5. Future developments prepare new, or update previous Traffic Impact Assessments as required, based on this functional planning study;
6. If required in stages, the implementation of the 17 Street improvements should occur in a sequential order, avoiding multiple transitions between two, four, or six lanes;
7. A functional planning study (concept plans) be developed for Roper Road to confirm the location of the 17 Street and Roper Road intersection;
8. All identified issues and opportunities arising from the Risk Registry and the Traffic Safety and Mobility Review be carried forward as action items into future phases of project (preliminary design, detail design, construction, etc.);
9. The Regional Travel model for the Capital Region be updated to reflect the recommended plans for 17 Street; and
10. The City of Edmonton and Strathcona County acquire (through dedication, subdivision, or acquisition) the future land required for the widening of 17 Street.