STRATHCONA COUNTY

THE CITY OF Edmonton

34 Street Concept Planning
Whitemud Drive to Baseline Road

FINAL REPORT
June 2013

McElhanney

A Report To:

THE CITY OF Edmonton

STRATHCONA COUNTY

34 Street Functional Planning

(Whitemud Drive to Baseline Road)

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EXECUTIVE SUMMARY

This planning study of 34 Street from Whitemud Drive to Baseline Road has been undertaken jointly by the City of Edmonton and Strathcona County to develop the long term roadway and right-of-way requirements for the corridor. This study includes the development of concept plans, which include access management, traffic, transit and active transportation accommodation, right-of-way identification and interim phasing for the ultimate widening of 34 Street. 34 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 roadway facilities including freeways. 34 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 overweight and over dimensional vehicles.

This functional planning study is consistent with the current City of Edmonton Transportation Master Plan (TMP) and the Integrated Transportation Master Plan (ITMP) for Strathcona County.

The primary objective of this study was to develop concept plans for the upgrade of 34 Street between Whitemud Drive and Baseline Road from its existing two-lane undivided rural roadway standard to an ultimate urban arterial standard (four and six lanes as required). Additional objectives of this study include:

- Identification of the roadway cross section and design criteria required for 34 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 wildlife passage opportunities;
- Identification of intersection and access locations and configurations;
- Development of concept plans and cost estimates for the roadway improvements;
- Recommendation of a configuration for 34 Street over Sherwood Park Freeway; and
- Development of a conceptual implementation plan for 34 Street, including the identification of a 4-lane widening opportunity, prior to complete buildout.

The long term traffic volume forecasts (including rationalization with the Maple Ridge Area Structure Plan and current Pylypow development) as well as the traffic analysis for intersections along the 34 Street corridor provide for a Level of Service (LOS) that meets or exceeds a LOS of “E”. This indicates acceptable long term operating conditions along the corridor. Calculated queuing lengths confirm that standard turn bay lengths for both left and right turn lanes will be sufficient at most intersections along the 34 Street corridor. The longest queuing and delays occur on 34 Street at Baseline Road.

An important aspect of planning goods movement corridors is to balance the movement of vehicles and access to businesses and land owners. For 34 Street, provision of people and goods movement along the corridor is the main objective; development access is planned 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 introduced with detailed zoning, site plans and traffic impact assessments. These proposed accesses could require modifications or revisions subject to approvals from the City of Edmonton and Strathcona County respectively. Additional network changes and improvements have also been included in the Maple Ridge Area (51 Avenue and 56 Avenue), from 64 to 68 Avenue, as well as around the 76 Avenue area.

The following general geometric conditions were applied to the corridor:

- A six-lane urban divided arterial cross section between Whitemud Drive and Sherwood Park Freeway;
- A four-lane urban divided arterial cross section between Sherwood Park Freeway and Baseline Road;
- Consistent lane widths through the corridor;
- Traffic signals included at most intersections, based on traffic projections;
- An asphalt shared-use path throughout the corridor;
- Transit stops included at most intersections with sidewalk connections; and
- New industrial collector roadways matched with the existing road network within the area.

There are two railroad crossings along the 34 Street corridor within the study limits: one is operated by CN Rail and the other 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 for identified environmentally valuable locations (Fulton Creek and Gold Bar Creek) were also completed to identify future requirements through these sections of 34 Street. Recommendations include consideration for wildlife signage and reflectors, fencing, natural vegetation, altered lighting and culverts for the passage of small mammals and/or amphibians. It was determined that the Fulton Creek crossing and the Goldbar Creek crossing are both important ecological resources; through the completion of an environmental overview. However; additional environmental studies (screening reports, assessments) will be required in future project phases.

A cost estimate for the improvements has been developed to a planning level of detail (targeted at +/- 30%). The overall project cost estimate totals **$85M** (as presented in the comprehensive breakdown provided in **Appendix I**). Of the total cost, $28M is within Strathcona County (Sherwood Park Freeway to Baseline Road), $39M within the City of Edmonton (Whitemud Drive to Sherwood Park Freeway) and $18M for the improvements over Sherwood Park Freeway, which is within the jurisdiction of Alberta Transportation.

It is understood that maintaining safe traffic operations throughout the 34 Street corridor is vitally important to the movement of goods and for accessibility reasons, including during future construction phases. Therefore, the ultimate improvements along 34 Street are recommended to be implemented in stages; firstly building the new southbound lanes, then reconstructing the ultimate northbound lanes. Private development will dictate the timing of the improvements, including the development of a four-lane interim section that would later be upgraded to a six-lane section between Whitemud Drive and Sherwood Park Freeway. For the staging of four-lanes to six-lanes, options were presented that provide for a four-lane interim section, including a recommended interim plan, however the interim staging in this section will depend on factors including development timing, utilities and the availability of land.

An important aspect of any planning project is the public consultation and public involvement process. For this functional planning study, two public involvement opportunities were provided: a public and business survey at the beginning of the project and a public information session, where project team members were available to answer questions with the public. During the development of the concept plans, there was ongoing communication and availability to the public by the Project Team through email, telephone and in person through key stakeholder meetings. Mail-outs (fact sheets), website updates and road signs were all used to advertise these public involvement opportunities. In addition to public consultation, discussions were held with internal City and County staff, as well as other key stakeholders. There was general acceptance of the proposed 34 Street widening concept plans at the public information session. Common issues identified by the public at the event and throughout the life of the project were:

- Access to public transportation and bus stop locations;
- Concerns over the number of large trucks;
- Condition and maintenance of the existing 34 Street;
- Concerns over the overall traffic network (Baseline Road, Anthony Henday Drive);
- Safety and security, specifically at or near traffic signals; and
- Timing of construction.

The recommendations and concept plans for the ultimate widening of 34 Street between Whitemud Drive and Baseline Road will accommodate the anticipated traffic volume growth beyond 2044 to the ultimate build-out scenario of the corridor. This functional planning study does accommodate existing development plans to date; however, revisions may be required as development occurs. The recommended improvements will enhance provisions for transit, pedestrian and cycling facilities along 34 Street, while maintaining design consistency and driver expectations throughout the corridor.

CORPORATE AUTHORIZATION

This report "34 Street, Functional Planning Study, Whitemud Drive to Baseline Road" 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.

PERMIT TO PRACTICE
McElhanney Consulting Services Ltd.

Signature

Date July 3, 2013

PERMIT NUMBER: P06383
The Association of Professional Engineers, Geologists and Geophysicists of Alberta

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1 INTRODUCTION

1.1 PROJECT PURPOSE

The functional planning for the widening and improvement of 34 Street from Whitemud Drive to Baseline Road has been undertaken by the City of Edmonton ("the City") and Strathcona County ("the County") to develop the framework for widening 34 Street for future development or redevelopment. This functional planning study includes the development of concept plans, access management plans and identification of right-of-way requirements, as well as implementation strategies for the widening of 34 Street. Future development (Maple Ridge, Pylypow) and redevelopment along 34 Street is expected to occur based on market conditions, which includes an existing need for serviced industrial land within the Capital Region.

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) as well as other guidelines including the 2013 City of Edmonton Access Management Guidelines.

1.2 STUDY AREA

The study area encompasses 34 Street, from Whitemud Drive to Baseline Road, including the portion of 34 Street over the interchange with Sherwood Park Freeway. It does not include the planning of the interchange itself, which is within the jurisdiction of Alberta Transportation. The study area is shown in **Figure 1-1**.

The total corridor length for this planning study is approximately 5.9 kilometres, of which 3.2 kilometres is south of Sherwood Park Freeway to Whitemud Drive (City portion) and 2.7 kilometres is north of Sherwood Park Freeway to Baseline Road (County portion).

Within the project area, 34 Street is currently classified as an arterial roadway according to the Transportation Systems Bylaws of both the City of Edmonton and Strathcona County. As an active arterial road, 34 Street is a goods movement corridor, accommodating traffic from local and collector roads as well as distributing traffic to higher level facilities such as highways and freeways. 34 Street is a designated 24-hour truck route throughout the entire project length as well as a dangerous goods route specifically north of Sherwood Park Freeway. 34 Street also serves an important role as a commuter route, primarily from Mill Woods (south of the project area) to both Sherwood Park Freeway and Baseline Road and ultimately to major activity areas such as Eastgate, Downtown and the University of Alberta.

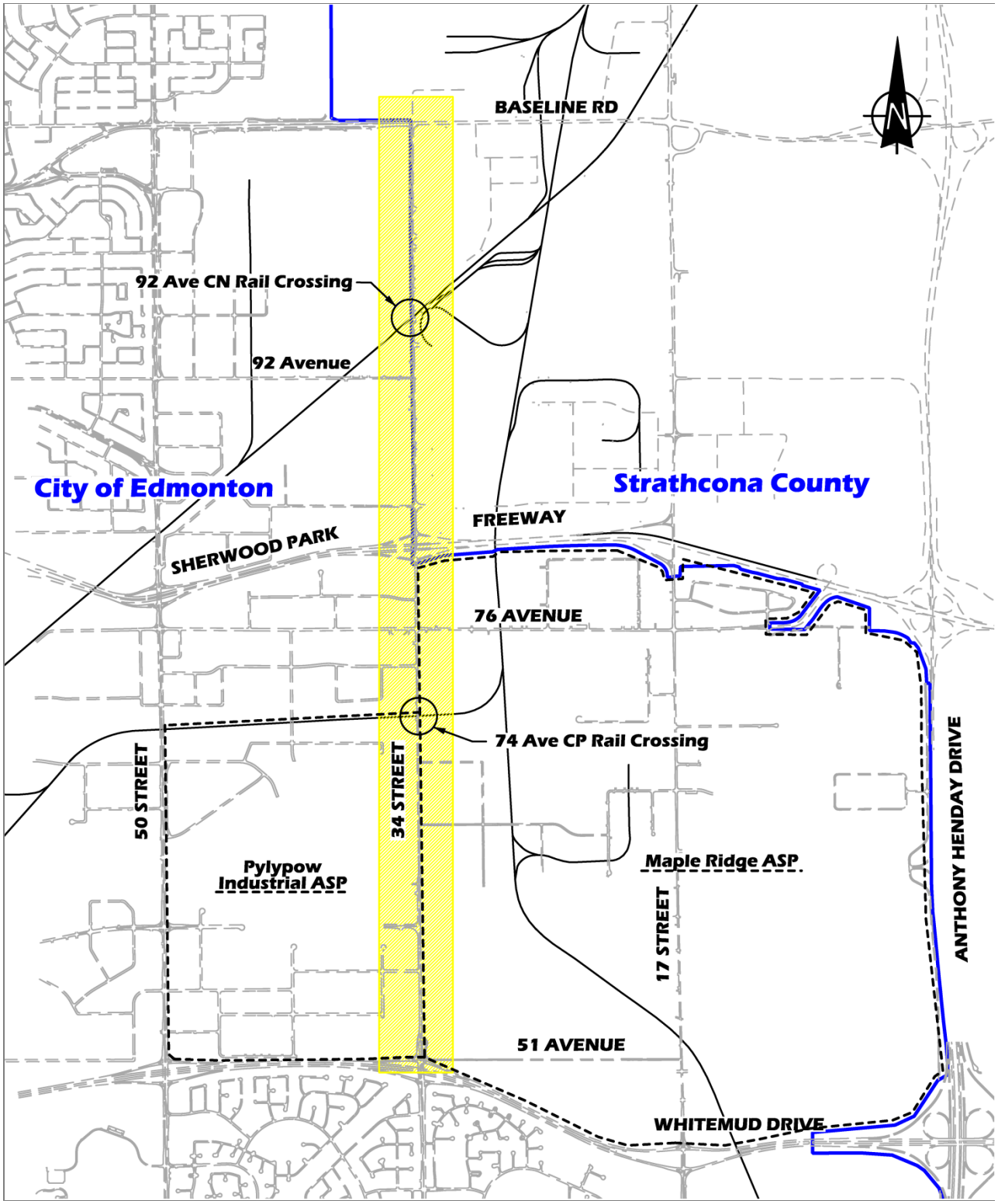


Figure 1-1:Study Area

1.3 SCOPE & OBJECTIVES

The primary objective of this study was to develop concept plans for the upgrade of 34 Street between Whitemud Drive and Baseline Road from the existing two lane undivided rural roadway to an ultimate divided urban arterial standard based on a full build-out scenario, rather than a specific design year. The specific key objectives of this study include:

- Identification of the roadway cross section and design criteria required for 34 Street;
- 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 and configurations;
- Development of cost estimates for the roadway improvements;
- Development of a conceptual implementation plan for 34 Street; and
- Development of a conceptual plan for the crossing of 34 Street over the Sherwood Park Freeway (SPF).

Through an initial project chartering and priority exercise with both City and County representatives, the 34 Street corridor was determined to require the consideration and integration of several aspects, listed below. These areas of interest required special attention during planning and will require cooperation between jurisdictions during future implementation and operation of the corridor.

- Existing and future traffic capacity
- Access management
- Right-of-way constraints
- Utility and railway crossings
- Property impacts and land acquisitions
- Traffic coordination between jurisdictions
- Over-dimensional loads
- Regional active transportation network
- Municipal boundary
- Concurrent projects: Roper Road, 51 Avenue realignment, SPF interchange
- Stormwater management and storm ponds
- Environmentally sensitive areas
- Wildlife passage
- Emergency response planning
- Constructability

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 Public Involvement Policy C513 Involving Edmonton: A Public Involvement Initiative;
- Strathcona County Policy GOV-002-025 (Public Engagement); and
- Strathcona County Public Engagement Framework.

1.4 PLANNING PROCESS & APPROACH

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

This project was also jointly managed by the City of Edmonton and Strathcona County. Both consultant and client Project Managers were involved in the project from the start through to completion and were supported by their own internal work groups and internal stakeholders; the recommendations and outcomes of this study were developed and reviewed collaboratively.

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 as decisions were made. Plans and technical memorandums were regularly circulated for comments and review through the project by the project team and internal stakeholders within 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

Existing conditions and previous reports and plans were reviewed in order to establish context for the project, as well as to determine which issues and constraints would require special consideration during the development of improvement plans. The following sections summarize the pertinent background information available at the time of this study.

2.1 BACKGROUND TRAFFIC & COLLISION HISTORY

2.1.1 Traffic Volumes & Composition

Traffic volumes along 34 Street have remained relatively steady at Sherwood Park Freeway, with an average annual growth rate of approximately 1.45% between 2003 and 2011. **Figure 2-1** shows the historical traffic growth at 34 Street and Sherwood Park Freeway, as well as the anticipated 2044 volumes according to City projections include an approximate growth rate of 2.3%. The sudden peak in volumes during 2007 is an anomaly and may be attributed to development in the area (major refinery upgrade / park and ride) or road construction on parallel roads within the network.

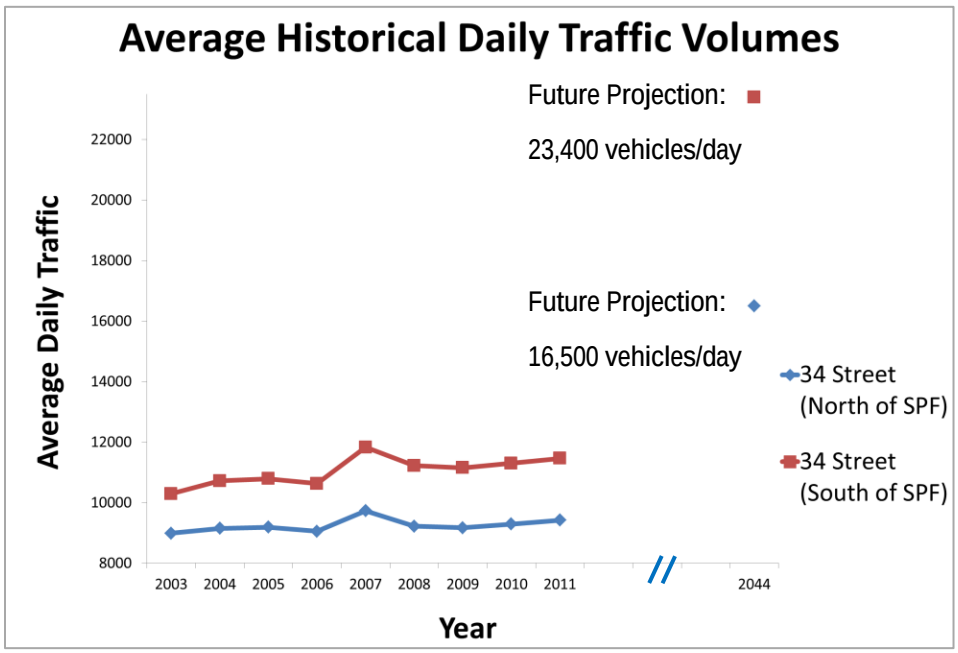


Figure 2-1: Historical Traffic Volumes at 34 Street and Sherwood Park Freeway

With a future traffic projection south of the Sherwood Park Freeway of 23,400 vehicles/day (vpd), substantial upgrades to the current infrastructure will be necessary for the continued safe and efficient operation of the corridor. These projections are based on the 2044 Regional Travel Model and are partially reflective of the full build-out of the area, including the Pylypow and Maple Ridge Area Structure Plans, which may increase traffic volumes through the corridor.

Traffic along 34 Street is currently 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 34 Street as a goods movement corridor.

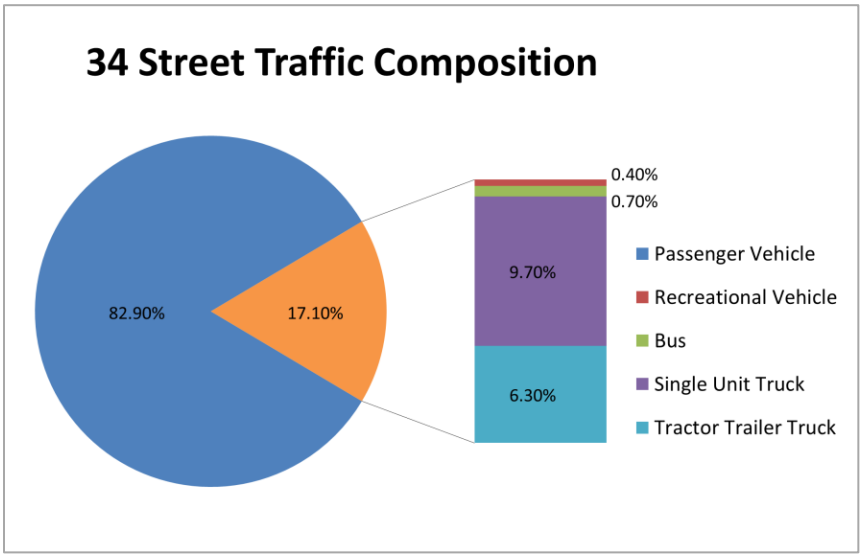


Figure 2-2: Traffic Composition at 34 Street and Sherwood Park Freeway

Given the predominately industrial nature of the study area, special consideration has been given to the large volume of heavy vehicles utilizing the corridor, both as a percentage of traffic (currently 16%) and as a requirement for a corridor design vehicle. It is also noted that as the corridor develops and background traffic increases, this growth will be largely passenger vehicle, which will reduce the overall percentage of trucks along the corridor.

34 Street is also an important corridor for the movement of overweight and over-dimensional vehicles. Data on these movements provided by the City of Edmonton indicated that the vehicles are commonly 7.3 metres (24 feet) wide and can be up to 9 metres (30 feet) tall. Usual routes along 34 Street in both the northbound and southbound directions involve access to and from the following connecting streets: 78 Avenue, 76 Avenue, 74 Avenue, 64 Avenue, and 51 Avenue. Sherwood Park Freeway is used by these movements, however the majority of the movements utilize Whitemud Drive or Baseline Road for east and west movements as there are fewer constraints. Due to the frequency of these over-dimensional moves, special consideration will be required during the planning and staging of the corridor improvements. There are also significant oversize moves through the intersection of Baseline Road and 34 Street, in all directions, largely a result of Waiward Steel and the Imperial Oil refinery.

The latest traffic turning movement data (between 2009 and 2011), as supplied by both the City and County for major intersections along the 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 the background AM and PM peak hour volumes along the corridor.

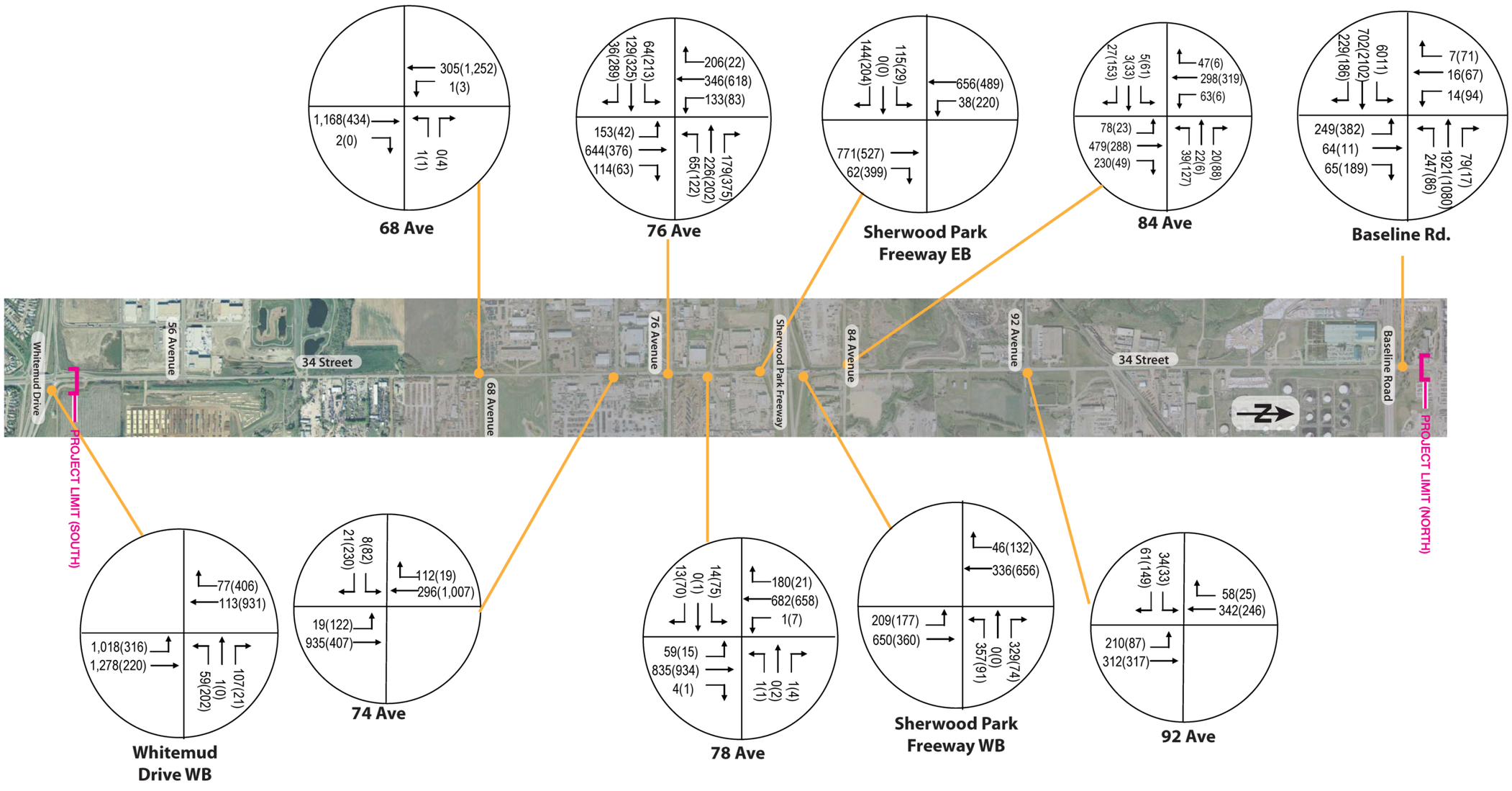


Figure 2-3: Background AM (PM) Peak Volumes (2009-2011)

2.1.2 Collision History and Severity

Historical collision data for 34 Street within the project limits was provided by the City and County (see **Appendix D**). Common collision causes include: 'followed too closely,' which may be attributed to speeding and limited sightlines (within the existing cross section there are limited ditches and areas where vegetation has encroached close to the roadway); 'traffic control violations,' often caused by traffic congestion and lack of signal timing coordination; and 'ran off road,' which may be a result of the existing rural cross section and limited shoulders. Due to the high volume of peak hour commuter traffic, increasing the number of lanes and adding separate turning lanes at intersections may reduce the likelihood that drivers will take risks such as accepting insufficiently sized gaps or unsafely passing turning vehicles on the shoulder of the roadway. Upgrading to an urban cross section may also help to reduce speeding along the corridor and increase compliance with traffic control measures by changing drivers' perception of the roadway. Reducing the number of private accesses along the corridor will also aid in maintaining consistent vehicle speeds between intersections and minimizing the frequency of sudden stops and/or lane changes to avoid merging vehicles.

Table 2-1 describes possible causes and solutions for frequent collision types for intersections along the 34 Street corridor.

Table 2-1: Frequent Collision Types at Intersections along 34 Street

Intersection Along 34 Street	Frequent Collision Types	Possible Causes	Possible Solutions
51 Avenue **56 Avenue** **64 Avenue**	Followed too closely Improper turning/passing Ran off road	• Insufficient capacity • Poor gap acceptance • Rural cross section	• Additional lanes • Signalization • Urban cross section
68 Avenue **74 Avenue**	Followed too closely	• Vehicles slowing down to make turns • Intersection visibility	• Channelization • Improved intersection treatments
76 Avenue **78 Avenue**	Followed too closely Improper turning/passing	• Access spacing • Poor intersection configuration	• Access closures • Improved intersection treatments
Sherwood Park Freeway	Followed too closely Ran off Road	• Speeding • Poor visibility • Lane markings	• Improved intersection/ interchange configuration • Signal timing
84 Avenue **92 Avenue**	Followed too closely Improper turning/passing Ran off road	• Sightlines • Intersection configuration • Rural cross section	• Improved intersection treatments • Urban cross section
Baseline Road	Followed too closely Ran off road Improper turning/passing	• Access proximity • Insufficient capacity	• Reduce/remove access • Additional lanes

No fatal collisions were recorded from 2007 to 2011, as well as no collisions involving cyclists and pedestrians. Of the 56 reported collisions resulting in injury between 2007 and 2011, **Table 2-2** shows the collision types, frequency and locations that were observed.

Table 2-2: Collision Types Resulting in Injury

Collision Type	Proportion	Locations
Followed too closely	50%	64 Ave, 68 Ave, 74 Ave, 76 Ave, 84 Ave, 92 Ave, 101 Ave
Traffic signal violation	16%	76 Ave, 84 Ave
Ran off road	12%	51 Ave, 68 Ave, 101 Ave
Left turn across path	11%	76 Ave, 84 Ave
Left of center	7%	64 Ave, 78 Ave
ROW violation	4%	76 Ave

Many of these collision types will be reduced through the development of additional lanes, and upgrades to an urban cross section. However, as more traffic signals are placed along the corridor in short succession, related collisions and severities have the potential to increase. Signal timing coordination and implementation of protected left turn phases where necessary will help reduce this potential and should be reviewed at later project stages.

Figure 2-4 presents the reported collisions between 2007 and 2011, based on data provided by the City and the County.

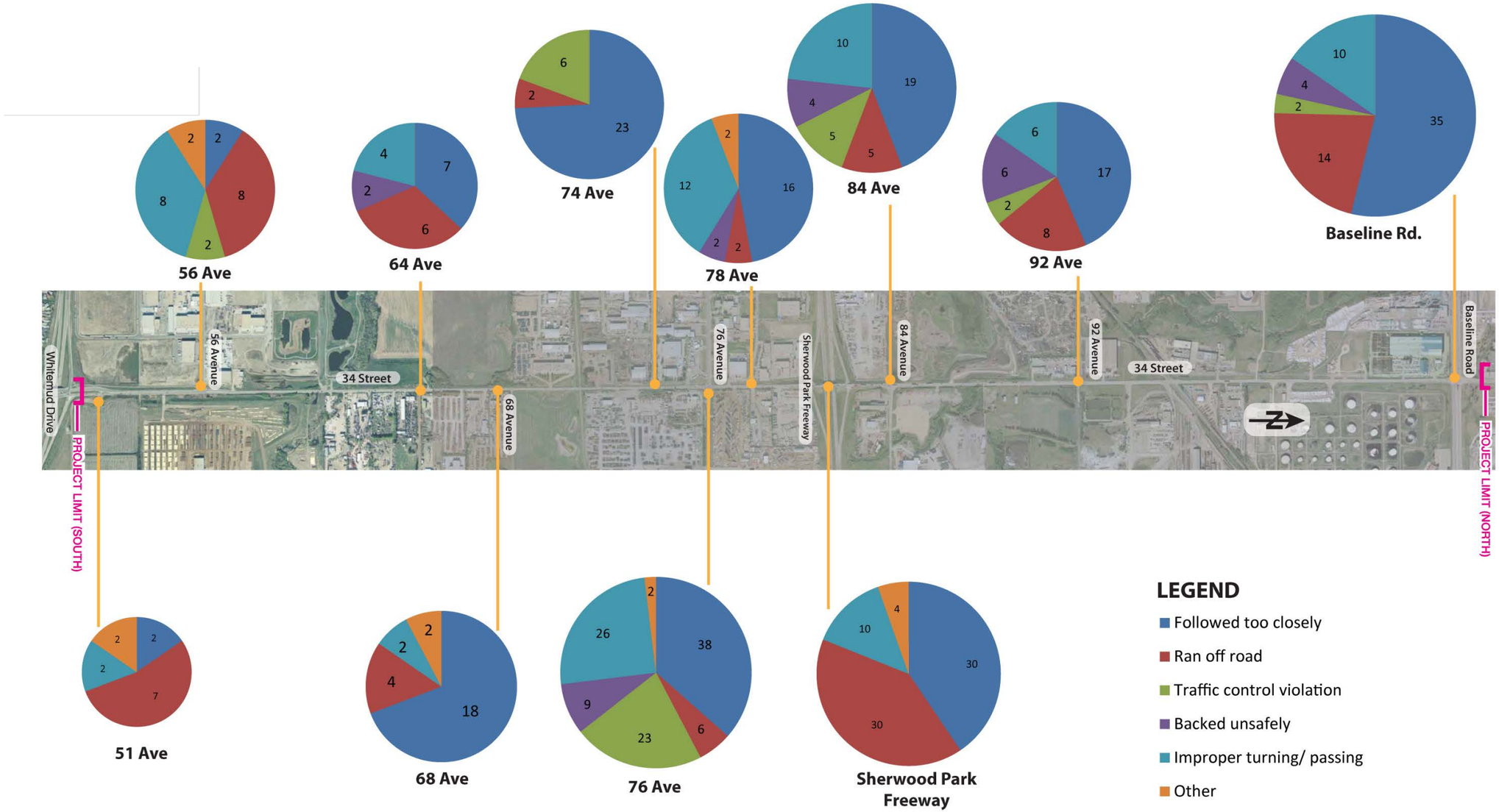


Figure 2-4: Collision History (2007-2011)

2.2 EXISTING LAND USE & ZONING

The existing land use zoning on 34 Street is almost exclusively industrial (light to heavy) with a mix of agricultural and reserve (both municipal and environmental). The existing zoning is reflective of a corridor that contains many large (full quarter section) lots currently used for storage, trucking logistics, manufacturing and tank farms. Although the existing zoning may allow for more intensive use of many of these lots, current market conditions and lack of servicing have generally detracted from more intensive uses along the corridor. With the development of the Pylypow neighborhood, the redevelopment process has begun on 34 Street, which will continue with development in other areas such as Maple Ridge.

2.3 FUTURE LAND USE & DEVELOPMENT

Land use and development plans were provided by both the City of Edmonton and Strathcona County along the 34 Street corridor**.** Consolidated Area Structure Plans for Maple Ridge (2010) and Pylypow Industrial (2006) were also provided by the City, which outline plans for future land use, environmental features, eco-industrial development features, infrastructure requirements and development phasing (see **Section 2.4**).

Figure 2-5 summarizes findings from the provided City and County land use and development plans. The majority of land adjacent to 34 Street is designated as light to heavy industrial, making the requirement to accommodate heavy vehicles important for the corridor. There are also small pockets of "Industrial Business" areas on the west side of the corridor, identifying areas where accesses will need to be maintained and/or accommodated.

Preservation of the indicated natural areas in order to adhere to existing zoning requirements will also be an important aspect of the project. There are also areas currently zoned as Agricultural Reserve within the 34 Street corridor; however, it is assumed that these are legacy zonings and, in the future, may be rezoned to a more appropriate land use.

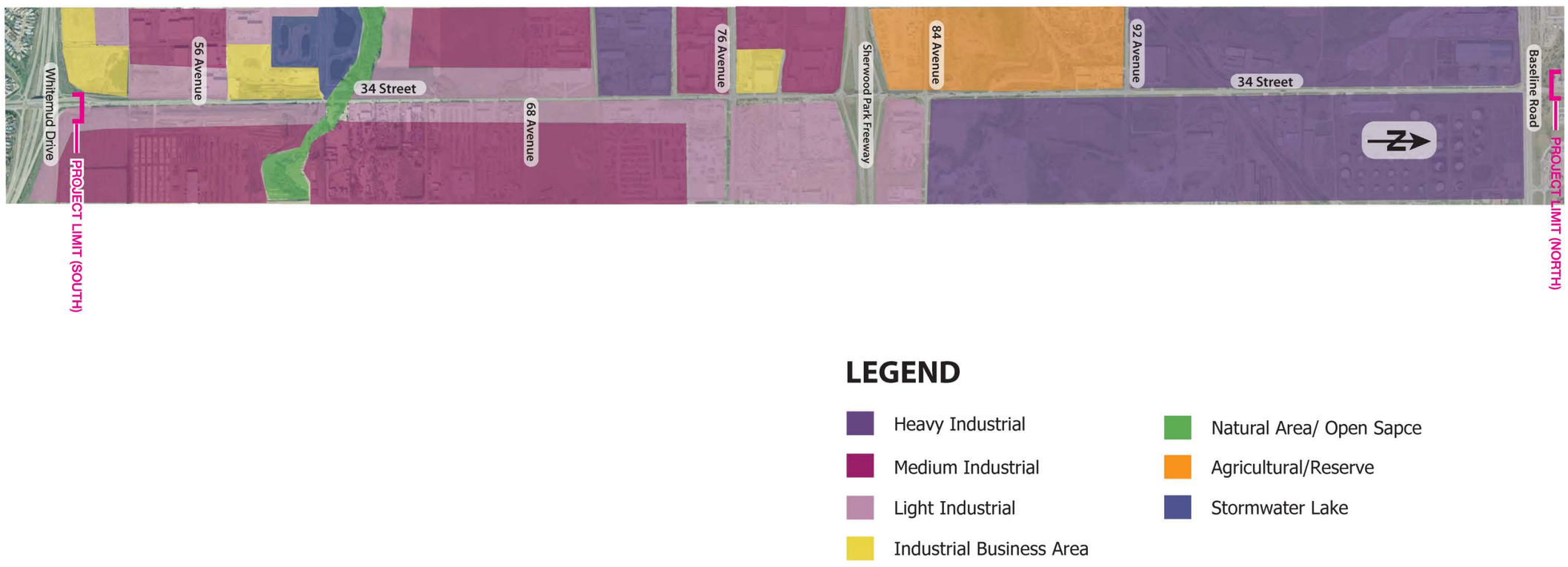


Figure 2-5: Future Land Use and Development

2.4 PREVIOUS REPORTS

Several reports have been completed along the 34 Street corridor, ranging from land use planning to geotechnical and environmental. The critical previous reports for this study are documented as the Maple Ridge Area Structure Plan (including the Traffic Impact Assessment and Area Servicing Master Plan) completed by Focus in 2009 and the Pylypow Industrial ASP completed by the City in 2006 (including a traffic analysis study completed by ISL Engineering in 2010).

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

This Area Structure Plan (ASP) was completed and refined over a period of several years (2007-2010), and outlines plans for future land use of the Maple Ridge Area, bordered by 34 Street (west), Sherwood Park Freeway (north), Anthony Henday Drive (east) and Whitemud Drive (south).

As a part of the Maple Ridge ASP prepared by Focus Corporation, a Traffic Impact Assessment (TIA) was prepared by Bunt and Associates to project ultimate traffic volumes for the full potential development Maple Ridge Industrial Park, located between Whitemud Drive and Sherwood Park Freeway. 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 between 34 Street and 17 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 far past the 2044 design year for City and County planning;
- Only the development on the east side of 34 Street was analyzed; development and analysis regarding the Pylypow and Weir Industrial areas were not included; and
- The recommendations were based on the assumption that a five lane undivided arterial cross section would be implemented along the 34 Street corridor, with two through lanes in each direction and a center left turn lane.

Based on these inconsistencies with the current planning study scope and objectives, the recommended roadway geometry and traffic control as provided in this TIA is not considered adequate for the 34 Street corridor and will require full re-analysis. However, the traffic projections included in the TIA (see **Appendix D**) were used as a starting point for future volume estimations along the corridor.

2.4.2 Pylypow Industrial ASP & Traffic Analysis Study (City of Edmonton, 2006 & ISL Engineering, 2010)

The purpose of this Area Structure Plan was to determine a development and servicing concept for the Pylypow Industrial region, bounded by 34 Street (east), Whitemud Drive (south), 50 Street (west) and a private rail corporation (north). Transportation network connections were also outlined within the ASP.

ISL Engineering completed the traffic analysis for the Pylypow Industrial ASP, evaluating the possibility of disconnecting 64 Avenue at the planned Fulton Creek crossing and its effects on future Roper Road accesses. While the assessment deemed that the traffic operations would remain adequate along Roper Road with the closure of the creek crossing, intersections along 34 Street were not accounted for; if traffic projections at the 34 Street / Roper Road intersection result in undesirable Level of Service, the creek crossing may need to remain as an alternative route for vehicles wishing to access the industrial park.

2.4.3 Environmental & Geotechnical

Table 2-3 provides a summary of pertinent background environmental and geotechnical reports gathered to date for the 34 Street corridor. These reports aided in the determination of existing conditions and helped to indicate where further investigation was required.

Table 2-3: Previous Environmental & Geotechnical Reports

Report Title	Year	Summary
Pavement Design Recommendations: 34 Street, 51 Avenue to Sherwood Park Freeway	1983	• Wet subgrade encountered • Road gravel contaminated with clay/organics • 30cm topsoil layer below 0.7m depth
Coring and Hand Augering, 34 Street and 92 Avenue (Failed Area)	1999	• Existing asphalt concrete thickness of 140mm to 180mm • GBC (20mm) depth of 135mm to 180mm • GBC underlain with high plastic, moist clay firm with some silt. • Recommendation was to remove the asphalt and GBC (to clay), re-compact clay and rebuild.
Geotechnical Investigation: 34 Street, Whitemud Drive to the Powerline ROW	2006	• General soil stratigraphy: ACP overlaying GBC followed by med-high plastic clay fill (some organic clay encountered) • From pavement inspection, total reconstruction of existing roadway not required • Use of a woven geotextile may be required where soft or organic clays are found
Environmental Assessment and Environmental Management Plan: 17 Street, Whitemud Drive to Knightsbridge Road	2012	• Fulton and Goldbar Creeks analyzed for fish and wildlife species • Site assessments confirmed low habitat suitability for sensitive species • Water quality should be monitored during construction

While previous environmental reports indicate that there is currently low habitat suitability for wildlife, it is acknowledged that with upgrades to the Fulton Creek crossings at 34 Street and 17 Street there is a potential for increase of wildlife along the corridor (see **Section 5.8**).

2.5 EXISTING UTILITIES

Existing utility and pipeline right-of-way plans are available in **Appendix C**. The existing utilities in the area include gas, water, drainage, power and telecommunications.

A major pipeline corridor currently exists along the east side of 34 Street from north of the CNR rail crossing to Baseline Road; it is therefore recommended to widen 34 Street to the west to avoid impacts to this pipeline corridor. A major pipeline crossing also exists north of 68 Avenue, which will require special attention during later design and implementation stages of the project.

Table 2-4 lists the existing utility crossing locations and owners, communication and coordination with whom will be required during future design stages of the project.

Table 2-4: Existing Utility Crossings

Utility Type	Owner(s)	Approximate Crossing Locations
Tele-communications	Telus	South of 56 Ave, south of 74 Ave, north of 78 Ave, south of SPF, north of 84 Ave, north of 92 Ave, south of CPR rail crossing, south of Baseline Road
Overhead Power	TransAlta	South of Fulton Creek
Gas	ATCO	South of 76 Ave, south of CPR rail crossing, north of CPR rail crossing
Oil	Terasen	North of 68 Ave
	Pembina Pipeline	North of 51 Ave, north of 68 Ave
	Plains Midstream Canada	South of CNR rail crossing
	Keyera Energy	South of 64 Ave
HPV Products	Nova Chemicals	North of CPR rail crossing
	Plains Midstream Canada	North of 68 Ave
Potable Water	Strathcona County	92 Avenue

Additional utility companies that do not subscribe to Alberta First Call are not listed above (including Shaw Communications) and will also need to contacted and coordinated with future work.

Crossing permits will be required for all the above mentioned utilities at future phases of the project (detailed design), most notably the gas, oil and HPV product pipelines. In some cases additional protection may be required based on consultation with the pipeline companies.

There is a significant utility crossing at 76 Avenue which will require future design, hydrovac and survey, including the relocation of a valve station, currently located in the southwest quadrant of the intersection. It is likely that additional crossing protection will be required and there is the potential for the pipelines to conflict with stormwater sewer locations.

The aerial transmission line (TransAlta), crossing north of Roper Road is well clear of the existing Epcor and Telus lines that parallel 34 Street, providing adequate clearance to 34 Street, provided the profile of 34 Street is not significantly raised (more than two metres).

There are also several franchise utilities that will require relocation or removal, including:

- ATCO Gas – there is an underground high pressure gas line along the west side of 34 Street (parallel within the existing right-of-way) that will require relocation or removal. Information provided by the City of Edmonton's Right-of-Way Management section indicated that this will be the responsibility of ATCO, under the current franchise and right-of-way operating agreement;
- Epcor Power – there are existing power lines on the west side of 34 Street that will be required to be relocated. The recommendation is to relocate the lines underground to avoid conflicts with over-dimensional vehicles;
- Fortis – Existing power lines along the east side of 34 Street from Sherwood Park Freeway to Baseline Road will need to be relocated, preferably underground in the proposed boulevard. Fortis also supplies power to the street lighting north of Sherwood Park Freeway;
- Telus – existing Telus aerial lines (located on both the east and west sides of 34 Street) will also need to be relocated underground.

3 CROSS SECTIONS & DESIGN CRITERIA

3.1 CROSS SECTION

The cross section of 34 Street will determine the ultimate right-of-way requirements for the corridor. Currently the cross section of 34 Street is rural in nature with two lanes of travel for traffic (one in each direction) and roadside ditches. Both the ditches 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 34 Street to be widened to six lanes south of Sherwood Park Freeway, and four lanes north of Sherwood Park Freeway, based in many cases on future land use and development patterns, and confirmed with the traffic analysis portion of the project (see **Section 4**).

3.1.1 Option Evaluation

Standard cross sections were proposed for 34 Street, both urban and rural based on City and County standards (see **Figure 3-1**). These cross sections were then qualitatively evaluated against many of the evaluation criteria that were determined by the Project Team (based on criteria from previous studies and workshops). They were evaluated as applied to the corridor as a whole. A summary of this evaluation with discussion is presented in **Table 3-1**. Based on this evaluation, it is recommended that an urban divided arterial cross section be used for the length of 34 Street (**Figure 3-2**).

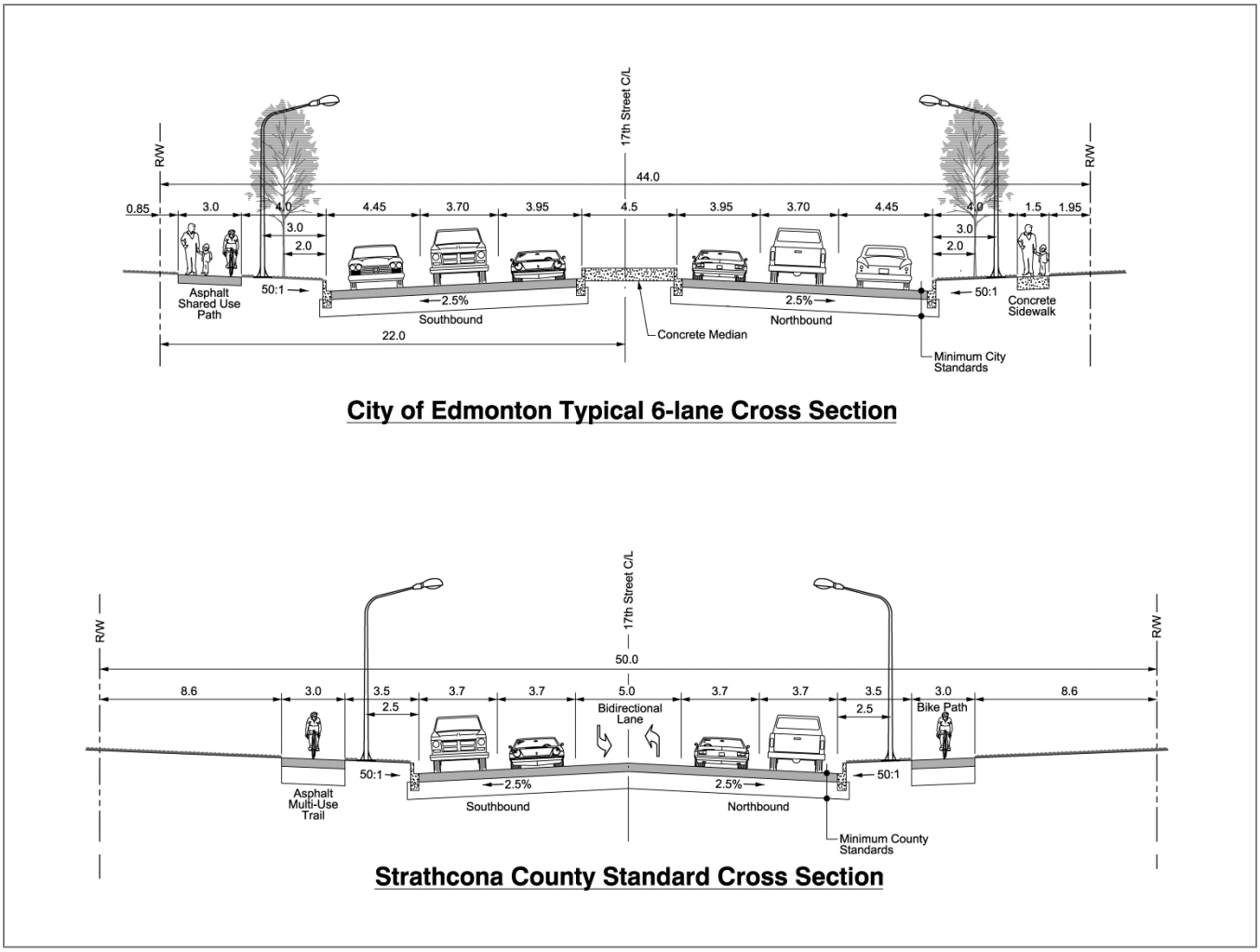


Figure 3-1: Standard Typical Cross Section Options

Table 3-1: Cross Section Evaluation

EVALUATION CRITERIA	Urban Standard Cross Section		Rural Standard Cross Section	
Safety	●	Cross Section provides a high level of safety	◕	Cross Section is safe, however increased chances of vehicles leaving the roadway surface
Traffic and Goods Movement	◕	Urban curbs and boulevards impact large vehicle movements, modifications such as swinging light poles will permit over dimensional loads	●	With shoulders and no curbs, there is more "open" pavement space for larger vehicles
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
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 34 St to the south	◑	Current road is an existing rural cross section
Environmental Impacts /Wetland Protection	◕	Stormwater is managed through storm sewer, parallel with 34 Street with outfall locations. Changes existing drainage pattern. Curbs create a barrier to wildlife movements.	◕	Open ditches could feed water to wetlands, risk of contamination through spills. Less likely to impede wildlife movements.
Stormwater Processing	●	Stormwater is managed through storm sewer, parallel with 34 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
Sidewalks and Shared Use Paths	●	Defined Shared Use Path, with boulevard and off sets	◑	Rural Paths are more difficult to construct and connect to roadways and other pedestrian facilities
Land Acquisition	●	Smallest cross section requirements minimizes land requirements	○	Widest Cross Section requires largest land requirements
Constructability	◑	Underground stormwater requires more construction; maintaining access more challenging	◕	Ditch construction requires more space; easier build one half, then flip the construction
Operations and Maintenance	●	Long term maintenance and operation costs are reduced with full urban cross section	◑	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

More Preferred	●	Less Preferred	○

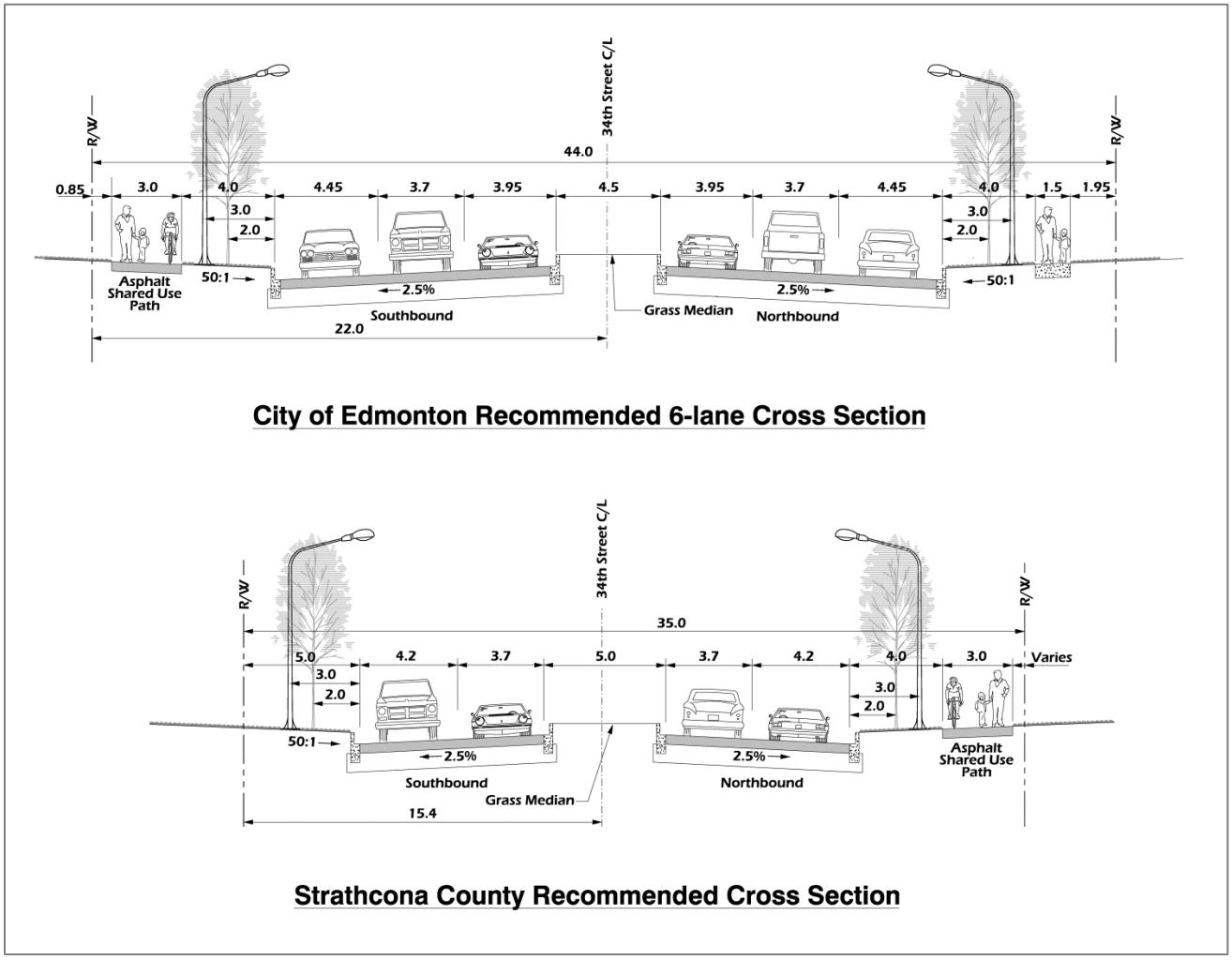


Figure 3-2: Recommended Typical Cross Sections

3.2 RECOMMENDED DESIGN CRITERIA

Design criteria for 34 Street were developed following the review of previous studies (**Section 2**) and the cross section evaluation (**Section 3.1**).

Consistency is important through the 34 Street corridor in order to maintain driver expectation and, therefore, many of the design criteria have been developed through a consolidation of both City of Edmonton and Strathcona County design guidelines and standards. As a result, it is recommended that lane widths remain consistent. The Strathcona County 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, as well as to maintain consistency with lane widths on 34 Street south of Whitemud Drive, which was developed to the old City of Edmonton standard of 3.7m. Curb and gutter is also recommended through the entire length of 34 Street, with a fully urbanized cross section. A shared-use path (multi-use trail) is recommended through the length of 34 Street, and is reflected in the design criteria.

The design designations, cross sections and right-of-way widths for intersecting avenues along 34 Street will not be modified, rather matched to the existing, with the exception of 76 Avenue, which may require upgrades to include two through lanes between 34 Street and 17 Street with left turn bays.

The current standard for Strathcona County is a 50 metre cross section, however as a constrianed corridor (pipelines, property) the recommended cross section was reduced from the standard to better fit within the constraints of 34 Street. The recommended typical cross section of 35 metres is urban and was derived based on a shared use path on the east side with sidewalk connections to bus stops on the west side. The City of Edmonton utilizes a standard four-lane cross section of 36 metres, however without a sidewalk and shared use path on both sides, the typical cross section can be reduced by a metre in most places. Although based on ths typical cross section, the cross section does vary in the concept plans through the corridor based on available land and other constraints.

The design criteria have been split into the two sections of 34 Street (north and south of Sherwood Park Freeway) and are summarized in **Table 3-2**.

Table 3-2: Recommended Design Criteria

34 Street: Whitemud Drive to Baseline Road Recommended Design Criteria		Whitemud to SPF	SPF to Baseline Road
Design	Design Classification	Urban	Urban
	Design Speed (km/h)	70	70
	Posted Speed (km/h)	60	60
	Design Vehicle	WB-21	WB-36
Horizontal Alignment	Signalized Intersection Spacing (m)	200(2)	200
	Minimum Curve Radius (m)	190	190
	Preferred Curve Radius (m)	500	500
	Max Superelevation Rate	0.06	0.06
Vertical Alignment	Crest (K Value)	23	23
	Sag (K Value)	12	12
	Stopping Sight Distance (m)	110	110
	Grades (max.)	5%	6%
Cross Section	Number of Basic Lanes	6	4
	Basic Lane Widths(1) (m)	3.7(3)	3.7
	Right Curb Lane(1) (m)	4.2	4.2
	Right Turn Bay(1) (m)	3.5	3.5
	Left Turn Lane(1) (excl. slot bay) (m)	3.3	3.5
	Left Turn Lane(1) slot bays (m) single/ double	3.7 / 3.5	3.7 / 3.5
	Right Turn Cut Off (when required)	High Entry Angle/ Low Exit Angle (R110, R22)	High Entry Angle/ Low Exit Angle (R110, R22)
	R/W Width (m)	44.0	35.0
	Cross Fall (%)	2.5	2.5
	Outside Shoulder Width (m)	N/A	N/A
	Sidewalk / SUP (m)	1.5 / 3.0	NA / 3.0

(1) All lane widths are noted to lip of gutter (LoG)

(2) Standard minimum spacing for a 6-lane divided arterial is 400m, however due to constraints in the area 200m is deemed acceptable based on access requirements

(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 TRAFFIC EVALUATION

This section provides an overview of the traffic analysis completed for 34 Street between Whitemud Drive and Baseline Road. The traffic analysis completed 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). Additionally, traffic projections were determined in undeveloped areas based on future land use scenarios.

4.1 TRAFFIC PROJECTIONS

Land use and development plans from 2001 to 2011 were provided by both the City of Edmonton and Strathcona County along the 34 Street corridor**.** Consolidated Area Structure Plans (ASPs) for Maple Ridge (2010) and Pylypow (2006) were also provided by the City, which outline plans for future land use, environmental features, eco-industrial development features, infrastructure requirements and development phasing. Land use plans are discussed in **Section 2.4** of this report.

4.1.1 Background Traffic

Existing traffic volume data as supplied by the City and County (summarized in **Section 2.1**) were projected and balanced to estimate current 2013 traffic volumes for use as background traffic in analysis (see **Figure 4-1**).

4.1.2 Traffic Composition

Based on existing patterns of heavy vehicles along the corridor, shown at major intersections along 34 Street in **Table 4-1**, the truck percentage used for the corridor was 10%, with the exception of north/south through movements south of the Sherwood Park Freeway, which were assumed to be 5% during the peak hours.

Table 4-1: Existing Truck Percentages

	Northbound (%)		Eastbound (%)		Southbound (%)		Westbound (%)	
	AM	PM	AM	PM	AM	PM	AM	PM
Basline	10.9	6.8	4.8	1.9	34.5	3.9	3.4	3.8
EB SPF	8.6	5.3	5.8	8.6	9.1	10.3	-	-
WB SPF	5.7	6.1	-	-	15.4	8.4	5.4	23.0
76 Ave	5.2	10.0	24.9	8.1	8.6	9.8	13.6	8.3
WB WMD	1.1	7.6	-	-	23.2	3.1	7.2	4.5

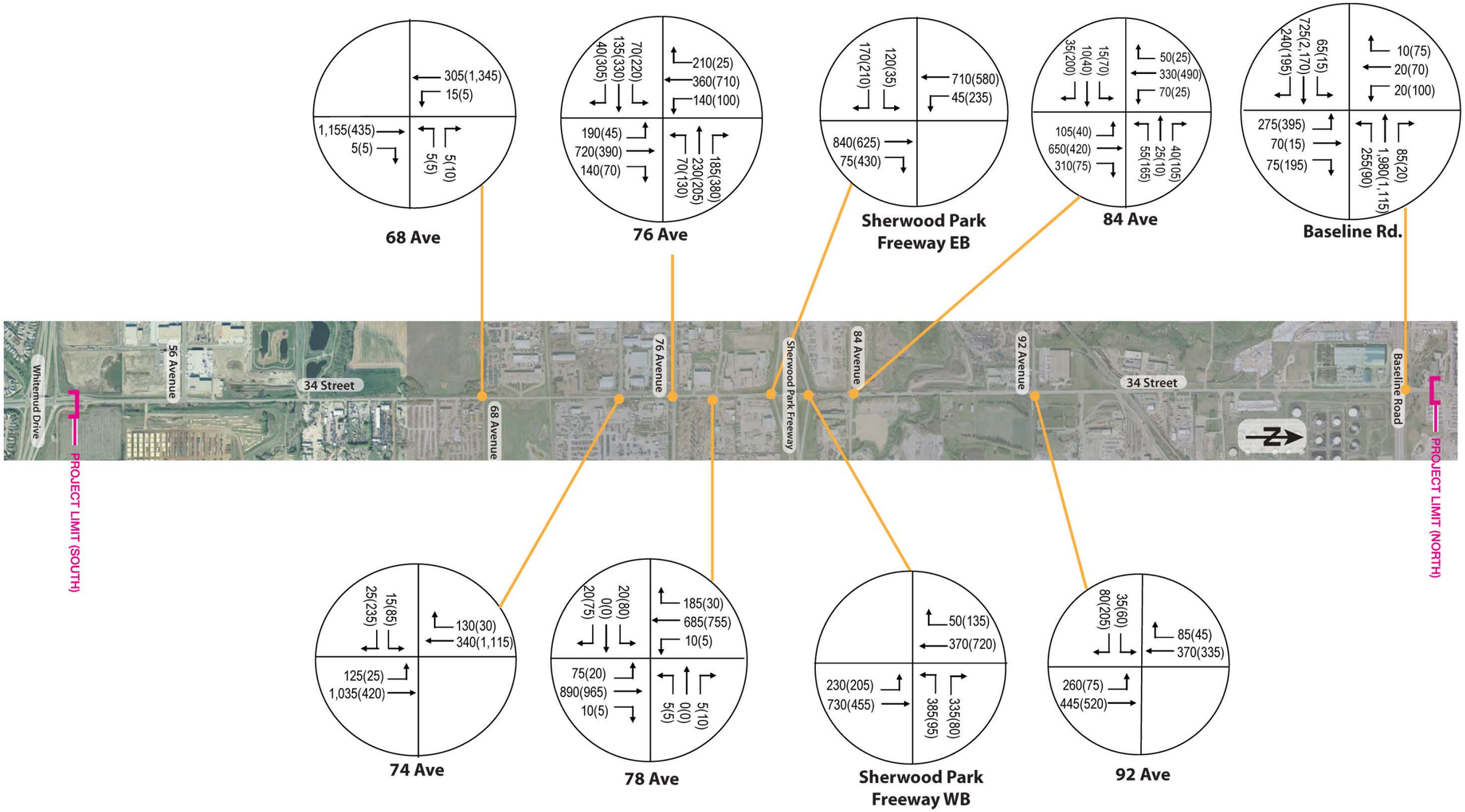


Figure 4-1: Balanced 2013 Existing Traffic AM(PM) Peak

4.1.3 Traffic Generation & Distribution

Future traffic projections along 34 Street to a full build-out scenario were determined by combining results from previous reports as well as trip generation / distribution exercises based on undeveloped land along the corridor. During initial iterations, a growth factor was applied to the background traffic volumes as a starting point for these projections; however, when combined with traffic generated by the Maple Ridge and Pylypow areas, as well as industrial areas north of Sherwood Park Freeway, the results exceeded the estimates provided by the City's Regional Travel Model (RTM). It was therefore assumed that the traffic generated based on only the future land use was adequate to represent the traffic volumes expected for a full build-out scenario; the background growth was compounding the results and was removed from the analysis.

Maple Ridge & Pylypow Industrial ASP / TIA

The Maple Ridge 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, based on full build-out east of 34 Street;
- Minimum 34 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).

The TIA was used as part of the traffic forecasts for 34 Street, through the Maple Ridge Area. However, because the TIA only accounted for land uses east of 34 Street, additional traffic generation / distribution exercises were required based on future land use designations, as well as consolidation with other ASPs in the area. Traffic generated from the Maple Ridge area was used as given in the TIA, balanced and rounded to the nearest five vehicles.

The land uses specified in the Pylypow Industrial ASP were used to generate peak hour trips for a full build out scenario, as shown in **Table 4-2**.

Table 4-2: Pylypow Industrial Trip Generation (Peak Hour)

	Land Use	Area (ha)	Density (emp/ha)	Total Employees	Trip Rate	Total Trips Generated	
SE	Medium Industrial	17.5	25	437.5	0.5	219	758
	Light Industrial	30.8	32	1078	0.5	539	
SW	Medium Industrial	17.5	25	437.5	0.5	219	398
	Light Industrial	10.2	35	357	0.5	179	
Future	Medium Industrial	35	25	875	0.5	438	1663
	Light Industrial	70	35	2450	0.5	1225	
					TOTAL	**2819**	

These trips were then distributed to the network, assuming that 50% of the generated traffic would access the site via 50 Street, while the other 50% would use 34 Street. The trips generated in the southeast quadrant were assumed to use either Roper Road or 56 Avenue to access 34 Street, while the northeast quadrant would use either 64 Avenue or 68 Avenue, as shown in **Figure 4-2**.

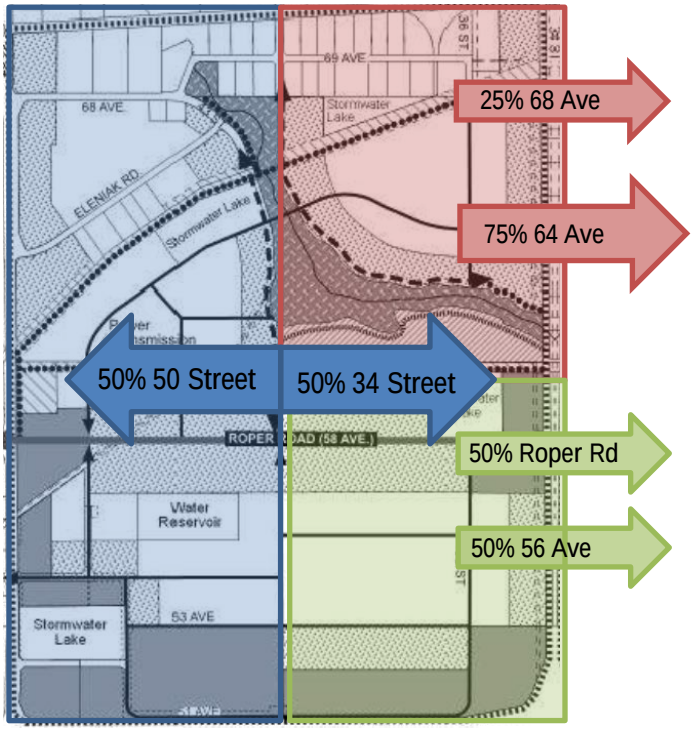


Figure 4-2: Pylypow Network Trip Distribution

Table 4-3 summarizes the directional distribution percentage assumptions for the Pylypow trips assigned to 34 Street during both the AM and PM peak hours.

Table 4-3: Pylypow Industrial Trip Distribution along 34 Street

	Directional Distribution (%)				South on 34 Street (%)		North on 34 Street (%)			
	In	Out	North	South	South of Roper	E. on Roper	E. on SPF	W. on SPF	E. on Baseline	W. on Baseline
AM Peak	80	20	50	50	40	10	15	20	5	10
PM Peak	20	80	50	50	40	10	15	20	5	10

Figure 4-3 summarizes the AM(PM) peak turning movements for resulting trips generated from both the Maple Ridge and Pylypow industrial areas, representing additional traffic to be added to the 2013 background scenario for the region south of Sherwood Park Freeway.

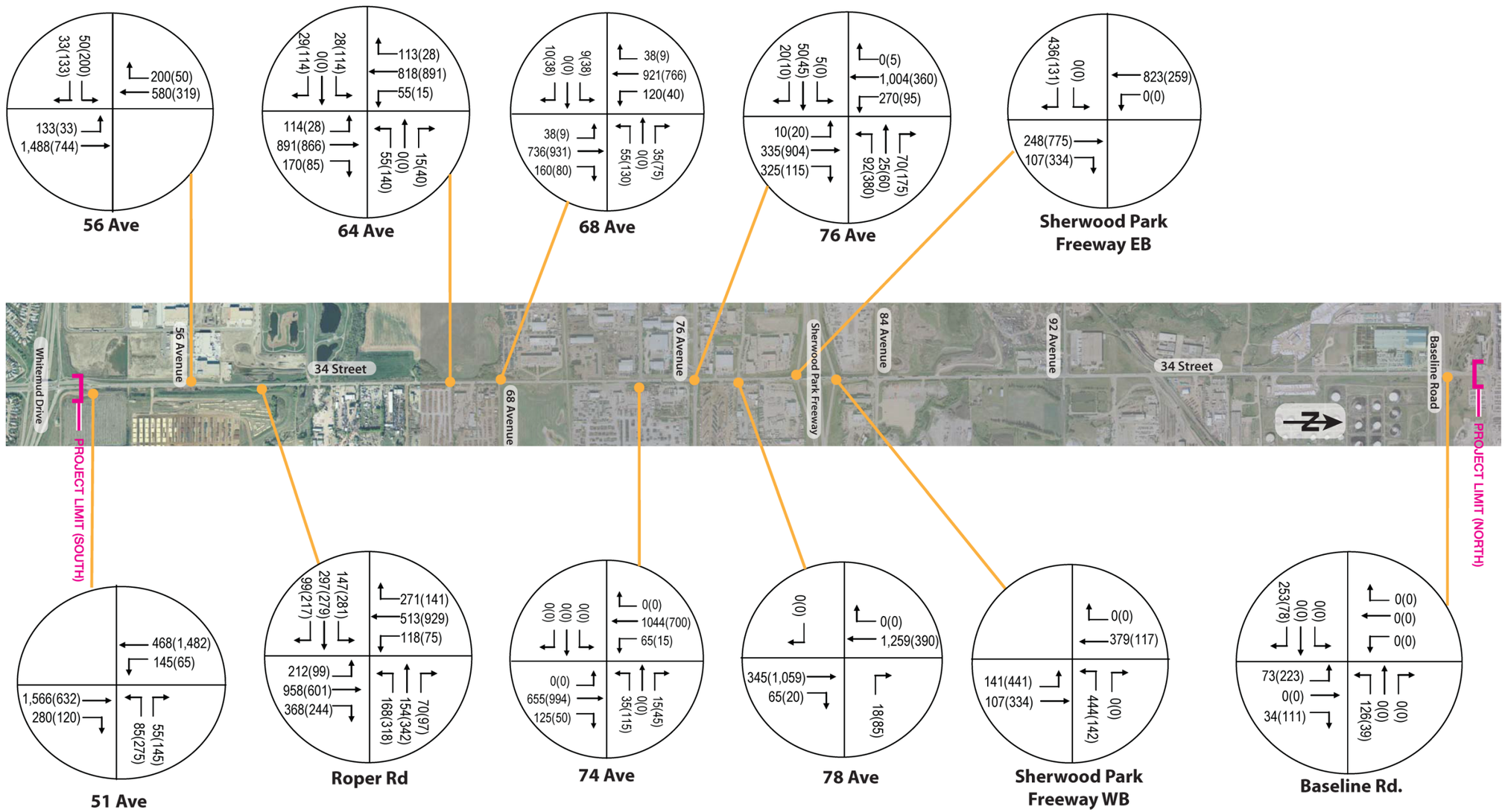


Figure 4-3: Build-out ASP/TIA Volumes AM(PM) Peak (Maple Ridge & Pylypow)

Undeveloped Industrial Land North of Sherwood Park Freeway

Land use information north of the Sherwood Park Freeway was used to determine the amount of undeveloped area for trip generation calculations, as summarized in **Table 4-4**.

Table 4-4: Heavy Industrial Trip Generation (N. of SPF)

Land Use	Undeveloped Area (ha)	Density (emp/ha)	Total Employees	Peak Hour Trip Rate	Total Peak Hour Trips Generated
Heavy Industrial	150	20	3000	0.5	1500

These trips were then assigned to the 34 Street corridor, assuming that either the Sherwood Park Freeway or Baseline Road would be the main access points along the network. The assumptions used to distribute the generated traffic are summarized in **Table 4-5** for the AM and PM peak hours. Trips that were generated to the 34 Street corridor were assumed to remain on 34 Street to either Baseline Road or Sherwood Park Freeway. Although 92 Avenue does connect to 50 Street in the east, the connection at 50 Street distributes traffic north and south to either Baseline Road or Sherwood Park Freeway (and 90 Avenue). Although some 34 Street trips may utilize this connection, especially those that are destined for the neighboring communities, this traffic would be minimal and would not impact operations on 34 Street.

Table 4-5: Industrial Trip Distribution (N. of SPF)

	Directional Distribution (%)						South on 34 Street (%)			North on 34 Street (%)		
	In	Out	North	South	East	West	S. of SPF	E. on SPF	W. on SPF	N. on Baseline	E. on Baseline	W. on Baseline
AM	80	20	50	50	60	40	20	40	40	0	50	50
PM	20	80	50	50	60	40	20	40	40	0	50	50

Figure 4-4 summarizes the turning movements for additional trips generated from undeveloped industrial areas north of Sherwood Park Freeway, which were added to the 2013 background traffic volumes.

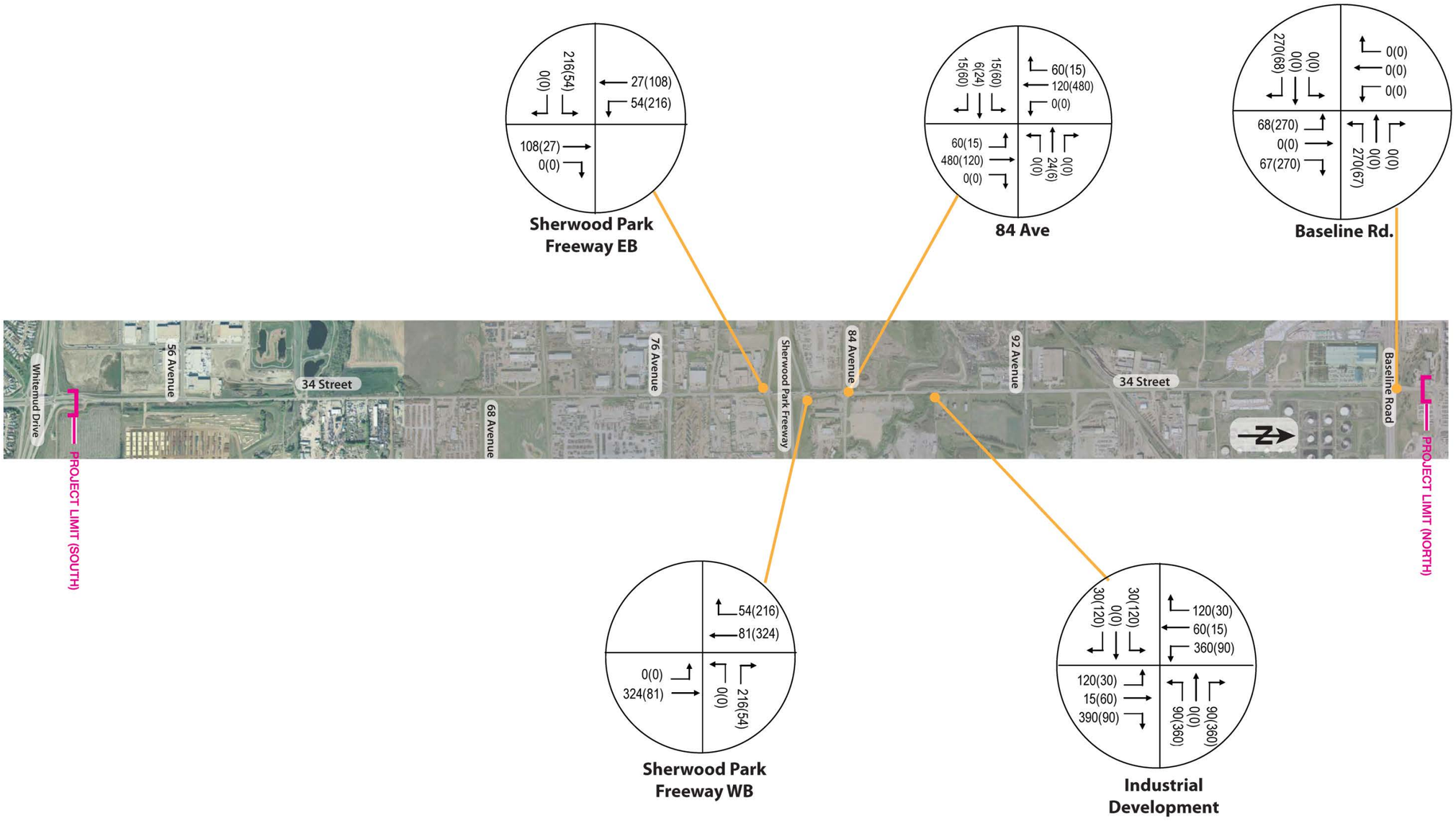


Figure 4-4: Build-out Industrial Traffic AM(PM) Peak (N. of SPF)

4.1.4 Combined Traffic

As a final confirmation step, full build-out AADT estimates were determined and compared to the City's long-term Regional Travel Model (RTM), as shown in **Figure 4-5**. Discrepancies along crossing streets may be attributed to development assumptions.

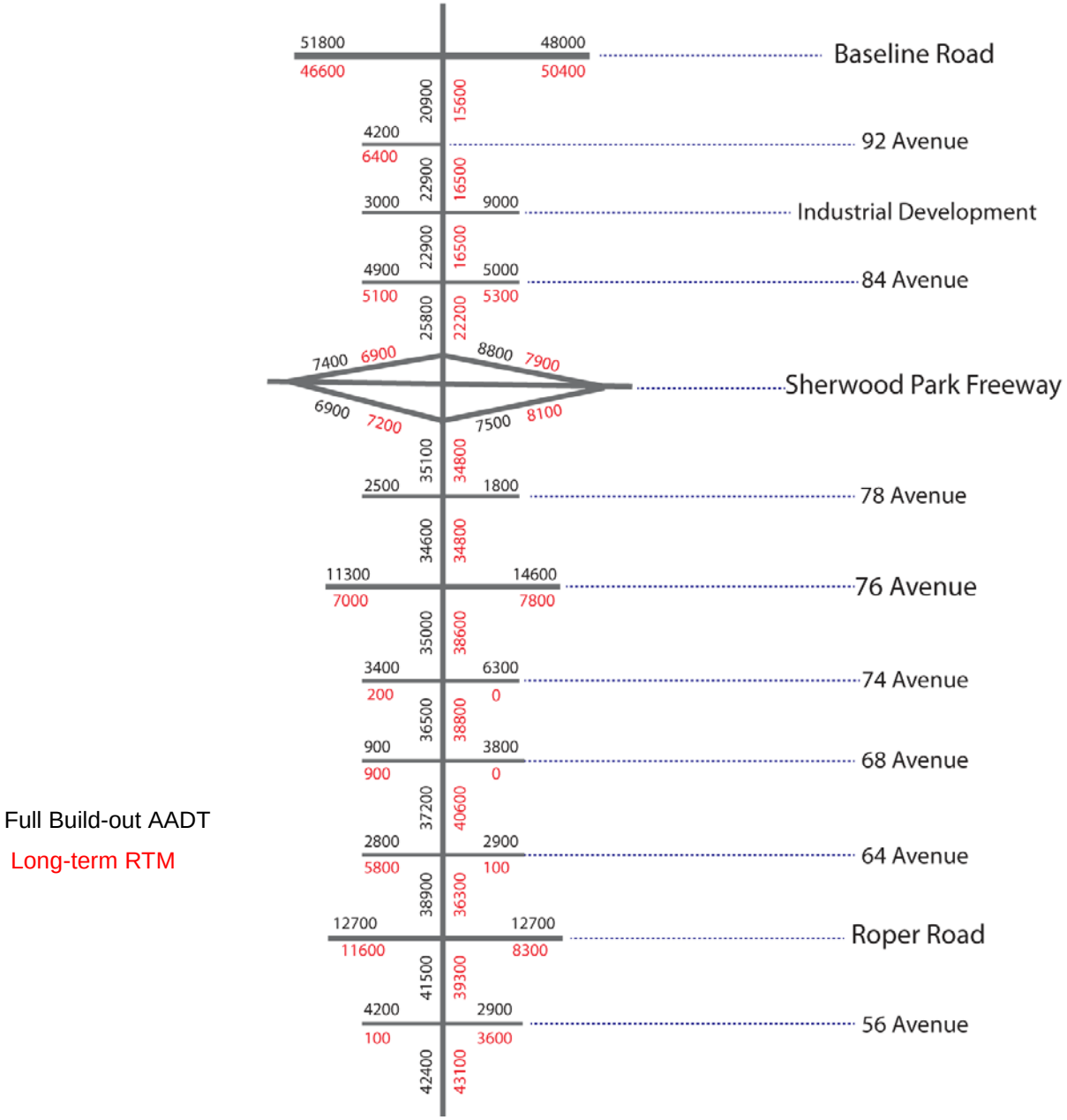


Figure 4-5: Combined Full Build-out AADT and Long Term Travel Model Volumes

Figure 4-6 shows the resulting forecasted traffic volumes along the 34 Street corridor for both the AM and PM peak design hours, compared with the AADT volumes from the Long Term Regional Travel Model.

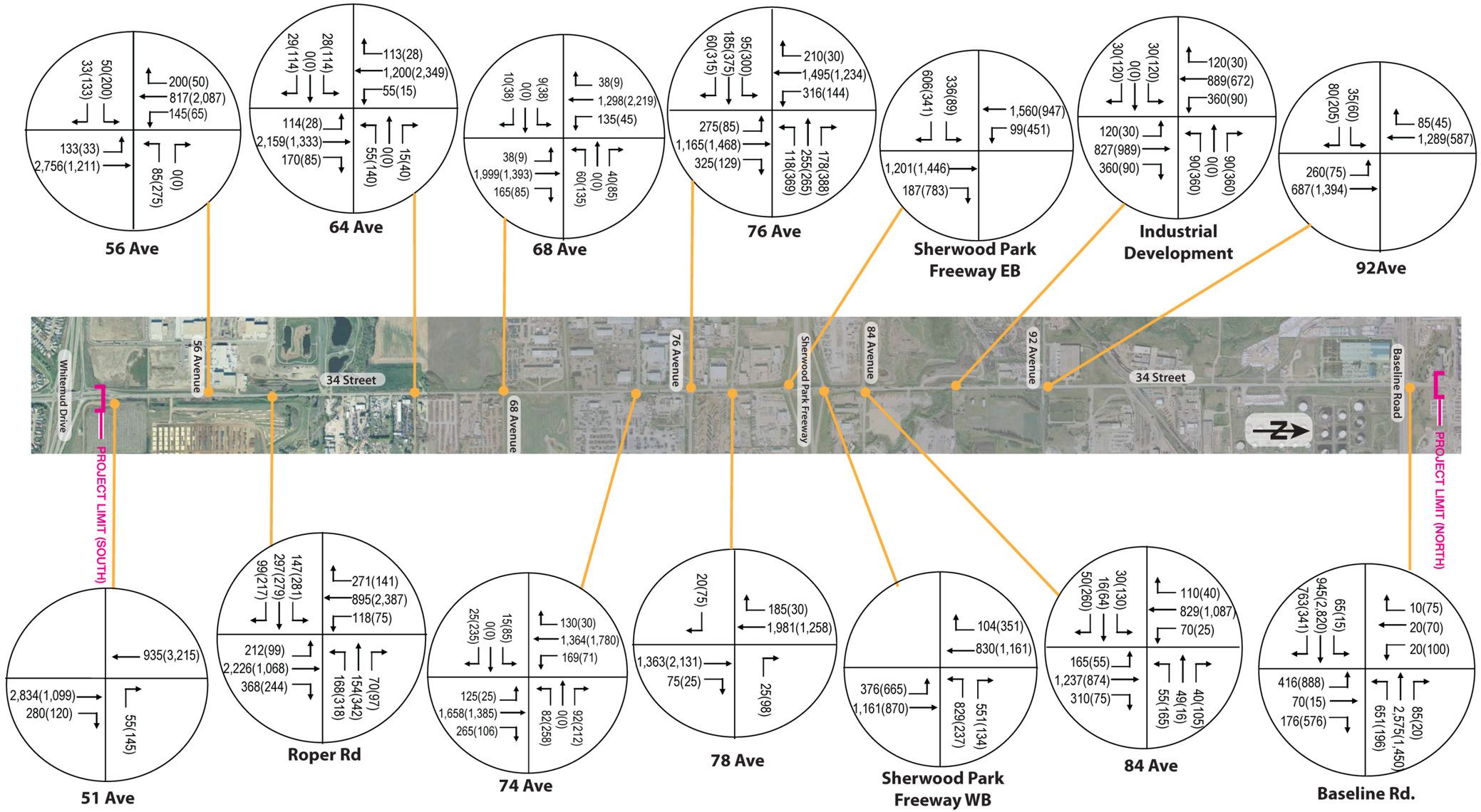


Figure 4-6: Combined Full Build-out AM(PM) Peak Volumes

4.2 ANALYSIS & RESULTS

4.2.1 Four vs. Six Lane Confirmation, Roper Road to 76 Avenue

In order to confirm the chosen design criteria for the corridor, traffic analysis was completed for the PM peak of a four lane section south of Sherwood Park Freeway to ensure the recommended six lane section would be required in the long term. The results as summarized in **Table 4-6** show Level of Service (LOS) including failures at several intersections along the corridor.

Table 4-6: Four-lane Level of Service (S. of SPF)

Location	Direction	Level of Service
56 Avenue	Northbound	C
	Southbound	F
	Eastbound	D
	Westbound	E
Roper Road	Northbound	C
	Southbound	F
	Eastbound	E
	Westbound	D
64 Avenue	Northbound	B
	Southbound	F
	Eastbound	D
	Westbound	D
68 Avenue	Northbound	A
	Southbound	B
	Eastbound	D
	Westbound	D
74 Avenue	Northbound	D
	Southbound	C
	Eastbound	C
	Westbound	D
76 Avenue	Northbound	F
	Southbound	F
	Eastbound	D
	Westbound	D

For the section of 34 Street between 68 Avenue and 74 Avenue, based on the analysis, traffic will maintain an acceptable LOS at a four lane cross section. However a six-lane section is recommended for the following reasons:

1. Driver consistency; with six lanes south and north of this section, without a distinguishable break in the roadway (such as a major intersection, interchange, etc.) transitioning to four lanes and back to six does not maintain consistency;

2. Land acquisition; roughly a third of the affected land is currently undeveloped and the land required from developed parcels is largely sterilized by pipeline and utility corridors. There is a small incremental cost and / or impact to acquire (or have dedicated) land for six-lane as opposed to four lanes;

3. Utilities; within the road right-of-way there will be other utilities (storm sewer, water, electrical, telecom) with the ultimate 34 Street and a consistent corridor cross section will help develop alignments for underground utilities, avoiding conflicts; and

4. Long term flexibility of the corridor; protecting for a six-lane cross section will provide better long term flexibility through this section and through 34 Street, between Whitemud Drive and Sherwood Park Freeway. With large sections of undeveloped land, traffic assumptions may change with development, impacting requirements.

4.2.2 Network Issues & Proposed Solutions

The results of the trip generation and distribution exercises were compiled and analyzed as a base future scenario along the transportation network as approved by the City and County in previous studies. However, several instances of capacity failures along the corridor led to the need for network changes in order to provide alternate routes for heavy movements. **Table 4-7** summarizes the issues at various intersections and the corresponding solutions required to ensure the corridor functions well in the future.

Table 4-7: Network Issues and Proposed Solutions

Location	AM	PM	Issue	Proposed Solution
51 Avenue	✓	✓	▪ Side street LOS F ▪ Left turn movements fail	▪ RI/RO at 51 Avenue ▪ Connect 51 Avenue to 56 Avenue
74 Avenue	✓	✓	▪ Side street fails	▪ Add signal at 74 Avenue
76 Avenue	✓		▪ Westbound left fails ▪ Eastbound and westbound through movements near failing	▪ Connect 74 Avenue to 76 Avenue via 33 Street to provide an alternate path
78 Avenue	✓	✓	▪ EB and WB movements fail	▪ Signalization at 78 Avenue
92 Avenue	✓	✓	▪ Side street fails	▪ Signalize 92 Ave to accommodate left turns and create gaps for accesses
Baseline Road	✓	✓	▪ Westbound left turn fails	▪ Provide a double left turn westbound to southbound

Figure 4-7 summarizes the proposed network changes, as well as approved future network connections as outlined in the Maple Ridge and Pylypow Industrial ASPs.

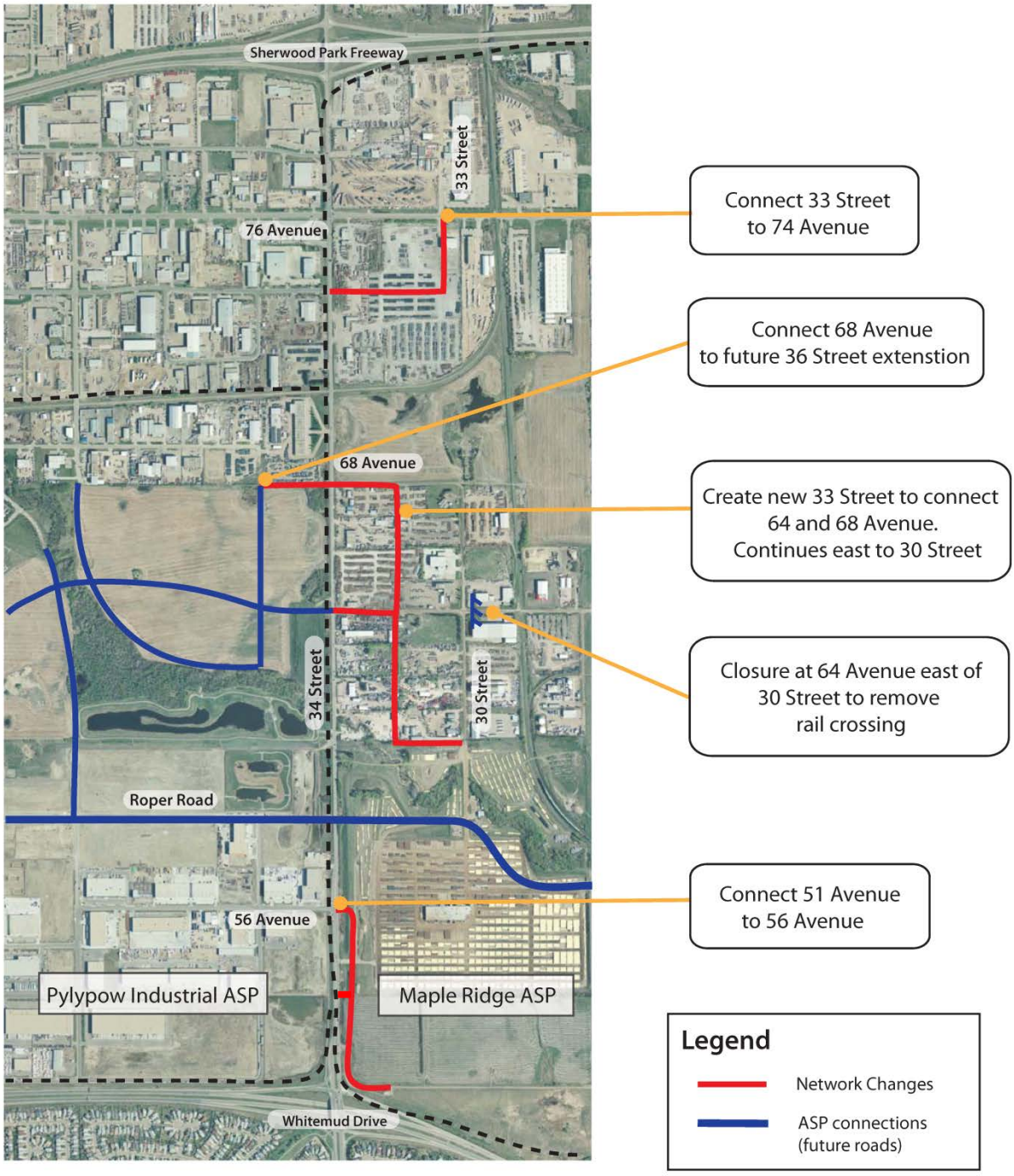


Figure 4-7: Proposed Network Changes

4.2.3 Recommended Intersection Configurations

Intersection configurations were determined based on traffic projections and analysis, as well as to maintain consistency and meet driver expectation through the corridor. Lane configurations for the east and west legs of 76 Avenue required further review and analysis in order to determine an adequate capacity for future volumes. **Table 4-8** shows the comparison in LOS for three configurations tested: 1 or 2 through lanes with separate turn bays, or a through lane with an additional shared through / right lane.

Table 4-8: 76 Avenue East/West Option Evaluation

Movement	1 lane		2 lanes		Shared T/R Lanes	
	AM	PM	AM	PM	AM	PM
EBL	C	C	C	C	C	D
EBT	D	F	D	D	D	D
EBR	C	C	C	D		
WBL	C	E	C	D	C	E
WBT	D	D	D	D	D	D
WBR	C	C	C	D		
NBL	E	C	D	C	D	C
NBT	B	D	B	C	B	C
NBR	C	C	C	B	C	B
SBL	F	D	D	C	E	D
SBT	C	C	C	C	C	C
SBR	B	C	B	C	B	C

While two dedicated through lanes for the east and west directions performs the best in the long term, in order to save right-of-way while maintaining minimum acceptable Level of Service, it is recommended that 76 Avenue be upgraded to include separate left turn bays, with a dedicated through in each direction, as well as a shared through / right lane for turning vehicles.

Figure 4-8 illustrates the recommended intersection configurations for all intersections along the corridor. Many of the collector roads along the corridor may require further review at future design stages to confirm the lane configurations, should further development occur.

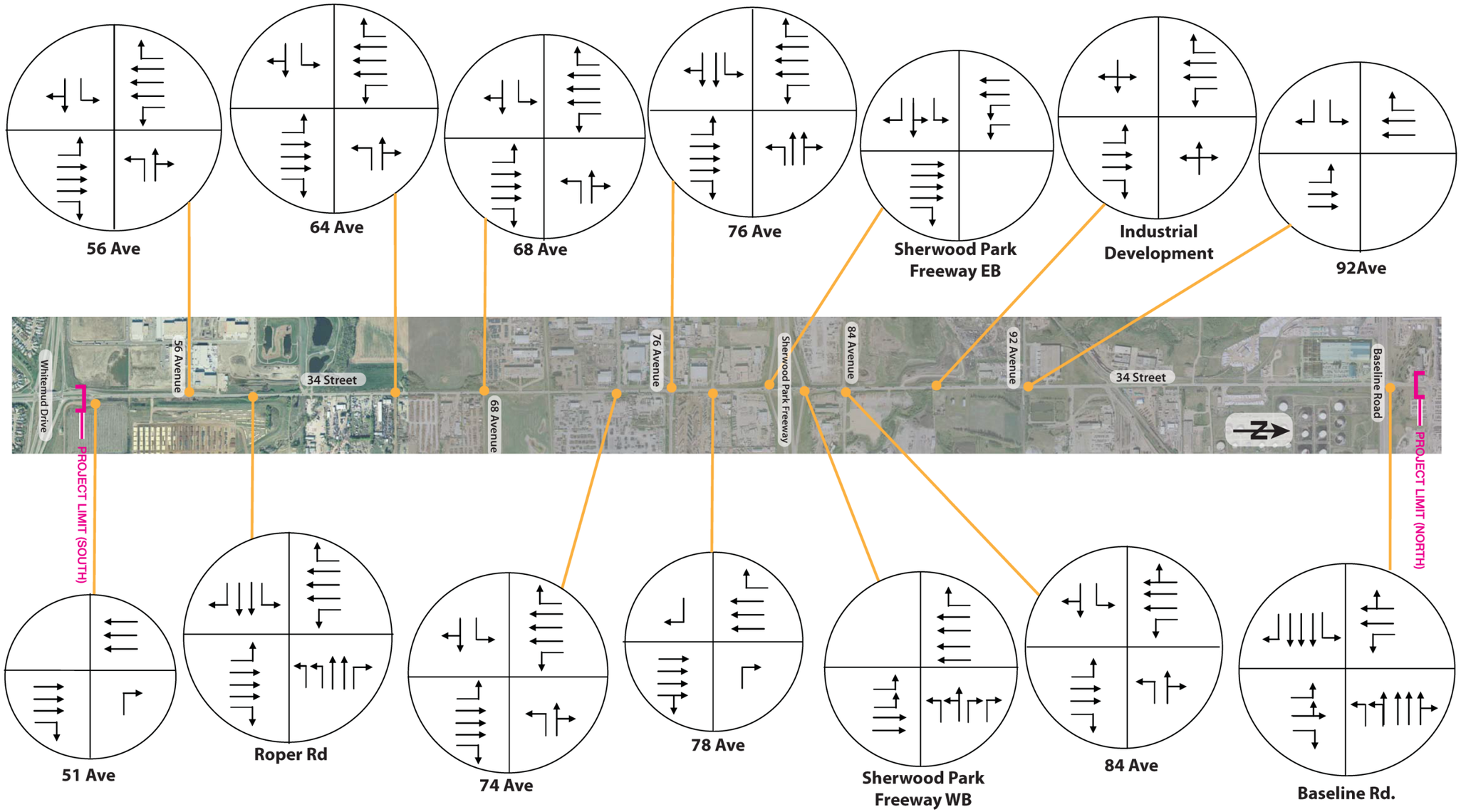


Figure 4-8: Recommended Intersection Configurations

4.2.4 Synchro 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) method that determines the indicators of traffic performance, including Level of Service (LOS), volume to capacity (v/c) ratios and the 95% quartile 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 long-term intersection operations and, to remain consistent through the corridor, this requirement has been adopted for the Strathcona County section as well. Strathcona County has adopted the use of HCM 2010 for analysis; however, there are still software issues with Synchro and HCM 2010, most notable with shared lanes and, therefore, the results have been determined along the entire corridor using HCM 2000 at this time.

For the purposes of this functional planning study, Synchro is an appropriate software tool to utilize, as it will confirm lane configurations and 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 movements along 34 Street are summarized in **Table 4-9**. Detailed Synchro analysis sheets can be found in **Appendix D**.

Table 4-9: 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)
56 Avenue	C/D	EBL	D	0.18	20	C	0.41	62.9
		EBT/R	D	0.02	0	D	0.09	15.5
		WBL	D	0.50	30.2	E	0.88	86.1
		WBT/R	-	-	-	-	-	-
		NBL	A	0.29	18.5	C	0.29	6.6
		NBT	C	0.95	311.8	B	0.48	77.3
		NBR	-	-	-	-	-	-
		SBL	D	0.68	53.2	A	0.28	2.7
		SBT	B	0.27	54.9	D	1.09	273.9
		SBR	B	0.14	20	A	0.04	0.2
Roper Road	B/D	EBL	D	0.47	43.4	E	0.86	91
		EBT	D	0.62	48.8	D	0.61	48.6
		EBR	D	0.07	14.9	D	0.60	53.6
		WBL	E	0.70	36.5	E	0.74	55.4
		WBT	D	0.32	27.1	D	0.67	57.2
		WBR	D	0.05	12.7	D	0.07	15
		NBL	B	0.53	2.5	E	0.59	35.4
		NBT	A	0.88	236.6	B	0.44	43.9
		NBR	A	0.27	2.6	A	0.17	3.6
		SBL	C	0.61	35.3	B	0.29	15.4
		SBT	B	0.37	70.5	D	1.01	266.7
		SBR	B	0.18	16.5	B	0.13	18.7
64 Avenue	B/B	EBL	D	0.18	11	D	0.48	33.7
		EBT/R	D	0.02	0	C	0.08	0
		WBL	D	0.35	18.3	D	0.63	41.5
		WBT/R	D	0.01	0	C	0.03	0
		NBL	A	0.32	16.5	B	0.20	5.5
		NBT	B	0.67	191.9	B	0.43	83.5
		NBR	A	0.14	20.6	A	0.06	8.4
		SBL	B	0.32	17.8	B	0.07	3.1
		SBT	A	0.38	41.5	C	0.78	225.2
		SBR	A	0.08	6.1	B	0.02	5.9
68 Avenue	A/A	EBL	D	0.07	5.9	D	0.18	14.7
		EBT/R	D	0.01	0	D	0.12	13
		WBL	D	0.44	22.2	D	0.62	42
		WBT/R	D	0.03	0	C	0.06	0
		NBL	A	0.17	0.3	A	0.13	1.1
		NBT	A	0.62	4.3	A	0.46	28.3
		NBR	A	0.13	0	A	0.06	1.2
		SBL	C	0.59	19	A	0.16	2.1
		SBT	A	0.33	1.5	A	0.62	34.1
		SBR	A	0.03	0	A	0.01	0

Table 4-9: Summary of Synchro Results (cont'd)

Intersection	Intersection Performance	Movement	AM Peak			PM Peak		
			LOS	v/c	95% Q (m)	LOS	v/c	95% Q (m)
74 Avenue	B/C	EBL	D	0.08	8.5	C	0.29	24.9
		EBT/R	D	0.02	0	C	0.16	15
		WBL	D	0.41	29.6	E	0.92	94.1
		WBT/R	D	0.06	0	C	0.14	10.2
		NBL	B	0.41	16.6	C	0.2	6.6
		NBT	A	0.59	30.9	C	0.61	124.9
		NBR	A	0.2	0	D	0.09	30.2
		SBL	C	0.57	39.7	B	0.33	6.8
		SBT	B	0.45	85.2	B	0.72	80.2
		SBR	D	0.09	14.3	B	0.03	1.5
76 Avenue	C/D	EBL	C	0.39	24.8	D	0.81	71.4
		EBT/R	D	0.39	30.9	D	0.84	81.7
		WBL	C	0.35	29.9	E	0.97	120
		WBT/R	D	0.52	43	D	0.67	61
		NBL	D	0.86	95.3	C	0.43	23.8
		NBT	B	0.62	32.6	C	0.97	140.3
		NBR	C	0.22	8.2	B	0.15	13.6
		SBL	E	0.91	107.7	D	0.61	40.1
		SBT	C	0.79	93.9	C	0.75	75.9
		SBR	B	0.19	14.4	C	0.03	6.5
EB SPF	B/C	EBL	D	0.6	51.8	D	0.31	19.6
		EBT/L	D	0.6	51.8	D	0.32	20.2
		EBR	A	0.41	0	A	0.23	0
		NBT	B	0.41	71.8	C	0.53	120.6
		NBR	C	0.13	21.7	E	0.71	135
		SBL	D	0.43	17.6	D	0.73	68.1
		SBT	B	0.65	102.5	A	0.35	22.3
WB SPF	C/C	WBL	D	0.79	100.6	D	0.51	33.8
		WBR	C	0.65	73.4	D	0.35	23.1
		NBL	D	0.7	57.9	E	0.84	94.8
		NBT	B	0.61	79.4	A	0.35	49.6
		SBT	B	0.49	29	B	0.53	42.8
		SBR	A	0.07	0.1	A	0.24	4

Table 4-9: Summary of Synchro Results (cont'd)

Intersection	Intersection Performance	Movement	AM Peak			PM Peak		
			LOS	v/c	95% Q (m)	LOS	v/c	95% Q (m)
84 Avenue	B/C	EBL	C	0.12	10.3	C	0.3	32.6
		EBT/R	D	0.11	14.1	D	0.63	67.6
		WBL	C	0.2	16	D	0.67	40.4
		WBT	D	0.18	18.2	D	0.06	8.6
		WBR	D	0.03	8.7	D	0.07	14.1
		NBL	A	0.42	31	C	0.26	11.4
		NBT	B	0.71	168.7	C	0.55	99.8
		NBR	B	0.27	33.9	C	0.05	14.5
		SBL	A	0.3	5	B	0.1	4.4
		SBT	A	0.51	33.6	C	0.74	127.9
		SBR	A	0.08	2.2	A	0.04	4.3
92 Avenue	B/A	EBL	D	0.18	15.6	D	0.30	23.6
		EBT/R	D	0.05	0	D	0.14	0
		NBL	D	0.64	55.6	A	0.13	3.6
		NBT	A	0.27	4.6	A	0.57	27.1
		SBT	B	0.70	150.9	A	0.28	37.2
		SBR	B	0.07	11.4	A	0.03	4.2
Baseline Road	D/F	EBL	D	0.54	24.2	C	0.13	6.6
		EBT	D	0.63	121.2	F	1.53	479
		EBR	D	0.64	121.8	D	0.44	78.7
		WBL	E	0.9	135.5	F	0.82	59.5
		WBT/R	D	0.9	292	C	0.55	118.4
		WBR	-	-	-	-	-	-
		NBL	E	0.71	101.4	F	1.1	244.6
		NBT	E	0.71	102.9	F	1.08	241.2
		NBR	D	0.13	21.1	F	1.1	227.7
		SBL	E	0.15	14.8	E	0.54	50.3
		SBT/R	E	0.08	8.7	E	0.23	22.1

4.2.5 Roundabout Evaluation

As an additional traffic analysis confirmation step for 34 Street, roundabouts at 84 Avenue and 92 Avenue were analyzed and compared to at-grade intersections.

SIDRA, a software analysis tool, was used to analyze the Level of Service (LOS), degree of saturation (v/c ratio) and queue lengths for the implementation of potential roundabouts at 84 Avenue and 92 Avenue, during both the AM and PM peak hours for a full build-out scenario. Refer to **Appendix D** for full analysis summary sheets. **Table 4-10** shows the analysis results for roundabouts compared with standard at-grade intersection configurations at both 84 Avenue and 92 Avenue during the AM and PM peak hours.

Table 4-10: Roundabout Analysis Summary

	Roundabout						At-grade Intersection					
	AM Peak			PM Peak			AM Peak			PM Peak		
	LOS	v/c	Q(m)	LOS	v/c	Q(m)	LOS	v/c	Q(m)	LOS	v/c	Q(m)
84 Ave	E	1.01	336	E	1.32	350	B	0.75	188	C	0.77	138
92 Ave	D	0.95	141	C	0.80	64	B	0.75	183	A	0.60	28

While roundabouts are preferable in some situations due to the free flow operational advantages, they require relatively equal volumes for all legs in order to be effective.

For 34 Street specifically, at grade intersections are preferred due to land constraints, heavy peak hour through movements and a high volume of heavy and oversized vehicles utilizing the corridor. Additionally, the mix of single and double laning for the east-west and north-south movements respectively could introduce safety concerns due to driver confusion, even with adequate lane markings and signage.

Overall, the capacity analysis results were consistently favorable for a standard at grade intersection at both locations, with a small exception for directional queue lengths at 92 Avenue in the AM peak. It was therefore recommended that roundabouts not be used in upgrades to the 34 Street corridor.

4.2.6 Baseline Road

The traffic analysis for Baseline Road indicated the need for a double left turn in the westbound to southbound direction, primarily during peak hours. The creation of this double left turn is not possible without significant geometric reconfiguration of Baseline Road, both east and west of 34 Street. One option that is proposed as part of this study is to utilize the median through lane as a through-left. The advantages are traffic service related for the left-turning vehicles, as there will be more capacity to complete the left turn movement. The main disadvantage is the reduction in capacity for the through movement (westbound) as vehicles will tend to avoid the lane as a result of a potential delay for a left turning vehicle. Safety also is considered as vehicles on Baseline Road (70 km/h speed limit) do not necessarily expect there to be a stopped left turn vehicle, in what is also a through lane. One option to consider is to make the existing median through lane a left turn during peak hours (AM) and a through lane during off-peak hours, utilizing overhead lane control and advance warnings.

The traffic and lane configuration on Baseline Road will need to be reviewed as traffic volumes increase, and there are potential traffic pattern changes as Anthony Henday Drive is reconstructed at Baseline Road.

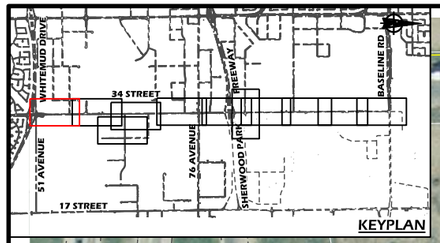
5 RECOMMENDED CONCEPT PLANS

Recommended Concept Plans were developed to respond to the requirements of the corridor, including traffic volumes, stormwater management, utility crossings, access and sustainable transportation such as pedestrian and transit facilities. Initial concepts plans were developed, and then refined through public input, technical constraints, input from business owners and developers as well as internal stakeholders from the administration of both the City of Edmonton and Strathcona County.

Several improvements or objectives were added within the concept design as part of this planning study as plans were 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 34 Street, traffic signals will be required at most intersections;
- 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; and
- 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.

The following plans in **Figure 5-1** present the concept for 34 Street, including the widening, lane configuration, intersection locations and access management on aerial photo base. Plan and profile drawings for the corridor are located in **Appendix A**.



34 Street, Whitemud Dr to Baseline Road Conceptual Alignment

51 Avenue Interim Design

36 Street
34 Street
Existing SUP
OIL PIPELINE R/W
PIPELINE R/W
(Realigned) 51 Avenue
R=500
R=50
30 TAPER
R=1000
R=40
R=15
60 TAPER
R=60
R=242.85
50 BAY
R=216.68
14.50
5.50
5.40
3.50
4.45
3.95
3.75
4.20
3.70

Whitemud Drive On-Ramp
Study Limit
Tie into existing Shared Use Path
4x9 Bus Pad
Natural Gas Lines
34 Street
3.0m Asphalt SUP
R=2000
R=1500m
0+000
0+100
0+200
0+300
0+400
0+500
4.45
3.70
3.95
4.70
4.35
5.35
60 TAPER
50 BAY
R=100
R=30
7.00
4x9 Bus Pad 120m from Island
Surplus Right of Way 1.14 ha. 2.82 ac.
Right in / Right out
7.25
Study Limit
(Realigned) 51 Avenue
Whitemud Drive
Whitemud Drive Off-Ramp
51 Avenue
4x9 Bus Pad 35m from Intersection
56 Avenue
Matchline S034-131-02
Tie to Existing Sidewalk
0+700
1.5 SIDEWALK
5.50
3.50

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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CONCEPT - SUBJECT TO PRELIMINARY SURVEY AND DESIGN

Figure 5-1

34 Street, Whitemud Dr to Baseline Road
Conceptual Alignment

20m 0 40m

DRAWN: TD
REVIEWED:
DATE: 2013 07 03

PLAN NO.
S034-131-01

KEYPLAN

Note:
Match to Plan No.
NROP-0702 (By Others)

Matchline

Matchline S034-131-01

Matchline S034-131-03

Roper Road

Study Limit

34 Street

HIGH VOLTAGE OVERHEAD POWER

Right in / Right out

Right in / Right out

4x9 Bus Pad 60m from Intersection

4x9 Bus Pad 60m from Intersection

4x9 Bus Pad 60m from Intersection

4x9 Bus Pad 60m from Intersection

3.0m Asphalt SUP

1.5 SIDEWALK

Natural Gas Lines

Right turn Bay lengths for channelized intersections are to the nose of the Island

New access off Roper Rd (To be determined)

Future Roper Road location to be determined. Subject to Roper Road Functional Planning Study by Others

1.5m Sidewalk

APPROXIMATE LOCATION OF FULTON CREEK CULVERT

200mm STEEL NATURAL GAS PIPELINE

(NEW) 33 Street
(Industrial Local)

11.50

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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CONCEPT - SUBJECT TO PRELIMINARY SURVEY AND DESIGN

Figure 5-1

34 Street, Whitemud Dr to Baseline Road
Conceptual Alignment

20m 0 40m

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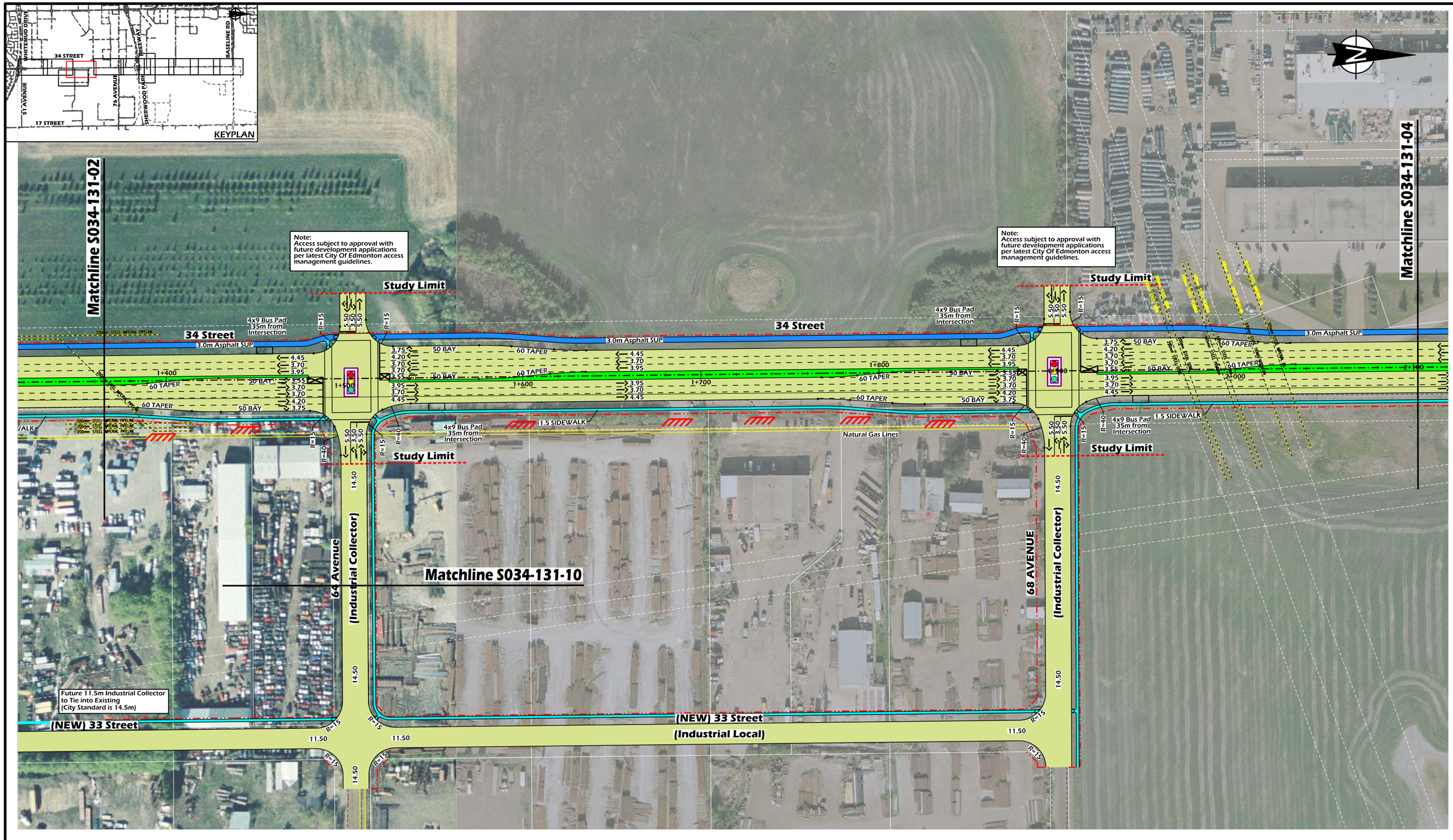
DATE: 2013 07 03

PLAN NO.
S034-131-02



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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CONCEPT - SUBJECT TO PRELIMINARY SURVEY AND DESIGN

Figure 5-1

34 Street, Whitemud Dr to Baseline Road
Conceptual Alignment

20m 0 40m

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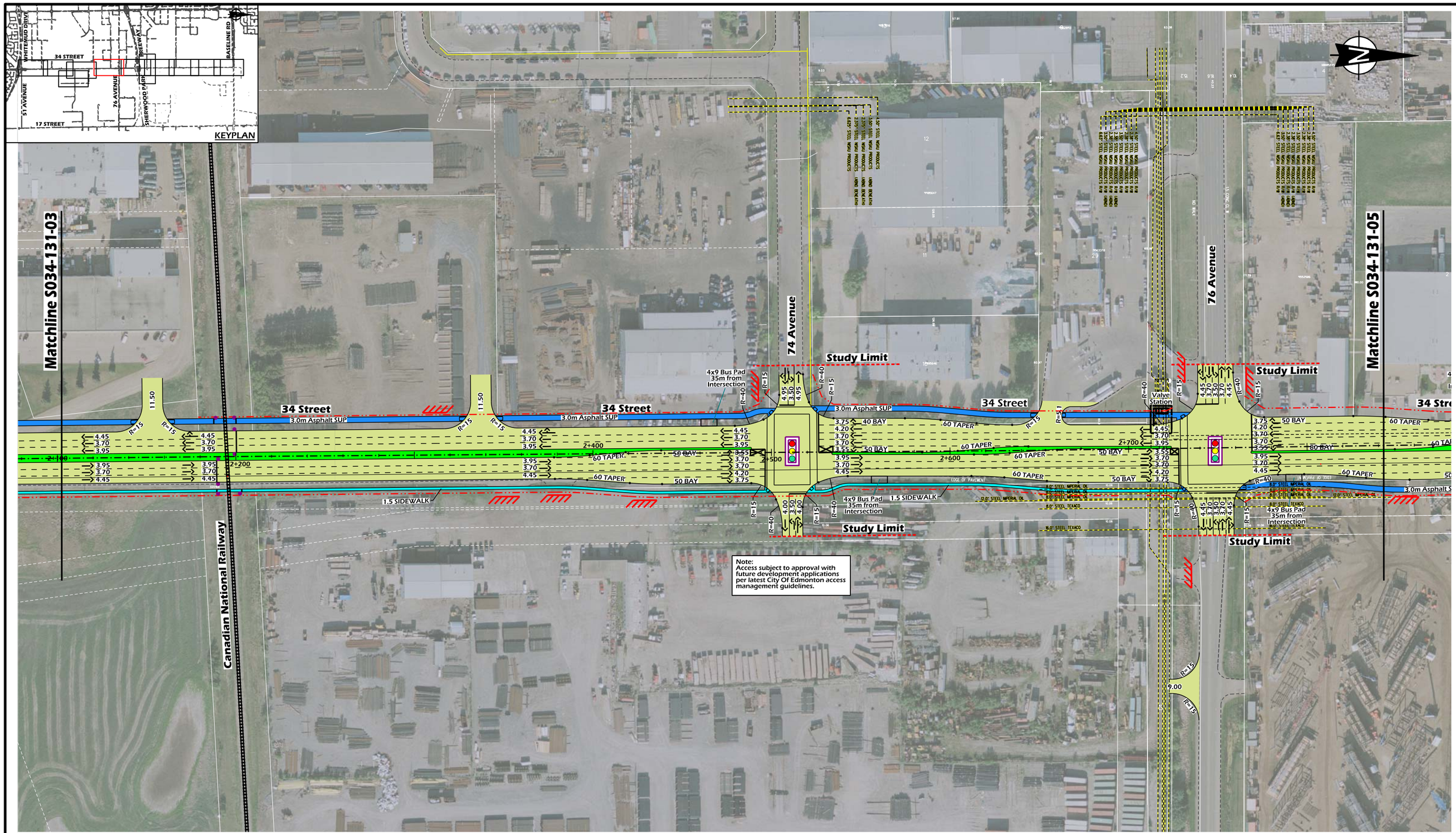
DATE: 2013 07 03

PLAN NO. S034-131-03

34th Street Conceptual Alignment.dgn Sheet 3 11/19/2013 9:16:47 AM



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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CONCEPT - SUBJECT TO PRELIMINARY SURVEY AND DESIGN

Figure 5-1

34 Street, Whitemud Dr to Baseline Road
Conceptual Alignment

20m 0 40m

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DATE: 2013 07 03

PLAN NO. S034-131-04

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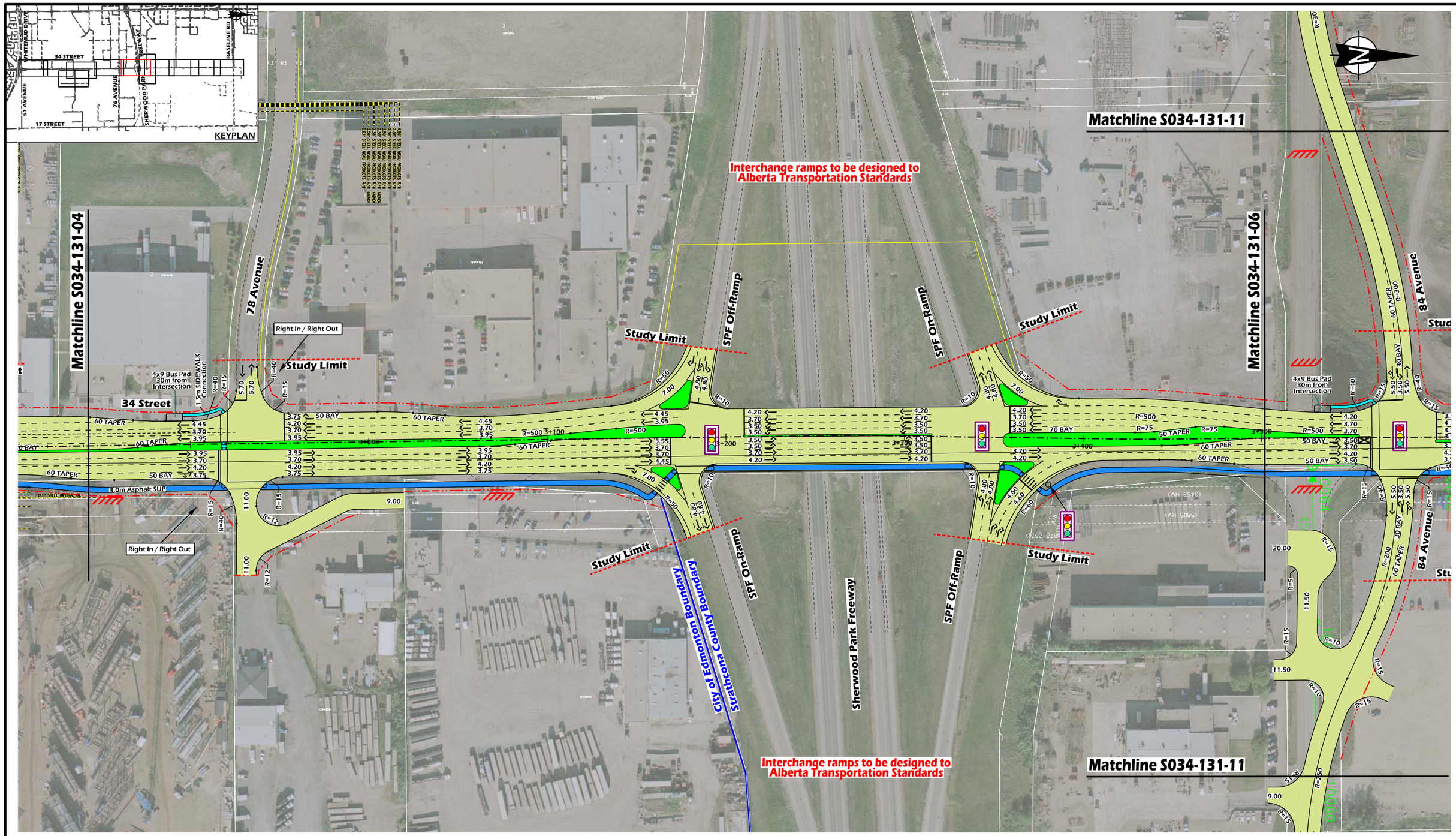

LEGEND

- 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

Notes:
*Road dimensions for the City of Edmonton are to the Face of Curb.
*Strathcona County Road dimensions are to the lip of gutter.

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CONCEPT - SUBJECT TO PRELIMINARY SURVEY AND DESIGN

Figure 5-1

34 Street, Whitemud Dr to Baseline Road
Conceptual Alignment

20m 0 40m

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DATE: 2013 07 03

PLAN NO. S034-131-05

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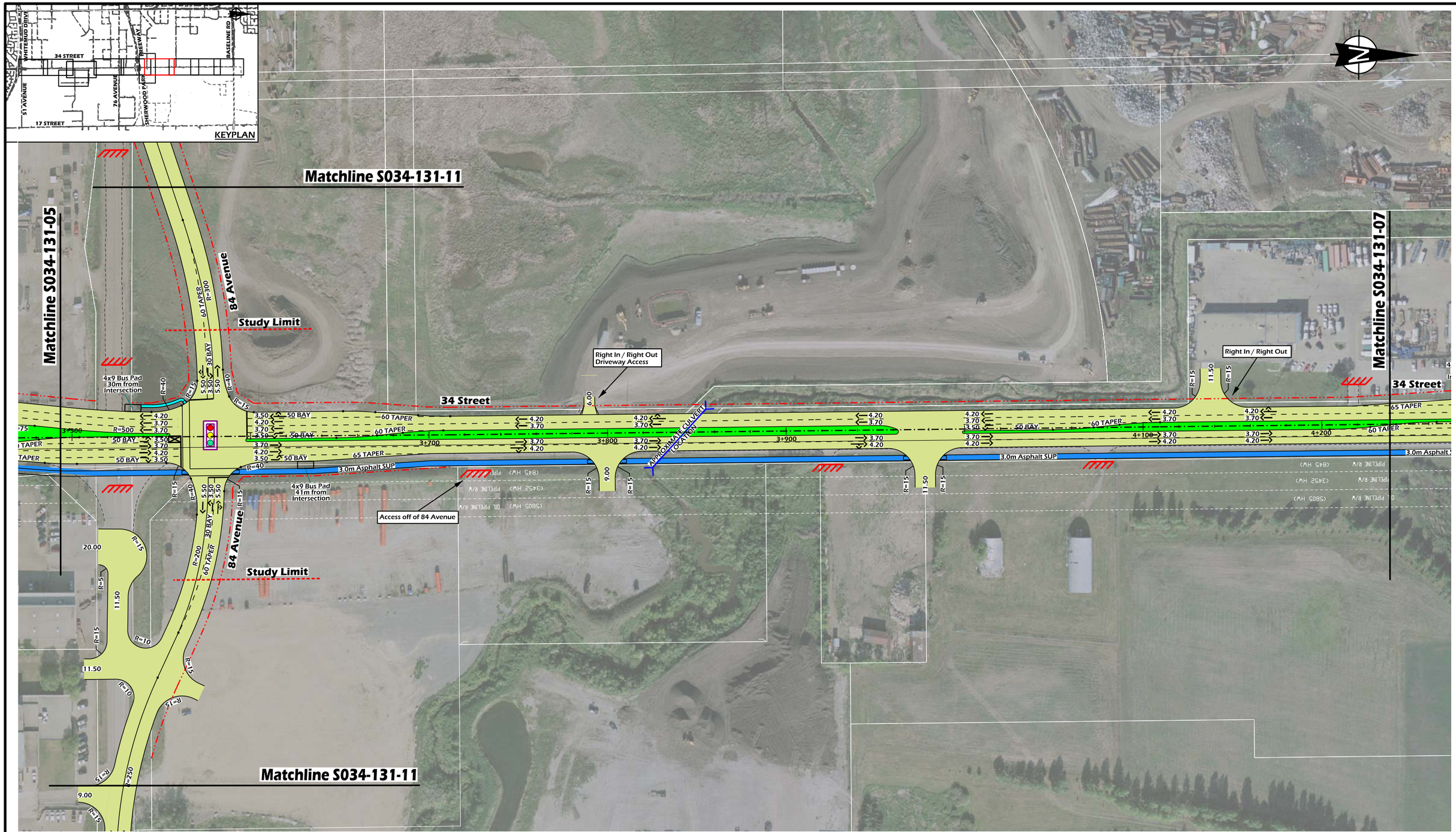

LEGEND

- 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

Notes:
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*Strathcona County Road dimensions are to the lip of gutter.

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CONCEPT - SUBJECT TO PRELIMINARY SURVEY AND DESIGN

Figure 5-1

34 Street, Whitemud Dr to Baseline Road
Conceptual Alignment

20m 0 40m

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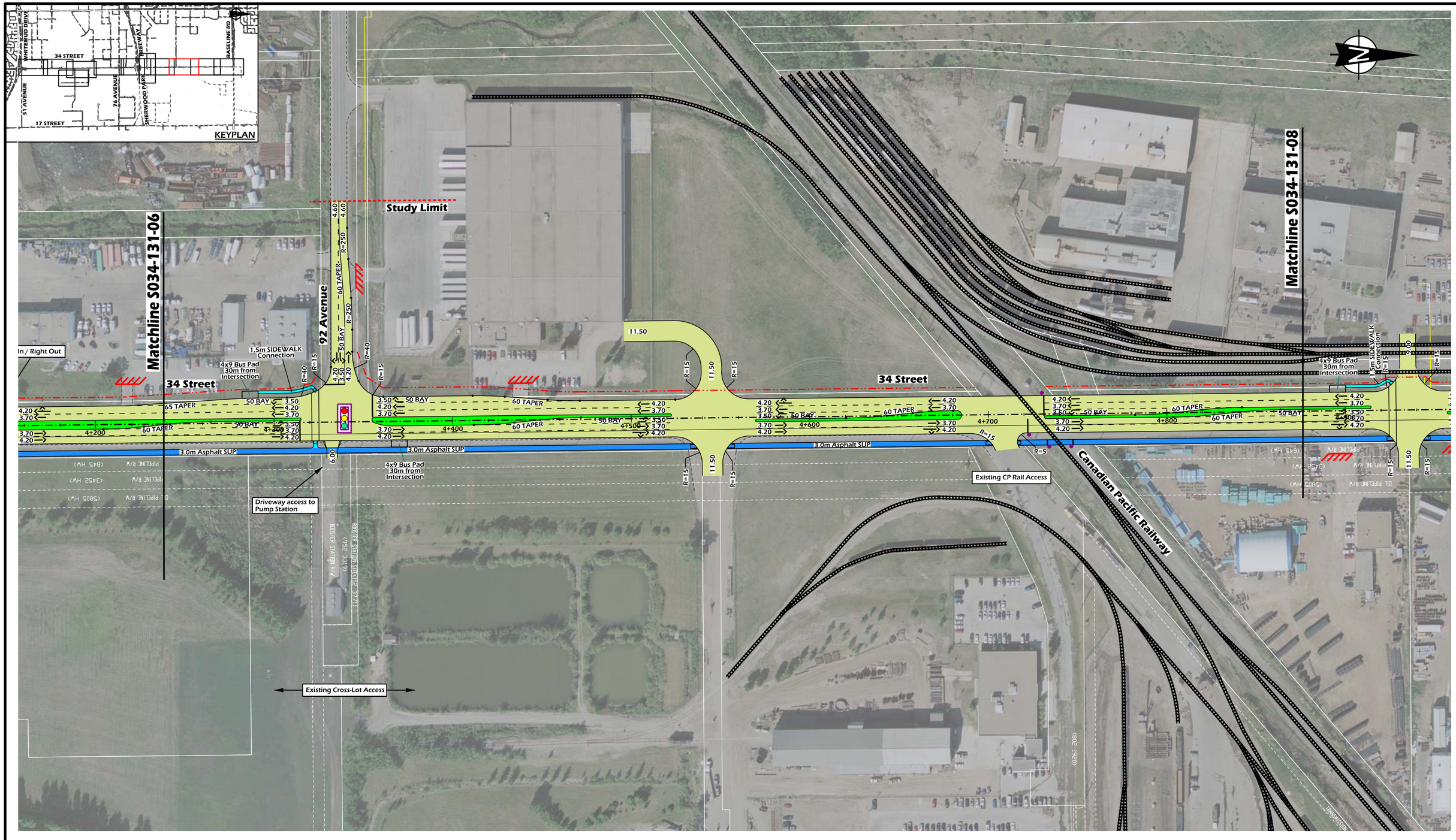
PLAN NO.
S034-131-06



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

Notes:
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CONCEPT - SUBJECT TO PRELIMINARY SURVEY AND DESIGN

Figure 5-1

34 Street, Whitemud Dr to Baseline Road
Conceptual Alignment

20m 0 40m

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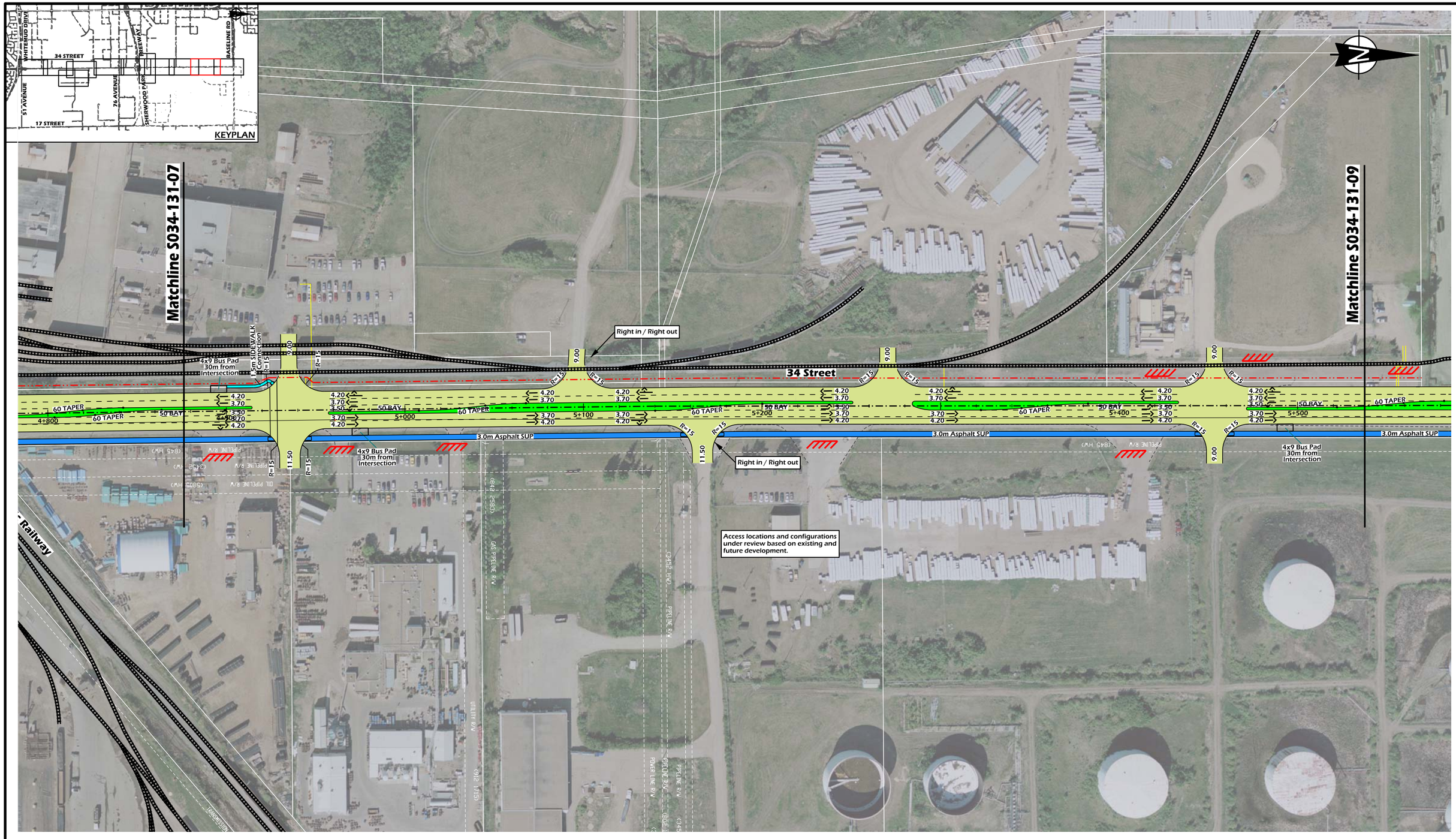
DATE: 2013 07 03

PLAN NO. S034-131-07



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

Notes:
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*Strathcona County Road dimensions are to the lip of gutter.

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CONCEPT - SUBJECT TO PRELIMINARY SURVEY AND DESIGN

Figure 5-1

34 Street, Whitemud Dr to Baseline Road
Conceptual Alignment

20m 0 40m

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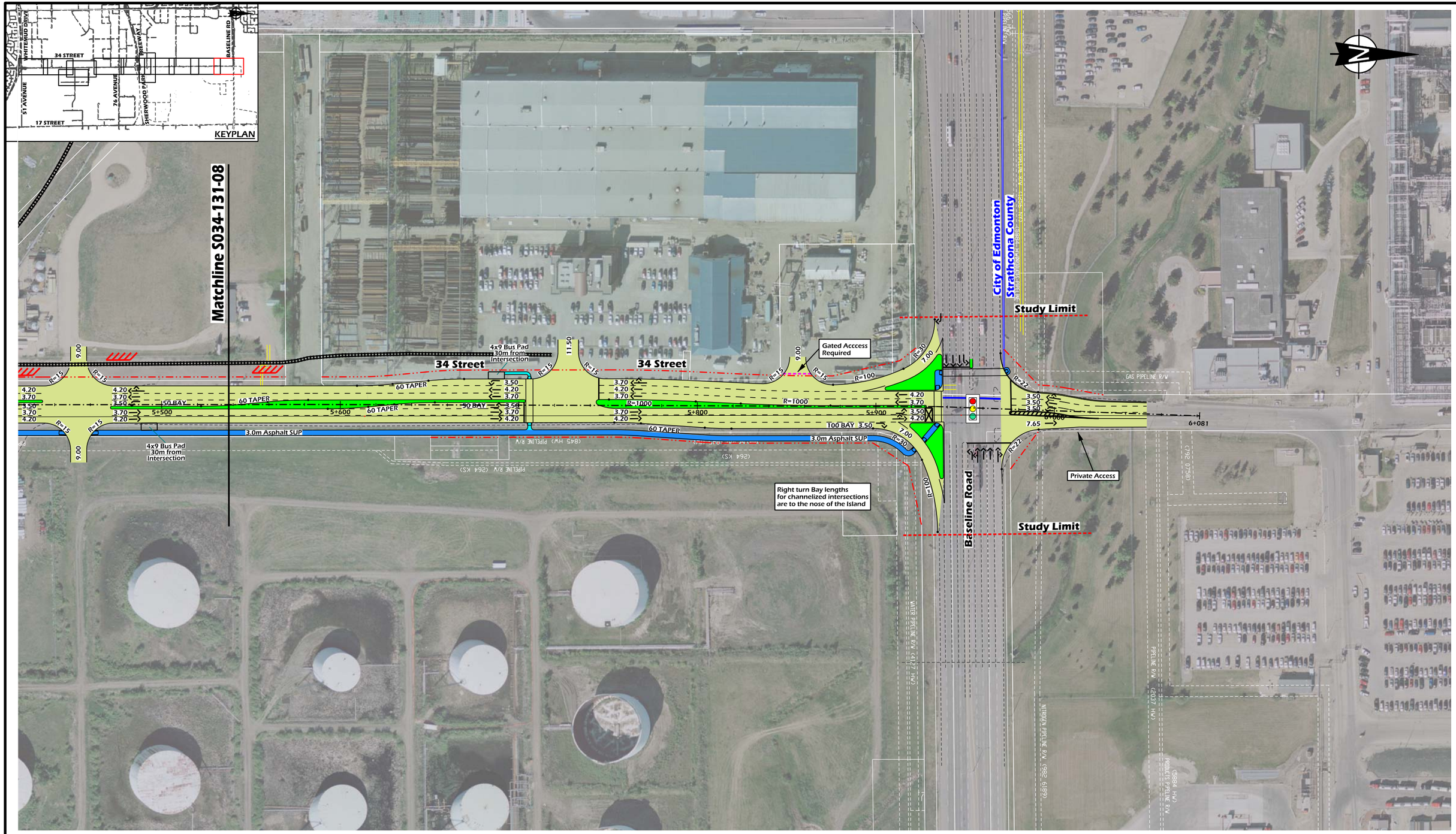
DATE: 2013 07 03

PLAN NO. S034-131-08



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

Notes:
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*Strathcona County Road dimensions are to the lip of gutter.

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CONCEPT - SUBJECT TO PRELIMINARY SURVEY AND DESIGN

Figure 5-1

34 Street, Whitemud Dr to Baseline Road
Conceptual Alignment

20m 0 40m

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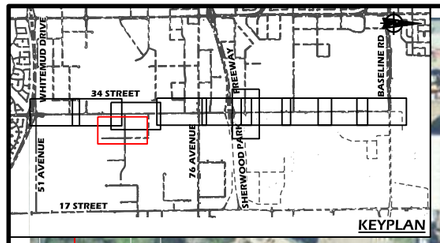
DATE: 2013 07 03

PLAN NO.
S034-131-09



Matchline S034-131-03

64 Avenue (Industrial Collector)

(NEW) 33 Street (Industrial Local)

60 AVENUE

32 Street

R=15 R=30 11.50 14.50

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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CONCEPT - SUBJECT TO PRELIMINARY SURVEY AND DESIGN

Figure 5-1

34 Street, Whitemud Dr to Baseline Road
Conceptual Alignment

20m 0 40m

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DATE: 2013 07 03

PLAN NO. S034-131-10

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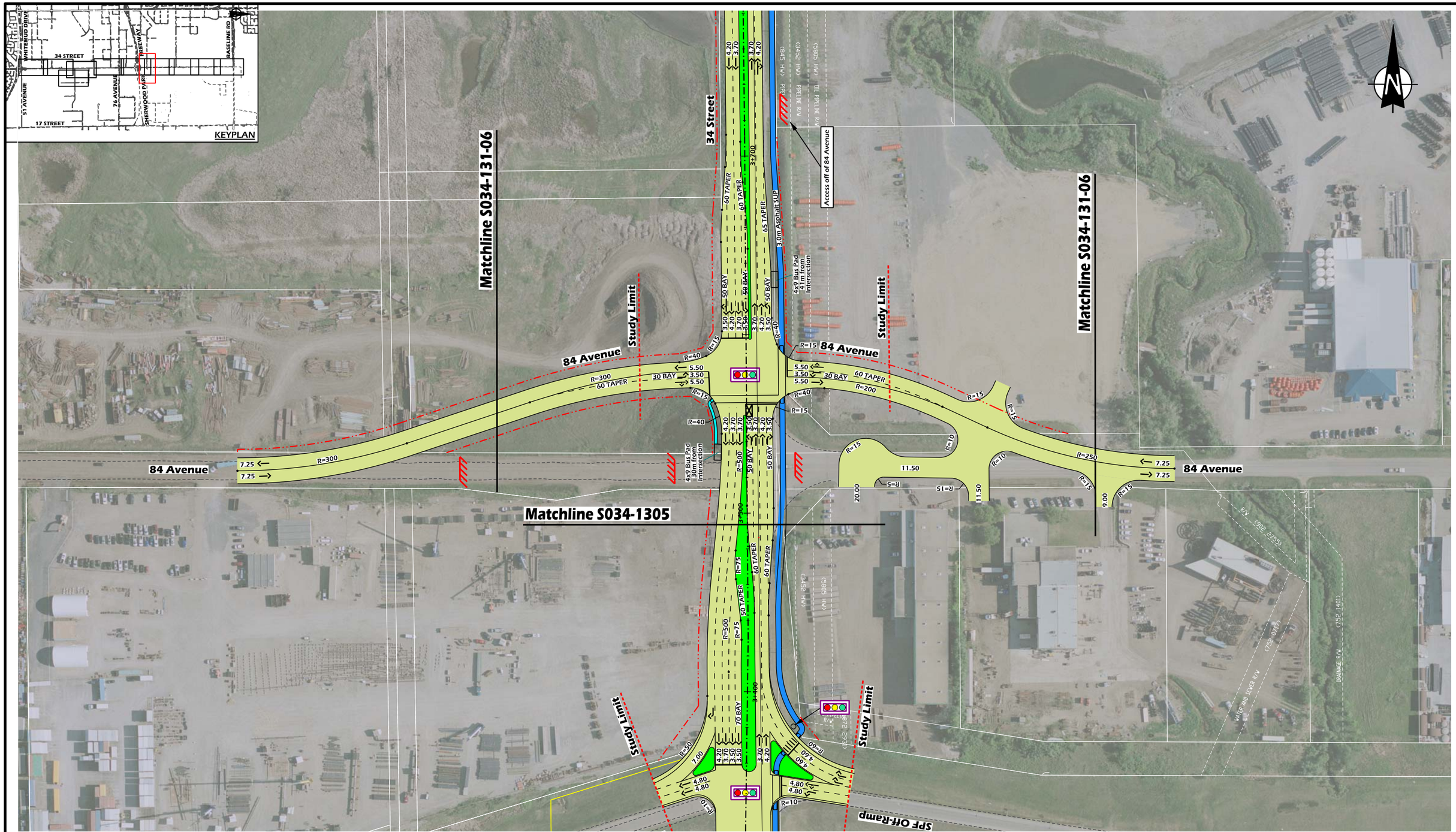

LEGEND

- 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

Notes:
*Road dimensions for the City of Edmonton are to the Face of Curb.
*Strathcona County Road dimensions are to the lip of gutter.

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CONCEPT - SUBJECT TO PRELIMINARY SURVEY AND DESIGN

Figure 5-1

34 Street, Whitemud Dr to Baseline Road
Conceptual Alignment

20m 0 40m

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DATE: 2013 07 03

PLAN NO. S034-131-11

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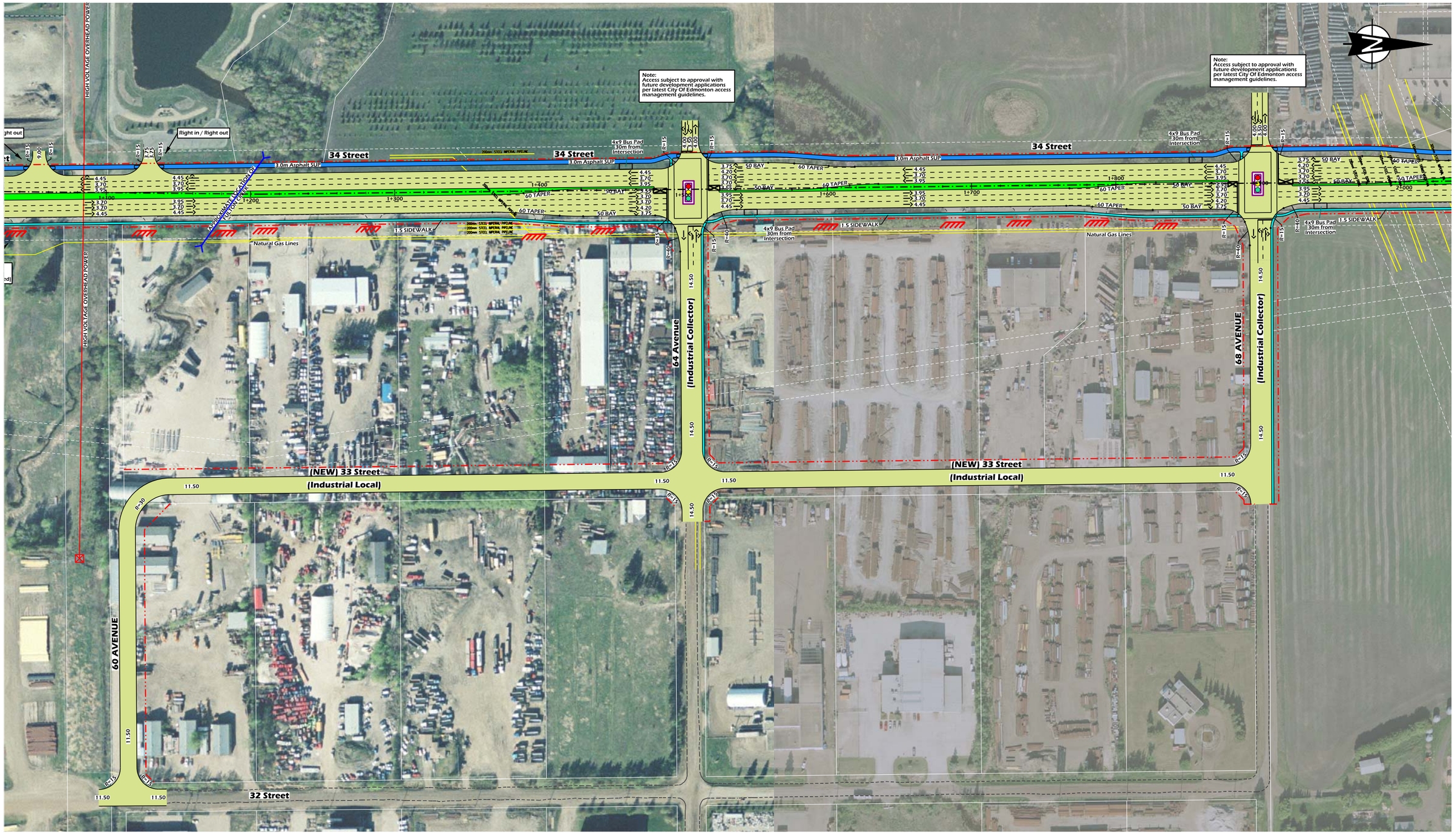
5.1 SHERWOOD PARK FREEWAY INTERCHANGE

The Sherwood Park Freeway is within the jurisdiction of Alberta Transportation, including the 34 Street overpass structure, approaches to the structure, interchange ramps and the terminal intersections. Although consideration was given to complete planning for this interchange as part of this study, without support from Alberta Transportation, this work was not completed. Although the interchange was not planned, a concept was developed for the terminal intersections as well as the 34 Street crossing of Sherwood Park Freeway. The recommendation, based primarily of traffic volume processing (refer to **Section 4**) was to have an eight (8) lane cross section, which includes double left turn lanes and two through lanes in both the northbound and southbound direction. The ramps on and off of Sherwood Park Freeway are presented for the purposes of traffic laning requirements at the intersections and would need to be designed to Alberta Transportation standards.

5.2 ACCESS MANAGEMENT

34 Street is primarily comprised of large lot developments or areas that have been recently developed (as is the case with the Pylypow area). As a result, there are reduced access management requirements. Many of the large lots have multiple accesses, which will be consolidated or relocated within the parcel; future areas of development have been identified with likely access locations to collector or arterial roads (51 Avenue, 56 Avenue, Roper Road, and 84 Avenue) and the existing level of access to 34 Street is generally maintained. One section of 34 Street is an exception: the east side of 34 Street, between 60 Avenue and 68 Avenue. This section is currently developed (industrial) with ten parcels having direct all-directional access to the existing 34 Street. To eliminate these accesses, a backage road (33 Street) is proposed between 60 Avenue and 68 Avenue to provide access to these parcels. 33 Street would connect to 34 Street at both 64 Avenue and 68 Avenue. This recommendation is presented in **Figure 5-2.**



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 5-2

34 Street, Whitemud Dr to Baseline Road
Access Management

25m 0 50m

DRAWN: TD
REVIEWED:
DATE: 2013 05 16

PLAN NO.
Sheet 1

Access Management Plan.dgn Sheet 1 5/17/2013 11:04:18 AM

Between the CP Rail line and Baseline Road, there are several options for access management. The recommended plan is the preferred option based on intersection spacing and aligning accesses across 34 Street; however, these intersection and access locations may be reviewed and reconsidered based on development or redevelopment opportunities. Additionally there is a CP Rail industrial spur line parallel to 34 Street on the west side, which limits access opportunity. Additionally due to site constraints such as the on-site rail line and crane structure, the Waiward Steel accesses will be required to remain at their current locations.

Accesses and intersections have also considered the movement of large vehicles entering and existing many of the sites and turning at intersections. Where feasible, two-centre curb returns have been utilized for intersections and larger radii used at accesses. Truck turning templates are presented in **Appendix E** which approximates the turning movements of standard large vehicles at the intersections on 34 Street.

5.3 OVER DIMENSIONAL VEHICLES

As an important goods movement corridor, 34 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 routes to areas north and east of the Capital Region. There are major moves of these vehicles transported to Fort McMurray along this corridor. Currently over-dimensional vehicles in the area utilize 76 Avenue or 92 Avenue, then move south on 34 Street to Whitemud Drive or north to Baseline Road. In the future, Roper Road may provide a route for over-dimensional vehicles to connect to 17 Street.

Waiward Steel at the north end of the 34 Street corridor (directly south of Baseline Road) transports over-dimensional loads on a regular basis. The over-dimensional vehicles exit the yard via their northern-most gated access onto 34 Street, heading north to Baseline Road, then east on Baseline Road. This movement will be protected with a mountable curb, gated access from the site to 34 Street, and consideration for a wider right turn bay and swinging signal poles and masts (which are currently installed at the intersection of 34 Street and Baseline Road).

It is further recommended that all traffic signals along the corridor be constructed with rotating pole bases to accommodate over-dimensional moves. Additionally, should Roper Road be identified as an over-dimensional route, mountable curbs in the median of 34 Street south of Roper Road should be considered to allow for vehicles that will need to travel wide to complete the turn and travel counter-flow on 34 Street. 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 at locations to facilitate these movements in and out of sites.

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 turning 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 an urban standard. Pavement structures may also be increased (additional base course) in consideration of the volume of heavy truck movements. With the corridor improvements, spring road bans are likely to be required in the future, but are currently an issue along the roadway.

5.4 RAIL CROSSINGS

There are two rail crossings along the 34 Street corridor, a CN Rail crossing at approximately 70 Avenue and a CP Rail crossing at 94 Avenue.

CN Rail – This is a public grade crossing, single track, crossing near 90 degrees to the roadway, known as Mile 0.44 Strathcona Industrial Lead, off Mile 4.46 Camrose Subdivision. This is an industrial spur line that CN provides service to three times per week on average. In January of 2013, a traffic count of this location was completed by the City of Edmonton. Two train crossings were observed (5:40AM and 6:10AM) with an average crossing time of less than two minutes. This is likely one service train loading in or out of a location west of the crossing. The existing crossing has flashers and, with the traffic growth on 34 Street and the planned widening to six (6) lanes, the crossing would need to be upgraded with gates as well as flashers for pedestrians. Based on the minimal trains and short crossing times, there is no requirement to consider a grade separation for this rail line.

CP Rail - The rail crossing at approximately 94 Avenue is a CP Mainline rail with frequent trains, estimated at 12 - 18 trains per day based on previous information from CP Rail provided to Strathcona County. This is a single track crossing, currently with full flashers and gates. This is a crossing that could be considered for grade separation based on future train and traffic volume (cross product); however, the recommendation is for the crossing to remain at-grade for the following reasons:

- There are alternative parallel and other network routes (17 Street, Sherwood Park Freeway, Baseline Road, 84 Avenue) that are not impacted by this crossing;
- From a cost perspective, utilizing other routes and notifying motorists through Intelligent Transportation Systems (ITS) of delays would be effective;
- There are existing spur lines parallel to 34 Street, which may need to be reconstructed in order to achieve a grade separation without significant retaining walls;
- Proximity of accesses (CP Rail access, Alta Steel, Procor, Esso Distribution) to the crossing would need to reconsidered as sightlines may not be sufficient with the changes in the grade of 34 Street;
- Existing right-of-way is not adequate to create a grade separation, resulting in the requirement to purchase significant land; and
- Utilities (currently running parallel to 34 Street on the east side) would be impacted, including costs to relocate oil product pipelines and establish new utility rights-of-way.

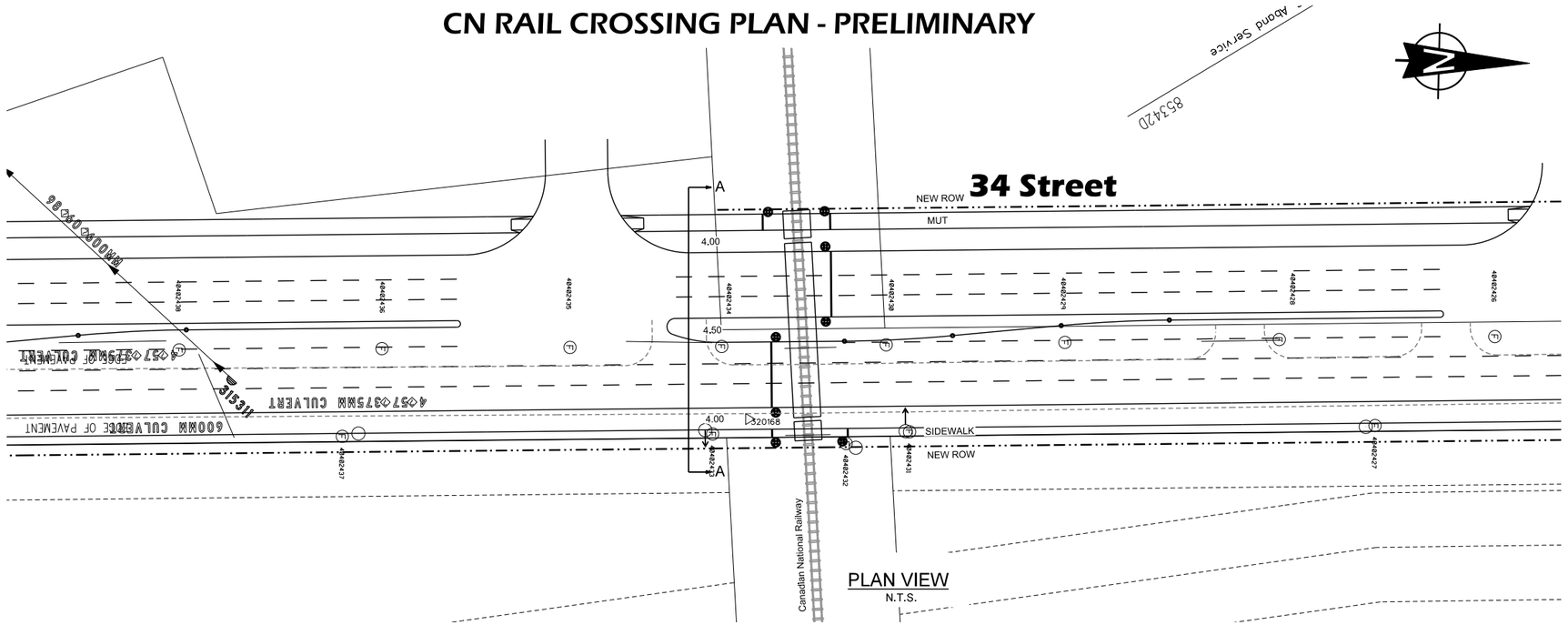
This recommendation may change based on future rail expansion into the Industrial Heartland area northeast of Edmonton, or additional rail tracks or volume.

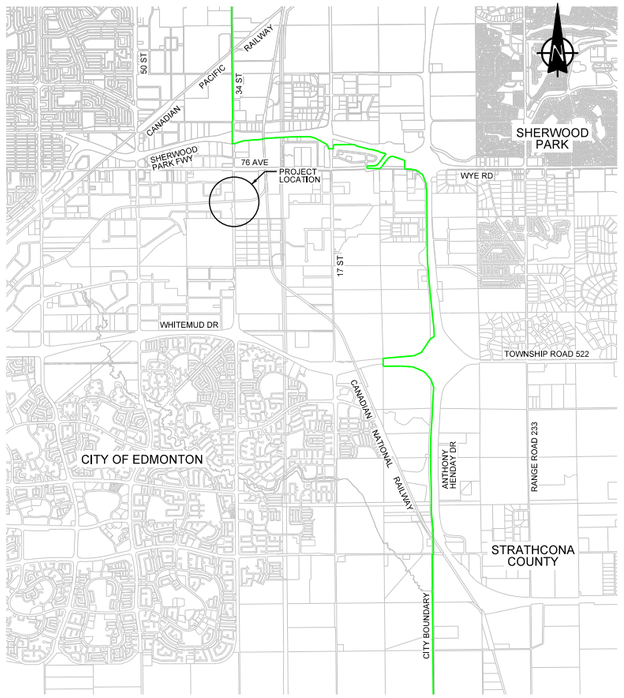
The existing crossing is on an approximately 45 degree skew angle, which is not ideal from a roadway perspective, where a perpendicular crossing is preferred. Full gates, overhead flashers and warning for pedestrians will be required at this location.

Schematic plans of both of the rail crossings are presented in **Figure 5-3.**

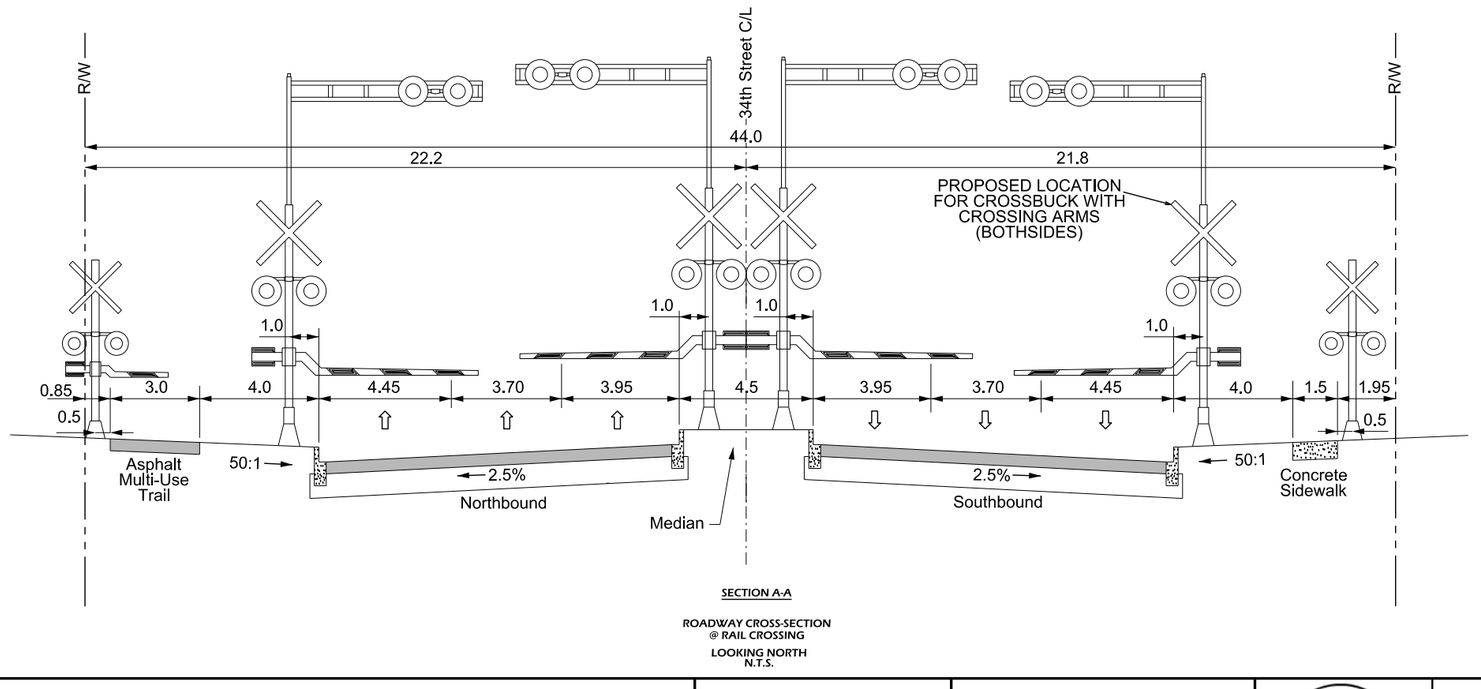
In addition to these rail crossings, there is an industrial spur line that parallels the west side of 34 Street, between the CP Rail crossing and Baseline Road. This is a line that services several businesses in the area, including Procor, Waiward Steel and BPCO. Business accesses along the west side of 34 Street in this area cross the spur line, with the potential to disrupt traffic on 34 Street in the event that rail cars on the spur line block the accesses. This is mitigated by the infrequency of trains as well as the small length of the trains, resulting in small crossing times. It is also noted that the additional lane on 34 Street will allow for through vehicles to manoeuver around a turning vehicle into a business if the access is blocked, resulting in minimal delays on 34 Street as a result of the spur lane.

CN RAIL CROSSING PLAN - PRELIMINARY





KEY PLAN
SCALE : 1:50,000



SECTION A-A

ROADWAY CROSS-SECTION @ RAIL CROSSING

LOOKING NORTH
N.T.S.

EXISTING SIGHTLINES				
DISTANCE FROM CL OF ROAD (m)	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: 60KMH
6. TRAFFIC VOLUMES: PROJECTED , 40,000 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 RYAN T. BETKER
P ENG
DATE
PERMIT TO PRACTICE P6383

Manager, Transportation Planning Branch

Director, Facility & Capital Planning

Director, Development Planning & Engineering

CONCEPT - SUBJECT TO PRELIMINARY SURVEY AND DESIGN

34th Street
Arterial Widening
Whitemud Dr to Baseline Rd

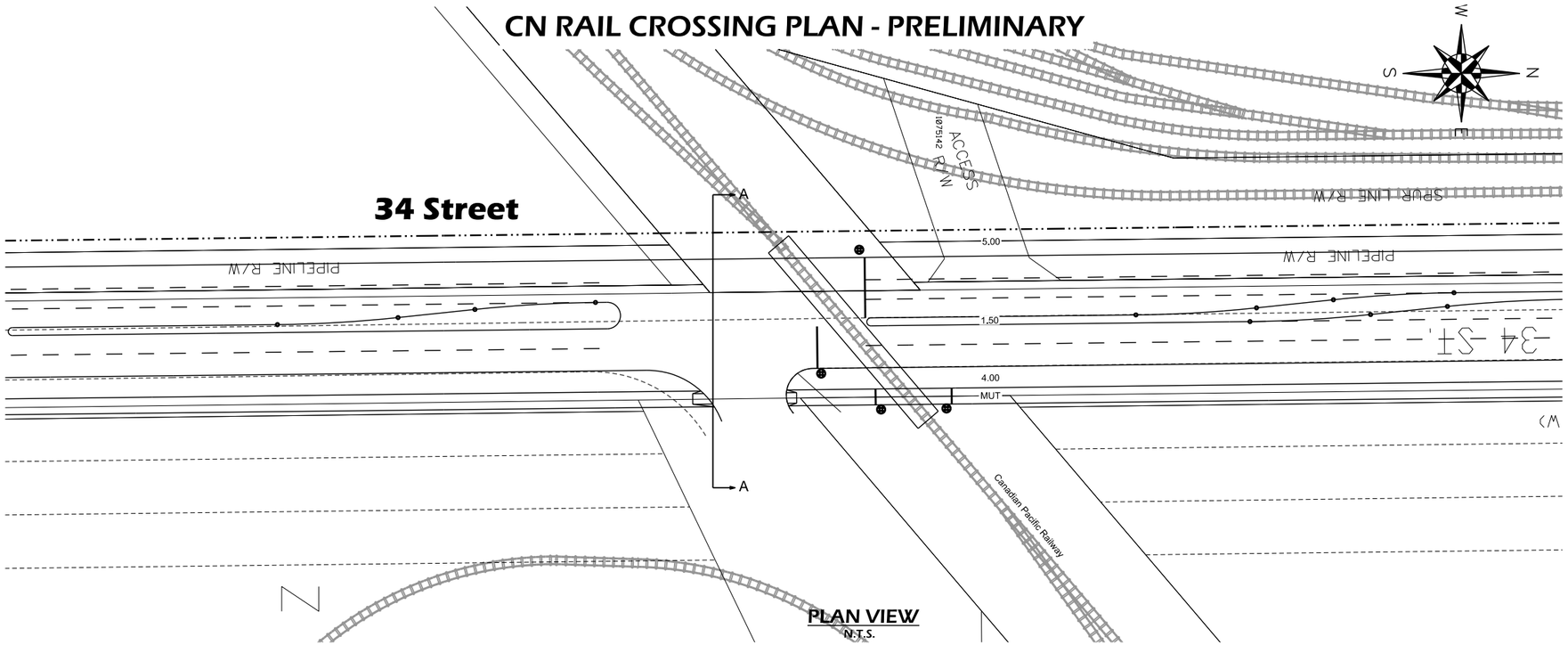
20m 0 40m

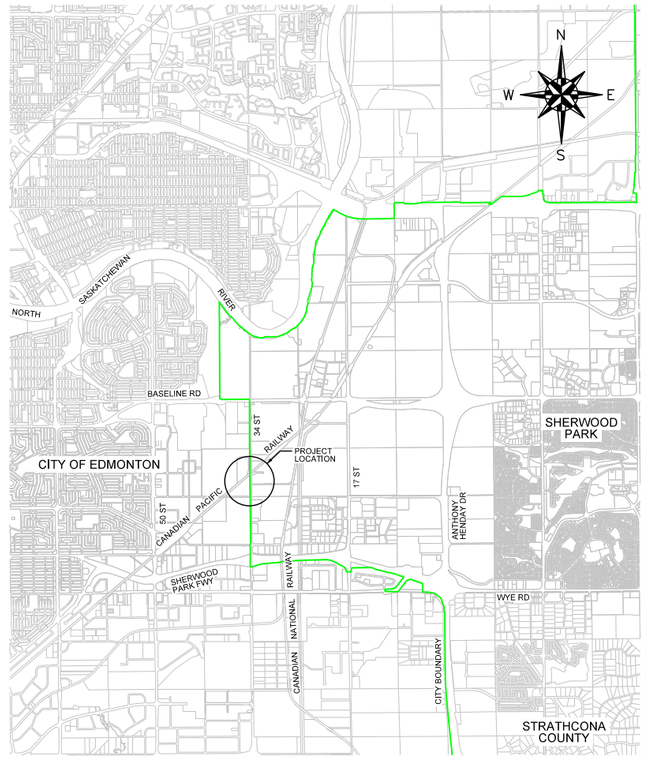
DRAWN: TD
REVIEWED:
DATE: 2013 05 08

PLAN NO.
Figure 5-3

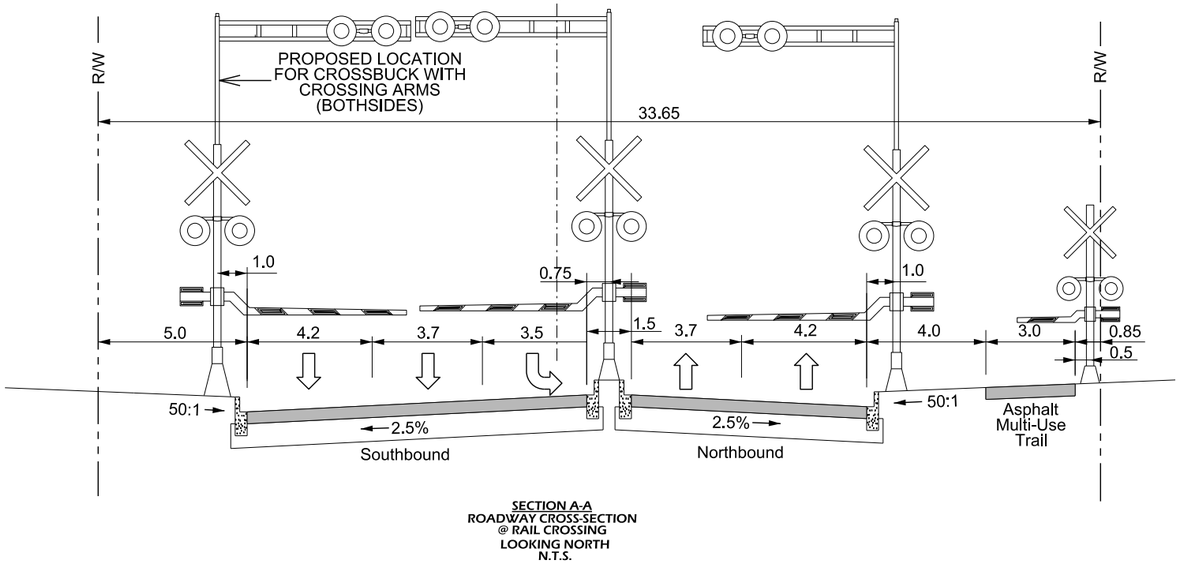
34th Street Rail_Crossing_74ave.dgn Railway crossing 5/17/2013 11:12:19 AM

CN RAIL CROSSING PLAN - PRELIMINARY





KEY PLAN
SCALE : 1:50,000



SECTION A-A
ROADWAY CROSS-SECTION @ RAIL CROSSING
LOOKING NORTH
N.T.S.

EXISTING SIGHTLINES				
DISTANCE FROM CL OF ROAD (m)	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 PRELIMINARY, SURVEYED BY STRATHCONA COUNTY.
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: 60KMH
6. TRAFFIC VOLUMES:
   PROJECTED , 20,000 AADT
7. TRAIN SPEED: NA
8. 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

McElhanney Consulting Services Ltd.

The City of Edmonton Transportation Services

Strathcona County

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

DATUM:		AIR PHOTO:	
PROJECTION:		CONTOUR INTERVAL:	
SCALE FACTOR:			
COORDINATES:			
SCALE (m): Horz: 1:1000	Vert: 1:10000	DATE: Dec 17, 2012	
PROJECT LOCATION: 34 Street from Whitemud Dr to Baseline Rd			
SURVEY BY:		DRAWN BY: TD	
DESIGN BY: TD		CHECKED BY: AH	
APPROVED BY: RB		PROJECT MANAGER:	
DRAWING/PROJECT No.:	REV. No.:	SHEET No.: Figure 5-3	

CONCEPT - SUBJECT TO PRELIMINARY SURVEY AND DESIGN

34th Street
Arterial Widening
Whitemud Dr to Baseline Rd

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

34th Street Rail_Crossing_92ave.dgn Railway crossing 5/17/2013 11:09:23 AM

5.5 INTELLIGENT TRANSPORTATION SYSTEMS

There are opportunities for implementing Intelligent Transportation Systems (ITS) along 34 Street, including traveler information. Variable or dynamic message signs (VMS, DMS) should be considered to advise drivers of emergency incidents or rail crossings. This information system would need to be included as part of a network information system, including Whitemud Drive, Sherwood Park Freeway, Baseline Road, and both 50 Street and 17 Street.

Adaptive traffic control systems (ATCS) and intelligent signal coordination and signal activation could be implemented to improve travel times along 34 Street, most notably from 74 Avenue to 84 Avenue where several signals will exist along a short stretch of 34 Street. These systems could help manage turning signal phases, including truncation of turning phases based on queues and extension of green time for through movements, which would be most beneficial at the Sherwood Park Freeway interchange and possibly Baseline Road for left turning vehicles.

5.6 SUSTAINABLE TRANSPORTATION

As part of this planning study, sustainable and alternative modes of transportation were considered within the 34 Street corridor. Currently, there are no formal pedestrian / transit accommodation facilities or shoulders for cyclist use along the roadway. As part of planned corridor improvements, a Shared Use Path (SUP) for pedestrians, cyclists, etc., is recommended through the length of the corridor, with an additional sidewalk on the opposite side between 56 Avenue and 76 Avenue.

There is only one peak hour bus route (Route #92) that operates on 34 Street, between Whitemud Drive and 56 Avenue. However the long term objective is to include transit routes on 34 Street and bus stop locations have been identified based on this transit need through the corridor. All transit stops are connected to the shared-use path or to a sidewalk, with all side streets also being connected to by either the shared-use path or sidewalk.

5.7 ENVIRONMENTAL OVERVIEW

An environmental overview report (**Appendix F**) was completed to provide information and recommendations regarding environmental areas and corresponding wildlife within the study limits that could be affected by upgrades to 34 Street.

The Alberta Sustainable Resources Development (ASRD) and the 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 instream works, must be equivalent to or exceed that which existed prior to the commencement of works. In addition to the Federal and Provincial requirements on "No Net Loss," the *Way We Grow* provides direction for improvements over and above existing degraded conditions:

> Objective 7.1.2: Restore ecologically degraded and/or damaged ecological systems and linkages to protect, expand and enhance biodiversity.
>
> Objective 7.3.1: Protect, preserve and enhance the North Saskatchewan River Valley and Ravine System as Edmonton's greatest natural asset.

Objective 7.3.3: Mitigate the impact of development upon the natural functions and character of the North Saskatchewan River Valley and Ravine System

Objective 7.5.1: Mitigate impacts upon Edmonton's water resources by ensuring that new developments in Edmonton embody an exemplary standard of ecological design.

Objective 7.5.2: Protect, maintain and continually enhance the water quality of the North Saskatchewan Watershed.

Given the historical disturbance level associated with the initial construction of 34 Street, industrial development and the increase in transportation use, the majority of the plant and wildlife species and sensitive ecosystem associations listed with FWMIS and ACIMS 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 salmonid or sport 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.

Environmental areas of significance within the project limits are highlighted in **Figure 5-4**. Future environmental work will include an Environmental Screening Report, typically requiring 4 to 6 months for completion and approval. A City of Edmonton Enviso checklist has also been updated and is included within **Appendix F**.

At future project stages, a cost-benefit analysis should be considered to determine if there would be benefit (both ecologically and other) to utilizing a bridge (with short span) as compared to the cost of installing both a permanent round bottom culvert for fish passage and the dry bottom culvert for mammal passage for the creek crossings. Such a proposal would fall in line with current City objectives on restoring degraded or damaged ecological linkages.

Opportunities to offset any land or habitat lost in the areas above due to right-of-way expansion should be considered with the objective to increase the functional ecological connectivity in the North Saskatchewan River Valley Ravine System.

Figure 5-4: Environmental Areas of Interest

5.8 WILDLIFE PASSAGE

Following an environmental field review with internal environmental personnel from the City and the Project Team, Appendix D of the City's *Wildlife Passage Engineering Design Guideline* (Stantec 2012) was reviewed and completed for the planning of upgrades to 34 Street. The completed checklists can be found in **Appendix F** of this report and are intended, at the planning stage, to identify which Ecological Design Groups (EDG) may be affected by the project as well as the future requirements to accommodate passage through the area.

While evidence of larger terrestrial mammals was observed during the initial field review, structural accommodation for these animals to cross over an industrial corridor such as 34 Street was not deemed feasible or sustainable at this time. This recommendation is also based on the low number of reported collisions involving larger animals within the last five years. As a result, the recommended minimum openness ratio for culverts or other passage structures was determined to be 0.4 in order to accommodate medium and small terrestrial animals at both the Fulton and Goldbar Creek crossing locations. Additionally it is recommend that a dry-passage culvert for small-medium mammals be provided at these crossings as well. Other mitigation measures that should be considered during future design stages of the project include overhead cover (e.g. logs, stumps) within the crossing structure signage and/or reflectors, fencing, diversionary methods, and vegetation management.

5.9 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 34 Street corridor within the project limits of this functional planning study.

No 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.

5.9.1 Geotechnical Overview (Review of Background Documents)

Pavement Structural Recommendations – 34 Street, 51 Avenue to Sherwood Park Freeway (City of Edmonton, Materials & Testing, 1983: In 1983, the City of Edmonton performed a series of asphalt cores (fourteen locations) along 34 Street between Whitemud Drive to Sherwood Park Freeway, evenly spaced throughout the corridor at 250 metre intervals. The overall purpose of this investigation was to assess the subsurface conditions with regards to a recommendation to improve the pavement on 34 Street.

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

- Subgrade was quite wet;
- The road gravel was extensively contaminated with clay and organics;
- A Design for California Bearing Ratios (CBR) was recommended to use 4.2 (10 year design life);
- Groundwater levels at each of the test holes (to a depth of 2.3 metres) were reported dry;
- At two locations (Roper Road, 66 Avenue) there were topsoil layers within the road base;
- 175mm asphalt was recommended over 150mm of soil cement; and
- Gravel layers should be supplemented with geotextile to avoid contamination.

Coring and Hand Auguring – 34 Street and 92 Avenue (EBA Engineering, 1999): A study completed for the *1999 Urban Projects for Strathcona County,* provided recommendations for repair to the road base at the intersection of 92 Avenue and 34 Street. The following information and is summarized at this location as follows:

- The existing asphalt ranges from 140mm to 180mm;
- There were gravels (20mm) present under the asphalt at a thickness of 135 mm to 180mm;
- The granular material was well graded and dense, with only traces of silt; and
- There was clay underneath the gravels to the termination of the core holes;

Based on the field conditions, the following recommendations were made:

- Remove the existing pavement structure and gravels;
- Scarify the clay to a depth of 150mm;
- Reconstruct the roadway, based on the one of the following structures:
  - 200mm granular base course (GBC), 300mm cement stabilized GBC, 150mm asphalt;
  - 250mm GBC, 150mm cement stabilized GBC, 225mm asphalt;
  - 400mm pit run subgrade, 250 GBC, 200mm asphalt; and
  - 400mm pit run subgrade, 400 GBC, 150mm asphalt.

Geotechnical Investigation, 34 Street, Whitemud Drive to the Powerline ROW, (J.R. Paine & Associates, 2006): This study was completed as part of a proposed upgrading of 34 Street, from Whitemud Drive to the Powerline (60 Avenue). A total of five test holes were drilled to a depth of 2.3 metres, and one test hole was drilled to a depth of 3.8 metres. The general soil stratigraphy consisted of ACP overlaying GBC followed by clay fill with layers of organic clay. The following summarized the field conditions:

- Asphalt Concrete Pavement (ACP) – 150 mm to 200mm;
- GBC – 220mm to 380mm;
- Clay Fill – half the locations had clay fill, which contained some organic or organic clay layers, above optimum moisture content;
- Native Clay – present at holes without clay fill, was silty with medium to high plasticity; and
- Pavement – existing conditions included moderate rutting, some transverse cracking and longitudinal cracking in all wheel paths.

As this study was completed as a rehabilitation, it was generally recommended that rehabilitation techniques be applied to areas of cracking and rutting, including proof rolling for areas where the GBC is exposed, pre-lifts and leveling in rutted areas and proper crack filling and sealing. In areas where the sub base is compromised with soft to firm clays, these materials should be removed and replaced with suitable fill and geotextiles where required.

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) in the vicinity of 34 Street:

- *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 create a framework for how the area is to be developed, 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, typical of the Edmonton region as a whole;
- The upland soils have been characterized as Angus Ridge Loam, an alluviated 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;
- 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.

5.9.2 Pavement Structure Analysis

A typical City of Edmonton standard for arterial roadways (the County section will match accordingly) that has been commonly used is:

- *100mm asphalt concrete overlay (ACO) over 100mm asphalt concrete base (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 pavement structure to consider would be as follows:

- *100mm ACO over 175 ACB over 350mm GBC*
- *150mm cement stabilized subbase*
- *To improve the existing subgrade, 200mm Pit-Run (recycled granulars) may also be considered over 150mm Cement Stabilized Subgrade.*

It is generally assumed for the length of 34 Street, that the entire road base will need to be removed and reconstructed. The subgrade will need to be assessed with further information, but generally a mix of removals (with new fill) and cement stabilization will be required. For the purposes of estimation of quantities and costs, this pavement structure and approach has been utilized.

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.

5.10 STORMWATER MANAGEMENT

A review of the stormwater drainage basins and discharge locations along the corridor resulted in the identification of two distinct basins (Fulton Creek and Gold Bar Creek). Each of these basins will need to meet the requirements identified in this section, and have been divided into catchment areas for the purposes of drainage planning. A stormwater report for each drainage basin will be required for future phases of design to determine the amount of surface run-off from 34 Street. This report provides a strategic plan for drainage of the corridor, highlighting drainage infrastructure requirements and outfalls. All new stormwater management facilities must follow the requirements of the Alberta Environmental Enhancement and Protection Act.

The Maple Ridge Area Master Plan Amendment – Final Report, Revised November 2009 by Focus, identifies the proposed stormwater servicing concepts for the Maple Ridge area. 34 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 stormwater requirements are dependent on the size of the undeveloped parcel. Parcels less than 10 hectares (which is the case for both drainage basins along 34 Street) will be required to control discharge to 35 L/s/ha for the 1:100 year rainfall event. The proposed stormwater drainage concepts presented in section have incorporated the information contained in the report. The storm systems will need to be designed with consideration for of 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). 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 and storm retention within the roadways.

Additional plans and studies in the area were also reviewed and incorporated where practical in the drainage concept, including:

- Pylypow Industrial Storm Drainage Basin (Focus, 2010);
- Cornerstone Business Park (Southeast Industrial Stage 1A) Overall Storm Catchment Plan (IBI, 2012);
- Thornhill Industrial Development (Strathcona County, 1979);
- Pylypow Regional Stormwater Management / Constructed Wetland Facility Record Drawings(Associated Engineering, 2011);
- Morris Wetland and Regional Stormwater Management Facility (Associated Engineering / Aecom, 2011); and
- Overland Drainage Plan 34 Street – Sherwood Park Freeway (City of Edmonton, 1998).

A detailed stormwater design will need to ensure that the minor system design and major system design adhere 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. **Figure 5-5** presents the conceptual drainage plan, including storm pipe network, inlets / catch basins and discharge locations. The storm mains will be located within the road right-of-way, typically in the middle median, but have been schematically shown outside the right-of-way for clarity of the drawings.

Fulton Creek Drainage Basin

The Fulton Creek drainage basin encompasses 34 Street between Whitemud Drive and the Canadian National Railway (near 72 Avenue). The approximate length of road is 2.0 kilometres. This basin is separated into two (2) catchment areas; from Whitemud Drive to the Fulton Creek constructed wetlands, and from the constructed wetlands to the CN Rail crossing. All of the stormwater in this basin is proposed to outlet into the constructed wetland on the west side of 34 Street. Additionally, Fulton Creek crosses under 34 Street at the constructed wetlands through a culvert. This culvert crossing is at a skew angle and enters into a creek channel. Through design of the creek crossing, there may be opportunity to straighten the crossing and reduce the crossing length of the watercourse. Additional considerations for the creek crossing include wildlife passage and determination of a suitable crossing structure (culvert, bridge, etc.).

Fulton Creek Basin Catchment Area South: Within this section, a 6-lane urban road cross section is proposed with a 44m road right-of-way. The affected area is 9.15 hectares, which results in a maximum discharge rate of approximately 320 L/s.

A new storm line is planned to be constructed on the east side of 34 Street from Whitemud Drive to the constructed wetlands, which will outlet north of the power transmission line. There is a recently constructed storm sewer along the west side of 34 Street between Whitemud Drive and Roper Road. This was developed as part of the Pylypow development and will also be utilized as an outlet from the future Cornerstone Business Park stormwater management facility planned for the east side of 34 Street, north of Whitemud Drive. There may be an opportunity to utilize this existing storm sewer for 34 Street, however, this system was sized for the development area and only considers the drainage from roughly half of the ultimate 34 Street. That connection would need to be determined during future project phases that would include drainage modeling.

Assuming that an additional storm sewer is required through this section to handle the roadway drainage, the proposed drainage concept is shown in **Figure 5-5**. Water would flow north from Whitemud Drive and discharge to the Fulton Creek stormwater management facility located approximately 1090m north. The first set of catch basins would be located near the existing access at 51 Avenue and would flow into a proposed storm main located on the west side of 34 Street. The proposed storm main would be installed from 51 Avenue northward to the proposed discharge location at the Fulton Creek stormwater facility. A number of catch basins located along 34 Street would be installed as required to meet the design standards. Depending on the depth of the conveyance pipe, a lift station may be required at the outfall; however this may be determined with survey and detailed design.

Fulton Creek Basin Catchment Area North: Stormwater along 34 Street between the Fulton Creek stormwater facility and the Canadian National (CN) Railway (near 72 Avenue) will flow north to approximately 68 Avenue, and south from the CN rail crossing to 68 Avenue (approximate length 990m). The first set of catch basins would be located north of the Fulton Creek wetland and flow northward through a proposed storm main located along 34 Street to 68 Avenue. From the CN rail crossing the storm sewer would flow south connecting to 68 Avenue. At 68 Avenue a proposed storm sewer would be constructed (as a separate right-of-way or future 68 Avenue extension to the west) to the west to 35 Street, then north on 35 Street to 69 Avenue, connecting to the existing storm sewer (750mm) at 69 Avenue and 35 Street. This storm sewer then flows west to an outlet on Fulton Creek. Alternatively, a new storm sewer could be constructed west along a 68 Avenue right-of-way to a new outlet to Fulton Creek. This drainage option will need to be confirmed in future project phases. The number of catch basins located along 34 Street would be installed as required to meet the design standards.

There is an existing storm sewer (600mm) from 34 Street that does connect to 35 Street through an extension (right-of-way easement) of 69 Avenue. Unfortunately this storm sewer bisects titled property and includes a portion that in underneath a building. Adding additional stormwater to this sewer is not desirable, and ultimately if there is an alternative (68 Avenue) that can provide for the level of water flow, consideration should be given to abandon this section of pipe.

The City of Edmonton has also identified two possible stormwater management facility locations on the east side of 34 Street, between 64 Avenue and the CN rail crossing which although are more required for land-based run-off and may be required with development, there may be an opportunity to collect roadway drainage for 34 Street within these facilities, prior to discharging to Fulton Creek through the planned / existing storm sewer.

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 stormwater from this section of 34 Street discharges to Fulton Creek, stormwater treatment is required.

Gold Bar Creek Drainage Basin

All of the stormwater within this basin will drain into Gold Bar Creek. There are three catchment areas that utilize this basin, separated by Sherwood Park Freeway and the CP Rail crossing. The area south of Sherwood Park Freeway will drain to Gold Bar Creek, through the Morris Pond constructed wetlands, while the two catchement areas north of Sherwood Park Freeway will drain to Gold Bar Creek. There is an established allowable discharge rate into Gold Bar Creek of 4.1L/s/ha, which has been agreed upon by both the City of Edmonton and Strathcona County. To meet this requirement, oversize pipes may be required for strom water storage and controlled release through this section.

Gold Bar Creek Basin Catchment Area South of Sherwood Park Freeway: The Gold Bar Creek drainage basin catchment area south of Sherwood Park Freeway incorporates 34 Street from the Canadian National Railway to Sherwood Park Freeway. The approximate length of the road through this catchement area is 930m, with an affected area of 4,09 hectares. Within this section, a 6-lane urban road cross section is proposed with a 44m road right-of-way, with a maximum discharge rate of approximately 143 L/s.

Stormwater from the catch basins would flow northward into a proposed storm main located on along 34 Street, with catch basins installed as required to meet standards. Through this section there is existing stormwater infractructure at 74 Avenue, 76 Avenue and 78 Avenune, all of which flow to the west. Connection to these existing storm sewers from the storm main on 34 Street could be used as partial outlets for the stormwater from 34 Street, which would control releases as well as reduce the pipe sizes along 34 Street. The amount of partial outlet for stormwater at these locations would be determined at future project phases.

North of 76 Avenue, the storm main would gradually become shallow, with the cover reducing to allow for the main to be outletted north of 78 Avenue into a ditch at an apporximate invert of 674m. This stormwater would then travel overland north the the Sherwood Park Freeway, then west to two (2) 900mm culverts that cross Sherwood Park Freeway and ultimately discharge into the Morris Pond constructed wetlands.

Although the stormwater from this section of 34 Street will ultimately discharge to Gold Bar Creek, stormwater treatment from the piped system is not required prior to discharge as passive treatment will occur in the constructed wetlands, prior to a controlled outlet into Gold Bar Creek.

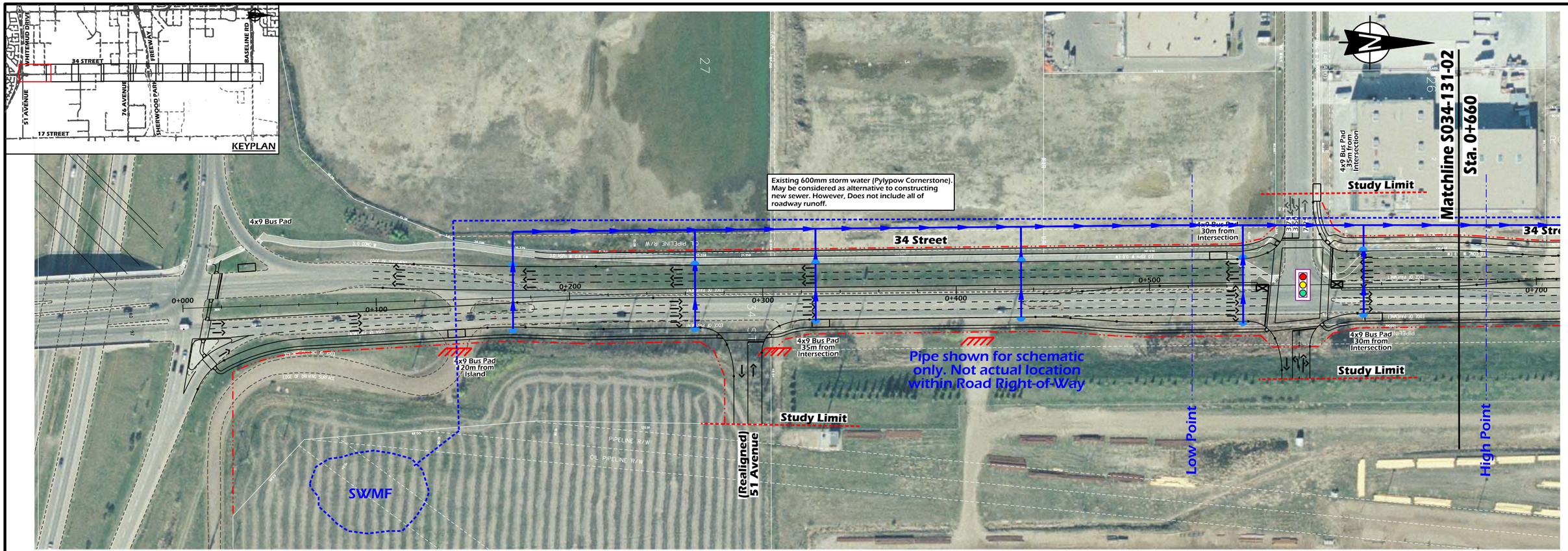
Gold Bar Creek Basin Catchment Area North of Sherwood Park Freeway: This catchment area incorporates Strathcona County's portion of 34 Street from Sherwood Park Freeway to the CP Rail crossing. The approximate length of road is 1.3 kilometres with the general conveyance pattern towards Gold bar Creek in the vicinity of the Morris Pond constructed wetlands. Within this section, a 4-lane urban road cross section is proposed with a 35m road right-of-way. The affected area is 9.29 hectares, which results in a maximum discharge rate of approximately 324 L/s.

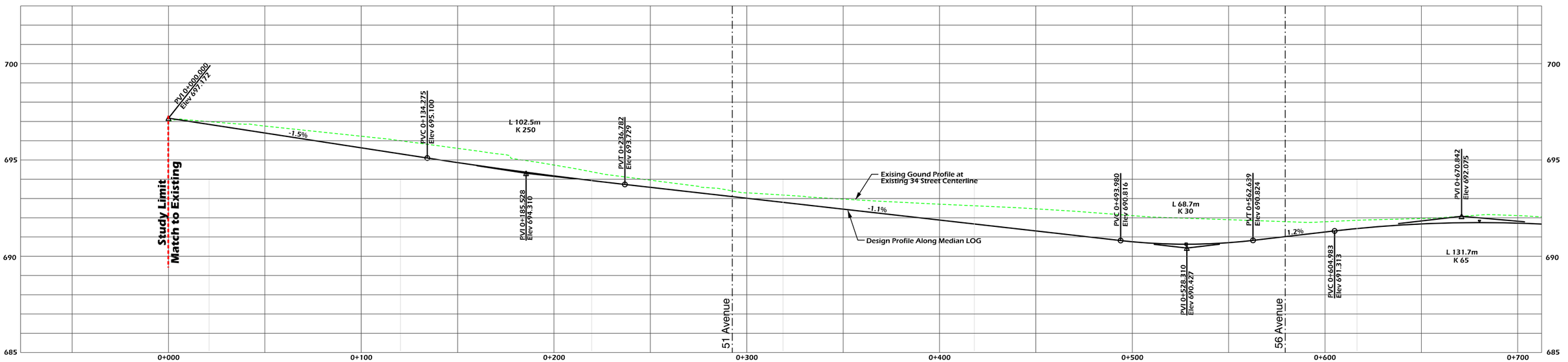
Drainage would flow from Sherwood Park Freeway northward approximately 650m to a future constructed wetlands facility (currently under construction). Catch basins would be installed as required to meet the standards. The stormwater from the catch basins would flow into a proposed storm main located along 34 Street. The storm main would discharge with treatment into Gold Bar Creek which would also need to be controlled. Alternatively there may be an opportunity to discharge the section south of Gold Bar Creek into Morris Pond, as there may be sufficient invert elevations to drain into the pond coming off the Sherwood Park Freeway interchange and 84 Avenue.

At the discharge location, the invert elevation of the storm main would be in 663m to 665m range, and although there is a constructed wetland (Morris Pond) the discharge invert elevation to Gold Bar Creek of the pond is 668m, which does not facilitate the outlet of roadway drainage in this area without a lift station. As an alternative, oversize pipes could be used to control flows into the Gold Bar Creek, or stormwater management facility in the vicinity of 92 Avenue could be considered however it would likely need to include the creek itself, which could impact water quality of the creek.

The stormwater from the CP Rail tracks would flow southward approximately 700m to this controlled discharge location into Gold Bar Creek. Stormwater treatment will be required prior to discharge.

Gold Bar Creek Basin Catchment Area North of CP Rail Crossing: The stormwater from the CP Rail tracks north would flow north to Baseline Road where it would be conveyed through the existing underground system, west along Baseline Road connecting with Gold Bar Creek (at Goldstick Park). It is unknown if the existing system can accommodate this additional run-off; however, there are alternatives including a stormwater connection to outlet to Gold Bar Creek south of Baseline Road, or a parallel underground system to the existing system along Baseline Road. Catch basins would be located at the intersection and at proper spacing to meet the design standards. As the stormwater from this section of 34 Street will ultimately discharge to a creek, stormwater treatment from the piped system is recommended prior to discharge. Treatment would consist of commercially available typical oil/grit separators. In order to restrict flows to the allowable 35 L/s/ha flow rate (as well as the reduced 4.1L/s/ha for discharge into Gold bar Creek), 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; however, this is not desirable and should be evaluated at future design phases. Stormwater management facilities may also be considered with development and / or redevelopment along this section, however there is limited opportunity, with only portions south of Baseline Road remaining undeveloped.





LEGEND

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

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 5-5

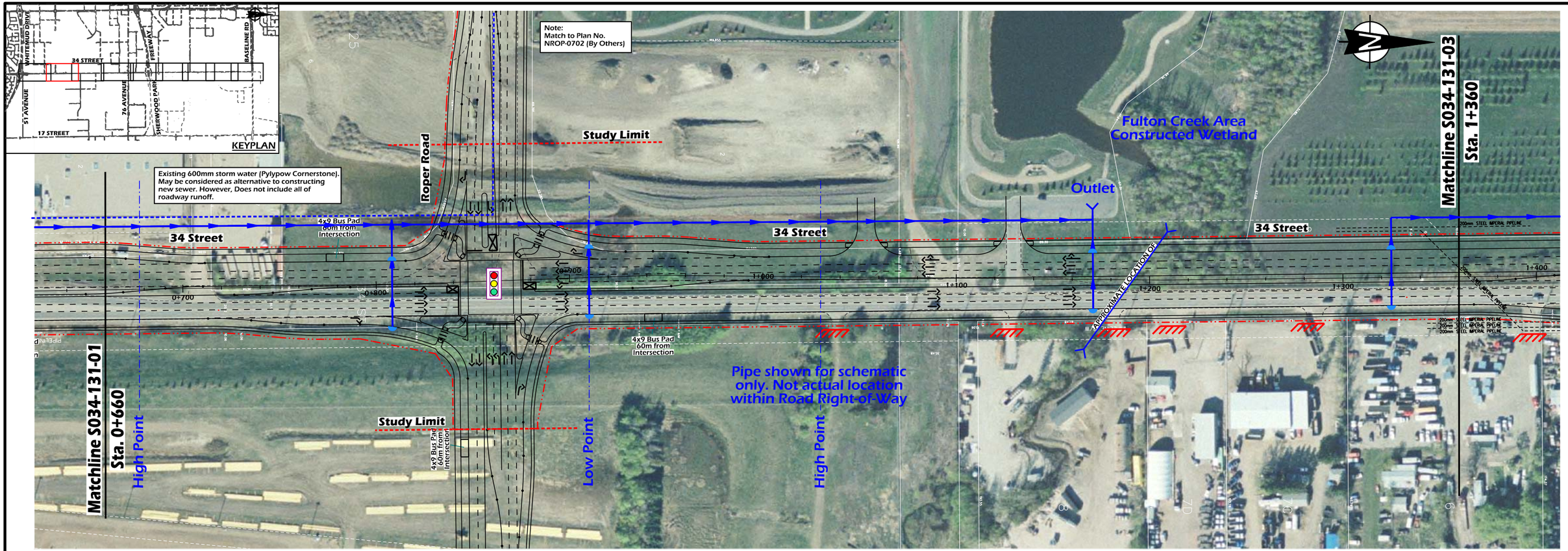
34 Street, Whitemud Dr to Baseline Road
Conceptual Drainage

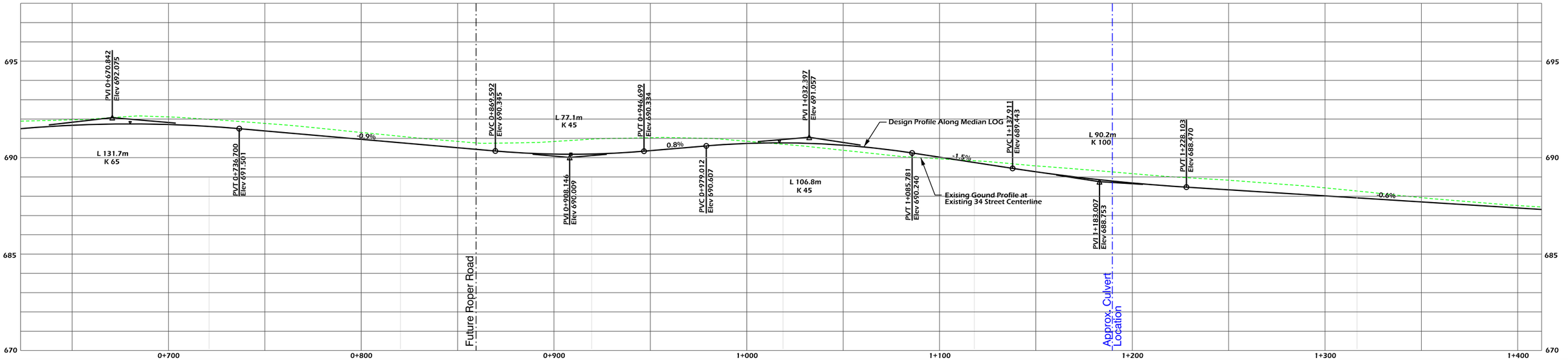
20m 0 40m

DRAWN: TD
REVIEWED:
DATE: 2013 07 03

PLAN NO.
S034-131-01

34th Street Conceptual Drainage Profile.dgn Sheet 1 7/3/2013 1:31:03 PM





LEGEND

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

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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Capital Planning and Construction

PERMIT TO PRACTICE P6383

CONCEPT - SUBJECT TO PRELIMINARY SURVEY AND DESIGN

Figure 5-5

34 Street, Whitemud Dr to Baseline Road
Conceptual Drainage

20m 0 40m

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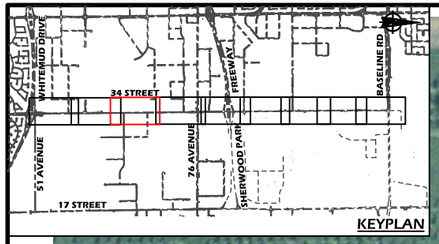
REVIEWED:
DATE: 2013 07 03

PLAN NO.
S034-131-02



Proposed Future Storm Sewer to Fulton Creek

Existing 600mm Storm Sewer. Possible alternative outlet to Fulton Creek

Study Limit

Study Limit

Study Limit

Study Limit

4x9 Bus Pad 30m from Intersection

4x9 Bus Pad 30m from Intersection

4x9 Bus Pad 30m from Intersection

4x9 Bus Pad 30m from Intersection

34 Street

Pipe shown for schematic only. Not actual location within Road Right-of-Way

Possible SWMFs as proposed by City of Edmonton Drainage Services

Matchline S034-131-02 Sta. 1+360

Matchline S034-131-04 Sta. 2+080

64 Avenue

68 AVENUE

1+400 1+500 1+600 1+700 1+800 1+900 2+000 2+100

690 685 680 675

-0.6%

Exising Gound Profile at Existing 34 Street Centerline

Design Profile Along Median LOG

PVC 2+045.465 Elev 683.340

L 116.5m K 75

PVI 2+103.734 Elev 682.974

64 Avenue

68 Avenue

LEGEND

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

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 5-5

34 Street, Whitemud Dr to Baseline Road
Conceptual Drainage

20m 0 40m

DRAWN: TD
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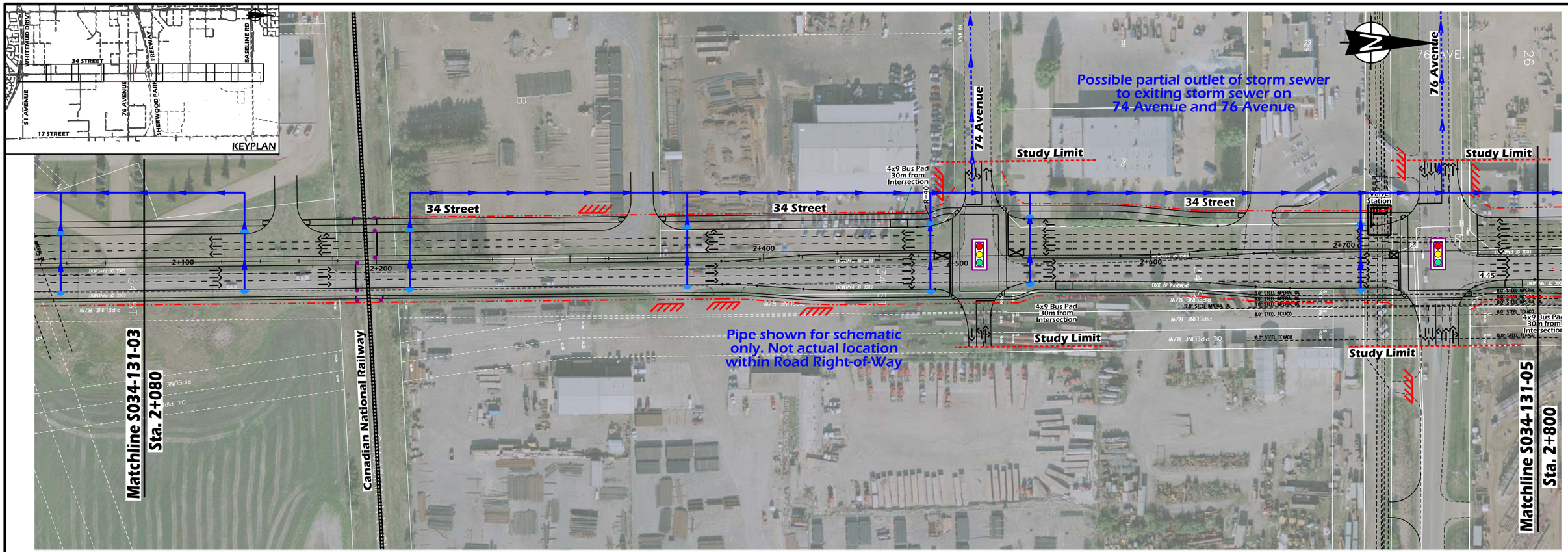
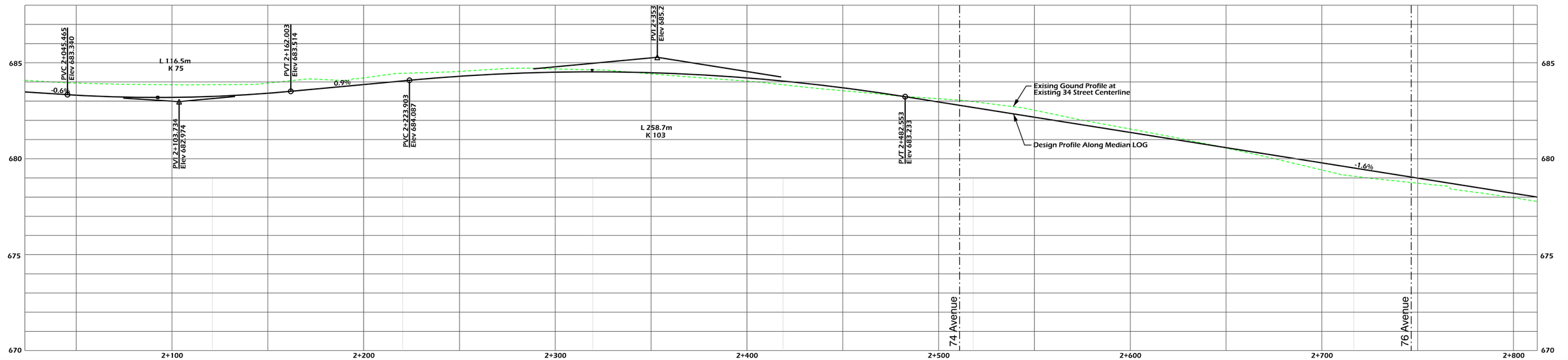
DATE: 2013 07 03

PLAN NO. S034-131-03

34th Street Conceptual Drainage Profile.dgn Sheet 3 7/3/2013 1:32:17 PM





LEGEND

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

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

Note:
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CONCEPT - SUBJECT TO PRELIMINARY SURVEY AND DESIGN

Figure 5-5

34 Street, Whitemud Dr to Baseline Road
Conceptual Drainage

20m 0 40m

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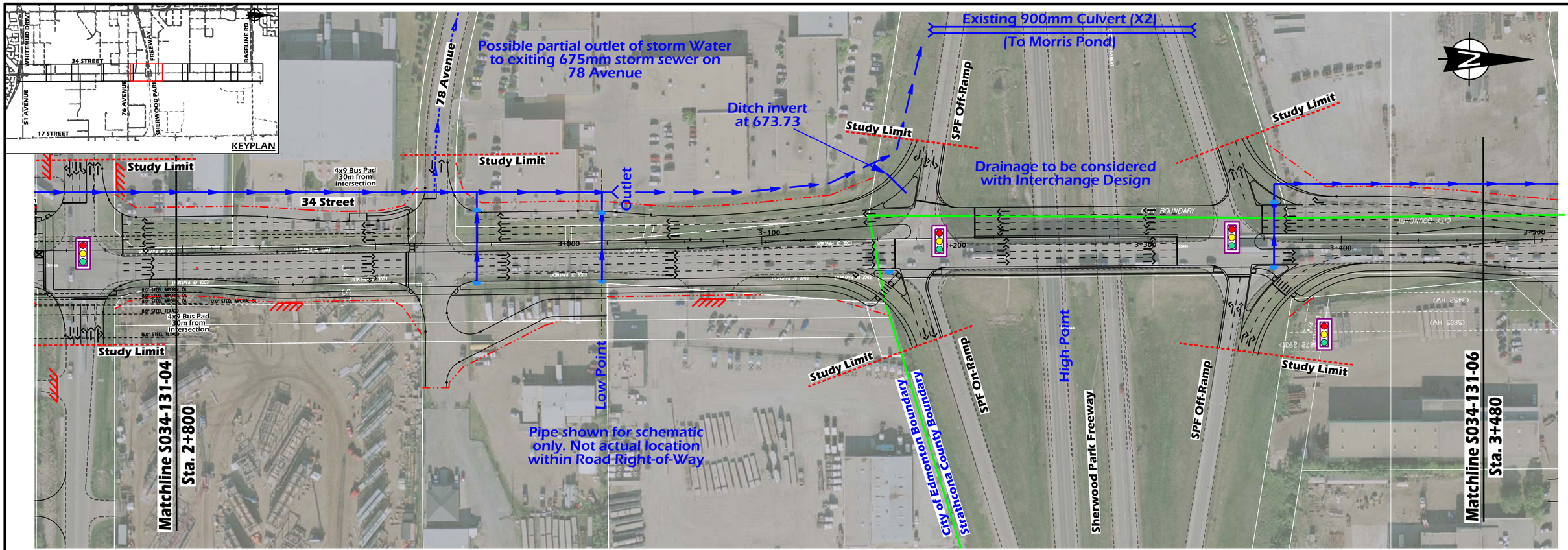
DATE: 2013 07 03

PLAN NO.
S034-131-04

34th Street Conceptual Drainage Profile.dgn Sheet 4 7/3/2013 1:32:48 PM



LEGEND

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

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

Notes:
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CONCEPT - SUBJECT TO PRELIMINARY SURVEY AND DESIGN

Figure 5-5

34 Street, Whitemud Dr to Baseline Road
Conceptual Drainage

20m 0 40m

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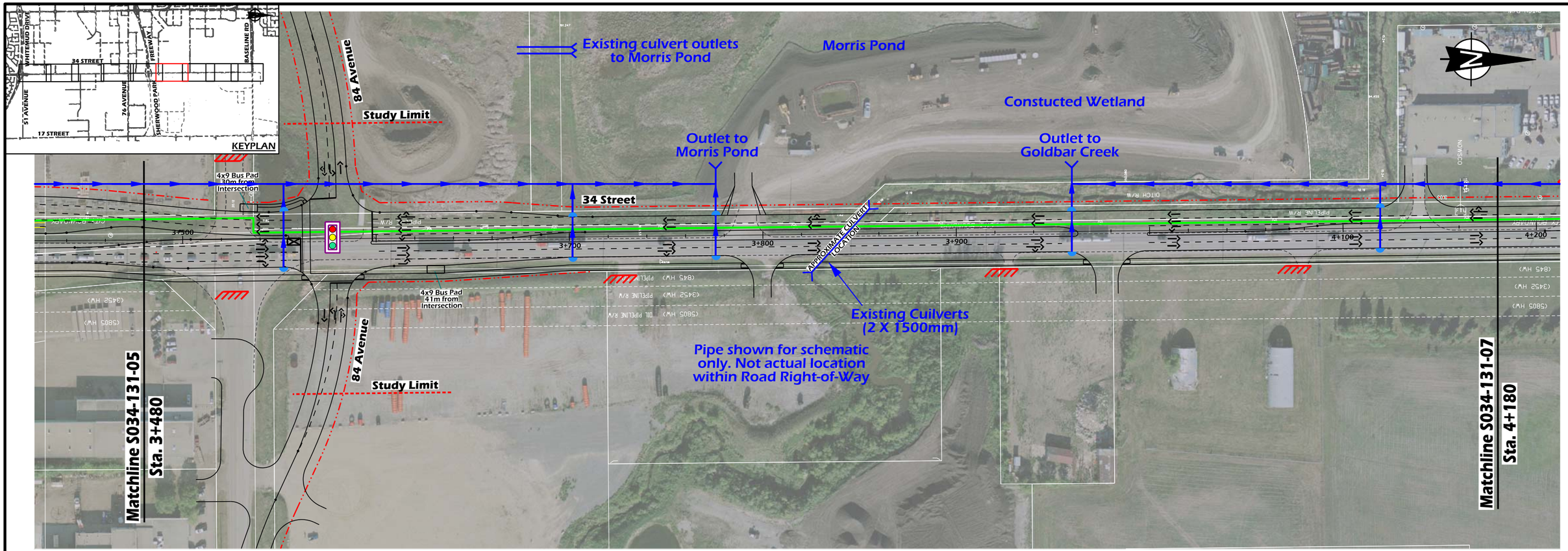
DATE: 2013 07 03

PLAN NO.
S034-131-05

34th Street Conceptual Drainage Profile.dgn Sheet 5 7/3/2013 1:35:42 PM



LEGEND

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

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

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CONCEPT - SUBJECT TO PRELIMINARY SURVEY AND DESIGN

Figure 5-5

34 Street, Whitemud Dr to Baseline Road
Conceptual Drainage

20m 0 40m

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DATE: 2013 07 03

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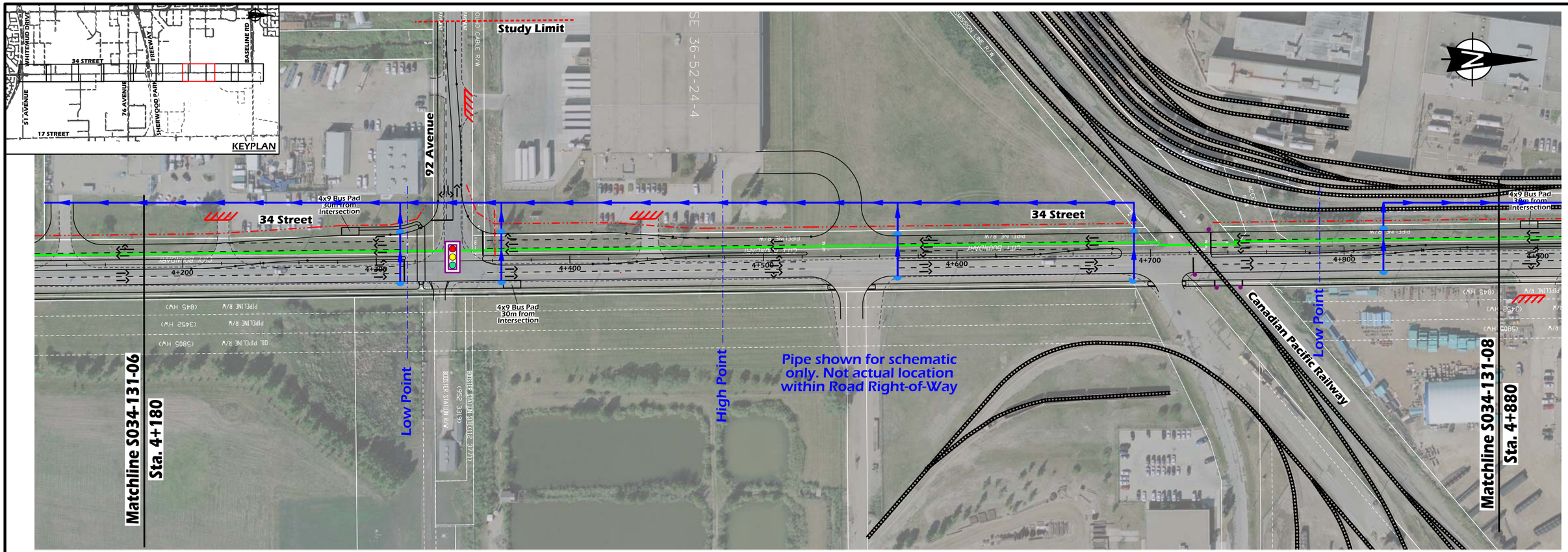

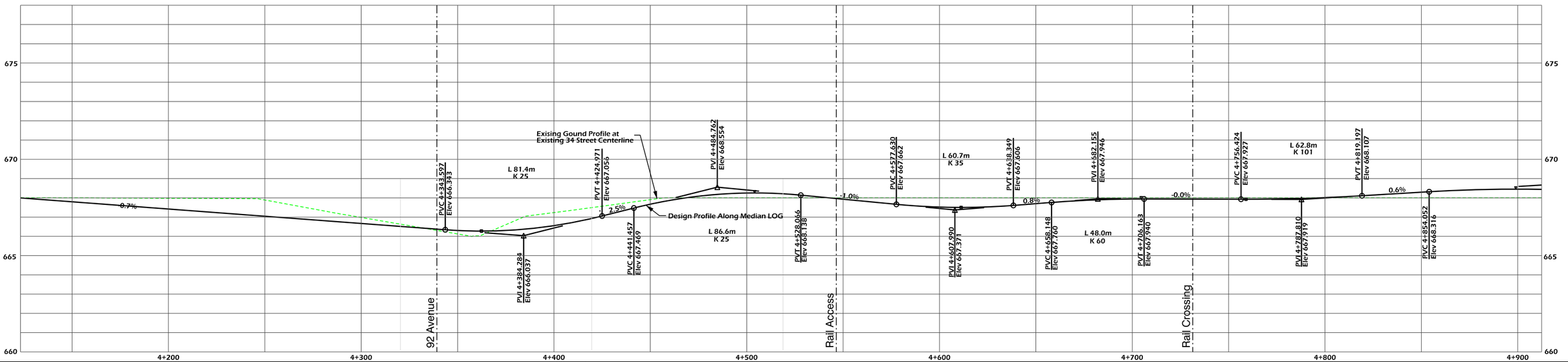

LEGEND

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

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

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CONCEPT - SUBJECT TO PRELIMINARY SURVEY AND DESIGN

Figure 5-5

34 Street, Whitemud Dr to Baseline Road
Conceptual Drainage

20m 0 40m

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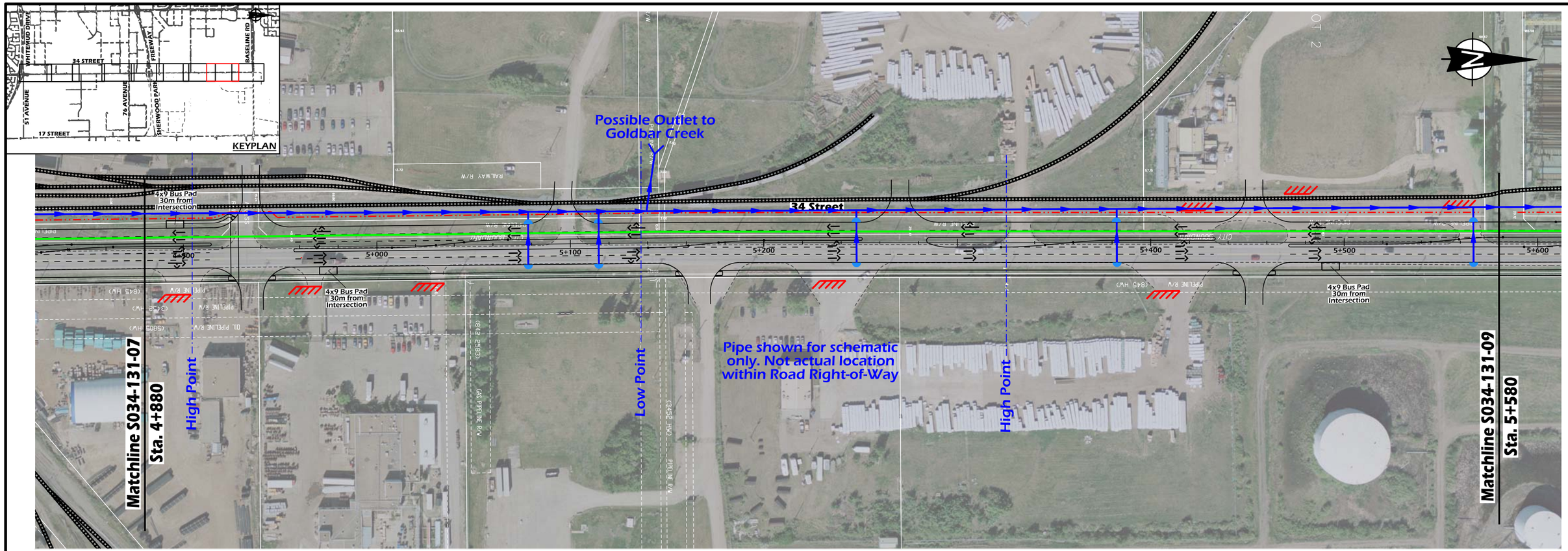
DATE: 2013 07 03

PLAN NO. S034-131-07



LEGEND

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

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

Notes:
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CONCEPT - SUBJECT TO PRELIMINARY SURVEY AND DESIGN

Figure 5-5

34 Street, Whitemud Dr to Baseline Road
Conceptual Drainage

20m 0 40m

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DATE: 2013 07 03

PLAN NO. S034-131-08

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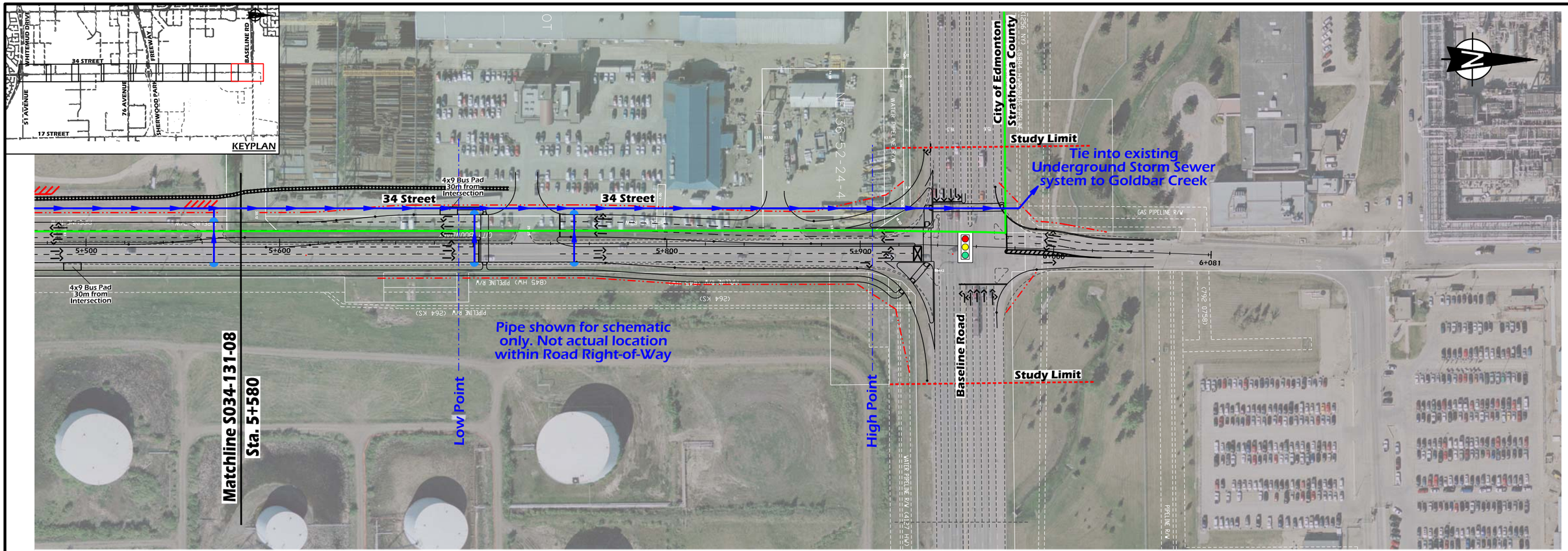

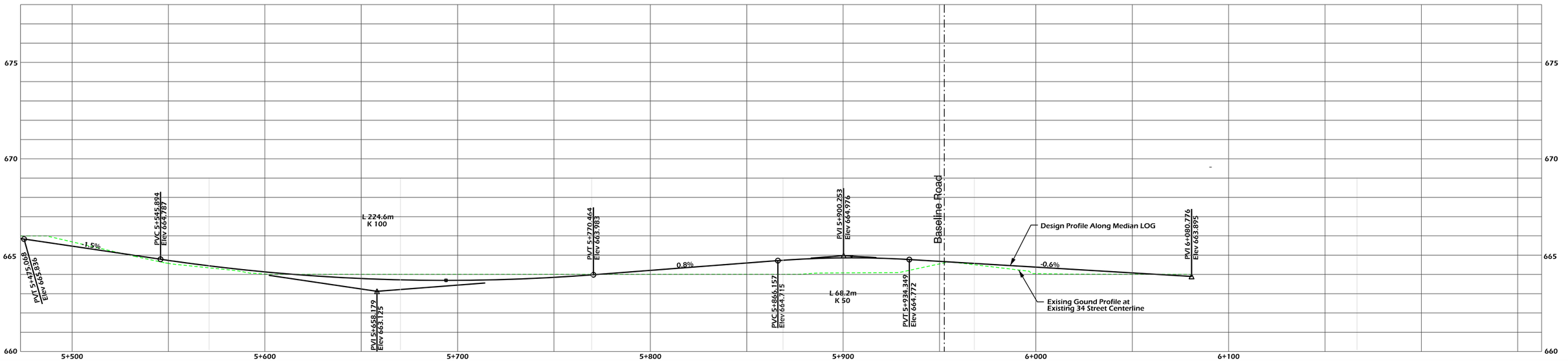

LEGEND

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

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

Notes:
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CONCEPT - SUBJECT TO PRELIMINARY SURVEY AND DESIGN

Figure 5-5

34 Street, Whitemud Dr to Baseline Road
Conceptual Drainage

20m 0 40m

DRAWN: TD
REVIEWED:
DATE: 2013 07 03

PLAN NO. S034-131-09

34th Street Conceptual Drainage Profile.dgn Sheet 9 7/3/2013 1:37:51 PM

5.11 HISTORICAL RESOURCES OVERVIEW

A Historical Resources Overview (HRO) was completed for 34 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**.

An estimated total of 80 archaeological sites have been recorded within five kilometres of the project area; however, no known sites are located within the project impact zone. 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. No further work was recommended for any of these sites. Most of the proposed new right-of-way lands have been previously disturbed by agriculture, industrial development, infrastructure emplacement, or road construction.

The only significant hydrologic features within the project area are Fulton Creek and Gold Bar Creek Crossing. Fulton Creek 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 area and no sites were found along its margins within the project limits at the 34 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.

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 34 Street (May 2013). The resulting plan mark ups from this review are presented in **Appendix H.**

General benefits of the recommended upgrades to 34 Street identified as part of this review include:

- Addition of travel lanes through the corridor and turn bays at intersections reduces turning conflicts and speed differentials;
- Addition of a Shared Use Path (SUP) along the entire corridor as well as sidewalks south of Sherwood Park Freeway provides pedestrians and cyclists with a safer alternative to using the roadway or roadside. The separation between the SUP, sidewalk and roadway reduces the risk of vehicular collisions, and will encourage more trips by active modes;
- Significant access management through the consolidation of numerous private accesses will increase motorist expectation of conflicting movements. Traffic volumes will be consolidated such that turning movements can be separated at signalized intersections;
- Aussie-style turn bays at Roper Road will reduce vehicle approach speeds to crosswalks.
- Converting 78 Avenue intersection to a right-in / right-out reduces weaving issues between Sherwood Park Freeway ramps and 76 Avenue intersection; and
- Signalized WB-NB ramp intersection at Sherwood Park Freeway provides a protected multi-use trail crossing and mitigates weaving between the ramp and the 84 Avenue intersection.

General concerns identified include:

- Risk of collisions due to permissive left turns across 3+ opposing lanes at private accesses and intersections along the corridor. Risk is dependent on volume of left turns and opposing traffic; the need for protected lefts should be considered at later design stages or future operational phases of the project. The City of Edmonton, also applies the practice of protected – prohibited left turn phasing for all dual left turns;

- Wide trail crossings at private accesses and driveways along the corridor could result in conflicts between cyclists, pedestrians and motorists;
- Single trail / sidewalk ramps at intersections could direct wheeled users into traffic prior to entering the crosswalk;
- Limited or discontinuous active mode facilities along adjacent avenues. Although outside the scope of this study, the City should investigate future active mode connections to 34 Street as bus stops are introduced;
- High potential for poor speed limit compliance due to straight and flat alignment of corridor; and
- Wide curb lane (4.2m from lip of gutter) could encourage excessive vehicle speeds. While the lane width may be to accommodate cyclists as well as snow storage, the separated multi-use trail should offset this need.

A response to the traffic safety and mobility review is detailed in **Table 5-1.** Many of the recommendations can be carried into future phases on the project, while some recommendations are not feasible due to physical constraints.

Table 5-1: Designer's Response to Safety & Mobility Issues

No.	Issue	Response
1	Removing the interim west leg at 51 Avenue may prove difficult during future stages of the project.	Removal of the west access should be implemented when the corridor is upgraded to a 6 lane cross section.
2	Short weaving distance between driveway and 56 Avenue.	This access has been subsequently removed on the ultimate concept plans due to a land consolidation.
3	Narrow left turn lanes could result in vehicles intruding into the adjacent lane, especially given the high volume of truck traffic through the corridor.	No action. Lane widths are to City and County standards.
4	Potential for lane drifting during the dual WB-SB left turn movement at Roper Road.	Guiding pavement markings are to be recommended during future design stages.
5	Potentially discontinuous sidewalk at new 33 Street connection.	Identified need for pedestrian connections only; sidewalk connections to be confirmed at future design stages.
6	Many wide trail crossings at private driveways.	Crosswalks are not provided across driveways, but consideration should be given for signage to increase driver awareness at later design stages
7	Minimal intersection spacing between driveways and 74 Avenue.	Spacing is constrained by railway crossing; unable to consolidate accesses at this location.
8	Unprotected NB-WB left turns across three lanes of opposing traffic at many private accesses.	Traffic signals downstream should provide sufficient gaps, while left turn separation will reduce driver expectation to accept insufficient gaps caused by through vehicles waiting behind them.
9	Unprotected EB-NB left turns across three lanes of opposing traffic.	Consider EB-NB left turn prohibition signage at these intersections to reduce attempts to make this movement during peak period. Sufficient gaps should be available off peak hours.
10	Single intersection ramps approaching perpendicular crosswalks.	City prefers to have single ramps; crosswalks and approaches should be reviewed at later design stages.

No.	Issue	Response
11	Short weaving distance between 76 Avenue and gas station driveway, as well as between the driveway and 74 Avenue.	Large trucks accessing the side are unable to turn around and require a continuous loop access. Current second access must be closed due to proximity to 76 Avenue intersection, which is consistent with the City of Edmonton Access Management Guidelines.
12	Mid-block pedestrian crossing for access to bus stop at 78 Avenue.	Review needed at future stages to determine whether a bus stop connection is required at this intersection. Consider flashing lights if required.
13	Short weaving distance for EB traffic at 78 Avenue who wish to continue EB at 76 Avenue.	Intersection locations constrained by existing corridor; traffic signals upstream and downstream of the interesection should provide sufficient gaps in order to maneuver across through lanes.
14	Separation between service road and 34 Street east of the 78 Avenue intersection.	Service road intersection to be reviewed during later stages based on future development in the area, the proposed design exceeds current City of Edmonton design standards.
15	The need for an auxiliary lane between 78 Avenue and SPF may no longer be required due to conversion of 78 Avenue into right-in/right-out	Removal of auxiliary lane to be considered during future design stages.
16	Four through lanes north and south of SPF interchange, two of which turn into left turn lanes may result in sudden lane changes.	Overhead signs recommended for prior to interchange to allow drivers to transition into the correct lane before approacing the ramp intersections.This is not an ideal situation, but is recommneded to minimize right-of-way requirements and bridge deck width as well as avoid additional horizontal radii introduced into the roadway on a vertical curve.
17	WB-SB traffic may inadvertently turn into the SB-EB left turn lanes at SPF	Guiding pavement markings and signage are recommended and are to be reviewed at future design stages.
18	Queuing should be reviewed for the on-ramps at SPF to ensure that the right turning queues don't interfere with WB-SB movements.	Queing has been reviewed as part of traffic analysis; ramps to be reviewed as part of future interchange planning (Alberta Transportation).
19	Intersection configuration east of 84 Avenue could result in confusion for motorists approaching 84 Avenue.	Low volume access location; intersection may be reconfigured during later design stages.
20	Acceleration lanes north of SPF may not be necessary as they are not provided elsewhere along the corridor.	Strathcona County standard; should consider removal of acceleration lanes for safety and to maintain consistency. Typically accelleration lanes are used at rural locations for vehicles to gain speed in a merging situation. In the case of these urban signalized intersections there will be sufficient gaps created by the signals to allow for safe right turn movements under a yield condition.Accelleration lanes can create speed differentials and short distance merging can create improper gap acceptance.
21	Bus stop does not connect to pedestrian facilities in the west at 92 Avenue. Crosswalk should be moved to the south leg to eliminate the need for two crossings.	Bus stop locations and connections to be reviewed at future stages. Plans updated to show pedestrian connection on the south leg.

No.	Issue	Response
22	Driveway access in the middle of signalized 92 Avenue intersection could cause driver confusion.	Access cannot be moved; to be treated as a right-in/right-out by employees. Minimal usage, mostly during off-peak hours. Plans updated to remove through arrow on west leg.
23	Flat profile north of 92 Avenue may increase the risk of ponding.	Drainage is an issue at this location due to the railway crossing to the north. Larger gutters may be considered during future design stages.
24	Large intersections for stop-controlled left turns onto 34 Street from various private accesses north of 92 Avenue.	Size of intersections constrained by truck traffic. To be reviewed at future design stages depending on development in the area.
25	Potentially large undefined space at CP Rail access south of crossing could result in motorist confusion. Intersection skew reduces sight distance for WB-SB traffic.	CP rail access only, other existing traffic to be diverted to south access intersection. Plans updated to reduce skew and narrow the access to 11m.
26	Shared use path crosses the railway tracks at a skewed angle.	May realign crossing to 90 degrees at future design stages.
27	Railway crosses the roadway on a skew. May cause lost-of-control hazard for motorcycles.	Roadway and rail alignments are constrained to existing locations. Warning signs for motorcycles to be included in the design during firture project phases.
28	Train tracks in close proximity to 34 Street at access south of Waiward Steel, may cause storage issues for large trucks.	These tracks are a spurline for Waiward Steel; usage is minimal. Crossings will be manually flagged.
29	Driveway for Waiward Steel in close proximity to Baseline Road.	Gated access at that location is required and will be used exclusively to access Baseline Road during oversized moves late at night.

6 COSTING & IMPLEMENTATION

6.1 COST ESTIMATES

6.1.1 Methodology

Cost estimates for 34 Street have been developed based on concept plan and profiles (drawing set dated April 29, 2013) and from unit rates derived from 2012 and 2013 tender results on similar cost items within the Capital region, most notably recent tender prices from Strathcona County. These cost estimates are at a conceptual planning level of detail (+/- 30%) and are developed based on 2013 dollars and are subject to inflation amounts for future years. Each section of the roadway was estimated based on the plan drawings (S034-1301-0 through S034-1301-09), typically between drawing match lines, presented in **Appendix A**.

6.1.2 Assumptions

For the purposes of a planning level estimate, several assumptions were made:

- A basic cross section of six or four lanes was utilized for quantities between intersections and include turn bays at intersections as per the plans;
- A complete reconstruction of the existing 34 Street is required (assuming removal to clay sub-base, assuming that clay is present, which has been the case with previous area test cores);
- Pavement structure is assumed as 100mm asphalt concrete overlay (ACO), 175mm asphalt concrete base (ACB) and 350mm gravel base course (GBC), total of 625mm, with stabilized subgrade (150mm clay). This is derived from City standards, County Standards and a recent recommendation on a similar roadway (17 Street), which recommended ACO / ACB total of 185mm and a GBC of 450mm (635mm total) for an urban modified cross section;
- Topsoil depth is assumed between 150mm and 250mm, noted as 150mm as per City of Edmonton standard. Typically, cost is more dependent on spreading with these depths;
- Sod will be placed between the back of curb and sidewalk or shared use path. All other landscaped areas, including medians will be seeded; and
- An allowance has been provided for the Fulton Creek and Gold Bar Creek Crossings as further determination of the crossing requirements will be developed in future design phases.

The overall estimate for the widening of 34 Street from Whitemud Drive to Baseline Road is **$85 Million** in 2013 dollars. This estimate includes 25% contingency as well as the structure expansion of 34 Street over Sherwood Park Freeway ($18M) and intersection improvements at the interchange (which is the responsibility of Alberta Transportation). The estimate does not include grading and paving for the ramp connections to Sherwood Park Freeway nor does it account for other interchange costs outside of the 34 Street crossing. As the project spans several jurisdictions, the cost estimate has been split into the three sections as shown in **Table 6-1**.

Table 6-1: Cost Estimate Allocation by Jurisdiction

Section	Cost ($2013)
City of Edmonton, Whitemud Drive to Sherwood Park Freeway, 6 lane widening	$39M
Strathcona County, Sherwood Park Freeway to baseline Road, 4 lane widening	$28M
Alberta Transportation, 34 Street over Sherwood Park Freeway	$18M
Total	**$85M**

The cost estimate is summarized below in **Table 6-2**, tabulated per section, based on the grouping of construction items. A detailed breakdown of quantities, unit rates and additional assumptions is presented in **Appendix I.**

Table 6-2: 34 Street Segment Estimate Summary

ITEM		Whitemud to 56 Avenue	56 Avenue to 64 Avenue	64 Avenue to 68 Avenue	68 Avenue to 76 Avenue	76 Avenue to Sherwood Park Freeway	Sherwood Park Freeway to 92 Avenue	92 Ave to Development Access	Development Access to 98 Avenue	98 Avenue to Baseline Road		
Removals		$36,000	$37,800	$59,520	$39,000	$18,506	$37,800	$37,800	$37,800	$27,000		**$331,226**
Concrete Work		$257,241	$472,247	$409,322	$433,188	$290,400	$370,228	$300,384	$306,666	$214,976		**$3,054,653**
Earthwork		$616,866	$865,857	$1,335,197	$862,009	$739,473	$913,831	$728,899	$695,550	$486,925		**$7,244,608**
Roadwork		$1,670,230	$2,135,727	$3,428,794	$2,329,204	$2,190,667	$2,186,099	$1,621,954	$1,434,751	$1,202,756		**$18,200,182**
Structure		$0	$1,000,000	$0	$0	$10,480,000	$1,000,000	$0	$0	$0		**$12,480,000**
Drainage - CB & Leads		$197,800	$280,455	$204,000	$250,550	$170,000	$300,700	$188,000	$183,400	$201,800		**$1,976,705**
Streetlighting		$198,000	$210,000	$216,000	$216,000	$204,000	$210,000	$210,000	$210,000	$150,000		**$1,824,000**
Landscaping		$169,880	$226,700	$211,120	$208,820	$149,704	$192,160	$150,180	$148,420	$100,040		**$1,557,024**
Traffic Control		$269,850	$355,750	$521,200	$626,200	$945,300	$520,750	$220,750	$20,750	$266,250		**$3,746,800**
Utilities		$0	$120,000	$120,000	$120,000	$920,000	$1,720,000	$120,000	$920,000	$120,000		**$4,160,000**
Land Acquisitions		$445,300	$905,750	$792,500	$527,800	$715,500	$367,500	$527,500	$605,250	$355,000		**$5,242,100**
ESTIMATED COST		**$3,861,167**	**$6,610,286**	**$7,297,653**	**$5,612,771**	**$16,823,549**	**$7,819,068**	**$4,105,468**	**$4,562,588**	**$3,124,747**		**$59,817,297**
Traffic Control	*2%*	$77,223	$132,206	$145,953	$112,255	$336,471	$156,381	$82,109	$91,252	$62,495		**$1,196,346**
Engineering & Testing	*15%*	$579,175	$991,543	$1,094,648	$841,916	$2,523,532	$1,172,860	$615,820	$684,388	$468,712		**$8,972,595**
Contingency	*25%*	$965,292	$1,652,571	$1,824,413	$1,403,193	$4,205,887	$1,954,767	$1,026,367	$1,140,647	$781,187		**$14,954,324**
TOTAL ESIMATED COST		$5,482,857	$9,386,606	$10,362,668	$7,970,135	$23,889,440	$11,103,076	$5,829,764	$6,478,875	$4,437,141		$84,900,000

6.2 STAGING & IMPLEMENTATION

The infrastructure improvements along 34 Street are recommended to be implemented over three separate stages south of SPF and two stages north of SPF, likely in a series of sections through the corridor. The first two stages are graphically depicted along the corridor through both plan and typical section views within the drawing implementation staging referenced as **Figure 6-1**, arbitrarily shown between 84 Avenue and 92 Avenue (this implementation scenario applies through the corridor for widening to four lanes). It is also anticipated that a third implementation stage will be required for 34 Street, between Whitemud Drive and Sherwood Park Freeway, accommodating the likelihood of initially constructing a 4-lane section, before the ultimate 6-lane section is built.

It is likely that the upgrading of 34 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. Although this is one recommended option for implementation, a more detailed and comprehensive implementation / staging program should be finalized as development occurs along the corridor.

6.2.1 4-Lane Implementation Stage 1

This initial implementation stage would require the construction of the ultimate west side of 34 Street. The following are general highlights of the implementation strategies and projected work to be completed throughout the corridor within Stage 1:

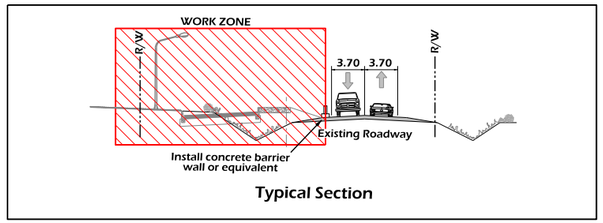
- Existing through lanes and left / right turn bays remain open as 2-way traffic (1 through lane in each direction) within existing pavement limits;
- Construction of the ultimate southbound lanes, including right turn bays, concrete medians and/or intersection islands (where allowable), underground 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 4-Lane Implementation Stage 2

A second implementation stage would require the removal of existing pavement and construction of the ultimate east side improvements along 34 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 transferred to the newly constructed, ultimate southbound lanes;
- Removal of the existing pavement, medians/islands and stormwater infrastructure (ditches), where applicable;
- Construction of the ultimate northbound 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.
- Placement of the final lift of pavement (ACO), may be left 50mm low and paved in later years after settlement has occurred;
- Final 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.



Typical Section

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

92 Avenue

34 Street

34 ST.

DITCH R/W

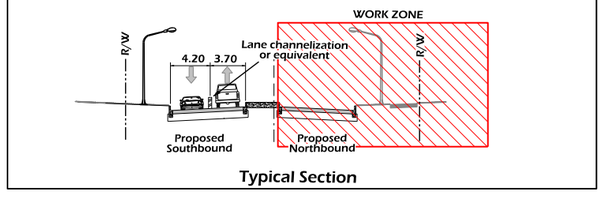
PIPELINE R/W

CITY BOUNDARY

PAVEMENT

BOOSTER STATION

IMPLEMENTATION STAGE 1



Typical Section

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

92 Avenue

34 Street

34 ST.

PIPELINE R/W

BOOSTER STATION

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 DURING CONSTR. = 50 km/h

McElhanney Consulting Services Ltd.

THE CITY OF Edmonton TRANSPORTATION SERVICES

STRATHCONA COUNTY

PROFESSIONAL ENGINEER ALBERTA RYAN T. BETKER

P ENG
DATE
PERMIT TO PRACTICE P6383

CONCEPT - SUBJECT TO PRELIMINARY SURVEY AND DESIGN

Figure 6-1
34 Street Arterial Widening
Whitemud Dr to Baseline Rd
Implementation Strategy

20m 0 40m

DRAWN: TD
REVIEWED:
DATE: 2013 05 17

PLAN NO.
Staging

6.2.3 Implementation Stage 3 - Interim 4-Lane Staging to 6-Lane Ultimate Cross Section (Whitemud Drive to Sherwood Park Freeway)

It is likely that the section of 34 Street between Whitemud Drive and Sherwood Park Freeway will not proceed directly to a six lane ultimate cross section; rather a four lane section will be built initially, with widening to six lanes occurring when required (or as funding is available). Based on this, several interim cross sections were developed to consider the widening, based on the following objectives:

- Minimize throw-away construction or investment;
- Develop as many of the ultimate cross section elements as practical, including multi-use trails, stormwater infrastructure, street lighting, etc.;
- Maintain efficient and safe operations;
- Create the ability to efficiently construct the widening;
- Balance costs on the investment, creating the best value for the dollar invested; and
- Maintain access to businesses through the corridor.

Through a costing review, the cost items identified at over a million dollars for the 34 Street corridor are: curb and gutter, rough grading and stripping, gravel base course, paving (both base and overlay), structures, underground stormwater, land acquisition, utility crossings, traffic signals, and street lighting. From an interim stage, these larger cost items present the best opportunity to provide value in the interim stage through the reduction or deferral. With a 4-lane section, there will be inherent savings on the grading, base course, paving, and structures. There are also limited savings between a 4-lane and 6-lane section for items such as traffic signals, street lighting, utility crossings and land acquisition. Based on this analysis, the items for consideration for deferral or reduction for an interim stage are curb and gutter work and underground stormwater.

Underground Stormwater: A cross section for 34 Street was considered that developed four travel lanes with a rural cross section, utilizing ditches on one or both sides of 34 Street that would remove most of the initial requirement for underground stormwater. The depth and width requirement for the ditches while maintaining safe side slopes for the ditches considerably expanded the overall right-of-way beyond the proposed right-of-way required for the ultimate urban cross section. Any cost savings from deferring the underground stormwater system was countered by a significant increase in cost and impacts for right-of-way.

Curb and Gutter: Any reduction in curb and gutter in an interim stage will reduce costs, but more importantly will avoid throwaway construction if any interim curb and gutter is avoided.

Based on these opportunities, two interim options were developed. Cross sections of the staging of these options are presented in **Figure 6-2** and **Figure 6-3**.

Option 1: The ultimate medians are constructed (curb and gutter with grass, islands at intersections) as well as the ultimate inside lane and ultimate middle lane. The ultimate outside or curb lane is not constructed; instead a small shoulder is built (in lieu of curb and gutter) that will provide sheet drainage across the roadway. The ultimate storm main is built as are the catch basin leads. The catch basin leads will be open drained (with trash guards) in a small swale and accommodate roadway drainage. When 34 Street is widened to six lanes, the swale is filled in, the catch basin leads extended to tie directly into the future constructed ultimate outside curb and gutter.

Option 2: This is an option where the outside curb and gutter is constructed, with the ultimate underground stormwater system. The two directional travel lanes would be developed off the curb and gutter, with a small inside shoulder provided. The median curb and gutter would not be constructed as future widening would occur to the median side.

These two options were compared based on criteria such as cost, constructability and traffic operations. This comparison is summarized in **Table 6-3,** which identifies the preferred option for each criterion. Option 1 is recommended as the preferred staging option.

Concept plans for this interim stage (Option 1) are presented in **Appendix A**, and shown in plan view on an aerial photobase in **Figure 6-4.**

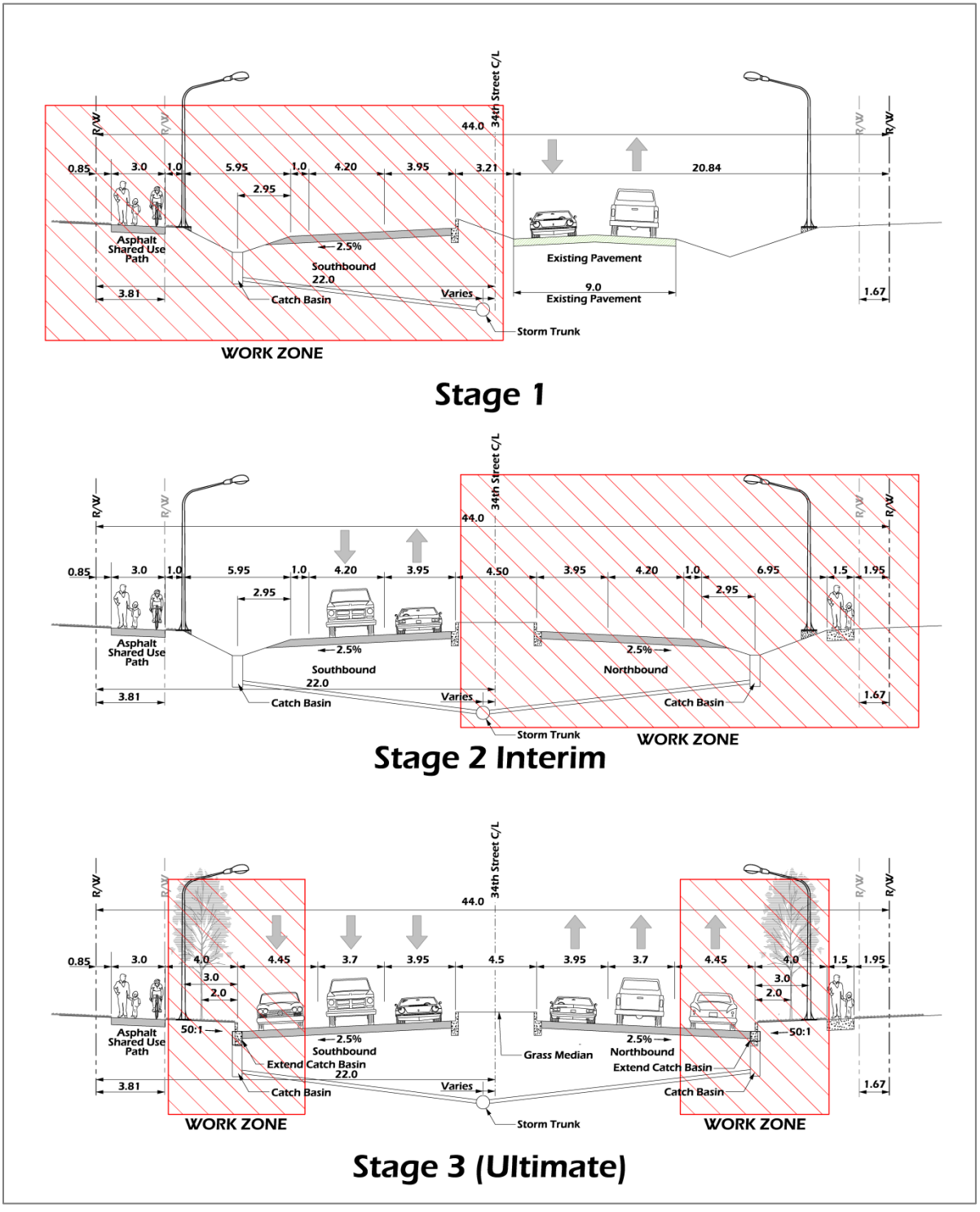


Figure 6-2: 6-Lane Staging Option 1

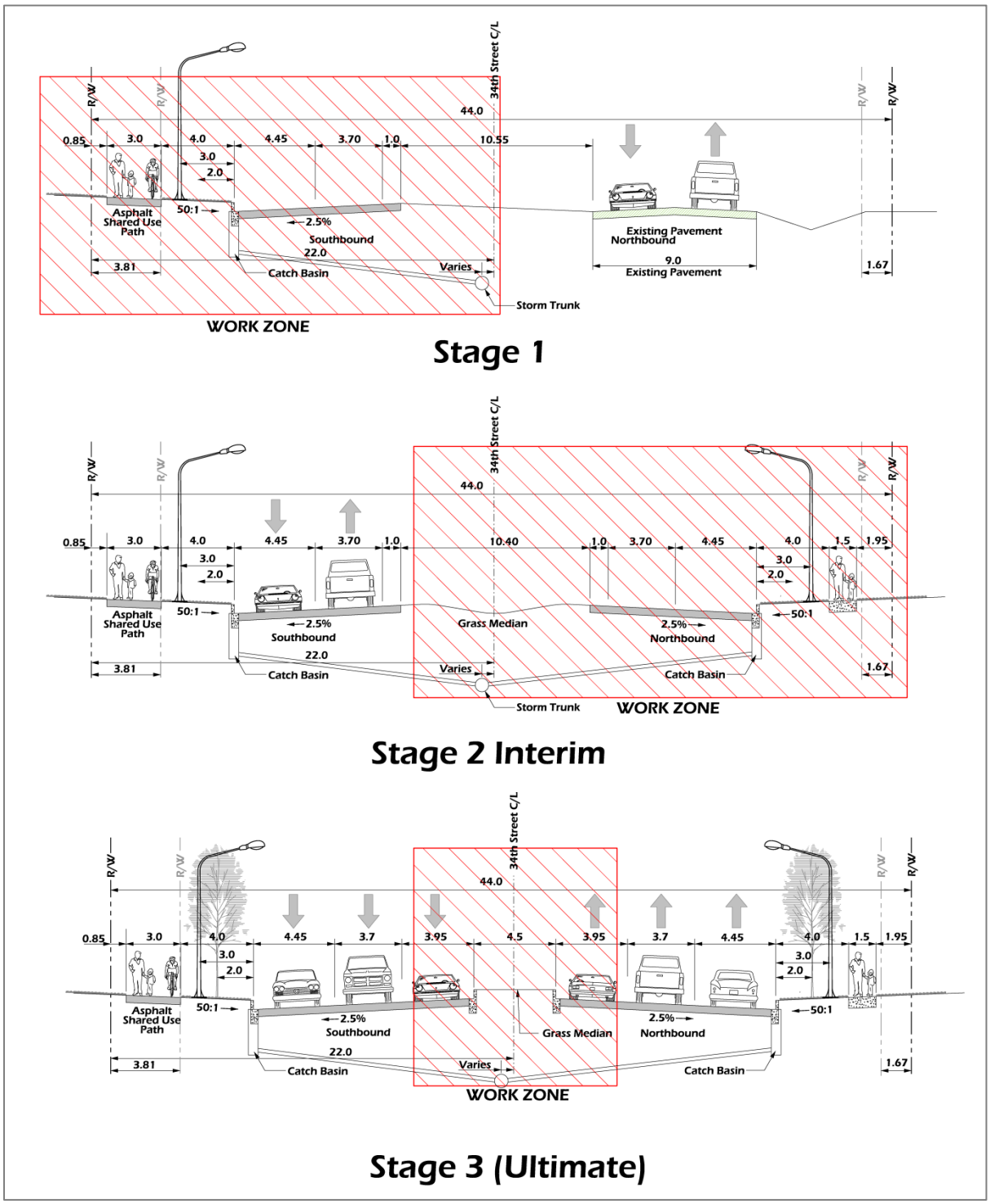
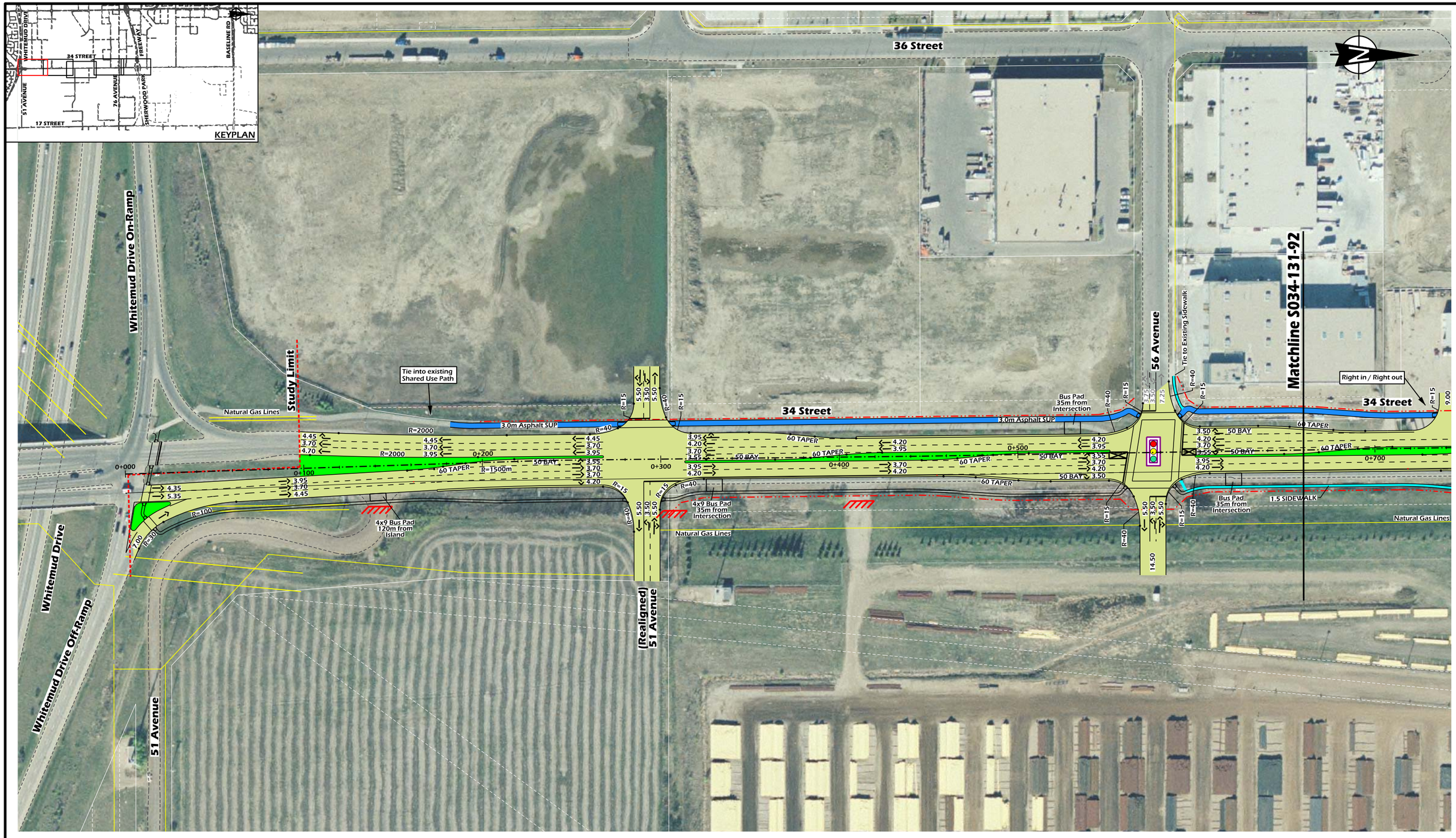


Figure 6-3: 6-Lane Staging Option 2

Table 6-3: Interim Staging Options Comparison

Criteria	Option 1 – Future widening to the outside	Option 2 – Future widening to the median	Comments
Initial Cost/ Investment	✓		Option 1 will have less costs with less grading, less curb and gutter and less underground stormwater construction
Curb and Gutter	✓		There is less curb to be constructed on the median side, as compared to the outside curb
Stormwater	✓		Option 1 saves the initial cost of the complete system, extending the CB leads with widening. Avoids median water storage
Throwaway Construction	✓	✓	Both options have minimal throwaway construction
Constructability	✓		Future widening to the outside provides an escape area on the outside as opposed to the median area where traffic borders both sides of the work area
Traffic Operations	✓		Option 2 creates the opportunity for vehicles to shortcut across the median during the interim 4-lane stage
Intersections	✓	✓	Widening to the outside allows for the left turn bays to be developed to ultimate configuration. Median widening can also allow for ultimate left turns with interim transitions
Business Access Impacts		✓	During construction, there will be minor impacts, as the accesses were determined during the initial construction



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

McElhanney
Consulting Services Ltd.

THE CITY OF Edmonton TRANSPORTATION SERVICES

STRATHCONA COUNTY

CONCEPT - SUBJECT TO PRELIMINARY SURVEY AND DESIGN

Figure 6-4

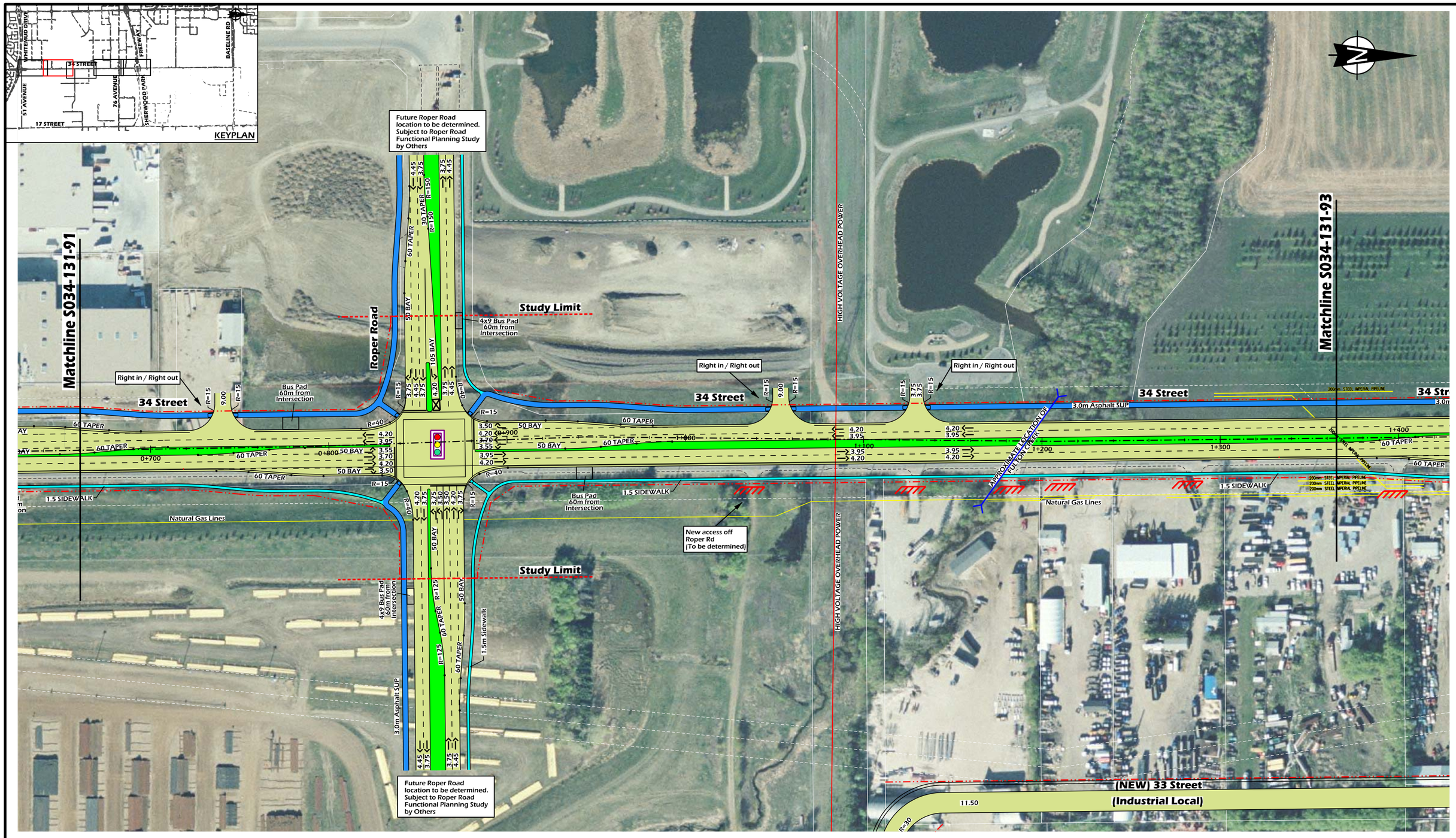
34 Street, Whitemud Dr to Baseline Road
4-Lane Interim Conceptual Alignment

20m 0 40m

DRAWN: TD
REVIEWED:
DATE: 2013 06 04

PLAN NO.
S034-131-91

34th Street 4 Lane Interim Conceptual Alignment.dgn Sheet 1 11/19/2013 9:36:34 AM



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

McElhanney
Consulting Services Ltd.

THE CITY OF Edmonton TRANSPORTATION SERVICES

STRATHCONA COUNTY

CONCEPT - SUBJECT TO PRELIMINARY SURVEY AND DESIGN

Figure 6-4

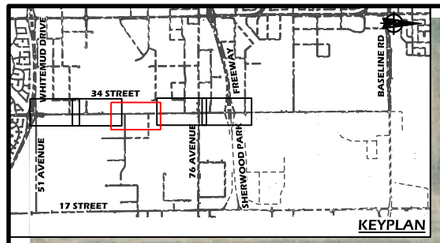
34 Street, Whitemud Dr to Baseline Road
4-Lane Interim Conceptual Alignment

20m 0 40m

DRAWN: TD
REVIEWED:
DATE: 2013 06 04

PLAN NO.
S034-131-92

34th Street 4 Lane Interim Conceptual Alignment.dgn Sheet 2 11/19/2013 9:39:11 AM



Matchline S034-131-92

Matchline S034-131-94

Note:
Access subject to approval with future development applications per latest City Of Edmonton access management guidelines.

Note:
Access subject to approval with future development applications per latest City Of Edmonton access management guidelines.

34 Street

3.0m Asphalt SUP

Bus Pad 35m from Intersection

1.5 SIDEWALK

Natural Gas Lines

64 Avenue (Industrial Collector)

68 AVENUE (Industrial Collector)

(NEW) 33 Street (Industrial Local)

Future 11.5m Industrial Collector to Tie into Existing (City Standard is 14.5m)

(NEW) 33 Street

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

CONCEPT - SUBJECT TO PRELIMINARY SURVEY AND DESIGN

Figure 6-4

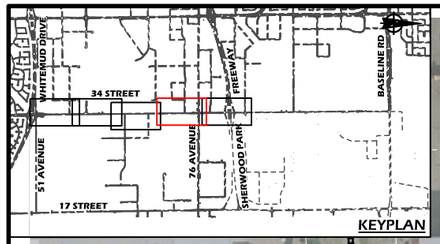
34 Street, Whitemud Dr to Baseline Road
4-Lane Interim Conceptual Alignment

20m 0 40m

DRAWN: TD
REVIEWED:
DATE: 2013 06 04

PLAN NO.
S034-131-93

34th Street 4 Lane Interim Conceptual Alignment.dgn Sheet 3 11/19/2013 9:39:55 AM



Matchline S034-131-93

Matchline S034-131-95

34 Street

3.0m Asphalt SUP

74 Avenue

76 Avenue

Study Limit

Valve Station

Bus Pad 35m from Intersection

1.5 SIDEWALK

Canadian National Railway

Note:
Access subject to approval with future development applications per latest City Of Edmonton access management guidelines.

4x9 Bus Pad 35m from Intersection

9.00

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

McElhanney
Consulting Services Ltd.

THE CITY OF Edmonton TRANSPORTATION SERVICES

STRATHCONA COUNTY

CONCEPT - SUBJECT TO PRELIMINARY SURVEY AND DESIGN

Figure 6-4

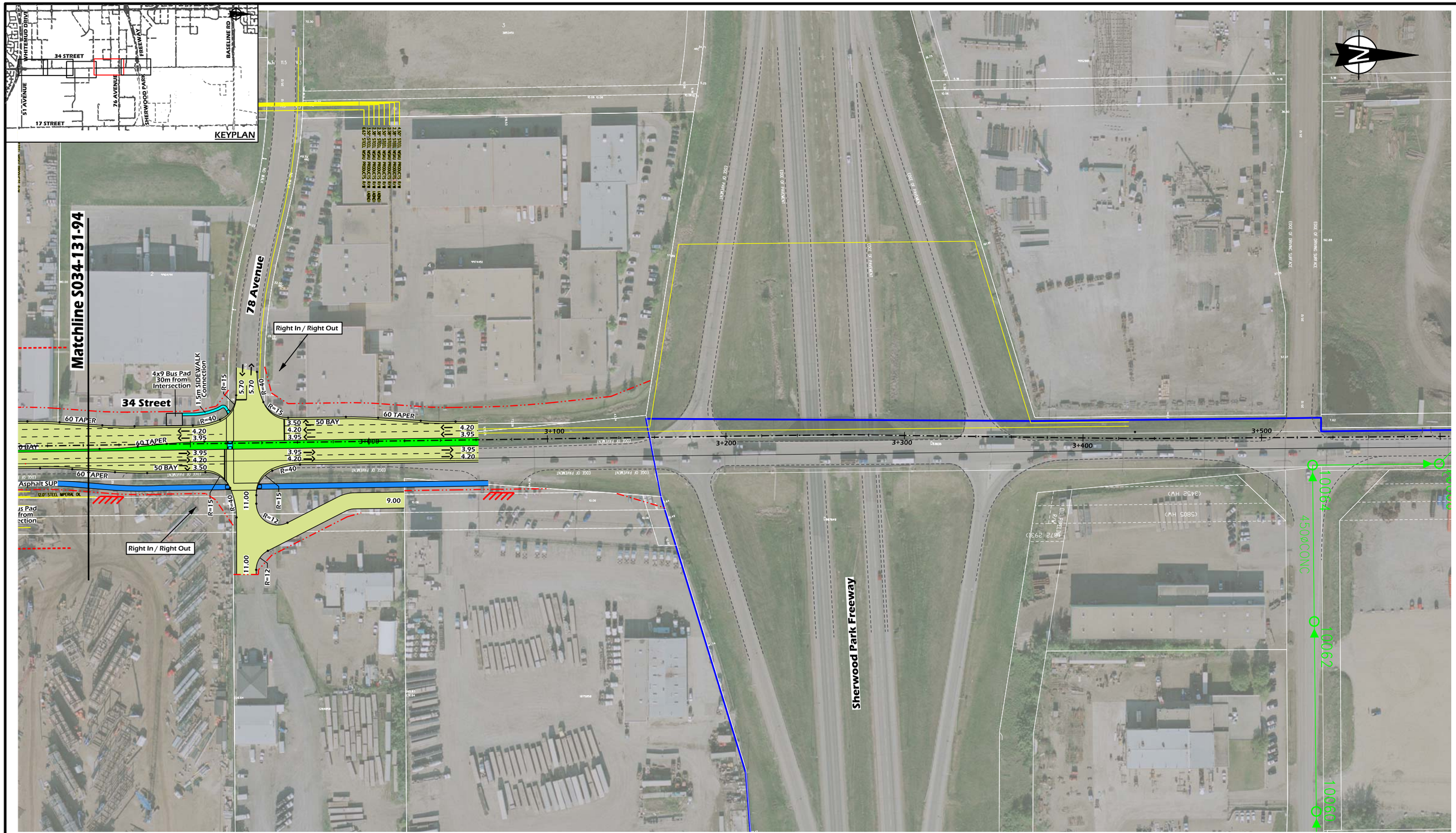
34 Street, Whitemud Dr to Baseline Road
4-Lane Interim Conceptual Alignment

20m 0 40m

DRAWN: TD
REVIEWED:
DATE: 2013 06 04

PLAN NO. S034-131-94

34th Street 4 Lane Interim Conceptual Alignment.dgn Sheet 4 11/19/2013 9:41:47 AM



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CONCEPT - SUBJECT TO PRELIMINARY SURVEY AND DESIGN

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20m 0 40m

DRAWN: TD
REVIEWED:
DATE: 2013 06 04

PLAN NO.
S034-131-95

34th Street 4 Lane Interim Conceptual Alignment.dgn Sheet 5 11/19/2013 9:42:38 AM

6.3 INTERIM 51 AVENUE INTERSECTION

With the likelihood of 34 Street being first constructed to a four-lane cross section as opposed to the six-lane ultimate section, the future intersection of 51 Avenue was considered for an interim option. The intersection of 51 Avenue and 34 Street will be realigned roughly to 200 metres north of Whitemud Drive as part of the currently ongoing Maple Ridge development; however, this intersection is close enough to Whitemud Drive to impact traffic operations at the Whitemud Drive interchange. Should the intersection be retained for a six-lane cross section, it will require signalization, which would result in five signalized intersections between Whitemud Drive and Roper Road. The delays at this intersection, as well as Whitemud Drive, could spill queues into the other intersections and create an unacceptable Level of Service. There is, however, the option to create the intersection as part of a four-lane cross section that initially (depending on construction timing) will not require signals, as gaps will be created from signals at Whitemud Drive and at 56 Avenue. This interim intersection is presented in **Figure 6-5**, along with the ultimate design. It is recommended to implement the 51 Avenue intersection as an interim stage in the 34 Street corridor as follows:

1. With widening to four lanes, the existing 51 Avenue should be realigned to the north (as recommended in the Maple Ridge Area Structure Plan);
2. The intersection can be constructed as an interim measure, including providing access to the east and to the west of 34 Street;
3. As traffic grows on 34 Street, this intersection may begin to function with a diminishing level of service. At this point, the intersection should be either signalized or preferably the median closed to create a right-in / right-out intersection;
4. When 34 Street is widened to six lanes, the intersection / access to the west should be removed as it will conflict with the right-turn ramp for the southbound to westbound movement at the Whitemud Drive interchange; and
5. With the six-lane widening, the 51 Avenue intersection to the east will become a right-in / right-out, with all-directional movements maintained at 56 Avenue for the area.

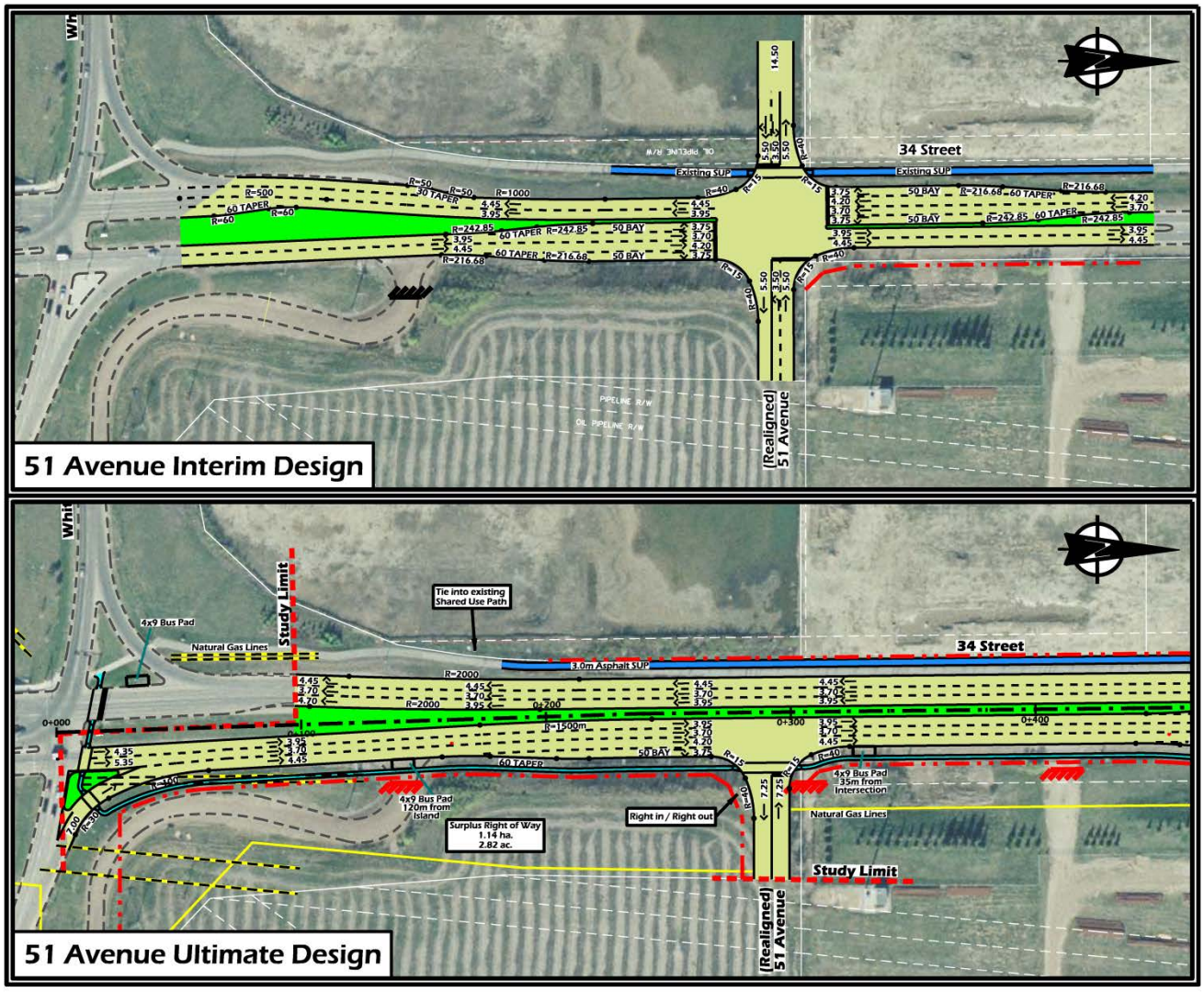

Figure 6-5: Interim & Ultimate 51 Avenue

6.4 NEXT STEPS AND 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, unknown funding and future development. Future work is suggested to include (but is not limited to):

- Survey;
- Utility investigation, hydrovacing and survey;
- Detailed geotechnical reporting, including drill / core samples and test pits;
- Detail design of rail crossings and coordination with rail companies;
- 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 and Gold Bar Creek Crossing, including wildlife passage;
- Review of realignment possibilities for Gold Bar Creek adjacent to 34 Street;
- Detailed Fish Habitat Assessment (Fulton Creek, Gold Bar Creek);
- Review of the Risk Registry;
- Property acquisition;
- Stakeholder involvement (information sharing);
- Crossing permits (major and minor utilities);
- Relocation of aerial utilities;
- Relocation of the ATCO gas lines (west side of 34 Street);
- Cost estimates developed from survey and three dimensional modeled quantities; and
- Pavement structures.

6.5 RISK REGISTRY

A Risk Registry was developed for 34 Street, which identifies risk items, possibility and severity, and any mitigation measures. Many of the risk items will carry into future phases of the study. Of note, land acquisition is currently scored as one of the highest risks for the corridor.

The Risk Registry for 34 Street is presented in **Figure 6-6.**

Figure 6-6 - Risk Registry: 34 Street Planning (Whitemud Drive to Baseline Road)

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				HIGH	
4					
3			MEDIUM		
2		LOW			
1					

Score	Severity
1	• Insignificant or negligible impact on Project or Schedule • Minor design detail changes and minor impact on Project
2	• Minor impact accomplishing Project objectives or delay within Schedule • Minor design detail changes applied extensively or to multiple locations
3	• Significant impact accomplishing Project objectives or delay within Schedule • Moderate detail changes applied throughout or to multiple locations.
4	• Major impact accomplishing Project objectives or delay within Schedule - Fundamental re-work required (e.g., Project re-design or re-approval)
5	• Redefine Scope of Work / Mitigate Risk before proceeding

McElhanney

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 April 4, 2013 by Ryan Betker

No.	Nature of Risk	Risk Type	Discussion	Likelihood	Severity	Risk	Mitigation	Responsible Party	Comments	Status
1	Water supply/ utility disruption	U	Interuption of water services to Strathcona County, should the line crossing 34 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)	3	1	3	All information, make a recommendation that may include longer time horizons to protect for right-of-way. Traffic is estimated based on conservative estimates, for a full build out along the corridor	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 motioring 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 motioring 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	1	3	3	City and County team members to disseminate information to political interests	City/County Staff	Must be momitored for action by Project Team, depending on issues that flare up	Ongoing
8	Alberta Transportation	A	AT has jurisdiction over 34 Street and Sherwood Park Freeway Interchange	2	2	4	Discussions with AT make sure plans are consistent with opportunity to discuss with Alberta Transportation - 34 Street planed over Sherrwood Park Freeway	Project Manager / City / County		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 incure access change recommendations, could lead to political reluctancy to approve plans	4	2	8	Communication with landowners, access management plans in place to transition access changes with development/redevelopment. Public Involvement did not raise it as a major issue.	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	4	3	12	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	Development / Re-development may mitigate some of acquisition over the next several years	To be addressed
14	Cross section consistency	M	Cross Sections and Design Criteria should be consistenat across the entire 34 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

The public involvement for 34 Street was based on the City of Edmonton's *Involving Edmonton* initiative, as well as Strathcona County public engagement policies, including a focus on gathering input and feedback from key internal and external stakeholders during the planning process. Online surveys were used early in the project to gather input and feedback from interested citizens and business owners along the corridor. A mail-out was sent to business owners in the area, while road side signs and website advertising were used to inform the public about the surveys, which were live from November 15 to December 14, 2012. A public event was also held on March 6, 2013, to share the input gathered from the surveys as well as the resulting recommendations and plans for the corridor. See **Appendix J** for public involvement materials.

Additional correspondence was achieved through ongoing availability of the Project Team to the public, who were accessible through email or telephone as required. In addition to public consultation, there were also ongoing meetings and discussion with internal (City and County staff) and other key stakeholders such as Waiward Steel and Northern Industrial Carriers. Public consultation details and results are documented in a Supplementary Stakeholder Report.

7.1 PUBLIC SURVEY

Web based surveys were available on the Strathcona County website from November 15 to December 14, 2012, intended to gather information and project input from both the public and affected business / land owners along the corridor. The public survey was open to all and advertised online and through road side signs along the corridor, while the business survey was password protected and directed at specific individuals, who were informed through a mailout in November.

Common issues / responses included:

- Heavy traffic volumes / congestion;
- Large number of oversize / overweight vehicles;
- Lack of roadway maintenance and servicing;
- Issues with traffic operations and signal timing;
- Concerns for road safety and security;
- Lack of access to public transportation and pedestrian/cyclist facilities; and
- Impacts to natural areas.

7.2 PUBLIC EVENT

A Public Event was held on March 6, 2013, at the Sawmill Banquet Center from 4:00 p.m. to 8:00 p.m. Display boards were used to introduce the project and summarize the comments from the public and business surveys, as well as the resulting design decisions. Additionally, a large aerial photo of the corridor was displayed in the center of the room with a plan view of the corridor improvements. Fact sheets and event questionnaires were also handed out to all attendees to obtain feedback.

Common issues/responses included:

- Access concerns;
- Implementation / construction timing;
- Road condition and lack of servicing along the corridor; and
- Traffic congestion and operational issues.

8 CONCLUSIONS & RECOMMENDATIONS

The widening of 34 Street between Whitemud Drive and Baseline Road will accommodate the anticipated traffic volume growth beyond 2044 to a full build-out scenario for the corridor. This widening will also provide transit, pedestrian and cycling facilities along 34 Street, which is a key component of the transportation policies of both the City of Edmonton and Strathcona County. Cross sections for 34 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 as much as practical. There is an identified need for industrial land within the Capital Region; it is expected that private development will largely dictate the timing of the 34 Street improvements, with support from both jurisdictions, and that this planning study will provide the template for the 34 Street corridor.

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 they could be revised based on approvals from the City of Edmonton and Strathcona County.

An access management plan was developed to balance traffic movement with access to businesses and land. Although 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 34 Street directly may be considered for specific use, including the use of locked gates, mountable curbing and removable fencing.

Both the Fulton Creek crossing, Gold Bar Creek crossing and associated wetland areas are important ecological resources and identified opportunities for wildlife passage. Although, as part of this planning study, both an environmental overview and wildlife passage review were completed, additional environmental studies (screening reports) will be required in future project phases.

Based on the completed work, outcomes and results of the 34 Street Functional Planning Study, it is recommended that:

- The plans and profiles (**Appendix A**) of the ultimate 34 Street be protected for implementation as funding becomes available or as development occurs;
- The access management plans be protected for implementation as 34 Street is improved or as opportunity occurs to provide for the plans, based on re-development;
- The network improvements for 51 Avenue to 56 Avenue, 64 Avenue to 68 Avenue, and 74 Avenue to 76 Avenue be considered for future implementation and inclusion within developer plans;
- Franchise utilities, most notably ATCO Gas, be relocated on an opportunity basis to avoid conflicts with the ultimate 34 Street plans;
- Future land use zoning and development plans be updated to reflect this functional planning study;
- Future developments prepare new, or update previous, Traffic Impact Assessments as required, based on this functional planning study;
- If required in stages, the implementation of the 34 Street improvements should occur in a sequential order, avoiding multiple transitions between two, four, or six lanes;

- A four-lane interim phase for 34 Street, between Whitemud Drive and Sherwood Park can be developed based on the presented implementation strategy;
- A functional planning study (concept plans) be developed for Roper Road to confirm the location of the 34 Street and Roper Road intersection as well as network impacts;
- An interchange planning study for 34 Street and Sherwood Park Freeway be undertaken by Alberta Transportation to confirm the configurations and recommendations of the sections of 34 Street over Sherwood Park Freeway identified within this study;
- 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.);
- The Regional Travel model for the Capital Region be updated to reflect the recommended plans for 34 Street; and
- The City of Edmonton and Strathcona County acquire (through dedication, subdivision, or acquisition) the future land required for the widening of 34 Street.