VARSITY
Land Use Study

THE CITY OF
CALGARY
LAND USE PLANNING & POLICY

VARSITY

Land Use Study

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Use Study

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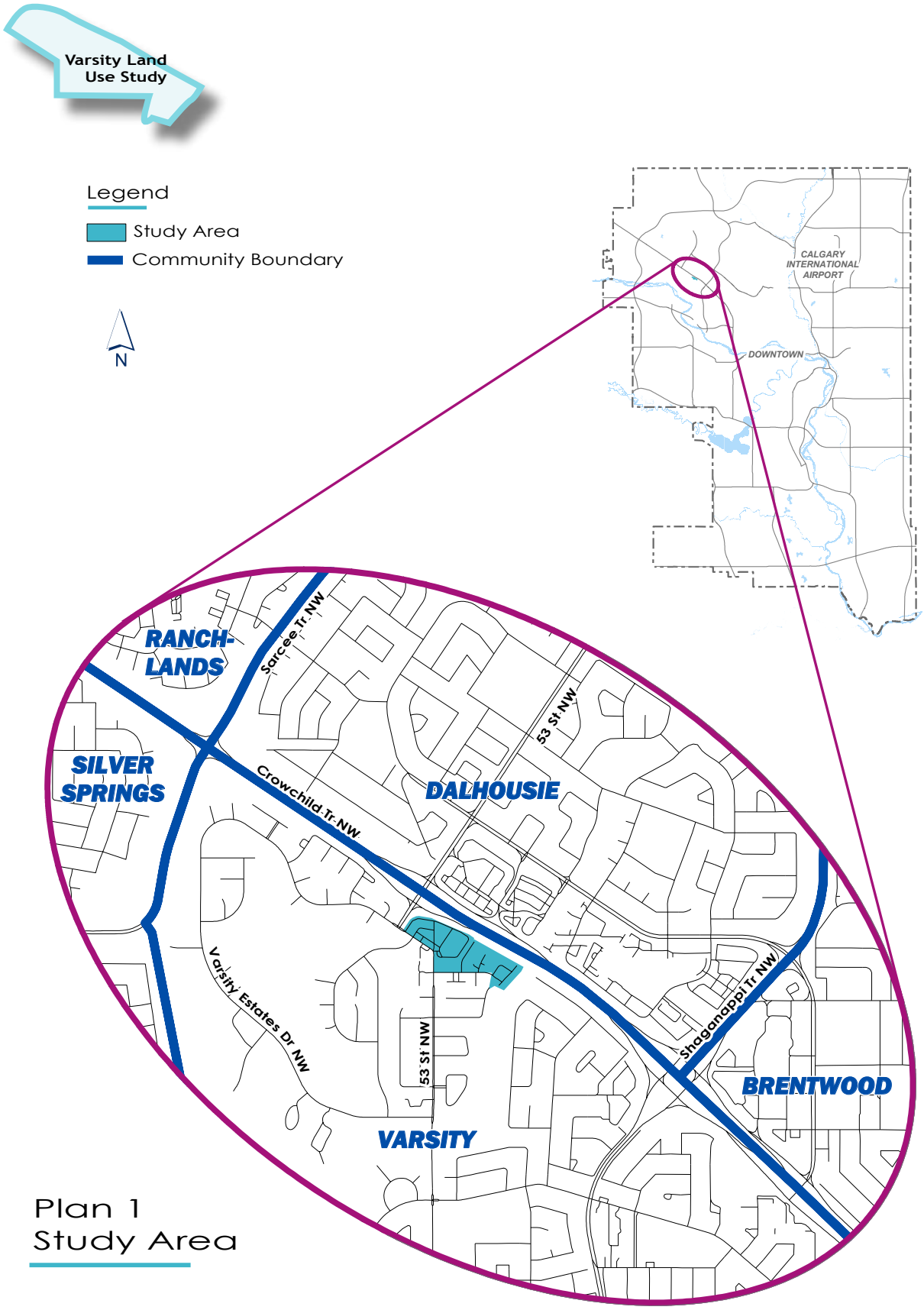
Background & Policy Context



Plan 1
Study Area

Lands South of Dalhousie LRT Station

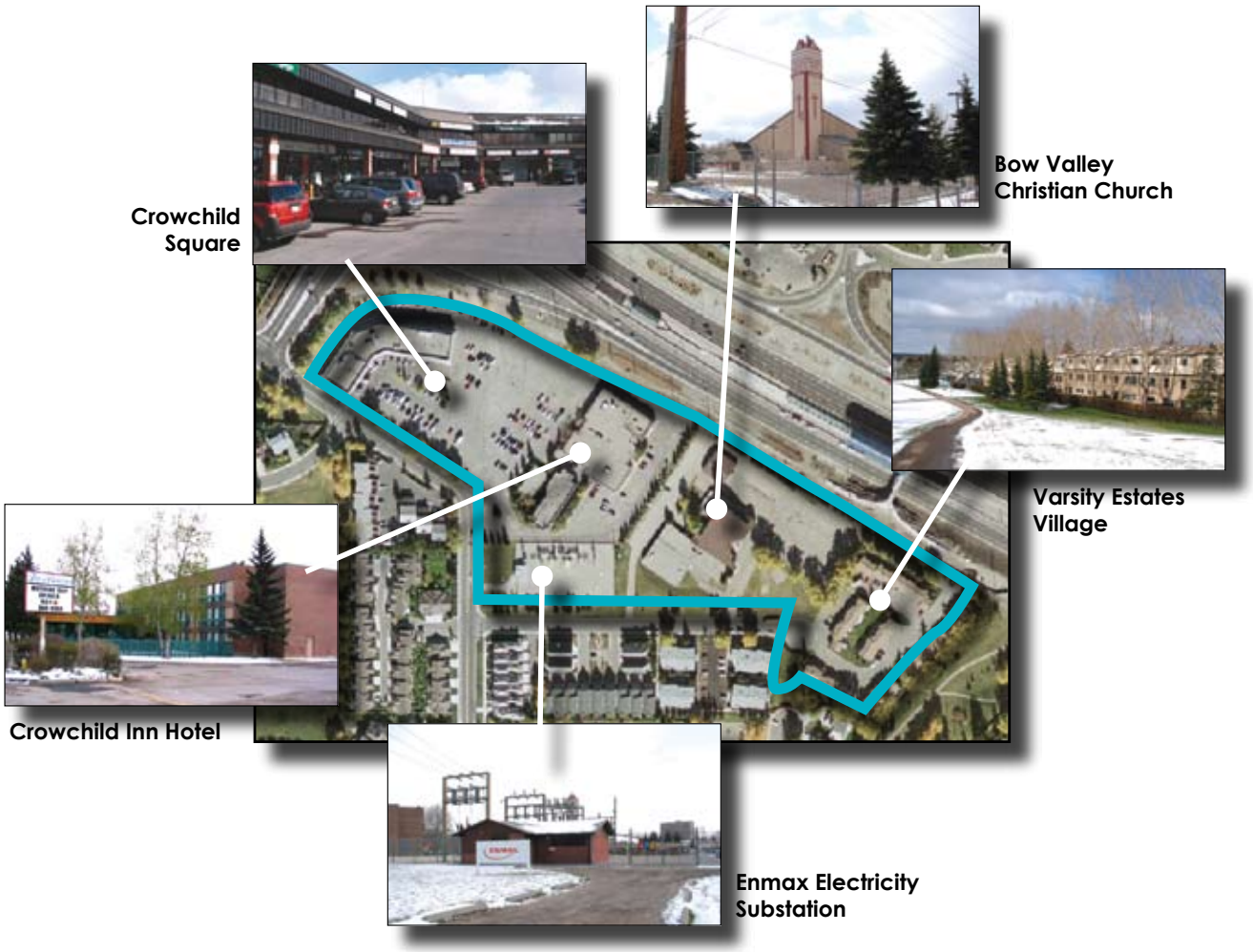
THE CITY OF CALGARY

O:\Plan\Operations\4748 Lands South of Dalhousie LRT Station\StudyArea.mxd

Part 1 Background & Policy Context

1.0 Site Location and Context

The study area covers approximately 6 hectares/16 acres of land located within the established community of Varsity and is immediately south of Crowchild Trail and the Dalhousie LRT station. The site is bounded by Crowchild Trail NW, 53 Street NW, Varsity Estates Drive NW, 53 Avenue NW and a park. Current uses within the study area include a shopping mall, a hotel, a church, an electricity substation and some townhouses.



Land uses adjacent to the study area south of Crowchild Trail NW include single detached residential, medium density multi residential (townhouses), open space/park and recreation (golf and country club). Land uses north of Crowchild Trail NW include the Dalhousie LRT Station, a park and ride, a shopping centre, medium density multi residential and single detached residential.

The study area is characterized by large underdeveloped parcels of land with poor connections through to the LRT Station. The area has the potential to become a strong focus for the community through the provision of new public spaces, a range of housing choices, greater walkability and increased amenities for the neighbourhood. The study area also offers a clear opportunity to further citywide objectives including creating opportunities for new jobs close to where people live, sensitively increasing housing densities, increasing population near existing communities and commercial services and reducing vehicle trips.

Full development of the study area also presents challenges. The foremost of these is the potential traffic impact of development on 53rd Street south of Varsity Estates Drive to 40th Avenue. Commercial development in the study area could also be limited by the existing shopping centre located north of Crowchild Trail NW. Future development in the study area must be sensitive to the context of the surrounding community, which is primarily low to medium density residential south of Crowchild Trail NW.

1.1 Study Purpose

Recognizing the close proximity of the Dalhousie LRT Station, this Land Use Study has been prepared to ensure:

i) Future land uses provide a positive addition to the community;

ii) The existing infrastructure including roads and amenities are adequate for any future development;

iii) Future land uses are compatible with the surrounding land uses; and

iv) City of Calgary objectives, for example, smart growth and transit-oriented development are realized in developments within the study area.

1.2 Authority of the Study

The Varsity Land Use Study is not a statutory plan authorized under the Municipal Government Act. Nevertheless, it has undergone a public review process and has been approved by City Council following a Public Hearing. It therefore represents City Council's views with respect to the future planning and development of the study area and must be taken into account by the Approving Authority and the public when reviewing subdivision, land use and development applications within the study area.

1.3 Interpretation of the Study

Any significant change to the Study's maps or policies requires an amendment to the Study, with a non-statutory public hearing which will be advertised in accordance with City policies. A proposed study amendment shall be circulated for comment to the community association.

The maps and policies within the adopted Study are intended to be complied with relative to decisions on land use redesignations, subdivision plans and development permits. *The boundaries of all policy areas, the location of any symbols shown on a map and all quantities and figures contained within the adopted Study are not intended to be absolute*

and may be varied where the variance is considered to be minor and consistent with the general intent of the Study. In addition, a variance to policies will be permitted where, in the view of the Approving Authority, the variance is permitted to be:

- minor and does not compromise the achievement of the intent of the Study;
- necessary to address unique circumstances that would otherwise render compliance impossible or impractical; and
- site-specific and does not result in the policy being unworkable in other situations.

All illustrations, sketches, and pictures are intended to illustrate concepts included in the Study and are not an exact representation of an actual development. They are to serve solely as examples of what might occur after implementation of the Study's policies and guidelines.

1.4 Public Process

This study has been prepared with input from land owners, the Varsity Community Association, several community volunteers and residents near to the study area. Feedback from public meetings has also been taken into account in preparing the study.

The main issues identified through the public process are as follows.

i) Future development needs to be consistent with the Transit Oriented Development Policy Guidelines (Approved December 2004).
ii) Appropriateness of uses.
iii) Visual impact of the multi-storey development on adjacent residential areas.
iv) Traffic impacts of intensification on 53 Street NW.
v) Bike and pathway connections.
vi) Provision of sufficient parking.
vii) Ensuring pedestrian oriented development.
viii) Vehicle access into the study area.
ix) The study area needs to be more connected to the Varsity community.
x) Provision of amenities to the Varsity community for example, a local commercial area, public gathering place and a kiss and ride drop off point to service the Dalhousie LRT station.
xi) Contribution to an attractive entranceway into Varsity.

1.5 Policy Context

1.5.1 Transit Oriented Development Policy Guidelines (Approved December 2004)

The Transit Oriented Development Policy Guidelines provide direction for the development of areas typically within 600 metres of a Transit Station (as indicated in Plan 2, the study area is within 600 metres of Dalhousie Station). This type of development creates a higher density, walkable, mixed-use environment within station areas in order to optimize use of existing transit infrastructure, create mobility options for Calgarians, and benefit local communities and city-wide transit riders alike.

The Transit Oriented Development Policy Guidelines contain six key Policy Objectives that have been applied in the preparation of this study.

1. Ensure transit supportive land uses

   Ensure land uses support ridership by generating high levels of transit use and provide a mixed-use activity node for the local community and city-wide transportation network benefits. This provides the local community with increased services, employment, and housing options within their community.

2. Increase density around Transit Stations

   Increase density around all Transit Stations to support high frequency, rapid transit service and provide a base for a variety of housing, employment, local services and amenities that support a vibrant station area community.

3. Create pedestrian-oriented design

   Create convenient, comfortable, direct and safe pedestrian linkages to and from all Transit Stations in order to support a walkable station area and promote the use of transit.

4. Make each station area a "place"

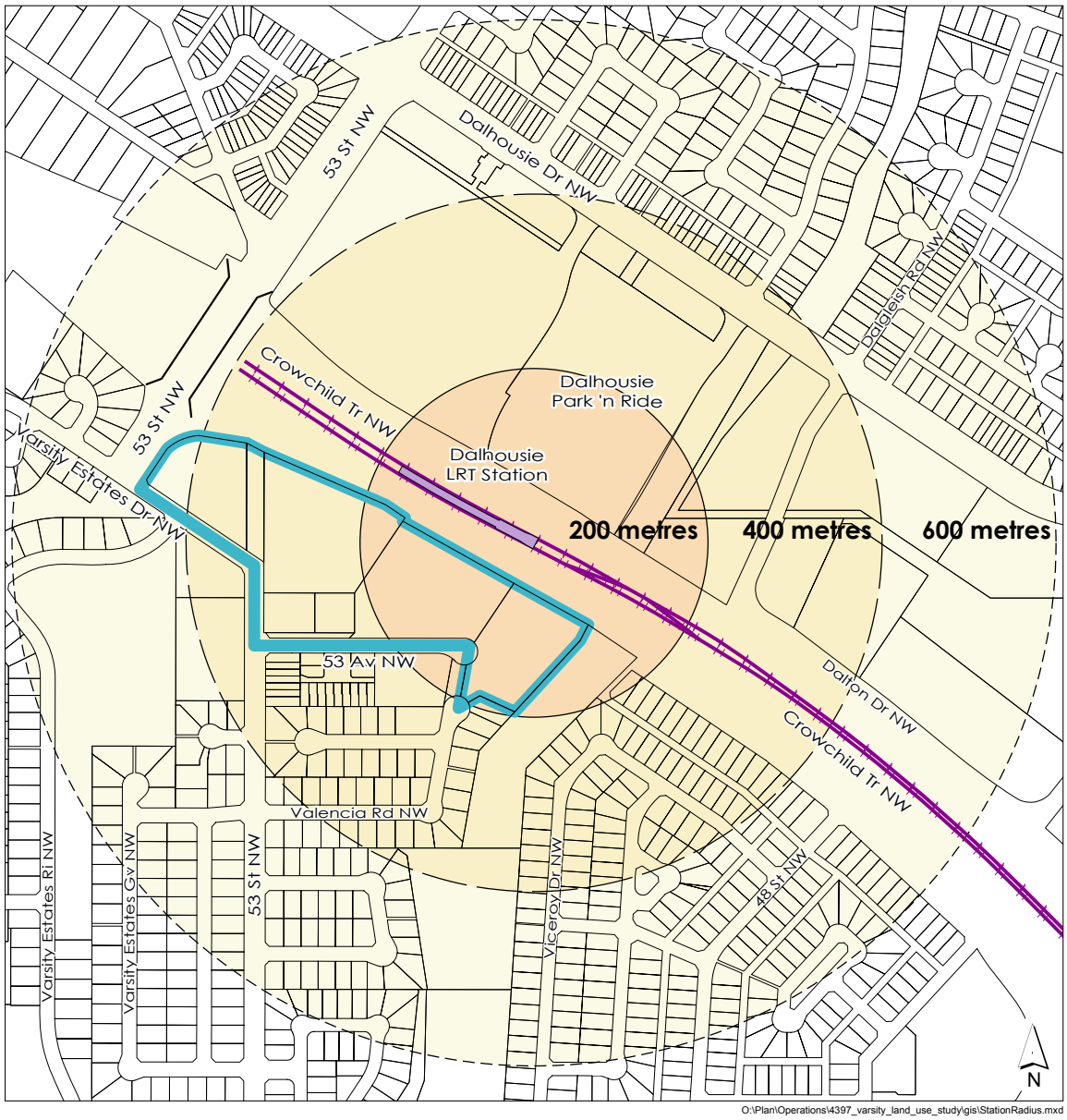
   Each station area should be developed as a unique environment, transforming a utilitarian transit node into a community gateway and a vibrant mixed-use hub of activity.

5. Manage parking, bus and vehicular traffic

   Accommodate transit bus and private automobile circulation and parking needs, while creating a comfortable pedestrian environment.

6. Plan in context with local communities

   Transit Oriented Development (TOD) should benefit the local community. Through consultation with local communities, TOD should provide a wide range of supporting benefits for local communities, including increased uses and services, a variety of housing, increased transportation options, and a more walkable environment and community amenities.



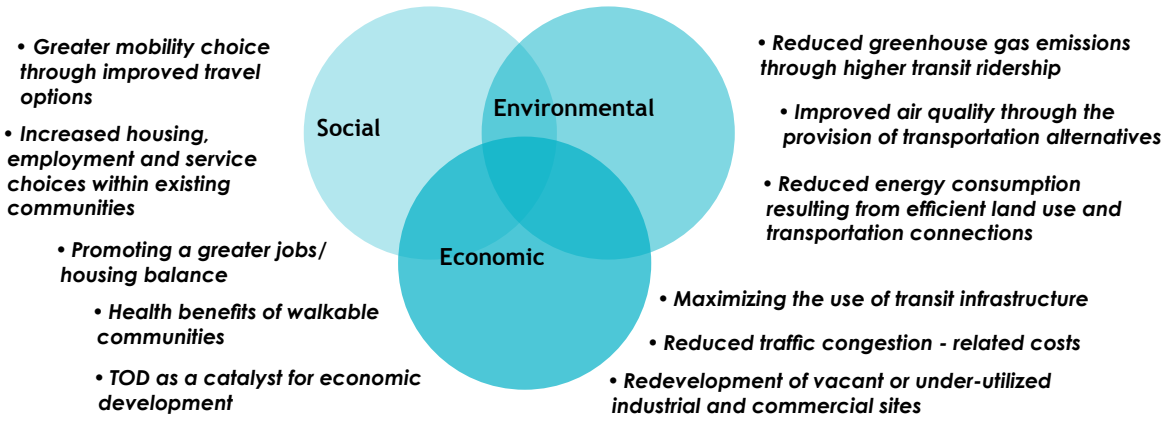
Legend

- Study Boundary
- 200m Radius
- 400m Radius
- 600m Radius
- Dalhousie Station
- LRT Track

PLAN 2
L.R.T. Station Radius Zones

1.5.2 Triple Bottom Line

Transit Oriented Development seeks to implement a more sustainable approach to urban planning and land use by adopting a "Triple Bottom Line" approach. This helps Calgary achieve some of its environmental, economic and social objectives as detailed below.



1.5.3 Smart Growth

Smart Growth has become an increasingly important approach in current planning practice. It is a term to describe ways of developing more sustainable cities by supporting economic development initiatives, creating healthy environments and strengthening communities. Calgary City Council has endorsed "Advancing Smart Growth" as a key priority for The City of Calgary. Some of the leading Smart Growth principles that guide or promote TOD include the following:

- Create walkable neighbourhoods
- Foster distinctive, attractive communities with a strong sense of place
- Encourage transit use
- Provide a variety of transportation choices
- Mix land uses
- Strengthen and direct development toward existing communities
- Create a range of housing opportunities and choices

Part 2

Vision & Principles

Part 2 Vision and Principles

2.0 Vision Statement

The study area (as indicated in Plan 1 on page 6) has developed into a pedestrian friendly medium to high density mixed use area which provides a range of transit supportive uses including multi-family residential, employment, local retail and service uses. The area is characterized by:

- Unifying elements that emphasize important buildings through distinct design features and a range of local shops, services and gathering places.
- Pedestrian pathways and bikeways running through the site and linking the study area to surrounding communities, regional pathway/bikeway routes, and the Dalhousie LRT Station.
- Landscaping treatment, street lighting, building orientation and design that enhances public safety and comfort.
- The stepping down of building heights, ensuring shadowing impacts are minimized and building scale is compatible with the existing community.
- A mix of uses which ensures that the traffic generated is more spread throughout the day.
- Access into and out of the study area is safe and efficient.

2.1 Principles

Founded on the Vision, guiding principles for the area are:

(1) Provide a clear sense of place for the study area for both transit users and local residents.

(2) Create a safe and comfortable environment for pedestrians.

(3) Create an active, compact, mixed use area near the Dalhousie LRT Station.

(4) Provide more housing opportunities for a range of income levels.

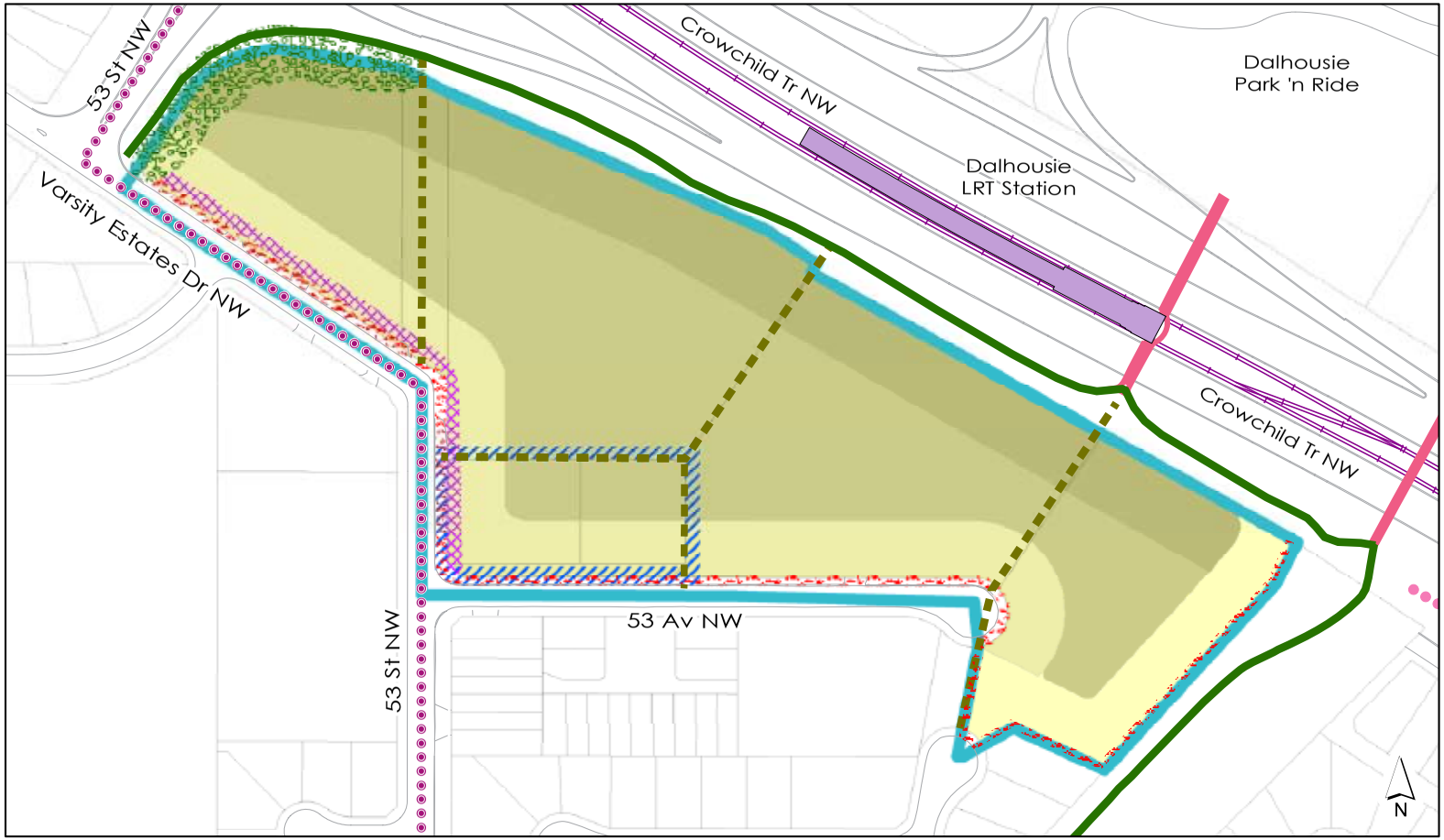
(5) Minimize the impact of higher density buildings through attention to massing, design and interface conditions.

(6) Provide an attractive entranceway to Varsity.

(7) Maintain adequate access and safe roadways for the community.

Part 3

Future Land Use Concept & Policies



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Legend

- Study Boundary
- Dalhousie Station
- LRT Track
- Existing Pathway
- Pedestrian Overpass
- Preferred Primary Pedestrian Routes
- Proposed Bicycle Route
- Existing Wide Curb Lane or Bicycle Lane
- *Low Density Mixed Use Area - Up to 3 Storeys.
- *Medium Density Mixed Use Area - Up to 4 Storeys.
- *Medium to High Density Mixed Use Area - Up to 8 Storeys.
- *Medium to High Density Mixed Use Area - Up to 12 Storeys.
- Buffer treatment to enable transition to higher density.
- Landscaping and signage to contribute to an attractive entranceway to Varsity.
- Buffer / Screening treatment required around Enmax substation.
- Provide land and setback buildings along Varsity Estates Dr NW to enable a tree planted boulevard

***Note: The areas indicating different densities are conceptual and the boundaries may vary.**

PLAN 3
Land Use Concept

Varsity Land Use Study

THE CITY OF CALGARY

Varsity Land Use Study

Part 3 Land Use Concept & Policies

3.0 Future Land Use Concept

Future developments within the study area (as indicated in Plan 3) should support a medium to high density mixed use environment. Uses within the categories of multi residential, employment, local retail and support services are considered to be appropriate. The mix of uses should include a variety of types of residences, including townhouses, condominiums and apartments. In addition to residences, uses should include shops and businesses that will be open during the day and that can provide job opportunities for neighbourhood residents, as well as restaurants and entertainment establishments that will attract night time activity. It is preferred that employment and residential development provide some opportunity for local retail uses to service nearby communities, residents, employees and transit users. To ensure that the traffic generated is more evenly distributed throughout the day, no one use should physically dominate the whole of the study area. Furthermore, the challenges presented by environmental capacity guidelines along 53rd Street South of Varsity Estates Drive should be balanced with the development densities required to support Transit Oriented Development.

The height and density of development recommended for the study area steps down from the northern boundary of the area towards the existing community (Plan 3). Building heights are greatest closest to the Dalhousie LRT station in order to allow for the desired intensity of development while minimizing the impact on the surrounding community. The highest densities have also been located closest to the LRT Station as this is the location with the best access to transit. This stepping down of development allows a transition to the lower density development which is compatible and in character with the existing community.

3.1 Implementation

Implementation of the land use concept will occur through owner initiated land use redesignations, at which time there will be further opportunities for public input. As the Study is implemented, actual developments – based on property line surveys, more detailed site information and level of design, and current market conditions – may differ from those shown here, but should follow the intent of the concept and policies.

3.2 Land Use Policies

The policies in this section should be used in conjunction with the concepts included in the rest of the Study as well as the Transit Oriented Development Guidelines (Approved December 2004) in assessing planning applications[1].

3.2.1 *Land Use*

Policy 1 - Land uses may vertically mixed. For example, office and /or residential over local commercial or different land uses in separate buildings located throughout the planning area.

Policy 2 - The Transit Oriented Development Policy Guidelines (Approved December 2004) should be used to determine appropriate transit-supportive land uses as well as those non transit-supportive land uses which are not suitable for the study area. Exceptions to the Transit Oriented Development Policy Guidelines include private schools and churches which are considered appropriate, and light industry which should not be permitted in the study area.

3.2.2 *Building Height and Density*

Policy 3 - For each individual parcel a maximum floor area ratio (FAR) and a minimum residential density in units per hectare has been recommended as shown in Figure 1. These densities are based on the height limits and density areas of the Land Use Concept and will encourage transit supportive densities in the study area.

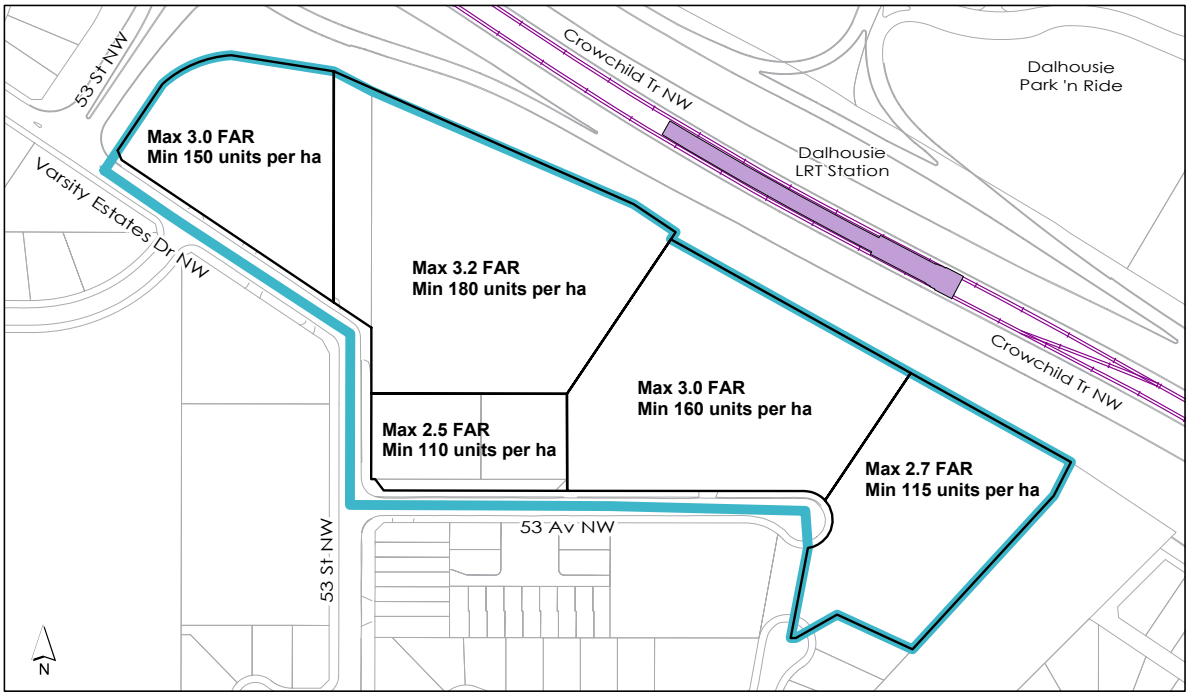

Figure 1: Density

1 Planning applications include development permit, subdivision and land use redesignation applications.

Policy 4 - The highest buildings should be located immediately adjacent to Crowchild Trail NW and shall be no higher than 12 storeys. The height of buildings should progressively step down in a southward direction from Crowchild Trail NW to a height limit of 8 and then 4 storeys (Refer to Plan 3).

Policy 5 - Developments immediately fronting Varsity Estates Drive NW and 53 Avenue NW, should be no more than 4 stories high. Buildings should be setback a minimum of 5 metres from the property line at these frontages.

Policy 6 - Development immediately fronting on to Valencia Road NW or the Park Space east of the study area should be no more than 3 stories high. Buildings should be set back a minimum of 6 metres from the property line at these frontages.

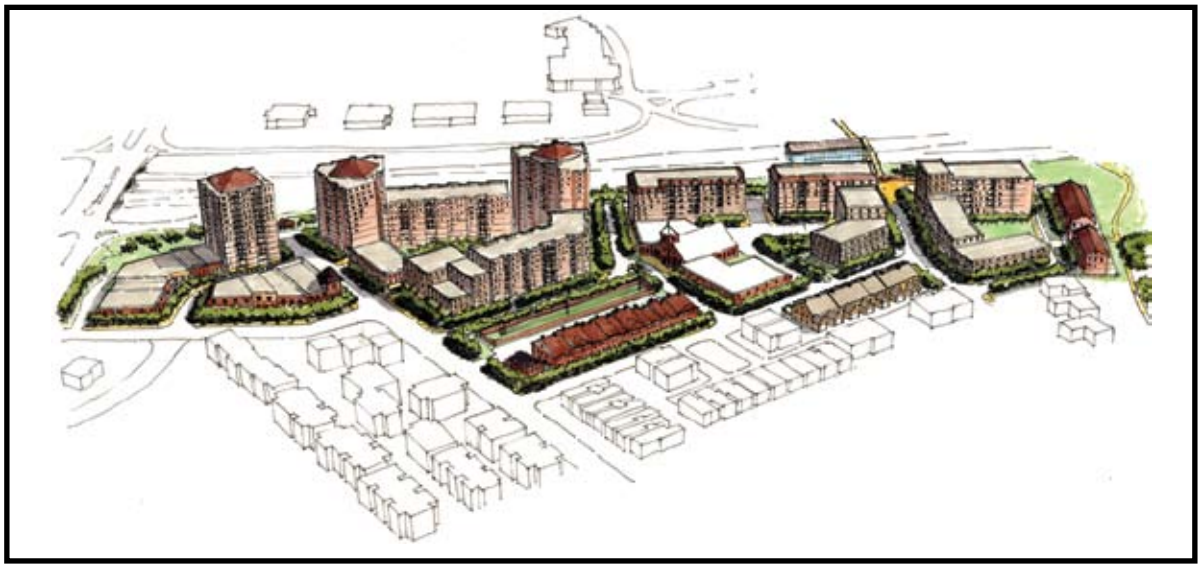

Figure 2: Aerial View of Design Concept

Policy 7 - A shadowing study shall be provided when required by the Approving Authority. Planning applications should not be approved for proposals which, in the opinion of the Approving Authority, have an unreasonable shadowing impact on surrounding areas.

3.2.3 Pedestrian Oriented Design

Policy 8 - Buildings should be oriented towards primary pedestrian routes and the study boundary with minimal setbacks (between 3 and 6 metres from the primary pedestrian route) and direct building entrances connected to the sidewalk.

Policy 9 - Buildings should be grouped together to frame pedestrian spaces.

Policy 10 - Developers are encouraged to provide local commercial or live/work uses at the grade level along primary pedestrian routes. Such uses should be small scale and provide store front access directly from the sidewalk. These uses should be concentrated and located near other focal points such as a gathering place, public space, or private amenities for public use.

Figure 3: Intimate Urban Square

Policy 11 - Development should contribute to the creation of a high quality visually interesting pedestrian environment through building design, signage, façade treatment (particularly on the lower storeys), landscaping and the provision of pedestrian amenities including street furniture, lighting and public art.

Policy 12 - Residential development along primary pedestrian routes is encouraged to be built in the form of townhouses in combination with high density apartment style development.

Policy 13 - Buildings should be stepped back horizontally and/or vertically to minimize massing. Visual articulation through the use of colours and materials should also be used. Roof top gardens, balconies and solariums within step back areas are encouraged.

Policy 14 - Developments should include climate and weather protection along primary pedestrian routes, for example, building projections, colonnades and awnings.

Policy 15 - High profile buildings (5 storeys or more) should have distinctive design features to create a land mark from surrounding areas. For example, distinctive rooflines.

Policy 16 - Street and building configuration should be designed to create vistas, or to terminate views with a land mark feature, building or public space. Important vistas include views looking north on 53 Street NW and looking east on Varsity Estates Drive NW.

Figure 4: Aerial View to LRT Station

Policy 17 - The creation of a wind tunnel effect should be avoided by the careful placement of tall buildings.

Policy 18 - Landscaping, including tree planting, should be used to soften the impact of new development on adjacent existing communities (including the retention of existing trees).

Policy 19 - Municipal reserve land owing should be considered for use as a public gathering place within the study area with the most appropriate location being close to the connection to the Dalhousie LRT Station or along pedestrian routes.

Figure 5: Treelined Urban Street

3.2.4 Pedestrian and Bicycle Linkages

Policy 20 - Development should contribute to a primary pedestrian network providing safe linkages across Varsity Estates Drive NW and 53 Avenue NW and routes through and around the site to the bridge linking the area to Dalhousie LRT Station. Plan 4 defines the preferred primary pedestrian routes (local pathways) through the study area.

Policy 21 - All primary pedestrian routes (local pathways) should comply with the City of Calgary Parks Development Guidelines and standard specifications, Landscape Construction 2004.

Policy 22 - Development should contribute to a secondary pedestrian route network which feeds into primary routes.

Legend

- Study Boundary
- Existing Regional Pathway++
- Preferred Primary Pedestrian Routes *** Local Pathways
- Pedestrian Overpass
- Proposed Bicycle Route*
- Existing Wide Curb Lane or Bicycle Lane**
- Primary Access Points
- Internal Road (Concept Only)
- Internal Parcel Roads (Concept Only)

PLAN 4
Transportation Linkages

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Varsity Land Use Study

Policy 23 - Developers are encouraged to provide lighting improvements to the existing pedestrian route to the north of the study area which runs parallel with Crowchild Trail.

Policy 24 - Internal roadways should have sidewalks on both sides which can accommodate high volume pedestrian activity.

3.2.5 Road Transportation

Policy 25 - Planning applications shall be required to include a Traffic Impact Assesment containing sufficient information to enable the Approving Authority to assess the likely impact on the highway network including the volume of vehicle movements per day (VPD) on 53rd Street south of Varsity Estates Drive to 40 Avenue NW. The traffic assessment should take into account the potential build out of other sites within the study area.

Policy 26 - Planning applications should not be approved where, in the opinion of the Approving Authority, proposals are likely to generate vehicle movements which cannot be satisfactorily accommodated by the road network.

Policy 27 - Appropriate traffic control measures should be undertaken within the study area to ensure that environmental capacity guidelines along 53rd Street South of Varsity Estates Drive to 40th Avenue are adhered to.

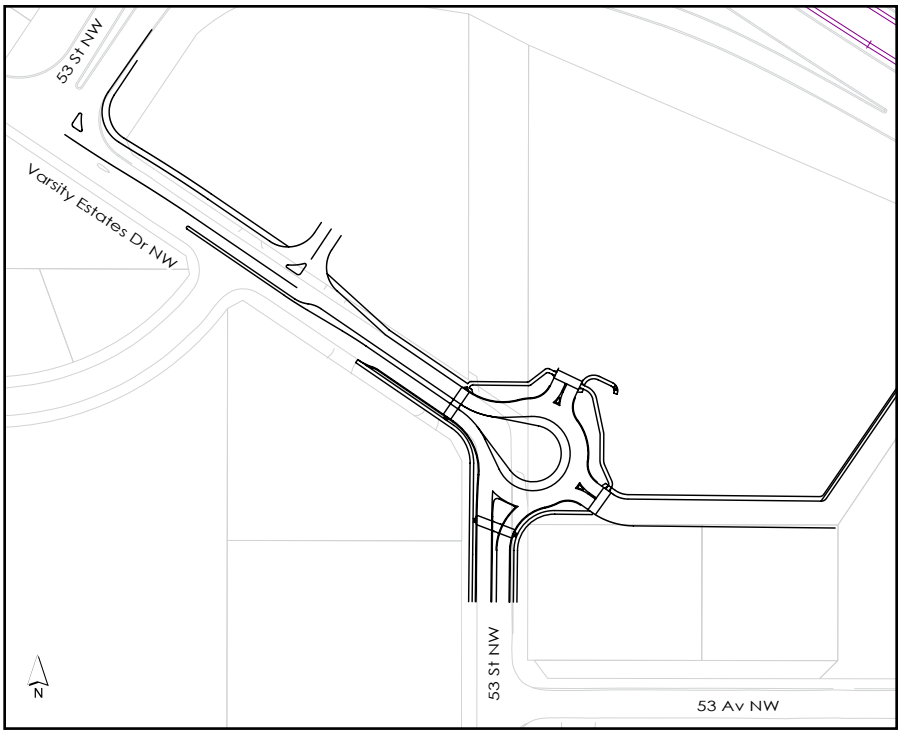

Figure 6: Conceptual Road Improvement Plan

Policy 28 - Development should be strongly encouraged to implement Transportation Demand Management measures designed to reduce automobile trips and encourage alternative modes of travel.

Policy 29 - Development should contribute to an internal road network that will help connect the sites within the study area, and connect the existing community to the Dalhousie LRT Station.

Policy 30 - Planning applications will demonstrate how development will contribute to the conceptual improvement plan shown in Figure 6, that has been designed to discourage traffic from the study area from turning south on 53 Street NW.

3.2.6 Car and Bicycle Parking Requirements

Policy 31 - Parking relaxations of Land Use Bylaw requirements should be considered where:

(i) Local retail is designed to be pedestrian oriented;

(ii) Residential development provides dwelling unit sizes under 60 m^2 (650 ft^2);

(iii) Applications include details of Traffic Demand Management measures which are sustainable (throughout the life of the development), measurable, enforceable and have tangible elements that can be incorporated into an approved plan (for example, dedicated car pool stalls and bicycle parking);

(iv) Applications provide other information, which, in the opinion of the Approving Authority, is sufficient to justify a parking relaxation;

Policy 32 - Multi residential, employment and supporting service developments should provide underground parking. Where surface parking areas are provided they should be designed to maximise pedestrian comfort by :

(i) Locating parking lots to the rear of buildings or side of buildings which front primary pedestrian routes;

(ii) Minimising the number of vehicle crossings over primary pedestrian routes;

(iii) Providing appropriate landscape treatment between parking areas and pedestrian routes;

(iv Breaking large surface parking areas into smaller cells through landscaping and walkways;

(v) Providing safe and landscaped walkways to primary pedestrian routes; and

(vi) Providing parking structures which have active street level facades, including commercial uses and / or building articulation and glazing.

Policy 33 - Surface parking should be designed to allow for redevelopment.

Policy 34 - Developments should provide for the minimum bicycle parking requirements recommended in the "Bicycle Parking Handbook: A Developers Guide".

Policy 35 - The maximum amount of parking should not exceed 125% of the minimum parking requirements set out in the Land Use Bylaw.

Policy 36 - An informal kiss and ride drop off point where motorists can drop off or wait for a transit passenger, should be provided within the study area. This should be placed where the vehicle can enter and leave the study area conveniently and where the passenger has a direct connection to a primary pedestrian route to Dalhousie LRT Station. The provision of an attractive shelter such as a pagoda near the drop off point is also encouraged.

3.2.7 Entrance to Varsity

Policy 37 - Landscaping and signage should be provided on lands immediately adjacent to 53rd Street NW which provides an attractive entrance to Varsity.

Policy 38 - Developers are encouraged to setback buildings and provide land to enable a future tree boulevard along Varsity Estates Drive.

3.2.8 Buffering Electricity Substation

Policy 39 - Landscaping and screening to buffer the visual impact of the electricity substation located at 5430, 5312 and 5330 - 53 Avenue NW on the surrounding areas should be provided.

Appendices


Varsity Land
Use Study

Appendix 1 - Plan 4 Definitions

Pathway Classification

++ Regional Pathway System:

The regional pathway system is a city-wide linear network that facilitates non-motorized movements for recreation and transportation purposes. The regional pathway is hard-surfaced, typically asphalt and located off-street. It is a multi-use facility and no one user or type of user is to be given elevated status. The spine of the system parallels the major physical features of the river valleys park system, including waterways, escarpments and ravines. It should be designed as a continuous facility that connects individual communities to:

- City-wide and Regional Parks and recreation facilities;
- Natural features, including water courses, escarpments, ravines, river valley parks and associated open space;
- Regional joint use sites, commercial districts, employment centres, adjacent communities and key cultural attractions;
- Local pathways, bikeways and trail systems; and
- LRT stations and transit routes.

***** Local Pathways:**

A local pathway is a pathway that provides routes within communities, linking residential areas to facilities such as neighbourhood parks, schools and other local community designations. Local pathways may also serve as links to the regional pathway system.

*** Proposed Pathways/Bikeways (Suggested future pathways)**

- 'Proposed' pathways are conceptual links to major community facilities, river valleys, waterways, park systems, escarpments & ravines, bikeways, LRT stations, major employment centres, schools, etc. In order to realize the Calgary Pathways and Bikeways Plan vision of interconnected neighbourhoods, all planning projects must provide 'proposed' pathway/bikeway links on this drawing. The exact routing of 'proposed' pathway links is subject to on-site conditions such as safety, existing infrastructure, environmental sensitivity, availability of public property, continuity, accessibility and typography.

**** Wide Curb Lane/Bicycle Lane**

- Right side lane on higher volume, medium-speed roads
- Identified by signs on-road bike symbols
- Minimum of 1.5 metres wide

Appendix 2 - Transportation Study

VARSITY TRAFFIC STUDY

1.0 EXECUTIVE SUMMARY

During the discussions on the Varsity Land Use Study at the 2007 March 12-13, Public Hearing of Council on Planning & Land Use, a motion to table the Varsity Land Use Study for eight weeks to return to Council on 2007 May 7, was passed. The details of that motion requested that an independent, updated traffic impact analysis of the Study Area and surrounding road network be undertaken.

This updated study builds on the original transportation work completed by DA Watt in 2006 February. Key differences include updated existing daily traffic counts, redevelopment of the Enmax site, maximum density on the Crowchild Inn site, closer examination of the potential community traffic impacts, and an increase in the study area size.

Existing (2007) Conditions

Existing land use within the Varsity Land Use study area include an estimated 52,000 sq. ft. of retail & office uses on the Crowchild Square site, a 58 room hotel and 5,800 sq. ft. restaurant on the Crowchild Inn site, an Enmax substation, the Bow Valley Christian Church (400 seats), and 39 multi-family units in Varsity Estates Village. These uses generate an estimated 3,900 vehicle trips per day.

Review of the existing (2007) traffic volumes shows that all study area roadways operate within their Environmental Design Guidelines. The only exception to this is Varsity Estates Drive immediately east of 53 Street (north leg), where daily traffic volumes of 10,200 vehicles per day are just over the Environmental Design Guideline for a collector roadways, (10,000 vehicles per day). The daily traffic volume on 53 Street just north of Varsity Drive carries 7,000 vehicles per day.

Analysis of the study area intersections using latest peak hour intersection counts shows that all signalized and stop controlled intersections and their individual turning movements operate at Level of Service D or better, well within acceptable City of Calgary standards.

Future (2020) Background Conditions

The Transportation Planning Forecasting Division produced 2020 projected daily volumes for the study area. Results show that very little traffic growth is anticipated throughout the study area over the next 15 years. This would be expected, as the residential community is established, there are no projected local increases in population or employment, and a number of regional transportation network improvements are in place. These network improvements include:

- Interchange at Shaganappi Trail & John Laurie Blvd
- Interchange at Trans Canada Highway & Bowfort Road
- Interchanges along the Sarcee Trail corridor

- Stoney Trail extension south of Trans Canada Highway to complete the Ring Road

These improvements provide major north-south corridors for travel in northwest Calgary as an alternative to north-south collector routes such as 53 Street.

Proposed Land Use

Using the maximum F.A.R. as outlined in the Varsity Land Use Study for each parcel of the study area, and assuming that the redeveloped Crowchild Square site would retain its primary office and retail uses, the maximum redevelopment potential can be summarized as:

- 240,000 sq. ft. office
- 26,000 sq. ft. retail
- 1459 multi-family dwelling units

This proposed land use is anticipated to generate an estimated 1,500 morning peak hour trips, 1,700 afternoon peak hour trips, and 14,000 trips daily.

Review of the 2020 combined daily traffic volumes shows that all study area roadways continue to operate within their Environmental Design Guidelines, with the exception of Varsity Estates Drive, just east of 53 Street. The daily traffic volume on 53 Street just north of Varsity Drive is estimated to be 9,000 vehicles per day, representing an increase of 1,800 vehicles per day over existing conditions. While Varsity Estates Drive is anticipated to carry over 15,000 vehicles per day, this is limited to a short segment of roadway with limited medium density residential frontage to the south. The roadway is being widened to accommodate the additional traffic and Transit Oriented Development objectives are being considered.

As with the DA Watt study, modifications to the existing road network are required to discourage new development traffic from exiting to southbound 53 Street and to provide an acceptable level of service on the road network to support the additional traffic demand. The key improvements include signals at Varsity Estates Drive/53 Street, widening of Varsity Estates Drive, addition of a median along Varsity Estates Drive, and addition of a modified roundabout at the east end of Varsity Estates Drive. Additional minor improvements, not previously identified in the DA Watt study are required for the Crowchild Trail / 53 Street intersections to improve operations. These improvements include:

- Westbound ramp intersection: northbound left advance phase and conversion of the westbound through lane to a shared left lane at the north intersection
- Eastbound ramp intersection: channelized southbound left turn, conversion of the existing southbound left lane to a southbound through lane

With the road network improvements implemented, analysis of the study area intersections using the 2020 combined peak hour intersection counts shows that all signalized and stop controlled intersections and their individual turning movements operate within City of Calgary standards with some exceptions:

- Crowchild Trail Westbound Ramp: potential for queuing on the ramp during the afternoon peak hour

- 53 Street/Varsity Estates Drive (south leg): northbound stop operates at a Level of Service F
- 53 Street/Varsity Drive: northbound stop operates at a Level of Service F

Modifying the multi-way stops to reinstate stop control on the minor intersecting streets improves the overall operation of both intersections.

The trip generation rates applied in this updated study are consistent with the 2006 DA Watt work and were endorsed by the City in 2004. Since that time, with supporting local data, Transportation Planning currently endorses 30% lower trip rates for use in TOD areas (e.g. Heritage Station). An examination of the operations of the network with these residential rates eliminates the operational concerns on the Crowchild Trail Westbound ramp intersection and reduces the northbound delay at the two stop controlled intersections by over 20 per cent.

Conclusion

In conclusion, traffic generated by redevelopment of the Varsity Land Use study area to its maximum potential (as governed by the maximum F.A.R. within the guiding policies) can be supported by the surrounding road network with improvements along Varsity Estates Drive and 53 Street. As select intersection movements are at capacity, no additional land use over and above the maximum F.A.R., can be supported by the surrounding road network within the context of Transit Oriented Development.

2.0 BACKGROUND INFORMATION

2.1 2004 Land Use & Supporting Transportation Study

In 2004, Statesman Development Corp. proposed a Land Use change on the Crowchild Inn site in the community of Varsity (refer to Figure 2.1) to accommodate a mixed multi-family/seniors housing development. A supporting Transportation Impact Study was conducted by DA Watt Consulting. During the approval process, administration was directed to examine the redevelopment of a broader area surrounding the Crowchild Inn site in the context of Transit Oriented Development. Administration then initiated the Varsity Land Use Study.

2.2 2006 Supporting Transportation Study & Review

At the direction of Transportation Planning, DA Watt Consulting expanded on their original Transportation Impact Study to include a review of the entire land use study area while achieving the policy objectives of the Varsity Land Use Study. This study was reviewed and accepted by Transportation Planning. During this process, Transportation Planning worked closely with the Varsity Community Association (Civic Affairs Sub-committee) to address their transportation concerns, many of which extended beyond the scope of the Transportation Impact Study.

2.3 March 2007 Council Direction & Current Updated Study

At the direction of Council in March 2007, Transportation Planning undertook an updated Transportation Impact Study in order to update 2004 existing traffic volumes presented in the 2006 DA Watt study to more current 2007 levels, better address potential community traffic impacts, and examine traffic impacts over a broader study area (refer to Figure 2.2). The original motion, and the proposed project scope, is included in Appendix A. This report before you is the product of those efforts.

2.4 Differences from 2006 DA Watt Study

The following is a summary of the differences between the 2006 DA Watt Study and the current updated study:

- Revised the existing horizon from 2004 to 2007.
- Revised the future horizon from 2008 to 2020.
- Redevelopment of the Enmax Site included in the trip generation calculations.
- Development potential on the Crowchild Inn site maximized. Previous work was based on the Statesman development proposal.
- Study area expanded to include: Varsity Estates Rise, Varsity Drive, 40 Avenue, and the Crowchild Trail interchange ramps.
- Maximum land use supported by the Transportation network determined.

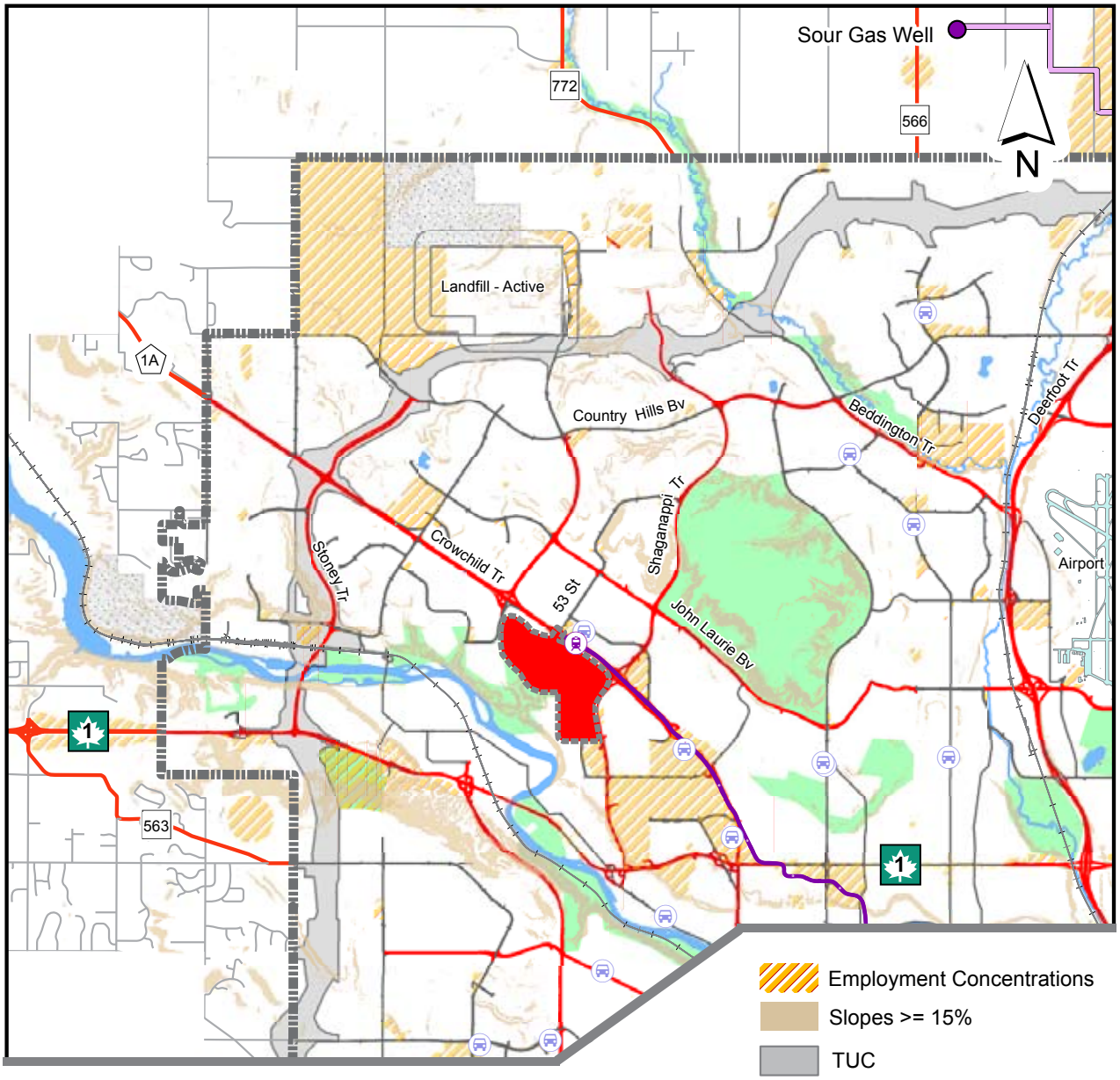

Fig. 2.1 Location - Regional Context

Legend

- Transportation Study Area
- City Limits
- Railway Track
- LRT Track Alignment
- Expressway / Freeway
- Major Road
- Park and Ride
- LRT Station - Existing
- LRT Station - Future

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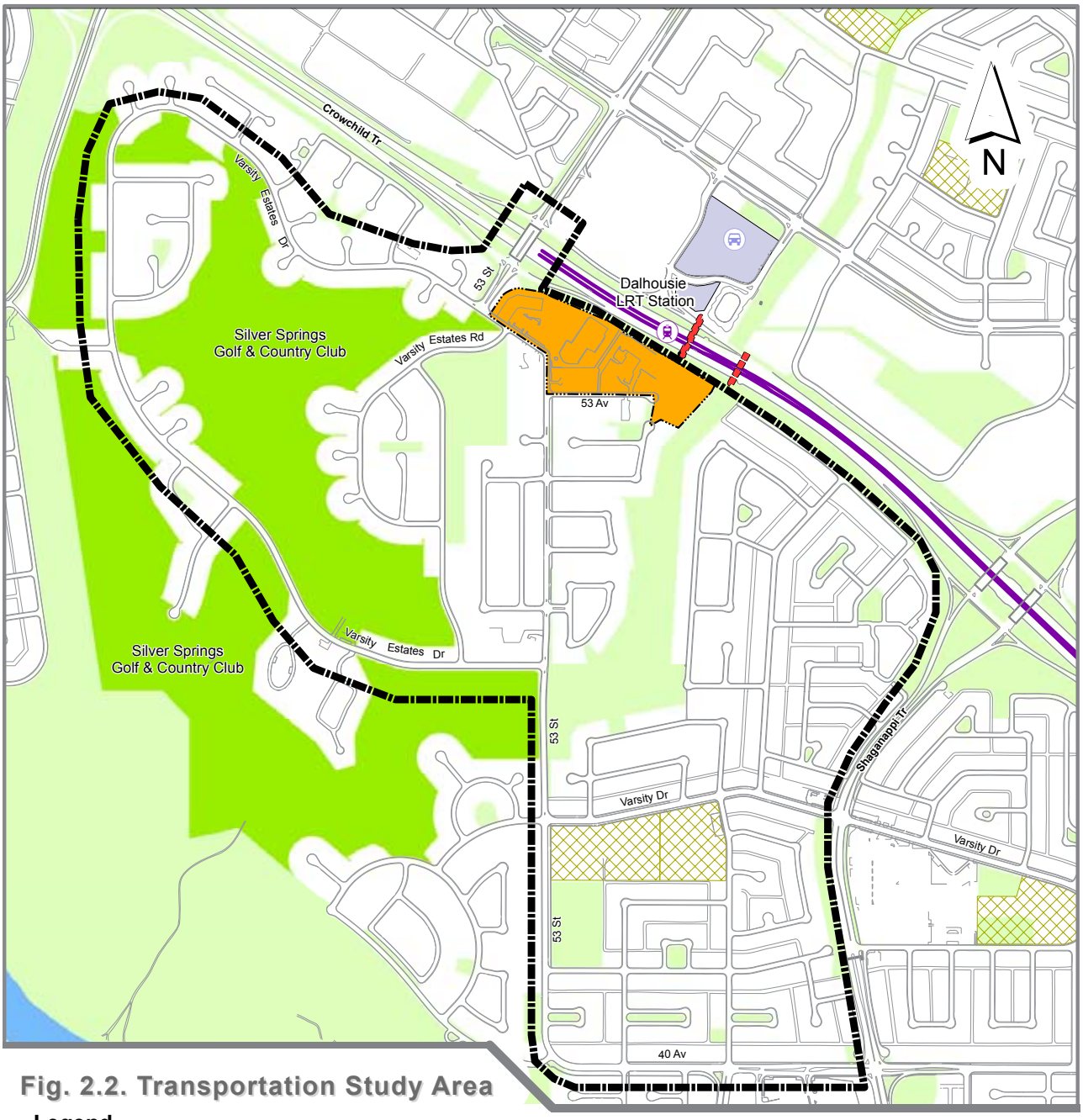

Fig. 2.2. Transportation Study Area

Legend

- Transportation Study Area
- Varsity Land Use Study Area
- LRT Alignment
- LRT Station
- School Parcels
- Pedestrian Overpass
- Park and Ride
- Golf Course
- Parks & Open Space

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3.0 2007 EXISTING CONDITIONS

3.1 Existing Road Network (Figure 3.1)

Crowchild Trail N.W. is a six lane Expressway connecting N.W. communities to central and southwestern Calgary. Upon completion of the Stoney Trail / Crowchild Trail interchange, Crowchild Trail will be a free-flow facility from the western City Limits to 24 Avenue N.W. Based on 2006 traffic counts, Crowchild Trail carries approximately 75,000 vehicles per day in the vicinity of 53 Street N.W.

53 Street N.W. (north leg) is a four lane Major Road connecting the Community of Varsity in the south to Edgemont in the north. Within the study area, 53 Street currently has signalized intersections at the westbound and eastbound Crowchild Trail ramps. 53 Street carries approximately 11,700 vehicles per day immediately north of Varsity Estates Drive.

53 Street NW (south leg) is a two lane Primary Collector road connecting Varsity Estates to the southern end of Varsity and Market Mall. 53 Street accommodates seven transit routes and is a designated bike route with a marked bike lane northbound and southbound. Four way stops and curb flares were installed to discourage shortcutting traffic from using 53 Street, and a raised median and boulevard trees were introduced to reinforce the residential character of the corridor. Based on 2007 information, 53 Street N.W. carries between 6,000 (south end) and 7,000 (north end) vehicles per day.

53 Avenue N.W. is a two lane local residential roadway serving existing multi-family sites and a church site. Parking is permitted on both sides. Based on 2007 March information, 53 Avenue carries approximately 850 vehicles per day.

Varsity Estates Drive N.W. is a two lane collector road that circulates around the Varsity Estates community. Parking is permitted on both sides west of 53 Street (north leg). Two transit routes are accommodated on Varsity Estates Drive. Based on 2007 March information, Varsity Estates Drive carries approximately 10,000 vehicles east of 53 Street (north leg), 2,500 vehicles per day west of 53 Street (north leg) and 2,000 vehicles per day west of 53 Street (south leg).

Varsity Estates Road N.W. is a two lane local residential road providing access to internal residential roadways. Based on 2007 March information, Varsity Estates Road carries approximately 750 vehicles per day.

Varsity Estates Rise N.W. is a two lane local residential road connecting Varsity Estates Road to Varsity Estates Drive to the south. Based on 2007 March information, Varsity Estates Rise carries approximately 450 vehicles per day.

Varsity Drive N.W. is a two lane primary collector road connecting 53 Street to Shaganappi Trail. Four transit routes are accommodated on Varsity Drive. Based on 2007 March information, Varsity Drive carries approximately 2,400 vehicles per day east of 53 Street to 6,000 vehicles per day west of Shaganappi Trail to.

40 Avenue N.W. is a two lane primary collector west of 49 Street and a four lane Major Road east of 49 Street. Eight transit routes are accommodated on 40 Avenue. Based on 2006 and 2007 traffic data, 40 Avenue carries approximately 6,000 vehicles per day east of 53 Street and 18,200 vehicles per day west of Shaganappi Trail.

3.2 Existing Land Use

Existing land use within the Varsity Land Use Study is estimated as follows:

- Crowchild Square: 52,000 sq ft office/retail
- Inn on Crowchild: 58 room hotel, 5,800 sq ft restaurant
- Bow Valley Christian Church: 400 seats
- Varsity Estates Village: 39 multi-family units

The existing land uses are shown in Figure 3.2. Combined, they generate an estimated 3,900 vehicle trips per day.

Fig. 3.1. Existing Road Network

Legend

- Transportation Study Area
- Varsity Land Use Study Area
- Signalized Intersection
- Stop
- LRT Alignment
- LRT Station
- Buildings
- Golf Course
- Parks & Open Space

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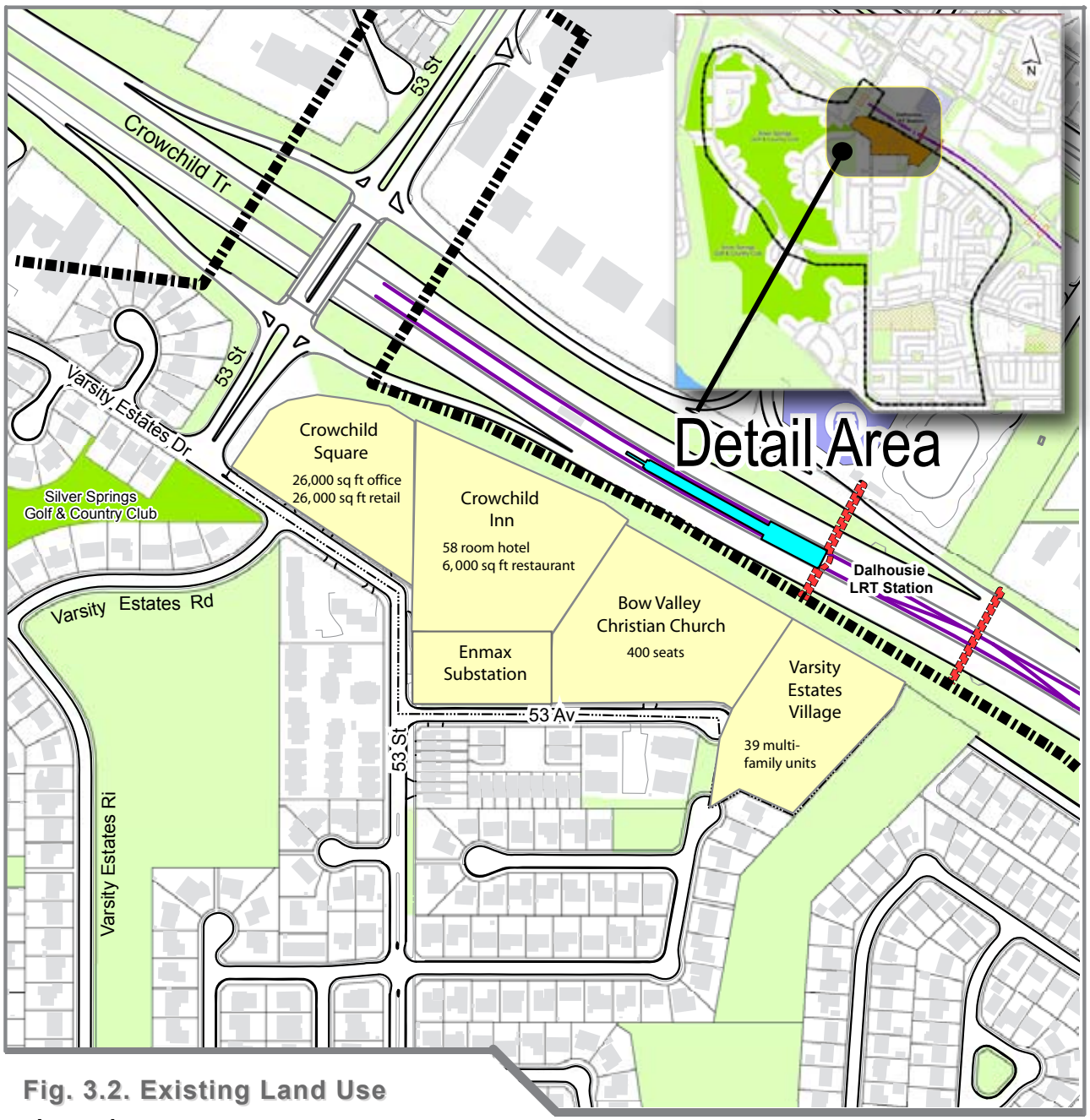

Fig. 3.2. Existing Land Use

Legend

- Transportation Study Area
- Varsity Land Use Study Area
- LRT Alignment
- LRT Station
- Buildings
- Pedestrian Overpass
- Park and Ride
- Golf Course
- Parks & Open Space

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3.3 Data Collection

Existing traffic data in the study area dates back ten years and includes 24-hour counts and six-hour intersection turning counts at select intersections. Current 24-hour counts were conducted by the Transportation Data Division for all study area roads on 2007 March 20-22 (Tuesday through Thursday) when local area schools were still in session.

3.4 Daily Traffic Volumes

2007 March 24-hour traffic counts are summarized in Figure 3.3: 2007 Existing Daily Traffic Counts. These were reviewed against historical 24-hour counts, historical intersection counts, and DA Watt's previous work for accuracy. Figure 3.3 shows that with the exception of Varsity Estates Drive near Crowchild Square, all current daily traffic volumes are well within Environmental Capacity Guidelines. Varsity Estates Drive is slightly over the 10,000 vehicle per day guideline for a collector roadway. 53 Street just north of Varsity Drive carries 7,000 vehicles per day.

3.5 Peak Hour Traffic Analysis

Recent (2006) peak hour intersection volumes are summarized in Figure 3.4.

Current morning and afternoon peak hour turning volumes at five study intersections were used to determine the existing operational level of service. These include:

- Crowchild Trail Westbound Ramp & 53 Street – signalized operation
- Crowchild Trail Eastbound Ramp & 53 Street – signalized operation
- 53 Street & Varsity Estates Drive (north) – 3-way stop operation
- 53 Street & Varsity Estates Drive (south) – 3-way stop operation
- 53 Street & Varsity Drive – 4-way stop operation

The operational performance of these intersections was determined using the Synchro/SimTraffic 6.0 software package which is based on mathematical methodology of the Highway Capacity Manual. The Level of Service (LOS) criteria for both unsignalized and signalized intersections, as summarized in the Highway Capacity Manual, is shown in Table 3.1.

Table 3.1: Level of Service Criteria

Level of Service (LOS)	Average Delay for Unsignalized Intersection Movements	Average Delay for Signalized Intersection Movements
A	0-10 seconds per vehicle	0-10 seconds per vehicle
B	>10-15 seconds per vehicle	>10-20 seconds per vehicle
C	>15-25 seconds per vehicle	>20-35 seconds per vehicle
D	>25-35 seconds per vehicle	>35-55 seconds per vehicle
E	>35-50 seconds per vehicle	>55-80 seconds per vehicle
F	>50 seconds per vehicle	>80 seconds per vehicle

A summary of the analysis of the intersections for 2007 Existing peak hour conditions is provided in Table 3.2.

Table 3.2: 2007 Existing Intersection Peak Hour Analysis

INTERSECTION / MOVEMENT			AM PEAK HOUR				PM PEAK HOUR			
			v/c	Delay (s/veh)	95 Q (m)	LOS	v/c	Delay (s/veh)	95 Q (m)	LOS
Crowchild Trail Westbound Ramp / 53 Street NW *(signalized)*	WB	Left	0.55	47.6	40.5	D	0.63	35.6	59.1	D
		Through/Right	0.37	41.3	29.3	D	0.74	40.2	73.3	D
	NB	Left/Through	0.16	13.7	31.2	B	0.48	9.2	35.6	A
	SB	Through/Right	0.24	3.7	24.7	A	0.19	5.8	21.0	A
	Overall Intersection		**0.55**	**13.7**	**-**	**B**	**0.74**	**15.0**	**-**	**B**
Crowchild Trail Eastbound Ramp / 53 Street NW *(signalized)*	EB	Left/Through	0.66	49.6	53.2	D	0.67	42.8	54.9	D
		Right	0.41	8.8	15.4	A	0.32	7.3	12.5	A
	NB	Through/Right	0.14	7.0	14.1	A	0.34	13.6	49.7	B
	SB	Left	0.69	11.1	47.3	B	0.43	9.9	29.6	A
		Through	0.16	3.5	15.8	A	0.30	8.9	53.3	A
	Overall Intersection		**0.69**	**14.4**	**-**	**B**	**0.67**	**15.7**	**-**	**B**
53 Street/Varsity Estates Drive NW (North Leg) *(3-way stop)*	EB	Left/Through	-	9.2	-	A	-	10.8	-	B
	WB	Through/Right	-	9.3	-	A	-	27.6	-	D
	SB	Left/Right	-	12.3	-	B	-	23.8	-	C
	Overall Intersection		**-**	**11.0**	**-**	**B**	**-**	**24.8**	**-**	**C**
53 Street/Varsity Estates Drive NW (South Leg) *(3-way stop)*	EB	Left/Right	-	7.5	-	A	-	9.8	-	A
	NB	Through/Left	-	8.3	-	A	-	29.2	-	D
	SB	Through/Right	-	8.5	-	A	-	9.8	-	A
	Overall Intersection		**-**	**8.2**	**-**	**A**	**-**	**23.5**	**-**	**C**
53 Street/Varsity Drive NW *(4-way stop)*	EB	Left/Through/Right	-	7.8	-	A	-	9.6	-	A
	WB	Left/Through/Right	-	8.0	-	A	-	10.4	-	B
	NB	Left/Through/Right	-	8.0	-	A	-	22.3	-	C
	SB	Left/Through/Right	-	9.1	-	A	-	10.9	-	B
	Overall Intersection		**-**	**8.7**	**-**	**A**	**-**	**17.5**	**-**	**C**

Fig. 3.3. Existing 2007 Daily Traffic Volumes

Legend

- Transportation Study Area
- Varsity Land Use Study Area
- 100 Vehicles Per Day
- LRT Alignment
- LRT Station
- School Parcels
- Pedestrian Overpass
- Park and Ride
- Golf Course
- Parks & Open Space

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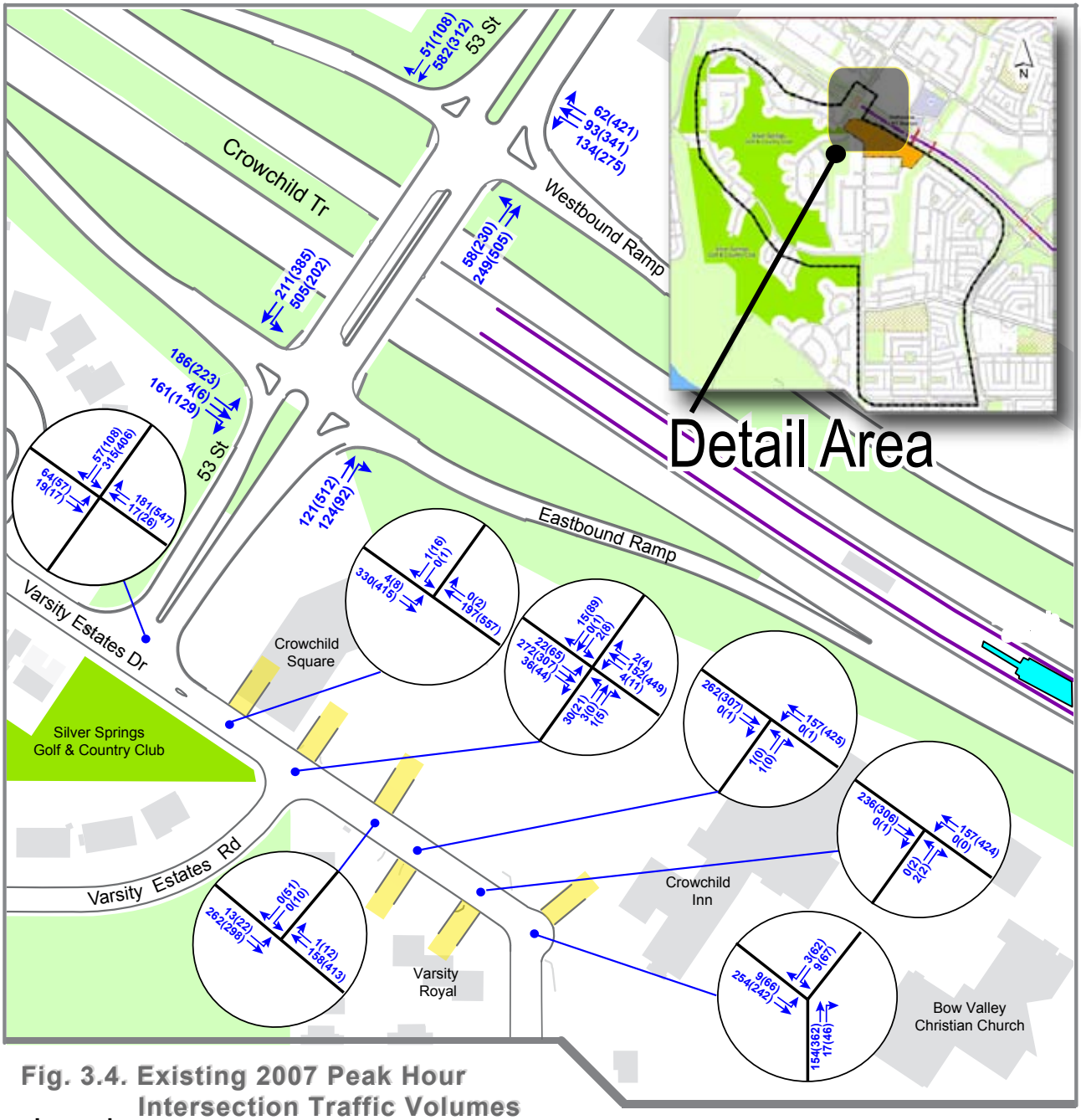

Fig. 3.4. Existing 2007 Peak Hour Intersection Traffic Volumes

Legend

- Transportation Study Area
- Varsity Land Use Study Area
- AM(PM) Peak Hour Traffic Volumes
- Driveway
- LRT Alignment
- LRT Station
- Buildings
- Golf Course
- Parks & Open Space

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4.0 2020 BACKGROUND CONDITIONS

4.1 Forecasting Information

The Transportation Planning Forecasting Division provided future background traffic data (daily and peak hour volumes) for this report based on their 2020 Standard Forecast Series of the Regional Transportation Model (RTM). Population and employment assumptions for each transportation zone at the 2005 (current) and 2020 (future) horizons were reviewed to determine what additional land use is assumed in the study area. No additional population or employment is assumed at the 2020 horizon in the Varsity Community. Some additional employment is assumed at Dalhousie Station, Market Mall, West Campus, and University of Calgary. No adjustments, therefore, were necessary to 'zero-out' additional land use within the Varsity Land Use Study Area.

4.2 2020 Background Daily Traffic Volumes

The 2020 projected daily traffic volumes throughout the study area. These daily volumes are summarized in Figure 4.1. This figure shows that very little growth is anticipated throughout the study area over the next 15 years. This would be expected, as the residential community is established, there are no projected local increases in population or employment, and a number of regional transportation network improvements are planned. These network improvements include:

- Interchange at Shaganappi Trail & John Laurie Blvd
- Interchange at Trans Canada Highway & Bowfort Road
- Interchanges along the Sarcee Trail corridor
- Stoney Trail extension south of Trans Canada Highway to complete the Ring Road

These improvements provide major north-south corridors for travel in northwest Calgary as an alternative north-south collector routes such as 53 Street.

4.3 2020 Background Intersection Peak Hour Tra Volumes

Transportation Planning reviewed the existing and 2020 forecast peak hour intersection volumes. As with the daily traffic volumes, very little growth is anticipated in the intersection volumes over the next 15 years. 2020 Background Peak Hour Intersection Traffic Volumes are shown in Figure 4.2.

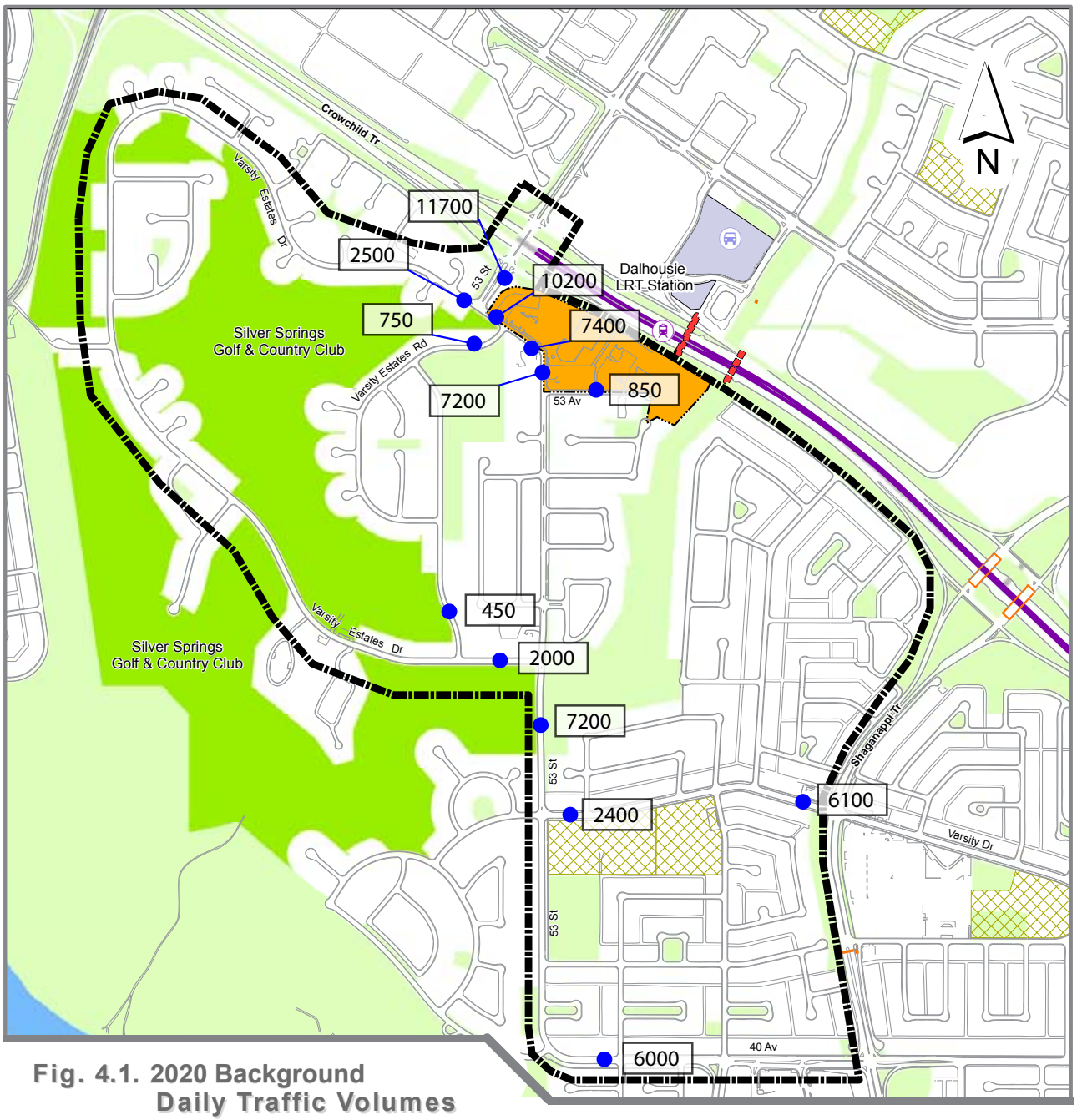

Fig. 4.1. 2020 Background Daily Traffic Volumes

Legend

- Transportation Study Area
- Varsity Land Use Study Area
- 100 Vehicles Per Day
- LRT Alignment
- LRT Station
- School Parcels
- Pedestrian Overpass
- Park and Ride
- Golf Course
- Parks & Open Space

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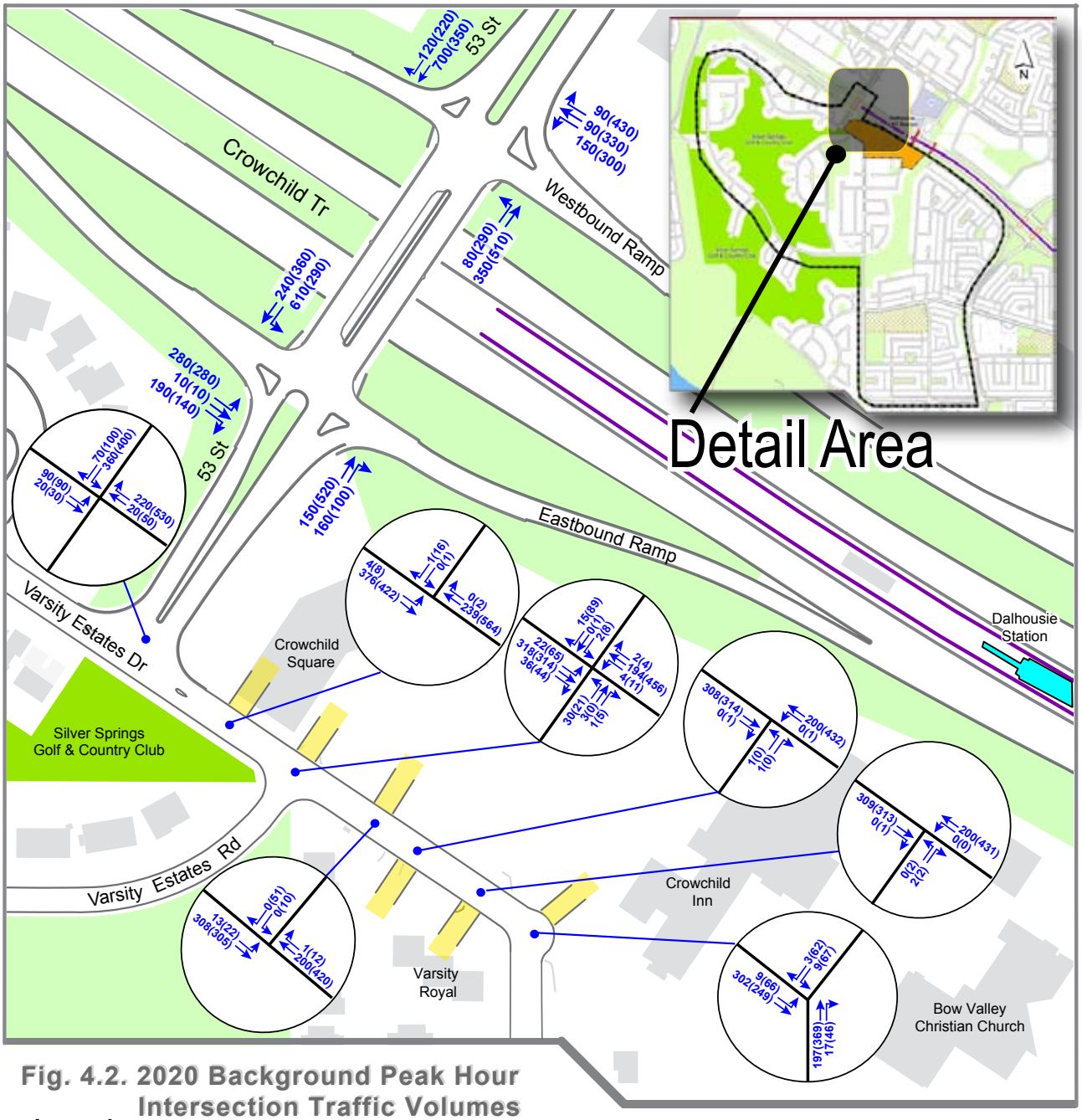

Fig. 4.2. 2020 Background Peak Hour Intersection Traffic Volumes

Legend

- Transportation Study Area
- Varsity Land Use Study Area
- AM(PM) Peak Hour Traffic Volumes
- Driveway
- LRT Alignment
- LRT Station
- Buildings
- Golf Course
- Parks & Open Space

THE CITY OF CALGARY TRANSPORTATION PLANNING

5.0 SUPPORTABLE LAND USE

5.1 Maximum Land Use Potential

The Varsity Land Use Policy states minimum residential land use density and maximum Floor Area Ratios for each parcel within the study area. The proposed land uses assumed in this study are based on the maximum Floor Area Ratios (F.A.R.) that the Policy sets for each parcel. Table 5.1 summarizes each parcel size, its maximum F.A.R., net developable area, and resulting land use potential.

The retail and office space assumed in the 2006 DA Watt study for the Crowchild Square site remains unchanged. Similarly, the small amount of retail space that was assumed on the Crowchild Inn site also remains unchanged. The remainder of land use is assumed to be multi-family residential.

Table 5.1: Land Use Assumptions

PARCEL	PARCEL SIZE (sq ft)	MAX F.A.R.	NET DEVELOPABLE AREA (sq ft)	OFFICE (sq ft)	RETAIL (sq ft)	MULTI-FAMILY UNITS (2)
Crowchild Square	102,400	3.0	261,100	240,000	20,000	
Crowchild Inn	219,900	3.2	598,200		6,000	593
Enmax	57,600	2.5	122,500			122
Bow Valley Church	177,500	3.0	452,500			452
Varsity Est. Villiage	127,300	2.7	292,000			292
TOTAL	**684,700**		**1,726,300**	**240,000**	**26,000**	**1459**

2 Average unit size = 1,000 sq. ft.

The 2006 DA Watt study assumed only 1,070 units in addition to the office and retail uses. This updated study assumes 379 additional units (for a total of 1459) because the Enmax site was not included in the original work (122 units), the Crowchild Inn site was based on the Statesman application proposal, not the maximum development potential (a difference of 153 units), and the remaining parcels were slightly underestimated in their development potential (remaining 104 units).

The maximum development potential on each parcel is shown in Figure 5.1.

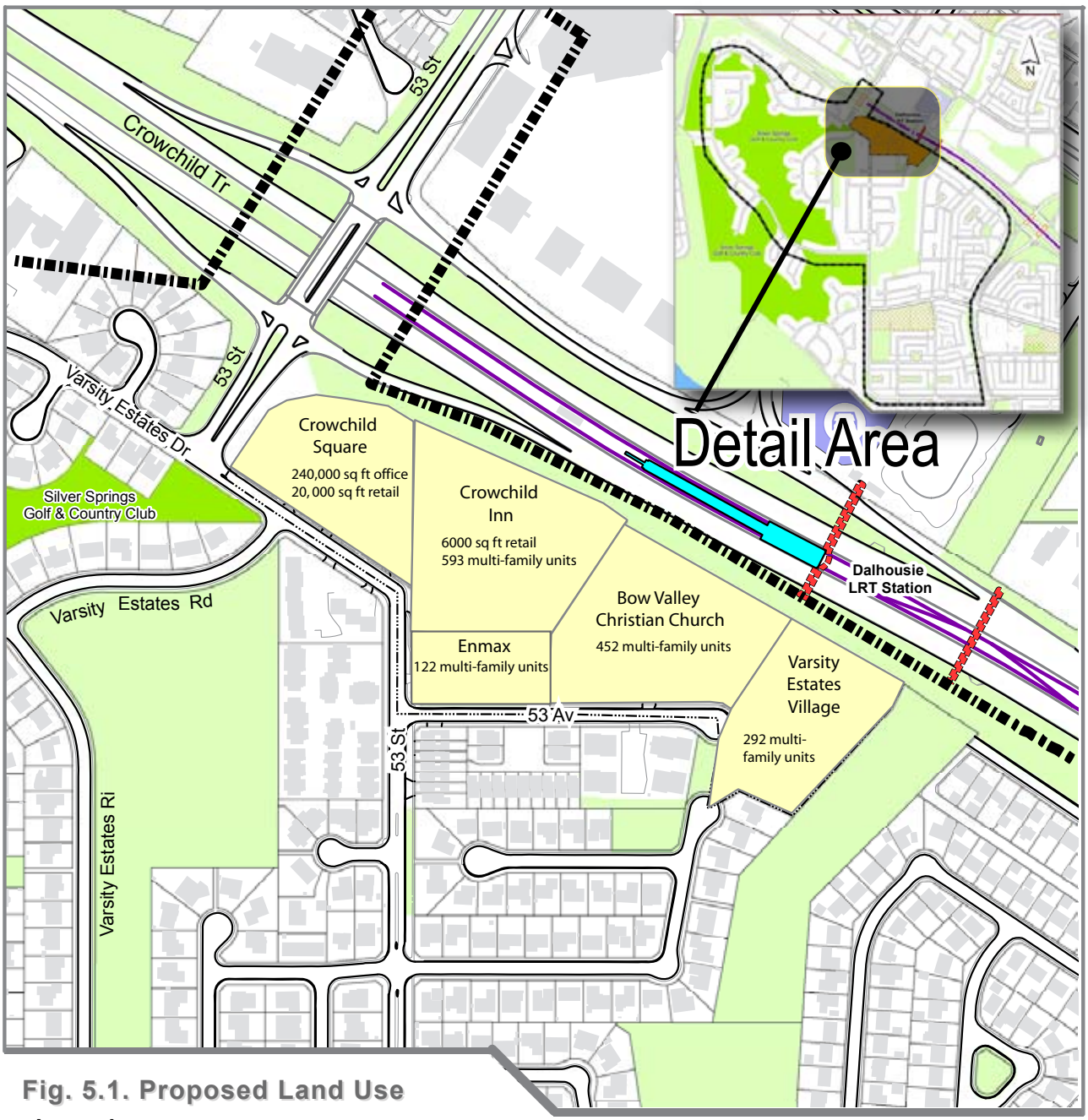

Fig. 5.1. Proposed Land Use

Legend

- Transportation Study Area
- Varsity Land Use Study Area
- LRT Alignment
- LRT Station
- Buildings
- Pedestrian Overpass
- Park and Ride
- Golf Course
- Parks & Open Space

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5.2 Proposed Road Network Improvements

Several improvements to the existing road network are proposed for two key reasons:

1. Discourage new development traffic from exiting to southbound 53 Street.
2. Provide an acceptable level of service on the road network to support the additional traffic demand.

The improvements, shown in Figure 5.2 are summarized as follows:

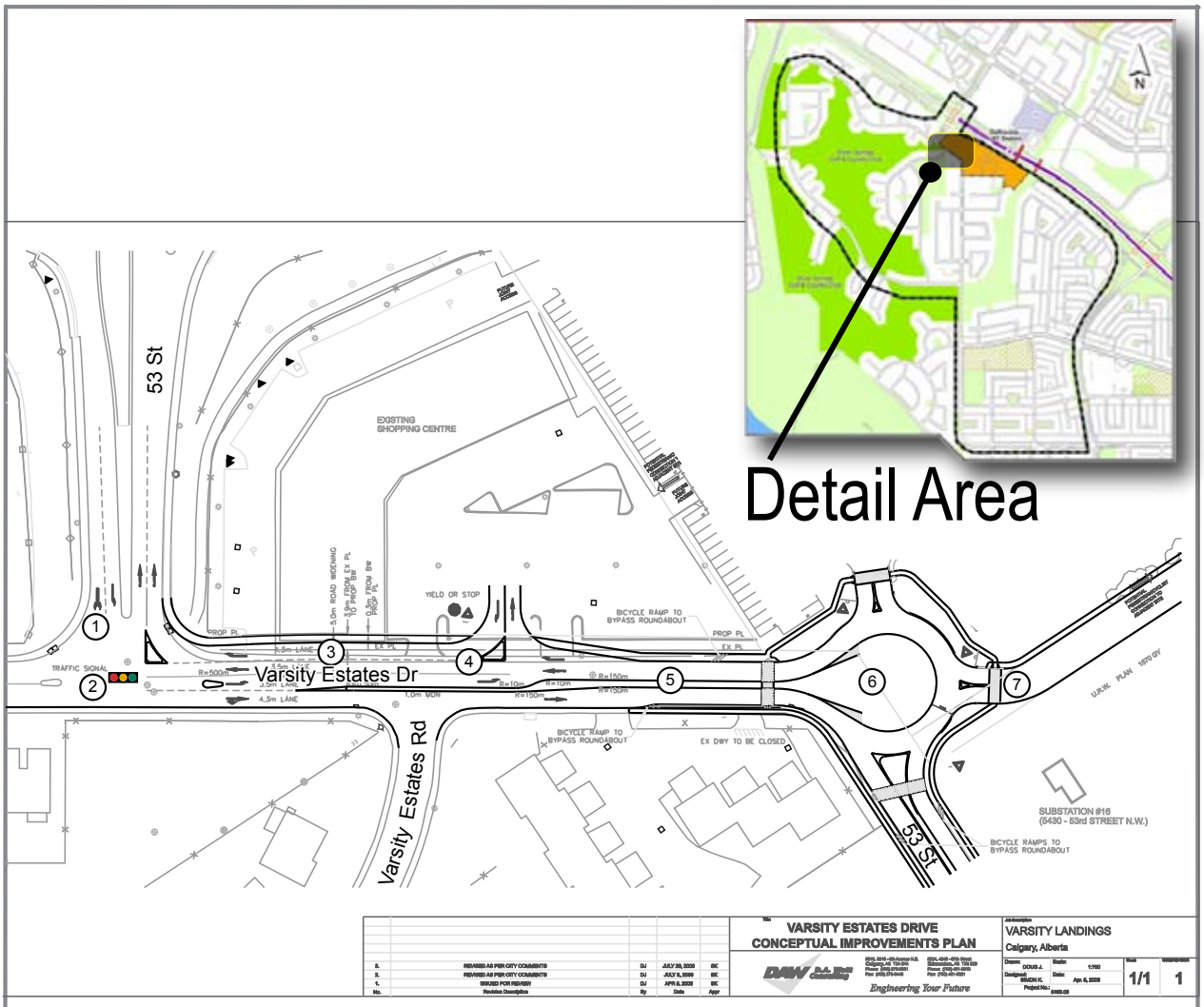
1. Signal installation at 53 Street/Varsity Estates Drive
2. Convert the southbound right turn lane at 53 Street / Varsity Estates Drive to a shared left/right turn lane.
3. Introduce a single access for the future redeveloped Crowchild Square site. Eastbound left turns, westbound right, and southbound right turns only will be permitted.
4. Introduce a four lane cross-section on Varsity Estates Drive between 53 Street (north leg) and the proposed Crowchild Square access.
5. Introduce a modified roundabout at the 53 Street/Varsity Estates Drive curve to prevent development traffic from egressing south.
6. Introduce a raised median between the proposed Crowchild Square access and the modified roundabout.
7. Introduce an internal road network that connects sites further east to the modified roundabout, thus removing access to 53 Avenue.

Additional improvements, not previously identified in the DA Watt study, are proposed for the Crowchild Trail / 53 Street intersections to improve the intersection operations. These improvements include:

- Westbound ramp intersection: northbound left advance phase and conversion of the westbound through lane to a shared left lane. This requires modifications to the signal timing and associated pavement markings and signage.
- Eastbound ramp intersection: channelized southbound left turn and conversion of the existing southbound left lane to a southbound through lane. This requires removal of temporary barriers on the north leg of the intersection and modifications to the median on the south leg of the intersection.

5.3 Internal Road Concept

Policy #29 of the Varsity Land Use Study states that development should contribute to an internal road network that will help connect the sites within the study area. A concept of this internal road is shown in Figure 5.3. Though the original intent of this policy may have been to connect all five sites with a single connecting roadway, subsequent analysis has shown that two points of access are required to service the study area: a dedicated access off of Varsity Estates Drive to service the Crowchild Square site, and access off of the modified roundabout. The conceptual design for the modified roundabout allows for connection to the internal road serving three of the five sites to the east. A conceptual internal circulation road has been shown for each site, along with the potential for future cross-connectivity between the Crowchild Square and Crowchild Inn sites. This internal road concept compliments Road Transportation Policies in the Varsity Land Use study.



Improvements:

1. Shared Left/Right Turn Lane
2. Signalize Intersection
3. 4-Lane Cross-Section
4. Restricted Turns Crowchild Square Access
5. Raised Median
6. Modified Roundabout
7. Internal Road Connection

Fig. 5.2. Proposed Road Network Improvements

Legend

- Transportation Study Area
- Varsity Land Use Study Area
- Signalized Intersection

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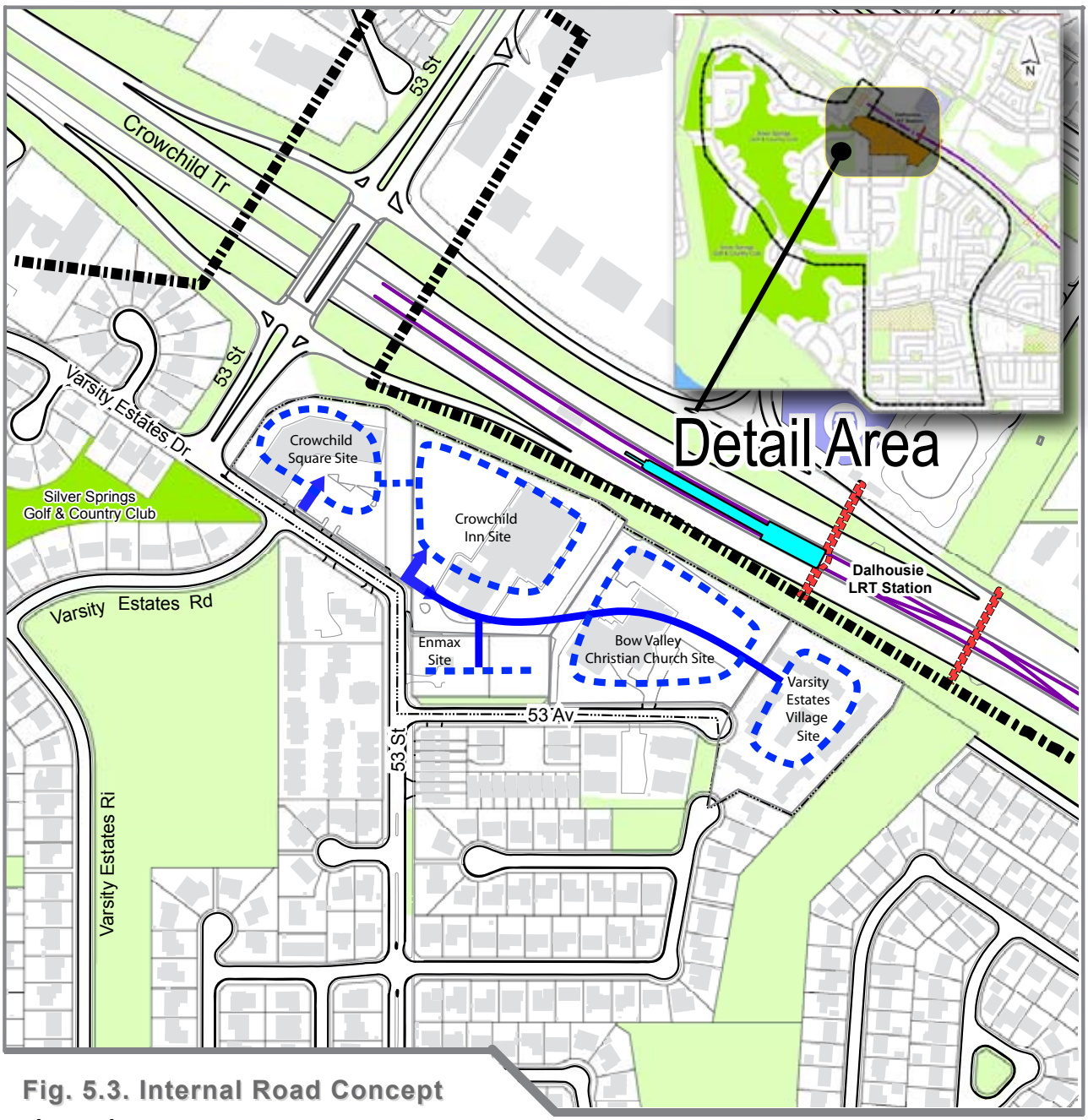

Fig. 5.3. Internal Road Concept

Legend

- Transportation Study Area
- Varsity Land Use Study Area
- Primary Access Points
- Internal Road (Concept Only)
- Internal Parcel Roads (Concept Only)
- LRT Alignment
- LRT Station
- Buildings
- Pedestrian Overpass
- Park and Ride
- Golf Course
- Parks & Open Space

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5.4 Trip Generation

The same trip generation rates that were used in the DA Watt 2006 study are used in this updated study. These rates were previously approved by Transportation Planning and, with the exception of the multi-family rates, represent current standard City of Calgary rates. The Trip Generation Rates are summarized in Table 5.2.

Table 5.2: Trip Generation Rates

LAND USE	AM PEAK HOUR	PM PEAK HOUR	DAILY
Office	2.5 trips/1000 ft^2 (88% in/12% out)	2.3 trips/1000 ft^2 (17% in/83% out)	15 trips/1000 ft^2 (50% in/ 50% out)
Retail	1.0 trips/1000 ft^2 (50% in/50% out)	6.0 trips/1000 ft^2 (50% in/50% out)	65 trips/1000 ft^2 (50% in/50% out)
*Multi-Family	0.5 trips/unit (25% in/75% out)	0.6 trips/unit (65% in/35% out)	6.0 trips/unit (50% in/50% out)

* Currently accepted City of Calgary Multi-Family TOD rates: 0.35 trips/unit am, 0.45 trips/unit pm.

Table 5.3 summarizes the calculated trip generation for each site. The values are calculated by applying the trip generation rates and inbound/outbound splits in Table 5.2 against the land use assumptions in Table 5.1.

Table 5.3: Trip Generation

SITE	AM PEAK (VPH)			PM PEAK (VPH)			DAILY (VPD)		
	In	Out	Total	In	Out	Total	In	Out	Total
Crowchild Square	538	82	620	154	518	672	2450	2450	4900
Inn on Crowchild	90	265	355	290	165	455	1974	1974	3948
Enmax	18	54	72	56	30	86	366	366	732
Bow Valley Church	67	200	266	207	112	319	1356	1356	2712
Varsity Est. Village	43	129	172	134	72	206	876	876	1752
TOTAL	**756**	**729**	**1485**	**842**	**897**	**1739**	**7022**	**7022**	**14044**

Total trips in Table 5.3 are higher than the 2006 DA Watt study (approximately 380 higher in the morning peak hour, 430 higher in the afternoon peak hour, and 2,860 higher daily). This reflects the additional 380 units and the assumption that these units are all multi-family with higher trip generation rates than the seniors units used in the DA Watt study.

5.5 Trip Distribution

The original trip distribution proposed in DA Watt's work, serves as the basis for the trip distributions used in this updated study.

The proposed office and retail trip distributions match the current distribution patterns seen for the Crowchild Square site. Transportation Planning endorsed those trip distributions during the review of the 2006 study. One adjustment was made to the office and retail trip distributions used to date: outbound traffic destined for Varsity Estates Road was reduced to zero. The latest proposed road network improvements will not permit a westbound to southbound left turn at this intersection. This traffic has been redistributed to Varsity Estates Drive.

DA Watt established their proposed residential trip distribution patterns by carefully examining existing traffic data and the City of Calgary Forecasting Model. Transportation Planning endorsed the residential trip distributions during the review of the 2006 study. The same adjustment as discussed with the office/retail uses above was applied to the residential distribution.

The proposed trip distribution for all proposed land uses (retail, office, residential) is summarized in Figure 5.4.

5.6 Trip Assignment

The daily and peak hour intersection development traffic volumes were assigned to the road network using the trip generated values in Table 5.3 and the trip distributions in Figure 5.4. The peak hour intersection traffic assignment is shown in Figure 5.6. The daily traffic assignment, shown in Figure 5.5, was developed using the daily trip generation values in Table 5.3 and a blended average of the peak hour distributions in Figure 5.4. Figure 5.5 shows that development contributes an estimated 2,400 vehicle trips per day to 53 Street north of Varsity Drive. This is a combination of 1,900 vehicle trips inbound from the south and 500 vehicle trips outbound from Varsity Estates Drive

(south leg). The 500 vehicle trips were derived from the 730 vehicle trips assigned to Varsity Estates Drive west of 53 Street. It was assumed that all residential development trips (estimated to be 500) were destined for 53 Street south and not residential-to-residential trips. The remaining 230 trips were assumed to be retail/office development trips returning to local residences.

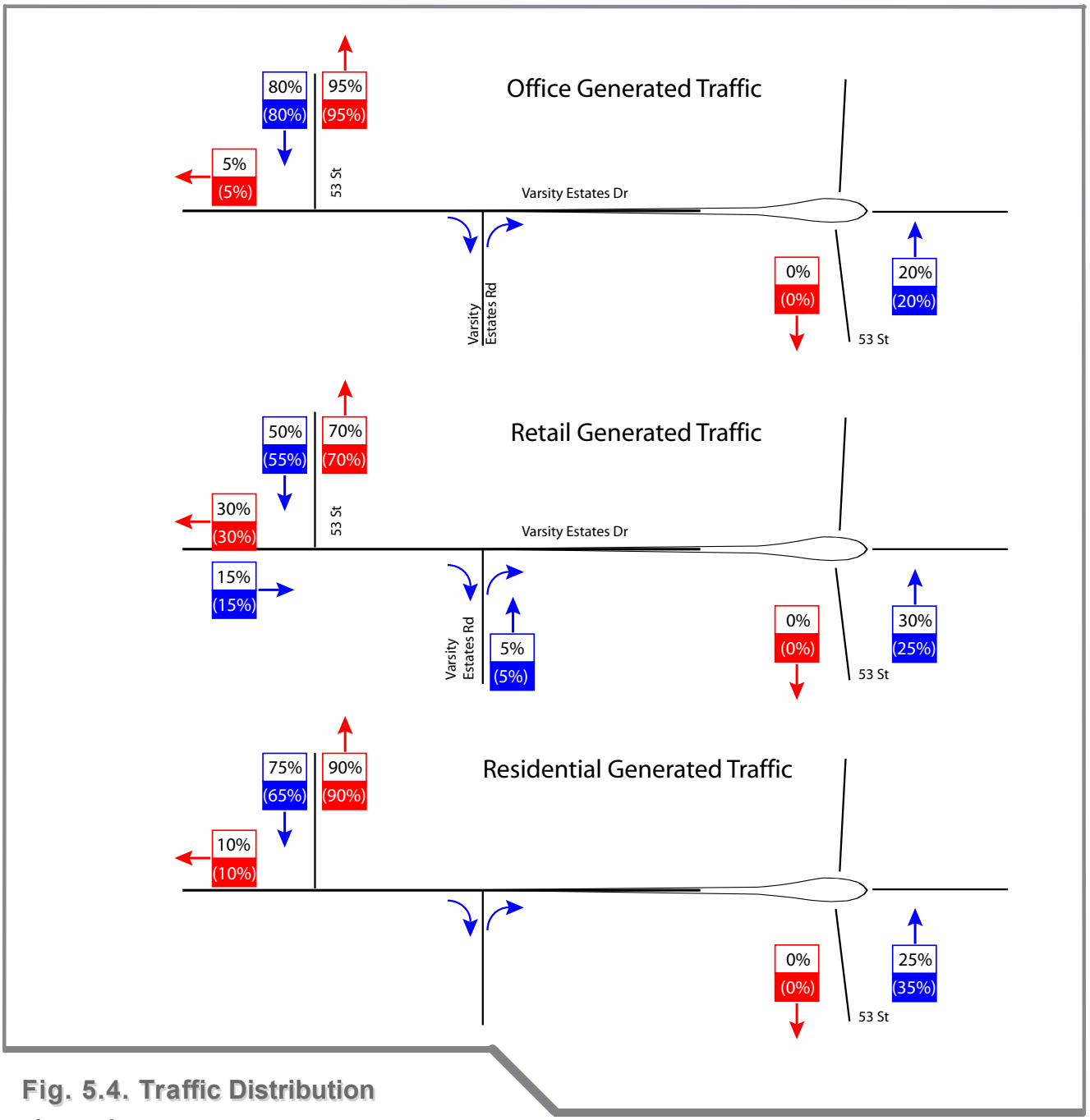

Fig. 5.4. Traffic Distribution

Legend

← Traffic Flow	← Traffic Flow
10% (10%) AM Peak PM Peak	10% (10%) AM Peak PM Peak
INBOUND	OUTBOUND

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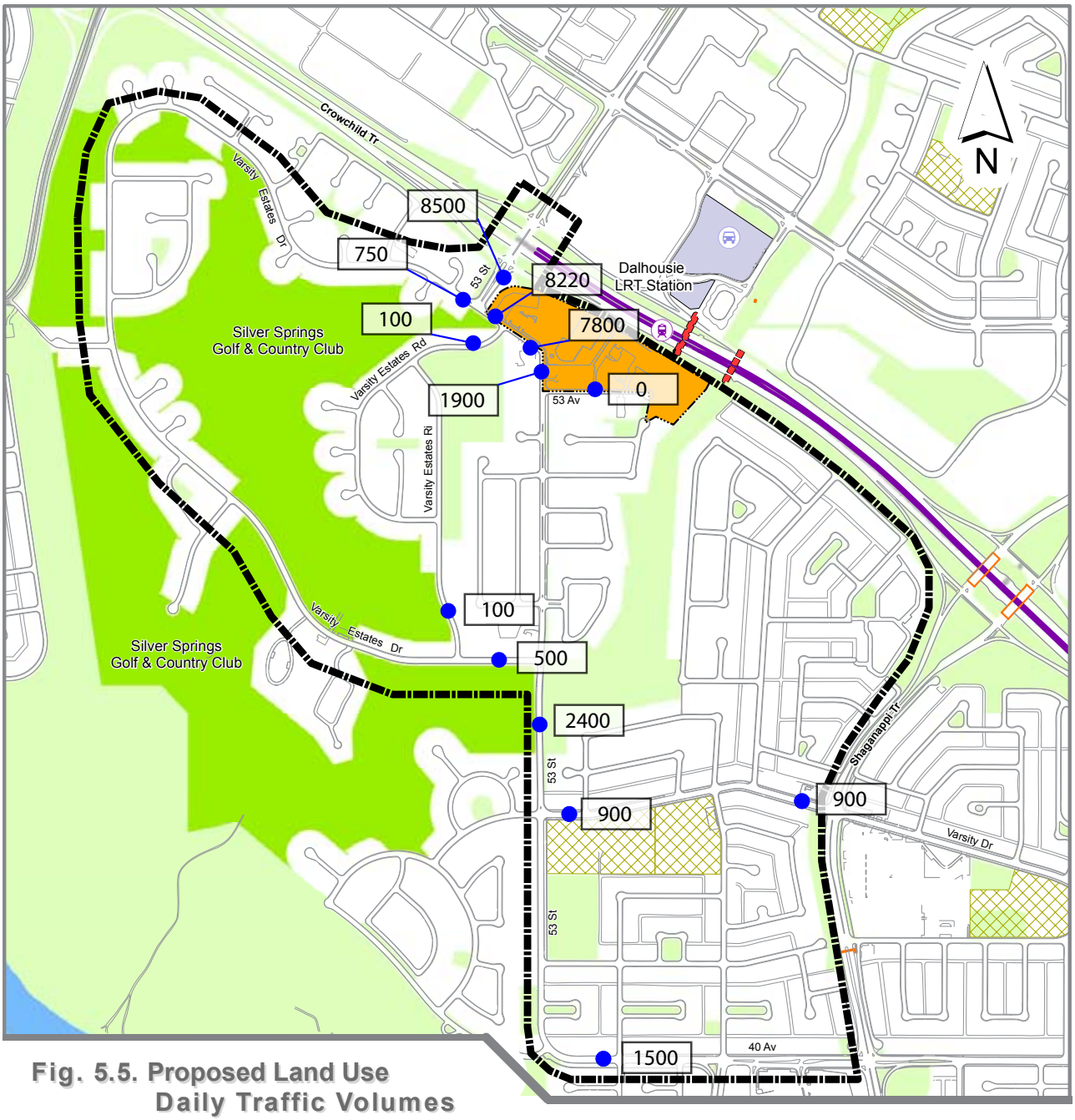

Fig. 5.5. Proposed Land Use Daily Traffic Volumes

Legend

- Transportation Study Area
- Varsity Land Use Study Area
- 100 Vehicles Per Day
- LRT Alignment
- LRT Station
- School Parcels
- Pedestrian Overpass
- Park and Ride
- Golf Course
- Parks & Open Space

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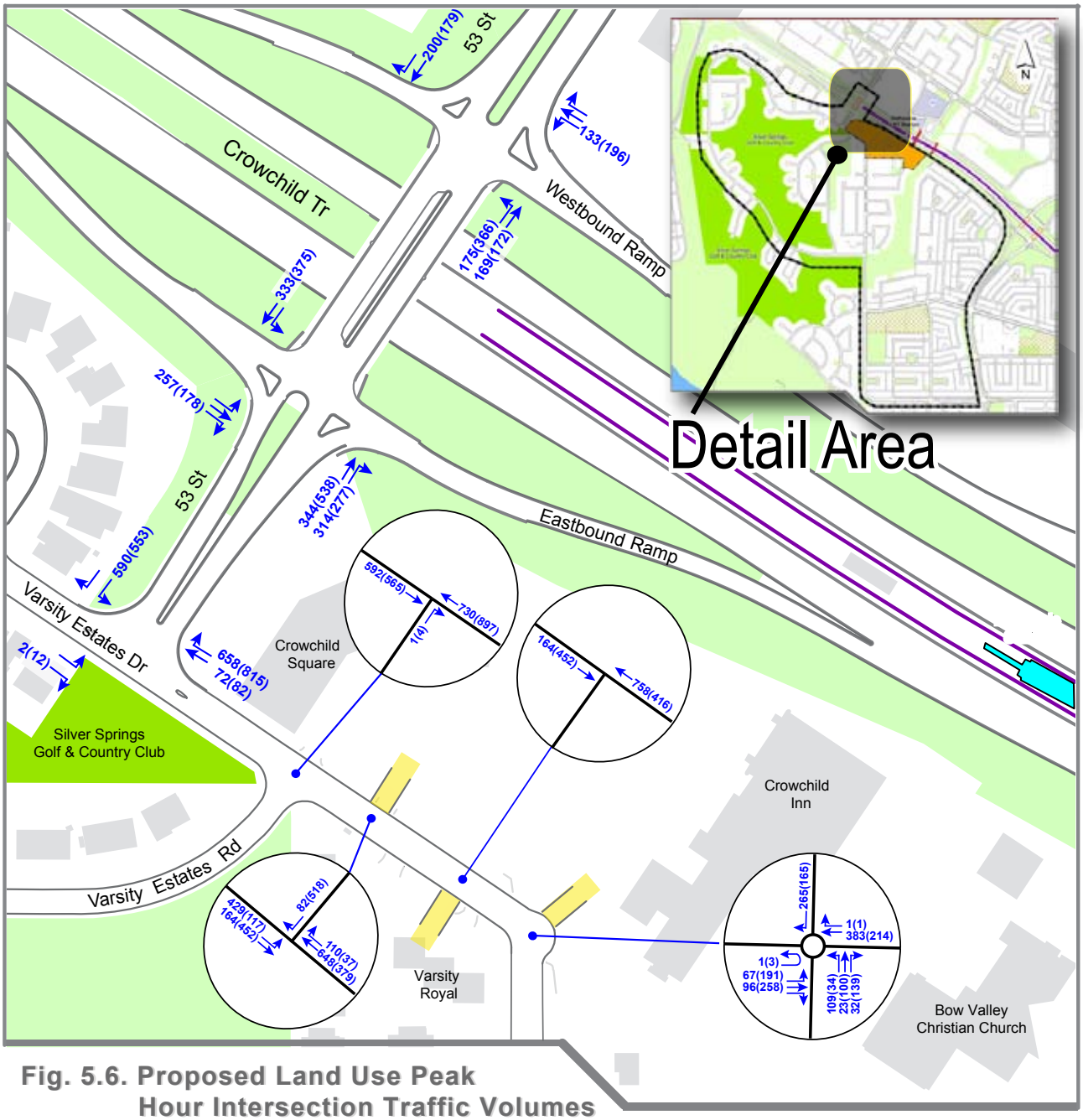

Fig. 5.6. Proposed Land Use Peak Hour Intersection Traffic Volumes

Legend

- Transportation Study Area
- Varsity Land Use Study Area
- AM(PM) Peak Hour Traffic Volumes
- Driveway
- LRT Alignment
- LRT Station
- Buildings
- Golf Course
- Parks & Open Space

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6.0 2020 COMBINED CONDITIONS (WITH LAND USE)

6.1 2020 Background Traffic Volume Adjustments

Two adjustments are required to the 2020 Background Traffic Volumes before the proposed Land Use traffic can be added:

(1) Remove the traffic from the network generated by the existing uses within the Varsity Land Use Study boundary.
(2) Reassign background community traffic affected by the proposed road network improvements.

Removal of Existing Uses

Using the driveway traffic counts collected by DA Watt in September 2004, the 2020 background daily and peak hour traffic volumes were adjusted to reflect no land use on the Varsity Land Use site.

Reassignment of Background Traffic Due to Road Network Improvements

The introduction of a median (and other network modifications) along Varsity Estates Drive is not anticipated to affect background traffic patterns significantly. As this potential impact remains a key concern of the community, however, it was examined in greater depth in this updated study. The traffic reassignment assumptions are summarized in Table 6.1, and described in detail below:

- 50 per cent of the northbound left turning traffic on Varsity Estates Road at Varsity Estates Drive was reassigned to Varsity Estates Drive (south leg) and 53 Street northbound as a conservative way to account for those drivers not wanting to turn right, and travel 180 degrees through the modified roundabout to make a left hand turn. This increases the traffic on 53 Street between Varsity Estates Drive (south) and Varsity Estates Drive (north) by an estimated 100 vehicles per day. The remaining 50 per cent of northbound left turning traffic will turn right and make a U turn movement through the roundabout. This increases the traffic on Varsity Estates Drive by an estimated 200 vehicles per day (as the same vehicle is counted in both directions).

- The introduction of a median on Varsity Estates Drive eliminates the westbound to southbound left turn at Varsity Estates Road. 100 per cent of this traffic is assumed to use Varsity Estates Drive (south leg) and Varsity Estates Rise to get to their residential destination. This decreases the traffic on Varsity Estates Drive and the north section of Varsity Estates Road by an estimated 90 vehicles per day. Conversely traffic on Varsity Estates Drive (south leg) and Varsity Estates Rise is anticipated to increase by an estimated 90 trips per day.

- The introduction of a modified roundabout requires the closure of one of the two driveway accesses to the Varsity Royal Condos. Consolidation of these driveways increases the daily traffic on the west driveway from an estimated 15 trips per day to 50 trips per day.

- The introduction of a median on Varsity Estates Drive eliminates the westbound to southbound left and the northbound to westbound left turn at the Varsity Royal access. This requires departing Varsity Royal traffic to turn right only. Given the close proximity of the roundabout to this location, all existing left turning traffic will use the roundabout to head west. Returning Varsity Royal residents that can no longer turn left from Varsity Estates Drive are most likely to use Varsity Estates Drive (south leg), Varsity Estates Rise, and Varsity Estates Road to access the site. The combined effect of these restrictions increases the traffic on Varsity Estates Drive in the vicinity of the roundabout by an estimated 30 trips per day and increases traffic on Varsity Estates Drive (south leg), Varsity Estates Rise, and Varsity Estates Road by en estimated 10 trips per day.

- No adjustment was made to the eastbound traffic on Varsity Estates Drive east of 53 Street (west). The introduction of the modified roundabout will not significantly impede the speed (or travel time) of those drivers destined for 53 Street south. Therefore, no additional traffic was assigned to ‘cut-through’ on Varsity Road.

- No other adjustments were made to the background traffic as the introduction of the median and modified roundabout will not impede existing traffic patterns.

Table 6.1: Traffic Reassignment for Road Network Improvements

RESTRICTED MOVEMENT	IMPEDEMENT	REASSIGNMENT	IMPACT
NB Left VER to VED	Median on VED	50% NB right and use roundabout, 50% south to 53 St NB	+100 vpd 53 St NB +200 vpd VED -100 vpd VER
WB Left VED to VER	Median on VED	100% trips from south via 53 St, VER	-90 vpd VED +90 vpd VER
Varsity Royal East Driveway Closure	Modified Roundabout	100% trips use West Driveway	+35 vpd on West Driveway
WB Left VED to VRC	Median on VED	100% trips from south via 53 St, VER	-10 vpd VED +10 vpd 53 St, VER
NB Left VRC to VED	Median on VED	100% NB right and use roundabout	+40 vpd VED
SB Traffic Bypassing Roundabout	Modified Roundabout	None	None
NB Traffic Bypassing Roundabout	Modified Roundabout	None	None

VED – Varsity Estates Drive
VER – Varsity Estates Rise
VRC – Varsity Royal Condo

All adjustments were then applied to 2020 Background volumes. The adjusted 2020 Background Daily Traffic and Volumes are shown in Figure 6.1 and Peak Hour Intersection Traffic Figure 6.2 respectively.

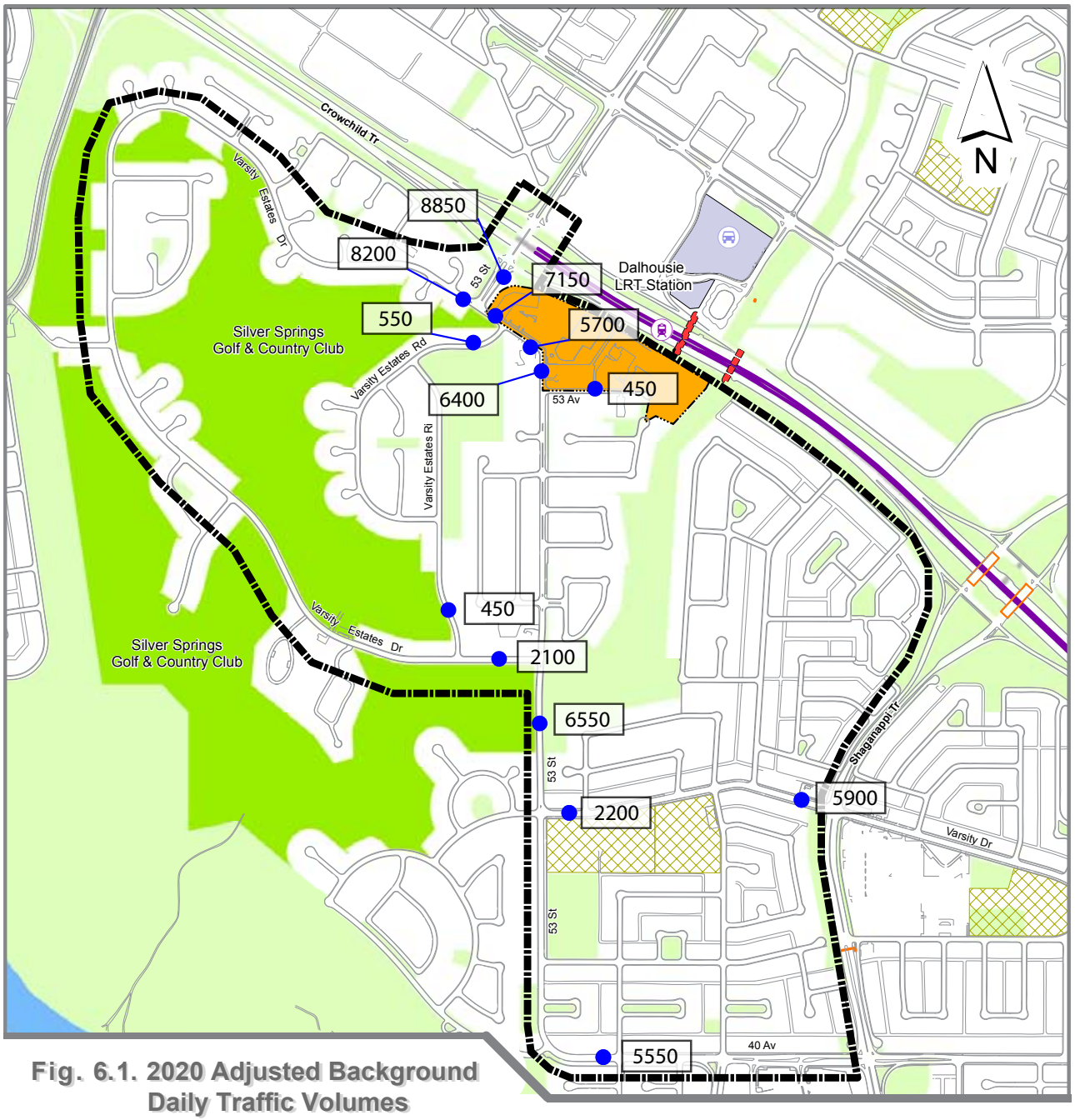

Fig. 6.1. 2020 Adjusted Background Daily Traffic Volumes

Legend

- Transportation Study Area
- Varsity Land Use Study Area
- 100 Vehicles Per Day
- LRT Alignment
- LRT Station
- School Parcels
- Pedestrian Overpass
- Park and Ride
- Golf Course
- Parks & Open Space

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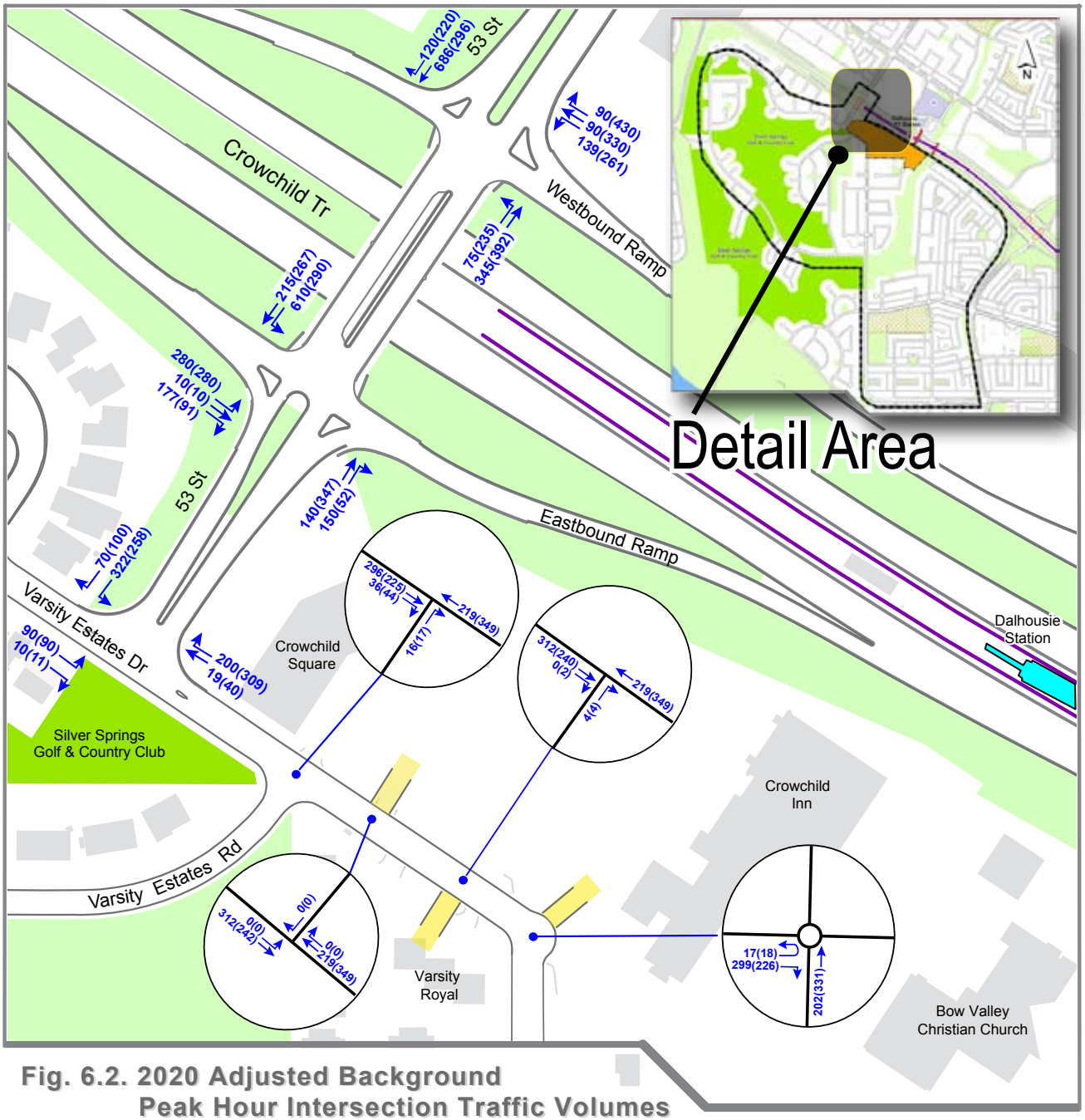

Fig. 6.2. 2020 Adjusted Background Peak Hour Intersection Traffic Volumes

Legend

- Transportation Study Area
- Varsity Land Use Study Area
- AM(PM) Peak Hour Traffic Volumes
- Driveway
- LRT Alignment
- LRT Station
- Buildings
- Golf Course
- Parks & Open Space

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6.2 2020 Combined Daily Traffic Volumes

The 2020 combined daily traffic volumes shown in Figure 6.3 were determined by adding the proposed land use daily trip assignment in Figure 5.5 to the 2020 adjusted background daily traffic volumes in Figure 6.1. The 2020 combined daily volumes and a comparison to 2007 existing daily volumes are discussed in Section 7.3.

6.3 2020 Combined Peak Hour Intersection Analysis

The 2020 combined peak hour intersection traffic volumes shown in Figure 6.4, were determined by adding the proposed land use trip assignment in Figure 5.6 to the 2020 adjusted background peak hour intersection traffic volumes in Figure 6.2. Intersection analysis is summarized in Table 6.2.

Table 6.2: 2020 Combined Peak Hour Intersection Analysis

INTERSECTION / MOVEMENT			AM PEAK HOUR				PM PEAK HOUR			
			v/c	Delay (s/veh)	95 Q (m)	LOS	v/c	Delay (s/veh)	95 Q (m)	LOS
Crowchild Trail Westbound Ramp / 53 Street NW *(signalized w/ NBLT adv. & WB dual shared LT in PM)*	WB	Left	0.75	45.2	67.9	D	0.91	58.3	118.9	E
		Through/Right	0.23	28.6	24.0	C	0.91	58.6	124.3	E
	NB	Left	0.73	24.6	33.8	C	0.92	27.6	130.1	C
		Through	0.45	7.4	55.4	A	0.54	5.7	25.8	A
	SB	Through/Right	0.60	19.6	97.6	B	0.84	43.0	104.2	D
	Overall Intersection		**0.75**	**20.1**	**-**	**C**	**0.92**	**31.2**	**-**	**C**
Crowchild Trail Eastbound Ramp / 53 Street NW *(signalized w/ SB dual thru (shared thru-left in AM))*	EB	Left/Through	0.74	43.7	70.3	D	0.75	44.4	70.3	D
		Right	0.64	7.7	22.6	A	0.49	6.8	17.5	A
	NB	Through/Right	0.78	19.9	68.5	B	0.77	24.3	109.5	C
	SB	Left	0.81	35.1	109.3	D	0.83	30.1	46.7	C
		Through	0.83	29.5	73.8	C	0.28	5.7	34.8	A
	Overall Intersection		**0.83**	**25.1**	**-**	**C**	**0.83**	**20.9**	**-**	**C**
53 Street/Varsity Estates Drive NW (North Leg) *(signalized with RT overlap in PM)*	EB	Left/Through	0.39	33.9	21.1	C	0.44	36.4	25.5	D
	WB	Through	0.29	30.9	18.7	C	0.38	33.9	26.3	C
		Right	0.88	13.8	26.3	B	0.79	6.2	0.0	A
	SB	Left/Right	0.36	2.5	19.2	A	0.32	9.6	61.0	A
	Overall Intersection		**0.88**	**10.1**	**-**	**B**	**0.79**	**10.6**	**-**	**B**
53 Street NW/ Crowchild Inn Access *(modified roundabout)*	EB	Left/Through/Right	0.28	6.8	0.0	A	0.40	6.9	0.0	A
	WB	Left/Through/Right	0.41	4.2	27.0	A	0.31	6.0	20.0	A
	NB	Left/Through/Right	0.31	9.4	19.0	A	0.65	13.8	64.0	B
	SB	Left/Through/Right	0.38	7.4	25.0	A	0.22	5.8	13.0	A
	Overall Intersection		**0.41**	**6.9**	**-**	**A**	**0.65**	**9.1**	**-**	**A**
53 Street/Varsity Estates Drive NW (South Leg) *(3-way stop)*	EB	Left/Right	-	9.7	-	A	-	10.8	-	B
	NB	Through/Left	-	11.5	-	B	-	161.5	-	F
	SB	Through/Right	-	11.0	-	B	-	10.7	-	B
	Overall Intersection		**-**	**10.9**	**-**	**B**	**-**	**119.8**	**-**	**F**
53 Street/Varsity Drive NW *(4-way stop)*	EB	Left/Through/Right	-	9.0	-	A	-	10.9	-	B
	WB	Left/Through/Right	-	9.5	-	A	-	17.2	-	C
	NB	Left/Through/Right	-	10.2	-	B	-	106.1	-	F
	SB	Left/Through/Right	-	14.8	-	B	-	16.1	-	C
	Overall Intersection		**-**	**12.4**	**-**	**B**	**-**	**62.3**	**-**	**F**

With the road network improvements discussed in Section 5.2 implemented, analysis of the study area intersections using the 2020 combined peak hour intersection counts shows that all signalized and stop controlled intersections and their individual turning movements operate within acceptable City of Calgary standards with these exceptions:

- Crowchild Trail Westbound Ramp / 53 Street – westbound approach and northbound left operate at capacity in the afternoon peak hour. Analysis indicates that there could be queuing on the westbound ramp during this peak hour.
- 53 Street/Varsity Estates Drive (south leg) – northbound stop operates at a Level of Service F with anticipated delays of 2min 40sec.
- 53 Street/Varsity Drive – northbound stop operates at a Level of Service F with delays of 1min 45sec

The addition of development traffic increases the delay at the multi-way stops along 53 Street. This delay is not caused by conflicting traffic, but by the traffic control device itself.

Modifying the multi-way stops to stop control on the minor intersecting streets improves the overall operation of 53 Street / Varsity Estates Drive significantly by removing the delay for the northbound traffic. The intersection of 53 Street / Varsity Drive NW will still experience increased delay, but this delay is shifted to the eastbound and westbound movements. This minor street stop control operation is summarized in Table 6.3.

The land use examined in this report is comprised of nearly 85% multi-family residential. The trip generation rates applied in this updated study are consistent with the 2006 DA Watt work – 0.5 trips/unit am peak hour and 0.6 trips/unit pm peak hour. These trip rates were endorsed by the City in 2004. Since that time, with supporting local data, Transportation Planning currently endorses 30% lower trip rates for use in TOD areas (e.g. Heritage Station). An examination of the operations of the network with these standard rates eliminates the operational concerns on the Crowchild Trail Westbound ramp intersection and reduces the northbound delay at the two stop controlled intersections by over 20 per cent.

Table 6.3: Minor Street Stop-Controlled Intersection Analysis

INTERSECTION / MOVEMENT			AM PEAK HOUR				PM PEAK HOUR			
			v/c	Delay (s/veh)	95 Q (m)	LOS	v/c	Delay (s/veh)	95 Q (m)	LOS
53 Street/Varsity Estates Drive NW (South Leg) *(EB stop)*	EB	Left/Right	-	12.7	-	B	-	24.0	-	C
	NB	Through/Left	-	1.3	-	A	-	2.2	-	A
	SB	Through/Right	-	0.0	-	-	-	0.0	-	-
	Overall Intersection		**-**	**3.6**	**-**	**-**	**-**	**4.4**	**-**	**-**
53 Street/Varsity Drive NW *(E-W stop)*	EB	Left/Through/Right	-	17.2	-	C	-	85.4	-	F
	WB	Left/Through/Right	-	12.4	-	B	-	75.2	-	F
	NB	Left/Through/Right	-	0.4	-	A	-	0.4	-	A
	SB	Left/Through/Right	-	2.9	-	A	-	2.9	-	A
	Overall Intersection		**-**	**4.5**	**-**	**-**	**-**	**21.3**	**-**	**-**

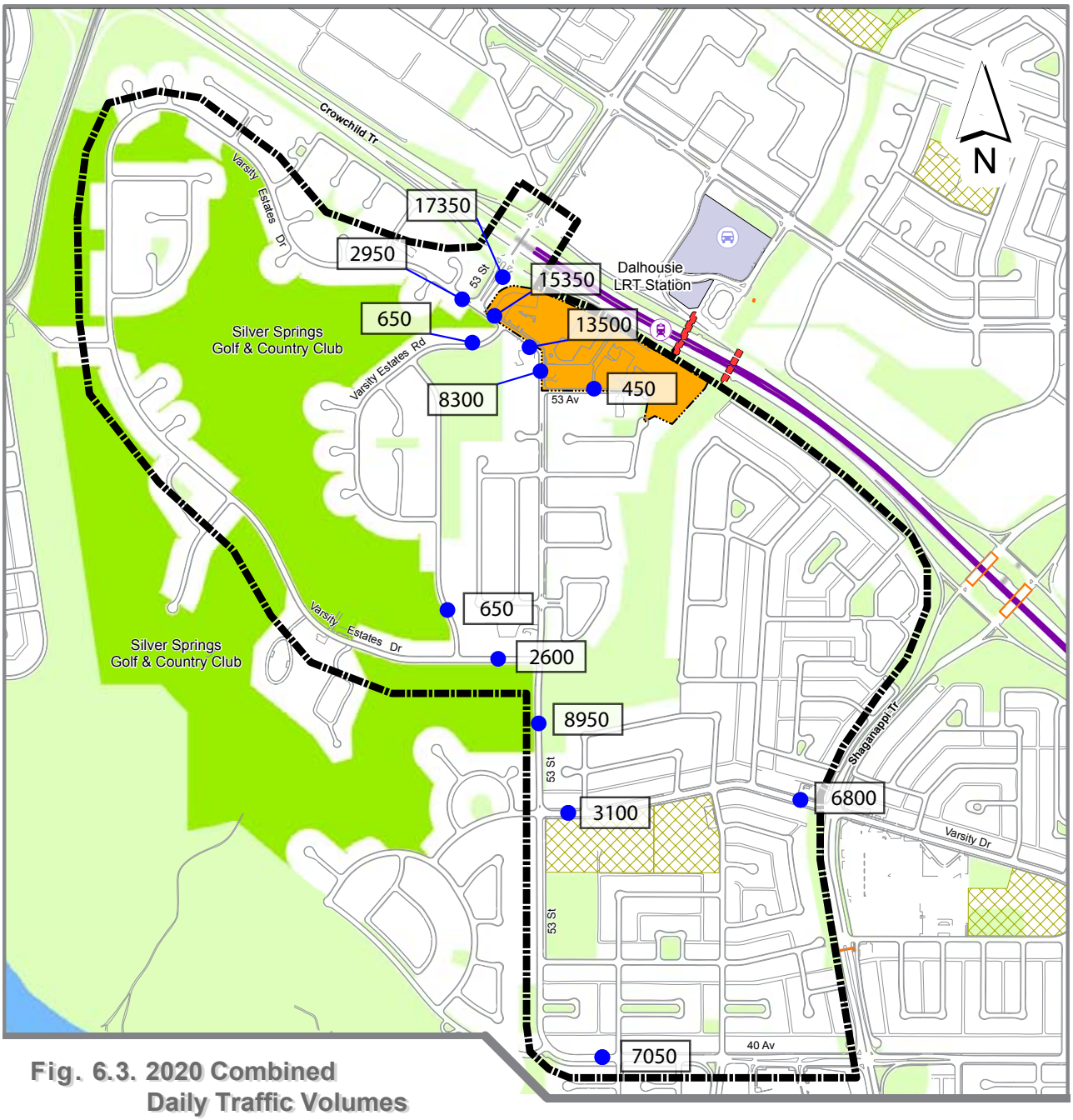

Fig. 6.3. 2020 Combined Daily Traffic Volumes

Legend

- Transportation Study Area
- Varsity Land Use Study Area
- 100 Vehicles Per Day
- LRT Alignment
- LRT Station
- School Parcels
- Pedestrian Overpass
- Park and Ride
- Golf Course
- Parks & Open Space

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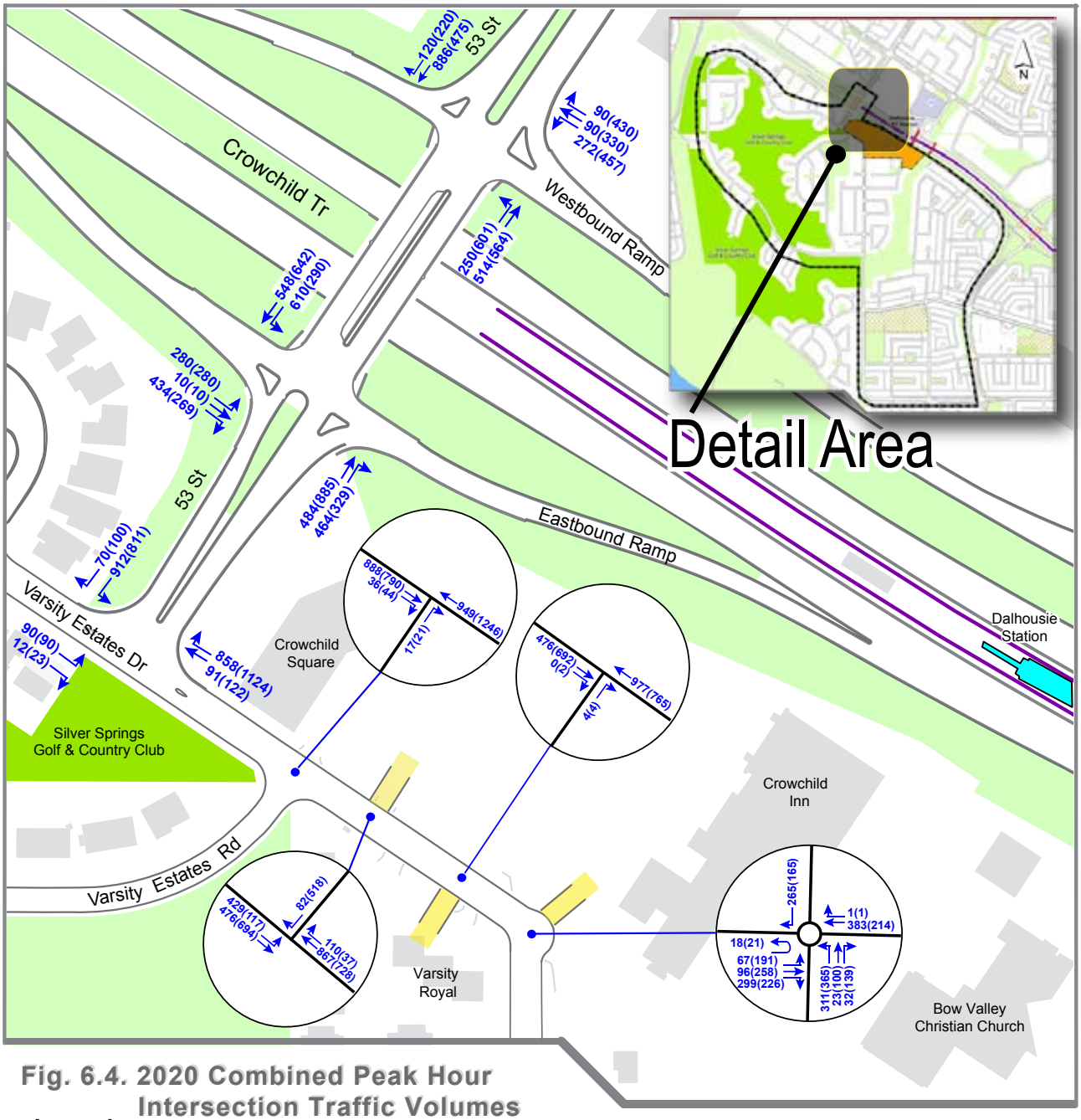

Fig. 6.4. 2020 Combined Peak Hour Intersection Traffic Volumes

Legend

- Transportation Study Area
- Varsity Land Use Study Area
- AM(PM) Peak Hour Traffic Volumes
- Driveway
- LRT Alignment
- LRT Station
- Buildings
- Golf Course
- Parks & Open Space

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7.0 CONCLUSIONS

7.1 Proposed Road Network Improvements

Various road network improvements are required to discourage new development traffic from exiting to southbound 53 Street and to provide an acceptable level of service on the road network to support the additional traffic demand from increased density.

The improvements, previously shown in Figure 5.2 are summarized as follows:

1. Installation of traffic signals at 53 Street/Varsity Estates Drive
2. Conversion of the southbound right turn lane at 53 Street / Varsity Estates Drive to a shared left/right turn lane.
3. Introduction of a single restricted turn's access for the future redeveloped Crowchild Square site. Eastbound left turns, westbound right, and southbound right turns only will be permitted.
4. Introduction of a four lane cross-section on Varsity Estates Drive between 53 Street (north leg) and the proposed Crowchild Square access.
5. Introduction of a modified roundabout at the 53 Street/Varsity Estates Drive curve to prevent development traffic from egressing south.
6. Introduction of a raised median between the proposed Crowchild Square access and the modified roundabout.
7. Introduction of an internal road network that connects to the modified roundabout.

Additional improvements, not previously identified in the DA Watt study, are proposed for the Crowchild Trail / 53 Street intersections to improve the interchange operations. These improvements include:

- Westbound ramp intersection: northbound left advance phase and conversion of the westbound through lane to a shared left lane.
- Eastbound ramp intersection: channelized southbound left turn and conversion of the existing southbound left lane to a southbound through lane.

7.2 2020 Combined Daily Traffic

Post-development daily traffic volumes (i.e. 2020 combined daily traffic volumes) were determined in the following manner:

1) 2020 background traffic volumes were adjusted to:
    a. remove existing land uses currently on the site
    b. account for redistribution of traffic with the required road network improvements in place
2) development traffic was generated, distributed, and assigned to the road network
3) the development traffic was added to the 2020 adjusted background daily traffic volumes

2007 Existing, 2020 Background, 2020 Adjusted Background, Development, and 2020 Combined Daily Traffic Volumes are summarized in Table 7.3.

Table 7.3: Daily Volume Summary
(vehicles per day)

Location	EDG*	2007 Existing	2020 Background	2020 Adjusted Background	Development Traffic	2020 Combined
53 St North of Varsity Est. Dr	30,000	11,700	11,700	8,850	8,500	17,350
Varsity Est. Dr West of 53 St	5,000	2,500	2,500	2,200	750	2,950
Varsity Est. Dr East of 53 St	10,000	10,200	10,200	7,150	8,200	15,350
Varsity Est. Dr East of Varsity Est. Rd	10,000	7,200	7,400	5,700	7,800	13,500
Varsity Est Road	1,000	750	750	550	100	650
Varsity Est. Rise	1,000	450	450	550	100	650
Varsity Est. Dr (south leg)	5,000	2,000	2,000	2,100	500	2,600
53 Street North of 53 Ave	10,000	7,000	7,200	6,400	1,900	8,300
53 Avenue	1,000	850	850	450	0	450
****53 St North of Varsity Drive**	**10,000**	**7,000**	**7,200**	**6,550**	**2,400**	**8,950**
Varsity Drive East of 53 St	5,000	2,400	2,400	2,200	900	3,100
Varsity Drive West of Shag.	10,000	6,100	6,100	5,900	900	6,800
40 Avenue East of 53 St	10,000	6,000	6,000	5,550	1,500	7,050

* EDG – Environmental Design Guideline (City of Calgary Design Guidelines for Subdivision Servicing)
** 53 Street “Ravine” Location

Table 7.3 shows that with the exception of Varsity Estates Drive near the redeveloped sites, 2020 combined daily traffic conditions do not exceed the Environmental Design Guidelines for all study area roads. Compared to 2007 Existing conditions, the following noteworthy daily traffic impacts on the local roads are anticipated:

- Varsity Estates Drive (north leg): 450 vpd increase
- Varsity Estates Drive (south leg): 600 vpd increase
- Varsity Estates Road: 100 vpd decrease
- Varsity Estates Rise: 200 vpd increase
- 53 Street (ravine location): 1,750 vpd increase
- Varsity Drive: 700 vpd increase

At the 2020 Combined conditions, with the exception of Varsity Estates Drive directly adjacent to the study area, Environmental Design Guidelines are not exceeded on any study area roads, including 53 Street. While Varsity Estates Drive is anticipated to carry over 15,000 vehicles per day, this is limited to a short segment of roadway with limited medium density residential frontage to the south, the roadway is being widened to accommodate the additional traffic, and Transit Oriented Development objectives are being met.

7.3 2020 Combined Peak Hour Intersection Performance

With the road network improvements discussed in Section 5.2 implemented, analysis of the study area intersections using the 2020 combined peak hour intersection counts shows that all signalized and stop controlled intersections and their individual turning movements operate within City of Calgary standards with these exceptions:

- Crowchild Trail Westbound Ramp / 53 Street – westbound approach and northbound left operate at capacity in the afternoon peak hour. Analysis indicates that there could be queuing on the westbound ramp during this peak hour.
- 53 Street/Varsity Estates Drive (south leg) – northbound stop operates at a Level of Service F with anticipated delays of 2min 40sec.
- 53 Street/Varsity Drive – northbound stop operates at a Level of Service F with delays of 1min 45sec

Modifying the multi-way stops to stop control on the minor intersecting streets improves the overall operation of both intersections.

The land use examined in this report is comprised of nearly 85% multi-family residential. The trip generation rates applied in this updated study are consistent with the 2006 DA Watt work – 0.5 trips/unit am peak hour and 0.6 trips/unit pm peak hour. These trip rates were endorsed by the City in 2004. Since that time, with supporting local data, Transportation Planning currently endorses 30% lower rates for use in TOD areas (e.g. Heritage Station). An examination of the operations of the network with these reduced residential rates eliminates the operational concerns on the Crowchild Trail Westbound ramp intersection and reduces the northbound delay at the two stop controlled intersections by over 20 per cent.

7.4 Supportable Land Use

The proposed land use, summarized in Table 7.2, was based on the Maximum F.A.R. for each parcel as set out in the Varsity Land Use Study Policy document. This served as the base land use assumption used throughout this updated Transportation Study. 2020 combined intersection peak hour volumes were analyzed at five intersection locations along 53 Street. Results indicate that individual intersection movements and overall intersection operations are within acceptable City of Calgary standards, provided the proposed road network improvements in Section 7.1 are implemented, and currently accepted City of Calgary multi-family trip rates within TOD areas are applied.

Table 7.2: Land Use Summary

PARCEL	OFFICE (sq ft)	RETAIL (sq ft)	MULTI-FAMILY UNITS
Crowchild Square	240,000	20,000	
Crowchild Inn		6,000	593
Enmax			122
Bow Valley Church			452
Varsity Est. Villiage			292
TOTAL	**240,000**	**26,000**	**1459**

In conclusion, traffic generated by redevelopment of the Varsity Land Use study area to its maximum potential (as governed by the maximum F.A.R. within the guiding policies) can be supported by the surrounding road network with improvements along Varsity Estates Drive and 53 Street. As select intersection movements are at capacity, no additional land use over and above the maximum F.A.R. can be supported by the surrounding road network within the context of Transit Oriented Development.

APPENDIX A: Council Motion and Report Scope
APPENDIX B: Responses to Community Questions and Concerns

Appendix A: Council Motion and Report Scope

VARSITY LAND USE STUDY
UPDATED TRAFFIC IMPACT STUDY

PROPOSED SCOPE

- 3 Horizons: Existing (2007), 2020 Background, 2020 Combined

- Daily Volumes at each horizon on the following roadways:
  - 53 Street – 3 locations – south of Varsity Drive, ravine, north of Varsity Estates Drive
  - 53 Avenue – east of 53 Street
  - Varsity Drive – east of 53 Street
  - 40 Avenue – east of 53 Street
  - Varsity Estates Drive – 3 locations – west of 53 St at ravine, east of 53 St at Crowchild, west of 53 Street at Crowchild
  - Varsity Estates Road
  - Varsity Estates Rise

- AM and PM peak hour intersection analysis at the following locations:
  - 53 Street / Varsity Estates Drive (near Crowchild Trail)
  - 53 Street / Crowchild Trail Interchange (north and south intersections)

- Assume proposed roadway improvements are in place at 2020 horizon. This includes:
  a) Signals at 53 Street/Varsity Estates Drive
  b) Dual southbound left turns at 53 Street/Varsity Estates Drive
  c) Modified Roundabout at 53 Street (east) / Varsity Estates Drive
  d) Median along Varsity Estates Drive between 53 Street and modified roundabout
  e) Four-lane cross section of Varsity Estates Drive between 53 Street and redeveloped Crowchild Square access
  f) Left-in access at redeveloped Crowchild Square access

- Include Enmax site is redeveloped

- Assume following land use:
  - 26,000 sq. ft. retail
  - 240,000 sq. ft. office
  - Multi-family dwelling units for remainder – number to be determined based on capacity of road network

C2007-036

REFER, Moved by Alderman Hodges, Seconded by Alderman Burrows,

That Council refer the Varsity Land Use Study contained in Report CPC2007-036 as moved by Alderman Lowe, seconded by Alderman King, for eight weeks or to not later than the Combined Council Meeting of 2007 May 07, in order for the following matters to be addressed by Land Use Planning and Transportation: 1. The completion of an independent, updated traffic impact analysis of the Study Area and surrounding road network, including 53 Street, 53 Avenue, Varsity Estates Rd., Varsity Estates Rise, Varsity Estates Drive, Varsity Drive and 40 Avenue, with a horizon date of 15 years. The purpose of this analysis would be to determine what density can be accommodated in the Study Area without compromising the existing roadway infrastructure.	General Manager, Planning, Development & Assessment & General Manager, Transportation

CARRIED

REFER, Moved by Alderman Hodges, Seconded by Alderman Burrows,

That Council refer the Varsity Land Use Study contained in Report CPC2007-036 for eight weeks or to not later than the Combined Council Meeting of 2007 May 07, in order for the following matters to be addressed by Land Use Planning and Transportation: 1. One of the important transportation planning concepts mentioned on page 26 of the Varsity Land Use Study, is “the internal road network that will help connect the sites within the study area.” (Policy 29). However, an internal road network concept does not appear on any of the illustrations or Land Use Concept plans in the Study document. A concept plan for an internal road network be included in the same report which provides responses to the issues outlined above.	General Manager, Planning, Development & Assessment & General Manager, Transportation

ROLL CALL VOTE:

For: Aldermen Chabot, Erskine, Hawkesworth, Hodges, Jones, McIver and Burrows
Against: Aldermen Farrell, Fox-Mellway, King, Lowe and Deputy Mayor Ceci

CARRIED

Appendix B: Responses to Community Questions and Concerns

B.1 2007 March 27 Meeting with Darlene Feil

On Tuesday, 2007 March 27, Transportation Planning met with Darlene Feil (Varsity Civic-Affairs Sub-Committee) and Alderman Hodges to answer questions surrounding the updated Transportation Study that was being worked on. Responses to those questions are in italics.

"An updated study should:

1. Include the Enmax site."

The updated study has included redevelopment of this site.

"2. Use a post-horizon of 25 years for future background traffic volumes (including additional buses as energy prices increase) instead of 2008."

A 2020 future background horizon has been used for the study. Forecast volumes at this horizon indicate that volumes will not change over the next 13 years.

"3. Assume there will be no access to 53 Avenue."

No access to 53 Avenue is assumed in the updated study.

"4. Evaluate the impact on existing roads without any improvements."

There would be very little value to this evaluation. Several of the road network improvements are required to accommodate the additional traffic. Without them, the road network would not be able to function within an acceptable level of service.

"5. Ascertain the existing traffic volumes to and from the study area."

Existing daily traffic counts were undertaken at 11 locations within the study area between 2007 March 20-22.

"6. Use a trip generation rate of six vehicle trips per unit for all residential development (i.e. no reduced trip generation for seniors accommodation)."

All residential redevelopment in the updated study was assumed to be multi-family with no seniors component. A daily trip rate of 6 trips/unit was used.

"7. Assess the level of service at all intersections in view of the increased density on the entire study area."

The morning and afternoon peak hour level of service was only examined at the signalized intersections and collector road intersections along 53 Street.

"8. Include existing traffic counts on 53 Street (north end and ravine), 53 Avenue, Varsity Estates Drive east of 53 Street, Varsity Estates Road, Varsity Estates Rise, Varsity Drive (east of 53 Street and west of Shaganappi Trail), and 40 Avenue."

These locations were all stated in the Council Motion for the updated study and have been included.

"9. Evaluate the impact of additional traffic volumes from the study area, short-cutting traffic through the community, as well as changes in traffic patterns within the community on all neighborhood roadways including Varsity Estates Drive (west of 53 Street) and Varsity Estates Road."

This evaluation has been undertaken.

"In evaluating the impact of road improvements such as the proposed roundabout, the study should:

10. Update the proposed road configuration to include a median on Varsity Estates Drive which prevents left turns to and from Varsity Estates Road. It is important that the median be constructed at the same time as the roundabout to prevent short-cutting down the Road/Rise. At the same time, the impact on the residents of the Varsity Estates Road/Rise/Bays who now must go around the roundabout to get to Crowchild Trail should be examined. This also adds traffic to the roundabout."

A median will be constructed along Varsity Estates Drive and it will prevent left turns to and from Varsity Estates Road. The timing of the median, however, is dependant on the redevelopment of the Crowchild Square site as additional road width would be required to implement this feature. The impact of the residents that must use the roundabout has been taken into account in the analysis.

"11. An alternative is a traffic light at Varsity Estates Road & Varsity Estates Drive (dual timed with the lights at Varsity Estates Drive & 53 Street) that allows only right turns from Varsity Estates Drive to Varsity Estates Road and left turns from the Road to the Drive."

Traffic volumes are very unlikely to meet the required levels to warrant traffic signal installation, they would be too closely spaced to 53 Street for coordination, and it would add additional travel delay to Varsity Estates Drive. Signals at this location would be highly undesirable.

"12. Evaluate the ability of Varsity Estates Drive to accommodate traffic between the roundabout and the light at 53 Street via a detailed simulation study (with and without the light at Varsity Estates Road & Varsity Estates Drive)."

This was previously examined with the same land use assumptions. The scenario with traffic signals at Varsity Estates Road was not evaluated for the reasons stated in #11.

"13. Evaluate the design of the median on Varsity Estates Drive."

The median has been shown conceptually designed by DA Watt. This concept design was endorsed by the City of Calgary. When the Crowchild Square site redevelops, a detailed design to the City's satisfaction will be required.

"14. Determine if sufficient land exists to widen Varsity Estates Drive to four lanes without moving the sidewalk south."

This was determined during the evaluation of the concept design. The south curb of Varsity Estates Drivedoes not need to be relocated. All required widening will occur to the north.

"15. Take into account the impact of cut-through traffic which will be facilitated by dual turns in and out of the community."

Only dual turns in to the community are being considered at 53 Street/Varsity Estates Drive. The inside left turn lane will be designated for Crowchild Square traffic only. The changes to this intersection (dual left turns, signals) will not encourage traffic to use this route to a greater degree than existing conditions.

"16. Take into account the impact of diverted vehicle trips from current Varsity residents accessing the study area who will not longer be able to turn south on 53 Street to return home."

This has been taken into account by distributing some exiting traffic to Varsity Estates Drive westbound.

"17. Evaluate the impact of eliminating once access point to the Varsity Royal Condos, particularly with respect to emergency response vehicles."

Closure of one of the Varsity Royal Condos to accommodate the design of the roundabout consolidates 4 vehicle trips in the peak hour. As the roadway internal to the condo site does not exceed 200 meters distance from the driveway entrance, emergency access standards are being met.

"18. Evaluate the impact of residents of the study area returning home via 53 Street from Market Mall and other points to the south."

Residential trip distribution patterns of the proposed residential developments is addressed in Section 5.3 of the report.

"19. Evaluate the impact of "link" trips between Market Mall and commercial development in the study area."

This specific trip potential is too insignificant to alter traffic distribution patterns..

"20. Determine the location of transit lay-bys."

Transit lay-bys are not being considered. Transit buses stopping on collector routes is common practice throughout the City.

"Internal Road Network

1. A conceptual plan for an internal road network should be completed."

This has been provided in the report.

"2. The Study should specify how the internal road network will be protected."

The internal road network will be a requirement of land use at time of redevelopment. An internal road concept is shown in Figure 5.3 of this report.

"3. The Study should specify that future connections between the study area and 53 Avenue will not be permitted."

The study does not specify this, but the traffic work is based on no connections. Policy would be required to dictate that no access would be permitted.

"4. Indicate possible kiss n ride locations."

This has not been determined at this time.

An additional request during the meeting was an evaluation of the intersection operations at Shaganappi Trail & Varsity Drive. There was some concern that some movements were currently operating at or above capacity and could be further exacerbated by additional development in the area.

Currently, the intersection of Shaganappi Trail and Varsity Drive operates very well in the morning peak hour with an overall intersection delay of 8 seconds (Level of Service A). The movement with the highest delay is the eastbound approach with an average delay of 20 seconds (Level of Service C). The intersection operates well overall in the afternoon peak hour with an intersection delay of less than 20 seconds (Level of Service B), but the southbound left turning movement has a delay of over 3 minutes (Level of Service F). Discussions with Traffic Signals Division in Calgary Roads revealed that there are plans in the near future to install northbound and southbound advanced left turn arrows at this intersection. Revisiting the analysis with this intersection modification shows that the operation of the southbound left turn movement will improve to a delay of 28 seconds (Level of Service C). A summary of the analysis is included in Table B.1.

Table B.1: 2007 Existing Intersection Peak Hour Analysis

INTERSECTION / MOVEMENT			AM PEAK HOUR				PM PEAK HOUR			
			v/c	Delay (s/veh)	95 Q (m)	LOS	v/c	Delay (s/veh)	95 Q (m)	LOS
Varsity Drive & Shaganappi Trail *(signalized)*	EB	Left/Through/Right	0.36	20.1	13.7	C	0.43	41.3	25.4	D
	WB	Left/Through/Right	0.25	18.5	10.0	B	0.69	52.6	52.5	D
	NB	Left	0.13	8.0	8.2	A	0.23	8.0	16.3	A
		Through	0.16	5.1	25.4	A	0.72	11.7	198.2	B
		Right	0.02	3.3	3.0	A	0.07	1.6	5.5	A
	SB	Left	0.11	6.1	13.6	A	1.23	204.6	48.8	F
		Through/Right	0.32	5.6	52.6	A	0.27	5.3	38.6	A
	Overall Intersection		**0.36**	**7.7**	**-**	**A**	**1.23**	**19.6**	**-**	**B**
Varsity Drive & Shaganappi Trail *(signalized with advance turn arrows)*	EB	Left/Through/Right	0.36	19.0	13.2	B	0.47	43.5	25.4	D
	WB	Left/Through/Right	0.25	18.6	10.0	B	0.68	44.6	44.1	D
	NB	Left	0.13	7.0	6.5	A	0.21	6.1	12.3	A
		Through	0.18	9.3	34.6	A	0.79	19.1	252.4	B
		Right	0.02	5.8	4.1	A	0.08	3.5	8.6	A
	SB	Left	0.12	5.8	12.5	A	0.55	28.2	30.6	C
		Through/Right	0.35	9.1	69.3	A	0.29	8.2	48.9	A
	Overall Intersection		**0.36**	**10.4**	**-**	**B**	**0.79**	**19.3**	**-**	**B**

B.2 Friday, 2007 March 30 E-mail From Darlene Feil

"1. We believe it would be prudent that the Transportation Study not only address the impact of high density redevelopment but also should address the traffic impacts if the minimum number of units as proposed in the Land Use Study were used as the baseline."

In the Motion that Council carried on2007 March 12, Transportation Planning was given the direction of examining the maximum number of units that could be supported by the Varsity road network within the updated study. Therefore, the minimum number of units was not a scenario that was examined,

"2. I asked at the meeting if there is a possibility that the access in and out of the Study area could be from one point only; thereby forcing vehicles to use Crowchild Trail which in turn would alleviate short cutting. The access would need to be off the dedicated lane from Crowchild Trail at the three way stop. This lane would need to be designed so as not to allow east-bound traffic from Varsity Estates Drive (west of the three way stop) to enter the lane. Residents eastbound wanting to access Crowchild Square would be required to use the roundabout."

Your suggested modification is unclear. The proposed road improvements appear to be the same, the only difference being the accessibility for drivers on Varsity Estates Drive eastbound to drive to the redevelopment would be reduced.

"3. How are the projected number of vehicle trips determined that would be generated from NB traffic on 53 Street to the Study area?"

The basis of the percentage of inbound development trips from 53 Street is the observed traffic patterns of the existing land uses within the Varsity Land Use Study Area.

"4. How are the projected number of vehicle trips determined that would be generated on Varsity Estates Rise/Varsity Estates Rd and Varsity Estates Dr (west of 3 way stop)?"

The additional vehicle trips anticipated to be on Varsity Estates Rise, Varsity Estates Road, and Varsity Estates Drive are based on the trip distributions in Section 5.4 of this report.

"5. What F.A.R. is being used in your TIA and has it been broken down to indicate what percentage of the total floor area is assigned for multi-family dwelling units and what percentage is for other uses?"

Maximum F.A.R.s as indicated in the Policy Study for each parcel were applied. Based on floor area, the breakdown of land uses can be summarized as follows:

- *Retail 2 per cent*
- *Office 14 per cent*
- *Residential 84 per cent*