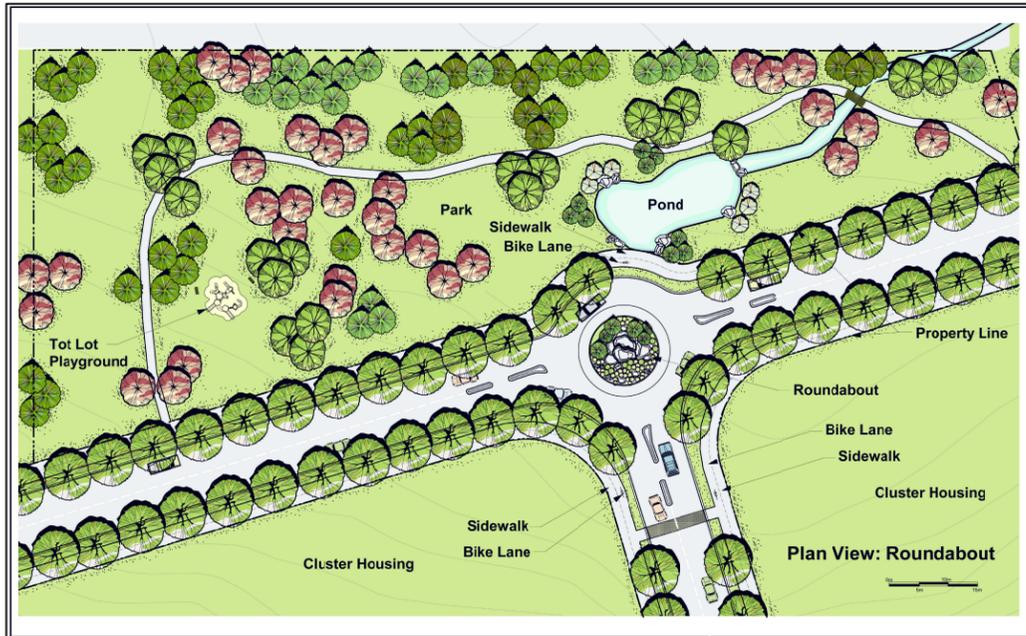


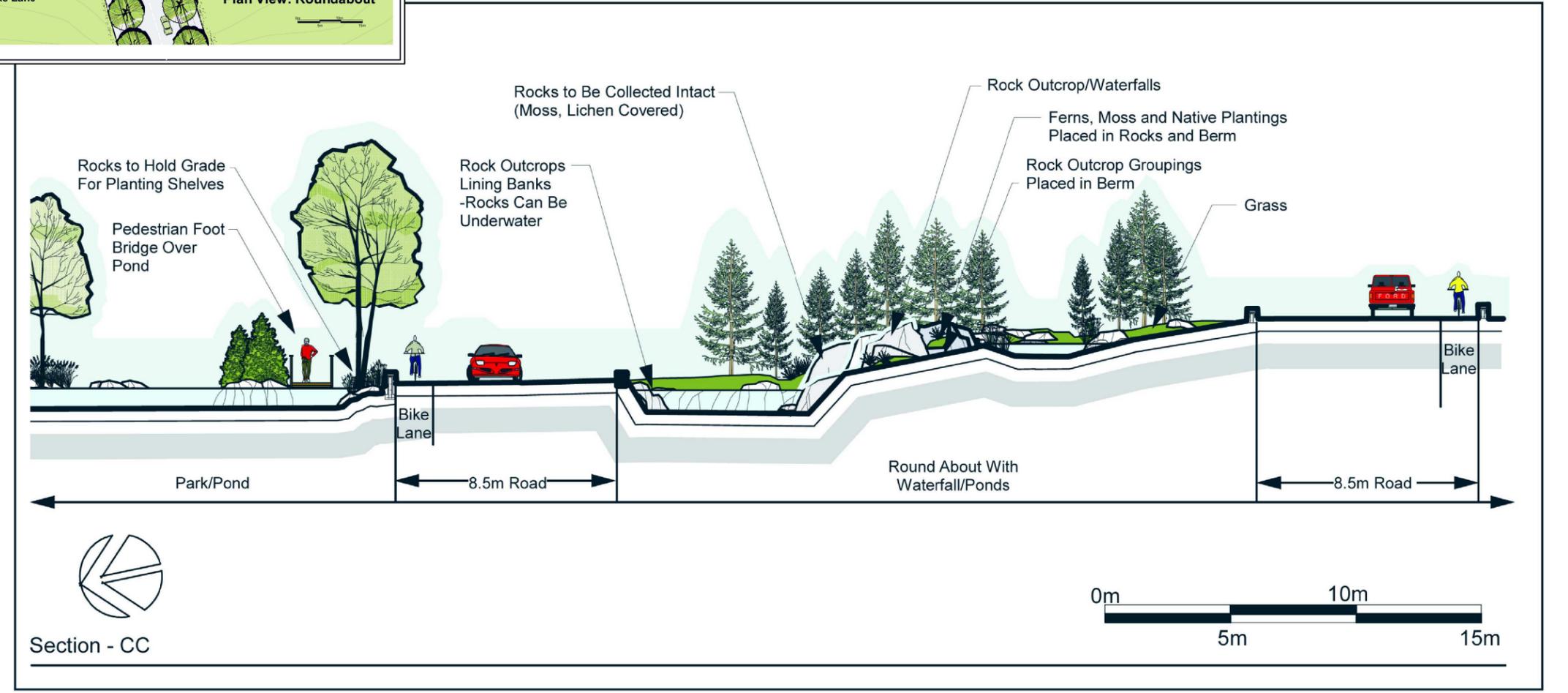


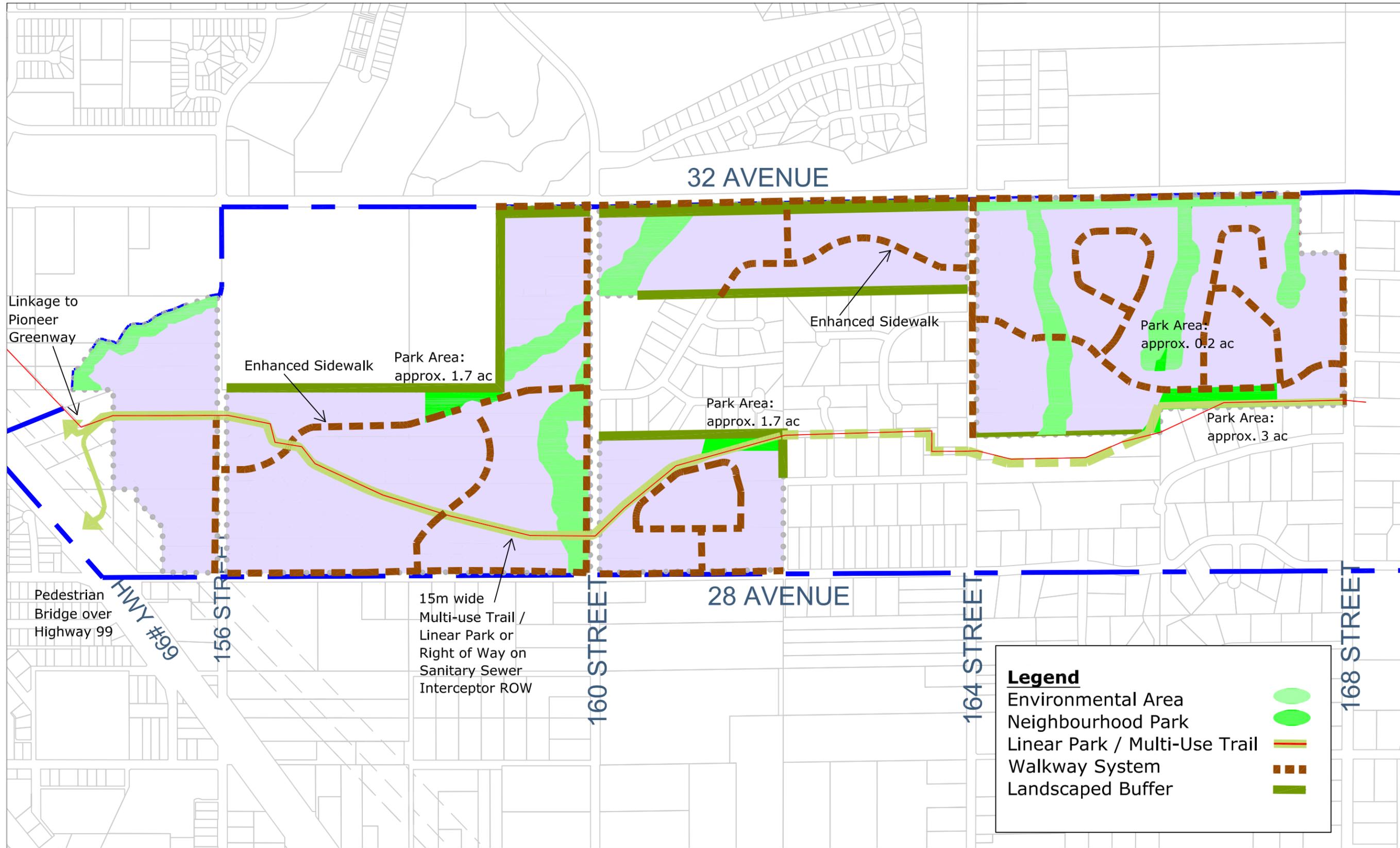
NORTH GRANDVIEW HEIGHTS  
NEIGHBOURHOOD CONCEPT PLAN

**Minor Street Entry Feature  
at 28th Avenue and 158th Street**



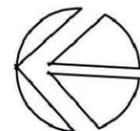
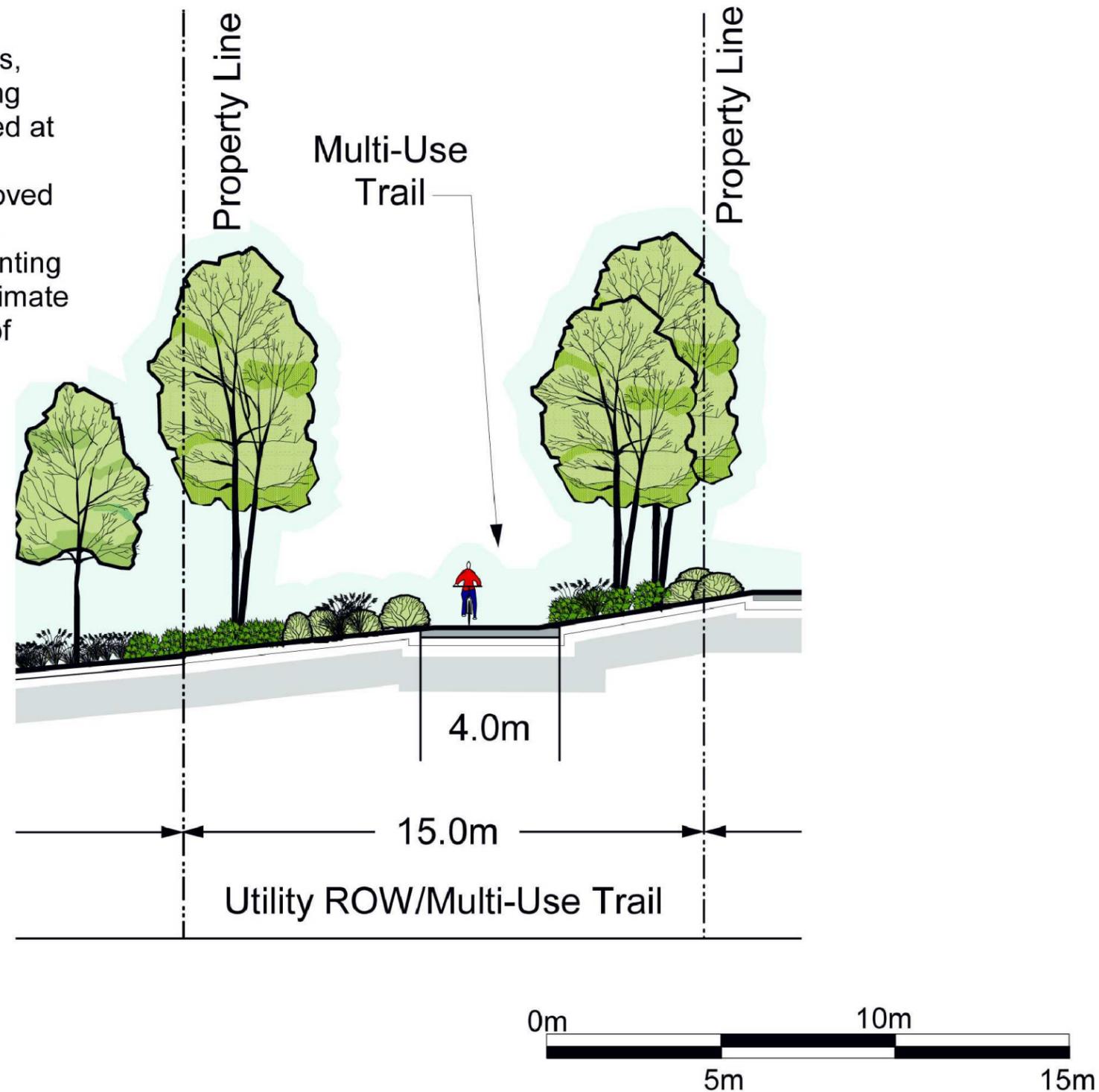
Note:  
Any water features in the round-about will have to be maintained under either a strata agreement or by a local home owners association; the City will not be responsible for maintaining such a water feature.



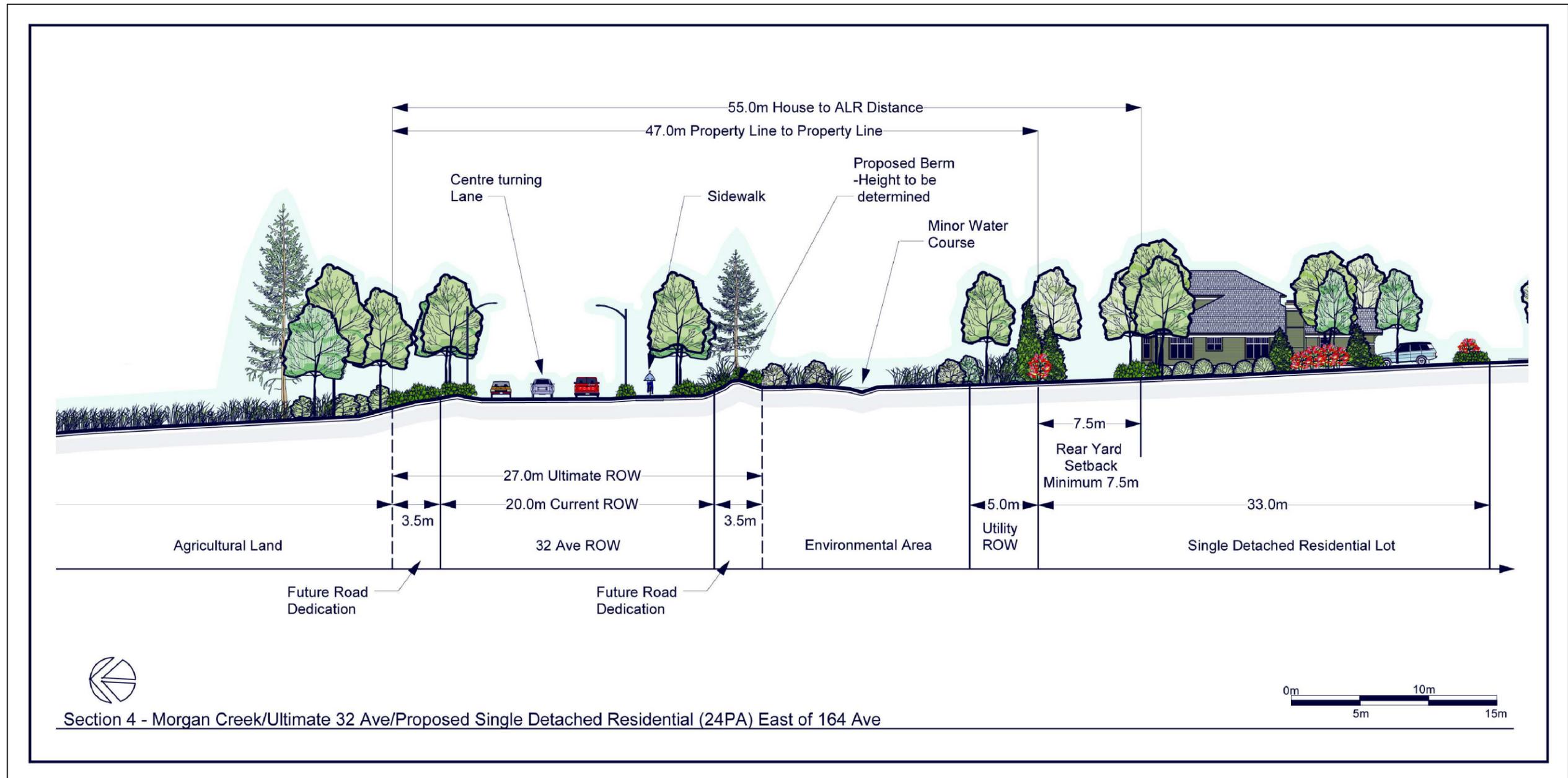


Note:

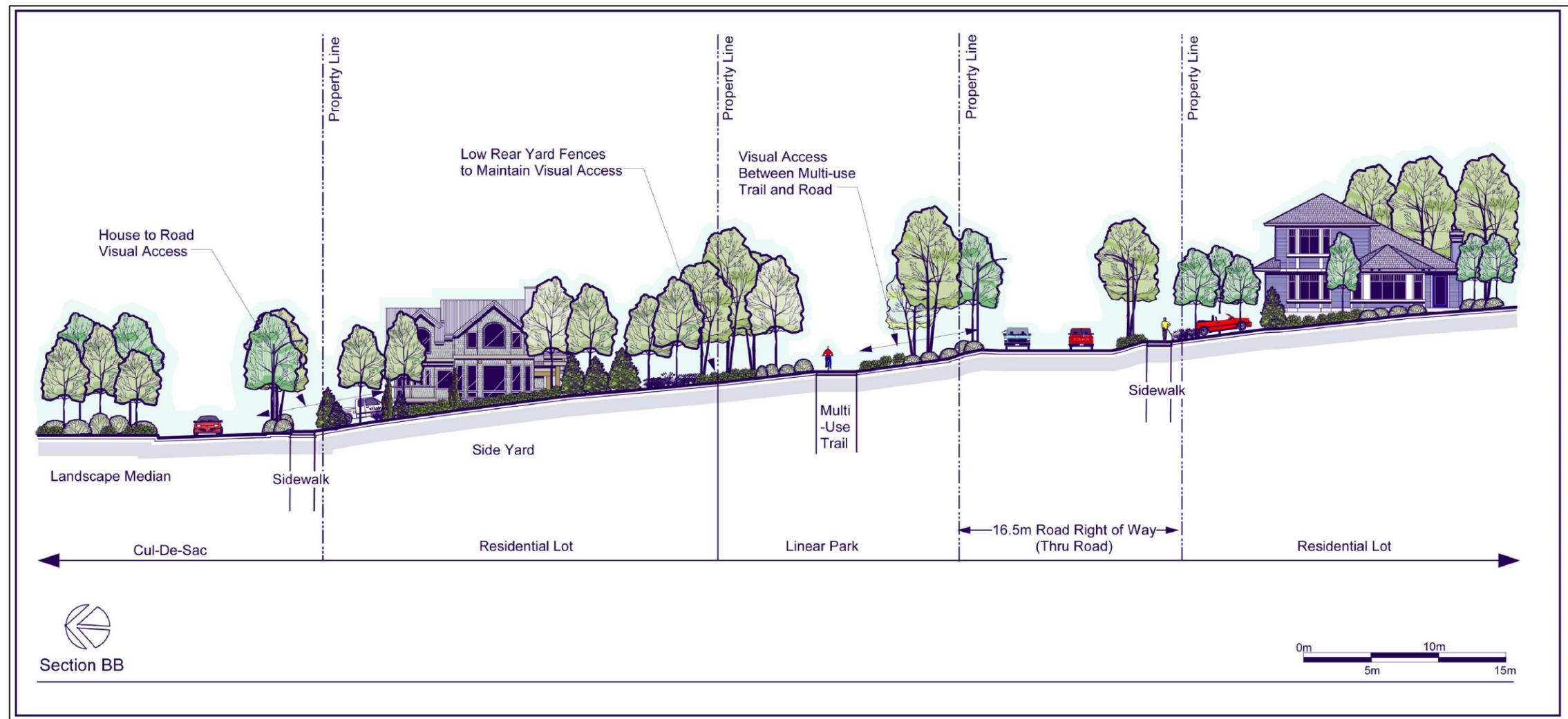
- Trail design, materials, trees, and landscaping details to be confirmed at time of development application and approved by the City of Surrey.
- Trail location and planting will vary based on ultimate design and location of Utility ROW.



Section 5,5

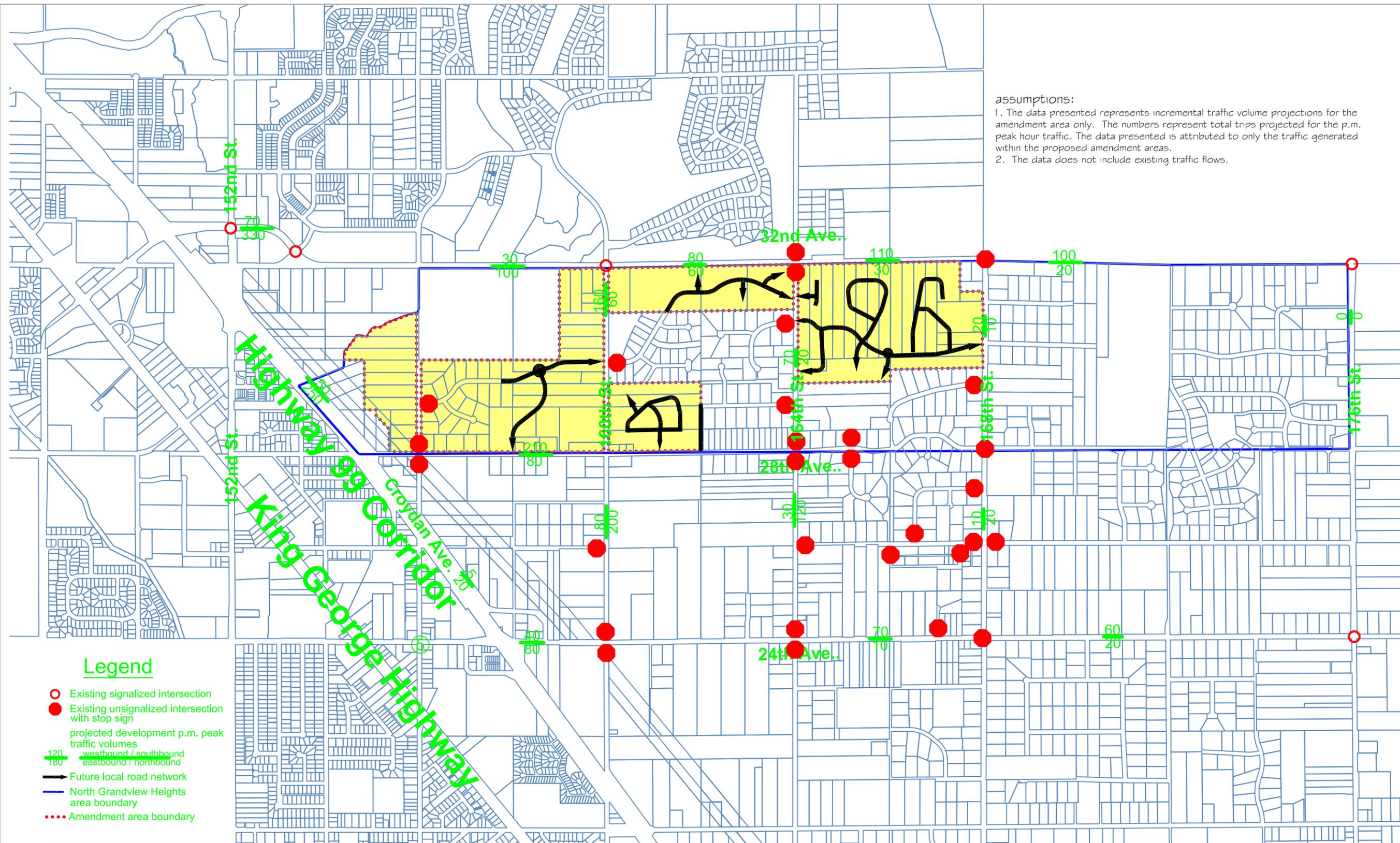


Parks and walkways will meet Crime Prevention Through Environmental Design (CPTED) standards, including walkways being visually open, located away from rear yard property lines, and feature low fences and vegetation to allow for visual access and surveillance.



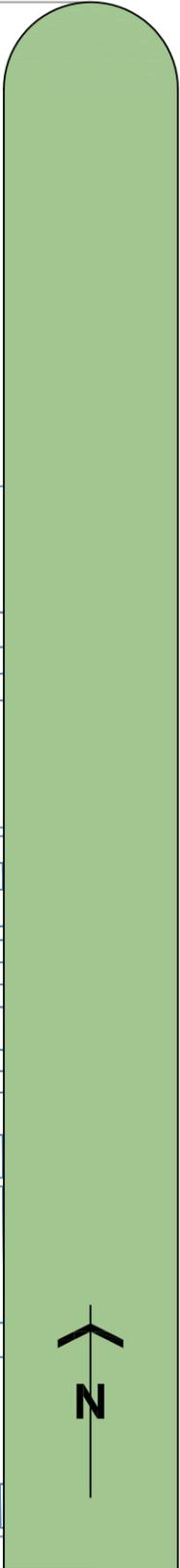
assumptions:

1. The data presented represents incremental traffic volume projections for the amendment area only. The numbers represent total trips projected for the p.m. peak hour traffic. The data presented is attributed to only the traffic generated within the proposed amendment areas.
2. The data does not include existing traffic flows.



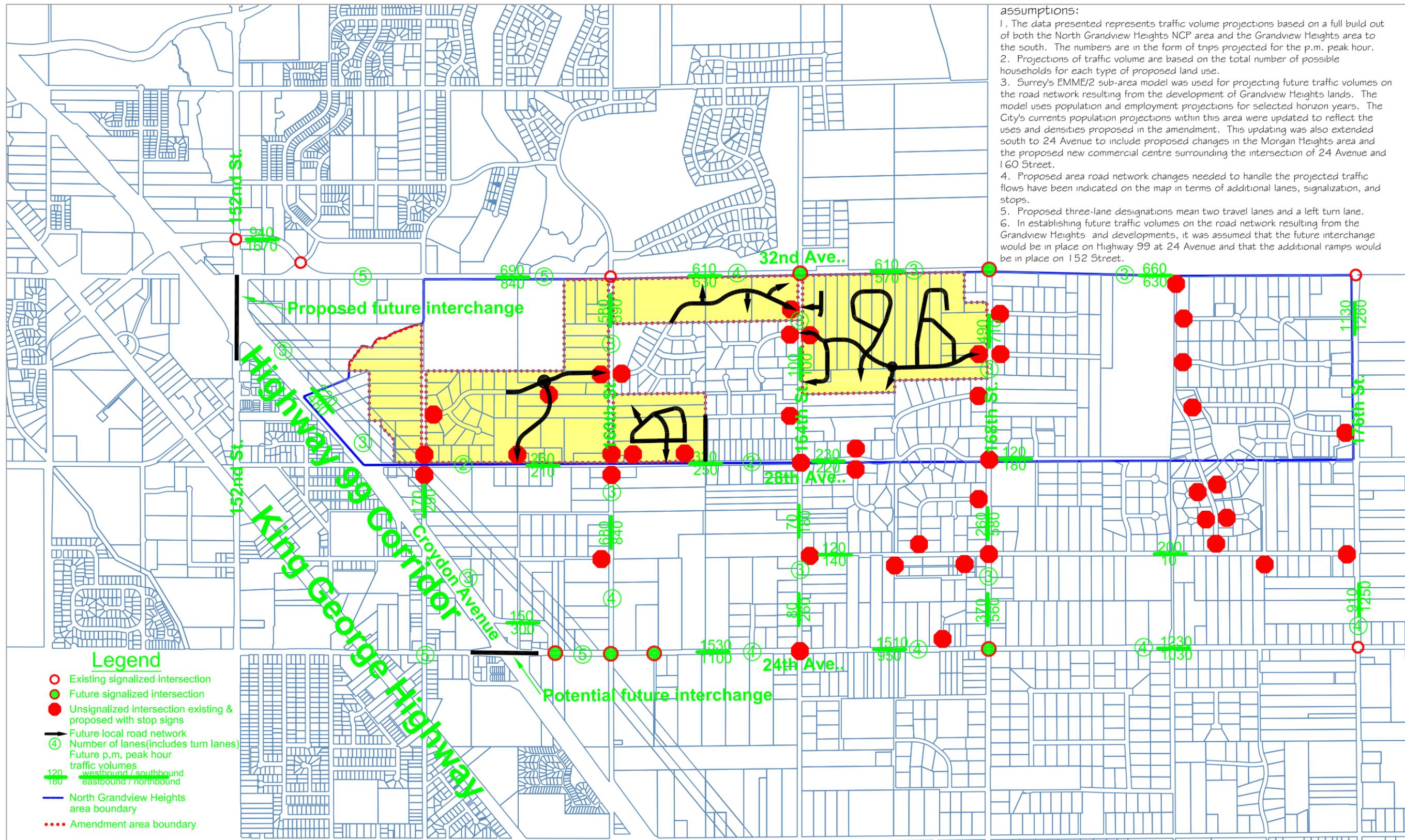
**Legend**

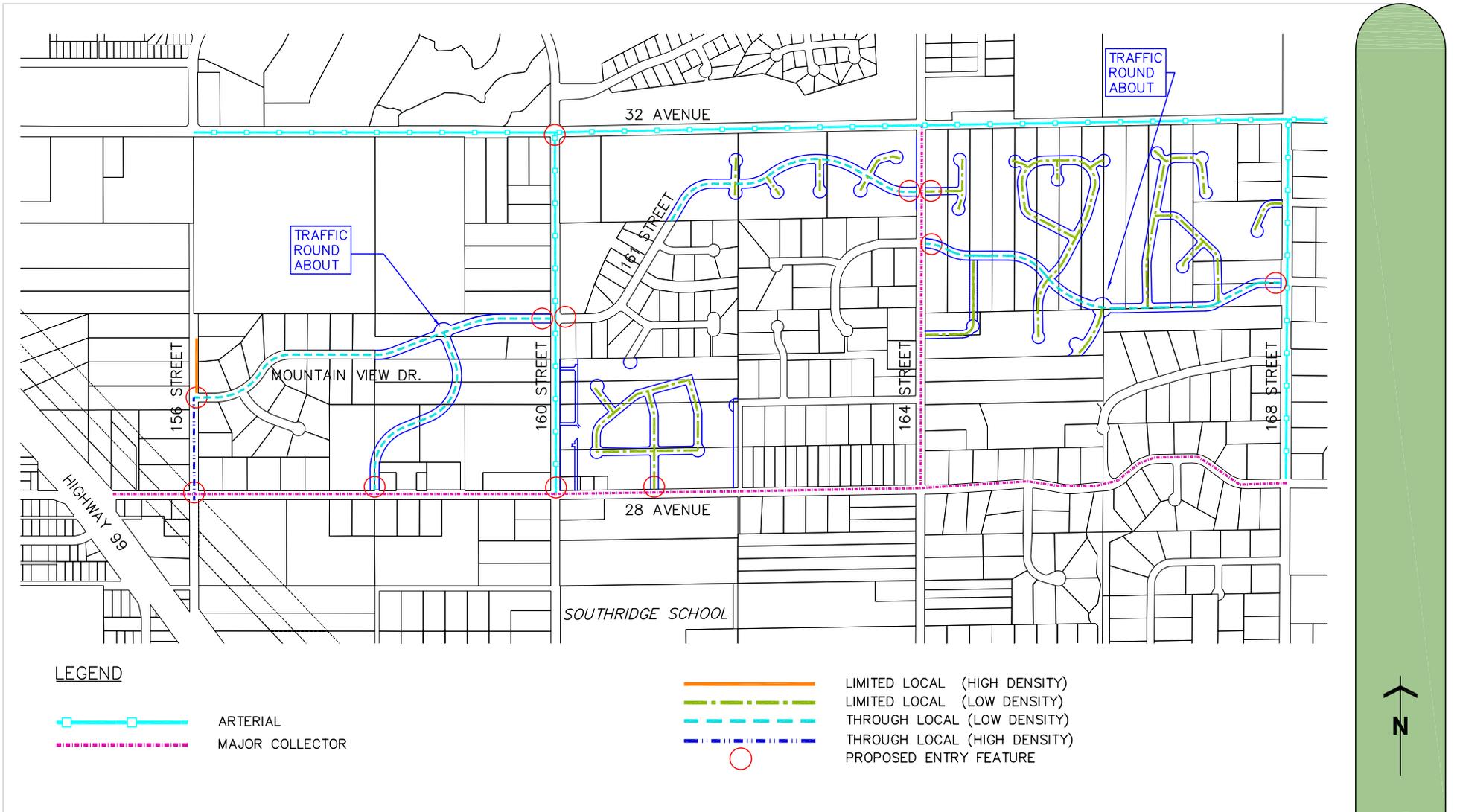
- Existing signalized intersection
- Existing unsignalized intersection with stop sign
- projected development p.m. peak traffic volumes
- 120 ← westbound / southbound
- 180 → eastbound / northbound
- Future local road network
- North Grandview Heights area boundary
- Amendment area boundary



NORTH GRANDVIEW HEIGHTS  
NEIGHBOURHOOD CONCEPT PLAN

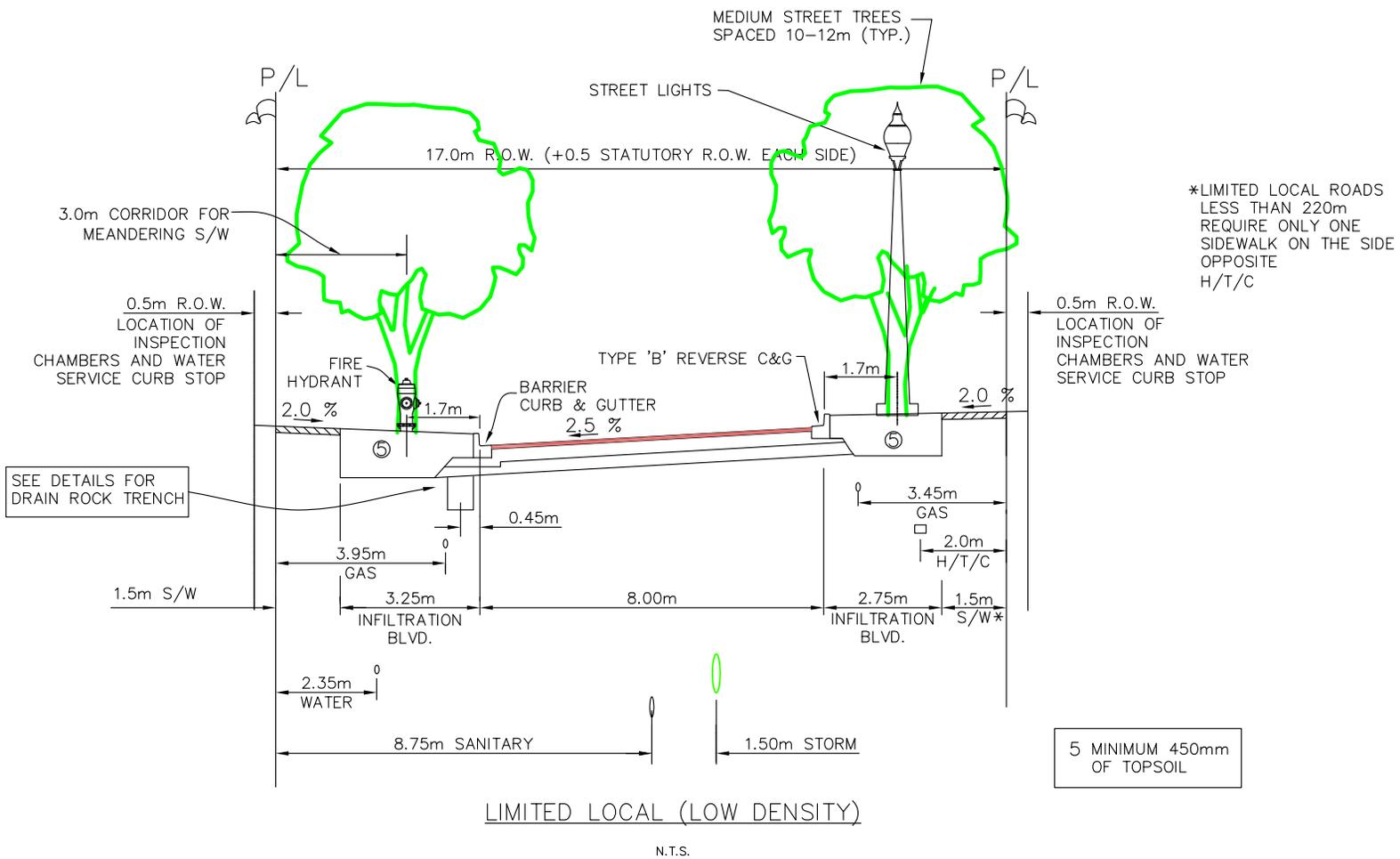
**2021 development  
generated traffic**





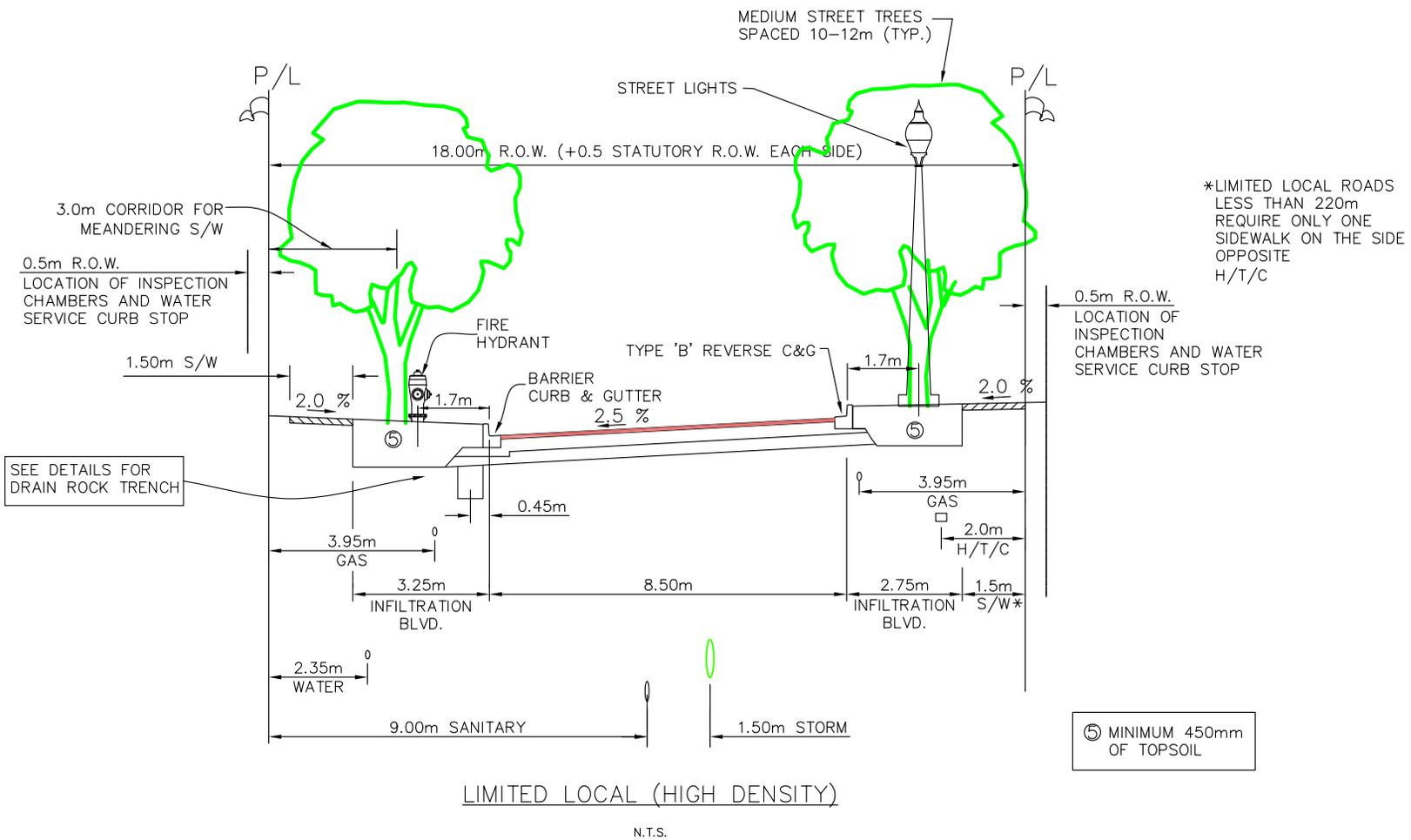
**NORTH GRANDVIEW HEIGHTS  
NEIGHBOURHOOD CONCEPT PLAN**

**road network-  
functional classification**



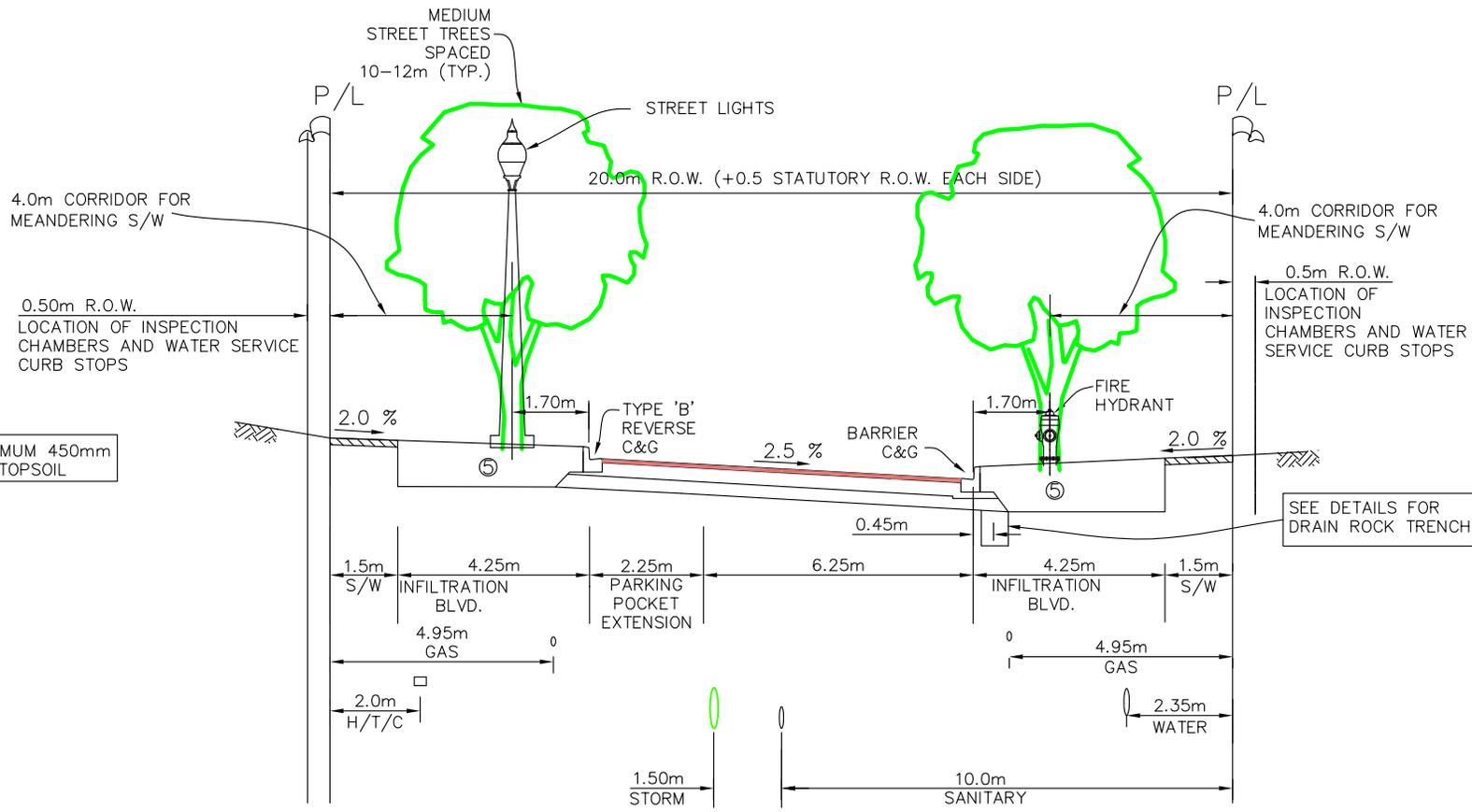
NORTH GRANDVIEW HEIGHTS  
NEIGHBOURHOOD CONCEPT PLAN

limited locals  
low density



LIMITED LOCAL (HIGH DENSITY)

N.T.S.



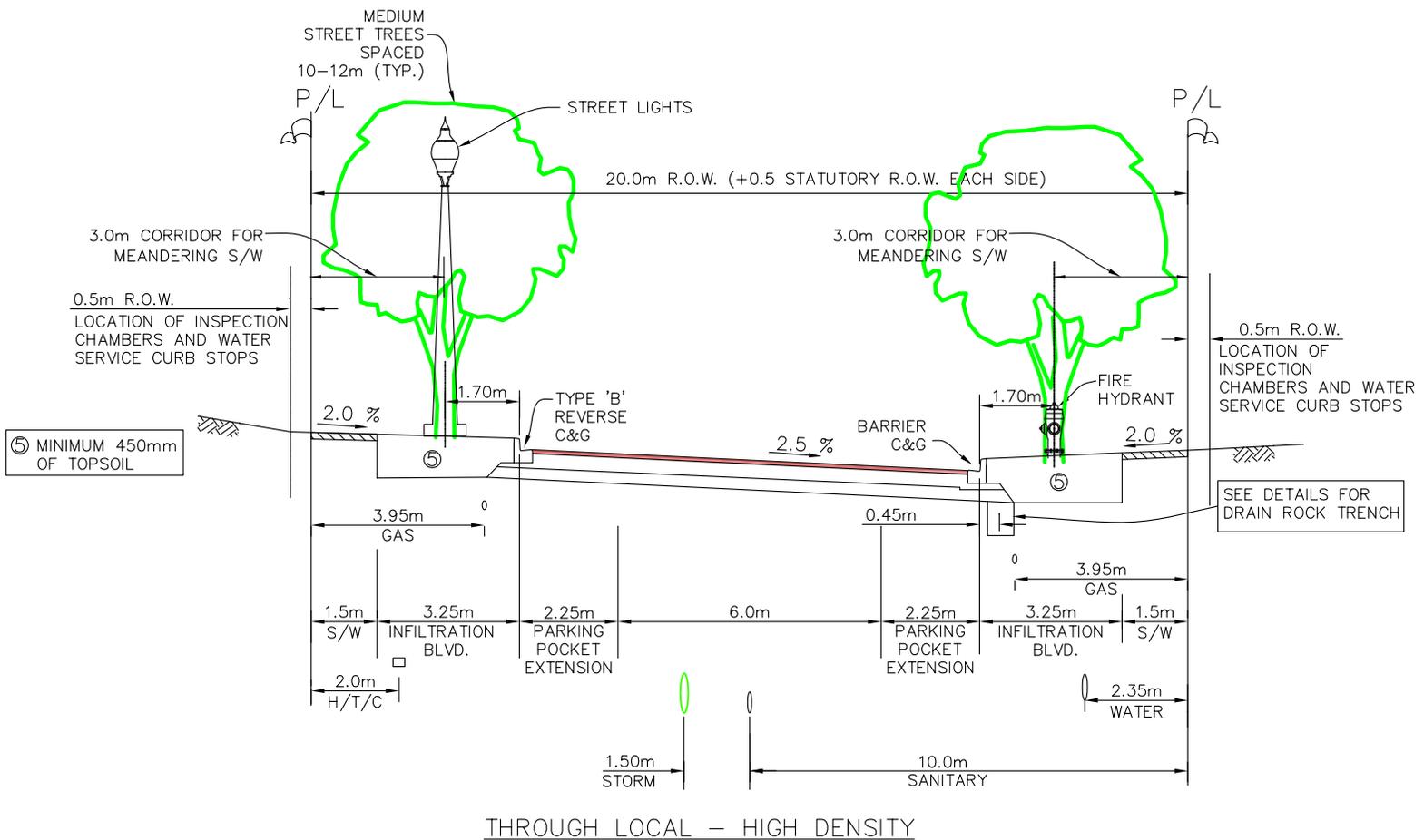
THROUGH LOCAL – LOW DENSITY

N.T.S.



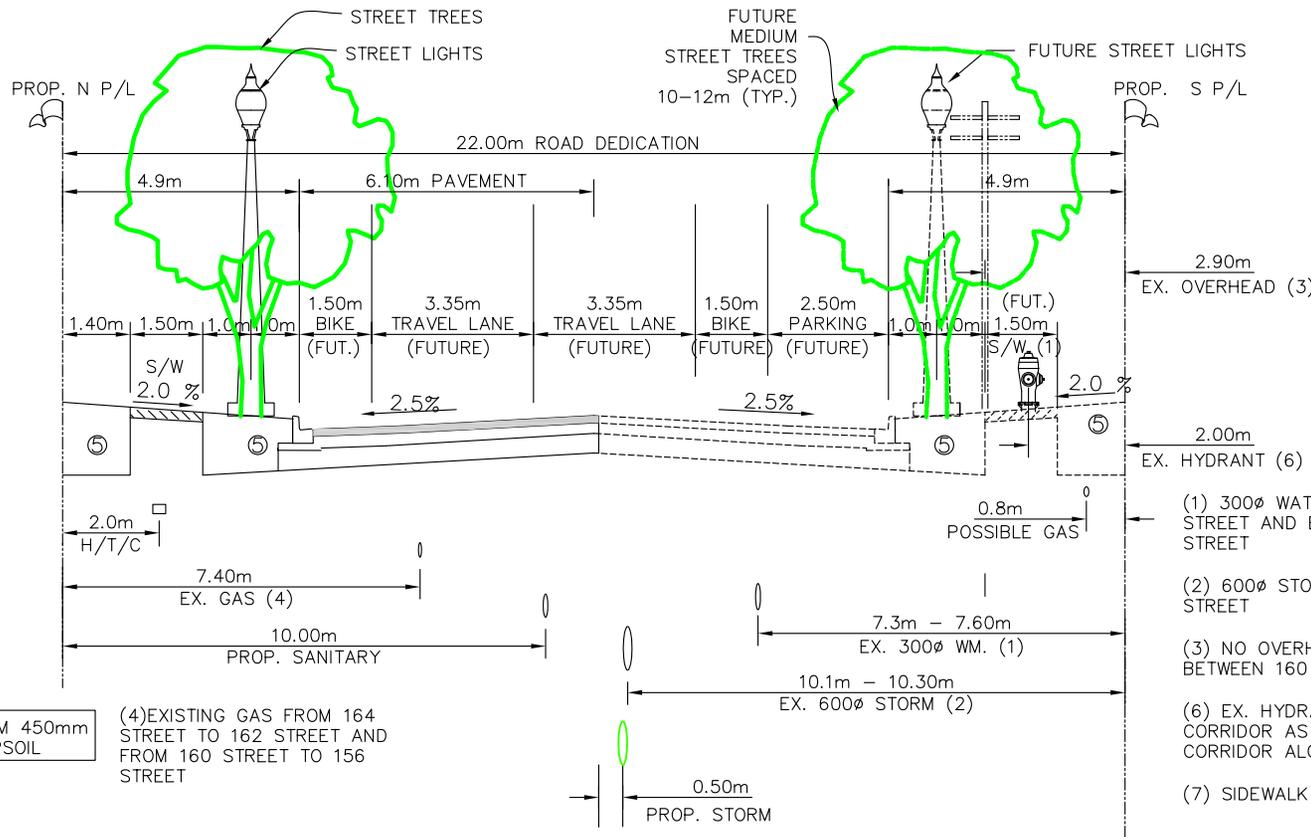
**NORTH GRANDVIEW HEIGHTS  
NEIGHBOURHOOD CONCEPT PLAN**

**through local -  
low density**



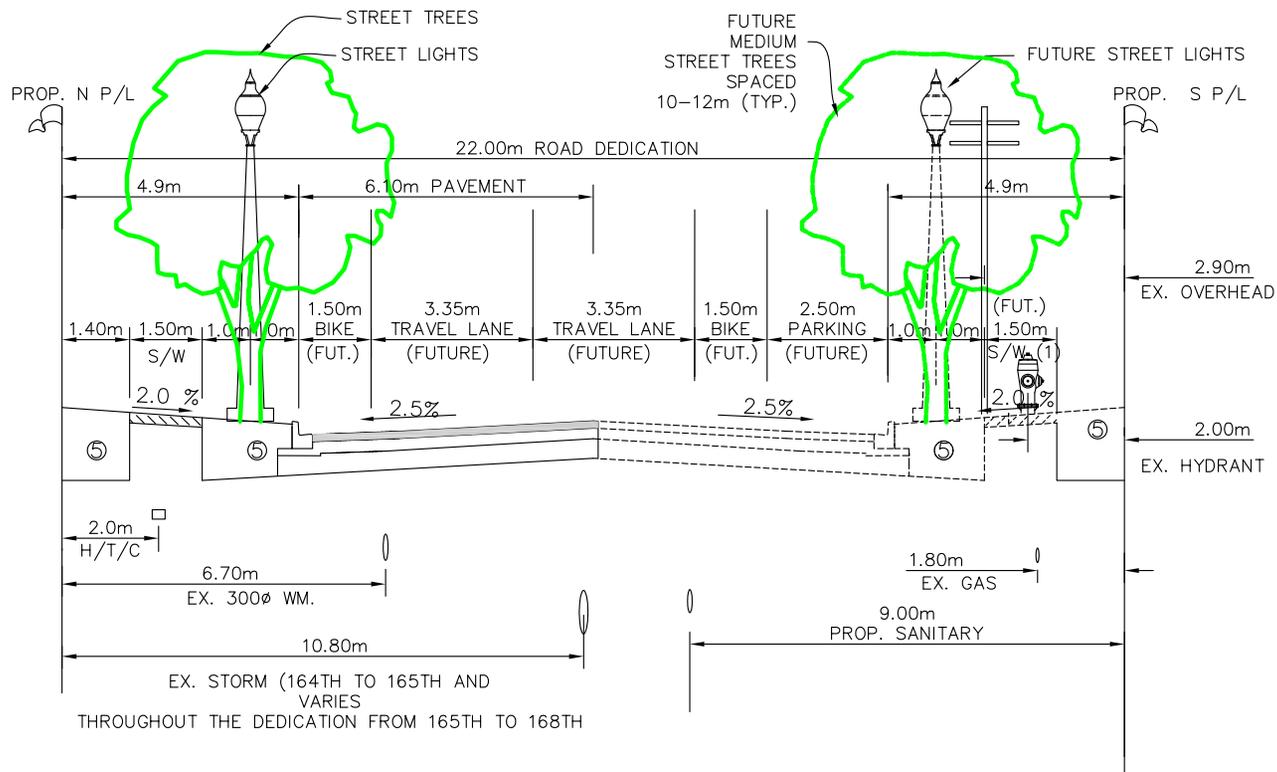
**NORTH GRANDVIEW HEIGHTS  
NEIGHBOURHOOD CONCEPT PLAN**

**through local -  
high density**



28th AVENUE FROM 156th STREET TO 164th STREET  
MAJOR COLLECTOR – PARKING – TYPICAL SECTION  
NTS





Ⓢ MINIMUM 450mm OF TOPSOIL

28th AVENUE – FROM 164th STREET TO 168th STREET  
MAJOR COLLECTOR – PARKING – TYPICAL SECTION

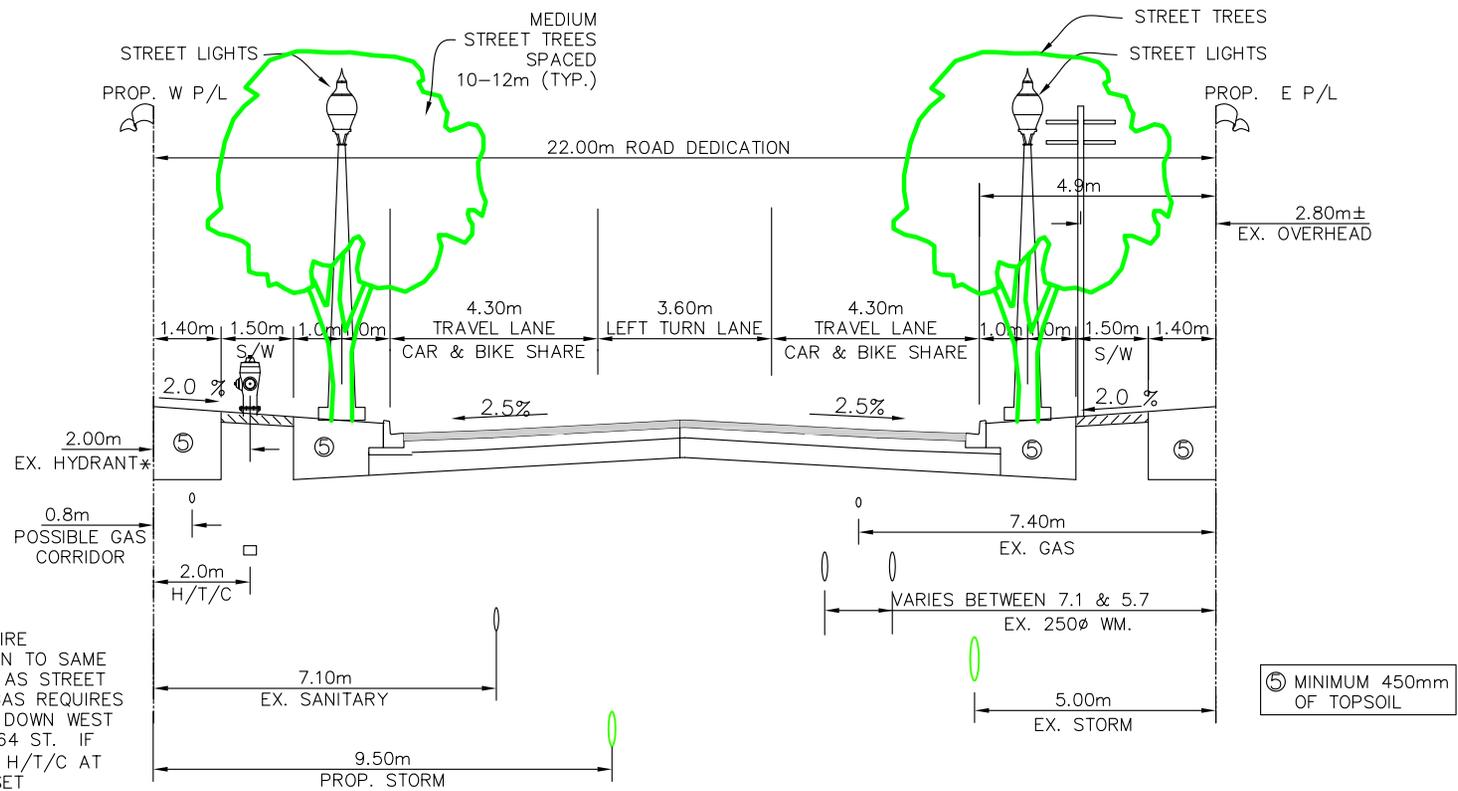
NTS



NORTH GRANDVIEW HEIGHTS  
NEIGHBOURHOOD CONCEPT PLAN

28th avenue - east  
major collector

28

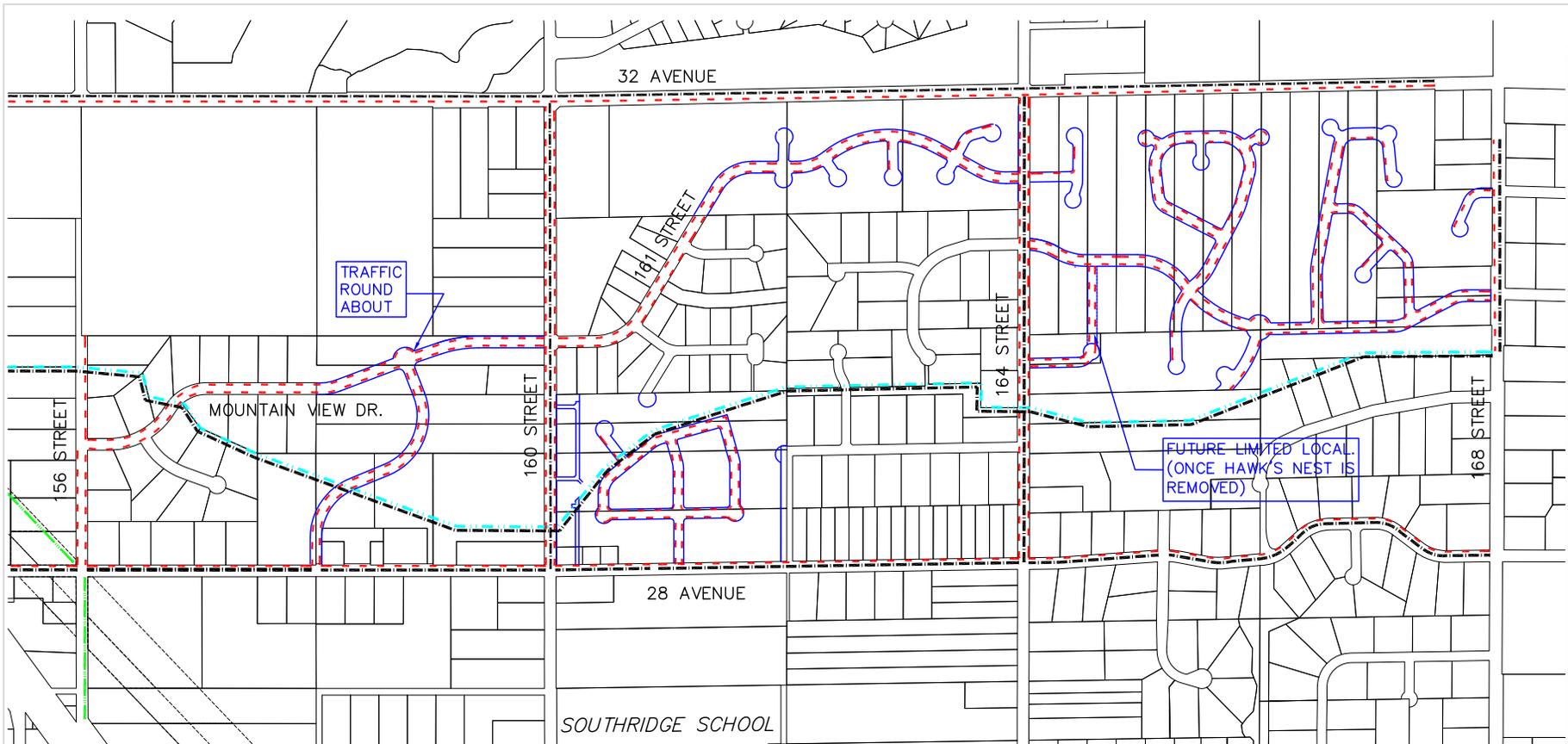


\*WILL REQUIRE RELOCATION TO SAME CORRIDOR AS STREET LIGHT IF GAS REQUIRES CORRIDOR DOWN WEST SIDE OF 164 ST. IF NOT THEN H/T/C AT 1.0m OFFSET

164th STREET (THROUGH COLLECTOR) – NO PARKING – TYPICAL SECTION

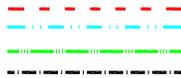
NTS





**LEGEND**

- ONSTREET SIDE WALK
- OFFSTREET MULTI-USE PATHWAY \*
- PIONEER GREENWAY
- BICYCLE FRIENDLY \*

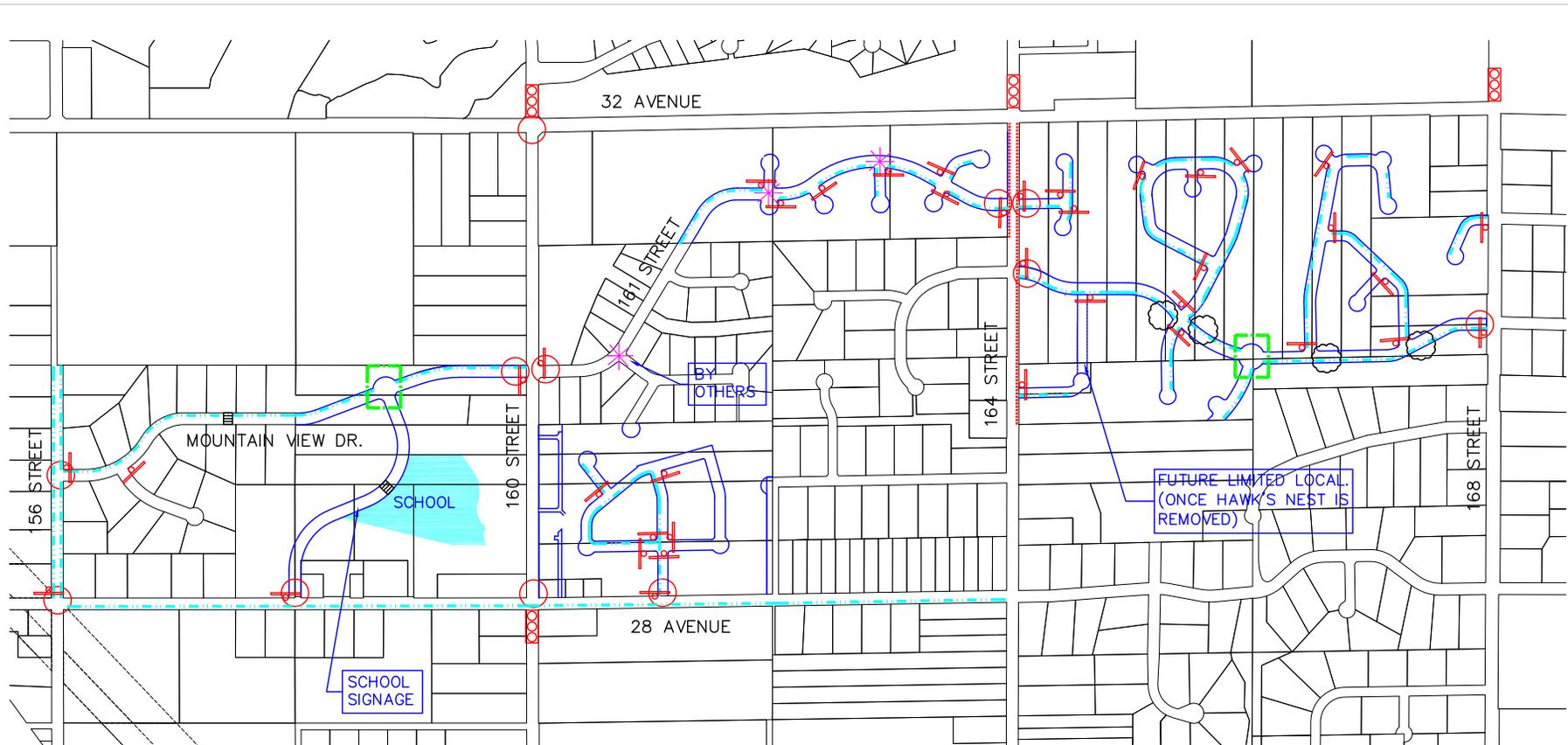


\*NOTE: FINAL ALIGNMENT TO BE DETERMINED AT SUBDIVISION



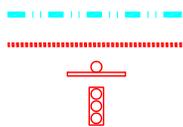
**NORTH GRANDVIEW HEIGHTS  
NEIGHBOURHOOD CONCEPT PLAN**

**bicycle and pedestrian  
circulation plan**



**LEGEND**

- PARKING AS SHOWN
- PARKING PROHIBITED
- STOP SIGN
- SIGNALIZED INTERSECTION



- PROPOSED ENTRY FEATURE
- ROUNDABOUT (SEPARATE DETAIL PROVIDED)
- PROPOSED TRAFFIC CIRCLE (SEE FIGURES 35 & 36)
- RAISED SIDEWALK

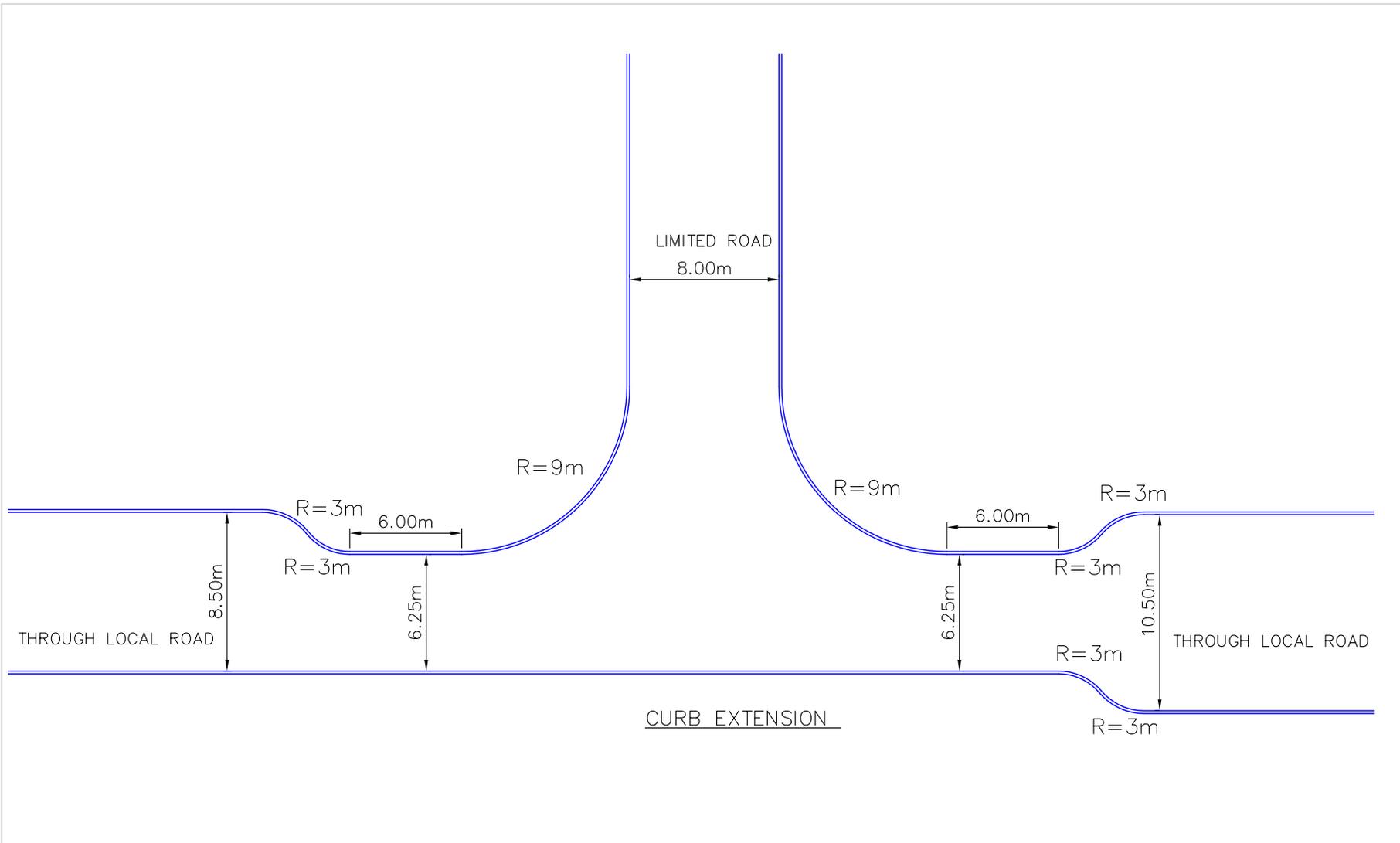


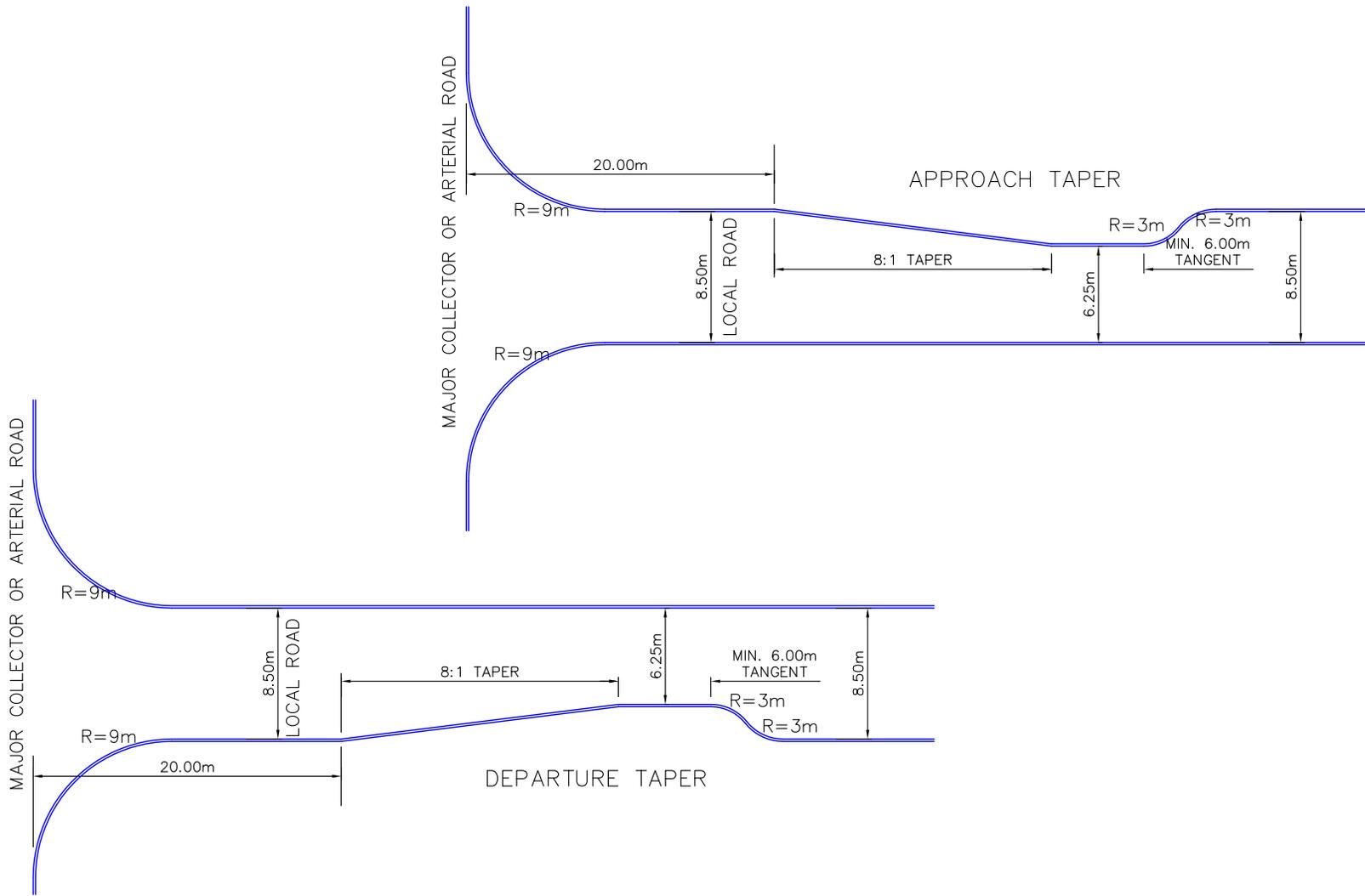
**NOTE:** THERE IS NO PARKING ALLOWED ON ARTERIAL ROADS.

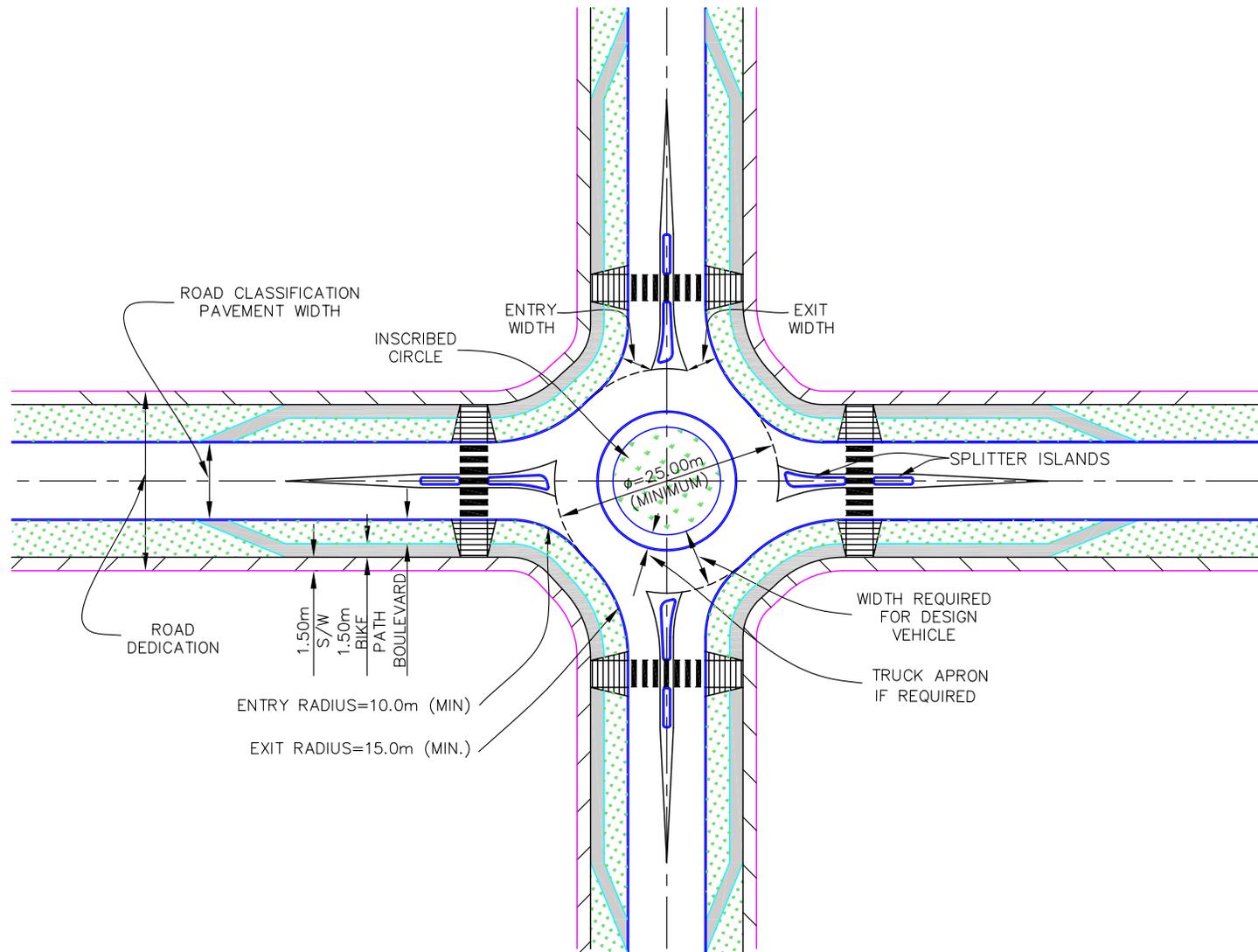


**NORTH GRANDVIEW HEIGHTS  
NEIGHBOURHOOD CONCEPT PLAN**

**traffic calming,  
parking management plan,  
and traffic control plan**







4-ROUNDBABOUT YIELD SIGN  
c/w YIELD TO TRAFFIC IN  
CIRCLE SIGN



RA-3 (ROUNDBABOUT YIELD SIGN)  
750mm SIDES

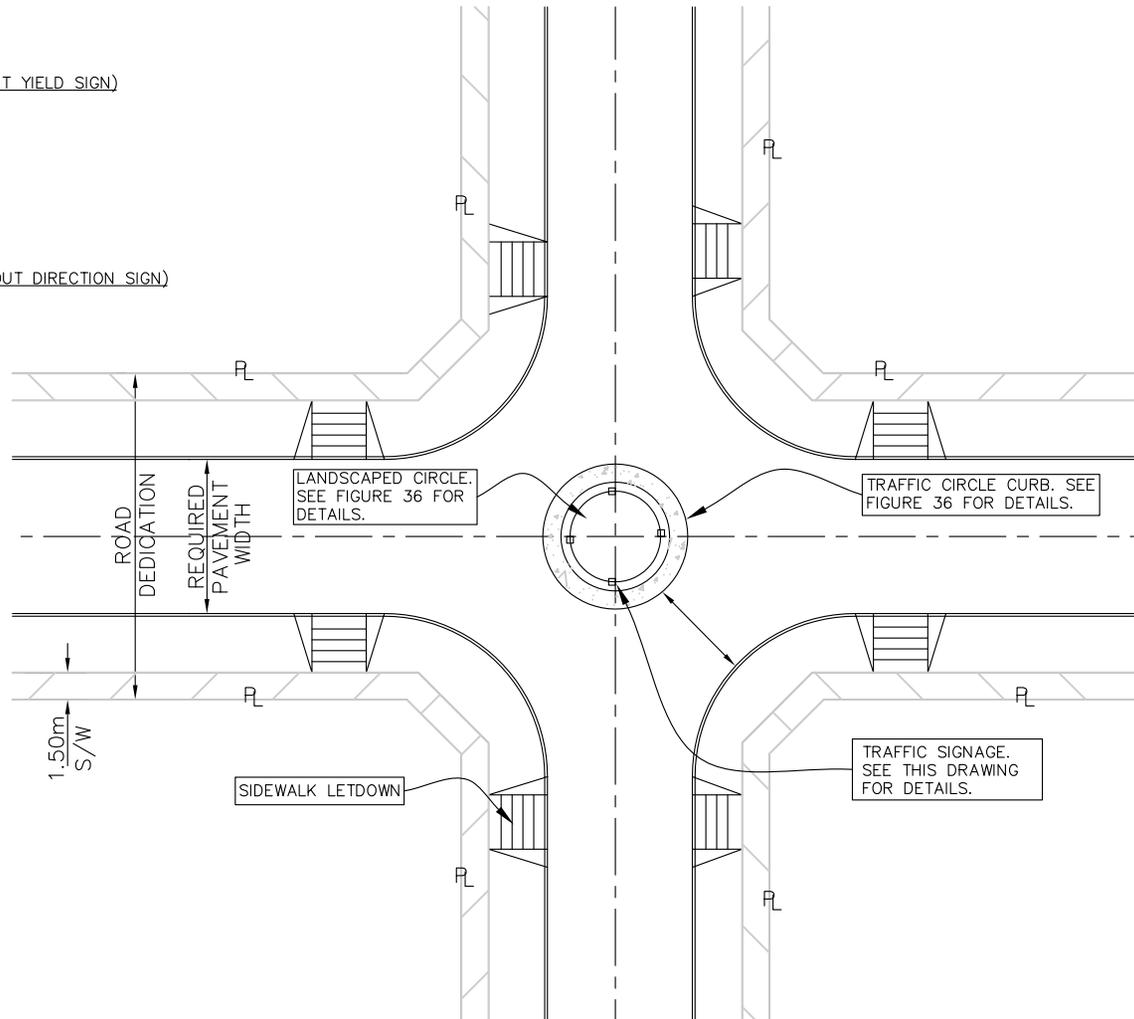
YIELD TO TRAFFIC  
IN THE CIRCLE

ADVISORY TAB  
600mm X 229mm

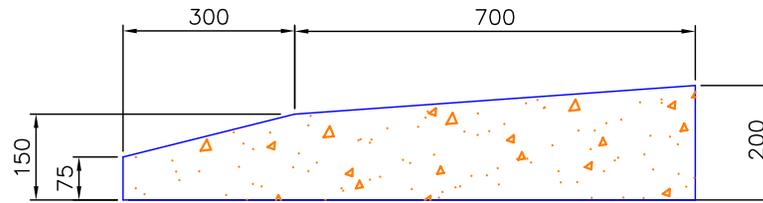
4-ROUNDBABOUT DIRECTION  
SIGN



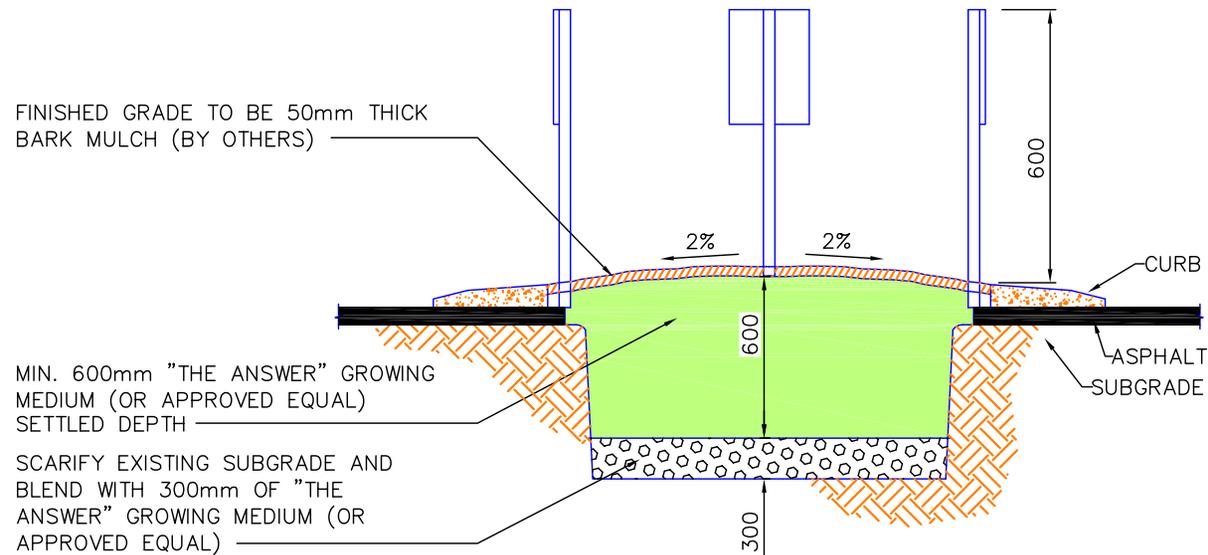
WA-38 (ROUNDBABOUT DIRECTION SIGN)  
550mm X 900mm



NOTE:  
DIMENSIONING AS PER FIGURE 4.10  
OF THE CANADIAN GUIDE TO  
NEIGHBOURHOOD TRAFFIC CALMING

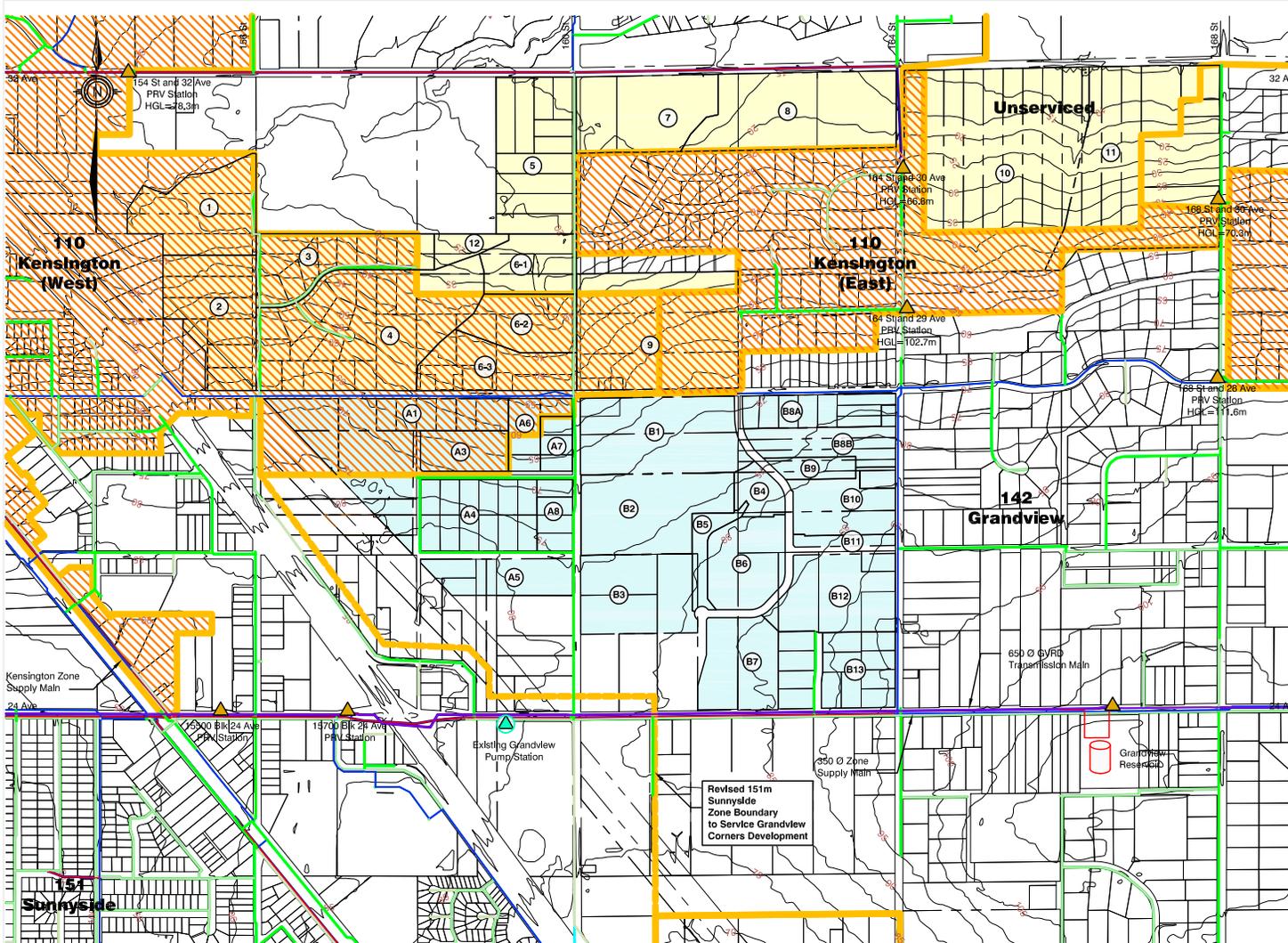


TRAFFIC CIRCLE CURB



LANDSCAPED CIRCLE





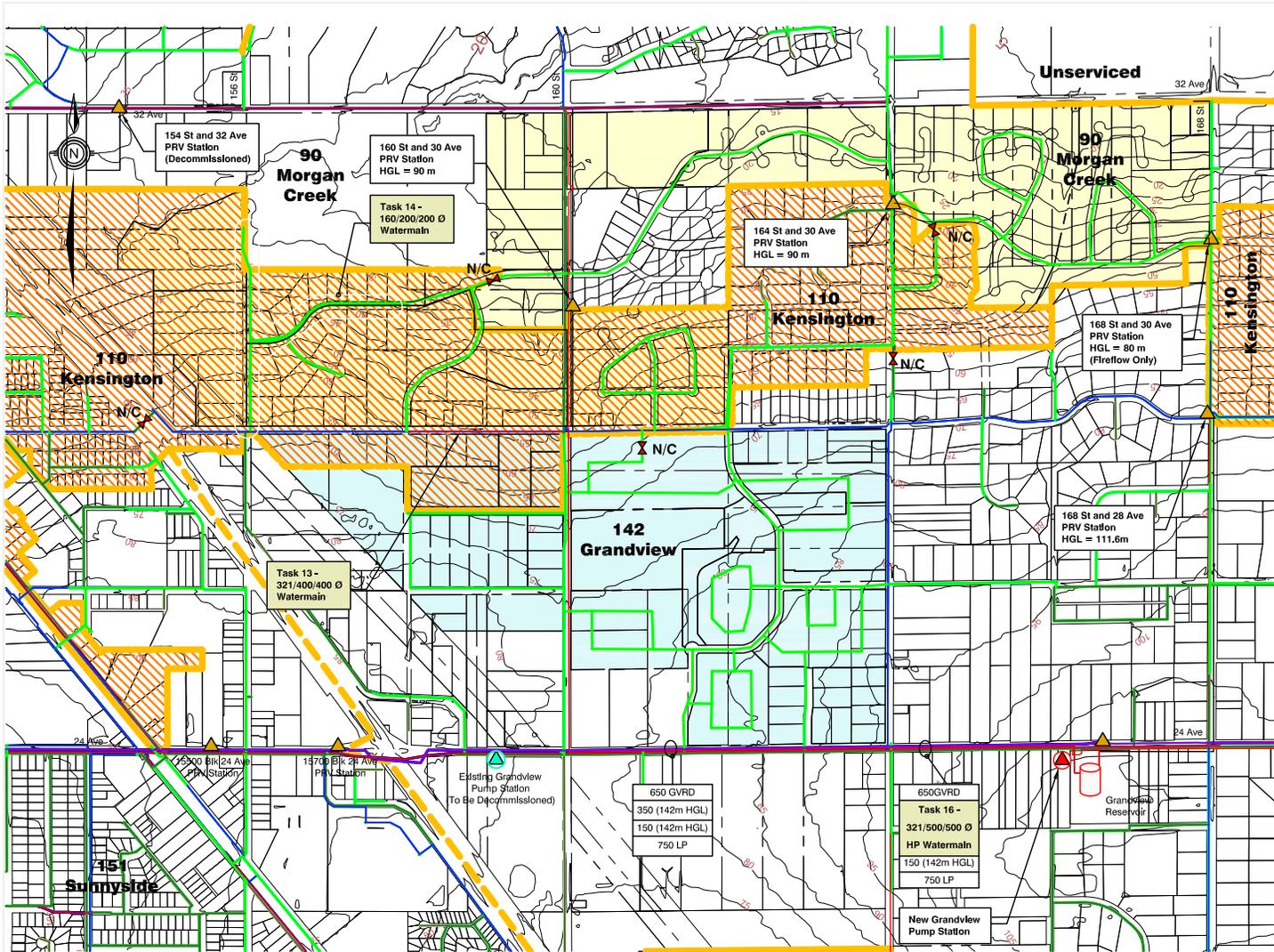
- LEGEND**
- Section Boundary
  - GVRD Transmission Main
  - Pump Station
  - Reservoir
  - PRV
  - Pressure Zone Boundary
  - 1m Contour
  - 5m Contour
  - North Grandview Heights NCP Amendment Area
  - Grandview Heights NCP #1 Area
  - Section Number (Refer to Table 2-1)
- Water Main Diameter (mm)**
- ≤ 150
  - 150 - 250
  - 300
  - > 300

Notes:  
 1. Topographic elevations are in metres to geodetic datum.



**NORTH GRANDVIEW HEIGHTS NEIGHBOURHOOD CONCEPT PLAN**

**existing water infrastructure and pressure zones**



- GVRD Transmission Main
- Pump Station
- Reservoir
- PRV
- Pressure Zone Boundary
- 1m Contour
- 5m Contour
- North Grandview Heights NCP Amendment Area
- Grandview Heights NCP No. 1 Area
- Revised Pressure Zone Boundary
- Normally Closed Valve
- New Watermain
- New Watermain Diameter Existing/Proposed/Minimum Required to Service NCP Area

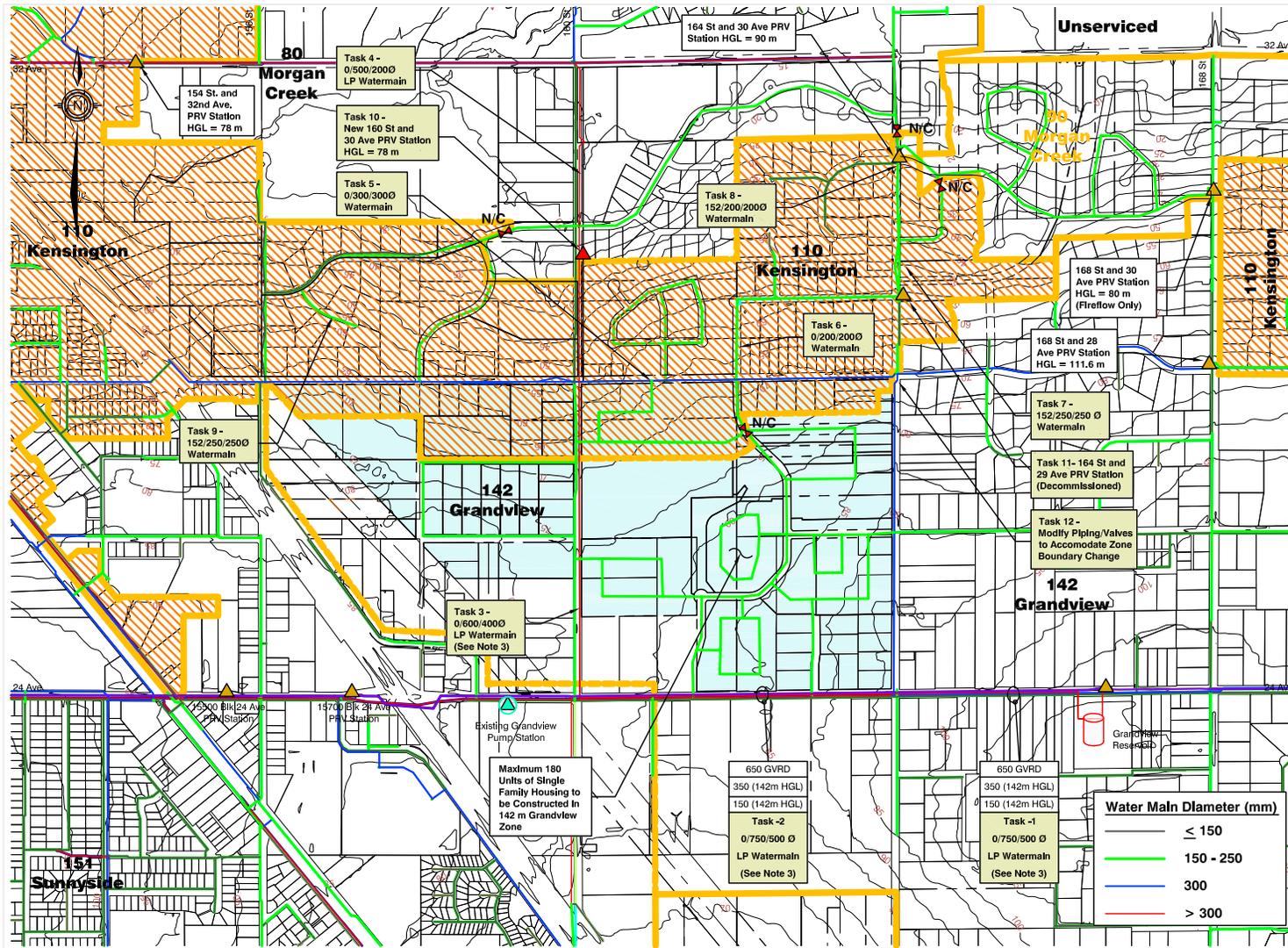
Notes:

1. Topographic elevations are in metres to geodetic datum.
2. On-site watermains shown are included in hydraulic model and are schematic. Additional watermains will be required for on-site servicing.
3. WaterCAD scenario = FINAL.

Water Main Diameter (mm)	
	≤ 150
	150 - 250
	300
	> 300

**NORTH GRANDVIEW HEIGHTS  
NEIGHBOURHOOD CONCEPT PLAN**

**ultimate water servicing  
infrastructure**



**LEGEND**

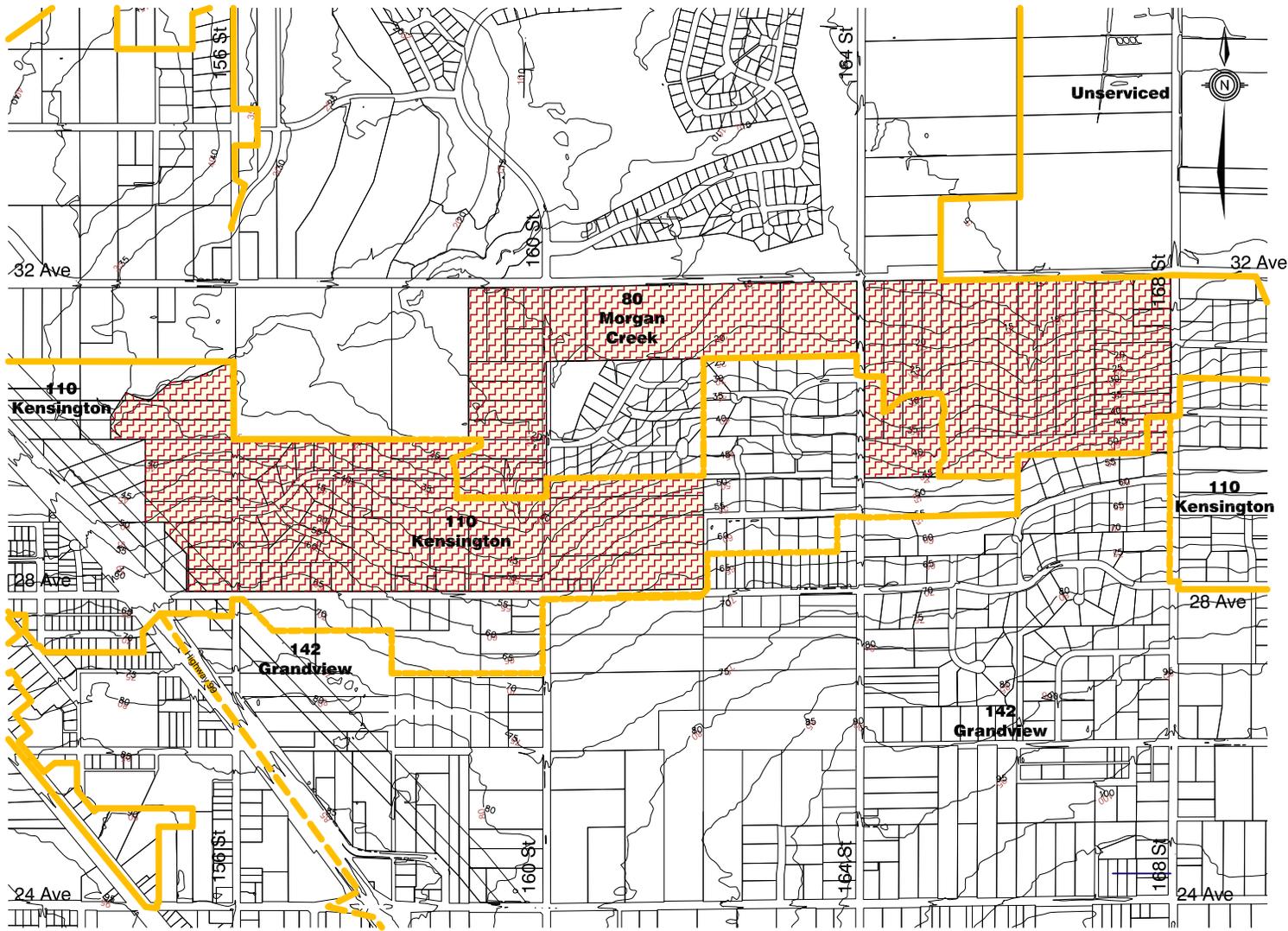
- Section Boundary
- GVRD Transmission Main
- Pump Station
- Reservoir
- PRV
- Pressure Zone Boundary
- 1m Contour
- 5m Contour
- North Grandview Heights NCP Amendment Area
- Grandview Heights NCP No. 1 Area
- Revised Pressure Zone Boundary
- Normally Closed Valve
- New Watermain
- New Watermain Diameter Existing/Proposed/Minimum Required to Service NCP Area

- Notes:
- Topographic elevations are in metres to geodetic datum.
  - On-site watermains shown are included in hydraulic model and are schematic. Additional watermains will be required for on-site servicing.
  - Minimum based on ultimate pressure zone boundaries; a minimum 600 Ø pipe is required for interim servicing.
  - WaterCAD scenario = Revised Interim 2

Water Main Diameter (mm)	
	≤ 150
	150 - 250
	300
	> 300

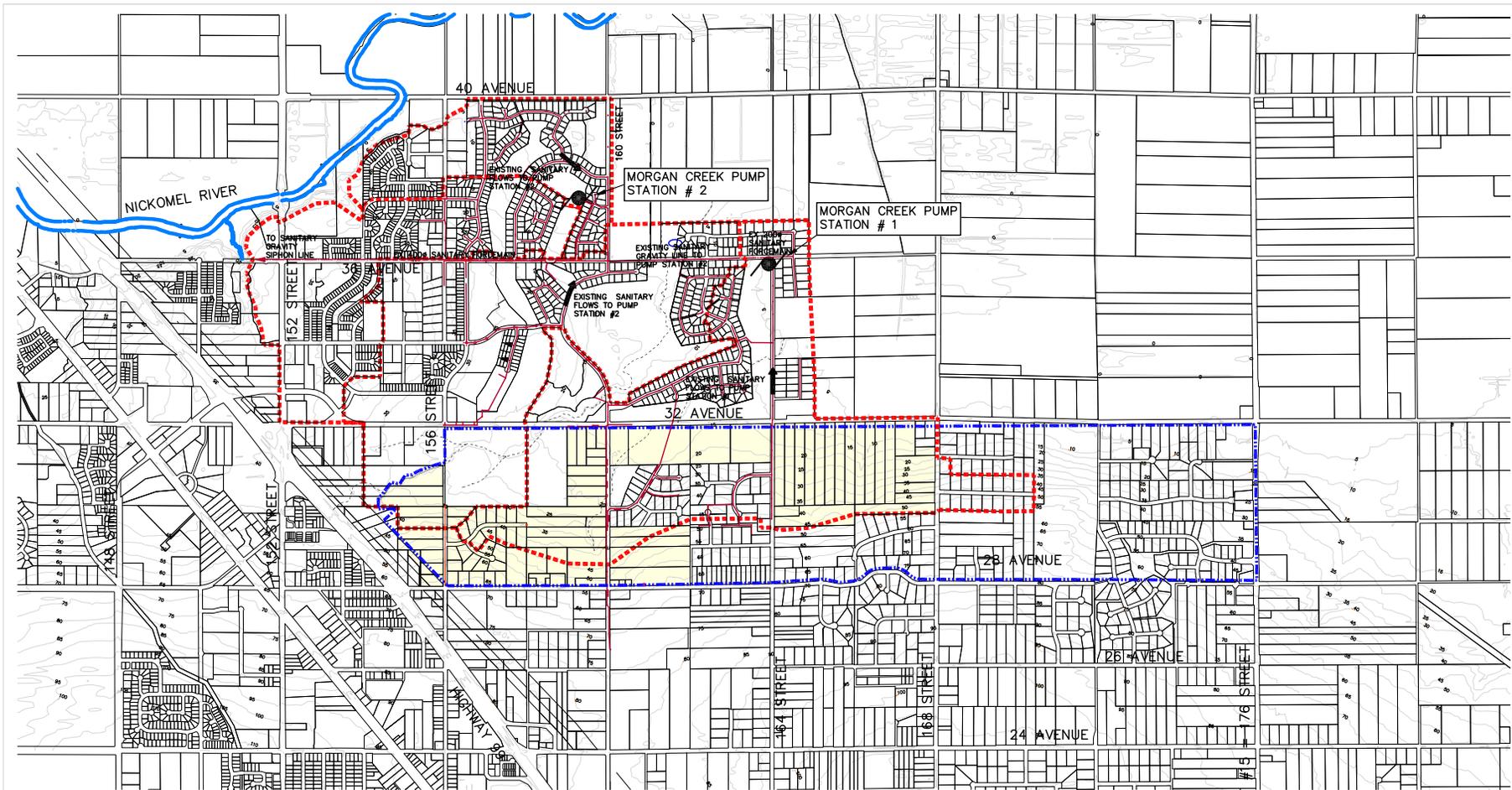
**NORTH GRANDVIEW HEIGHTS  
NEIGHBOURHOOD CONCEPT PLAN**

**interim water servicing  
infrastructure**



-  North Grandview Heights Amendment NCP contributing area = 117 Ha.
-  North Grandview Heights Amendment NCP Area





Legend

North Grandview Heights Boundary

Amendment Area

Sanitary Catchment Boundary

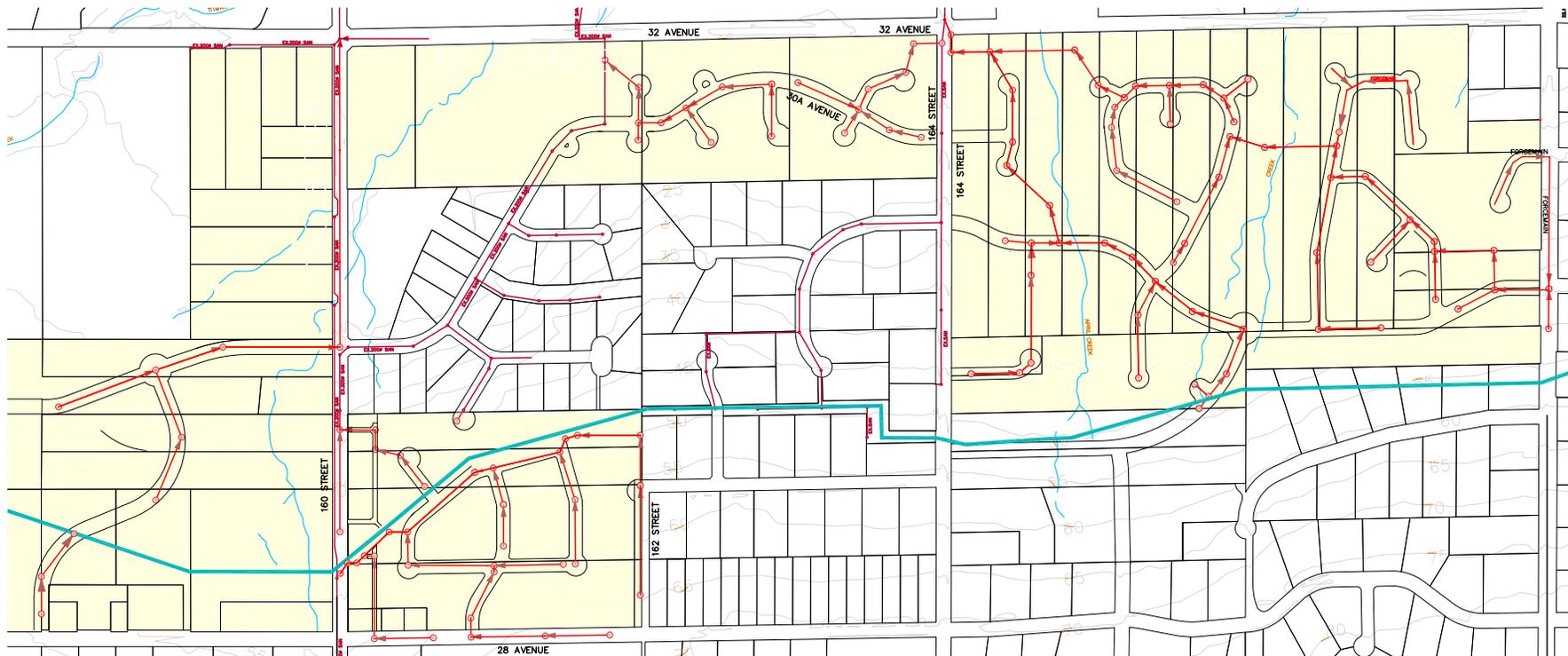
Sanitary Pump Station



Not to Scale

# NORTH GRANDVIEW HEIGHTS NEIGHBOURHOOD CONCEPT PLAN

## existing sanitary catchment



Legend

- North Grandview Gravity Interceptor
- Existing Sanitary Sewer
- Proposed Sanitary Sewer
- Proposed Manhole



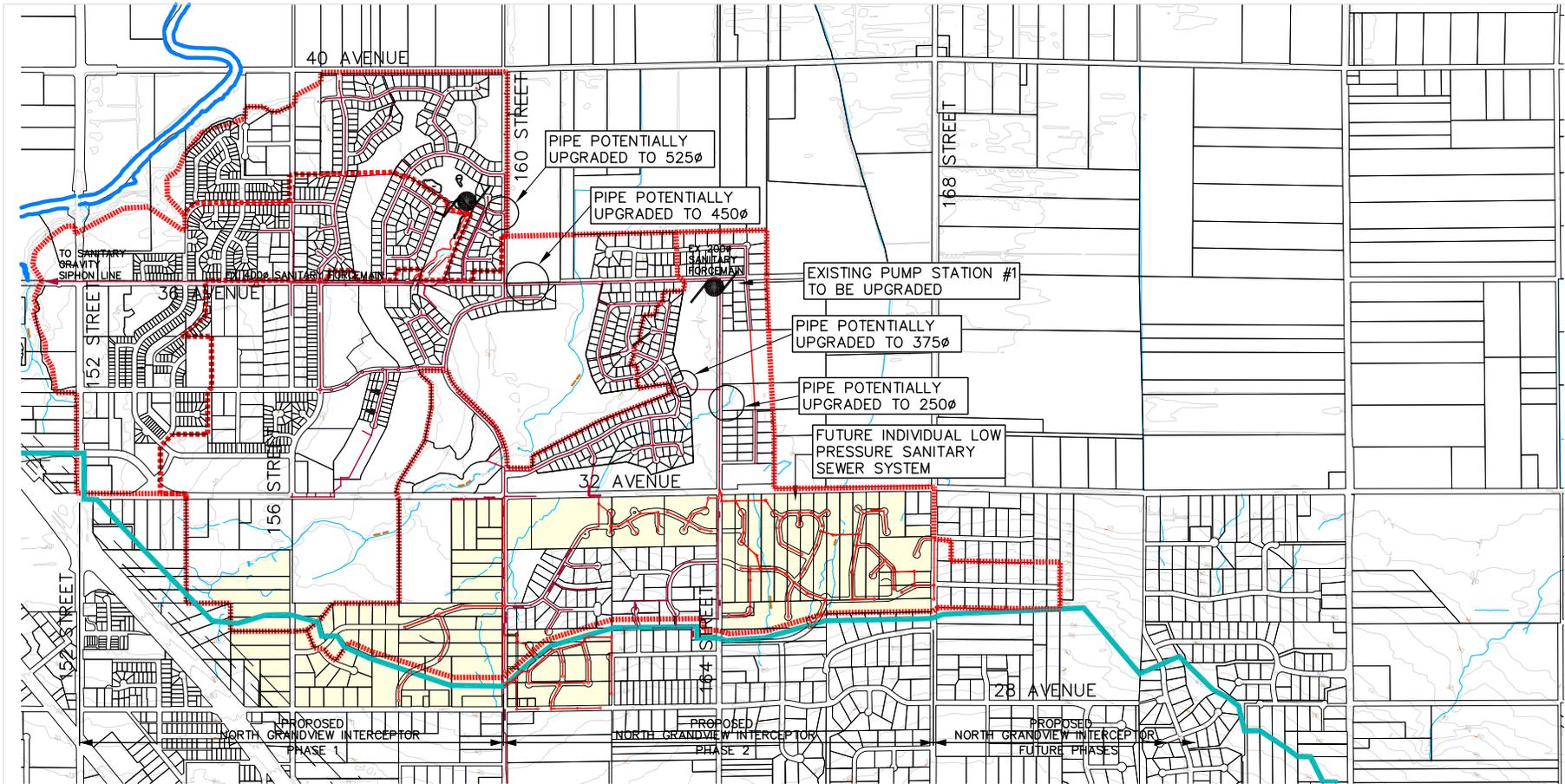
Lots are Conceptual and Illustrated only for Engineering Design Purposes. Actual Lot Layouts will be Established at Detailed Design Stages.

Not to Scale

# NORTH GRANDVIEW HEIGHTS NEIGHBOURHOOD CONCEPT PLAN

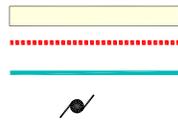
# proposed minor sanitary system





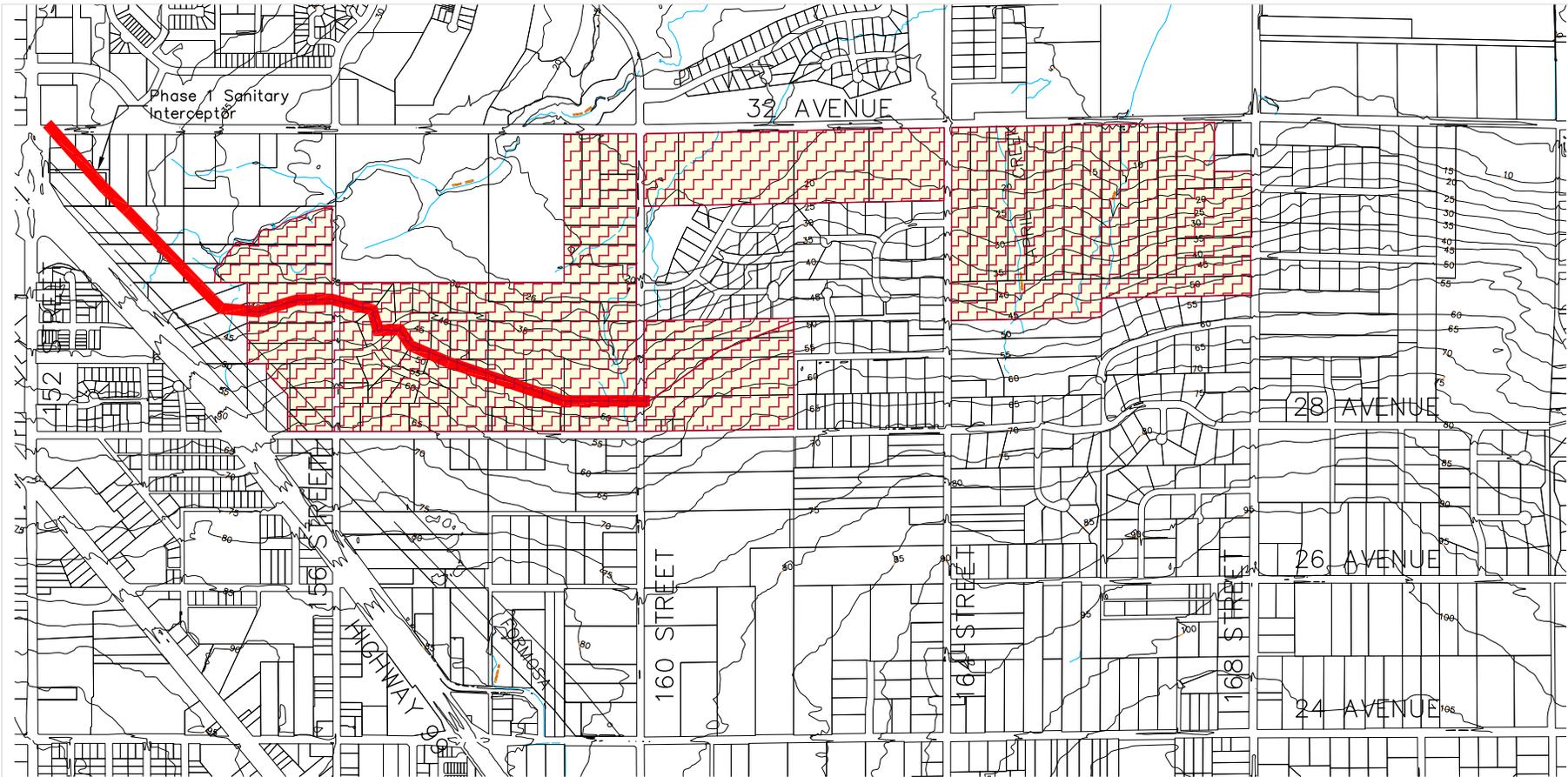
Legend

- Amendment Area
- Sanitary Catchment Boundary
- North Grandview Gravity Interceptor
- Sanitary Pump Station



# NORTH GRANDVIEW HEIGHTS NEIGHBOURHOOD CONCEPT PLAN

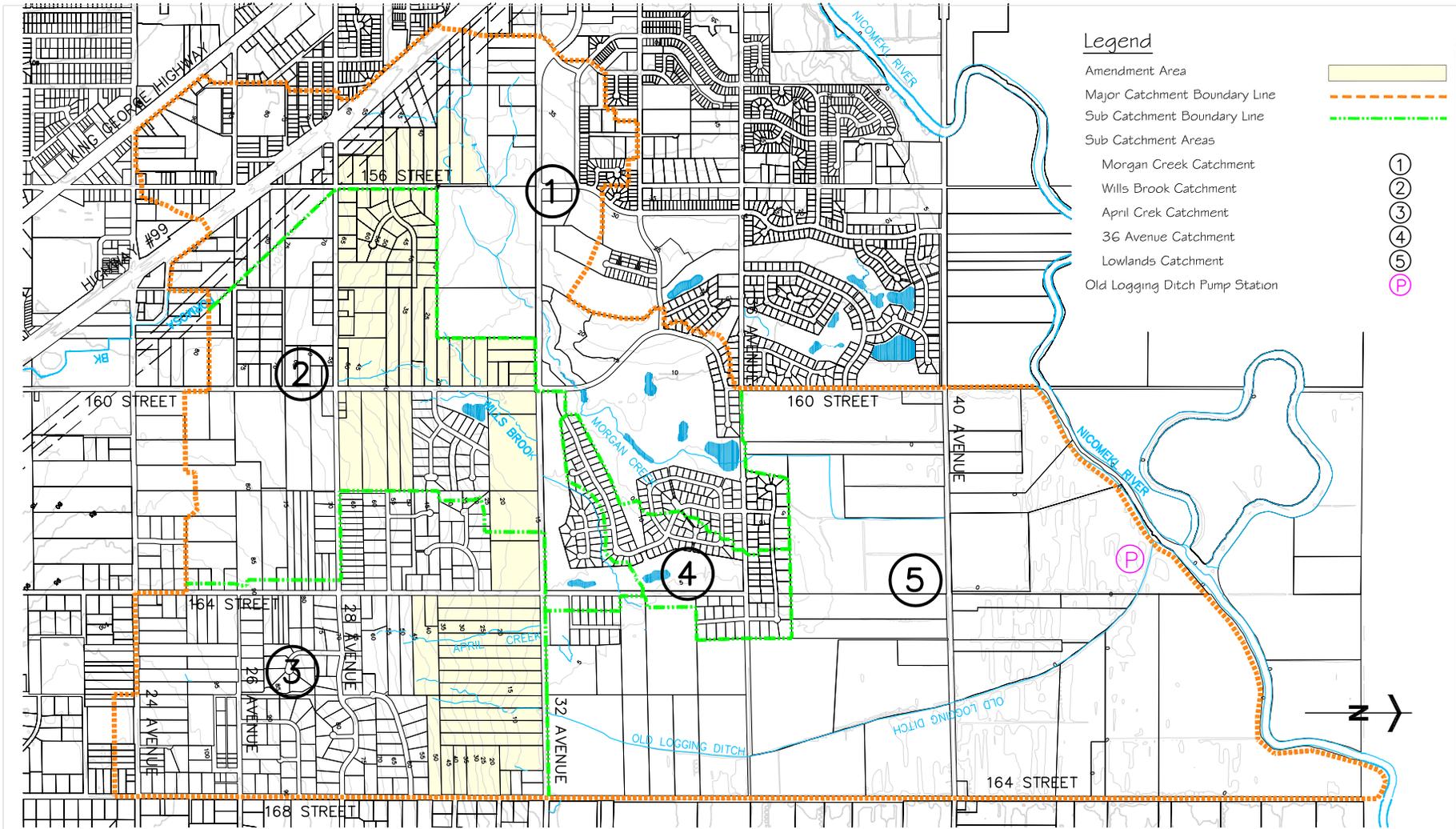
# proposed major sanitary system



Legend

-  The NCP areas contributing to North Grandview Heights Amendment Levy
-  North Grandview Heights NCP Amendment Area



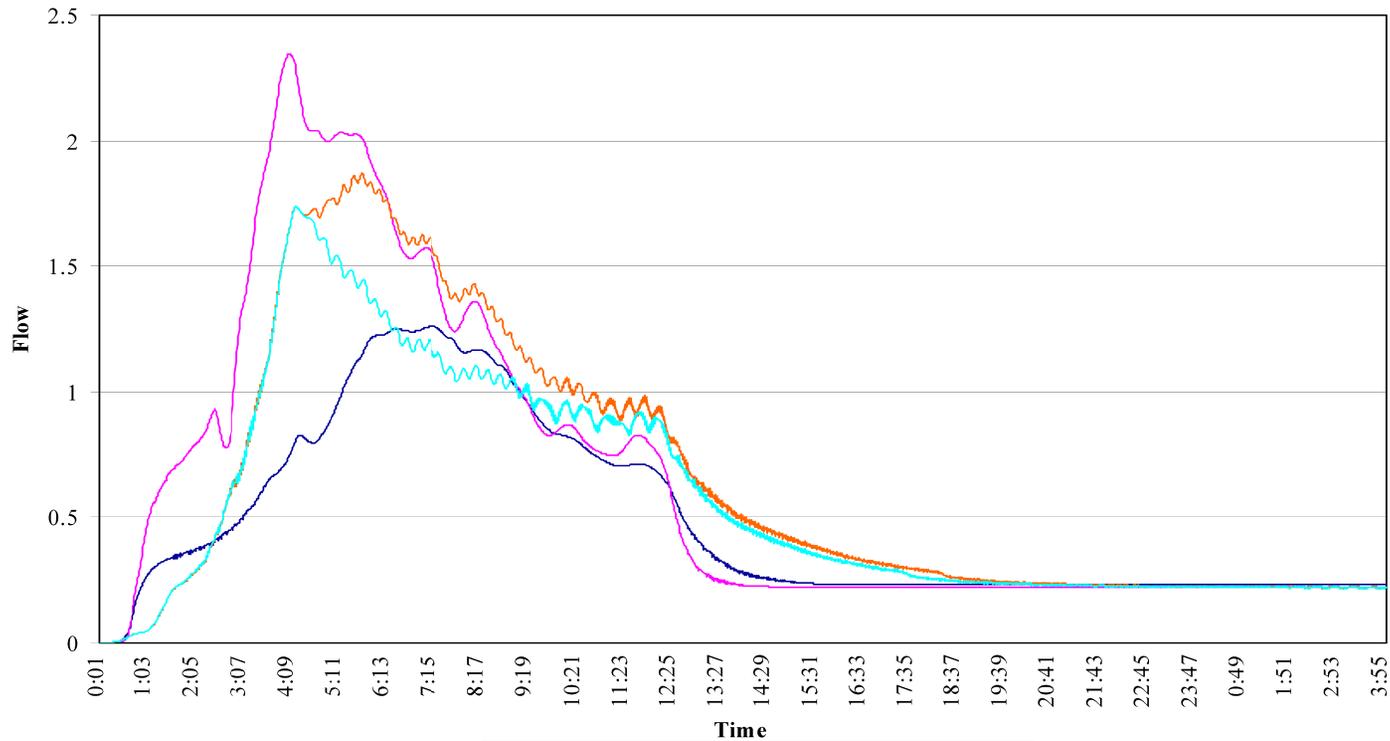


**NORTH GRANDVIEW HEIGHTS  
NEIGHBOURHOOD CONCEPT PLAN**

**stormwater drainage  
study area**

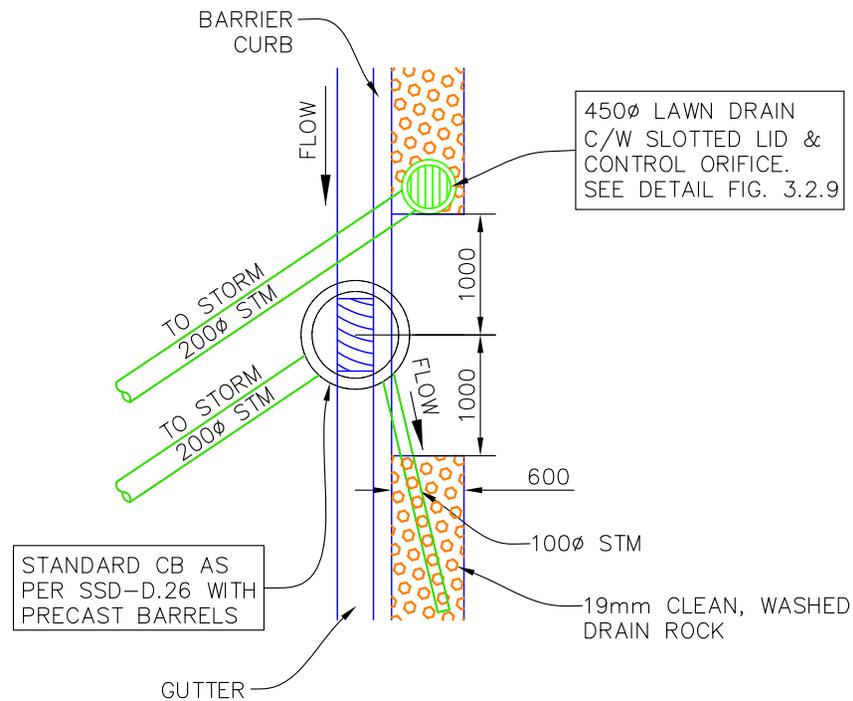


### Hydrograph Wills Brook (L24) From 32 Avenue to 164 Street



- Pre Development
- Depression Storage 10 mm (Pervious Area)
- Post Development Without Detention
- Depression Storage 10 mm (Pervious Area)
- Post Development With Detention
- Depression Storage 10 mm (Pervious Area)
- Post Development With Detention
- Depression Storage 20 mm (Pervious Area)

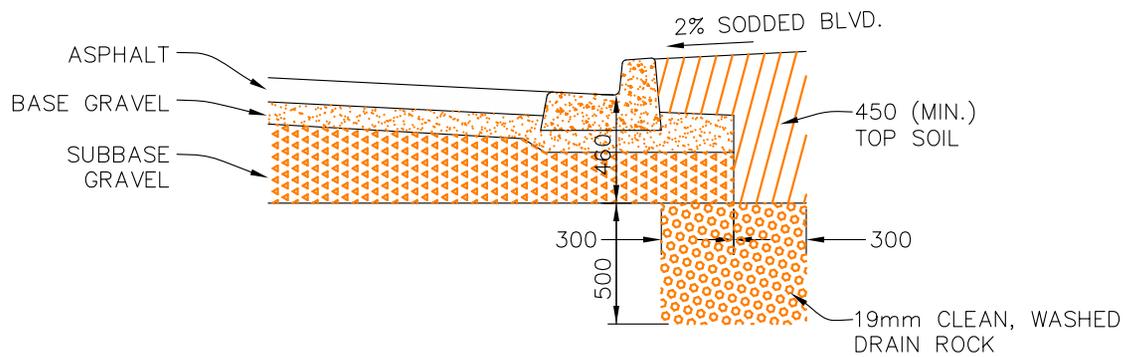




DRAIN ROCK TRENCH – PLAN VIEW

NTS

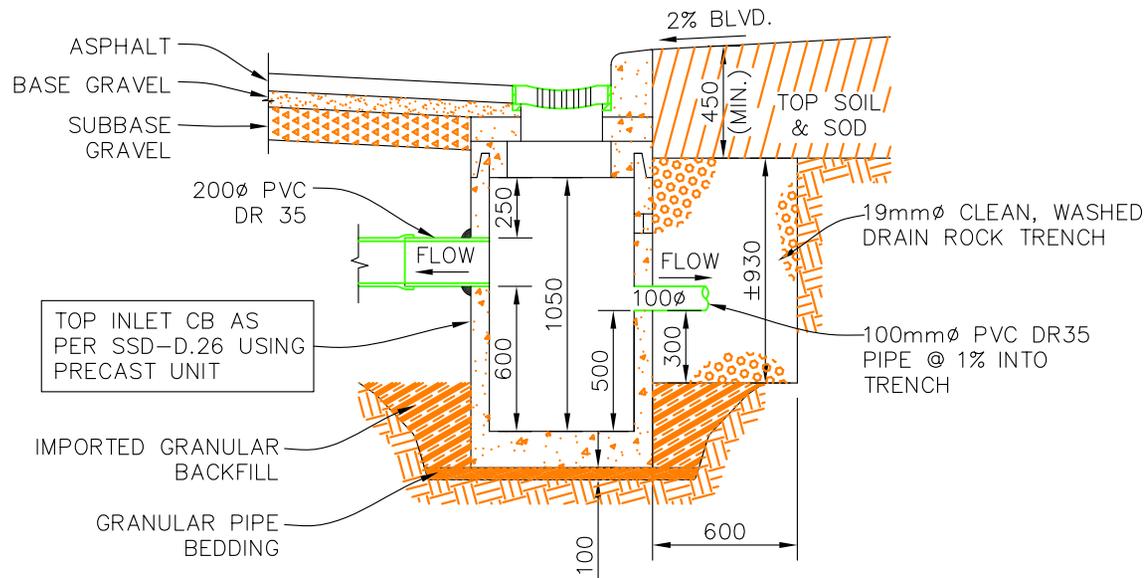




DRAIN ROCK TRENCH – SECTION VIEW

NTS

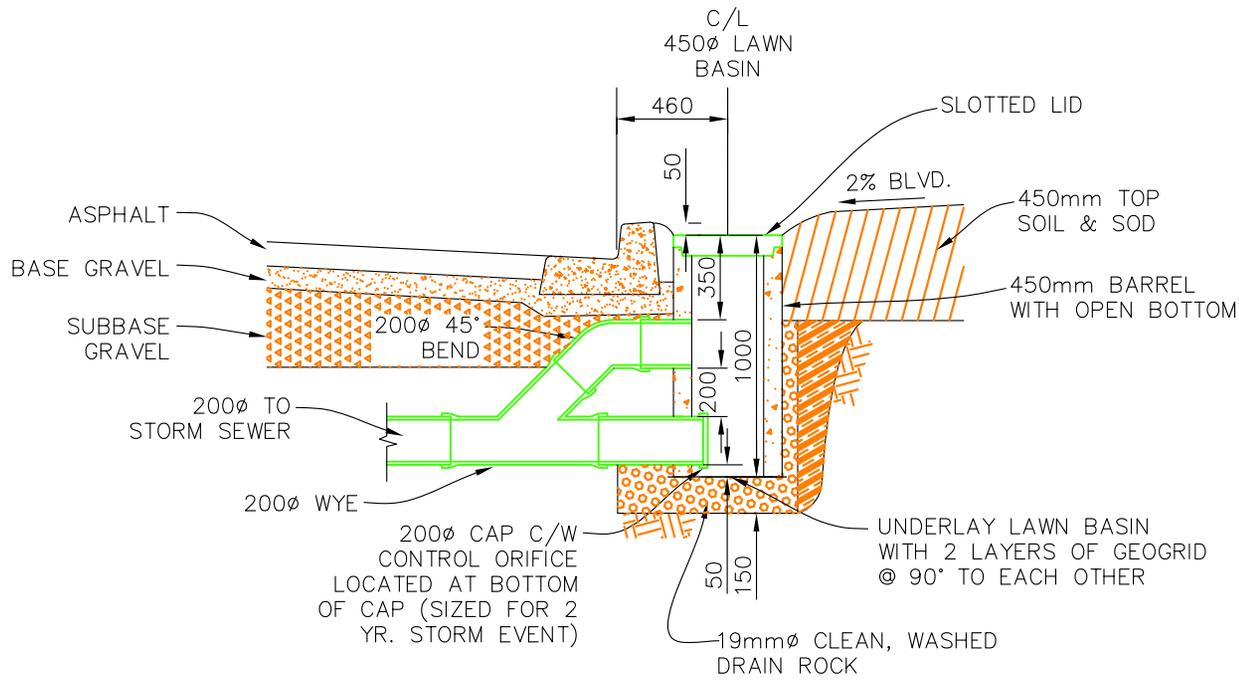




DRAIN ROCK TRENCH – SECTION AT CATCH BASIN

NTS



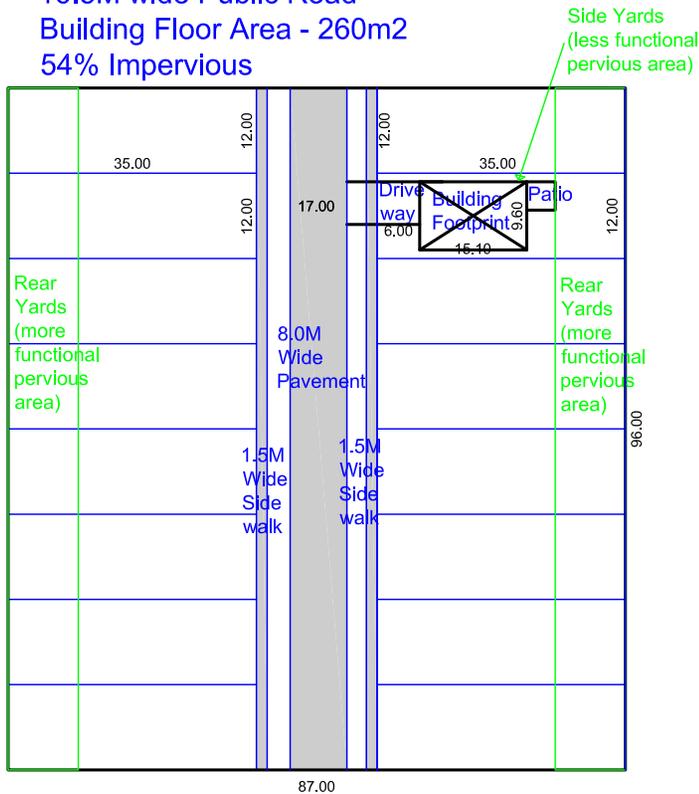


DRAIN ROCK TRENCH – SECTION AT LAWN BASIN  
NTS



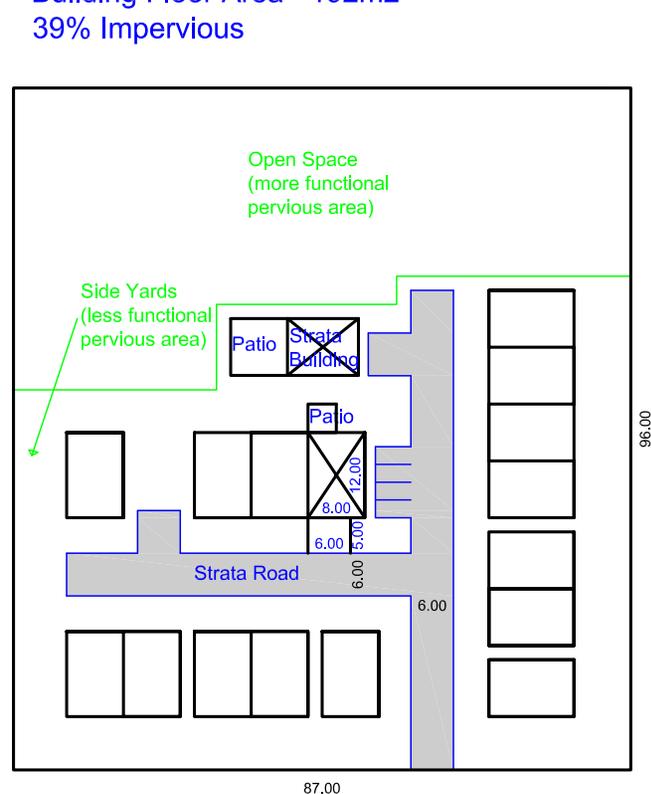
### TRADITIONAL DEVELOPMENT

2.05 acre parcel  
 8 upa  
 RF-12 Zone  
 16 units  
 420m2 lots  
 Double Car Garages  
 16.5M wide Public Road  
 Building Floor Area - 260m2  
 54% Impervious

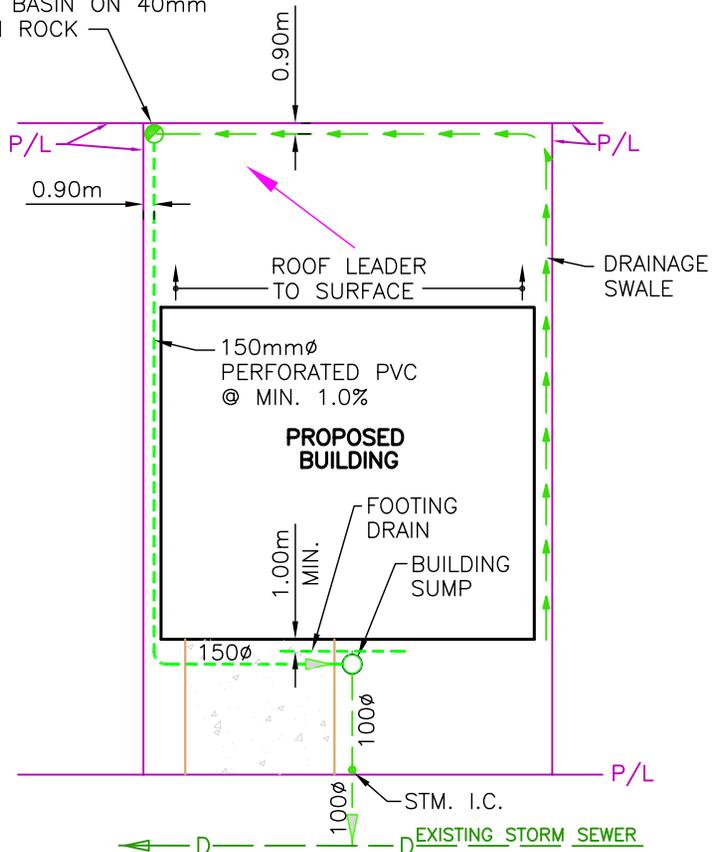


### CLUSTER HOUSING

2.05 acre parcel  
 8 upa  
 Cluster Housing Zone  
 16 units  
 Double Car Garages  
 6M wide Strata Road  
 Building Floor Area - 192m2  
 39% Impervious



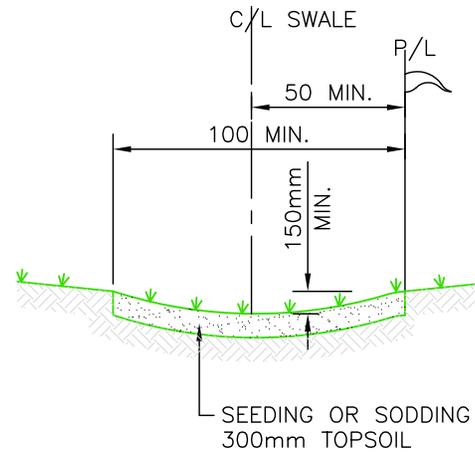
450mm $\phi$  OPEN BOTTOM  
LAWN BASIN ON 40mm  
DRAIN ROCK



**ON-SITE LAWN BASIN DETAIL**

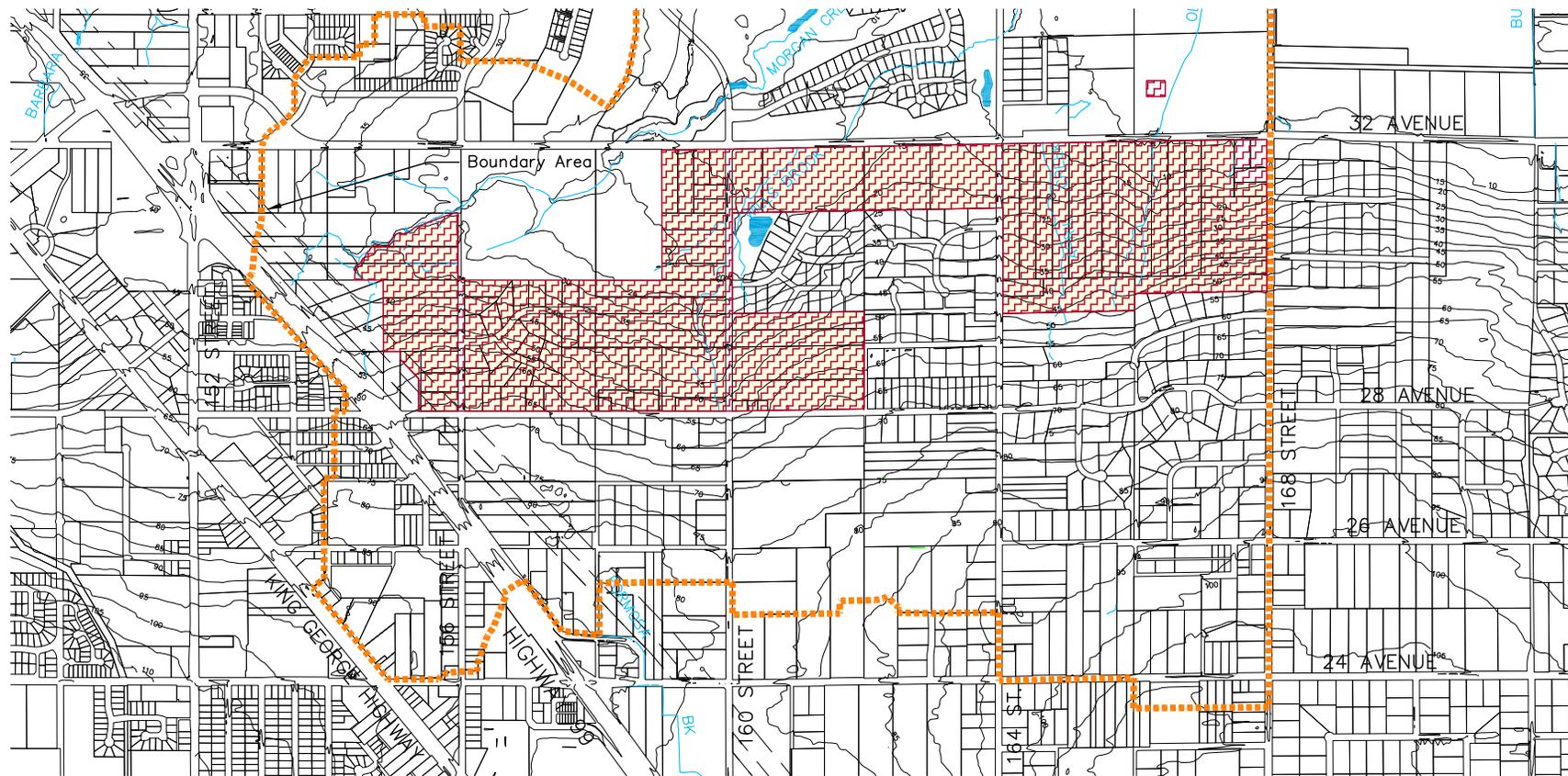
(BY BUILDER)  
N.T.S.

1. BASIN TO BE LOCATED IN REAR OR FRONT AS NECESSITATED BY LOT GRADING.



**INDIVIDUAL LOT DRAINAGE SWALE**

(BY BUILDER)  
N.T.S.



Legend



The NCP Area contributing to the North Grandview Heights Amendment Levy



North Grandview Heights Amendment Area



**NORTH GRANDVIEW HEIGHTS  
NEIGHBOURHOOD CONCEPT PLAN**

**storm levy area**

---

# **APPENDIX I**

## **ENVIRONMENTAL OVERVIEW STUDY**

---



**COAST RIVER  
ENVIRONMENTAL  
SERVICES LTD**



**ENKON**  
ENVIRONMENTAL

June 6, 2005

Michael Sanderson  
Manager, Planning & Urban Design  
Aplin & Martin Consultants Ltd.  
Suite 201, 12448 – 82<sup>nd</sup> Avenue  
Surrey, B.C. V3W 3E9

Unit 201 - 2430 King George Highway  
Surrey, B.C. Canada  
V4P 1H8  
Phone: (604) 536-2947  
Fax: (604) 536-2948  
Email: enkon@telus.net  
Web Page: www.enkon.com

Dear Sir:

**Re: North Grandview Heights Neighbourhood Concept Plan Environmental Overview  
(Draft Conceptual Amendment from Aplin & Martin, January 8, 2005)**

---

**Background**

The North Grandview Heights Neighbourhood Concept Plan requires amendment for densification of lots from the original land use plan (City of Surrey Planning and Land Use Department, June 18, 2002) which was based on one-acre residential; the area under consideration is bounded by 168<sup>th</sup> Street on the east and Highway 99 to the west, 32<sup>nd</sup> Avenue on the north and 28<sup>th</sup> Avenue on the south. The amendment increases the density of single detached dwellings up to 8 units per acre and allows for cluster and multi-family housing within certain areas. Multi-family and cluster housing is proposed from 160<sup>th</sup> Street to Hwy 99; from 160<sup>th</sup> to 164<sup>th</sup> streets single detached and cluster housing is proposed for areas adjacent to 28<sup>th</sup> and 32<sup>nd</sup> avenues, with the middle portion unchanged from the original NCP. The north half of the block bounded by 28<sup>th</sup> Avenue on the south, 32<sup>nd</sup> Avenue on the north, 164<sup>th</sup> Street on the west and 168<sup>th</sup> Street on the east is proposed for single-family, detached residential housing on 0.5 acre lots, as opposed to the original plan of one acre lots (portions of the North Grandview Heights have already been developed at this density). Delineation of greenspaces (parks, trails, riparian setbacks) is unchanged. Road accesses have been modified slightly from the original to provide increased servicing based on lot layouts developed for the concept plan.

The following letter report is based on work undertaken by Enkon Environmental, which focused on properties to the west of 164<sup>th</sup> Street, and Coast River Environmental Services, which concentrated on properties between 164<sup>th</sup> and 168<sup>th</sup> Streets.

**Fish Populations and Habitat**

***West of 164<sup>th</sup> Street, East of Highway 99***

With respect to the existing aquatic resources within the Grandview Heights NCP amendment area, for the area bounded by 164<sup>th</sup> Avenue to the east and Highway 99 to the west, there are two main tributaries of concern. Watercourses of concern within the area include Wills Brook and Morgan Creek (alias Titman Creek).

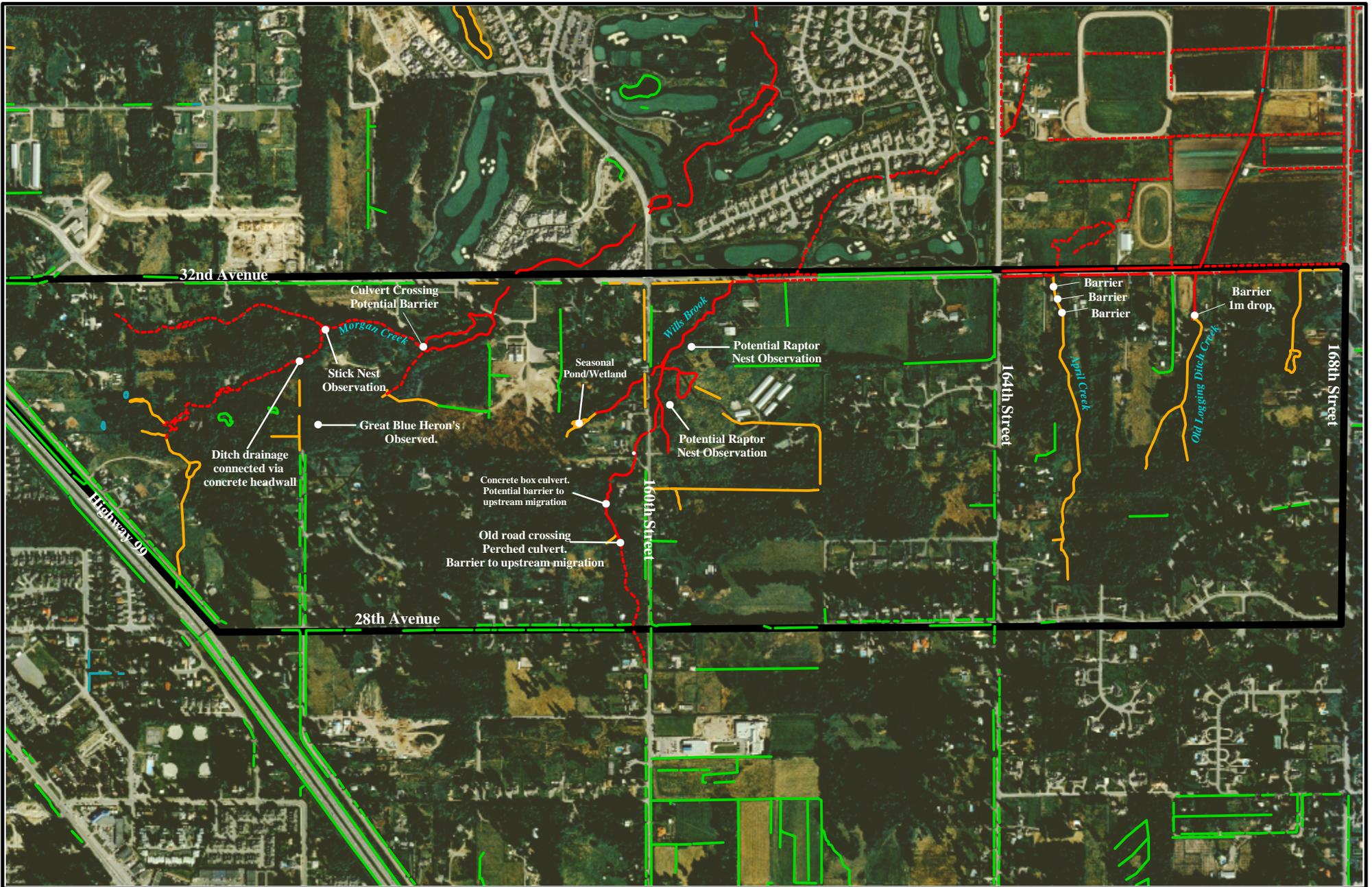
Review of City of Surrey's watercourse classification mapping indicates that portions of both watercourses within the NCP amendment area are fish-bearing streams with headwaters classified as significant food and nutrient sources. While fish habitat values associated with Morgan Creek have not changed significantly from that described in the North Grandview Heights General Area and Neighborhood Concept Engineering Plan (Urban Systems, November 1998), there have been some significant changes to the fish habitat values of Wills Brook and its tributaries associated with recent development (Figure 1).

Available information from the Ministry of Sustainable Resource Management indicates records of cutthroat trout (*Oncorhynchus clarki*), minnows (general) and Three-spine stickleback (*Gasterosteus aculeatus*) within the Morgan Creek drainage (Watershed Code 900- 004300-26700). While no specific fish distribution information is available for Wills Brook, data for Old Logging Ditch Creek (Watershed Code 900-004300-28800) and its tributaries, which are located immediately downstream, indicate the presence of coho salmon (*Oncorhynchus kisutch*), cutthroat trout, redbreasted shiner (*Richardsonius balteatus*) and stickleback (general). Field surveys completed in both 2002 and 2003 confirm the presence of juvenile coho within Wills Brook, both above and below the culvert crossing at 160<sup>th</sup> Street.

### **Wills Brook**

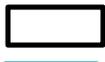
Urban Systems (1998) reported the main channel of Wills brook as suitable spawning habitat which is confirmed by field observations of suitable gravel and cobble substrate. During 2002 and 2003, a portion of the main channel of Wills Brook was modified to facilitate future road widening. The relocated channel was reconstructed again in 2003 to include gravel and cobble substrate, rock-crested weirs and large-woody debris complexing. Supplementary riparian vegetation was planted along the enhanced channel section in the summer of 2004. The most significant changes affecting the Wills Brook drainage are attributed to changes associated with the recent residential development located off 160<sup>th</sup> Street at Wills Brook Road, the previous location of Wills Brook Farm. The changes are located east of 160<sup>th</sup> Street and south of 32<sup>nd</sup> Avenue; the most significant of these changes includes the construction of a large fish-accessible detention pond and outflow channel with direct connectivity to fish bearing portions of Wills Brook. In addition, the recently developed area includes the construction of a non-fish-bearing environmental channel providing seasonal contribution of flow and food and nutrient value to the detention pond, several perimeter drainages feeding runoff to the pond and a drainage swale along the southern boundary which intercepts an apparent artesian water source from the south and is subsequently piped to a culvert outlet which sustains flows in a small tributary branch of Wills Brook.

These recent enhancement works to provide suitable substrate coupled with the aforementioned changes to the drainage network will likely enhance base flows and, as such, may improve both spawning and rearing habitat values within Wills Brook.



**Legend:**

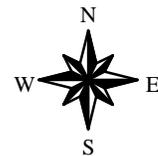
- Watercourse Classification**
- Class A
  - - - Class A(O)
  - Class B
  - Class C



North Grandview Hieghts NCP



Unclassified



Prepared by:



**North Grandview Heights NCP  
- Watercourse Classification -**

**Aplin & Martin**

**Figure 1**

**June 2005**

Fish surveys conducted in Wills Brook confirmed the presence of cutthroat trout to approximately 320m upstream of the crossing of 160<sup>th</sup> Street. An existing road crossing forms a barrier to potential upstream migration and no fish were observed upstream; however, removal of the barrier would likely facilitate upstream migration resulting in fish presence up to the existing crossing at 28<sup>th</sup> Avenue. An additional barrier to upstream migration was observed below the upstream limit of fish distribution at approximately 220m upstream of the 160<sup>th</sup> Street crossing. The two aforementioned barriers are introduced stream crossing barriers and fish distribution may increase if these features are removed. Similarly, the 28<sup>th</sup> Avenue road crossing could be enhanced to facilitate potential fish access to the upper portions of the stream where flows originate from ditch drainage and City of Surrey watercourse classifications indicated a Class C or Non Fish Habitat classification. Stream classifications for Wills Brook have been modified accordingly to reflect the known fish distribution and potential for fish presence with access enhancements (Figure 1).

A small tributary to Wills Brook crosses 160<sup>th</sup> Street at approximately 220m south of 32<sup>nd</sup> Avenue. This tributary is presently the subject of investigation by Fisheries and Oceans Canada as upstream portions of the stream were allegedly infilled. To confirm the present state of the watercourse ENKON conducted field reconnaissance and mapping of the watercourse. While the hydrology and morphology of the stream appear to indicate minimal flows and marginal fish habitat, the channel is accessible to fish and is potentially fish-bearing to the upstream limit of the defined channel. The areas above the defined channel appear to have been modified; however, localized ponded water and discontinuous channel sections drain to the channel itself and the drainage is classified as providing food and nutrient values. Figure 1 illustrates the current channel geometry and an updated classification.

The riparian plant communities for Wills Brook are well established. Review of recent air photographs illustrates a near contiguous riparian community throughout the length of the creek with the exception of existing road and driveway crossings. Riparian impacts associated with existing residences is limited to that portion of the stream located west of 160<sup>th</sup> Street for approximately 220m upstream of the 160<sup>th</sup> Street crossing with maintained lawns extending to the stream banks.

### **Morgan Creek**

City of Surrey watercourse classification mapping (January 2005) indicates that fish distribution within Morgan Creek is limited to the pond area within the cemetery lands located south of 160<sup>th</sup> Street. Field surveys conducted by ENKON in early March, 2005 focused on biophysical parameters and a preliminary assessment of fish distribution within the proposed development parcels. Initial sampling efforts within the upper Morgan Creek tributaries confirm the lack of fish presence upstream of the culvert at the large pond within the cemetery lands; however, no significant barriers were noted above the culvert and the stream classification has been modified to reflect the potential for fish presence with access enhancements (Figure 1). Discussion with a local area resident indicated that the in-line ponds located towards the upstream limit of the Morgan Creek tributary may be stocked with fish; however, the lack of fish presence throughout the lower reaches above the cemetery combined with anecdotal information suggest any fish present are likely introduced ornamental species. Due to access restrictions on private property, the potential fish presence in the ponds has not been confirmed.

The riparian plant communities for Morgan Creek are also well established. Review of recent air photographs illustrates a near contiguous riparian community throughout the length of the creek with the exception of existing road and driveway crossings.

### **Environmentally Sensitive Areas**

Review of the environmental evaluation by Urban Systems (November 1998) indicates that the riparian corridors for both Morgan Creek and Wills Brook are rated as “high” based on their significance with respect to fish habitat values. Upstream reaches of the mainstem of Morgan Creek also include areas rated as “medium”. With respect to future developments, setbacks should be established in consultation with the Department of Fisheries and Oceans and should be based on the most currently acceptable regulations pertaining to riparian areas and fish habitat values.

#### ***Between 164<sup>th</sup> and 168<sup>th</sup> Streets***

In general, fish habitat features and utilization have not changed since the original *North Grandview Heights General Area and Neighbourhood Concept Engineering Plan* was prepared and submitted by Urban Systems in November 1998. April Creek and the Old Logging Ditch Creek remain unchanged in course and their riparian zones remain intact within the subject block. If anything, riparian function may have improved slightly as trees have grown up to the point where they now provide additional shade and leaf litter to the system and shrubs have increased in density and fruiting capacity.

Surrey’s stream mapping codes those portions of April Creek, Old Logging Ditch and 32<sup>nd</sup> Avenue roadside drainage within the subject block as red-coded watercourses. Although, it is evident that the main channels of April Creek and Old Logging Ditch (within the subject block) do provide a good source of food and nutrients for downstream fish populations: migration barriers, lack of spawning substrates and low-to-dry summer base flow conditions preclude fish use. These streams do, however, make up the headwater source of the Old Logging Ditch system that flows north to join the Nicomekl River and are therefore highly important to its hydrologic regime.

Both creeks are shown as red-coded on the current Surrey Fisheries Watercourse Classification Map. However, on the basis of our field inspections we have adjusted the extent of the systems, their configurations and their watercourse classifications accordingly. We have shown Upper Old Logging Ditch and April Creek as “yellow coded” watercourses south of 32<sup>nd</sup> Ave. The roadside drainage system along 32<sup>nd</sup> Avenue that fronts the parcel is fish bearing and should be coded solid red as shown on the Surrey mapping. The spring fed pond and outflow channel are coded yellow on Surrey’s mapping. This coding appears to be appropriate, however, the watercourse should be shown as draining northward to the 32<sup>nd</sup> Avenue roadside drainage.

The old Logging Ditch stream corridor was designated as “high” in the *Environmentally Sensitive Areas Update & Park Acquisition and Enhancement Strategy* study (Coast River *et al.*, 1997), due to the value of year-round salmonid presence in its lower reaches. Upstream anadromous fish access within the Old Logging Ditch system extends to include the 32<sup>nd</sup> Avenue roadside ditch, which was confirmed, during a recent site reconnaissance conducted by Coast River (December

2004). Spawned out salmon carcasses, too deteriorated to identify to species, but likely coho, based on size and time of year, were observed in the 32<sup>nd</sup> Avenue ditch fronting the study site. Barriers, immediately upstream from the 32<sup>nd</sup> Avenue ditch preclude fish access to all streams within the property between 164<sup>th</sup> and 168<sup>th</sup> Streets, including April Creek and upper reaches of Old Logging Ditch.

Other minor watercourses are shown on the City of Surrey's watercourse classification map as "yellow," indicating that they provide food and nutrients to downstream fish populations. Most of these mapped watercourses originate from seasonal artesian outflows and follow man-made ditches or trenches. Most of these features are ephemeral and not accessible to fish, due to various dams and cascades, particularly within the ravine areas where they join April Creek or the Old Logging Ditch. We did note several inconsistencies between our ground surveys of the watercourses within this parcel and their mapped locations, drainage direction, and extent of channel as shown on the Surrey watercourse map. Appropriate adjustments and corrections to mapped watercourses have been incorporated into our base mapping.

Wells have been installed, over the years, on several of the properties along 32<sup>nd</sup> Avenue. Many of these wells are capped, although, some remain open providing seasonal, artesian flows. At least one well provides permanent artesian flow to support constructed ponds. A seasonal artesian well, located immediately east of April Creek, flows along a man-made grassy swale to join the creek and is not shown on the City of Surrey's watercourse classification map. This drainage does provide some food and nutrients, in addition to clean water to April Creek. If the well is capped, its benefits to lower April Creek would be lost, however, if the flow can be piped to April Creek's riparian leave strip and run along a constructed open swale before joining the stream; its base flow, water quality, and nutrient supply benefits can be maintained. Development concepts should incorporate measures to maintain or enhance base flows in April Creek and the upper portion of the Old Logging Ditch.

Riparian zones have been delineated along each side of upper April creek, the Old Logging Ditch and a spring fed drainage to the east on this block of land. These riparian setback zones averaging 15 m in width (from top of bank) will incorporate nearly all of the site's significant streamside vegetation into streamside protection zones, in accordance with streamside setback legislation. The avoidance and/or minimizing stream crossings in road access design will decrease potential disturbance to the streams and their riparian margins on the site. Invasive and exotic species have encroached at places along the various watercourses (particularly lower April Creek) and should be removed as part of the overall development plan. These areas, along with decommissioned driveways situated within the riparian margin of streams on the site, should be revegetated with local native species.

### **Wildlife Populations and Habitat**

West of 164<sup>th</sup> Street, landscapes with higher habitat value are found within the Morgan Creek and Wills Brook riparian corridors. Riparian areas provide feeding and breeding areas, movement corridors, and security cover for birds, raptors, herptiles, small mammals and large mammals. Provided that watercourse protection is in place, these highly valuable wildlife habitats would be retained and continue to provide life requisites to resident and transient wildlife. Tables 1 and 2

summarize habitat values and types for the NCP area and the wildlife potentially inhabiting or using the habitats found therein.

Intact woodland habitat also warrants a high wildlife rating in theory, but the quality of the woodland habitat is highly dependent on the size of the woodland and whether it is connected to adjacent woodlands or riparian habitat. Within North Grandview Heights, west of 164<sup>th</sup> Street, very little intact woodland habitat still exists. The most significant stand of woodlands is a small band of deciduous forest west of 160<sup>th</sup> Street and north of 28 Avenue.

Moderately valuable wildlife habitats are found adjacent to riparian areas. These areas may be smaller patches of woodland or shrub dominated areas that provide partial life requisites (e.g., food) but are lacking other habitat qualities (e.g., security cover). Much of the woodland habitats

**Table 1 - Habitat Values for Selected Vertebrate Species/Species Groups.**

Habitat Grouping	Relative Importance to Species / Species Group							Overall Wildlife Rating
	Deer	Furbearers <sup>1</sup>	Small Mammals <sup>2</sup>	Herptiles <sup>3</sup>	Woodpeckers	Songbirds	Waterbirds <sup>4</sup>	
<b>Deciduous Woodland</b>	Moderate	Moderate	Moderate	Low	Moderate to High	Moderate to High	Low	Moderate
<b>Young Deciduous Woodland</b>	Moderate	Moderate	Moderate to Low	Low	Moderate to High	Moderate to High	Low	Moderate
<b>Coniferous Woodland</b>	Moderate to High	Moderate to High	Moderate	Moderate	Moderate to High	Moderate to High	Low	Moderate to High
<b>Mixed Woodland</b>	Moderate to High	Moderate to High	Moderate to High	Moderate	Moderate to High	Moderate to High	Low	Moderate to High
<b>Landscaped</b>	Low	Low	Low	Low	Moderate to Low	Moderate	Low	Low
<b>Grassland</b>	Moderate to Low	Low	Moderate to High	Low	Moderate to Low	Moderate	Moderate	Moderate to Low
<b>Agricultural</b>	Low	Low	Moderate to High	Low	Low	Low	Moderate to High	Low
<b>Riparian</b>	High	High	High	Very High	High	High	Moderate	High

**Notes:** Evaluation is based on knowledge of the area and air photo interpretation of habitat, detailed habitat mapping has not been completed at this stage

<sup>1</sup> “Furbearers” is a generalized term, which includes raccoons, mustelids, Douglas squirrels.

<sup>2</sup> “Small Mammals” include shrews, mice and voles native to the area.

<sup>3</sup> “Herptiles” is a term given to the combined grouping of amphibians with reptiles.

<sup>4</sup> “Waterbirds” is a term used here to include migratory and non-migratory waterfowl and wading birds

**Table 2 - Summary of Values in Habitat Types**

<b>Habitat Grouping</b>	<b>Forage Production</b>			<b>Snag Abundance</b>	<b>Coarse Woody Debris</b>	<b>Surface Complexity</b>	<b>Hiding Cover</b>	<b>Travel Corridor Potential</b>
	<b>Browse</b>	<b>Herbage</b>	<b>Berries</b>					
<b>Deciduous Woodland</b>	Moderate to High	Moderate to Low	Moderate to High	Moderate to High	Moderate to High	Moderate	High	High
<b>Young Deciduous Woodland</b>	Moderate to High	Moderate to High	Moderate to High	Moderate to Low	Moderate to Low	Moderate	Low	High
<b>Coniferous Woodland</b>	Moderate to High	Moderate to Low	Moderate to Low	Moderate to High	Moderate to High	Moderate	High	High
<b>Mixed Woodland</b>	Moderate to High	Moderate to Low	Moderate to Low	Moderate to High	Moderate to High	Moderate	High	High
<b>Landscaped</b>	Very Low	High	Low	Nil	Nil	High	Very Low	Moderate
<b>Grassland</b>	Very Low	High	Moderate	Nil	Nil	High	Very Low	Moderate
<b>Agricultural</b>	Very Low	High	Low	Nil	Nil	High	Very Low	Moderate
<b>Riparian</b>	Moderate	Moderate	Low	High	Moderate to Low	Low	High	High

Evaluation is based on knowledge of the area and air photo interpretation of habitat, detailed habitat mapping has not been completed at this stage

of North Grandview Heights would be evaluated as moderate, not high, due to their size and lack of connectivity to more valuable habitat.

Low value would be assigned to the majority of the landscapes in Grandview Heights. Landscapes that have undergone a great deal of alteration due to human disturbances generally have low habitat value. For example, agricultural land and landscaped land do not provide nesting habitat for birds, nor do they provide security cover for deer. These landscapes do, however, provide ideal hunting grounds for raptors.

Within the 164 to 168 Street blocks, wildlife habitat and usage is restricted to the existing stream corridors and shrubby sections. As the area is developed, terrestrial wildlife usage and movements will decrease because of fences and other restrictions on territory and migration, and the change from canopy and shrubbery to open lawn spaces. Birds and bats using large trees for perching or roosting may continue to do so within the riparian zones; however, as the agricultural lands to the north and the surrounding vacant areas are also developed into residential housing, some raptor species will move out as hunting opportunities will be decreased. Passerine bird usage, including nesting and rearing will be unaffected. Wildlife species, such as coyotes, raccoons, skunks, *etc.*, that adapt well to urban conditions will likely diminish in numbers, but, like deer, will utilize the stream corridors and path networks to move about. Some species, such as deer, are even attracted to urban landscaping and gardens because of the relatively easy access to browse material. Some large conifer stands exist at property boundaries and along right-of-ways; the majority of these significant trees will be retained during development due to their importance in providing aesthetically pleasing attributes to the properties.

With respect to species at risk, it is highly unlikely that any of those flora and fauna listed by the COSEWIC as threatened or endangered would be found in the area, due to its previous development (logging) and existing land use (residential, agricultural and aquacultural); the attached tables list the species designated by the *Species at Risk Act* Public Registry and the BC Conservation Data Centre (these lists are broad as they cover the province and the Chilliwack Forest District, respectively). Provincial red- or blue-listed wildlife species that may be resident in the NCP area are summarized in Table 3. Various birds (*e.g.*, Lewis' woodpecker, *etc.*) and bat species of concern may also use the area incidentally. During March 2005 field work, the blue-listed great blue heron was seen in the NCP area. In addition, the organization Orphaned Wildlife Rehabilitation Society confirmed that the blue-listed barn owl has been rescued and released in the NCP area.

Aquatic species or species with aquatic life history stages, such as salamanders and dragonflies, would be unaffected by development given that proper water quality protection measures are implemented and the permanent red-coded watercourses protected. To date, no specific benthic invertebrate or shrew trapping studies have been conducted to assess the potential presence of protected species. Any existing ponds or developed stormwater detention ponds could be upgraded (*i.e.*, provide access and habitat complexing) to provide aquatic habitat for those species requiring water during some portion of their life cycle.

**Table 3 - Potential Resident Wildlife Species of Concern in the North Grandview Heights Area**

Scientific Name	English Name	Required Habitat	Potential to Occur
<b>Herptiles</b>			
<i>Rana aurora</i>	Red-legged Frog	Moist forests and wetlands with trees, breeds in shallow ponds or slow streams that are well shaded	Possible
<b>Birds</b>			
<i>Ardea herodias fannini</i>	Great Blue Heron, <i>fannini</i> Subspecies	Nest in a wide variety of tree species in BC they nest in quiet woodlots within 8 km (most within 3 km) of foraging habitats such as large eelgrass meadows, along rivers, and in estuarine and freshwater marshes.	ENKON confirmed to forage in area
<i>Butorides virescens</i>	Green Heron	Sloughs, rivers, lakes, ponds, reservoirs, estuaries and beaches in BC	Possible - as transient
<i>Asio flammeus</i>	Short-eared owl	Short-eared Owls nest in open treeless areas such as grasslands, rangelands, dry marshes and farmlands.	Possible - as transient or resident
<i>Tyto alba</i>	Barn Owl	Prefer low-elevation, open country, where their small rodent prey are more abundant; often associated with agricultural lands, especially pasture. In B.C. nests are most often located in buildings	Confirmed by the Orphaned Wildlife Rehabilitation Society
<b>Terrestrial Mammals</b>			
<i>Sorex bendirii</i>	Pacific Water Shrew	Associated with low-elevation riparian, typically forests with extensive canopy and understory. Because it is an aquatic feeder it is found near water.	Possible
<i>Sorex trowbridgii</i>	Trowbridge's Shrew	Inhabits a wide variety of low elevation coastal forest stands, preferring dry, loose litter.	Possible

### Summarized Wildlife Observations

On 7 and 8 March 2005, ENKON conducted wildlife and fish preliminary habitat assessments of the North Grandview Heights area. The following amphibian, bird and mammal species, not categorized by the province (*i.e.*, common species) were observed on the property during the March survey:

- Pacific treefrog (*Hyla regilla*)
- Black-capped chickadee (*Poecile atricapilla*)
- American robin (*Certhia americana*)
- Pileated woodpecker (*Dryocopus pileatus*)
- Hairy woodpecker (*Picoides villosus*)
- Brown creeper (*Turdus migratorius*)

- Dark-eyed junco (*Junco hyemalis*)
- Winter wren (*Troglodytes troglodytes*)
- Fox sparrow (*Passerella iliaca*)
- Northern flicker (*Colaptes auratus*)
- Red-tailed hawk (*Buteo jamaicensis*)
- Northwestern crow (*Corvus caurinus*)
- Bufflehead (*Bucephala albeola*)
- Columbian black-tailed deer (*Odocoileus hemionus columbianus*)

Of the potentially occurring provincially and federally-listed wildlife species, only the blue-listed great blue heron was observed on the property. Other notable field observations are illustrated in Figure 1, and are as follows:

- A resident at 156 Street and 28 Avenue reported that rehabilitated great horned and barred owls have been released in the area. This was confirmed by the Delta organization Orphaned Wildlife Rehabilitation Society (O.W.L.);
- O.W.L. confirmed nesting of barn owls in the NCP area;
- The resident also spoke of historic bald eagle activity in the area;
- A patch of mature conifers exists south of 32 Avenue at 156 Street at the confluence of Morgan Creek; and
- Two large stick nests were identified by ENKON as potential raptor nests; they were located near the Wills Brook pond (Figure 1).

### **Environmental Overview**

The North Grandview Heights area has been historically impacted by past logging and farming activities, and is currently suburban in context due to surrounding developments; consequently, it does not retain any “natural” characteristics. Surrounding development, including major road networks, have effectively divided existing habitat into blocks and restricted movements. The watercourses and roadside ditch networks, however, have provided important salmonid habitat, indicating that accessibility to original and created habitats has been maintained. Avoidance of impacts to these watercourses and man-made conveyances is crucial to maintaining fish and fish habitat.

The following recommendations should be incorporated into any development plan where such watercourses could potentially be impacted:

- elimination of stream crossings where alternative access routes are available (additional benefit is avoidance of *Species at Risk* issues (*i.e.*, Pacific water shrews);
- use of clearspan bridges where crossings are necessary;
- adherence to recommended riparian zone setbacks for the watercourse classification;

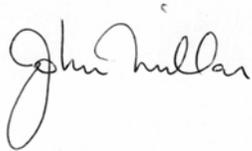
- removal of invasive and exotic plant species, and revegetation with native species, including landscaped areas within the community (and encouragement of residents to vegetate with native species within their lots);
- inclusion of greenspace corridors that allow wildlife movements through the larger area and aid in reduction of habitat fragmentation;
- maintenance of baseflows to watercourses through diversion of artesian springs that are slated for capping;
- where possible retain significant trees,
- retain raptor nest trees and buffer them according to provincial BMP;
- install nest boxes or nest platforms for raptors such as Northern saw-whet owl, barred owl and American kestrel;
- install bat houses for insectivorous bats such as the little brown bat;
- remove invasive and exotic plant species and maintain annually where necessary;
- endorse a stormwater management plan that maximises the use of impervious surfaces, incorporates lawn basin to retain rainwater; and utilises landscaping techniques as a means to retain stormwater;
- plant the banks of permanent stormwater detention ponds with riparian plant and add coarse woody debris features to detention ponds to attract fish and herptiles species; and
- fence riparian setback habitat with attractive, wooden fencing and post signs that identify the area as sensitive fish and wildlife habitat.

The above list is not exhaustive, but is intended to provide some general guidelines during concept development.

If you have any questions or require further information, please do not hesitate to call S. Reed at 604 264 7522 and Glenn Stewart at 604-536-2947.

Sincerely,

**COAST RIVER ENVIRONMENTAL SERVICES LTD.**



John Millar B.Sc, R.P. Bio.  
Principal

**ENKON Environmental Limited**



Glenn Stewart, B. Sc., R.P.Bio.  
President

<i>Species at Risk Act Public Registry</i>			
<b>Endangered, Threatened and Special Concern Species in British Columbia (Dec 2004)</b>			
<b>Scientific Name</b>	<b>English Name</b>	<b>Risk Category</b>	<b>Schedule</b>
<b>Fish</b>			
<i>Gasterosteus sp.</i>	Benthic Paxton Lake Stickleback	Endangered	Schedule 1
<i>Gasterosteus sp.</i>	Benthic Vananda Creek Stickleback	Endangered	Schedule 1
<i>Gasterosteus sp.</i>	Benthic Enos Lake Stickleback	Endangered	Schedule 2 (pending to 1)
<i>Gasterosteus sp.</i>	Charlotte Unarmoured Stickleback	Special concern	Schedule 3
<i>Cottus bairdi hubbsi</i>	Columbia Mottled Sculpin	Special concern	Schedule 1
<i>Lampetra macrostoma</i>	Cowichan Lake Lamprey	Threatened	Schedule 1
<i>Lampetra richardsoni</i>	Morrison Creek Lamprey	Endangered	Schedule 1
<i>Cottus sp.</i>	Cultus Pygmy Sculpin	Threatened	Schedule 1
<i>Gasterosteus sp.</i>	Giant Stickleback	Special concern	Schedule 3
<i>Acipenser medirostris</i>	Green Sturgeon	Special concern	Schedule 3 (pending to 1)
<i>Gasterosteus sp.</i>	Limnetic Enos Lake Stickleback	Endangered	Schedule 2 (pending to 1)
<i>Gasterosteus sp.</i>	Limnetic Paxton Lake Stickleback	Endangered	Schedule 1
<i>Gasterosteus sp.</i>	Limnetic Vananda Creek Stickleback	Endangered	Schedule 1
<i>Rhinichthys sp.</i>	Nooksack Dace	Endangered	Schedule 1
<i>Catostomus sp.</i>	Salish Sucker	Endangered	Schedule 2 (pending to 1)
<i>Cottus confusus</i>	Shorthead Sculpin	Threatened	Schedule 1
<i>Rhinichthys osculus</i>	Speckled Dace	Endangered	Schedule 3 (pending to 1)
<i>Rhinichthys umatilla</i>	Umatilla Dace	Special concern	Schedule 3
<i>Oncorhynchus nerka</i>	Sockeye Salmon (Sakinaw Lake)	Not listed (COSEWIC endan.)	Pending for Schedule 1
<i>Oncorhynchus nerka</i>	Sockeye Salmon (Cultus Lake)	Not listed (COSEWIC endan.)	Pending for Schedule 1
<i>Oncorhynchus kisutch</i>	Coho Salmon (Interior Fraser Pop.)	Not listed (COSEWIC endan.)	Pending for Schedule 1
<i>Acipenser transmontanus</i>	White Sturgeon	Endangered	Schedule 3 (pending to 1)
<b>Herptiles</b>			
<i>Ambystoma tigrinum</i>	Tiger salamander (southern mountain population)	Endangered	Schedule 1

<b>Species at Risk Act Public Registry</b>			
<b>Endangered, Threatened and Special Concern Species in British Columbia (Dec 2004)</b>			
<b>Scientific Name</b>	<b>English Name</b>	<b>Risk Category</b>	<b>Schedule</b>
<b>Fish</b>			
<i>Ascaphus montanus</i>	Rocky mountain tailed frog	Endangered	Schedule 1
<i>Ascaphus truei</i>	Coastal Tailed Frog	Special concern	Schedule 1
<i>Dicamptodon tenebrosus</i>	Pacific Giant Salamander	Threatened	Schedule 1
<i>Plethodon idahoensis</i>	Coeur d'Alene Salamander	Special concern	Schedule 1
<i>Rana aurora</i>	Northern red-legged Frog	Special concern	Schedule 3 (pending to 1)
<i>Rana pipiens</i>	Northern leopard frog (southern mountain population)	Endangered	Schedule 1
<i>Rana pretiosa</i>	Oregon Spotted Frog	Endangered	Schedule 1
<i>Bufo boreas</i>	Western Toad	Not listed (COSEWIC sp. con)	Pending for Schedule 1
<i>Spea intermontana</i>	Great basin Spadefoot	Threatened	Schedule 1
<i>Pituophis catenifer deserticola</i>	Great Basin Gophersnake	Not listed (COSEWIC threat.)	Pending for Schedule 1
<i>Charina bottae</i>	Rubber Boa	Not listed (COSEWIC sp. con)	Pending for Schedule 1
<i>Hypsiglena torquata</i>	Night Snake	Endangered	Schedule 1
<i>Eumeces skiltonianus</i>	Western Skink	Not listed (COSEWIC sp. con)	Pending for Schedule 1
<i>Crotalus oreganus</i>	Western Rattlesnake	Not listed (COSEWIC threat.)	Pending for Schedule 1
<i>Coluber constrictor mormon</i>	Western Yellow-bellied Racer	Not listed (COSEWIC sp. con)	Pending for Schedule 1
<i>Contia tenuis</i>	Sharp-tailed Snake	Endangered	Schedule 1
<b>Birds</b>			
<i>Accipiter gentilis laingi</i>	Northern goshawk laingi sub spp.	Threatened	Schedule 1
<i>Ardea herodias fannini</i>	Great blue heron	Special concern	Schedule 3
<i>Asio flammeus</i>	Short eared owl	Special concern	Schedule 3
<i>Athene cunicularia</i>	Burrowing owl	Endangered	Schedule 1
<i>Brachyramphus marmoratus</i>	Marbled Murrelet	Threatened	Schedule 1
<i>Coturnicops noveboracensis</i>	Yellow rail	Special concern	Schedule 1
<i>Falco peregrinus anatum</i>	Peregrine falcon	Threatened	Schedule 1
<i>Falco peregrinus pealei</i>	Peregrine falcon	Special concern	Schedule 1

<b>Species at Risk Act Public Registry</b>			
<b>Endangered, Threatened and Special Concern Species in British Columbia (Dec 2004)</b>			
<b>Scientific Name</b>	<b>English Name</b>	<b>Risk Category</b>	<b>Schedule</b>
<b>Fish</b>			
<i>Eremophila alpestris strigata</i>	Horned Lark Strigata sub spp	Not listed (COSEWIC endan.)	Pending for Schedule 1
<i>Icteria virens auricollis</i>	Western yellow-breasted chat (BC population)	Endangered	Schedule 1
<i>Melanerpes lewis</i>	Lewis's woodpecker	Special concern	Schedule 1
<i>Numenius americanus</i>	Long billed curlew	Special concern	Schedule 3 (pending to 1)
<i>Puffinus creatopus</i>	Pink-footed Shearwater	Not listed (COSEWIC threat.)	Pending for Schedule 1
<i>Numenius borealis</i>	Eskimo curlew	Endangered	Schedule 1
<i>Oreoscoptes montanus</i>	Sage thrasher	Endangered	Schedule 1
<i>Otus flammeolus</i>	Flammulated owl	Special concern	Schedule 1
<i>Picoides albolarvatus</i>	White-headed woodpecker	Endangered	Schedule 1
<i>Megascops kennicottii kennicottii</i>	Western screech-owl kennicottii sub spp.	Not listed (COSEWIC sp. con)	Pending for Schedule 1
<i>Megascops kennicottii macfarlanei</i>	Western screech-owl marfarlanei sub spp.	Not listed (COSEWIC endan.)	Pending for Schedule 1
<i>Strix occidentalis caurina</i>	Northern spotted owl	Endangered	Schedule 1
<i>Phoebastria albatrus</i>	Short-tailed Albatross	Not listed (COSEWIC threat.)	Pending for Schedule 1
<i>Synthliboramphus antiquus</i>	Ancient murrelet	Special concern	Schedule 3
<i>Tyto alba</i>	Barn Owl	Special concern	Schedule 1
<b>Mammals (excluding marine mammals)</b>			
<i>Antrozous pallidus</i>	Pallid bat	Threatened	Schedule 1
<i>Aplodontia rufa</i>	Mountain beaver	Special concern	Schedule 1
<i>Bison bison bison</i>	Plains bison	Not listed (COSEWIC threat.)	Pending for Schedule 1
<i>Bison bison athabascae</i>	Wood bison	Threatened	Schedule 1
<i>Euderma maculatum</i>	Spotted bat	Special concern	Schedule 3
<i>Gulo gulo</i>	Wolverine (Western population)	Special concern	Schedule 3 (pending to 1)
<i>Marmota vancouverensis</i>	Vancouver Island Marmot	Endangered	Schedule 1
<i>Mustela erminea haidarum</i>	Ermine	Threatened	Schedule 1
<i>Rangifer tarandus caribou</i>	Woodland caribou (Boreal population)	Threatened	Schedule 1

<b>Species at Risk Act Public Registry</b>			
<b>Endangered, Threatened and Special Concern Species in British Columbia (Dec 2004)</b>			
<b>Scientific Name</b>	<b>English Name</b>	<b>Risk Category</b>	<b>Schedule</b>
<b>Fish</b>			
<i>Rangifer tarandus caribou</i>	Woodland caribou (Northern Mountain population)	Not listed (COSEWIC sp. con)	Pending for Schedule 1
<i>Rangifer tarandus caribou</i>	Woodland caribou (Southern Mountain population)	Threatened	Schedule 1
<i>Reithrodontomys megalotis megalotis</i>	Western harvest mouse	Special concern	Schedule 3
<i>Scapanus townsendii</i>	Townsend's mole	Endangered	Schedule 2 (pending to 1)
<i>Sorex bendirii</i>	Pacific water shrew	Threatened	Schedule 1
<i>Sylvilagus nuttallii nuttallii</i>	Nuttall's cottontail	Special concern	Schedule 3
<i>Taxidea taxus jeffersonii</i>	American badger	Endangered	Schedule 1
<i>Ursus arctos</i>	Grizzly Bear (NW population)	Special concern	Schedule 3 (pending to 1)

Schedule 1: official list of species either extirpated, endangered, threatened, or a special concern.

Schedule 2: assessment must be completed within 30 days after the minister's request.

Schedule 3: assessment must be completed within one year after the minister's request

<b>B.C. Conservation Data Centre: Rare Vertebrate Animal Tracking List for the Chilliwack Forest District, December 2004</b>						
<b>Scientific Name</b>	<b>English Name</b>	<b>G Rank</b>	<b>Provincial</b>	<b>COSEWIC</b>	<b>BC Status</b>	<b>Identified Wildlife</b>
<b>Fish</b>						
<i>Cottus sp. 2</i>	Cultus Lake Sculpin	G1	S1	T (NOV 2000)	RED	
<i>Acipenser medirostris</i>	Green Sturgeon	G3	S1S2B,S3N	SC (1987)	RED	
<i>Acipenser transmontanus pop. 4</i>	White Sturgeon (Lower Fraser River Pop.)	G4T2Q	S2	E (NOV 2003)	RED	
<i>Oncorhynchus clarki clarki</i>	Cutthroat Trout, <i>clarki</i> Subspecies	G4T4	S3S4SE		BLUE	
<i>Salvelinus confluentus</i>	Bull Trout	G3	S3		BLUE	
<i>Salvelinus</i>	Dolly Varden	G5	S3S4		BLUE	

<b>B.C. Conservation Data Centre: Rare Vertebrate Animal Tracking List for the Chilliwack Forest District, December 2004</b>						
<b>Scientific Name</b>	<b>English Name</b>	<b>G Rank</b>	<b>Provincial</b>	<b>COSEWIC</b>	<b>BC Status</b>	<b>Identified Wildlife</b>
<i>malma</i>						
<i>Spirinchus sp. 1</i>	Pygmy Longfin Smelt	G1Q	S1	DD (NOV 2004)	RED	
<i>Thaleichthys pacificus</i>	Eulachon	G5	S2S3		BLUE	
<i>Rhinichthys sp. 4</i>	Nooksack Dace	G3	S1	E (MAY 2000)	RED	
<i>Catostomus platyrhynchus</i>	Mountain Sucker	G5	S3?	NAR (1991)	BLUE	
<i>Catostomus sp. 4</i>	Salish Sucker	G1	S1	E (NOV 2002)	RED	
<b>Herptiles</b>						
<i>Dicamptodon tenebrosus</i>	Coastal Giant Salamander	G5	S2	T (NOV 2000)	RED	I (MAY 2004)
<i>Ascaphus truei</i>	Coastal Tailed Frog	G4	S3S4	SC (MAY 2000)	BLUE	I (MAY 2004)
<i>Rana aurora</i>	Red-legged Frog	G4	S3S4	SC (NOV 2004)	BLUE	I (MAY 2004)
<i>Rana pretiosa</i>	Oregon Spotted Frog	G2G3	S1	E (MAY 2000)	RED	
<i>Chrysemys picta</i>	Painted Turtle	G5	S3S4		BLUE	
<i>Clemmys marmorata</i>	Western Pond Turtle	G3G4	SX	XT (MAY 2002)	RED	
<i>Pituophis catenifer catenifer</i>	Gopher Snake, <i>catenifer</i> Subspecies	G5T5	SX	XT (MAY 2002)	RED	
<b>Birds</b>						
<i>Aechmophorus occidentalis</i>	Western Grebe	G5	S1B,S3N		RED	
<i>Phalacrocorax auritus</i>	Double-crested Cormorant	G5	S2B,SZN	NAR (1978)	RED	
<i>Botaurus lentiginosus</i>	American Bittern	G4	S3B,SZN		BLUE	
<i>Ardea herodias fannini</i>	Great Blue Heron, <i>fannini</i> Subspecies	G5T4	S3B,S4N	SC (1997)	BLUE	I (MAY 2004)
<i>Butorides virescens</i>	Green Heron	G5	S3S4B,SZN		BLUE	
<i>Falco peregrinus</i>	Peregrine Falcon,	G4T3	S2B,SZN	T (MAY 2000)	RED	

<b>B.C. Conservation Data Centre: Rare Vertebrate Animal Tracking List for the Chilliwack Forest District, December 2004</b>						
<b>Scientific Name</b>	<b>English Name</b>	<b>G Rank</b>	<b>Provincial</b>	<b>COSEWIC</b>	<b>BC Status</b>	<b>Identified Wildlife</b>
<i>anatum</i>	<i>anatum</i> Subspecies					
<i>Grus canadensis</i>	Sandhill Crane	G5	S3S4B,SZN	NAR (1979) G. CANADENSIS TABIDA ASSESSED	BLUE	
<i>Grus canadensis pop. 1</i>	Sandhill Crane (Georgia Depression Pop.)	G5T1Q	S1		RED	
<i>Recurvirostra americana</i>	American Avocet	G5	S2B,SZN		RED	
<i>Sterna caspia</i>	Caspian Tern	G5	S3B,SZN	NAR (1999)	BLUE	
<i>Brachyramphus marmoratus</i>	Marbled Murrelet	G3G4	S2B,S4N	T (NOV 2000)	RED	I (MAY 2004)
<i>Columba fasciata</i>	Band-tailed Pigeon	G4	S3S4B,SZN		BLUE	
<i>Coccyzus americanus</i>	Yellow-billed Cuckoo	G5	SXB,SAN		RED	
<i>Tyto alba</i>	Barn Owl	G5	S3	SC (NOV 2001)	BLUE	
<b>Birds</b>						
<i>Otus kennicottii kennicottii</i>	Western Screech-owl, <i>kennicottii</i> Subspecies	G5TNR	S3	SC (MAY 2002)	BLUE	
<i>Strix occidentalis</i>	Spotted Owl	G3	S1	E (MAY 2000) CAURINA SUBSPECIES	RED	I (MAY 2004)
<i>Asio flammeus</i>	Short-eared Owl	G5	S3B,S2N	SC (1994)	BLUE	I (MAY 2004)
<i>Melanerpes lewis pop. 1</i>	Lewis's Woodpecker (Georgia Depression Pop.)	G5TNRQ	SXB,SZN		RED	I (MAY 2004)
<i>Sphyrapicus thyroideus thyroideus</i>	Williamson's Sapsucker, Thyroideus Subsp.	G5TU	S3B,SZN		BLUE	
<i>Eremophila alpestris strigata</i>	Horned Lark, <i>strigata</i> Subspecies	G5T2	SX	E (NOV 20003)	RED	
<i>Progne subis</i>	Purple Martin	G5	S2B		RED	
<i>Sialia mexicana</i>	Western	G5TNRQ	SHB,SZN		RED	

<b>B.C. Conservation Data Centre: Rare Vertebrate Animal Tracking List for the Chilliwack Forest District, December 2004</b>						
<b>Scientific Name</b>	<b>English Name</b>	<b>G Rank</b>	<b>Provincial</b>	<b>COSEWIC</b>	<b>BC Status</b>	<b>Identified Wildlife</b>
<i>pop. 1</i>	Bluebird (Georgia Depression Pop.)					
<i>Sturnella neglecta pop. 1</i>	Western Meadowlark (Georgia Depression Pop.)	G5TNRQ	SXB,SZN		RED	
<b>Mammals (excluding marine mammals)</b>						
<i>Sorex bendirii</i>	Pacific Water Shrew	G4	S1S2	T (MAY 2000)	RED	I (MAY 2004)
<i>Sorex trowbridgii</i>	Trowbridge's Shrew	G5	S3S4		BLUE	
<i>Scapanus townsendii</i>	Townsend's Mole	G5	S1	E (2003)	RED	
<i>Myotis keenii</i>	Keen's Long-eared Myotis	G2G3	S2	DD (NOV 2003)	RED	I (MAY 2004)
<i>Lasiurus blossevillii</i>	Western Red Bat	G5	S1		RED	
<i>Corynorhinus townsendii</i>	Townsend's Big-eared Bat	G4	S2S3		BLUE	
<i>Lepus americanus washingtonii</i>	Snowshoe Hare, <i>washingtonii</i> Subspecies	G5T3T5	S1		RED	
<i>Aplodontia rufa rainieri</i>	Mountain Beaver, <i>rainieri</i> Subspecies	G5T4	S3	SC (1999)	BLUE	
<i>Aplodontia rufa rufa</i>	Mountain Beaver, <i>rufa</i> Subspecies	G5T4?	S1S2	SC (1999)	RED	
<i>Clethrionomys gapperi occidentalis</i>	Southern Red-backed Vole, <i>occidentalis</i> Subsp.	G5T5	S1		RED	
<i>Ursus arctos</i>	Grizzly Bear	G4	S3	SC (MAY 2002)	BLUE	I (MAY 2004)
<i>Mustela frenata altifrontalis</i>	Long-tailed Weasel, <i>altifrontalis</i> Subspecies	G5TNR	SX		RED	

<b>B.C. Conservation Data Centre: Rare Vertebrate Animal Tracking List for the Chilliwack Forest District, December 2004</b>						
<b>Scientific Name</b>	<b>English Name</b>	<b>G Rank</b>	<b>Provincial</b>	<b>COSEWIC</b>	<b>BC Status</b>	<b>Identified Wildlife</b>
<i>Gulo gulo luscus</i>	Wolverine, Luscus Subspecies	G4T4	S3	SC (2003) WESTERN POPULATION ONLY	BLUE	I (MAY 2004)

*For global and provincial ranking codes see the Conservation Data Centre's definitions on their web site :<http://srmwww.gov.bc.ca/atrisk/glossary.html>*

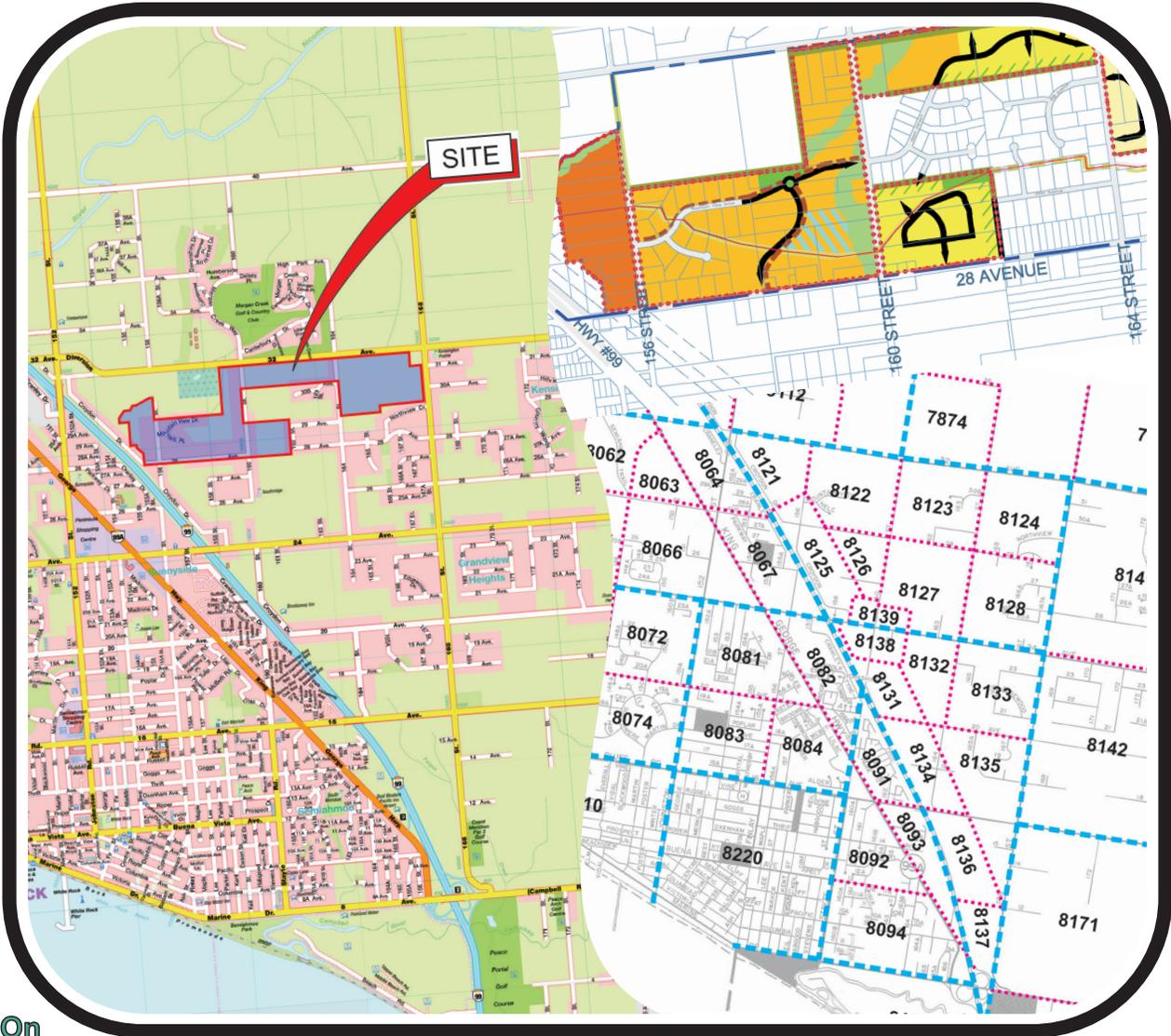
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# **APPENDIX II**

## **TRAFFIC REVIEW**

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Report to  
**CITY OF SURREY**



On

**TRAFFIC REVIEW OF  
NORTH GRANDVIEW HEIGHTS NCP**





- Traffic Impact
- Parking
- Transportation Planning
- Corridor Studies
- Traffic Operations
- Transit
- Trucking
- Network Modelling
- Bicycles/Pedestrians

August 9, 2005

Aplin & Martin Consultants Ltd.  
201-12448 82 Avenue  
Surrey, BC V3W 3E9

**Attention: Mr. Eric Aderneck**

Dear Mr. Aderneck:

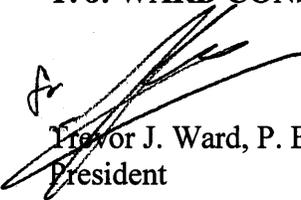
**Re: North Grandview Heights NCP – Traffic**

In response to your request, we have now undertaken an analysis of the traffic implications of the modified land use plan proposed for a substantial portion of the area covered by the North Grandview Heights NCP. The attached report documents the work undertaken together with the findings and conclusions.

I trust that this is adequate for your purposes as you go through the approval process with the City of Surrey. Please do not hesitate to call if you have any questions or need additional information.

Yours truly,

**T. J. WARD CONSULTING GROUP INC.**

  
Trevor J. Ward, P. Eng., M.B.A.  
President

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## 1.0 INTRODUCTION

This document presents the results of a review of the transportation component of the North Grandview Heights neighbourhood, particularly as it is affected by the proposed uses for the lands covered by the current development application. The extent of the study area in the context of the broader area is shown in Exhibit 1.1 and an aerial photo of the site is shown in exhibit 1.2

## 2.0 EXISTING CONDITIONS

This section describes the existing transportation system in the North Grandview Heights study area and serves as the base on which future traffic conditions are forecasted and on which the recommendations for the transportation system are based.

### 2.1 Road Network

The existing road network in the North Grandview Heights area is illustrated in Exhibit 2.1. The City of Surrey in their *Road Classification Plan R91* have a number of different classifications ranging from “provincial highway” through “arterials” and “collector” roads to “local” streets. In the study area there are two types of highways – a controlled access freeway, this being Highway 99, and an arterial highway, this being 176 Street/Highway 15. Both are under the jurisdiction of the Ministry of Transportation and are intended to connect primary areas of traffic generation, whether these be residential, industrial, or commercial concentrations, and to accommodate high volumes of traffic moving at higher speeds and, for freeways, under free-flowing conditions. All other roads are under the jurisdiction of the City of Surrey. The function of arterial roads is to carry through traffic from one area of a municipality to another minimizing interference from and to adjacent land uses. Collector roads in Surrey can be either major or limited and typically to collect traffic from local areas and carry this traffic to arterial roads. Local roads provide direct access to adjacent lands.

The key roads in the study area are as follows:

- (a) Highway 99: This is a divided four lane controlled access freeway which connects Interstate 5 at the U.S. border with the Trans Canada Highway on the North Shore of Vancouver. It is the primary route for many residents of South Surrey and White Rock travelling to Vancouver, Richmond (including the airport), South Delta, and the ferry terminals. It has all-movement interchanges at 8 Avenue, Highway 91, Ladner Trunk Road/Highway 17 and limited movement interchanges at 32 Avenue/152 Street and King George Highway. It has a rural cross-section with ditches and no provisions for pedestrians.
- (b) 176 Street/Highway 15: This runs in a north-south direction on the east side of the study area, connecting the truck crossing at the U.S. border in the south with the Trans Canada Highway in the north. It is four lanes from 32 Avenue south and two lanes north with a

