



## Strathcona County

Final Report

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### Range Road 231 and 232 Functional Planning Study

November 2019



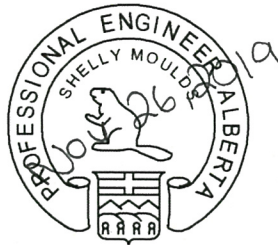


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## Executive Summary

The Range Road 231 and 232 Functional Planning Study has been developed to address the long-term improvements required for both corridors. The study has examined existing and future travel patterns, the need for active transportation infrastructure, safety and speed limits, drainage requirements, and impacts to the right-of-way. The 2016 Municipal Development Plan (MDP) has confirmed the long-term land-use in the area and this has provided certainty around the function of the two corridors in the long-term. The functional plan has been developed based on land use decisions arising from the MDP and the 2017 Edmonton Metropolitan Regional Board Growth Plan.

The following foundations were key to developing recommendations for this project:

- Land use and transportation policy decisions by Strathcona County and the Edmonton Metropolitan Regional Growth.
- Input from the public, gained at three open houses:
  - Open House #1 in May 2018 to understand community needs.
  - Open House #2 in October 2018 to consult on proposed options.
  - Open House #3 in May of 2019 to share proposed recommendations and final plans.
- Input from various stakeholders, including businesses, the school, and a church serviced by the corridor.
- Technical Analysis completed to understand the travel patterns in the area, and requirements for drainage along both corridors.

Traffic forecasts for the roadways were developed for the 2038 and 2048 scenarios, which represented full build-out and ten years after the full build-out, respectively. Traffic analysis showed that the corridors did not require widening to 4-lanes, however, intersection control upgrades were required at several intersections. Left and right-turn bays, 4-way stops, traffic signals, and roundabouts were evaluated as potential upgrades; however, traffic signals and roundabouts were the only feasible options at intersections with significant delay. In applying the Safer Systems approach onto Strathcona County's roadways, a decision was made to move forward with roundabouts as intersection control upgrades.

The plans for both corridors also include urban cross-sections at the north tie-ins to Wye Road to better accommodate the Wye Road Functional Planning Study and drainage requirements for the area.

Other improvements within the plans include:

- Active transportation trails being extended south along both corridors to provide access to all subdivisions within the study area.
- Speed limit reduction to 60 km/h for the north and south sections of each corridor in the short-term plans and for the entire length of each corridor in the long-term plans.
- Identification of drainage infrastructure and improvements required to accommodate the proposed roadway plans.

The proposed plans were shared with the public at Open House #3 to gain feedback on the recommendations. Overall, the feedback that was received indicated a significant level of confidence in the ability of the plans to address traffic, active transportation, and safety requirements for each corridor.

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## 1.0 Introduction

### 1.1 Background and Context

Range Roads 231 and 232 provide vital north-south access to the country residential and rural areas in between Highway 628 and Wye Road (Highway 630). These roads connect local residents from approximately 3,500 parcels of land to amenities in Sherwood Park and to the provincial highway network. Both Range Road 231 and Range Road 232 currently exist predominantly as a 9-meter-wide two-lane rural roadway that was never indented to serve the traffic volumes this type of land use demands.

Although previous planning studies identified short term improvements along the range roads, and along Highway 628 and Wye Road, nothing has been constructed to date. The 2016 MDP outlines the long-term purpose of these roads has been validated and the County is in a position to effectively address roadway requirements on these corridors.

### 1.2 Study Areas

The study areas are along Range Roads 231 and 232, between Wye Road (Highway 630) and the Whitemud Extension (Highway 628) as shown in Exhibit 1.1.

### 1.3 Project Purpose

The purpose of this study is to determine the future requirements of the Range Road 231 and 232 corridors. The study recommends upgrades to improve safety and traffic flow and support future growth. This includes recommendations on:

- number of travel lanes;
- speed limits;
- multi-use trails;
- stormwater management requirements; and
- right-of-way impacts.

### 1.4 Study Methodology

The general study methodology for the study was:

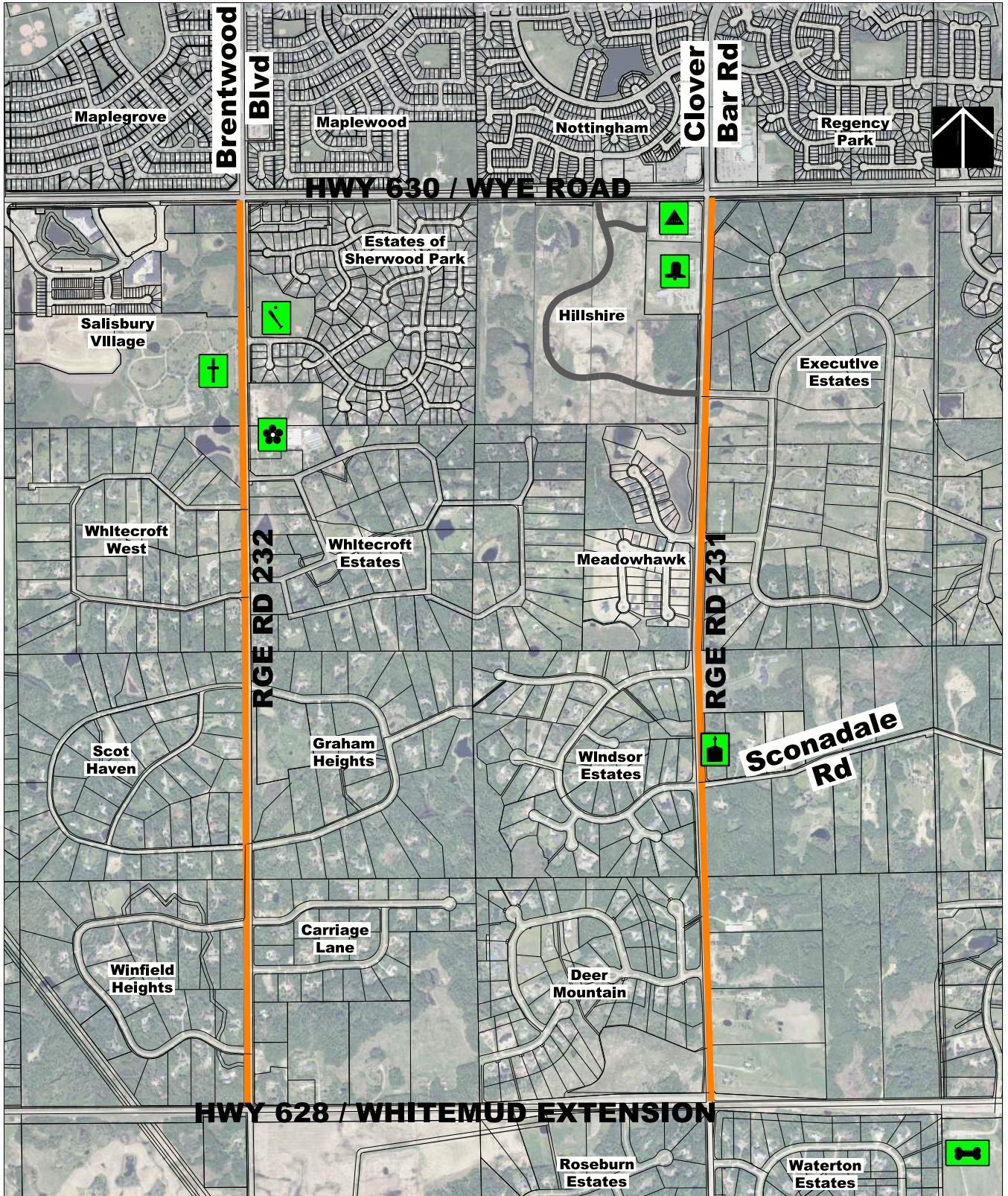
- Gather and review background documents and information;
- Gather feedback from stakeholders and the public:
  - One-on-one meetings with key stakeholders;
  - Door-to-door engagement;
  - On-line survey;
  - Kitchen table meetings, and
  - Open House #1: May 10, 2018
- Develop alternatives;
- Gather feedback on alternatives at Open House #2 and on-line survey: October 17, 2018;
- Comparative analysis of alternatives;
- Selection of a preferred alternative;
- Develop functional planning drawings, identifying access requirements and right-of-way limits;
- Present functional plan to stakeholders at Open House #3: May 16, 2019;
- Prepare cost estimate and final report.





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# STUDY AREA MAP



## LEGEND

STUDY AREA

GLENWOOD FUNERAL HOME & CEMETERY



SALISBURY GREENHOUSE



VICTORY BAPTIST CHURCH



ELK ISLAND SCHOOL BOARD OFFICE



DEERMOUND OFF-LEASH PARK



CHRISTIAN ACADEMY ELEMENTARY

SPORTS FIELD

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## 2.0 Background Information

### 2.1 Range Road 231

#### 2.1.1 Existing Roadway

Range Road 231 is a two-lane undivided paved rural roadway. There are several minor roadways that branch off Range Road 231 as well as numerous private accesses. The turning lanes are present at Elk Island School Board, Strathcona Christian Academy Elementary, the intersection of Meadow Hawk/ Executive Estates, and Windsor Estates. The corridor has a posted speed of 80 km/h that reduces to 60 km/h north of the north access into Executive Estates.

#### 2.1.2 Land Use

##### Subdivisions

Range Road 231 provides access to the country residential subdivisions of Meadowhawk, Executive Estates, Windsor Estates, Deer Mountain, Sconadale, and Park Estates.

##### Elk Island School Board

The Elk Island School Board is located on the southwest corner of Range Road 231 and Wye Road. The site has an administration building and two maintenance buildings. All direction access to the site is located approximately 150m south of Wye Road.

##### Strathcona Christian Academy Elementary

The Strathcona Christian Academy runs a K-6 school on the site adjacent to the Elk Island School Board site. The school currently has 575 students, with the potential for expansion sometime in the future.

The site has two accesses of Range Road 231, approximately 275 m and 420 m south of Wye Road. The first access permits a right-in for southbound traffic that is restricted to staff, busses, and deliveries. The second access is an all-directional access to the public parking lot, and egress for the staff, buses, and delivery vehicles.

##### Victory Baptist Church

The Victory Baptist Church access is located approximately 110 m north of Sconadale Road. The church offers Sunday morning and evening services as well as a Wednesday night prayer meeting and bible study. The parking lot has approximately 45 stalls.

#### 2.1.3 Existing Traffic

Existing traffic analysis was completed using traffic counts from the County. Peak hour counts were generated from 14-hour data for most intersections. Some intersections included only daily traffic. Using conversion rates from daily traffic to AM and PM traffic, peak hour counts were developed for these intersections as well. The following conversion rates were used:

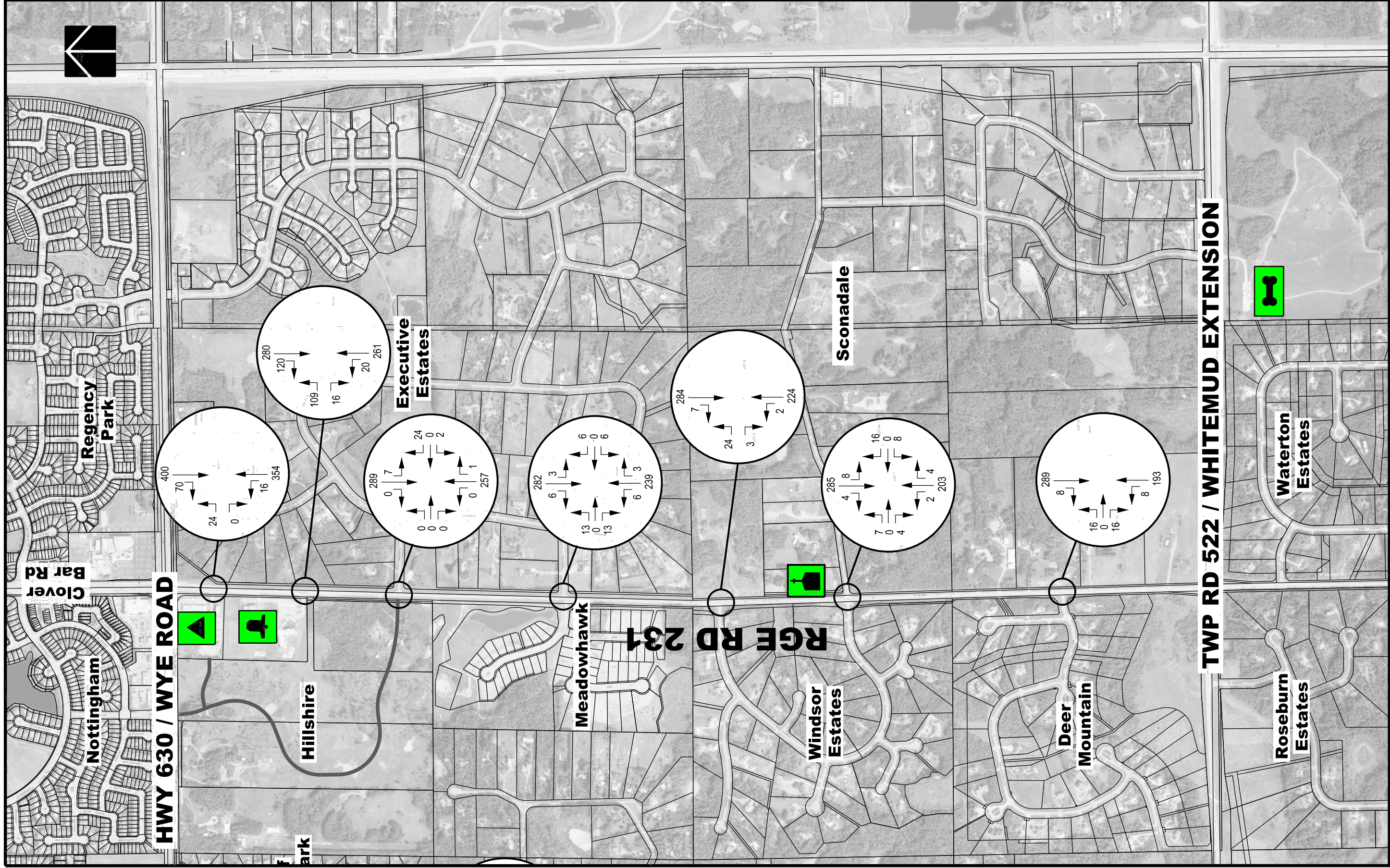
- AM traffic out of access: 10% of daily traffic
- AM traffic in to access: 5% of daily traffic
- AM traffic travelling northbound or southbound through intersections: 6% of daily traffic
- PM traffic out of access: 5% of daily traffic
- PM traffic in to access: 10% of daily traffic
- PM traffic travelling northbound or southbound through intersections: 8% of daily traffic

Exhibits 2.1 - 2.2 show the existing traffic volumes for the two corridors.

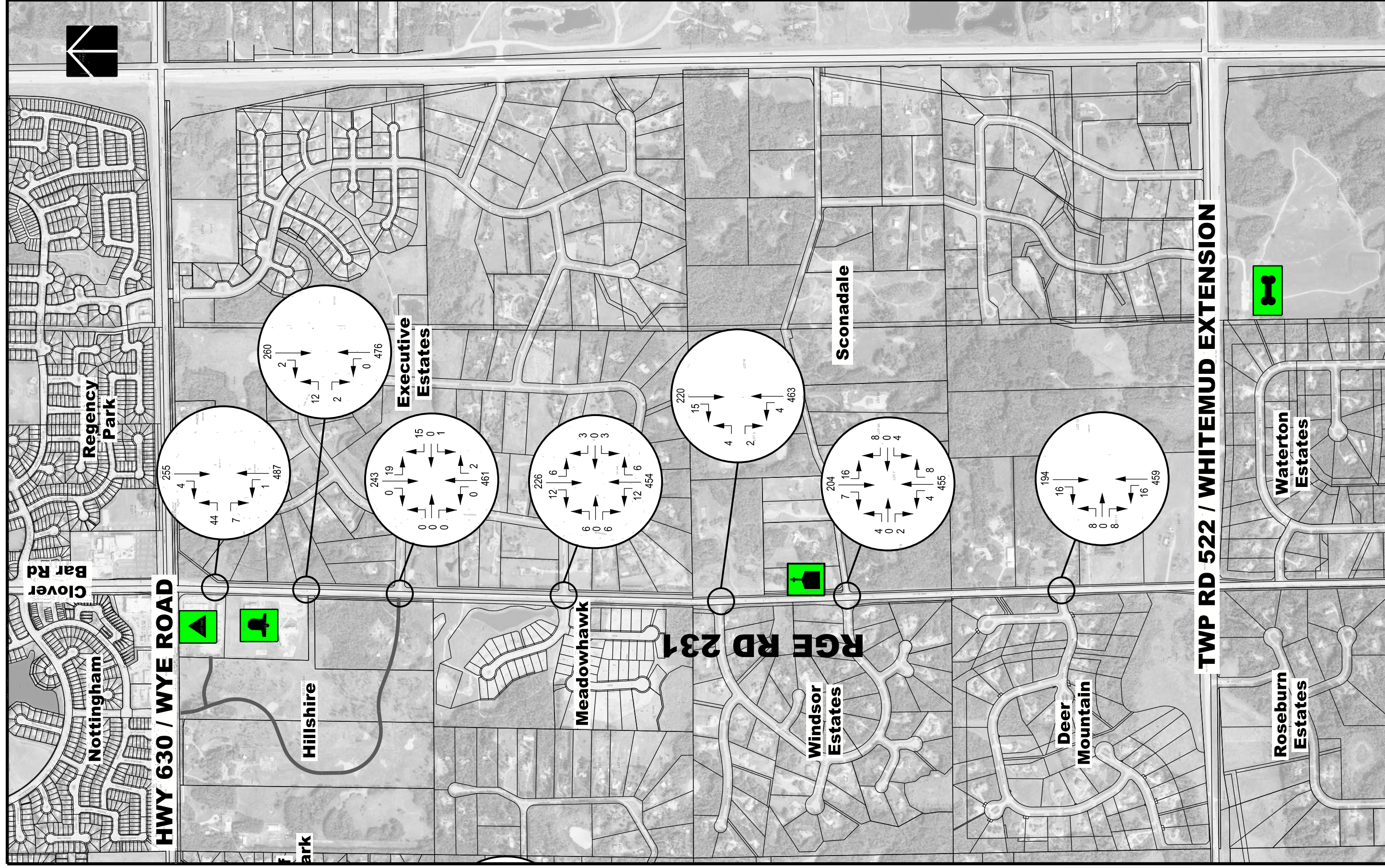


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The PM peak hour calculated for the Elk Island School Board intersection and Strathcona Christian Academy Elementary intersection was 3:15-4:15 PM, around the afternoon pick-up time for the school. The rest of the intersections along the corridor had a peak hour of 4:30-5:30 PM. The traffic volumes shown at the school board intersection and school intersection in the exhibits reflect volumes in the time period of 4:30-5:30 PM even though this was not the true peak hour for these intersections. However, for Synchro analysis, volumes from 3:15-4:15 PM were used for these two intersections to test operations during school pick-up.

On Range Road 231 all intersections operated at a level of service of C or better for the existing conditions. The results of the traffic analysis completed in Synchro can be seen in Appendix C.

#### 2.1.4 Existing Collision History

Collision data was provided by the County for the years of 2007 to 2016. Along Range Road 231, there was a total of 81 collisions:

- 0 fatal collisions,
- 20 injury collisions, and
- 61 property damage only collisions.

Most of these collisions were rear-end type collisions, occurring most frequently at the Whitemud Extension (Highway 628). During engagement with the community, a frequent comment heard was that drivers followed too closely and did not allow for comfortable braking. Another comment heard was that the accesses off of the corridor were difficult to see at times and required abrupt braking to stop. These may be possible reasons for rear-end collisions within this corridor. The location and collision type is shown on Exhibit 2.5.

Collisions occurred under the following conditions:

- Most collisions occurred from Wednesday to Saturday during peak hours.
- Light conditions when the collisions occurred were nearly evenly split between daylight and darkness.
- Most collisions occurred on clear days.
- Surface conditions were relatively even split between dry and slush/snow/ice surface.

At the design stage a review of animal collisions should be conducted.

#### 2.1.5 Trails

Currently, a trail exists on the west side of Range Road 231, extending from Wye Road to the Meadow Hawk sub-division. Strathcona County's Recreation, Parks and Culture has identified the need for expanding the trail along the west side of Range Road 231. Refer to Exhibit 2.6 for the proposed trail network within the study area. The project recommendations include these proposed trails.

#### 2.1.6 Utilities

There are several utilities along Range Road 231 that must be considered. A map of the utilities is provided on Exhibit 2.7. Utilities along Range Road 231 include:

##### Pipelines

- ATCO Gas and Pipelines Ltd has a 406.4 mm high pressure natural gas pipeline that runs adjacent to the south side of Wye Road;
- ATCO Gas and Pipelines Ltd has a 508 mm high pressure natural gas pipeline that runs adjacent to the south side of Wye Road;
- ATCO Gas low pressure natural gas pipelines appear to cross the road several times between Wye Road and Hwy 628.



The high-pressure natural gas pipelines are located within the segment of road that is proposed to be urbanized and therefore conflict with the road construction. The depth of cover for these pipelines is unknown and will need to be confirmed by the utility provider to determine the mitigation measures required. All the ATCO Gas low pressure pipelines and any local gas co-op pipelines that cross the road or are located within the road right-of-way may require relocation. The geotechnical conditions, specifically the depth to the clay layer, is a key factor to determining the depth of excavation. An initial desktop study has been completed however further investigation will be required.

### Co-Op Lines

- Low power local co-op lines are present all along the corridor.

### Overhead Power

- A Fortis Power line runs adjacent to the east side of Range Road 231 then turns into Executive Estates North.
- A Fortis Power line begins approximately 60 m south of Executive Estates North and extends adjacent to the west side of Range Road 231 and continues north to tie in at Wye Road.
- Power poles are placed approximately 65 m to 75 m apart.

Due to the widening of the roadway any overhead power poles that are located within the road right-of-way will most likely require relocation. Some segments of power lines are along the edge of the road right-of-way and may be located far enough away from the project and will therefore not be impacted.

### Telus

- A Telus Trench runs along the east side of the road between Wye Road and Hwy 628 and on the west side from Highway 628 to Windsor Estates North. There is a small segment of Telus Trench on the west side of Range Road 231 at Wye Road that is used for the school and school board site. The Telus Trench crosses the roadway at several points.
- Communication pedestals are located predominantly on the east side along Range Road 231 between Executive Estates and Highway 628.

Some segments of the Telus Trench appear to run under the existing road and would need to be relocated for the road work. There are also sections where the Telus Trench cross the road and that would require mitigation as well.

### Water and Wastewater

Pressurized water and wastewater pipelines exist along portions of Range Road 231; these have been illustrated in Exhibit 2.7. During the detailed design stage of this project, the Strathcona County Country Residential Wastewater Master Plan and the Strathcona County Rural and Expanded Services Area Water Master Plan should be reviewed to ensure consideration of future utilities in the area.

## 2.2 Range Road 232

### 2.2.1 Existing Roadway

Range Road 232 is a two-lane undivided paved rural roadway. There are several minor roadways that branch off Range Road 232 as well as numerous private accesses. The only turning lanes on the corridor are at the Estate Drive entrance just south of Wye Road. The corridor has a posted speed of 80 km/h that reduces to 60 km/h at Salisbury Greenhouse.



## 2.2.2 Land Use

### Subdivisions

Range Road 232 provides access to the country residential subdivisions of the Estates of Sherwood Park, West Whitecroft, East Whitecroft, Scot Haven, Graham Heights, Carriage Lane, and Winfield Heights.

### Estates Park

Estates Park is an approximately 40,000 m<sup>2</sup> green area adjacent to and north of Estates Drive. The park has a multi-use trail that continues north to Wye Road. A baseball diamond and soccer field are on the south end of the park with a toboggan hill to the north. Street parking is available on Estate Drive.

### Glenwood Funeral Home and Cemetery

Glenwood Funeral Home and Cemetery has an access approximately 520 m south of Wye road and another 175 m south of the first. The north access center line is offset from Estate Drive on the east side of Range Road 231 by less than 15 m. Similarly, the south access centerline is also offset from the Salisbury Greenhouse access by less than 15 m. Burial sites are located as near as 32 m from the center line of Range Road 232.

### Salisbury Greenhouse

Salisbury Greenhouse is a full-service garden center open seven days a week. The greenhouse has regular farmer's markets every Thursday evening. The site has two accesses onto Range Road 232 with approximately 200 m between them. The north access is very close to Glenwood Memorial's south access. The two accesses are off-set, the north edge of the Glenwood Memorial access is aligned with the south edge of the Salisbury Greenhouse access.

## 2.2.3 Existing Traffic

Similar to Range Road 231, traffic along Range Road 232 was converted using the rates described in Section 2.1.3. Refer to Exhibits 2.3 and 2.4 for existing traffic volumes.

On Range Road 232 all intersections operated at a level of service of C or better for the existing conditions. The results of the traffic analysis completed in Synchro can be seen in Appendix C.

## 2.2.4 Existing Collision History

Collision data was provided by the County for the years of 2007 to 2016. Along Range Road 232, there was a total of 96 collisions:

- 0 fatal collisions,
- 27 injury collisions, and
- 69 property damage only collisions.

Most of these collisions were rear-end type collisions, occurring most frequently at the Whitemud Extension (Highway 628). During engagement with the community, a frequent comment heard was that drivers followed too closely and did not allow for comfortable braking. Another comment heard was that the accesses off of the corridor were difficult to see at times and required abrupt braking to stop. These may be possible reasons for rear-end collisions within this corridor. The location and collision type are shown on Exhibit 2.5.

Collisions occurred under the following conditions:

- Most collisions occurred from Wednesday to Saturday.
- Most collisions occurred in the daylight.
- Most collisions occurred on clear days.
- Most collisions occurred on dry surface conditions.

At the design stage a review of animal collisions should be conducted.



### 2.2.5 Trails

Currently there are short sections of trail along the east side of Range Road 232, from Wye Road to Estates Park. Strathcona County's Recreation, Parks and Culture has identified the need for expanding the trail along the east side of Range Road 232. Refer to Exhibit 2.6 for the proposed trail network within the study area. The project recommendations include these proposed trails.

### 2.2.6 Utilities

There are several utilities along Range Road 232 that must be considered. A map of the utilities is provided on Exhibit 2.7. Utilities along Range Road 232 include:

#### Pipelines

- ATCO Gas and Pipelines Ltd has a 406.4 mm high pressure natural gas pipeline that runs adjacent to the south side of Wye Road;
- ATCO Gas and Pipelines Ltd has a 508 mm high pressure natural gas pipeline that runs adjacent to the south side of Wye Road;
- ATCO Gas and Pipelines Ltd has a 88 mm high pressure natural gas pipeline that runs adjacent to the east side of Range Road 232, from Wye Road to Whitecroft Estates;
- ATCO Gas and Pipelines Ltd has a 42 mm high pressure natural gas pipeline that runs adjacent to the east side of Range Road 232, from Wye Road to Whitecroft Estates;
- ATCO Gas and Pipelines Ltd has a 60 mm high pressure natural gas pipeline that runs adjacent to the east side of Range Road 232, from Wye Road to 120 m north Whitecroft Estates.

The high-pressure natural gas pipelines that are adjacent to Wye Road are located within the segment of road that is proposed to be urbanized and therefore conflict with the road construction. The 88 mm, 42 mm, and 60 mm pipelines may be located outside of the road right-of-way and therefore would not conflict with construction. The depth of cover and exact locations for these pipelines is unknown and will need to be confirmed by the utility provider to determine the mitigation measures required.

#### Gas Co-op

- ATCO Gas low pressure natural gas pipelines run along the corridor and cross at multiple instances.
- Low power local co-op lines are present all along the corridor.

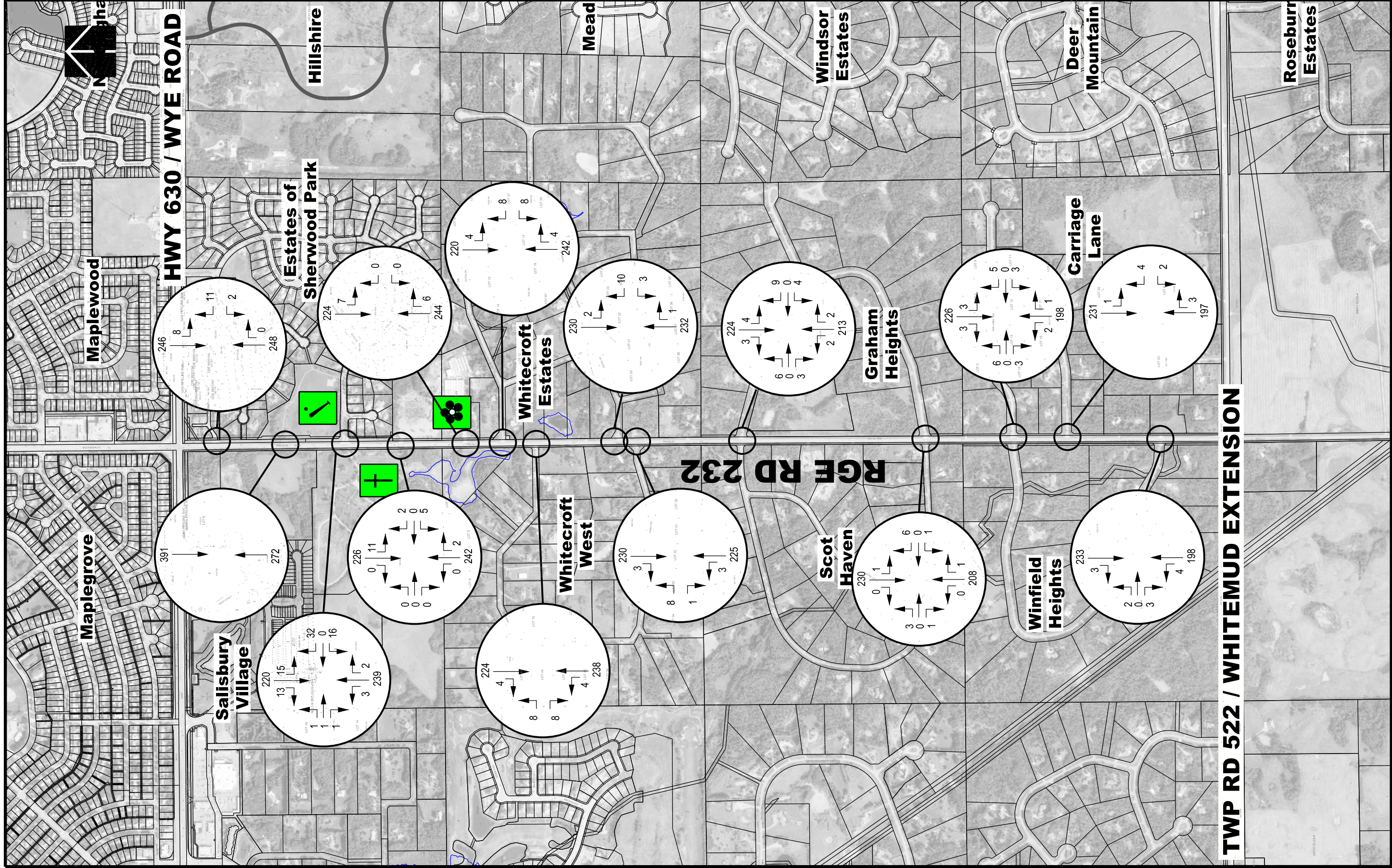
All of the ATCO Gas low pressure pipelines and any local gas co-op pipelines that cross the road or are located within the road right-of-way may require relocation.

#### Overhead Power

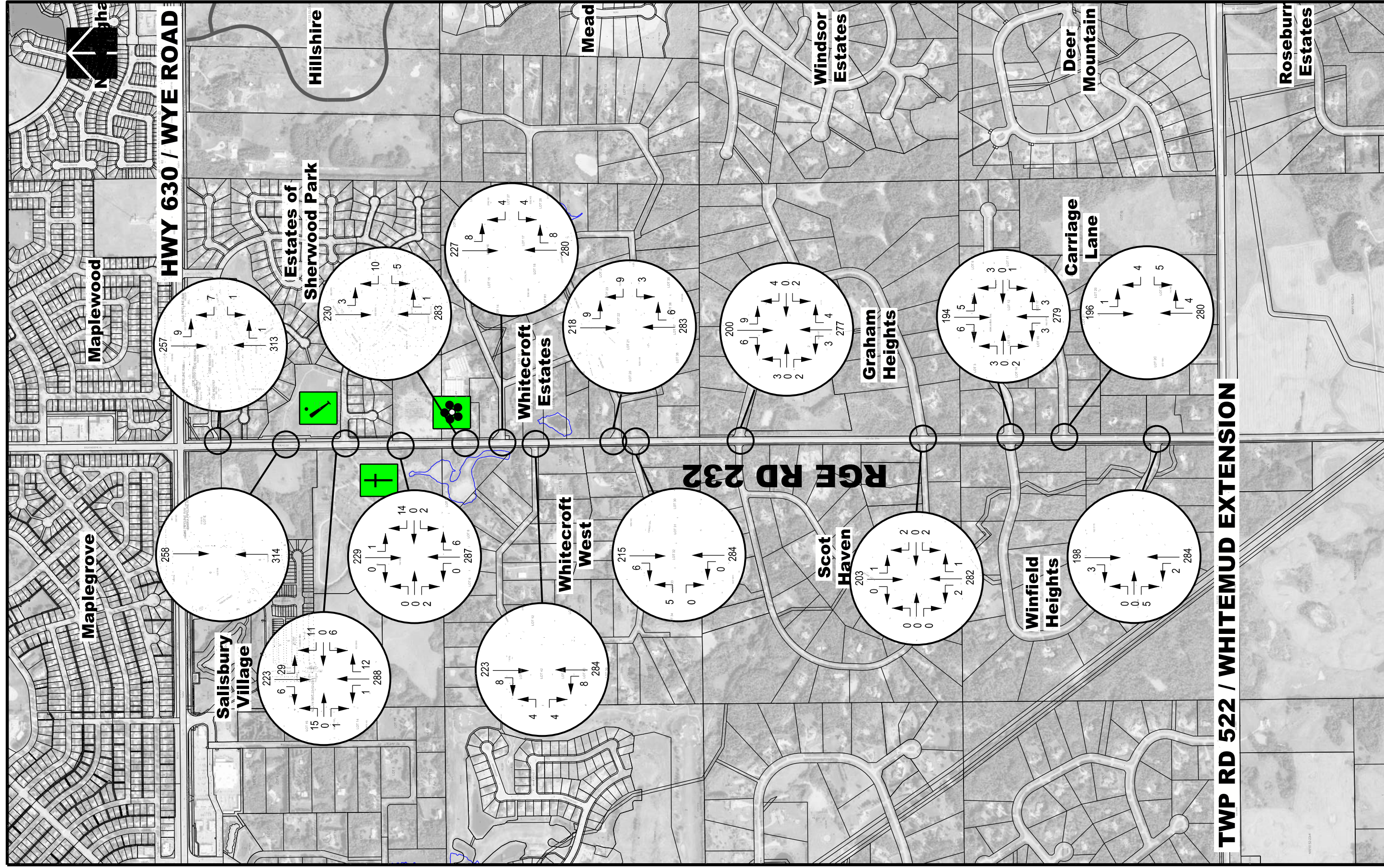
- A Fortis Power line runs along the east side of the roadway from Hwy 628 to approximately 145 m past Carriage Lane North, on the west side of the roadway from Carriage Lane North to West Whitecroft North.
- A Fortis Power line runs adjacent to the east side of Range Road 232 from West Whitecroft North to approximately 190 m north of Estate Drive.
- Power poles are placed between 65 m and 75 m apart.

Due to the widening of the roadway any overhead power poles that are located within the road right-of-way will most likely require relocation. Some segments of power lines are along the edge of the road right-of-way and may be located far enough away from the project and will therefore not be impacted.



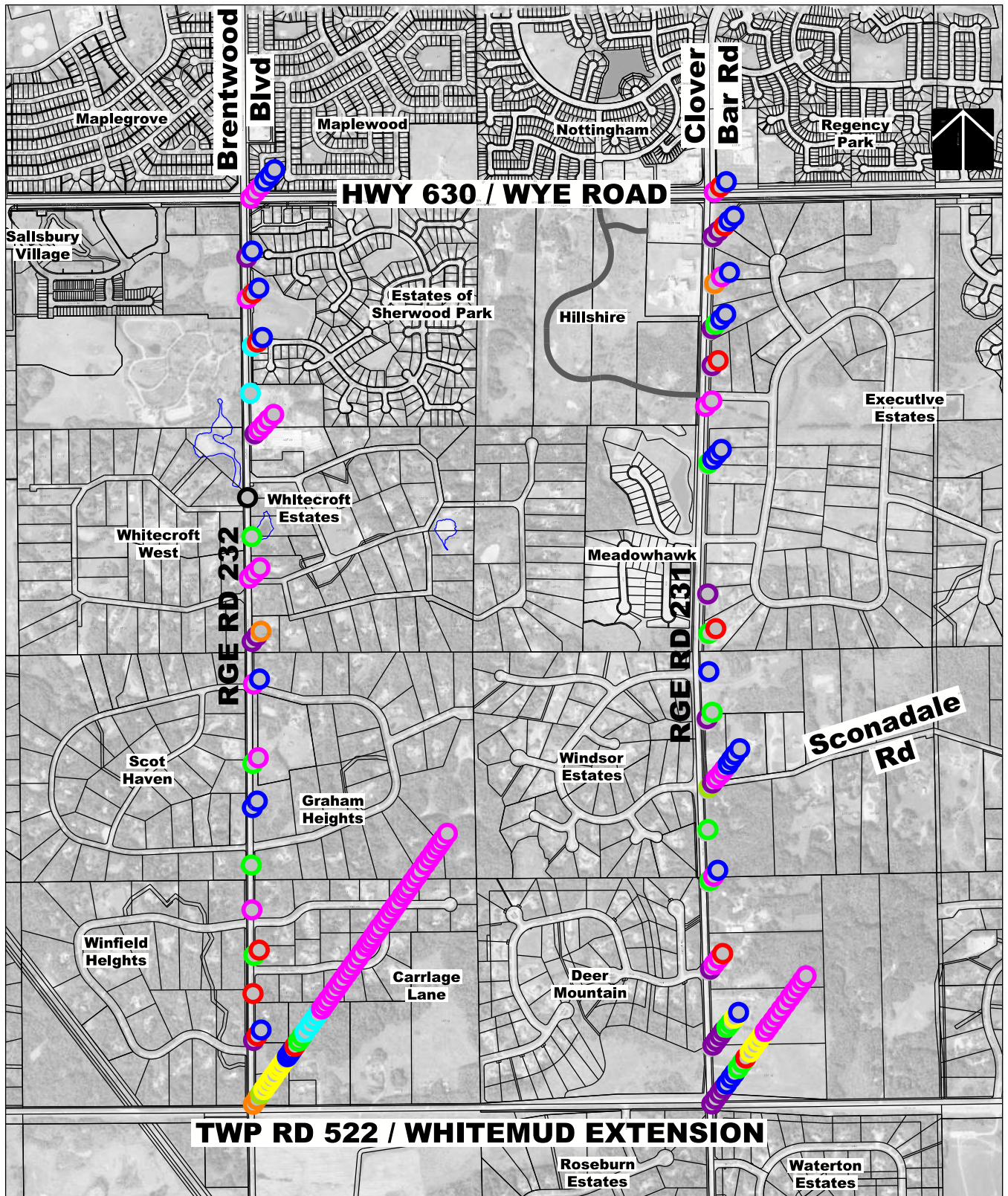








# COLLISION HISTORY (2007 - 2016)



- |               |           |             |          |                         |
|---------------|-----------|-------------|----------|-------------------------|
| STRUCK OBJECT | BACKING   | RIGHT ANGLE | REAR END | OFF ROAD                |
| OTHER         | SIDESWIPE | HEAD ON     | PASSING  | LEFT TURN - ACROSS PATH |

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# Strathcona County - Proposed Trails 2019-2030

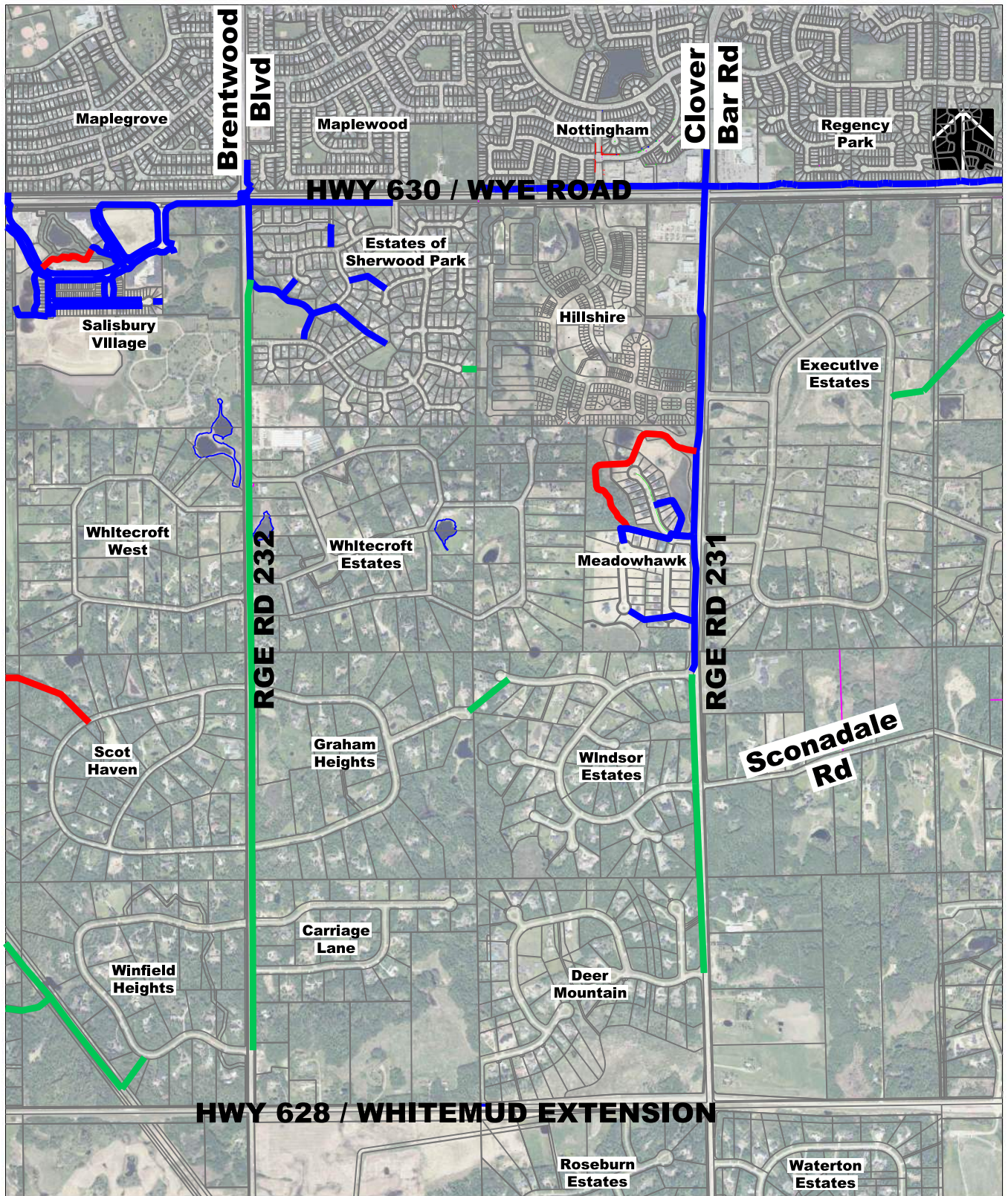
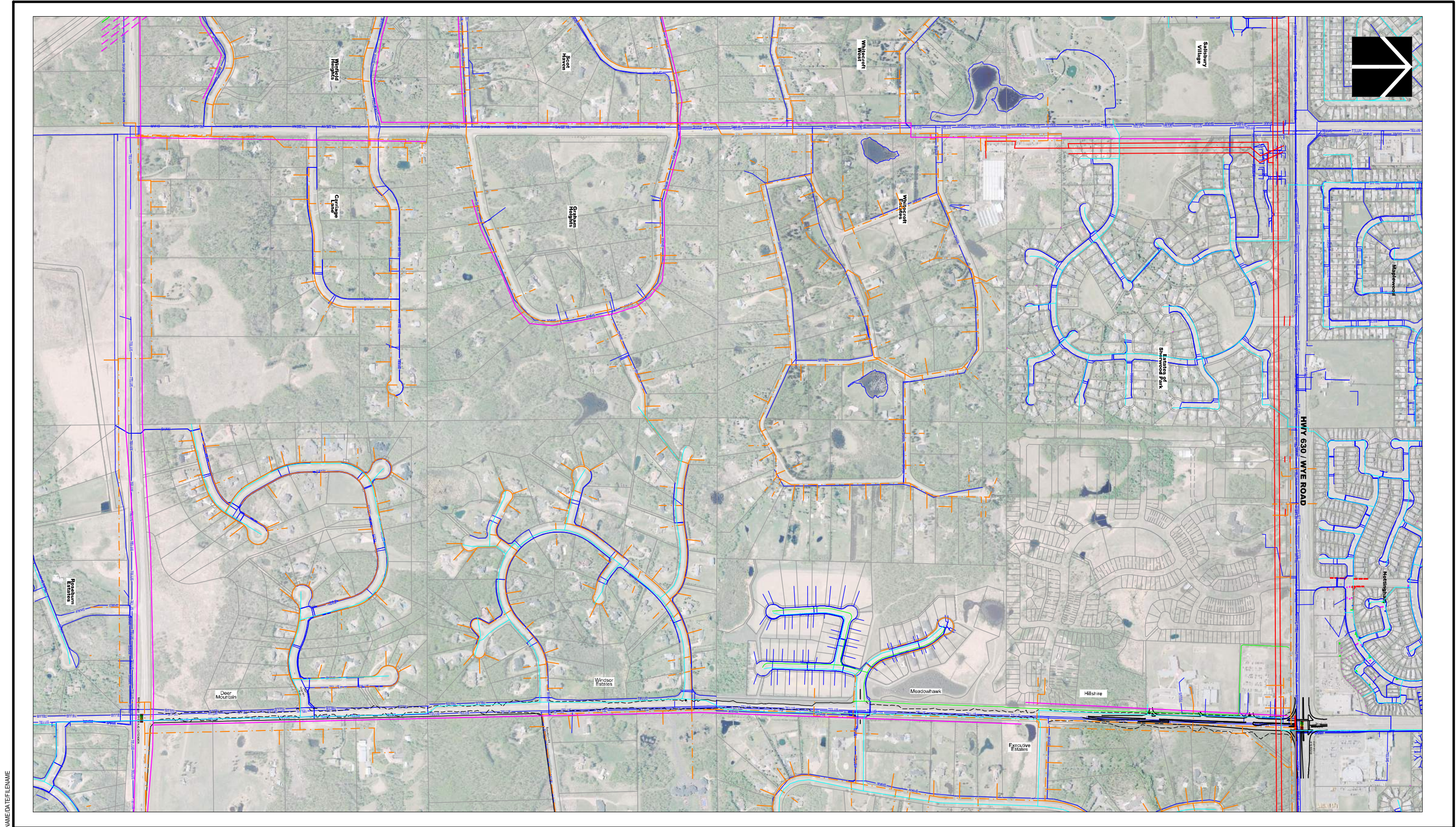


EXHIBIT 2.6: PROPOSED TRAILS





NAME/DATE/FILENAME



# LEGEND

- |  |  |
|--|--|
| <span style="color: cyan;">—</span> PRESSURIZED WATER        | <span style="color: blue;">—</span> TELUS TRENCH                         |
| <span style="color: green;">—</span> PRESSURIZED WASTE WATER | <span style="color: magenta;">—</span> OVERHEAD POWER LINES              |
|  | <span style="color: red;">—</span> HIGH PRESSURE NATURAL GAS PIPELINES   |
|  | <span style="color: orange;">—</span> LOW PRESSURE NATURAL GAS PIPELINES |

## RANGE ROAD 231/232 - FUNCTIONAL PLANNING

### UTILITIES MAP

September 6, 2019



## Telus

- A Telus Trench runs adjacent to the west side of Range Road 232 between Wye Road and Hwy 628. The Telus Trench crosses the roadway at several points.
- Communication pedestals are located predominantly on the west side along Range Road 232 between Wye Road and Hwy 628.

Some segments of the Telus Trench appear to run under the existing road and would need to be relocated for the road work. There are also sections where the Telus Trench cross the road and that would require mitigation as well.

## Water and Wastewater

Currently, no pressurized water and wastewater pipelines exist along Range Road 232. During the preliminary and detailed design stage of this project, the Strathcona County Country Residential Wastewater Master Plan and the Strathcona County Rural and Expanded Services Area Water Master Plan should be reviewed to ensure consideration of future utilities in the area.

Future urban watermain pipelines proposed as part of the Salisbury Village East development will require connection the existing system at multiple points. One location will require watermain pipeline along Range Road 232. During preliminary and detailed design, the watermain alignment requirements should be identified and the utilities should be coordinated with roadway improvements.

## 2.3 Surrounding Road Network

**Anthony Henday Drive (Highway 216)** is a provincially controlled highway that serves as the Edmonton Ring Road. Both Wye Road / Sherwood Park Freeway and Highway 628 / Whitemud Drive have interchange access to this highway.

**Highway 14** is a provincially controlled highway providing access to communities between Anthony Henday Drive and the Saskatchewan Border. Currently Range Roads 231 and 232 both have access to Highway 14; however, Alberta Transportation has indicated that Range Road 231 will be closed in the long term when the Highway 14/21 interchange is upgraded.

**Highway 21** is a provincially controlled highway providing access to communities between Fort Saskatchewan and Stettler. Between Wye Road and Highway 628 / Whitemud Extension there is a single at-grade intersection that provides access to Executive Estates.

**Range Road 233** is a County road that provides access to county residential subdivisions south of Sherwood Park.

## 2.4 Environmental

### 2.4.1 Introduction

A desktop environmental review was commissioned to identify sensitive biological and physical features within or adjacent to the Study Area that could potentially impact the project. The desktop review was conducted within the Study Area, which was defined as being within 5 km of the project footprint (Figure 1.2 in Appendix D). The desktop review included database searches fish and wildlife, and review of maps and lists of rare ecological communities and rare plants. It also includes general description of the region, important features and recommendations for field studies. No field visits were completed as part of the desktop review, and additional field work may be required for regulatory approvals, if required for future work.





## 2.4.2 Findings

The Landscape Analysis Tool (LAT) report results (Attachment A in Appendix D) show that the project footprint intersects with the following sensitive species requirements: Other Sensitive and Endangered Species; Sensitive Raptor Range; and Sharp-tailed Grouse Survey.

### Wetlands

Figure 2.3.5.2 (in Appendix D) shows the results of the wetland delineation based off the historical imagery. A precipitation analysis was also completed pursuant to the Alberta Wetland Identification and Delineation Directive. Table 2. 1 (in Appendix D) provides the precipitation data. With respect to wetland replacement pursuant to the Wetland Policy, the study area is located within the Relative Wetland Value Assessment Unit 2, where in lieu rates are \$19,400/ha. Some wetlands within the study area display permanent characteristics and are likely eligible for Crown ownership pursuant to the Guide for Assessing Permanence of Wetland Basins. All reasonably permanent wetlands must be submitted to the Water Boundary group for determination for crown ownership through an Assessment of Permanence for Wetland Basins. This process can take six to twelve months.

### Watercourses

According to FWMIS mapping, Range Road 232 crosses Goldbar Creek between West and East Whitecroft. At the crossing site Goldbar Creek is an Unmapped Class D waterbody as it flows into the mapped section of Goldbar Creek. Being a Class D waterbody, no Restricted Activity Period is noted. Previous fisheries assessments located numerous non-sportfish species in the watercourse.

### Vegetation

The most commonly occurring vegetation found throughout the Central Parkland Subregion is presented in Table 2. 1. It is likely that many of these species occur within the study area. Land Cover information is provided in Figure 2.4.1 (in Appendix D), The Priority Landscape Ecology Assessment is provided in Figure 2.4.2 (in Appendix D).

Table 2.1: Vegetation Typically Found within the Central Parkland Subregion

Common Name	Scientific Name
Porcupine grass	<i>Miscanthus sinensis</i>
June grass	<i>Koeleria macrantha</i>
Needle-and-thread	<i>Hesperostipa comata</i>
Blue grama	<i>Bouteloua gracilis</i>
Plains rough fescue	<i>Festuca hallii</i>
Slender wheat grass	<i>Elymus trachycaulus</i>
Northern wheat grass	<i>Agropyron cristatum</i>
Prairie crocus	<i>Anemone patens</i>
Prairie sagewort	<i>Artemisia frigida</i>
Wild blue flax	<i>Linum lewisii</i>
Northern bedstraw	<i>Galium boreale</i>
Three-flowered avens	<i>Geum triflorum</i>
Bearberry	<i>Arctostaphylos uva-ursi</i>
Beaked hazelnut	<i>Corylus cornuta</i>
Bunchberry	<i>Cornus canadensis</i>
Wild lily-of-the-valley	<i>Maianthemum canadense</i>
Wild sarsaparilla	<i>Aralia nudicaulis</i>

Common Name	Scientific Name
Prickly rose	<i>Rosa acicularis</i>
Buckbrush	<i>Ceanothus cuneatus</i>
Silverberry	<i>Elaeagnus commutata</i>
Chokecherry	<i>Prunus virginiana</i>
Saskatoon berry	<i>Amelanchier alnifolia</i>
Labrador tea	<i>Rhododendron groenlandicum</i>
Aspen	<i>Populus tremuloides</i>
Jack pine	<i>Pinus banksiana</i>
White spruce	<i>Picea glauca</i>
Black spruce	<i>Picea mariana</i>

An ACIMS database search returned no rare vascular plant occurrences within the study area. Additionally there are no Committee on the Status of Endangered Wildlife in Canada or Species at Risk Act listed species expected to be found in the central parkland.

### Fish and Wildlife

The project footprint is not located within or near (i.e., 5 km) to any Ramsar Wetlands of International Importance, Western Hemisphere Shorebird Reserves, Important Bird Areas, National Wildlife Areas, Migratory Bird Sanctuaries, or Duck Unlimited Canada Projects. A FWMIS search of the study area identified historical occurrences of 3 fish species and 23 bird species. Information of the fish species and bird species can be found in Table 2.2.

Table 2.2: Fish and Wildlife Species Records Occurring within the Study Area

Common Name	Scientific Name	Provincial Status3	COSEWIC Status4
<b>Fish</b>			
Brook stickleback	<i>Culaea inconstans</i>	S5; Secure	G5; Not listed
Fathead minnow	<i>Pimephales promelas</i>	S5; Secure	G5; Not listed
Lake chub	<i>Couesius plumbeus</i>	S5; Secure	G5; Not listed
<b>Birds</b>			
American bittern	<i>Botaurus lentiginosus</i>	S3S4 (W); Sensitive	G4; Not listed
American kestrel	<i>Falco sparverius</i>	S5 (W); Sensitive	G5; Not listed
American white pelican	<i>Pelecanus erythrorhynchos</i>	S2S3 (T); Sensitive	G4; Not at risk
Baltimore oriole	<i>Icterus galbula</i>	S4 (W); Sensitive	G5; Not listed
Bank swallow	<i>Riparia riparia</i>	S5; Sensitive	G5; Threatened
Barn swallow	<i>Hirundo rustica</i>	S4 (W); Sensitive	G5; Threatened
Black tern	<i>Chlidonias niger</i>	S4 (W); Sensitive	G4; Not at risk
Black-crowned night-heron	<i>Nycticorax nycticorax</i>	S2 (T); Sensitive	G5; Not listed
Common yellowthroat	<i>Geothlypis trichas</i>	S4 (W); Sensitive	G5; Not listed
Eastern kingbird	<i>Tyrannus tyrannus</i>	S5; Sensitive	G5; Not listed
Eastern phoebe	<i>Sayornis phoebe</i>	S4 (W); Sensitive	G5; Not listed
Forster's tern	<i>Sterna forsteri</i>	S2S3 (T); Sensitive	G5; Not listed
Grasshopper sparrow	<i>Ammodramus savannarum</i>	S3S4 (W); Sensitive	G5; Special concern
Great blue heron	<i>Ardea herodias</i>	S3 (W); Sensitive	G5; Special concern

Common Name	Scientific Name	Provincial Status <sup>3</sup>	COSEWIC Status <sup>4</sup>
<b>Birds</b>			
Great gray owl	<i>Strix nebulosa</i>	S4 (W); Sensitive	G5; Not at risk
Horned grebe	<i>Podiceps auritus</i>	S3 (W); Sensitive	G5; Special concern
Least flycatcher	<i>Empidonax minimus</i>	S5 (W); Sensitive	G5; Not listed
Long-tailed weasel	<i>Mustela frenata</i>	S3 (W); May be at risk	G5; Not listed
Northern goshawk	<i>Accipiter gentilis</i>	S3S4; Sensitive	G5; Not listed
Northern pygmy-owl	<i>Glaucidium gnoma</i>	S3 (W); Sensitive	G4G5; Not listed
Peregrine falcon	<i>Falco peregrinus</i>	S2S3 (T); At risk	G4; Not listed
Pied-billed grebe	<i>Podilymbus podiceps</i>	S4 (W); Sensitive	G5; Not listed
Purple martin	<i>Progne subis</i>	S3S4 (W); Sensitive	G5; Not listed
Sharp-tailed grouse	<i>Tympanuchus phasianellus</i>	S3S4 (W); Sensitive	G5; Not listed
Short-eared owl	<i>Asio flammeus</i>	S3 (T); May be at risk	G5; Special concern
Sora	<i>Porzana carolina</i>	S5 (W); Sensitive	G5; Not listed
Trumpeter Swan	<i>Cygnus buccinator</i>	S2S3 (T) Sensitive	G4; Not at risk
Western wood-pewee	<i>Contopus sordidulus</i>	S4 (W); May be at risk	G5; Not listed

**Sources:** ACIMS 2014, Alberta Environment and Parks (AEP) 2017b, NatureServe 2017, Government of Canada 2017

#### Notes:

1. Alberta general status ranks are based in part on ACIMS ranks, but are only updated every five years while ACIMS ranks are updated annually; the general status ranks are therefore not considered to be current nor particularly informative for the purposes of this report. The current general status ranks of these species were reviewed but have not been included in this report.
2. Naming convention consistent with ACIMS (ACIMS 2014). ACIMS for vertebrates has not been updated from 2015-2017.
3. See Note 1 in Table 2. 3 (in Appendix D).
4. See Note 2 in Table 2. 3 (in Appendix D).

### Parks and Protected Areas

#### Sherwood Park Natural Area

The Sherwood Park Natural Area is located within the study area with the closest corner of the Natural Area being approximately 0.83 km away from the project footprint. Wetlands are scattered throughout the Natural Area and there is a large slough in the northwest corner. The Natural Area is home to various bird species, wildlife, and tree species. These can be found in section 2.6 in Appendix D.

#### Beaver Hill Biosphere

The Project lies within the eastern portion of the Beaver Hill Biosphere, which was designated a Biosphere on March 19, 2016 by the United Nations Educational, Scientific and Cultural Organization (UNESCO) (Beaver Hills Initiative 2019). This designation provided global recognition of the community's commitment to conservation and sustainable development within the area. The Beaver Hills/Cooking Lake moraine is a distinct geomorphological feature that encompasses 1572 km<sup>2</sup> that includes an island of boreal mixedwood forest and "knob and kettle" terrain of the moraine that forms a patchwork of depressional areas, many of which support wetlands, small lakes and streams (Beaver Hills Initiative 2019.) Due to the complexity of the area, with both boreal and parkland features, numerous vegetation and wildlife species that frequent both those areas occur within the Biosphere.

A review of the Biosphere map indicated that no rare species have been found within the Project footprint, however directed field studies prior to development (i.e., rare plant; wildlife surveys) would be valuable in determining potential occurrences.

## Municipal Development Plan

The Municipal Development Plan for the County (Strathcona County, 2019) considers the Project Area as part of their Country Residential Policy Area, where the major environmental policy requires conservation of the environment by requiring environmental reserves or environmental reserve easements to be developed through a biophysical assessment. It also promotes the retention of natural topography, retention of tree stands and wetlands, as well as to incorporate conservation design into ASPs.

### 2.4.3 Regulatory Requirements

The following table outlines some of the federal, provincial, and municipal regulatory requirements.

Table 2.3: Regulatory Requirements

Title	Administered By	Description	This Project
<b>Federal</b>			
Migratory Birds Convention Act	Environment and Climate Change Canada	Ensure protection of migratory birds, their nest, and their eggs. General nesting period is February 15 to August 31.	Pre-disturbance nest survey should be conducted following advice of a wildlife biologist and should occur between February 15 and August 31. Additional mitigation and/or onsite monitoring may be required.
Fisheries Act	Fisheries and Oceans Canada (DFO)	Includes provisions to avoid causing harm to fish.	DFO has developed a self-assessment tool to guide proponents on the need for a submission for DFO review, which should be completed for any changes to the crossing of Goldbar Creek.
<b>Provincial</b>			
Water Act	Alberta Environment and Parks	Governs activities affecting waterbodies.	Activities within a waterbody that do not fall under the guidance of a Code of Practice, will require approval.
Wetlands Policy	N/A	Wetlands must be identified and delineated, classified, and assigned an ecological wetland value. A Water Act application requires a Wetland Assessment and Impact Report.	Wetlands should be assessed prior to construction for potential impacts proposed work has on the wetlands. Water Act applications must be submitted for any water bodies that will be affected.
Public Lands Act	N/A	Requires a surface disposition be issued for the use of all public lands in Alberta. A disposition for any watercourse and potentially wetland impact.	Any work located outside the highway right-of-way would potentially require a disposition. Assessments of watercourse and wetlands required prior to submission for a disposition.
Alberta Weed Control Act	N/A	Protects stakeholders from economic and invasive losses caused by weeds. Prescribes activities should a noxious or restricted weed be encountered.	A weed survey should be completed as part of field assessment for wetlands to determine potential weed infestations and provide a weed management plan for construction.
Alberta Wildlife Act	N/A	Birds may be protected provincially under the Wildlife Act. Setbacks and Restricted Activity Dates have been identified for important species.	Pre-disturbance surveys should be conducted should work occur between February 15 and August 31. Additional mitigation and/or onsite monitoring may be required.

Title	Administered By	Description	This Project
<b>Municipal</b>			
Dedication of Conservation Easement	N/A	Legal agreements that allow landowners to continue to manage and own the land while providing a limit on future land use to help conserve natural features.	There is one potential impacted conservation easement along adjacent to Range Road 232.
Biophysical Assessment	N/A	Allow County to develop potential environmental reserves, municipal reserves, and conservation easements.	Any area concept plans, area structure plans, or subdivision applications within the Study Area would require a biophysical assessment.
Tree Conservation During Development	N/A	Policy to protect trees within the urban and rural areas of the County.	Any development within the Study Area impacting trees will require a Tree Conservation Report and Tree Protection Plan.
Tree Management	N/A	Policy to ensure safe and healthy trees through continual inspection and maintenance of trees.	Following the Final Acceptance Certificate, the County will ensure trees within the Study Area remain safe and healthy.
Wetland Conservation Policy	N/A	Allows the County to put in place procedures to meet the goal of No Net Loss of wetland function through the implementation of Avoidance, Minimization, and Compensation for wetland damage.	All developments within the County are subject to this policy.

## 2.5 Historical Resources

A Statement of Justification for the study area was prepared by The Archaeology Group recommending that no further work is required along the corridors. Approval was received from Alberta Culture and Tourism on February 13, 2018. A copy of the Statement of Justification and the Approval Letters can be found in Appendix E.

## 2.6 Geotechnical

A geotechnical desktop assessment was carried out by Thurber Engineering Ltd. for the project. The desktop review indicates that the construction of the proposed intersection improvements, be it signalization or roundabouts, and roadway upgrades are feasible from a geotechnical point of view. The site is expected to be underlain by clay and clay till deposits with sand layers overlying competent clay shale and sandstone bedrock at relatively shallow depth. Peat may be encountered below the existing roadway fill.

Permeability of the silty clay is low; consequently, the natural drainage condition is poor. Suitable drainage facilities will be required to promote drainage in the area. Thurber suggests achieving this by providing a suitable cross-fall on the subgrade draining to side ditches at least 1 m in depth. The clay till soils along the corridor alignments have low potential for erosion. Thurber suggests permanent cut and fill slopes should be topsoiled and revegetated promptly and deep cuts should have erosion mats or other appropriate erosion control to reduce potential slope erosion. The construction of approach roads, intersection upgrades and roundabouts should avoid any bogs or sloughs when possible. Where it is not feasible, the organic materials and any underlying soft soil should be sub-excavated prior to embankment fill construction.

The desktop study was based on widely spaced existing information and general knowledge of surface conditions in the area. A detailed geotechnical investigation will be required once a design option has been selected. Thurber's detailed desktop study is provided in Appendix F.

## 2.7 Stormwater Management

### 2.7.1 Existing Drainage Patterns

The lands bordered by Range Road 231, Range Road 232, Wye Road and Highway 628 is generally consisted of undulating lands that drain into three separate drainage basins. Elevations in the study area ranges from 730 m to 770 m. The high points in the study area are located approximately 900 m north of Highway 628 and form a horizontal line that divides the Fulton Creek basin from Gold Bar Creek and Oldman Creek basins. North of this horizontal divide, lands west of Range Road 231 generally drain northwest towards Gold Bar Creek and lands east of Range Road 231 generally drain northeast towards Oldman Creek. Existing topography as well as the boundaries that divide the three drainage basins are shown on Exhibit 2.8.

Pockets of natural wetland areas are present throughout the site and they provide a level of flow retention and attenuation within the country residential developments. Local drainage in these developments are provided through ditches and culverts, and flows drain through the natural wetlands before discharging to downstream major creek systems. The local drainage patterns are identified on Exhibit 2.9.

### 2.7.2 Existing Road Drainage

Existing roadway drainage is provided through ditches and culverts with runoff discharging from the roadway drainage system at several locations. Existing culverts on Range Road 231 and Range Road 232 range in sizes from 300mm to 900mm. These culverts either convey flow across the roadway (centerline crossing culverts) or provide continuous flow between ditches at access roads (approach culverts). Culvert data provided by the County of Strathcona, such as size and invert elevations, are available in Appendix G. In general, invert elevations provided in the culvert data are much lower than surface elevations obtained from the LiDAR. Culvert locations and numbers are identified on Figures 3 to 6 (in Appendix G).

### Roadway Profiles

There are two high points located on Range Road 231 between Wye Road and Highway 628. The south high point is located near Sconadale Road, at station 0+888, with an elevation of 758.378 m. The north high point is lower in comparison and is located south of Wye Road, at station 2+818, with an elevation of 745.65 m. Between the high points, the grades on the roadway are generally flat, usually between 0.16% and 0.5%, although some sections can be as steep as 4.4%. The roadway sags between the two points near the future Hillshire/Executive Estates north access, at station 2+446, with an elevation of 742.54m. Another sag is located just north of Highway 628, at station 0+083, with an elevation of 736.16 m. The roadway is relatively steeper from this sag to the south high point, ranging from 2-4.

On Range Road 232, there are two high points as well. The south high point is located near the entrance to Scot Haven, at station 1+250, with an elevation of 757.32 m. The north high point is located south of Estate Drive, at station 2+618, with an elevation of 744.23 m. Between the high points, the roadway sags near station 2+309, with an elevation of 742.15 m. Another low point is located just north of Highway 628, at station 0+046, with an elevation of 736.44 m. The roadway is generally steeper near the south end, similar to Range Road 231, with grades close to 3.4%. There is a section about 300 m on the roadway with minimal grading, at 0.09%, between the two high points. Other sections on the roadway generally vary from 0.6% to 2.2%.

### Outlet locations/drainage

The existing roadway drainage directions on Range Road 231 and Range Road 232 are shown on Exhibit 2.8. The overall catchment area to the roadway drainage systems are identified on Exhibit 2.9. Between Highway 628 and Wye Road, there are seven outlets on Range Road 231 and six on Range Road 232 where runoff discharge out of the roadway drainage systems. These outlet locations are also shown on Exhibit 2.9. The overall catchment area contributing runoff to each outlet is summarized in Table 2.4.

Table 2.4: Catchment Areas Contributing to Each Outlet

Outlet	Range Road	Roadway Catchment (ha)	External Catchment (ha)
1	232	2.12	21
2	232	2.00	56
3	232	3.05	198
4	232	1.41	0
5	232	0.35	1
6	232	0.67	0
<b>232 Total</b>		<b>9.60</b>	<b>276</b>
7	231	1.55	7
8	231	1.50	27
9	231	4.24	0
10	231	0.59	2
11	231	3.63	15
12	231	0.69	2
13	231	0.82	0
<b>231 Total</b>		<b>13.02</b>	<b>53</b>

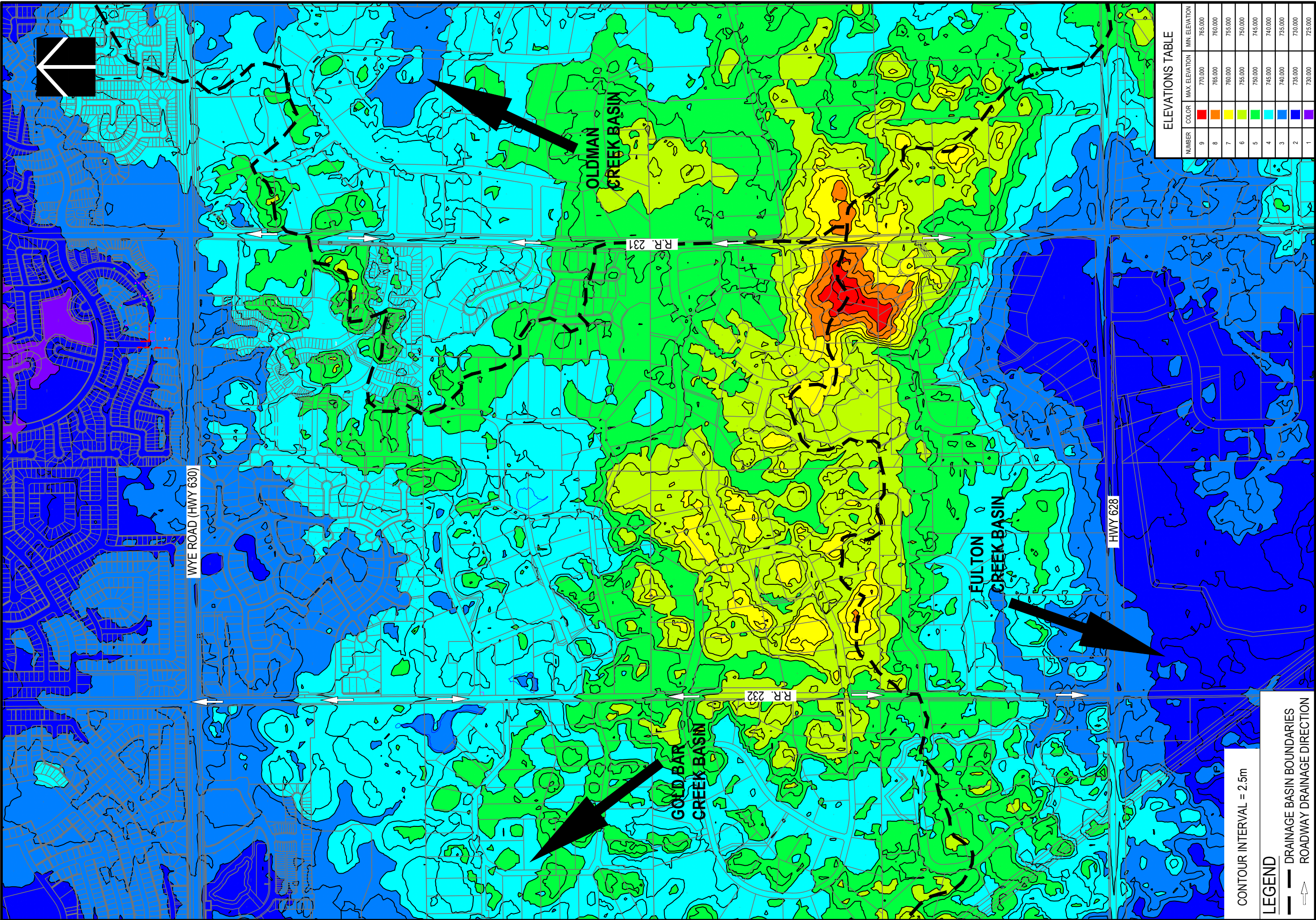
On the south end of Range Road 231, roadway runoff from the south high point and runoff from some areas adjacent to the roadway flow to the sag just north of Highway 628. Flows in the west ditch discharge to the green field to the west and eventually crosses Highway 628 to the south (Outlet 7). In the east ditch, because a culvert is not available to drain the sag, flows would pond in the sag until water levels reach roadway surface and flow across Range Road 231 to the west (Outlet 8). The two outlets are shown on Exhibit 2.10.

Between the two high points on Range Road 231, there are three outlets in the sag (Outlets 9, 10, and 11). Outlets 9 and 10 are located on the west side, draining flows from the west ditch to downstream. Flows between the south high point and sag discharges through Outlet 9 to an existing stormwater management facility adjacent to the roadway and flows from the north high point currently discharge through Outlet 10 to a natural wetland. Outlet 11 drains flow in the east ditch between the two high points to a wet pond east of the roadway. The three outlet locations and downstream receiving systems are identified on Exhibit 2.11. The last two outlets on Range Road 231 are located at the north end where flows between the north high point and Wye Road discharge to the ditches along Wye Road (Outlet 12 and 13).

On Range Road 232, there are significantly larger catchment areas adjacent to the roadway compared to Range Road 231 that either contribute to the roadway drainage system or cross the roadway to downstream systems. At the south end, two 600mm culverts on either side of Range Road 232 convey ditch flows across Highway 628, shown as Outlets 1 and 2 on Exhibit 2.12. Flows through the two culverts include roadway runoff between the south high point and Highway 628 as well as runoff from a total of 77 ha of land on either side of the roadway. Between the two high points on Range Road 232, roadway runoff that drain towards the sag discharge from the roadway drainage system and flow to the west towards Salisbury Village (Outlet 3). Flows in the east ditch cross the road through a 900mm culvert to the west. This culvert also conveys flows from a total catchment area of 195 ha across the road. This offsite catchment area is to the east of Range Road 232 and is generally comprised of country residential lands. There are pockets of natural wetlands throughout the area that retains runoff and attenuates the peak flow discharging through the 900mm culvert. From the north high point to Wye Road, there are three more outlet locations. The first one is near station 2+900, discharging east ditch flows to the treed area to the east (Outlet 4) and the second one is near station 3+100, discharging flows in the west ditch to a natural wetland. The last outlet location is at the north end, discharging flows in the northern most 400 m of the roadway to the ditch on Wye Road, draining towards the east (Outlet 6). Flows in the west ditch are conveyed across the road through a 600mm culvert. Outlets 3 to 6 are shown on Exhibit 2.13.

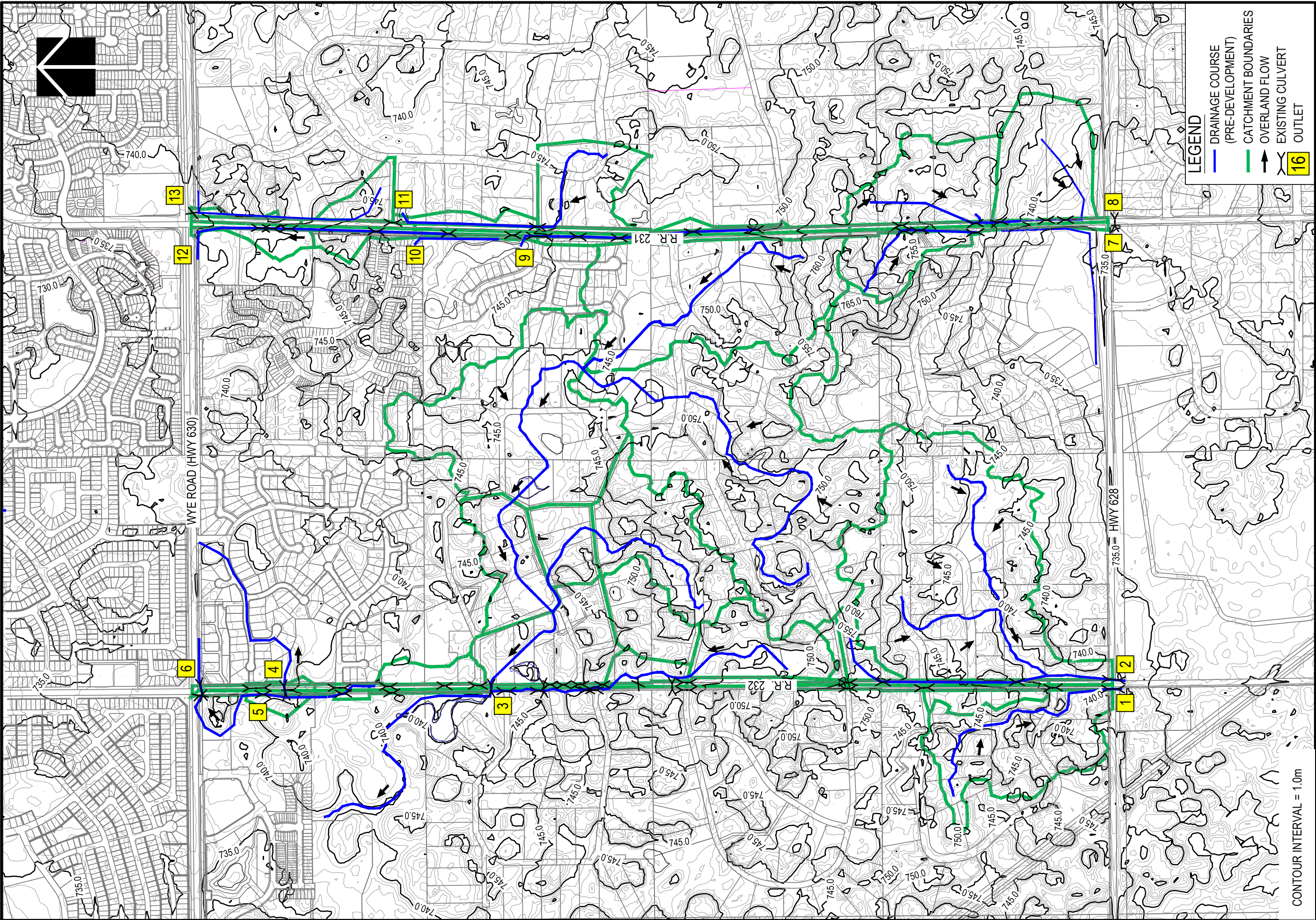


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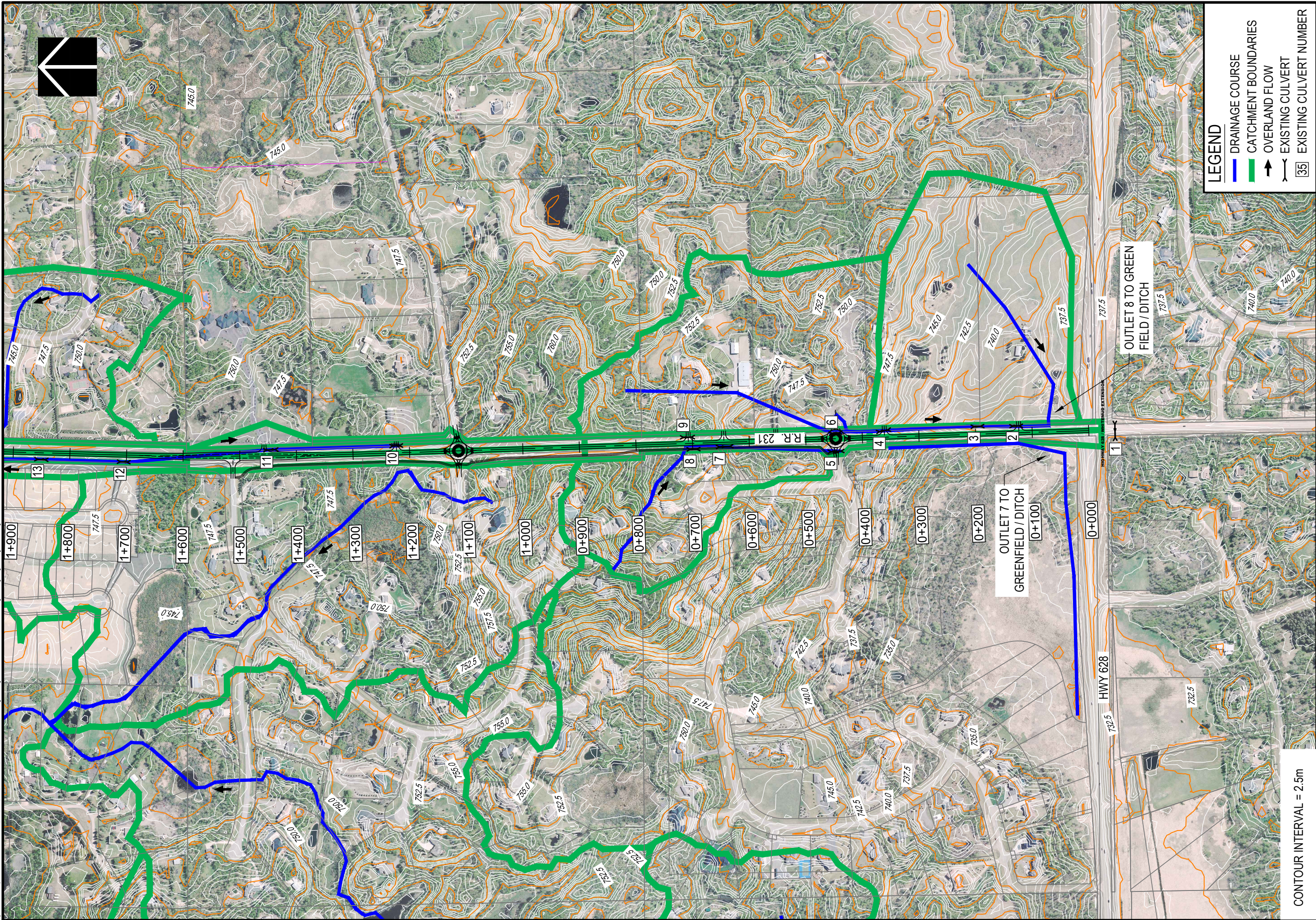


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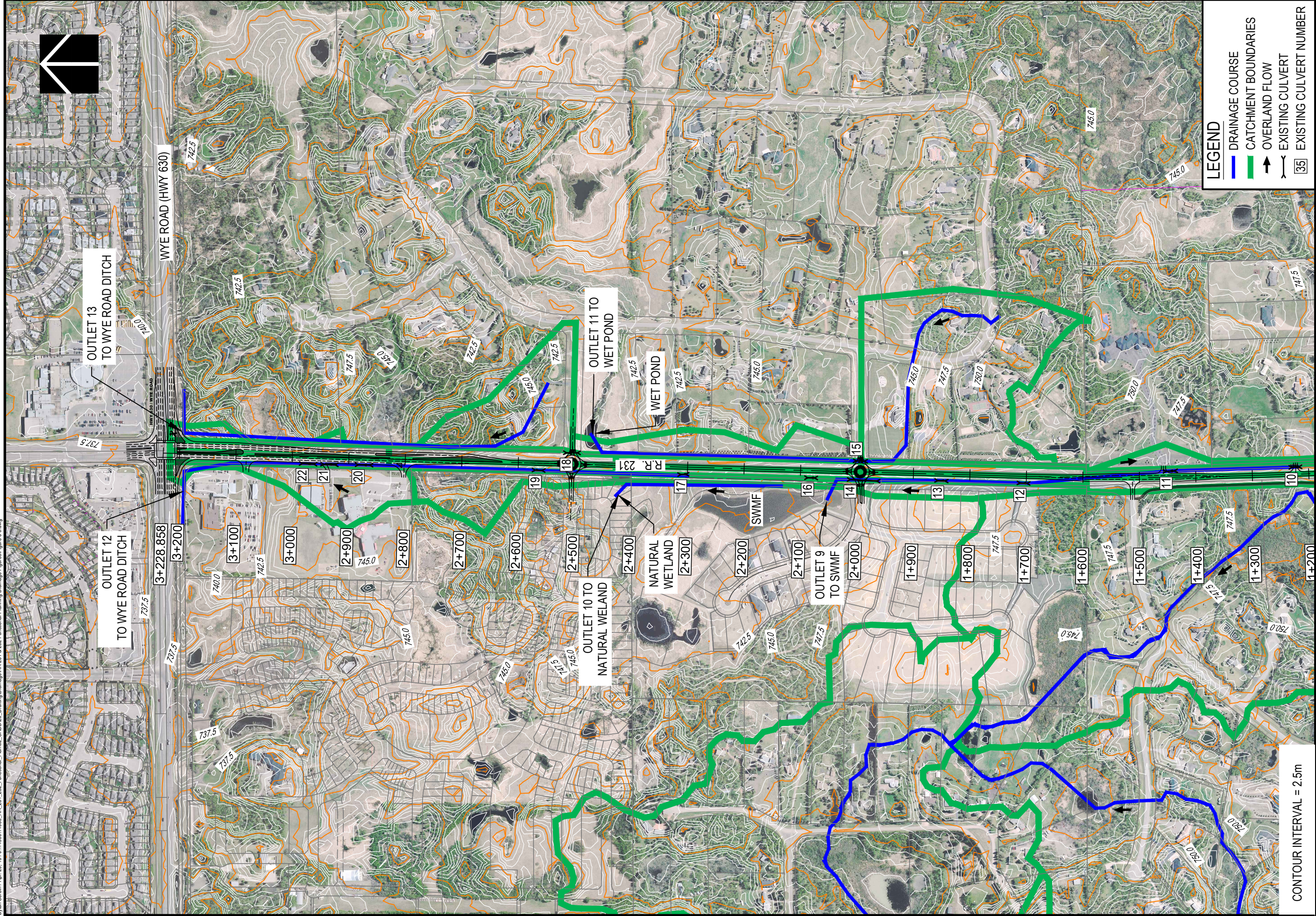
**RANGE ROAD 231 AND 232** **EXHIBIT 2.10**

**FUNCTIONAL PLANNING STUDY**

SITE DRAINAGE

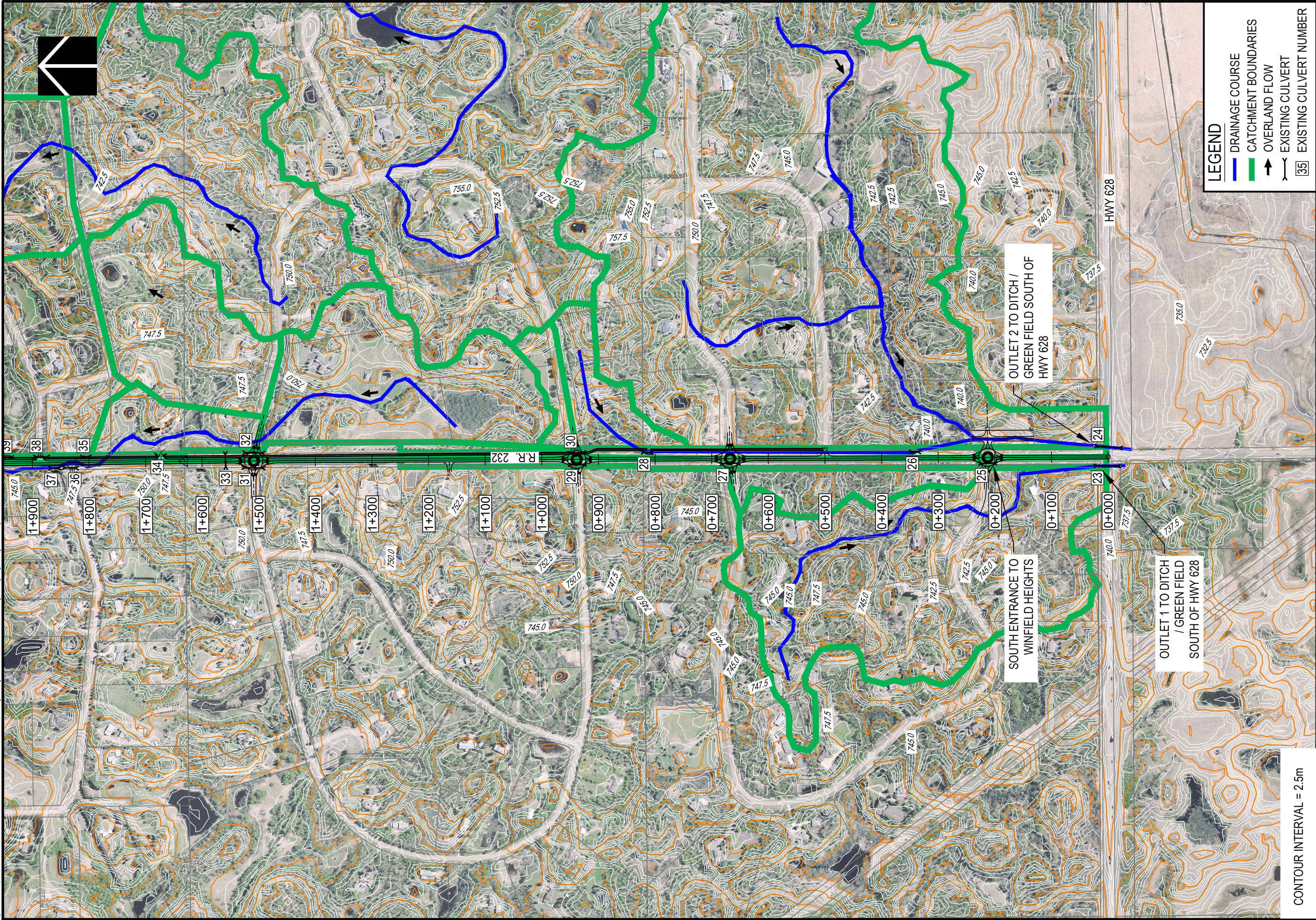
RANGE ROAD 231 SOUTH SECTION







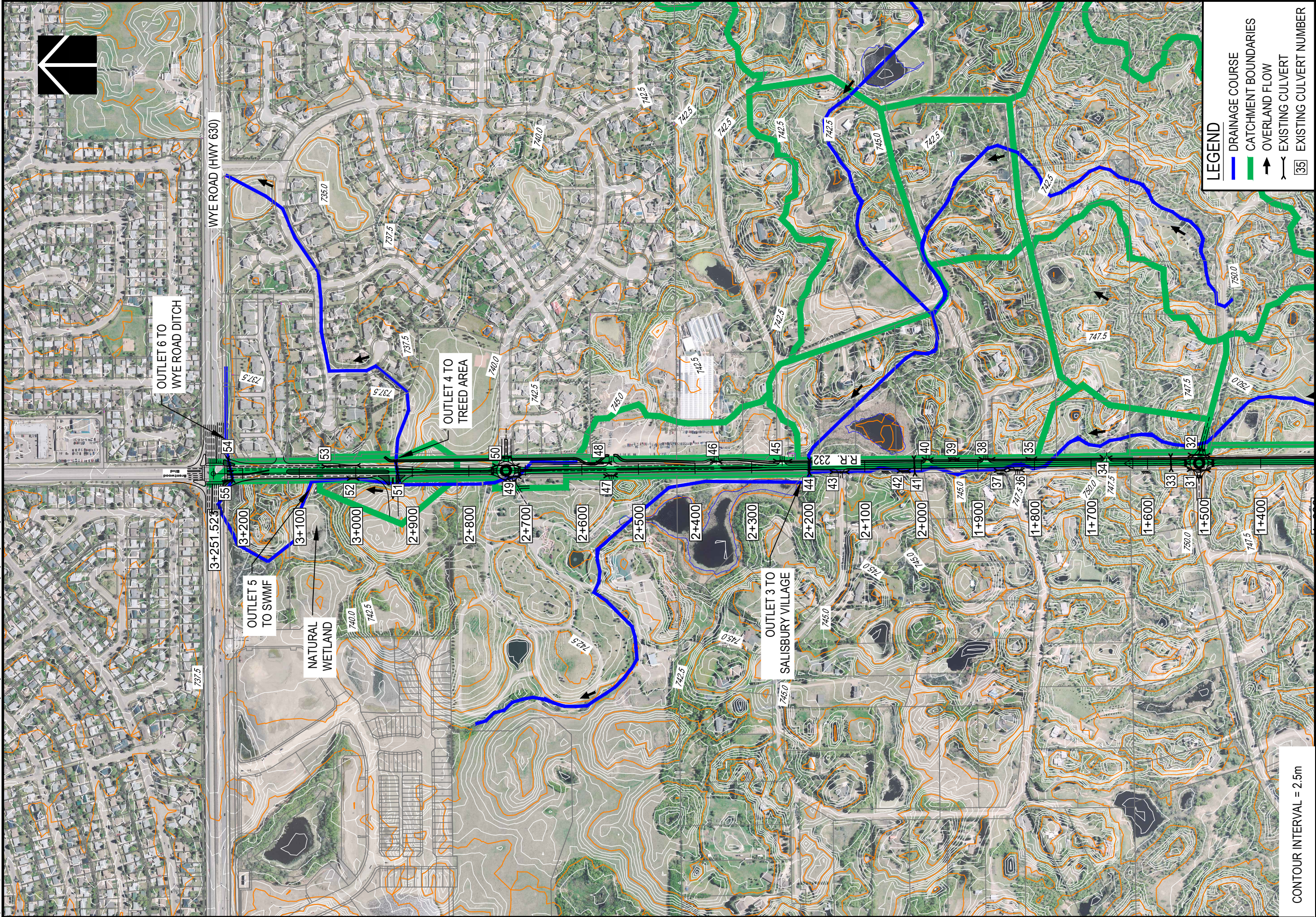
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CONTOUR INTERVAL = 2.5m



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**RANGE ROAD 231 AND 232**      **EXHIBIT 2.13**  
**FUNCTIONAL PLANNING STUDY**  
SITE DRAINAGE  
RANGE ROAD 232 NORTH SECTION



### 2.7.3 Existing Drainage Issues

Several known drainage issues have been observed near the Range Road 232 and Highway 628 intersection, these observations were described by the County of Strathcona as follows:

- Ponding observed in the northeast corner off the intersection; and
- Water backing up to the south entrance into Winfield Heights.

There are two 600mm culverts on either side of Range Road 232 crossing Highway 628. Based on the culvert data provided by the County of Strathcona and LiDAR data, it appears that the culvert invert elevations are more than 1m below surrounding surface. If culvert data are correct, then it is likely that the ditch flows cannot be drained across the highway due to the low profile of the culverts compared to ground at the downstream end, and thus causing flows to back up. It is also possible that both culverts are undersized as there is a catchment area of 21 ha (west) and 55 ha (east) adjacent to the roadway contributing flow to the culverts. Based on field observation, it appears that the ditch from the Winfield Heights to Highway 628 is poorly graded which could also cause flows to pond and back up to the access roads. Figure 2.1 below shows the west ditch near the Winfield Heights south entrance.



Figure 2.1: Range Road 232 West Ditch (Looking south from the Winfield Heights south entrance)

## 2.8 Urban Services Boundary

Strathcona County's Urban Servicing Boundary, shown in Figure 2.2 below, will be used as a guideline for defining the transition for urban to rural drainage along the corridors. Stormwater management calculations in Section 7.0 confirm the exact stationing for these transitions as part of the study.



Figure 2.2: Urban Servicing Boundary along Range Roads 231 & 232

## ■ 3.0 Listen and Learn Engagement

The following section summarizes the engagement activities during the listen and learn phase of the project.

### 3.1 Meetings with Key Stakeholders

Individual meetings were held with key stakeholders along the corridor to introduce the project, identify specific site access needs, and answer questions that stakeholders had. The following is a summary of stakeholder concerns. Information received from these meeting was used during option development later in the project.

#### Alberta Transportation

Alberta Transportation has scheduled improvements along Highway 628. Phase 1 (east of the Anthony Henday Drive ramps to 200 m east of Range Road 232) includes:

- Pavement rehab project that will also include the installation of signals at Range Road 231 and 232, and direct access closure to subdivisions that have alternate access onto the local roads.
- Signals will not include pedestrian crossings since they will not be permitted when the roadway is twinned.
- Secondary accesses to the subdivisions will remain in place with an emergency gate, similar to Deer Mountain.
- This work is listed on the 3 year construction program and started in 2018 with work continuing in 2019 and possibly longer. .
- Alberta Transportation has completed the design for this work.

Phase 2 (east of Phase 1 to Highway 21) is also a rehab project and is on the 3-year construction program.

#### Salisbury Greenhouse

Salisbury Greenhouse Staff provided the following comments and provided questions when engaged:

- There is currently a posted speed change between the two entrances of the site. To the unfamiliar driver this is unexpected and there is misconception about how much time they have to complete turns. Accidents are not uncommon as a result.
- If at all possible, could the speed limit be shifted to the south to have a consistent speed at both driveway accesses?
- Both site accesses are used. Ideally there would be left turn lanes provided on Range Road 232 because during the peak seasons, queues can develop.
- Both driveways are accessed by semi-trucks.
- Staff would like to have a bike trail and walking paths to the site to give them more options to get to/from work. Most people do not feel comfortable doing these activities on the existing road.
- A roadway like Range Road 233 would probably be wide enough, with some roundabouts on it to slow people down.

#### Victory Baptist Church

The church pastor had the following concerns and comments:

- Site lines to the south are restricted by the hill on Range Road 231.
- Previous discussions with the County have been to relocate the driveway to Sconadale Road. This road has an incline approaching the intersection that is often difficult to climb during winter months due to ice. The poor sightlines would be even worse if the roadway was moved to Sconadale Road.
- Largest vehicle to access the site is the monthly septic truck.
- The church has a large wooden sign on the edge of their property which they are hoping will not be impacted by the proposed improvements.





### Strathcona Christian Academy Elementary

Although the development application for the elementary school was approved on the premise that all students would be bused to and from the site to their homes or an off-site transfer location, the site experiences significant congestion before and after school with parents using the public parking lot as a kiss'n'ride site. The high percentage of vehicles turning left out of the site creates queues. The County worked with the school to review and implement intersection and access improvements for the site in 2017. The current queueing safety issue had been mitigated, however high queues still exist.

The school had the following concerns and comments:

- Parking lot queues back up to Wye Road during student drop-off at 8:35 and pick-up at 3:15
- Queues last around 20 minutes in AM; PM is way worse because the students are all let out at the same time
- The queues interfere with sightlines for the left turn coming out of the parking lot
- The Elk Island School Board runs a shuttle bus from the school to the church lot across the street to reduce the queues on Range Road 231
- Elk Island Schools organizes buses into the school, there are anywhere from 11-15
- There is no access from the back, however there may be a potential to provide an access through Hillshire ASP
- The school currently has 575 students (K-6) and is at capacity, but there is potential to expand the school on the existing site
- Delivery trucks use the north access and parking space, they have enough room to turn around
- There are not a lot of pedestrians and cyclists currently; however, the bike racks are full in the spring
- Adding paths is not expected to increase the number of students walking or cycling because the school catchment area is so large
- If there is a traffic light added to the Hillshire Access of Wye Road, perhaps there could be more pedestrians that walk from the subdivisions from the north
- If a roundabout was added to the Hillshire Access on Range Road 231, drivers could turn right out of the parking lot instead of left, resolving the sight line issues
- The school is built lower than the road and there are slope challenges, if the road is widened and the ditch is reduced, school could get flooded

Following the meeting, ISL observed the queueing issue during afternoon dismissal, from 3:10 to 3:45pm. The queue from the school had already spilled out onto the road prior to our arrival and continued to worsen for most of our time there. At its peak, there were 34 cars waiting to enter the school parking lot. We also observed several vehicles using the staff/bus entrance to short-cut the line, suggesting that the problem would be worse if this option was not available.

### Glenwood Funeral Home and Cemetery

Glenwood staff had the following concerns and comments:

- Internal access road is bordered by grave sites, so relocating the existing driveway to match the Estate Drive intersection may be challenging. Any changes to the driveway will need to accommodate passenger vehicles, small delivery trucks, septic trucks, and 40-foot flat beds.
- There is an elevation difference of approximately 6m between Range Road 232 and the north portion of the property. This area currently experiences seasonal flooding. Hopefully any recommendations for road improvements does not direct more water into this area. If rural drainage is maintained, a small back slope may be needed to direct water into an alternate area.
- Sight lines along Range Road 232 to the north are challenging.
- Glenwood is an active site, with several activities occurring daily on their premise. They are concerned about maintaining access while the roadway is rebuilt.

An invitation was also extended to the Elk Island School District, but they declined the meeting request.

## 3.2 Door-to-Door Engagement

To ensure residents directly adjacent to Range Road 231 and 232 were aware of the project, team members completed door-to-door engagement for the 92 residents along the corridors. Residents were informed about the project and encouraged to check out the study website and on-line survey.

## 3.3 Kitchen Table Meetings

Following the community wide mail out of the project pamphlet and door-to-door engagement activities, local residents were given the opportunity to host a kitchen table meeting for their neighbors. Project team members were on hand to lead discussions about residents' concerns about the corridors, and what improvements they would like to see. In April of 2018 meetings were held in homes at Estate Drive, Carriage Lane, and Deer Mountain.

Comments received from these events included:

- Concern about existing and future noise along the corridor;
- Issues with speed along the corridor – not well enforced, and there is a speed change by Salisbury;
- Safety when making turns – sight lines, the offset intersection with Glenwood, and speed are all factors;
- Would like to see speed reductions and turning lanes;
- Would not like to see anything that would increase the urban feel of the area (traffic signals, roundabouts, illumination, etc.);
- Impacts to wildlife;
- Elk Island School busses do not enter the subdivisions, requiring kids to wait on the range roads to be picked-up and then dropped off. As this road is posted at 80 km/hr, with little shoulder space, many parents are concerned about their kid's safety and prefer to drive their kids to reduce this risk.

## 3.4 Open House #1 and On-line Survey

On Thursday, May 10, 2018, ISL Engineering and Strathcona County hosted an Open House to solicit feedback from the community on development plans for Range Road 231 and 232. The Open House was part of the initial consultation phase to understand community needs prior to developing a plan for moving ahead. Approximately 180 participants attended the Open House and provided feedback via sticky notes, poster pages, and by speaking directly to those involved in the project. Additionally, residents had the opportunity to email feedback to the project team, based on the Open House display board content.



### 3.5 What We Heard

Overall feedback was significantly divided, with areas such as roundabouts, traffic lights, and speed limits highly contentious. What follows below is the summarized and themed feedback.

Table 3.1: Feedback Received at Open House #1

	Range Road 231	Range Road 232
<b>Roundabouts</b>	<ul style="list-style-type: none"> <li>No roundabouts, people aren't familiar with them</li> <li>Need a roundabout at Meadowhawk/Executive Estates</li> <li>Need a roundabout at Thompson Ave and Hillshire Blvd.</li> <li>Use turning lanes rather than roundabouts</li> <li>No traffic circle or speed reduction</li> <li>Roundabouts good if used properly</li> </ul>	<ul style="list-style-type: none"> <li>No traffic circles</li> <li>Traffic circles at Graham Heights and Scot Haven essential</li> <li>Desire for a traffic circle to be built into Range Road 232 at the cemetery entrance, similar to Range Road 233.</li> </ul>
<b>Bicycle Paths/ Multi-use trails</b>	<ul style="list-style-type: none"> <li>Multi-use trails are crucial to accommodate pedestrian travel</li> <li>Need a solution to keep cyclists safe</li> <li>Extend walking trails between Wye Road and Whitemud Freeway</li> <li>Paved trail for bikes and walking</li> <li>Widen shoulders for bicycle paths</li> <li>Bike paths to join subdivisions</li> </ul>	<ul style="list-style-type: none"> <li>Widen shoulders for cyclists</li> <li>Bike lane required</li> <li>Bike paths linking acreage loops</li> <li>Paved trails</li> <li>Separated bike path</li> <li>No bike lanes needed, road to nowhere</li> <li>No pathway along Wye Rd</li> <li>Route to Whitemud</li> </ul>
<b>Traffic lights</b>	<ul style="list-style-type: none"> <li>Lights at both 231 and 232 on Whitemud Extension</li> <li>No lights, roundabouts are better</li> <li>Improve signal timing at 231 and Wye</li> <li>Need traffic lights, preferred over roundabouts</li> <li>Lights at 233 and 231 will control 232</li> <li>Safe crossing from Executive Estates to the new developed side</li> <li>Need intersection controls on 231 and Whitemud</li> </ul>	<ul style="list-style-type: none"> <li>No more traffic lights</li> <li>Traffic lights at 232 and 522</li> <li>No lights or roundabouts, too much noise and traffic pollution</li> <li>Lights are long overdue</li> <li>Intersection with 628 and Hwy 14 needs lights</li> <li>No lights on Whitemud exit</li> <li>Street lights would be a practical improvement</li> <li>Lights at 232 and 522</li> <li>Lights at corner of 232 and Whitemud</li> </ul>
<b>Lanes</b>	<ul style="list-style-type: none"> <li>Add a deceleration lane northbound on 231 at Sconadale</li> <li>Turning lane for each subdivision</li> <li>Turning lane for Salisbury Greenhouse, Glenwood and Estates</li> <li>Widen 231 south of 521</li> <li>Leave two lane road</li> <li>Widen the roads</li> <li>Drivers do not use the left turn lane Executive Estates correctly</li> </ul>	<ul style="list-style-type: none"> <li>Keep two lane road and maintain a rural setting</li> <li>No twinning of 232</li> <li>Light and merge lane at 232 and 522</li> <li>Left turn lane coming out of Estates Village</li> <li>RR to Estates has become main entrance due to no lights on Wye Road</li> <li>Narrower ditches and wider shoulders</li> <li>Less traffic, no four lanes</li> <li>Widen to accommodate turning lanes</li> <li>Four lane road on 638</li> <li>Leave as two lanes with turning lanes</li> <li>Widen the shoulders</li> </ul>

	Range Road 231	Range Road 232
<b>Speed</b>	<ul style="list-style-type: none"> <li>• Keep speed limit</li> <li>• Speed enforcement on two lanes</li> <li>• No speed reduction on 231</li> <li>• Don't reduce speed limit unnecessarily</li> <li>• Reduce speed to 60km to reduce noise</li> <li>• No fast speeds – 70km</li> </ul>	<ul style="list-style-type: none"> <li>• 70 km/hr</li> <li>• Slower speeds past Salisbury and a turning lane</li> <li>• All subdivisions should have 30km/hr speed limits</li> <li>• 232 needs to be slowed down</li> <li>• Reduce to 60km/hr with enforcement</li> <li>• Lower speeds would make left turns safer</li> <li>• Don't change speeds</li> <li>• 60km too slow, 70km is better</li> </ul>
<b>Signage</b>	<ul style="list-style-type: none"> <li>• Highway 14 signage missing</li> <li>• Note 628 is Whitemud</li> <li>• Clarity as to who has right-of-way in two-way stop</li> <li>• No engine retarder brakes signs needed</li> <li>• Street lights at all neighbourhood entries</li> </ul>	
<b>Other</b>	<ul style="list-style-type: none"> <li>• Coordination required with Alberta transportation</li> <li>• Determine if purpose of streets is local service or through traffic</li> <li>• Road noise associated with future development a concern</li> <li>• Concern about volume of cars coming out of Hillshire on 231</li> <li>• Transit stops would be good</li> <li>• Provide water and sewers to reduce traffic</li> <li>• Keep wildlife undisturbed</li> <li>• Close 231/232 for local traffic, do not increase traffic flow</li> <li>• Noise barriers</li> <li>• Visibility for cyclists and walkers needs to improve near Meadowhawk</li> </ul>	<ul style="list-style-type: none"> <li>• Highway access deterrents should be considered</li> <li>• Salisbury entrances hazardous</li> <li>• More information about timelines and how input will be used</li> <li>• Difficult to turn out of division during rush hour</li> <li>• Public transportation stops</li> <li>• Deterrents to access Whitemud through 232, 231, and 233 should be included</li> <li>• Noise barriers</li> <li>• Better lighting at night</li> <li>• Better linkage between range roads for walkers and cyclists</li> <li>• Shoulders should be wider</li> </ul>



## 4.0 Development of Alternatives

### 4.1 Design Criteria

Using County design standards as a starting point, the following design criteria was developed for the project.

Table 4.1: Design Criteria for Rural Sections

Criteria for Class I Roadway	Minimum Standard	
Design Speed	70 km/hr	90 km/hr
Posted Speed	60 km/h	80 km/hr
Alignment		
Minimum Curve Radius	130 m	340 m
Minimum k for Passing Sight Distance (crest)	255	390
Minimum k for Stopping Sight Distance (crest/sag)	17 / 23	39 / 38
Grade	0.3% (min) 5.0% (max)	0.3% (min) 5.0% (max)
Cross Section		
Lane Width	3.5 m	
Outside Shoulder	1.0 m	
Subgrade Width	12.4 m	
Median Width (if required)	5.5 m	
Ditch Depth	1.0 m below top of subgrade	
Ditch Width	3.5 m*	
Sideslope Ratio	4:1	
Backslope Ratio	3:1 (min) 4:1 (desirable)	
Clear Zone (from TAC)	7.5m – 8.5m	8.0m – 10.0m
Bike Trail	3.0 m	
Right-of-Way		
Basic Right-of-Way	40 m	
Intersections		
Left Turn Bay Width	3.5 m	
Right Turn Bay Width	3.5 m	
Left turn Bay Length	60 m	
Right Turn Bay Length	60 m	
Design Vehicles	WB-21	
Level-of-Service (LOS) Threshold	C/D	

**Note:** Ditch width may be adjusted to accommodate a bike trail on one side.



The existing corridor was compared to the design criteria to identify possible improvements that would be required. Both corridors will require shoulders to be added to the existing roadway, and the vertical curve at Station 0+888 on Range Road 231 will need to be flattened to improve sight distances.

The following table displays the design criteria for the urban sections along Range Roads 231 and 232.

Table 4.2: Design Criteria for Urban Sections

Criteria for Class I Roadway	Minimum Standard
Design Speed	70 km/hr
Posted Speed	60 km/h
<b>Alignment</b>	
Minimum Curve Radius	130 m
Minimum k for Passing Sight Distance (crest)	255
Minimum k for Stopping Sight Distance (crest/sag)	22 / 15
Grade	0.3% (min) 5.0% (max)
<b>Cross Section</b>	
Lane Width	3.5 m
Curb	0.15 m
Gutter	0.25 m
Median Width (if required)	5.5 m
Boulevard Crossfall	2%
Clear Zone (from TAC)	7.5m – 8.5m
Bike Trail	3.0 m
<b>Right-of-Way</b>	
Basic Right-of-Way	40 m
<b>Intersections</b>	
Left Turn Bay Width	3.5 m
Right Turn Bay Width	3.5 m
Left turn Bay Length	60 m
Right Turn Bay Length	60 m
<b>Design Vehicles</b>	<b>WB-21</b>
<b>LOS Threshold</b>	<b>C/D</b>

Typical cross-sections based on these design criteria can be seen in Exhibit 4.1 and 4.2. Both an urban and rural cross-section has been included for Range Road 231 and Range Road 232.

## 4.2 Corridor Improvements

To improve traffic operations and overall corridor traffic flow along the corridors, the following improvement options were considered:

- Two Lane Roadway with Roundabouts
- Two Lane Roadway with Signals
- Two Lane Roadway with Four-way Stop Control
- Two Lane Roadway with Left and Right Turn Bays
- Four Lane Roadway

Each option was evaluated using the following criteria: safety, traffic flow, pedestrian / cyclist accommodation, right-of-way impacts, and construction and maintenance costs. Figure 4.1 below summarizes the evaluation results. Refer to Appendix B for more details.






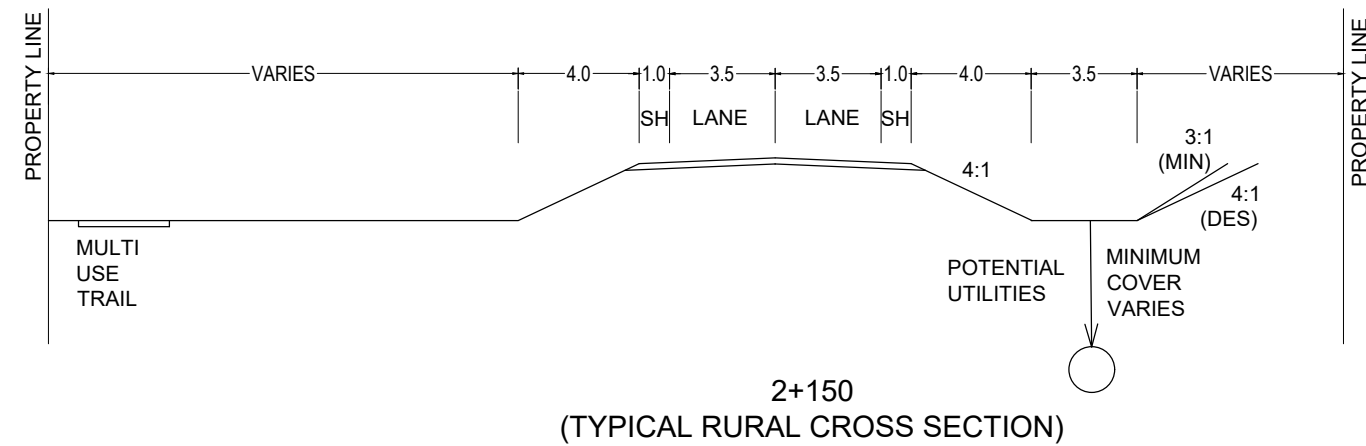
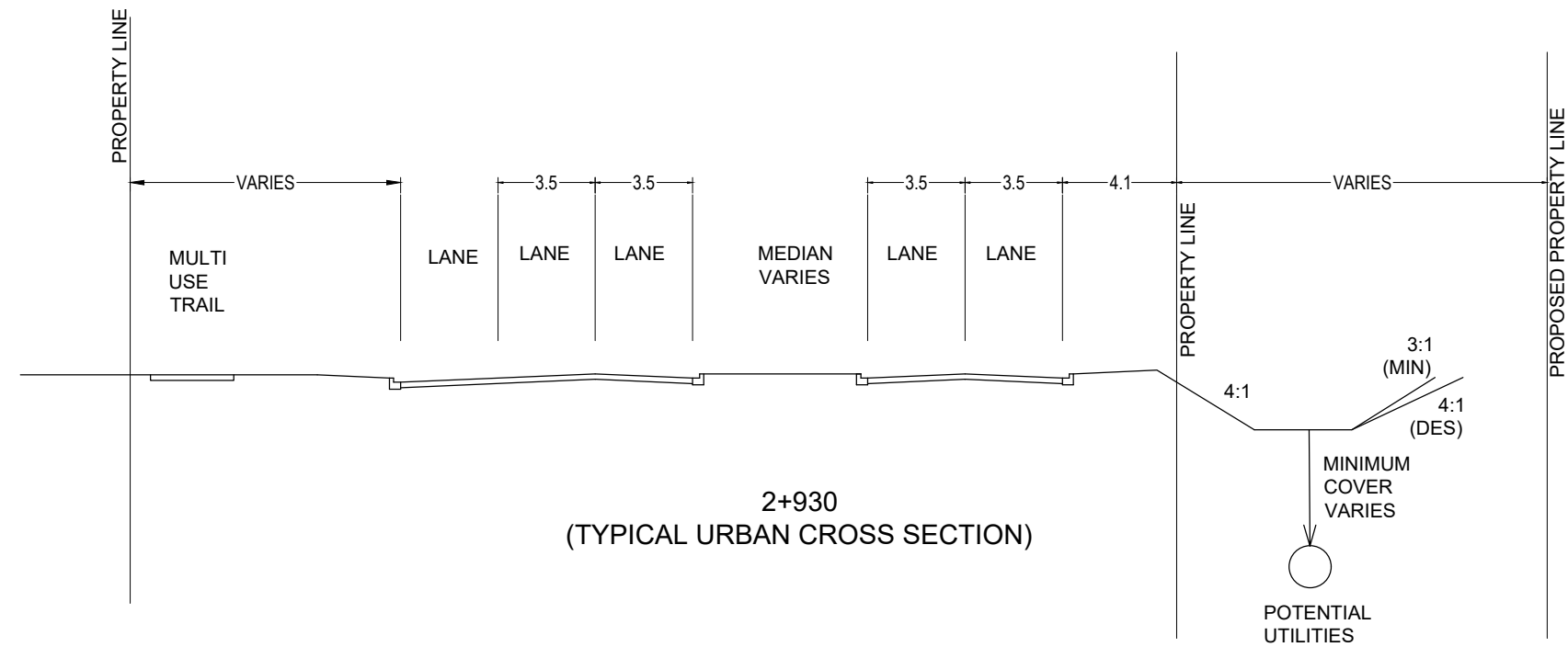
Roadway Improvements Reviewed					
Criteria	 <b>Roundabouts</b> <small>(similar to Range Road 233 at Balmoral Way / Clubhouse Drive)</small>	 <b>Signals</b>	 <b>Four-way stop</b>	 <b>Left &amp; right turn bays</b>	 <b>Four Lanes</b>
<b>Safety</b>	Removes conflict points, decreases probability of serious injuries and fatalities.  Decreases travel speed.	Maintains conflict points and probability of serious injuries and fatalities.  Lowers probability of high speed collision.	Maintains conflict points.  Lowers probability of high speed collision.	Maintains conflict points.  Increases probability of high speed collision.	Maintains conflict points.  Increases probability of high speed collision.
<b>Traffic Flow</b>	Increases delay along the corridor.  Decreases side street delay.	Increases delay along the corridor.  Decreases side street delay.	Increases delay along the corridor.  Decreases side street delay.	Improves corridor capacity.  Does not decrease side street delay.	Improves corridor capacity.  Does not decrease side street delay.
<b>Pedestrian/Cyclist Accommodation</b>	Clearly defined crosswalks	Protected walk phase	Clearly defined crosswalks	Increases crossing width	Increases crossing width
<b>Land Impacts</b>	Minimal	Minimal	None	Minimal	Significant
<b>Relative Cost</b>	\$\$\$	\$\$\$	\$	\$\$	\$\$\$\$\$
<b>Next Steps</b>	Improvement still being considered.	Improvement still being considered.	Improvement does not achieve project objectives in the long term and are no longer being considered.		

Figure 4.1: Roadway Improvements Considered for this Project

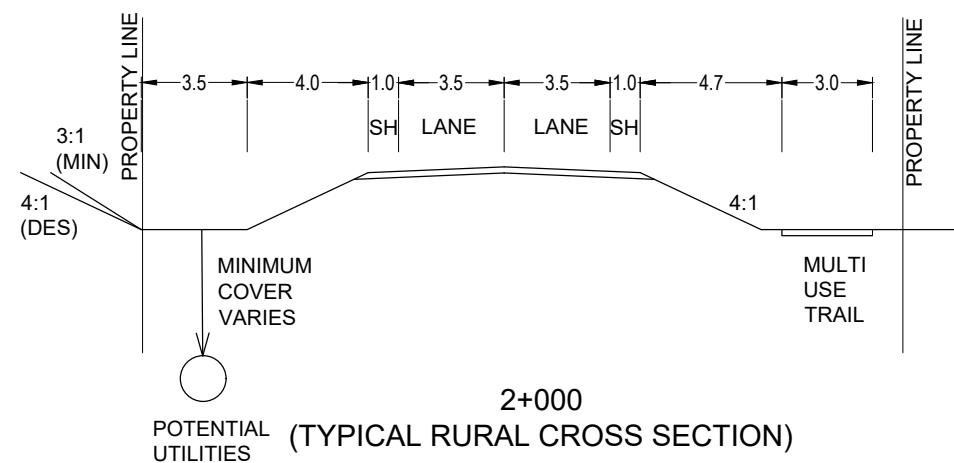
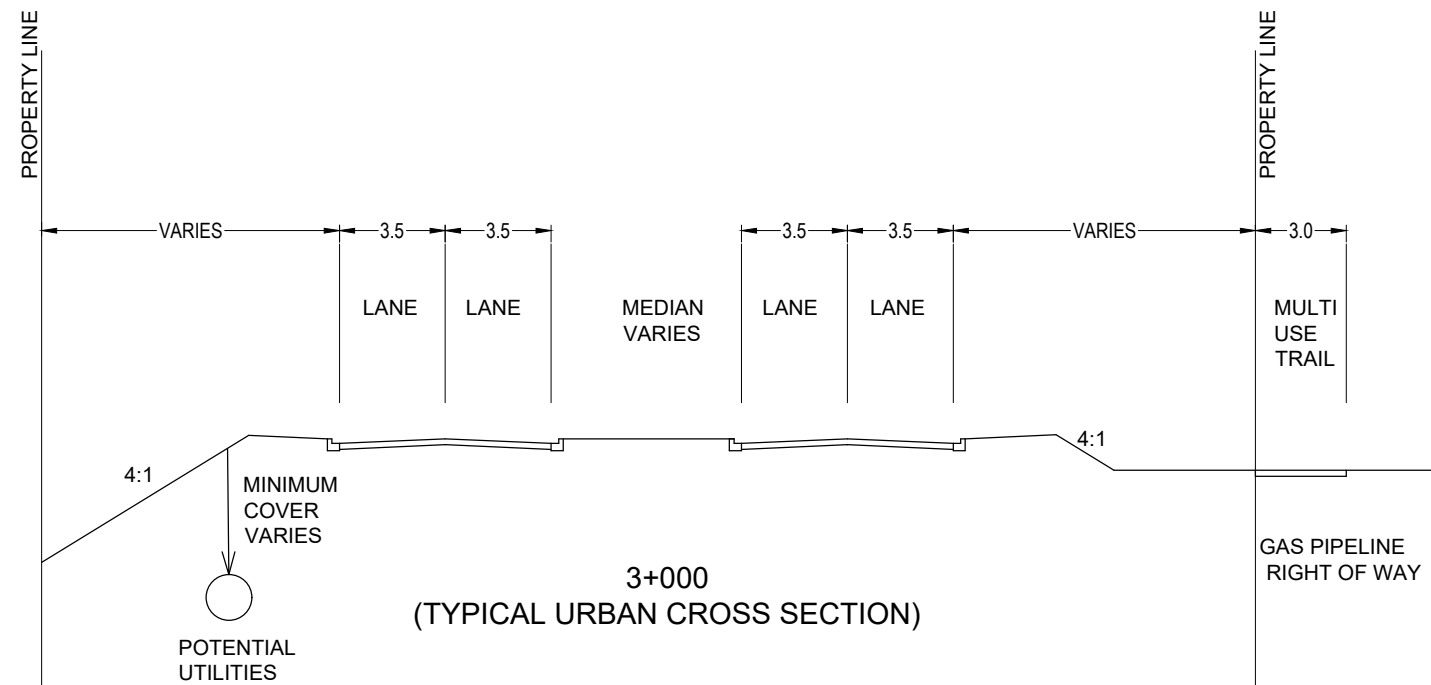
There are proven benefits to the signal and roundabout options, however based on this study, the roundabout option is favorable. The roundabout option provides the greatest safety improvements and has lower operation and maintenance costs than traditional signals. While residents will be inconvenienced during construction and there is sure to be a transition period, overall traffic flow and safety along the corridor is expected to improve with the installation of roundabouts.

The preference for roundabouts is compatible with the County's Safer Systems approach to design (also known as Vision Zero). This approach recognizing that people make mistakes, and roads and the road network should be designed with that in mind. It places safety as the most important outcome of the road network, acknowledging that while not all collisions are avoidable, death and serious injury should be.

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### 4.3 Compatibility with the Proposed Wye Road Improvements

The Wye Road Functional Planning Study from Ordze Road to Highway 21 (AI-Terra, 2015) identified Range Road 231 and 232 to both have 4-lanes south of Wye Road plus auxiliary lanes. The additional lanes were required for the high traffic projections anticipated by the study, which may have included provisions for the Colchester development. The traffic volumes for this analysis were derived using the project volumes developed for Range Road 231 and 232 and the traffic volumes from the Wye Road Functional Planning Study.

At Range Road 231, two variations of roadway geometry near Wye Road were considered:

- 3 southbound lanes, as per the AI-Terra plan, with a high speed eastbound to southbound right turn. The outside southbound lane would be dropped at the access to the school, and the middle lane would be dropped as part of the existing acceleration lane.
- 2 southbound lanes, with an eastbound to southbound right turn with a yield condition. The outside lane would be dropped at the access to the school.

For both options the northbound lanes are the same, with a protected left-in/left-out lane from the school that continues as a northbound through lane.

To ensure that the worst-case scenario is protected for, the recommended plan will show the 3 lane option along Range Road 231, but the 2 lane option should be reviewed at detailed design.

At Range Road 232, two variations of roadway geometry near Wye Road were considered:

- 3 southbound lanes, as per the AI-Terra plan, with a high speed eastbound to southbound right turn. The outside southbound lane would be dropped at the access to Salisbury Village, and the middle lane would be dropped prior to the roundabout.
- 2 southbound lanes, with an eastbound to southbound right turn with a yield condition. The outside lane would be dropped at the access to Salisbury Village.

For both options the northbound lanes are the same, with a protected left-in/left-out lane from Salisbury Village that continues as a northbound through lane.

Traffic analysis shows that the 2 lane option with an eastbound to southbound right turn with a yield condition will operate acceptably in the long-term. To minimize impacts to adjacent development this option is recommended at this location.

### 4.4 Range Road 231 – Access to Strathcona Christian Academy Elementary

The Wye Road improvement project included an all directional access at this location, with a northbound protected left turn bay. Site observations have shown that queues from the eastbound left turns cause internal circulation issues that result in vehicles entering the site to queue on Range Road 231. Traffic analysis shows that this problem will increase in the long term.

Options that were considered for this location include:

- Relocating the access to an alternate roadway but deemed unfeasible due to adjacent land uses.
- Converting the access to a right-in/right-out. This would require the northbound left turns would need to be rerouted along an alternate north/south corridor, then travel across Wye Road, and then head south to access the site. The project team felt drivers would avoid this degree of rerouting and would choose to make an illegal U-turn at the Range Road 231 / Wye Road intersection or within the commercial site to the north. This was considered less safe than the original option and was therefore rejected.
- Converting the access to a right-in/right-out/left-in. This option is similar to above but accommodates the northbound left turn with a protected left turn off the range road. Eastbound left turns would still need to travel south to the Hillshire/Executive Estates roundabout to safely complete a U-Turn before travelling northbound.



- Modifying the proposed all directional access to include a protected northbound left turn bay that also serves as a protected downstream eastbound left turn receiving lane. This protected lane then becomes an added lane and becomes the inside through lane at the Wye Road intersection.

The last option was deemed preferred for the following reasons:

- Best option from the user's perspective,
- Achieves acceptable operations in the long-term, and
- Assists with the lane balance between the Range Road Functional Planning project and the Wye Road Improvements project.

#### 4.5 Range Road 231 – Access to Elk Island School Board Site

The Wye Road improvement project included an all directional access at this location, with a northbound protected left turn bay. Traffic analysis shows that left turns existing the site will experience poor operations in the long term.

An option was considered to make this access a right-in/right-out, however northbound left turns would need to be rerouted along an alternate north/south corridor, then travel across Wye Road, and then head south to access the site. The project team felt drivers would avoid this degree of rerouting and would choose to make an illegal U-turn at the Range Road 231 / Wye Road intersection or within the commercial site to the north. This was considered less safe than the original option and was therefore rejected.

Relocating the access to an alternate roadway was also considered but deemed unfeasible due to adjacent land uses.

The preferred option for this site is to maintain the previously proposed all directional access, with the understanding that eastbound left turn drivers will have the option of completing the left turn if sufficient gaps exist or making a right turn and travel 580m south to the Hillshire/Executive Estates roundabout to safely complete a U-Turn before travelling northbound. Prior to construction the County should provide some education to the staff at this site to ensure that they are aware of their travel options.

#### 4.6 Range Road 232 – Access to Glenwood and Salisbury

Along Range Road 232, the staggered intersections at Estate Drive/Glenwood Funeral Home and Cemetery access will experience poor operations on the side roads in the long term. Initial analysis shows that accesses may need to be reconfigured. As part of this project five options were developed to address the expected delay. Each option was evaluated based on potential traffic flow improvements, feasibility, sensitivity, and public engagement feedback.

### Work with Existing Entrance

This option involves realigning Glenwood Funeral Home & Cemetery's main access to better line up with Estate Drive. Initially, it was thought that proximity to existing grave sites would limit improvements at the locations; however, it was found that there is enough room to realign the Cemetery's main access. Traffic signals or a roundabout would be installed to address delay on the minor roads. While space for a roundabout is limited, initial design indicates that it is possible. Refer to Figure 4.2 below.

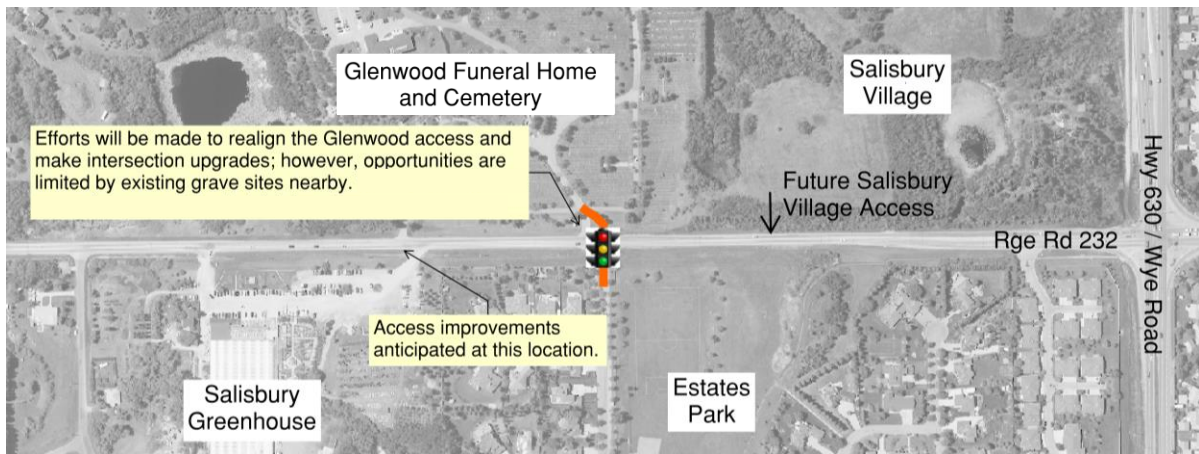


Figure 4.2: Work with Existing Entrance

### Relocate Glenwood's Main Entrance

The main access to Glenwood would be relocated to the southern access, where an upgraded intersection would be created with access to Salisbury Greenhouse. Signals or a roundabout would be installed to address delay on the minor roads at the upgraded intersection. The existing main access to Glenwood would be closed or have restricted movements. Refer to Figure 4.3 below.

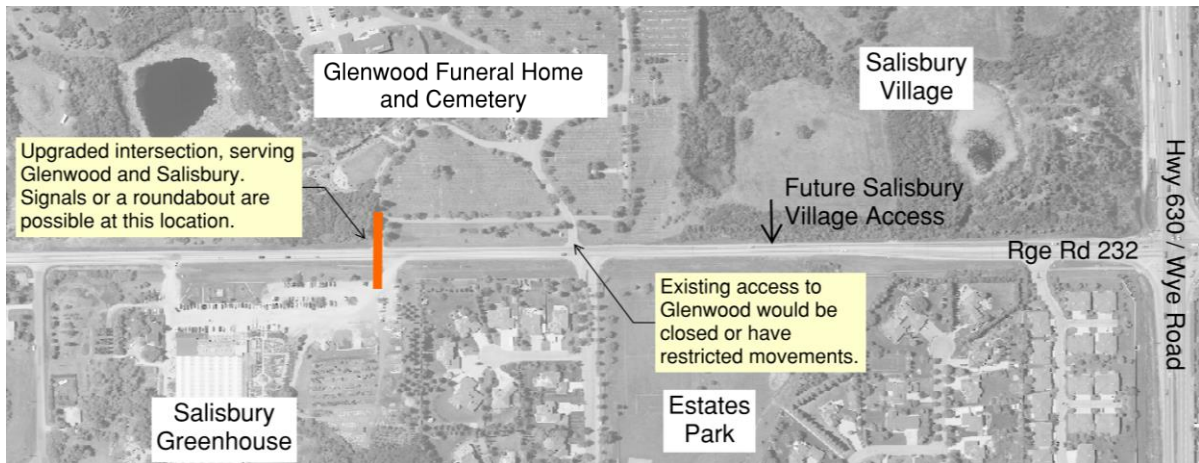


Figure 4.3: Relocate Glenwood's Main Entrance



### T-Intersection

The northern access to Glenwood and Salisbury Greenhouse would be closed, creating T-intersections along the corridor. Intersection upgrades would be made to ensure the design of accesses is adequate, however, a traffic signal or a roundabout will not be required. Refer to Figure 4.4 below.

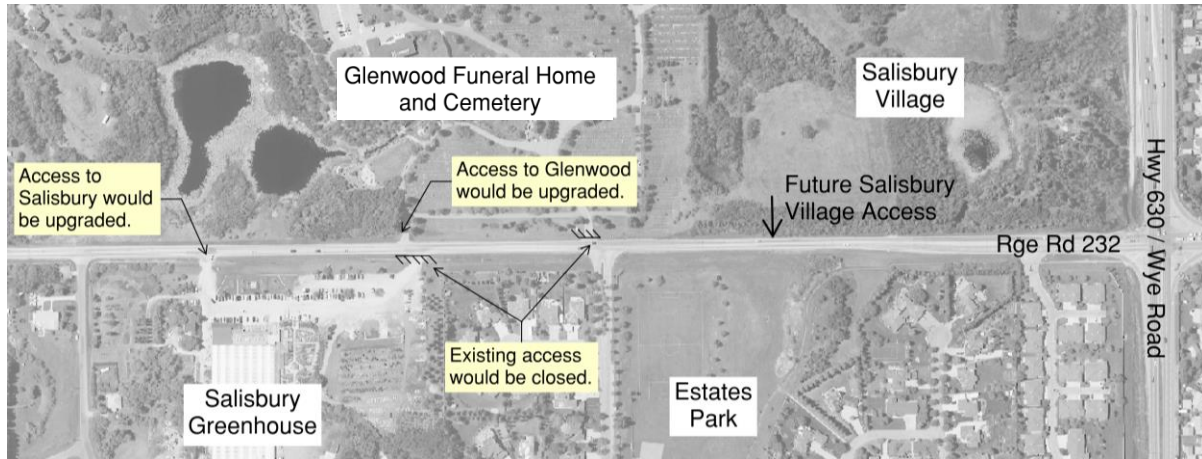


Figure 4.4: T-Intersection

### New Combined Access

The two Glenwood and Salisbury Greenhouse accesses would be consolidated into a new upgraded intersection. This new intersection could have traffic signals or a roundabout. Existing accesses would be closed or have restricted movements. Refer to Figure 4.5 below.

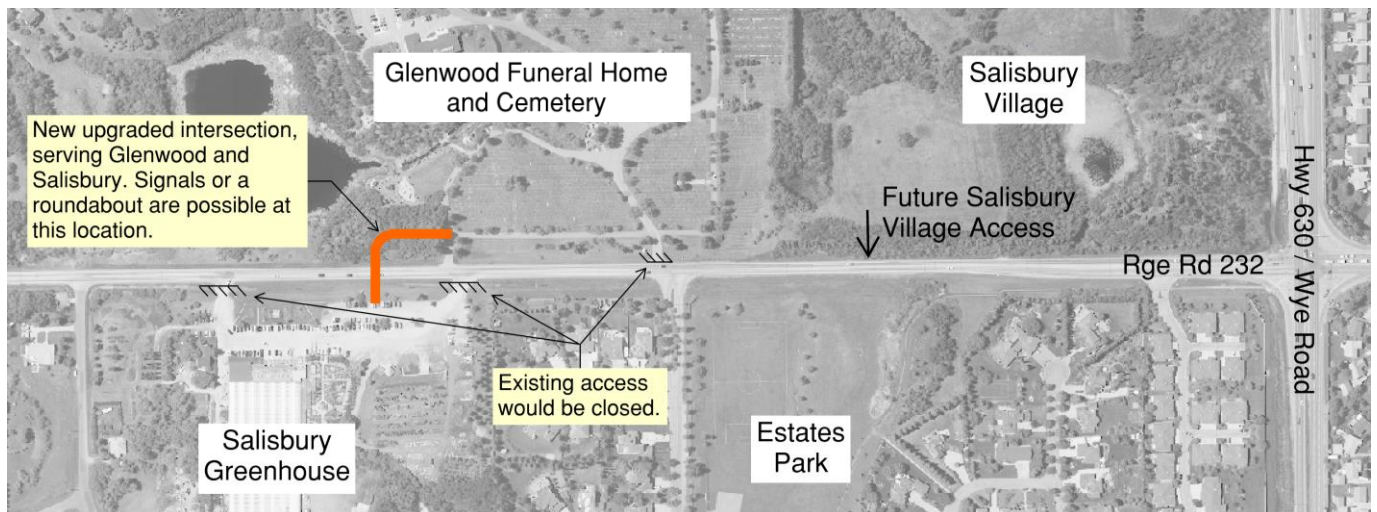


Figure 4.5: New Combined Access

### Realigning Estate Drive

Estate Drive would be closed and realigned to a new upgraded intersection at the Salisbury Village Access. This option would create more on-street parking, but it would also impact the soccer pitch. Refer to Figure 4.6 below.

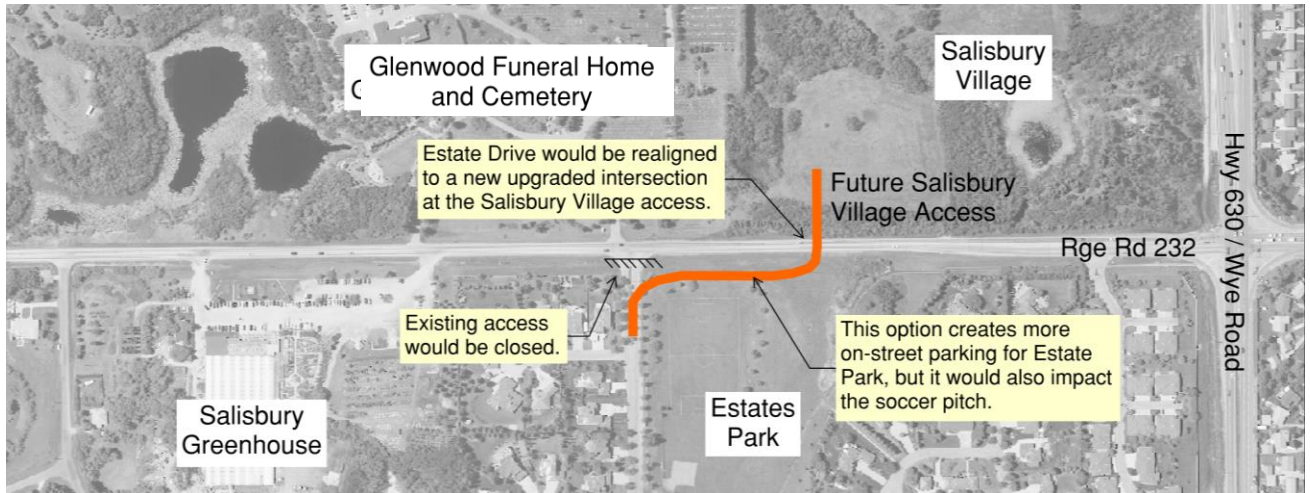


Figure 4.6: Realigning Estate Drive

## 5.0 Traffic Projections and Traffic Analysis

Traffic analysis was conducted for each of the range roads to assess the existing and future infrastructure requirements. Analysis was based on existing traffic counts from 2017 conducted by Strathcona County. Traffic for future horizons was developed using the existing counts, growth of background traffic using Alberta Transportation traffic count data, and trips generated from anticipated future development within the study area.

### 5.1 Traffic Projections

#### 5.1.1 Future Development

The number of new dwelling units in each of the developments was as follows:

- Salisbury Village – 1,486 new units
- Hillshire – 1,056 new units
- Meadow Hawk – 60 new units
- Sconadale – 150 new units
- Winfield Heights – 23 new units
- Carriage Lanes – 27 new units

For the purpose of selecting future study horizons, a growth rate was applied to the above new units. The growth rate was calculated to be 2.38% based on an average year-to-year growth rate from 2003 to 2016. It was assumed that Salisbury, Hillshire, and Meadow Hawk would be fully built-out in 2023 and that the remaining new units would be built added at the growth rate calculated. This resulted in a future full build-out of the study area of 2031. The second future horizon was selected to 10 years after the 2031, at 2041.

The growth horizons were reviewed and amended by the County. For the development identified within the study area, 2038 and 2048 were selected as more appropriate horizons.

#### 5.1.2 Trip Generation

The trip generation calculation for was completed using the 9<sup>th</sup> edition of the ITE Trip Generation Handbook. The following trip rates were used for the various types of developments in the study area:

Table 5.1: ITE Trip Generation Rates

Land Use	ITE Land Use	Unit	AM	PM
<b>Low Density Residential</b>	210 – Single Family Homes	per Dwelling Unit	0.75	1.00
<b>Medium Density – Semi/Townhouse</b>	231 – Low Rise Residential Condo	per Dwelling Unit	0.67	0.78
<b>High Density Residential</b>	220 – Apartment	per Dwelling Unit	0.51	0.62
<b>Commercial</b>	820 – Shopping Center	per 1000 sq. ft.	0.96	3.71
<b>Business Park Office</b>	770 – Business Park	per Acre	18.86	16.84
<b>Mixed Business Park – Hotel</b>	312 – Business Hotel	per Occupied Rooms	0.58	0.62
<b>Mixed Business Park – Apartments</b>	220 – Apartment	per Dwelling Unit	0.51	0.62



The low density residential rate was applied to any subdivisions within the study area with single family homes. Rates for medium density residential, high density residential, commercial, business park office, and mixed business park hotel were applied to the Salisbury Village development based on the Area Structure Plan.

Table 5.2 displays the resulting trips generated from the future development within the study area. It should be noted that for the purposes of trip generation and assignment for future horizons, the existing sconadale access was referred to as “Sconadale North” and a potential access to the south was referred to as “Sconadale South”.

Table 5.2: Trips Generated within the Study Area

Development	Peak	In	Out	Distribution to Access		In	Out
				In	Out		
Salisbury – Phase 2 – Residential	AM	83	287	5%	5%	4	14
	PM	280	177	5%	5%	14	9
Salisbury – Phase 2 – Commercial	AM	56	35	5%	5%	3	2
	PM	169	183	5%	5%	8	9
Salisbury – Phase 3 – Residential	AM	8	33	10%	10%	1	3
	PM	31	19	10%	10%	3	2
Salisbury – Phase 3 – Business	AM	218	53	33%	33%	72	17
	PM	70	180	33%	33%	23	59
Salisbury – Total	AM	365	407	0%	0%	80	37
	PM	549	559	0%	0%	49	79
Hillshire	AM	Provided from Hillshire TIA				70	228
	PM	Provided from Hillshire TIA				227	126
Meadow Hawk	AM	8	23	100%	100%	8	23
	PM	25	15	100%	100%	25	15
Sconadale North	AM	7	22	100%	100%	7	22
	PM	25	14	100%	100%	25	14
Sconadale South	AM	9	28	100%	100%	9	28
	PM	32	19	100%	100%	32	19
Carriage Lane	AM	5	15	100%	100%	5	15
	PM	17	10	100%	100%	17	10
Winfield Heights	AM	4	13	100%	100%	4	13
	PM	14	9	100%	100%	14	9

The future development traffic was assigned to the study corridors using the northbound and southbound distribution percentages at existing accesses along the corridors. Table 5.3 summarizes the distribution percentages for each of the developments.

Table 5.3: Distribution Percentages for Each Development

Development	Peak	In	Out	Distribution		In North	In South	Out North	Out South
				To North	To South				
Salisbury – Phase 2 – Residential	AM	4	14	0%	100%	0	4	0	14
	PM	14	9	0%	100%	0	14	0	9
Salisbury – Phase 2 – Commercial	AM	3	2	0%	100%	0	3	0	2
	PM	8	9	0%	100%	0	8	0	9
Salisbury – Phase 3 – Residential	AM	1	3	60%	40%	0	0	2	1
	PM	3	2	60%	40%	2	1	1	1
Salisbury – Phase 3 – Business	AM	72	17	60%	40%	43	29	10	7
	PM	23	59	60%	40%	14	9	36	24
Salisbury – Total	AM	80	37	0%	0%	44	36	12	24
	PM	49	79	0%	0%	16	33	37	43
Hillshire	AM	70	228	0%	100%	12	58	43	185
	PM	227	126	0%	100%	57	170	46	80
Meadow Hawk	AM	8	23	50%	50%	4	4	11	11
	PM	25	15	50%	50%	13	13	7	7
Sconadale North	AM	7	22	67%	33%	5	2	15	7
	PM	25	14	67%	33%	16	8	10	5
Sconadale South	AM	9	28	50%	50%	5	5	14	14
	PM	32	19	50%	50%	16	16	9	9
Carriage Lane	AM	5	15	67%	33%	3	2	10	5
	PM	17	10	80%	20%	14	3	8	2
Winfield Heights	AM	4	13	67%	33%	3	1	9	4
	PM	14	9	80%	20%	12	3	7	2

### 5.1.3 Background Traffic Growth

External trips (trips without an origin or destination within the study area) on Range Roads 231 and 232 were increased for both future horizons. The external trips for each of the corridors can be seen in Tables 5.4 and 5.5 below.

Table 5.4: 2038 External Trips

2038	AM Northbound	AM Southbound	PM Northbound	PM Southbound
Range Road 231	192	328	538	224
Range Road 232	266	283	363	257

Table 5.5: 2048 External Trips

2048	AM Northbound	AM Southbound	PM Northbound	PM Southbound
Range Road 231	217	371	660	253
Range Road 232	316	336	431	304

The background traffic was grown based on Alberta Traffic counts at the intersection of Range Road 231 and Highway 628 and the Range Road 232 and Highway 628. The background growth rates applied were 1.82% and 3.07% on Range Road 231 and Range Road 232, respectively.

#### 5.1.4 Project Volumes

The future development traffic and the background traffic growth were added to the existing counts to develop traffic volumes for the future horizons. Refer to Exhibits 5.1 to 5.8 for the 2038 and 2048 peak hour volumes.

## 5.2 Traffic Analysis

The traffic volumes developed were tested with the existing intersection configurations at the 2038 and 2048 horizons to determine which intersections required improvements. The following sub-sections share the future operations with the existing geometry and the operations of the recommended options along both corridors.

### 5.2.1 Range Road 231

The operations for future traffic horizons with the existing intersection geometry are summarized below:

- Elk Island School Board: reaching Level-of-Service (LOS) F in the PM in 2038
- Strathcona Christian Academy: reaching LOS F in the PM in 2038
- Future Hillshire / Executive Estates North: reaching LOS F in the PM in 2038
- Meadow Hawk / Executive Estates South: reaching LOS D in the PM in 2048
- Windsor Estates North: at LOS of C in 2048, no operational issues
- Windsor Estates South / Sconadale North: reaching LOS D in the PM in 2038
- Deer Mountain Trail / Sconadale South: reaching LOS D in the PM in 2048

As described in Section 4.2, to address the operations of the intersections with failing movements, a variety of options were considered. The results are discussed below:

#### Widening to 4 lanes

- Did not resolve the operational issues on the minor approaches
- Is a very costly option
- This option was removed from further consideration at all intersections, except for the section of Range Road 231 from the Strathcona Christian Academy to the connection to Wye Road

#### Adding left and right turn bays along the corridors

- Did not resolve the operational issues on the minor approaches

This option was removed from further consideration

#### All-way stop control

- This option significantly worsened the delay for the through traffic along Range Road 231
- The option was removed from further consideration





### Signalization

- Helped address operational issues at failing approaches

### Roundabouts

- Helped address operational issues at failing approaches

**Conclusion:** Installing signals or roundabouts were the only acceptable and effective options to address failing traffic movements. The traffic analysis and discussion of options is further described within the intersection options memorandum, in Appendix B. Detailed results from the analysis of each of the options are shared in intersection performance tables within Appendix C.

Through discussions with the Project Team, it was determined that the most suitable traffic control at each of the failing intersections was installing roundabouts.

### Intersection Control Recommendations

Roundabouts are recommended at each of these intersections:

- **Future Hillshire / Executive Estates North** – The movements which had previously operated at LOS F operate at LOS B with the roundabout.
- **Meadow Hawk / Executive Estates South** – The movements which had previously operated at LOS F operate at LOS B with a roundabout.
- **Windsor Estates South / Sconadale North** – The movements which had previously operated at LOS D operate at LOS B with a roundabout.
- **Deer Mountain Trail / Sconadale South** – The movements which had previously operated at a LOS D operate at LOS B with a roundabout.

### Elk Island School Board

Although this intersection was failing in 2038, a traffic control was not recommended for this location due to the proximity to the Wye Road intersection. However, this section of the corridor included 2 northbound through lanes and 3 southbound through lanes, which helped improve the operations.

The intersection will operate at LOS D in 2038 and 2048, however this is deemed to be an acceptable level of service with the constraint of proximity to Wye Road.

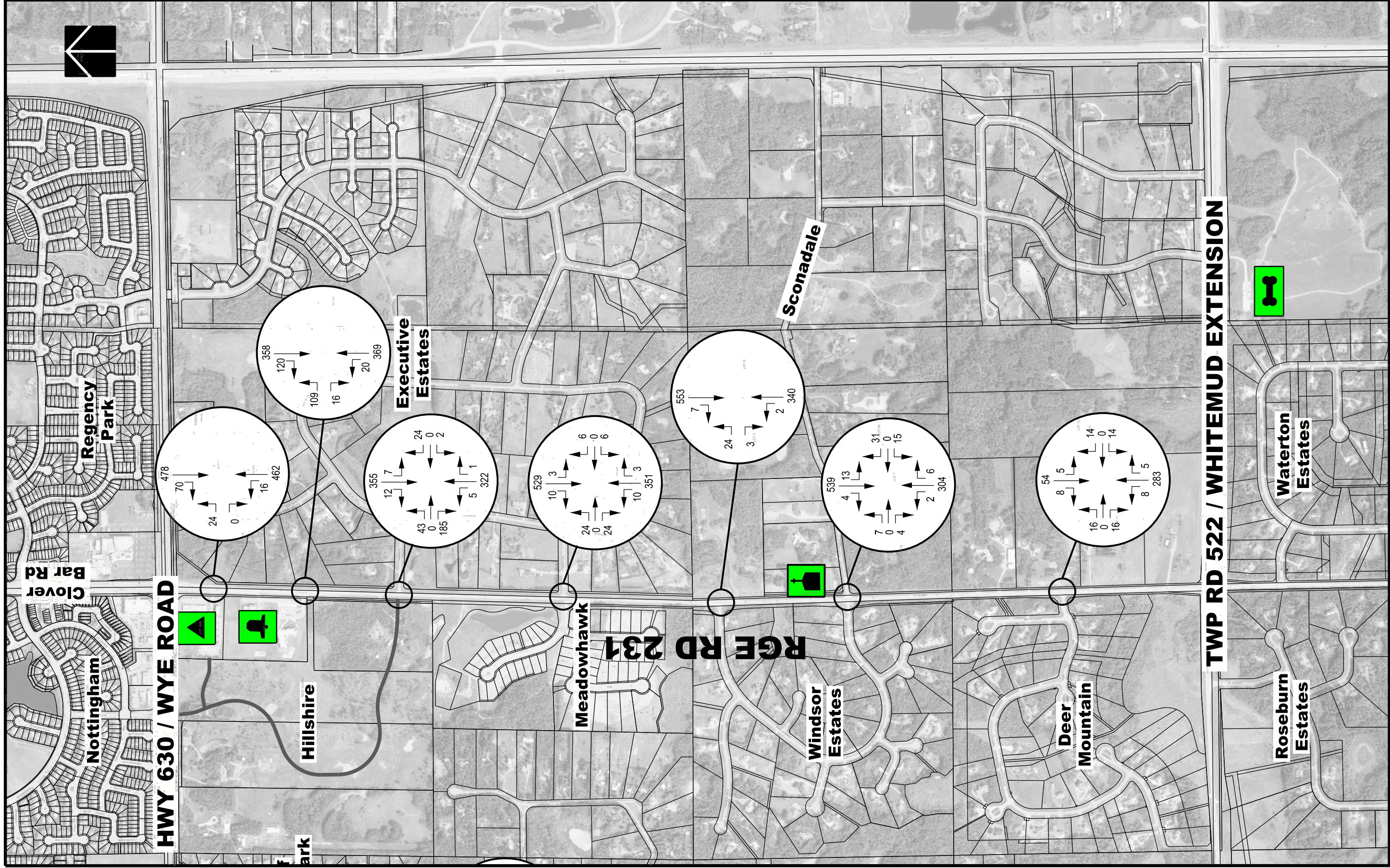
### Strathcona Christian Academy Elementary

A roundabout was not recommended for this location as well, as a result of the proximity to the Future Hillshire / Executive Estates roundabout and steep grades to the east. However, improvements included providing a median on the receiving lanes of the left-turn movements exiting the site. This median protects the left-turning vehicles from the northbound through traffic and improves the operations. The intersection will operate at LOS B in 2038 and 2048.

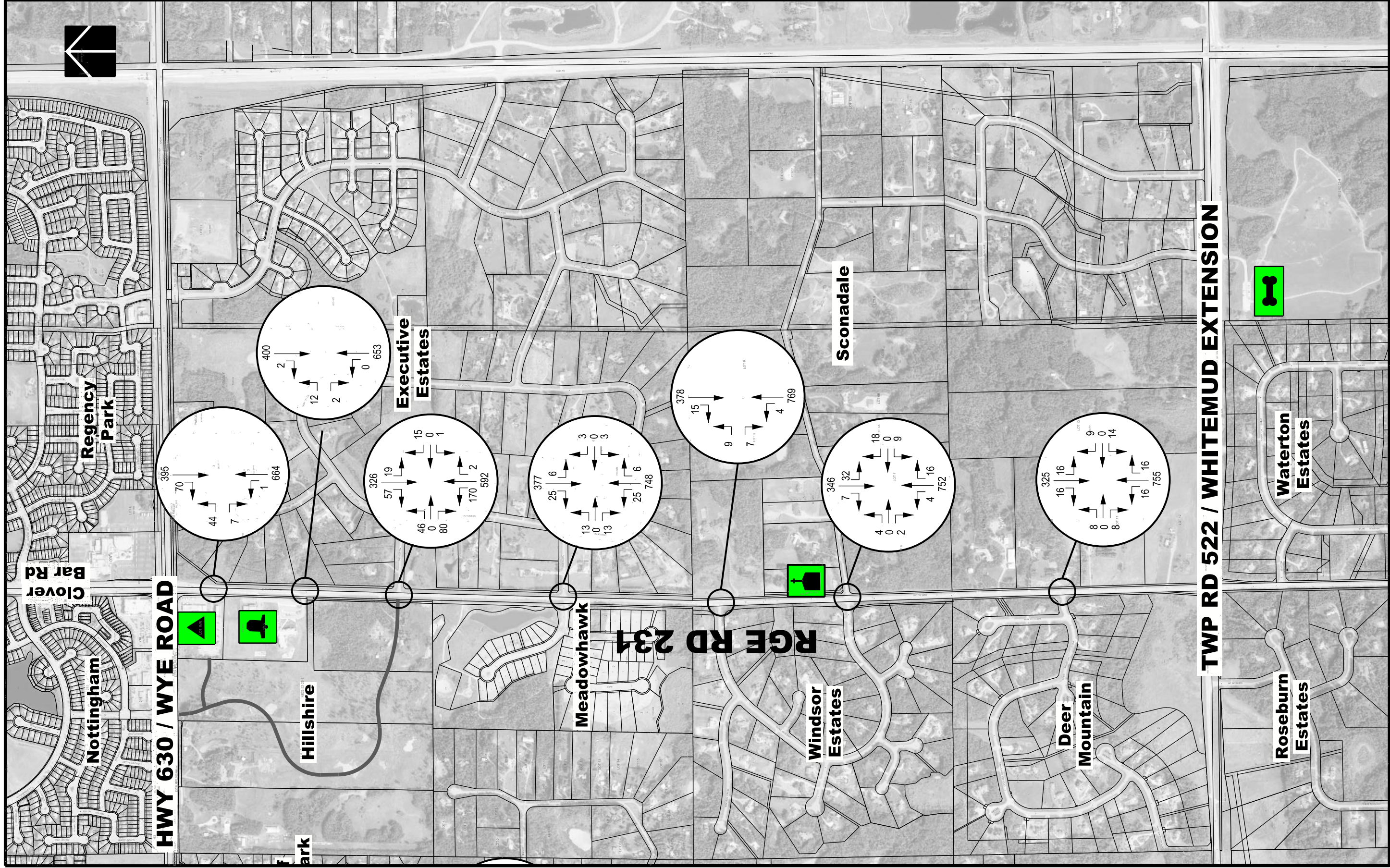
### Windsor Estates North

No improvements are recommended at Windsor Estates North. The minor approaches operate acceptably at a LOS of C in 2048 at this intersection.











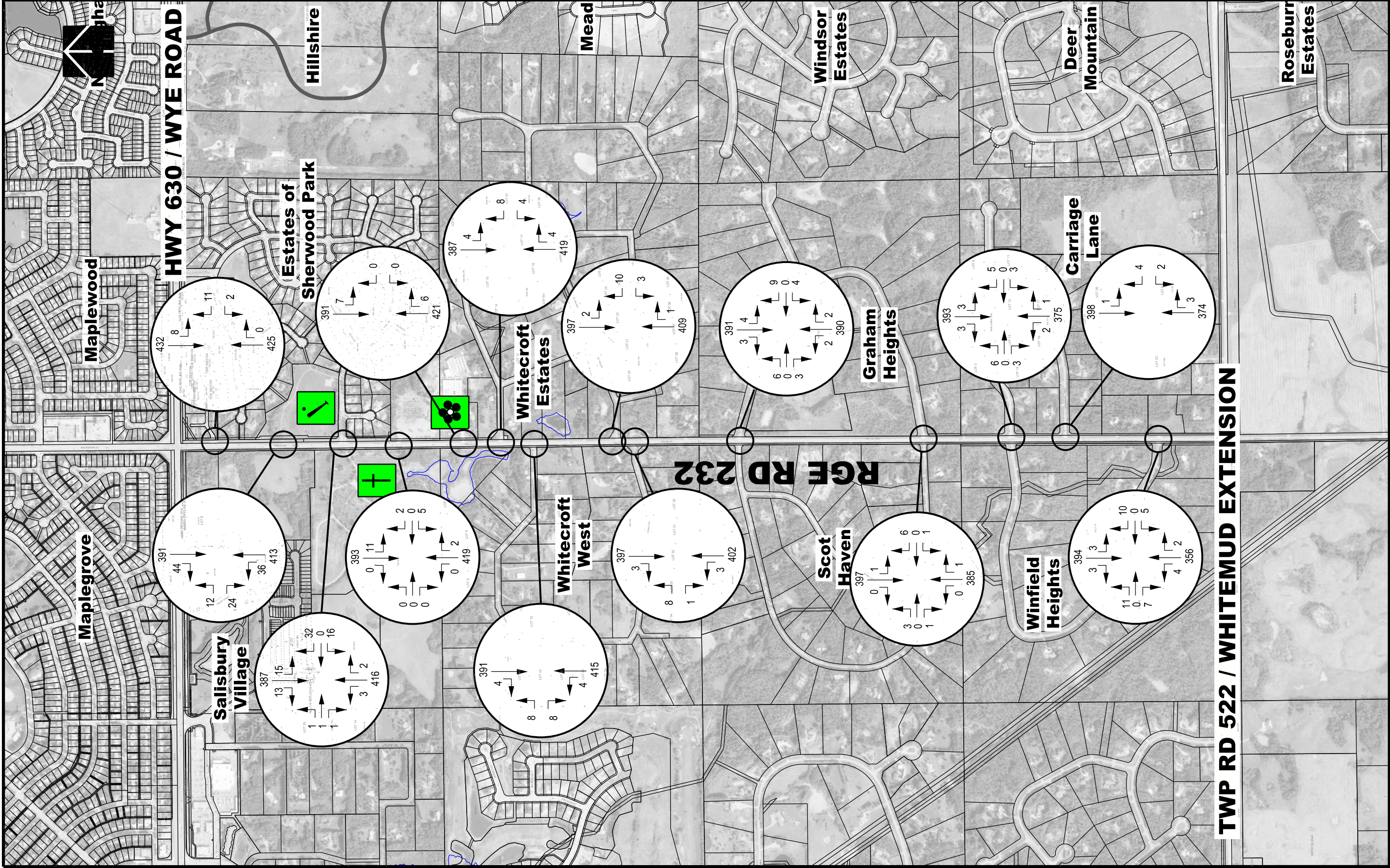
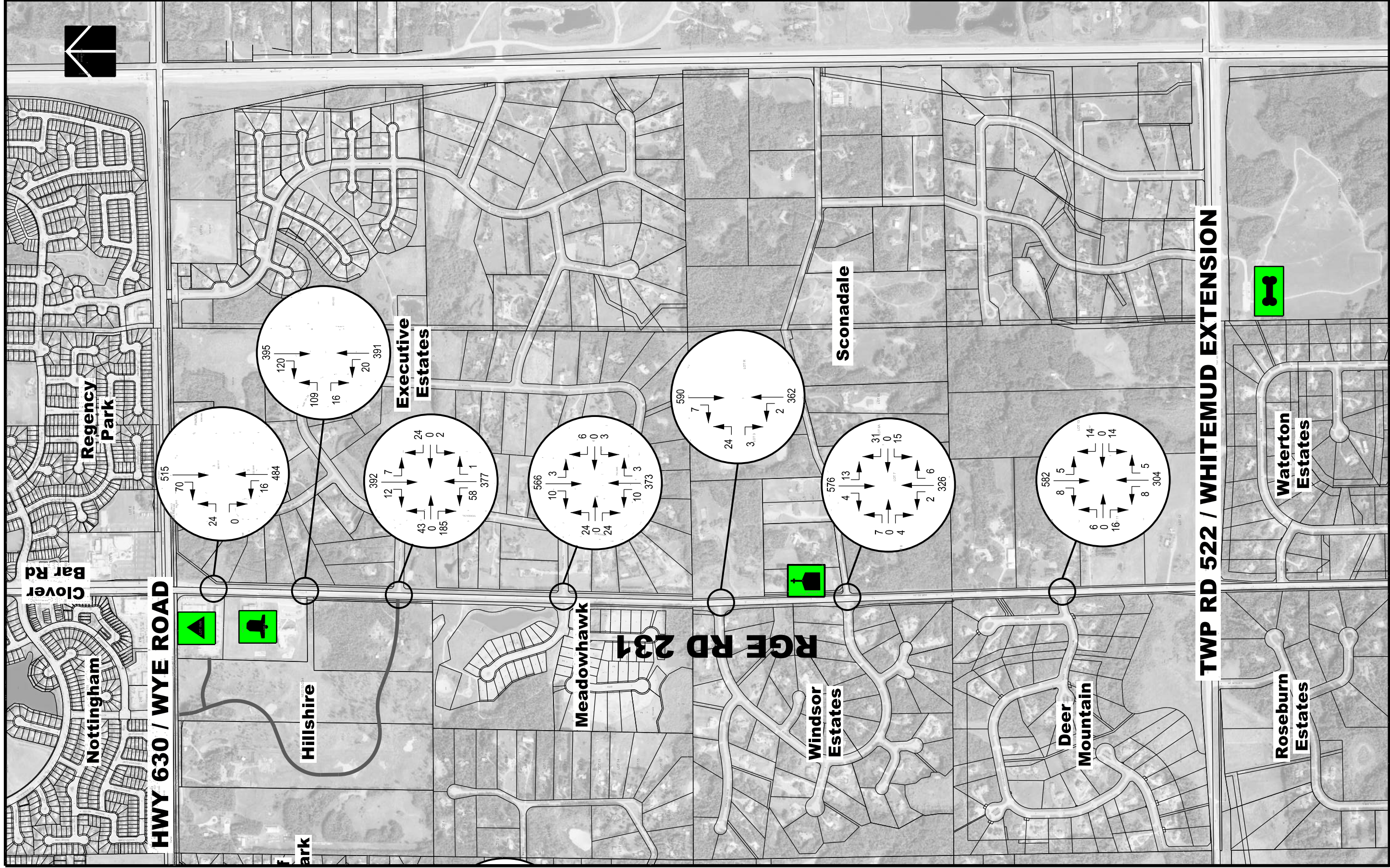


EXHIBIT 5.3: TRAFFIC VOLUMES  
RANGE ROAD 232 2038 AM

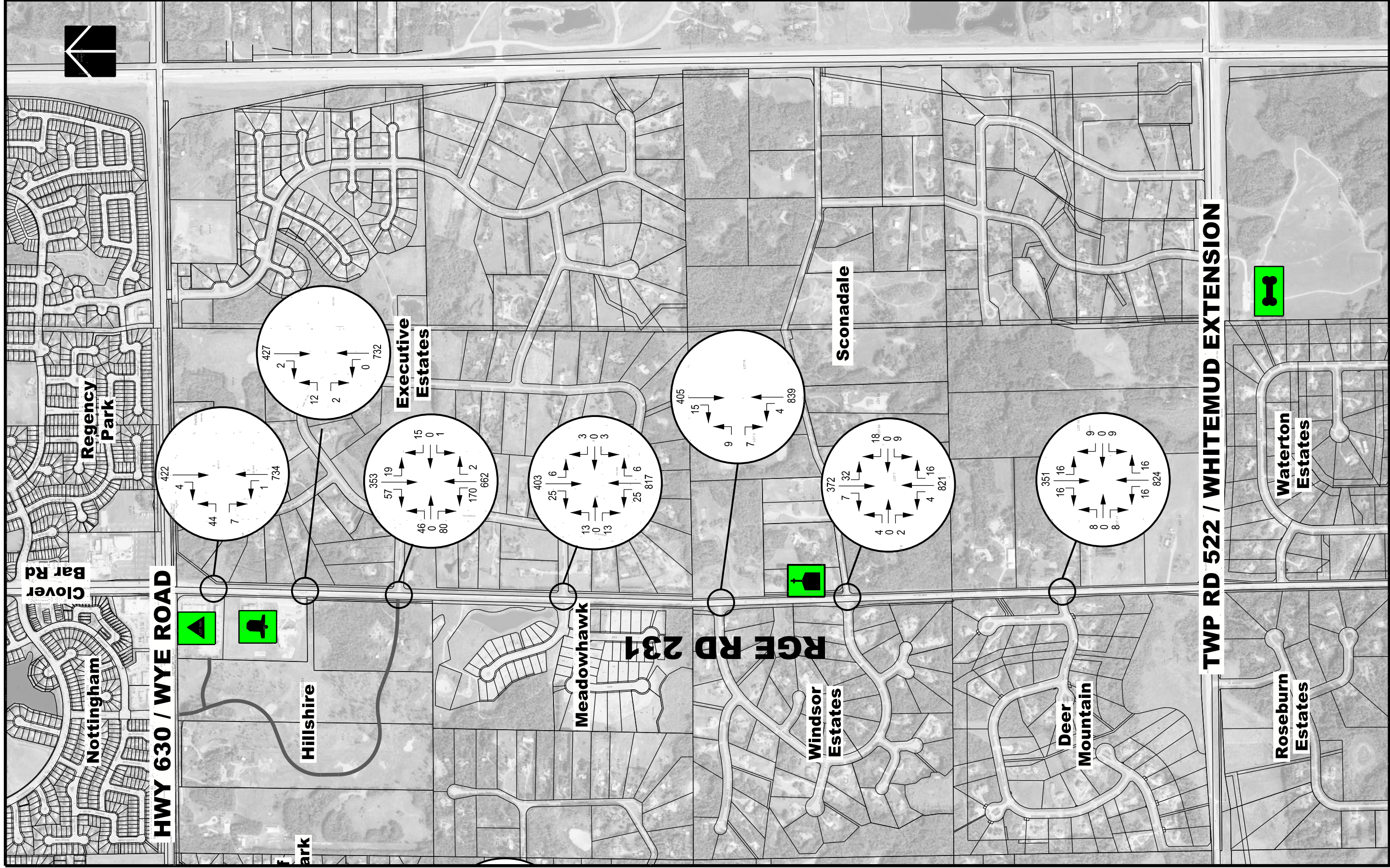




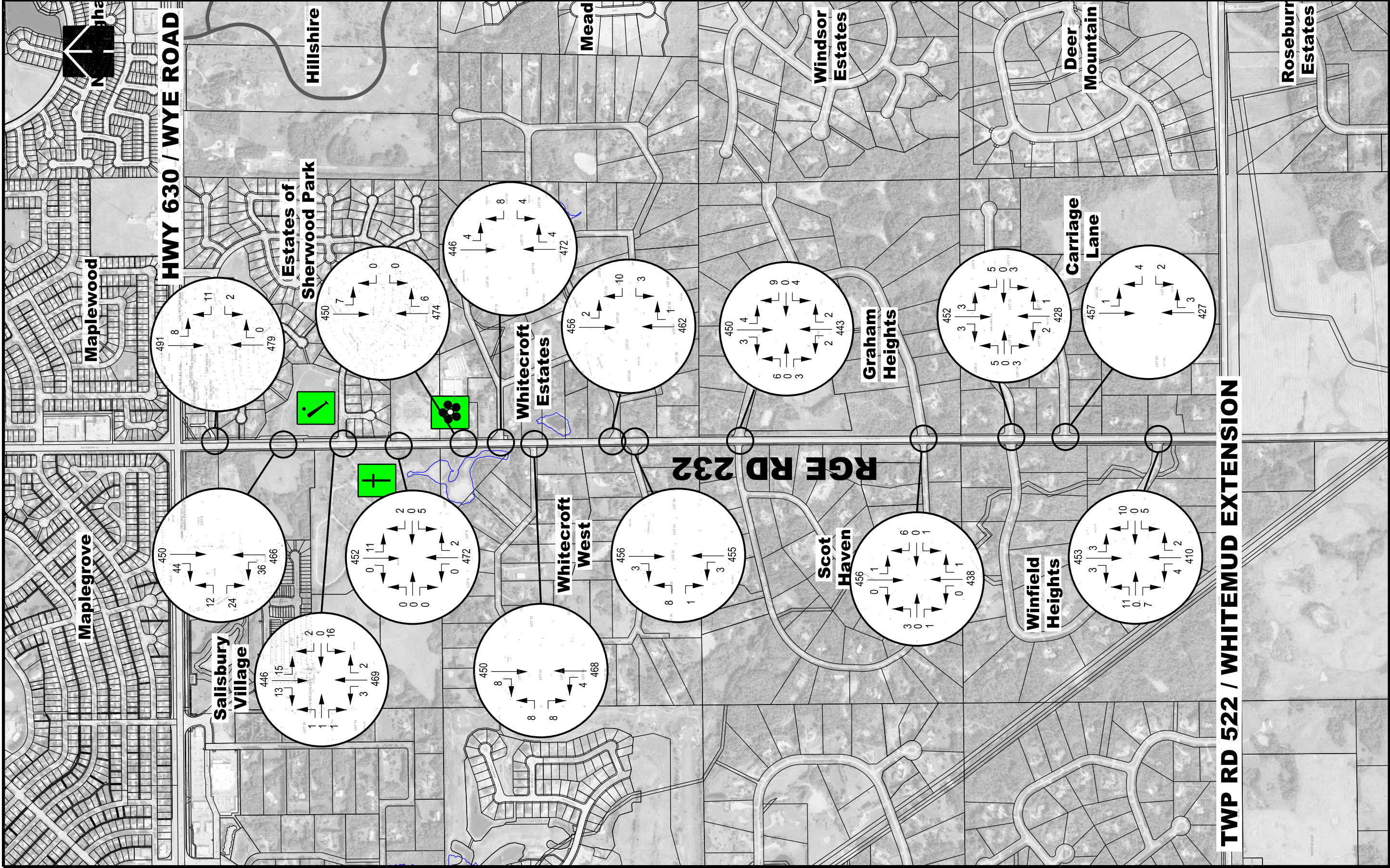




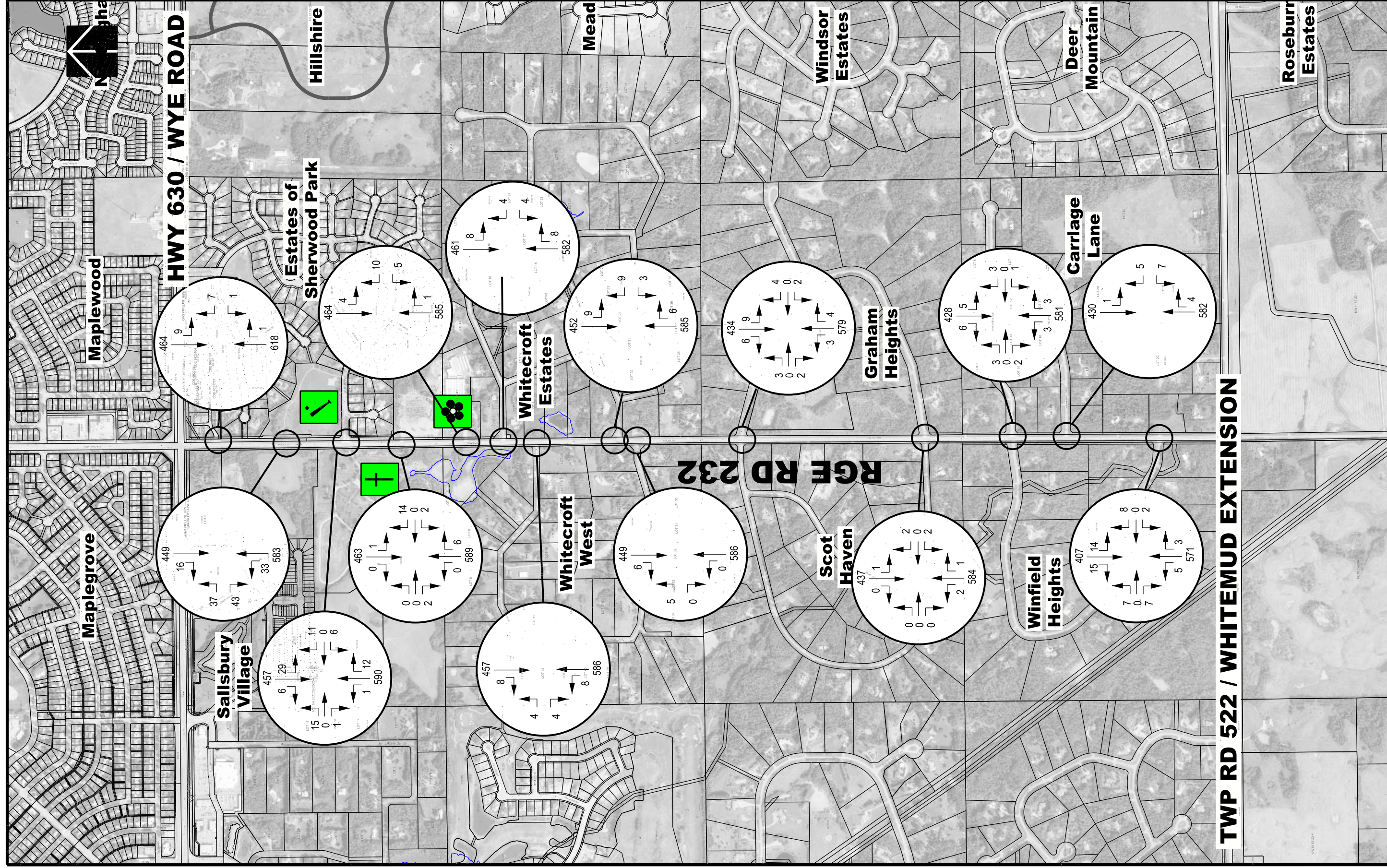














### 5.2.2 Range Road 232

The operations for future traffic horizons with the existing intersection geometry are summarized below:

- Estates Court: at LOS B in 2048, no operational issues
- Salisbury East Parkway: at LOS C in 2048, no traffic operational issues
- Estate Drive: reaching LOS D in the PM in 2038
- Salisbury Greenhouse North: at LOS C in 2048, no traffic operational issues
- Salisbury Greenhouse South: at LOS C in 2048, no traffic operational issues
- East Whitecroft North: at LOS C in 2048, no traffic operational issues
- West Whitecroft North: at LOS C in 2048, no traffic operational issues
- East Whitecroft South: at LOS C in 2048, no traffic operational issues
- West Whitecroft South: at LOS C in 2048, no traffic operational issues
- Scot Haven / Graham Heights North: at LOS C in 2048, no traffic operational issues
- Scot Haven / Graham Heights South: at LOS C in 2048, no traffic operational issues
- Winfield Heights / Edelweiss Avenue: at LOS C in 2048, no traffic operational issues
- Carriage Lane South: at LOS C in 2048, no traffic operational issues
- Winfield Heights / Carriage Lane New: at LOS C in 2048, no traffic operational issues

As described in Section 4.2, to address the operations of the intersections with failing movements, a variety of options were considered. These options were also considered to take into account comments received from the public at the two public engagement events. The options considered are described below.

#### **Widening to 4 lanes**

- Did not resolve the operational issues on the minor approaches
- It is a very costly option
- This option was removed from further consideration, except for the section of Range Road 232 north of Salisbury Village to the connection at Wye Road

#### **Adding left and right turn bays along the corridors**

- Did not resolve the operational issues for the minor approaches
- This option was considered for many intersections where public indicated a need for turning lanes on Range Road 232

#### **All-way stop control**

- This option significantly worsened the delay for the through traffic along Range Road 232

The option was removed from further consideration

#### **Signalization**

- Helped address operational issues at failing approaches

#### **Roundabouts**

- Helped address operational issues at failing approaches

**Conclusion:** Installing signals or roundabouts were the only acceptable and effective options to address failing traffic movements. The traffic analysis and discussion of options is further described within the intersection options memorandum, in Appendix B. Detailed results from the analysis of each of the options are shared in intersection performance tables within Appendix C.





Based on public engagement considerations and through discussions with the project team, it was determined that the most suitable traffic control at each of the failing intersections was installing roundabouts.

### Intersection Control Recommendations

The following intersection required improvements in traffic control as result of intersection operations. A roundabout was the recommended option. The LOS results with a roundabout are as follows:

- Estate Drive – The minor approaches operate at LOS of B in 2048

Roundabouts are also recommended at the intersections listed below for safety. Left and right turn lanes off of Range Road 232 were desired for these intersections. However, the spacing between the intersections did not allow adequate acceleration and deceleration lanes for the sections in between the intersections resulting in a lengthy 5-lane cross-section. With safety improvements still required at each of the intersections to ensure vehicles turning off of Range Road 232 could do so safely, it was decided that roundabouts would be an acceptable intersection control. The operational level-of-service of the intersections with a roundabout are as follows:

- South Haven / Graham Heights North – The minor approaches operate at LOS of B in 2048
- South Haven / Graham Heights South – The minor approaches operate at LOS of B in 2048
- Winfield Heights North / Edelweiss Avenue – The minor approaches operate at LOS of B in 2048
- Winfield Heights South / Carriage Lane New – The minor approaches operate at LOS of B in 2048

The following intersections did not require traffic control improvements and all have minor approaches operating acceptably at LOS C in 2048:

- East Whitecroft North
- West Whitecroft North
- East Whitecroft South
- West Whitecroft South
- Carriage Lane South

### Intersection Design Improvements

#### Estates Court

Estates Court was not expected to see operational issues for future traffic horizons. However, tying into the Wye Road intersection required 2 northbound and 2 southbound lanes. Both the northbound right turn lane and the southbound left turn lane at the Estates Court intersection have been maintained in the recommended plan.

#### Salisbury East Parkway

This is a future intersection location. A southbound right-turn lane and a northbound left-turn lane has been recommended for this intersection.

A crosswalk is also recommended across Range Road 232 at the Salisbury Village access as this intersection was thought to have increased pedestrian activity in the future as a result of commercial developments proposed within the subdivision. The crossing was assessed using Transportation Association of Canada's Pedestrian Crossing Control Guide to determine crossing signs are sufficient at this location. Flashing lights would only be required if the threshold of 15 pedestrians per hour (or 100 pedestrians over a 7-hour period) are met. Full analysis for this crossing is provided in Appendix C.



### **Salisbury Greenhouse North**

The recommended design for this intersection includes northbound right-turn lane and a southbound left-turn lane for access to Salisbury Greenhouse to provide storage for drivers waiting to enter the site. Comments received from the stakeholder and public engagement identified that drivers were worried about being rear-ended at this location. The recommended plan includes a realigned access into the Greenhouse to line up across from the Glenwood Funeral Home and Cemetery access.

### **Salisbury Greenhouse South**

The recommended design for this intersection includes a northbound right-turn lane and a southbound left-turn lane for access to Salisbury Greenhouse. Comments received from the stakeholder and public engagement identified that drivers were worried about being rear-ended at this location.

## **5.3 Speed Limit Analysis**

Each of the sections in between traffic controls were tested for acceleration, constant speed, and deceleration at 60 km/h, 70 km/h, and 80 km/h. The details results are included within a table within Appendix C.

### **Range Road 231**

The following sections in between traffic controls in both northbound and southbound directions were analysed:

- Between the Hillshire Roundabout and Meadowhawk Roundabout
- Between the Meadowhawk Roundabout and Sconadale Roundabout
- Between the Sconadale Roundabout and Deer Mountain Roundabout
- Between the Deer Mountain Roundabout and Highway 628 Traffic Signal

The following conclusions were made:

- A vehicle speed of 60 km/h, 70 km/h, and 80 km/h can be reached between each of the sections listed above
- Upon accelerating to a speed of 70 km/hr between Deer Mountain and Highway 628, vehicles would need to start decelerating after a short distance:
  - Within 110m in the northbound direction
  - Within 119m in the southbound direction
- Upon accelerating to a speed of 80 km/h between Deer Mountain and Highway 628, vehicles would need to start decelerating after a short distance:
  - Within 14m in the northbound direction
  - Within 23m in the southbound direction

Based on the above analysis, it is recommended that in the long term Range Road 231 be posted at 60 km/h.

Within the short-term, it is expected that the first stage of construction for the corridor will be from Wye Road to the Hillshire Roundabout. The following speed limits should be used:

- 60 km/h can be retained from Wye Road to south of the Hillshire Roundabout.
- 60 km/h can be used south of Deer Mountain Trail
- 80 km/h can be used for the sections in between





### Range Road 232

The following sections in between traffic controls in both northbound and southbound directions were analysed:

- Between the Estate Drive Roundabout and Scot Haven North Roundabout
- Between the Scot Haven North Roundabout and the Scot Haven South Roundabout
- Between the Scot Haven South Roundabout and Winfield Heights North Roundabout
- Between the Winfield Heights North Roundabout and the Winfield Heights South Roundabout
- Between the Winfield Heights South Roundabout and the Highway 628 Traffic Signal

The following conclusions were made:

- Vehicles can reach a speed of 60 km/h between each of the sections above except for the short section between Highway 628 and Winfield Heights South which is only 187 m
- Vehicles cannot reach a speed of 70 km/h between multiple sections along the corridor
- Vehicles cannot reach a speed of 80 km/h between multiple sections along the corridor

Based on the above analysis, it is recommended that in the long term Range Road 231 be posted at 60 km/h.

Within the short-term, it is expected that the first stage of construction for the corridor will be from Wye Road to the Estate Drive Roundabout. A speed limit of 60 km/h can be retained from Wye Road to the Estate Drive Roundabout. Currently the speed limit changes just north of the north Salisbury Greenhouse Access. As the speed limit change in close proximity to an access for a major destination was a concern heard during public engagement, it is recommended that a speed limit change 80 km/h be made south of the Salisbury Greenhouse. A recommended location for the speed limit change would be north of East Whitecroft.



## 6.0 Collaborative Engagement

### 6.1 Open House #2 and On-line Survey

On Wednesday, October 17, 2018, from 5 p. m. – 8 p. m. ISL and Strathcona County hosted an open house to solicit feedback from the community on development plans for Range Roads 231 and 232. The open house was part of the consultation phase to obtain public opinion on proposed options. Approximately 160 participants attended the open house and provided feedback via location-specific sticky notes on aerial maps, sticky notes on boards, general comments collected on a sticky wall, and by speaking directly to those involved in the project. Residents also had the opportunity to email feedback to the project team, based on the open house display board content that was made available online. Additionally, an event evaluation form was made available and collected throughout the evening.

### 6.2 What We Heard

#### Aerial Map Summary

The aerial maps were large printed maps where participants could write directly on the map or place a sticky note with their comment in a location-specific area on the map. The main areas of comment were:

- Bike paths/ multi-use trails
- Traffic lanes/ controlled intersections
- Speed
- General safety



Range Road 231

Range Road 232

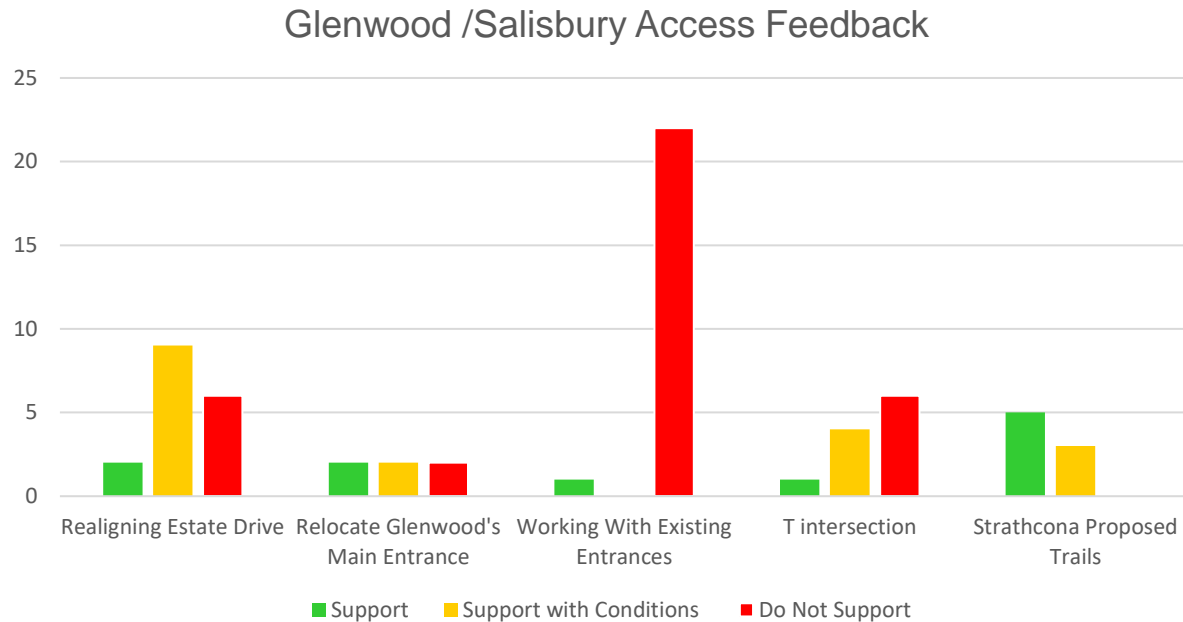






### Glenwood / Salisbury Access Option Summary

The issues maps were sections of boards at the end where attendees were encouraged to place a sticky note denoting if they Supported, Supported with Conditions, or Did Not Support the proposed idea. There was some contention in this area, and most feedback was cautious about the presented issues.



**Work with existing entrance:** Open house attendees were very against working with the existing entrances. This was likely due to a signal being proposed at the location. Several comments opposed traffic lights in favor of roundabouts. At the time of the open house it was thought that a roundabout would not fit into the intersection without impacting existing grave sites. However, later discussions with Glenwood staff confirmed that a roundabout will fit into this location without impacting existing grave sites.

**Relocate Glenwood's main entrance:** Attendees preferred roundabouts to signals for this option, however there were questions on how a roundabout would affect Glenwood.

**T-intersections:** In general, there was opposition against T-intersections stating that there were too many on the corridor as it is.

**New combined access:** The majority of comments supported this option with conditions, many including realigning Estate Drive to the Salisbury Village access.

**Realigning Estate Drive:** The majority of comments supported this option with conditions. Some comments were concerned about the toboggan hill near the soccer pitch, while others requested a roundabout.



### 6.2.1 Sticky Wall Summary

The sticky wall was used as an additional venue for attendees to give comments on the project. The sticky wall is a plastic sheet coated in an adhesive spray so that attendees could place index cards with comments upon the sheet for all participants to view, thus further increasing sharing of individual perspectives. Comments ranged from on the project to about the event itself. Comment themes included:

- Roundabouts
- Water stations
- Traffic flow and speed
- Trail suggestions

### 6.2.2 Online Survey

In addition to the Open House event, stakeholders were encouraged to fill out an online survey, available through the County's survey website, Scoop and on the Gizmo survey tool. Thirty surveys were received from Scoop, and five surveys were received by Gizmo.

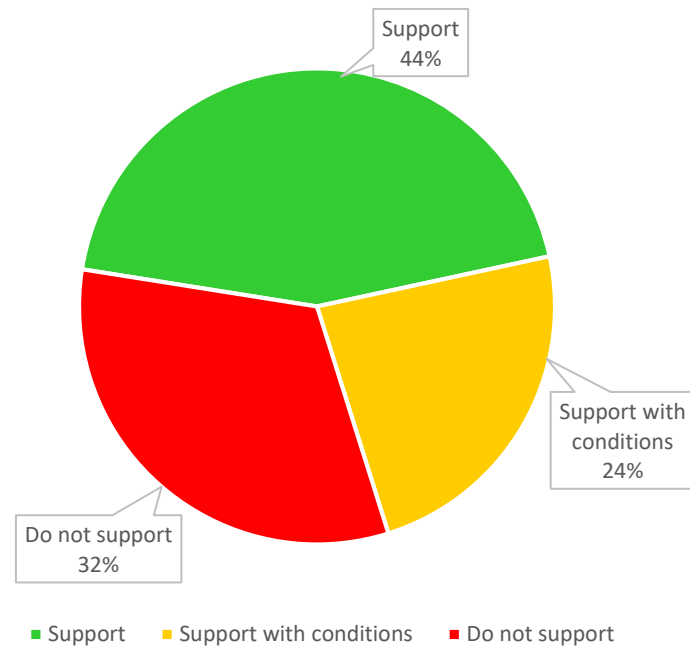
## ■ Q1: Do you have any feedback on these two alternatives

### PUBLIC COMMENTS

- If you use roundabouts, please don't plant vegetation in the middle as it reduces sight lines throughout the circle
- I feel roundabouts would keep traffic flowing better, but should only be added when the traffic volume gets high enough at each intersection
- I prefer the roundabouts if they are large enough to accommodate large trailers and rv's.
- It makes more sense to me to install lights at both of these RR'd's at the 522 Twp roads, than any roundabouts
- Prefer roundabouts
- I guess I prefer roundabouts in areas where traffic is not heavy
- Prefer roundabout to traffic lights
- Roundabouts the preferred option
- Roundabouts all the way
- No to signals
- Roundabouts preferred for the roads in the study area
- I much prefer roundabouts because they maintain better flow of traffic and are better for the environment (less complete stops), but they still slow traffic down and allow for the safest points of entry from side streets.
- My preference is signals
- Prefer roundabouts
- The traffic circles are preferred over lights. The stop signs are working now though
- No one knows how to properly use the current roundabout we have in Sherwood Park. Adding more roundabouts would not be a positive change in my opinion
- You rearrange the main traffic circle (Sherwood Dr & Broadmoor) in Sherwood Park because no one apparently know how to use one, and then want to put more traffic circles in, seems very counter intuitive. Put lights in already
- Roundabout is preferred. The county is traffic signal "happy" and doesn't seem capable of creating signal timing that actually works



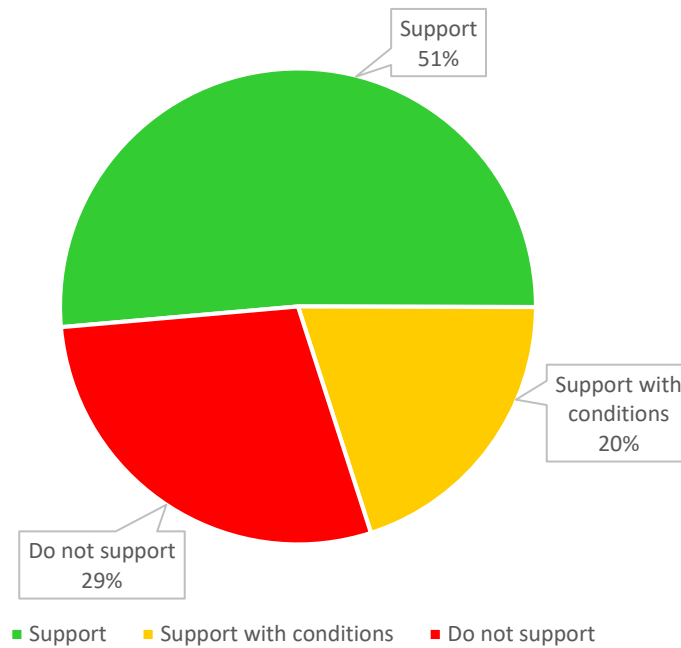
■ Q2: Your support for working with existing entrances?



- Installation of traffic circles or, if it is traffic lights, that they operate during peak hours only
- No traffic lights
- Roundabout instead of lights
- I don't like the signal option
- Too many intersections so close together
- Both lanes could, potentially, be blocked if someone was turning right and someone was turning left at the same time
- I do not see the need for a signal at this area
- No change is required
- Too many accesses. The numerous access points should be consolidated using service roads
- Too bad the roundabout will not work here...would have been ideal



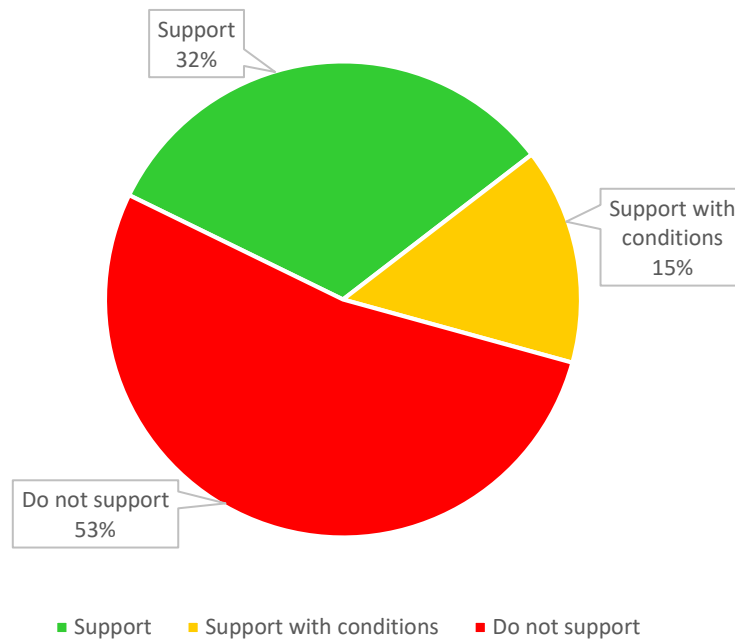
■ **Q3: Your support for relocating the entrance to Glenwood Funeral Home and Cemetery?**



- With a round about
- Roundabout would be preferred
- Roundabout preferred
- Signals. No roundabout
- Too many intersections/lights so close together
- Both lanes could, potentially, be blocked if someone was turning right and someone was turning left at the same time



#### ■ Q4: Your support for creating T- Intersections?



- All with lights I am assuming, information not provided so I have no idea
- Agree to closing accesses, but more consolidation could be achieved using service roads
- Roundabouts are safer and keep traffic flowing. Lights impede traffic flow and would be very disruptive given the number of intersections
- This better depending on the designs of the intersections and how well/safe they would handle traffic
- Do not prefer traffic lights at these new T intersections
- They are NOT made 3 way stops
- T's do not help those trying to get onto RR232
- Too many intersections!
- This seems dangerous
- No change is required



### 6.3 Input from Key Stakeholders

The project team consulted with Salisbury Greenhouse and Glenwood Funeral Home and Cemetery regarding the proposed access options. Based on their feedback, the following options were deemed unfeasible:

- **Relocate Glenwood's Memorial entrance:** The driveway in Glenwood is not wide enough to support this option without impacting existing graves.
- **T-intersections:** After consultation with Salisbury Greenhouse it was determined that Salisbury needs two accesses. Glenwood Cemetery also requires two accesses for vehicles leaving after a service. Often, one of the accesses gets blocked as funeral processions are on-going in the vicinity, and makes the use of the second access necessary.
- **New Access:** The potential alignment for the new access option passes through a memorial garden recently installed by Glenwood.

The two remaining options, work with existing entrance or realign Estate Drive were carried forward to be considered in more detail.



## 7.0 Stormwater Management Plan

### 7.1 Drainage System Assessment

#### 7.1.1 Computer Simulation Modelling

Computer simulation modelling in XP-SWMM was undertaken to assess roadway drainage systems and estimate flows at the 13 outlet locations under existing and post development conditions. A summary of the catchment area to each outlet location and their imperviousness before and after roadway upgrades are provided in Table 7.1.

Table 7.1: Catchment Imperviousness Before and After Roadway Upgrades

Outlet	Total Catchment (ha)	Catchment Impervious (%)	
		Existing	Future
1	23.3	8%	8%
2	57.5	7%	8%
3	201.1	6%	7%
4	1.6	26%	40%
5	1.4	7%	21%
6	0.7	46%	74%
7	8.1	15%	17%
8	28.3	5%	5%
9	4.2	24%	28%
10	2.4	7%	12%
11	18.8	18%	20%
12	2.8	46%	51%
13	1.2	27%	57%

Runoff was generally determined using the Horton infiltration method. However, there are some large country residential catchments adjacent to the roadways either contributing runoff to the roadway drainage system or have flows that cross the roadway (i. e. at Outlet 3). In this study, for country residential catchments greater than 10 ha, the Soil Conservation Service (SCS) Curve Number method was used to estimate runoff. The approach to determining the SCS parameters were similar to those used in the Salisbury Village Stormwater Assessment project completed by ISL in 2016. As part of the Salisbury Village project, ISL studied the runoff from rural catchments draining towards Salisbury Village stormwater management facilities through the 900mm culvert at Outlet 3. Since the catchments studied in the Salisbury project are similar to this project, it was determined that the parameters previously used would apply to this study as well.

A summary of the catchment data and hydrological model data are provided in Appendix G2.

#### 7.1.2 Comparison of Existing and Future Discharge Rates

Peak discharge rates under existing and post development conditions were estimated at the 13 outlet locations. These discharge rates were used to determine the effect of increased impervious area from the roadway upgrades on the downstream receiving systems. A comparison of the existing and post development flows is provided in Table 7.2. The increases in overall catchment imperviousness is minimal when there are large adjacent areas contributing runoff to the roadway drainage system. Consequently, the increase in discharge rates after roadway upgrades will generally be small, with some exceptions which will be discussed in this section. Table 7.2 provides a comparison of discharge rates at each outlet location before and after roadway upgrades.



Table 7.2: Estimated Discharge Rates Before and After Roadway Upgrades

Outlet	Total Catchment Area (ha)	Existing Discharge (m <sup>3</sup> /s)	Post Development Discharge (m <sup>3</sup> /s)
1	23.3	0.33	0.33
2	57.5	0.52	0.65
3	201.1	0.53	0.53
4	1.6	0.23	0.17
5	1.4	0.22	0.39
6	0.7	0.10	0.06
7	8.1	0.42	0.58
8	28.3	0.27	-
9	4.2	0.45	0.49
10	2.4	0.31	-
11	18.8	1.44	1.58
12	2.8	0.44	0.15
13	1.2	0.22	0.20

### Range Road 231

On Range Road 231 (Outlets 7-13), the increase in discharge rates at the outlets are generally small. Outlet 11 has a higher increase in discharge rates compared to the other outlets. This is because Outlet 10 currently discharges to a natural wetland west of Range Road 231, as shown on Exhibit 2.11 (in Section 2.7). However, according to the Hillshire ASP, this natural wetland will be destroyed and developed into single family residential properties in the future. As a result, flows currently discharging to this natural wetland must be directed elsewhere. Based on site topography, flows to the wetland can be directed across Range Road 231 to the wet pond downstream of Outlet 11. The impact of the additional flow to the wet pond is minimal, it was estimated that the pond level may increase by 0.03m under the 1:100-year storm. At Outlet 8, runoff in the east ditch currently accumulate in the sag just north of Highway 628. When water level rises to the top of the existing road surface, flows would cross the roadway to the west, following the drainage patterns downstream of Outlet 7. Under future conditions, flows to Outlet 8 will be diverted across Range Road 231 to the west through a culvert. As shown in Table 7.2, future discharge rate at Outlet 8 is removed. An increase in discharge will be observed at Outlet 7. At Outlet 12, the 2ha area adjacent to the roadway currently contributing flow to the roadway drainage system will be excluded from the system under post development conditions. Runoff from this catchment has been included as part of the controlled discharge from the Elk Island Public School Site as shown in the AI-Terra design drawing for the Wye Road Widening project (attached in Appendix G3).

### Range Road 232

Model simulation confirmed that the existing 600mm culvert in the east ditch on Range Road 232, at Highway 628, is under capacity to convey peak flows across the highway. Under existing conditions, the headwater depth (maximum depth above culvert invert elevation at the inlet) is estimated to be 2.4 m during the 1:100-year design storm. By increasing the culvert size to 800mm, the headwater depth can be reduced to 0.9 m. However, as shown in Table 7.2, increasing the culvert size would increase the peak discharge through the culvert from 0.5 m<sup>3</sup>/s to 0.7 m<sup>3</sup>/s. This may have a negative impact on the downstream system and may cause ponding south of Highway 628. Because the downstream capacity is unknown, it is recommended to only increase the culvert size to 700mm and widen the east ditch to provide storage for the surcharged flows. With a 700mm culvert, the peak discharge would be reduced by almost 0.1 m<sup>3</sup>/s, and the headwater depth under the 1:100-year event would be 1.4 m. The ditch will need to be designed with a depth greater than 1.4 m to prevent runoff from encroaching to the roadway or damaging the subgrade structure. On the west side, the headwater at the 600mm culvert is 0.85 m. This culvert appears to be adequately sized, however, if the culvert is blocked with debris then it is possible for water to backup, causing ponding in the upstream.





The existing invert elevations of the two culverts should be confirmed, as the elevations from the culvert data are more than 1m lower than the data shown in the LiDAR.

Under existing conditions, the centerline crossing culvert south of Outlet 5 (Culvert 51) conveys some flows in the west ditch on Range Road 232 across the road to Outlet 4. With the roadway upgrades, this section of Range Road 232 will be converted to urban roadway and the existing culvert will be removed. As a result, flows in the west ditch currently discharging through Outlet 4 will be directed to Outlet 5, increasing the peak flow to the natural wetland and decreasing the flow to the treed area on the east. Additionally, to minimize the minor flows discharging to the storm sewer system on Wye Road, the majority of the minor flows in the urban section on Range Road 232 will be discharged through Outlet 5, thus further increasing the peak flow to the wetland. The total peak discharge rate to the natural wetland west of Range Road 232 is expected to increase from 0.25 m<sup>3</sup>/s to 0.40 m<sup>3</sup>/s. The impact of the additional flows on the wetland is not as significant, as roadway runoff is a small percentage of the total catchment area contributing runoff to the wetland. It is estimated that the high-water level in the wetland will increase by 0.03 m.

Under post development conditions, the discharge rate at Outlet 6 would be less than that under existing conditions. This is because the minor flows in the urban section of Range Road 232 will either be discharged through Outlet 5 to the natural wetland or to the storm sewer system on Wye Road. The remaining major flows that will discharge to the Wye Road major drainage system will be less than the total flow currently discharging to the Wye Road ditches.

## 7.2 Proposed Stormwater Management Concepts

### 7.2.1 Rural Drainage Design

Rural roadway drainage will be provided through ditches and culverts, similar to existing conditions. The purpose of the ditches is not only to convey flow but when designed with stormwater BMPs, such as check dams and tall grasses, it can provide a level of water quality treatment and reduce peak flow rates. As the roadway upgrades will widen the sections of roadways that are to remain as rural sections, approach culverts would need to be relocated to the outer perimeters of the new roadway right-of-way and centerline crossing culverts would need to be extended beyond the new shoulder limits. Ditches and culverts are not sized as part of this assessment, with the exception of culverts at outlets and locations with existing drainage issues, in which case culvert sizes are recommended and will be discussed in this section.

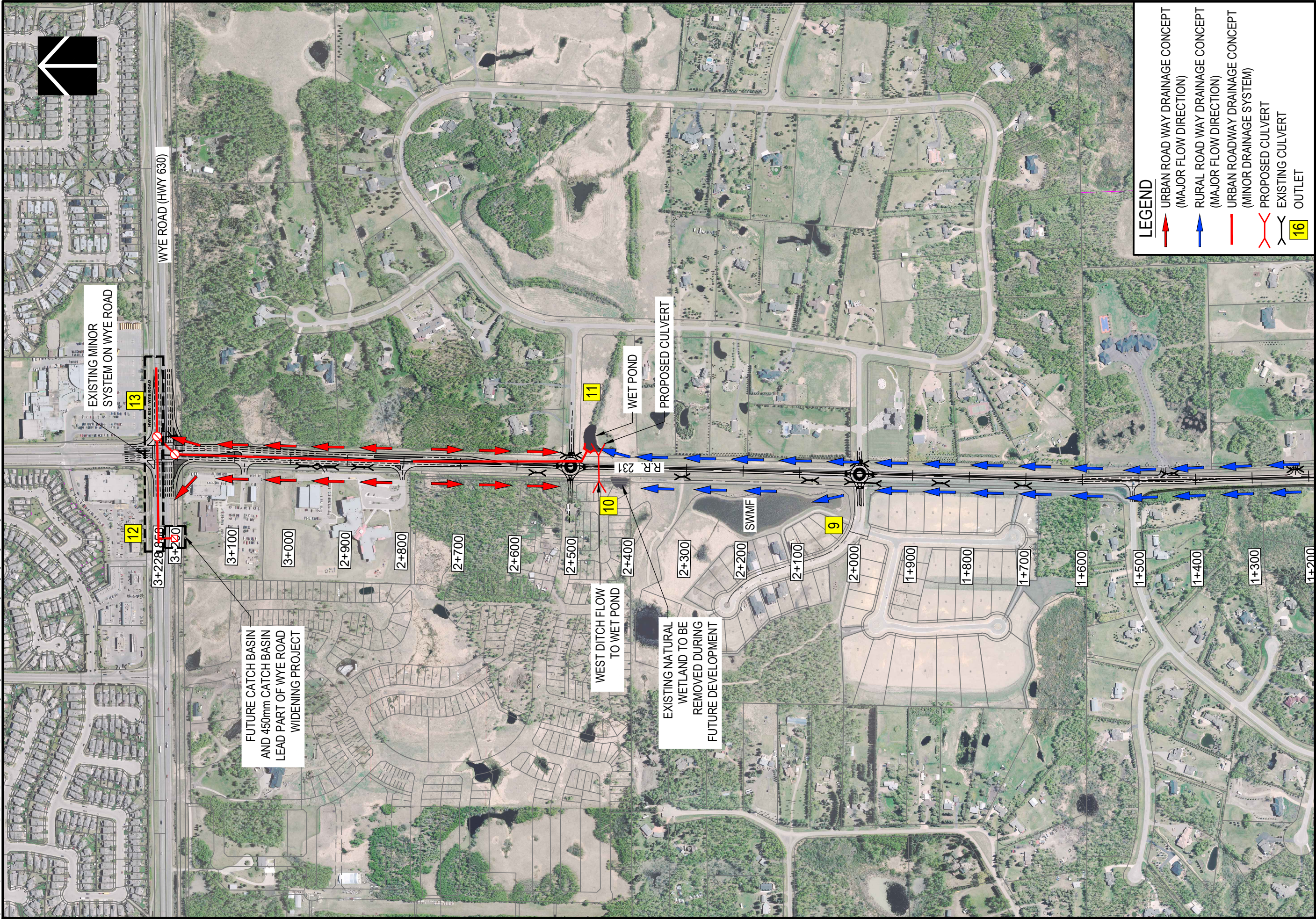
#### Range Road 231

On Range Road 231, just north of Highway 628, there were no culverts identified where runoff in the east ditch appear to cross Range Road 231 at the sag, discharging to the green field and eventually crossing Highway 628. To mitigate flooding risks and prevent water from encroaching onto the roadway, a small culvert is proposed to direct flows in the east ditch across Range Road 231. To reduce the increase in peak flow discharging to the green field, a smaller 500mm culvert is recommended to restrict flows crossing the roadway while keeping the peak water level in the east ditch below road subgrade. The estimated headwater depth at the 500mm culvert, under future conditions, is just below 1m during the 1:100-year storm.

Rural roadway runoff between the south high point and the north sag, in the west ditch, will continue to be discharged (at Outlet 9) to the stormwater management facility north of the Meadow Hawk access. The increase in peak flow is small and will not have an impact on the water levels in the facility as the roadway catchment is a small percentage of the total catchment to the facility. In the east ditch, rural roadway runoff between the south high point and the north sag will be discharged to the wet pond near the north entrance to Executive Estates following existing drainage patterns. In addition to the rural runoff, runoff from a section of the future urban roadway will also be discharged to this wet pond. This will be discussed in the next section.

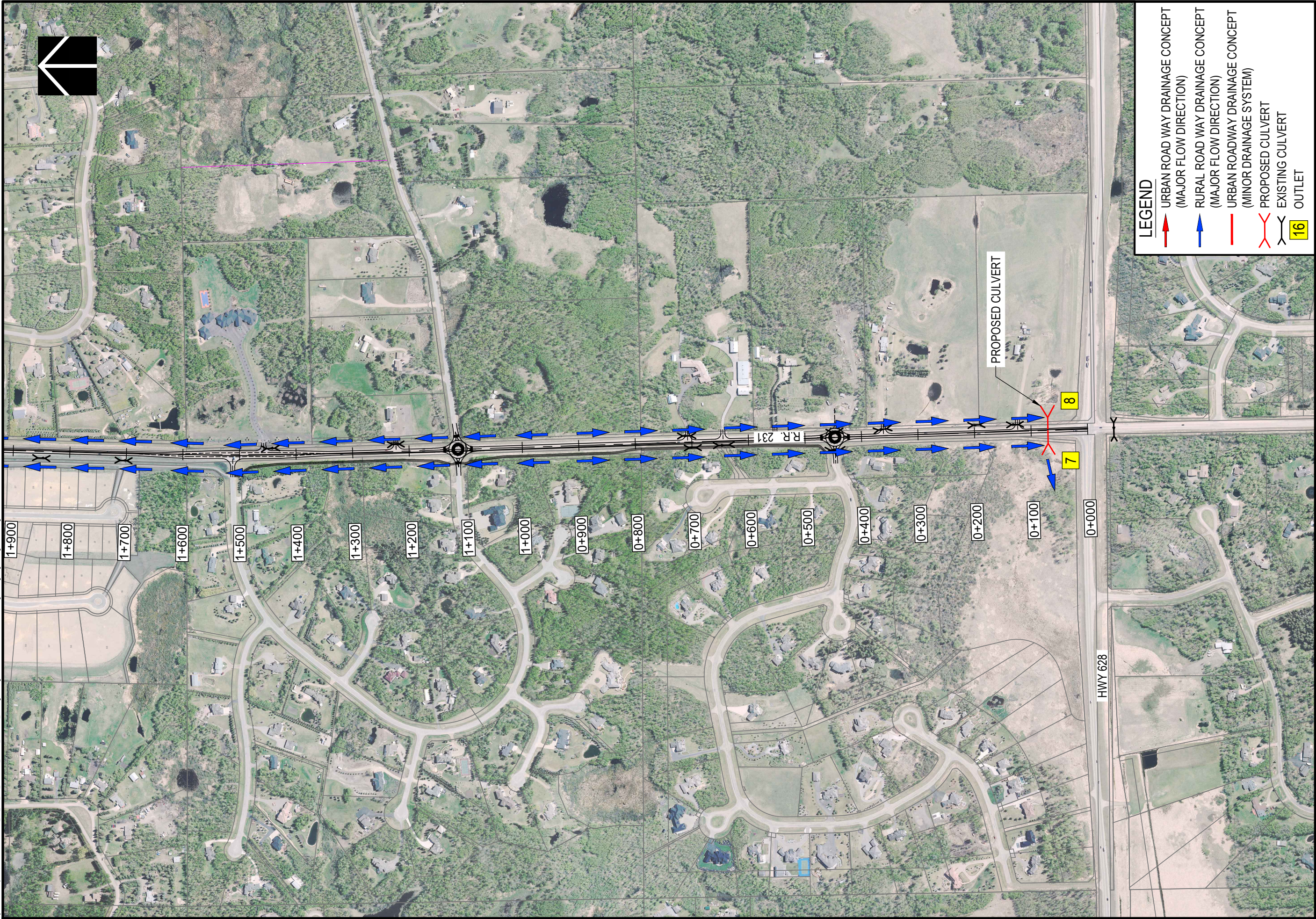
Stormwater management concepts for the rural section of Range Road 231 are shown on Exhibit 7.1 and 7.2.







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## Range Road 232

From the south high point on Range Road 232 to Highway 628, flows in the ditches currently discharge through two culverts across Highway 628. As discussed in Section 7.1.2, the culvert in the east ditch appears to be undersized. Increasing the culvert size from 600mm to 800mm would improve drainage and address the ponding issue at the intersection. However, as discussed, increasing the culvert capacity would allow additional flows to pass through and discharge to the downstream systems. Since the capacity in the downstream system is unknown, it is recommended to only increase the culvert size to 700mm in order to mitigate the risks of surcharging downstream systems while still improving existing conditions at the intersection. Alternatively, an assessment of the downstream conditions can be completed to determine its capacity for additional flows. If the downstream system has adequate capacity, it is recommended to upsize the culvert in the east ditch to 800mm to reduce the headwater depth during a 1:100-year storm.

On the west side of Range Road 232, near the Highway 628 intersection, it has been identified by the County of Strathcona that water in the ditch could back up to the south entrance to Windfield Heights. Based on a field assessment, it appears that the west ditch in this section is poorly graded, see Figure 2.1 (in Section 2.7.3). It is recommended to re-grade the ditch to re-establish positive drainage towards Highway 628.

Between the two high points on Range Road 232, roadway runoff as well as runoff from a large catchment area east of the roadway discharge through an existing 900mm culvert across Range Road 232 towards Salisbury Village. Since the majority of the catchment area contributing flow to this culvert will remain unchanged during roadway upgrades, the impact of increasing roadway impervious area is negligible to the overall runoff rates to the outlet.

Stormwater management concepts for the rural section of Range Road 232 are shown on Exhibits 7.3 and 7.4.

During design stage, existing culvert invert elevations should be verified by field survey as the elevations in the culvert data appear to be much lower than the LiDAR surface. Existing and future culverts should have adequate grades to ensure proper drainage.

### 7.2.2 Urban Drainage Design

A portion of Range Road 232 and Range Road 231 south of Wye Road will be upgraded to urban roadway which will require dual drainage system to convey both major and minor flows. During storms up to the 5-year return period, flows in the road side gutters will be collected at catch basins on either sides of the road and will be conveyed through underground storm pipes. The catch basins must be spaced such that the maximum distance that flow travels before reaching the next catch basin is no more than 150m, as per the County of Strathcona's design standards. During events greater than the 1:5-year design storm, flows in excess of the minor system's design capacity will continue to flow overland along the roadway until flows eventually reach downstream drainage systems. The major drainage system should be designed to minimize surface ponding and prevent flooding of roadways or private properties.

## Range Road 231

On Range Road 231, the transition from rural to urban roadway will be located at the north low point about 800m south of Wye Road. Runoff from the south half of the urban section will drain towards Outlets 10 and 11. As the natural wetland downstream of Outlet 10 will be removed at the time of future development, it is recommended to direct the runoff to Outlet 10 across the road to Outlet 11 through a 500mm culvert. This will increase the peak discharge to the wet pond. However, water level in the pond is not expected to vary significantly. The storm sewer conveying minor flows from the north high point to the sag will also be designed to daylight and discharge to the wet pond downstream of Outlet 11. In addition to the urban roadway runoff, rural runoff in the east ditch, between the south high point and the sag will discharge to the wet pond through Outlet 11 as well. Post development flows will increase high water levels in the pond by 0.03 m.





The north half of the urban section on Range Road 231 will drain towards Wye Road with major flows discharging to the Wye Road major drainage system and minor flows connecting to the storm sewer system on Wye Road. Design drawings from the Wye Road Widening project indicate that some minor flows from the west side of Range Road 231 are designed to be captured by a 450mm catch basin lead, just west of the Range Road 231 and Wye Road intersection, connecting to an existing 600 mm pipe on Wye Road. Using Rational method, runoff estimated from the catchment to the 450mm catch basin lead (including additional hard surface from proposed roadway upgrades) was similar to the design flow to the 450mm pipe. Minor flows from the east half of the 150m section and the remaining 250m from the north high point will connect to an existing 375mm storm pipe on Wye Road, upstream of the 600mm pipe. It was presumed that the 375mm pipe would not have capacity for additional minor flows from RR231. To prevent surcharge to the Wye Road system, the storm pipe on RR 231 would be over sized (e.g. 675mm) to provide temporary in-line storage with controlled release to the downstream system. During design, downstream system capacity should be confirmed. If the 450mm catch basin lead does not have capacity for additional minor flow from RR 231, then flows on the west half of the roadway can be directed to the proposed storm sewer (oversized pipe) on RR231 with controlled release to Wye Road system. The major flows from this urban section will discharge to Wye Road, towards the Wye Road sag west of Range Road 231. Major flows in the sag will be collected by the catch basin to the 450mm catch basin lead. Major flows discharging to Wye Road at Outlet 12 and 13 are estimated to be similar or less than existing flows as the minor flows will be conveyed through storm sewers. Some ponding during the 1:100 year will be expected. Ponding limits and depth on Wye Road were estimated by Al-Terra Engineering as part of the Wye Road Widening project.

The proposed stormwater management concepts for the urban section of Range Road 231 are shown on Exhibit 7.1.

### Range Road 232

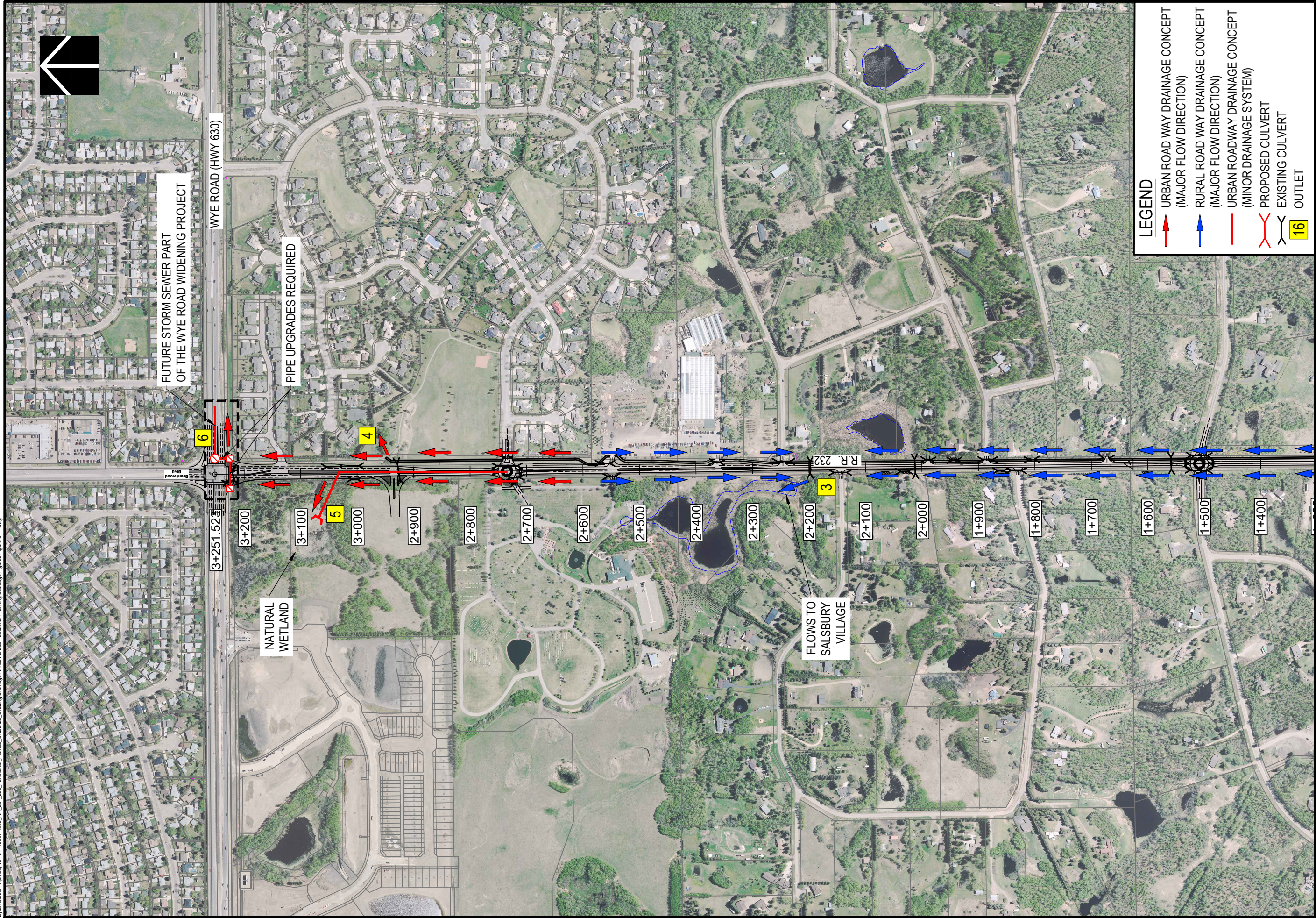
On Range Road 232, the transition from rural to urban roadway will be at the north high point (approximately 600 m south of Wye Road). Since the transition is located at a high point, all of the urban roadway runoff will drain north towards Wye Road. Due to capacity constraints in the downstream system on Wye Road, minor flows in the 450 m north of the high point will discharge to the natural wetland downstream of Outlet 5. Storm sewers in increasing sizes of 300mm, 375mm, and 525mm will be used to convey the minor flows and will daylight at the wetland. Major flows from the west half of the 450m section will discharge to the natural wetland while the east half will discharge to the treed area on the east side, downstream of Outlet 4. Minor flows from the remaining 150 m of the urban roadway on Range Road 232 will discharge to the storm sewer system on Wye Road. Design information of the storm sewer system on Wye Road provided by Al-terra Engineering shows that a few sections of the pipes at Range Road 232 are under capacity to convey the flows estimated in this study. It is recommended that the 300mm and 375mm pipes from "Inlet" to "MH2A" (as shown on Al-Terra's design drawing attached in Appendix G3) should be upgraded to 375mm and 450mm respectively. The design flows in these pipes are expected to increase up to 130% of the pipe's current design capacity. Pipes further downstream of the system on Wye Road appears to have adequate capacity. Design flows and downstream system capacity should be verified during detailed design. Major flows from this urban section will discharge to the major drainage system on Wye Road and flow overland following roadway profile. Ponding limits and depths along Wye Road during the 1:100-year storm were estimated by Al-Terra Engineering as part of the Wye Road Widening project.

The proposed stormwater management concepts for the urban section of Range Road 232 are shown on Exhibit 7.3.

Due to surface constraints, pipe sections leading up to the daylighting locations will be shallow and will be at risk of freezing. Insulation are recommended on pipes with cover less than 2 m.

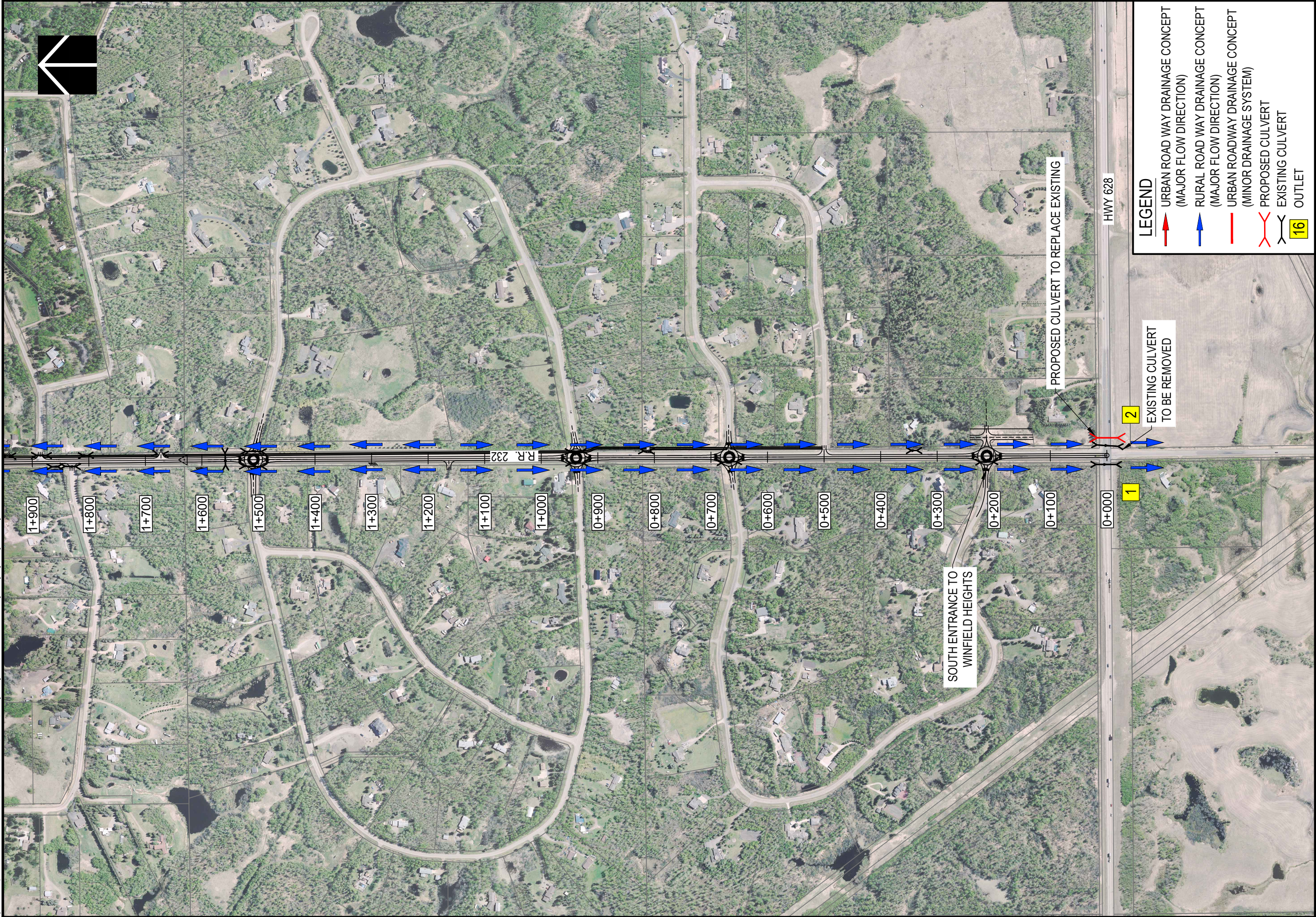


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**RANGE ROAD 231 AND 232**

**EXHIBIT 7.4**

**FUNCTIONAL PLANNING STUDY**

PROPOSED STORMWATER MANAGEMENT CONCEPT

RANGE ROAD 232 SOUTH SECTION

1 : 6 250



### 7.2.3 Discharge Hydrographs at the Outlet Locations

Peak discharge rates were estimated by computer modelling to compare flow rates at the 13 locations discharging from the roadway drainage system before and after roadway upgrades. The impact of the increased imperviousness as a result of the roadway upgrades on the downstream systems are generally minimal. When there is a large catchment area adjacent to the roadway contributing flow to the roadway drainage system or crossing the roadway, the increase in peak discharge is sometimes negligible. In this section, peak discharge hydrographs are provided for better visualization of the effect of roadway upgrades on the discharge rates to the downstream systems.

The following figures (Figures 7.1-7.5) provide peak flow hydrograph comparisons at outlet locations on Range Road 231. Existing flows are shown in “blue” and post development flows are shown in “orange”.

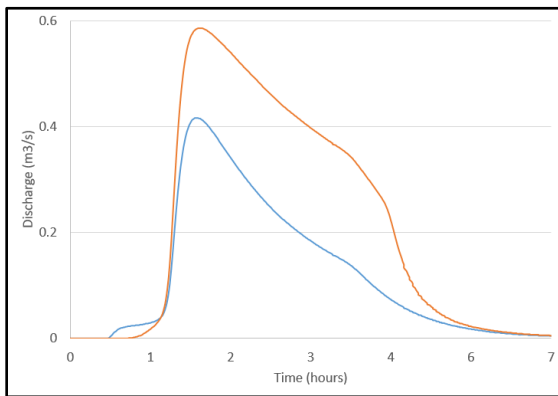


Figure 7.1: Discharge Hydrographs at Outlet 7

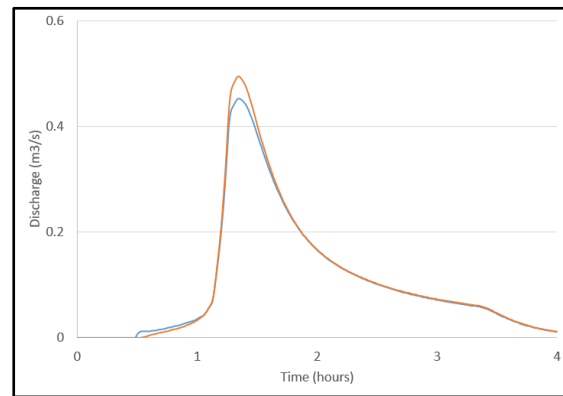


Figure 7.2: Discharge Hydrographs at Outlet 9

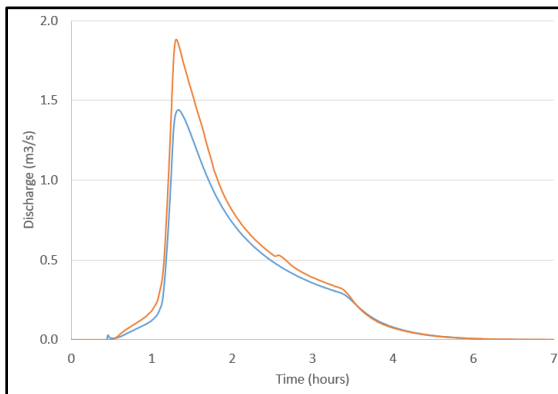


Figure 7.3: Discharge Hydrographs at Outlet 11

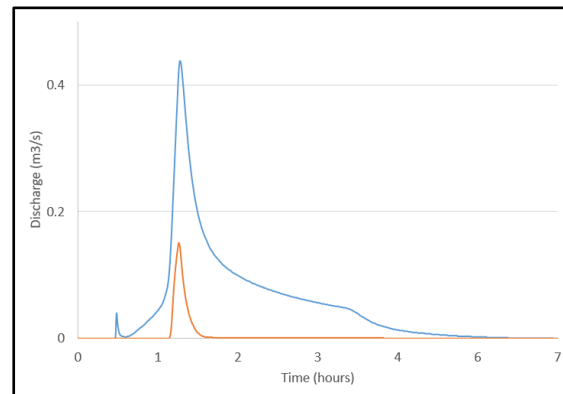


Figure 7.4: Discharge Hydrographs at Outlet 12



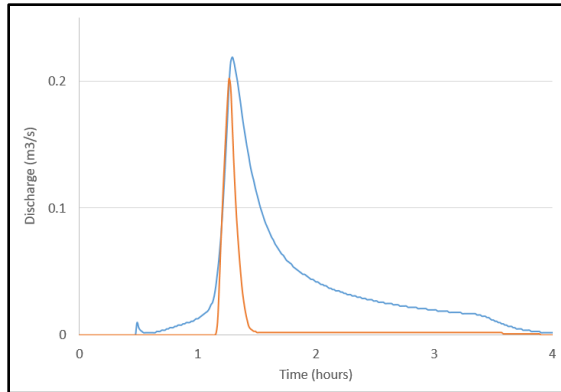


Figure 7.5 Discharge Hydrographs at Outlet 13

Hydrographs at Outlets 8 and 10 are not shown because there will be no discharge through those locations under post development conditions. Outlets on Range Road 231 with higher increases in peak discharge under post development conditions are at Outlet 7 and Outlet 11. As discussed in Section 7.1.2, the increase in discharge at Outlet 7 is due to the proposed culvert added to convey flows from the east ditch to the west to reduce ponding risks in the east ditch. To reduce the increase in the peak discharge at Outlet 7, a smaller culvert (500mm) is proposed to control discharge from the east ditch without causing too much ponding in the ditch that may cause the roadway to flood. The post development hydrograph shown in Figure 7.1 is based on flows discharging from a 500mm culvert. At Outlet 11, there is a higher increase in peak discharge compared to other outlets due to removal of Outlet 10 and re-directing flows at Outlet 10 towards Outlet 11. Since the flows at Outlet 11 will be discharge to a wet pond, the increase in peak flow is relatively small for the overall pond capacity. Increase in water levels in the pond will be minimal. Other outlets on Range Road 231 will either have a very small increase in peak discharge or, at some locations, reductions in discharge under post development conditions.

Peak flow hydrograph comparisons at the 6 outlet locations on Range Road 232 are shown on Figures 7.6 to 7.11 below. Existing flows are shown in “blue” and post development flows are shown in “orange”.

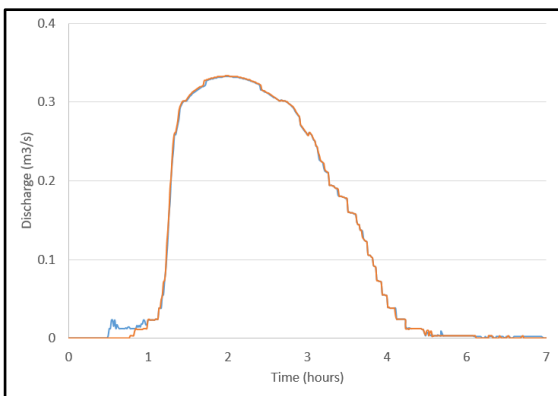


Figure 7.6: Discharge Hydrographs at Outlet 1

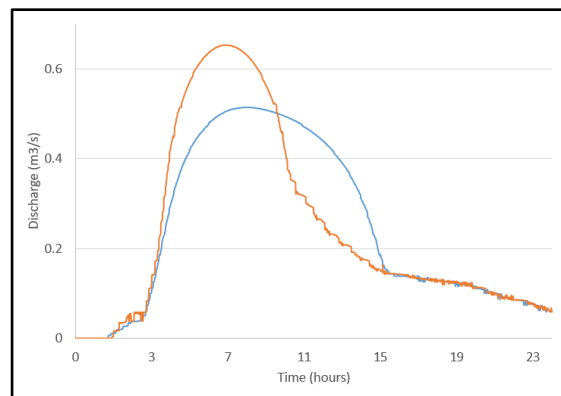


Figure 7.7: Discharge Hydrographs at Outlet 2



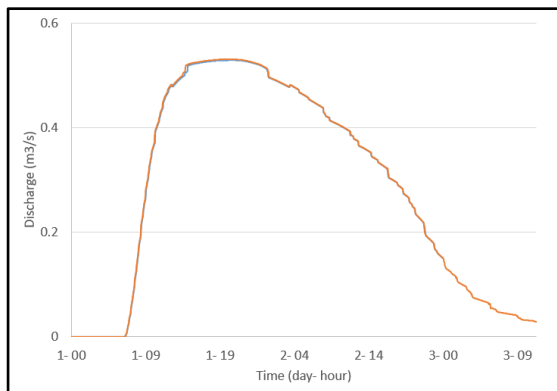


Figure 7.8: Discharge Hydrographs at Outlet 3

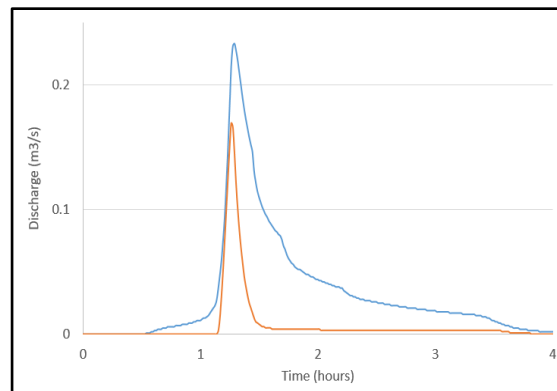


Figure 7.9: Discharge Hydrographs at Outlet 4

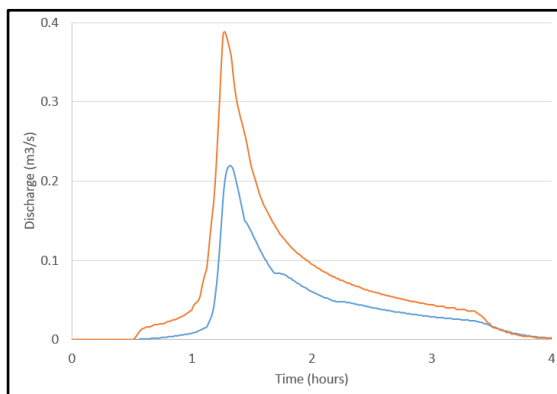


Figure 7.10: Discharge Hydrographs at Outlet 5

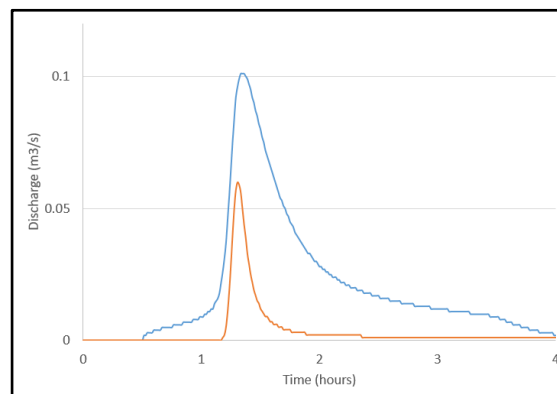


Figure 7.11: Discharge Hydrographs at Outlet 6

Outlets on Range Road 231 with higher increases in peak discharge are Outlet 2 and Outlet 5. As discussed in Section 7.1.2, the increase in peak discharge from Outlet 2 has been mitigated by upgrading the existing culvert to a 700mm instead of an 800mm. However, if it was determined that the downstream system has capacity for higher additional flows, an 800mm would be preferred. The post development hydrograph shown in Figure 7.11 is based on a 700mm culvert. At Outlet 5, since the runoff are discharging to a natural wetland, the impact of the increased flow on the water levels will be minimal. At the other outlets on Range Road 231, the post development flows are expected to be similar or less than existing conditions.

#### 7.2.4 Stormwater Management Facilities

The roadway upgrades including roadway widening and conversion from rural to urban roadway will increase impervious surfaces. As a result, higher runoff volume and peak flows will be expected in the roadway drainage systems and at the outlets. Although discharge rates will increase, it is expected that impact to the downstream systems are minimal. Stormwater management facilities for retention and attenuation of roadway discharges will not be needed.





### 7.3 Conclusion

The assessment on the existing and post development flows at the 13 outlet locations on Range Road 231 and Range Road 232 has been completed to determine the increase in peak flows as a result of roadway upgrades and propose mitigation measure to reduce the impact on downstream drainage systems. In general, increase in peak discharge rates are minimal. At some outlets, the post development discharge rates will be lower than that of existing conditions. A few locations will have a higher increase in discharge rates, and mitigation measures have been proposed to minimize the increase and reduce impact on downstream systems. A summary of the proposed changes for Range Road 231 and Range Road 232 has been included in Section 8.5 and Section 9.5, respectively.



## ■ 8.0 Recommended Plan for Range Road 231

Refer to Exhibits 8.1 to 8.5 at the back of this section for the recommended plan and profiles.

### 8.1 Roadway Improvements

Range Road 231 will primarily be a two-lane rural roadway, with roundabouts located at the following intersections:

- Deer Mountain Trail / New subdivision access at Station 0+450
- Windsor Estates South / Scona Dale Road at 1+110
- Meadowhawk / Executive Estates south access at 2+000
- Hillshire / Executive Estates north access at 2+500

Although not all intersections listed above required roundabouts for traffic operations, the roundabouts are recommended to reduce the cross-section of the roadway along the corridor.

North of the roundabout at the future Hillshire/Executive Estates north access, the roadway will transition to an urban cross-section, and additional lanes will be introduced / dropped to match cross-section from the Wye Road improvement project. In the southbound direction, the outside lane will become a forced right at the school parking lot, and the middle lane will be dropped prior to the roundabout at the future Hillshire/Executive Estates north access. In the northbound direction, an inside lane is added using the protected eastbound left turn lane from the school parking lot.

### 8.2 Pedestrian and Cyclist Accommodation

As per the Recreation, Parks and Culture Plan (Strathcona County Trail Strategy), there will be a 3m trail along the west side of Range Road 231, from Wye Road to the roundabout at Deer Mountain. Crosswalks will be provided across Range Road 231 at all proposed roundabout locations and across all subdivision access roads.

### 8.3 Access Management

#### 8.3.1 Access to Victory Baptist Church

To reduce conflict points along Range Road 231 and to address concerns about site lines at the church driveway it is recommended that the current access for the church be relocated to Sconadale Road. This relocation would occur in conjunction with roadway reconstruction.

#### 8.3.2 Access to Strathcona Christian Academy Elementary

To support safe egress from the school parking lot it is recommended that a protected northbound left / eastbound right turn bay be added to limit conflict points for these movements. This protected lane would then continue northbound as an added lane upstream of the Wye Road intersection.

In the southbound direction, access to the school's bus / staff parking lot and the public parking remain unchanged.

#### 8.3.3 Access to Elk Island School Board

All directional access is still permitted at this access, and a northbound protected left turn-bay has been added to improve safety.





It is recommended that prior to construction the County engage the Elk Island School Board and provide some education to ensure that drivers understand that during peak periods, when gaps may not be sufficient for the left turn onto Range Road 231, drivers have the option to turn right and complete a safe U-turn at the roundabout at the future Hillshire/Executive Estates north access.

#### 8.3.4 Emergency Egress Roads

The subdivisions of Deer Mountain and Meadow Hawk currently have gated emergency egress roads that connect to Range Road 231. These roads will remain unchanged by this plan.

#### 8.3.5 Private Access

To improve safety and traffic flow along the corridor, it is recommended that private accesses be relocated from Range Road 231 to a subdivision road whenever possible. Table 8.1 summarizes the recommendations for accesses along the corridor.

Table 8.1: Access Recommendations along Range Road 231

Station	Land Use	Recommendation
0+120	Private Residence	Area is zoned as a future subdivision. If redevelopment occurs, access should be provided via the internal road network. For this to occur, an Area Structure Plan would be required prior to consideration of rezoning or subdivision.
0+360	Private Residence	
0+550	Private Residence	
0+650	Private Residence	
0+700	Private Residence	
1+460	Private Residence	No changes, alternate access not available

Relocations would occur as part of privately driven development projects, or as part of roadway reconstruction.

### 8.4 Posted Speed Limit

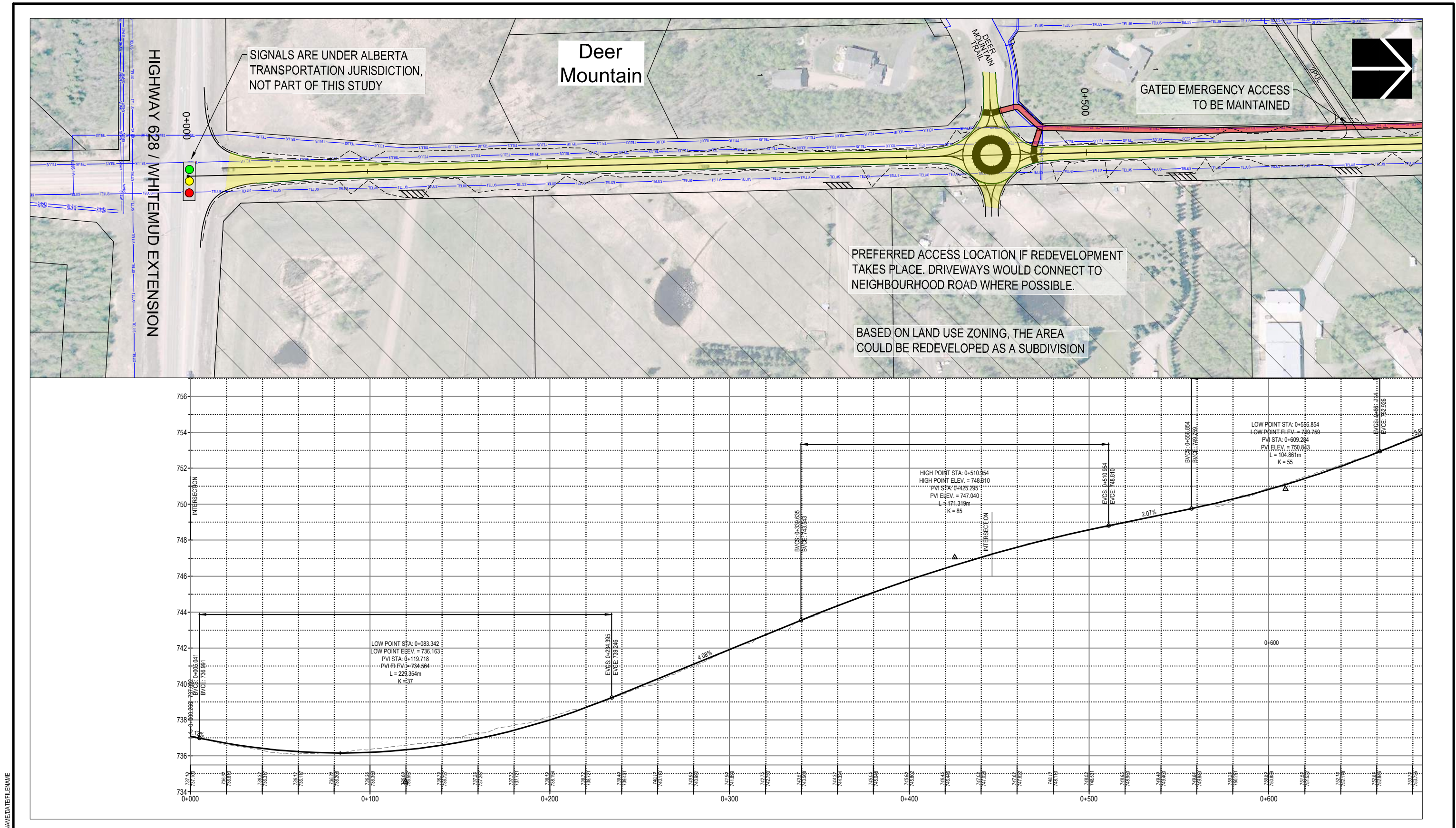
In the short-term it is recommended that the corridor be posted at 60 km/h at the ends of the corridor, and 80 km/h in the middle section. Transitions should occur south of the Hillshire/Executive Estates north access and Deer Mountain Trail. As roundabouts are introduced in the long term, the posted speed in the middle section of the corridor should also be reduced to 60 km/h.

### 8.5 Stormwater Management

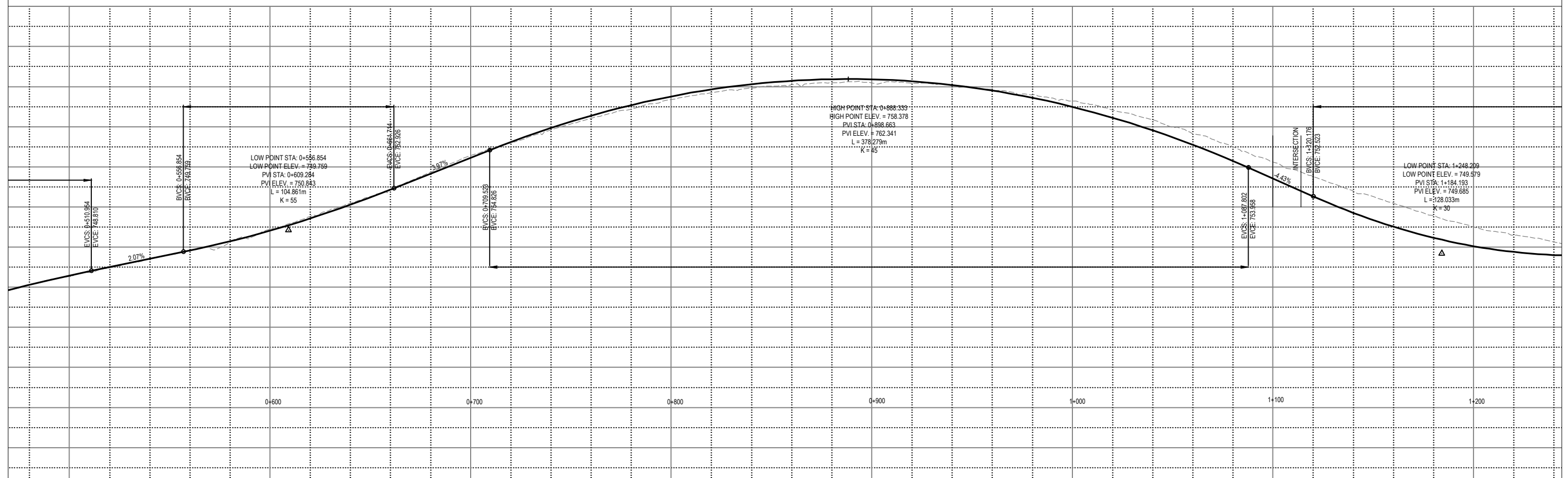
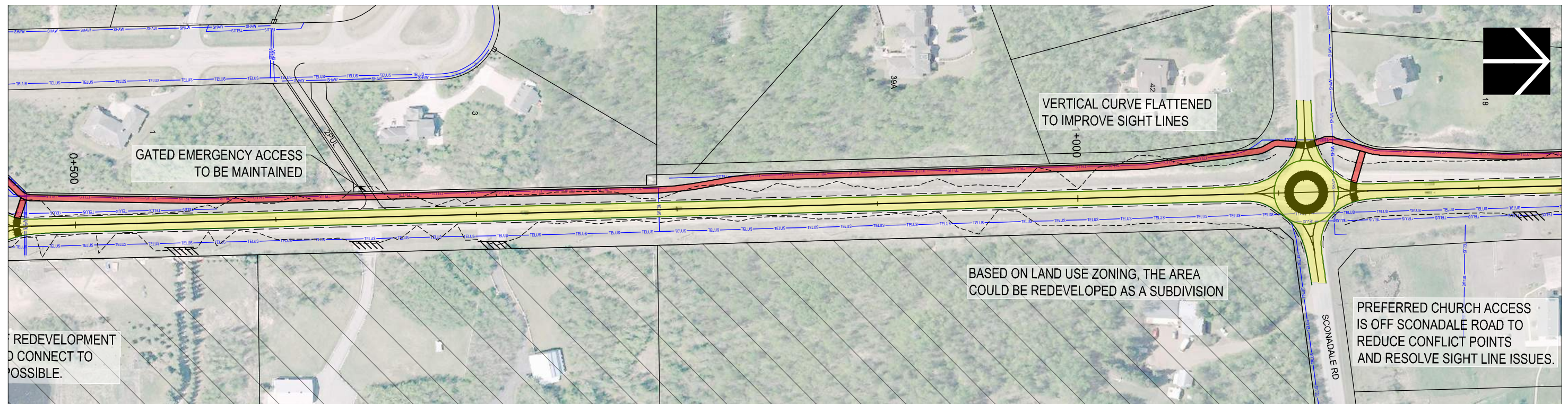
The following is a summary of proposed stormwater management concepts and mitigation measures proposed for both Range Road 231:

- A 500mm culvert is proposed in the south sag (north of the Highway 628 intersection) to convey flow from the east ditch to the west towards the green field. This culvert will drain the flows in the east ditch to prevent water from encroaching to the roadway under flooding events. The 500mm culvert is slightly undersized to restrict flows discharging to the green field through Outlet 7 to reduce impact on downstream systems.
- The natural wetland downstream of Outlet 10 will be removed as part of future residential development. Flows currently discharging through Outlet 10 will be redirected to Outlet 11 through a proposed 500mm culvert. The increase in peak flow to the wet pond downstream of Outlet 11 will have minimal impact on the pond water levels since the roadway catchment is a small portion of the overall catchment to the pond.
- Runoff from the south half of the urban section will discharge through Outlet 11 to the wet pond. Storm sewers carrying minor flows will daylight at the wet pond.



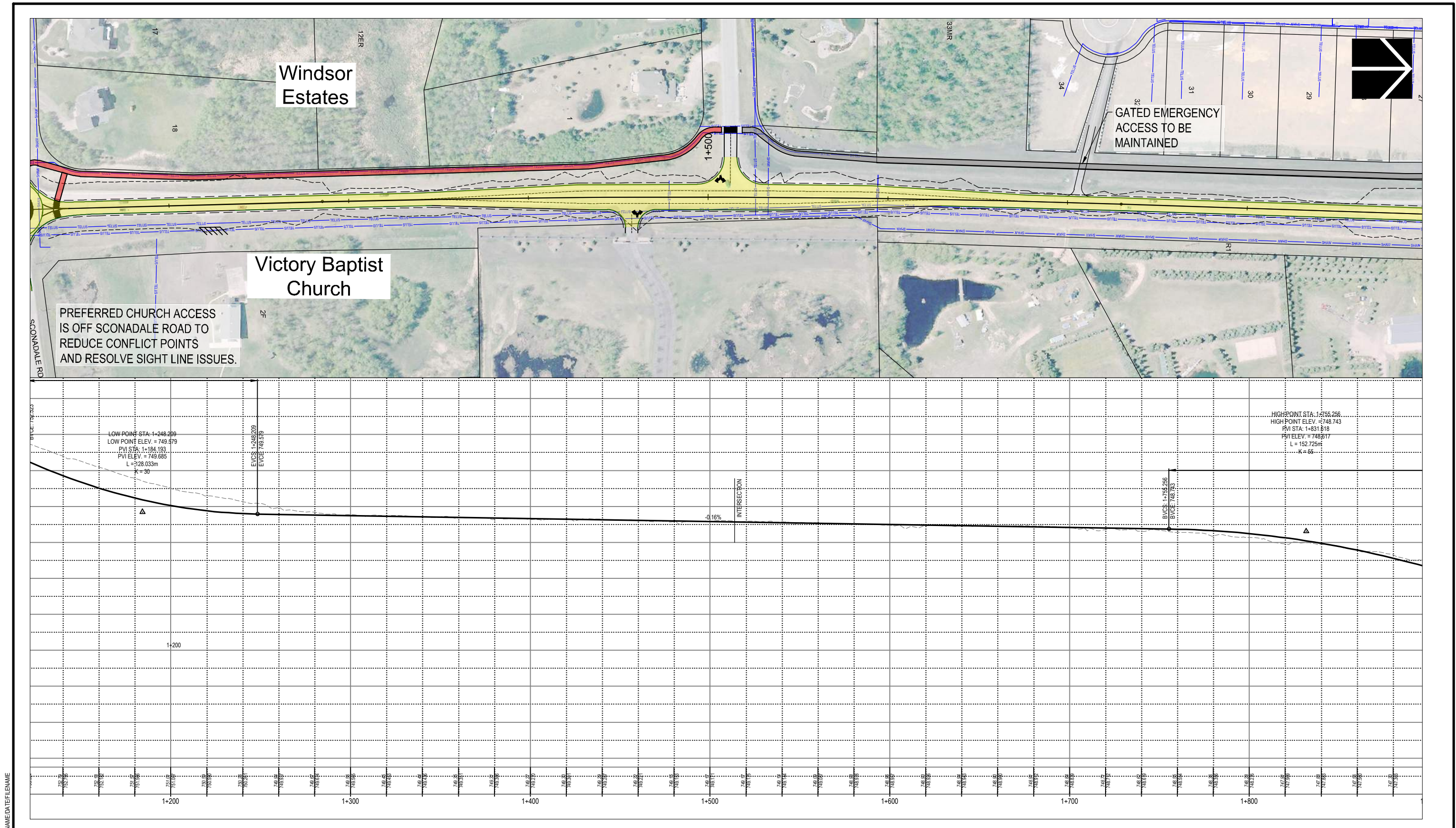






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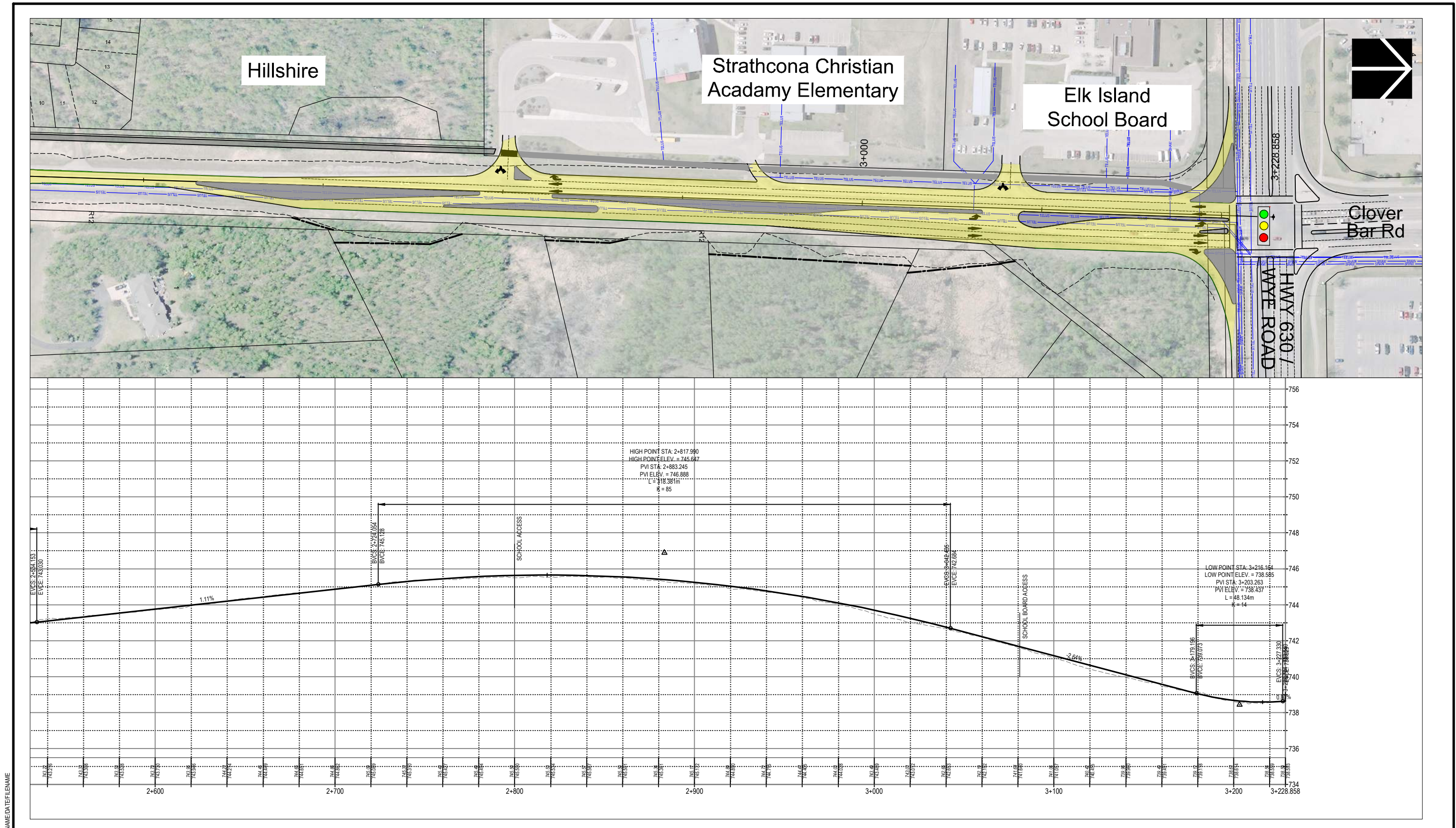














- Runoff from the north half of the urban section will discharge through Outlets 12 and 13 to Wye Road. A small portion of the minor flows will be collected by a future catch basin on Wye Road west of Range Road 231 as part of the Wye Road Widening project. The remaining minor flow will be conveyed through storm sewer along Range Road 231 that will connect to an existing 375mm pipe on Wye Road. To prevent surcharging the downstream system, the pipe on Range Road 231 will be oversized (e. g. 675mm) to reduce peak discharge and provide temporary in-line storage. Major flows to Wye Road will overland flow following roadway profile to the sag west of the Range Road 231 intersection and flows will be collected by the future catch basin.
- Pipe insulation will be required in wherever pipe cover is less than 2m (e. g. in the sections upstream of the daylighting location).
- Stormwater management integration into natural wetlands will require provincial approval at the design stage.

## 8.6 Utility Impacts

Several utilities such as overhead powerlines, low-pressure natural gas lines, telecommunication trenches, and telecommunication pedestals are located along Range Road 231. Contact should be made with all the utility owners to confirm location and depth of the buried utilities and to ensure proper mitigation procedures.

There are 8 telecommunication pedestals located along the corridor and are within the road right-of-way. Three pedestals are located between station 1+400 and 1+600 on the east side of Range Road 231. There is one pedestal located north of station 1+100 on the northeast corner of the intersection of Range Road 231 and Sconadale Road. Four pedestals are located between station 0+000 and 0+800 with three out of the four on the west side of the road.

In addition to the telecommunication pedestals there are telecommunication trenches that may require relocation due to their proximity to the work area. Depths and location of the trenches need to be confirmed to determine if a relocation is required. Between Telus and Shaw there are nine crossings along the corridor. One crossing at approximately station 3+060 is within the area with proposed urbanization and will most likely require mitigation measures. There are two Telus trenches that run the entire length of the corridor on the east side of the road and may conflict with road work and ditch regrading. Between station 0+000 and 2+100 there are eight telecommunication trenches that cross under Range Road 231. Since the proposed road work from station 0+000 to 2+300 is shoulder widening and ditch regrading, the crossings may not require relocation if the depth of cover is maintained. Mitigation measures should be confirmed with the telecommunication provider.

Between station 0+000 and 1+600 there is approximately 1600 meters of overhead powerlines that is located within the road right-of-way and may conflict with road widening and ditch regrading. There are four low-pressure natural gas pipeline crossings located between stations 2+500 and 3+000 that are located within the proposed urbanization. There are two low pressure gas crossings, near station 0+400 and 1+500, which are located within the section of Range Road 231 that is being upgraded with widening and ditch regrading. Like the telecommunication trenches, the low-pressure natural gas crossings may not require relocation if a specified depth of cover is maintained. The utility provider would need to confirm the proper mitigation measures. An important note is that if relocation of the low-pressure natural gas pipelines is not required a crossing agreement will be required. There is a total of approximately 2700 meters of low-pressure pipelines within the work area.

There is no cost associated with relocating any telecommunications feature that is located within the road right-of-way. Any crossings, pedestals, and trenches that require relocation will be paid for by the telecommunication owner. The cost to relocate the overhead powerlines is estimated to be \$100,000 dollars per kilometer and for this corridor is estimated to total \$160,000 dollars. Costs for relocating the low-pressure natural gas pipelines is also estimated to be \$100,000 dollars per kilometer and would total \$270,000 for all of Range Road 231.

Strathcona County's "Country Residential Wastewater Master Plan (ISL, 2010)" identifies a low pressure sewer alignment along Range Road 231 to service future country residential subdivisions. This potential sewer would be extended south from Meadowhawk to Highway 628.





## 8.7 Environmental Issues

The following are recommendations from the Environmental Overview:

- ISL recommends that wetlands considered reasonably permanent be submitted during the design phase to the Water Boundary Group at Alberta Environment and Parks for an Assessment of Permanence. This process can take approximately 12 months and must be completed before submission of a Water Act application.
- Water Act applications for wetlands are expected to be required for this Project; however, data for wetlands expires three years following fieldwork and therefore are not completed at a functional planning study level. To avoid repeating fieldwork, ISL recommends conducting wetland assessments approximately 1 - 2 years prior to construction to provide appropriate regulatory approval timelines.
- Stormwater management integration into natural wetlands will require provincial approval at the design stage.

## 8.8 Right-of-way Requirements

Along Range Road 231, the recommended plan identifies the need for property acquisition from parcels shown in Table 8.2. Refer to Appendix H for individual landownership plans (IOP's).

Table 8.2: Right-of-way Requirements for Range Road 231

Legal Land Description	Area Required (acre)
0321698 BLK 3 LOT 8A	0. 113
0321698 BLK 3 LOT 7A	0. 232
7822645 BLK 3 LOT 6	0. 021
7822645 BLK 3 LOT 5	0. 102
7822645 BLK 3 LOT R12	0. 585

For information purposes, landowners were contacted via personalized letter explaining that right-of-way would be required at some point in the future. Right-of-way requirements will be confirmed during the design phase of the project, and land acquisition would occur a year or two prior to construction.

Estimated costs for right-of-way acquisition are **\$310,750**.

## 8.9 Staging

The urban segment from Wye Road to the future Hillshire/Executive Estates north access is anticipated to be completed in the short term based on intersection improvement requirements. Improvements along the remainder of the corridor will occur in the long term and is anticipated to occur from north to south, based on development demands.

It is anticipated that the construction for the short-term horizon at 2038 will include the following intersections:

- Elk Island School Board
- Strathcona Christian Academy
- Hillshire / Executive Estates North Access (Roundabout)

With these changes, the speed limit of 60 km/h should be retained for the north section of Range Road 231 and extended to south of the roundabout at Hillshire / Executive Estates North access. A speed limit of 60 km/h should also be applied for the south section of the corridor from Highway 628 to Deer Mountain Trail.



It is anticipated that the construction for the long-term horizon at 2048 will include the following intersections:

- Meadow Hawk / Executive Estates South Access (Roundabout)
- Windsor Estates North access
- Windsor Estates / Sconadale Road (Roundabout)
- Deer Mountain Trail / New subdivision access (Roundabout)

Along with the construction of the roundabouts, a speed limit of 60 km/h should be applied for the entire corridor. The portion of the trail south of station 1+500 should be completed as part of the 2048 improvements.

## 8.10 Opinion of Probable Costs

Table 8.3 summarizes the opinion of probable costs for the Range Road 231 corridor.

Table 8.3: Range Road 231 Cost Estimate

		Short Term Stage		Ultimate (Long Term) Stage	
Cost Item	Unit Rate	Quantity	Cost	Quantity	Cost
Roadways					
Remove Existing Pavement Surface	\$16 / sq. m	11,700	\$187,200	0	\$0
Clearing and Grubbing	\$3.5 / sq. m	3,600	\$12,600	7,500	\$26,250
Common Excavation	\$12 / m³	16,200	\$194,400	20,100	\$241,200
Waste Excavation	\$28 / m³	3,100	\$86,800	1,500	\$42,000
Borrow Excavation	\$40 / m³	0	\$0	0	\$0
Ditch Regrading	\$18 / m³	4,500	\$81,000	20,000	\$360,000
Waste Topsoil Excavation	\$28 / m³	5,100	\$142,800	6,100	\$170,800
Prepared Subgrade	\$5 / sq. m	24,200	\$121,000	12,500	\$62,500
Granular Base Course	\$100 / sq. m	4,900	\$490,000	1,000	\$100,000
Asphalt Concrete Pavement	\$65 / sq. m	24,200	\$1,573,000	5,000	\$325,000
Roundabout Construction	\$300,000 / EA	1	\$300,000	3	\$900,000
Seeding/ Topsoil	\$10 / sq. m	11,000	\$110,000	22,100	\$221,000
Concrete Curb and Gutter	\$90 / m	3,100	\$279,000	0	\$0
Concrete Curb Ramp	\$3,000 / EA	2	\$6,000	14	\$42,000
3m Asphalt Multi-Use Trail	\$50 / sq. m	900	\$45,000	2,900	\$145,000
Access Closure / Relocation	\$11,000 / EA	0	\$0	1	\$11,000
Access Closure / Relocation with Subdivision	\$0 / EA	0	\$0	4	\$0
Speed Limit and Pedestrian Crossing Signs	\$350 / EA	6	\$2,100	18	\$6,300
Paint lines	\$19 / m	1,300	\$24,700	4,900	\$93,100
Utilities					
Power Line Relocations - Overhead	\$100,000 / km	0	\$0	1.6	\$160,000
High Pressure Natural Gas Relocation	\$2,000,000 / km	0	\$0	0*	\$0
Low Pressure Natural Gas Relocation	\$100,000 / km	0.7	\$70,000	1.8	\$180,000
Telecommunication Trench**	\$ -	1,200	\$0	100	\$0
Telecommunication Pedestals**	\$ -	0		8	\$0





		Short Term Stage		Ultimate (Long Term) Stage	
Cost Item	Unit Rate	Quantity	Cost	Quantity	Cost
Drainage					
Culverts	\$350 / m	0	\$0.00	8	\$2,800
Storm Pipe	\$400 / m	610	\$244,000	0	\$0.00
Catchbasin Leads	\$4,000 / EA	165	\$660,000	0	\$0.00
Catchbasins	\$150 / m	11	\$1,650	0	\$0.00
Storm Manholes	\$2,000 / EA	6	\$12,000	0	\$0.00
Right-of-way					
Land Value	\$150,000 / acre	1.05	\$157,950	0	\$0
Damages			\$52,800		\$0
Incidental Costs			\$100,000		\$0
Total			\$4,954,000		\$3,709,750
Contingency (15%)			\$744,000		\$464,000
Total with Contingency			\$5,698,000		\$3,553,000
Engineering (10%)			\$570,000		\$356,000
Total with Contingency and Engineering			\$6,268,000		\$3,909,000

The following notes apply to this cost estimate:

- \*Pipelines locations should be confirmed with utility provider. Utilities may not conflict if work remains in the Road Right-of-Way.
- \*\*Costs for telecommunications relocation will be responsibility of telecommunications provider as it is within road right-of-way.
- The right-of-way costs do not include expropriation costs as that would depend on the negotiations with each landowner



## ■ 9.0 Recommended Plan for Range Road 232

Refer to Exhibits 9.1 to 9.5 at the back of this section for the recommended plan and profiles.

### 9.1 Roadway Improvements

Range Road 232 will be primarily be a two-lane rural roadway, with roundabouts located at the following intersections:

- Winfield Heights South access at Station 0+210
- Winfield Heights North / Carriage Lane access at Station 0+660
- Scot Haven South / Graham Heights South at Station 0+940
- Scot Haven North / Graham Heights North at Station 1+510
- Estate Drive / Glenwood at 2+730

Although not all intersections listed above required roundabouts for traffic operations, the roundabouts are recommended to reduce the cross-section of the roadway along the corridor.

Near the north access to Salisbury Greenhouse the roadway will transition to an urban cross-section, and additional lanes will be introduced / dropped to match cross-section from the Wye Road improvement project. Southbound the outside lane will become a forced right into Salisbury Village, and the middle lane will be dropped prior to the Estate Drive / Glenwood roundabout. Northbound an inside lane is added using the protected eastbound right turn lane from Salisbury Village.

It should be noted that a decision was made to protect and plan for the 6-lane cross-section proposed by the Wye Road project; however, traffic forecasts do not require more than 4-lanes. At the design stage it is recommended that traffic volumes be reviewed, and if the extra lanes are not required for capacity, then the plans should be altered to include a yield condition for the eastbound to southbound right turn off Wye Road, and only two (2) southbound lanes.

### 9.2 Pedestrian and Cyclist Accommodation

As per the Recreation, Parks and Culture Plan (Strathcona County Trail Strategy), there will be a 3m trail along the east side of Range Road 232, from Wye Road to the roundabout at the south access to Winfield Heights. Crosswalks will be provided across Range Road 232 at all proposed roundabout locations, across all subdivision access roads, and across Range Road 232 at Salisbury East Parkway.

The construction of the trail would be pending the acquisition of right-of-way. Right-of-way requirements have been detailed further in section 9.8.

### 9.3 Access Management

#### 9.3.1 Salisbury Greenhouse

The south access for Salisbury Greenhouse will remain in its existing location and the north access will be relocated approximately 15m to the south to line up with the south access to Glenwood. Both accesses will be upgraded to include a northbound right turn lane and a southbound left turn lane.



### 9.3.2 Glenwood Funeral Home and Cemetery

Both accesses into Glenwood will remain in their existing locations. The south access will remain as an all directional intersection, and the north access will serve as the west leg of the Estate Drive / Glenwood roundabout. Cemetery plots will not be affected by the roundabout construction but impacts to the entrance sign and adjacent trees will be impacted.

### 9.3.3 Private Accesses

To improve safety and traffic flow along the corridor, it is recommended that private accesses be relocated from Range Road 232 to a subdivision road whenever possible. Table 9.1 summarizes the recommendations for accesses along the corridor.

Table 9.1: Access Recommendations along Range Road 232

Station	Land Use	Recommendation
0+340	Private Residence	Area is zoned as a future subdivision. If redevelopment occurs, access should be provided via the internal road network. For this to occur, an Area Structure Plan would be required prior to consideration of rezoning or subdivision.
0+810	Private Residence	Relocate to Edelweiss Avenue
1+160	Private Residence	No changes, alternate access not available
1+300	Private Residence	Relocate to Scot Haven
1+600	Private Residence	Relocate to Scot Haven
1+670	Private Residence	No changes, alternate access not available
1+860	Private Residence	Relocate to South Whitecroft
1+950	Private Residence	Relocate to East Whitecroft
2+030	Private Residence	Relocate to North Whitecroft
2+060	Private Residence	Relocate to North Whitecroft

Relocations would be subject to land owner approval and would occur as part of privately driven development projects, or as part of roadway reconstruction.

## 9.4 Posted Speed Limits

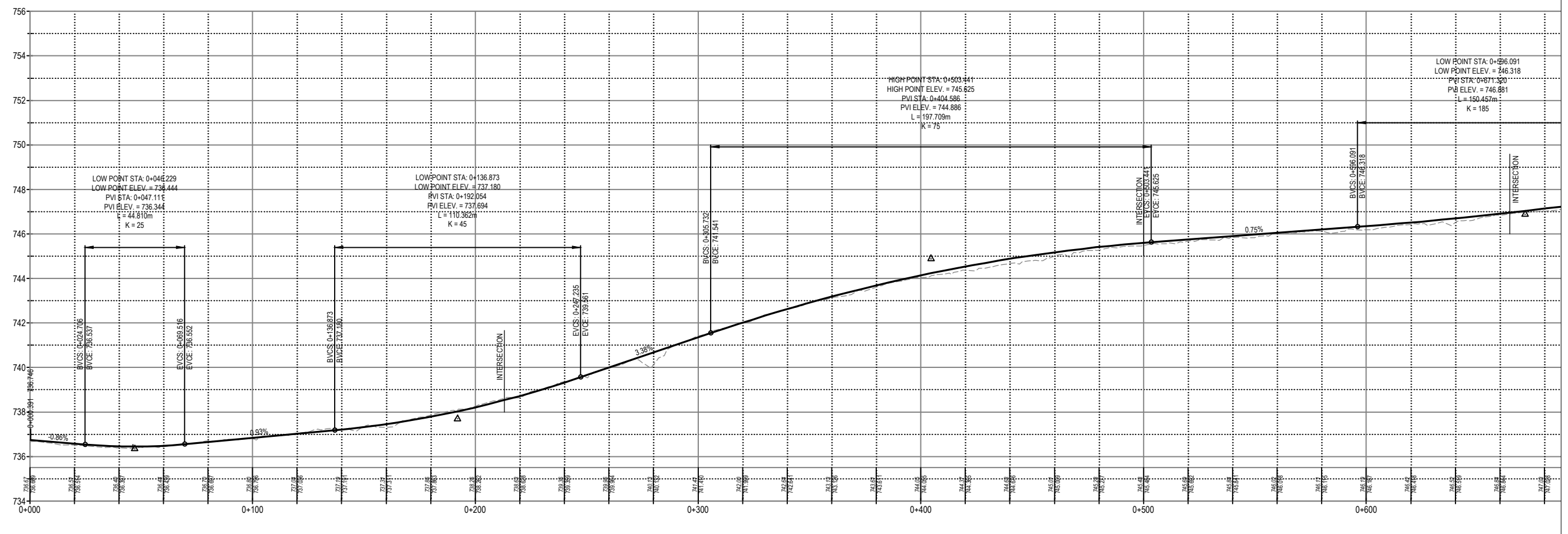
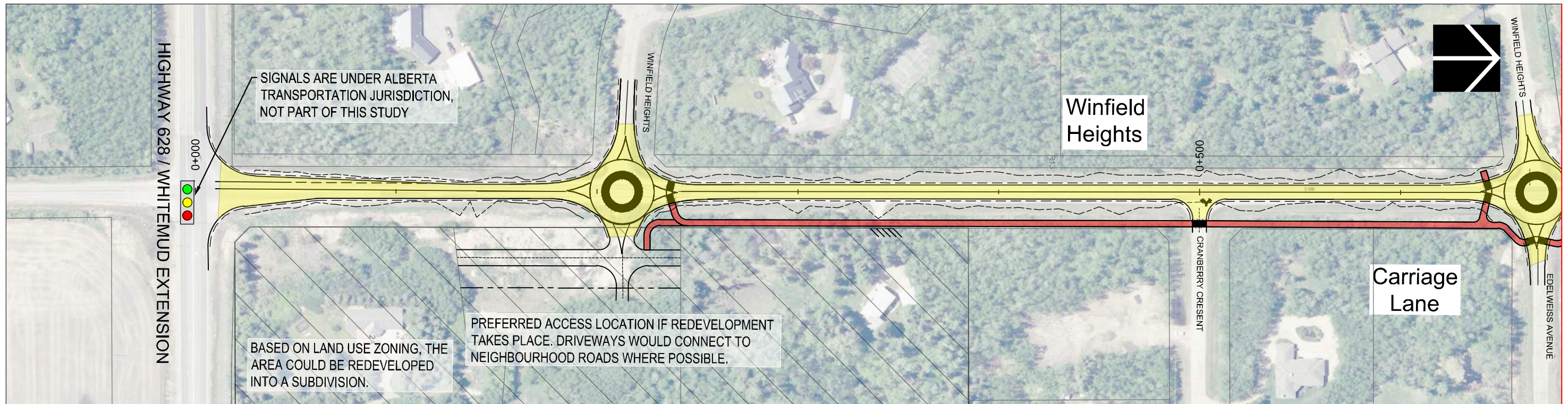
In the short-term it is recommended that the corridor be posted at 60 km/h at the ends of the corridor, and 80 km/h in the middle section. Transitions should occur north of East Whitecroft and the south access to Winfield Heights. As roundabouts are introduced in the long term, the posted speed in the middle section of the corridor will also be reduced to 60 km/h.

## 9.5 Stormwater Management

The following is a summary of proposed stormwater management concepts and mitigation measures proposed for both Range Road 232:

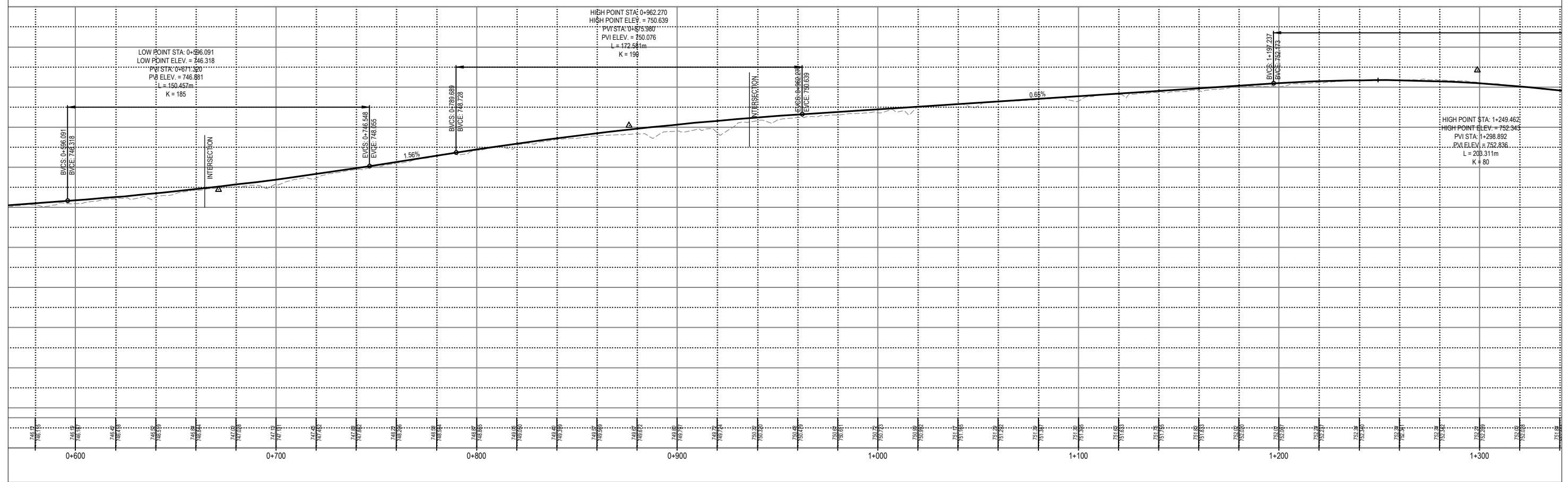
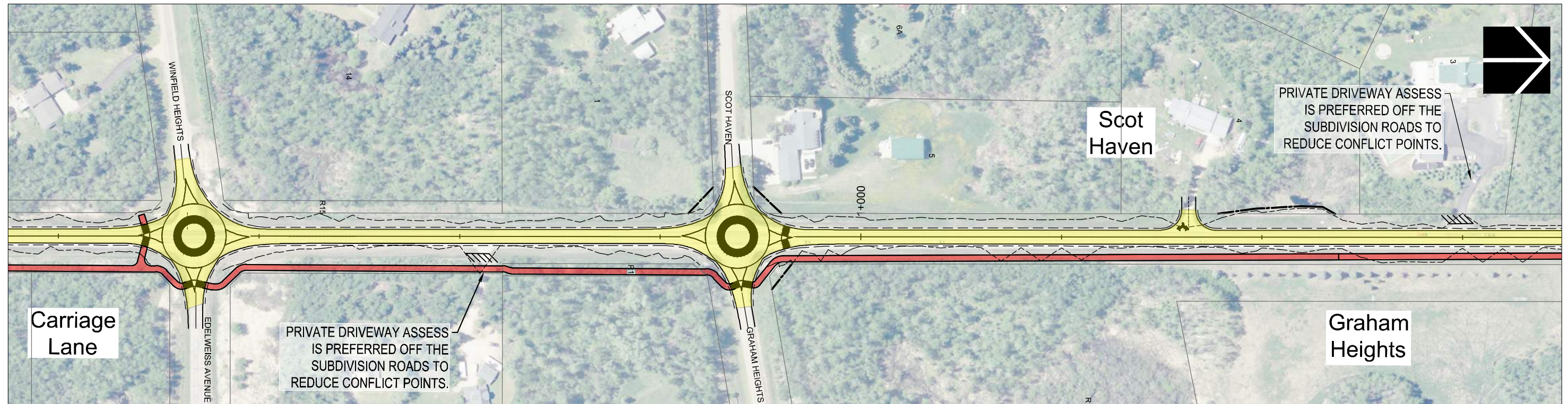
- Existing 600mm culvert at Highway 628 in the east ditch is undersized and causing ponding issues at the intersection. Upgrading the culvert to 800mm is recommended provided that the downstream system has adequate capacity for the additional flows. Assessment on the downstream capacity is recommended. If the downstream has limited capacity, the culvert can be upgraded to 700mm instead to reduce the increase in peak discharge. Larger ditch capacity upstream of the culvert may be needed to reduce the flow rate and the high water levels.





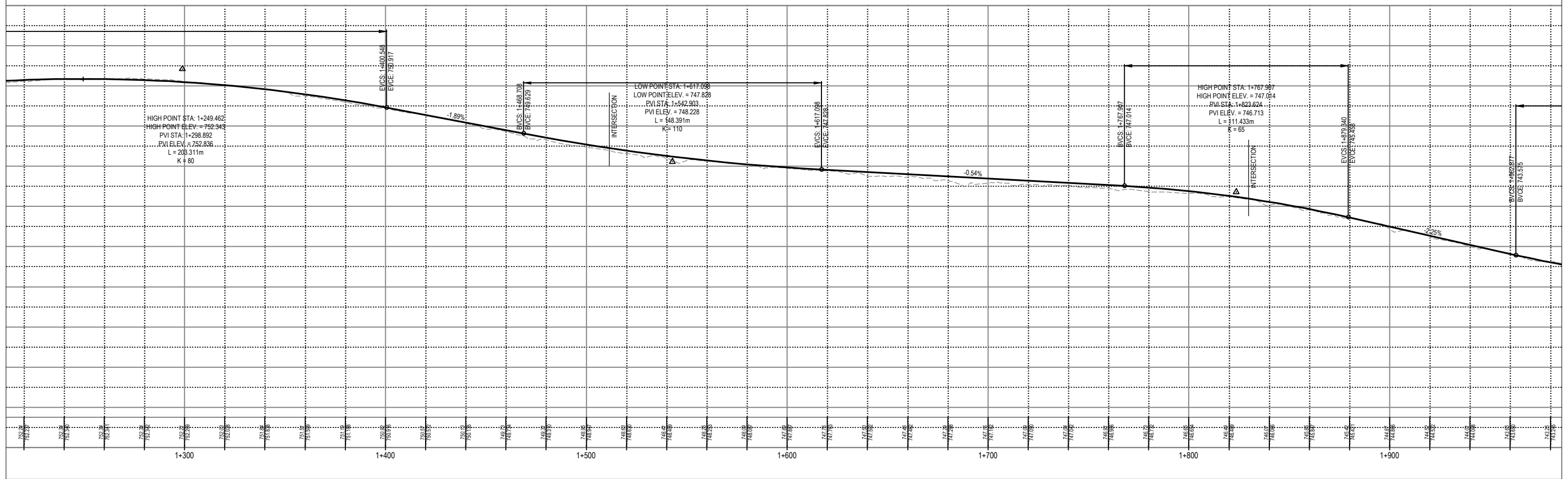
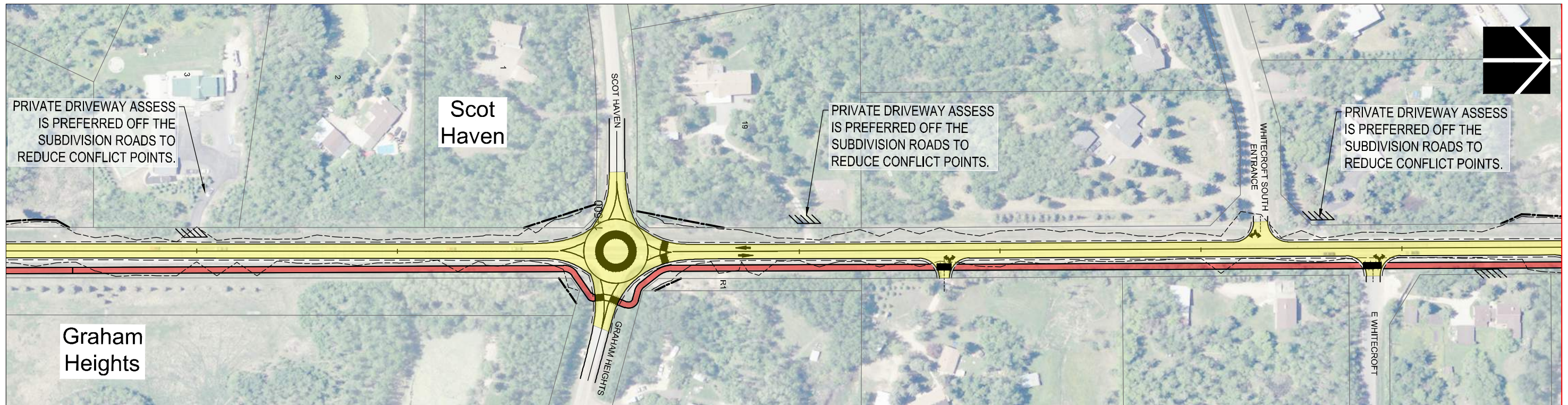
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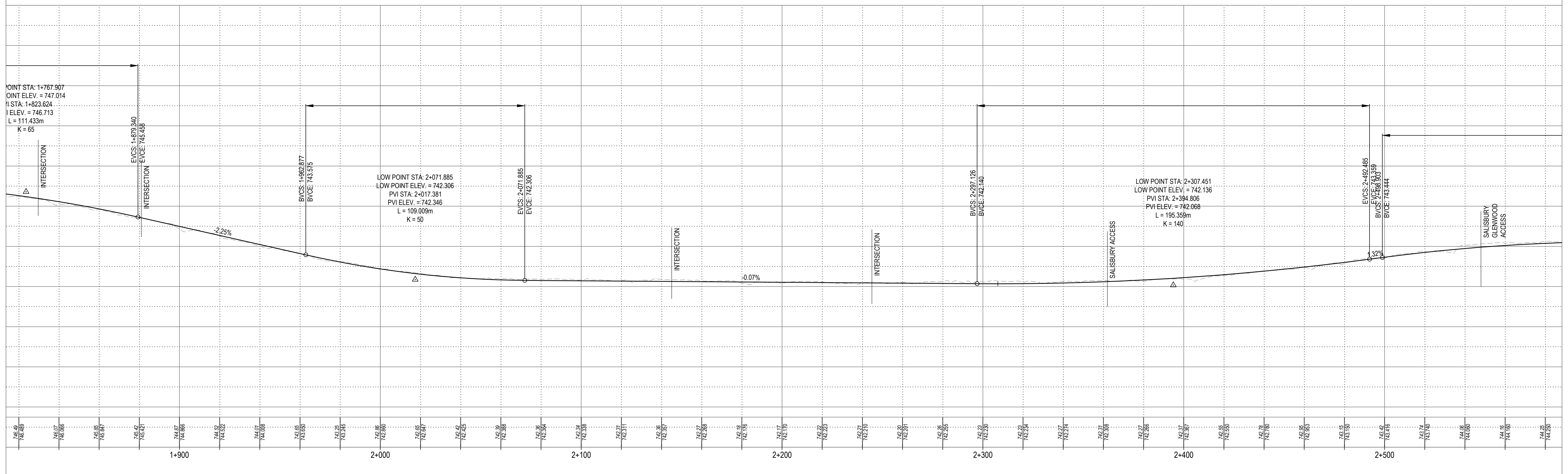
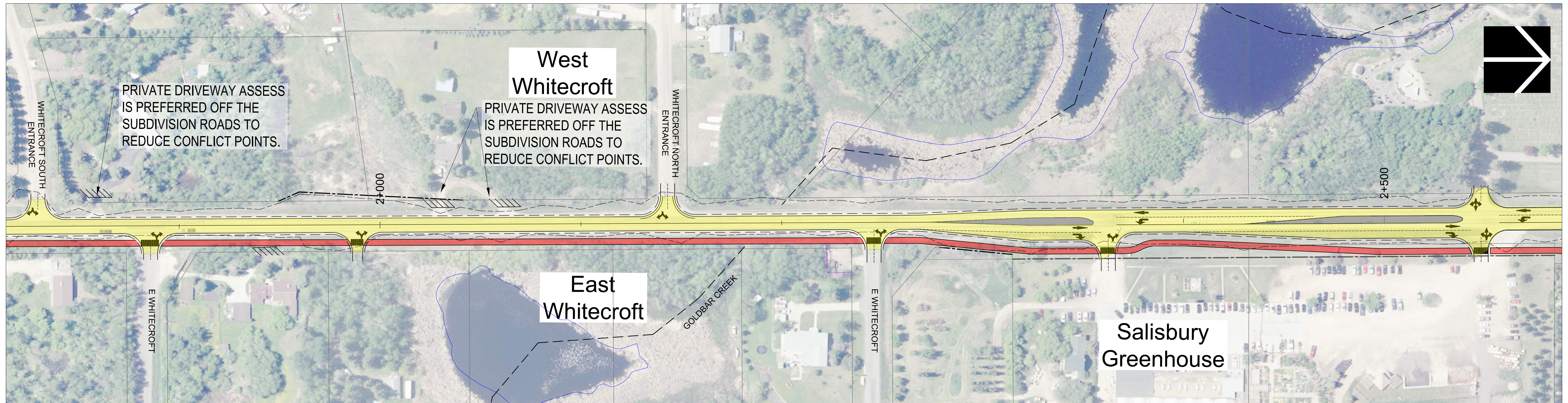
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- The west ditch south of the Winfield Heights south entrance is poorly graded and causing water to back up to the access road. Ditch regrading will be required to re-establish positive drainage towards Highway 628.
- Runoff in the northern most 150 m of the urban section will discharge to Wye Road. The minor flows (1:5-year) will be serviced by the storm sewer system on Wye Road. Storm sewer on Range Road 232 will not be needed in this section as the flows will be collected by future catch basins (as part of the Wye Road Widening project) at the intersection. A few pipe sections at the intersection, indicated on Exhibit 2.12 (in Section 2.7.2), will require an upgrade to prevent the system from surcharging. Major flows from the 150m will discharge to the major drainage system on Wye Road and follow the roadway profile to the downstream systems.
- The remaining 450 m of urban section will discharge through Outlets 4 and 5 to the treed area (east) and natural wetland (west). Due to surface constraints, all the minor flows conveyed through storm sewers along Range Road 232 will daylight at the natural wetland west of the roadway. Discharging the minor flows to the wetland rather than to the storm system on Wye Road will reduce the impact on the existing system and reduce the number of pipe upgrades required. The increase in peak flow to the wetland will not have a significant impact on the water levels.
- Pipe insulation will be required in wherever pipe cover is less than 2m (e. g. in the sections upstream of the daylighting location).
- Stormwater management integration into natural wetlands will require provincial approval at the design stage.

## 9.6 Utility Impacts

Several utilities such as overhead powerlines, high pressure and low-pressure natural gas lines, telecommunication trenches, and telecommunication pedestals are located along Range Road 232. Contact should be made with all the utility owners to confirm location and depth of the buried utilities and to ensure proper mitigation procedures.

There are 16 telecommunication pedestals located along the corridor and are within the right-of-way. Four of the pedestals are located along the west side of Range Road 232 in the area which is going to be urbanized (between station 2+600 and 3+200). One pedestal is on the east side of the road and is located next to the Salisbury Greenhouse south entrance and conflicts with the multi-use trail. There are four pedestals located between station 2+200 and 2+400 on the west side of the road that may conflict with the ditch regrading.

In addition to the telecommunication pedestals there are telecommunication trenches that may require relocation due to their proximity to the work area. Depths and location of the trenches need to be confirmed to determine if a relocation is required. Between Telus and Shaw there are four crossings between station 3+000 and 3+200, and with the proposed urbanization of that area will most likely require mitigation measures. One Telus and one Shaw trench run the entire length of the corridor on the west side of the road and may conflict with ditch regrading. Between station 0+000 and 2+300 there are 6 telecommunication trenches that cross under Range Road 232. Since the proposed road work from station 0+000 to 2+300 is shoulder widening the crossings may not require relocation if the depth of cover is maintained. Mitigation measures should be confirmed with the telecommunication provider.

Between station 1+500 and 3+200 there is approximately 1550 meters of overhead powerlines that is located within the road right-of-way and may conflict with road widening and ditch regrading. There are seven low-pressure natural gas pipeline crossings located between stations 0+000 and 2+600, and none are located within the proposed urbanization. Like the telecommunication trenches, the low-pressure natural gas crossings may not require relocation if a specified depth of cover is maintained. The utility provider would need to confirm the proper mitigation measures. An important note is that if relocation of the low-pressure natural gas pipelines is not required a crossing agreement will be required. There is a total of approximately 2000 meters of low-pressure pipelines within the work area.





There is no cost associated with relocating any telecommunications feature that is located within the road right-of-way. Any crossings, pedestals, and trenches that require relocation will be paid for by the telecommunication owner. The cost to relocate the overhead powerlines is estimated to be \$100,000 dollars per kilometer and for this corridor is estimated to total \$155,000 dollars. Costs for relocating the low-pressure natural gas pipelines is also estimated to be \$100,000 dollars per kilometer and would total \$200,000 for all of Range Road 232.

New country residential development or a local improvement to existing development may trigger the requirement of a potable water main installation along Range Road 232.

## 9.7 Environmental Issues

It is noted in the Environmental Overview in Appendix D that Range Road 232 crosses Goldbar Creek. Goldbar Creek at the crossing site is an Unmapped Class D waterbody, as it flows into the mapped section of Goldbar Creek. Being a Class D waterbody, no Restricted Activity Period is noted. Previous fisheries assessments located numerous non-sportfish species, including brook stickleback, fathead minnow, lake chub and spottail shiners in the watercourse.

The following are recommendations from the Environmental Overview:

- ISL recommends that wetlands considered reasonably permanent be submitted at the design phase to the Water Boundary Group at Alberta Environment and Parks for an Assessment of Permanence. This process can take approximately 12 months and must be completed before submission of a Water Act application.
- Water Act applications for wetlands are expected to be required for this Project; however, data for wetlands expires three years following fieldwork and therefore are not completed at a functional planning study level. To avoid repeating fieldwork, ISL recommends conducting wetland assessments approximately 1 - 2 years prior to construction to provide appropriate regulatory approval timelines.
- Any changes to the crossing of Goldbar Creek will require a Code of Practice notification, as well as a DFO self-assessment to ensure that the crossing does not impact fish and fish habitat.

## 9.8 Right-of-way Requirements

Along Range Road 232, the recommended plan identifies the need for property acquisition from parcels shown in Table 9.2. Refer to Appendix H for individual landownership plans (IOP's).

Table 9.2: Right-of-way Requirements for Range Road 232

Legal Land Description	Area Required (acre)
8720616 LOT 2	0. 327
8720616 LOT 1	0. 851
9424099	0. 030
9423847	0. 094
7921623 LOT 42	0. 016
8522457 LOT A	0. 229
7921623 LOT 41	0. 177
1892MC LOT 19	0. 015
1892MC LOT 27	0. 036
3856RS BLK 3 LOT 4	0. 035
3856RS BLK 1 LOT 1	0. 016
3856RS BLK 3 LOT 1	0. 047
3856RS BLK 3 LOT 5	0. 017
3856RS BLK 1 LOT 19	0. 039



Legal Land Description	Area Required (acre)
7620107 BLK 2 LOTR1	0. 028
7620107 BLK 3 LOT R1	0. 012
8821878 BLK 1 LOT 108MR	0. 082

For information purposes, landowners were contacted via personalized letter explaining that land would be required at some point in the future. Right-of-way requirements will be confirmed during the design phase of the project, and land acquisition would occur a year or two prior to construction.

Estimated costs for right-of-way acquisition are **\$845,650**.

## 9.9 Staging

The urban segment from Wye Road to Salisbury Greenhouse is anticipated to be completed in the short term based on intersection improvement requirements. Improvements along the remainder of the corridor will occur in the long term and is anticipated to occur from north to south, based on development demands.

It is anticipated that the construction for the short-term horizon at 2038 will include the following intersections:

- Estates Crescent
- Salisbury Village
- Estate Drive (Roundabout)

With these changes, the speed limit of 60 km/h should be retained for the north section of Range Road 232 and extended to south of the roundabout at Estate Drive. A speed limit of 60 km/h should also be applied for the south section of the corridor from Highway 628 to the south Winfield Heights access.

The trail should be constructed from Salisbury Village access to the Salisbury Greenhouse North access, as part of the short-term improvements anticipated in 2038.

It is anticipated that the construction for the long-term horizon at 2048 will include the following intersections:

- Salisbury Greenhouse North access
- Salisbury Greenhouse South access
- East Whitecroft North access
- West Whitecroft North access
- East Whitecroft South access
- West Whitecroft South access
- Scot Haven North / Graham Heights North access (Roundabout)
- Scot Haven North / Graham Heights South access (Roundabout)
- Winfield Heights North / Carriage Lane access (Roundabout)
- Carriage Lane South
- Winfield Heights / Carriage Lane New (Roundabout)

Along with the construction of the roundabouts, a speed limit of 60 km/h should be applied for the entire corridor. The remaining portion of the trail, from the Salisbury Greenhouse North access to the Winfield Heights South access, should also be constructed as part of the 2048 improvements.





## 9.10 Opinion of Probable Costs

Table 9.3 summarizes the opinion of probable costs for the Range Road 232 corridor.

Table 9.3: Range Road 232 Cost Estimate

		Short Term Stage		Ultimate (Long Term) Stage	
Cost Item	Unit Rate	Quantity	Cost	Quantity	Cost
Roadways					
Remove Existing Pavement Surface	\$16 / sq. m	10,200	\$163,200	0	\$0
Clearing and Grubbing	\$3. 5 / sq. m	4,900	\$17,150	10,300	\$36,050
Common Excavation	\$12 / m³	10,900	\$130,800	21,800	\$261,600
Waste Excavation	\$28 / m³	4,200	\$117,600	1,400	\$39,200
Borrow Excavation	\$40 / m³	0	\$0	0	\$0
Ditch Regrading	\$18 / m³	9,900	\$178,200	18,000	\$324,000
Waste Topsoil Excavation	\$28 / m³	3,300	\$92,400	6,600	\$184,800
Prepared Subgrade	\$5 / sq. m	7,900	\$39,500	11,300	\$56,500
Granular Base Course	\$100 / sq. m	3,800	\$380,000	1,000	\$100,000
Asphalt Concrete Pavement	\$65 / sq. m	18,100	\$1,176,500	4,500	\$292,500
Roundabout Construction	\$300,000 / EA	1	\$300,000	4	\$1,200,000
Seeding/ Topsoil	\$10 / sq. m	10,900	\$109,000	21,800	\$218,000
Concrete Curb and Gutter	\$90 / m	3,200	\$288,000	0	\$0
Concrete Curb Ramp	\$3000 / EA	8	\$24,000	11	\$33,000
3m Asphalt Multi-Use Trail	\$50 / sq. m	2,200	\$110,000	6,000	\$300,000
Access Closure / Relocation	\$11,000 / EA	1	\$11,000	7	\$77,000
Speed Limit and Pedestrian Crossing Signs	\$350 / EA	11	\$3,850	14	\$4,900
Paint lines	\$19 / m	1,400	\$26,600	5,600	\$106,400
Utilities					
Power Line Relocations - Overhead	\$100,000 / km	0.8	\$80,000	0.8	\$80,000
High Pressure Natural Gas Relocation	\$2,000,000 / km	2*	\$4,000,000		
Low Pressure Natural Gas Relocation	\$100,000 / km	0.2	\$20,000	1.8	\$180,000
Telecommunication Trench**	\$ -	2.4		5	
Telecommunication Pedestals**	\$ -	8		8	



		Short Term Stage		Ultimate (Long Term) Stage	
Cost Item	Unit Rate	Quantity	Cost	Quantity	Cost
Drainage					
Culverts	\$350 / m	0	\$0	12	\$4,200
Storm Pipe	\$400 / m	355	\$142,000	0	\$0
Catchbasin Leads	\$150 / m	120	\$18,000	0	\$0
Catchbasins	\$4,000 / EA	8	\$32,000	0	\$0
Storm Manholes	\$2000 / EA	3	\$6,000	0	\$0
Right-of-way					
Land Value	\$150,000 / acre	1.81	\$270,900	0.245	\$36,750
Damages			\$79,200		\$118,800
Incidental Costs			\$160,000		\$180,000
Total			\$7,976,000	Total	\$3,834,000
Contingency (15%)			\$1,197,000		\$576,000
Total with Contingency			\$9,173,000		\$4,410,000
Engineering (10%)			\$918,000		\$441,000
Total with Contingency and Engineering			\$10,091,000		\$4,851,000

The following notes apply to this cost estimate:

- \*Pipelines locations should be confirmed with utility provider. Utilities may not conflict if work remains in the Road Right-of-Way.
- \*\*Costs for telecommunications relocation will be responsibility of telecommunications provider as it is within road right-of-way.
- The right-of-way costs do not include expropriation costs as that would depend on the negotiations with each landowner.





## ■ 10.0 Engagement Wrap-up

### 10.1 Open House #3

Strathcona County held the final Open House for the Range Road 231 and 232 Functional Plan on May 16, 2019 to present the recommended plans for Range Roads 231 and 232 to the community. The open house was the final part of the consultation phase. Approximately 150 participants attended the open house and had the opportunity to review the recommended plans and speak directly to the project team. Residents also had the opportunity to review the recommended plans and the open house display board content online. An event evaluation form was made available and collected throughout the evening.

Feedback from the community was not required at this phase of engagement. The project team had designed this session to inform the public. However, feedback was given in the following categories:

- Overall satisfaction
- Recommendations for the study or recommended plans
- Feedback on the event and materials

There was significant support for the use of roundabouts as traffic control devices and to improve safety along the corridors. The project team also heard overwhelming support for the expansion of the trails along both Range Road 231 and 232.



## 11.0 Conclusions and Recommendations

### 11.1 Conclusions

The Functional Planning Report for Range Road 231 and 232 has been prepared by ISL Engineering to determine short- and long-term improvements for both corridors. The project aims included:

- Identifying the operational needs for the corridors and intersections as a result of growth in background traffic and future developments
- Understanding key issues identified by residents along each roadway and users of the corridor
- Addressing stormwater management requirements for each roadway
- Identifying land requirements for the short and long term horizons
- Expanding the trail network along each corridor
- Conducting desktop level studies of the geotechnical, environmental, and historical resources conditions in the study area

Within the engagement sessions for this project the following common themes arose:

- Many residents raised concerns with the speed limit being too high in sections with the 80 km/h speed limit, while there was also support for maintaining an 80 km/h speed limit.
- The support for roundabouts or traffic signals was roughly even within the community.
- Expanding the trail network southwards was a comment shared by many people throughout the engagement phases.

While traffic analysis concluded that no widening would be required for the corridor, some intersections did require upgrades to the existing traffic control to accommodate traffic for the 2038 and 2048 horizons. Though both roundabouts and traffic signals improved traffic operations, a decision was made by the project team to move forward with roundabouts, as they provided better safety outcomes than traffic signals, and were also more cost effective. A recommended plan was developed based on the roundabouts and shared with the Community at the third engagement session. The comments received indicated overall support from the community for recommended plans.

### 11.2 Recommendations

Detailed recommendations and plans for Range Road 231 and 232 have been shared in Section 8.0 and 9.0, respectively. Long-term recommendations resulting from this study have been summarized below:

#### Transportation

- It is recommended that prior to construction the County engage the Elk Island School Board and provide some education to ensure that drivers understand that during peak periods, when gaps may not be sufficient for the left turn onto Range Road 231, drivers have the option to turn right and complete a safe U-turn at the roundabout at the future Hillshire/Executive Estates north access.
- The decision to protect and plan for the 6-lane cross-section proposed by the Wye Road project should be reviewed prior to the design stage. Traffic forecasts do not require more than 4-lanes; however, it is recommended that traffic volumes be reviewed, and if the extra lanes are not required for capacity, then the plans should be altered to include a yield condition for the eastbound to southbound right turn off Wye Road, and only two (2) southbound lanes.
- Pedestrian crossings at Range Road 232 and the future Salisbury Village Access should be monitored to determine whether an Overhead Flashing Beacon is required at the crosswalk.
- At the design stage a review of animal collisions should be conducted.





### Stormwater Management

- Discussions with Alberta Transportation should be initiated to plan for a culvert at the Highway 628 and Range Road 231 intersection prior to the design stage.
- Discussions with Alberta Transportation should be initiated to upgrade the culvert at the Highway 628 and Range Road 232 intersection prior to the design stage.
- Stormwater management integration into natural wetlands will require provincial approval at the design stage.

### Environmental

- ISL recommends that wetlands considered reasonable permanent be submitted to the Water Boundary Group at Alberta Environment and Parks for an Assessment of Permanence. This process can take approximately 12 months and must be completed before submission of a *Water Act* application.
- Water Act applications for wetlands are expected to be required for the project; however, data for wetlands expires three years following fieldwork. To avoid repeating fieldwork, ISL recommends conducting wetland assessments 1-2 years prior to construction.
- Any changes to the crossing of Goldbar Creek will require a Code of Practice notification, as well as a DFO self-assessment to ensure that the crossing does not impact fish and fish habitat.

### Geotechnical

- The desktop study was based on widely spaced existing information and general knowledge of surface conditions in the area. A detailed geotechnical investigation will be required once a design option has been selected.

### Right-of-way

- For information purposes, landowners were contacted via personalized letter explaining that land would be required at some point in the future. Right-of-way requirements will be confirmed during the design phase of the project, and land acquisition would occur a year or two prior to construction.

## 11.3 Staging

### Range Road 231

The urban segment from Wye Road to the future Hillshire / Executive Estates north access (including the intersections for the Elk Island School Board, Strathcona Christian Academy, and the roundabout at Hillshire / Executive Estates north access) will be constructed in the short-term based on intersection improvement requirements. These improvements should include construction of the trail on the west side of the road.

With these changes, the speed limit of 60 km/h should be retained for the north section of Range Road 231 and extended to the south of the roundabout at Hillshire / Executive Estates north access. A speed limit of 60 km/h should also be applied for the south section of the corridor from Deer Mountain Trail to Highway 628.

Road and trail improvements along the remainder of the corridor will occur in the long term (by 2048) and is anticipated to occur from north to south, based on development demands. As roundabouts are added to the corridor, the speed limit should be reduced to 60 km/h.



### Range Road 232

The urban segment from Wye Road to Salisbury Greenhouse (including the intersections for Estates Crescent, Salisbury Village, and the roundabout at Estate Drive) will be constructed in the short-term based on intersection improvement requirements. These improvements should include construction of the trail on the east side of the road.

With these changes, the speed limit of 60 km/h should be retained for the north section of Range Road 232 and extended to the south of the roundabout at Estate Drive. A speed limit of 60 km/h should also be applied for the south section of the corridor from Deer Mountain Trail to Highway 628.

Road and trail improvements along the remainder of the corridor will occur in the long term (by 2048) and is anticipated to occur from north to south, based on development demands. As roundabouts are added to the corridor, the speed limit should be reduced to 60 km/h.