



**RR 233 FUNCTIONAL PLANNING  
STUDY FINAL REPORT**

**OCTOBER 30, 2008**

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## RANGE ROAD 233 FUNCTIONAL PLANNING STUDY SUMMARY REPORT

### 1.0 INTRODUCTION

#### 1.1 *Study Area*

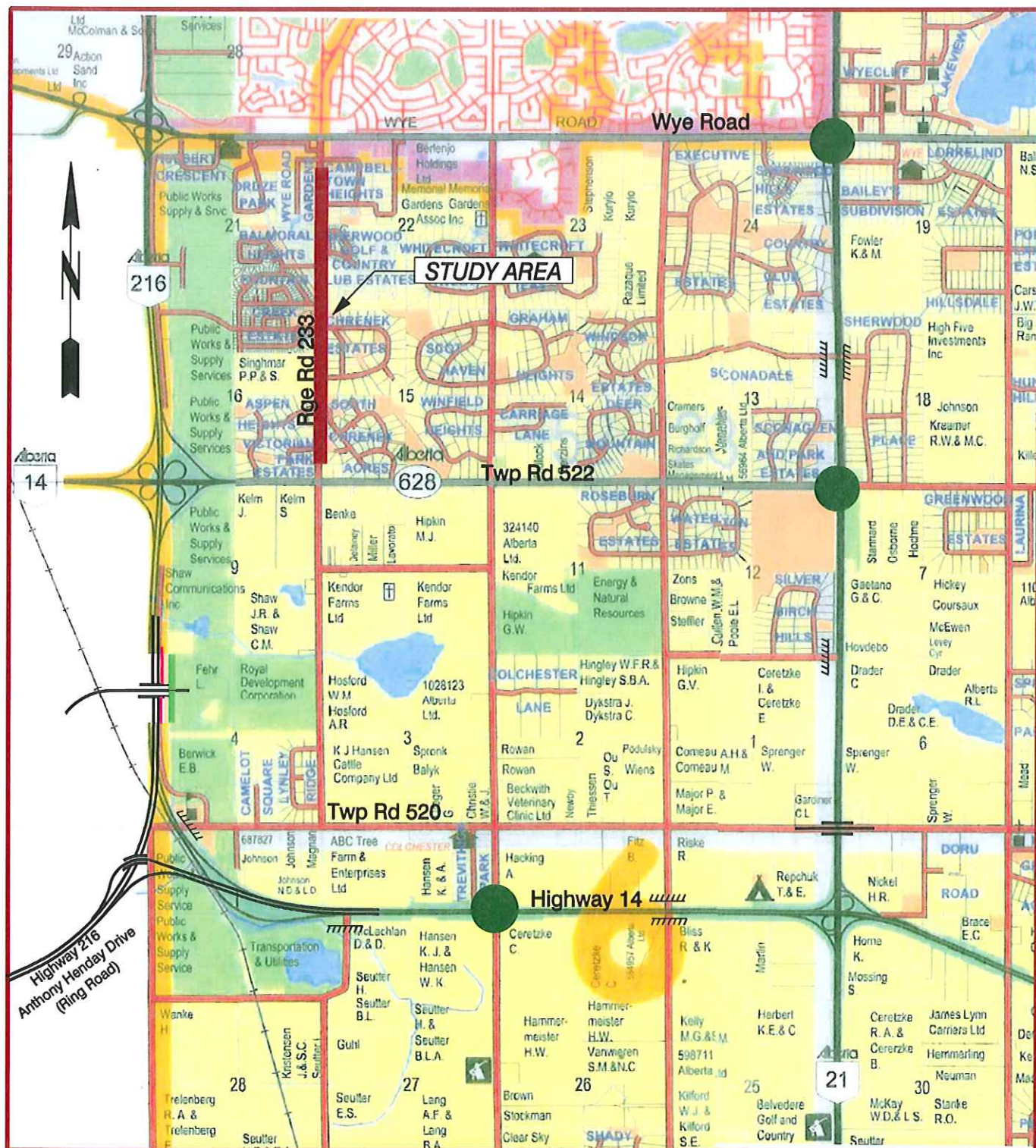
The study is of Range Road 233 on the west side of Sherwood Park, south of Wye Road. The study extends from Wallace Drive to Highway 628. **Exhibit 1 – Key Map** shows the study area.

#### 1.2 *Background and Objective*

Al-Terra Engineering was initially retained to evaluate whether roundabout intersections would manage the traffic demand on Range Road 233 as well as, or better than, conventional intersection treatments with road widening. The analysis indicated that a two lane roadway with single lane roundabouts would meet the traffic demand for build out of areas adjacent to Range Road 233, including background traffic growth and in fact would function at a superior Level of Service (LOS) with less overall delay than a two lane roadway with conventional signalized intersections. However, a possible Urban Growth Node located south of Highway 628 would generate additional traffic on Range Road 233 requiring a four lane roadway with two lane roundabouts to maintain a Level of Service similar or better than a four lane roadway with conventional signalized intersections. Due to the uncertainty of the growth node, it was concluded that a two lane roadway with single lane roundabout intersections would be a feasible approach to upgrading of Range Road 233, however right-of-way would be protected to facilitate future upgrading to four lanes with either conventional signalized intersection treatment or two lane roundabouts.

Based on the findings of the initial work, Al-Terra was retained to provide an update to the Range Road 233 Functional Planning Study based on the two lane roadway with single lane roundabout intersection concept. In view of the potential long term requirements for upgrading to four lanes, the current functional planning was developed with a view to cost effective long term widening to four lanes.

The conclusions and recommendations resulting from the traffic and intersection analyses completed on Wye Road between Ordze Crescent and Hawthorne Street and on Sherwood Drive between Fir Street and Wallace Drive, completed as per the proposal, have been excluded from this summary report. Al-Terra has been retained by Strathcona County to complete a Functional Planning Study of Wye Road, where the findings are more appropriately summarized.



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## **2.0 EXISTING CONDITIONS**

### *2.1 Road Network*

Range Road 233 connects Wye Road to Highway 628 on the west side of Sherwood Park. North of Wye Road, the road provides access to the business developments on both sides of the roadway, and a circuitous connection to Baseline Road. South of Highway 628, Range Road 233 provides access to several acreage subdivisions. There is no connection from Range Road 233 to Highway 14 or Anthony Henday Drive.

### *2.2 Existing Geometry*

Range Road 233 is currently a two-lane undivided roadway with stop control on the minor legs of all intersections. Adjacent residents perceive that they have poor access into and long delays exiting their neighborhoods. The posted speed limit is 70 km/hr, recently reduced from 80 km/hr, per the 2004 Earth-Tech Functional Planning Study Recommendations. Through traffic often exceeds the posted speed limit. Range Road 233 is intended to function as a minor arterial, operating at lower speeds and providing good local access.

### *2.3 Land Use*

The adjacent land to Range Road 233 is Subdivision Estates and Country Residential. Residential lots vary from 0.3 acres to 5 acre parcels with one remaining 80 acre parcel privately owned on the west side of the road. Build-out of all adjacent residential properties is anticipated to be completed by 2012.

### *2.4 Existing Traffic*

Range Road 233 does not connect to Highway 14 or the Anthony Henday and therefore primarily serves the local residents. There is not a significant amount of through background traffic on the roadway.

## **3.0 FUTURE TRAFFIC PROJECTIONS AND ANALYSES**

Subsequent to the 2004 Earth-Tec Functional Planning Study Al-Terra was retained by Strathcona County to review the functionality of roundabout intersections rather than conventional intersection improvements with signals on Range Road 233. The findings of that study are summarized below and provided as supplemental background information.

### *3.1 Study Horizons & Traffic Projections*

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The primary study horizon was 2012, when it is assumed that all neighborhoods adjacent to Range Road 233 between Wye Road and Highway 628 will have fully developed. The background traffic growth and trip destinations were based on the Strathcona County Regional Transportation Model. The Daily Traffic Estimate for the 2012 Horizon is shown on **Exhibit 2**.

The second study horizon was longer term, and included traffic from a possible future development along Range Road 233 south of Highway 628. The purpose was to study how the road would function in the event an Urban Growth Node was constructed south of Highway 628. The scenario is purely speculative as the location of the Urban Growth Node is currently undecided. The Daily Traffic Estimate for the Urban Growth Node Horizon is shown on **Exhibit 3**.

### *3.2 Improvement Options & Analyses*

Using projected 2012 volumes and long-term estimated future traffic forecasts, Traffic Operations were analyzed for four roadway options:

- Two lane road with turning lanes and signals as required
- Two lane road with roundabouts at major intersections
- Four lane road with turning lanes and signals as required
- Four lane road with two lane roundabouts at major intersections

The findings are summarized in **Table 1 – Network Performance Operational Parameters Summary**. Table 1 provides a comparative analysis of the road network under AM Peak traffic conditions. Definitions of the terms used in the Table are included in **Appendix 1**.

#### *3.2.1 Analysis 1 - Two Lane Roadway with Signals vs. Roundabouts*

##### **Option 1A**

Two Lane Roadway with Turning Lanes and Signalized Intersections as Required

Traffic Horizon 2012

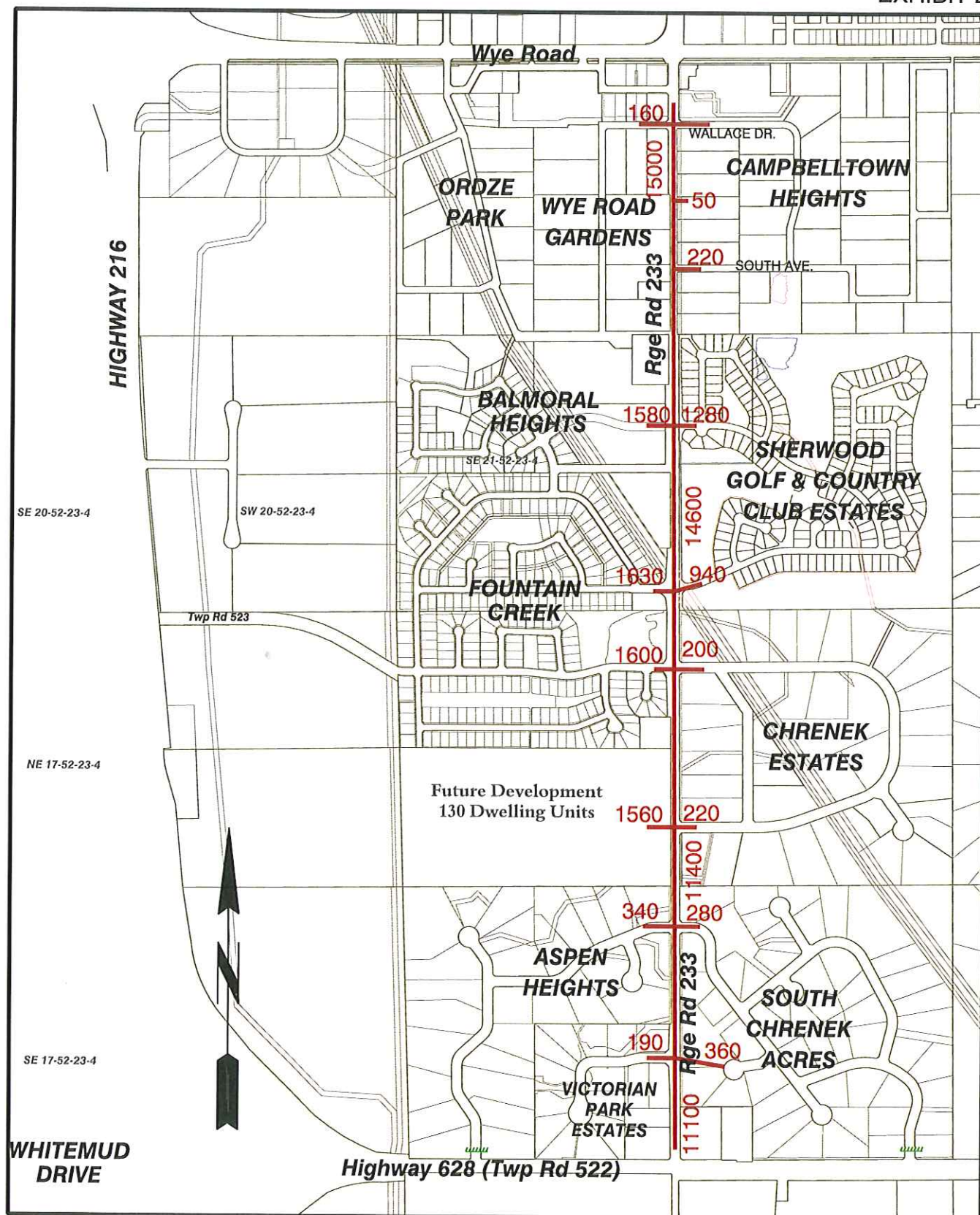
This scenario assumes the intersections from the south entrance to Chrenek Estates to the Balmoral Heights entrance are signalized with dedicated left turn lanes in all quadrants, and dedicated right turn lanes on Range Road 233. The remaining intersections are stop controlled.

##### **Option 1B**

Two Lane Roadway with Roundabouts

Traffic Horizon 2012

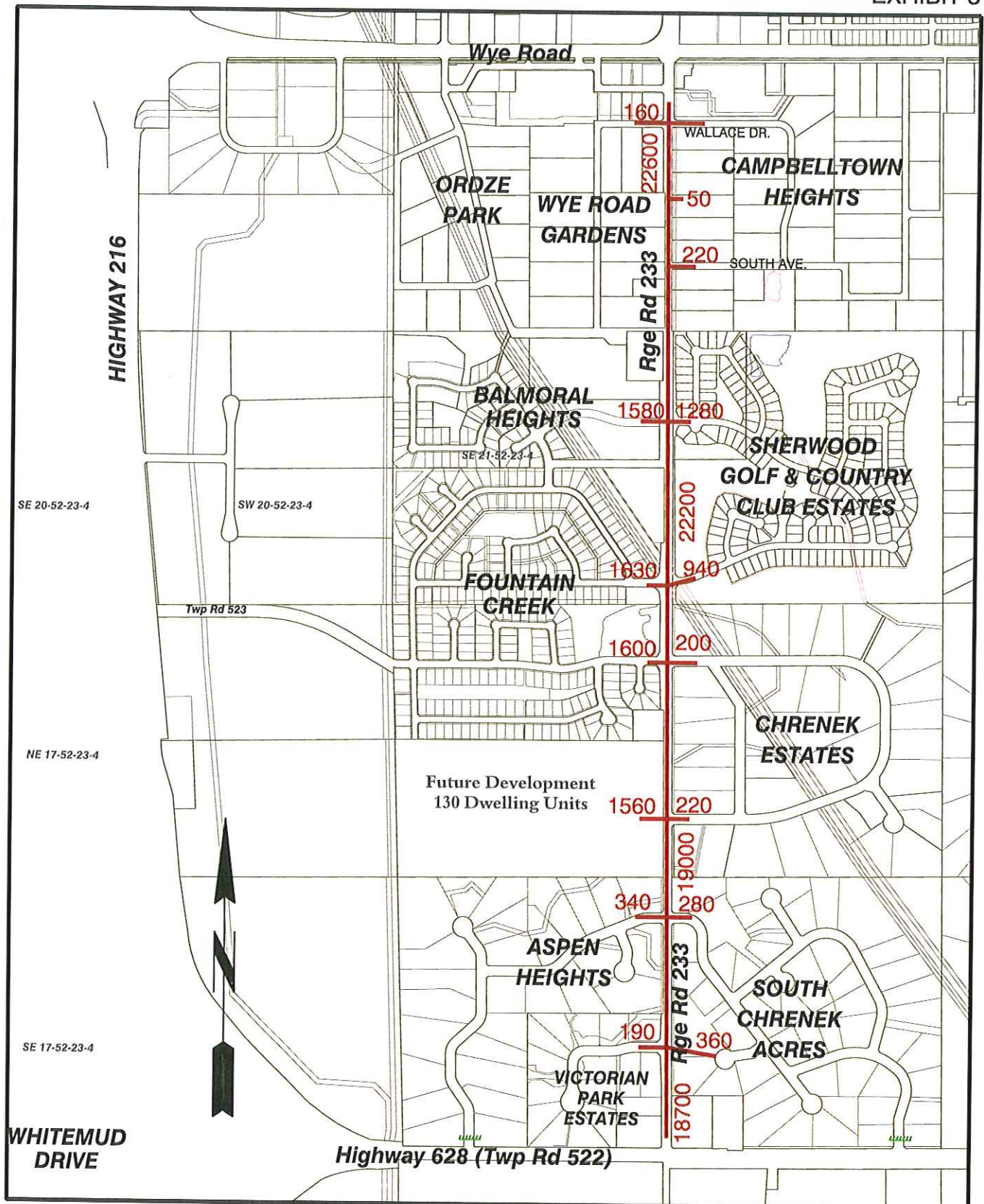
This scenario assumes the intersections from the south entrance to Chrenek Estates to the Balmoral Heights entrance are single lane roundabouts. The remaining intersections are stop controlled



RGE RD 233 IN STRATHCONA COUNTY  
N. OF HIGHWAY 628 TO S. OF ORDZE ROAD  
TRAFFIC ACCOMMODATION OPTIONS

DAILY TRAFFIC ESTIMATE  
(YEAR 2012 HORIZON)

NTS FEBRUARY, 2006



RGE RD 233 IN STRATHCONA COUNTY  
 N. OF HIGHWAY 628 TO S. OF ORDZE ROAD  
 TRAFFIC ACCOMMODATION OPTIONS  
 DAILY TRAFFIC ESTIMATE  
 (YEAR 2012 HORIZON + URBAN GROWTH NODE)

NTS FEBRUARY, 2006

**RR 233 - North of Hwy 628 to S. of Ordze Road**  
**Traffic Accommodation Assessment**  
**Network Performance - Operational Parameters Summary**

TABLE 1

Intersection	Network	Victorian Park Estates	Aspen Drive (W)/Chrenek (S) Int.	Future Development/C hrenek Drive (South Int.)	Chrenek Dr.(N)/Fountain Creek Blvd. Int.	Fountain Creek Way/ Sherwood Golf Estates	Balmoral Dr./ Sherwood Golf Estates	South Avenue	Service Road Intersection	Wallace Drive
<b>2 lanes - Signals Year 2012</b>		Stop Control	Stop Control	Signals	Signals	Signals	Signals	Stop Control	Stop Control	Stop Control
Total Delay	13.3 hr	0.6 hr	0.5 hr	1.5 hr	1.6 hr	2.5 hr	3.5 hr	1.1 hr	0.4 hr	0.6 hr
Intersection Average Delay	30.8 s/veh	2.3 s/veh	2.1 s/veh	5.4 s/veh	5.5 s/veh	7.7 s/veh	9.6 s/veh	3.0 s/veh	1.1 s/veh	1.6 s/veh
LOS		LOS A	LOS A	LOS A	LOS A	LOS A	LOS A	LOS A	LOS A	LOS A
Average Speed	57 km/h	61 km/h	67 km/h	55 km/h	41 km/h	49 km/h	50 km/h	65 km/h	69 km/h	56 km/h
Critical Movement Average Delay		13.6 s/veh	11.5 s/veh	43.7 s/veh	28.0 s/veh	29.2 s/veh	23.7 s/veh	15.6 s/veh	2.0 s/veh	9.5 s/veh
LOS - Critical Movement		LOS B	LOS B	LOS D	LOS C	LOS C	LOS C	LOS C	LOS A	LOS A
<b>Roundabouts Year 2012</b>		Stop Control	Stop Control	Yield Control	Yield Control	Yield Control	Yield Control	Stop Control	Stop Control	Stop Control
Total Delay	13.3 hr	0.5 hr	0.4 hr	2.3 hr	2.3 hr	2.6 hr	3.3 hr	0.7 hr	0.4 hr	0.5 hr
Average Delay	30.5 s/veh	1.8 s/veh	1.3 s/veh	7.9 s/veh	7.8 s/veh	7.9 s/veh	9.2 s/veh	2.1 s/veh	1.0 s/veh	1.5 s/veh
LOS		LOS A	LOS A	LOS A	LOS A	LOS A	LOS A	LOS A	LOS A	LOS A
Average Speed	53 km/h	63 km/h	63 km/h	47 km/h	43 km/h	43 km/h	48 km/h	62 km/h	69 km/h	57 km/h
Critical Movement Average Delay		9.3 s/veh	7.7 s/veh	8.7 s/veh	8.9 s/veh	9.3 s/veh	10.4 s/veh	5.3 s/veh	8.2 s/veh	7.9 s/veh
LOS - Critical Movement		LOS A	LOS A	LOS A	LOS A	LOS A	LOS B	LOS A	LOS A	LOS A
<b>2 lanes Signals Year 2012 +Node #2</b>		Signals	Signals	Signals	Signals	Signals	Signals	Signals	Signals	Signals
Total Delay	54.8 hr	3.1 hr	3.6 hr	5.3 hr	5.0 hr	9.1 hr	10.8 hr	4.8 hr	1.6 hr	6.5 hr
Average Delay	78.2 s/veh	6.0 s/veh	7.0 s/veh	9.9 s/veh	9.0 s/veh	15.5 s/veh	17.4 s/veh	7.8 s/veh	2.6 s/veh	10.7 s/veh
LOS		LOS A	LOS A	LOS A	LOS A	LOS B	LOS B	LOS A	LOS A	LOS B
Average Speed	48 km/h	52 km/h	55 km/h	46 km/h	32 km/h	37 km/h	42 km/h	58 km/h	62 km/h	48 km/h
Critical Movement Average Delay		49.1 s/veh	123.8 s/veh	55.1 s/veh	64.4 s/veh	67.8 s/veh	96.7 s/veh	51.9 s/veh	70.8 s/veh	47.8 s/veh
LOS - Critical Movement		LOS D	LOS F	LOS D	LOS E	LOS E	LOS F	LOS D	LOS E	LOS D
<b>2 lanes Roundabouts Year 2012 + Node # 2</b>		Yield Control	Yield Control	Yield Control	Yield Control	Yield Control	Yield Control	Yield Control	Yield Control	Yield Control
Total Delay	102.6 hr	6.4 hr	5.9 hr	5.9 hr	7.3 hr	8.1 hr	12.1 hr	30.2 hr	6.1 hr	20.6 hr
Average Delay	149.8 s/veh	12.7 s/veh	11.4 s/veh	10.8 s/veh	13.1 s/veh	13.8 s/veh	19.4 s/veh	50.2 s/veh	10.1 s/veh	37.8 s/veh
LOS		LOS B	LOS B	LOS B	LOS B	LOS B	LOS D	LOS B	LOS F	LOS E
Average Speed	35.8 km/h	36 km/h	39 km/h	39 km/h	39 km/h	37 km/h	38 km/h	35 km/h	30 km/h	29 km/h
Critical Movement Average Delay		14.9 s/veh	13.1 s/veh	11.8 s/veh	18.7 s/veh	16.6 s/veh	25.8 s/veh	73.8 s/veh	11.4 s/veh	61.8 s/veh
LOS - Critical Movement		LOS C	LOS C	LOS C	LOS D	LOS D	LOS E	LOS E	LOS E	LOS F
<b>4 lanes Signals Year 2012 +Node #2</b>		Signals	Signals	Signals	Signals	Signals	Signals	Signals	Stop Control	Signals
Total Delay	19.2 hr	1.0 hr	1.1 hr	2.0 hr	2.4 hr	4.1 hr	4.2 hr	1.5 hr	0.4 hr	0.8 hr
Average Delay	27.1 s/veh	2.0 s/veh	2.2 s/veh	3.8 s/veh	4.3 s/veh	6.9 s/veh	6.8 s/veh	2.5 s/veh	0.7 s/veh	1.4 s/veh
LOS		LOS A	LOS A	LOS A	LOS A	LOS A	LOS A	LOS A	6.4	LOS A
Average Speed	61 km/h	59 km/h	69 km/h	61 km/h	45 km/h	51 km/h	57 km/h	68 km/h	72 km/h	57 km/h
Critical Movement Average Delay		36.1 s/veh	33.4 s/veh	27.5 s/veh	29.4 s/veh	27.1 s/veh	27.4 s/veh	28.3 s/veh	19.0 s/veh	12.5 s/veh
LOS - Critical Movement		LOS D	LOS C	LOS C	LOS C	LOS C	LOS C	LOS C	LOS B	LOS B
<b>4 lanes Roundabouts Year 2012 + Node # 2</b>		Yield Control	Yield Control	Yield Control	Yield Control	Yield Control	Yield Control	Yield Control	Stop Control	Yield Control
Total Delay	48.3 hr	6.2 hr	6.6 hr	4.1 hr	4.6 hr	4.5 hr	5.6 hr	5.5 hr	1.1 hr	9.9 hr
Average Delay	69.3 s/veh	11.9 s/veh	12.5 s/veh	7.6 s/veh	8.2 s/veh	7.7 s/veh	8.9 s/veh	9.0 s/veh	1.9 s/veh	16.5 s/veh
LOS		LOS B	LOS B	LOS A	LOS A	LOS A	LOS A	LOS A	LOS A	LOS C
Average Speed	41.0 km/h	36 km/h	40 km/h	42 km/h	44 km/h	43 km/h	46 km/h	45 km/h	42 km/h	24 km/h
Critical Movement Average Delay		38.1 s/veh	16.4 s/veh	7.9 s/veh	9.4 s/veh	8.1 s/veh	10.5 s/veh	22.6 s/veh	16.4 s/veh	43.6 s/veh
LOS - Critical Movement		LOS E	LOS C	LOS A	LOS A	LOS A	LOS B	LOS C	LOS C	LOS E

Comparison of AM Peak Volume Traffic

The analysis shows that total delays, average vehicle delays and average speed, for the two lane signalized versus the two lane road with roundabout option are very similar under 2012 traffic projections. The Level of Service (LOS) for the road network with roundabout shows a higher level of service is provided overall as delays for the critical movements at the intersections is much lower with roundabouts. This is due to the fact that signalized intersections stop local access traffic regardless of the traffic flow on the through roadway, whereas with roundabouts, vehicles on the local access road are only required to stop until it is safe to proceed. As well, in off-peak times roundabouts provide continuous traffic flow on Range Road 233, whereas signals will stop traffic regardless of whether there is a need. The two lane roadway system with roundabouts also has greater benefits when the severity of collisions, overall safety and cost implications are considered.

### *3.2.2 Analysis 2 – Two Lane Roadway with Signals vs. Roundabouts with Urban Growth Node South of Highway 628*

#### *Option 2A*

Two Lane Roadway with Turning Lanes and Signalized Intersections as Required  
Traffic Horizon 2012 with Urban Growth Node

The introduction of an Urban Growth Node south of Highway 628 assumes all intersections along Range Road 233 would be signalized.

#### *Option 2B*

Two Lane Roadway with Roundabouts  
Traffic Horizon 2012 with Urban Growth Node

The introduction of an Urban Growth Node south of Highway 628 assumes all intersections along Range Road 233 would be roundabouts.

The analysis shows that the introduction of an Urban Growth Node south of Highway 628 significantly increases the total delays and average vehicle delays for both the signalized and roundabout roadway options. The Urban Growth Node has the potential to increase through traffic on Range Road 233 such that the lane capacity is compromised regardless of intersectional treatments. However, it is again important to note that the analysis was completed for AM Peak traffic Volumes, and in off-peak hours the roundabout will provide a better Level of Service for the through traffic, and better local access at all times.

### *3.2.3 Analysis 3 – Four Lane Roadway with Signals vs. Roundabouts with Urban Growth Node South of Highway 628*

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This analysis evaluated the improvement to Range Road 233 functionality under the 2012 traffic and Urban Growth Node Traffic conditions if widened to a four lane cross-section either with signals or two-lane roundabouts. It is important to note the Urban Growth Node is only a possibility, no firm plans have been implemented to date to indicate where the next Urban Growth Node will be located or even if one will be constructed. However an evaluation was requested to determine which long term improvement would provide the greatest benefit in order to establish long term right-of-way acquirement / protection goals.

#### Option 3A

Four Lane Roadway with Turning Lanes and Signalized Intersections as Required

Traffic Horizon 2012 with Urban Growth Node

The analysis assumes Range Road 233 to be a four lane roadway with dedicated right and left turn lanes. All intersections would be signalized except the Service Road intersection north of South Avenue which would be stop controlled on the local access.

#### Option 3B

Four Lane Roadway with Two Lane Roundabouts

Traffic Horizon 2012 with Urban Growth Node

The analysis assumes Range Road 233 to be a four lane roadway with two lane roundabouts at all intersections except the Service Road intersection north of South Avenue which would be stop controlled on the local access.

The analysis shows that with the implementation of four lanes and signals, the through traffic on Range Road 233 is better served in the AM Peak Volumes, but local access is impeded more than if the intersections were roundabouts. The four lane roadway with two lane roundabouts provides better local access, which is the intent of a local arterial, and through traffic would not be required to stop at the intersections in off-peak hours.

### 3.3 *Traffic Study Conclusions*

The traffic study confirmed that a two lane roadway with roundabout intersections would provide a good level of service for the projected build-out along Range Road 233 and provide a higher level of safety as well as cost savings over conventional signalized intersections. Without the Urban Growth Node, the two lane roadway will continue to function at a high level of service for 20+ years using the Strathcona County projected rate of background traffic growth.

As recommended in the 2004 Earth-Tec report right-of-way acquisition should continue to protect a 45.0m right-of-way in case the long term development strategies of Strathcona County require Range Road 233 to be upgraded to four lanes.

## 4.0 FUNCTIONAL PLANNING

### 4.1 *Cross-Section*

Based on the conclusions of the initial Traffic Study, Range Road 233 is proposed to be upgraded to a two lane rural roadway with 1.8m shoulder for the southbound lanes and 2.5m shoulder on the northbound lanes. Single lane roundabouts are proposed as intersection treatments (see **Exhibit 4 – Key Map**). Between Wallace Drive and South Avenue, Range Road 233 will be a four lane divided arterial matching with the Functional Planning of Wye Road and the proposed all-directional intersection at Wallace Drive.

### 4.2 *Side of Widening*

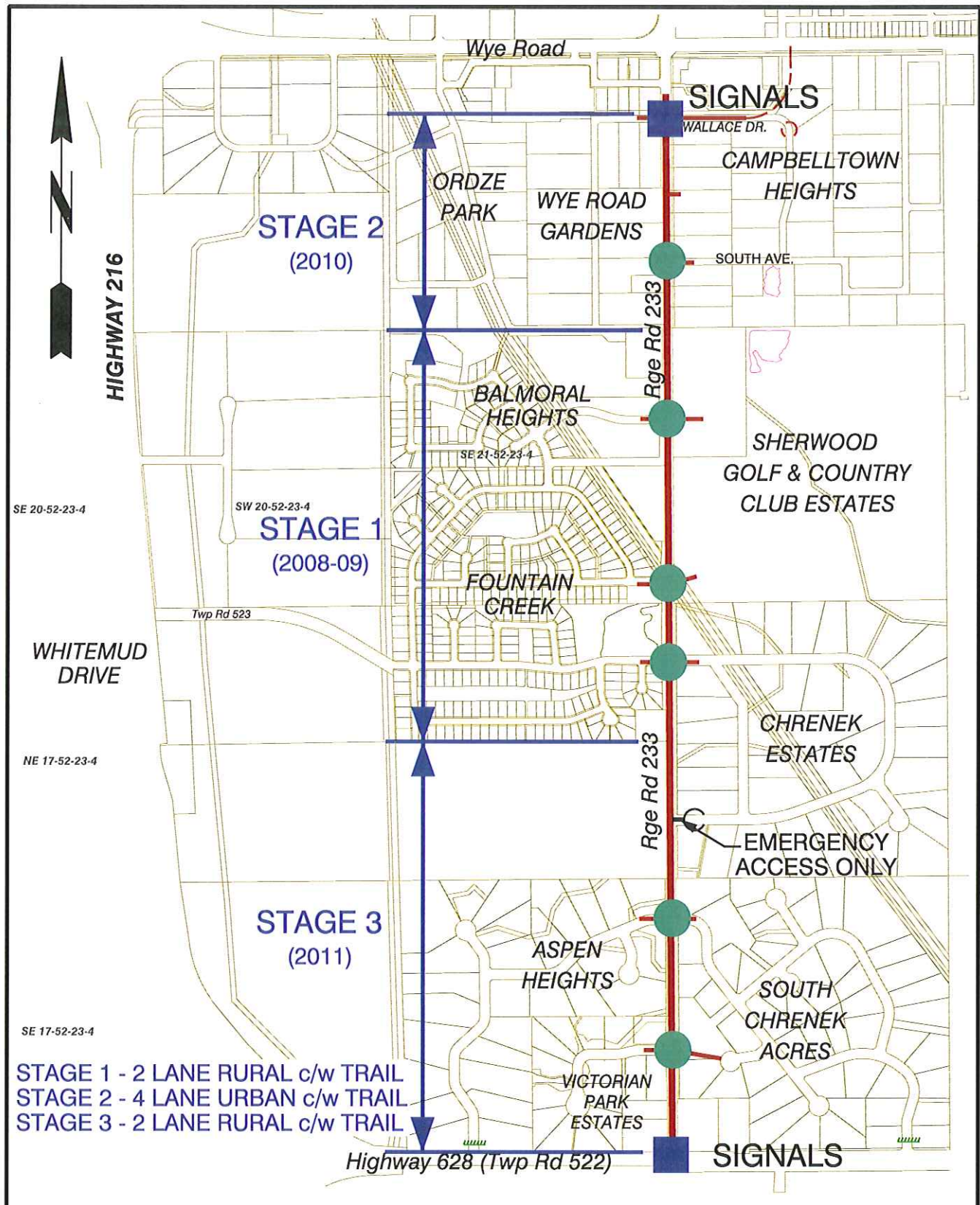
Range Road 233 is currently an 8.8m two lane rural road. The initial upgrading will require the road to be widened approximately 3.1m. The side of widening was determined by evaluation of long-term “throw-away” costs. Should the Urban Growth Node be constructed to the south and Range Road widened to four lanes, west side widening constructs the southbound lanes of the ultimate four lane roadway at this time. East side widening would in the future be almost entirely “throw-away” because of the median construction. As well, the consequence of west side widening is that in the future only one side of the roadway (the east side) has to be significantly disturbed.

### 4.3 *Centerline Shift*

The west side widening and identification of wider shoulders on Range Road 233 results in the new centerline of the road being 2.0m west of the existing centerline. The crown of the road is not planned at this time to be shifted to the new centerline. Therefore, the crown of the road will be in the center of the northbound lane. This is not anticipated to cause any problems with operation except for perhaps large trucks completing passing movements. However, with the spacing of the roundabout intersections and expected through traffic volumes, passing movements are not anticipated and should be prohibited through line painting. The west side widening and centerline shift are illustrated on **Exhibit 5 – Typical Cross-Section Widening to West**.

### 4.3 *Horizontal and Vertical Alignment*

Generally, the alignment of Range Road 233 will remain as existing. Widening on the west side is proposed for the two-lane roundabout stage. Due to the proximity of the man made pond on the west side of Range Road 233, south of Fountain Creek, alternative road widening / cross-sections were investigated in this section. Widening on the west



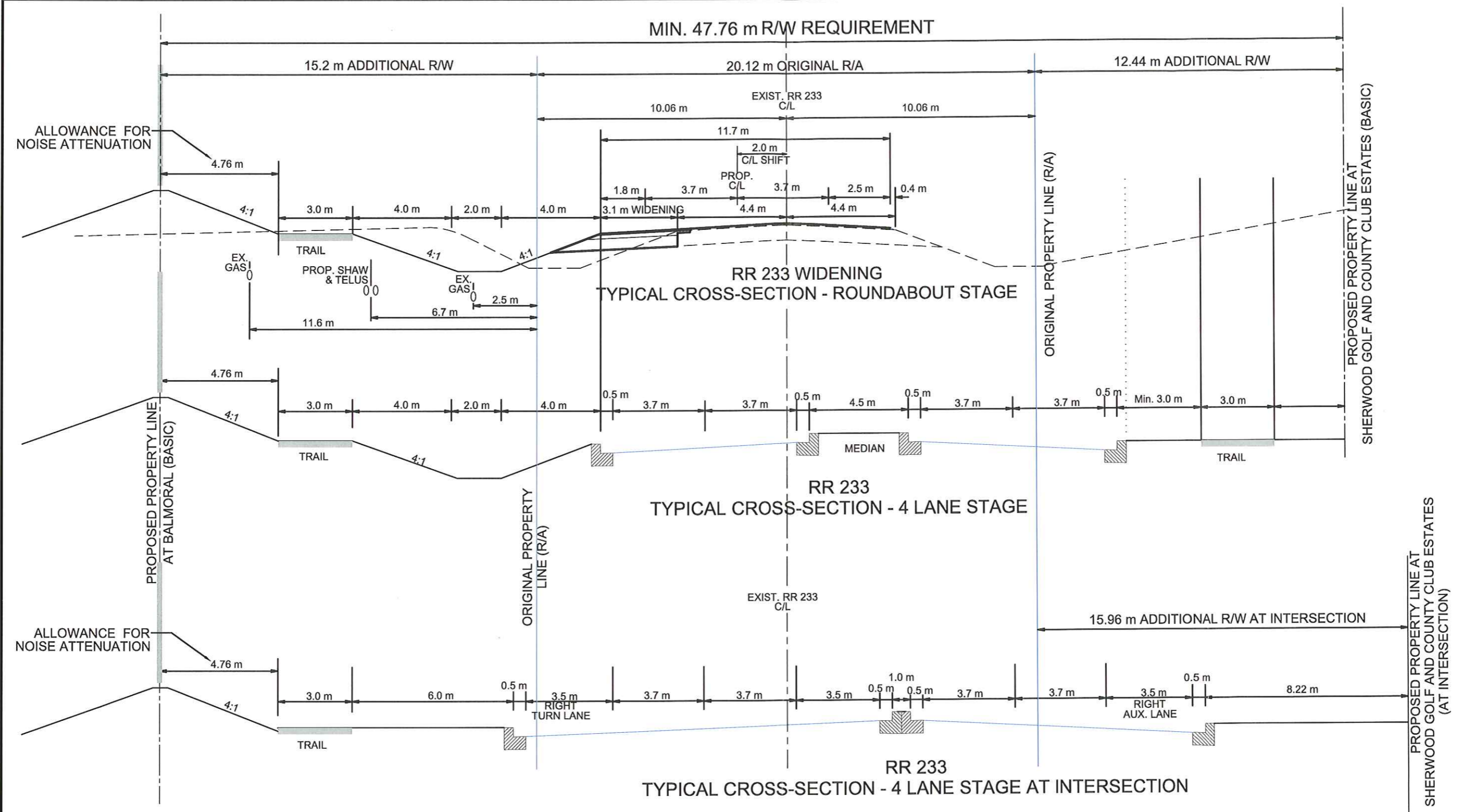
INTERSECTION TREATMENT REQUIRED - CONVENTIONAL

INTERSECTION TREATMENT REQUIRED - ROUNDABOUT

RGE RD 233 IN STRATHCONA COUNTY  
N. OF HIGHWAY 628 TO S. OF ORDZE ROAD  
TRAFFIC ACCOMMODATION OPTIONS

INTERSECTION IMPROVEMENTS REQUIREMENTS

KEY MAP



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side and introduction of a path would extend the roadway cross-section into the man made pond. To avoid impacting the landowner's water feature, the alignment of Range Road 233 is shifted east (see **Exhibit 6**). Through this section, a path would only be constructed on the east side.

As much of the existing pavement of Range Road 233 is proposed to be saved, the vertical alignment of the roadway is also anticipated to remain unchanged. Ditch drainage will be reviewed and improved as required during the two-lane roundabout improvements.

The existing vertical alignment of Range Road 233 would generally provide adequate longitudinal gradient if the four lane urban cross-section was introduced as a result of the Urban Growth Node developing south of Highway 628. There is only one section between Aspen Heights and Fountain Creek Boulevard that longitudinal grades are less than the minimum 0.60% required for curb drainage. If four lane urbanization of Range Road 233 is required, this section could remain rural, or semi-rural, maintaining drainage in a ditch system, or full depth reclamation of the road could be used to add structure to increase the longitudinal gradient

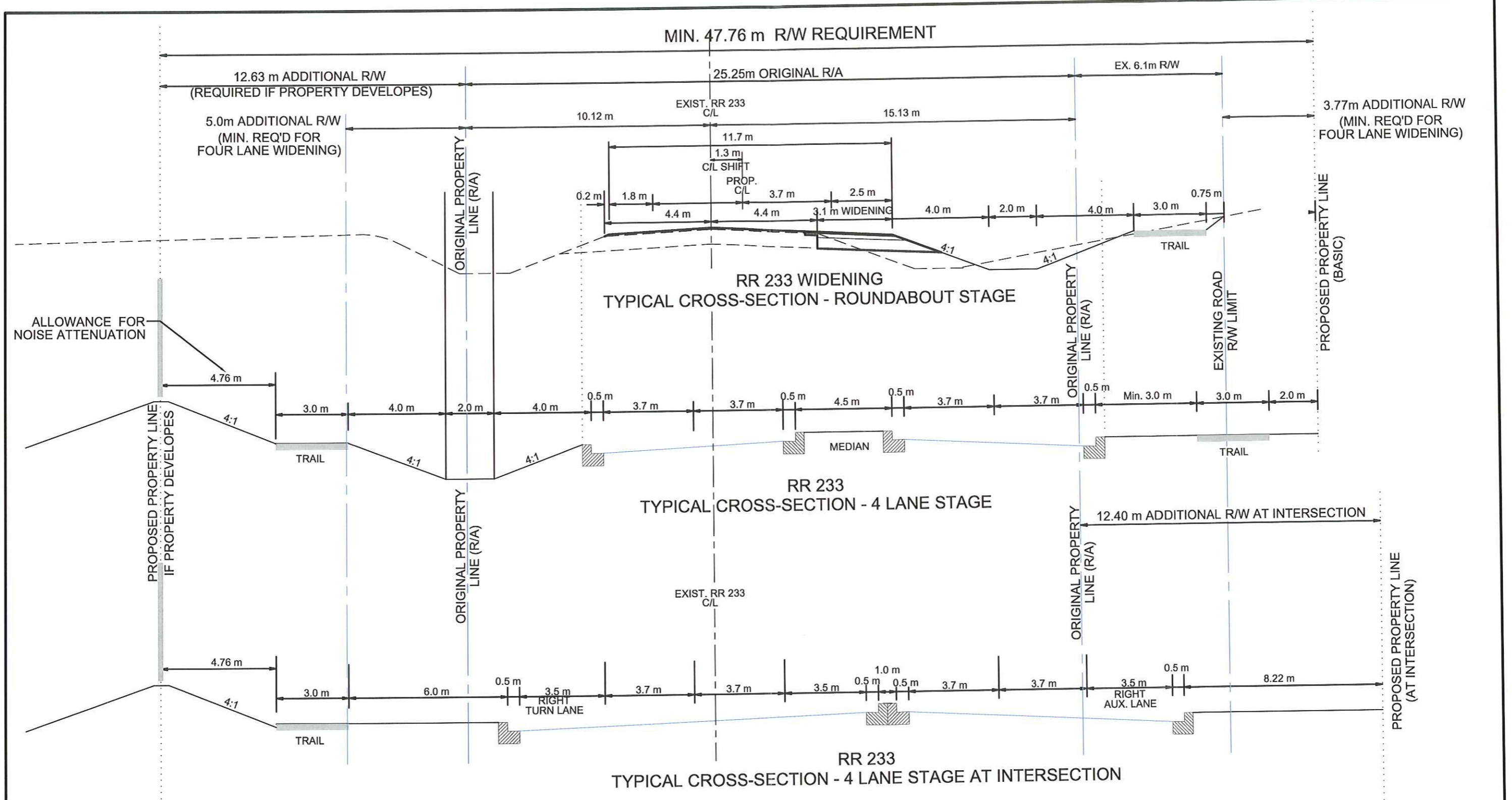
At this time, Alberta Transportation's long-term improvement plans for Highway 628 have not been finalized. As such, Range Road 233 improvements are planned to connect into the existing Highway 628 cross-section. Prior to construction final details and ultimate intersection configuration will have to be coordinated with Alberta Transportation. It is anticipated, for technical reasons, Range Road 233 will likely be a four lane divided arterial at the connection to Highway 628.

#### *4.5 Roundabout Geometrics*

The geometrics of the roundabouts have been planned to provide high capacity, while being compact (to mitigate right-of-way requirements) with yield points upon entry. The yield points upon entry give circulating traffic priority, increasing capacity. All the roundabouts are designed to have deflected incoming roadways and flared entry to reduce through speeds, allowing Range Road 233 to operate as a minor arterial providing good local access.

#### *4.6 Trail Considerations*

From the previously held Open Houses discussing options for Range Road 233 improvements, it is apparent that a trail connection to Wye Road is very important to the adjacent residents. Therefore a path connection is proposed along one side of Range Road 233, to be completed in conjunction with the widening and roundabout construction.



**RR 233**  
**FUNCTIONAL PLANNING STUDY**  
TYPICAL CROSS-SECTION  
WIDENING TO EAST  
STA 0+980

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Path connection currently exists between Fountain Creek Way and Fountain Creek Boulevard on the west side of Range Road 233. Therefore it is anticipated that the path alignment north of Fountain Creek Way will be on the west side.

Wherever possible, the horizontal and vertical path alignment will be such that the long term four laning of Range Road 233 can be completed without reconstructing the path. Along recently developed areas; Fountain Creek, Balmoral, and Sherwood Park Golf Estates, this is easily accomplished. As well, ultimate path alignment is achievable south of Wallace Drive where the four lane urban cross-section with storm sewer is proposed.

Between the north property line of Balmoral Heights and South Avenue alternative path alignment should be considered as ultimate vertical path alignment may have significant environmental impact. Due to the uncertainty of the Urban Growth Node location, four lane urbanization of Range Road 233 may never be required. As such, in this section it seems prudent to defer extensive tree clearing and impacts to the existing slough in the area until such time that it is unavoidable. Path alignments that minimize tree clearing and existing drainage course modifications should be evaluated.

South of Fountain Creek Boulevard the path may cross to the east side of Range Road 233 due to the private land owner constraints on the west side. As well, Strathcona County owns two parcels on the east side of the Range Road south of Fountain Creek Boulevard an E.R. and M.R. parcels which would facilitate path construction in the area. Although generally the intent would be to construct the path to ultimate alignment, there may be environmental impacts to consider when crossing the low area south of the Chrenek Estates South access, and the proposed storm water management facility on the east side of Range Road 233 just north of the Victorian Park Estates intersection.

#### *4.7 Road Network and Access Management*

As part of the Range Road 233 Functional Study, Al-Terra completed a review of the existing accesses, emergency access and intersection spacing. An access management plan was prepared illustrating long term closures and new construction required to improve the overall functionality of the road system. The greatest impact to existing accesses occurs near Highway 628 and near Wallace Drive, where several property owners at both locations have accesses within the area of influence of the intersections.

Between Wallace Drive and South Avenue four properties in Campbelltown Heights and two properties on the west side currently have direct access to Range Road 233. Traffic modeling indicates the continued provision of these all-directional accesses between South Avenue and Wallace Drive would cause through traffic delays as well as geometrically inhibit the deceleration lane and left turn at Wallace Drive as well as the introduction of a four lane divided cross-section. On the east side, the accesses are proposed to be consolidated to two locations approximately half way between Wallace

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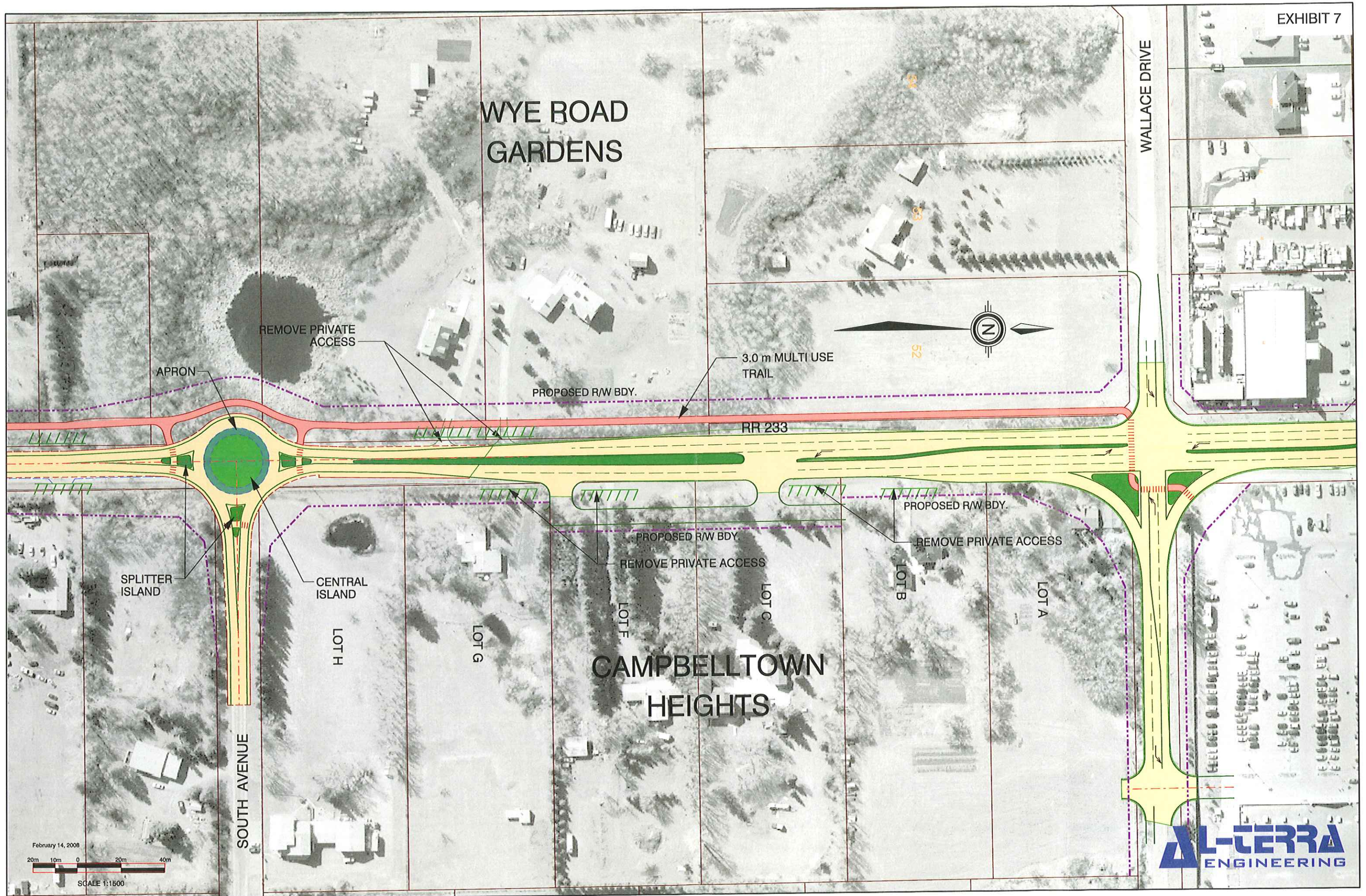
Drive and South Avenue, one all directional, and one right-in / right-out. A service road across the frontage of the middle properties would connect the two accesses and provide admittance to the other parcels. On the west side the accesses are proposed to be revised to be right-in, right-out only. A centerline median on Range Road 233 would be constructed to prevent the all directional movements. **Exhibit 7** shows the proposed access modifications between Wallace Drive and South Avenue.

Understanding the access modifications would prohibit direct trips into Sherwood Park from the west side parcels, a roundabout is proposed to be constructed at South Avenue as part of the access modifications. With the introduction of a roundabout at South Avenue, property owners on the west side wanting to travel directly into Sherwood Park can exit their property south onto Range Road 233, travel a short distance to South Avenue and essentially complete a U-turn at the roundabout to complete the trip into Sherwood Park. Although the solution is perhaps somewhat less desirable from a property owners perspective, the detour is short and it is anticipated that the delay of the detour would be less than the delay of waiting for a break in traffic to complete the left turn, and much safer then crossing opposing lanes of traffic onto the Range Road

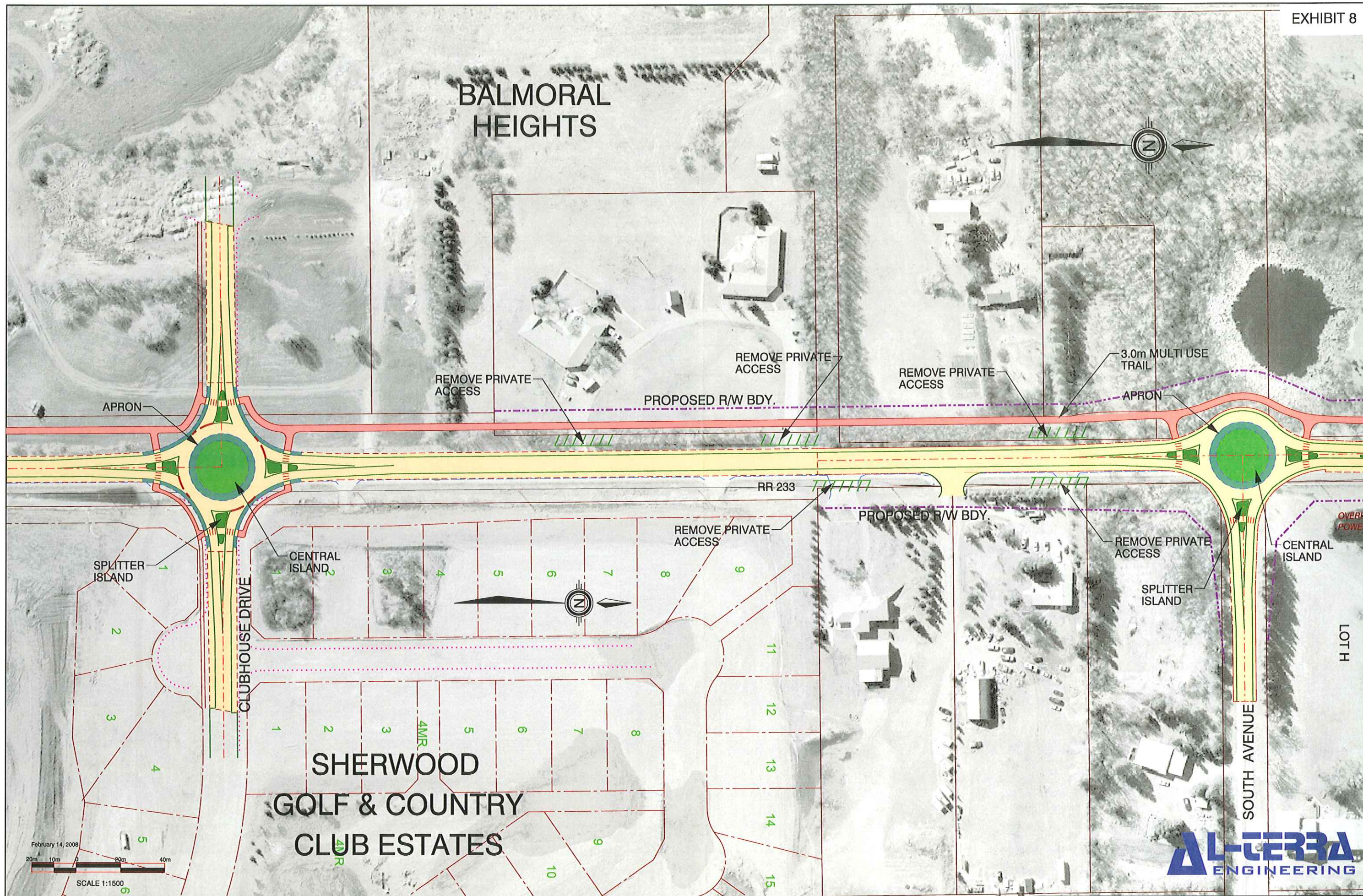
The South Avenue, Balmoral Heights and Fountain Creek Way intersection roundabouts are well spaced at approximately 450m. The Fountain Creek Way and Fountain Creek Boulevard intersections are only 250m apart, which is somewhat less than desirable, but functional.

The Fountain Creek Boulevard and Aspen Heights roundabouts are approximated 750m apart. The feasibility of a roundabout between these two at the South Chrenek Estates intersection was evaluated and deemed not viable. The construction of a roundabout at the South Chrenek Estates intersection would significantly impact the man made pond on the west side of Range Road 233. The local traffic of Chrenek Estates can be accommodated at the north intersection of the development. Therefore it is proposed that the south entrance is removed, and only an emergency route maintained. This results in the private access on the west side of Range Road 233 to be maintained as existing which is desirable given the location of the private water feature. Access modifications proposed between Fountain Creek and Aspen Heights are shown on **Exhibit 8**.

At Highway 628, the parcels in the northeast and northwest quadrants both have accesses to Range Road 233 within the zone of influence of the intersection. Projected traffic volumes indicate that cues at the intersection will extend past these existing accesses. As well, accesses near intersections can cause increased rear end collisions as through traffic does not expect turning traffic before an intersection; even though the vehicle may signal, the movement is still expected to be at the intersection. Thus, from both a safety and an operation standpoint, these accesses require closure, and alternative access to the



February 14, 2008  
20m 10m 0 20m 40m  
SCALE 1:1500



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properties must be found through the adjacent subdivisions. One such alternative is shown on **Exhibit 9**.

#### *4.8 Right-of-Way Acquisition*

Plans for right-of-way acquisition were based on obtaining adequate right-of-way to accommodate a four lane divided cross-section with a 3.0m multi-use trail on both sides. Additional right-of-way is sought at the intersections to accommodate acceleration and deceleration lanes.

The primary focus for obtaining right-of-way is between Wallace Drive and South Avenue as this section of road is proposed to be upgraded in conjunction with the Wallace Drive Jughandle / Wye Road improvements scheduled for 2008.

Sufficient right-of-way has already been acquired through developer agreements along Range Road 233 adjacent to Balmoral Heights, the Sherwood Park Golf Course and County Club Estates and Fountain Creek.

### **5.0 SHALLOW UTILITY IMPACTS**

#### *5.1 Fortis*

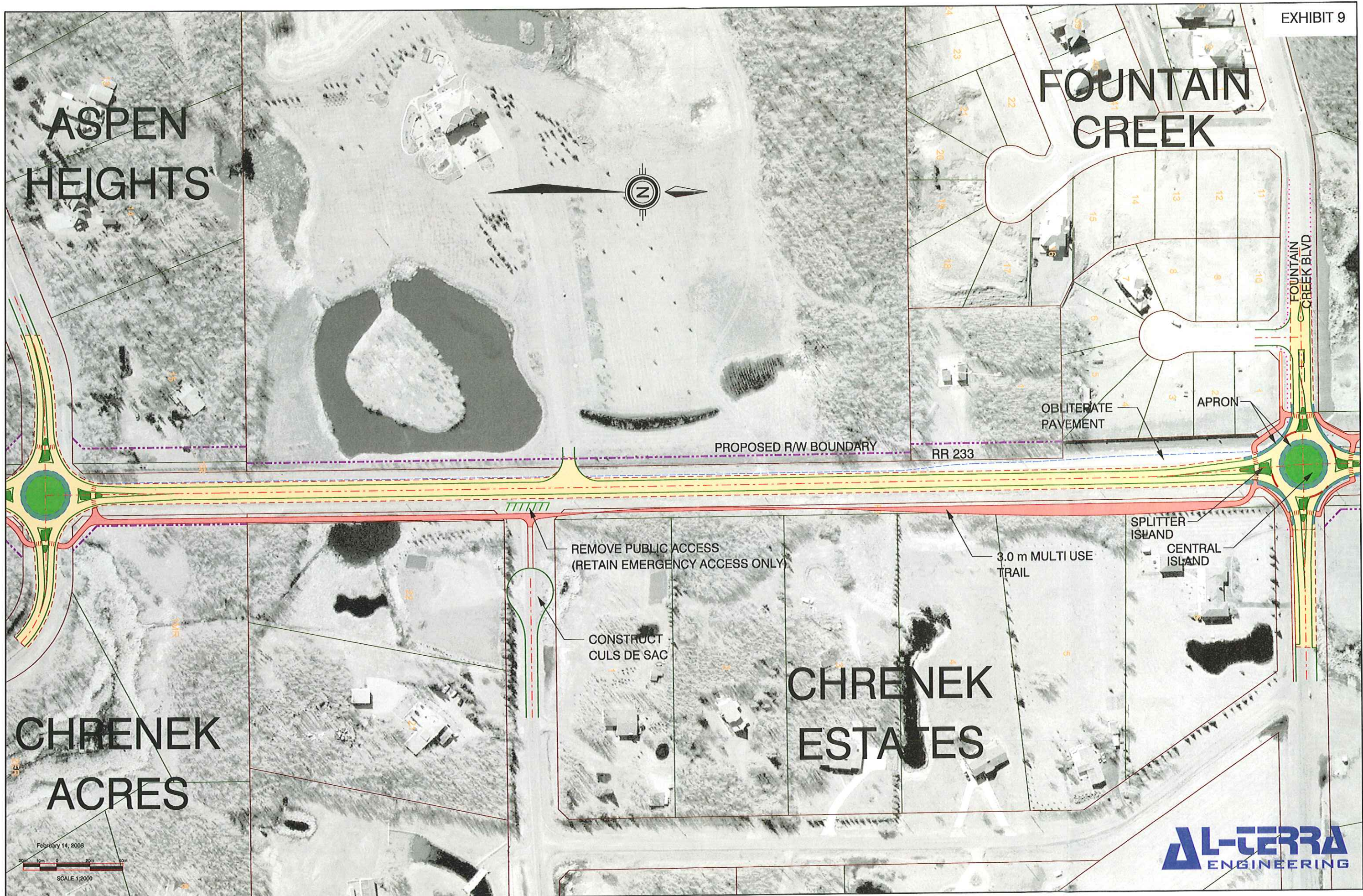
There is an exiting overhead Fortis line located on the east side of Range Road 233. In the initial two lane roundabout stage, only poles at the roundabout intersections will have to be relocated. In the long term when Range Road 233 is four lanes, the overhead power line will have to be relocated east, possibly underground.

#### *5.2 Telus / Shaw*

A section of the existing Telus / Shaw overhead line on the west side of Range Road 233 was relocated underground in 2007 as part of the Balmoral subdivision development. As right-of-way had not been obtained in 2007 north of the Balmoral property line, the relocation did not extend past the Balmoral north property line. The remainder of the line will have to be relocated once the right-of-way is obtained to accommodate the Stage 2 (2010) improvements to Range Road 233.

#### *5.3 Atco Gas*

ATCO Gas obtained an easement along the east side of the Sherwood Park Golf Course and County Club Estates to extend their distribution system south of Balmoral Heights.



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At the time of this report it is not expected that ATCO will be continuing their main south of Sherwood Park Golf Course and County Club Estates.

#### *5.4 Transportation Pipeline Utility Corridor*

Range Road 233 crosses the Transportation Utility Pipeline Corridor at Fountain Creek Way. The Sherwood Park Golf Course and County Club Estates Developer on the east side of Range Road 233 will be responsible for completing the construction of the roundabout at the Fountain Creek Way intersection in 2008. Therefore the developer will apply and obtain all necessary crossing agreements to complete the roundabout construction and storm sewer installation.

Range Road 233 was widened on the west side as part of the Fountain Creek development. Therefore the two lane roundabout stage of Range Road 233 should not further impact the pipelines within the right-of-way. The applicable crossing agreements will have to be obtained if Range Road 233 is upgraded to four lanes with signals.

### **6.0 STORMWATER MANAGEMENT / DRAINAGE**

Range Road 233 is currently a two lane rural roadway with ditches. The intersection improvements to date have maintained the rural nature of the road and the existing ditch system.

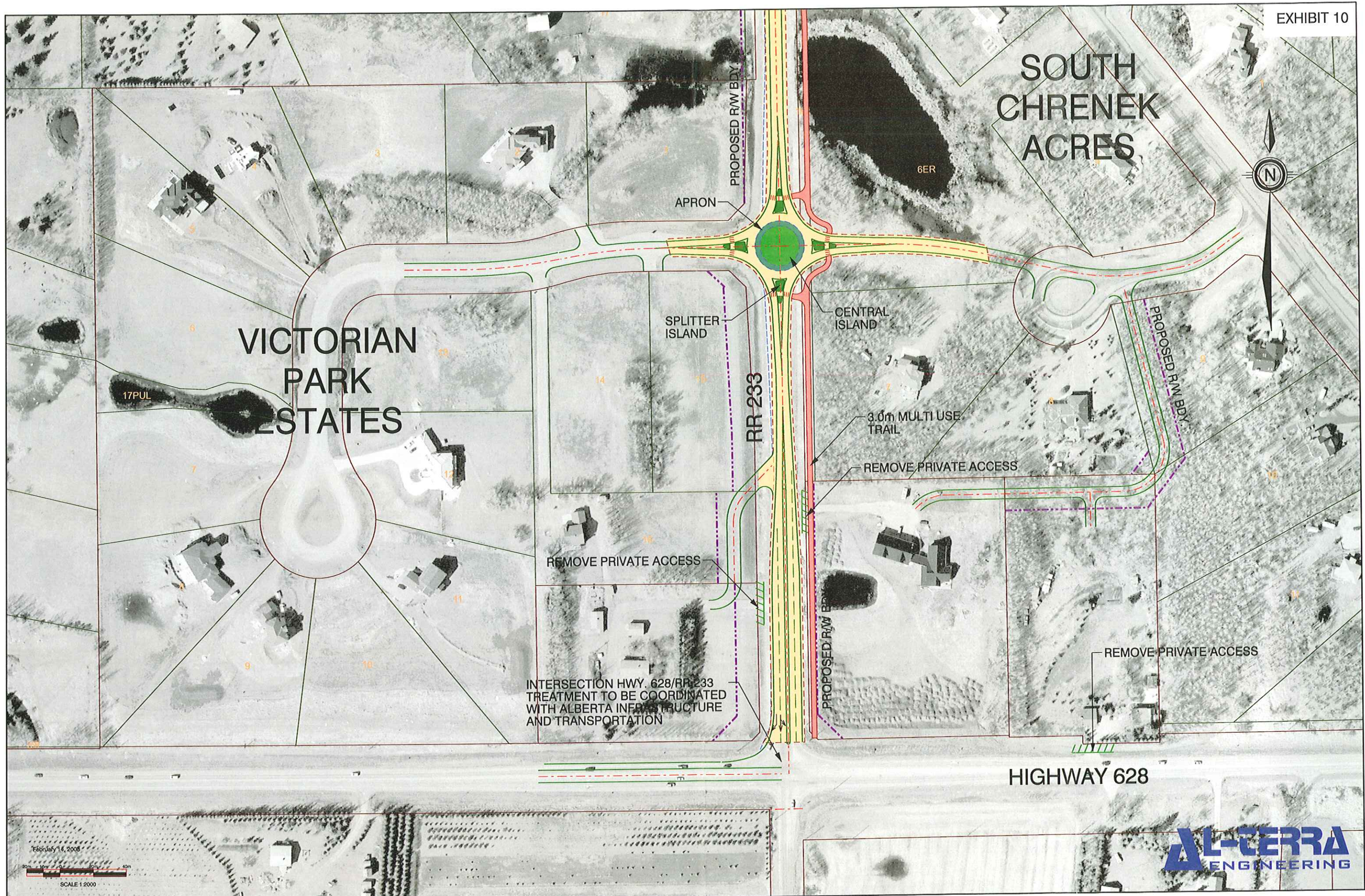
The widening of the existing two lane roadway and construction of roundabouts at intersections will continue to primarily use the existing ditch system for stormwater management. As the roundabouts are curbed, storm sewer and/or culverts will be required to convey the water from the road into the ditch system, and provide continuous flows of the ditch system through the roundabouts to an appropriate storm water pond.

An overview is as follows:

#### *6.1 Highway 628 to High Point North of Aspen Heights (Sta 0+000 to 1+100)*

##### **Plan Profiles shown on Exhibit 10 and Exhibit 11**

Range Road 233 drains to the north away from Highway 628. There is a low spot on the east side of Range Road 233 approx. 400m north of Highway 628. Range Road 233 then rises from Sta 0+400 to approx. Sta. 1+100, the high point, after which the road drains to the north again. The intent in both the short and long term is that storm water from Highway 628 to Sta 1+100 would be directed to the natural low area either through a ditch system or a storm sewer and the area would be utilized as a storm water management facility. Treatment of road salts and control of sand and silt may have to be investigated in the long term, once the intersection of Highway 628 and Range Road 233 is urbanized, or if the connection to the low area is made with pipe.



VICTORIAN  
PARK  
ESTATES

SOUTH  
CHRENEK  
ACRES

RR 233

HIGHWAY 628

INTERSECTION HWY. 628/RR 233  
TREATMENT TO BE COORDINATED  
WITH ALBERTA INFRASTRUCTURE  
AND TRANSPORTATION

**AL-TERRA**  
ENGINEERING

February 14, 2008  
SCALE 1:2000

With the construction of a roundabout at the Victoria Park Estates entrance, some storm sewer will be required to direct drainage from Highway 628 underneath the roundabout to the low area. A simple ditch inlet connected to catchbasins on the curbed roundabout would be adequate to direct storm water towards the existing low area. As the grade from Highway 628 to the Victoria Park Estates intersection is 0.60%, a piped system should function adequately.

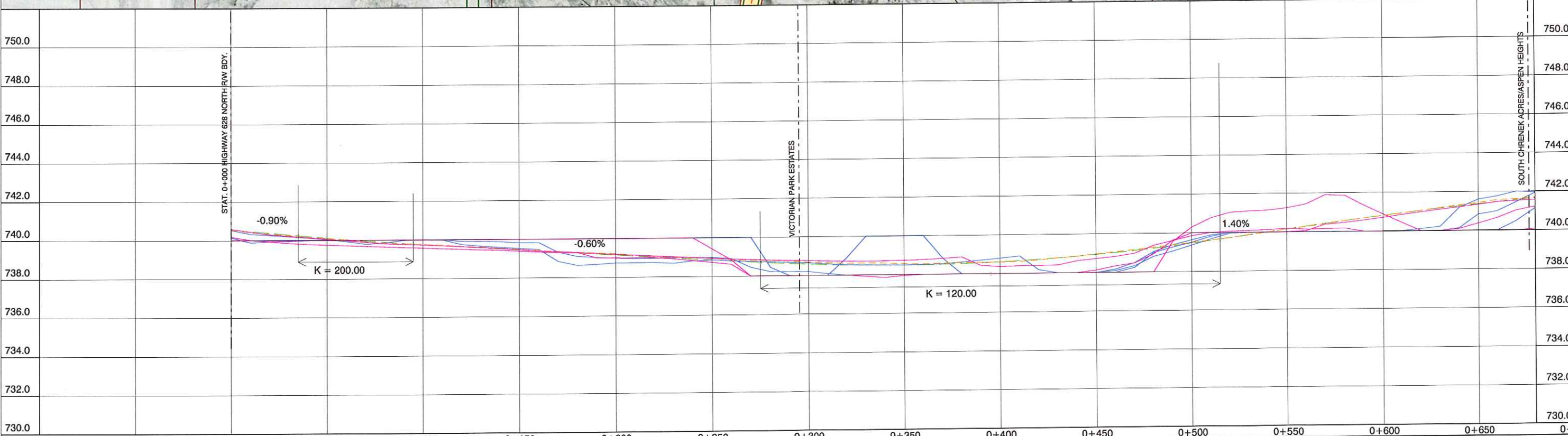
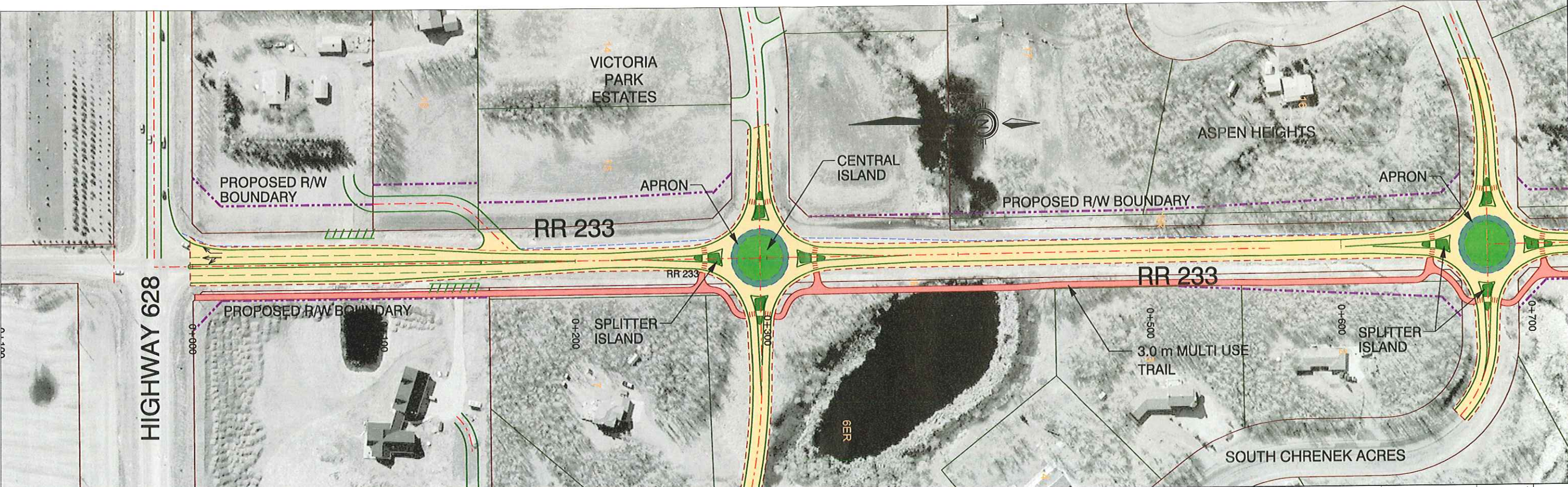
From the high point at Sta 1+100 back south towards the low area at Sta 0+400, the road grade is initially ~0.20%, then steeper at 1.40%. The intersection of Aspen Heights at Sta 0+700 is at the transition of the two gradelines; the intersection is approximately 4m higher than the proposed storm water management facility. Between the Aspen Heights intersection and the high point of the road the ditch drainage on the west side generally follows the road profile. On the east side of the road the drainage is intercepted. The ditch drainage flows into a low area south of the Chrenek Estates South access and then through a natural drainage channel into Chrenek Acres. Improvements to Range Road 233 would be designed to maintain these existing routes as it would be difficult to force this water along the ditch system on the east side within the proposed Range Road 233 right-of-way without significant modifications and impact on adjacent properties.

#### **6.2 High Point North of Aspen Heights to Fountain Creek Way (Sta 1+100 to 1+700) Plan Profiles shown on Exhibit 11 and Exhibit 12**

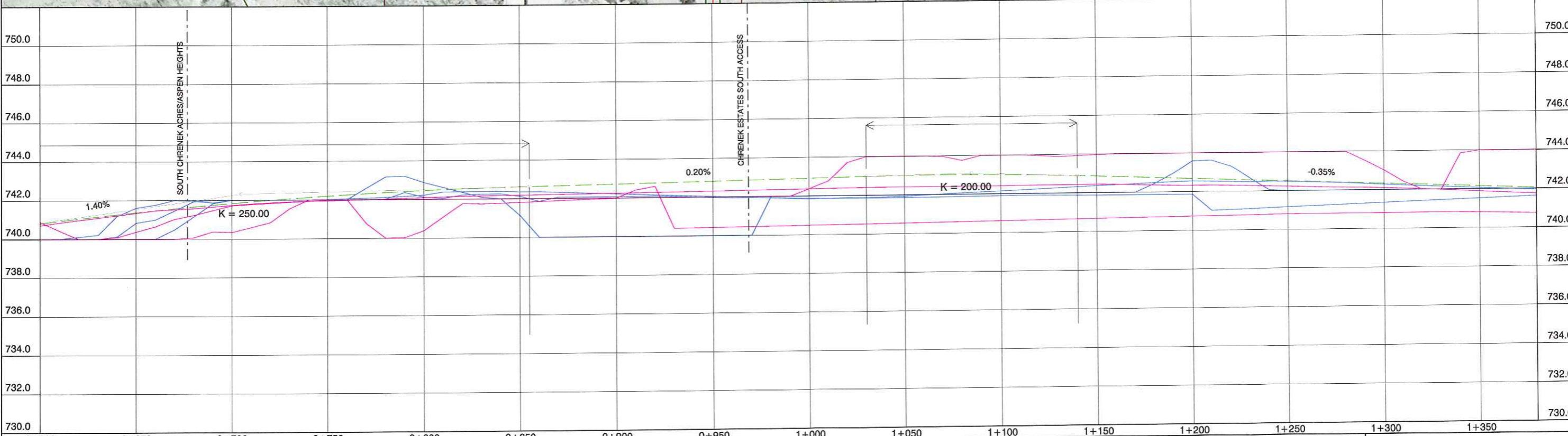
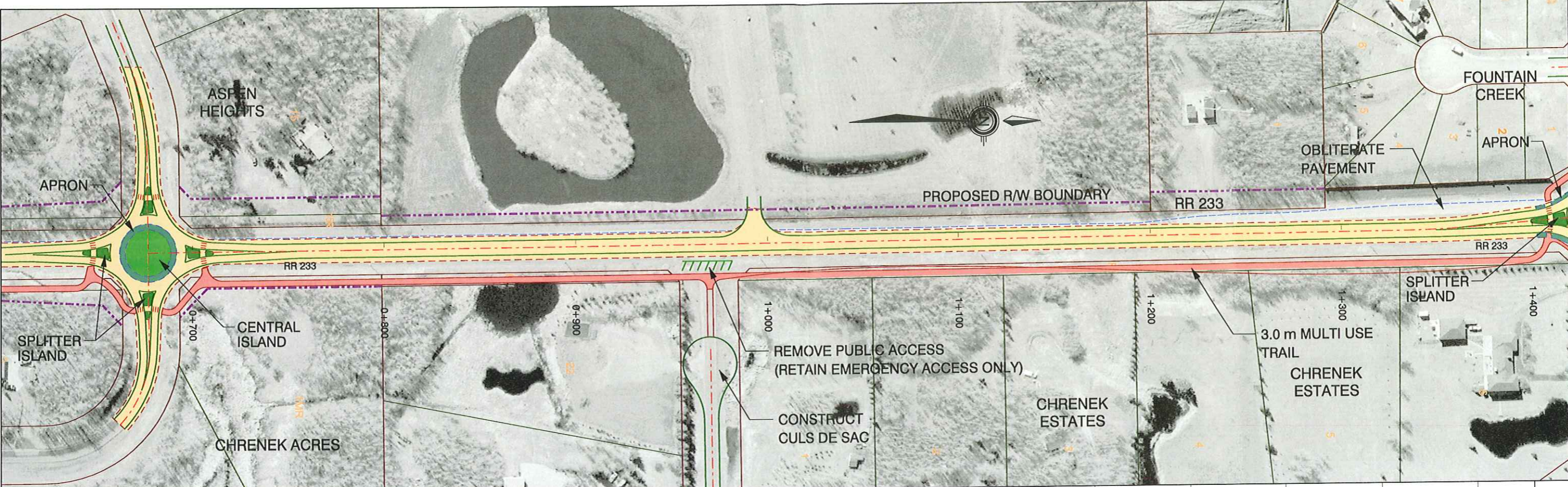
North of Sta 1+100 the existing drainage goes north, generally following the existing road grade. Initially, the road grade is rather flat ~0.35%, increasing to 0.75%. At Fountain Creek Boulevard, there is an existing storm sewer system connecting the ditch drainage on the west side underneath Fountain Creek Boulevard to the existing low area / storm water management pond on the west side north of the intersection. Only minor improvements to the system are anticipated to accommodate the Range Road widening and construction of the roundabout. New storm sewer or culvert would be required on the east side of Range Road 233 to collect the storm water and direct it north underneath the roundabout.

Between Fountain Creek Boulevard and Fountain Creek Way the drainage on the west side is all directed to the low area on the west side north of Fountain Creek Boulevard. The proposed Range Road improvements are unlikely to affect this drainage as Range Road 233 has already been widened on the west side through this section as part of the Fountain Creek development.

On the east side, north of Fountain creek Boulevard, the existing ditch system drains to the north. The storm water is currently detained in a small slough just south of Fountain Creek Way until the overflow point is reached, when it continues down the ditch to the



<table border="1"><thead><tr><th>NO.</th><th>REVISION</th><th>DATE</th><th>BY</th></tr></thead><tbody><tr><td>1.</td><td>PRELIMINARY</td><td>15/02/08</td><td>KC</td></tr></tbody></table>		NO.	REVISION	DATE	BY	1.	PRELIMINARY	15/02/08	KC	<b>AL-TERRA ENGINEERING</b>		<b>RR 233</b> HIGHWAY 628 TO WALLACE DRIVE ROUNDBOUT OPTION FUNCTIONAL PLANNING STUDY  <b>Strathcona County</b>	
		NO.	REVISION	DATE	BY								
		1.	PRELIMINARY	15/02/08	KC								
		RR 233											
PLAN/PROFILE													
DESIGN: BS	CHECKED: CB	JOB NO: 1148A											
DRAWN BY: BS	DATE: AUG. 2008	DRAWING NO: 1148-P1											



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north. The construction of the roundabout at Fountain Creek Way will have to accommodate this overflow route to the north. The storm system will have to cross several significant pipelines.

*6.3 Fountain Creek Way to Balmoral Heights (Sta 1+700 to 2+150)*

**Plan Profiles shown on Exhibit 12 and Exhibit 13**

The existing drainage would be maintained, flowing to the north. At the Balmoral intersection the ditch drainage would be intercepted through ditch inlets and directed into the Balmoral storm sewer system on the west side of the road and into the Sherwood Golf Course and County Club Estates system on the east. Both subdivisions are aware of this requirement, and at the time of this report the storm sewer systems have been constructed.

*6.4 Balmoral Heights to Wallace Drive (Sta 2+150 to Sta 3+025)*

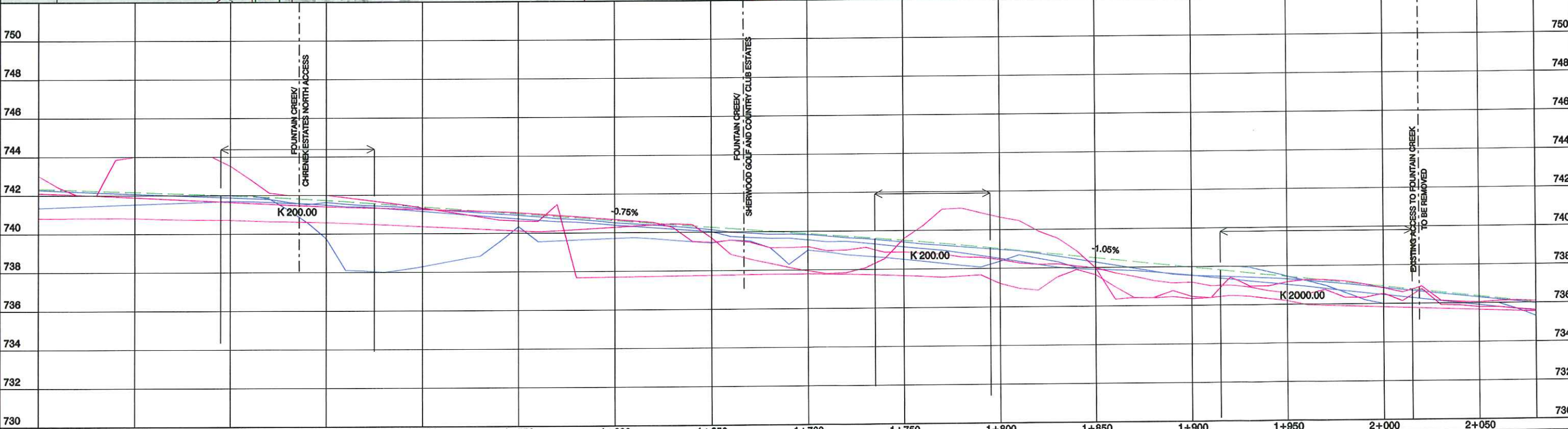
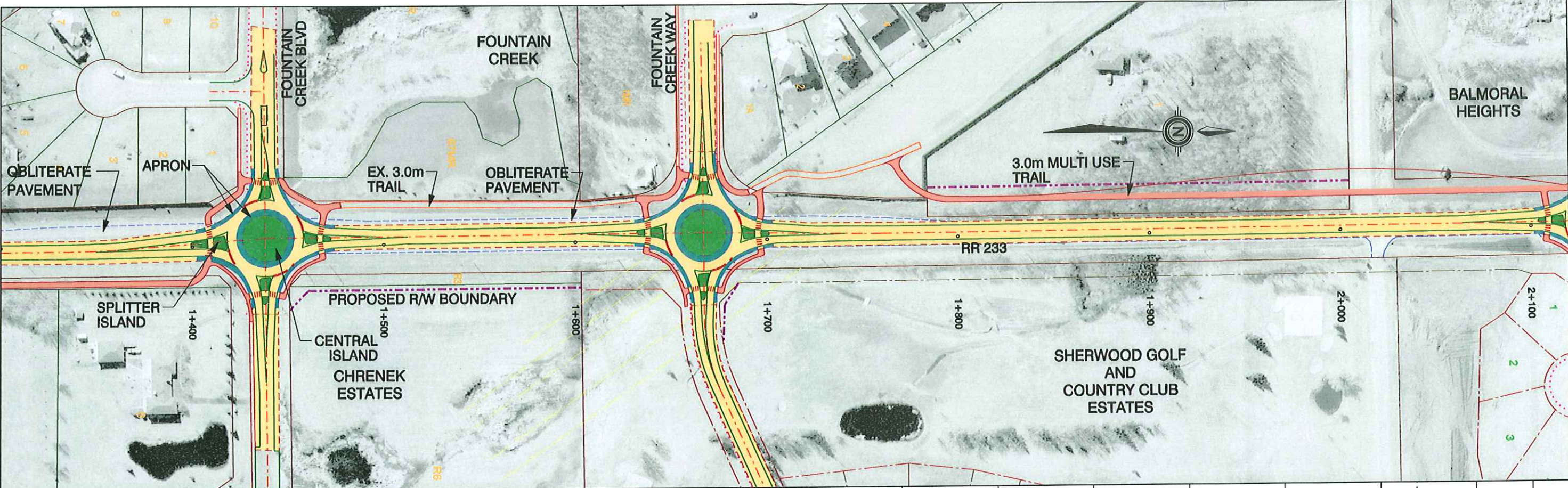
**Plan Profiles shown on Exhibit 13 and Exhibit 14**

From Balmoral Way the existing drainage is to the north to a major overland storm crossing of Range Road 233 north of South Avenue. The major drainage route intercepts the Range Road 233 drainage and directs it west through Wye Gardens. Improvements to Range Road 233 are not intended to alter this drainage.

North of South Avenue, Range Road 233 is proposed to be a four lane divided urbanized road with storm sewer. The storm sewer will drain north to Wallace Drive where it will connect to a storm sewer on Wallace Drive and be directed west to the storm pond west of Canadian Tire. As there is an 8.0m elevation difference between the road at Range Road 233 / Wallace Drive intersection and the invert of the storm line at Wallace Drive 200m to the west it is not anticipated to be any problems conveying water from a pipe system on Range Road 233 to the west and into the existing storm line.

## **7.0 STAGING AND IMPLEMENTATION STRATEGY**

Stage 1 of the Range Road 233 improvements will widen the road between the north property line of Balmoral Heights and the south edge of Fountain Creek and construct roundabout intersections at the Balmoral Heights, Fountain Creek Way and Fountain Creek Boulevard intersections. The roundabout at Balmoral Heights will be developer constructed and will be completed in 2008. The intersection at Fountain Creek Way will be constructed by the Sherwood Park Golf and County Club Estates developer starting in 2008 and is anticipated to be completed (at the latest) by spring 2009. Strathcona County is investigating options to complete the Range Road widening and the Fountain Creek Boulevard roundabout in 2009.

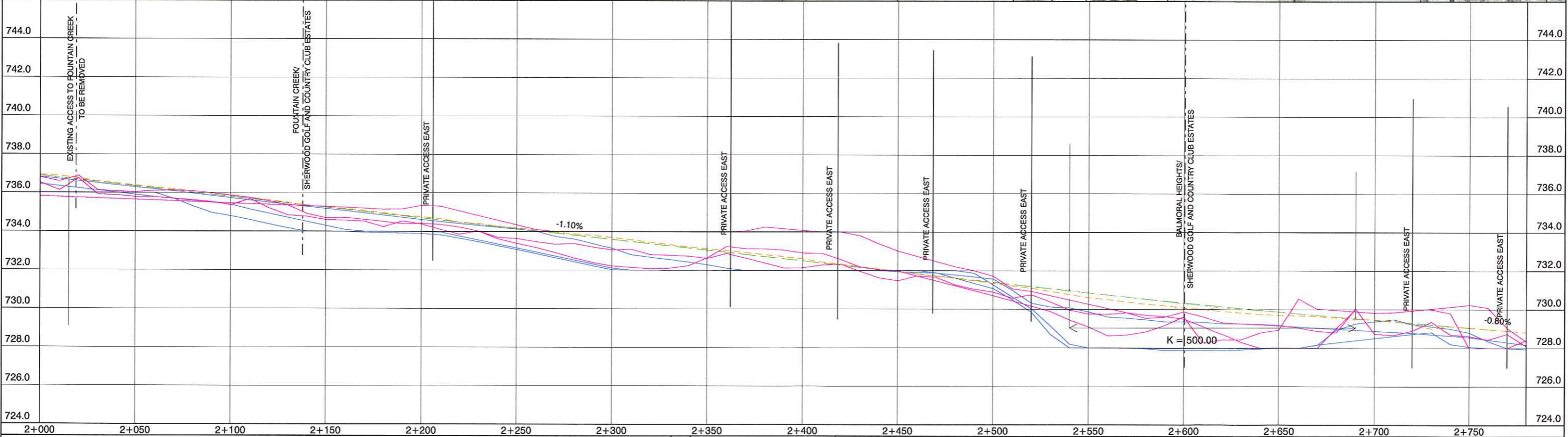
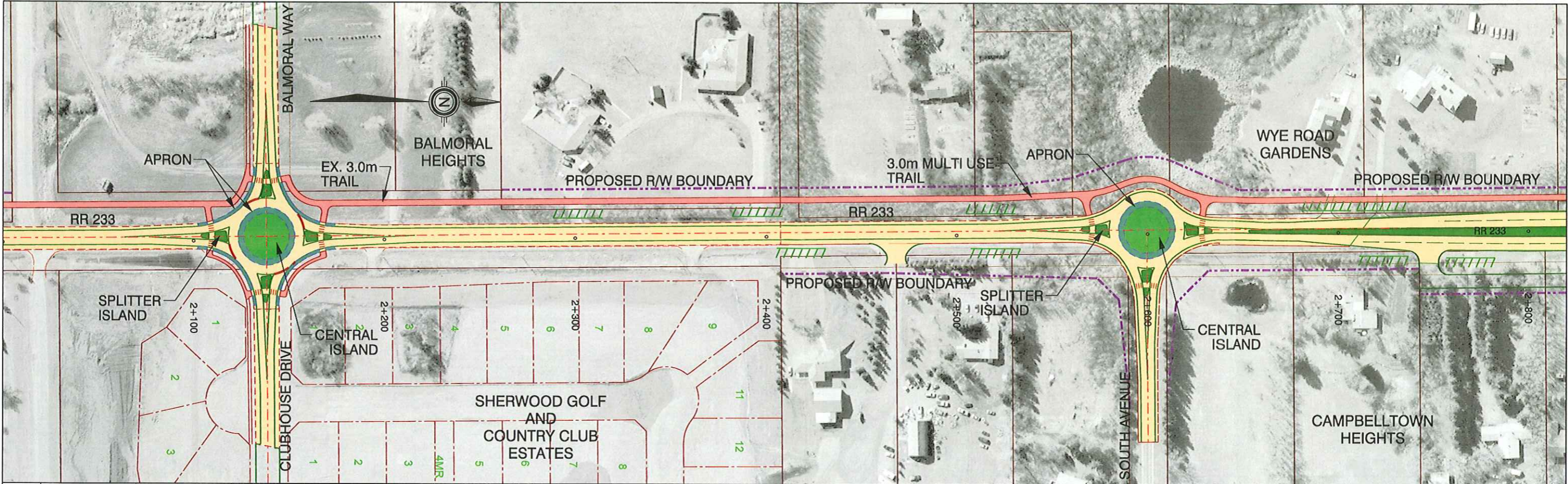


1. PRELIMINARY		15/02/08	KC
NO.	REVISION	DATE	BY

<b>AL-TERRA</b> ENGINEERING		
RR 233		
PLAN/PROFILE		
DESIGN: BS	CHECKED: CB	JOB NO: 1148A
DRAWN BY: BS	DATE: AUG. 2008	DRAWING NO:
20	0	20 40
1148-P3		

RR 233  
HIGHWAY 628 TO WALLACE DRIVE  
ROUNDBABOUT OPTION  
FUNCTIONAL PLANNING STUDY

**Strathcona**  
County



NO.	REVISION	DATE	BY
1.	PRELIMINARY	13/02/08	KC

RR 233  
PLAN/PROFILE

DESIGN: BS

CHECKED: CB

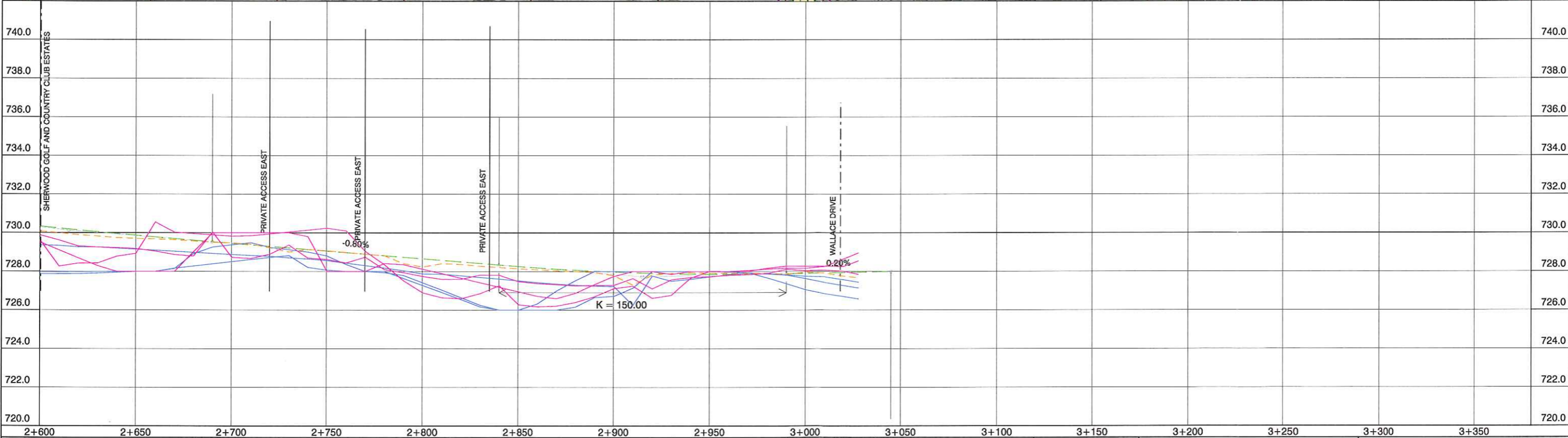
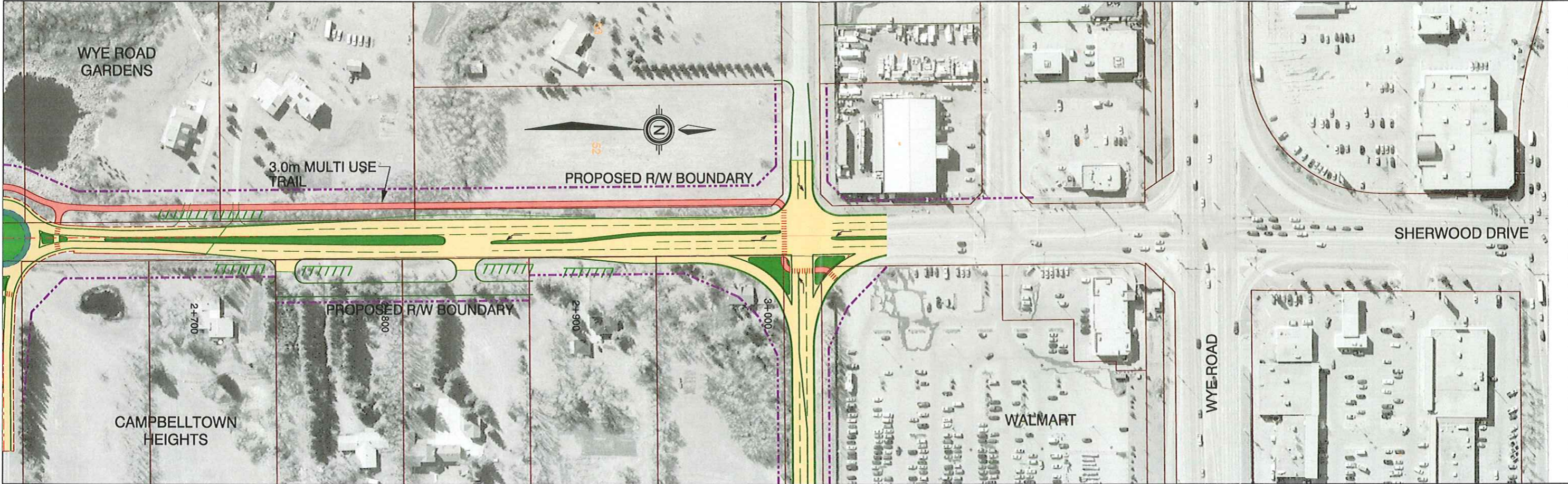
DRAWN BY: BS

DATE: AUG. 2008

JOB NO: 1148A

DRAWING NO: 1148-P4

RR 233  
HIGHWAY 628 TO WALLACE DRIVE  
ROUNDBOUT OPTION  
FUNCTIONAL PLANNING STUDY



				<div>AL-TERRA ENGINEERING</div>				RR 233 HIGHWAY 628 TO WALLACE DRIVE ROUNDABOUT OPTION FUNCTIONAL PLANNING STUDY									
				RR 233 PLAN/PROFILE				Strathcona County									
DESIGN: BS		CHECKED: CB		JOB NO: 1148A		DRAWN BY: BS		DATE: AUG. 2006		DRAWING NO:							
20		0		20		40		1148-P5									
1. PRELIMINARY				15/02/08				KC									
NO.				REVISION				DATE									

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Stage 2 of the improvements will complete the four lane divided construction of Range Road 233 south of Wallace drive and the roundabout at South Avenue. Right-of-way acquisition is currently proceeding in the areas and construction is anticipated in 2010.

Stage 3 will complete two lane upgrading and roundabout construction between the south edge of Fountain Creek Estates and Highway 628. This section of upgrading is currently planned for 2011 pending right-of-way acquisition.

See **Exhibit 15 – Staging Key Map** for an overall plan outlining staging boundaries and proposed improvements.

Primary focus of design constraints has been on the section of Range Road 233 planned for the 2008 – 2010 improvement horizon so that right-of-way can be acquired in a timely fashion to facilitate construction. The Stage 3, 2011 improvement horizon has been subjected to a more overall view, with general concepts for construction outlined, but less focused detail as right-of-way acquisition has not been started in that area to date. A more detailed investigation of all constraints must be undertaken prior to right-of-way acquisition.

Four lane urbanization would only be undertaken if an Urban Growth Node was constructed south of Highway 628.

## **8.0 COST ANALYSIS**

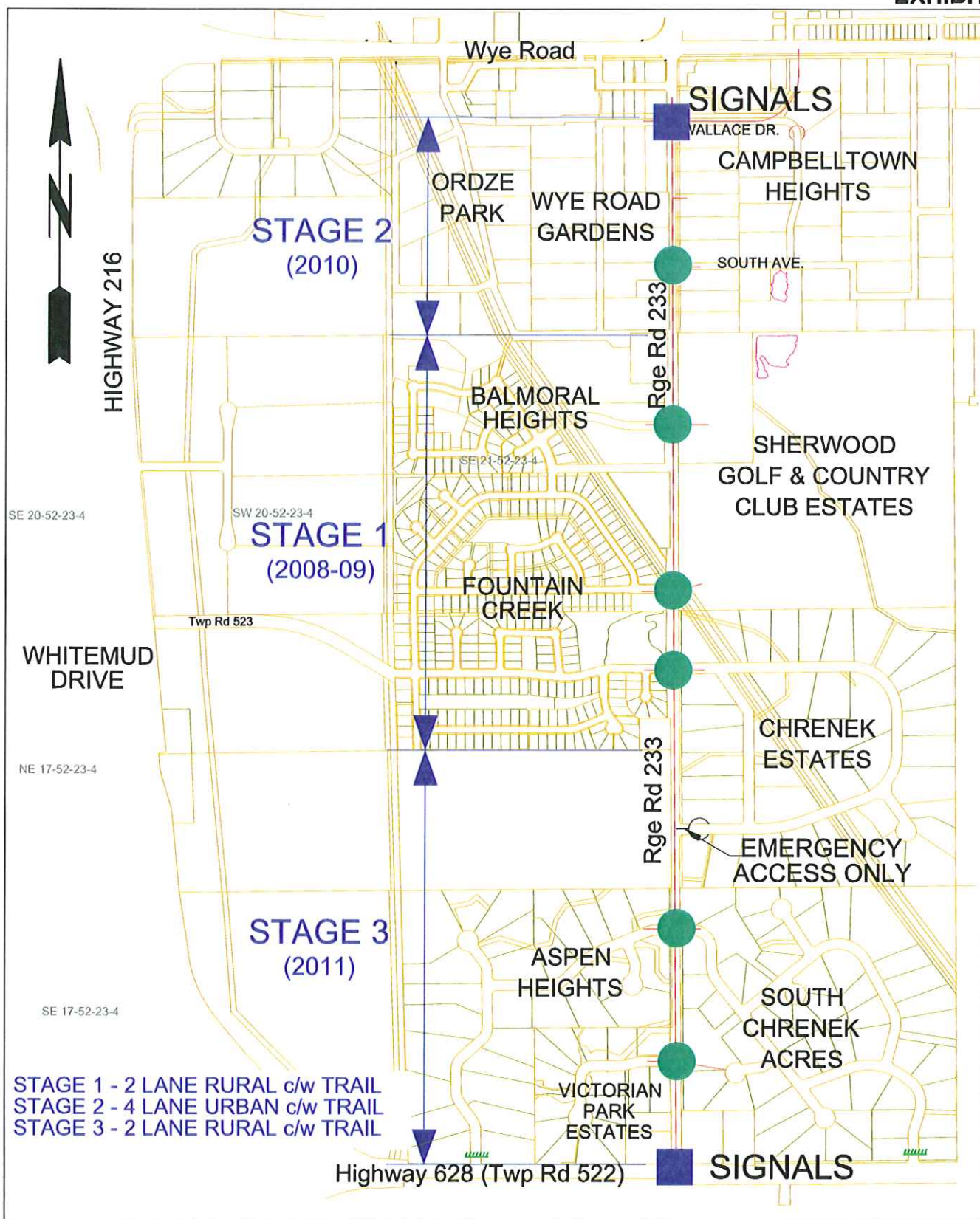
The cost analysis completed on the Range Road 233 improvements showed the overall costs to construct a widened two lane cross-section with roundabout intersections were less than a widened two lane roadway with signalized intersections. Although the costs of constructing a roundabout versus a typical signalized intersection are similar, significant cost savings are realized with roundabouts when maintenance and operational costs of signals are considered.

Preliminary comparative cost estimates are provided in **Table 4**.

The methodology proposed for widening Range Road 233 (widening to the west) mitigates future costs of four lane urbanization if required.

## **9.0 CONCLUSIONS AND RECOMMENDATIONS**

The upgrading of Range Road 233 to a two lane roadway with roundabout intersections is a cost effective solution that will provide good local access, assist to reduce through



INTERSECTION TREATMENT REQUIRED -  
CONVENTIONAL



INTERSECTION TREATMENT REQUIRED -  
ROUNDBOUT

RGE RD 233 IN STRATHCONA COUNTY  
N. OF HIGHWAY 628 TO S. OF ORDZE ROAD  
TRAFFIC ACCOMMODATION OPTIONS

INTERSECTION IMPROVEMENTS REQUIREMENTS

## KEY MAP

NTS

NOVEMBER, 2007

Table 4

**COMPARATIVE COST ESTIMATE  
BETWEEN  
FLARED SIGNALIZED INTERSECTION AND ROUNDABOUT**

<b>SIGNALIZED INTERSECTION</b>					
<b>ITEM</b>	<b>DESCRIPTION</b>	<b>UNIT</b>	<b>QUANTITY</b>	<b>ESTIMATE</b>	
				<b>UNIT RATE</b>	<b>AMOUNT</b>
<b>1.0</b>	<b>Earthworks</b>				
1.1	Top Soil Stripping (0.2 m depth)	m <sup>3</sup>	1,300	\$9.00	\$ 11,700
1.2	Earthworks (Common/Borrow)	m <sup>3</sup>	10,000	\$8.00	\$ 80,000
<b>2.0</b>	<b>Roadway</b>				
2.1	150 mm Cement Modified Subgrade	m <sup>2</sup>	11,224	\$6.00	\$ 67,344
2.2	400 mm - 20 mm crush (two lifts)	m <sup>2</sup>	11,224	\$ 25.00	\$ 280,600
2.3	180 mm ACB (three lifts)	m <sup>2</sup>	10,354	\$ 42.00	\$ 434,868
2.4	Curb and Gutter	lm	700	\$ 75.00	\$ 52,500
2.5	Concrete slab-on	m <sup>2</sup>	870	\$ 85.00	\$ 73,950
<b>3.0</b>	<b>Landscaping</b>				
	Topsoil and Seeding	m <sup>2</sup>	15,000	\$ 5.00	\$ 75,000
	Other				
<b>4.0</b>	<b>Signing and Pavement Markings</b>				
	Permanent Line Marking and Signing	Lump Sum	Lump Sum	\$ 2,000.00	\$ 2,000
<b>5.0</b>	<b>Signals (new)</b>	Lump Sum	Lump Sum	\$ 180,000.00	\$ 180,000
<b>6.0</b>	<b>Cost of Signal Operation over 20 years</b>	Lump Sum	Lump Sum	\$ 60,000.00	\$ 60,000
<b>TOTAL CONSTRUCTION ESTIMATE</b>					\$ 1,317,962
Contingency				20%	\$ 263,592
<b>SUBTOTAL</b>					<b>\$ 1,581,554</b>
Engineering				10%	\$ 158,155
<b>SUBTOTAL</b>					<b>\$ 1,739,710</b>
NET GST				3%	\$ 52,191
<b>GRAND TOTAL</b>				(rounded)	<b>\$ 1,790,000</b>

<b>ROUNDABOUT (2 LANE ROADWAY)</b>					
<b>ITEM</b>	<b>DESCRIPTION</b>	<b>UNIT</b>	<b>QUANTITY</b>	<b>ESTIMATE</b>	
				<b>UNIT RATE</b>	<b>AMOUNT</b>
<b>1.0</b>	<b>Earthworks</b>				
1.1	Top Soil Stripping (0.2 m depth)	m <sup>3</sup>	1,700	\$9.00	\$ 15,300
1.2	Earthworks (Common/Borrow)	m <sup>3</sup>	5,200	\$8.00	\$ 41,600
<b>2.0</b>	<b>Roadway</b>				
2.1	150 mm Cement Modified Subgrade	m <sup>2</sup>	7,550	\$6.00	\$ 45,300
2.2	400 mm - 20 mm crush (two lifts)	m <sup>2</sup>	7,850	\$ 25.00	\$ 196,250
2.3	180 mm ACB (three lifts)	m <sup>2</sup>	7,430	\$ 42.00	\$ 312,060
2.3	Curb and Gutter	lm	140	\$ 75.00	\$ 10,500
2.4	Concrete Apron	m <sup>2</sup>	260	\$ 150.00	\$ 39,000
2.5	Concrete slab-on	m <sup>2</sup>	870	\$ 160.00	\$ 139,200
<b>3.0</b>	<b>Landscaping</b>				
	Topsoil and Seeding	m <sup>2</sup>	18,000	\$ 5.00	\$ 90,000
	Other	Lump Sum	Lump Sum	\$ 60,000.00	\$ 60,000
<b>4.0</b>	<b>Signing and Pavement Markings</b>				
	Permanent Line Marking and Signing	Lump Sum	Lump Sum	\$ 5,000.00	\$ 5,000
<b>TOTAL CONSTRUCTION ESTIMATE</b>					\$ 954,210
Contingency				20%	\$ 190,842
<b>SUBTOTAL</b>					<b>\$ 1,145,052</b>
Engineering				10%	\$ 114,505
<b>SUBTOTAL</b>					<b>\$ 1,259,557</b>
<b>SUBTOTAL</b>					<b>\$ 1,259,557</b>
NET GST				3%	\$ 37,787
<b>GRAND TOTAL</b>				(rounded)	<b>\$ 1,300,000</b>

Note: Based on typical 2005 Unit Prices

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speeds on the roadway and severity of collisions, as well as improve the level of service of the local arterial.

The two lane upgrading can be accomplished with minor additions and modifications to the existing storm infrastructure and major drainage routes. Existing low areas can be used as storm water management facilities. The existing road profile is generally adequate to accommodate longitudinal drainage if urbanized, with the exception of the crest curve between Aspen Heights and Fountain creek Boulevard where minor modifications may be required if the long term requires curbs in this section.

Protection of long term widening requirements will be completed by acquisition of a 45.0m right-of-way, which can accommodate a four lane urban cross-section with a 3.0m multi-use trail. Widening of Range Road 233 is recommended to be on the west side, so that upon completion of the Range Road upgrades the southbound lanes of the ultimate four lane roadway are constructed, reducing future improvement costs.

The multi-use trail is proposed to be constructed on the west side of Range Road 233 from Wallace Drive to Fountain Creek Boulevard and on the east side south of Fountain Creek Boulevard. The trail can be constructed at ultimate horizontal and vertical alignment for the majority of the roadway. In sensitive environmental areas, the benefits of constructing the trail congruent with long term urbanization must be weighed against the immediate environmental impacts.

The decision to upgrade Range Road 233 and construct intersection roundabouts is timely as the adjacent neighborhoods along the road are anticipated to be completely developed by 2012. There currently exists good opportunity to coordinate with the developers to construct the roundabout intersections and Range Road widening as part of the subdivision development.

## DEFINITIONS – TABLE 1

***Total Delay*** – The difference between the travel time actually experienced and the reference travel time that would result during base conditions, in the absence of incident, intersectional control and/or opposing traffic.

***Intersection Average Delay*** – The average amount of time vehicles are stopped or delayed at the intersection. All traffic movements are considered in determining the average.

***Level of Service (LOS)*** – a term used to qualitatively describe the operating conditions of a roadway based on factors such as speed, travel time, maneuverability, and delay. The level of service of a facility is designated with a letter A to F, with A representing the best operating system and F the worst.

***Average Speed*** – The average speed a vehicle has through the intersection

***Critical Movement Average Delay*** – The average delay a vehicle experiences in the intersection completing the movement that has the greatest delay in the intersection. Often at signalized intersections the critical movement is the left turn movement from the local road onto the through route.

***LOS – Critical Movement*** – The LOS of the Critical Movement in the intersection. Evaluates the Level of Service provided to the movement that has the greatest delay in the intersection. Intersection analysis can show a high LOS when a significant volume of through traffic moves through the intersection with little delay, even if the lesser movement traffic is experiencing unacceptable delays. Evaluation of the greatest delayed traffic movement for Level of Service indicates the overall functionality of the intersection.