Prepared By:

ISL Engineering and Land Services

Gateway to the Rockies
HINTON

Transportation Master Plan

Hinton Planning & Development Division | Current as of August 2018



ISL Engineering and Land Services

Inspiring sustainable thinking

Record of Meeting

4015-7 Street SE Calgary, AB T2G 2Y9 T: 403.254.0544 F: 403.254.9186

Project:	**Hinton Master Plan Program Management**	Project No.:	**ISL: 26580**
Client:	**The Town of Hinton**	Meeting Date:	**July 25, 2018**
Location:	**Conference Call**	Meeting Time:	**1:30 PM**
Purpose:	**Master Plan Final Draft Review Meeting**	Meeting No.:	**1**
In Attendance:	**Dale Woloszyn, Diana Daley-Beckford, Gordie Lee, Todd Martens, Wendy Jones – Town of Hinton** **Alex Ho, David Galic, Geoffrey Schulmeister, Jordan Quick, Joseph Thoms, Sarah Barbosa, Shanna Daly – ISL Engineering**	Written By:	**David Galic**
Distribution:	**All in attendance**		

The subjects discussed and decisions reached are summarized in the following record. Please notify the author of any errors or omissions. If no comments are received within 7 days this record is considered correct.

Item	Description	Action By
1.1.0	**Introductions**	
1.1.1	All attendees were introduced	INFO
1.2.0	**Storm Master Plan**	
1.2.1	No revision required. Storm MP accepted. MP to be sealed and submitted to Hinton Administration	ISL
1.3.0	**Water Master Plan**	
1.3.1	Inclusion of Project from Cheviot Drive to Macleod Avenue 300mm watermain loop. Town to provide markup of extents of this new connection	ISL/TOWN
1.3.2	Water MP accepted. MP to be sealed and submitted to Hinton Administration	ISL
1.4.0	**Wastewater Master Plan**	
1.4.1	Update front cover photo	ISL
1.4.2	Wastewater MP accepted. MP to be sealed and submitted to Hinton Administration.	ISL

Item	Description	Action By
1.5.0	**Transportation Master Plan**	
1.5.1	Update references to the Trails Master Plan. The 2011 plan referenced in the TMP is currently undergoing a update	ISL
1.5.2	Update references to Hinton Transit. The transit system routing presented in the TMP may be changed as a result of the study currently underway	ISL
1.5.3	Transportation MP accepted. MP to be sealed and submitted to Hinton Administration	ISL
1.6.0	**Adjournment**	
1.6.1	Meeting Adjourned at 2:45pm	INFO

ISL Engineering and Land Services

Inspiring sustainable thinking

4015 – 7 Street SE, Calgary, AB T2G 2Y9 T: 403.254.0544 F: 403.254.9186

August 2, 2018

Our Reference: 26571

Town of Hinton
2nd Floor, 131 Civic Centre Road
Hinton, AB T7V 2E5

Attention: Wendy Jones, Director of Planning and Development

Dear Madam:

Reference: Hinton Transportation Master Plan – Current as of August 2018

Enclosed is the Hinton Transportation Master Plan, current as of August 2018.

The key objective of this project is to assess Hinton's transportation infrastructure and the future needs for Hinton's population. The Transportation Master Plan will provide Hinton with direction on infrastructure implementation to service the projected population, while ensuring infrastructure remains fully functional in providing the appropriate level of service. This information will aid in making informed decisions on capital projects and will provide solutions for efficient, economic and sustainable transportation services.

We sincerely appreciate the opportunity to undertake this project on your behalf. Should you have any questions or concerns, please do not hesitate to contact the undersigned at 403.254.0544.

Sincerely,



Alex Ho, P.Eng., PTOE
Manager, Traffic Engineering

Corporate Authorization

This document entitled "Transportation Master Plan" has been prepared by ISL Engineering and Land Services Ltd. (ISL) for the use of the Town of Hinton. The information and data provided herein represent ISL's professional judgment at the time of preparation. ISL denies any liability whatsoever to any other parties who may obtain this report and use it, or any of its contents, without prior written consent from ISL.



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2018-08-14

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Senior Reviewer



Permit to Practice

Executive Summary

Introduction

The Town of Hinton (Hinton) retained ISL Engineering and Land Services Ltd. (ISL) to update the existing Transportation Master Plan (TMP) for Hinton. For this TMP Update, Hinton's first travel demand model was developed. The model provides a more comprehensive tool for evaluation and assessment of the road network, now and in future. The ultimate goal of the TMP is to provide a framework for Council and Administration to assess the capability of the road network to accommodate new development in the short and long term.

Study Objectives

The study was prepared to achieve the following nine objectives:

1. Develop a travel demand model for Hinton, providing a more comprehensive tool for evaluation and assessment of the road network
2. Rationalize the future road network required to support different stages of development and build-out of Hinton within the areas as defined in the East, West and Future South Area Structure Plans (ASP)
3. Review and analyze key intersections throughout Hinton, to determine the extent and expected timing of future upgrades such as construction of additional lanes and traffic signals
4. Review specific issues identified by Hinton:
    - Drinnan Way railway crossing
    - Sawyer Drive connection
    - Highway 16 at Mountain Street
    - West River Road second access
    - Service Road between Woodley Drive and Carmichael Lane
    - Review of Highway Vicinity Management Agreement
    - Advise on a suitable location for a multi-service building
    - Highway 16 pedestrian crossing at Brookhart Street and McArdell Drive
    - Existing pedestrian crossing control check
    - Pedley Drive truck bypass
    - Robb Road pavement
    - West Fraser alternate logging route
5. Review typical roadway cross-sections and recommend suitable approaches for development of future streets
6. Review the Trails Master Plan to identify future pathways and connections to the planned and proposed pathway systems to support growth areas
7. Review existing pedestrian crossings
8. Review existing transit routing and identify future transit service expansion to support growth areas
9. Review truck / pulp truck routes and identical potential changes, if any

Conclusions

Existing Transportation Network

Findings for the existing road network include:

- Overall network capacity (macro-level) analysis confirmed that there are generally no areas of major network congestion and no intersection bottlenecks within Hinton today. This is consistent with observed experience. The volume and capacity plots indicate all existing roadways show good operation with moderate volumes. The PM peak hour volumes on Highway 16 (the existing roadway with the highest volumes) is about 500 to 700 vehicles per hour in each direction, or roughly 12,000 vehicles per day.
- From the detailed operational (micro-level) analysis, the key locations where existing traffic counts were conducted throughout Hinton all operate at a good LOS and v/c ratio (LOS E or better, v/c < 0.90). Therefore, no traffic lane improvement or traffic control revision is required at any of the 39 analyzed intersections.
- Signal warrants were conducted at all the unsignalized intersections and the results of this investigation are negative, which means no signals are required at any of the unsignalized intersections. This is also consistent with the traffic controls used in Synchro.
- It was found that some of the existing streets are at the lower end of the typical size range for streets of their type. Generally speaking, the cost and disruption associated with widening corridors for marginal additional width would not be an effective strategy for enhancement of the transportation network.

Future Transportation Network

Two horizons of future land use (+800 Population and Full Build-Out) were included in the macroscopic and microscopic modelling analyses.

In the +800 Population Scenarios, the additional trips generated in the PM peak hour did not cause any significant new demand on the road network and overall conditions suggest that the traffic would be operating effectively. In the microscopic modelling, it was concluded that improvements are only required at Highway 16/Drinnan Way (add signal, add advanced warning flashers, and reduce speed to 60 km/h at approach to intersection) and Highway 16/Keil Drive (add signal).

In the Full Build-Out of the three ASP areas, the population increases to a total of nearly 30,000. Three network scenarios (Scenarios 3, 4, and 5) were evaluated for this population. From the macroscopic and microscopic modelling analyses of the three scenarios, the following conclusions are drawn:

- Macroscopic modelling:
  - With the Highway 16 Bypass in Scenario 5, 800 peak hour trips are drawn off Highway 16. From the model, the existing Highway 16 operates better (v/c 0.80 or better) as compared to Scenarios 3 and 4 (without Highway 16 Bypass) where some Highway 16 segments operate at v/c 0.80 to 1.0.
  - Switzer Drive could be considered for twinning between Kelley Road and Hardisty Avenue.

- Microscopic modelling:
  - All three scenarios require extensive improvements on Highway 16, including retiming of existing signals, adding up to 14 traffic signals, adding left turn bays at one or more approaches of various intersections, adding right turn bays at one or more approaches of various intersections, and extending the 60 km/h speed limit to Hinton's boundaries.

Specific-area analyses were also undertaken for the Full Build-Out scenarios, they include:

- Drinnan Way Railway Crossing:
  - To accommodate vehicle queues during a train crossing, four lanes are required on Drinnan Way between Highway 16 and the Drinnan Way Lands access.
- Sawyer Drive:
  - From the model run, a connection (Sawyer Drive) between McArdell Drive and Robb Road is not warranted by traffic demand.
- Highway 16 at Mountain Street/Carmichael Lane:
  - Due to the insufficient spacing on Mountain Street between Carmichael Lane and Highway 16, large trucks turning from Carmichael Lane are required to occupy both lanes of Mountain Street between Carmichael Lane and Highway 16 to perform the turn. Three options could be considered: Option 1 limit intersection to WB-12 or smaller vehicle; Option 2 widening into median and limit intersection to WB-19 or smaller vehicle or; Option 3 additional signal phasing.
- West River Road Second Access:
  - Currently there is only one access (via Kelley Road/West River Road intersection) to the developments and recreational use areas along West River Road. A second access could be considered by rebuilding the bridge over Maskuta Creek.
- Service Road between Woodley Drive and Carmichael Lane:
  - A public road connection between Carmichael Lane and Woodley Drive could be implemented by extending Carmichael Lane west and intersecting with Woodley Drive. This connection would likely be triggered by growth of developments in the area.
- Gregg Avenue/Jasper Avenue
  - With a new Tim Hortons at Gregg Avenue/Jasper Avenue, additional truck traffic and truck parking demand is anticipated. Due to the narrow road width and limited on-street parking on Gregg Avenue, on-street truck parking may not be available. Converting Gregg Street to an eastbound only one-way road would create on-street parking on the north side of Gregg Avenue, providing for additional truck parking locations. The following two options could be considered to check if truck parking could be accommodated on Gregg Avenue: Option 1 transformation of Gregg Avenue to a one-way roadway or; Option 2 restriction of truck access on Gregg Avenue.
- Review of Highway Vicinity Management Agreement:
  - Hinton and Alberta Transportation have decided to withdraw from the HVMA as the following policies are already covered in the HVMA:
    - In development applications within 800 m of a highway ROW and in an area where the highway posted speed limit is higher than 80 km/h, a TIA is required.
    - In development applications within 800 m of a highway ROW and in an area where the highway posted speed limit is less than 80 km/h, a TIA is not required if the development does not generate a significant volume of traffic (i.e., less than 100 vehicles per hour in the peak hour). In some occasions, a TIA will be required even if the development generates 100 or less trips in the peak hour. These may include: development is in an existing congested location, the proposed development does not align with the intended land use (ASP), and design standards are not met (e.g., insufficient sight distance, spacing).
    - In the East, West and future South ASP areas, the roadway network policy in the ASP requires a TIA to be undertaken at the Outline Plan/Land Use Amendment stage.
- Multi-Service Building:

- Potential location for the multi-service building should be close to the geographic centre of Hinton, similar to the current location of the Hinton RCMP and the Emergency Services Building. A possible site is in the existing DC-District within the East ASP at the southeast corner of the intersection Mountain Street/Eaton Drive/Robb Road.

In addition to the findings and recommendations for the future road network, ISL recommends some general practices for the development of new growth areas as follows:

- Strive to maintain the existing grid street network for lesser-classification roadways, avoiding both circuitous routing or closed districts and massive, inaccessible arterial routes.
- Continue to require site-specific TIA's for all applicable subdivision and development permit applications, with the intent of verifying that proposed developments are consistent with overall network planning, and to identify the extent and timing of localized roadway improvements (turn bays, signals) for implementation by the developer and/or through off-site levies.
- Promote walkable districts, providing pedestrian facilities (sidewalks/pathways) on both sides of roadways and allowing for a high level of permeability and access within and between districts. Avoid pedestrian dead ends or barriers that require significant walking distances between spatially proximate destinations (such as commercial areas that are physically blocked and separated from adjacent residential areas).
- Update Hinton transit routing over time to include new growth areas and to provide two-way service.
- Encourage updating of private transit services for local industry as new areas develop.
- Improve pedestrian safety across Highway 16 in east Hinton by either installing pedestrian half-signals at McArdell Drive and Brookhart Street or constructing a pedestrian overpass/underpass in between these roads.
- Implement various pedestrian crossing improvements at locations throughout Hinton.
- Truck routes: Add an unloaded pulp truck route on Switzer Drive between Kelley Road and East River Road. This provides connectivity of the unloaded pulp truck route to the east end of Switzer Drive.
- West Fraser: In the event Switzer Drive and Kelley Road are no longer suitable for truck traffic, alternate inbound and outbound routes are shown in Figure 9.2 and Figure 9.3, respectively.

Table of Contents

Corporate Authorization

Executive Summary i

1.0 Introduction 1
- 1.1 Background 1
- 1.2 Purpose of Study 1

2.0 Land Use and Modelling 3
- 2.1 Existing 3
- 2.2 Existing Land Use 5
- 2.3 Future Land Use 6

3.0 Travel Demand Model and Calibration 9
- 3.1 Travel Demand Model 9
- 3.2 Roadway Capacity 11
- 3.3 Existing Horizon and Calibration 12
- 3.4 Existing Detailed Intersection Analysis 12

4.0 Future Road Network 15
- 4.1 Scenario 1 15
- 4.2 Scenario 2 15
- 4.3 Scenario 3 16
- 4.4 Scenario 4 16
- 4.5 Scenario 5 16
- 4.6 Road Network Summary 17
- 4.7 Highway 16 Bypass 17

5.0 Future Horizon Detailed Intersection Analysis 19
- 5.1 Scenarios 1 and 2 Analysis Results 19
- 5.2 Scenario 3 Analysis Results 19
- 5.3 Scenario 4 Analysis Results 20
- 5.4 Scenario 5 Analysis Results 20
- 5.5 Recommended Upgrades – Scenarios 1 and 2 21
- 5.6 Recommended Upgrades – Scenarios 3, 4 and 5 21
- 5.7 Switzer Drive 25
- 5.8 Timeline of Improvements 25
- 5.9 Cost Estimate 26

6.0 Additional Analysis/Review 29
- 6.1 Drinnan Way Railway Crossing 29
- 6.2 Sawyer Drive Analysis 34
- 6.3 Highway 16 at Carmichael Lane/Mountain Street 35
- 6.4 West River Road Second Access 39
- 6.5 Service Road between Woodley Drive and Carmichael Lane 40
- 6.6 Intersection at Gregg Avenue and Jasper Avenue 41
- 6.7 Review of Highway Vicinity Management Agreement 43
- 6.8 Multi-Service Building 43

7.0 Roadway Cross Sections 45
- 7.1 Existing Cross Sections 45
- 7.2 Future Cross Sections 47

8.0 Pathways 49
8.1 Review of Trails Master Plan and Recommendations 49
8.2 Pedestrian Crossing Across Highway 16 49
8.3 Existing Pedestrian Crossing Control Check 50

9.0 Transit and Trucks 55
9.1 Transit 55
9.2 Trucks 55

10.0 Conclusions and Recommendations 59
10.1 Existing Transportation Network 59
10.2 Future Transportation Network 59

APPENDICES

Appendix A Model Zones and Land Use
Appendix B Model Calibration
Appendix C Highway 16 Bypass Plans
Appendix D Cost Estimates
Appendix E Pedestrian Crossing Control Check Data
Appendix F Preliminary Design Report, Robb Road

TABLES

Table 2.1: External Zone Links 4
Table 2.2: Existing Land Use 5
Table 2.3: Hinton Roadway Classification 6
Table 3.1: Link Capacities 11
Table 3.2: Volume-to-Capacity Ratio Ranges 11
Table 3.3: Level of Service Criteria 13
Table 5.1: Scenarios 1 and 2 Recommended Intersection and Traffic Control Upgrades Comparison 21
Table 5.2: Scenarios 3, 4 and 5 Recommended Intersection and Traffic Control Upgrades Comparison 22
Table 5.3: Switzer Drive Daily Traffic Volumes 25
Table 5.4: Cost Estimates 27
Table 6.1. Criteria for Determination of Turn Bay Length 32
Table 6.2: Scenarios 1 and 2 Simulation Results 32
Table 6.3: Scenario 2 with Improvements Simulation Results 33
Table 6.4: Multi-Service Buildings in Alberta 44
Table 7.1: Hinton Roadway Classification 45
Table 7.2: Cross-Section Characteristics 45
Table 8.1: Count Dates and AM and PM Peak Hours 50
Table 8.2: Pedestrian Crossing Control Summary 53

FIGURES

Figure 3.1: Typical Four Step Travel Demand Modelling Process 9
Figure 3.2: General Representation of Base Year Model Development 10
Figure 6.1: Study Area, Drinnan Way Lands 29
Figure 6.2: Eastbound (L) and Westbound (R) Approach, Highway 16 at Drinnan Way 30
Figure 6.3: Drinnan Way Railway Crossing 30
Figure 6.4: Drinnan Way Recommended Lane Configurations 34
Figure 6.5: Possible Sawyer Drive Connection 34
Figure 6.6: WB-12 on Highway 16 at Carmichael Lane/Mountain Street 35
Figure 6.7: Highway 16 at Carmichael Lane/Mountain Street 36
Figure 6.8: WB-19 Turns at Highway 16/Carmichael Lane/Mountain Street 37
Figure 6.9: Existing Signal Timing Plan at Highway 16/Carmichael Lane/Mountain Street 38
Figure 6.10: Proposed Signal Timing Plan at Highway 16/Carmichael Lane/Mountain Street 39
Figure 6.11: Recommended Access Options 39
Figure 6.12: Alberta Transportation Access Management Plan with Highway 16 Bypass 40
Figure 6.13: Existing Road Network Adjacent to Parks West Mall 41
Figure 6.14: One-Way Gregg Avenue 42

Figure 6.15: Truck Restriction 42
Figure 6.16: Possible Location of Multi-Service Building 44
Figure 8.1: Existing Pedestrian Crossing Locations 49
Figure 9.1: Existing Logging Truck Routes 57
Figure 9.2: Alternate Inbound Logging Truck Route 57
Figure 9.3: Alternate Outbound Logging Truck Route 58

EXHIBITS

following page

Exhibit 2.1: Transportation Zones 8
Exhibit 2.2: Existing Population and Household 8
Exhibit 2.3: Existing Employment 8
Exhibit 2.4: Existing Roadway Classification 8
Exhibit 2.5: Growth Areas 8
Exhibit 2.6: Population Growth – +800 Population 8
Exhibit 2.7: Population Growth – Full Buildout 8
Exhibit 2.8: Total Population – +800 Population 8
Exhibit 2.9: Total Population – Full Buildout 8
Exhibit 2.10: Employment Growth – +800 Population 8
Exhibit 2.11: Employment Growth – Full Buildout 8
Exhibit 2.12: Total Employment – Full Buildout 8
Exhibit 2.13: Total Employment – Full Buildout 8
Exhibit 3.1: PM Peak Volume to Capacity Plot - Existing 14
Exhibit 3.2: PM Peak Hour Traffic Volumes – Existing West 14
Exhibit 3.3: PM Peak Hour Traffic Volumes – Existing Central 14
Exhibit 3.4: PM Peak Hour Traffic Volumes – Existing East 14
Exhibit 4.1: Road Classifications – 2046 Scenario 1/2: +800 Population 18
Exhibit 4.2: PM Peak Hour Volumes to Capacity – 2046 Scenario 1: +800 Population 18
Exhibit 4.3: PM Peak Hour Traffic Volumes – 2046 Scenario 1: +800 Population West 18
Exhibit 4.4: PM Peak Hour Traffic Volumes – 2046 Scenario 1: +800 Population Central 18
Exhibit 4.5: PM Peak Hour Traffic Volumes – 2046 Scenario 1: +800 Population East 18
Exhibit 4.6: PM Peak Hour Volumes to Capacity – 2046 Scenario 2: +800 Population 18
Exhibit 4.7: PM Peak Hour Traffic Volumes – 2046 Scenario 2: +800 Population West 18
Exhibit 4.8: PM Peak Hour Traffic Volumes – 2046 Scenario 2: +800 Population Central 18
Exhibit 4.9: PM Peak Hour Traffic Volumes – 2046 Scenario 2: +800 Population East 18
Exhibit 4.10: Road Classifications – 2046 Scenario 3/4: Full Buildout 18

Exhibit 4.11: PM Peak Hour Volumes to Capacity – 2046 Scenario 3: Full Buildout 18
Exhibit 4.12: PM Peak Hour Traffic Volumes – 2046 Scenario 3: Full Buildout West 18
Exhibit 4.13: PM Peak Hour Traffic Volumes – 2046 Scenario 3: Full Buildout Central 18
Exhibit 4.14: PM Peak Hour Traffic Volumes – 2046 Scenario 3: Full Buildout East 1 18
Exhibit 4.15: PM Peak Hour Traffic Volumes – 2046 Scenario 3: Full Buildout East 2 18
Exhibit 4.16: PM Peak Hour Volumes to Capacity – 2046 Scenario 4: Full Buildout 18
Exhibit 4.17: PM Peak Hour Volumes Comparison – 2046 Scenario 3 and Scenario 4 18
Exhibit 4.18: PM Peak Hour Traffic Volumes – 2046 Scenario 4: Full Buildout West 18
Exhibit 4.19: PM Peak Hour Traffic Volumes – 2046 Scenario 4: Full Buildout Central 18
Exhibit 4.20: PM Peak Hour Traffic Volumes – 2046 Scenario 4: Full Buildout East 1 18
Exhibit 4.21: PM Peak Hour Traffic Volumes – 2046 Scenario 4: Full Buildout East 2 18
Exhibit 4.22: PM Peak Hour Volumes to Capacity – 2046 Scenario 5: Full Buildout 18
Exhibit 4.23: PM Peak Hour Volumes Comparison – 2046 Scenario 3 and Scenario 5 18
Exhibit 4.24: PM Peak Hour Traffic Volumes – 2046 Scenario 5: Full Buildout West 18
Exhibit 4.25: PM Peak Hour Traffic Volumes – 2046 Scenario 5: Full Buildout Central 18
Exhibit 4.26: PM Peak Hour Traffic Volumes – 2046 Scenario 5: Full Buildout East 1 18
Exhibit 4.27: PM Peak Hour Traffic Volumes – 2046 Scenario 5: Full Buildout East 2 18
Exhibit 5.1: Scenario 1/2 (+800 Population) Recommended Intersection Improvements 28
Exhibit 5.2: Scenario 3/4/5 (Full Buildout) Recommended Intersection Improvements 28
Exhibit 7.1: Cross Sections for Complete Street Standards 48
Exhibit 7.2: Cross Sections for Complete Street Standards 48
Exhibit 7.3: Road Classifications – 2046 Scenario 1/2: +800 Population 48
Exhibit 7.4: Road Classifications – 2046 Scenario 3/4: Full Buildout 48
Exhibit 8.1: Trails Master Plan 54
Exhibit 9.1: Existing Transit Routing 58
Exhibit 9.2: Recommended Transit Routing (With South ASP Access Off Highway 40) 58
Exhibit 9.3: Recommended Transit Routing (With South ASP Access Off Robb Road) 58
Exhibit 9.4: Truck Route 58

ACRONYMS AND DEFINITIONS

Acronym	Meaning
ASP	Area Structure Plan
East ASP	Adopted East Area Structure Plan (Bylaw 1118)
FPS	Functional Planning Study
Hinton	The Town of Hinton
HVMA	Highway Vicinity Management Agreement
ISL	ISL Engineering and Land Services Ltd.
OD	origin-destination
South ASP	Forthcoming South Area Structure Plan
SU-9	single unit truck
Synchro	traffic analysis software
TIA	Traffic Impact Assessment
TMP	Transportation Master Plan
VISUM	traffic modelling software
WB-15	Semi trailer
WB-36	turnpike double
West ASP	Adopted West Area Structure Plan (Bylaw 1117)

Term	Meaning
Industrial/Commercial Arterial	A road primarily for through traffic in industrial / commercial area
Industrial/Commercial Collector	A road on which traffic movement and access have similar importance in industrial / commercial area
Industrial/Commercial Local	The main function of local roads is land access. The intended traffic function of an industrial / commercial local road is allow vehicles to reach properties in industrial / commercial area.
Residential Arterial	A road primarily for through traffic in residential area
Residential Collector	A road on which traffic movement and access have similar importance in residential area
Residential Local	The main function of local roads is land access. The intended traffic function of a residential local road is allow vehicles to reach properties in residential area.

UNITS

Unit	Meaning
AADT	annual average daily traffic
ha	hectare
HH	household
hr	hour
km	kilometre
km/h	kilometres per hour
km^2	square kilometre
LOS	level of service
m	metre
m/s	metres per second
m^2	square metres
min	minute
OD	origin-destination
persons/dwelling	persons per dwelling
persons/ha	persons per hectare
Pop	population
R^2	regression value
s/veh	second per vehicle
Sc	scenario
UPA	unit-per-acre
v/c	volume-to-capacity ratio
veh/lane/hr	vehicles per lane per hour
AADT	annual average daily traffic

1.0 Introduction

The Town of Hinton (Hinton) retained ISL Engineering and Land Services Ltd. (ISL) to update the existing Transportation Master Plan (TMP) for Hinton. The subject study updates the previous *Town of Hinton Transportation Master Plan 2008 Update* dated October 2010 by Morrison Hershfield.

For this TMP Update, Hinton's first travel demand model was developed. The model provides a more comprehensive tool for evaluation and assessment of the road network, now and in future. The ultimate goal of the TMP is to provide a framework for Council and Administration to assess the capability of the road network to accommodate new development in the short and long term. This information is also useful for carrying out short- and long-term planning and budgeting, including development of off-site levies. Comprehensive Master Plans require financial commitment on the part of a municipality. The investment in Master Plans, however, represent only a small fraction of the future costs for maintaining these systems for existing residents and expanding them to accommodate new growth.

1.1 Background

Hinton is situated on the western end of central Alberta in Yellowhead County, and lies right on the edge of the Canadian Rockies. Originally a hamlet, Hinton was named in 1911, and remained a hamlet until 1956. In 1957, the Town of Hinton and the Village of Drinnan amalgamated to form what is currently known as the Town of Hinton. Hinton is bounded by the Athabasca River to the north and dense forest to the south. The major interprovincial Yellowhead Highway which connects Winnipeg to Prince Rupert, transects Hinton.

Hinton's current population is 9,882, per the *Census of Population, 2016*. Historically, Hinton recorded populations of 9,640 and 9,825 for the 2011 and 2009 censuses, respectively. At full build-out of the current boundary of Hinton, including the 2016 population of 9,882, the cumulative future population is estimated to be 28,816 residents.

1.2 Purpose of Study

There were nine primary objectives of the TMP:

1. Develop a travel demand model for Hinton, providing a more comprehensive tool for evaluation and assessment of the road network
2. Rationalize the future road network required to support different stages of development and build-out of Hinton within the areas as defined in the East, West and Future South Area Structure Plans (ASP)
3. Review and analyze key intersections throughout Hinton, to determine the extent and expected timing of future upgrades such as construction of additional lanes and traffic signals

4. Review specific issues identified by Hinton:
    - Drinnan Way railway crossing
    - Sawyer Drive connection
    - Highway 16 at Mountain Street
    - West River Road second access
    - Service Road between Woodley Drive and Carmichael Lane
    - Review of Highway Vicinity Management Agreement
    - Advise on a suitable location for a multi-service building
    - Highway 16 pedestrian crossing at Brookhart Street and McArdell Drive
    - Existing pedestrian crossing control check
    - Pedley Drive truck bypass
    - Robb Road pavement
    - West Fraser alternate logging route
5. Review typical roadway cross-sections and recommend suitable approaches for development of future streets
6. Review the Trails Master Plan to identify future pathways and connections to the planned and proposed pathway systems to support growth areas
7. Review existing pedestrian crossings
8. Review existing transit routing and identify future transit service expansion to support growth areas
9. Review truck / pulp truck routes and identical potential changes, if any

Specific to Hinton, the TMP includes the following:

- Compilation of the existing traffic data
    - Identification of observed areas of concern
- Analysis of infrastructure under existing and future growth scenarios including:
    - Existing scenario (9,882 residents)
    - Future scenario 1 (10,682 residents)
    - Future scenario 2 (30,433 residents)
- Identification of the required upgrades to the infrastructure to meet existing and future needs:
    - With future South ASP access off Highway 40 or Robb Road
    - With the Highway 16 Bypass
- Development of cost estimates for all required upgrades and the future roadway network

2.0 Land Use and Modelling

Long-term forecasting for the TMP Update was completed with a travel demand model that ties intimately to existing and future land use for Hinton, and provides a rational basis on which to assess future requirements. The travel demand models developed for the TMP will also provide an effective foundation for Hinton's ongoing use for future planning analysis, helping to supplement such initiatives as infrastructure design, traffic impact studies and evaluation of alternative infrastructure solutions or future land use scenarios.

The following sections provide a summary of the land use assumptions that form the basis for recommendations in this report.

2.1 Existing

The existing built area of Hinton is located along Highway 16 (Yellowhead Highway). Geographically, Hinton is divided by Highway 16. Thus, while Highway 16 represents a vital transportation link and external connection for Hinton, it also represents a major barrier to mobility and connections within Hinton.

North of the highway, Switzer Drive separates the residential and the historic downtown core from the industrial area. There are many commercial businesses along Highway 16. The recreation centre and many parks and playing fields are on Switzer Drive.

South of the highway there are primarily residential districts and highway commercial businesses. The Hinton Healthcare Centre, Hinton Golf Course, and Hinton Bike Park are also located south of the highway.

2.1.1 Existing Model Zoning

For modelling purposes, Hinton and the surrounding area was subdivided into zones that allow for land use characteristics to be described on a geographic basis.

The zone map of Hinton area is shown in Exhibit 2.1. The zoning scheme was derived from the zones in the 2008 TMP Update based on existing subzones and road boundaries, and to reflect natural and man-made divisions such as major roads, the Canadian National Railway lines, the Athabasca River, coulees and other natural features (Happy Creek, Hardisty Creek). Zones also reflect varying land use, such as the division of downtown into commercial and residential areas.

2.1.2 Model Numbering

Each zone within the transportation model was named and numbered for reference. Numbering was organized according to the following methodology:

- Zone numbers in the 100s are used for the Terrace Heights district
- Zone numbers in the 200s are used for the Hillcrest district
- Zone numbers in the 300s are used for the Eaton district
- Zone numbers in the 400s are used for the Thompson Lake district
- Zone numbers in the 500s are used for the Hardisty district
- Zone number 600 is used for the Riverside district
- Zone numbers in the 700s are used for the Mountain View district
- Zone number 800 is used for the West Riverside district
- Zone number 900 is used for the future South ASP district
- Zone numbers in the 10,000s are external zones

2.1.3 Internal Zones and Subzones

As shown in Exhibit 2.1, subzones of municipal zones within the built area of Hinton are summarized as follows:

- Terrace Heights (Zones 101-112) – subdivided by Highway 16 to separate commercial, recreational and residential land uses
- Hillcrest (Zones 201 and 202) – subdivided by Mountain Street to provide multiple zone connections to the street network
- Eaton (Zones 300-302) – subdivided for existing and future development
- Thompson Lake (Zones 400 and 414) – subdivided by Highway 16 to separate commercial and residential land use
- Hardisty (501-505) – subdivided to better replicate multiple zone connections to the divided street network
- Riverside (600) – no further subzones
- Mountain View (701-704) – subdivided to better replicate multiple zone connections to the divided street network
- West Riverside (800) – no further subzones
- Future South ASP (900) – no further subzones

Generally, the zone system provides a good breakout of the areas within Hinton's boundary, and provides a reasonably fine definition of land uses and zone connections to the road network for transportation modelling. The existing model for the Hinton consists of 17 traffic zones.

2.1.4 External Zones

External zones are used in the transportation model to represent traffic passing into and out of the road system from regional destinations.

Hinton is a regional transportation hub servicing many external trips (external to internal, internal to external, and Hinton by-pass trips), the interaction between residential land bases and employment zones within Hinton and to external municipalities is a key consideration in this regard. To provide a reasonable snapshot of transportation requirements and their impact on roadways within Hinton, the transportation demand model was developed including nine external gates to account for the external trips. The external gates are summarized in Table 2.1.

Table 2.1: External Zone Links

External Zone	Roadway	Direction	Notes
10001	Highway 16	East	Major route representing demand to/from Edson and Edmonton
10002	Cache Percotte Road	East	Minor route to/from Yellowhead County
10003	Robb Road (Cold Creek Road)	South	Minor route to/from Yellowhead County (connection to Highway 40 South)
10004	Highway 40	South	Minor provincial highway route to/from Cadomin and Luscar
10005	Highway 16	West	Major route representing demand to/from Jasper and British Columbia (connection to Highway 93)
10006	Highway 40	North	Minor provincial highway route to/from Grande Cache
10007	West River Road	West	Minor route to/from Yellowhead County
10008	Willow Creek Road	North	Minor route to/from Yellowhead County
10009	East River Road	East	Minor route to/from Yellowhead County

2.2 Existing Land Use

Land use information for the TMP was provided by Hinton and adapted to suit the format of the travel demand model. Table 2.2 provides a summary of existing land use by zone.

Table 2.2: Existing Land Use

Zone ID	Code	District	HH (1)	HH/ Acre	Pop (2)	Pop/ HH	Emp (3) (Retail)	Emp (Non-Retail)	Emp (Industrial)
101	TER101	Terrace Heights	110	8	275	2.5	0	10	0
102	TER102		16	0	40	2.5	250	0	0
201	HIL201	Hillcrest	402	3	1,005	2.5	0	0	0
202	HIL202		528	3	1,320	2.5	0	40	0
300	EAT300	Eaton	161	1	403	2.5	0	50	0
401	THO401		348	3	887	2.5	10	5	0
402	THO402		0	0	0	-	80	100	30
501	HAR501	Hardisty	246	2	627	2.5	50	200	0
502	HAR502		266	2	678	2.5	20	50	0
503	HAR503		647	2	1,650	2.6	105	50	0
504	HAR504		220	3	561	2.6	80	50	0
505	HAR505		0	0	0	-	20	310	0
600	RIV600	Riverside	0	0	0	-	0	50	599
701	MOU701	Mountain View	423	3	1,079	2.6	20	30	0
702	MOU702		310	2	791	2.6	120	30	350
703	MOU703		15	0	38	2.5	40	270	0
704	MOU704		40	1	100	2.5	220	0	0
800	WES800	West Riverside	86	0	215	2.5	0	30	30
900	MIE900	Future South ASP	0	0	0	-	0	0	300
Total			**3,818**	**---**	**9,882**	**---**	**1,015**	**1,275**	**1,309**

Notes:
(1) HH = Households
(2) Pop = Population
(3) Emp = Employment

2.2.1 Existing Population

Existing population data was provided by Hinton and is represented graphically in Exhibit 2.2.

From *Census of Population, 2016*, Hinton's existing population is 9,882 persons in 3,818 households. Based on this data, the existing population of 9,882 provides for an average household population of 2.5 persons per household.

2.2.2 Existing Employment

Similar to the population figures, employment figures for the TMP were confirmed and provided by Hinton. From Hinton's data, the employment was divided into three categories:

- Retail Employment – employment at retail/higher-turnover businesses
- Non-Retail Employment – employment at non-retail/lower-turnover businesses including offices
- Industrial Employment – employment at pulp mill/saw mill/coal mine/oil and gas/industrial sites

From the data provided by Hinton, the total existing retail employment, non-retail employment and industrial employment is 1,015 jobs, 1,275 jobs and 1,309 jobs, respectively, or a total of 3,600 jobs. This is illustrated in Exhibit 2.3. The total employment for each zone is detailed in the summary spreadsheet in Appendix A. Jobs that are outside Hinton boundary (e.g., coal mine, oil and gas) are assigned as trips to/from the external zones.

2.2.3 Existing Roadway Classification

The existing road classification and its roadway capacity (per Hinton's *Engineering Design Standards*) is shown below and in Exhibit 2.4.

Table 2.3: Hinton Roadway Classification

Road Class	Capacity (veh/day)	Description
Industrial/ Commercial Arterial	> 5,000	A road primarily for through traffic in or near an industrial/commercial area
Industrial/ Commercial Collector	1,000 – 5,000	A road on which traffic movement and access have similar importance in an industrial/commercial area
Industrial/ Commercial Local	< 1,000	The main function of local roads is land access. The intended traffic function of an industrial/commercial local road is allow vehicles to reach properties in industrial/commercial area.
Residential Arterial	> 5,000	A road primarily for through traffic in or near a residential area
Residential Collector	1,000 – 5,000	A road on which traffic movement and access have similar importance in residential area
Residential Local	< 1,000	The main function of local roads is land access. The intended traffic function of a residential local road is to allow vehicles to reach properties in a residential area.

2.3 Future Land Use

The future land use is based on the adopted East ASP (Bylaw 1118) and West ASP (Bylaw 1117). In addition to the two ASPs, the forthcoming South ASP area located south of the West ASP area is included as a future land use. The land use statistics behind these concepts were used to inform the development of the TMP.

2.3.1 Model Zoning

The growth areas are illustrated in Exhibit 2.5. In the model, the growth areas add 10 zones (from 17 zones to 27 zones):

- East ASP Area: Zones 301, 302, 400, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413
- West ASP Area: Zones 103, 104, 105, 106, 107, 108, 109, 110, 111, 112
- Future South ASP Area: Zone 900

In both future horizons, traffic to/from the external gates also grew. The growth is based on historic highway growth rates (2-2.5% annually) from Alberta Transportation's 10-year traffic data (2006 to 2016).

2.3.2 Forecasting Horizon and Study Area

In the TMP, planning and analysis was undertaken for two future land use horizons:

- +800 Population Scenario: Moderate normalized growth rate at 0.89% per year for a population increase of 800 people in 30 years (2046)
- Full Build-Out Scenario: Full build-out in the East, West and future South ASP areas, an additional growth of 20,682 people, for a total population of 30,433 is expected in 30 years

Forecasting was based on extrapolation from the current horizon to the assumed horizons and derived from a calibrated model of existing traffic conditions. Further detail on the calibration process is provided in Section 3.0.

Future land use information for the TMP was provided in the development concept plans of the East and West ASP areas; these are used to balance household figures and employment rates against existing conditions. A complete summary table of existing and full build-out land use by zone is provided in Appendix A.

One school site was added in each of the three zones in the growth areas: Zone 106 in Terrace Heights, Zone 301 in Eaton, and Zone 408 in Thompson Lake.

2.3.3 Future Population

The expected population in the residential growth areas within Hinton was reviewed in the TMP process to confirm total population and density targets, and is enclosed in Appendix A.

In the case of +800 Population Scenario, a moderate normalized growth rate 0.89% of population resulted in a total population of 10,682 for Hinton as a whole in 2046.

In the Full Build-Out scenario, an additional growth of 20,500 people, for a total population of 30,433 is expected in 2046. This is based on the ASPs' targeted 8.0 gross unit per acre (UPA) for new development areas and an average household population of 2.6 persons per household. This is slightly higher than the existing household population of 2.5 persons.

Population growth is represented graphically in Exhibits 2.6 and 2.7 for the +800 Population and Full Build-Out scenarios, respectively. Total future population (existing population plus population growth) is represented in Exhibit 2.8 and 2.9 for the two scenarios, respectively.

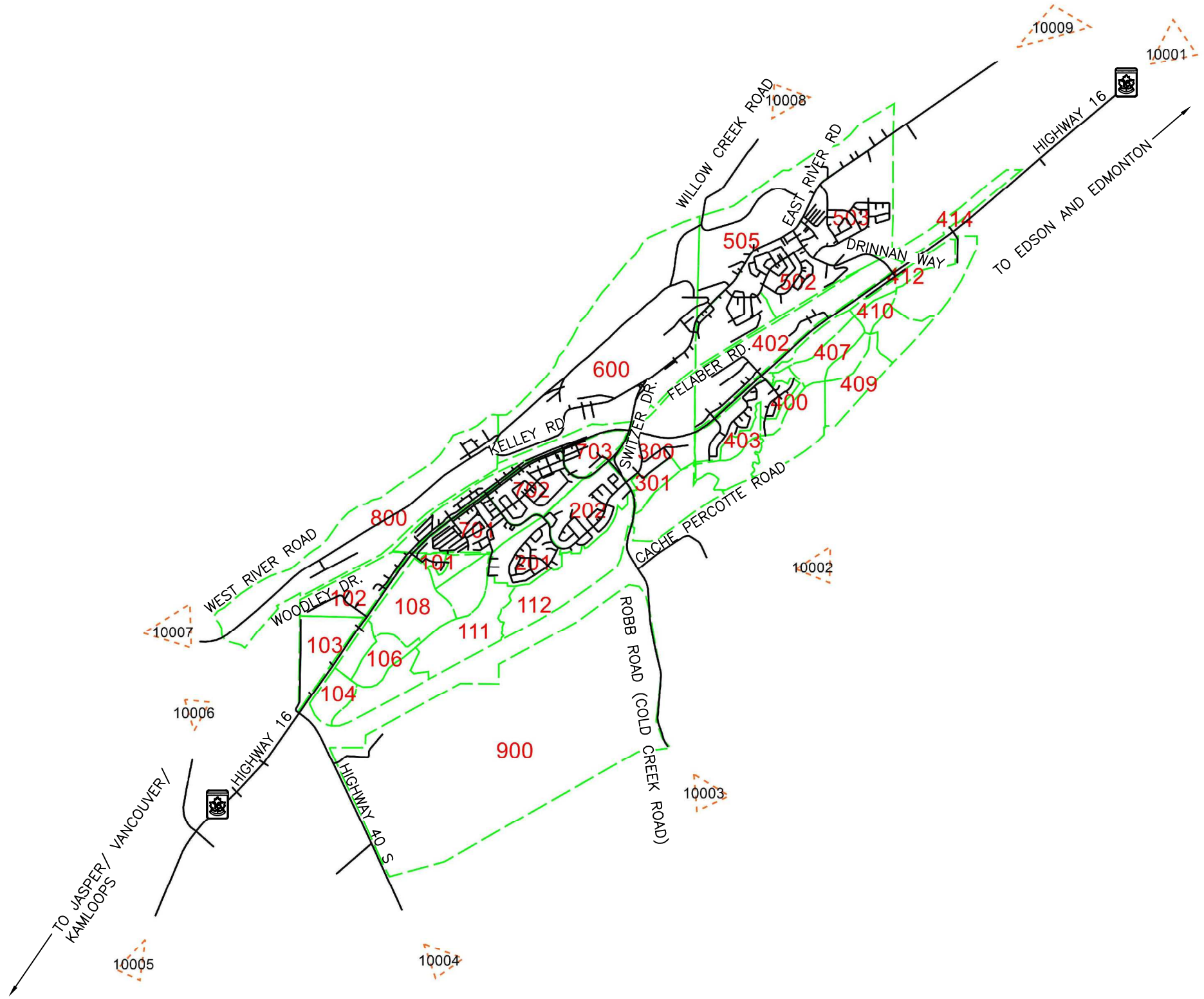
2.3.4 Future Employment

Derivation of employment for the future scenario was based on similar assumptions and methodology as for the existing employment, and is summarized by zone in Appendix A.

Using similar methodology and calculations as for the existing employment figures, assumptions for future employment are summarized as follows:

- As calculated from the existing model, the employment rate for Retail Employment per household is assumed to be 0.26, while the employment rate for Non-Retail Employment per household is 0.33. The employment rate for Industrial Employment per household is assumed to be 0.34. These rates were applied to the planned industrial and commercial growth areas of the two future population scenarios
- Employment in existing area remains the same
- In the residential growth areas, additional elementary schools were assumed in Zones 106, 301 and 408. For each school, 50 non-retail jobs were assumed

In the +800 Population Scenario, approximately 300 additional jobs within Hinton were added; this translates to a total of 3,900 jobs. In the Full Build-Out Scenario, approximately 7,650 additional jobs within Hinton were added; this translates to a total of 11,250 jobs. Employment growth is represented graphically in Exhibits 2.10 and 2.11 for the +800 Population and Full Build-Out scenarios, respectively, while total future employment (existing employment plus employment growth) is represented in Exhibits 2.12 and 2.13 for the two scenarios.



Legend:

INTERNAL ZONES

EXTERNAL ZONES

ISL Engineering and Land Services

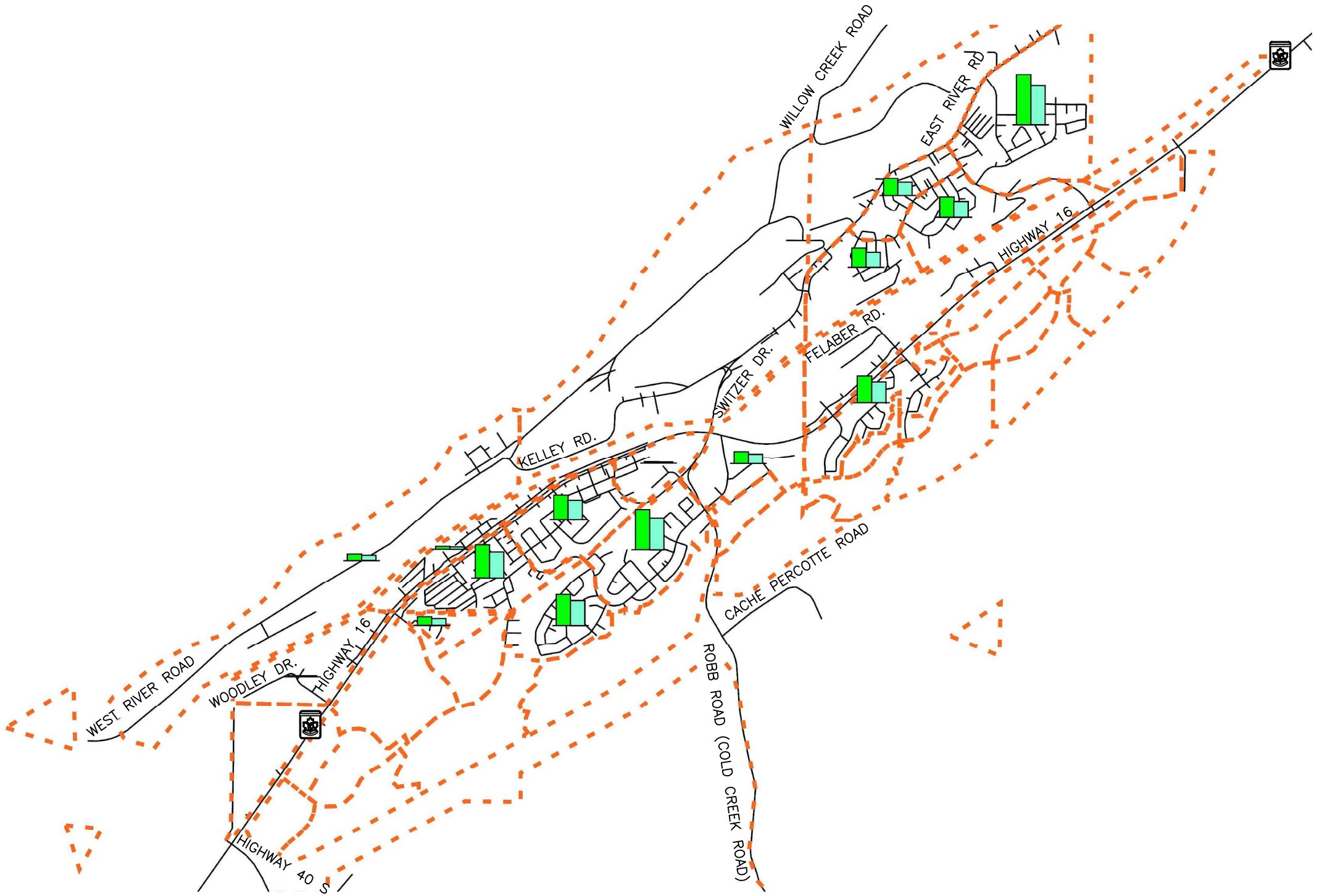
TOWN OF HINTON Gateway to the Rockies

TOWN OF HINTON TRANSPORTATION MASTER PLAN

TRANSPORTATION ZONES

EXHIBIT 2.1

Diana Ranca / Oct. 18, 17 / M:\26560\26571_Town Of Hinton_TMP\02_CADD\20_Drafting\201_TMP_EXHIBITS\170721_TMP_EXHIBITS_TRANS_ZONES_170721.dwg



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ISL Engineering and Land Services

TOWN OF HINTON
Gateway to the Rockies

Legend:

ZONES

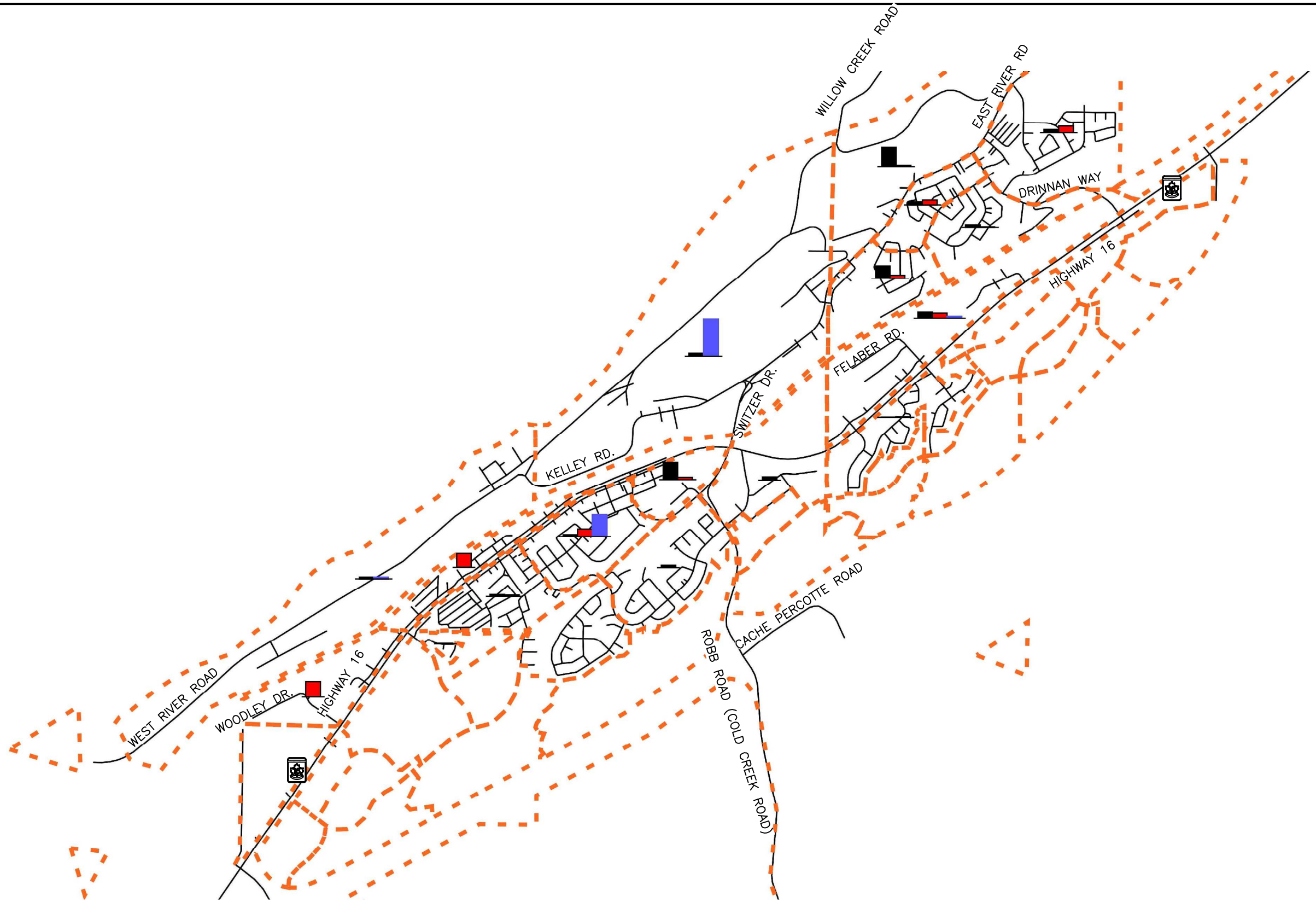
POPULATION 10K
2000
1000
0

HOUSEHOLD 10K
2000
1000
0

TOWN OF HINTON TRANSPORTATION MASTER PLAN

EXISTING POPULATION AND HOUSEHOLD BASE YEAR (2016)

EXHIBIT 2.2



Legend:

ZONES

NON RETAIL 10K — 1000 / 500 / 0

RETAIL 10K — 1000 / 500 / 0

INDUSTRIAL 10K — 1000 / 500 / 0

ISL Engineering and Land Services

TOWN OF HINTON — Gateway to the Rockies

TOWN OF HINTON TRANSPORTATION MASTER PLAN

EXISTING EMPLOYMENT

EXHIBIT 2.3

Diana Ranes | Oct. 18, 17 | M:\26500\26571_Town Of Hinton_TMP\02_CADD\20_Drafting\001_TMP_EXHIBITS\170721_TMP_Exhibits\26571_EMPLOYMENT_170721.dwg



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ISL Engineering and Land Services

TOWN OF HINTON
Gateway to the Rockies

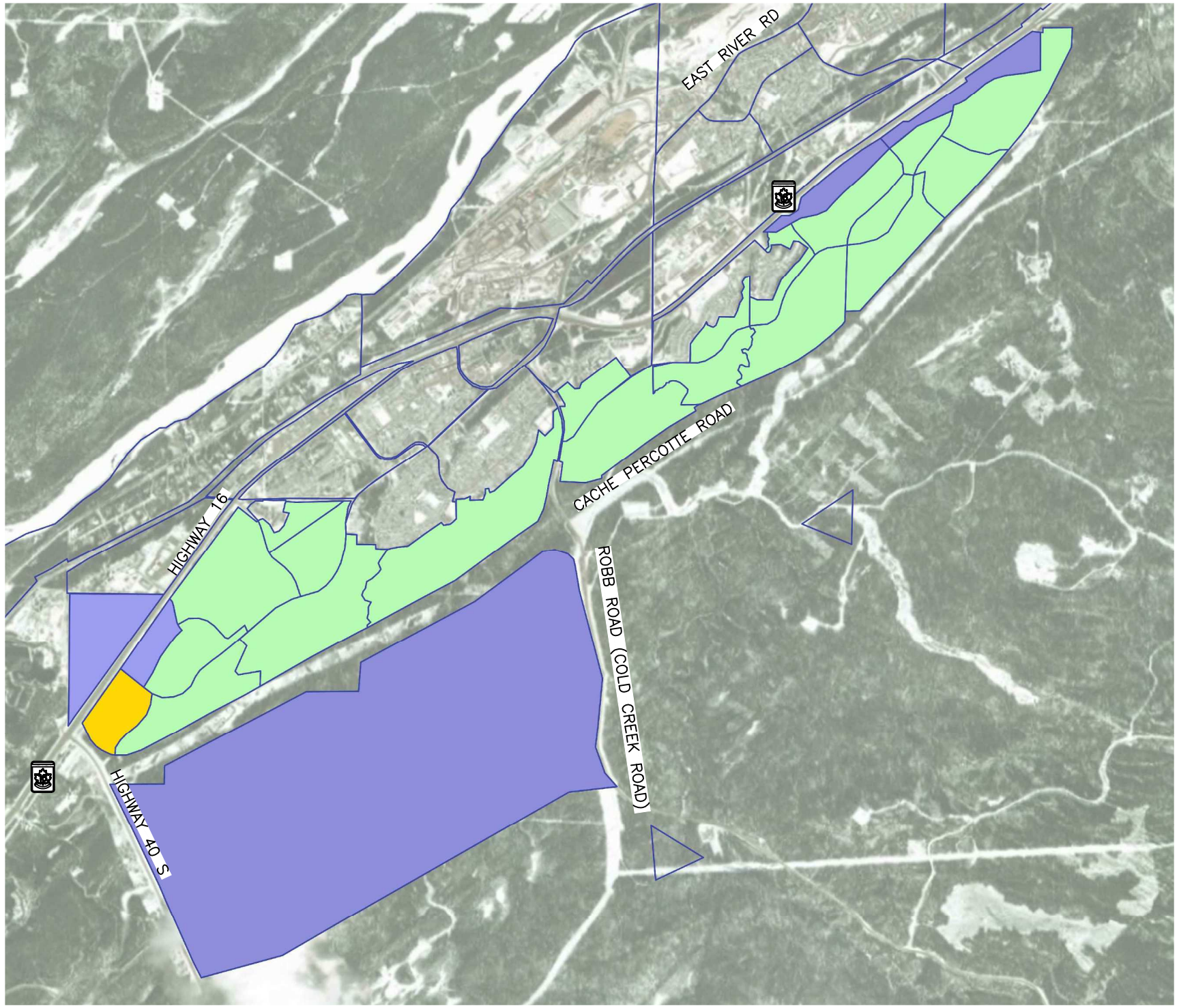
Legend:

- HIGHWAY
- ARTERIAL
- COLLECTOR
- LOCAL
- RURAL

TOWN OF HINTON TRANSPORTATION MASTER PLAN

ROAD CLASSIFICATION EXISTING

EXHIBIT 2.4



Legend:

HIGHWAY COMMERCIAL/INDUSTRIAL	
RESIDENTIAL	
MIXED USE	

ISL Engineering and Land Services

TOWN OF HINTON
Gateway to the Rockies

TOWN OF HINTON TRANSPORTATION MASTER PLAN

GROWTH AREAS

EXHIBIT 2.5

Diana Ranca | Oct. 18, 17 | M:\26560\26571_Town Of Hinton_TMP\02_CADD\20_Drafting\301_TMP_EXHIBITS\170721_TMP_Exhibits\26571_GROWTH_AREAS.dwg



Legend:

ZONES

POP. 800 GROWTH
2000
1000
0

HOUSEHOLD 800 GROWTH
1000
500
0

ISL Engineering and Land Services

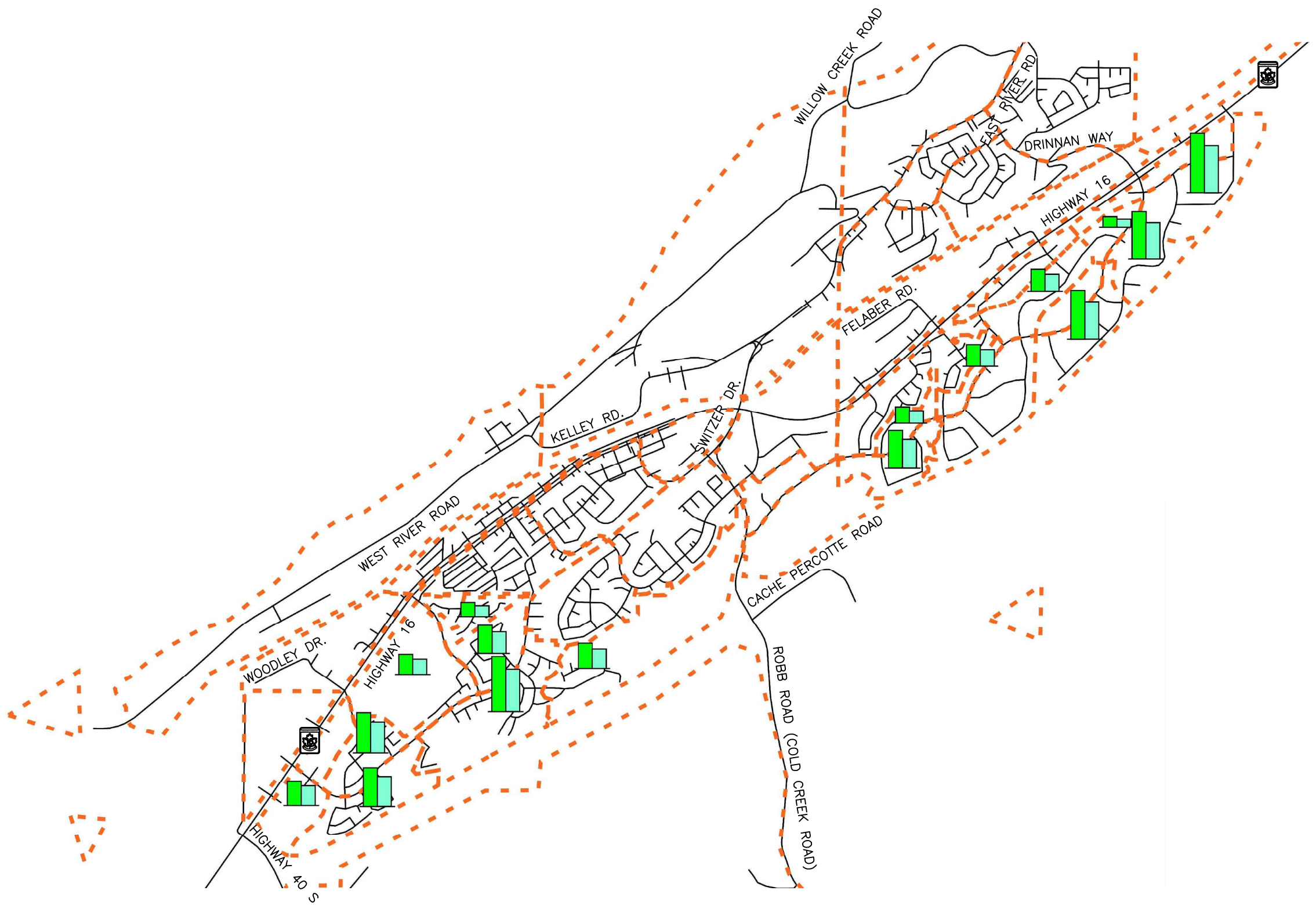
TOWN OF HINTON
Gateway to the Rockies

TOWN OF HINTON TRANSPORTATION MASTER PLAN

POPULATION AND HOUSEHOLD GROWTH +800 POPULATION (2046)

EXHIBIT 2.6

Diana Rancel / Oct. 18, 17 / M:\26500\26571_Town Of Hinton_TMP\02_CADD\20_Drafting\201_TMP_EXHIBITS\170721_TMP_Exhibits\26571_FUTURE_800POP_GROWTH.dwg



Legend:

ZONES

POP. GROWTH BUILDOUT
2000
1000
0

HOUSEHOLD GROWTH BUILDOUT
1000
500
0

ISL Engineering and Land Services

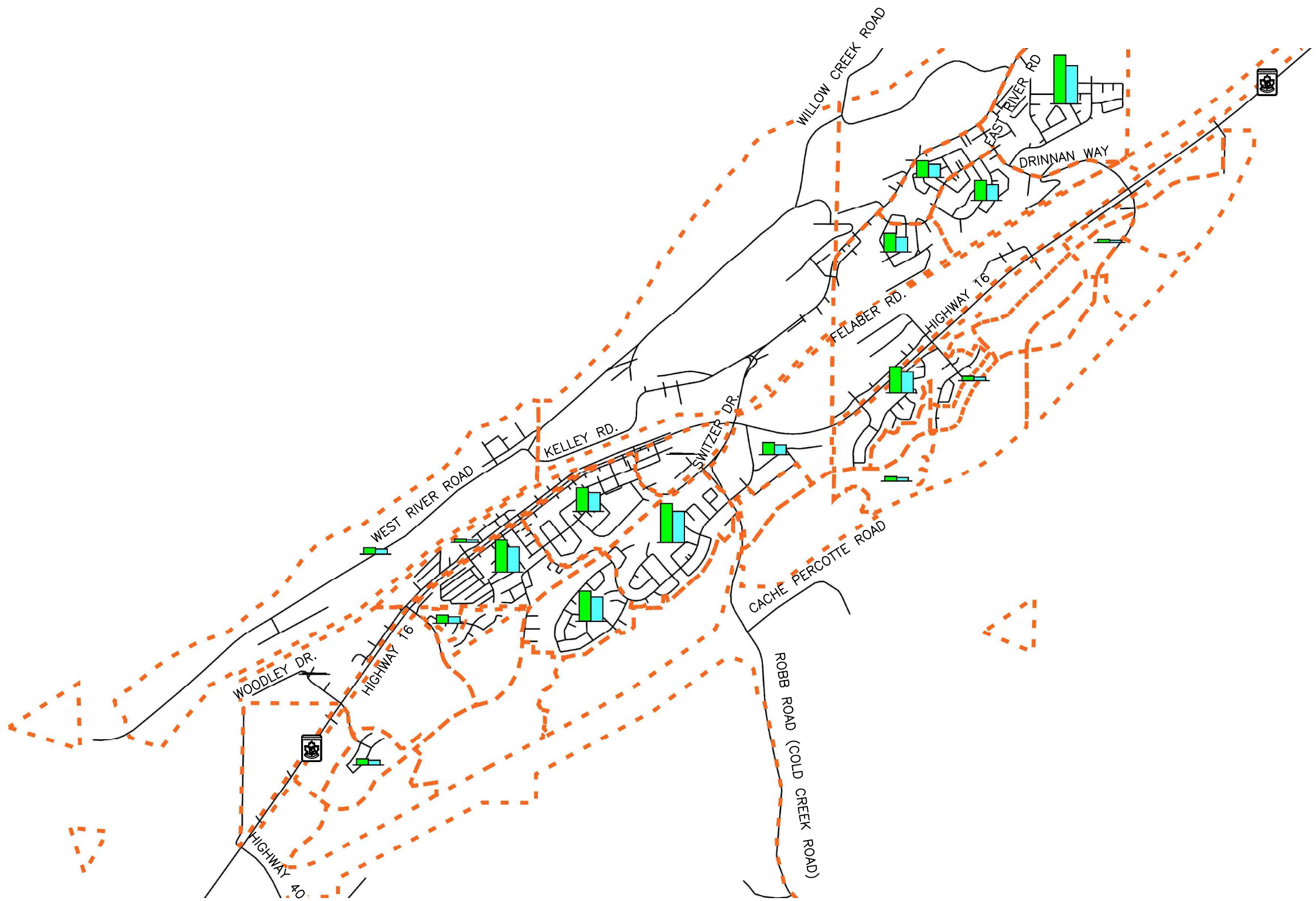
TOWN OF HINTON
Gateway to the Rockies

TOWN OF HINTON TRANSPORTATION MASTER PLAN

POPULATION AND HOUSEHOLD GROWTH FULL BUILDOUT (2046)

EXHIBIT 2.7

Diana Rensa / Oct. 18, 17 / M:\26560\26571_Town Of Hinton_TMP\02_CADD\20_Drafting\201_TMP_EXHIBITS\170721_TMP_Exhibits\26571_FUTURE_BUILT-OUT_POP_GROWTH.dwg



Legend:

ZONES

TOTAL POP. 2046 +800 SCENARIO

2000
1000
0

TOTAL HOUSEHOLD 2046 +800 SCENARIO

1000
500
0

ISL Engineering and Land Services

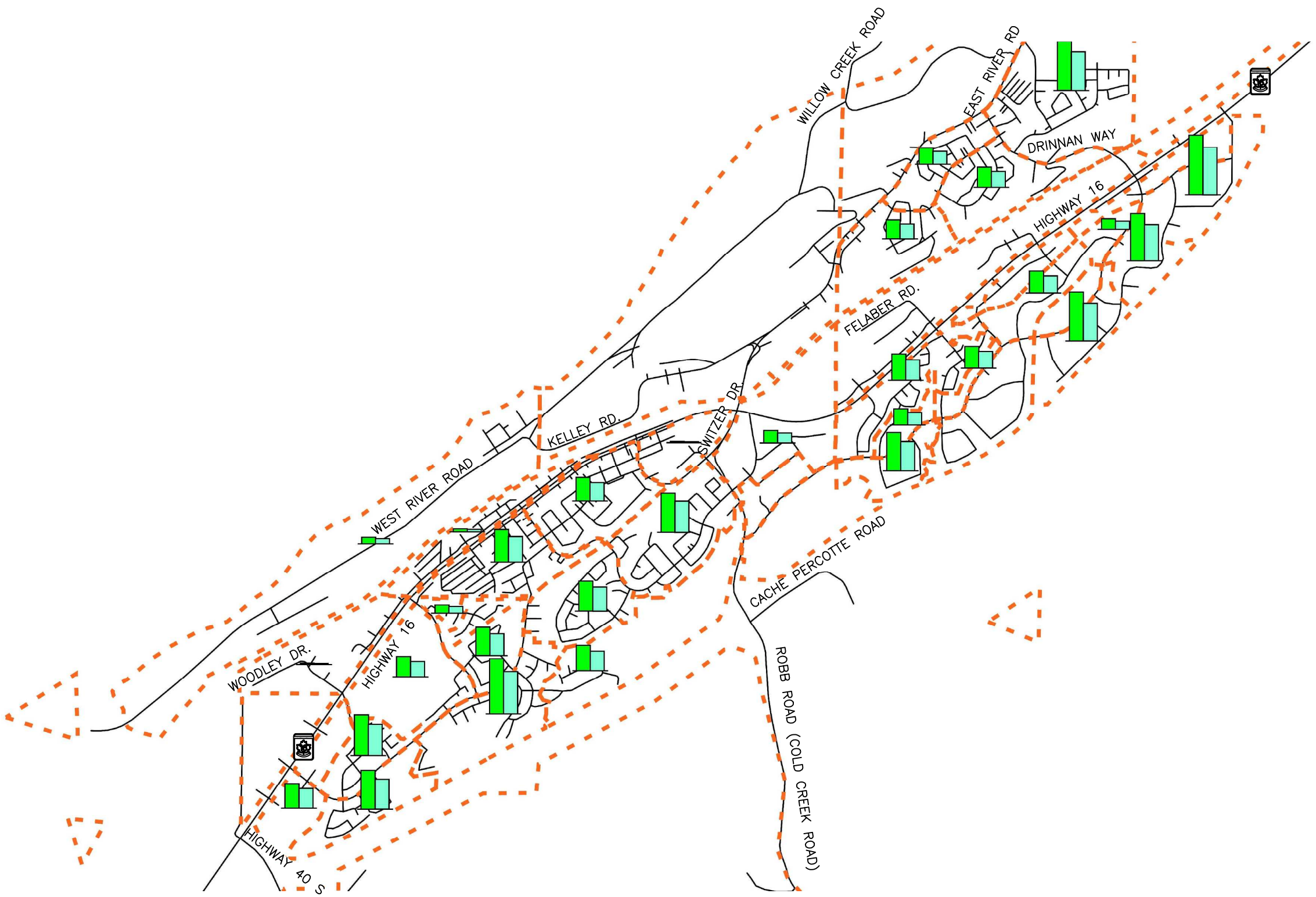
TOWN OF HINTON
Gateway to the Rockies

TOWN OF HINTON TRANSPORTATION MASTER PLAN

TOTAL POPULATION AND HOUSEHOLD +800 POPULATION SCENARIO (2046)

EXHIBIT 2.8

Diana Ranca | Oct. 18, 17 | M:\26560\26571_Town Of Hinton_TMP\02_CADD\20_Drafting\201_TMP_EXHIBITS\170721_TMP_Exhibits\26571_FUTURE_800POP_GROWTH_2046.dwg



Legend:

ZONES

TOTAL POP. 2046 BUILDOUT SCENARIO

2000
1000
0

TOTAL HOUSEHOLD 2046 BUILDOUT SCENARIO

1000
500
0

ISL Engineering and Land Services

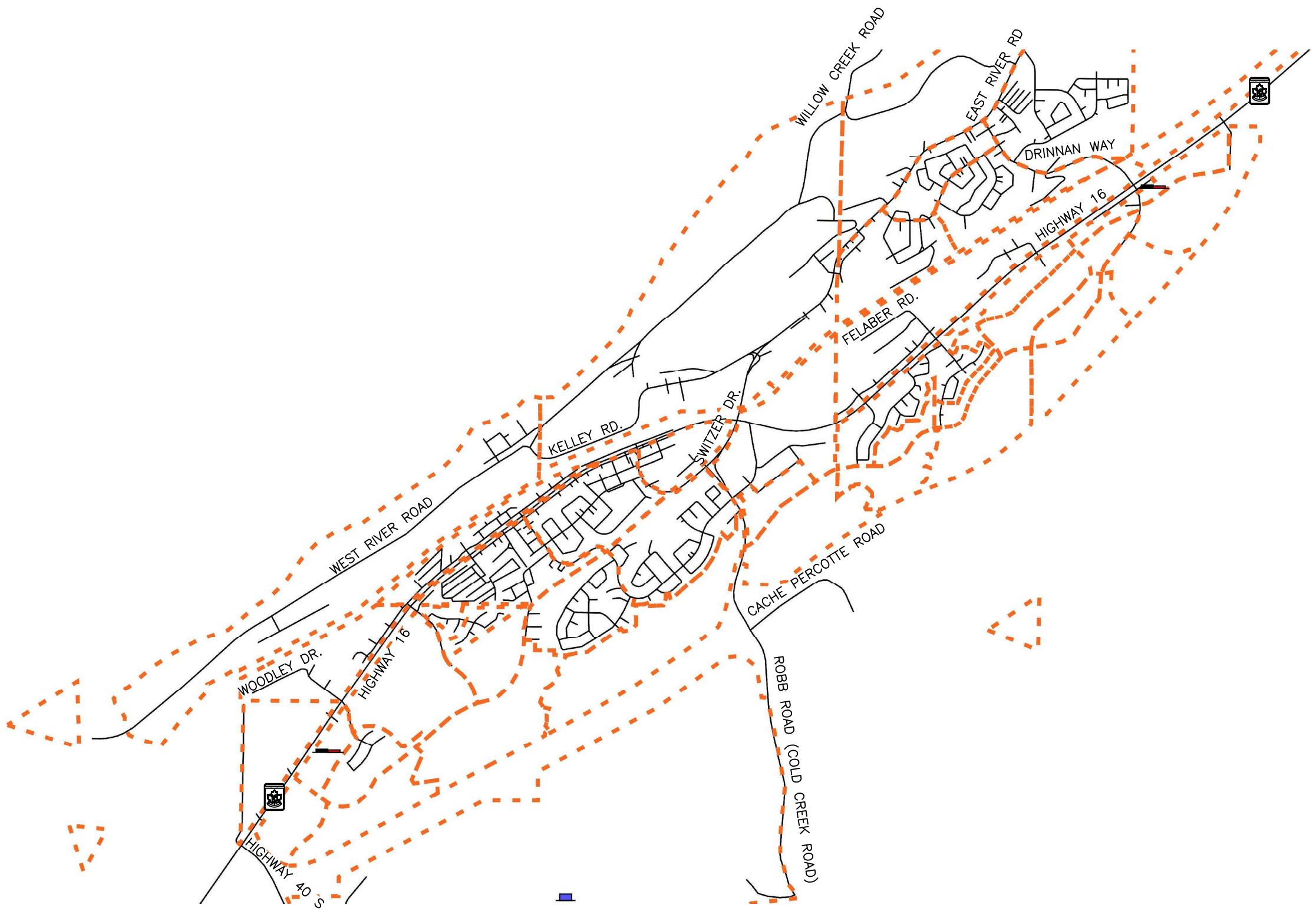
TOWN OF HINTON
Gateway to the Rockies

TOWN OF HINTON TRANSPORTATION MASTER PLAN

TOTAL POPULATION AND HOUSEHOLD FULL BUILDOUT (2046)

EXHIBIT 2.9

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Legend:

ZONES

NON–RETAIL GROWTH

RETAIL GROWTH

INDUSTRIAL GROWTH

SCALING

1000

500

0

ISL Engineering and Land Services

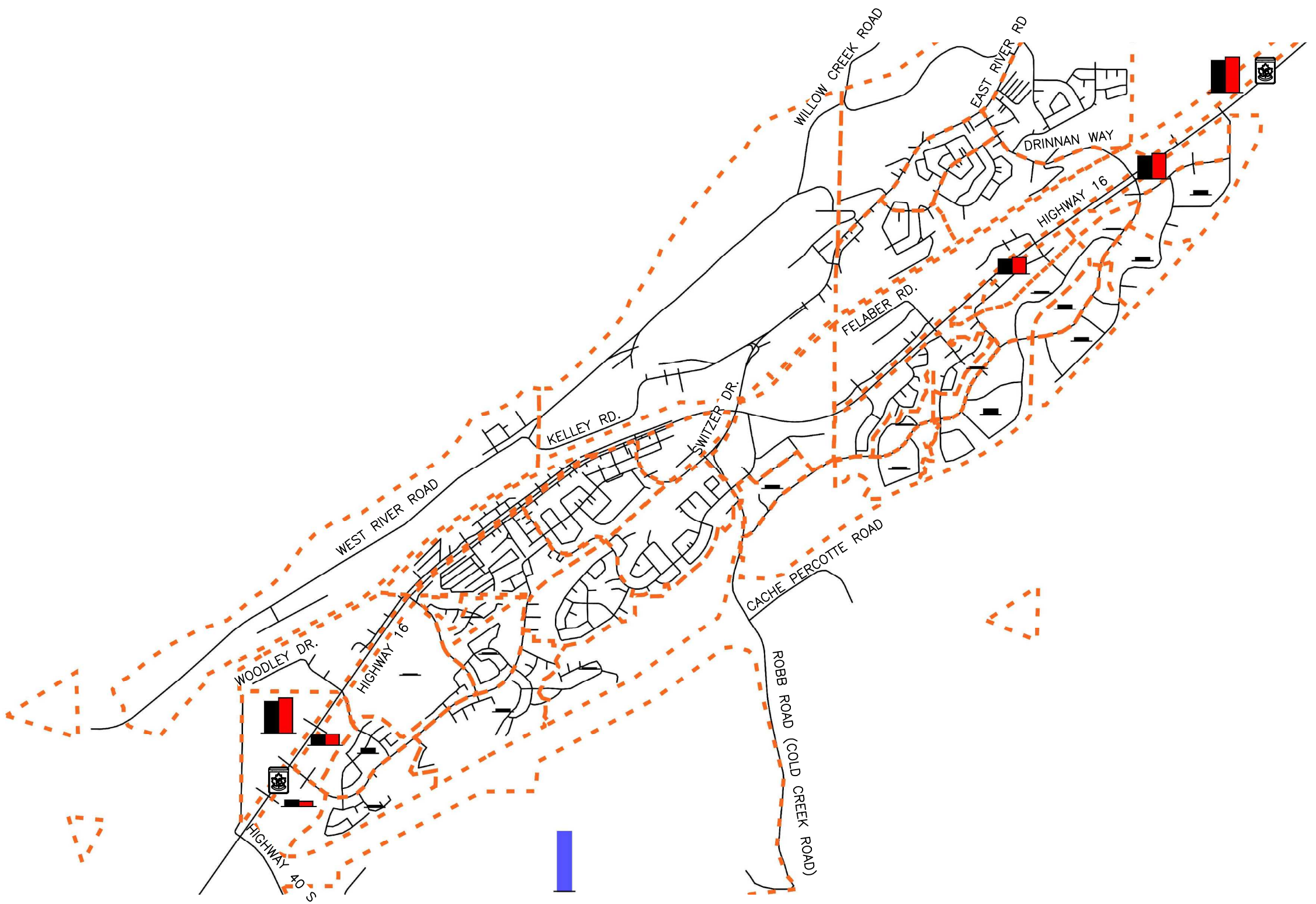
TOWN OF HINTON
Gateway to the Rockies

TOWN OF HINTON TRANSPORTATION MASTER PLAN

EMPLOYMENT GROWTH
+800 POPULATION (2046)

EXHIBIT 2.10

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Legend:

ZONES

NON–RETAIL GROWTH

RETAIL GROWTH

INDUSTRIAL GROWTH

SCALING

1000

500

0

ISL Engineering and Land Services

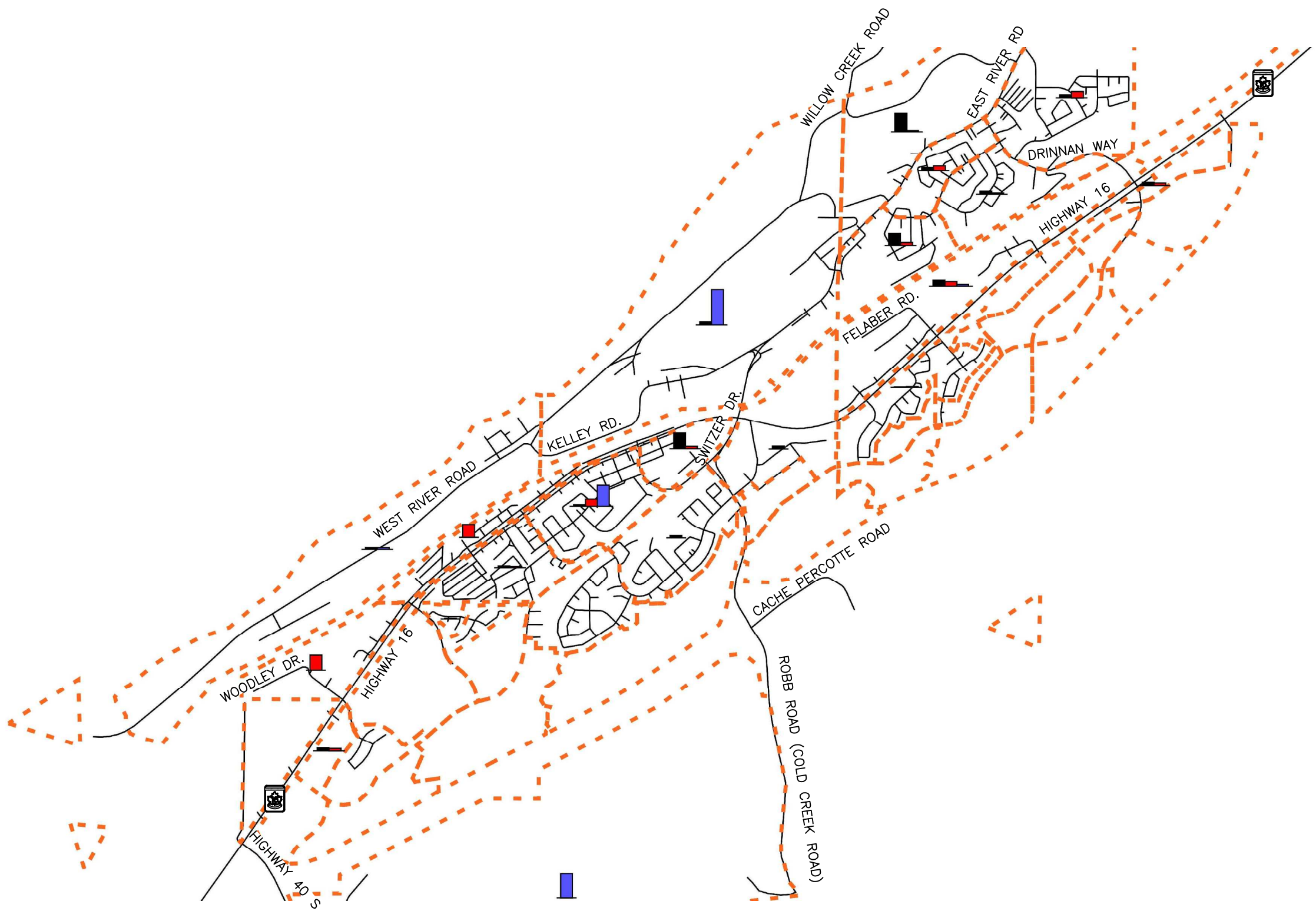
TOWN OF HINTON Gateway to the Rockies

TOWN OF HINTON TRANSPORTATION MASTER PLAN

EMPLOYMENT GROWTH FULL BUILDOUT (2046)

EXHIBIT 2.11

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Legend:

ZONES

NON–RETAIL

RETAIL

INDUSTRIAL

SCALING

1000

500

0

ISL Engineering and Land Services

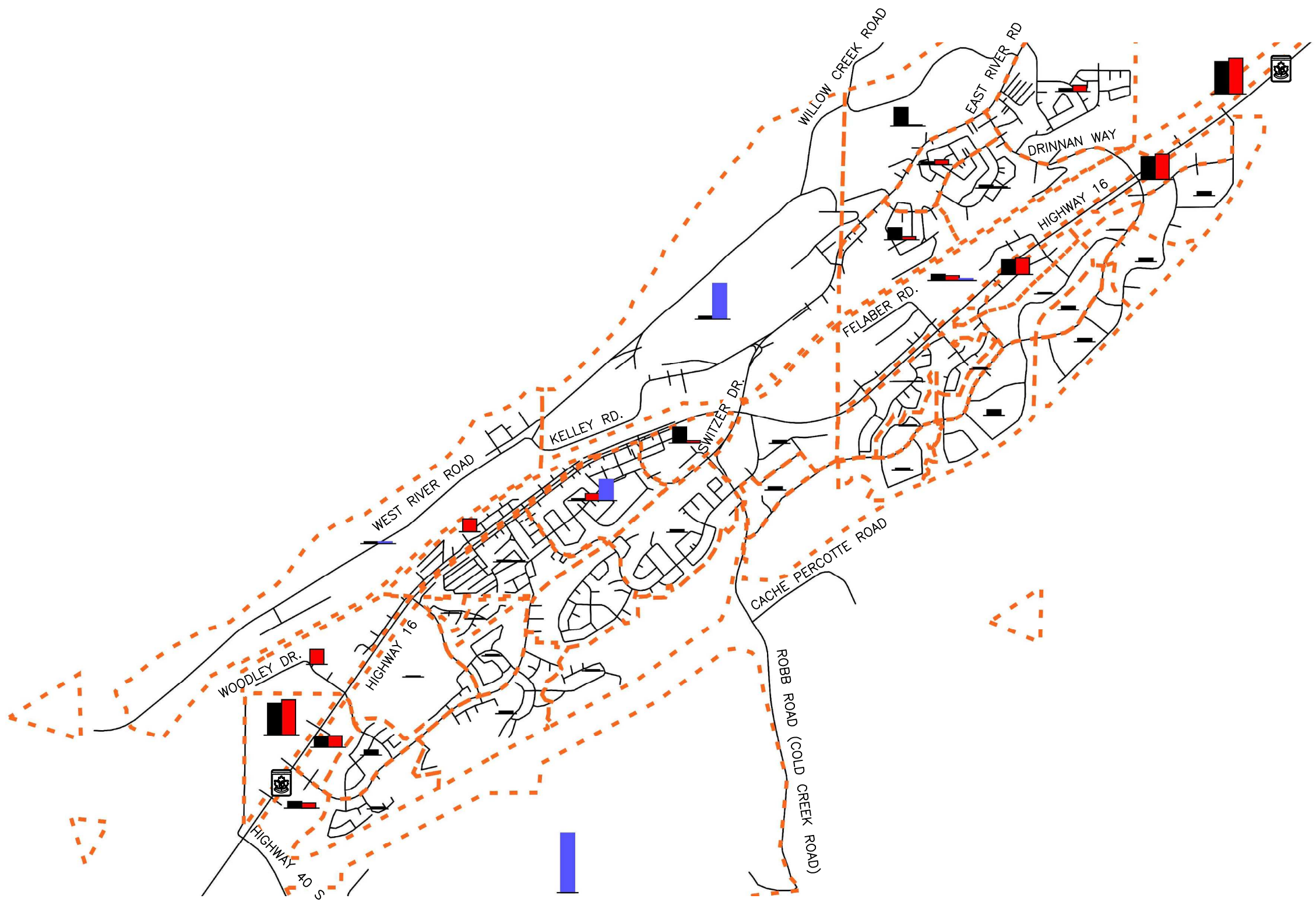
TOWN OF HINTON Gateway to the Rockies

TOWN OF HINTON TRANSPORTATION MASTER PLAN

TOTAL EMPLOYMENT
+800 POPULATION (2046)

EXHIBIT 2.12

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Legend:

ZONES

NON–RETAIL

RETAIL

INDUSTRIAL

SCALING

1000

500

0

ISL Engineering and Land Services

TOWN OF HINTON Gateway to the Rockies

TOWN OF HINTON TRANSPORTATION MASTER PLAN

TOTAL EMPLOYMENT FULL BUILDOUT (2046)

EXHIBIT 2.13

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3.0 Travel Demand Model and Calibration

Transportation network planning was considered in the *Town of Hinton Transportation Master Plan 2008 Update* dated October 2010 by Morrison Hershfield. Key components of the study included an inventory and analysis of existing roadways in terms of capacity and classification; identifying opportunities for expansion of the future transportation network; considering constraints including topography, water bodies and existing infrastructure; and developing plans for future growth recognizing the existing roadway network. This prior plan included only a generalized road network, projecting the broad-based protection of an arterial street network, consistent with practice in other Alberta municipalities. However, no detailed forecasting was completed to rationalize this network.

Generally, it is believed that the 2008 study was conservative in its approach, and may have over-estimated the road network needed to support growth in the Hinton annexation areas. The travel demand modelling completed for this update was intended to verify these requirements in a more robust way.

3.1 Travel Demand Model

The travel demand model development and the analysis undertaken in this study used the VISUM 16.0 transportation planning software suite developed by PTV Group. This GIS-based travel forecasting model is a state-of-the-art transportation planning tool that can efficiently estimate changes in travel patterns and utilization of transportation systems in response to changes in land use, population, employment, and transportation infrastructure. It integrates mapping, land use planning, development projections, future traffic demand, and transportation networks to produce reliable traffic forecasts that can be interpreted easily and presented in effective visual format.

A typical four-step travel demand forecasting process was implemented for this study, which is illustrated in Figure 3.1 and summarized as follows:

1. Trip Generation – residential, commercial, and industrial land uses are used to determine the number of peak hour trips being generated for the study area
2. Trip Distribution – zone-to-zone trip distribution is based on the road network impedance (i.e., travel time) and determines a zone-to-zone origin-destination (OD) trip matrix
3. Mode Split – in the modelling process, this step can be incorporated to split the OD trip matrix into various travel modes, such as driving, walking, and transit. However, separate transit networks were not considered in this study, so a 100% passenger vehicle model was used
4. Trip Assignment – the estimated OD trip matrix is assigned onto the established road network to get link volumes for the existing and future traffic scenarios

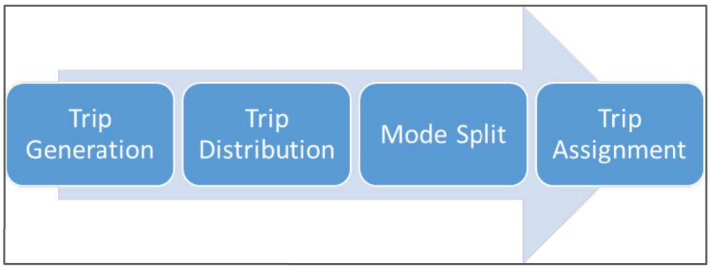


Figure 3.1: Typical Four Step Travel Demand Modelling Process

The first step of the TMP is to create an existing travel demand model. The existing model captures the travel patterns, trip generation, and trip distribution of local residents and pass-by travelers through Hinton. With a model calibrated to existing conditions, these characteristics can then be applied to annexed areas of Hinton to forecast the future traffic volumes. The transportation demand model as scoped, has provided Hinton with a scalable, flexible platform that can be readily adapted over time to include additional scenarios or transportation complexity as Hinton grows. The flow chart as in Figure 3.2 is a general representation of our technical approach for the 2016 base year model development.

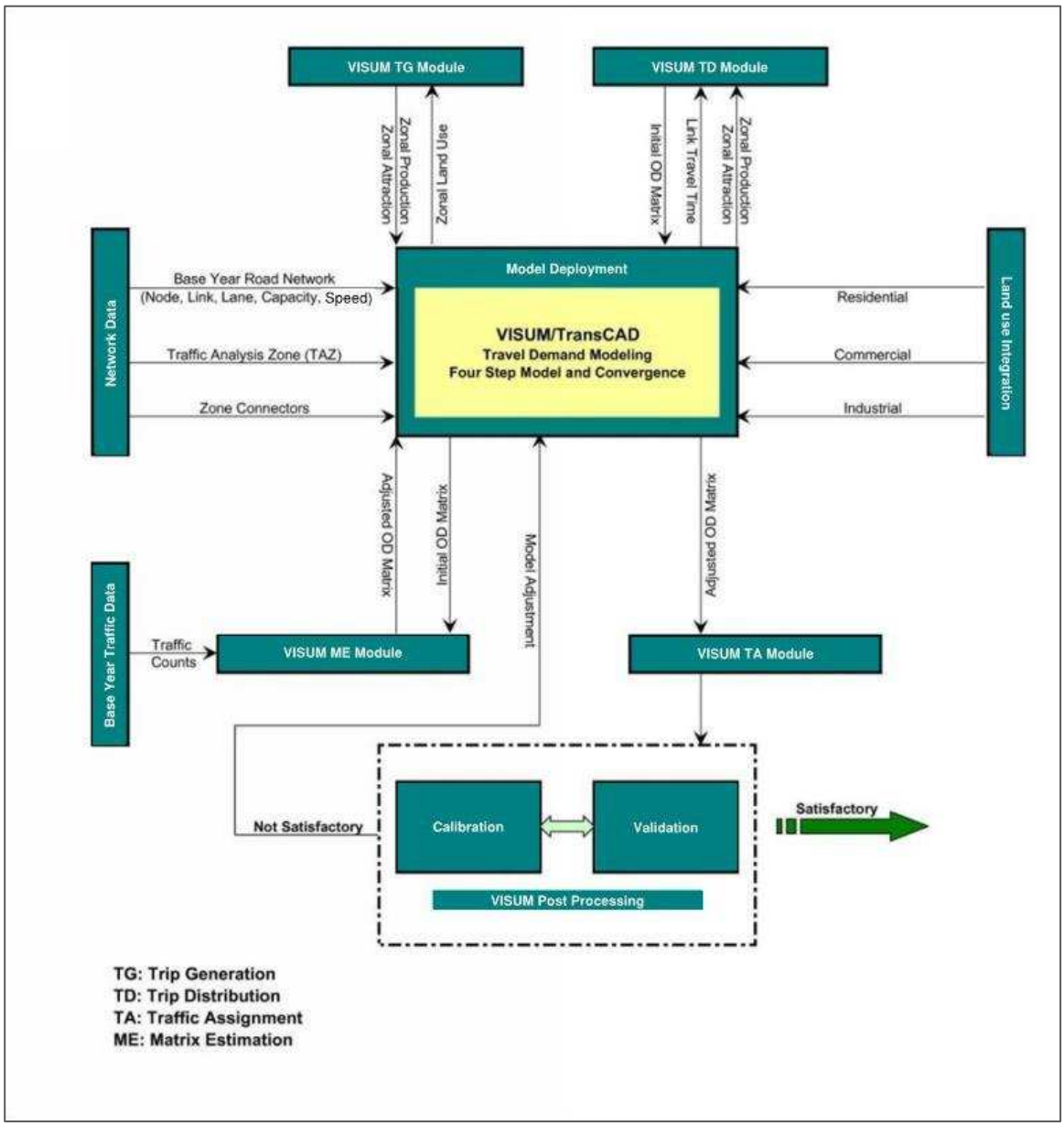


Figure 3.2: General Representation of Base Year Model Development

3.2 Roadway Capacity

Road capacities within the model are based on their functional classification. Link capacities used in the TMP model are summarized in Table 3.1. The link capacities are generally conservative (i.e., low), in that they are based on the capacity of a single traffic lane, multiplied out to the total number of lanes on the road in a given scenario. There were additional variations in the model not noted here, such as reduced speed and capacity in roadways with lower speed limits to allow for an appropriate travel time penalty on such routes.

Table 3.1: Link Capacities

Road Classification	Capacity (veh/lane/hr)
Freeway	2,100
Rural Highway	900
Arterial	900
Collector	800
Local	400

Collector demand is less precise in the model, as traffic from within a zone generally finds the "shortest-path" routes from the zone centroid. Transportation Impact Assessments (TIA) at the ASP or Outline Plan stage will typically provide a more detailed trip assignment on a particular zone's internal roadway network.

Model outputs for scenario planning are based on the volume-to-capacity (v/c) ratio of each roadway, with ranges defined in Table 3.2. Given the conservative ranges for the link capacities, the macro-level planning works up to a capacity band ranging from 95% to 105% of link capacity. For example, the link capacities do not provide for channelized turn bays at intersections, which in practice will increase total capacity through a traffic signal on an arterial. The acceptance of certain higher-volume links in some cases has either been proven via more detailed micro-level analysis (Section 5) or is considered to be an acceptable level of congestion given the existing constraints and limitations of certain roadways.

Table 3.2: Volume-to-Capacity Ratio Ranges

Colour	v/c Ratio	Notes
Dark Green	<0.60	Effective operations
Light Green	0.60 – 0.80	Effective operations
Yellow	0.80 – 0.95	Normal operations/urban traffic conditions
Orange	0.95 – 1.05	At or near capacity
Red	>1.05	Above capacity, but may be acceptable based on tolerance of peak hour congestion; requires detailed analysis

3.3 Existing Horizon and Calibration

A baseline model was developed for the transportation network, using existing land use and traffic counts within Hinton to develop and calibrate the network model. The baseline year chosen was 2016, as the data including zone population numbers and traffic counts represented the existing condition at that time.

Additional traffic counting was completed by ISL in May 2016 to capture additional locations and provide a baseline to adjust the modestly older Alberta Transportation counts, dating to 2015. Thirty-nine count locations were used for the model calibration. Most of the pre-existing Alberta Transportation counts were focused on provincial corridors, including Highway 16 and Highway 40, while the supplementary counts provided a better geographic range in the downtown area and included such outlying locations as East River Road/Maurer Drive, Robb Road/Mountain Street, and West River Road/Kelley Road. These counts provide some reference for external traffic demand to/from Yellowhead County.

A calibration plot of the existing network model is provided in Appendix B. A regression value (R^2) of 0.93 was ultimately obtained for the network, which represents strong convergence with the collected traffic data. In a TMP, the typical R^2 value for acceptance is 0.75.

A capacity plot for Hinton's existing network is provided in Exhibit 3.1, while the peak traffic volume plots for the existing network are provided in Exhibits 3.2, 3.3 and 3.4.

The capacity plot does not indicate any major network congestion locations or bottlenecks. This is generally consistent with anecdotal knowledge of current traffic issues, with the major concern presently being high truck volumes on Highway 16 and Switzer Drive, rather than overt peak-hour congestion problems. The volume and capacity plots indicate all existing roadways within Hinton show good operation with moderate volumes at peak times. The PM peak hour volumes on Highway 16 (the existing roadway with the highest volumes) in Hinton is about 500 to 700 vehicles per hour in each direction, or roughly 12,000 vehicles per day.

3.4 Existing Detailed Intersection Analysis

Following the overall network capacity (macro-level) analysis described in this section, detailed operational (micro-level) analysis was completed at the 39 key locations where the traffic counts were conducted (2016). The purpose of the detailed evaluation was to verify the findings of the macro-level recommendations and undertake detailed lane requirements and identify the potential upgrades.

ISL used Synchro 9.0 to analyze the operational characteristics of the signalized intersections. The Level of Operating Service (LOS) A represents the highest level of service or generally free flowing conditions, while LOS F generally represents a breakdown or gridlock condition in vehicular flow. There are varying degrees of delay and congestion introduced at the intermediate LOS B, C, D and E levels. LOS D is representative of normal peak hour congestion, while LOS E is representative of an intersection nearing its capacity. Typically, LOS D or better is the accepted standard for peak hour operations in urban areas, with LOS E accepted where limited to certain movements. LOS criteria for intersections are based on average delay per vehicle, and are summarized in Table 3.3.

Table 3.3: Level of Service Criteria

LOS	Signalized	Unsignalized
	Average Delay Per Vehicle (s/veh)	
A	<10	<10
B	10 – 20	10 – 15
C	20 – 35	15 – 25
D	35 – 55	25 – 35
E	55 – 80	35 – 50
F	>80	>50

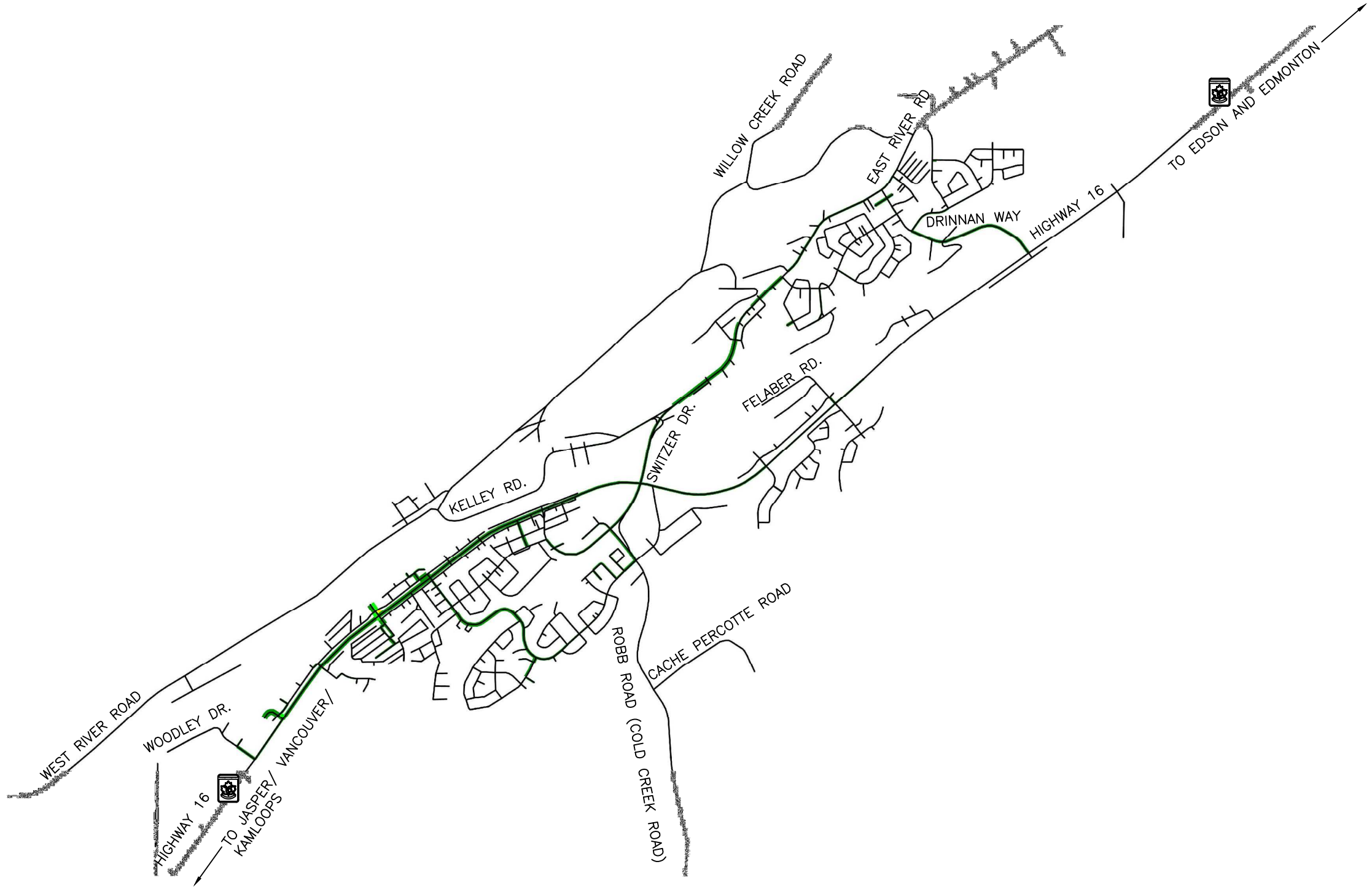
Synchro also calculates each movement's v/c. A v/c ratio of 1.0 represents an intersection or movement at full capacity with no ability to facilitate extra vehicles. Typically, a v/c ratio of 0.9 or lower for all intersection movements is the accepted standard for peak hour operations in urban areas. Finally, Synchro also calculates the 95th percentile vehicle queue length for each intersection movement, which provides the criteria for left and right turn storage requirements. This queue length is exceeded 5% of the time, which is accepted practice for normal peak hour operation in urban areas.

The *Canadian Traffic Signal Matrix Procedure 2007* published by the Transportation Association of Canada (TAC) was used to perform the signal warrant analysis at the Highway 16 intersections. The signal matrix warrants signalization of an intersection when a warrant score of 100 or greater is reached.

From the Synchro analysis, all analyzed intersections (39 intersections) operated at a good LOS and v/c ratio (LOS E or better, v/c <0.9) with their existing traffic controls and lane configurations. Therefore, no traffic lane changes or traffic control revisions are presently recommended at any of the 39 analyzed intersections.

Signal warrants were conducted at all the unsignalized intersections on Highway 16 and the results of this investigation are negative, which means no signals are warranted at any of the unsignalized intersections at the present time. This is also consistent with the Synchro results.

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CAPACITY LEGEND:

V/C RATIO

	0.00 - 0.60	EFFECTIVE OPERATIONS
	0.60 - 0.80	EFFECTIVE OPERATIONS
	0.80 - 0.95	NORMAL OPERATIONS / URBAN TRAFFIC CONDITIONS
	0.95 - 1.05	AT OR NEAR CAPACITY
	> 1.05	ABOVE CAPACITY REQUIRES DETAILED ANALYSIS

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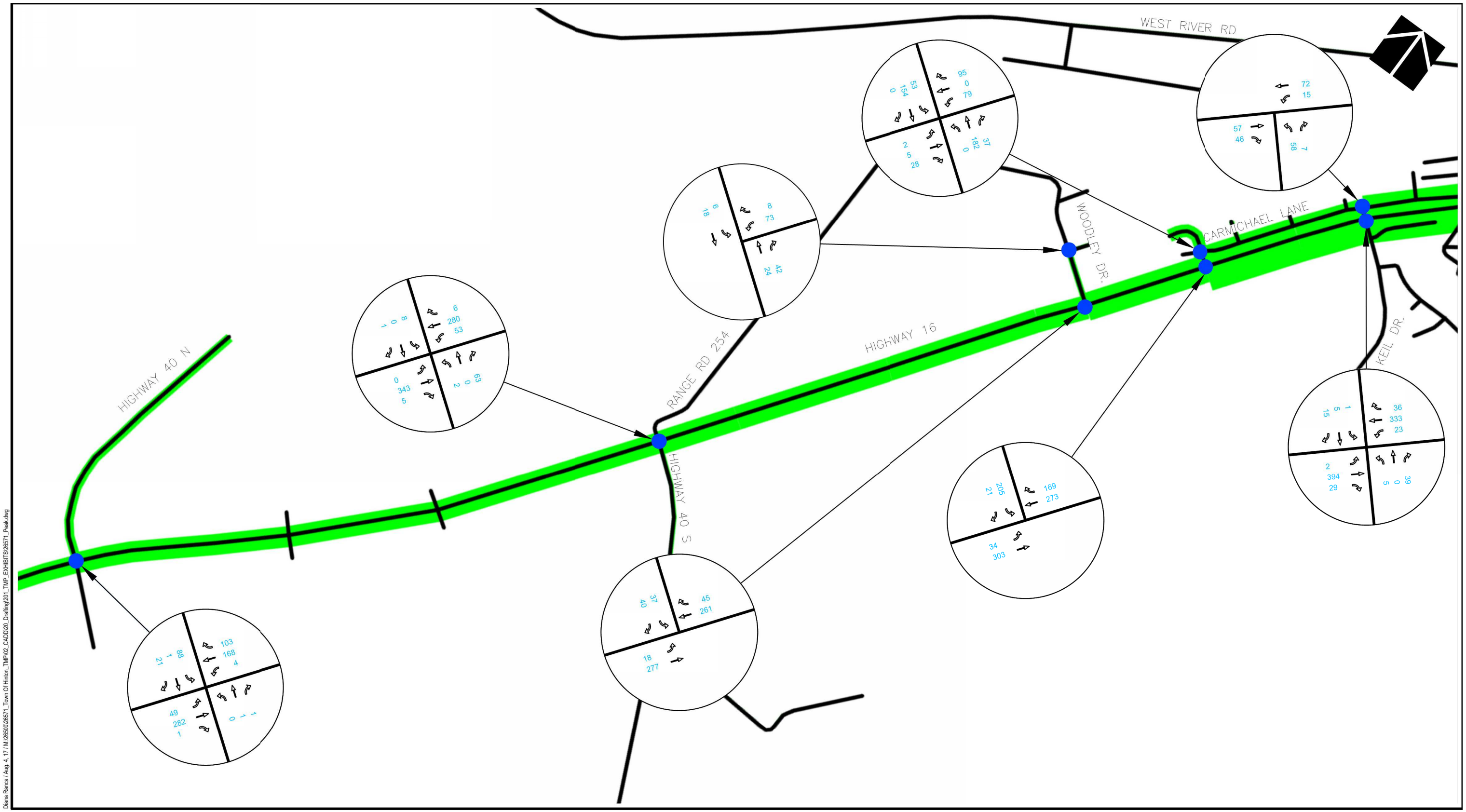
TOWN OF HINTON Gateway to the Rockies

TOWN OF HINTON TRANSPORTATION MASTER PLAN

PM PEAK HOUR VOLUME TO CAPACITY EXISTING

EXHIBIT 3.1

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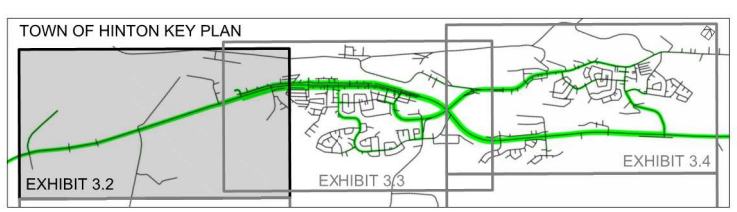


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ISL Engineering and Land Services

TOWN OF HINTON
Gateway to the Rockies

TOWN OF HINTON KEY PLAN



Legend:

- ANALYZED INTERSECTIONS
- XXX PM PEAK VOLUMES

TOWN OF HINTON TRANSPORTATION MASTER PLAN

PM PEAK HOUR TRAFFIC VOLUMES
EXISTING - WEST

EXHIBIT 3.2

WEST RIVER RD

LOWER WEST RIVER ROAD

KELLEY RD.

CARMICHAEL LANE

GREGG AVE

MACLEOD AVE

MOUNTAIN ST.

COLLINGE RD

JARVIS ST

FOREST HT DR

KEIL DR.

JASPER AVE

SWITZER DR.

EATON RD

HIGHWAY 16

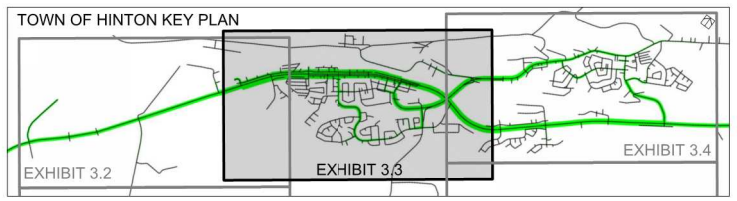
ROBB ROAD (COLD CREEK ROAD)

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TOWN OF HINTON
Gateway to the Rockies

TOWN OF HINTON KEY PLAN



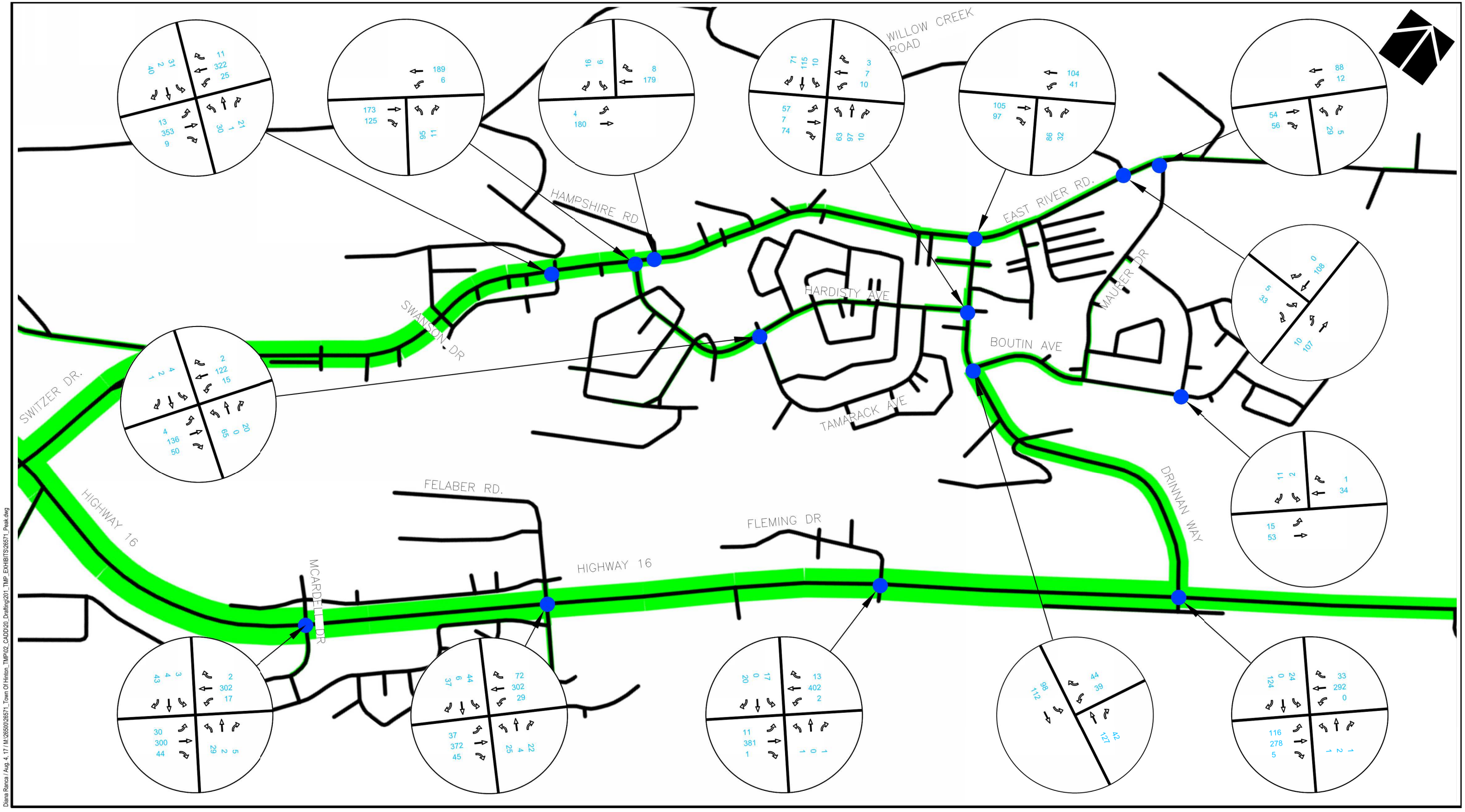
Legend:

- ANALYZED INTERSECTIONS
- XXX PM PEAK VOLUMES

TOWN OF HINTON TRANSPORTATION MASTER PLAN

PM PEAK HOUR TRAFFIC VOLUMES
EXISTING - CENTRAL

EXHIBIT 3.3



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ISL Engineering and Land Services

TOWN OF HINTON
Gateway to the Rockies

TOWN OF HINTON KEY PLAN



Legend:

- ANALYZED INTERSECTIONS
- XXX PM PEAK VOLUMES

TOWN OF HINTON TRANSPORTATION MASTER PLAN

PM PEAK HOUR TRAFFIC VOLUMES
EXISTING - EAST

EXHIBIT 3.4

4.0 Future Road Network

For the two future horizons, +800 Population and Full Build-Out, different network scenarios were modelled:

- **Scenario 1:** The future traffic volumes of +800 Population on the existing network with the future South ASP access off Highway 40
- **Scenario 2:** The future traffic volumes of +800 Population on the existing network with the future South ASP access off Robb Road
- **Scenario 3:** The future traffic volumes of Full Build-Out on the existing roadway network with the future South ASP access off Highway 40
- **Scenario 4:** The future traffic volumes of the Full Build-Out on the existing network with the future South ASP access off Robb Road
- **Scenario 5:** The future traffic volumes of Full Build-Out on the existing roadway network with the Highway 16 Bypass

In the development of the travel demand model of all future horizon scenarios, the traffic zones for the new development in East, West and future South ASP areas along with their respective population and employment levels as outlined in Section 2.3 were added to the calibrated base model. In addition, highway growth to 30 years was also added assuming approximately 2 to 2.5% of annual growth, depending on the locations along the highway. The growth rates were derived from the Alberta Transportation 10-year (2006 to 2016) historic traffic growth data. The existing calibrated model's trip generations, trip distributions, and traffic assignments were generated by the additional population, employment, and Highway 16 growth were added to the road network. Any atypical growth such as higher than anticipated growth, earlier growth, and/or significant density increase, may result in a TMP update.

4.1 Scenario 1

Scenario 1 was modelled by applying the +800 Population traffic levels to the existing 2016 road network, with no additional transportation improvements to the existing roads except the additions of connections to existing roadways to accommodate the new growth areas. The new connections added to the network are illustrated in Exhibit 4.1 and highlighted in green. The future South ASP access is off Highway 40. The +800 Population increases in 2046 adds a proportionately low volume of traffic to the roadway network in the PM peak.

The capacity output for this model run is provided in Exhibit 4.2. The results indicate that there are no significant improvements required to the existing network in this scenario.

The peak traffic volume plots for Scenario 1 are provided in Exhibits 4.3, 4.4 and 4.5.

4.2 Scenario 2

Scenario 2 is similar to Scenario 1, with the exception of the future South ASP access off Robb Road. The capacity output for this model run is provided in Exhibit 4.6. Similar to Scenario 1, the results indicate that no significant roadway improvements are required, as the additional trips did not cause any congestion to develop within the road network.

The peak traffic volume plots for Scenario 2 are provided in Exhibits 4.7, 4.8 and 4.9.

Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
+800 Population with South ASP Access off Highway 40	+800 Population with South ASP Access off Robb Road	Full Build-Out with South ASP Access off Highway 40	Full Build-Out with South ASP Access off Robb Road	Full Build-Out with Highway 16 Bypass

4.3 Scenario 3

This scenario models the future traffic volumes of Full Build-Out residential, commercial and industrial development in the East ASP, West ASP, and future South ASP areas. The East and West ASP areas are served by collector road systems with multiple connections to Highway 16. The future South ASP access is off Highway 40. The roadway networks of the growth areas are based on the proposed plans of the East and West ASP areas. As the accesses of the highway commercial lands were not identified in the ASPs, it was assumed the accesses for highway commercial areas are off Highway 16. The future roadway network of the Full Build-Out is illustrated in Exhibit 4.10 and the new roads are highlighted in yellow. The future roadway network is further discussed in Section 6.

The capacity output for this model run is provided in Exhibit 4.11. Most segments within Hinton and along Highway 16 operate within capacity, with the following exceptions:

- Highway 16: between Carmichael Lane (Parks West Mall access) and Jarvis Street
- East ASP area: three segments on the internal roadways

Further detailed intersection analysis was undertaken at the noted locations and summarized in Section 5, to determine the type and timing and required improvements.

The peak traffic volume plots for Scenario 3 are provided in Exhibits 4.12, 4.13, 4.14, and 4.15.

4.4 Scenario 4

Scenario 4 is similar to Scenario 3, with the exception of the future South ASP access off Robb Road. The capacity output for this model run is provided in Exhibit 4.16.

From the v/c ratio plot, most roadway segments within Hinton and along Highway 16 are operating within capacity, with the following exceptions:

- East ASP area: three segments on the internal roadways which are operating near capacity

Comparisons of the link-level traffic volumes between Scenarios 3 and 4 are provided in Exhibit 4.17. The difference is the traffic that was previously on Highway 16 between Highway 40 and Dow Drive/McArdell Drive has been redistributed to Robb Road. Also, traffic operations on Highway 16 between Highway 40 and Switzer Drive are improved with the future South ASP access on Robb Road.

The peak traffic volume plots for Scenario 4 are provided in Exhibits 4.18, 4.19 4.20, and 4.21.

4.5 Scenario 5

In this scenario, the effect of the planned Highway 16 Bypass on Hinton's network is evaluated. The east end of the bypass is near Drinnan Way while the west end is near Highway 40. It is assumed that the bypass has two travel lanes in each direction with a capacity of 2,100 vehicle/hour/lane in the VISUM model. The capacity output for this model run is provided in Exhibit 4.22. From the v/c plot, it is shown that the traffic on Highway 16 is operating better than Scenarios 3 and 4. This is due to the diversion of most of the external through trips from Highway 16 to the bypass as it is the faster route. Comparisons of link-level traffic volume of Scenario 3 and 5 are provided in Exhibit 4.23. From the exhibit, 800 vehicles were diverted from Highway 16 to the bypass in the PM peak. The remnant section of the old Highway 16 through Hinton thus primarily serves internal trips within Hinton, providing a major east-west arterial corridor for Hinton.

The peak traffic volume plots for Scenario 5 are provided in Exhibits 4.24, 4.25, 4.26, and 4.27.

Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
+800 Population with South ASP Access off Highway 40	+800 Population with South ASP Access off Robb Road	Full Build-Out with South ASP Access off Highway 40	Full Build-Out with South ASP Access off Robb Road	Full Build-Out with Highway 16 Bypass

4.6 Road Network Summary

From the 30-year horizon (Scenarios 1 to 5) link volume analyses above, the following conclusions are drawn:

- Scenarios 1 and 2: In the two +800 Population scenarios, no roadway improvements to the existing network are required as the additional population does not generate significant additional trips on the existing road network
- Scenarios 3, 4 and 5:
- The conclusions are relatively similar in both Scenarios 3 and 4. The only exception is on Highway 16 between Carmichael Lane (Parks West Mall) and Jarvis Street, where Scenario 3 operates less effectively
- With the Highway 16 Bypass in Scenario 5, the entire old Highway 16 corridor operates better (v/c 0.80 or better) as compared to Scenarios 3 and 4 where some Highway 16 segments operate at v/c 0.80 to 1.0

4.7 Highway 16 Bypass

The Highway 16 Bypass plans are shown in Appendix C.

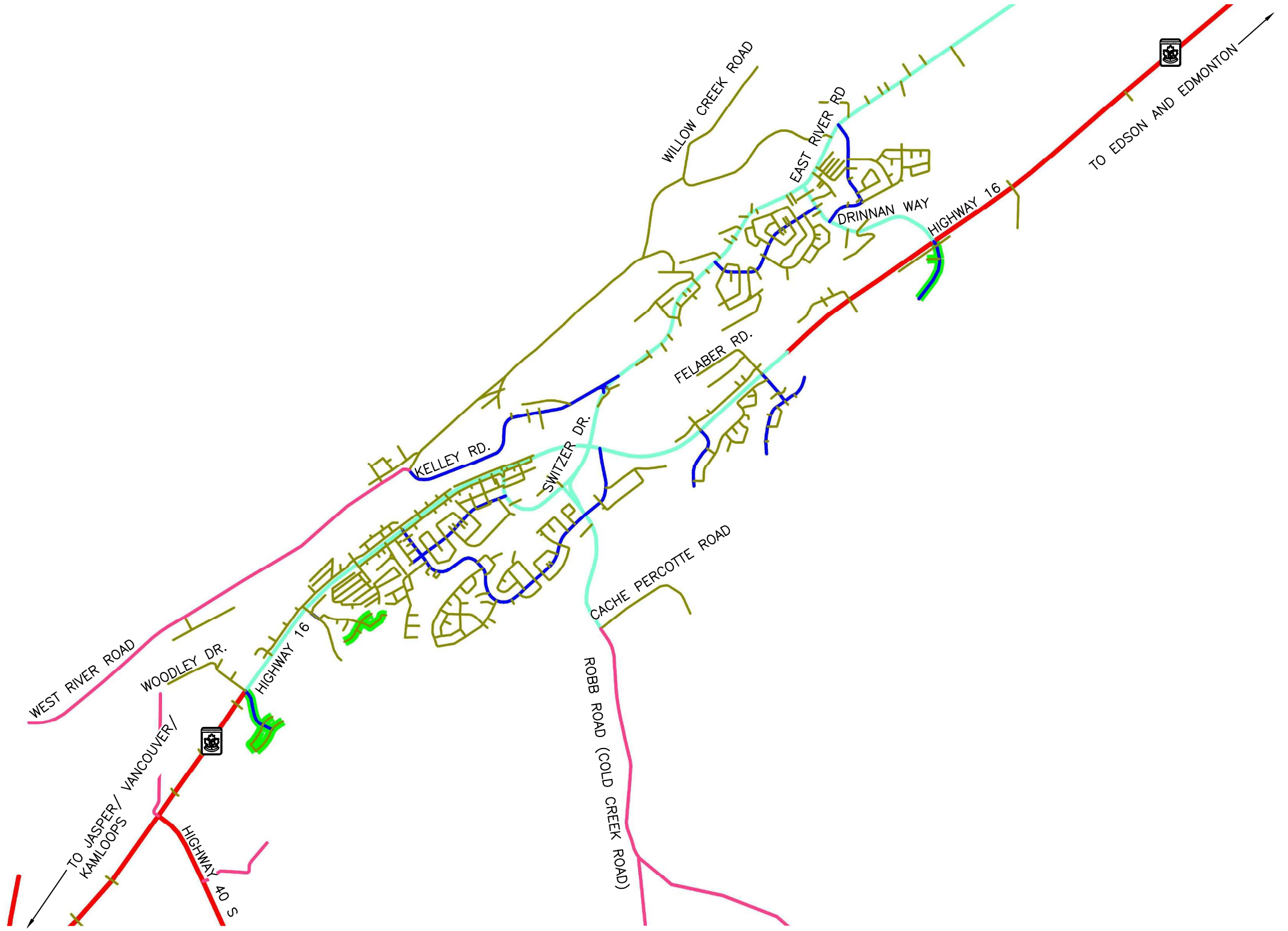
At the east end of Hinton, the bypass interchange ties into the existing Highway 16. There is 1,650 m between Drinnan Way and the interchange junction. Per Alberta Transportation guidelines, 400 m or 150 m from the ramp taper (whichever is higher) is required to the first access. Per the East ASP, the proposed easterly access is located about 650 m from the interchange junction, meeting the spacing requirement.

At the west end, the bypass interchange also ties into the existing Highway 16. Per the West ASP, the proposed westerly access is located about 750 m from the interchange junction, meeting the spacing requirement.

Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
+800 Population with South ASP Access off Highway 40	+800 Population with South ASP Access off Robb Road	Full Build-Out with South ASP Access off Highway 40	Full Build-Out with South ASP Access off Robb Road	Full Build-Out with Highway 16 Bypass

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Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
+800 Population with South ASP Access off Highway 40	+800 Population with South ASP Access off Robb Road	Full Build-Out with South ASP Access off Highway 40	Full Build-Out with South ASP Access off Robb Road	Full Build-Out with Highway 16 Bypass



Legend:

HIGHWAYS	LOCALS
ARTERIALS	RURALS
COLLECTORS	NEW ROAD

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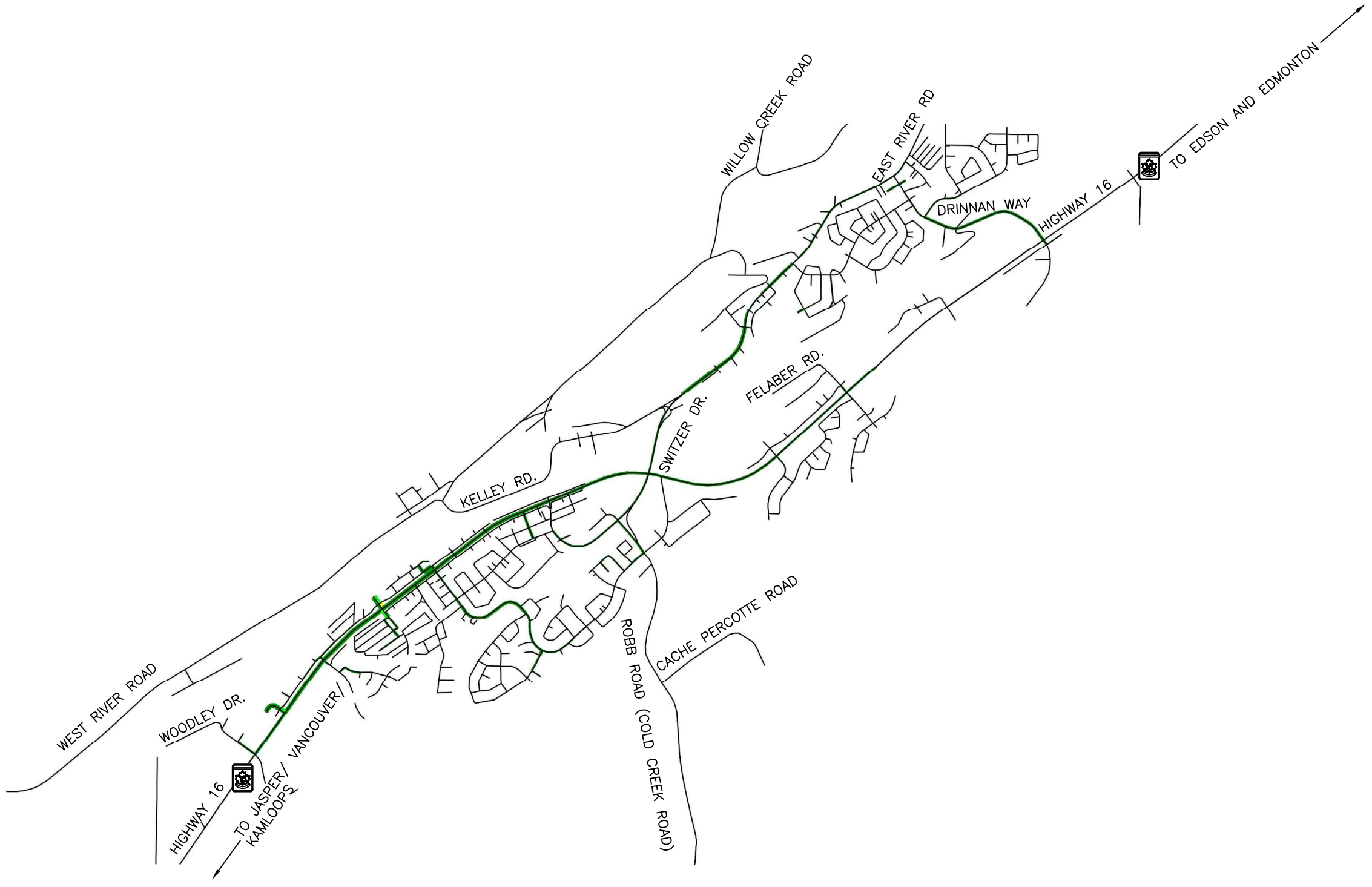
TOWN OF HINTON
Gateway to the Rockies

TOWN OF HINTON TRANSPORTATION MASTER PLAN

ROAD CLASSIFICATION
2046 SCENARIO 1/2: +800 POPULATION BASE (2046)

EXHIBIT 4.1

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CAPACITY LEGEND:

V/C RATIO

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	0.60 - 0.80	EFFECTIVE OPERATIONS
	0.80 - 0.95	NORMAL OPERATIONS / URBAN TRAFFIC CONDITIONS
	0.95 - 1.05	AT OR NEAR CAPACITY
	> 1.05	ABOVE CAPACITY REQUIRES DETAILED ANALYSIS

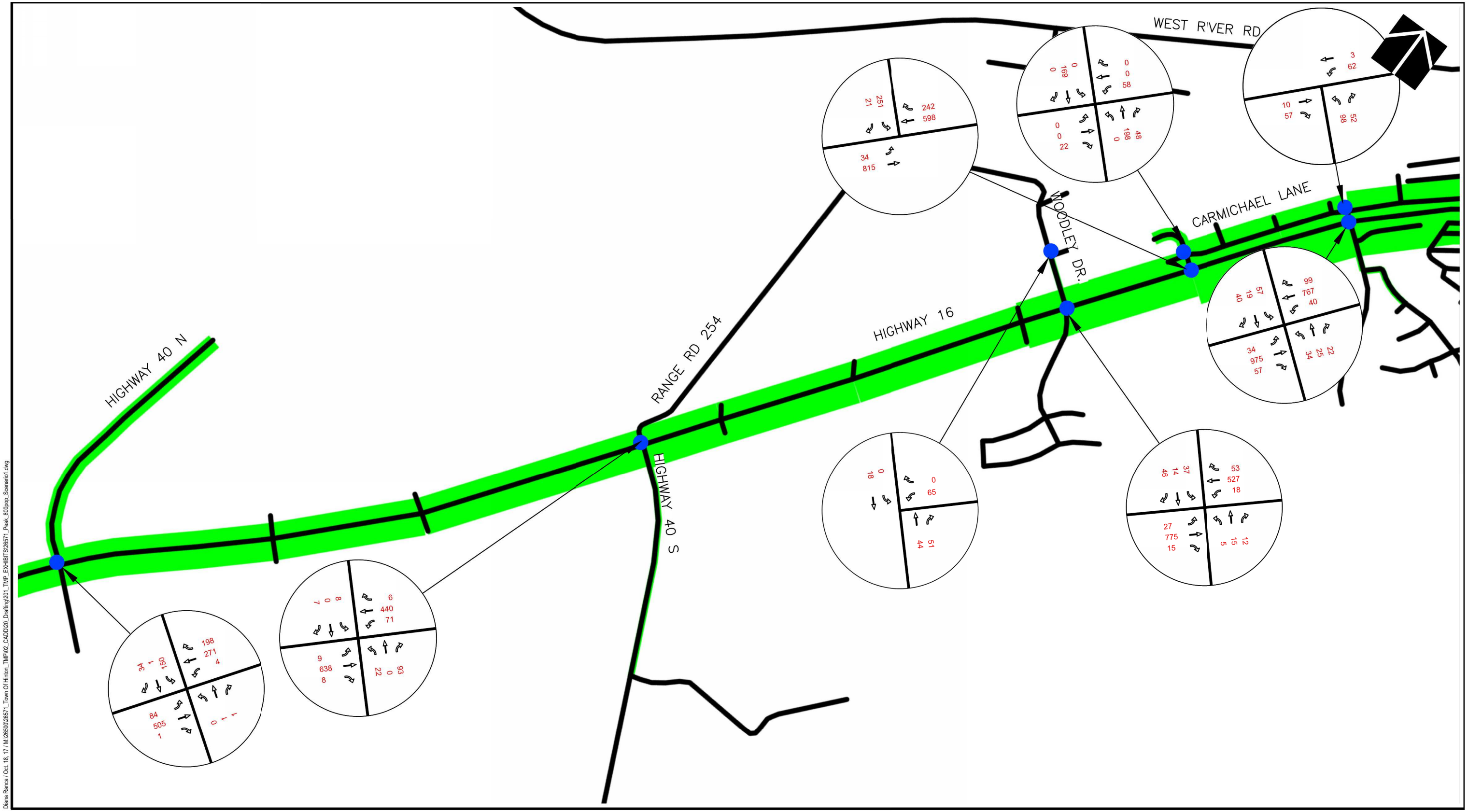
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TOWN OF HINTON
Gateway to the Rockies

TOWN OF HINTON TRANSPORTATION MASTER PLAN

PM PEAK HOUR VOLUME TO CAPACITY
2046 SCENARIO 1: +800 POPULATION
WITH SOUTH ASP ACCESS OFF HWY 40
EXHIBIT 4.2

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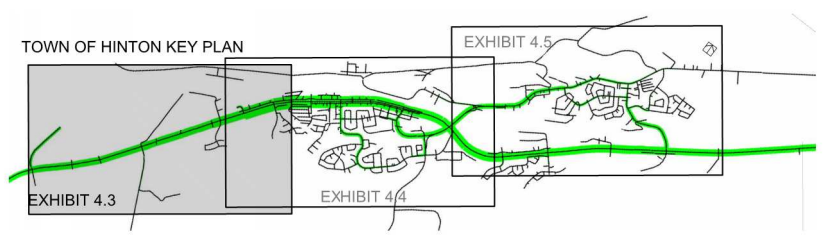


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TOWN OF HINTON
Gateway to the Rockies

TOWN OF HINTON KEY PLAN



Legend:

- ANALYZED INTERSECTIONS
- XXX PM PEAK HOUR VOLUMES

TOWN OF HINTON TRANSPORTATION MASTER PLAN

PM PEAK HOUR TRAFFIC VOLUMES
2046 SCENARIO 1: +800 POPULATION
(WITH SOUTH ASP ACCESS OFF HWY 40) - WEST

EXHIBIT 4.3

WEST RIVER RD

LOWER WEST RIVER ROAD

KELLEY RD.

CARMICHAEL LANE

CARMICHAEL LANE

JARVIS ST

FOREST HT DR

GREGG AVE

JASPER ST

MACLEOD AVE

MOUNTAIN ST.

SWITZER DR.

EATON RD

MOUNTAIN ST

COLLINGE RD

ROBB ROAD (COLD CREEK ROAD)

TOWN OF HINTON KEY PLAN

EXHIBIT 4.3

EXHIBIT 4.4

EXHIBIT 4.5

Legend:

ANALYZED INTERSECTIONS

XXX PM PEAK HOUR VOLUMES

TOWN OF HINTON TRANSPORTATION MASTER PLAN

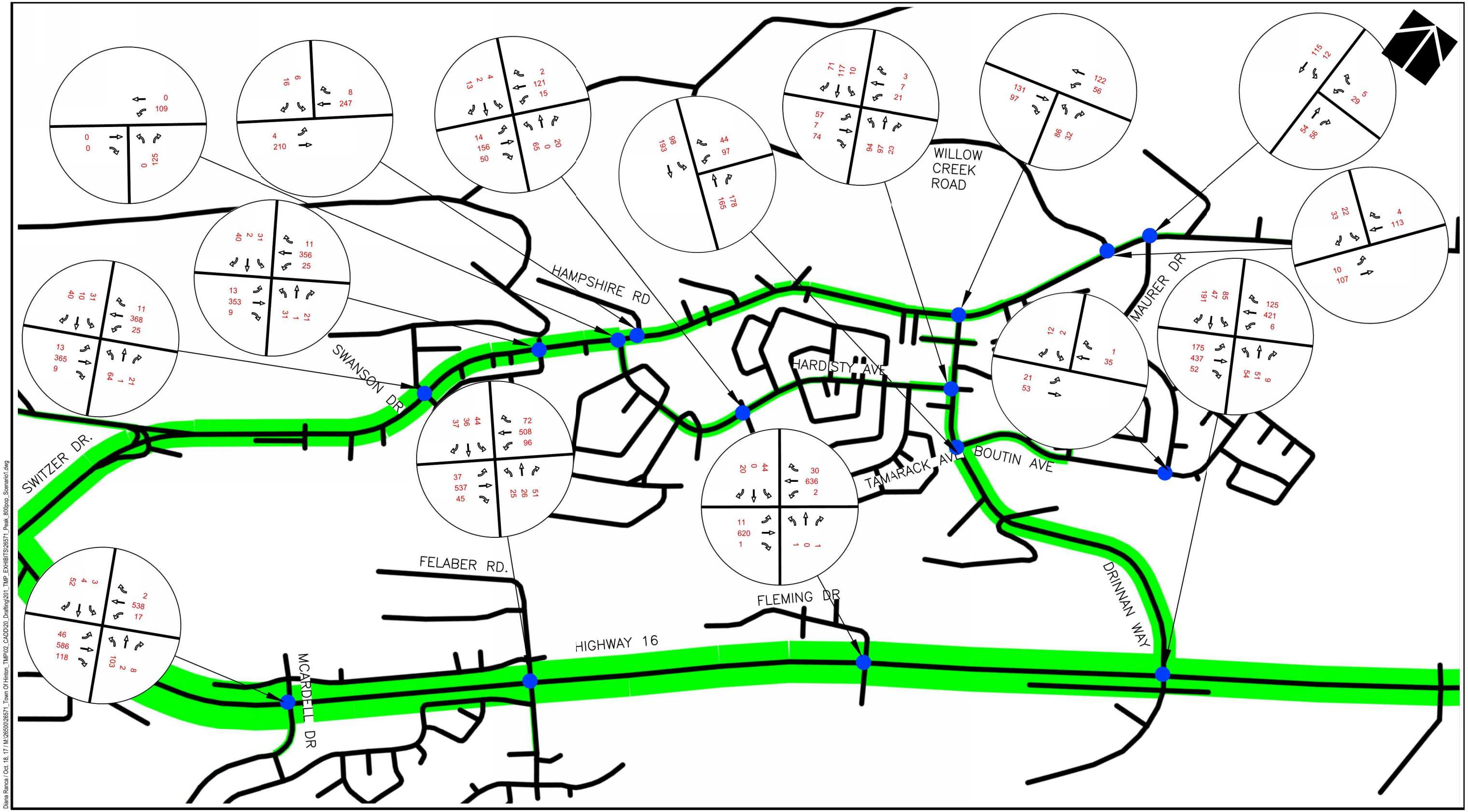
PM PEAK HOUR TRAFFIC VOLUMES
2046 SCENARIO 1: +800 POPULATION
(WITH SOUTH ASP ACCESS OFF HWY 40) - CENTRAL

EXHIBIT 4.4

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TOWN OF HINTON Gateway to the Rockies

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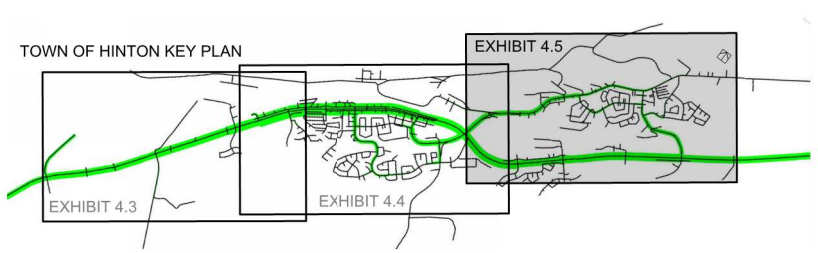


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ISL Engineering and Land Services

TOWN OF HINTON
Gateway to the Rockies

TOWN OF HINTON KEY PLAN



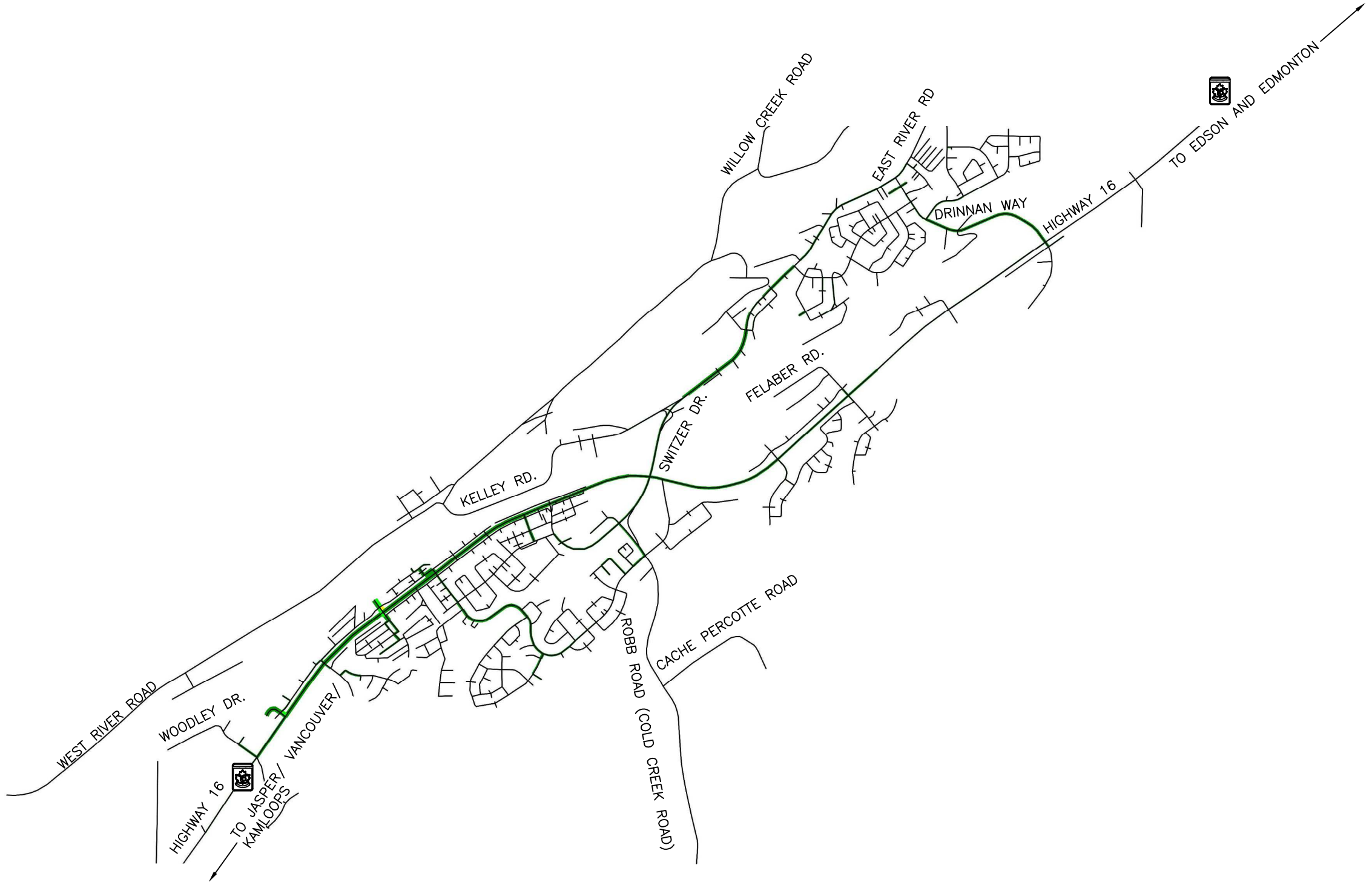
Legend:

- ANALYZED INTERSECTIONS
- XXX PM PEAK HOUR VOLUMES

TOWN OF HINTON TRANSPORTATION MASTER PLAN

PM PEAK HOUR TRAFFIC VOLUMES
2046 SCENARIO 1: +800 POPULATION
(WITH SOUTH ASP ACCESS OFF HWY 40) - EAST

EXHIBIT 4.5



CAPACITY LEGEND:

V/C RATIO

0.00 - 0.60	EFFECTIVE OPERATIONS
0.60 - 0.80	EFFECTIVE OPERATIONS
0.80 - 0.95	NORMAL OPERATIONS / URBAN TRAFFIC CONDITIONS
0.95 - 1.05	AT OR NEAR CAPACITY
> 1.05	ABOVE CAPACITY REQUIRES DETAILED ANALYSIS

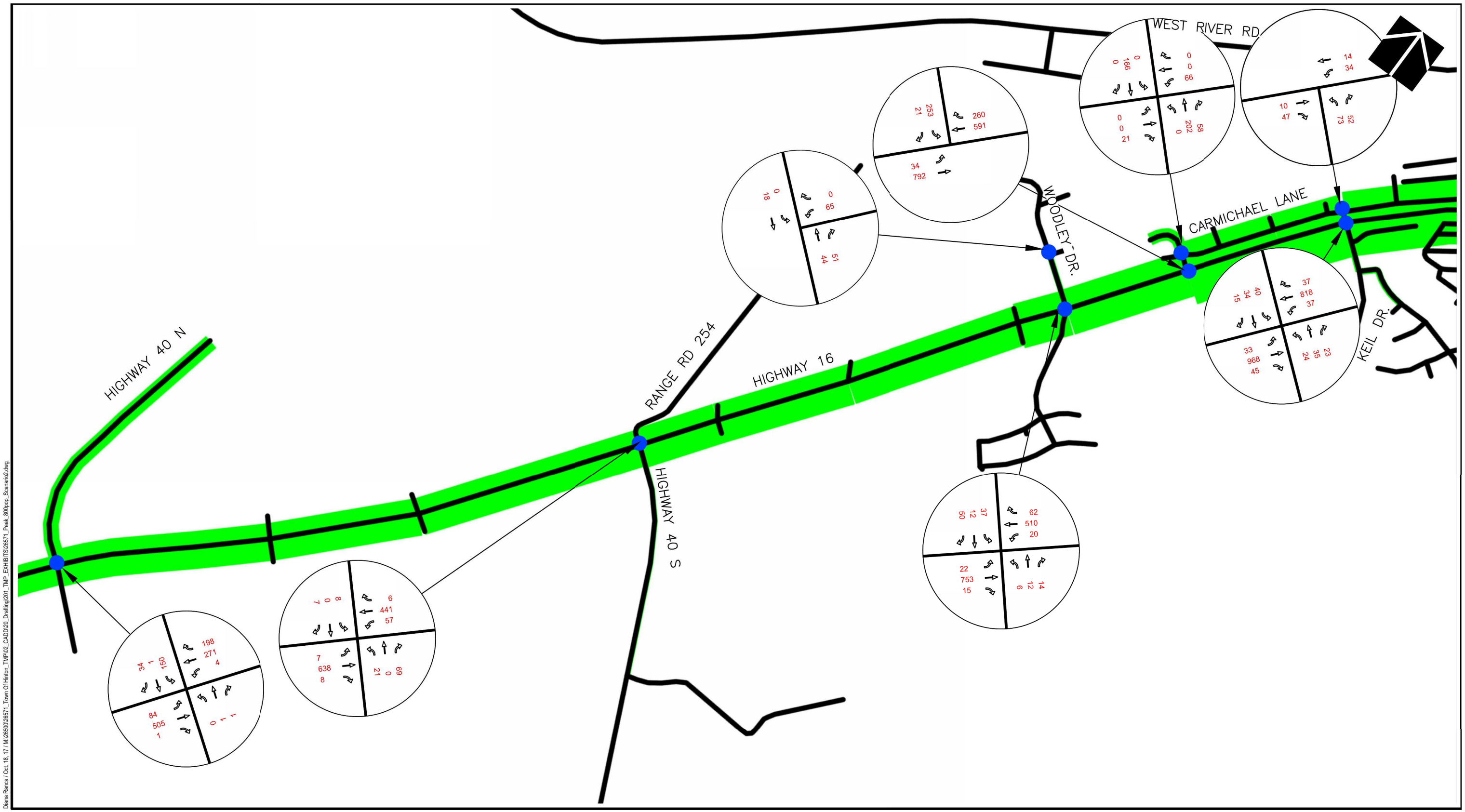
ISL Engineering and Land Services

TOWN OF HINTON Gateway to the Rockies

TOWN OF HINTON TRANSPORTATION MASTER PLAN

PEAK HOURLY VOLUME TO CAPACITY
2046 SCENARIO 2: +800 POPULATION
(WITH SOUTH ASP ACCESS OFF ROBB ROAD)
EXHIBIT 4.6

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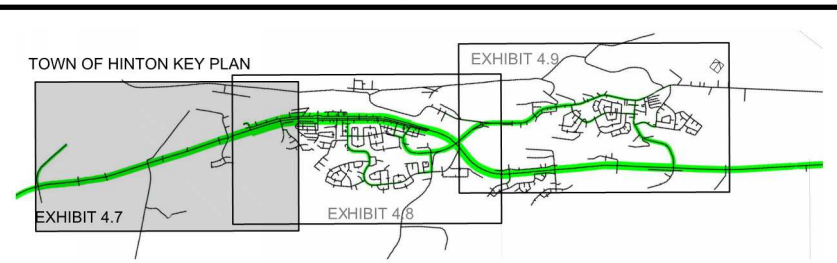


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TOWN OF HINTON
Gateway to the Rockies

TOWN OF HINTON KEY PLAN



Legend:

- ANALYZED INTERSECTIONS
- XXX PM PEAK HOUR VOLUMES

TOWN OF HINTON TRANSPORTATION MASTER PLAN

PM PEAK HOUR TRAFFIC VOLUMES
2046 SCENARIO 2: +800 POPULATION
(WITH SOUTH ASP ACCESS OFF ROBB ROAD) - WEST

EXHIBIT 4.7

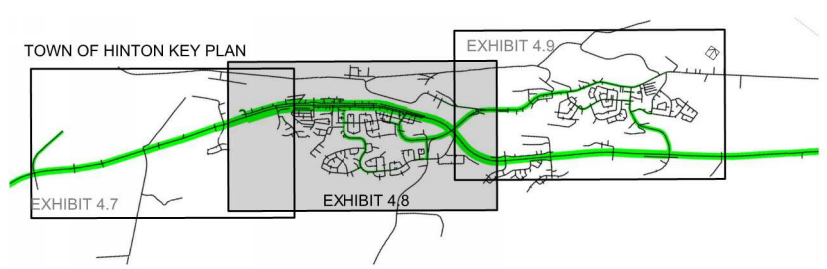
WEST RIVER RD
LOWER WEST RIVER ROAD
KELLEY RD.
CARMICHAEL LANE
CARMICHAEL LANE
JARVIS ST.
FOREST HT DR.
GREGG AVE
JASPER ST.
SWITZER DR.
KEIL DR.
MACLEOD AVE
MOUNTAIN ST.
HIGHWAY 16
EATON RD
MOUNTAIN ST
COLLINGE RD
ROBB ROAD (COLD CREEK ROAD)

Diana Ranes | Oct. 18, 17 | M:\2650\26571_Town Of Hinton_TMP\02_CAD\20_Drafting\301_TMP_EXHIBITS\26571_Peak_800pop_Scenario2.dwg

ISL Engineering and Land Services

TOWN OF HINTON
Gateway to the Rockies

TOWN OF HINTON KEY PLAN



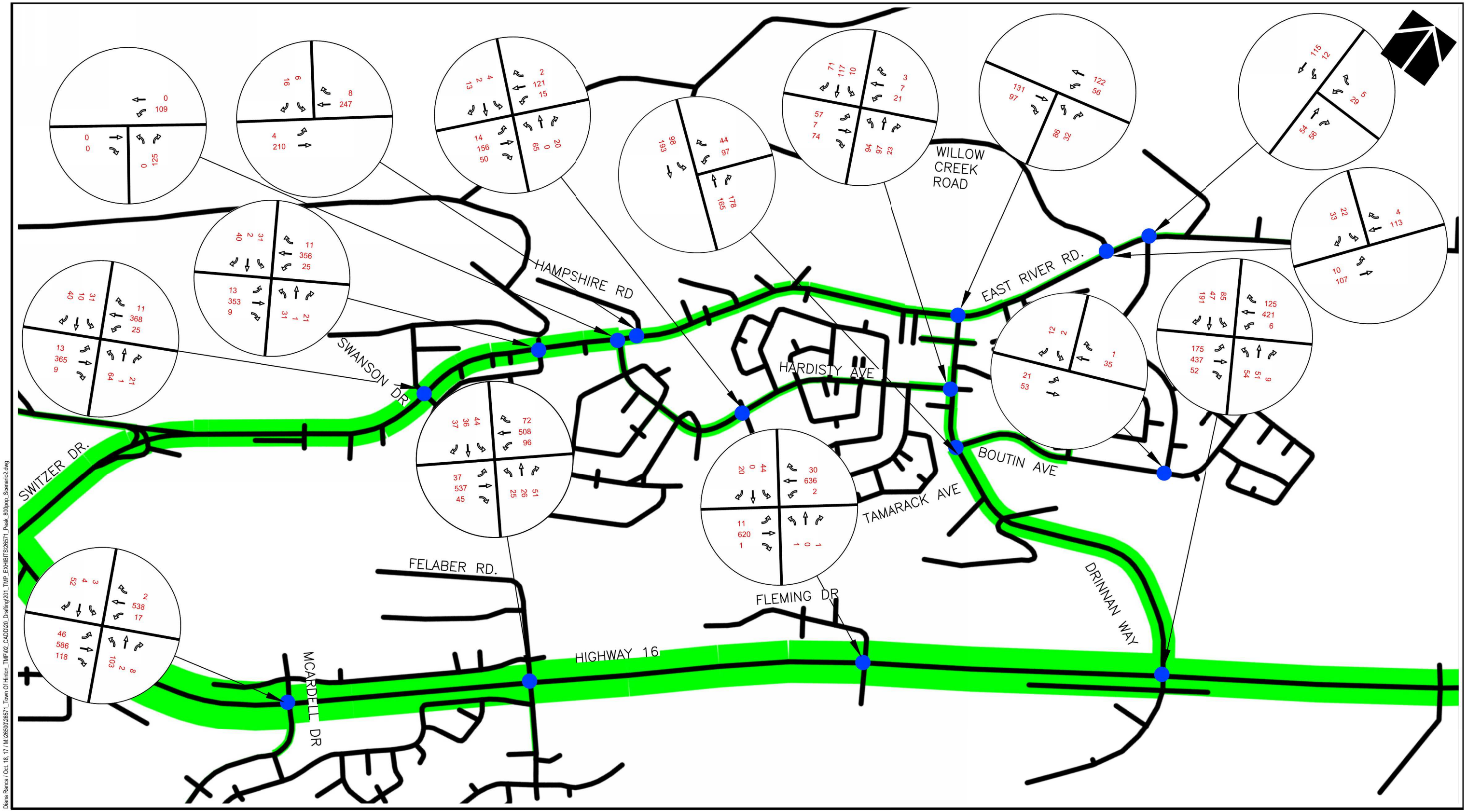
Legend:

- ANALYZED INTERSECTIONS
- XXX PM PEAK HOUR VOLUMES

TOWN OF HINTON TRANSPORTATION MASTER PLAN

PM PEAK HOUR TRAFFIC VOLUMES
2046 SCENARIO 2: +800 POPULATION
(WITH SOUTH ASP ACCESS OFF ROBB ROAD) - CENTRAL

EXHIBIT 4.8

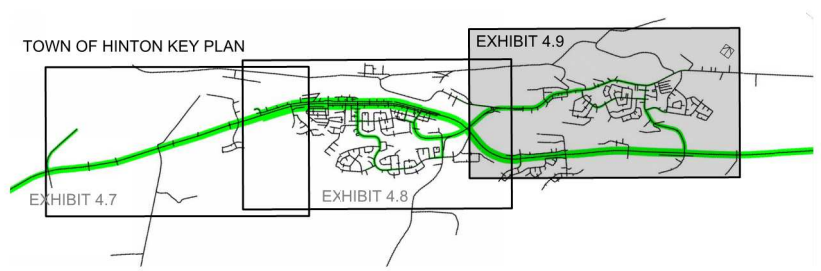


Diana Renes | Oct. 18, 17 | M:\26509\26571_Town Of Hinton_TMP\02_CAD\D20_Drafting\201_TMP_EXHIBITS\26571_Peak_800pop_Scenario02.dwg

ISL Engineering and Land Services

TOWN OF HINTON
Gateway to the Rockies

TOWN OF HINTON KEY PLAN



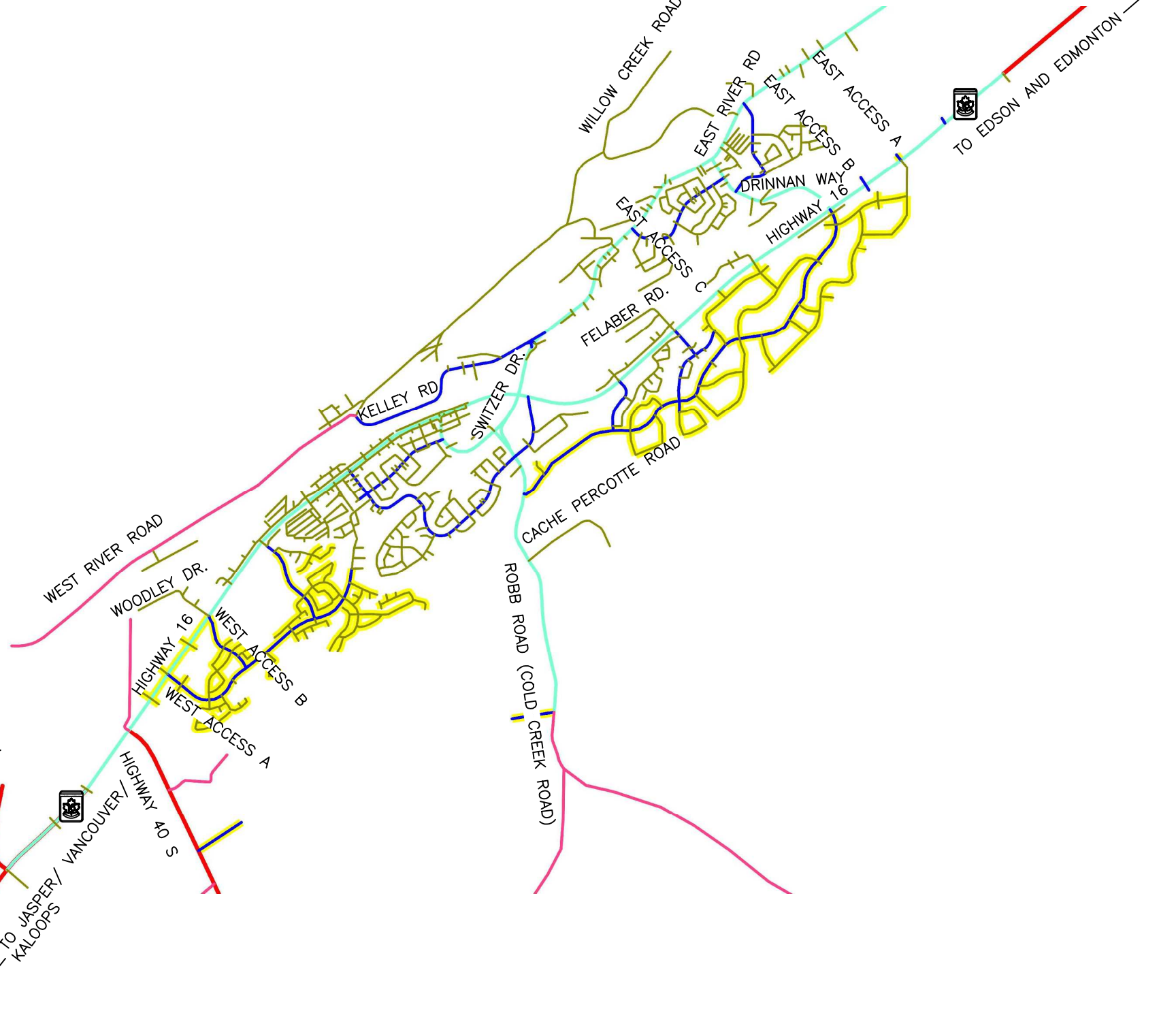
Legend:

- ANALYZED INTERSECTIONS
- XXX PM PEAK HOUR VOLUMES

TOWN OF HINTON TRANSPORTATION MASTER PLAN

PM PEAK HOUR TRAFFIC VOLUMES
2046 SCENARIO 2: +800 POPULATION
(WITH SOUTH ASP ACCESS OFF ROBB ROAD) - EAST

EXHIBIT 4.9



Legend:

- HIGHWAYS
- ARTERIALS
- COLLECTORS
- LOCALS
- RURALS
- NEW ROADS

ISL Engineering and Land Services

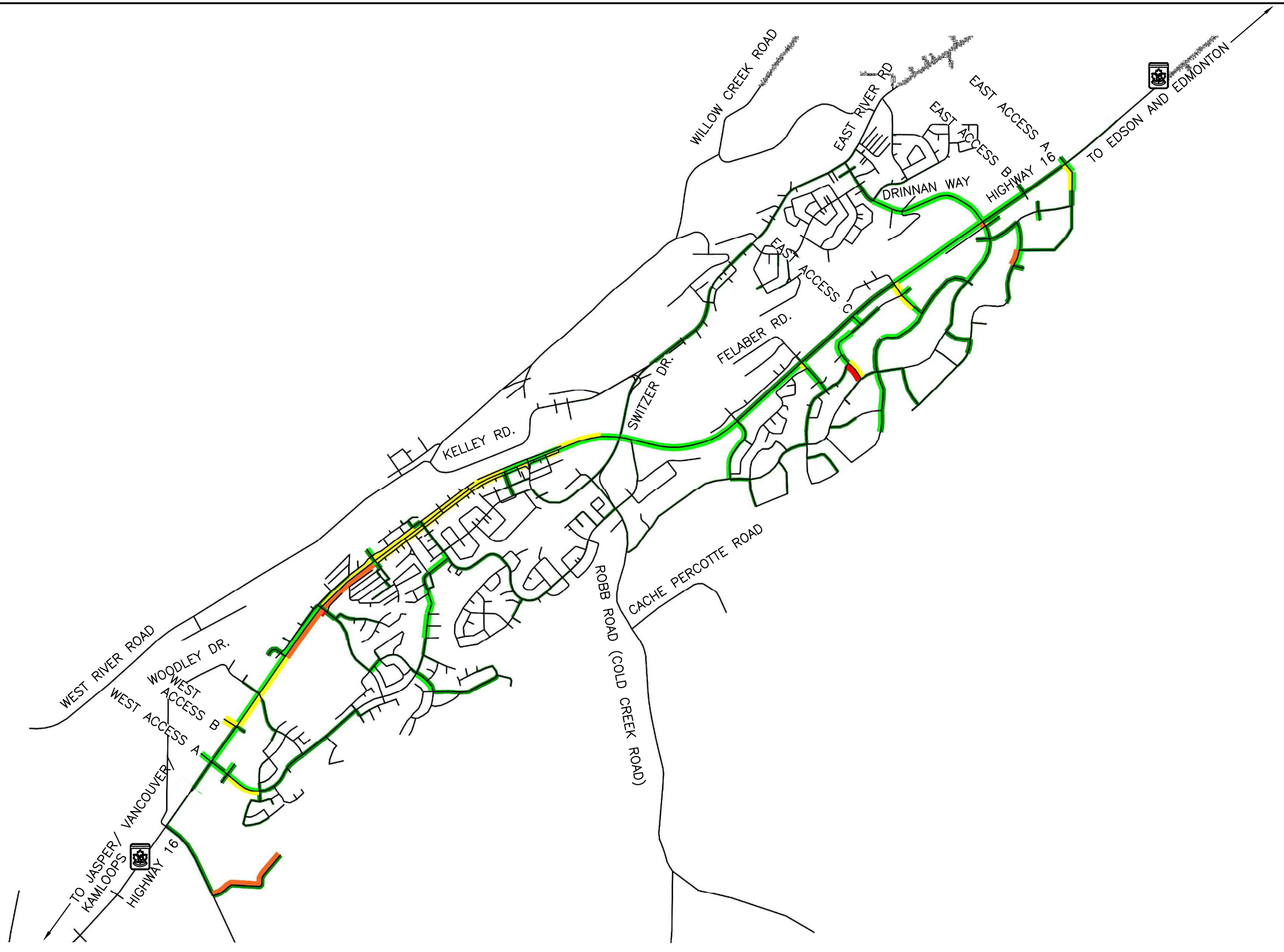
TOWN OF HINTON
Gateway to the Rockies

TOWN OF HINTON TRANSPORTATION MASTER PLAN

ROAD CLASSIFICATION
2046 SCENARIO 3/4 : FULL BUILDOUT

EXHIBIT 4.10

Diana Ranca | Oct. 19, 17 | M:\26560\26571_Town Of Hinton_TMP\02_CADD\20_Drafting\201_TMP_EXHIBITS\170721_TMP_ROAD_CLASS_Full_Buildout.dwg



CAPACITY LEGEND:

V/C RATIO

	0.00 - 0.60	EFFECTIVE OPERATIONS
	0.60 - 0.80	EFFECTIVE OPERATIONS
	0.80 - 0.95	NORMAL OPERATIONS / URBAN TRAFFIC CONDITIONS
	0.95 - 1.05	AT OR NEAR CAPACITY
	> 1.05	ABOVE CAPACITY REQUIRES DETAILED ANALYSIS

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TOWN OF HINTON
Gateway to the Rockies

TOWN OF HINTON TRANSPORTATION MASTER PLAN

PM PEAK HOUR VOLUME TO CAPACITY
2046 SCENARIO 3: FULL BUILDOUT
(WITH SOUTH ASP ACCESS OFF HWY 40)
EXHIBIT 4.11

Diana Renzi / Oct. 20, 17 / M:\265009\26571_Town Of Hinton_TMP\02_CADD\20_Drafting\20\1_TMP_EXHIBITS\170721_TMP_Exhibit\26571_VOL_CAP_Full_buildout.dwg

WEST RIVER RD

WEST RIVER RD

HIGHWAY 40 N

RANGE RD 234

HIGHWAY 16

WOODLEY DR.

CARMICHAEL LANE

WEST ACCESS B

WEST ACCESS A

KEIL DR.

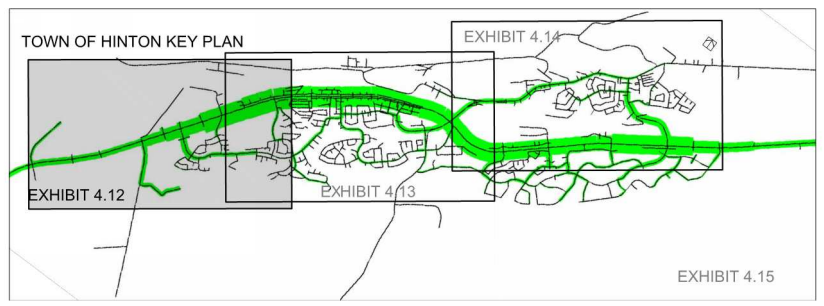
HIGHWAY 40 S

Diana Renca | Oct. 18, 17 | M:\2650\26571_Town Of Hinton_TMP\02_CAD\D20_Drafting\201_TMP_EXHIBITS\26571_Peak_buillout.dwg

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TOWN OF HINTON
Gateway to the Rockies

TOWN OF HINTON KEY PLAN



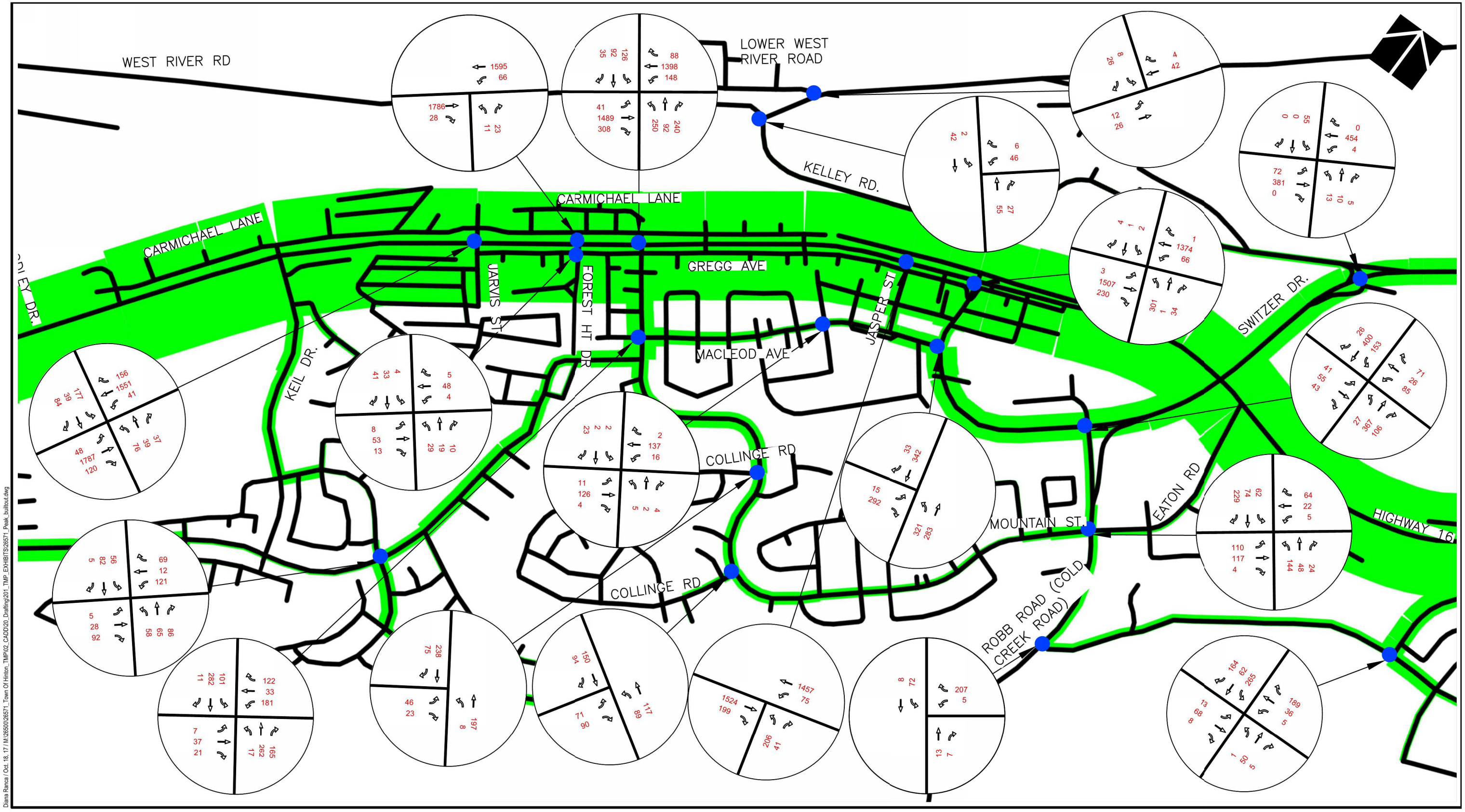
Legend:

- ANALYZED INTERSECTIONS
- XXX PM PEAK HOUR VOLUMES

TOWN OF HINTON TRANSPORTATION MASTER PLAN

PM PEAK HOUR TRAFFIC VOLUMES
2046 SCENARIO 3: FULL BUILDOUT
(WITH SOUTH ASP ACCESS OFF HWY 40) - WEST SIDE

EXHIBIT 4.12

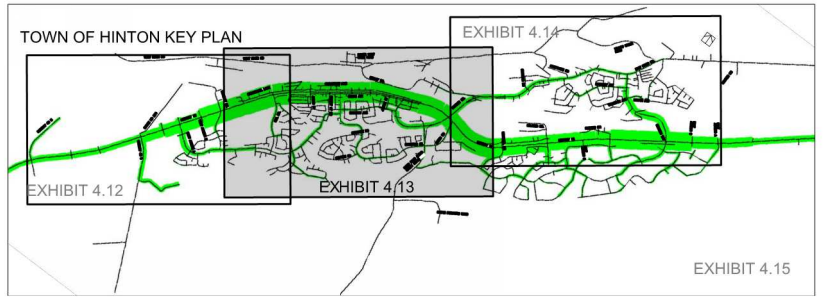


Diana Ranca | Oct. 18, 17 | M:\2650\26571_Town Of Hinton_TMP\02_CADD\03_Drafting\201_TMP_EXHIBITS\26571_Peak_builtout.dwg

ISL Engineering and Land Services

TOWN OF HINTON
Gateway to the Rockies

TOWN OF HINTON KEY PLAN



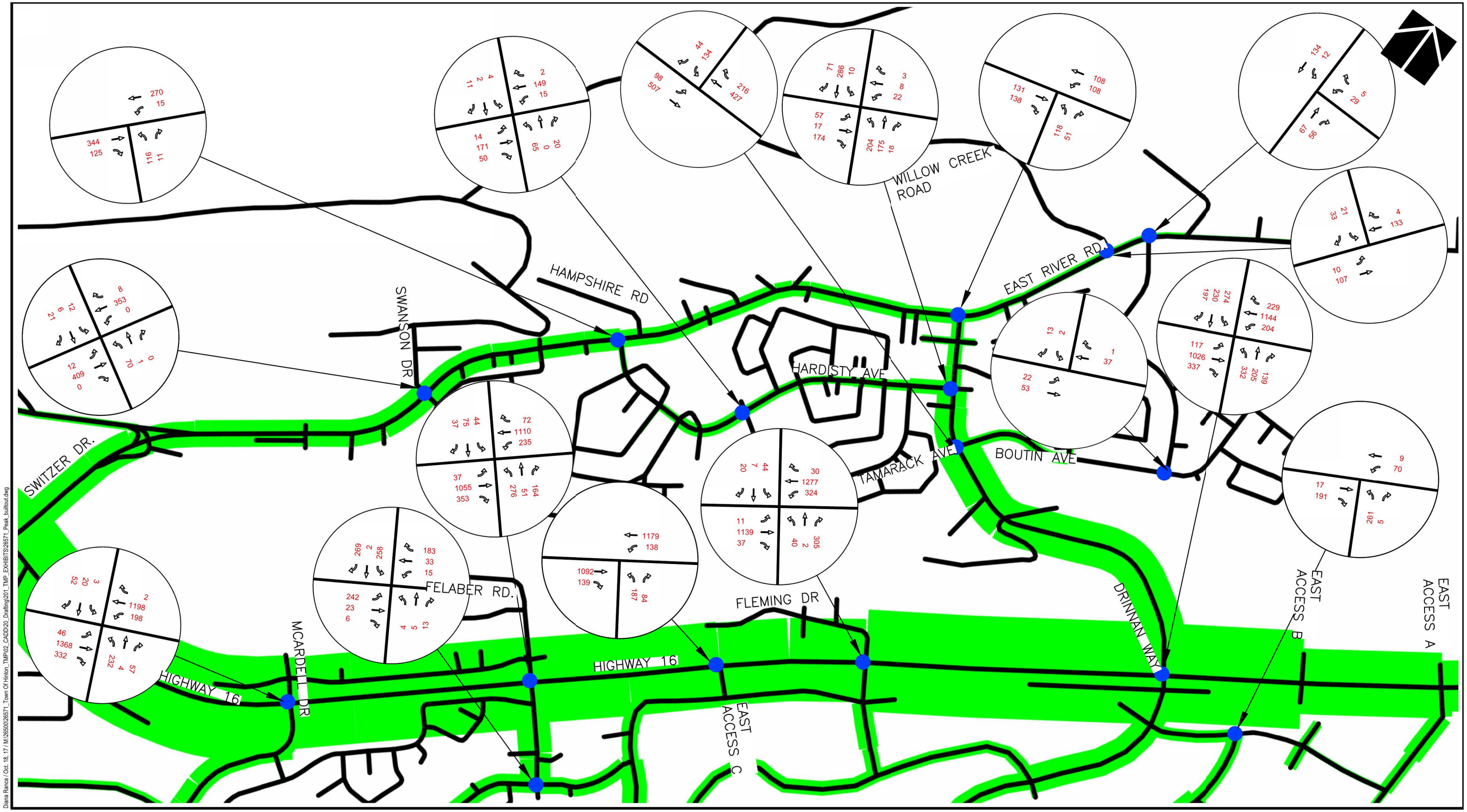
Legend:

- ANALYZED INTERSECTIONS
- XXX PM PEAK HOUR VOLUMES

TOWN OF HINTON TRANSPORTATION MASTER PLAN

PM PEAK HOUR TRAFFIC VOLUMES
2046 SCENARIO 3: FULL BUILDOUT
(WITH SOUTH ASP ACCESS OFF HWY 40) - CENTRAL

EXHIBIT 4.13

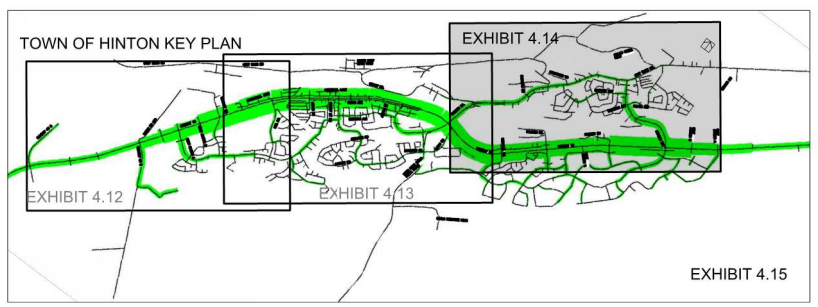


Diana Renca | Oct. 18, 17 | M:\365\00026571_Town Of Hinton_TMP\02_CAD\20_Drafting\201_TMP_EXHIBITS\26571_Peak_buildout.dwg

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TOWN OF HINTON
Gateway to the Rockies

TOWN OF HINTON KEY PLAN



Legend:

- ANALYZED INTERSECTIONS
- XXX PM PEAK HOUR VOLUMES

TOWN OF HINTON TRANSPORTATION MASTER PLAN

PM PEAK HOUR TRAFFIC VOLUMES
2046 SCENARIO 3: FULL BUILDOUT
(WITH SOUTH ASP ACCESS OFF HWY 40) - EAST SIDE 1

EXHIBIT 4.14

FELABER RD.

FLEMING DR

DRINNAN WAY

EAST ACCESS B

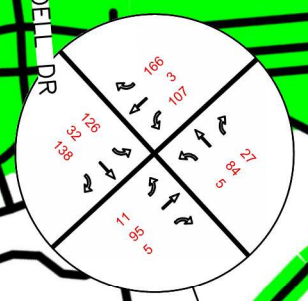
EAST ACCESS A

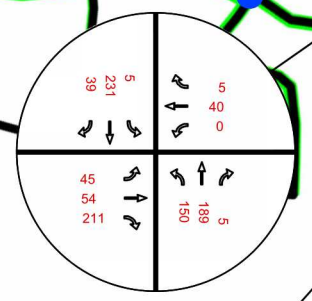
HIGHWAY 16

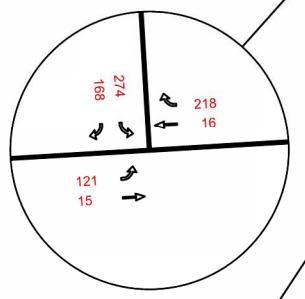
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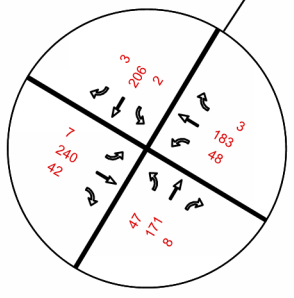
MCARDELL DR

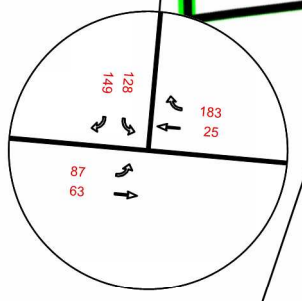
EAST ACCESS C

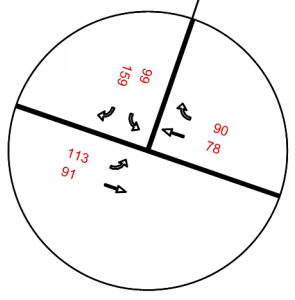


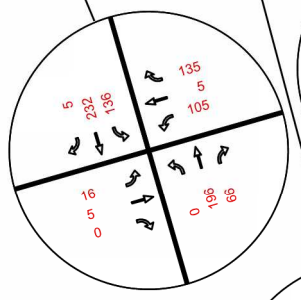


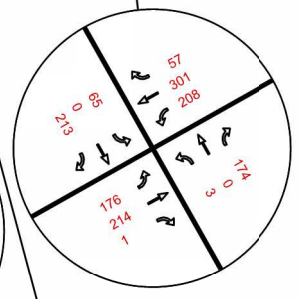


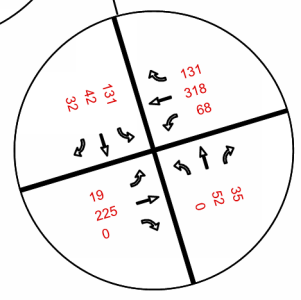


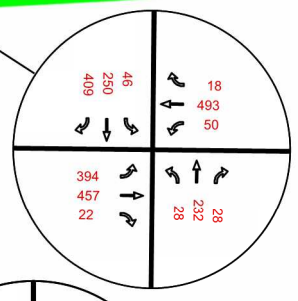


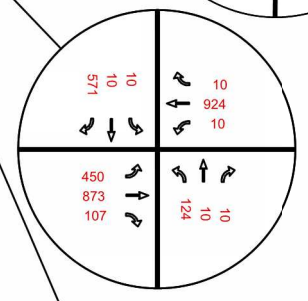


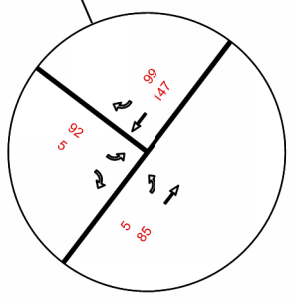








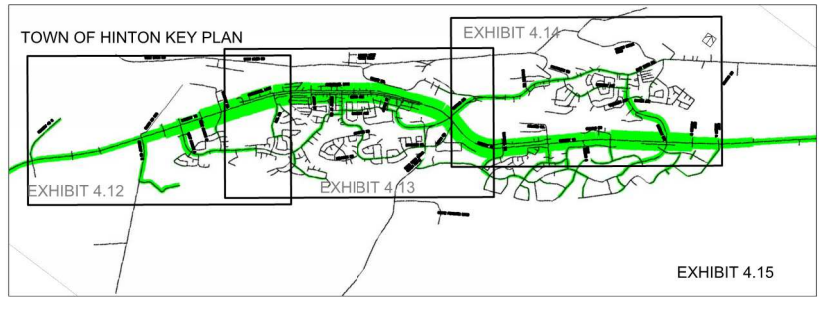




Diana Ranca / Oct. 18, 17 / M:\35590\35571_Town Of Hinton_TMP\02_CADD\20_Drafting\201_TMP_EXHIBITS\35571_Peak_buildout.dwg

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TOWN OF HINTON
Gateway to the Rockies



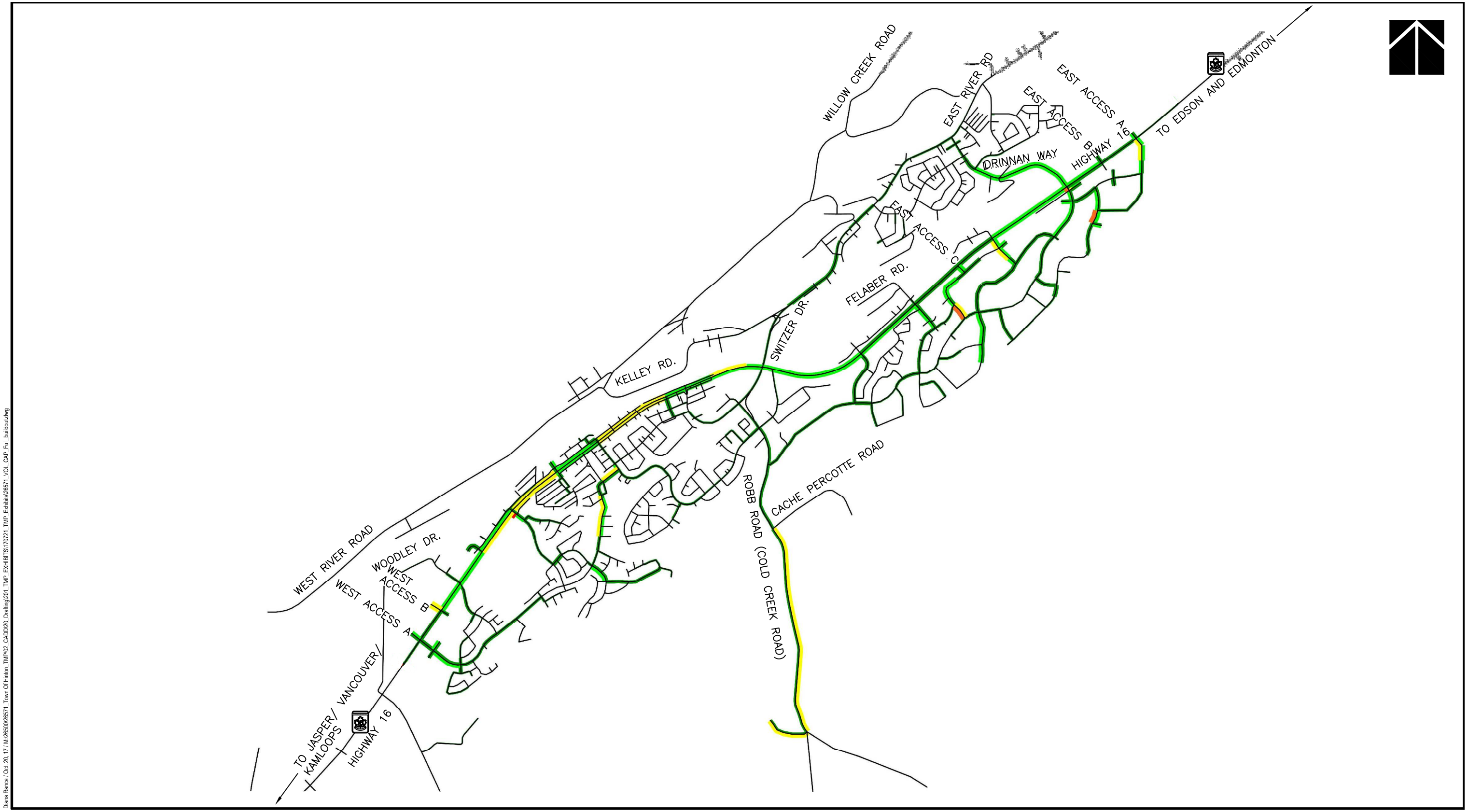
Legend:

- ANALYZED INTERSECTIONS
- XXX PM PEAK HOUR VOLUMES

TOWN OF HINTON TRANSPORTATION MASTER PLAN

PM PEAK HOUR TRAFFIC VOLUMES
2046 SCENARIO 3: FULL BUILDOUT
(WITH SOUTH ASP ACCESS OFF HWY 40) - EAST SIDE 2

EXHIBIT 4.15



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CAPACITY LEGEND:

V/C RATIO

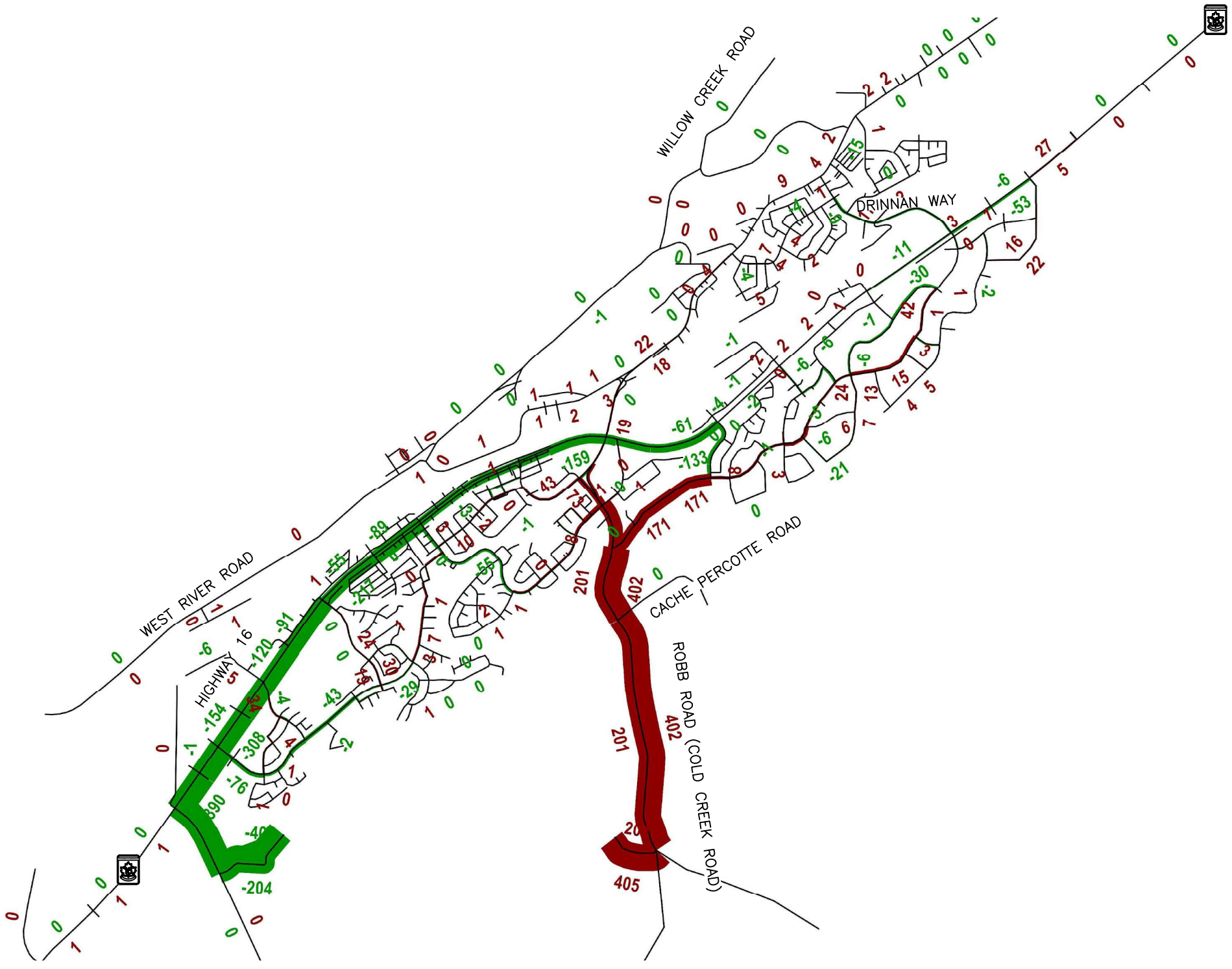
	0.00 - 0.60	EFFECTIVE OPERATIONS
	0.60 - 0.80	EFFECTIVE OPERATIONS
	0.80 - 0.95	NORMAL OPERATIONS / URBAN TRAFFIC CONDITIONS
	0.95 - 1.05	AT OR NEAR CAPACITY
	> 1.05	ABOVE CAPACITY REQUIRES DETAILED ANALYSIS

ISL Engineering and Land Services

TOWN OF HINTON
Gateway to the Rockies

TOWN OF HINTON TRANSPORTATION MASTER PLAN

PM PEAK HOUR VOLUME TO CAPACITY
2046 SCENARIO 4: FULL BUILDOUT
(WITH SOUTH ASP ACCESS OFF ROBB ROAD)
EXHIBIT 4.16



Legend:

PM PEAK HOUR TRAFFIC VOLUME

FULL BUILDOUT (SCENARIO 3)

ROBB RD ACCESS (SCENARIO 4)

VEHICLE VOLUME SCALING

ISL Engineering and Land Services

TOWN OF HINTON
Gateway to the Rockies

TOWN OF HINTON TRANSPORTATION MASTER PLAN

PM PEAK HOUR TRAFFIC VOLUME
COMPARISON OF SCENARIO 3 (HWY 40 ACCESS)
AND SCENARIO 4 (ROBB ROAD)
EXHIBIT 4.17

Diana Ranca / Oct. 18, 17 / M:\26500\26571_Town Of Hinton_TMP\02_CADD\20_Drafting\201_TMP_EXHIBITS\170721_TMP_Exhibits\26571_FUTURE_PeakHr_Traffic.dwg

WEST RIVER RD

WEST RIVER RD

HIGHWAY 40 N

RANGE RD 254

WEST ACCESS A

WEST ACCESS B

HIGHWAY 16

WOODLEY DR.

CARMICHAEL LANE

KEIL DR.

HIGHWAY 40 S

335 183 51 | 304 321 94 | 23 468 270 | 125 264 107

405 720 190 | 371 85 10 | 10 880 32 | 176 80 18

237 55 50 | 53 1202 140 | 46 1280 102 | 100 44 61

6 38 | 8 73 | 59 53

195 10 | 238 1354 | 10 1580

53 0 173 | 95 0 79 | 2 5 28 | 198 44 0

8 66 | 7 116 | 100 106

81 242 155 | 70 43 159 | 81 38 82 | 126 327 65

83 1368 167 | 78 83 21 | 60 1498 217 | 114 63 203

37 5 5 | 37 158 114 | 93 5 5 | 65 5 5

98 36 5 | 114 414 162 | 303 5 5 | 118 32 5

198 271 4 | 150 1 34 | 84 505 1 | 0 1 1

10 419 75 | 8 0 8 | 8 638 9 | 96 1 43

44 46 | 377 62 | 24 395

158 26 5 | 205 5 6 | 11 38 5 | 28 5 5

Diana Ranca / Oct. 19, 17 / M:\3550\026571_Town Of Hinton_TMP\02_CADD\20_Drafting\201_TMP_EXHIBITS\026571_Peak_BO_Scenario4.dwg

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TOWN OF HINTON Gateway to the Rockies

TOWN OF HINTON KEY PLAN

EXHIBIT 4.18 | EXHIBIT 4.19 | EXHIBIT 4.20 | EXHIBIT 4.21

Legend:

- ANALYZED INTERSECTIONS
- XXX PM PEAK HOUR VOLUMES

TOWN OF HINTON TRANSPORTATION MASTER PLAN

PM PEAK HOUR TRAFFIC VOLUMES
2046 SCENARIO 4: FULL BUILDOUT
(WITH SOUTH ASP ACCESS OFF ROBB ROAD) - WEST SIDE

EXHIBIT 4.18

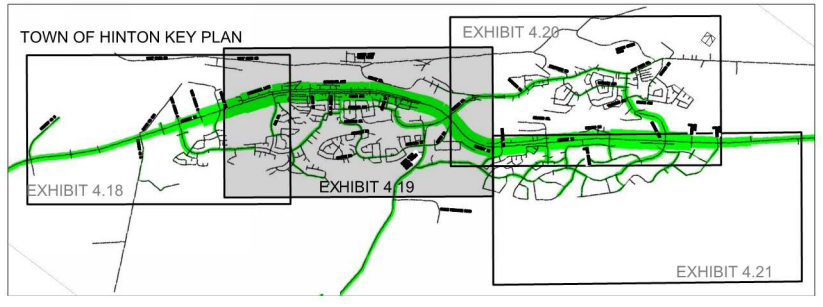
WEST RIVER RD
LOWER WEST RIVER ROAD
KELLEY RD.
CARMICHAEL LANE
CARMICHAEL LANE
GREGG AVE
JARVIS ST
FOREST HT DR
JASPER ST
MACLEOD AVE
SWITZER DR.
KEIL DR.
MOUNTAIN ST.
COLLINGE RD
COLLINGE RD
MOUNTAIN ST
EATON RD
HIGHWAY 16
ROBB ROAD (COLD CREEK ROAD)

Diana Ranca | Oct. 19, 17 | M:\2050\26571_Town Of Hinton_TMP\02_CADD\20_Drafting\201_TMP_EXHIBITS\26571_Peak_BO_Scenario4.dwg

ISL Engineering and Land Services

TOWN OF HINTON
Gateway to the Rockies

TOWN OF HINTON KEY PLAN



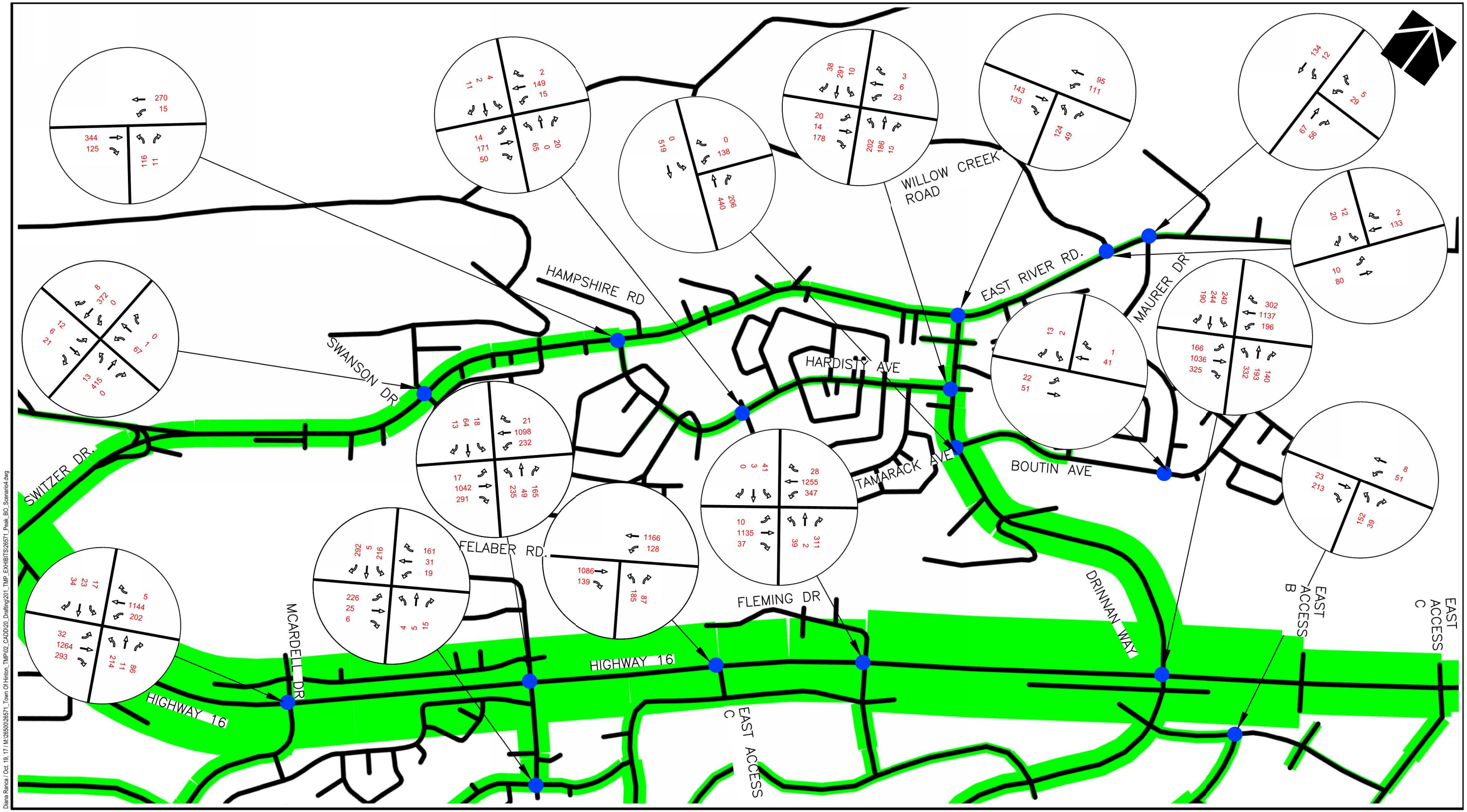
Legend:

- ANALYZED INTERSECTIONS
- XXX PM PEAK HOUR VOLUMES

TOWN OF HINTON TRANSPORTATION MASTER PLAN

PM PEAK HOUR TRAFFIC VOLUMES
2046 SCENARIO 4: FULL BUILDOUT
(WITH SOUTH ASP ACCESS OFF ROBB ROAD) - CENTRAL

EXHIBIT 4.19

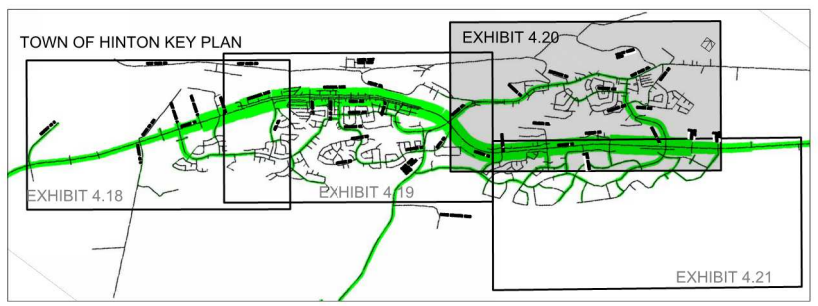


Diana Ranca | Oct. 19, 17 | M:\26500\26571_Town Of Hinton_TMP\02_CADD\20_Drafting\201_TMP_EXHIBITS\26571_Peak_BG_Scenario4.dwg

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TOWN OF HINTON
Gateway to the Rockies

TOWN OF HINTON KEY PLAN



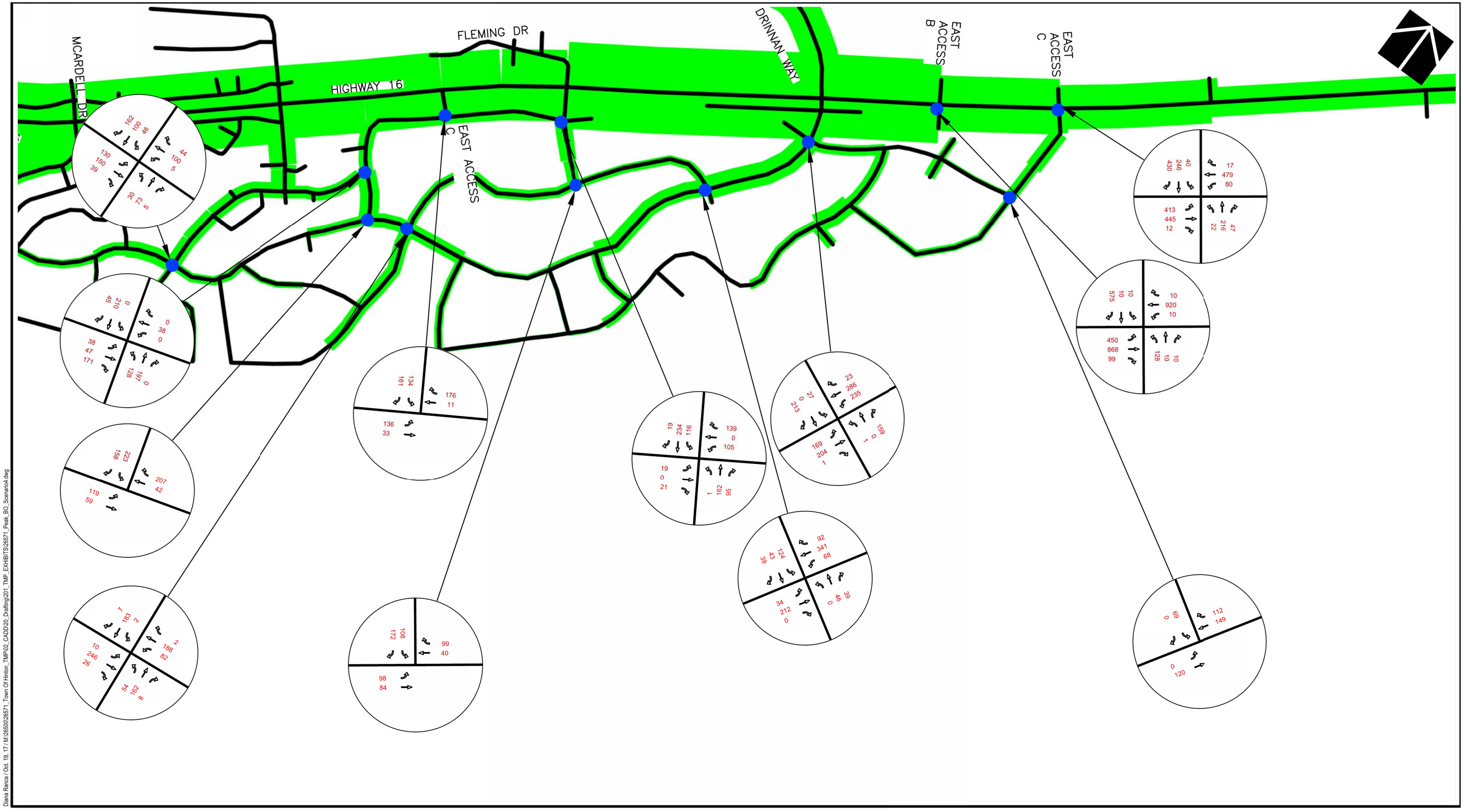
Legend:

- ANALYZED INTERSECTIONS
- XXX PM PEAK HOUR VOLUMES

TOWN OF HINTON TRANSPORTATION MASTER PLAN

PM PEAK HOUR TRAFFIC VOLUMES
2046 SCENARIO 4: FULL BUILDOUT
(WITH SOUTH ASP ACCESS OFF ROBB ROAD) - EAST SIDE 1

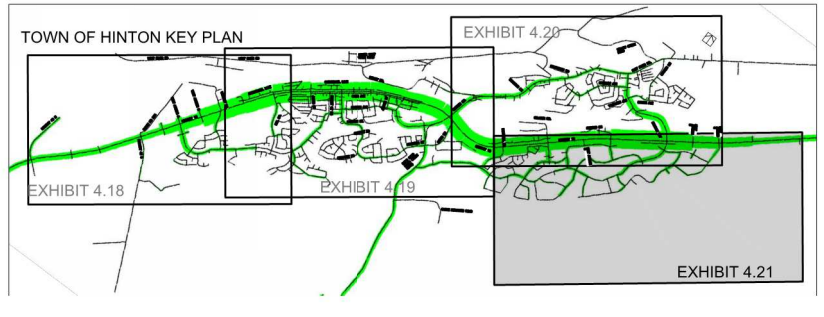
EXHIBIT 4.20



Diana Roncal | Oct. 19, 17 | M:\2650\26571_Town Of Hinton_TMP\02_CADD\20_Drafting\201_TMP_EXHIBITS\26571_Peak_BO_Scenario4.dwg

ISL Engineering and Land Services

TOWN OF HINTON
Gateway to the Rockies



Legend:

- ANALYZED INTERSECTIONS
- XXX PM PEAK HOUR VOLUMES

TOWN OF HINTON TRANSPORTATION MASTER PLAN

PM PEAK HOUR TRAFFIC VOLUMES
2046 SCENARIO 4: FULL BUILDOUT
(WITH SOUTH ASP ACCESS OFF ROBB ROAD) - EAST SIDE 2

EXHIBIT 4.21



Diana Ranca | Oct. 20, 17 | M:\2659\09\26571_Town Of Hinton_TMP\02_CADD\02_Drafting\201_TMP_EXHIBITS\170721_TMP_Exhibits\26571_VOL_CAP_Full_buildout_Bypass.dwg

CAPACITY LEGEND:

V/C RATIO

	0.00 - 0.60	EFFECTIVE OPERATIONS
	0.60 - 0.80	EFFECTIVE OPERATIONS
	0.80 - 0.95	NORMAL OPERATIONS / URBAN TRAFFIC CONDITIONS
	0.95 - 1.05	AT OR NEAR CAPACITY
	> 1.05	ABOVE CAPACITY REQUIRES DETAILED ANALYSIS

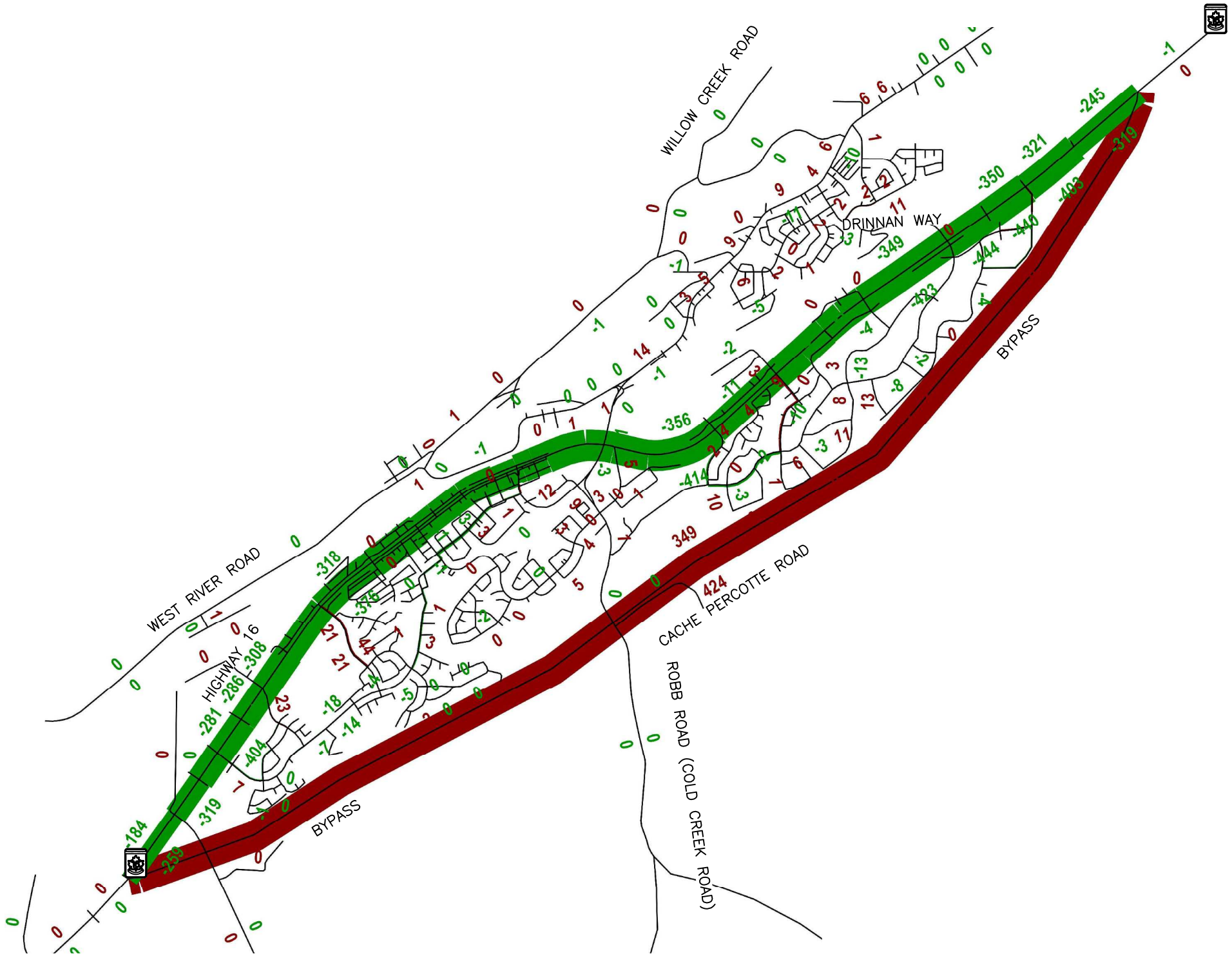
ISL Engineering and Land Services

TOWN OF HINTON Gateway to the Rockies

TOWN OF HINTON TRANSPORTATION MASTER PLAN

PM PEAK HOUR VOLUME TO CAPACITY
2046 SCENARIO 5: FULL BUILDOUT WITH HWY 16 BYPASS

EXHIBIT 4.22



Legend:

PM PEAK HOUR TRAFFIC VOLUME

FULL BUILDOUT (SCENARIO 3)

HWY 16 BYPASS (SCENARIO 5)

VEHICLE VOLUME SCALING

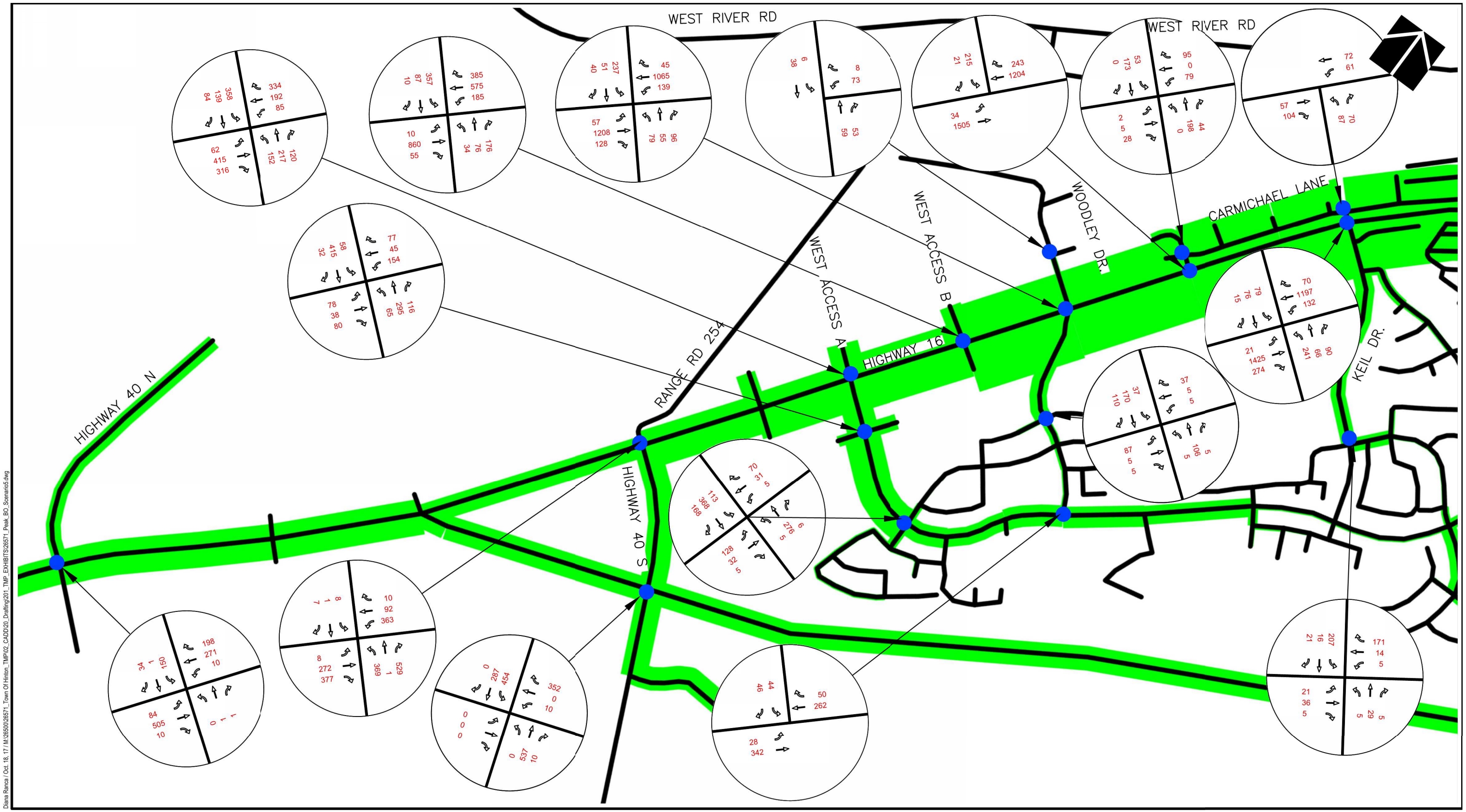
ISL Engineering and Land Services

TOWN OF HINTON
Gateway to the Rockies

TOWN OF HINTON TRANSPORTATION MASTER PLAN

PM PEAK HOUR VOLUME WITH HWY 16
COMPARISON OF SCENARIO 3 (NO HWY 16 BYPASS)
AND SCENARIO 5 (WITH HWY 16 BYPASS)
EXHIBIT 4.23

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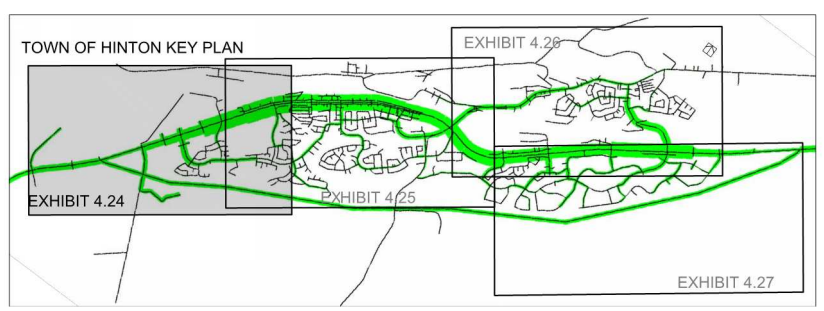


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TOWN OF HINTON
Gateway to the Rockies

TOWN OF HINTON KEY PLAN



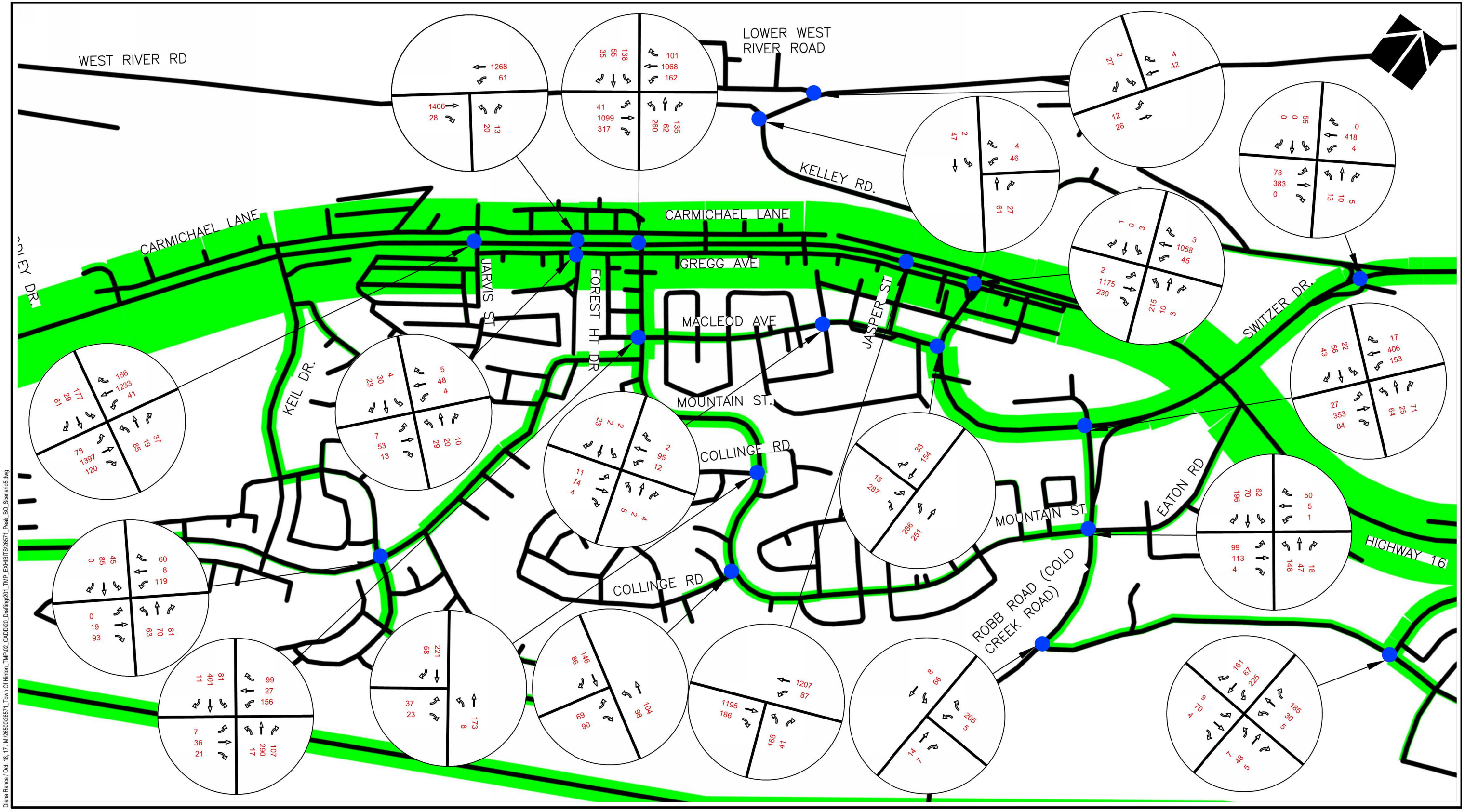
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- XXX PM PEAK HOUR VOLUMES

TOWN OF HINTON TRANSPORTATION MASTER PLAN

PM PEAK HOUR TRAFFIC VOLUMES
2046 SCENARIO 5 : FULL BUILDOUT WITH HWY 16 BYPASS WEST

EXHIBIT 4.24

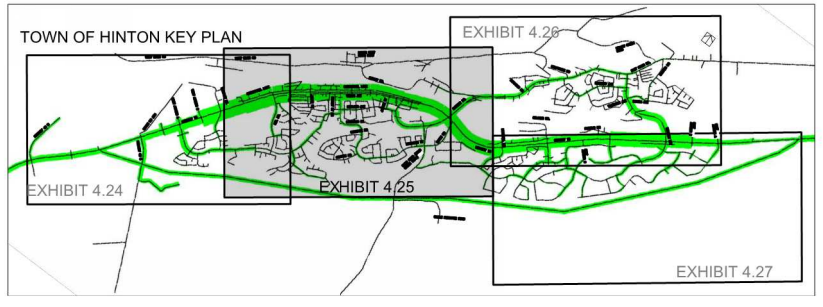


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TOWN OF HINTON
Gateway to the Rockies

TOWN OF HINTON KEY PLAN



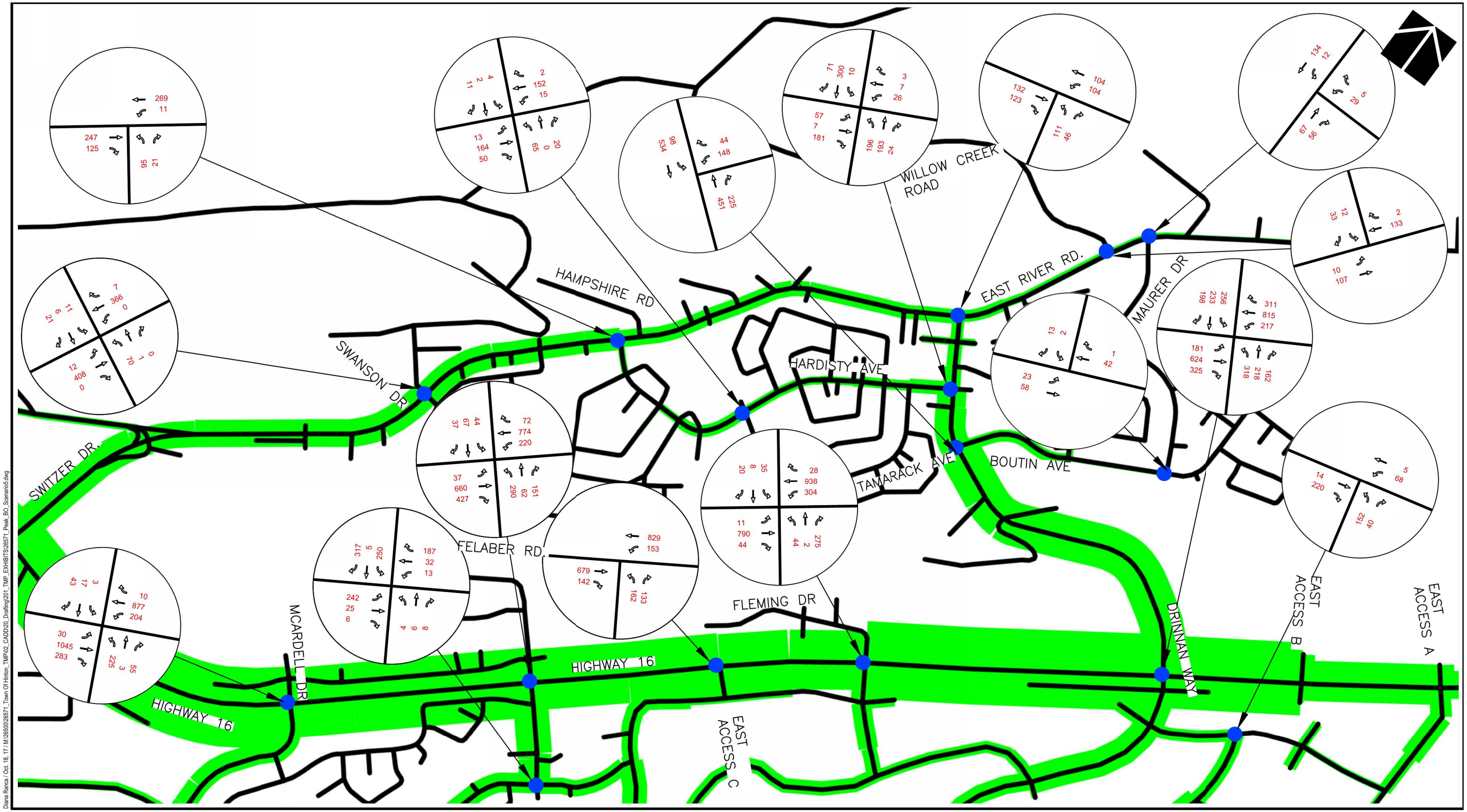
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- ANALYZED INTERSECTIONS
- XXX PM PEAK HOUR VOLUMES

TOWN OF HINTON TRANSPORTATION MASTER PLAN

PM PEAK HOUR TRAFFIC VOLUMES
2046 SCENARIO 5: FULL BUILDOUT WITH HWY 16 BYPASS
CENTRAL

EXHIBIT 4.25

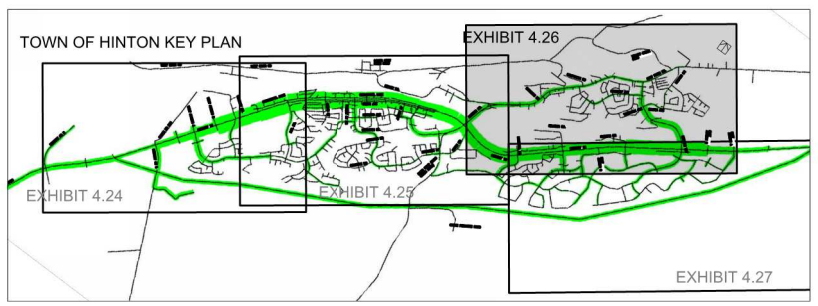


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TOWN OF HINTON
Gateway to the Rockies

TOWN OF HINTON KEY PLAN



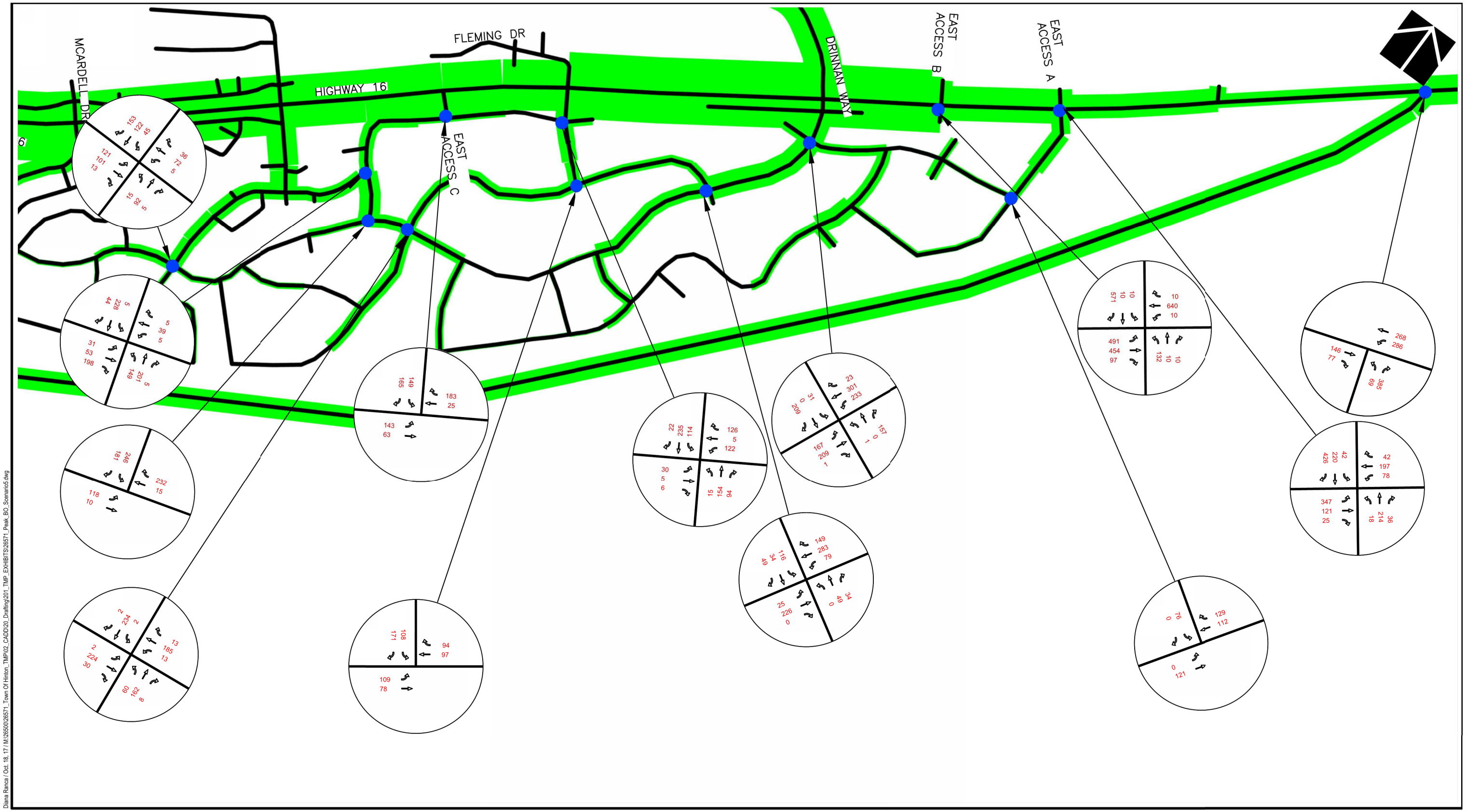
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- ANALYZED INTERSECTIONS
- XXX PM PEAK HOUR VOLUMES

TOWN OF HINTON TRANSPORTATION MASTER PLAN

PM PEAK HOUR TRAFFIC VOLUMES
2046 SCENARIO 5: FULL BUILDOUT WITH HWY 16 BYPASS
EAST SIDE 1

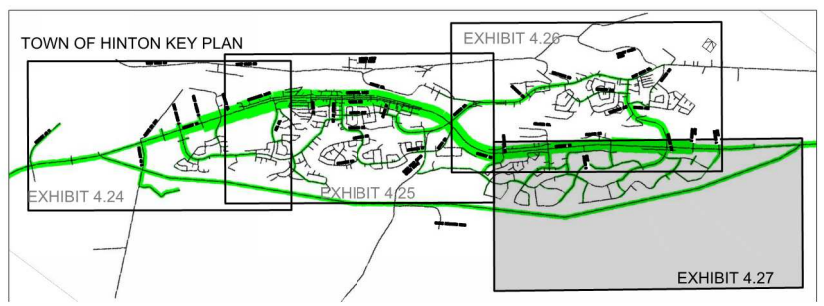
EXHIBIT 4.26



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TOWN OF HINTON
Gateway to the Rockies



Legend:

- ANALYZED INTERSECTIONS
- XXX PM PEAK HOUR VOLUMES

TOWN OF HINTON TRANSPORTATION MASTER PLAN

PM PEAK HOUR TRAFFIC VOLUMES
2046 SCENARIO 5: FULL BUILDOUT WITH HWY 16 BYPASS
EAST SIDE 2

EXHIBIT 4.27

5.0 Future Horizon Detailed Intersection Analysis

Following the overall network capacity (macro-level) analysis described in Section 4.0, detailed operational (micro-level) analysis was completed at key locations within the existing roadway network and at new intersections in the East, West and future South ASP areas. The purpose of the detailed evaluation was to verify the findings of the macro-level recommendations and to determine the detailed traffic control and lane requirements which may drive localized roadway upgrades in future.

Intersection turning volumes for the analysis were iteratively derived from the five scenario models as described in Section 4.0. It is cautioned that micro-level forecasting from a travel demand model had a typical margin of error of +/-25%, and that local-level forecasting and analysis via TIAs should continue to be used as part of the development approval process as new growth areas come on-line.

Similar to the detailed analysis of the existing traffic (Section 3.4), the following were undertaken:

- Synchro 9.0 analysis to determine the operational characteristics of the signalized intersections
- Performed signal warrant analysis at all key locations on Highway 16 using TAC's *Canadian Traffic Signal Matrix Procedure 2007*

All Collector-to-Collector or higher classification intersections were evaluated and the intersections that operated above standards are discussed in the following sections.

5.1 Scenarios 1 and 2 Analysis Results

Detailed Synchro analysis and traffic warrant analysis was undertaken at all intersections in the existing lane configurations and traffic controls in Scenarios 1 and 2. Detailed analyses results are summarized below and shown in Exhibit 5.1. The recommended upgrades at each intersection and the Scenarios 1 and 2 comparisons of the recommended upgrades are shown in Table 5.1 below.

- Both scenarios operated well
- Highway 16/Drinnan Way: Add signalization, add northbound right turn bay, revise to 60 km/h at the approach to Drinnan Way on Highway 16, with advanced signal warning flashers on Highway 16
- Highway 16/Keil Drive: Synchro analysis did not result in signalization, while signal warrant analysis resulted in signalization. Given the type of development around this intersection (highway commercial to the north), and the potential pedestrian draw between the residential and commercial uses on opposite sides of the highway, we recommend that this traffic signal be installed within this horizon

5.2 Scenario 3 Analysis Results

Traffic volumes for Scenario 3 were analyzed in the existing roadway network. The detailed Synchro and traffic warrant analyses results are summarized below and shown in Exhibit 5.2. The recommended upgrades at each intersection and the Scenarios 3/4/5 comparisons of the recommended upgrades are shown in Table 5.2 below.

- Highway 16: Improvements may include one or a combination of the following: retiming of existing signal (4 intersections), adding traffic signals (14 intersections), adding left turn bays at one or more approaches of the intersection, adding right turn bays at one or more approaches of the intersection
- Highway 16: It is recommended to extend the 60 km/h zone, from Highway 40 in the west to beyond Drinnan Way in the east
- Highway 16 at West Access B, Woodley Drive, Keil Drive and Mountain Street: The intersections are near capacity
- Internal ASP area intersections: No signalization required

Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
+800 Population with South ASP Access off Highway 40	+800 Population with South ASP Access off Robb Road	Full Build-Out with South ASP Access off Highway 40	Full Build-Out with South ASP Access off Robb Road	Full Build-Out with Highway 16 Bypass

At the macro-level analysis, Scenario 3 indicated the maximum possible travel demands on the existing Highway 16 corridor. The potential level of investment in Highway 16 under Scenario 3, with widespread signalization and turn bay improvements, is reflective of that condition.

5.3 Scenario 4 Analysis Results

Traffic volumes for Scenario 4 were analyzed in the existing roadway network. The detailed Synchro and traffic warrant analysis results are summarized below and shown in Exhibit 5.2. The recommended upgrades at each intersection and the Scenarios 3/4/5 comparisons of the recommended upgrades are shown in Table 5.2 below.

- Highway 16: Improvements may include one or a combination of the following: retiming of existing signal (4 intersections), adding traffic signals (13 intersections), adding left turn bays at one or more approaches of the intersection, adding right turn bays at one or more approaches of the intersection. As compared to Scenario 3, the differences are:
- Highway 16/Highway 40 South: Signalization is not required. In Scenario 3, signalization is required
- Highway 16 at West Access B, Woodley Drive, Keil Drive and Mountain Street: As compared to Scenario 3, the intersections operate better and are under capacity
- Highway 16: It is recommended to extend the 60 km/h zone, from Highway 40 in the west to beyond Drinnan Way in the east
- Internal ASP intersections: No signalization required

Like Scenario 3, Scenario 4 accounts for significant investments in the existing Highway 16 corridor to support full build-out of the East, West and future South ASP areas.

5.4 Scenario 5 Analysis Results

In Scenario 5, the effect of the potential Highway 16 Bypass on Hinton's network is evaluated. With the Bypass, the traffic volumes on Highway 16 will be reduced. Thus, traffic operations on Highway 16 are expected to be better than Scenarios 3 and 4. The results are summarized below and shown in Exhibit 5.2. The recommended upgrades at each intersection and the Scenarios 3/4/5 comparisons of the recommended upgrades are shown in Table 5.2 below.

- Highway 16: Improvements may include one or a combination of the following: retiming of existing signal (4 intersections), adding traffic signals (13 intersections), adding left turn bays at one or more approaches of the intersection, adding right turn bays at one or more approaches of the intersection. When compared to Scenario 3, the differences are:
- Highway 16/Highway 40 South: Will be an interchange per the Highway 16 Bypass design in the *Highway 16 Functional Planning Study* (FPS)
- Highway 16 at West Access B, Woodley Drive, Keil Drive and Mountain Street: As compared to Scenario 3, the intersections operate better and are under capacity
- Highway 16 Bypass East Connection: Will be an interchange per the Highway 16 Bypass design in the Highway 16 FPS
- Highway 16: It is recommended to extend the 60 km/h zone, from Highway 40 to the west to beyond Drinnan Way to the east
- Internal ASP area intersections: No signalization required

Like Scenarios 3 and 4, Scenario 5 includes appreciable investment in the existing (former) Highway 16 corridor, even with implementation of the provincial bypass. This reflects Highway 16's evolving role as an important internal arterial corridor for Hinton.

Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
+800 Population with South ASP Access off Highway 40	+800 Population with South ASP Access off Robb Road	Full Build-Out with South ASP Access off Highway 40	Full Build-Out with South ASP Access off Robb Road	Full Build-Out with Highway 16 Bypass

In practical terms, the analysis confirms that the Highway 16 Bypass is of significant importance in supporting full build-out of the East, West and future South ASP areas. Without the bypass, Alberta Transportation is unlikely to support the level of access and traffic signalization on the existing Highway 16 corridor that is required to support this higher growth scenario.

5.5 Recommended Upgrades – Scenarios 1 and 2

The analysis results for Scenarios 1 and 2 are compared and summarized in Table 5.1 and cross-referenced in Exhibit 5.1.

Table 5.1: Scenarios 1 and 2 Recommended Intersection and Traffic Control Upgrades Comparison

Intersection	Scenario 1	Scenario 2
	Recommended Intersection and Traffic Control Upgrades	
Highway 16/Drinnan Way	• Add signalization with advanced warning flasher on Highway 16 • Add southbound right turn bay • 60 km/h at approach to intersection on Highway 16	
Highway 16/Keil Drive	• Add signalization	

5.6 Recommended Upgrades – Scenarios 3, 4 and 5

The analysis results for Scenarios 3, 4, and 5 are compared and summarized in Table 5.2 and cross-referenced in Exhibit 5.2.

Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
+800 Population with South ASP Access off Highway 40	+800 Population with South ASP Access off Robb Road	Full Build-Out with South ASP Access off Highway 40	Full Build-Out with South ASP Access off Robb Road	Full Build-Out with Highway 16 Bypass

Table 5.2: Scenarios 3, 4 and 5 Recommended Intersection and Traffic Control Upgrades Comparison

Intersection	Scenario 3	Scenario 4	Scenario 5
	Recommended Intersection and Traffic Control Upgrades		
Highway 16/ Highway 40 North/ Fisher Road	• Intersection operates at acceptable LOS and v/c ratio, no upgrade is needed		• Per Highway 16 FPS, intersection closed with Highway 16 Bypass
Highway 16/ Highway 40 South	• Reduce posted speed limits on Highway 16 from 100 km/h to 60 km/h		• Interchange per Alberta Transportation's Highway 16 Bypass design in Highway 16 FPS
	• Add traffic signal	• Existing unsignalized intersection operates at acceptable LOS and v/c ratio, no upgrade is needed	
Highway 16/ West Access A	• New signalized intersection • Reduce posted speed limits on Highway 16 from 100 km/h to 60 km/h • Add westbound left, westbound right, eastbound left, southbound left, southbound right, and northbound left turn bay • Existing third eastbound lane becomes right turn lane (lane drop) • Add northbound right turn lane (from the upstream intersection)		
Highway 16/ West Access B	• New signalized intersection • Reduce posted speed limits on Highway 16 from 100 km/h to 60 km/h • Add westbound left, westbound right, eastbound left, eastbound right, northbound left, northbound right and southbound left turn bay		
	• Eastbound through movement operated with long queue (approximately 230m) • recommend intersection be closely monitored for further upgrade such as additional eastbound through lane in the future	• No additional improvements required	
Highway 16/ Woodley Drive	• Add traffic signal • New south leg connection • Reduce posted speed limits on Highway 16 from 80 km/h to 60 km/h • Add westbound left, eastbound right and northbound left turn bay		
	• Eastbound through movement operated with long queue (approximately 1600m) • Recommend intersection be closely monitored for further upgrade such as additional eastbound through lane in the future	• No additional improvements required	

Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
+800 Population with South ASP Access off Highway 40	+800 Population with South ASP Access off Robb Road	Full Build-Out with South ASP Access off Highway 40	Full Build-Out with South ASP Access off Robb Road	Full Build-Out with Highway 16 Bypass

Intersection	Scenario 3	Scenario 4	Scenario 5
	Recommended Intersection and Traffic Control Upgrades		
Highway 16/ Meier Street	• Revised signal timing but no geometric upgrade is needed • Reduce posted speed limits on Highway 16 from 70 km/h to 60 km/h		
Highway 16/ Keil Drive	• Add traffic signal • Reduce posted speed limits on Highway 16 from 70 km/h to 60 km/h		
	• Eastbound through movement operated at v/c over 1.00 and long queue (approximately 300m) • Recommend intersection be closely monitored for further upgrade such as additional eastbound through lane in the future	• No additional improvements required	
Highway 16/ Jarvis Street	• Revised signal timing, no geometric upgrade is needed		
Highway 16/ Forest Height Drive	• Intersection operates at acceptable LOS and v/c ratio, no upgrade is needed		
Highway 16/ Mountain Street	• Revised signal timing		
	• Eastbound through movement operated at v/c over 1.0 and long queue (approximately 240m) • Recommend intersection be closely monitored for further upgrade such as additional eastbound through lane in the future	• Intersection operates at acceptable LOS and v/c ratio	
Highway 16/ Jasper Street	• Add traffic signal		
Highway 16/ Switzer Drive	• Revised signal timing but no geometric upgrade is needed		
Highway 16/ McArdell Drive/ Dow Drive	• Add traffic signal • Reduce posted speed limits on Highway 16 from 80 km/h to 60 km/h • Add northbound left turn bay		

Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
+800 Population with South ASP Access off Highway 40	+800 Population with South ASP Access off Robb Road	Full Build-Out with South ASP Access off Highway 40	Full Build-Out with South ASP Access off Robb Road	Full Build-Out with Highway 16 Bypass

Intersection	Scenario 3	Scenario 4	Scenario 5
	Recommended Intersection and Traffic Control Upgrades		
Highway 16/ Felaber Road/ Brookhart Street	• Add traffic signal • Reduce posted speed limits on Highway 16 from 80 km/h to 60 km/h • Add northbound left turn bay		
Highway 16/ East Access C	• Add traffic signal • Reduce posted speed limits on Highway 16 from 100 km/h to 60 km/h • Add westbound left turn bay		
Highway 16/Fleming Drive	• Add traffic signal • Reduce posted speed limits on Highway 16 from 100 km/h to 60 km/h • Add westbound left and eastbound right turn bay		
Highway 16/ Drinnan Way	• Add traffic signal • Reduce posted speed limits on Highway 16 from 100 km/h to 60 km/h • Add southbound left, southbound right, northbound left and northbound right turn bay		
Highway 16/ East Access B	• New signalized intersection • Reduce posted speed limits on Highway 16 from 100 km/h to 60 km/h • Add westbound left, westbound right, eastbound left, eastbound right and southbound right turn bay		
Highway 16/ East Access A	• New signalized intersection • Reduce posted speed limits on Highway 16 from 100 km/h to 60 km/h • Add westbound left, westbound right, eastbound left, eastbound right, northbound left and southbound right turn bay		
Highway 16/ Bypass (East End)	• No bypass	• No bypass	• Interchange per Alberta Transportation's Highway 16 Bypass design
West Access B/ Road I	• Four-way stop control or single-lane roundabout • Four lanes at approach to Highway 16		
West Access B/ Road J	• Four-way stop control or single-lane roundabout • Southbound right turn bay (if stop-controlled)		
Drinnan Way/ Road A	• Four-way stop control or single-lane roundabout • Southbound left turn bay (if stop-controlled)		
Drinnan Way/ Road C	• Two-way stop or single-lane roundabout • Eastbound left and southbound right turn bay (if stop-controlled)		
Drinnan Way/ Boutin Avenue	• Three-way stop control or single-lane roundabout • Add southbound left and northbound right turn bay (if stop-controlled)		

From Table 5.2, the intersection upgrades and posted speed limit recommendations are similar for all three of the Full Build-Out scenarios. The differences are:

- Highway 16/Highway 40 North/Fisher Road: No upgrades are required in Scenarios 3 and 4; in Scenario 5, per Highway 16 FPS, the intersection will be closed with the Highway 16 Bypass
- Highway 16/Highway 40 South: Scenario 3 signal required; Scenario 4 no signal required; Scenario 5 interchange (per Alberta Transportation's Highway 16 Bypass Design in the Highway 16 FPS)
- Highway 16 (between Keil Drive and West Access B): Scenario 3 operates near capacity; Scenarios 4 and 5 operate under capacity
- Highway 16/Mountain Street: Scenario 3 operates near capacity; Scenarios 4 and 5 operate under capacity
- Highway 16 Bypass East Connection: No intersection in Scenarios 3 and 4; in Scenario 5, the east bypass connection will be an interchange per the Highway 16 FPS

5.7 Switzer Drive

From the network capacity (Section 4.0) and detailed intersection analysis (Section 5.0), Switzer Drive was found to operate well under the existing lane configurations – four lanes from Highway 16 to Kelley Road, and two lanes east of Kelley Road. From discussions with Hinton, drivers may get frustrated on the current two-lane section of Switzer Drive when they are slowed by large trucks. The daily traffic volumes are shown in Table 5.3 and are all under the threshold of twinning, which is typically at 10,000 to 12,000 vehicles per day. In the three Full Build-Out scenarios, the section between Kelley Road and Hardisty Avenue is near the twinning threshold and should be considered for twinning.

Table 5.3: Switzer Drive Daily Traffic Volumes

Scenario	Switzer Drive at		
	Kelley Road	Hardisty Avenue	Drinnan Way
Existing	7,500	6,000	3,000
1 and 2	8,000	6,500	3,500
3, 4, and 5	9,500	7,500	5,000

Based on the forecasting, upgrades to Switzer Drive may not be warranted due to traffic volumes alone. Detailed analysis and a passing assessment for large trucks may be warranted for each section to drive upgrades in a nearer-term timeframe.

5.8 Timeline of Improvements

As no issues were identified in the existing roadway network, the improvements as identified in the preceding sections are mainly development driven by the build-out of the ASP areas. The timeline of the improvements will directly correlate with the progress of development based on size and type of development, staging of development, and location of development.

When new developments are planned, it is recommended that a TIA be undertaken to determine the timeline of specific improvements associated with the specific proposed development. Off-site levy collection for roadway improvements will ensure that all developments contribute fairly to these future upgrades, even if a specific early development is not itself the trigger for a specific improvement.

Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
+800 Population with South ASP Access off Highway 40	+800 Population with South ASP Access off Robb Road	Full Build-Out with South ASP Access off Highway 40	Full Build-Out with South ASP Access off Robb Road	Full Build-Out with Highway 16 Bypass

5.9 Cost Estimate

5.9.1 Recommended Upgrades Costing

A high level cost estimate was prepared to provide Hinton with information on future transportation infrastructure costs. The cost estimate can be a tool that Hinton can update and incorporate with other infrastructure budgeting tools to assist in planning budgets for future transportation studies, designs, and capital construction projects. Future transportation studies and designs would provide more detailed estimates required to continually review and update the off-site levy bylaw.

From the detailed intersection analyses, the improvements can be broken down as follows:

- Add traffic signal on existing Highway 16 intersection
  - Drinnan Way in +800 Population, 12 to 13 more locations in Full Build-Out scenarios
- Add advanced warning flashers
  - Drinnan Way in +800 Population
- Re-time signals
  - Four signals in Full Build-Out scenarios
- Add left turn bay (assuming 120m storage and taper) in median of existing Highway 16 intersection
  - Many locations in Full Build-Out scenarios
- Add right turn bay (assuming 120m storage and taper) on the side of existing Highway 16 intersection
  - Many locations in Full Build-Out scenarios
- Repaint lines on cross-streets of existing Highway 16 intersections to add turn bays
  - McArdell Drive/Brookhart Street in Full Build-Out scenarios
- Reconstruction intersection approach of cross-street of existing Highway 16 intersections to add turn bay
  - Drinnan Way in Full Build-Out scenarios
- New connections to Highway 16
  - West Access A (north and south leg), West Access B (north and south leg), Woodley Drive (south leg), East Access C (south leg), Fleming Drive (south leg), East Access B (north and south leg), East Access A (north and south leg) in Full Build-Out scenarios
- New collector road (based on Hinton's 24 m 2-lane Collector standard) in ASP areas
  - 10 km in Full Build-Out scenarios
- Switzer Drive twinning between Kelley Road and Hardisty Avenue
  - 2 km in Full Build-Out scenarios
- Street lighting on Highway 16 (between Switzer Drive and east Hinton boundary, between Highway 40 and Kiel Drive)
  - 8 km in Full Build-Out scenarios

Using the above categories, the cost estimates for Scenarios 1 to 5 are shown in Appendix D and a summary of the recommended upgrades can be found below.

The following are not included in the cost estimate:

- The cost of the internal local roads within the ASP areas were not included as it was assumed it would be the responsibility of the developer as part of the basic subdivision development agreement
- The future South ASP access connection to either Highway 40 or Robb Road
- Highway 16 Bypass and interchanges, which are assumed to be fully funded by Alberta Transportation

Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
+800 Population with South ASP Access off Highway 40	+800 Population with South ASP Access off Robb Road	Full Build-Out with South ASP Access off Highway 40	Full Build-Out with South ASP Access off Robb Road	Full Build-Out with Highway 16 Bypass

Table 5.4: Cost Estimates

Upgrade	Lump Sum	per km
New Green Field Arterial		$14,380,000
New Green Field Collector		$10,800,000
Twinning Switzer Drive Kelly Road to Hardisty Avenue *		$16,270,000
Street Lighting		$600,000
New Advanced Warning Flasher	$80,000	
New Signal Light (AT Standard with Lighting)	$750,000	
New Signal Light (Typical)	$530,000	
Added Lane on HWY 16		$6,000,000
Intersection Upgrade All Turns Access	$750,000	
Intersection Improvement Turn Bay Entering HWY 16 (L/R)	$450,000	
Intersection Improvement Turn Bay Exiting HWY 16 (L/R)	$600,000	

Costs shown herein are comparable to recent construction projects completed in Hinton
Costs shown herein are transportation network costs only (STM Catch basins and conveyance have been included within the road XS only)
Costs are representative of 2018 and recent tender close unit prices
* Estimate based off preliminary design Estimate from 2013 with updated costing as per above

5.9.2 0-25 Year Capital Plan

A Capital Plan Cost Estimate with a 25-year horizon has been developed from the recommendations made by all four Master Plans (ISL 2018) and has been included within Appendix D. The following should be considered when reviewing this information:

- A 2.0% inflation increase per year has been added to the base costs;
- The annual capital budget allowances for each asset has been provided, this allowance is meant to hold funding each year for maintenance and "one off" instances where repairs are required;
- The year in which the upgrade is suggested is based on a best guess from ISL and current Administration on when development could occur based on a full build out scenario for Thompson Lake (Plainsman Lands) and Qualico/Terrace Heights Lands;
- Unit costs used for the development of cost estimates were taken from recent tender close bids from Hinton projects; and
- High level cost estimates provided are a Class 4 with an accuracy of +75% to -40%.
- The residential area around Hardisty Avenue is an established area of Hinton with a dated water supply system and although it currently operates according to standard, this system can be upgraded over time. The triggers for these upgrades could be the result of increased fire flow requirements (pressure) triggered by growth or through regular maintenance and inspection by Hinton. Whatever the trigger, full road rehab (Roadworks, Stormwater, Wastewater and Water) costs as well as roadway surface improvements have been included in the appendix.

Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
+800 Population with South ASP Access off Highway 40	+800 Population with South ASP Access off Robb Road	Full Build-Out with South ASP Access off Highway 40	Full Build-Out with South ASP Access off Robb Road	Full Build-Out with Highway 16 Bypass

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Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
+800 Population with South ASP Access off Highway 40	+800 Population with South ASP Access off Robb Road	Full Build-Out with South ASP Access off Highway 40	Full Build-Out with South ASP Access off Robb Road	Full Build-Out with Highway 16 Bypass



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ISL Engineering and Land Services

TOWN OF HINTON
Gateway to the Rockies

Legend:

+800 POPULATION GROWTH AREA

+800 POPULATION GROWTH AREA NEW ROADS

TOWN OF HINTON TRANSPORTATION MASTER PLAN

SCENARIO 1 TO 2 INTERSECTION IMPROVEMENTS

EXHIBIT 5.1

- SIGNAL TIMING UPDATE

- SIGNAL

- MONITOR FOR UPGRADE (SUCH AS ADDITIONAL EB THRU LANE
- SIGNAL TIMING UPDATE

- SIGNAL TIMING UPDATE

- MONITOR OPERATIONS FOR POSSIBLE INTERSECTION IMPROVEMENT
- SIGNAL

- SIGNAL TIMING UPDATE

- SIGNAL
- WBL, EBR, SBL AND NBL TURN BAY
- MONITOR FOR UPGRADE

- SIGNAL
- WBL, WBR, EBL, EBR, NBL, NBR AND SBL TURN BAY
- MONITOR FOR UPGRADE

- SIGNAL
- WBL, WBR, EBL, NBL, SBL AND SBR TURN BAY
- NBR LANE

- SIGNAL
- MONITOR FOR REQUIREMENT OF SIGNALIZATION
- 60 KM/HR ZONE ON HIGHWAY 16 AT APPROACH TO INTERSECTION

- FOUR-WAY STOP
- 4 LANES AT APPROACH TO HIGHWAY 16

- FOUR-WAY STOP
- SBL TURN BAY

- THREE-WAY STOP
- SBL AND NBR TURN BAY

- TWO-WAY STOP
- SBL, WBR TURN BAY

- FOUR-WAY STOP
- SB TURN BAY

- NEW SIGNALIZED INTERSECTION
- WBL, WBR, EBL, EBR, NBL AND SBR TURN BAY

- NEW SIGNALIZED INTERSECTION
- WBL, WBR, EBL, EBR AND SBR TURN BAY

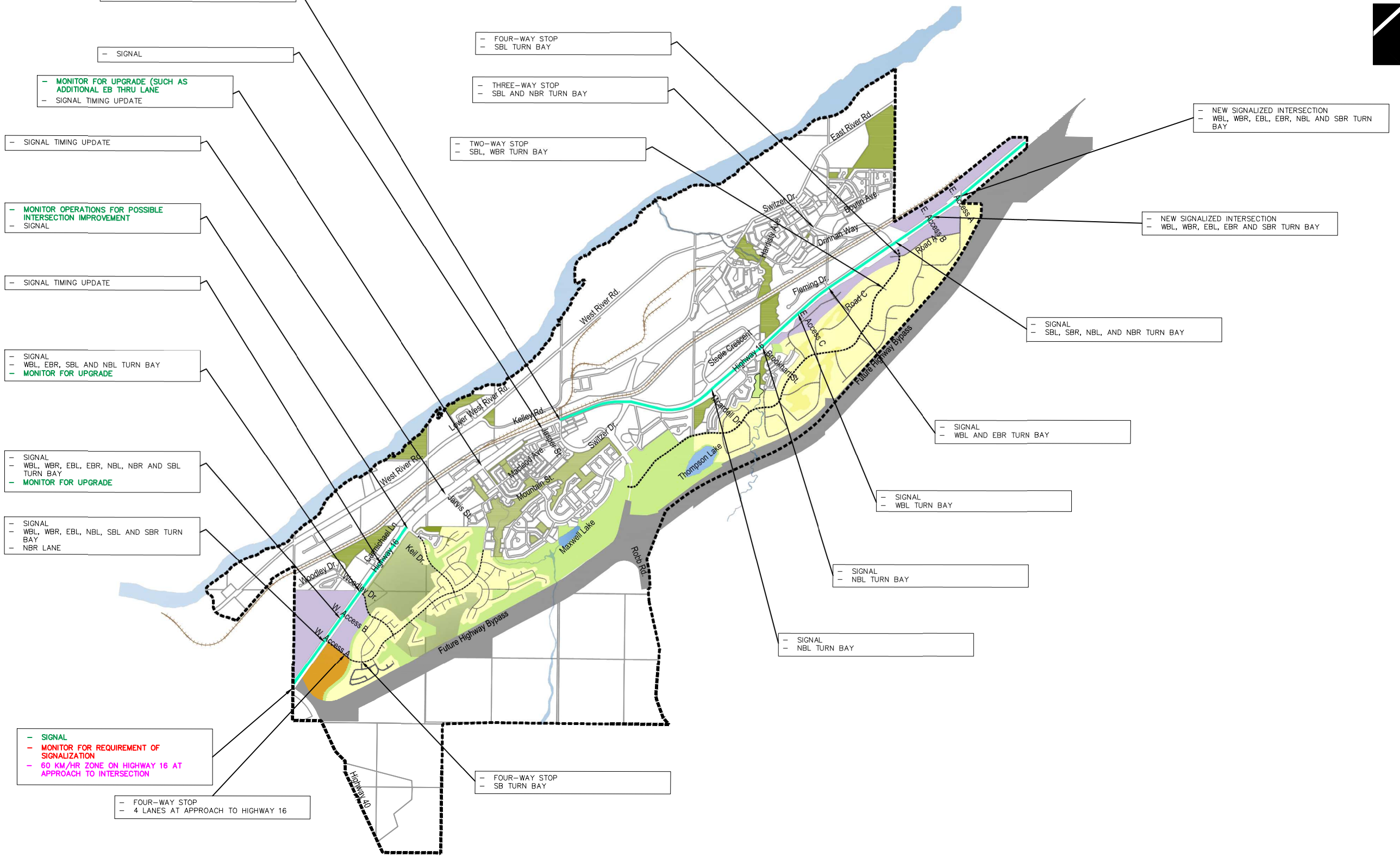
- SIGNAL
- SBL, SBR, NBL, AND NBR TURN BAY

- SIGNAL
- WBL AND EBR TURN BAY

- SIGNAL
- WBL TURN BAY

- SIGNAL
- NBL TURN BAY

- SIGNAL
- NBL TURN BAY



Legend:

Scenario 3 PROPOSED IMPROVEMENT

Scenario 4 PROPOSED IMPROVEMENT

Scenario 5 PROPOSED IMPROVEMENT

Scenario 3 & 4 & 5 PROPOSED IMPROVEMENT

PROPOSED 60 KM/H ZONE

ISL Engineering and Land Services

TOWN OF HINTON Gateway to the Rockies

TOWN OF HINTON TRANSPORTATION MASTER PLAN

SCENARIO 3 TO 5 INTERSECTION IMPROVEMENTS

EXHIBIT 5.2

Diana Ranca / Oct. 18, 17 / M:\2650\026571_Town Of Hinton_TMP\02_CAD\020_Drafting\201_TMP_EXHIBITS\26571_Road_improv_scen3to5.dwg

6.0 Additional Analysis/Review

The following section evaluates specific issues identified by Hinton.

6.1 Drinnan Way Railway Crossing

Hinton is planning for the development of commercial, residential and industrial lands within the Drinnan Way area north of Highway 16. The area is known as the Drinnan Way Lands. The study area is shown in Figure 6.1.

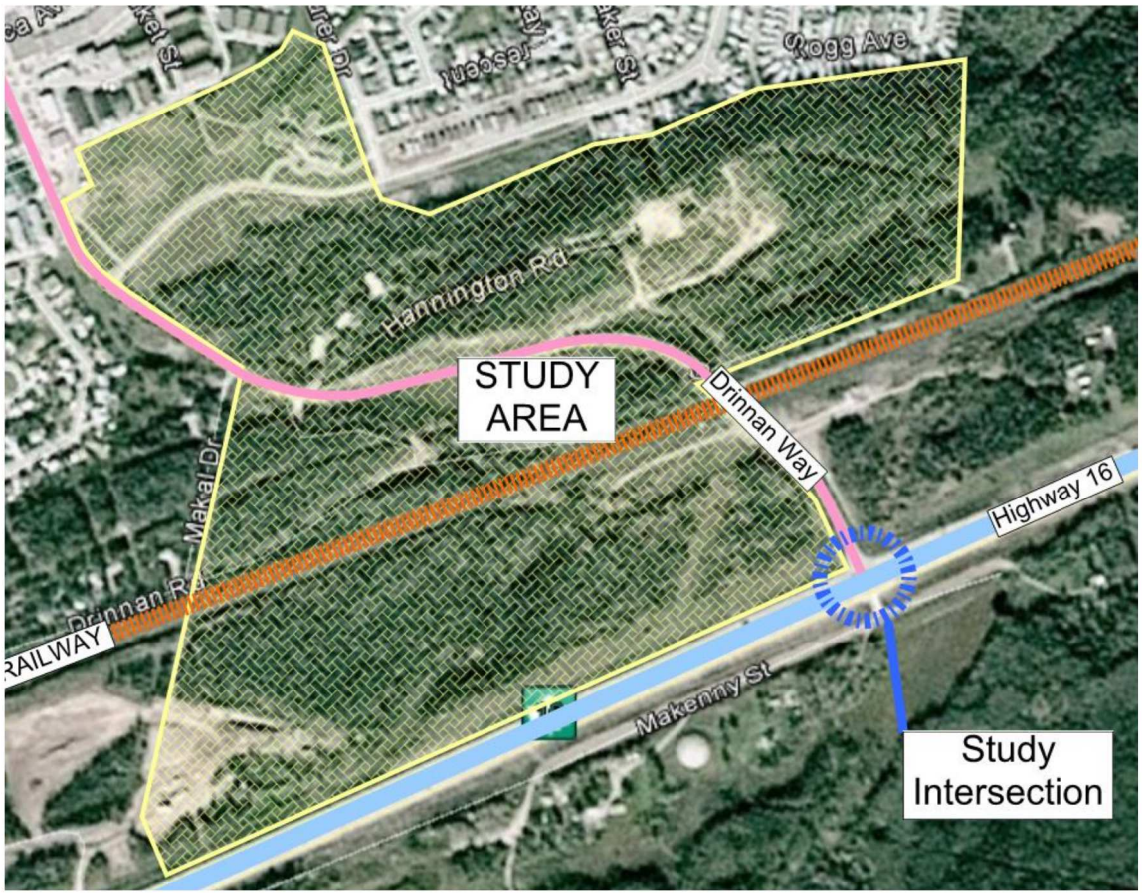


Figure 6.1: Study Area, Drinnan Way Lands

There are two background reports in the study area: *Drinnan Way Lands Transportation Impact Assessment (ISL, 2013)* and *Drinnan Way Railway Crossing Transportation Impact Assessment Report (GENIVAR Inc., 2013)*. In the Drinnan Way Lands TIA Report, no railway crossing was analyzed and in the Drinnan Way Railway Crossing TIA Report, the traffic was based on the previous Hinton TMP. An updated review was completed to determine the impact to the road network with the most updated TMP traffic, Drinnan Way railway crossing, and Drinnan Way Lands traffic.

Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
+800 Population with South ASP Access off Highway 40	+800 Population with South ASP Access off Robb Road	Full Build-Out with South ASP Access off Highway 40	Full Build-Out with South ASP Access off Robb Road	Full Build-Out with Highway 16 Bypass

Highway 16 is a four-lane divided highway with a posted speed limit of 100 km/h. Drinnan Way is the main connection to Drinnan Way Lands and is posted at 60 km/h. Currently, the eastbound approach to Drinnan Way on Highway 16 is complete with a left turn bay while the westbound approach has both left and right turning bays. The existing eastbound and westbound approaches are shown in Figure 6.2.



Figure 6.2: Eastbound (L) and Westbound (R) Approach, Highway 16 at Drinnan Way

The train crossing on Drinnan Way is an at-grade crossing with gates, bells and flashers (see Figure 6.3).



Figure 6.3: Drinnan Way Railway Crossing

From Section 5.5, the following upgrades were recommended to the Highway 16/Drinnan Way intersection:

- Add signalization with an advanced warning flasher on Highway 16
- Add northbound and southbound right turn bays
- Revise speed limit to 60 km/h on Highway 16 at approach to Drinnan Way

In this analysis, the above intersection upgrades were assumed on the Highway 16/Drinnan Way intersection.

6.1.1 Vehicle Traffic

PM peak hour turning movements at the Highway 16/Drinnan Way intersection were obtained from the updated TMP model (Scenario 1). The site-generated traffic from the Drinnan Way Lands was then added to the model traffic to obtain final design volumes for the intersection. As the TMP only evaluated the PM peak hour, this analysis is also focused on the PM peak hour only.

Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
+800 Population with South ASP Access off Highway 40	+800 Population with South ASP Access off Robb Road	Full Build-Out with South ASP Access off Highway 40	Full Build-Out with South ASP Access off Robb Road	Full Build-Out with Highway 16 Bypass

6.1.2 Train Traffic

From the Drinnan Way Railway Crossing TIA, two types of trains, regular freight trains and Coalspur trains, are anticipated to go through the crossing. The data of the two train types are summarized below:

- Number of regular freight trains per day: 30 to 40, subject to change depending on customer needs and requirements
- Coalspur train frequency:
  - 5.0 Mtpa: 0.738 trains per day
  - 11.2 Mtpa: 1.772 trains per day
- Regular freight train running speed:
  - Maximum: 60 mph (96 km/h) west and eastbound
  - Average: 60 mph (96 km/h) west and eastbound
- Coalspur train running speed:
  - Eastbound (empty): 60 mph (96 km/h)
  - Westbound (loaded): 40 mph (64 km/h)
- Length of trains:
  - Regular freight train maximum: 12,200 feet (3,719 m)
  - Regular freight train average: 8,500 feet to 9,500 feet (2,591 m to 2,896 m)
  - Coalspur train: 3,048 m (175 cars plus power unit)
- Time duration used for train passing the railway crossing:
  - Existing: 140 seconds
  - Coalspur: 115 seconds (eastbound) and 172 seconds (westbound)
- Amount of warning time:
  - 30 seconds before train arrives
  - 10 seconds after train completely clears the crossing
- Total time Drinnan Way vehicular traffic is held:
  - Regular: 180 seconds
  - Coalspur: 155 seconds (eastbound) and 212 seconds (westbound)
- A conservative assumption of five trains per hour (one train every 12 minutes)

Based on the above railway traffic information, the analyses assumed a maximum of five trains will pass through the Drinnan Way railway crossing during the peak PM period with crossing dwell times of 180 seconds for regular freight trains and 212 seconds for Coalspur trains. The preceding assumptions are conservative as it assumes 25-30% of the peak PM traffic hour on Drinnan Way is occupied by a train crossing.

6.1.3 Simulation Results

Synchro and SimTraffic models were created for the Highway 16/Drinnan Way intersection, Drinnan Way Lands site access intersection, and Drinnan Way railway crossing for the following:

- Condition 1 – 5 regular freight trains with design traffic
- Condition 2 – 5 Coalspur trains with design traffic

Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
+800 Population with South ASP Access off Highway 40	+800 Population with South ASP Access off Robb Road	Full Build-Out with South ASP Access off Highway 40	Full Build-Out with South ASP Access off Robb Road	Full Build-Out with Highway 16 Bypass

Typical parameters, as used by Alberta Transportation to determine the length of the turn bay length, are used in the analysis; the parameters are summarized in Table 6.1.

Table 6.1. Criteria for Determination of Turn Bay Length

Design Speed	Deceleration Requirement	Storage Requirement (turn bay length) Single-Lane Turn Lane
70 km/h	110 m	SimTraffic maximum queue in turn bay + 60 m

SimTraffic queue is based on the average of five 60-minute simulation runs. The simulation results for the two train types are summarized in Table 6.2.

Table 6.2: Scenarios 1 and 2 Simulation Results

Intersection/Movement			Simulation Results – PM Peak Hour			
			Regular Freight Trains		Coalspur Trains	
			Queue Length 95th (m)	Max Queue Length (m)	Queue Length 95th (m)	Max Queue Length (m)
Drinnan Way/ Railway Crossing	NB	TH	*128.2	*109.0	*138.9	*110.4
	SB	TH	158.9	146.4	166.1	142.8
Drinnan Way/ Site Access	EB	L/R	54.3	67.6	80.6	94.9
	NB	L/TH	*124.7	*114.9	*130.5	*115.7
	SB	TH/R	40.9	83.5	49.3	85.8
Highway 16/ Drinnan Way	EB	L	138.8	152.5	**203.7	**218.7
	WB	R	44.2	58.8	64.0	82.0

*Queue length has reached the maximum length of the simulation road link. The actual queue may be longer.
**Queue length spilled over the existing storage bay.

From Table 6.2, the northbound queue at the railway crossing spilled over to the Highway 16/Drinnan Way intersection in both rail crossing conditions.

With regular freight trains, the storage requirement is 213 m (153 m + 60 m = 213 m) and the existing storage length is 240 m (140 m storage + 100 m taper = 240 m, on both EBL and WBR). Based on the preceding, there is sufficient turn bay storage length provided for both the eastbound left turn and westbound right turn movements at the Highway 16/Drinnan Way intersection.

With the Coalspur trains, the storage requirement is 278 m (219 m + 60 m = 278 m), which exceeds the existing storage length (140 m + 100 m = 240 m) provided and further improvement is required in Condition 2.

Additional analyses were undertaken with the Coalspur trains and it was concluded that the following upgrades are required:

- Drinnan Way
  - Four-lane roadway (two northbound lanes, two southbound lanes) between Highway 16 and the Drinnan Way Lands Site Access
- Drinnan Way/Drinnan Way Lands Site Access
  - Inside northbound lane on Drinnan Way becomes left turning lane
  - Add eastbound right turn bay

Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
+800 Population with South ASP Access off Highway 40	+800 Population with South ASP Access off Robb Road	Full Build-Out with South ASP Access off Highway 40	Full Build-Out with South ASP Access off Robb Road	Full Build-Out with Highway 16 Bypass

- Highway 16/Drinnan Way
  - Outside southbound lane on Drinnan Way becomes the south turning lane

With the above upgrades, simulations were completed and the results are shown in Table 6.3.

Table 6.3: Scenario 2 with Improvements Simulation Results

Intersection/Movement			Simulation Results – PM Peak Hour	
			Coalspur Trains	
			Queue Length 95th (m)	Max Queue Length (m)
Drinnan Way/Railway Crossing	NB	TH	*139.1	*108.7
	SB	TH	166.4	146.5
Drinnan Way/Site Access	EB	L	37.4	46.6
		R	19.7	26.1
	NB	L	39.9	65.4
		TH	*123.7	*111.8
	SB	TH/R	38.6	60.3
Highway 16/Drinnan Way	EB	L	134.6	157.4
	WB	R	56.2	74.9

*Queue length has reached the maximum length of the simulation road link. The actual queue may be longer.

From Table 6.3, the northbound queue at the Drinnan Way railway crossing remains spilled over to the Highway 16/Drinnan Way intersection with the improvements. The maximum eastbound left turn queue at Highway 16/Drinnan Way intersection is 157 m and the storage requirement is 218 m (158 m + 60 m = 218 m). With an existing storage of 240 m (140 m + 100 m = 240 m), there is sufficient turn bay storage length provided for both the eastbound left turn and westbound right turn movements at Highway 16/ Drinnan Way.

6.1.4 Recommendations

To accommodate the Drinnan Way Lands, near-term growth and the regular freight and Coalspur trains, the following upgrades are recommended:

- Highway 16/Drinnan Way intersection
  - Add signalization with an advanced warning flasher on Highway 16
  - Add northbound right turn bay
  - Add southbound right turn lane between Highway 16 and the Drinnan Way Lands site access
  - Revised 60 km/h speed limit on Highway 16 at the approach to Drinnan Way
- Drinnan Way Lands Site Access
  - Add northbound left turn lane between Highway 16 and the Drinnan Way Lands site access
  - Add eastbound right turn bay

The recommended lane configurations and traffic controls are shown in Figure 6.4, which effectively create a four-lane road section on Drinnan Way between Highway 16 and the Drinnan Way Lands access.



Figure 6.4: Drinnan Way Recommended Lane Configurations

6.2 Sawyer Drive Analysis

An additional VISUM model run was performed to identify the potential benefit to the road network by constructing the potential Sawyer Drive connection from McArdell Drive to Robb Road (see Figure 6.5). The analysis was performed in Scenarios 1 and 2.



Figure 6.5: Possible Sawyer Drive Connection

Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
+800 Population with South ASP Access off Highway 40	+800 Population with South ASP Access off Robb Road	Full Build-Out with South ASP Access off Highway 40	Full Build-Out with South ASP Access off Robb Road	Full Build-Out with Highway 16 Bypass

From the VISUM model run of Scenario 1, 20 vehicles are expected to travel eastbound on Sawyer Drive while 109 vehicles are expected to travel westbound in the PM peak. In Scenario 2, 31 vehicles are expected to travel eastbound on Sawyer Drive while 114 vehicles are expected to travel westbound in the PM peak. This equates to about 1,500 vehicles per day, which is at the low end for a residential collector.

In general, the analysis confirms that Sawyer Drive is not strictly warranted by traffic demand. It could, however, provide other benefits such as reduced travel times and modestly reduced traffic on Highway 16, if implemented.

6.3 Highway 16 at Carmichael Lane/Mountain Street

Currently at the intersection of Highway 16 at Carmichael Lane/Mountain Street, large trucks turning from Carmichael Lane are required to occupy both lanes of Mountain Street between Carmichael Lane and Highway 16 to perform the turn and while in que at the signal large trucks can block the ability for travelers on Carmichael Lane to continue straight through the Mountain Street intersection. This is caused by the insufficient spacing on Mountain Street between Carmichael Lane and Highway 16. Truck turn modelling was completed at the intersection by ISL and it was concluded that only WB-12 trucks could be accommodated (see Figure 6.6). Three options are evaluated below to improve the intersection:

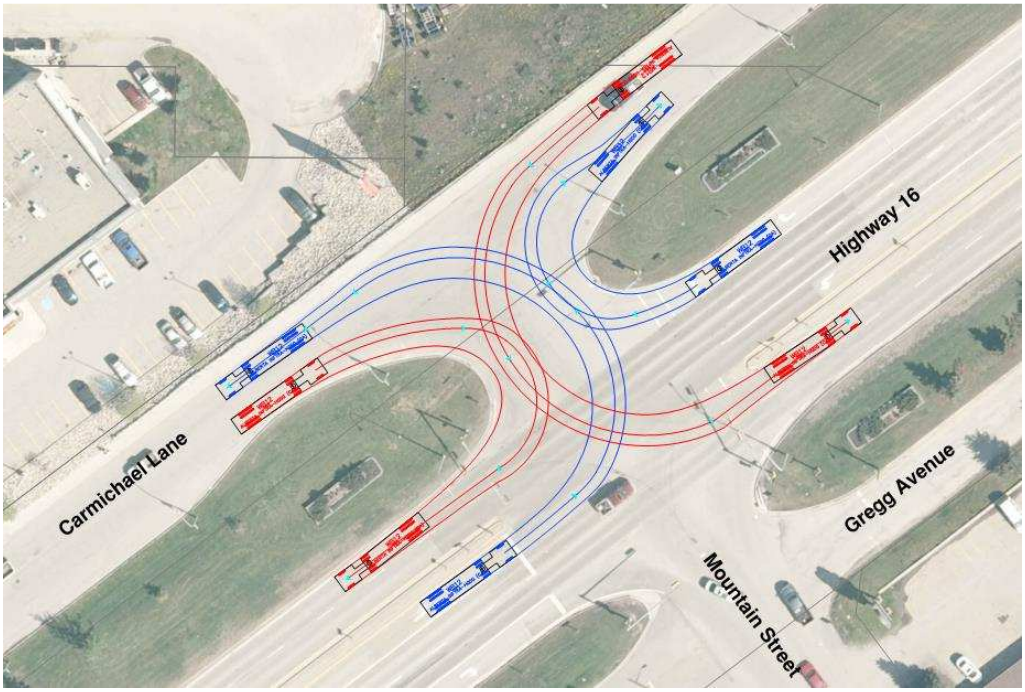


Figure 6.6: WB-12 on Highway 16 at Carmichael Lane/Mountain Street

Option 1 – Limit Intersection to WB-12 or Smaller Vehicle:

As per Figure D-9.1f in Alberta Transportation's Highway Geometric Design Guide, the rural frontage road spacing is 46 m to accommodate the next larger truck size, a WB-15 truck. The frontage road centre line spacing from Carmichael Lane to Highway 16 on Mountain Street is ±36 m (see Figure 6.7).

Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
+800 Population with South ASP Access off Highway 40	+800 Population with South ASP Access off Robb Road	Full Build-Out with South ASP Access off Highway 40	Full Build-Out with South ASP Access off Robb Road	Full Build-Out with Highway 16 Bypass



Figure 6.7: Highway 16 at Carmichael Lane/Mountain Street

Based on the current centre line spacing, Mountain Street cannot accommodate the WB-15 or larger trucks. Due to the existing development north of Carmichael Lane, widening the median to the north to increase the spacing cannot be completed without impacting established businesses. If a restriction of WB-15 or larger trucks is imposed, alternate routes would be required; potential alternative routes to/from Highway 16 are:

- Entering from westbound Highway 16 via the Petro-Canada access (to enter directly into Petro-Canada only) or L&W Restaurant access and exit to Highway 16 at Jarvis Street
- Entering from eastbound Highway 16 via Jarvis Street is achievable however, as there is no suitable signalized exit further east of Jarvis Street to allow for a large vehicle to exit back onto eastbound Highway 16

If this option was considered, further improvements to accommodate WB-15 or larger trucks will be required at either the Highway 16 access adjacent to Petro-Canada or L&W Restaurant (signalization, geometric improvements, etc.). Alternately, WB-15 or larger trucks could be restricted from travelling eastbound on Carmichael Lane east of Jarvis Street.

Option 2 – Widening into Median:

This option reviews the widening of the section of Mountain Street between Highway 16 and Carmichael Lane into the median (highlighted in yellow in Figure 6.8). Truck turning movements were checked and it is concluded that widening the existing pavement into the west median could accommodate a WB-19 vehicle, however, with the current traffic signal setup and timing this size of truck would block access and obstruct the view of the intersection to other road users. Larger trucks (i.e. WB-21) are recommended to be restricted from the intersection as it would require both lanes to manoeuvre any turns. This option on its own is not recommended.

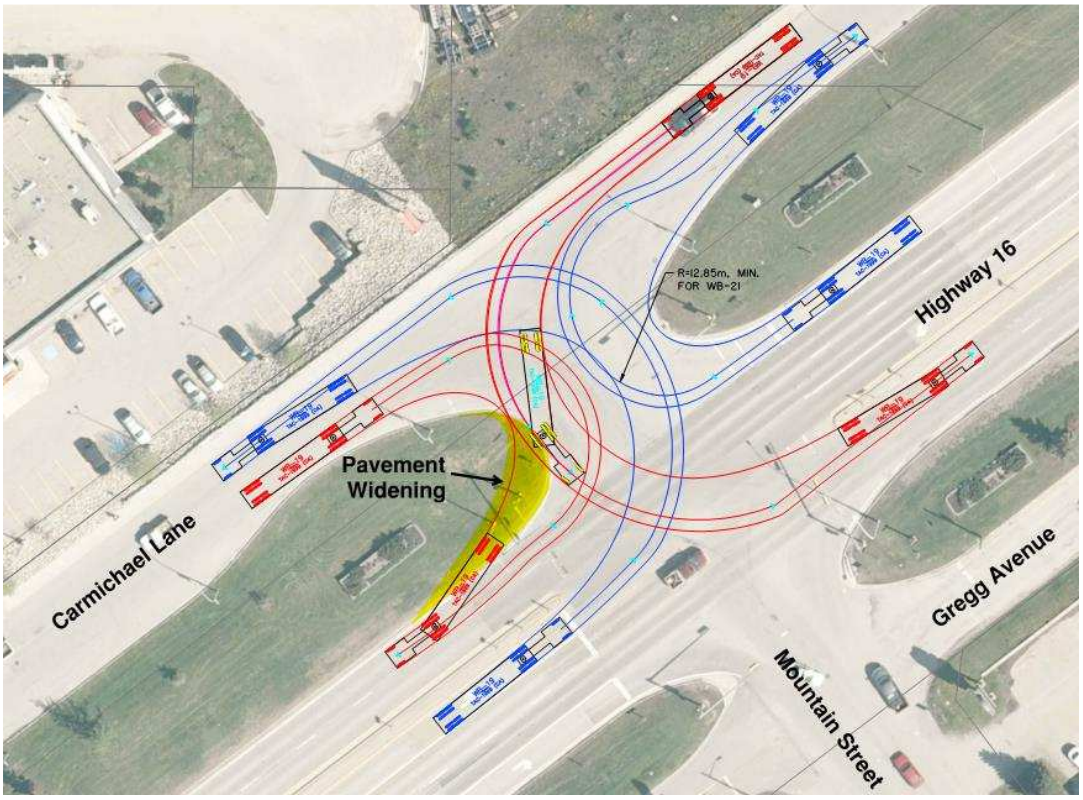


Figure 6.8: WB-19 Turns at Highway 16/Carmichael Lane/Mountain Street

Option 3 – Add Signal Phasing:

Currently, the existing signal at Highway 16/Mountain Street is operated in two phases: Phase 1 Highway 16 eastbound/westbound all movements; and Phase 2 Mountain Street northbound/southbound all movements (see Figure 6.9). The stop bar on southbound Mountain Street is right at Highway 16; the existing signal timing plan allows vehicles on Mountain Street (between Highway 16 and Carmichael Lane) to travel simultaneously in both directions.

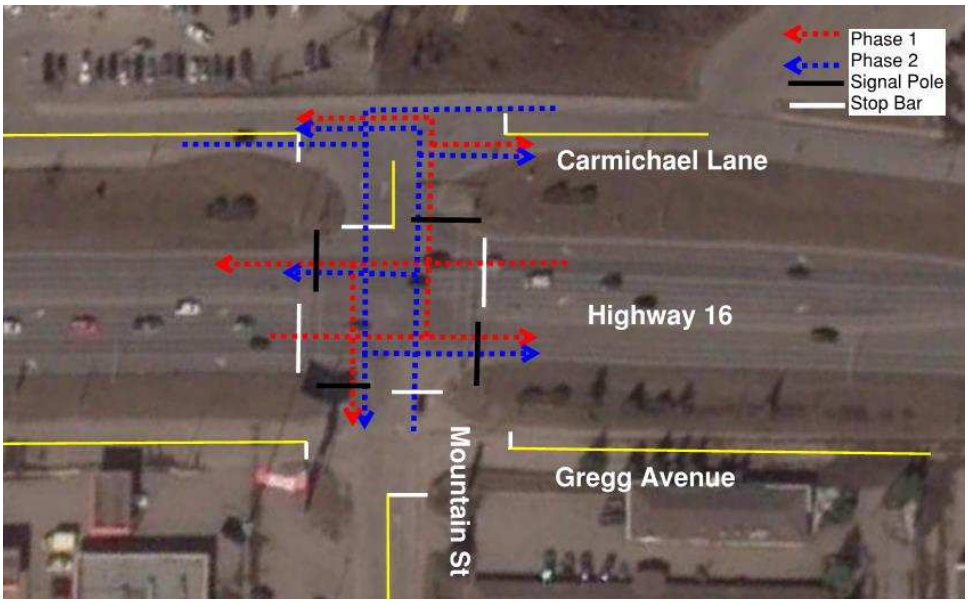


Figure 6.9: Existing Signal Timing Plan at Highway 16/Carmichael Lane/Mountain Street

In Option 3, two additional phases are added to the existing signal timing plan: Phase 1 Highway 16 phase unchanged, Phase 2 Mountain Street northbound all turns, Phase 3 eastbound Carmichael Lane all turns, Phase 4 westbound Carmichael Lane all turns (see Figure 6.10).

Along with the additional phasing, the following are also required: no right turn on red and the relocation of the stop bar and signal poles to Carmichael Lane. With the preceding, vehicles are permitted to use the entire road width of Mountain Street between Highway 16 and Carmichael Lane as there is no opposing traffic. A drawback to the option is traffic operations of the intersection would operate at a lower level of service as compared to the existing condition. Additional signal timings and longer cycle lengths will be required to accommodate the extra phasing as well as the no right turn on red condition. If the option is carried forward, a detailed traffic signal and lane marking design is required to be prepared and may also combine the intersection widening presented in Option 2.

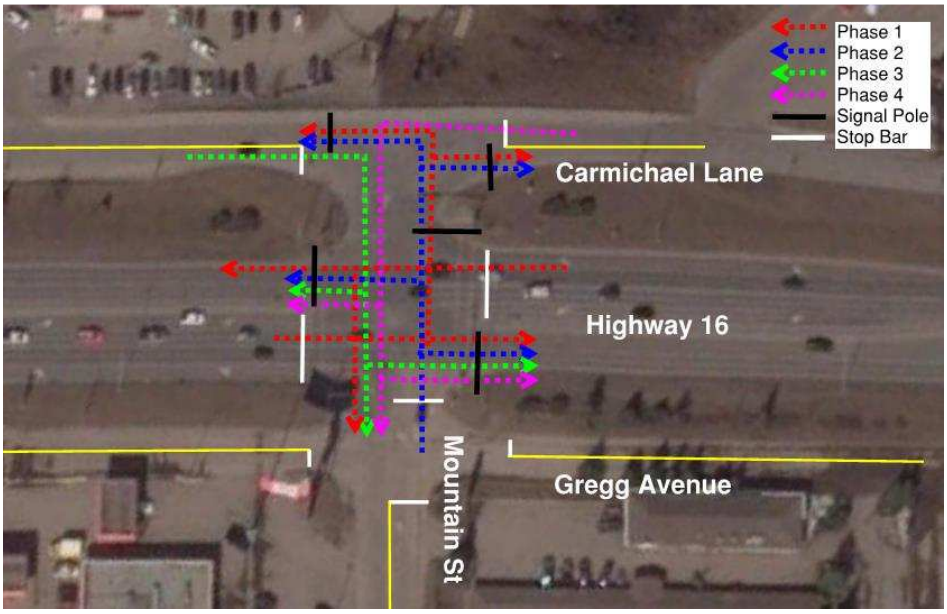


Figure 6.10: Proposed Signal Timing Plan at Highway 16/Carmichael Lane/Mountain Street

6.4 West River Road Second Access

Currently there is only one access (via Kelley Road/West River Road intersection) to the developments along West River Road. In the event of an emergency where Kelley Road/West River Road is inaccessible, a second access to the developments along West River Road is needed. Two alternative access options were considered in Figure 6.11:

- Option 1: Reconnect the West River Road by rebuilding the bridge over the Maskuta Creek
- Option 2: Extend Range Road 254 north to connect to the West River Road; an overpass or underpass at the CPR crossing is needed for this option



Figure 6.11: Recommended Access Options

Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
+800 Population with South ASP Access off Highway 40	+800 Population with South ASP Access off Robb Road	Full Build-Out with South ASP Access off Highway 40	Full Build-Out with South ASP Access off Robb Road	Full Build-Out with Highway 16 Bypass

Based on discussions with Hinton and the Hinton Fire Department, Option 1 is the preferred option due to the following:

- A more economical solution
- No at-grade train crossing along access route
- Drafting points becomes more accessible for Fire along West River Road

6.5 Service Road between Woodley Drive and Carmichael Lane

On the north side of Highway 16, there is no service road connection between Carmichael Lane and Woodley Drive. Currently, drivers wanting to travel between Carmichael Lane and Woodley Drive travel either on Highway 16 or through the Parks West Mall parking lot.

In Alberta Transportation's Highway 16 FPS, Prairie Creek Avenue is a proposed service road north of Highway 16 (see Figure 6.12) and is aligned south of the Trestle Place residential development and north of the Ramada Hotel. Prairie Creek Avenue will be connected between the future Highway 40 alignment (north leg) and Woodley Drive; the plan does not show a connection between Carmichael Lane and Woodley Drive.

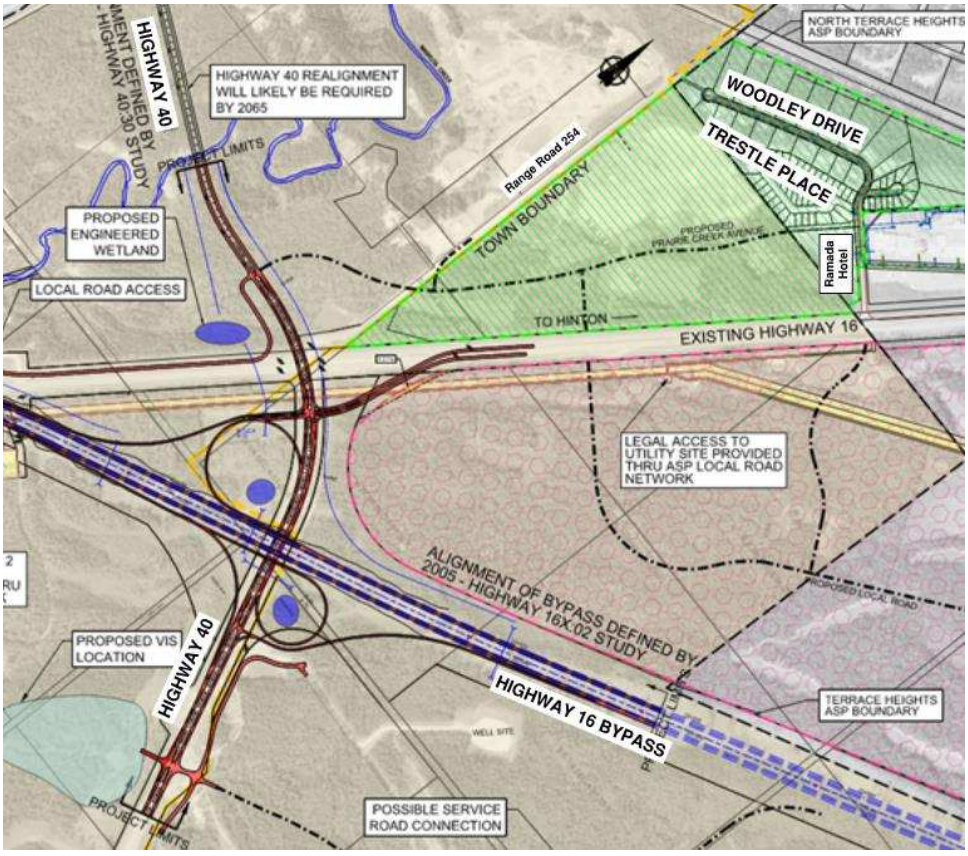


Figure 6.12: Alberta Transportation Access Management Plan with Highway 16 Bypass

Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
+800 Population with South ASP Access off Highway 40	+800 Population with South ASP Access off Robb Road	Full Build-Out with South ASP Access off Highway 40	Full Build-Out with South ASP Access off Robb Road	Full Build-Out with Highway 16 Bypass

Based on the preceding, a public road connection between Carmichael Lane and Woodley Drive could be implemented by extending Carmichael Lane west, and connecting to Woodley Drive (see Figure 6.13). This connection would likely be triggered by growth of developments in the area and would require land acquisition for the new road ROW. Spacing between the proposed service road and Highway 16 should be designed to Alberta Transportation's *Highway Geometric Design Guide*. However, if lands are not available, no service road (north of Highway 16) connection between Carmichael Lane and Woodley Drive is possible. The only route is via Highway 16; if this is the case, it is recommended to implement traffic calming (speed humps, movement restrictions, etc.) to prevent drivers from using Parks West Mall parking lot as a shortcut route.



Figure 6.13: Existing Road Network Adjacent to Parks West Mall

6.6 Intersection at Gregg Avenue and Jasper Avenue

Currently:

- Gregg Avenue is two-way roadway with no on-street parking permitted on the north side of the road
- The south side of Gregg Avenue has limited room for parking due to business access
- All businesses on Gregg Avenue have their own parking lots
- Trucks are not permitted on Gregg Avenue east of the Jasper Avenue (Visitor Information Centre)
- Gregg Avenue (near Jasper Avenue) is narrow at approximately 8.5 m.

At the intersection of Gregg Avenue/Jasper Avenue, a new Tim Hortons restaurant drive through has been constructed in the location of the former Shell gas station. With the new restaurant, additional truck traffic and truck parking demand is anticipated on Gregg Avenue between Jasper Avenue and Carmichael Lane, however with the narrow road and limited on-street parking, truck parking may not be accommodated on Gregg Avenue. Two options are evaluated below.

Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
+800 Population with South ASP Access off Highway 40	+800 Population with South ASP Access off Robb Road	Full Build-Out with South ASP Access off Highway 40	Full Build-Out with South ASP Access off Robb Road	Full Build-Out with Highway 16 Bypass

One-Way Gregg Avenue

By converting the existing two-way road into a one-way road (eastbound traffic only) on Gregg Avenue between Carmichael Lane and Jasper Street, on-street parking would be created on the north side of Gregg Avenue.

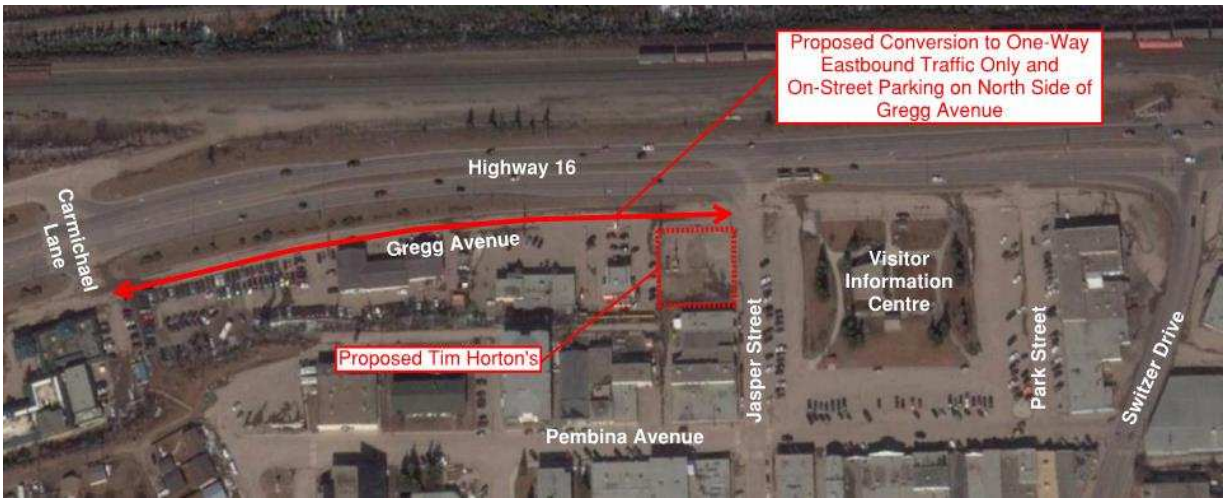


Figure 6.14: One-Way Gregg Avenue

Restriction of Trucks

The restriction of trucks on Gregg Avenue between Carmichael Lane and Jasper Street would eliminate the need for on-street truck parking on Gregg Avenue. The preceding would basically extend the current Gregg Avenue truck restriction between Jasper Street and Park Street. It is noted that this option may not work for the car dealership (Chinook Chevrolet Buick GMC) due to their requirement of trucks on Gregg Avenue for the deliveries of vehicles. However, if this option was to proceed, it is also recommended to provide a truck designated parking area adjacent to the commercial businesses on Gregg Avenue – a possible location is near the Visitor Information Centre. Prior to the implementation of any of the above options, it is recommended to undertake a detailed study to evaluate the following: traffic impacts, geometric review, truck circulation to/from Highway 16, consultation with businesses, and truck parking area.



Figure 6.15: Truck Restriction

Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
+800 Population with South ASP Access off Highway 40	+800 Population with South ASP Access off Robb Road	Full Build-Out with South ASP Access off Highway 40	Full Build-Out with South ASP Access off Robb Road	Full Build-Out with Highway 16 Bypass

6.7 Review of Highway Vicinity Management Agreement

In August 2015, Hinton and Alberta Transportation signed a Highway Vicinity Management Agreement (HVMA). The HVMA will expire on November 30, 2020. In the agreement, typical Alberta Transportation approval is not required for a development application of a new development that is within 800 m of a highway ROW and is in an area where the highway posted speed limit is less than 80 km/h. The agreement allows development applications near the 60 km/h zone at the west end of Hinton to bypass Alberta Transportation's referral.

Hinton and Alberta Transportation have decided to withdraw from the HVMA as the following policies already cover the HVMA:

- In development applications within 800 m of a highway ROW and in an area where the highway posted speed limit is **higher than 80 km/h**, a TIA is required
- In development applications within 800 m of a highway ROW and in an area where the highway posted speed limit is **less than 80 km/h**, a TIA is not required if the development does not generate a significant volume of traffic (i.e., less than 100 vehicles per hour in the peak hour). In some occasions, a TIA will be required even if the development generates 100 or less trips in the peak hour. These may include: development is in an existing congested location, the proposed development does not align with the intended land use (ASP), and design standards are not met (e.g., insufficient sight distance, spacing)
- In the East, West and future South ASP areas, the roadway network policy in the ASP requires a TIA to be undertaken at the Outline Plan/Land Use Amendment stage

6.8 Multi-Service Building

The evaluation of possible locations of a multi-service building is undertaken in this section. A multi-service building may combine emergency services, protective services, and other Hinton departments into one building. To determine the possible land size required for the multi-service building, the following existing facilities throughout Alberta are referenced:

- Country Hills Multi-Services Centre (11955 Country Village Link N.E, Calgary, Alberta)
- Saddle Ridge Multi-Service Centre (800 Saddle Towne Circle NE, Calgary, Alberta)
- Seton Multi-Services Centre (3790 Seton Drive S.E., Calgary, Alberta)
- Southridge Emergency Services (98 Woodhaven Drive, Okotoks, Alberta)
- Fire Station No. 3 (100 Giroux Road, St. Albert, Alberta)
- Vulcan County Emergency Services (165075A Range Rd 244, Vulcan, Alberta)

The primary characteristics and service provided in the multi-service buildings are summarized in Table 6.4.

Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
+800 Population with South ASP Access off Highway 40	+800 Population with South ASP Access off Robb Road	Full Build-Out with South ASP Access off Highway 40	Full Build-Out with South ASP Access off Robb Road	Full Build-Out with Highway 16 Bypass

Table 6.4: Multi-Service Buildings in Alberta

Service Centre	Location	Land Size (acre)	Building Size (sqft)	Police	Fire	EMS	Note
Country Hills Multi-Services Centre	Calgary	5	44,000	Yes	Yes	Yes	Also offices to City Animal Services and By-Law Service
Saddle Ridge Multi-Services Centre	Calgary	3.77	52,000	Yes	Yes	Yes	-
Seton Multi-Services Centre	Calgary	3.0*	24,000	Yes	Yes	Yes	Also offices to City Parks and Animal Services
Southridge Emergency Services	Okotoks	2.0*	36,600	Yes	Yes	No	Also offices to Municipal Enforcement
Fire Station No. 3	St. Albert	2.5*	22,000	No	Yes	Yes	-
Vulcan County Emergency Services	Vulcan	3.5*	25,000*	Yes	Yes	Yes	-

* Estimated by measurement in Google Earth

The potential location for the multi-service building (police, fire, and EMS services) is recommended to be close to the geographic centre of Hinton, similar to the current location of the Hinton RCMP and the Emergency Services Building. A possible location is in the Existing DC-District within East ASP (see Figure 6.16), at the southeast corner of the intersection Mountain Street/Eaton Drive/Robb Road. The land is approximately 30 acres and a potential school site was also identified on the lands in the East ASP. From Table 6.4, the land area required for a multi-service building ranges from 2.0 to 5.0 acre and could be accommodated within the identified land. It is recommended that a detailed study be undertaken when Hinton decides to build a multi-service building to determine the land size requirement, building size, and provided services of the building.

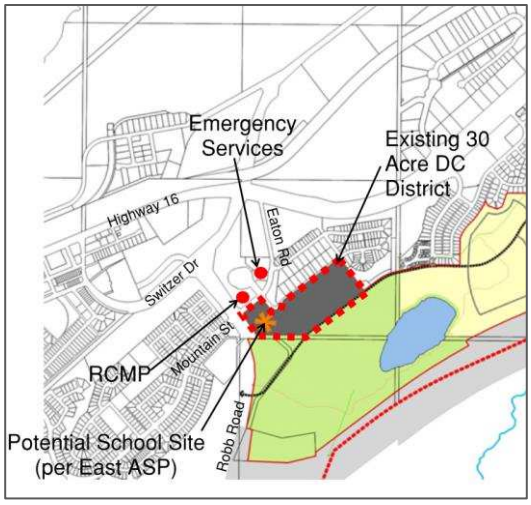


Figure 6.16: Possible Location of Multi-Service Building

Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
+800 Population with South ASP Access off Highway 40	+800 Population with South ASP Access off Robb Road	Full Build-Out with South ASP Access off Highway 40	Full Build-Out with South ASP Access off Robb Road	Full Build-Out with Highway 16 Bypass

7.0 Roadway Cross Sections

7.1 Existing Cross Sections

The TMP included a high-level review of potential cross-section development of key roadways. This included reference to Chapter 5, New Street Design Standards of *2014 City of Calgary Complete Streets Guide* for cross-section standards[1] which are illustrated in Exhibits 7.1 and 7.2, for types ranging from 16 m Residential Street to 36 m arterial. The Calgary guide was selected as a reference as it is unique in Alberta in representing a recent and significant review of world-wide and local best practices, and has similar design conditions as Hinton in terms of vehicle types and utilities. Table 7.1 provides a summary of the existing road classifications in Hinton. The existing road network is also shown in Exhibit 7.3. In Table 7.2, existing Hinton roads are compared to Complete Streets standards.

Table 7.1: Hinton Roadway Classification

Road Class	Capacity (veh/day)	Road ROW	Lanes
Industrial/Commercial Arterial	> 5,000	36 m urban, 42 m rural	4
Industrial/Commercial Collector	1,000 – 5,000	26 m urban, 32 m rural	2
Industrial/Commercial Local	< 1,000	22 m urban, 27 m rural	2
Residential Arterial	> 5,000	48 m	4
Residential Collector	1,000 – 5,000	24 – 35 m	2/4
Residential Local	< 1,000	18 – 20 m	2

Table 7.2: Cross-Section Characteristics

Street	Segment	Existing Road Class (# of Lanes)	Existing ROW	Hinton Standards ROW	Typical Complete Streets ROW
Highway 40	South of Highway 16	Highway (2)	74 – 76 m	–	Min 60 m
Highway 16	West Hinton boundary to Woodley Drive	Highway (4)	61 – 81 m	–	Min 60 m
Highway 16	Woodley Drive to Felaber Road	Highway Arterial (4)	31 – 86 m	–	Min 60 m
Highway 16	Felaber Road to east Hinton boundary	Highway (4)	61 m	–	Min 60 m
Switzer Drive	Highway 16 to Jughandle	Arterial (4)	28 – 30 m	36 – 42 m	36 m
Switzer Drive	Jughandle to Market Street	Arterial (2)	30 m	36 – 42 m	30 m

[1] http://www.calgary.ca/CA/city-clerks/Documents/Council-policy-library/TP021-Complete-Streets-Policy.pdf

Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
+800 Population with South ASP Access off Highway 40	+800 Population with South ASP Access off Robb Road	Full Build-Out with South ASP Access off Highway 40	Full Build-Out with South ASP Access off Robb Road	Full Build-Out with Highway 16 Bypass

Street	Segment	Existing Road Class (# of Lanes)	Existing ROW	Hinton Standards ROW	Typical Complete Streets ROW
East River Road	Market Street to east Hinton boundary	Arterial (2)	30 m	36 – 42 m	30 m
Robb Road	Switzer Drive to Cache Percotte Road	Arterial (2)	40 – 46 m	36 – 42 m	30 m
Drinnan Way	Switzer Drive to Highway 16	Arterial (2)	24 – 30 m	36 – 42 m	30 m
Mountain Street	Highway 16 to Macleod Avenue	Collector (4)	24.5 m (undivided)	30 m (undivided)	29 – 30 m
Mountain Street	Macleod Avenue to Robb Road	Collector (2)	28 m (divided)	35 m (divided)	21 – 25.2 m
Eaton Road	Robb Road to Highway 16	Industrial/ Commercial Collector (2)	20 – 28 m	26 – 32 m	21 – 25.2 m
Macleod Avenue	Mountain Street to Switzer Drive	Residential Collector (4)	24 m	30 m	29 – 30 m
Kelley Road	West River Road to Switzer Drive	Industrial/ Commercial (2)	20 – 30 m	26 – 32 m	21 – 25.2 m
McArdell Drive	All	Residential Collector (2)	24 m	24 m	21 – 25.2 m
Bradwell Street	All	Residential Collector (2)	20 m	24 m	21 – 25.2 m
Hardisty Avenue	All	Residential Collector (4)	24 m	30 m (undivided) 35 m (divided)	29 – 30 m
Boutin Avenue	Drinnan Way to Maurer Drive	Residential Collector (2)	20 – 22 m	24 m	21 – 25.2m

From the above review, it was found that some of the existing streets are at the lower end of the typical size range for streets of their type in Hinton and Complete Streets standards. Generally speaking, the cost and disruption associated with widening roadways for marginal additional width would not be an effective strategy for enhancement of the transportation network. For Collectors in the existing core of Hinton, it is recommended that road sizing generally continue to reflect Collector roadway standards, but that capacity for future growth be improved by reducing direct property access to the degree possible, particularly if opportunities arise to modify or consolidate access points through a development permit process.

Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
+800 Population with South ASP Access off Highway 40	+800 Population with South ASP Access off Robb Road	Full Build-Out with South ASP Access off Highway 40	Full Build-Out with South ASP Access off Robb Road	Full Build-Out with Highway 16 Bypass

The following is a summary of recommendations where improvements could be implemented on existing roads to meet part or all components of the Complete Street standard:

- Switzer Drive (Highway 16 to Robb Road) – has four existing undivided travel lanes and sidewalks on the south and west side of the road; per the Switzer Drive conceptual design, a median is planned to be added; has potential for sidewalks to be added/maintained on both sides of the road (when ROW permits and/or where there are no constraints)
- Switzer Drive (Robb Road to Kelley Road) – has four existing divided travel lanes and a sidewalk on the south side; there are no improvements per the Switzer Drive conceptual design; has potential for sidewalks to be added/maintained on both sides of the road (when ROW permits and there are no constraints)
- Switzer Drive (Kelley Road to Market Street) – has two existing travel lanes and sidewalks in some sections on the south side; per the Switzer Drive conceptual design, a median with sidewalk on both sides of the road is planned
- East River Road – has two existing travel lanes only; has potential for sidewalks
- Robb Road (south of Mountain Street) – has two existing travel lanes and sidewalks on both sides (north of Mountain Street); has travel lanes and east sidewalk just south of Mountain Street; remaining road has travel lanes only; per the Robb Road conceptual design, four lanes with median is planned
- Drinnan Way (Highway 16 to Hardisty Avenue) – has two existing travel lanes only; has potential for sidewalks
- Mountain Street (Highway 16 to Macleod Avenue) – has four existing travel lanes and sidewalks; not sufficient ROW for further enhancements
- Mountain Street (Macleod Avenue to Robb Road) – has two existing travel lanes, median (Emerson Drive to Robb Road), on-street parking and sidewalks; not sufficient ROW for further enhancements
- Eaton Road (between Eaton Drive and Highway 16) – has two existing travel lanes only; has potential for sidewalks
- Eaton Road (between Robb Road and Eaton Drive) – has two existing travel lanes, on-street parking and sidewalk; has potential to complete south sidewalk near Robb Road; not sufficient ROW for further enhancements
- Macleod Avenue – has four existing travel lanes and sidewalks; not sufficient ROW for further enhancements
- Kelley Road – has two existing travel lanes only; the section with wider ROW near Switzer Drive has potential for sidewalks and on-street parking; the remaining roadway has potential for sidewalks
- McArdell Drive – has two existing travel lanes, sidewalks and on-street parking; has potential to add on-street bike lanes
- Bradwell Street – has two existing travel lanes, sidewalks, and on-street parking; not sufficient ROW for further enhancements
- Hardisty Drive – has existing travel lanes (four lanes undivided west of Tamarack Avenue, four lanes divided east of Tamarack Avenue) and sidewalks; not sufficient ROW for further enhancements
- Boutin Avenue – has two existing travel lanes only; has potential to add sidewalks and on-street parking

7.2 Future Cross Sections

On the basis of the macro-level (Section 4) analysis, micro-level analysis (Section 5), and the East, West and future South ASPs, a recommended network plan was developed for Hinton. In addition to the detailed analytic findings, the network plan is also based on typical planning principles including route continuity and protection for possible future extension and growth.

Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
+800 Population with South ASP Access off Highway 40	+800 Population with South ASP Access off Robb Road	Full Build-Out with South ASP Access off Highway 40	Full Build-Out with South ASP Access off Robb Road	Full Build-Out with Highway 16 Bypass

Highway 16 will continue to have importance to the future transportation network in Hinton. Access management should reflect typical urban arterial conditions. With the full build-out of the East, West and future South ASP areas, the proposed two-lane collector network within the ASP areas along with various intersection improvements on Highway16, new intersections are required to accommodate the ASP build-outs.

Classification of the road networks in the growth areas are conceptual only and should be considered in greater detail. TIAs should be required at the district planning level. They should consider the transportation requirements for the entire adjacent growth area, not individual parcels, so that access routes are well coordinated and protected for all landowners in the growth areas, and not just a first come, first served methodology.

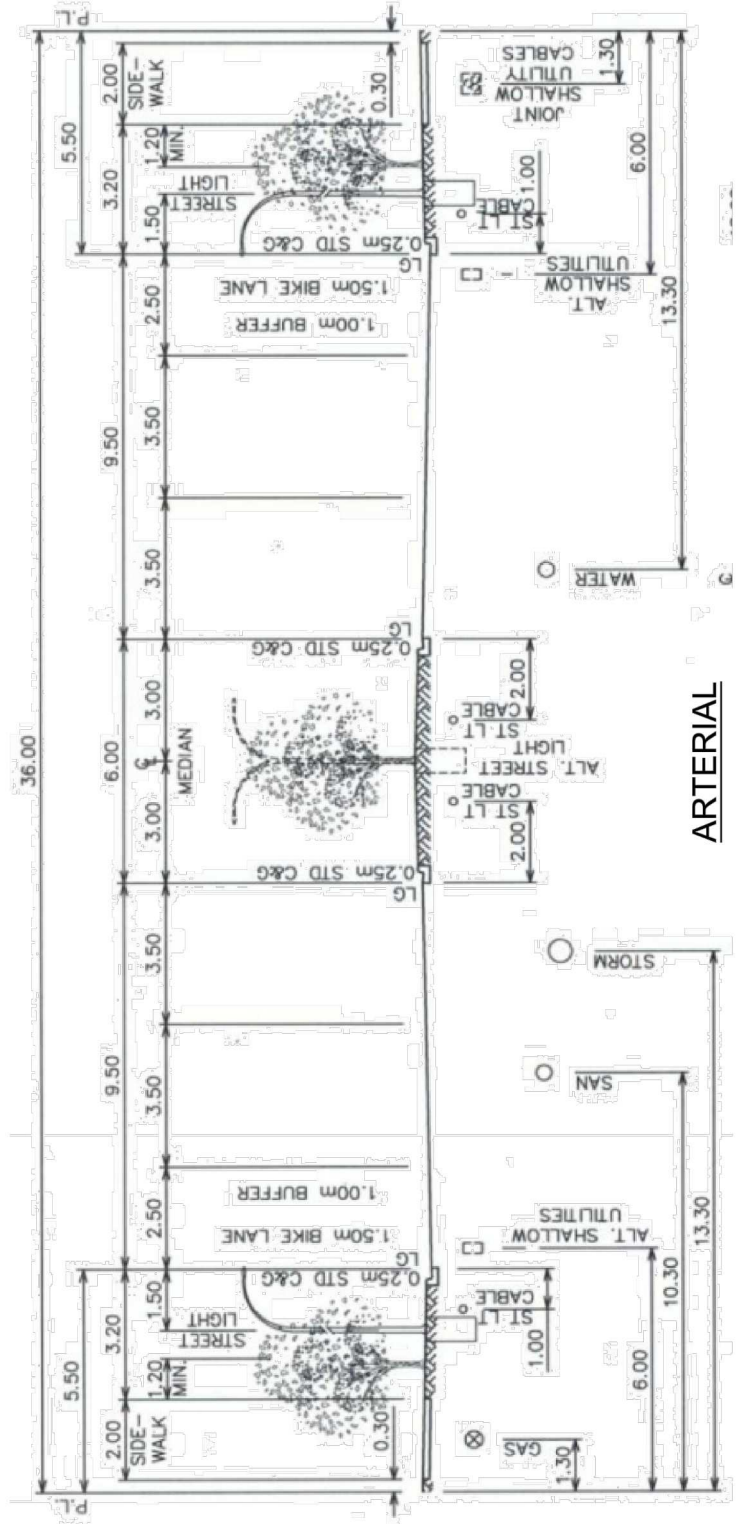
ISL recommends some general practices for the development of new growth areas as follows:

- Strive to maintain the existing grid street network for lesser-classification roadways, avoiding both circuitous routing or closed districts and massive, inaccessible arterial routes
- Promote walkable districts, providing pedestrian facilities (sidewalks/pathways) on both sides of all roadways and allowing for a high level of permeability and access within and between districts. Avoid pedestrian dead ends or barriers that require significant walking distances between spatially proximate destinations (such as commercial areas that are physically blocked and separated from adjacent residential areas)
- Consider the inclusion of the active modes elements in the road cross-section within new developments

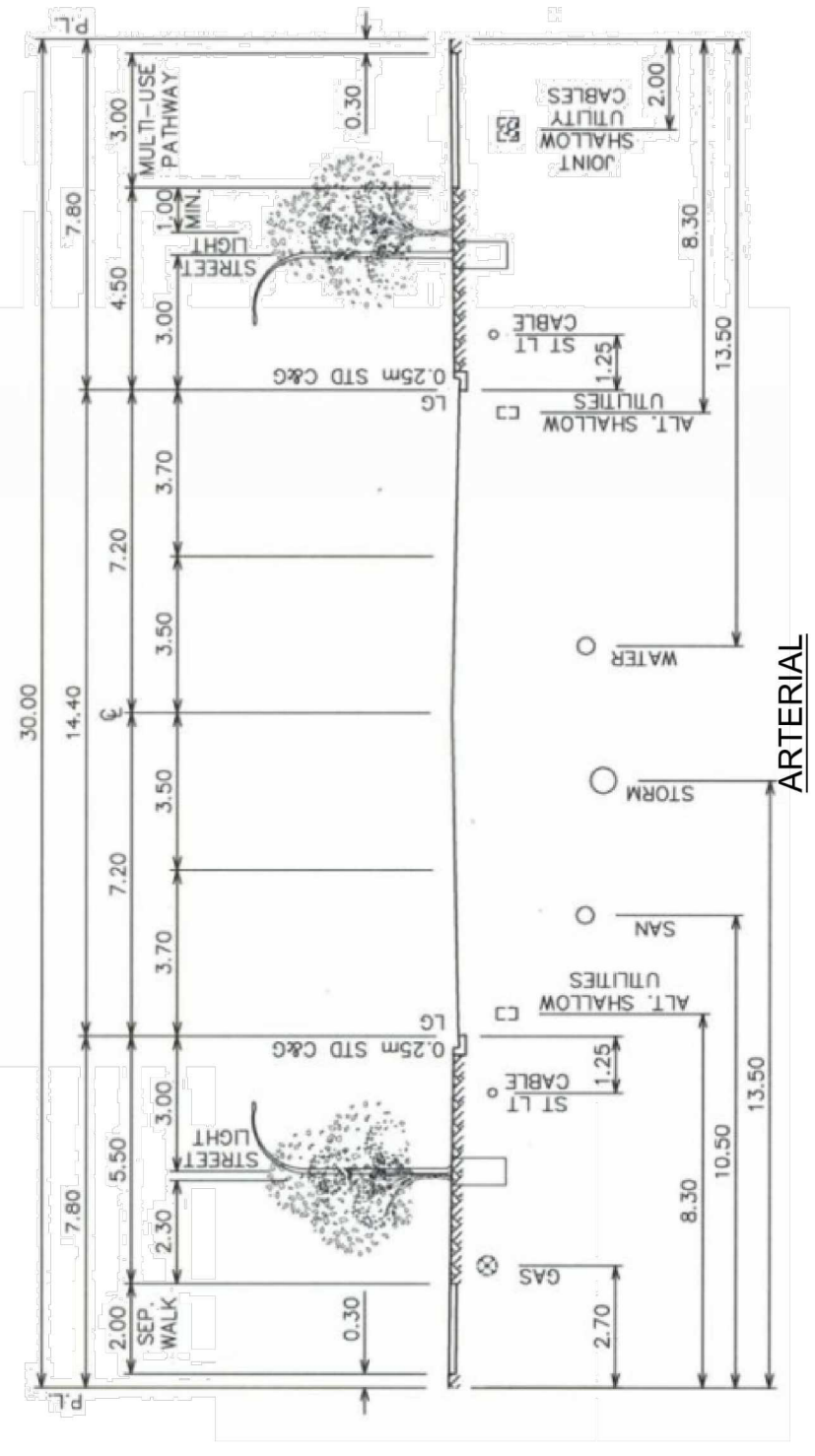
With the future East ASP, West ASP, and future South ASP areas, the recommended road classification is summarized below and shown in Exhibit 7.4:

- West ASP Area:
  - An east-west collector road system connects Highway 16 (between Woodley Drive and Highway 40) and Mountain Street (via Wanyandi Avenue)
  - Wanyandi Avenue: Upgrade to Collector. The Collector road in the West ASP area will connect to Mountain Street via Wanyandi Avenue. Currently, most of Wanyandi Avenue does not have curbs or sidewalks. When upgraded, a modified Collector road standard can be implemented as there is only 20 m ROW while 21 m is typically required for a Collector. We recommend that the road width be modestly reduced to accommodate this constraint, while maintaining the full width of the roadside areas and sidewalks
  - Two additional connections off Highway 16 are provided: a new south leg of Woodley Drive and connect to the existing Keil Drive
  - Commercial access: Directly off Highway 16
  - Highway 16: The Arterial road classification is recommended to extend west from Woodley Drive to the west Hinton boundary
- East ASP Area:
  - An east-west collector road system connects Robb Road (just south of Eaton Road) and Highway 16 (at Drinnan Way)
  - Two connections off Highway 16 are provided: connect to existing McArdell Drive and Brookhart Street (via Bradwell Street)
  - Commercial access: Directly off Highway 16
  - Highway 16: The Arterial road classification is recommended to extend east from Brookhart Street to the east Hinton boundary
- Future South ASP (two access scenarios):
  - Access off Highway 40: A collector road is required off Highway 40 to service the future South ASP
  - Access off Robb Road: A collector road is required off Robb Road to service the future South ASP

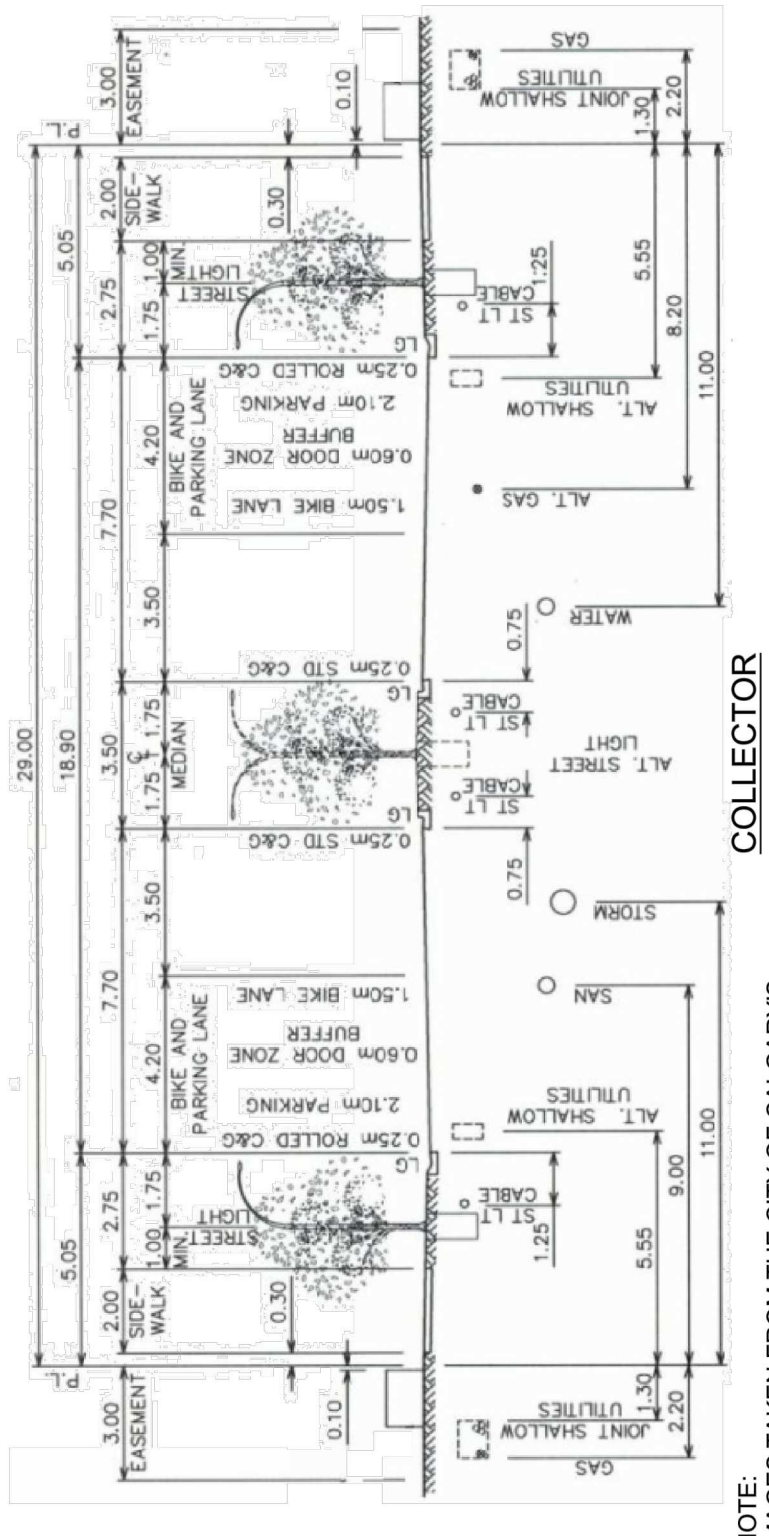
Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
+800 Population with South ASP Access off Highway 40	+800 Population with South ASP Access off Robb Road	Full Build-Out with South ASP Access off Highway 40	Full Build-Out with South ASP Access off Robb Road	Full Build-Out with Highway 16 Bypass



ARTERIAL



ARTERIAL



COLLECTOR

NOTE:
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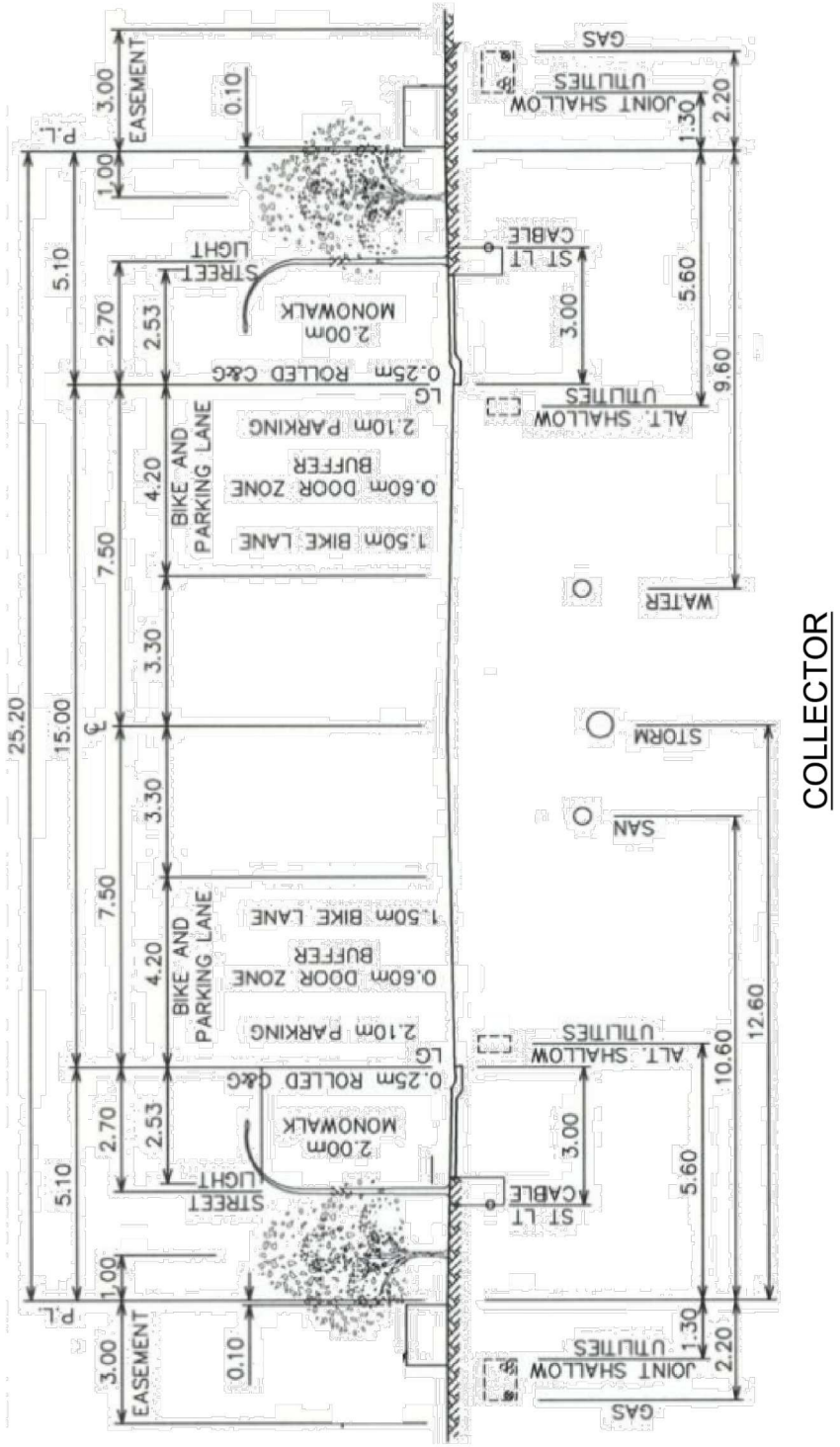
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Gateway to the Rockies

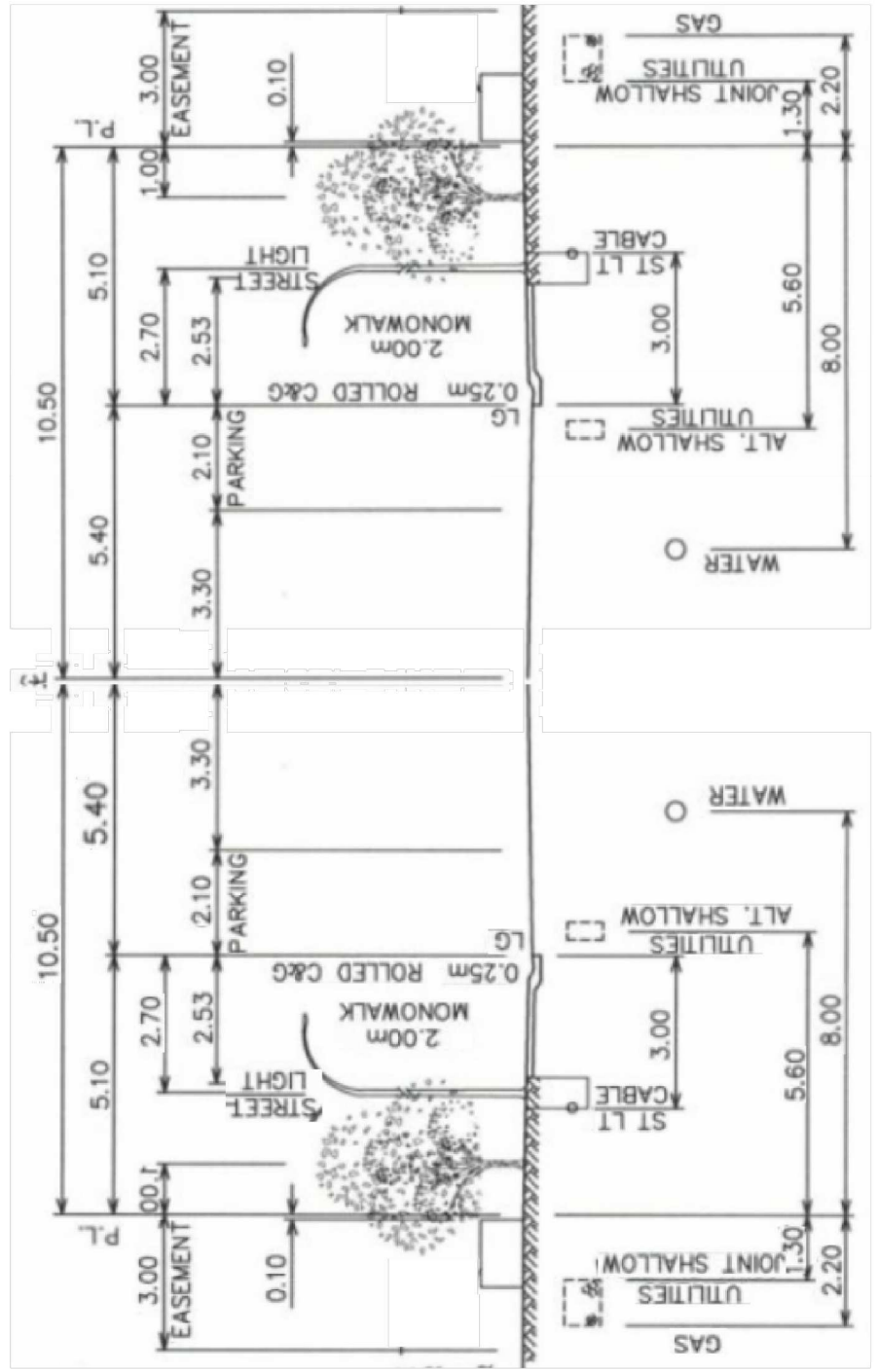
TOWN OF HINTON TRANSPORTATION MASTER PLAN

CITY OF CALGARY COMPLETE STREETS CROSS-SECTIONS

EXHIBIT 7.1

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NOTE:
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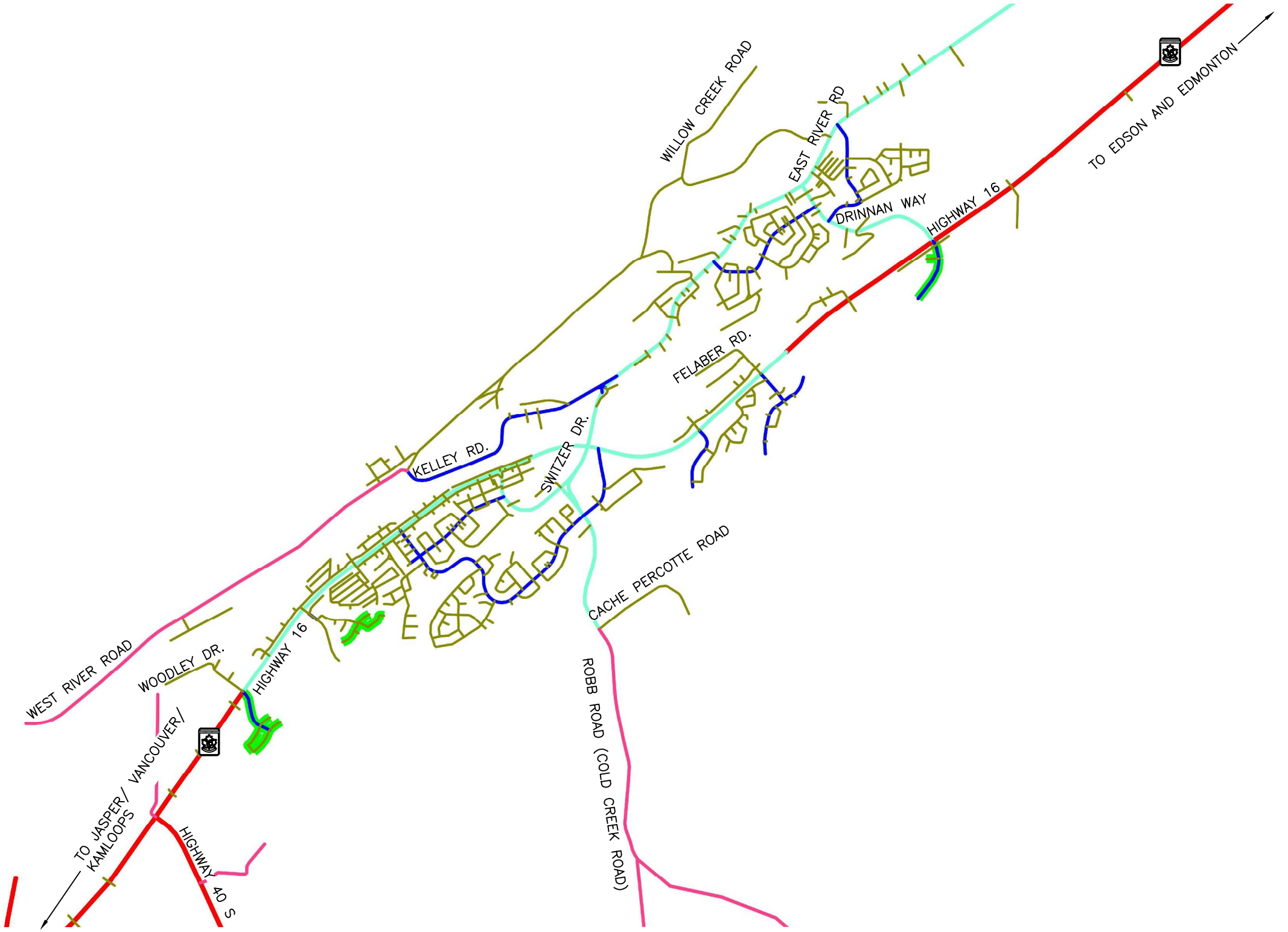
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TOWN OF HINTON TRANSPORTATION MASTER PLAN

CITY OF CALGARY COMPLETE STREETS CROSS-SECTIONS

EXHIBIT 7.2

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Legend:

- HIGHWAYS
- ARTERIALS
- COLLECTORS
- LOCALS
- RURALS
- NEW ROADS

ISL Engineering and Land Services

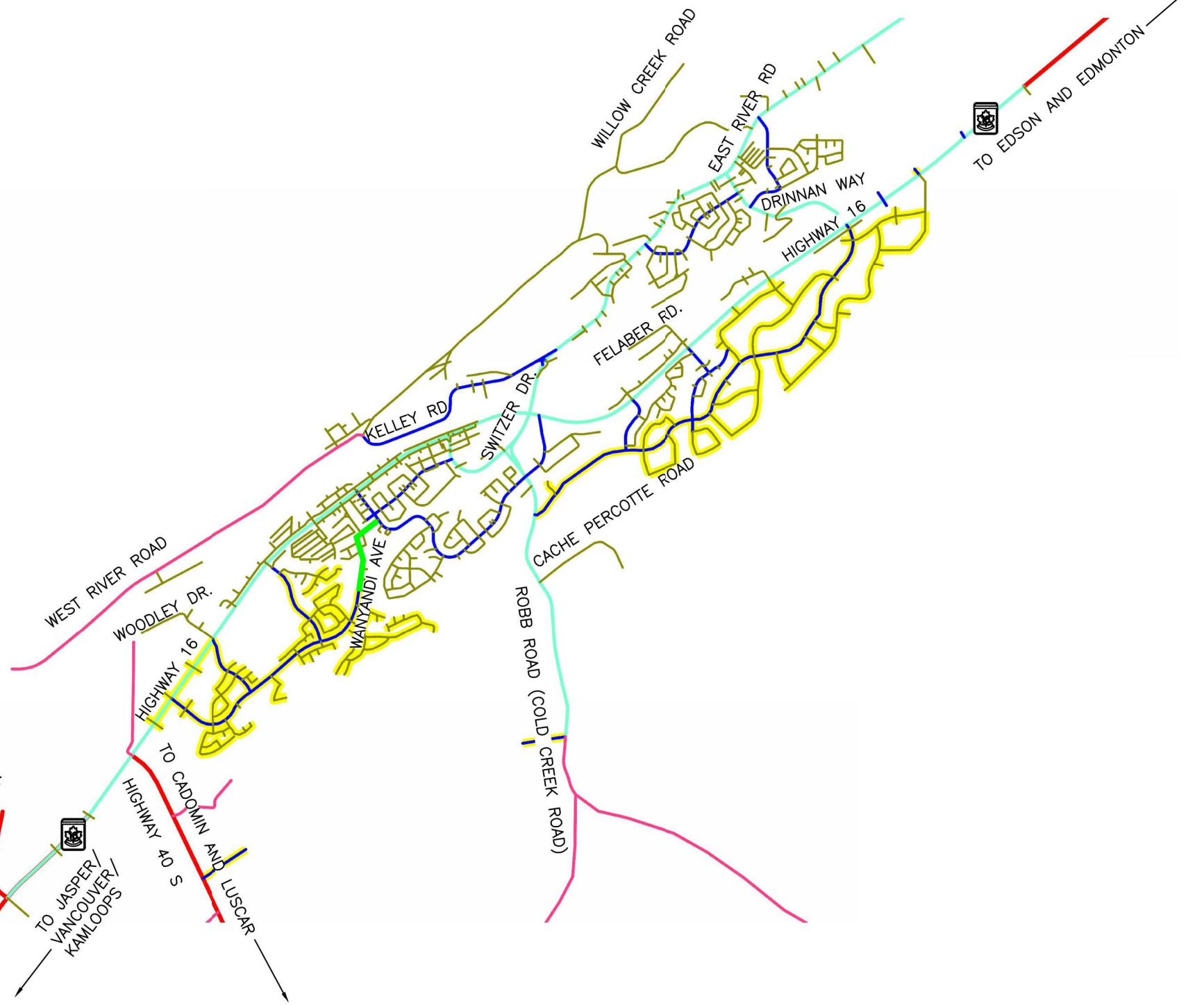
TOWN OF HINTON
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TOWN OF HINTON TRANSPORTATION MASTER PLAN

ROAD CLASSIFICATION
2046 SCENARIO 1/2: +800 POPULATION

EXHIBIT 7.3

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Legend:

- HIGHWAYS
- ARTERIALS
- COLLECTORS
- LOCALS
- RURALS
- NEW ROADS
- UPGRADE TO COLLECTORS

ISL Engineering and Land Services

TOWN OF HINTON
Gateway to the Rockies

TOWN OF HINTON TRANSPORTATION MASTER PLAN

ROAD CLASSIFICATION
2046 SCENARIO 3/4: FULL BUILDOUT

EXHIBIT 7.4

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8.0 Pathways

8.1 Review of Trails Master Plan and Recommendations

Hinton's *Trails Master Plan* was completed by EDS Group in 2011. The *Trails Master Plan* identified all existing trails and recommended trails to be added to Hinton. Hinton is currently developing a Parks, Open Space and Trails Master Plan that is anticipated to be completed in December 2018. The recommended trails were based on the previous versions of the East and West ASPs, which were recently updated.

An updated trails map is shown in Exhibit 8.1. The exhibit combines Hinton's existing trails, the trails recommended in the *Trails Master Plan*, and the trails recommended in the updated in East and West ASPs. In addition to the recommendations of the two ASPs, an additional multi-use pathway is recommended along the collector road within the two ASP areas.

Presently Hinton is updating the 2011 *Trails Master Plan.* The updated plan is called the *Parks, Open Space and Trails Master Plan* and all recommendations found in this new plan will take precedence over all relevant recommendations contained within this TMP referencing the 2011 *Trails Master Plan*.

8.2 Pedestrian Crossing Across Highway 16

A pedestrian crossing review was undertaken to identify the potential pedestrian crossing location across Highway 16 between Brookhart Street and McArdell Drive. In the review area, Highway 16 is a four-lane divided highway with a posted speed limit of 80 km/h. Retail/commercial developments (pedestrian destinations) are located on the north side of Highway 16 and residential developments are located on the south side. There are no crosswalks at Highway 16/Brookhart Street and Highway 16/McArdell Drive. According to the Hinton, pedestrians are crossing Highway 16 at three locations: mid-block between Brookhart Street and McArdell Drive, Highway 16/Brookhart Street, and Highway 16/McArdell Drive (see Figure 8.1). Since there are no formal pedestrian crossings or pedestrian infrastructure in the study area, pedestrian safety is of high concern.

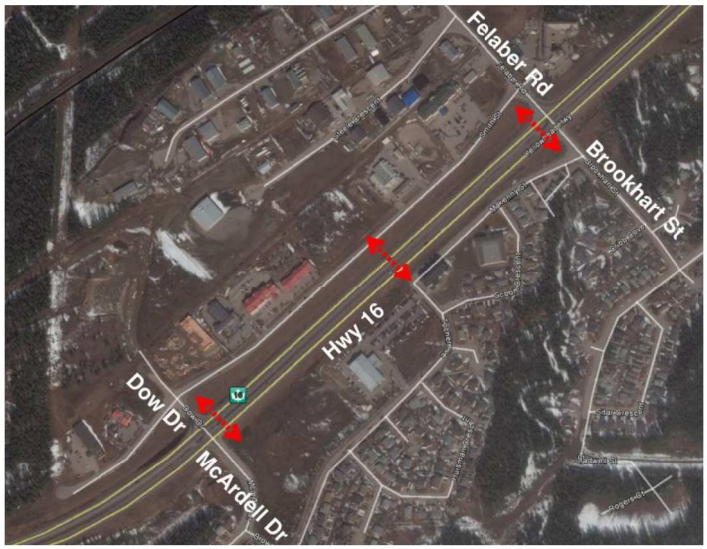


Figure 8.1: Existing Pedestrian Crossing Locations

Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
+800 Population with South ASP Access off Highway 40	+800 Population with South ASP Access off Robb Road	Full Build-Out with South ASP Access off Highway 40	Full Build-Out with South ASP Access off Robb Road	Full Build-Out with Highway 16 Bypass

To enhance pedestrian safety, pedestrian warrants were undertaken at Highway 16/Brookhart Street and Highway 16/McArdell Drive. From the pedestrian warrant, a Traffic Signal Systems (TS) treatment is warranted at both Highway 16/Brookhart Street and Highway 16/McArdell Drive. A TS is a traffic signal with pedestrian push button, often called a "half signal" because it does not provide green light phases for vehicles on the side street.

Although a full signal for traffic is not warranted for either intersection, the investment in the pedestrian half-signal typically cost about 60-70% of the cost for the full system, hence it may be cost-effective to provide full signalization (which would be required for the full-build scenarios).

As an alternate, a pedestrian overpass (pedestrian bridge) or underpass (pedestrian tunnel) at mid-block Highway 16/Brookhart Street and Highway 16/McArdell Drive could be constructed. If this investment is made, strong connections should also be provided from Brookhart Street and McArdell Drive so that all users can safely access the crossing, without the additional signals on the highway. A location/structure type study could be completed to confirm if there is a cost-effective option available.

8.3 Existing Pedestrian Crossing Control Check

Existing pedestrian crossing controls were reviewed at 13 locations throughout Hinton. TAC's *Pedestrian Crossing Control Guide* was used as the basis to identify that appropriate pedestrian crossing control is provided for the volumes of vehicular and pedestrian traffic at each crossing, with full results provided in Appendix E and summarized below.

8.3.1 Data Collection

ISL conducted vehicle and pedestrian counts during the AM and PM peak periods on the weeks of June 12-16 and June 19-23, 2017. The AM peak count was conducted between 7:00 AM to 9:00 AM and the PM peak count was conducted between 4:00 PM to 6:00 PM; the hours are based on the typical workday peak periods in Hinton. At pedestrian crossing locations in close proximity to a school, the PM peak period count was extended from 2:30 PM to 6:00 PM to capture peak pedestrian traffic associated with the school's start and end times. Table 8.1 shows the intersections, count dates, peak hours, and existing pedestrian controls as found from the count.

Table 8.1: Count Dates and AM and PM Peak Hours

Number on Plan	Intersection	Date of Count	AM Peak	PM Peak	Existing Pedestrian Control
1	Boutin Avenue/ Maurer Drive	June 20, 2017	7:45 - 8:45	4:30 - 5:30	Side-mounted sign with flashing beacon and push button crossing
2	Collinge Radd/ Rispler Way	June 19, 2017/ June 23, 2017	AM (Fri): 8:00 - 9:00	PM (Mon): 4:00 - 5:00	Side-mounted sign with flashing beacon and push button crossing
3	Dr Reid Way/ Robb Road	June 21, 2017	7:15 - 8:15	4:30 - 5:30	Side-mounted sign with flashing beacon and push button crossing
4	Drinnan Way/ Hardisty Avenue	June 14, 2017	7:45 - 8:45	4:00 - 5:00	Side-mounted sign with flashing beacon and push button crossing
5*	Macleod Avenue/ Meadow Drive	June 13, 2017	8:00 - 9:00	4:45 - 5:45	Side-mounted sign with flashing beacon and push button crossing
6	Mountain St/ Collinge Road	June 22, 2017	7:30 - 8:30	4:00 - 5:00	Overhead-mounted sign with flashing beacon and push button crossing
7*	Mountain Street/ Fairfax Drive	June 13, 2017	7:30 - 8:30	5:00 - 6:00	Side-mounted sign with flashing beacon and push button crossing
8	Mountain Street/ Emerson Drive	June 20, 2017	7:45 - 8:45	4:00 - 5:00	Side-mounted sign with flashing beacon and push button crossing
9	Mountain Street/ Reimer Drive	June 22, 2017	8:00 - 9:00	4:45 - 5:45	Side-mounted sign with flashing beacon and push button crossing

Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
+800 Population with South ASP Access off Highway 40	+800 Population with South ASP Access off Robb Road	Full Build-Out with South ASP Access off Highway 40	Full Build-Out with South ASP Access off Robb Road	Full Build-Out with Highway 16 Bypass

Number on Plan	Intersection	Date of Count	AM Peak	PM Peak	Existing Pedestrian Control
10*	Tamarack Avenue/ Lodgepole Drive	June 15, 2017	7:45 - 8:45	2:45 - 3:45	Side-mounted sign with flashing beacon and push button crossing
11	Robb Road/ Eaton Drive (Mountain Street)	June 21, 2017	7:45 - 8:45	4:45 - 5:45	Overhead-mounted sign with flashing beacon and push button crossing
12	Switzer Drive/ Timber Lane	June 14, 2017	7:45 - 8:45	4:00 - 5:00	Overhead-mounted sign with flashing beacon and push button crossing
13*	Gerard Redmond School Crossing on Maligne Drive	June 15, 2017	7:30 - 8:30	2:45 - 3:45	Side-mounted sign on north side of Maligne Drive only

* indicates in close proximity or adjacent to school

8.3.2 Pedestrian Crossing Control Review

The following outlines the steps undertaken to apply TAC's *Pedestrian Crossing Control Guide* and to determine the appropriateness of the existing control at each location (refer to Appendix E for an outline of the steps followed):

1. Check whether or not a signal is warranted at each site using the peak AM and PM values from each intersection. TAC's *Canadian Traffic Signal Matrix Procedure 2007* was used in this step and signalization is warranted when a warrant score of 100 or more is reached. Refer to Appendix E for the Traffic Signal Warrant results for all intersections.
   - In the signal warrant, 6 hours of traffic and pedestrian data (2 hours each in AM peak, noon peak, and PM peak) is required to be inputted. As no noon peak data was collected, the formula "(AM + PM) x 2.61" was used to convert the AM and PM peak hour traffic to 6-hour traffic. The preceding is a commonly-used formula to estimate the 6-hour traffic for an urban setting and is typically used by ISL in projects for The City of Calgary and Alberta Transportation.
   - If a traffic signal is warranted, a signalized pedestrian crossing is automatically warranted. If a traffic signal is not warranted, the Pedestrian Crossing Control review is continued.
2. If a traffic signal is not warranted, the Pedestrian Crossing Control review is continued with the evaluation of pedestrian and vehicular traffic. The given thresholds as outlined in the Pedestrian Crossing Control Guide are 15 equivalent adult units (EAU) per hour and 1,500 vehicles/day. If both requirements are met, enhanced controls are recommended.

- Pedestrian traffic must be converted into EAUs to account for pedestrian age and physical ability as per the following:
  - Adult = 1.00 EAU
  - Unaccompanied children ≤ 12 years old = 2.00 EAU
  - Seniors ≥ 65 years old = 1.50 EAU
  - Pedestrians with physical impairments = 2.00 EAU

  The EAUs per hour are calculated by taking the total number of pedestrians observed at a crossing and dividing by the number of hours the count was completed.

3. The volumes of traffic are taken from the intersection leg where the pedestrian crosses the road (e.g., east crosswalk, the two-way traffic at the east leg of the intersection). The number of vehicles/day is calculated to be the PM peak hour at the leg multiplied by 10. The preceding is a commonly used formula to estimate the daily traffic and was used by ISL in projects for The City of Calgary and Alberta Transportation.
4. In both cases where the pedestrian/traffic conditions are satisfied or not satisfied, the next assessment reviews the site of interest's proximity (100 m to 200 m) to an adjacent traffic control device. For the

purpose of this report, the more conservative 100 m is taken as the minimum distance between a desired pedestrian crossing control and the traffic-controlled intersection.

- If the site of interest is not within 100 m of a traffic control device and is on a pedestrian desired line or is a requirement for system connectivity, then the site is appropriate for a pedestrian control crossing
- If the above is met, than the site may not be a candidate for a pedestrian crossing control

5. Once the site has been established as an appropriate location for a pedestrian control crossing, the Pedestrian Crossing Control Guide determines the type of control.
   - There are three categories: GM (Ground-Mounted System), OF (Overhead Flashing Beacon System) with push button crossing, and TS (Traffic Signal System)
   - GM can be further divided into two categories, GM1 and GM2. GM1 is simply a crosswalk with side-mounted signs, while GM2 is a crosswalk with overhead-mounted signs
   - In Hinton, side-mounted signs with flashing beacon and push button crossings are already installed at many intersections. This treatment is closest to an OF, provided that the road is not too wide for ready visibility of the flashing beacons. In this study, the side-mounted sign with flashing beacon and push button crossing is considered as an OF

From these steps, a specific pedestrian control can be determined and therefore the check is complete.

8.3.3 Summary and Conclusion

Following the steps as outlined in Section 8.3.2, Table 8.2 outlines the parameters as used in the crossing evaluation and the concluded crossing treatments for each intersection. The locations where improvements are recommended are summarized below.

Maligne Drive School Crossing

Currently, there is a painted crosswalk with a side-mounted pedestrian crossing sign on the north side of the road. From the crossing evaluation, the following recommendations are made:

- Add an additional side-mounted sign to the south side of the road
- Add yellow centre painted lines at the approach to restrict passing of vehicles on the opposing lane
- Stopping prohibition sign for a minimum of 15 m at the approach of the crossing and 10 m following the crossing; this is used to prohibit on-street parking, which enables drivers to have a clear view of the crossing
- Advanced pedestrian crossing warning in signs, if visibility is limited

All Other Intersections

With the exception of Location 4 (crosswalk at Hardisty Avenue/Drinnan Way), the following upgrades are recommended in addition to the already existing crossing:

- Locations 1, 2, 3, 8, 10, and 11 (GM1 Crossing Treatment): Stopping prohibition sign for a minimum of 15 m at the approach of the crossing and 10 m following the crossing
- Locations 5, 6, 7, 9, and 12 (GM2 Crossing Treatment): Stopping prohibition sign for a minimum of 30 m at the approach of the crossing and 10 m following the crossing
- Location 4 does not require stopping prohibition signs as there is a driveway at the approach and an additional parking lane is provided following the crossing

Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
+800 Population with South ASP Access off Highway 40	+800 Population with South ASP Access off Robb Road	Full Build-Out with South ASP Access off Highway 40	Full Build-Out with South ASP Access off Robb Road	Full Build-Out with Highway 16 Bypass

Table 8.2: Pedestrian Crossing Control Summary

Intersection #	E-W Road	N-S Road	Location of Crossing (N/S/E/W Leg)	Existing Crossing Control	Warrant Score	Traffic Signal Warranted (Y/N)	Ped Hourly Volume (EAU)	Ped Hourly Volume ≥ 15 EAUs? (Y/N)	AADT on Crossing Leg	AADT on Crossing Leg ≥ 1500 veh/day? (Y/N)	Adjacent Traffic control device distance > 100m? (Y/N)	Recommended Crossing Treatment
1	Boutin Ave	Mauer Dr	West	Side-mounted sign with flashing beacon and push button crossing (OF*)	1	N	0	N	2140	Y	Y	GM1. Existing OF crossing treatment, no crossing treatment upgrade required. Crossing improvements recommended, refer to Section 8.3.3
2	Rispler Way	Collinge Rd	North	Side-mounted sign with flashing beacon and push button crossing (OF*)	2	N	4	N	1060	N	Y	GM1. Existing OF crossing treatment, no crossing treatment upgrade required. Crossing improvements recommended, refer to Section 8.3.3
3	Dr Reid Way	Robb Road	West	Side-mounted sign with flashing beacon and push button crossing (OF*)	0	N	1	N	1360	N	Y	GM1. Existing OF crossing treatment, no crossing treatment upgrade required. Crossing improvements recommended, refer to Section 8.3.3
4	Hardisty Ave	Drinnan Way	South	Side-mounted sign with flashing beacon and push button crossing (OF*)	23	N	15	Y	3510	Y	Y	GM1. Existing OF crossing treatment, no crossing treatment upgrade required. Crossing improvements recommended, refer to Section 8.3.3
5	Macleod Ave	Meadow Dr	West	Side-mounted sign with flashing beacon and push button crossing (OF*)	3	N	2	N	2930	Y	Y	GM1. Existing OF crossing treatment, no crossing treatment upgrade required. Crossing improvements recommended, refer to Section 8.3.3
6	Mountain St	Collinge Rd	East	Overhead-mounted sign with flashing beacon and push button crossing (OF)	19	N	5	N	4770	Y	Y	GM2. Existing OF crossing treatment, no crossing treatment upgrade required. Crossing improvements recommended, refer to Section 8.3.3
7	Mountain St	Fairfax Dr	East	Side-mounted sign with flashing beacon and push button crossing (OF*)	4	N	1	N	3340	Y	Y	GM2. Existing OF crossing treatment, no crossing treatment upgrade required. Crossing improvements recommended, refer to Section 8.3.3
8	Emerson Dr	Mountain St	North	Side-mounted sign with flashing beacon and push button crossing (OF*)	5	N	17	Y	3400	Y	Y	GM1. Existing OF crossing treatment, no crossing treatment upgrade required. Crossing improvements recommended, refer to Section 8.3.3
9	Mountain St	Reimer Dr	West	Side-mounted sign with flashing beacon and push button crossing (OF*)	5	N	5	N	3260	Y	Y	GM2. Existing OF crossing treatment, no crossing treatment upgrade required. Crossing improvements recommended, refer to Section 8.3.3
10	Lodgepole Dr	Tamerack Ave	Midblock	Side-mounted sign with flashing beacon and push button crossing (OF*)	1	N	7	N	935	N	Y	GM1. Existing OF crossing treatment, no crossing treatment upgrade required. Crossing improvements recommended, refer to Section 8.3.3
11	Eaton Dr	Robb Road	South	Overhead-mounted sign with flashing beacon and push button crossing (OF)	14	N	3	N	500	N	Y	GM1. Existing OF crossing treatment, no crossing treatment upgrade required. Crossing improvements recommended, refer to Section 8.3.3
12	Timber Lane	Switzer Dr	North	Overhead-mounted sign with flashing beacon and push button crossing (OF)	8	N	6	N	7150	Y	Y	GM2. Existing OF crossing treatment, no crossing treatment upgrade required. Crossing improvements recommended, refer to Section 8.3.3
13	Maligne Dr	Gerard Redmond School	South	Crosswalk with side mounted sign on north side only	0	N	15	Y	0	N	Y	GM1. Crossing Treatment upgrade recommended, refer to Section 8.3.3

GM1 = Side Mounted Sign, GM2 = Push Button Crosswalk, OF = Overhead Flashing Beacon System

* These locations do not match to any Crossing Treatment in the TAC Pedestrian Crossing Control Guide, but is closest to an OF. In this study, the side-mounted sign with flashing beacon and push button crossing is considered as an OF.

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Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
+800 Population with South ASP Access off Highway 40	+800 Population with South ASP Access off Robb Road	Full Build-Out with South ASP Access off Highway 40	Full Build-Out with South ASP Access off Robb Road	Full Build-Out with Highway 16 Bypass

West River Rd.
Lower West River Rd.
West River Rd.
Woodley Dr.
Carmichael Ln
Highway 16
Woodley Dr.
Keil Dr.
W. Access B
W. Access A
Jarvis St.
Kelley Rd.
Macleod Ave.
Jasper St.
Mountain St.
Switzer Dr.
Hardisty Ave.
Switzer Dr.
East River Rd.
Boutin Ave.
Drinnan Way
Fleming Dr.
Steele Crescent
Highway 16
Mcardell Dr.
Brookhart St.
E. Access C
Road C
Road A
Road B
E. Access B
E. Access A
Future Highway Bypass
Maxwell Lake
Thompson Lake
Robb Rd.
Future Highway Bypass
Highway 40

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ISL Engineering and Land Services

TOWN OF HINTON
Gateway to the Rockies

Legend:

- Green Corridor
- Collector Roadway Network
- Local Roads
- Rail Road
- Potential Future School Site
- Existing Trails
- Proposed Trails (Trails Master Plan)
- Regional Trails
- Historical Trails
- Current Town Boundary
- Recommended Multi Use Pathway

TOWN OF HINTON TRANSPORTATION MASTER PLAN

TRAILS MASTER PLAN WITH UPDATED ASP

EXHIBIT 8.1

9.0 Transit and Trucks

9.1 Transit

9.1.1 Review of Transit Routing and Recommendations

Hinton has a well-developed transit system that consists of 42 bus stops and operates between the hours of 8:00 AM until 8:00 PM Mondays through Fridays, and 8:00 AM to 6:00 PM on Saturdays. The system operates on an hourly basis and there is no scheduled Sunday or Statutory Holiday service[2]. The system is a one-way circle route and operates on the main roads: Athabasca Avenue, Government Road, Hardisty Avenue, Hardisty Drive, Swanson Drive, Switzer Drive, Pembina Avenue, Macleod Avenue, Mountain Street, Carmichael Lane, Highway 16, Tocher Avenue, Smith Street, Boutin Avenue, Wilson Avenue, Baker Street, Maurer Drive, East River Road, and Market Street. The existing route is shown in Exhibit 9.1.

With the addition of the East, West and future South ASP areas, the future recommended transit route is shown in Exhibit 9.2 (with industrial lands off Highway 40) and Exhibit 9.3 (with industrial lands off Robb Road). The new transit route expands the existing transit service to the East, West and future South ASP areas. The route generally follows the major collector roads in the East and West ASP areas. In addition, it is also recommended that the transit system be expanded with build-out to include a full two-way route system. A major disadvantage of the existing one-way route is the inefficiency of the route due to the number of stops and the inconvenience of the one-way route. For example, riders wanting to travel from the arena have to ride the entire route to reach Drinnan Way. In a two-way routing, a more efficient and direct routing is provided.

Hinton is currently undertaking a review of the transit system. When the study is complete, all recommendations in the study takes precedence over all relevant recommendations contained within this report. It is also recommended to review the recommendations of this study and check if any recommendations are required to be reanalyzed and updated.

9.1.2 Industrial Facility Transit

In addition to transit operated by Hinton transit, the industrial facilities outside of Hinton also operate private buses servicing staff who live in Hinton. It is recommended that when new communities are developed, the industrial facilities also update their bus routes.

9.2 Trucks

9.2.1 Truck Bypass on Pedley Drive

Currently, trucks are not permitted to travel on Drinnan Way. The current prohibition of trucks on Drinnan Way requires trucks traveling on westbound Highway 16 to Hinton's east industrial area (i.e., Willow Creek Road) to use Switzer Drive. The usage of Switzer Drive adds approximately 10 km to a single trip, or 20 km to a round trip, when compared with travelling directly to Willow Creek Road via Drinnan Way.

Initially, a possible truck bypass through Mary Reimer Regional Park was evaluated. However, initial discussions with Hinton concluded that a road through Mary Reimer Regional Park would be cost prohibitive within grades. The next possible truck bypass would be Pedley Drive, located 8 km east of Hinton.

[2] http://ab-hinton2.civicplus.com/261/Routes-Schedules

Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
+800 Population with South ASP Access off Highway 40	+800 Population with South ASP Access off Robb Road	Full Build-Out with South ASP Access off Highway 40	Full Build-Out with South ASP Access off Robb Road	Full Build-Out with Highway 16 Bypass

To estimate the volume of trucks that may use Pedley Drive as a truck bypass, existing traffic counts at Highway 16/Switzer Drive were referenced. From Alberta Transportation's count in 2016, there are about 146 trucks per day that travel on westbound Highway 16 and turn onto Switzer Drive, and another 184 trucks per day that travel to eastbound Highway 16 from Switzer Drive. The preceding movements represent the truck volumes that may use the truck bypass.
Not all of the trucks will travel to/from the east industrial areas as some of the trucks may be destined to the west industrial area (i.e., Kelley Road), in which case Switzer Drive would still be the most convenient route. Considering the low volumes of potential truck traffic that would use the Pedley Drive bypass, the Pedley Drive truck bypass was not evaluated in the model. Rather, the development of the road would need to refer primarily to the economic/district benefits of diverting trucks from Switzer Drive and reducing the round-trip travel distances for industrial access.

9.2.2 Review of Truck Routes and Recommendations

In Hinton's Traffic Bylaw #1023 (Schedule 60 and 62) and Bylaw #1023-3, truck routes, loaded pulp truck routes, and unloaded pulp truck routes are restricted to Highway, Arterial, and Industrial roadways. The current truck routes for general purposes and designated routes for pulp trucks are illustrated in Exhibit 7.5. Under the bylaws, Highway 16, Switzer Drive, Robb Road, and East River Road are designated as truck routes. Kelley Road (near Jughandle) is partially designated as a truck route. In addition, Robb Road and segments of Switzer Drive and Kelley Road are designated as loaded and unloaded pulp truck routes.

As a minor amendment to the existing bylaw, it is recommended to add the unloaded pulp truck route on Switzer Drive between Kelley Road and East River Road. This provides connectivity for the unloaded pulp truck route to the east end of Switzer Drive.

For the East and West ASP areas, no additions to the existing truck and pulp truck routes are required. As primarily residential areas, truck routing through the new neighbourhoods should not be encouraged.

For the future South ASP area, the following truck route additions are required:

- Highway 40 Access: Highway 40 between Highway 16 and the industrial access, plus all industrial roads within the industrial area
- Robb Road Access: All industrial roads within the industrial area

The proposed truck routes are presented in Exhibit 9.4.

9.2.3 Robb Road Future Pavement Requirements

There are active logging areas south of Hinton and as a result logging trucks are continuously using Robb Road as a trucking route. As presented in the preliminary design report for Robb Road (ISL Engineering, April 2014), empty logging trucks travel southbound (away from Hinton) on Robb Road while fully-loaded logging trucks travel northbound (towards Hinton). With the fully-loaded logging trucks traveling towards Hinton a higher load rating is required on the northbound lanes of Robb Road. To accommodate this increased loading the roadway structure is required to be thicker and therefore has an associated cost increase.

The additional granular material required for the special use by West Fraser logging trucks is described in the attached *Preliminary Design Report – Robb Road*, by ISL Engineering and Land Services, 2014 (see Appendix F).

9.2.4 West Fraser Alternate Logging Route

Currently, West Fraser logging trucks use Robb Road, Switzer Drive, and Kelley Road as seen in Figure 9.1.

Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
+800 Population with South ASP Access off Highway 40	+800 Population with South ASP Access off Robb Road	Full Build-Out with South ASP Access off Highway 40	Full Build-Out with South ASP Access off Robb Road	Full Build-Out with Highway 16 Bypass

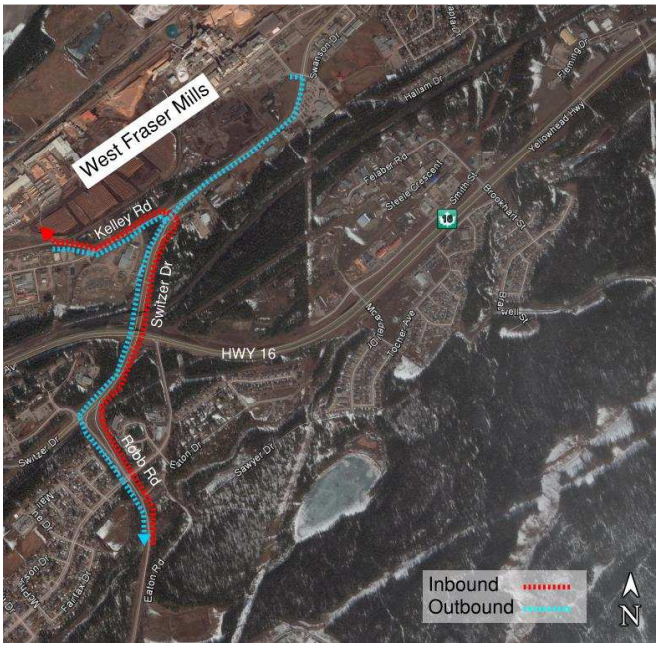


Figure 9.1: Existing Logging Truck Routes

In the event that Switzer Drive and Kelley Road become unsuitable as trucking routes, alternate inbound and outbound routes, are shown in Figure 9.2 and Figure 9.3, respectively.

- Inbound: The potential new inbound route is via Robb Road north, west on Seabolt Road, north on Highway 40 and Range Road 254, across the CPR tracks at a new crossing and finally east on West River Road. This new inbound route adds 10 km to the trip

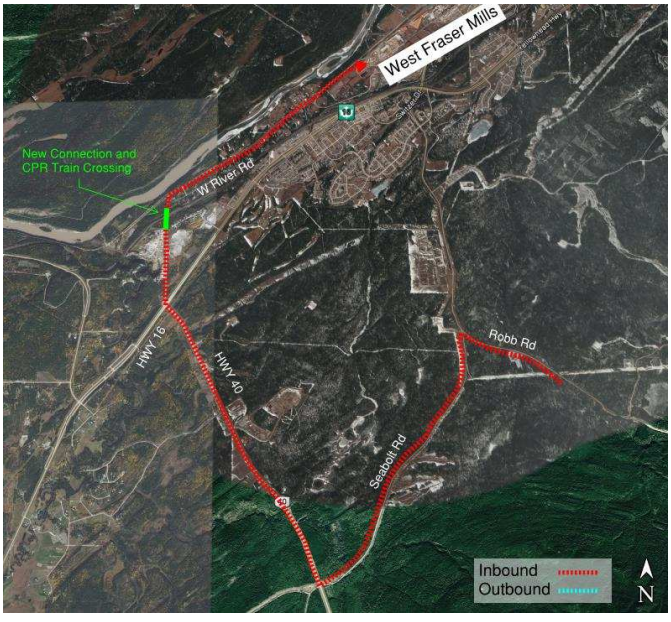


Figure 9.2: Alternate Inbound Logging Truck Route

Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
+800 Population with South ASP Access off Highway 40	+800 Population with South ASP Access off Robb Road	Full Build-Out with South ASP Access off Highway 40	Full Build-Out with South ASP Access off Robb Road	Full Build-Out with Highway 16 Bypass

- Outbound: East on West River Road, Willow Creek Road, and East River Road, south on Pedley Road, west on Highway 16, south on Highway 40, east on Seabolt Road, and south on Robb Road. This new outbound route adds 35 km to the trip

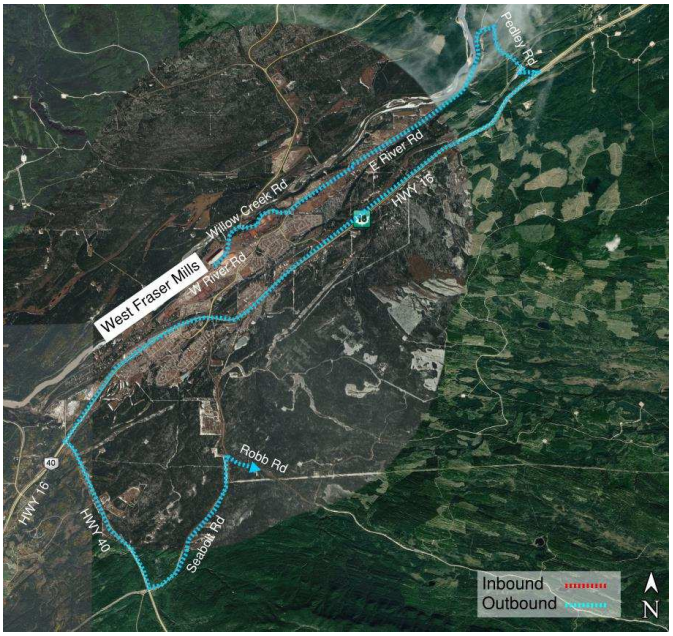


Figure 9.3: Alternate Outbound Logging Truck Route

Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
+800 Population with South ASP Access off Highway 40	+800 Population with South ASP Access off Robb Road	Full Build-Out with South ASP Access off Highway 40	Full Build-Out with South ASP Access off Robb Road	Full Build-Out with Highway 16 Bypass



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TOWN OF HINTON
Gateway to the Rockies

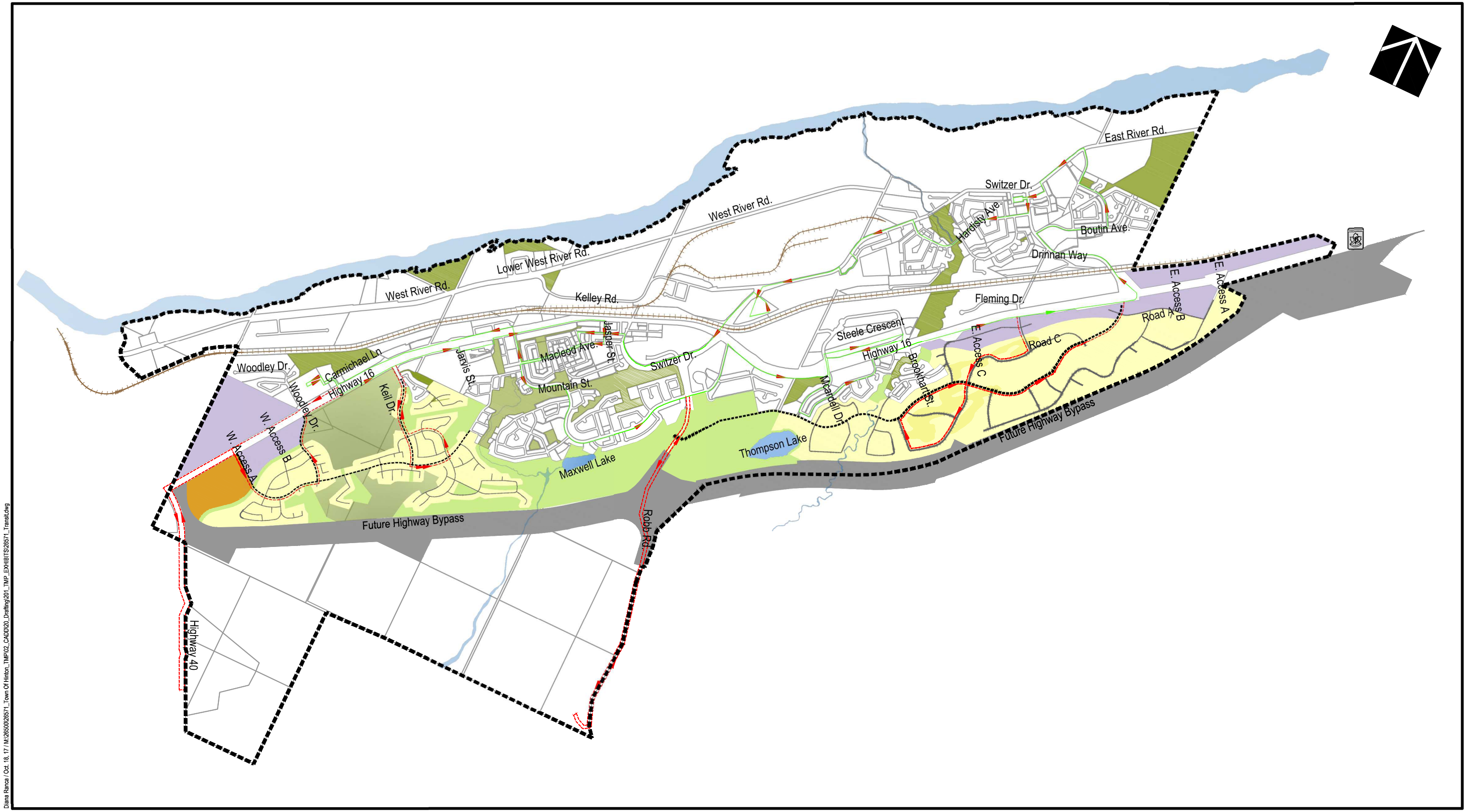
Legend:

- Local Roads
- Rail Road
- Existing Transit Route

TOWN OF HINTON TRANSPORTATION MASTER PLAN

EXISTING TRANSIT ROUTE

EXHIBIT 9.1



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TOWN OF HINTON
Gateway to the Rockies

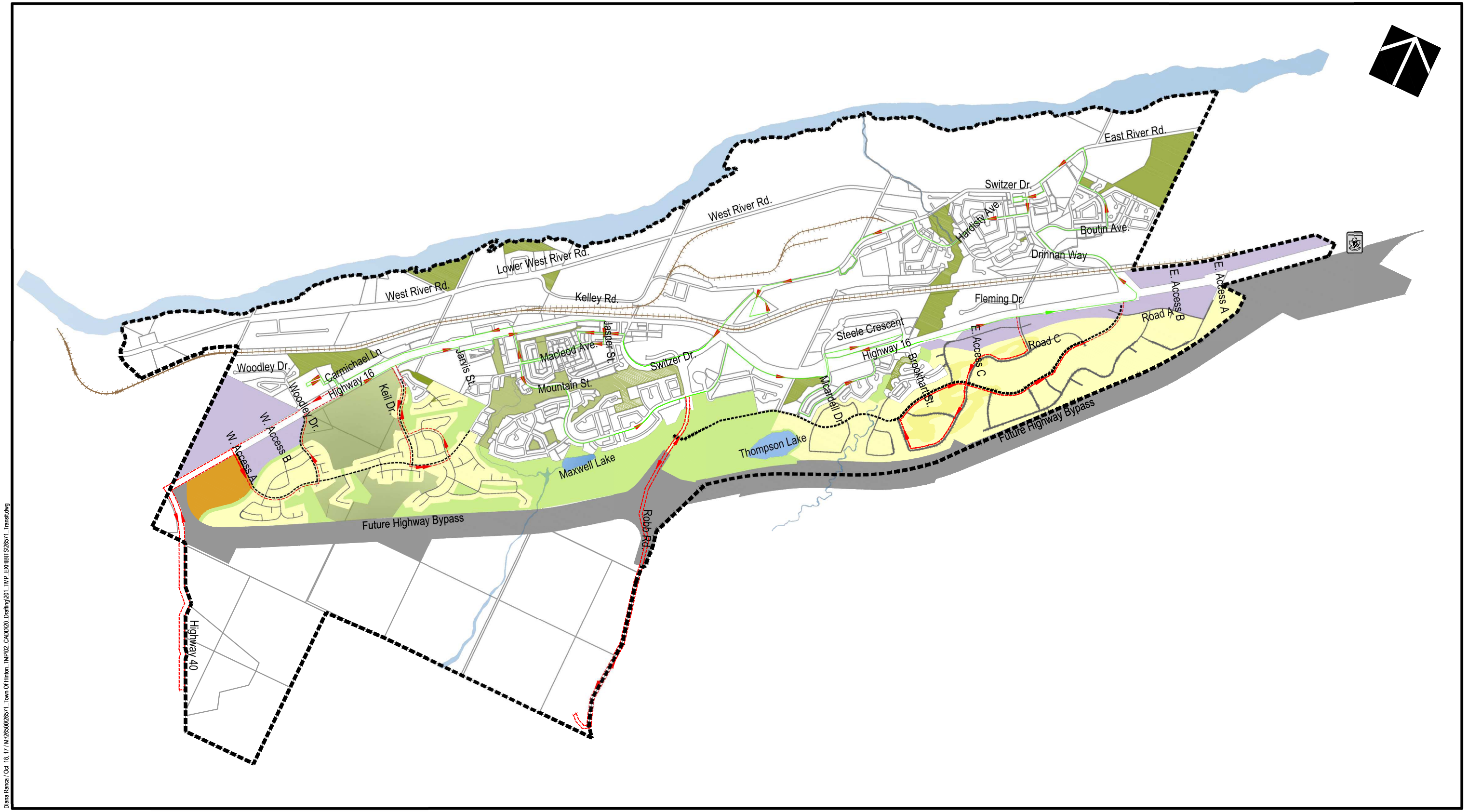
Legend:

- Collector Roadway Network
- Local Roads
- Rail Road
- Existing Transit Route
- Proposed Transit Route

TOWN OF HINTON TRANSPORTATION MASTER PLAN

PROPOSED TRANSIT ROUTE WITH SOUTH ASP ACCESS OFF HIGHWAY 40

EXHIBIT 9.2



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TOWN OF HINTON
Gateway to the Rockies

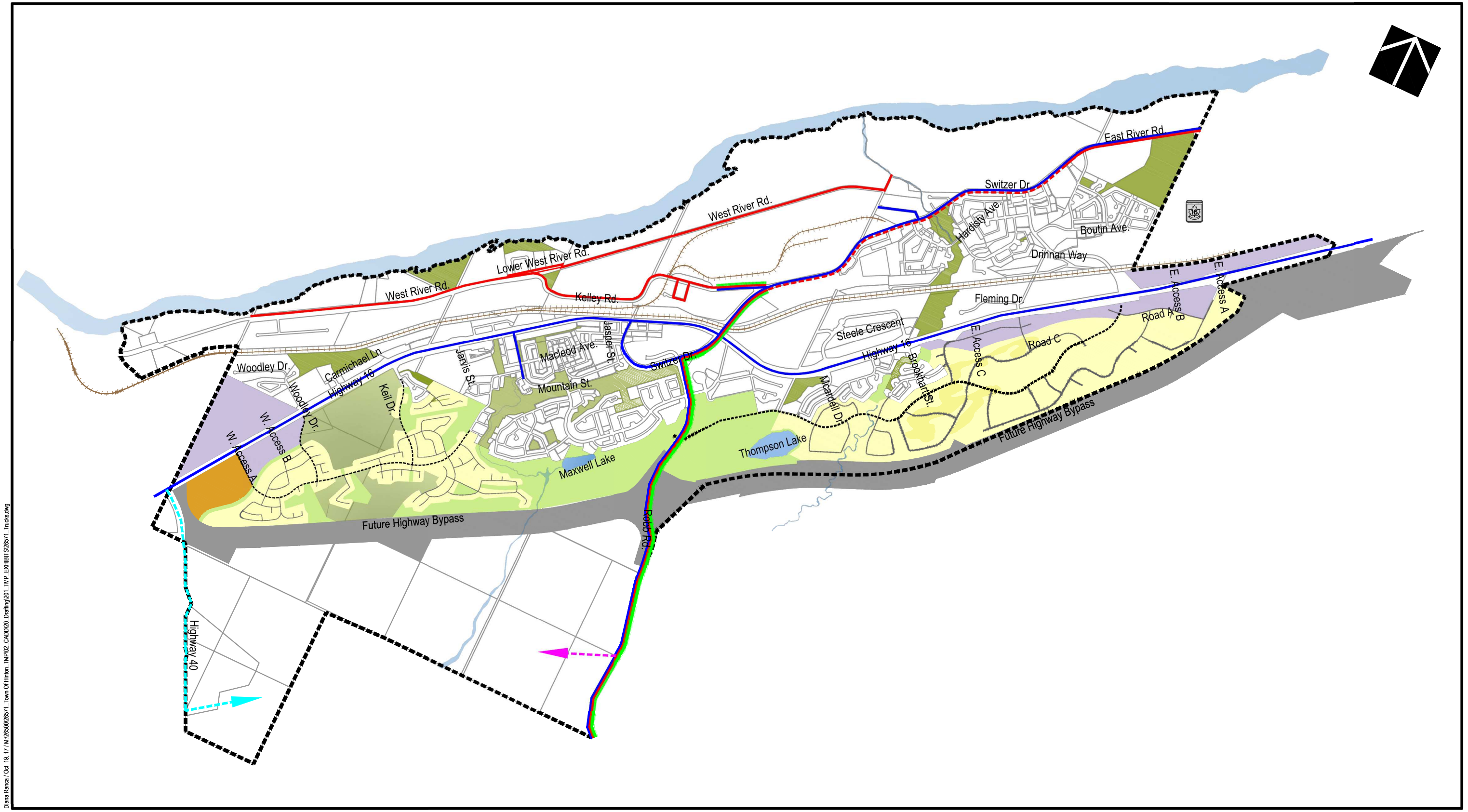
Legend:

- Collector Roadway Network
- Local Roads
- Rail Road
- Existing Transit Route
- Proposed Transit Route

TOWN OF HINTON TRANSPORTATION MASTER PLAN

PROPOSED TRANSIT ROUTE WITH SOUTH ASP ACCESS OFF ROBB ROAD

EXHIBIT 9.3



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ISL Engineering and Land Services

TOWN OF HINTON Gateway to the Rockies

Legend:

- Collector Roadway Network
- Local Roads
- Rail Road
- Truck Routes
- Loaded Pulp Truck Routes
- Un–Loaded Pulp Truck Routes
- Proposed Un–Loaded Pulp Truck Route
- Proposed Truck Route with South Industrial Access off Highway 40
- Proposed Truck Route with South Industrial Access off Robb Road

TOWN OF HINTON TRANSPORTATION MASTER PLAN

EXISTING AND PROPOSED TRUCK ROUTES

EXHIBIT 9.4

10.0 Conclusions and Recommendations

The conclusions and recommendations of this Transportation Master Plan should be used in conjunction with the Water, Wastewater and Stormwater Master Plans.

10.1 Existing Transportation Network

Findings for the existing road network include:

- Overall network capacity (macro-level) analysis confirmed that there are generally no areas of major network congestion and no intersection bottlenecks within Hinton today. This is consistent with observed experience. The volume and capacity plots indicate all existing roadways show good operation with moderate volumes. The PM peak hour volumes on Highway 16 (the existing roadway with the highest volumes) is about 500 to 700 vehicles per hour in each direction, or roughly 12,000 vehicles per day.
- From the detailed operational (micro-level) analysis, the key locations where existing traffic counts were conducted throughout Hinton all operate at a good LOS and v/c ratio (LOS E or better, v/c < 0.90). Therefore, no traffic lane improvement or traffic control revision is required at any of the 39 analyzed intersections.
- Signal warrants were conducted at all the unsignalized intersections and the results of this investigation are negative, which means no signals are required at any of the unsignalized intersections. This is also consistent with the traffic controls used in Synchro.
- It was found that some of the existing streets are at the lower end of the typical size range for streets of their type. Generally speaking, the cost and disruption associated with widening corridors for marginal additional width would not be an effective strategy for enhancement of the transportation network.

10.2 Future Transportation Network

Two horizons of future land use (+800 Population and Full Build-Out) were included in the macroscopic and microscopic modelling analyses.

In the +800 Population Scenarios, the additional trips generated in the PM peak hour did not cause any significant new demand on the road network and overall conditions suggest that the traffic would be operating effectively. In the microscopic modelling, it was concluded that improvements are only required at Highway 16/Drinnan Way (add signal, add advanced warning flashers, and reduce speed to 60 km/h at approach to intersection) and Highway 16/Keil Drive (add signal).

In the Full Build-Out of the three ASP areas, the population increases to a total of nearly 30,000. Three network scenarios (Scenarios 3, 4, and 5) were evaluated for this population. From the macroscopic and microscopic modelling analyses of the three scenarios, the following conclusions are drawn:

- Macroscopic modelling:
  - With the Highway 16 Bypass in Scenario 5, 800 peak hour trips are drawn off Highway 16. From the model, the existing Highway 16 operates better (v/c 0.80 or better) as compared to Scenarios 3 and 4 (without Highway 16 Bypass) where some Highway 16 segments operate at v/c 0.80 to 1.0.
  - Switzer Drive could be considered for twinning between Kelley Road and Hardisty Avenue.

Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
+800 Population with South ASP Access off Highway 40	+800 Population with South ASP Access off Robb Road	Full Build-Out with South ASP Access off Highway 40	Full Build-Out with South ASP Access off Robb Road	Full Build-Out with Highway 16 Bypass

- Microscopic modelling:
  - All three scenarios require extensive improvements on Highway 16, including retiming of existing signals, adding up to 14 traffic signals, adding left turn bays at one or more approaches of various intersections, adding right turn bays at one or more approaches of various intersections, and extending the 60 km/h speed limit to Hinton's boundaries.

Specific-area analyses were also undertaken for the Full Build-Out scenarios, they include:

- Drinnan Way Railway Crossing:
  - To accommodate vehicle queues during a train crossing, four lanes are required on Drinnan Way between Highway 16 and the Drinnan Way Lands access.
- Sawyer Drive:
  - From the model run, a connection (Sawyer Drive) between McArdell Drive and Robb Road is not warranted by traffic demand.
- Highway 16 at Mountain Street/Carmichael Lane:
  - Due to the insufficient spacing on Mountain Street between Carmichael Lane and Highway 16, large trucks turning from Carmichael Lane are required to occupy both lanes of Mountain Street between Carmichael Lane and Highway 16 to perform the turn. Three options could be considered: Option 1 limit intersection to WB-12 or smaller vehicle; Option 2 widening into median and limit intersection to WB-19 or smaller vehicle or; Option 3 additional signal phasing.
- West River Road Second Access:
  - Currently there is only one access (via Kelley Road/West River Road intersection) to the developments and recreational use areas along West River Road. A second access could be considered by rebuilding the bridge over Maskuta Creek.
- Service Road between Woodley Drive and Carmichael Lane:
  - A public road connection between Carmichael Lane and Woodley Drive could be implemented by extending Carmichael Lane west and intersecting with Woodley Drive. This connection would likely be triggered by growth of developments in the area.
- Gregg Avenue/Jasper Avenue
  - With a new Tim Hortons at Gregg Avenue/Jasper Avenue, additional truck traffic and truck parking demand is anticipated. Due to the narrow road width and limited on-street parking on Gregg Avenue, on-street truck parking may not be available. Converting Gregg Street to an eastbound only one-way road would create on-street parking on the north side of Gregg Avenue, providing for additional truck parking locations. The following two options could be considered to check if truck parking could be accommodated on Gregg Avenue: Option 1 transformation of Gregg Avenue to a one-way roadway or; Option 2 restriction of truck access on Gregg Avenue.
- Review of Highway Vicinity Management Agreement:
  - Hinton and Alberta Transportation have decided to withdraw from the HVMA as the following policies are already covered in the HVMA:
    - In development applications within 800 m of a highway ROW and in an area where the highway posted speed limit is higher than 80 km/h, a TIA is required.
    - In development applications within 800 m of a highway ROW and in an area where the highway posted speed limit is less than 80 km/h, a TIA is not required if the development does not generate a significant volume of traffic (i.e., less than 100 vehicles per hour in the peak hour). In some occasions, a TIA will be required even if the development generates 100 or less trips in the peak hour. These may include: development is in an existing congested location, the proposed development does not align with the intended land use (ASP), and design standards are not met (e.g., insufficient sight distance, spacing).
    - In the East, West and future South ASP areas, the roadway network policy in the ASP requires a TIA to be undertaken at the Outline Plan/Land Use Amendment stage.

Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
+800 Population with South ASP Access off Highway 40	+800 Population with South ASP Access off Robb Road	Full Build-Out with South ASP Access off Highway 40	Full Build-Out with South ASP Access off Robb Road	Full Build-Out with Highway 16 Bypass

- Multi-Service Building:
  - Potential location for the multi-service building should be close to the geographic centre of Hinton, similar to the current location of the Hinton RCMP and the Emergency Services Building. A possible site is in the existing DC-District within the East ASP at the southeast corner of the intersection Mountain Street/Eaton Drive/Robb Road.

In addition to the findings and recommendations for the future road network, ISL recommends some general practices for the development of new growth areas as follows:

- Strive to maintain the existing grid street network for lesser-classification roadways, avoiding both circuitous routing or closed districts and massive, inaccessible arterial routes.
- Continue to require site-specific TIA's for all applicable subdivision and development permit applications, with the intent of verifying that proposed developments are consistent with overall network planning, and to identify the extent and timing of localized roadway improvements (turn bays, signals) for implementation by the developer and/or through off-site levies.
- Promote walkable districts, providing pedestrian facilities (sidewalks/pathways) on both sides of roadways and allowing for a high level of permeability and access within and between districts. Avoid pedestrian dead ends or barriers that require significant walking distances between spatially proximate destinations (such as commercial areas that are physically blocked and separated from adjacent residential areas).
- Update Hinton transit routing over time to include new growth areas and to provide two-way service.
- Encourage updating of private transit services for local industry as new areas develop.
- Improve pedestrian safety across Highway 16 in east Hinton by either installing pedestrian half-signals at McArdell Drive and Brookhart Street or constructing a pedestrian overpass/underpass in between these roads.
- Implement various pedestrian crossing improvements at locations throughout Hinton.
- Truck routes: Add an unloaded pulp truck route on Switzer Drive between Kelley Road and East River Road. This provides connectivity of the unloaded pulp truck route to the east end of Switzer Drive.
- West Fraser: In the event Switzer Drive and Kelley Road are no longer suitable for truck traffic, alternate inbound and outbound routes are shown in Figure 9.2 and Figure 9.3, respectively.

Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
+800 Population with South ASP Access off Highway 40	+800 Population with South ASP Access off Robb Road	Full Build-Out with South ASP Access off Highway 40	Full Build-Out with South ASP Access off Robb Road	Full Build-Out with Highway 16 Bypass

Appendix A

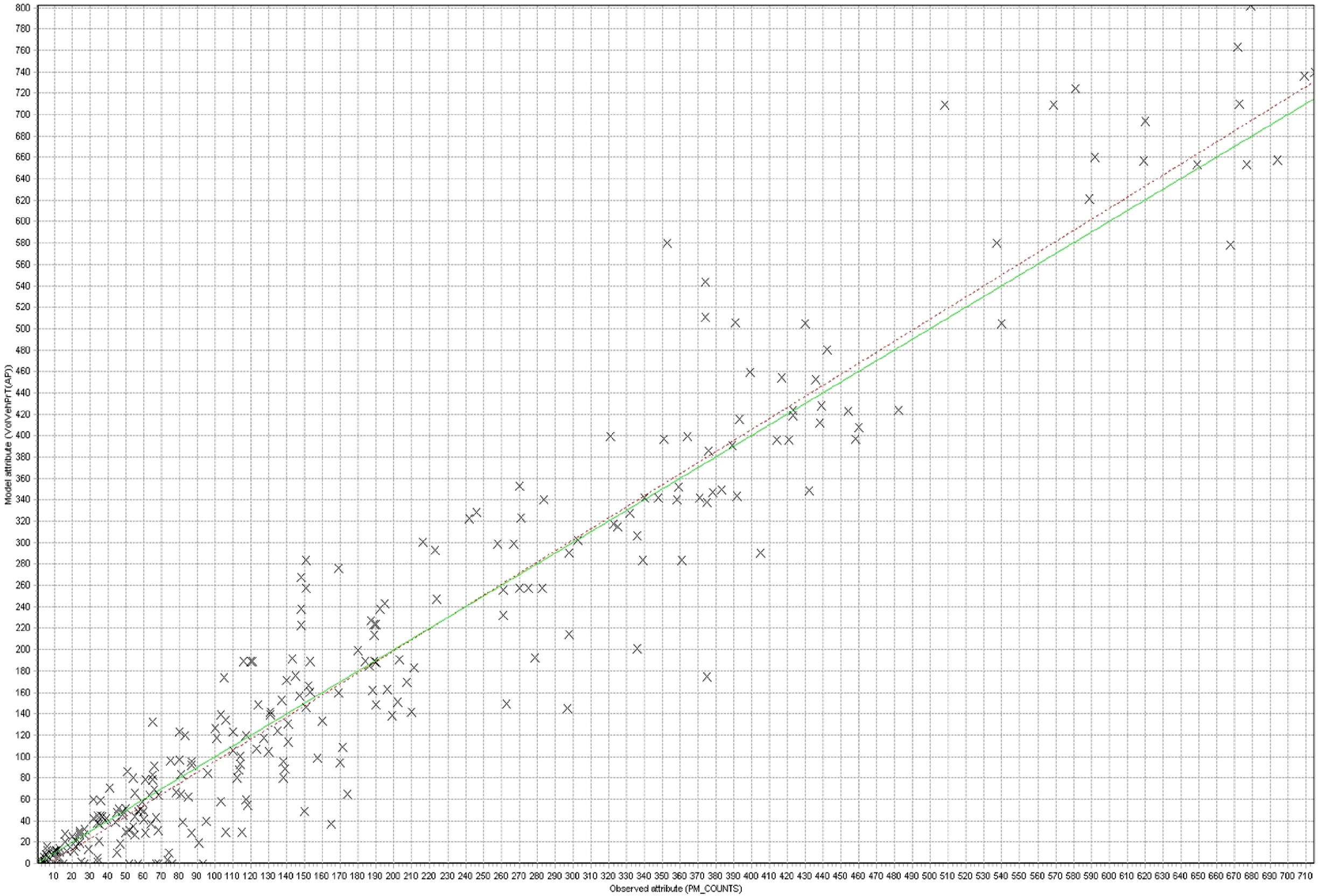
Model Zones and Land Use

Zone ID	Code	Community	Household	HH/Acre	Population	Pop/HH	Retail	Non-Retail	Industrial	Note
101	TER101	Terrance Heights	110	8	275	2.5	0	10	0	Existing
102	TER102		16	0	40	2.5	250	0	0	Existing
103	TER103		0	0	0	-	592	534	0	Highway Commercial
104	TER104		331	6	828	2.5	87	109	0	Mixed Use Urban Node
105	TER105		0	0	0	-	189	170	0	Highway Commercial
106	TER106		523	8	1358	2.6	0	82	0	Residential, School
107	TER107		504	8	1308	2.6	0	31	0	Residential
108	TER108		258	8	670	2.6	0	16	0	Residential
109	TER109		179	8	465	2.6	0	11	0	Residential
110	TER110		362	8	942	2.6	0	22	0	Residential
111	TER111		714	8	1854	2.6	0	44	0	Residential
112	TER112		323	8	838	2.6	0	20	0	Residential
201	HIL201	Hillcrest	402	3	1005	2.5	0	0	0	Existing
202	HIL202		528	3	1320	2.5	0	40	0	Existing
300	EAT300	Eaton	161	1	403	2.5	0	50	0	Existing
301	EAT301		0	0	0	-	0	50	0	Existing DC District, School
302	EAT302		0	0	0	-	0	0	0	Open Space
400	THO400		283	8	735	2.6	0	24	0	Residential
401	THO401		348	3	887	2.5	10	5	0	Existing
402	THO402		0	0	0	-	80	100	30	Existing
403	THO403		210	8	545	2.6	0	18	0	Residential
404	THO404		487	8	1266	2.6	0	42	0	Residential
405	THO405		1083	8	2815	2.6	0	93	0	Residential
406	THO406		0	0	0	-	275	248	0	Highway Commercial
407	THO407		284	8	737	2.6	0	24	0	Residential
408	THO408		209	8	545	2.6	0	68	0	Residential, School
409	THO409		631	8	1641	2.6	0	54	0	Residential

Zone ID	Code	Community	Household	HH/Acre	Population	Pop/HH	Retail	Non-Retail	Industrial	Note
410	THO410		136	8	353	2.6	0	12	0	Residential
411	THO411		606	8	1577	2.6	0	52	0	Residential
412	THO412		0	0	0	-	422	380	0	Highway Commercial
413	THO413		798	8	2074	2.6	0	69	0	Residential
414	THO414		0	0	0	-	594	535	0	Highway Commercial
501	HAR501	Hardisty	246	2	627	2.5	50	200	0	Existing
502	HAR502		266	2	678	2.5	20	50	0	Existing
503	HAR503		647	2	1650	2.6	105	50	0	Existing
504	HAR504		220	3	561	2.6	80	50	0	Existing
505	HAR505		0	0	0	-	20	310	0	Existing
600	RIV600	Riverside	0	0	0	-	0	50	599	Existing
701	MOU701	Mountain View	423	3	1079	2.6	20	30	0	Existing
702	MOU702		310	2	791	2.6	120	30	350	Existing
703	MOU703		15	0	38	2.5	40	270	0	Existing
704	MOU704		40	1	100	2.5	220	0	0	Existing
800	WES800	West Riverside	86	0	215	2.5	0	30	30	Existing
900	MIE900	Miette	0	0	0	-	0	0	3083	Existing

Appendix B
Model Calibration

Assignment analysis, Network: Hinton_base_Final



Appendix C

Highway 16 Bypass Plans

CONSULTANT

JOB No. | PLAN No.

Stantec

FIGURE 2.1

HIGHWAY 16
FUNCTIONAL PLANNING STUDY
EAST INTERCHANGE
ORIGINAL CONFIGURATION (1982)

REGION	PLAN No.	PROJECT	CONTRACT No.	SHEET
				of

Alberta TRANSPORTATION

HORIZONTAL / VERTICAL

PROCESS | BY | DATE

TO IDMS

TO GIS

MICROFILMED

PLAN DESCRIPTION

BAR CODE

PLAN No. | CONTRACT No. | PLAN LOCATION

COORDINATE DATA: NAD 83 | BASE LONGITUDE

PHOTO No. | TITLE SEARCH DATE | GRAPHICS FILE

SURVEYED | DESIGNED | CHECKED | DRAWN

REVISION | BY | DATE | No.

DRINNAN WAY

HIGHWAY 16

CANADIAN NATIONAL RAILWAY

C.N.R.

EXTRA R/W

GAS PIPELINE R/W

POWER LINE R/W

ROAD ALLOWANCE

EXISTING HWY. 16

INTERCHANGE FROM 1982 STUDY

PROP. R/W BDY.

R = 2500
D = 17° 42' 05"

R = 4000
D = 11° 05' 42"

R = 500
A = 220

A = 280
R = 600

C.T. 33+863.394

T.C. 33+034.390

T.C. 30+655.277

C.T. 31+141.586

0+000

10+500

30+500

31+000

31+500

32+000

32+500

33+000

33+500

34+000

NE19 5I-24-5

SE30 5I-24-5

NW29 5I-24-5

SW29 5I-24-5

NE29 5I-24-5

SE32 5I-24-5

NW20 5I-24-5

SW20 5I-24-5

NE20 5I-24-5

SW28 5I-24-5

NW28 5I-24-5

SE28 5I-24-5

LOT 1

LOT 2

01/14/2005

W:\1135\active\113555102\planning\CD+align\Jan14+05\Fig+2+1.dgn

01/02/2005

r:\1355\active\135550102\planning\drawing\dwg\P3275-8.dgn

HIGHWAY 16
FUNCTIONAL PLANNING STUDY
PROPOSED HWY 16 REALIGNMENT
W. OF HINTON TO E. OF HINTON
ROBB ROAD INTERSECTION

Alberta TRANSPORTATION

REGION	PLAN No.	PROJECT	CONTRACT No.	SHEET
NORTH CENTRAL	P3275-8	HWY 16:02		1 of 2

CONSULTANT

Stantec

JOB No. 113555102 | PLAN No. 135551102P02A

P3275-8

No.	REVISION	BY	DATE

DRAWN / CHECKED / DESIGNED / SURVEYED

GRAPHICS FILE

PHOTO No

TITLE SEARCH DATE

COORDINATE DATA

BASE LONGITUDE: NAD 83

PLAN LOCATION

CONTRACT No.

PLAN No.

BAR CODE

PLAN DESCRIPTION

P3275-8

MICROFILMED

PROCESS / TO IDIMS / TO GIS / BY / DATE

LEASEHOLD BOUNDARY
PROPOSED ROW
CUT / FILL
ROAD CLOSURE
DRAINAGE

NORTH TERRACE HEIGHTS ASP BOUNDARY
PRIVATE OWNERSHIP
TERRACE HEIGHTS ASP BOUNDARY
HINTON WEST URBAN FRING JOINT ASP BOUNDARY

EXISTING HIGHWAY 16
ALIGNMENT OF BYPASS DEFINED BY 2005 STUDY - HIGHWAY 16X:02
TERRACE HIEGHT ASP BOUNDARY
PROPOSED HIGHWAY 16
PROPOSED PRAIRIE CREEK AVENUE
RR 254
NORTH TERRACE HEIGHTS ASP BOUNDARY
TOWN OF HINTON
YELLOWHEAD COUNTY
S.W.1/4 SEC.4-51-25-5
NW32 50-25-5
PROPOSED SERVICE ROAD
EXISTING HIGHWAY 40
PROJECT LIMITS
PROPOSED HIGHWAY 40
HIGHWAY BYPASS BOUNDARY
PROPOSED VIS LOCATION
HIGHWAY 40 REALIGNMENT WILL LIKELY BE REQUIRED BY 2065
PROPOSED ENGINEERED WETLANDS
ALIGNMENT DEFINED BY 2003 - HIGHWAY 40:30 STUDY
PROJECT LIMITS
PROPOSED SERVICE ROAD
MASKUTA CREEK
NE31 50-25-5
ROAD R/W
R 90 A 70
R 190 A 110
R 122.6 A 75
21+500
21+000
1+000
1+500
2+000
0+500
0+000

0 50 100 150 200m
SCALE 1:5000

CONSULTANT
ISL Engineering and Land Services

Alberta Transportation

HIGHWAY 16:02 FUNCTIONAL PLANNING STUDY
ULTIMATE STAGE (50 YEAR PLAN)

JOB No.	CONTRACT	HIGHWAY	SHEET	DRAWING
12457	June, 2014	16:02	B13	P-3417

DRAWING
HIGHWAY
CONTRACT
DESCRIPTION
PHOTO
DATE
BY
SURVEYED
DEPARTMENT BAR CODE

J:\12400\12457\A1_Hwy16_Twinning\02_drafting\02a_project\12457_alignment-40m-20120615_III_2.dgn - June 6, 2014 - sheet13

Jun/06/2014

12457_alignment-40m-20120615_III_2.dgn

Appendix D
Cost Estimates

HINTON TRANSPORTATION MASTER PLAN - RECOMMENDED UPGRADES
SCENARIO 1 -5
CLASS 4 - LEVEL COST ESTIMATE (+75% to -40%)

Scenario 1/2

Item	Quantity	Units	Unit Cost	Sub-Total (rounded)	Contingency 30%	Engineering 15%	Total Cost (rounded)
New Signal	2	ea	$ 500,000	$1,000,000	$300,000	$195,000	$1,500,000
Advanced Signal Warning	1	ea	$ 50,000	$50,000	$15,000	$9,750	$100,000
Drinnan Way SB right Turn Bay	1	LS	$ 300,000	$300,000	$90,000	$58,500	$500,000
						Total (rounded):	**$2,100,000**

Scenario 3

Item	Quantity	Units	Unit Cost	Sub-Total (rounded)	Contingency 30%	Engineering 15%	Total Cost (rounded)
New Signal on Highway 16	13	ea	$ 500,000	$6,500,000	$1,950,000	$1,267,500	$9,800,000
Retime Signal	4	ea	$ 5,000	$20,000	$6,000	$3,900	$100,000
Hwy 16 Left/Right Turn Bay (120m storage)	20	ea	$ 400,000	$8,000,000	$2,400,000	$1,560,000	$12,000,000
Add Turn Bay on Side Street	2	ea	$ 150,000	$300,000	$90,000	$58,500	$500,000
Street Lighting on Hwy 16	8	km	$ 400,000	$3,200,000	$960,000	$624,000	$4,800,000
Switzer Drive Twinning - Hardisty Ave. to Kelly Rd.	1	LS	$ 8,000,000	$8,000,000	$2,400,000	$1,560,000	$12,000,000
New Green Field Collector Road	10	km	$ 6,000,000	$60,000,000	$18,000,000	$11,700,000	$89,700,000
Add Turn Bay by Repainting Lines at Cross Streets to Highway 16	2	ea	$ 20,000	$40,000	$12,000	$7,800	$100,000
Drinnan Way Turn Bays onto Highway 16	1	LS	$ 550,000	$550,000	$165,000	$107,250	$900,000
New Unsiganlized Intersection Connection to Highway 16 (north and south)	4	ea	$ 500,000	$2,000,000	$600,000	$390,000	$3,000,000
New Unsignalized Intersection Connection to Highway 16 (north or south)	2	ea	$ 300,000	$600,000	$180,000	$117,000	$900,000
						Total (rounded):	**$133,800,000**

Scenario 4/5

Item	Quantity	Units	Unit Cost	Sub-Total (rounded)	Contingency 30%	Engineering 15%	Total Cost (rounded)
New Signal on Highway 16	12	ea	$ 500,000	$6,000,000	$1,800,000	$1,170,000	$9,000,000
Retime Signal	4	ea	$ 5,000	$20,000	$6,000	$3,900	$100,000
Hwy 16 Left/Right Turn Bay (120m storage)	20	ea	$ 400,000	$8,000,000	$2,400,000	$1,560,000	$12,000,000
Add Turn Bay on Side Street	2	ea	$ 150,000	$300,000	$90,000	$58,500	$500,000
Street Lighting on Hwy 16	8	km	$ 400,000	$3,200,000	$960,000	$624,000	$4,800,000
Switzer Drive Twinning - Hardisty Ave. to Kelly Rd.	1	LS	$ 8,000,000	$8,000,000	$2,400,000	$1,560,000	$12,000,000
New Green Field Collector Road	10	km	$ 6,000,000	$60,000,000	$18,000,000	$11,700,000	$89,700,000
Add Turn Bay by Repainting Lines at Cross Streets to Highway 16	2	ea	$ 20,000	$40,000	$12,000	$7,800	$100,000
Drinnan Way Turn Bays onto Highway 16	1	LS	$ 550,000	$550,000	$165,000	$107,250	$900,000
New Unsiganlized Intersection Connection to Highway 16 (north and south)	4	ea	$ 500,000	$2,000,000	$600,000	$390,000	$3,000,000
New Unsignalized Intersection Connection to Highway 16 (north or south)	2	ea	$ 300,000	$600,000	$180,000	$117,000	$900,000
						Total (rounded):	**$133,000,000**

HINTON TRANSPORTATION MASTER PLAN - RECOMMENDED UPGRADES

CLASS 4 - LEVEL COST ESTIMATE (+75% to -40%)

Item	HINTON TRANSPORTATION MASTER PLAN - RECOMMENDED UPGRADES CLASS 4 - LEVEL COST ESTIMATE (+75% to -40%)										
	New Green Field Arterial	New Green Field Collector	Twinning Switzer Drive Kelly Road to Hardisty Avenue *	Street Lighting	New Advanced Warning Flasher	New Signal Light (AT Standard with Lighting)	New Signal Light (Typical)	Added Lane on HWY 16	Intersection Upgrade All Turns Access	Intersection Improvement Turn Bay Entering HWY 16 (L/R)	Intersection Improvement Turn Bay Exiting HWY 16 (L/R)
LUMP SUM			$10,870,000		$50,000	$500,000	$350,000		$500,000	$300,000	$400,000
PER KILOMETRE COST	$8,000,000	$6,000,000		$400,000				$4,000,000			
(TURN BAYS / INTERSECTIONS) 20%	$1,600,000	$1,200,000									
CONTINGENCY 30%	$2,880,000	$2,200,000	$3,300,000	$120,000	$20,000	$150,000	$110,000	$1,200,000	$150,000	$90,000	$120,000
ENGINEERING AND TESTING 15%	$1,900,000	$1,400,000	$2,100,000	$80,000	$10,000	$100,000	$70,000	$800,000	$100,000	$60,000	$80,000
Class 4 Cost Per Upgrade (rounded)	**$14,380,000**	**$10,800,000**	**$16,270,000**	**$600,000**	**$80,000**	**$750,000**	**$530,000**	**$6,000,000**	**$750,000**	**$450,000**	**$600,000**

HINTON TRANSPORTATION MASTER PLAN - RECOMMENDED UPGRADES
ROADWORKS DETAILS
CLASS 4 - LEVEL COST ESTIMATE (+75% to -40%)

			New Green Field Arterial		New Green Field Collector		1 Added Lane on HWY 16		Intersection Upgrade North and South Legs to Hwy 16		Intersection Upgrade One Leg Connection to Hwy 16		Intersection Improvement Turn Bay onto HWY 16 (L/R)		Intersection Improvement Turn Bay leaving HWY 16 (L/R)	
			ROW Length (m) 36		ROW Length (m) 24		ROW Length (m) 100		ROW Length (m)		ROW Length (m)		ROW Length (m)		ROW Length (m)	
			Increase (m) 100		Increase (m) 100		Increase (m)		Increase (m) 50		Increase (m) 25		Increase (m) 75		Increase (m) 120	
			Width (m)		Width (m)		Width (m) 0.3		Width (m)		Width (m)		Width (m)		Width (m)	
			Increase (m) 19		Increase (m) 15		Increase (m) 3.75		Increase (m) 30		Increase (m) 15		Increase (m) 3.75		Increase (m) 3.75	
Description	**Unit**	**Unit Price**	**Quantity**	**Total Price**	**Quantity**	**Total Price**	**Quantity**	**Total Price**	**Quantity**	**Total Price**	**Quantity**	**Total Price**	**Quantity**	**Total Price**	**Quantity**	**Total Price**
REMOVALS																
Remove Asphalt Pavement Structure (milling	m^2	$ 8.00	0	$ -	0	$ -	30	$ 240.00	250	$ 2,000.00	250	$ 2,000.00	22.5	$ 180.00	36	$ 288.00
Remove Granular Road Structure	m^2	$ 10.00	0	$ -	0	$ -	0	$ -		$ -		$ -		$ -		$ -
Remove Concrete Curb & Gutter	m	$ 25.00	0	$ -	0	$ -	100	$ 2,500.00		$ -		$ -	75	$ 1,875.00	120	$ 3,000.00
Remove Concrete Sidewalk	m	$ 35.00	0	$ -	0					$ -		$ -	75	$ 2,625.00		$ -
EARTHWORKS																
Stripping	m^3	$ 22.00	3600	$ 79,200.00	2400	$ 52,800.00	110	$ 2,420.00	450	$ 9,900.00	112.5	$ 2,475.00	281.25	$ 6,187.50	450	$ 9,900.00
Waste Material	m^3	$ 40.00	900	$ 36,000.00	600	$ 24,000.00	410	$ 16,400.00	750	$ 30,000.00	187.5	$ 7,500.00	140.625	$ 5,625.00	225	$ 9,000.00
Common Excavation	m^3	$ 10.00	1800	$ 18,000.00	1200	$ 12,000.00	187.5	$ 1,875.00	1500	$ 15,000.00	375	$ 3,750.00	281.25	$ 2,812.50	450	$ 4,500.00
Imported Fill under Roadway	m^3	$ 40.00	1080	$ 43,200.00	720	$ 28,800.00	562.5	$ 22,500.00	1250	$ 50,000.00	1250	$ 50,000.00	562.5	$ 22,500.00	900	$ 36,000.00
ROADWORKS																
Subgrade Preparation	m^2	$ 3.00	2100	$ 6,300.00	1600	$ 4,800.00	500	$ 1,500.00	1500	$ 4,500.00	375	$ 1,125.00	356.25	$ 1,068.75	570	$ 1,710.00
Granular Sub Base - 80mm (325mm thick)	m^2	$ 21.00	2100	$ 44,100.00	1600	$ 33,600.00	500	$ 10,500.00	1500	$ 31,500.00	375	$ 7,875.00	356.25	$ 7,481.25	570	$ 11,970.00
Granular Base - 25 mm (125mm thick)	m^2	$ 10.00	2100	$ 21,000.00	1600	$ 16,000.00	500	$ 5,000.00	1500	$ 15,000.00	375	$ 3,750.00	356.25	$ 3,562.50	570	$ 5,700.00
Asphalt Mix 'Base Course' - 100mm thick	m^2	$ 30.00	1900	$ 57,000.00	1500	$ 45,000.00	400	$ 12,000.00	1500	$ 45,000.00	375	$ 11,250.00	281.25	$ 8,437.50	450	$ 13,500.00
Asphalt Mix 'Surface Course' - 75mm thick	m^2	$ 25.00	1900	$ 47,500.00	1500	$ 37,500.00	400	$ 10,000.00	1500	$ 37,500.00	375	$ 9,375.00	281.25	$ 7,031.25	450	$ 11,250.00
2.5m Asphalt Pathway cw granular base and filter fabric	m^2	$ 65.00	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -
Concrete Curb and Gutter	m	$ 150.00	400	$ 60,000.00	200	$ 30,000.00	100	$ 15,000.00	0	$ -	0	$ -	75	$ 11,250.00	120	$ 18,000.00
Concrete Sidewalk 1.5m	m	$ 250.00	200	$ 50,000.00	200	$ 50,000.00				$ -		$ -	75	$ 18,750.00		$ -
STORM																
S&I 250mm Catch Basin Lead - PVC SDR-35 Pipe	m	$ 300.00	60	$ 18,000.00	60	$ 18,000.00	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -
S&I 600mm Storm Sewer Lead - PVC SDR-35 Pipe	m	$ 750.00	100	$ 75,000.00	100	$ 75,000.00	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -
S&I Single Type C Catch Basins	each	$ 5,500.00	4	$ 22,000.00	4	$ 22,000.00	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -
S&I 1-S MH (1220x1220)	each	$ 15,000.00	2	$ 30,000.00	2	$ 30,000.00	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -
Tie-in to MH	each	$ 2,500.00	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -
ANCILLARY																
Landscaping Allowance	LS	$ 250,000.00	0.2	$ 50,000.00	0.1	$ 25,000.00	0.1	$ 25,000.00	0.3	$ 75,000.00	0.3	$ 75,000.00	0.1	$ 25,000.00	0.2	$ 50,000.00
Signal Lighting Allowance with AT lighting requirement	LS	$ 500,000.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -
Signal Lighting Allowance without AT lighting requirement	LS	$ 350,000.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -
Street Lighting Allowance	LS	$ 100,000.00	0.6	$ 60,000.00	0.3	$ 30,000.00	1.5	$ 150,000.00	0.75	$ 75,000.00	0.5	$ 50,000.00	0.25	$ 25,000.00	0.5	$ 50,000.00
Utility Relocation Allowance	LS	$ 150,000.00		$ -		$ -	0	$ -	0	$ -	0	$ -	0.3	$ 45,000.00	0.5	$ 75,000.00
Land Acquisition Allowance	LS	$ -	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -
Mobilization Allowance	LS	7%		$ 60,000.00		$ 40,000.00		$ 20,000.00		$ 30,000.00		$ 20,000.00		$ 20,000.00		$ 30,000.00
Traffic Accommodation Allowance	LS	5%						$ 20,000.00		$ 20,000.00		$ 20,000.00		$ 10,000.00		$ 20,000.00
SUBTOTAL (rounded):				$ 800,000.00		$ 600,000.00		$ 400,000.00		$ 500,000.00		$ 300,000.00		$ 300,000.00		$ 400,000.00
(TURN BAYS / INTERSECTIONS):	**20%**			$ 160,000.00		$ 120,000.00										
CONTINGENCY:	**30%**			$ 288,000.00		$ 216,000.00		$ 120,000.00		$ 150,000.00		$ 90,000.00		$ 90,000.00		$ 120,000.00
ENGINEERING:	**15%**			$ 187,200.00		$ 140,400.00		$ 78,000.00		$ 97,500.00		$ 58,500.00		$ 58,500.00		$ 78,000.00
CLASS 4 ESTIMATE (rounded):				$ 1,440,000.00		$ 1,080,000.00		$ 600,000.00		$ 750,000.00		$ 450,000.00		$ 450,000.00		$ 600,000.00
BASE COST PER km:				$ 14,400,000.00		$ 10,800,000.00		$ 6,000,000.00								

*** October 2017 PRICING**

5/1/2018

Town of Hinton 0-25 Year Capital Plan Cost Estimate

2018 Master Plans

2% inflation increase

Infrastructure Master Plan	Project Description	Present Value	0-5 Years Total	6-10 Years Total	11-25 Years Total	Years Out / Year of Anticipated Upgrade						
						0	1	2	3	4	5	6
						2018	2019	2020	2021	2022	2023	2024
Stormwater MP												
	Capital Annual Allowance	$ 100,000.00	$ 630,000.00	$ 580,000.00	$ 2,040,000.00	$ 100,000.00	$ 102,000.00	$ 104,000.00	$ 106,000.00	$ 108,000.00	$ 110,000.00	$ 112,000.00
Transportation MP												
	Capital Annual Allowance	$ 250,000.00	$ 1,575,000.00	$ 1,450,000.00	$ 5,100,000.00	$ 250,000.00	$ 255,000.00	$ 260,000.00	$ 265,000.00	$ 270,000.00	$ 275,000.00	$ 280,000.00
Full Build-out of Qualico/Terrace Heights												
	New Signal (Keil Drive)	$ 500,000.00	$ -	$ -	$ 640,000.00							
	New Signal (Woodley Drive)	$ 500,000.00	$ -	$ -	$ 700,000.00							
	New Signal Timing (Carmichael Lane)	$ 10,000.00	$ -	$ -	$ 14,000.00							
	New Signal Timing (Jarvis Street)	$ 10,000.00	$ -	$ -	$ 14,000.00							
	New Signal Timing (Switzer Drive)	$ 10,000.00	$ -	$ -	$ 12,800.00							
Full Build-out of Thompson Lake												
	New Advanced Warning Flasher (Drinnan Way)	$ 80,000.00	$ -	$ 96,000.00	$ -							
	New Signal (Drinnan Way)	$ 750,000.00	$ -	$ 900,000.00	$ -							
	New Signal (Brookhart Street)	$ 750,000.00	$ -	$ -	$ 1,095,000.00							
	New Signal (Mcardell Drive)	$ 750,000.00	$ -	$ -	$ 1,005,000.00							
	Turn Improvements - Line Painting (Mcardell Drive and Dow Drive	$ 40,000.00	$ -	$ -	$ 53,600.00							
	Turn Improvements - Line Painting (Brookhart Street and Felaber Roac	$ 40,000.00	$ -	$ -	$ 58,400.00							
	Intersection Upgrade Added Right Turn Lane (Drinnan Way	$ 450,000.00	$ -	$ 540,000.00	$ -							
Wastewater MP												
	Install 250 mm gravity (Mountain Street)	$ 300,000.00	$ 306,000.00	$ -	$ -		$ 306,000.00					
	Install 300 mm gravity (Switzer Drive at Robb Road	$ 2,200,000.00	$ 2,288,000.00	$ -	$ -			$ 2,288,000.00				
	Install 300 mm gravity (Gregg Avenue)	$ 2,600,000.00	$ 2,860,000.00	$ -	$ -						$ 2,860,000.00	
	Install 750 mm gravity (Switzer Drive at King Street)	$ 900,000.00	$ 972,000.00	$ -	$ -					$ 972,000.00		
	Install 750 mm gravity (Switzer Drive at Kelley Road	$ 300,000.00	$ 306,000.00	$ -	$ -		$ 306,000.00					
	Install Catchbasin Lead (Thompson Place	$ 300,000.00	$ 318,000.00	$ -	$ -				$ 318,000.00			
Full Build-out of Qualico/Terrace Heights	Install 750 mm Sewer (Carmichael Lane)	$ 1,600,000.00	$ -	$ 1,856,000.00	$ -							
Water MP												
Project 1	Replace 150 mm with 300 mm (Woodley Drive)	$ 1,000,000.00	$ 1,060,000.00	$ -	$ -				$ 1,060,000.00			
Project 2	Install 300 mm PVC (Wanyandi Avenue from Lovsin Street to Balsam Avenue	$ 500,000.00	$ 510,000.00	$ -	$ -		$ 510,000.00					
Project 3	Replace 250 mm CI with 400 mm PVC (Gregg Avenue)	$ 600,000.00	$ 660,000.00	$ -	$ -						$ 660,000.00	
Project 4	Replace 150 mm CI with 200 mm PVC (Ceal Square)	$ 200,000.00	$ 208,000.00	$ -	$ -			$ 208,000.00				
Project 5	150 mm CI with a 250 mm PVC (Jarvis Street from Switzer Drive to the end of the line)	$ 160,000.00	$ 176,000.00	$ -	$ -						$ 176,000.00	
Project 6	Replace 200mm with 300mm PVC (Cheviot Drive)	$ 910,000.00	$ 964,600.00	$ -	$ -				$ 964,600.00			
Full Build-out of Thompson Lake	East ASP Reservoir	$ 2,500,000.00	$ -	$ -	$ 3,250,000.00							
	Install 900 mm Supply Line	$ 3,600,000.00	$ -	$ -	$ 4,536,000.00							
	Install 600 mm Supply Line	$ 300,000.00	$ -	$ -	$ 378,000.00							
	Install Pressure Reducing Valves (x2	$ 100,000.00	$ -	$ -	$ 126,000.00							
Full Build-out of Qualico/Terrace Heights	Terrace Heights Reservoir	$ 2,500,000.00	$ -	$ -	$ 3,050,000.00							
	Install 600 mm Supply Line	$ 1,600,000.00	$ -	$ 1,888,000.00	$ -							
	Install Pressure Reducing Valves (x4	$ 200,000.00	$ -	$ 236,000.00	$ -							

Year of Anticipated Upgrade	2018	2019	2020	2021	2022	2023	2024
Stormwater MP Subtotal	$ 100,000.00	$ 102,000.00	$ 104,000.00	$ 106,000.00	$ 108,000.00	$ 110,000.00	$ 112,000.00
Transportation MP Subtotal	$ 250,000.00	$ 255,000.00	$ 260,000.00	$ 265,000.00	$ 270,000.00	$ 275,000.00	$ 280,000.00
Wastewater MP Subtotal	$ -	$ 612,000.00	$ 2,288,000.00	$ 318,000.00	$ 972,000.00	$ 2,860,000.00	$ -
Water MP Subtotal	$ -	$ 510,000.00	$ 208,000.00	$ 2,024,600.00	$ -	$ 836,000.00	$ -
Subtotal	$ 350,000.00	$ 1,479,000.00	$ 2,860,000.00	$ 2,713,600.00	$ 1,350,000.00	$ 4,081,000.00	$ 392,000.00
Rounded Total ($10,000)	$ 350,000.00	$ 1,480,000.00	$ 2,860,000.00	$ 2,720,000.00	$ 1,350,000.00	$ 4,090,000.00	$ 400,000.00

Notes:

Cast Iron (CI) replacement program is typically done during a road replacement project or an emergency situation such as watermain break. A cost benefit of each should be reviewed in conjunction with the roadworks program to confirm ideal timing

This spreadsheet does not account for AT constructing the bypass, as well as additional intersection closure

Future storm is assumed to be developer funde

2% increase has been applied for years 1-2

August 2018

Town of Hinton 0-25 Year Capital Plan Cost Estimate

2018 Master Plans

2% Inflation increase

Infrastructure Master Plan	Project Description	Present Value	0-5 Years Total	6-10 Years Total	11-25 Years Total	Years Out / Year of Anticipated Upgrade									
						7	8	9	10	11	12	13	14	15	16
						2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Stormwater MP															
	Capital Annual Allowance	$ 100,000.00	$ 630,000.00	$ 580,000.00	$ 2,040,000.00	$ 114,000.00	$ 116,000.00	$ 118,000.00	$ 120,000.00	$ 122,000.00	$ 124,000.00	$ 126,000.00	$ 128,000.00	$ 130,000.00	$ 132,000.00
Transportation MP															
	Capital Annual Allowance	$ 250,000.00	$ 1,575,000.00	$ 1,450,000.00	$ 5,100,000.00	$ 285,000.00	$ 290,000.00	$ 295,000.00	$ 300,000.00	$ 305,000.00	$ 310,000.00	$ 315,000.00	$ 320,000.00	$ 325,000.00	$ 330,000.00
Full Build-out of Qualico/Terrace Heights															
	New Signal (Keil Drive)	$ 500,000.00	$ -	$ -	$ 640,000.00								$ 640,000.00		
	New Signal (Woodley Drive)	$ 500,000.00	$ -	$ -	$ 700,000.00										
	New Signal Timing (Carmichael Lane)	$ 10,000.00	$ -	$ -	$ 14,000.00										
	New Signal Timing (Jarvis Street)	$ 10,000.00	$ -	$ -	$ 14,000.00										
	New Signal Timing (Switzer Drive)	$ 10,000.00	$ -	$ -	$ 12,800.00								$ 12,800.00		
Full Build-out of Thompson Lake															
	New Advanced Warning Flasher (Drinnan Way)	$ 80,000.00	$ -	$ 96,000.00	$ -				$ 96,000.00						
	New Signal (Drinnan Way)	$ 750,000.00	$ -	$ 900,000.00	$ -				$ 900,000.00						
	New Signal (Brookhart Street)	$ 750,000.00	$ -	$ -	$ 1,095,000.00										
	New Signal (Mcardell Drive)	$ 750,000.00	$ -	$ -	$ 1,005,000.00										
	Turn Improvements - Line Painting (Mcardell Drive and Dow Drive	$ 40,000.00	$ -	$ -	$ 53,600.00										
	Turn Improvements - Line Painting (Brookhart Street and Felaber Roac	$ 40,000.00	$ -	$ -	$ 58,400.00										
	Intersection Upgrade Added Right Turn Lane (Drinnan Way	$ 450,000.00	$ -	$ 540,000.00	$ -				$ 540,000.00						
Wastewater MP															
	Install 250 mm gravity (Mountain Street)	$ 300,000.00	$ 306,000.00	$ -	$ -										
	Install 300 mm gravity (Switzer Drive at Robb Road	$ 2,200,000.00	$ 2,288,000.00	$ -	$ -										
	Install 300 mm gravity (Gregg Avenue)	$ 2,600,000.00	$ 2,860,000.00	$ -	$ -										
	Install 750 mm gravity (Switzer Drive at King Street)	$ 900,000.00	$ 972,000.00	$ -	$ -										
	Install 750 mm gravity (Switzer Drive at Kelley Road	$ 300,000.00	$ 306,000.00	$ -	$ -										
	Install Catchbasin Lead (Thompson Place	$ 300,000.00	$ 318,000.00	$ -	$ -										
Full Build-out of Qualico/Terrace Heights	Install 750 mm Sewer (Carmichael Lane)	$ 1,600,000.00	$ -	$ 1,856,000.00	$ -		$ 1,856,000.00								
Water MP															
Project 1	Replace 150 mm with 300 mm (Woodley Drive)	$ 1,000,000.00	$ 1,060,000.00	$ -	$ -										
Project 2	Install 300 mm PVC (Wanyandi Avenue from Lovsin Street to Balsam Avenue	$ 500,000.00	$ 510,000.00	$ -	$ -										
Project 3	Replace 250 mm CI with 400 mm PVC (Gregg Avenue)	$ 600,000.00	$ 660,000.00	$ -	$ -										
Project 4	Replace 150 mm CI with 200 mm PVC (Ceal Square)	$ 200,000.00	$ 208,000.00	$ -	$ -										
Project 5	150 mm CI with a 250 mm PVC (Jarvis Street from Switzer Drive to the end of the line)	$ 160,000.00	$ 176,000.00	$ -	$ -										
Project 6	Replace 200mm with 300mm PVC (Cheviot Drive)	$ 910,000.00	$ 964,600.00	$ -	$ -										
Full Build-out of Thompson Lake	East ASP Reservoir	$ 2,500,000.00	$ -	$ -	$ 3,250,000.00									$ 3,250,000.00	
	Install 900 mm Supply Line	$ 3,600,000.00	$ -	$ -	$ 4,536,000.00							$ 4,536,000.00			
	Install 600 mm Supply Line	$ 300,000.00	$ -	$ -	$ 378,000.00							$ 378,000.00			
	Install Pressure Reducing Valves (x2	$ 100,000.00	$ -	$ -	$ 126,000.00							$ 126,000.00			
Full Build-out of Qualico/Terrace Heights	Terrace Heights Reservoir	$ 2,500,000.00	$ -	$ -	$ 3,050,000.00					$ 3,050,000.00					
	Install 600 mm Supply Line	$ 1,600,000.00	$ -	$ 1,888,000.00	$ -			$ 1,888,000.00							
	Install Pressure Reducing Valves (x4	$ 200,000.00	$ -	$ 236,000.00	$ -			$ 236,000.00							

Year of Anticipated Upgrade						2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Stormwater MP Subtotal						$ 114,000.00	$ 116,000.00	$ 118,000.00	$ 120,000.00	$ 122,000.00	$ 124,000.00	$ 126,000.00	$ 128,000.00	$ 130,000.00	$ 132,000.00
Transportation MP Subtotal						$ 285,000.00	$ 290,000.00	$ 295,000.00	$ 1,836,000.00	$ 305,000.00	$ 310,000.00	$ 315,000.00	$ 972,800.00	$ 325,000.00	$ 330,000.00
Wastewater MP Subtotal						$ -	$ 1,856,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Water MP Subtotal						$ -	$ -	$ 2,124,000.00	$ -	$ 3,050,000.00	$ -	$ 5,040,000.00	$ -	$ 3,250,000.00	$ -
Subtotal						$ 399,000.00	$ 2,262,000.00	$ 2,537,000.00	$ 1,956,000.00	$ 3,477,000.00	$ 434,000.00	$ 5,481,000.00	$ 1,100,800.00	$ 3,705,000.00	$ 462,000.00
Rounded Total ($10,000)						$ 400,000.00	$ 2,270,000.00	$ 2,540,000.00	$ 1,960,000.00	$ 3,480,000.00	$ 440,000.00	$ 5,490,000.00	$ 1,110,000.00	$ 3,710,000.00	$ 470,000.00

Notes:

Cast Iron (CI) replacement program is typically done during a road replacement project or an emergency situation such as watermain break. A cost benefit of each should be reviewed in conjunction with the roadworks program to confirm ideal timing

This spreadsheet does not account for AT constructing the bypass, as well as additional intersection closure

Future storm is assumed to be developer funde

2% increase has been applied for years 1-2

August 2018

Town of Hinton 0-25 Year Capital Plan Cost Estimate

2018 Master Plans

2% Inflation increase

Infrastructure Master Plan	Project Description	Present Value	0-5 Years Total	6-10 Years Total	11-25 Years Total	Years Out / Year of Anticipated Upgrade								
						17	18	19	20	21	22	23	24	25
						2035	2036	2037	2038	2039	2040	2041	2042	2043
Stormwater MP														
	Capital Annual Allowance	$ 100,000.00	$ 630,000.00	$ 580,000.00	$ 2,040,000.00	$ 134,000.00	$ 136,000.00	$ 138,000.00	$ 140,000.00	$ 142,000.00	$ 144,000.00	$ 146,000.00	$ 148,000.00	$ 150,000.00
Transportation MP														
	Capital Annual Allowance	$ 250,000.00	$ 1,575,000.00	$ 1,450,000.00	$ 5,100,000.00	$ 335,000.00	$ 340,000.00	$ 345,000.00	$ 350,000.00	$ 355,000.00	$ 360,000.00	$ 365,000.00	$ 370,000.00	$ 375,000.00
Full Build-out of Qualico/Terrace Heights														
	New Signal (Keil Drive)	$ 500,000.00	$ -	$ -	$ 640,000.00									
	New Signal (Woodley Drive)	$ 500,000.00	$ -	$ -	$ 700,000.00				$ 700,000.00					
	New Signal Timing (Carmichael Lane)	$ 10,000.00	$ -	$ -	$ 14,000.00				$ 14,000.00					
	New Signal Timing (Jarvis Street)	$ 10,000.00	$ -	$ -	$ 14,000.00				$ 14,000.00					
	New Signal Timing (Switzer Drive)	$ 10,000.00	$ -	$ -	$ 12,800.00									
Full Build-out of Thompson Lake														
	New Advanced Warning Flasher (Drinnan Way)	$ 80,000.00	$ -	$ 96,000.00	$ -									
	New Signal (Drinnan Way)	$ 750,000.00	$ -	$ 900,000.00	$ -									
	New Signal (Brookhart Street)	$ 750,000.00	$ -	$ -	$ 1,095,000.00							$ 1,095,000.00		
	New Signal (Mcardell Drive)	$ 750,000.00	$ -	$ -	$ 1,005,000.00	$ 1,005,000.00								
	Turn Improvements - Line Painting (Mcardell Drive and Dow Drive	$ 40,000.00	$ -	$ -	$ 53,600.00	$ 53,600.00								
	Turn Improvements - Line Painting (Brookhart Street and Felaber Roac	$ 40,000.00	$ -	$ -	$ 58,400.00							$ 58,400.00		
	Intersection Upgrade Added Right Turn Lane (Drinnan Way	$ 450,000.00	$ -	$ 540,000.00	$ -									
Wastewater MP														
	Install 250 mm gravity (Mountain Street)	$ 300,000.00	$ 306,000.00	$ -	$ -									
	Install 300 mm gravity (Switzer Drive at Robb Road	$ 2,200,000.00	$ 2,288,000.00	$ -	$ -									
	Install 300 mm gravity (Gregg Avenue)	$ 2,600,000.00	$ 2,860,000.00	$ -	$ -									
	Install 750 mm gravity (Switzer Drive at King Street)	$ 900,000.00	$ 972,000.00	$ -	$ -									
	Install 750 mm gravity (Switzer Drive at Kelley Road	$ 300,000.00	$ 306,000.00	$ -	$ -									
	Install Catchbasin Lead (Thompson Place	$ 300,000.00	$ 318,000.00	$ -	$ -									
Full Build-out of Qualico/Terrace Heights	Install 750 mm Sewer (Carmichael Lane)	$ 1,600,000.00	$ -	$ 1,856,000.00	$ -									
Water MP														
Project 1	Replace 150 mm with 300 mm (Woodley Drive)	$ 1,000,000.00	$ 1,060,000.00	$ -	$ -									
Project 2	Install 300 mm PVC (Waryandi Avenue from Lovsin Street to Balsam Avenue	$ 500,000.00	$ 510,000.00	$ -	$ -									
Project 3	Replace 250 mm CI with 400 mm PVC (Gregg Avenue)	$ 600,000.00	$ 660,000.00	$ -	$ -									
Project 4	Replace 150 mm CI with 200 mm PVC (Ceal Square)	$ 200,000.00	$ 208,000.00	$ -	$ -									
Project 5	150 mm CI with a 250 mm PVC (Jarvis Street from Switzer Drive to the end of the line)	$ 160,000.00	$ 176,000.00	$ -	$ -									
Project 6	Replace 200mm with 300mm PVC (Cheviot Drive)	$ 910,000.00	$ 964,600.00	$ -	$ -									
Full Build-out of Thompson Lake	East ASP Reservoir	$ 2,500,000.00	$ -	$ -	$ 3,250,000.00									
	Install 900 mm Supply Line	$ 3,600,000.00	$ -	$ -	$ 4,536,000.00									
	Install 600 mm Supply Line	$ 300,000.00	$ -	$ -	$ 378,000.00									
	Install Pressure Reducing Valves (x2	$ 100,000.00	$ -	$ -	$ 126,000.00									
Full Build-out of Qualico/Terrace Heights	Terrace Heights Reservoir	$ 2,500,000.00	$ -	$ -	$ 3,050,000.00									
	Install 600 mm Supply Line	$ 1,600,000.00	$ -	$ 1,888,000.00	$ -									
	Install Pressure Reducing Valves (x4	$ 200,000.00	$ -	$ 236,000.00	$ -									

	Year of Anticipated Upgrade	2035	2036	2037	2038	2039	2040	2041	2042	2043
	Stormwater MP Subtotal	$ 134,000.00	$ 136,000.00	$ 138,000.00	$ 140,000.00	$ 142,000.00	$ 144,000.00	$ 146,000.00	$ 148,000.00	$ 150,000.00
	Transportation MP Subtotal	$ 1,393,600.00	$ 340,000.00	$ 345,000.00	$ 1,078,000.00	$ 355,000.00	$ 360,000.00	$ 1,518,400.00	$ 370,000.00	$ 375,000.00
	Wastewater MP Subtotal	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Water MP Subtotal	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Subtotal	$ 1,527,600.00	$ 476,000.00	$ 483,000.00	$ 1,218,000.00	$ 497,000.00	$ 504,000.00	$ 1,664,400.00	$ 518,000.00	$ 525,000.00
	Rounded Total ($10,000)	$ 1,530,000.00	$ 480,000.00	$ 490,000.00	$ 1,220,000.00	$ 500,000.00	$ 510,000.00	$ 1,670,000.00	$ 520,000.00	$ 530,000.00

Notes:

Cast Iron (CI) replacement program is typically done during a road replacement project or an emergency situation such as watermain break. A cost benefit of each should be reviewed in conjunction with the roadworks program to confirm ideal timing

This spreadsheet does not account for AT constructing the bypass, as well as additional intersection closure

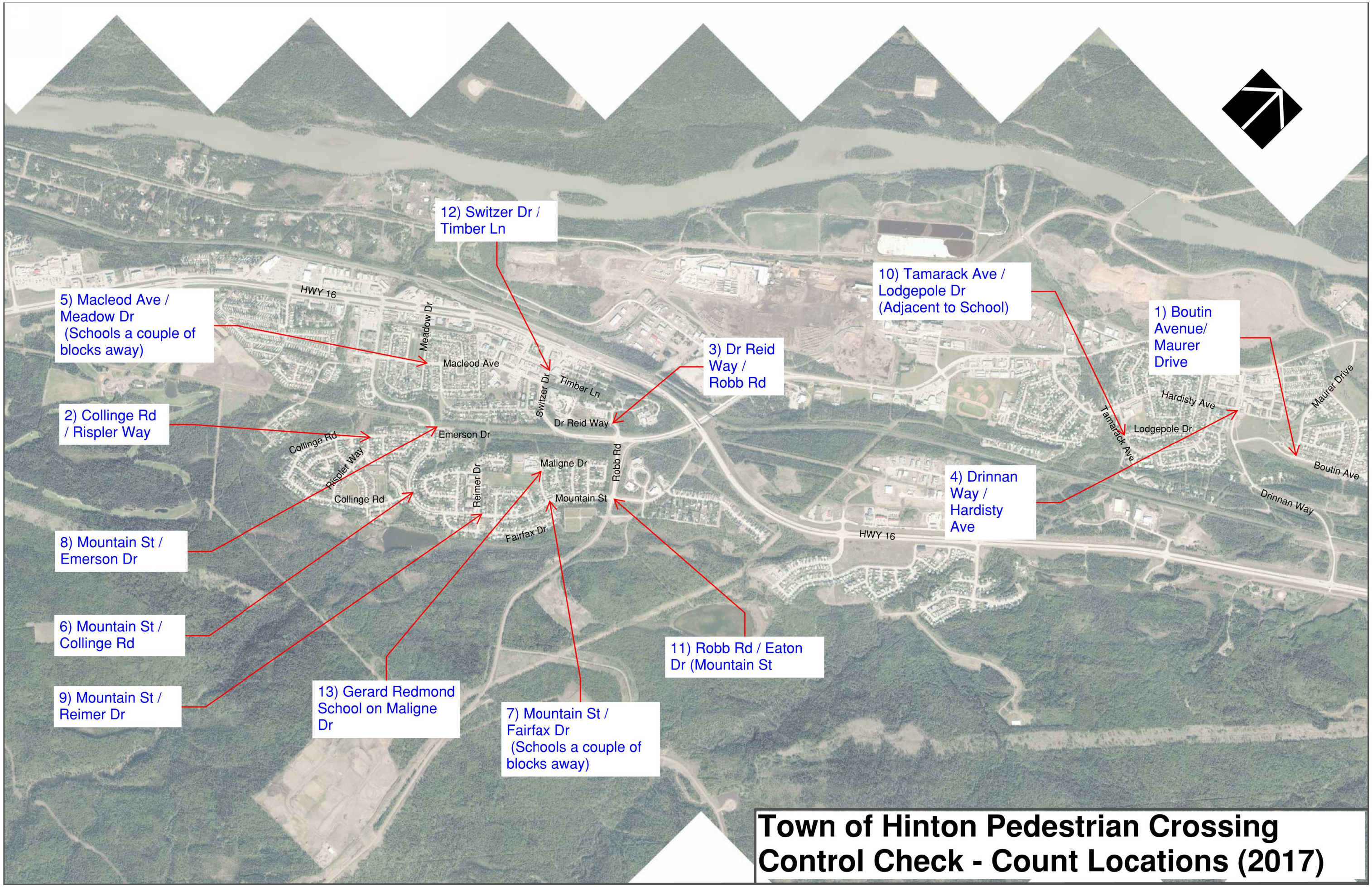
Future storm is assumed to be developer funde

2% increase has been applied for years 1-2

August 2018

Appendix E

Pedestrian Crossing Control Check Data



Town of Hinton Pedestrian Crossing Control Check - Count Locations (2017)

Town of Hinton - Traffic Signal Warrant Analysis

Main Street (name)	Boutin Ave	Direction (EW or NS)	EW
Side Street (name)	Maurer Dr	Direction (EW or NS)	NS
Quadrant / Int #		Comments	Note: 6 hour peak = (AM peak + Pm peak) * 2.61
for Warrant Calculation Results, please hit 'Page Down'	CHECK SHEET		

Road Authority:	Town of Hinton
City:	Hinton, AB
Analysis Date:	2017 Jul 13, Thu
Count Date:	2017 Jun 20, Tue
Date Entry Format:	(yyyy-mm-dd)

Lane Configuration		Excl LT	Th & LT	Through	Th+RT+LT	Th & RT	Excl RT	UpStream Signal (m)	# of Thru Lanes
Boutin Ave	WB					1		5,000	1
Boutin Ave	EB		1					5,000	1
Maurer Dr	NB								
Maurer Dr	SB				1				

Are the Maurer Dr SB right turns significantly impeded by through movements? (y/n) n

Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	y
Pathway to School	(y/n)	n
Metro Area Population	(#)	10,000
Central Business District	(y/n)	n

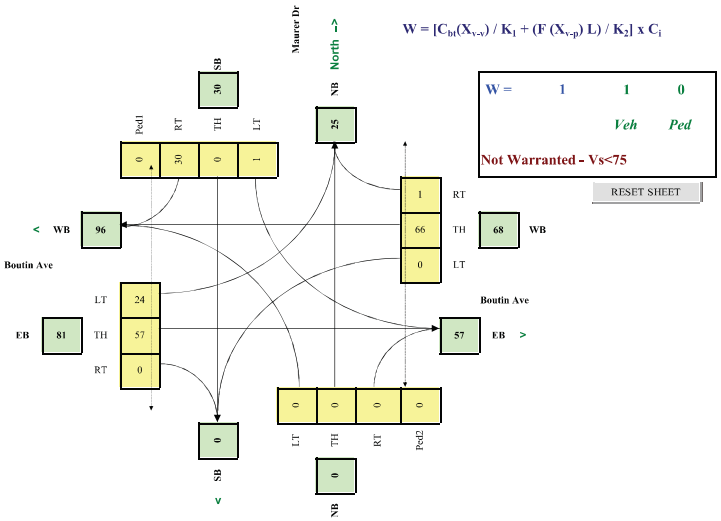
Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
Boutin Ave	EW	50	9.8%	y	0.0
Maurer Dr	NS		3.6%	n	

Set Peak Hours

Traffic Input	NB			SB			WB			EB			Ped1 NS	Ped2 NS	Ped3 EW	Ped4 EW
	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	W Side	E Side	N Side	S Side
press 'Set Peak Hours' Button to set the peak hour periods																
	0	0	0	5	0	177	0	397	8	144	339	0	0	0	8	0
Total (6-hour peak)	0	0	0	5	0	177	0	397	8	144	339	0	0	0	8	0
Average (6-hour peak)	0	0	0	1	0	30	0	66	1	24	57	0	0	0	1	0

Average 6-hour Peak Turning Movements

$$W = [C_{bt}(X_{v-v}) / K_1 + (F\,(X_{v-p})\,L) / K_2] \times C_i$$



W = 1 1 0

Veh *Ped*

Not Warranted - Vs<75

RESET SHEET

APPENDIX A

Town of Hinton - Traffic Signal Warrant Analysis

Main Street (name)	Collinge Rd	Direction (EW or NS)	NS
Side Street (name)	Rispler Way	Direction (EW or NS)	EW
Quadrant / Int #		Comments	Note: 6 hour peak = (AM peak + Pm peak) * 2.61
for Warrant Calculation Results, please hit 'Page Down'	CHECK SHEET		

Road Authority:	Town of Hinton
City:	Hinton, AB
Analysis Date:	2017 Jul 13, Thu
Count Date:	2017 Jun 23, Fri
Date Entry Format:	(yyyy-mm-dd)

Lane Configuration		Excl LT	Th & LT	Through	Th+RT+LT	Th & RT	Excl RT	UpStream Signal (m)	# of Thru Lanes
Collinge Rd	NB					1		5,000	1
Collinge Rd	SB		1					5,000	1
Rispler Way	WB				1				
Rispler Way	EB								

Are the Rispler Way WB right turns significantly impeded by through movements? (y/n) n

Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	y
Metro Area Population	(#)	10,000
Central Business District	(y/n)	n

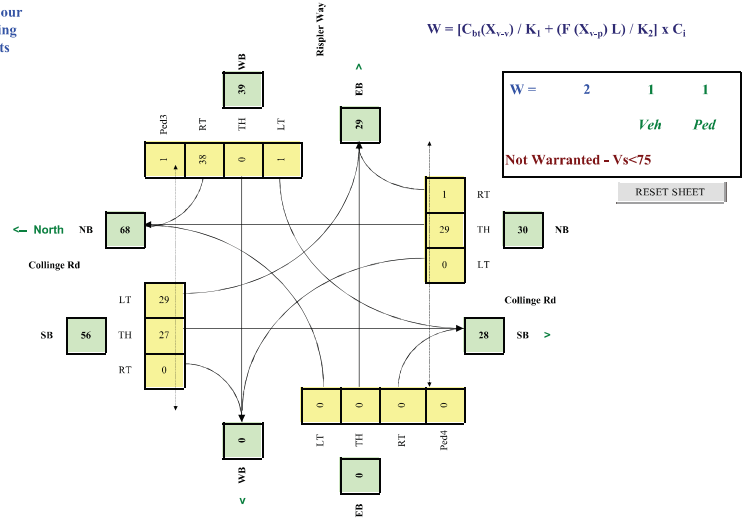
Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
Collinge Rd	NS	50	0.0%	n	0.0
Rispler Way	EW		0.0%	n	

Set Peak Hours

Traffic Input	NB			SB			WB			EB			Ped1 NS	Ped2 NS	Ped3 EW	Ped4 EW
	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	W Side	E Side	N Side	S Side
press 'Set Peak Hours' Button to set the peak hour periods																
	0	175	3	172	164	0	3	0	230	0	0	0	0	5	5	0
Total (6-hour peak)	0	175	3	172	164	0	3	0	230	0	0	0	0	5	5	0
Average (6-hour peak)	0	29	1	29	27	0	1	0	38	0	0	0	0	1	1	0

Average 6-hour Peak Turning Movements

$$W = [C_{bt}(X_{v-v}) / K_1 + (F\,(X_{v-p})\,L) / K_2] \times C_i$$



W = 2 1 1

Veh *Ped*

Not Warranted - Vs<75

RESET SHEET

Town of Hinton - Traffic Signal Warrant Analysis

Main Street (name)	Dr Reid Way	Direction (EW or NS)	EW	Road Authority:	Town of Hinton
Side Street (name)	Robb Rd	Direction (EW or NS)	NS	City:	Hinton, AB
Quadrant / Int #		Comments	Note: 6 hour peak = (AM peak + Pm peak) * 2.61	Analysis Date:	2017 Jul 13, Thu
for Warrant Calculation Results, please hit 'Page Down'	CHECK SHEET			Count Date:	2017 Jun 21, Wed
				Date Entry Format:	(yyyy-mm-dd)

Lane Configuration		Excl LT	Th & LT	Through	Th+RT+LT	Th & RT	Excl RT	UpStream Signal (m)	# of Thru Lanes
Dr Reid Way	WB					1		1,000	1
Dr Reid Way	EB		1					150	1
Robb Rd	NB								
Robb Rd	SB				1				

Are the Robb Rd SB right turns significantly impeded by through movements? (y/n) n

Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population	(#)	10,000
Central Business District	(y/n)	n

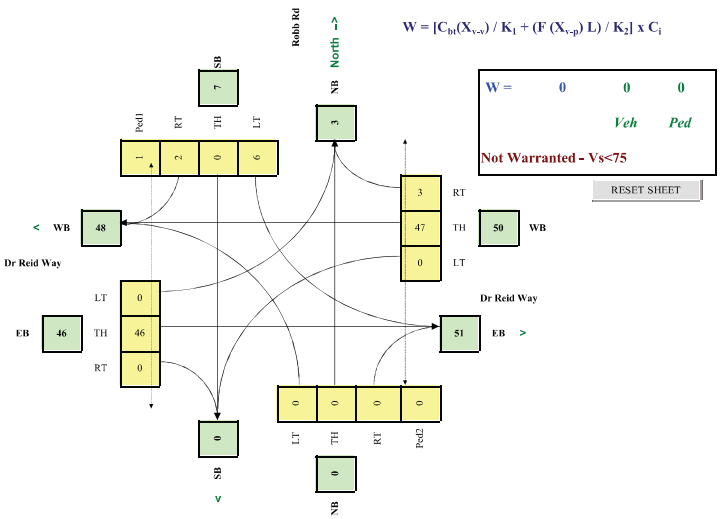
Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
Dr Reid Way	EW	50	0.0%	n	0.0
Robb Rd	NS		0.0%	n	

Set Peak Hours

Traffic Input	NB			SB			WB			EB			Ped1	Ped2	Ped3	Ped4
	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	NS W Side	NS E Side	EW N Side	EW S Side
press 'Set Peak Hours' Button to set the peak hour periods																
	0	0	0	34	0	10	0	279	18	0	274	0	3	0	0	0
Total (6-hour peak)	0	0	0	34	0	10	0	279	18	0	274	0	3	0	0	0
Average (6-hour peak)	0	0	0	6	0	2	0	47	3	0	46	0	1	0	0	0

Average 6-hour Peak Turning Movements

$$W = [C_{bt}(X_{v-v}) / K_1 + (F\,(X_{v-p})\,L) / K_2] \times C_i$$



APPENDIX A

Town of Hinton - Traffic Signal Warrant Analysis

Main Street (name)	Drinnan Way	Direction (EW or NS)	NS	Road Authority:	Town of Hinton
Side Street (name)	Hardistry Ave	Direction (EW or NS)	EW	City:	Hinton, AB
Quadrant / Int #		Comments	Note: 6 hour peak = (AM peak + Pm peak) * 2.61	Analysis Date:	2017 Jul 13, Thu
for Warrant Calculation Results, please hit 'Page Down'	CHECK SHEET			Count Date:	2017 Jun 20, Tue
				Date Entry Format:	(yyyy-mm-dd)

Lane Configuration		Excl LT	Th & LT	Through	Th+RT+LT	Th & RT	Excl RT	UpStream Signal (m)	# of Thru Lanes
Drinnan Way	NB		1					5,000	1
Drinnan Way	SB					1		5,000	1
Hardistry Ave	WB								
Hardistry Ave	EB				1				

Are the Hardistry Ave EB right turns significantly impeded by through movements? (y/n) n

Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population	(#)	10,000
Central Business District	(y/n)	n

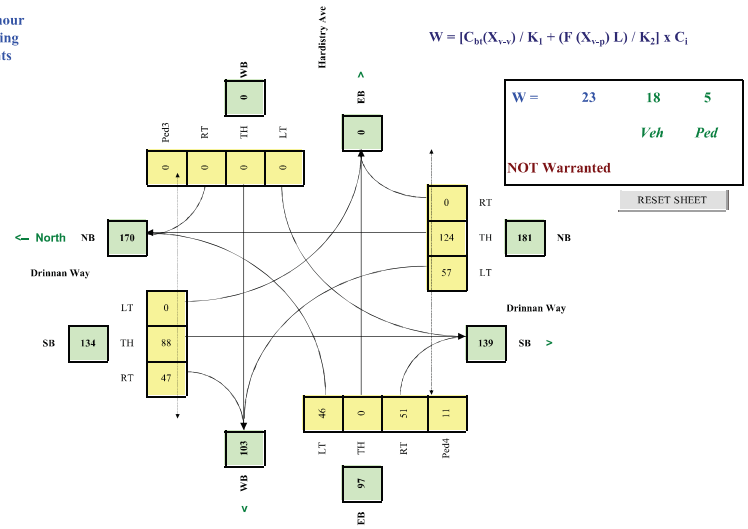
Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
Drinnan Way	NS	50	9.6%	n	0.0
Hardistry Ave	EW		9.7%	n	1.0

Set Peak Hours

Traffic Input	NB			SB			WB			EB			Ped1	Ped2	Ped3	Ped4
	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	NS W Side	NS E Side	EW N Side	EW S Side
press 'Set Peak Hours' Button to set the peak hour periods																
	339	744	0	0	527	279	0	0	0	274	0	308	8	5	0	66
Total (6-hour peak)	339	744	0	0	527	279	0	0	0	274	0	308	8	5	0	66
Average (6-hour peak)	57	124	0	0	88	47	0	0	0	46	0	51	1	1	0	11

Average 6-hour Peak Turning Movements

$$W = [C_{bt}(X_{v-v}) / K_1 + (F\,(X_{v-p})\,L) / K_2] \times C_i$$



Town of Hinton - Traffic Signal Warrant Analysis

Main Street (name)	MacLeod Ave	Direction (EW or NS)	EW
Side Street (name)	Meadow Dr	Direction (EW or NS)	NS
Quadrant / Int #		Comments	Note: 6 hour peak = (AM peak + Pm peak) * 2.61
for Warrant Calculation Results, please hit 'Page Down'	CHECK SHEET		

Road Authority:	Town of Hinton
City:	Hinton, AB
Analysis Date:	2017 Jul 13, Thu
Count Date:	2017 Jun 13, Tue
Date Entry Format:	(yyyy-mm-dd)

Lane Configuration		Excl LT	Th & LT	Through	Th+RT+LT	Th & RT	Excl RT	UpStream Signal (m)	# of Thru Lanes
MacLeod Ave	WB				1			5,000	1
MacLeod Ave	EB				1			5,000	1
Meadow Dr	NB				1				
Meadow Dr	SB				1				

Are the Meadow Dr NB right turns significantly impeded by through movements? (y/n) n
Are the Meadow Dr SB right turns significantly impeded by through movements? (y/n) n

Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	y
Metro Area Population	(#)	10,000
Central Business District	(y/n)	n

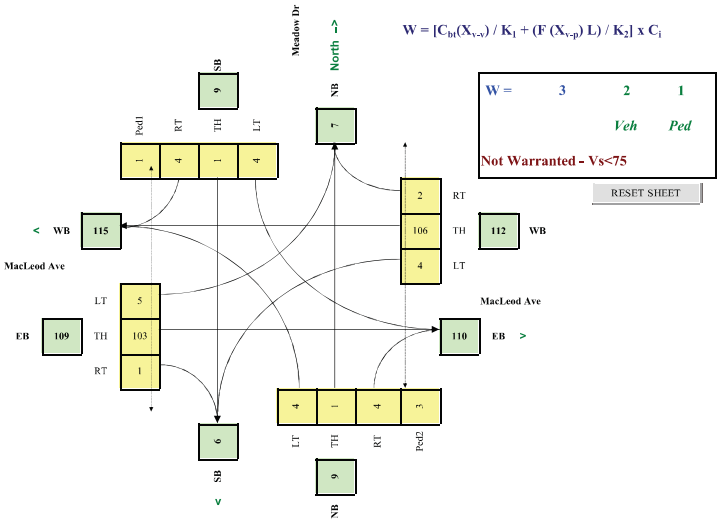
Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
MacLeod Ave	EW	50	0.0%	y	0.0
Meadow Dr	NS		0.0%	n	

Set Peak Hours

Traffic Input	NB			SB			WB			EB			Ped1 NS	Ped2 NS	Ped3 EW	Ped4 EW
	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	W Side	E Side	N Side	S Side
press 'Set Peak Hours' Button to set the peak hour periods																
	26	3	23	23	3	26	26	637	10	31	616	8	8	16	52	52
Total (6-hour peak)	26	3	23	23	3	26	26	637	10	31	616	8	8	16	52	52
Average (6-hour peak)	4	1	4	4	1	4	4	106	2	5	103	1	1	3	9	9

Average 6-hour Peak Turning Movements

$$W = [C_{bt}(X_{v\text{-}v}) / K_1 + (F\,(X_{v\text{-}p})\,L) / K_2] \times C_i$$



W = 3 2 1
Veh Ped

Not Warranted - Vs<75

RESET SHEET

APPENDIX A

Town of Hinton - Traffic Signal Warrant Analysis

Main Street (name)	Moutain St	Direction (EW or NS)	EW
Side Street (name)	Collinge Rd	Direction (EW or NS)	NS
Quadrant / Int #		Comments	Note: 6 hour peak = (AM peak + Pm peak) * 2.61
for Warrant Calculation Results, please hit 'Page Down'	CHECK SHEET		

Road Authority:	Town of Hinton
City:	Hinton, AB
Analysis Date:	2017 Jul 13, Thu
Count Date:	2017 Jun 22, Thu
Date Entry Format:	(yyyy-mm-dd)

Lane Configuration		Excl LT	Th & LT	Through	Th+RT+LT	Th & RT	Excl RT	UpStream Signal (m)	# of Thru Lanes
Moutain St	WB		1					5,000	1
Moutain St	EB					1		5,000	1
Collinge Rd	NB				1				
Collinge Rd	SB				1				

Are the Collinge Rd NB right turns significantly impeded by through movements? (y/n) n

Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	y
Metro Area Population	(#)	10,000
Central Business District	(y/n)	n

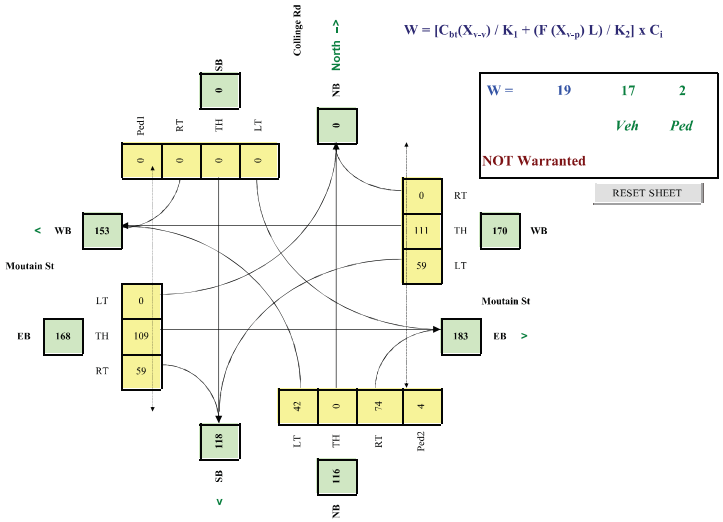
Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
Moutain St	EW	50	1.2%	y	1.0
Collinge Rd	NS		0.0%	n	

Set Peak Hours

Traffic Input	NB			SB			WB			EB			Ped1 NS	Ped2 NS	Ped3 EW	Ped4 EW
	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	W Side	E Side	N Side	S Side
press 'Set Peak Hours' Button to set the peak hour periods																
	253	0	441	0	0	0	355	666	0	0	655	355	0	26	0	10
Total (6-hour peak)	253	0	441	0	0	0	355	666	0	0	655	355	0	26	0	10
Average (6-hour peak)	42	0	74	0	0	0	59	111	0	0	109	59	0	4	0	2

Average 6-hour Peak Turning Movements

$$W = [C_{bt}(X_{v\text{-}v}) / K_1 + (F\,(X_{v\text{-}p})\,L) / K_2] \times C_i$$



W = 19 17 2
Veh Ped

NOT Warranted

RESET SHEET

Traffic Signal Warrant Spreadsheet - v3H © 2007 Transportation Association of Canada

Town of Hinton - Traffic Signal Warrant Analysis

Main Street (name)	Moutain St	Direction (EW or NS)	EW
Side Street (name)	Fairfax Dr/Maligne Dr	Direction (EW or NS)	NS
Quadrant / Int #		Comments	Note: 6 hour peak = (AM peak + Pm peak) * 2.61
for Warrant Calculation Results, please hit 'Page Down'	CHECK SHEET		

Road Authority:	Town of Hinton
City:	Hinton, AB
Analysis Date:	2017 Jul 13, Thu
Count Date:	2017 Jun 13, Tue
Date Entry Format:	(yyyy-mm-dd)

Lane Configuration		Excl LT	Th & LT	Through	Th+RT+LT	Th & RT	Excl RT	UpStream Signal (m)	# of Thru Lanes
Moutain St	WB				1			5,000	1
Moutain St	EB				1			5,000	1
Fairfax Dr/Maligne Dr	NB				1				
Fairfax Dr/Maligne Dr	SB				1				

Are the Fairfax Dr/Maligne Dr NB right turns significantly impeded by through movements? (y/n) n
Are the Fairfax Dr/Maligne Dr SB right turns significantly impeded by through movements? (y/n) n

Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	y
Metro Area Population	(#)	10,000
Central Business District	(y/n)	n

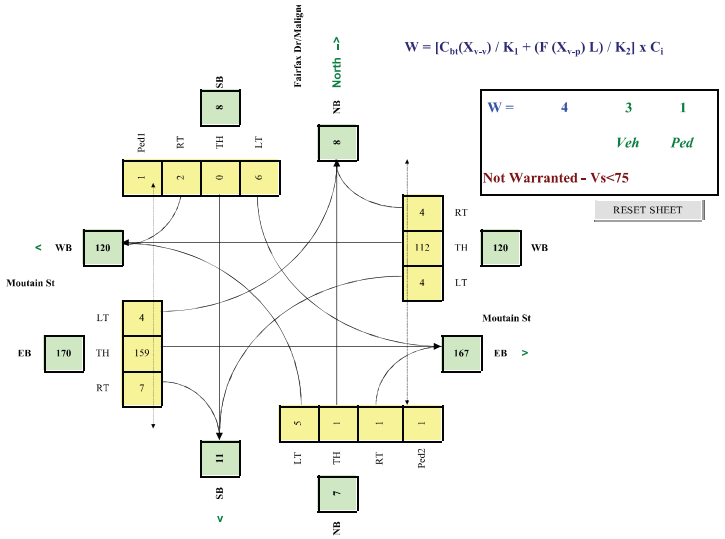
Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
Moutain St	EW	50	6.3%	y	1.0
Fairfax Dr/Maligne Dr	NS		15.4%	n	

Set Peak Hours

Traffic Input	NB			SB			WB			EB			Ped1	Ped2	Ped3	Ped4
	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	NS	NS	EW	EW
press 'Set Peak Hours' Button to set the peak hour periods													W Side	E Side	N Side	S Side
	31	3	8	37	0	13	23	673	21	23	955	42	6	3	31	16
Total (6-hour peak)	31	3	8	37	0	13	23	673	21	23	955	42	6	3	31	16
Average (6-hour peak)	5	1	1	6	0	2	4	112	4	4	159	7	1	1	5	3

Average 6-hour Peak Turning Movements

$$W = [C_{bt}(X_{v\text{-}v}) / K_1 + (F\,(X_{v\text{-}p})\,L) / K_2] \times C_i$$



W = 4 3 1
Veh Ped

Not Warranted - Vs<75

RESET SHEET

APPENDIX A

Town of Hinton - Traffic Signal Warrant Analysis

Main Street (name)	Moutain St	Direction (EW or NS)	NS
Side Street (name)	Emerson Dr	Direction (EW or NS)	EW
Quadrant / Int #		Comments	Note: 6 hour peak = (AM peak + Pm peak) * 2.61
for Warrant Calculation Results, please hit 'Page Down'	CHECK SHEET		

Road Authority:	Town of Hinton
City:	Hinton, AB
Analysis Date:	2017 Jul 13, Thu
Count Date:	2017 Jun 20, Tue
Date Entry Format:	(yyyy-mm-dd)

Lane Configuration		Excl LT	Th & LT	Through	Th+RT+LT	Th & RT	Excl RT	UpStream Signal (m)	# of Thru Lanes
Moutain St	NB					1		5,000	1
Moutain St	SB		1					5,000	1
Emerson Dr	WB				1				
Emerson Dr	EB								

Are the Emerson Dr WB right turns significantly impeded by through movements? (y/n) n

Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	y
Metro Area Population	(#)	10,000
Central Business District	(y/n)	n

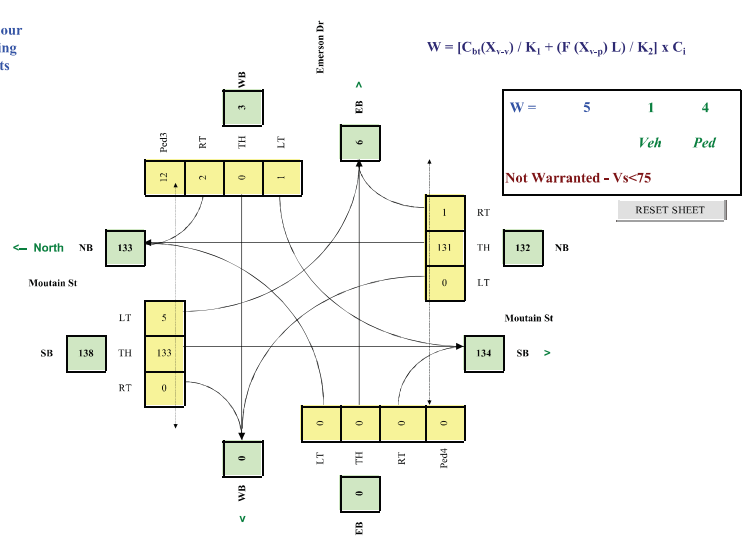
Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
Moutain St	NS	50	0.5%	y	1.0
Emerson Dr	EW		0.0%	n	

Set Peak Hours

Traffic Input	NB			SB			WB			EB			Ped1	Ped2	Ped3	Ped4
	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	NS	NS	EW	EW
press 'Set Peak Hours' Button to set the peak hour periods													W Side	E Side	N Side	S Side
	0	786	3	31	799	0	3	0	13	0	0	0	0	10	74	0
Total (6-hour peak)	0	786	3	31	799	0	3	0	13	0	0	0	0	10	74	0
Average (6-hour peak)	0	131	1	5	133	0	1	0	2	0	0	0	0	2	12	0

Average 6-hour Peak Turning Movements

$$W = [C_{bt}(X_{v\text{-}v}) / K_1 + (F\,(X_{v\text{-}p})\,L) / K_2] \times C_i$$



W = 5 1 4
Veh Ped

Not Warranted - Vs<75

RESET SHEET

Town of Hinton - Traffic Signal Warrant Analysis

Main Street (name)	Moutain St	Direction (EW or NS)	EW
Side Street (name)	Reimer Dr/Seabolt Dr	Direction (EW or NS)	NS
Quadrant / Int #		Comments	Note: 6 hour peak = (AM peak + Pm peak) * 2.61
for Warrant Calculation Results, please hit 'Page Down'	CHECK SHEET		

Road Authority:	Town of Hinton
City:	Hinton, AB
Analysis Date:	2017 Jul 13, Thu
Count Date:	2017 Jun 22, Thu
Date Entry Format:	(yyyy-mm-dd)

Lane Configuration		Excl LT	Th & LT	Through	Th+RT+LT	Th & RT	Excl RT	UpStream Signal (m)	# of Thru Lanes
Moutain St	WB				1			5,000	1
Moutain St	EB				1			5,000	1
Reimer Dr/Seabolt Dr	NB				1				
Reimer Dr/Seabolt Dr	SB				1				

Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	y
Metro Area Population	(#)	10,000
Central Business District	(y/n)	n

Are the Reimer Dr/Seabolt Dr NB right turns significantly impeded by through movements? (y/n) n
Are the Reimer Dr/Seabolt Dr SB right turns significantly impeded by through movements? (y/n) n

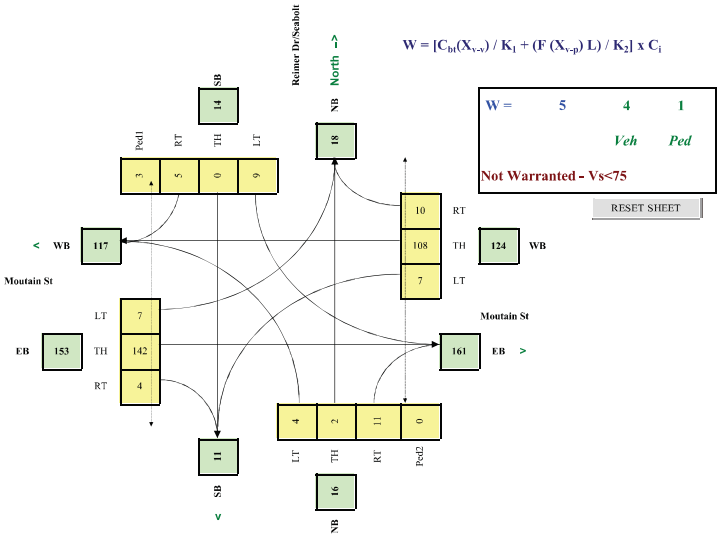
Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
Moutain St	EW	50	4.3%	y	1.0
Reimer Dr/Seabolt Dr	NS		5.3%	n	

Set Peak Hours

Traffic Input	NB			SB			WB			EB			Ped1 NS	Ped2 NS	Ped3 EW	Ped4 EW
	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	W Side	E Side	N Side	S Side
press 'Set Peak Hours' Button to set the peak hour periods																
	23	10	63	52	0	31	44	645	57	42	853	23	18	0	29	10
Total (6-hour peak)	23	10	63	52	0	31	44	645	57	42	853	23	18	0	29	10
Average (6-hour peak)	4	2	11	9	0	5	7	108	10	7	142	4	3	0	5	2

Average 6-hour Peak Turning Movements

$$W = [C_{bt}(X_{v\text{-}v}) / K_1 + (F\,(X_{v\text{-}p})\,L) / K_2] \times C_i$$



W = 5 4 1
Veh Ped

Not Warranted - Vs<75

RESET SHEET

APPENDIX A

Town of Hinton - Traffic Signal Warrant Analysis

Main Street (name)	Tamarack Ave	Direction (EW or NS)	NS
Side Street (name)	Lodgepole Dr	Direction (EW or NS)	EW
Quadrant / Int #		Comments	Note: 6 hour peak = (AM peak + Pm peak) * 2.61
for Warrant Calculation Results, please hit 'Page Down'	CHECK SHEET		

Road Authority:	Town of Hinton
City:	Hinton, AB
Analysis Date:	2017 Jul 13, Thu
Count Date:	2017 Jun 15, Thu
Date Entry Format:	(yyyy-mm-dd)

Lane Configuration		Excl LT	Th & LT	Through	Th+RT+LT	Th & RT	Excl RT	UpStream Signal (m)	# of Thru Lanes
Tamarack Ave	NB					1		5,000	1
Tamarack Ave	SB		1					5,000	1
Lodgepole Dr	WB				1				
Lodgepole Dr	EB								

Demographics		
Elem. School/Mobility Challenged	(y/n)	y
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	y
Metro Area Population	(#)	10,000
Central Business District	(y/n)	n

Are the Lodgepole Dr WB right turns significantly impeded by through movements? (y/n) n

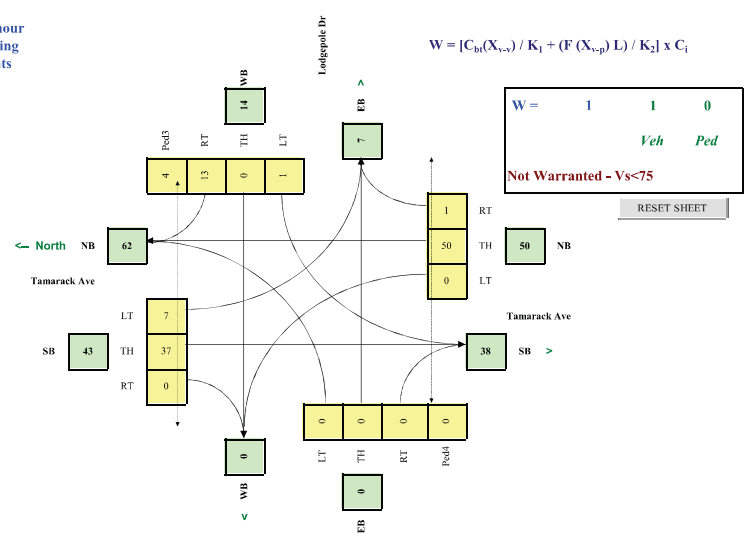
Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
Tamarack Ave	NS	50	0.0%	n	0.0
Lodgepole Dr	EW		0.0%	n	

Set Peak Hours

Traffic Input	NB			SB			WB			EB			Ped1 NS	Ped2 NS	Ped3 EW	Ped4 EW
	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	W Side	E Side	N Side	S Side
press 'Set Peak Hours' Button to set the peak hour periods																
	0	298	3	39	219	0	8	0	76	0	0	0	0	90	21	0
Total (6-hour peak)	0	298	3	39	219	0	8	0	76	0	0	0	0	90	21	0
Average (6-hour peak)	0	50	1	7	37	0	1	0	13	0	0	0	0	15	4	0

Average 6-hour Peak Turning Movements

$$W = [C_{bt}(X_{v\text{-}v}) / K_1 + (F\,(X_{v\text{-}p})\,L) / K_2] \times C_i$$



W = 1 1 0
Veh Ped

Not Warranted - Vs<75

RESET SHEET

Traffic Signal Warrant Spreadsheet - v3H © 2007 Transportation Association of Canada

Town of Hinton - Traffic Signal Warrant Analysis

Main Street (name)	Mountain St	Direction (EW or NS)	EW
Side Street (name)	Robb Rd	Direction (EW or NS)	NS
Quadrant / Int #		Comments	Note: 6 hour peak = (AM peak + Pm peak) * 2.61
for Warrant Calculation Results, please hit 'Page Down'	CHECK SHEET		

Road Authority:	Town of Hinton
City:	Hinton, AB
Analysis Date:	2017 Jul 13, Thu
Count Date:	2017 Jun 21, Wed
Date Entry Format:	(yyyy-mm-dd)

Lane Configuration		Excl LT	Th & LT	Through	Th+RT+LT	Th & RT	Excl RT	UpStream Signal (m)	# of Thru Lanes
Mountain St	WB				1			5,000	1
Mountain St	EB	1				1		300	1
Robb Rd	NB				1				
Robb Rd	SB				1				
Are the Robb Rd NB right turns significantly impeded by through movements? (y/n)							n		
Are the Robb Rd SB right turns significantly impeded by through movements? (y/n)							n		

Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	y
Metro Area Population	(#)	10,000
Central Business District	(y/n)	n

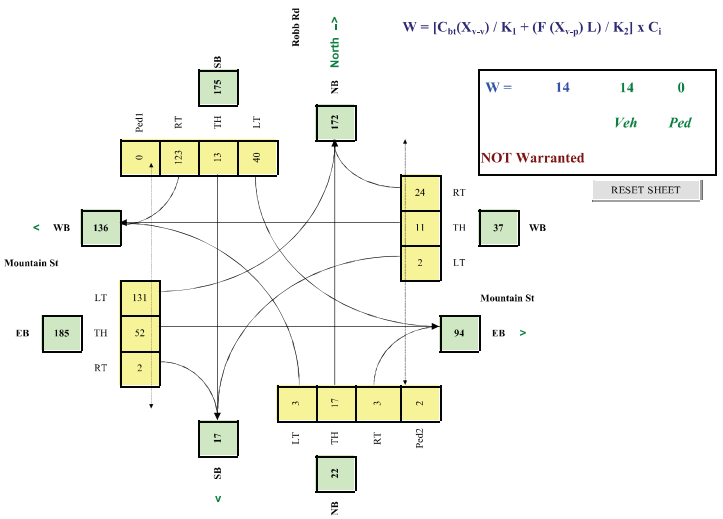
Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
Mountain St	EW	50	12.2%	n	0.0
Robb Rd	NS		68.8%	n	

Set Peak Hours

Traffic Input	NB			SB			WB			EB			Ped1 NS	Ped2 NS	Ped3 EW	Ped4 EW
	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	W Side	E Side	N Side	S Side
press 'Set Peak Hours' Button to set the peak hour periods																
	16	102	16	238	78	736	13	63	146	783	311	13	0	11	34	16
Total (6-hour peak)	16	102	16	238	78	736	13	63	146	783	311	13	0	11	34	16
Average (6-hour peak)	3	17	3	40	13	123	2	11	24	131	52	2	0	2	6	3

Average 6-hour Peak Turning Movements

$$W = [C_{bt}(X_{v\text{-}v}) / K_1 + (F\,(X_{v\text{-}p})\,L) / K_2] \times C_i$$



W = 14 14 0

Veh Ped

NOT Warranted

RESET SHEET

APPENDIX A

Town of Hinton - Traffic Signal Warrant Analysis

Main Street (name)	Switzer Dr	Direction (EW or NS)	NS
Side Street (name)	Timber Lane	Direction (EW or NS)	EW
Quadrant / Int #		Comments	Note: 6 hour peak = (AM peak + Pm peak) * 2.61
for Warrant Calculation Results, please hit 'Page Down'	CHECK SHEET		

Road Authority:	Town of Hinton
City:	Hinton, AB
Analysis Date:	2017 Jul 14, Fri
Count Date:	2017 Jun 14, Wed
Date Entry Format:	(yyyy-mm-dd)

Lane Configuration		Excl LT	Th & LT	Through	Th+RT+LT	Th & RT	Excl RT	UpStream Signal (m)	# of Thru Lanes
Switzer Dr	NB					1		150	1
Switzer Dr	SB		1					5,000	1
Timber Lane	WB				1				
Timber Lane	EB								
Are the Timber Lane WB right turns significantly impeded by through movements? (y/n)							n		

Demographics		
Elem. School/Mobility Challenged	(y/n)	n
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	y
Metro Area Population	(#)	10,000
Central Business District	(y/n)	y

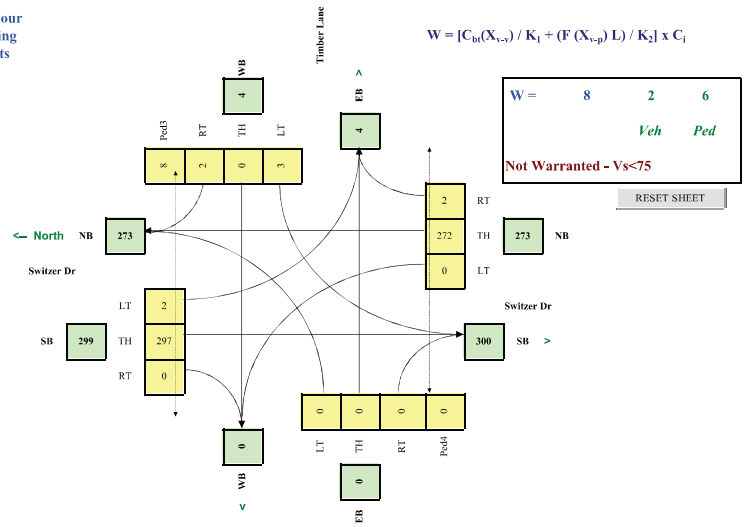
Other input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
Switzer Dr	NS	50	14.8%	n	0.0
Timber Lane	EW		0.0%	n	

Set Peak Hours

Traffic Input	NB			SB			WB			EB			Ped1 NS	Ped2 NS	Ped3 EW	Ped4 EW
	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	W Side	E Side	N Side	S Side
press 'Set Peak Hours' Button to set the peak hour periods																
	0	1629	11	11	1783	0	16	0	10	0	0	0	0	18	47	0
Total (6-hour peak)	0	1,629	11	11	1,783	0	16	0	10	0	0	0	0	18	47	0
Average (6-hour peak)	0	272	2	2	297	0	3	0	2	0	0	0	0	3	8	0

Average 6-hour Peak Turning Movements

$$W = [C_{bt}(X_{v\text{-}v}) / K_1 + (F\,(X_{v\text{-}p})\,L) / K_2] \times C_i$$



W = 8 2 6

Veh Ped

Not Warranted - Vs<75

RESET SHEET

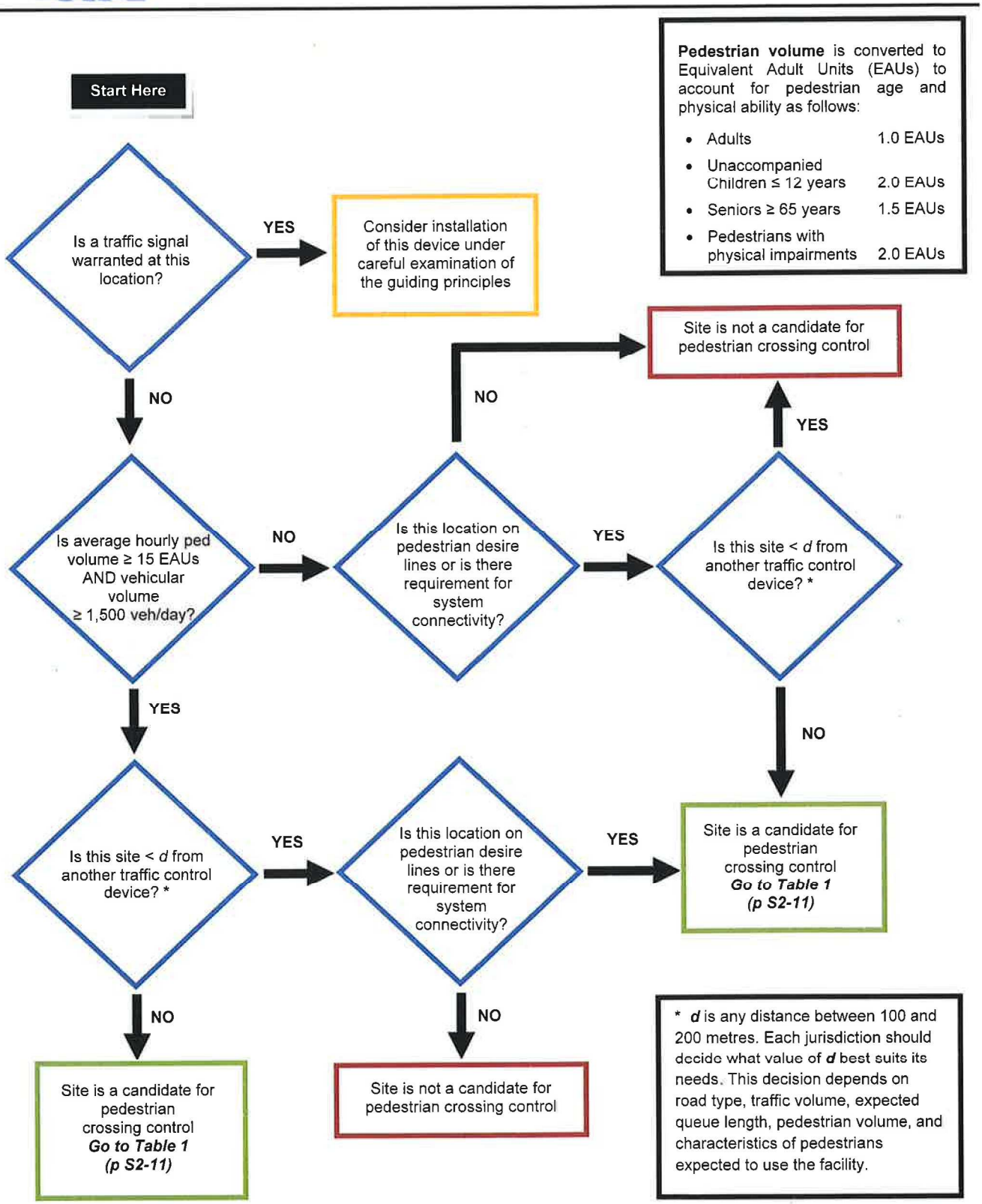


Figure 6: Decision Support Tool – Preliminary assessment.

Table 1: Decision Support Tool – Treatment selection matrix.

Use this table ONLY if instructed to do so in Figure 6 (p S2-8)

AVERAGE DAILY TRAFFIC	SPEED LIMIT (km/h)	TOTAL NUMBER OF LANES (includes all types of lanes^)			
		1 or 2 lanes	3 lanes	2 or 3 lanes/direction w/ raised refuge	2 lanes/direction w/o raised refuge
1,500 < ADT ≤ 4,500	≤50	GM1	GM1	GM1	GM2
	60	GM2	GM2	OF	OF
	70	GM2	GM2	OF	OF
4,500 < ADT ≤ 9,000	≤50	GM1	GM1	GM1	GM2
	60	GM2	GM2	OF	TS
	70	OF	OF	OF	TS
9,000 < ADT ≤ 12,000	≤50	GM1	GM2	OF	OF
	60	OF	OF	OF	TS
	70	OF	OF	TS	TS
12,000 < ADT ≤ 15,000	≤50	GM2	OF	OF	OF
	60	OF	OF	TS	TS
	70	OF	TS	TS	TS
>15,000	≤50	OF	OF	OF	TS
	60	OF	TS	TS	TS
	70	OF	TS	TS	TS

^ The total number of lanes is representative of crossing distance. The width of these lanes is assumed to be between 3.0 and 3.7 m according to TAC *Geometric Design Guide for Canadian Roads* (Table 2.2.2.3). A cross-sectional feature (e.g., a bike lane) that extends the average crossing distance per lane beyond this range of lane widths may need to be considered as an additional lane in this table.

- A **TS treatment system** should be selected: (1) for cross sections with GREATER THAN 6 lanes where a raised refuge is present; (2) for cross sections with GREATER THAN 4 lanes where no raised refuge is present; (3) for speeds GREATER THAN 70 km/h; and (4) in cases where the table recommends an OF system but these systems are not used in the jurisdiction.
- Installation of an **OF treatment system** can negatively impact traffic operations when there is high pedestrian demand and vehicular traffic volumes are greater than 12,000 vehicles per day. As a general rule, pedestrian demand may be considered high when the volume of crossing pedestrians exceeds 100 EAUs per hour, averaged over a seven-hour continuous counting period. In these cases, **replace the OF system with a TS system.**
- If this table recommends a TS or OF system AND the application environment is a roundabout, **select a GM2 system** instead for installation. OF or TS systems should not be installed at roundabouts.
- Always check stopping sight distance at the site as per the *Geometric Design Guide for Canadian Roads*, and if it is insufficient, create it by applying available tools.

GM1	GM2	OF	TS
Go to Table 3A Page S2-18	Go to Table 3B Page S2-19	Go to Table 3C Page S2-20	Go to Table 3D (half) or 3E (full signal) Page S2-21

Table 3A: Components for crosswalk with side-mounted signs treatment system.

SYSTEM	RECOMMENDED COMPONENTS	DESIRABLE COMPONENTS	OPTIONAL COMPONENTS
GM1 Crosswalk with side-mounted signs	**GENERAL CASE** • Side-mounted signs (RA-4) on both sides of the road • Twin parallel line crosswalk marking • Advanced warning sign (WC-2) where visibility is limited • Stopping prohibition for a minimum of 15 m on each approach to the crossing, and 10 m following the crossing • Passing restrictions on single lane approaches • Lane change prohibition on multiple lane approaches using solid white lines (recommended length of solid line depends on approach speed – use 30 m for 50 km/h speed limit) **See FIGURES 7 to 10** (Pages S2-26 to S2-29)	**GENERAL CASE** • Zebra Crosswalk markings • Advance Yield to Pedestrians line on multiple lane approaches • Raised refuge island for road cross-sections with more than two lanes and two-directional traffic • Stopping prohibition for a minimum of 30 m on each approach to the crossing, and 15 m following the crossing	**GENERAL CASE** • Crossing guards
	SCHOOL AREAS • Side-mounted signs (RA-3) on both sides of the road • Zebra Crosswalk markings • Advanced warning sign (WC-16) where visibility is limited • Stopping prohibition for a minimum of 15 m on each approach to the crossing, and 10 m following the crossing • Passing restrictions on single lane approaches • Lane change prohibition on multiple lane approaches as in GENERAL CASE above **See FIGURES 11 and 12** (Pages S2-30 and S2-31)	**SCHOOL AREAS** • Advance Yield to Pedestrians line on multiple lane approaches • Raised refuge island for road cross-sections with more than two lanes and two-directional traffic • Stopping prohibition for a minimum of 30 m on each approach to the crossing, and 15 m following the crossing	**SCHOOL AREAS** • In-Street School Crosswalk sign • Crossing guards

Note 1: The GENERAL CASE applies to every situation other than school areas.

Note 2: If a practitioner determines that a crossing outside the designated school area is influenced by school activities, a school area crossing treatment may be applied.

Note 3: Advance Yield to Pedestrians line markings should not be used in advance of crosswalks that cross an approach to or departure from a roundabout.

Table 3C: Components for special crosswalk treatment system.

SYSTEM	RECOMMENDED COMPONENTS	DESIRABLE COMPONENTS	OPTIONAL COMPONENTS
OF Special Crosswalk	**GENERAL CASE** • Overhead-mounted signs (RA-5) on both sides of the road • Side-mounted signs (RA-4) on both sides of the road • Alternating amber flashing beacons • Pedestrian pushbutton with sign (ID-21) • Twin parallel Line Crosswalk markings at intersections, Zebra Crosswalk markings at mid-block locations • Advanced warning sign (WC-2) where visibility is limited • Stopping prohibition for a minimum of 15 m on each approach to the crossing, and 10 m following the crossing • Passing restrictions on single lane approaches • Lane change prohibition on multiple lane approaches using solid white lines (recommended length of solid line depends on approach speed – use 30 m for 50 km/h speed limit) **See FIGURES 19 to 22** (Pages S2-38 to S2-41)	**GENERAL CASE** • Zebra Crosswalk markings at intersections • Advance Yield to Pedestrians line on multiple lane approaches • Raised refuge island for road cross-sections with more than two lanes and two-directional traffic • Stopping prohibition for a minimum of 30 m on each approach to the crossing, and 15 m following the crossing • Active indicator to notify pedestrians they can proceed	**GENERAL CASE** • Crossing guards
	SCHOOL AREAS Same as GENERAL CASE but with the following modifications: • Side-mounted signs (RA-3) on both sides of the road • Zebra Crosswalk markings • Advanced warning sign (WC-16) where visibility is limited **See FIGURE 23** (Page S2-42)	**SCHOOL AREAS** • Advance Yield to Pedestrians line on multiple lane approaches • Raised refuge island for road cross-sections with more than two lanes and two-directional traffic • Stopping prohibition for a minimum of 30 m on each approach to the crossing, and 15 m following the crossing • Active indicator to notify pedestrians they can proceed	**SCHOOL AREAS** • In-Street School Crosswalk sign • Crossing guards

Note 1: The GENERAL CASE applies to every situation other than school areas.

Note 2: If a practitioner determines that a crossing outside the designated school area is influenced by school activities, a school area crossing treatment may be applied.

Note 3: Advance Yield to Pedestrians line markings should not be used in advance of crosswalks that cross an approach to or departure from a roundabout.

Appendix F

Preliminary Design Report, Robb Road

ISL Engineering and Land Services

Inspiring sustainable thinking



Gateway to the Rockies

HINTON

Town of Hinton

Preliminary Design Report

Robb Road

Phase I, II and III

April 2014

Town of Hinton

Robb Road
Phase I, II and III

For additional information regarding this Report please contact:

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ISL Engineering and Land Services

ISL Engineering and Land Services Ltd. is an award-winning full-service consulting firm dedicated to working with all levels of government and the private sector to deliver planning and design solutions for transportation, water, land, and environmental projects.

Inspiring sustainable thinking

bullfrogpowered

THE GREEN 30

2013 Best Small and Medium Employers in Canada

Table of Contents

1.0 Introduction 1
- 1.1 Scope 1
- 1.2 Phase 1 1
- 1.3 Phase 2 1
- 1.4 Phase 3 1
- 1.5 Summary 2

2.0 Design Report 2
- 2.1 Roadway Design 2
- 2.2 Right of Way Drainage 2
- 2.3 Environmental Considerations 2
- 2.4 Utility Co-ordination 3
- 2.5 Geotechnical Investigations 3
- 2.6 Land Acquisition 3
- 2.7 Street Lighting 3
- 2.8 Potential Construction Issues 3
- 2.9 Outstanding Issues 3

3.0 Conclusion 4
- 3.1 Preliminary Cost Estimate 4
- 3.2 Interim Phase 1 4
- 3.3 Topics of Further Discussion 5

APPENDICES

Appendix A Drawings

Appendix B Geotechnical Report

Appendix C Utilities

Appendix D Environmental Overview

1.0 Introduction

1.1 Scope

The scope of this project as provide by the Town of Hinton is the upgrading of Robb Road to the ultimate design stage and is broken up into three phases. Each of these phases describe a specific length of Robb Road. One of the major design considerations taken into account during the preliminary design phase of Robb Road was to provide a safe and functional roadway. This was achieved through the development of proper sight lines, which meant not only adjusting the horizontal, but the vertical alignment of Robb Road.

1.2 Phase 1

Covers the design of Robb Road from a "2 – Lane Undivided Gravel Roadway – Rural" to a "4 – Lane Industrial / Commercial Arterial – Rural" cross-section. This upgrade occurs from the intersection of Robb Road and Mountain Street (including intersection upgrades), to a point 580m south (Sta. 20+900). This is a change in the proposed location for the boundary of Phase 1 and 2, but in our view is a necessary one as it promotes constructability of the first phase as it is a point where both the proposed and existing vertical alignments of Robb Road intersect.

In this phase there is a significant infill component which is required for the vertical realignment of Robb Road. Other items of importance include the following: access upgrades to the Cemetery and Bike Park, a pedestrian / bike crossing at bike park intersection, lighting both intersections, the addition of on-street parking (outer lanes), utility adjustments, boardwalk reconstruction and the installation of a new high load warning device.

1.3 Phase 2

This phase of Robb Road from a "2 – Lane Undivided Gravel Roadway – Rural" to a "4 – Lane Industrial / Commercial Arterial – Rural" including the transition down to a "2 – Lane Industrial / Commercial Collector – Rural" cross-section. Phase 2 of the design continues south from phase 1 for approximately 1,100 metres and ends at the existing truck escape ramp. This end point is another point at which the existing and proposed vertical alignments coexist, thus creating an excellent tie-in location.

This phase of the design follows the existing vertical alignment of Robb Road, then has both a significant fill and cut component that is centered at the intersection of Cache Percotte Road. Other design items of importance in the phase, include: utility adjustments, intersection upgrades, encroachment on the Bike Park (daylighting), transition from a 4 – lane urban divided to a 2 – lane rural undivided and the upgrade of the truck escape ramp.

1.4 Phase 3

This final design upgrades Robb Road from a "2 – Lane Undivided Gravel Roadway – Rural" to a "2 – Lane Industrial / Commercial Collector – Rural" cross-section. This upgrade takes place from the Phase 2 / Phase 3 boundary (Sta. 21+900) to the southern project limits, located 1,850 metres to the south (Sta. 23+750).

Phase 3 of Robb Road has several existing rises and falls, so to avoid the unnecessary removal of an already very well compacted road structure, we have chosen to design the vertical alignment above it, this maintains the existing structure wherever possible. Also, this phase has more significant adjustments to the horizontal alignment than other phases, this was incorporated into the design to achieve the required safe sight distances. Additional works to coincide with this phase of construction include improved access to the K-Lynn Trucking property, utility adjustments and the reinstatement of the high load warning device.

1.5 Summary

Design considerations for all Phases of Robb Road have been made to include the use of this roadway by 7, 8 and 9 axle logging trucks; with greater consideration given to the 7 axle truck as it is the primary size in use.

An increased road structure thickness has been recommended for the Northbound Lanes of Robb Road. This added structure of 125 mm; when compared to that required for Switzer Drive, is accounted for within the 20mm Granular Base Course of the road structure and is there to accommodate the special use requirements of the logging trucks. This added thickness has been outlined in the Geotechnical Report and its associated costs have been broken out within the preliminary cost estimate. Section 3.2 of this report covers the interim construction of phase 1 and also covers the additional structure requirements (as noted above) for the northbound lanes of Robb Road.

2.0 Design Report

2.1 Roadway Design

The current condition of Robb Road is to be updated to meet the following standards, as detailed in the Town of Hinton – Minimum Engineering Design Standards, September 2007.

- 4 – Lane Industrial / Commercial Arterial – Urban
- 2 – Lane Industrial / Commercial Collector – Rural
- The design allows for a posted speed limit of 70 or 80 km/h
- Horizontal / Vertical alignments upgraded to meet design standards for sightlines
- Access improvements:
    - Cemetery
    - Bike Park
- Truck escape ramp upgraded to meet current standards. (Alberta Transportation)
- Intersection improvements:
    - Robb Road at Mountain Street
    - Robb Road at Cache Percotte Road

2.2 Right of Way Drainage

The existing cross-section of Robb Road allows for surface water to be managed by drainage ditches. The proposed cross section for Robb Road varies from urban to rural but it will follow the same standard and allow for depressed curbs and drainage ditches where it is geometrically possible. Erosion and sediment control measures for all phases will involve the reinstatement of natural grasses and ground cover; and where required the design of permanent erosion and sediment control devices. In combination these items will reduce the potential for instability and erosion.

2.3 Environmental Considerations

The findings from the Environmental Overview conducted by The Green Plan can be found in the Appendix, a summary of the items covered can be found below:

- Fish and Fish Habitat
- Wetland Areas and Drainage
- Nesting Birds

- Wildlife and Grizzly Bear Zone Requirements
- Historical Resources
- Soil Handling, Borrow Areas and Land Reclamation

2.4 Utility Co-ordination

Alberta One Call has been notified and during detailed design ISL will engage in further communications with utilities that we have identified as potential conflicts.

2.5 Geotechnical Investigations

The findings from the Geotechnical investigation conducted by Hoggan Engineering and Testing Ltd. can be found in the Appendix, a summary of the items covered include:

- Existing Soil Conditions
- Borehole Results and Discussion
- Recommendations
- Robb Road Pavement Structure

2.6 Land Acquisition

The acquisition of right-of-way will be required in all phases of this project. Phase 1 highlights the impacts and associated offset costs for encroaching on the Bike Park as well as a wet-land. Phase 2 and 3 both have the requirement for additional right-of-way and the Town of Hinton has expressed that they will engage in further communications with the MD for these areas. Line items for Land Acquisition and the approximated costing has been identified in the Preliminary estimate.

2.7 Street Lighting

The requirement for localized street lighting has been identified at the intersection of Robb Road and the Cemetery and at the Bike Park. No allowance and considerations have been provided for the longitudinal lighting of Robb Road from Mountain Street through to the end of phase 3.

2.8 Potential Construction Issues

Given the steep and rolling hills along with large cuts and fills in some areas, moving equipment around the site and completing the work in a timely manner will be a significant challenge. The right-of-way is constrained in places, and providing space for the contractor to store material and equipment has not yet been discussed. If the roadway can be closed to all traffic for the duration of construction, that would make the job easier and likely shorten the construction schedule, but it's unclear if that will be possible, given the lack of alternate routes.

2.9 Outstanding Issues

The future Sawyer Drive intersection is considered in this design, as Robb Road is planned to be flattened out between the cemetery and the bike park in order to accommodate the Sawyer Drive intersection with adequate sightlines.

The potential Highway 16 bypass has not been considered in the design, since neither the horizontal nor vertical alignment of the bypass are known at this time, nor are any potential interchange configurations. Consultation with Alberta Transportation may be worthwhile, to see if the design can be adjusted to better fit their future plans. Given that the bypass would likely cross Robb Road near the existing Cache Percotte Road intersection, accommodating interchange junctions will be extremely challenging, and require a complete re-design of Robb Road with substantial cuts and fills. The proposed grade of Robb Road in this area (Phase 2) averages 6.5%, so any flattening for interchange junctions would require grades in excess of 8%.

The existing truck escape ramp South of Cache Percotte Road is outdated, and would likely have to be rebuilt to a modern standard. This new configuration will likely result in a larger, longer and safer ramp, which will have an impact on the footprint of this project.

3.0 Conclusion

3.1 Preliminary Cost Estimate

ROBB ROAD – PRELIMINARY DESIGN COSTING			
	Phase 1	**Phase 2**	**Phase 3**
Sum of Unit Costs	$4,550,000	$5,249,000	$6,376,000
Contingency 20%	$910,000	$1,050,000	$1,275,000
Engineering Detailed Design 3.5%	$191,000	$220,000	$268,000
Engineering Construction 5%	$273,000	$315,000	$383,000
Total	**$5,924,000**	**$6,834,000**	**$8,302,000**

3.2 Interim Phase 1

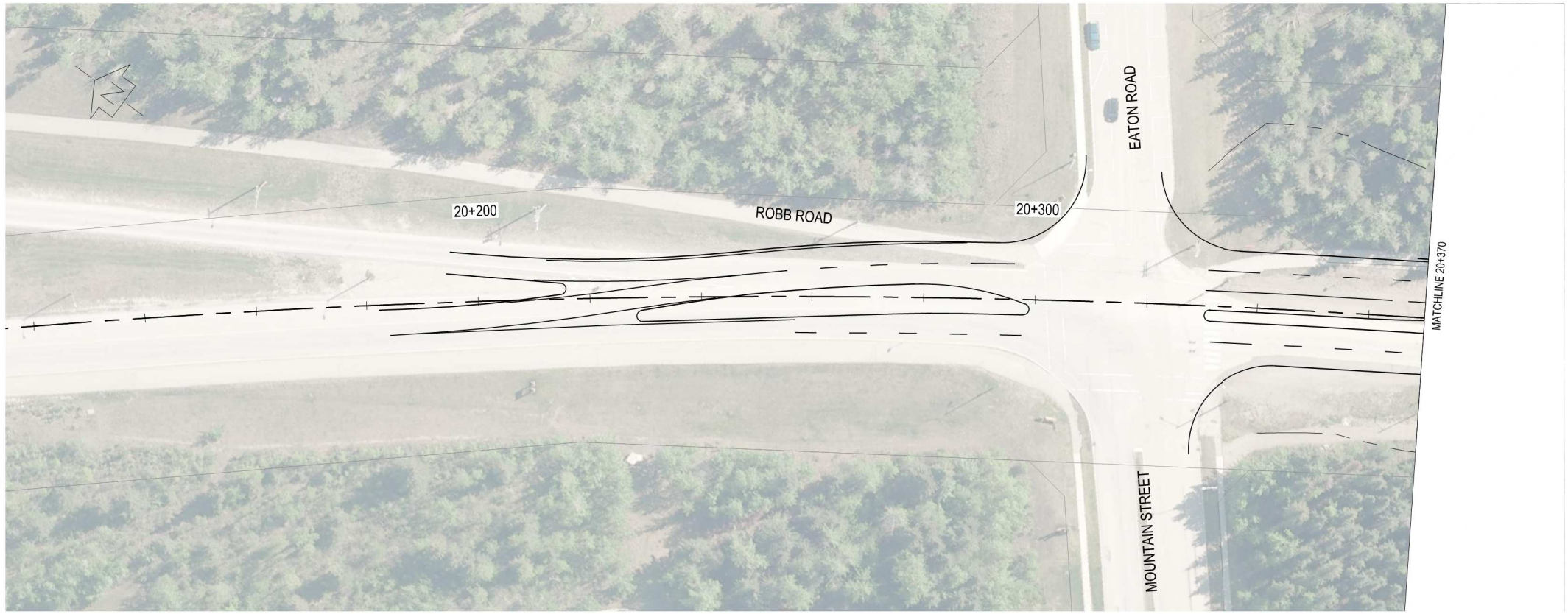
ROBB ROAD – INTERIM PHASE 1			
	Town of Hinton	**West Fraser**	**Total Costing**
Subgrade Preparation (inc. scarification and compaction)	$45,000	-	$45,000
Supply and Place – 20mm GBC @ 150mm thk.	$60,000	-	$60,000
*Supply and Place – 50-75mm GBC @ 125mm thk.	$50,000	-	$50,000
** Supply and Place – 20mm GBC @ 125mm thk.	-	$25,000	$25,000
Supply and Place – Asphalt (H2-150/200A) @ 120mm thk.	$225,000	-	$225,000
Sum of Unit Costs:	$380,000	$25,000	$405,000
Contingency 25%:	$95,000	$7,000	$102,000
Engineering, Testing and Construction Administration:	$45,000	$5,000	$50,000
Total	**$520,000**	**$37,000**	**$557,000**

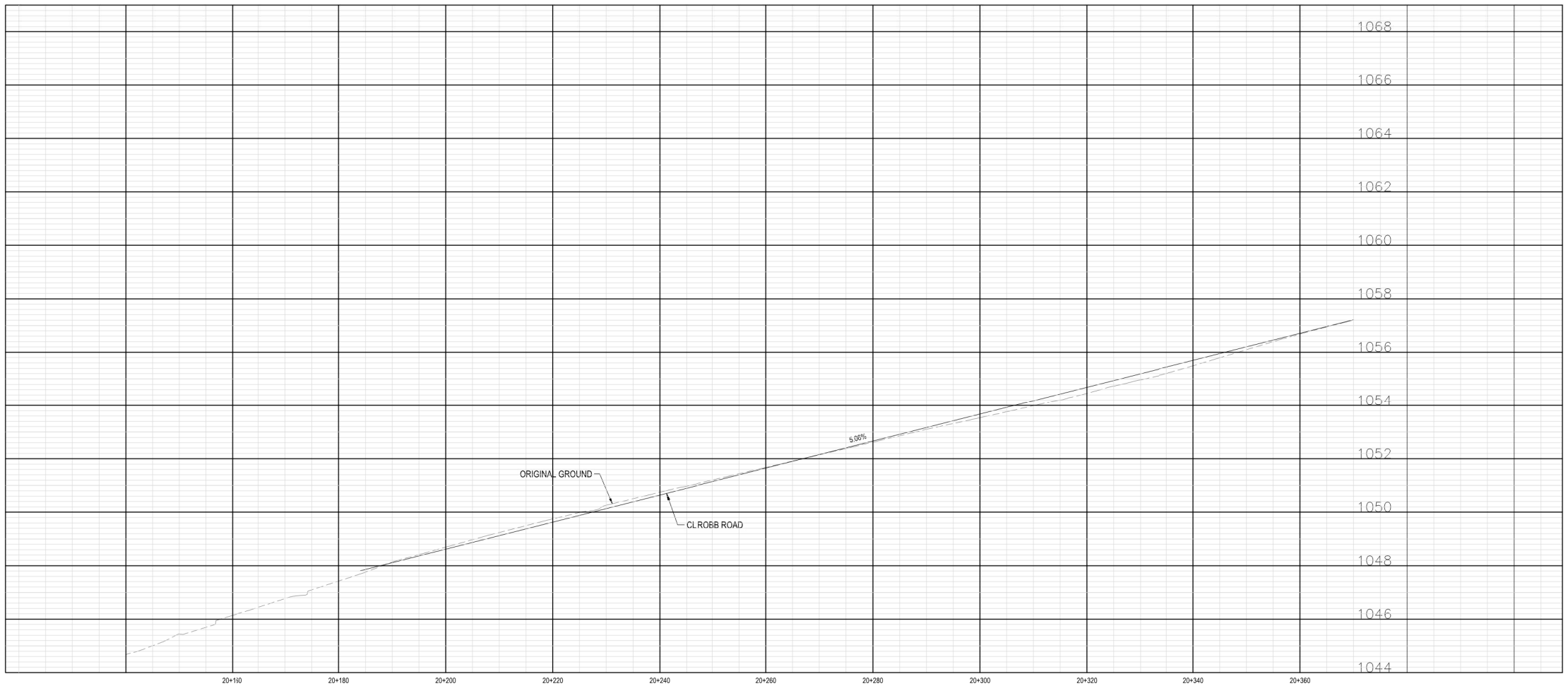
* Material required to make up the void created by the additional 20mm gravel in the northbound lane
** Contribution dollar amount for the added road structure requirements for northbound Robb Road
***Total thickness required for Robb Road Interim Phase 1 is 395mm (based on Surface Utilities Point 2 and 7 from the Geotechnical Report)

3.3 Topics of Further Discussion

- Truck Escape Ramp, reconstructed and brought up to current standards, perhaps a cost sharing can be negotiated with West Fraser.
- Multi-use crossing from the Bike Park to the East Side of Robb Road. Possible use of solar powered advanced warning signs and flashers.
- On street parking near the cemetery vs. an increase in parking lot size on the cemetery property.
- Supply and installation of a new load height restriction device near the intersection of Mountain Street and Robb Road, as well as removing and reinstating a similar device across from the K-Lynn site access.
- Daylight side slopes from the new vertical alignment impact the Bike Park, resulting in a loss of Bike Park terrain of approximately 1.0 ha. An allowance of $100,000.00 has been held to offset the loss of facilities and to allow for reconstruction of various related structures.
- Trans-Alta transmission line impacts, including actual costs and scheduling.
- Possible cost sharing with the provincial government in relation to the proposed HWY 16 By-pass.
- West Fraser's contribution to the increase in road structure for Robb Road.

APPENDIX A
Drawings





THE TOWN OF HINTON

P.Eng. | Permit

No.	DESCRIPTION	BY	DATE
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REVISIONS

ISL Engineering and Land Services

TOWN OF HINTON

ROBB ROAD

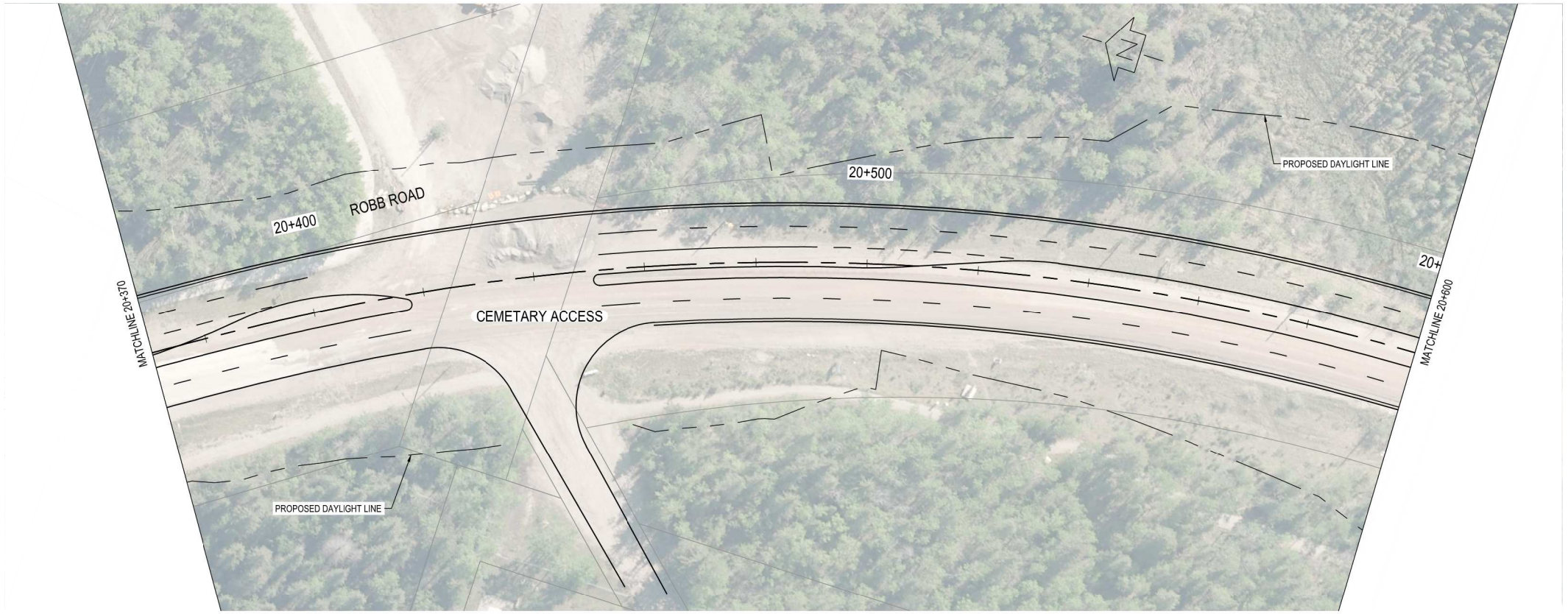
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PLAN PROFILE
STA 20+160 TO STA 20+370

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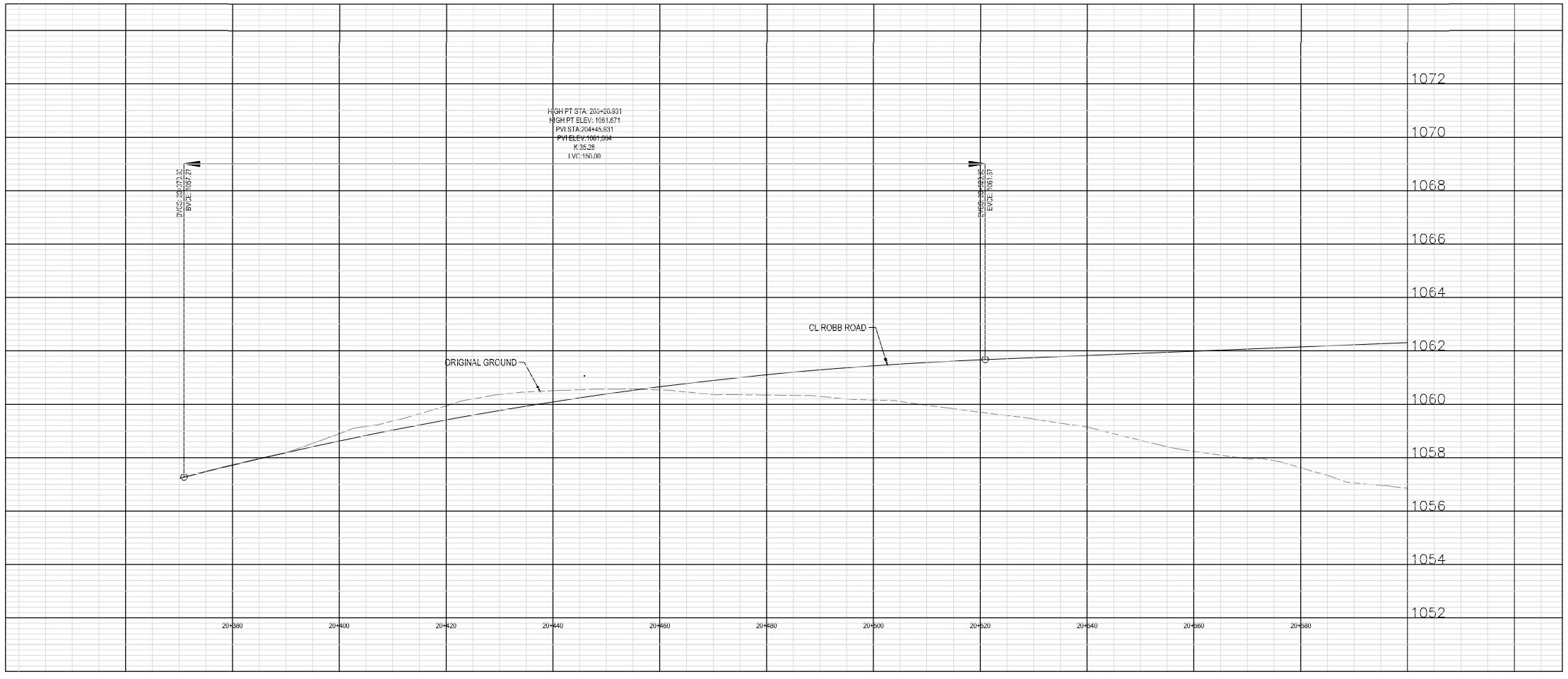
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NOTE: ALL PIPE SIZES ARE IN MILLIMETERS AND ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE NOTED.



THE TOWN OF HINTON

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REVISIONS

ISL Engineering and Land Services

TOWN OF HINTON

ROBB ROAD

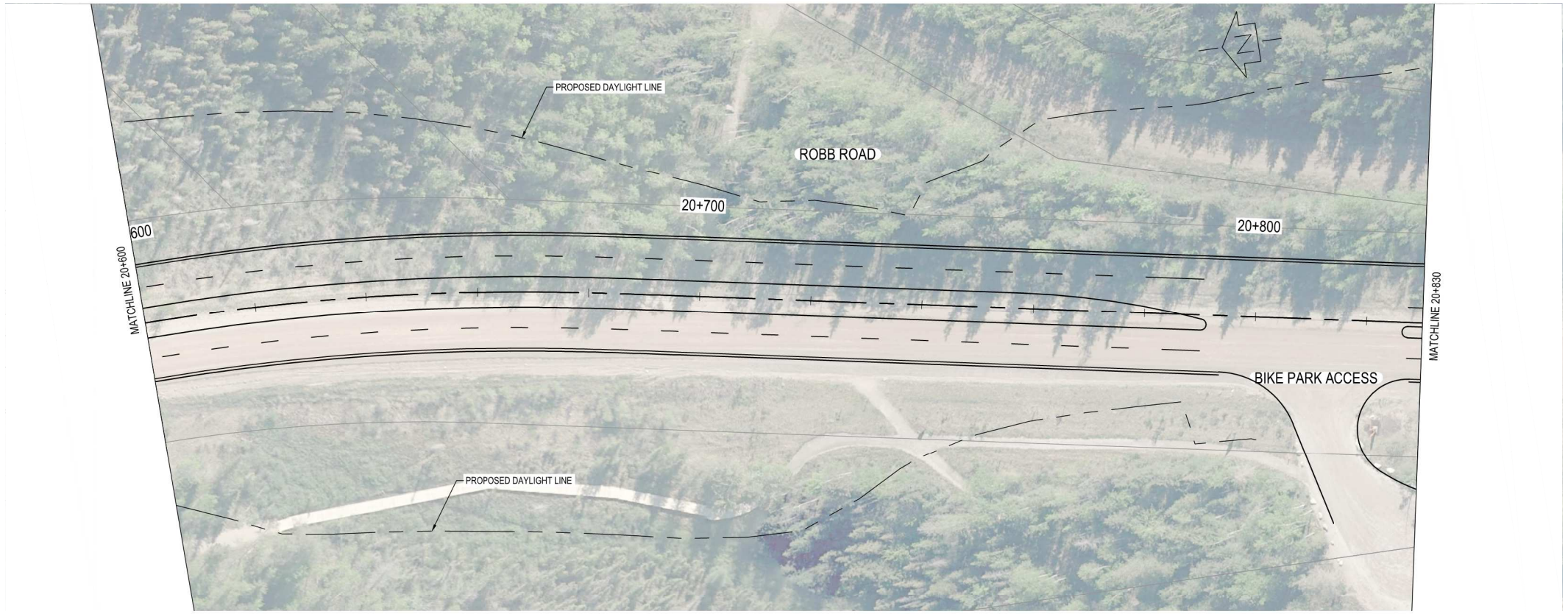
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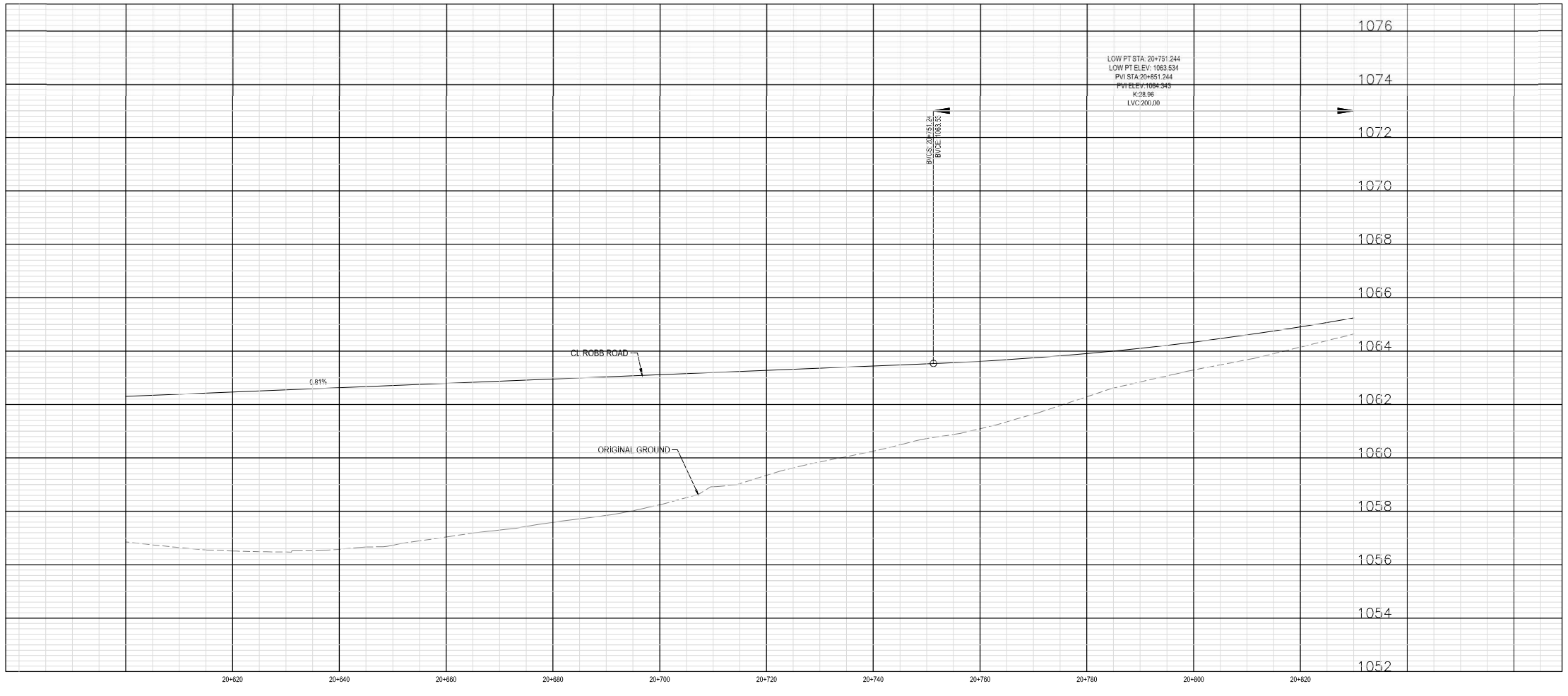
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STA 20+30 TO STA 20+600

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THE TOWN OF HINTON

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ISL Engineering and Land Services

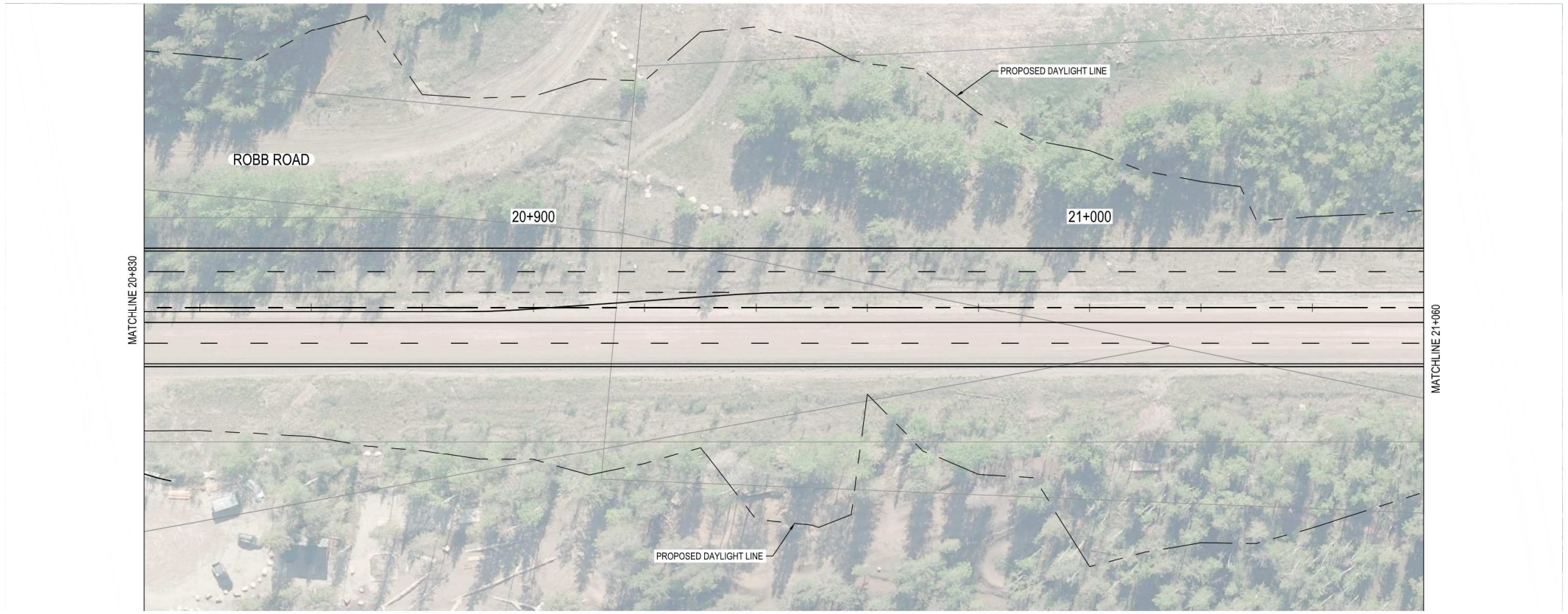
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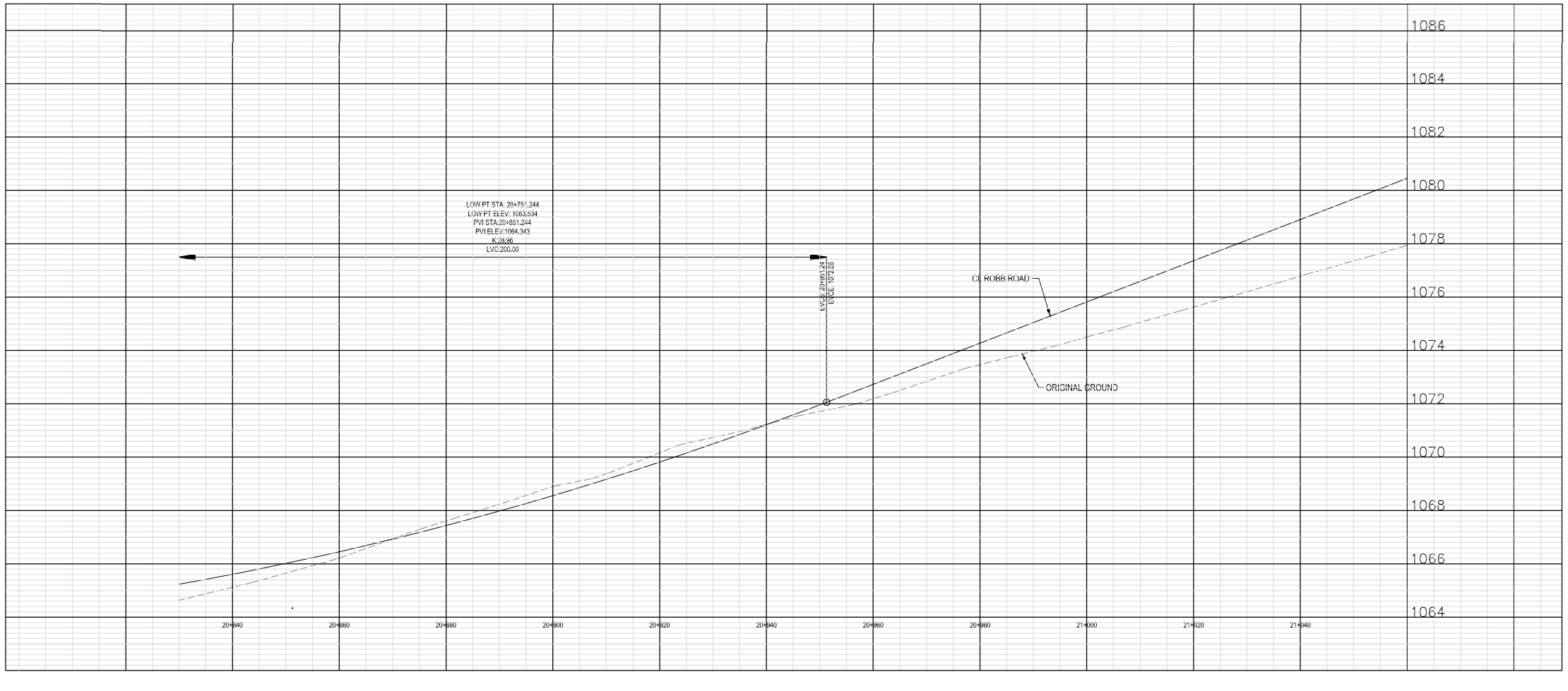
ROBB ROAD

PRELIMINARY DESIGN
PLAN PROFILE
STA 20+600 TO STA 20+830

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ISL Engineering and Land Services

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ROBB ROAD

PRELIMINARY DESIGN

PLAN PROFILE

STA 20+830 TO STA 21+060

Drawn: RG

Designed:

Design Checked: Date:

Discipline Review: Date:

Scale

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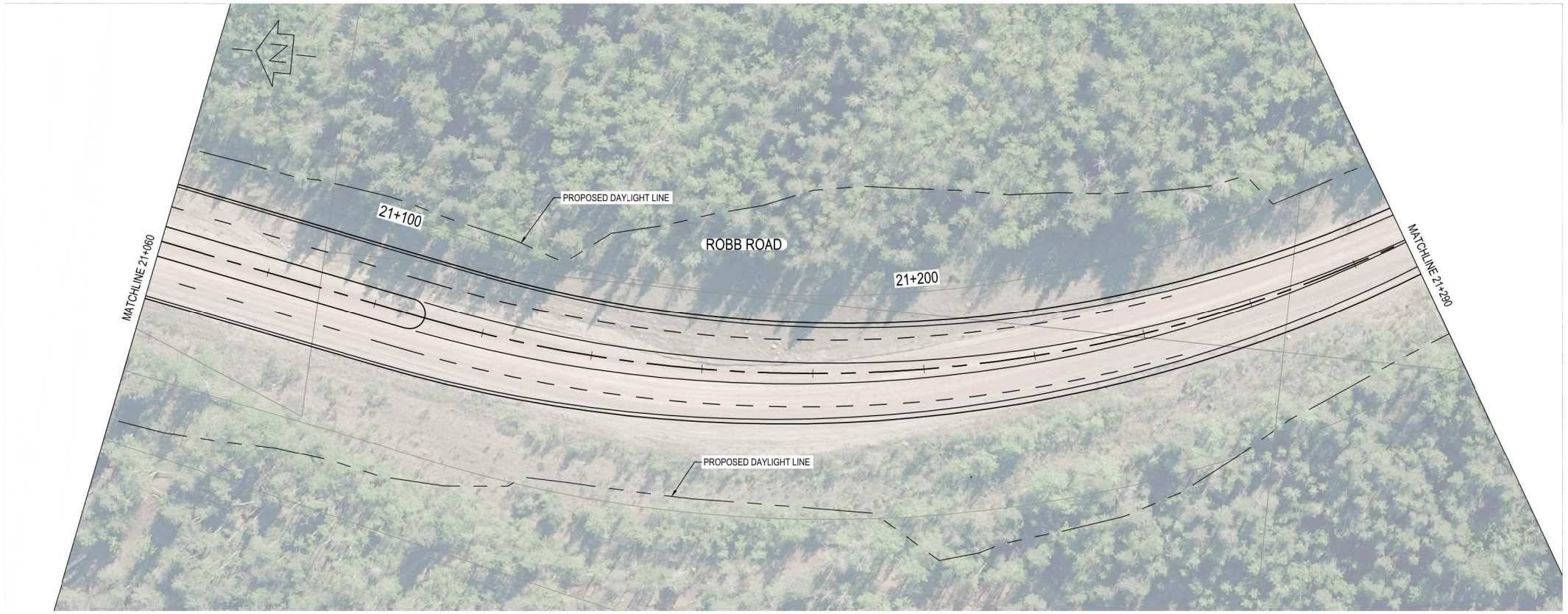
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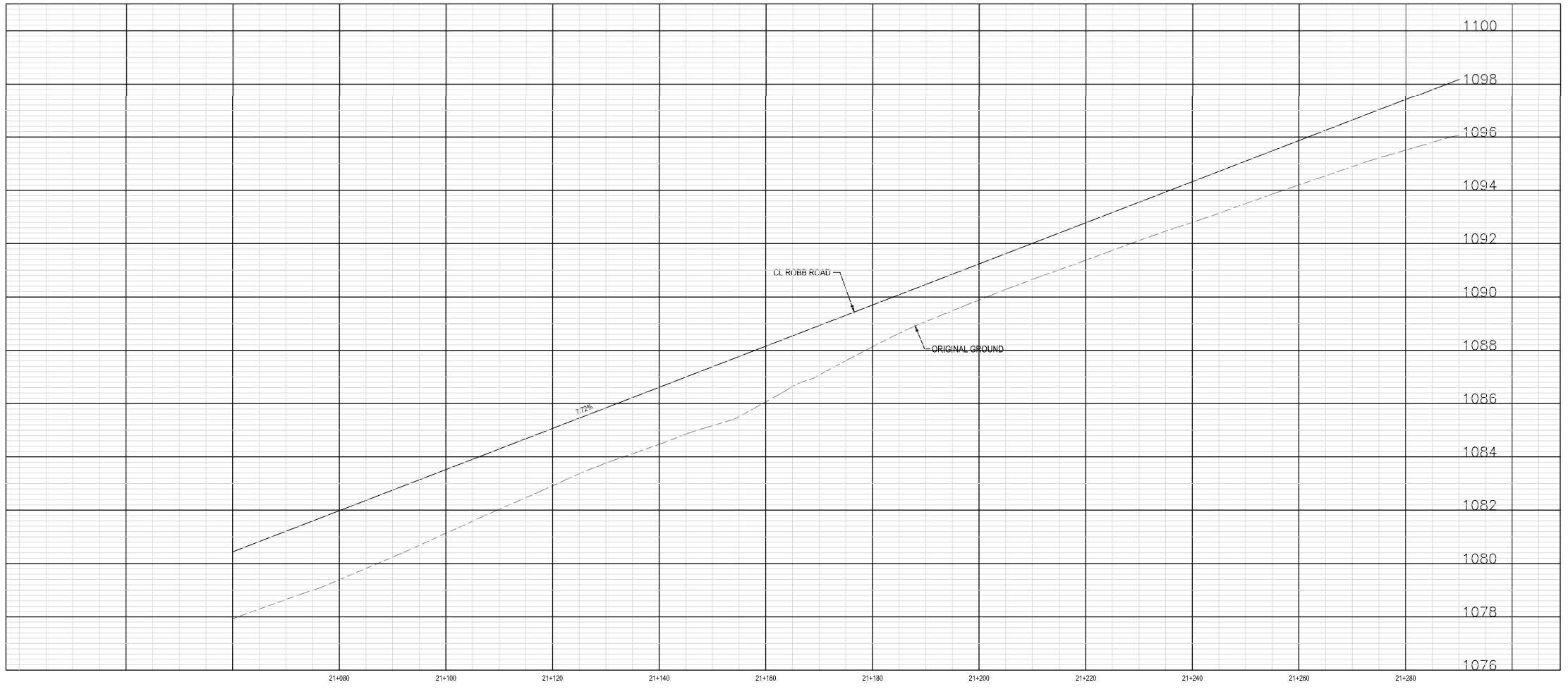
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Sheet No. 4

Revision No.

Jack Mason / Jan. 30, 13 / T:\Projects\25600\25611 - Hinton_Robb Road\02_CADD\20_Drafting\203_Drawings\25611_Robb Road.dwg





THE TOWN OF HINTON

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REVISIONS

ISL Engineering and Land Services

TOWN OF HINTON

ROBB ROAD

PRELIMINARY DESIGN

PLAN PROFILE

STA 21+060 TO STA 21+290

Drawn: RG

Designed:

Design Checked: Date:

Discipline Review: Date:

Scale

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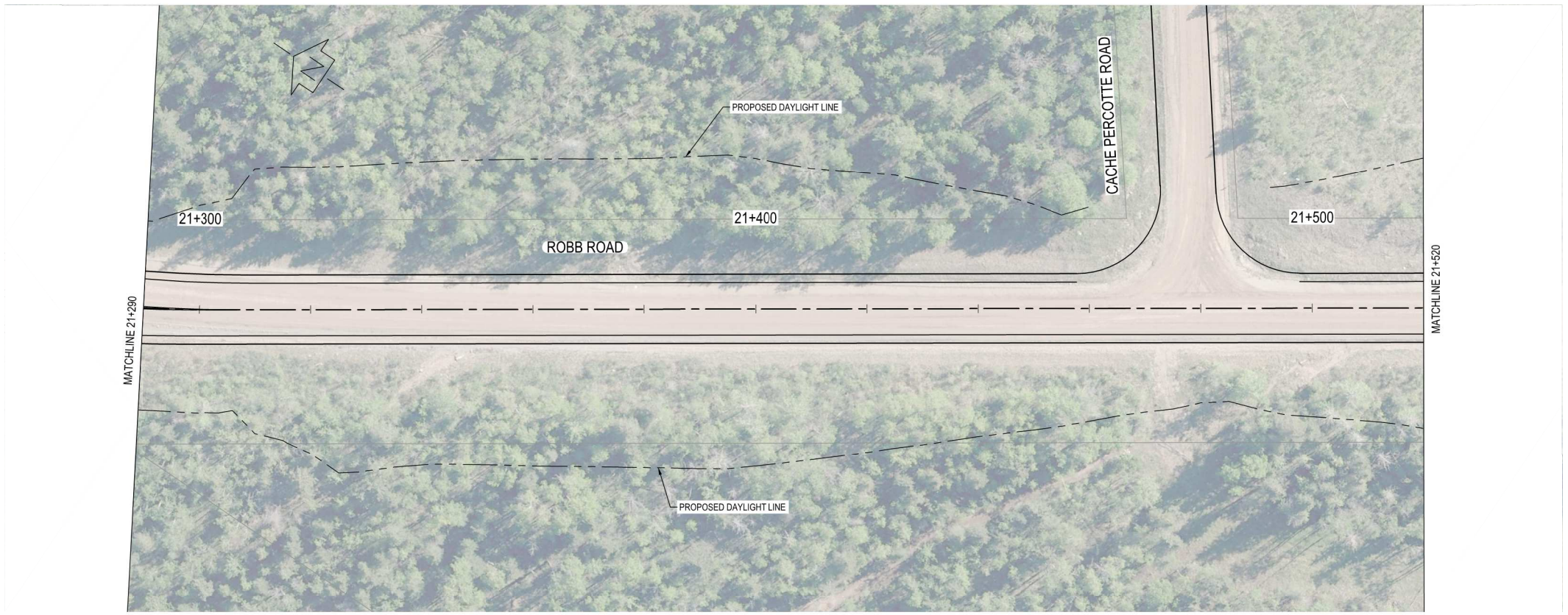
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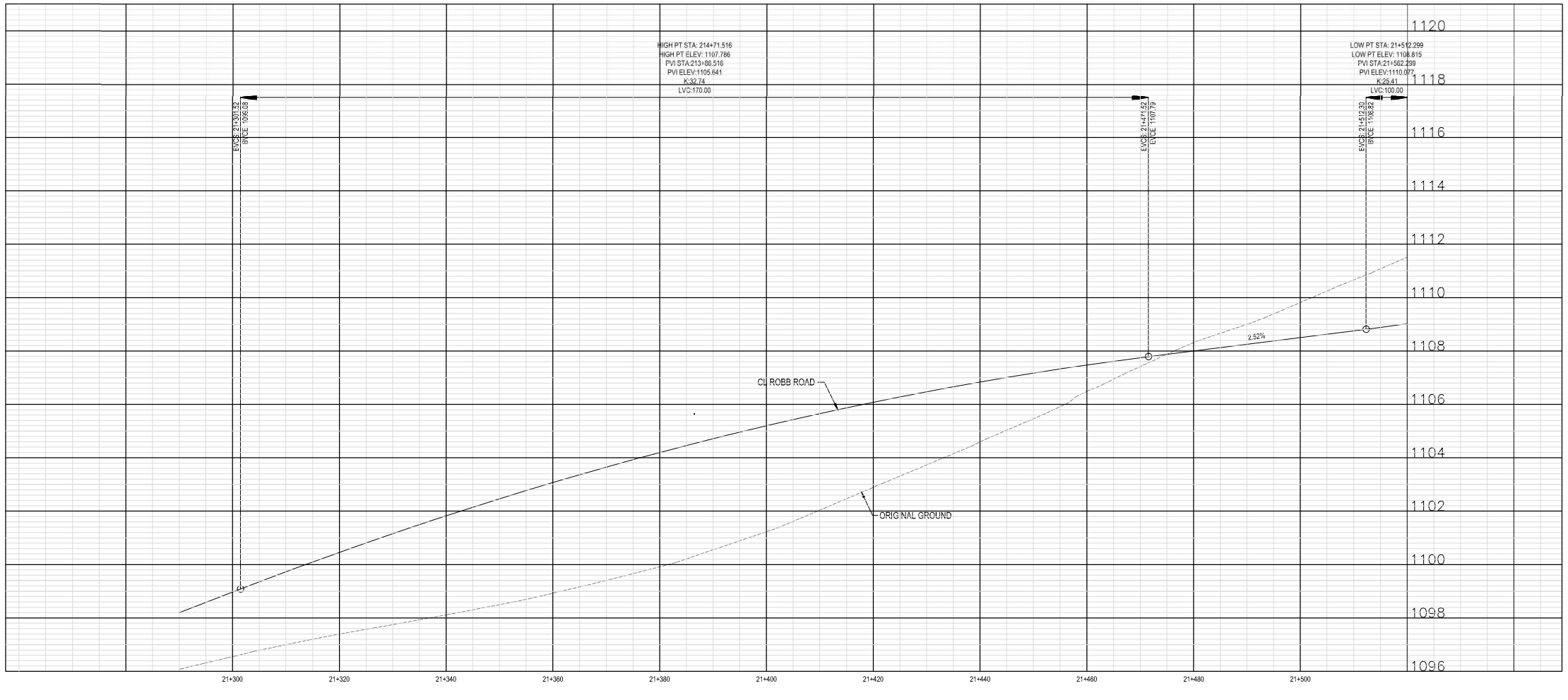
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Sheet No. 5

Revision No.

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REVISIONS

ISL Engineering and Land Services

TOWN OF HINTON

ROBB ROAD

PRELIMINARY DESIGN

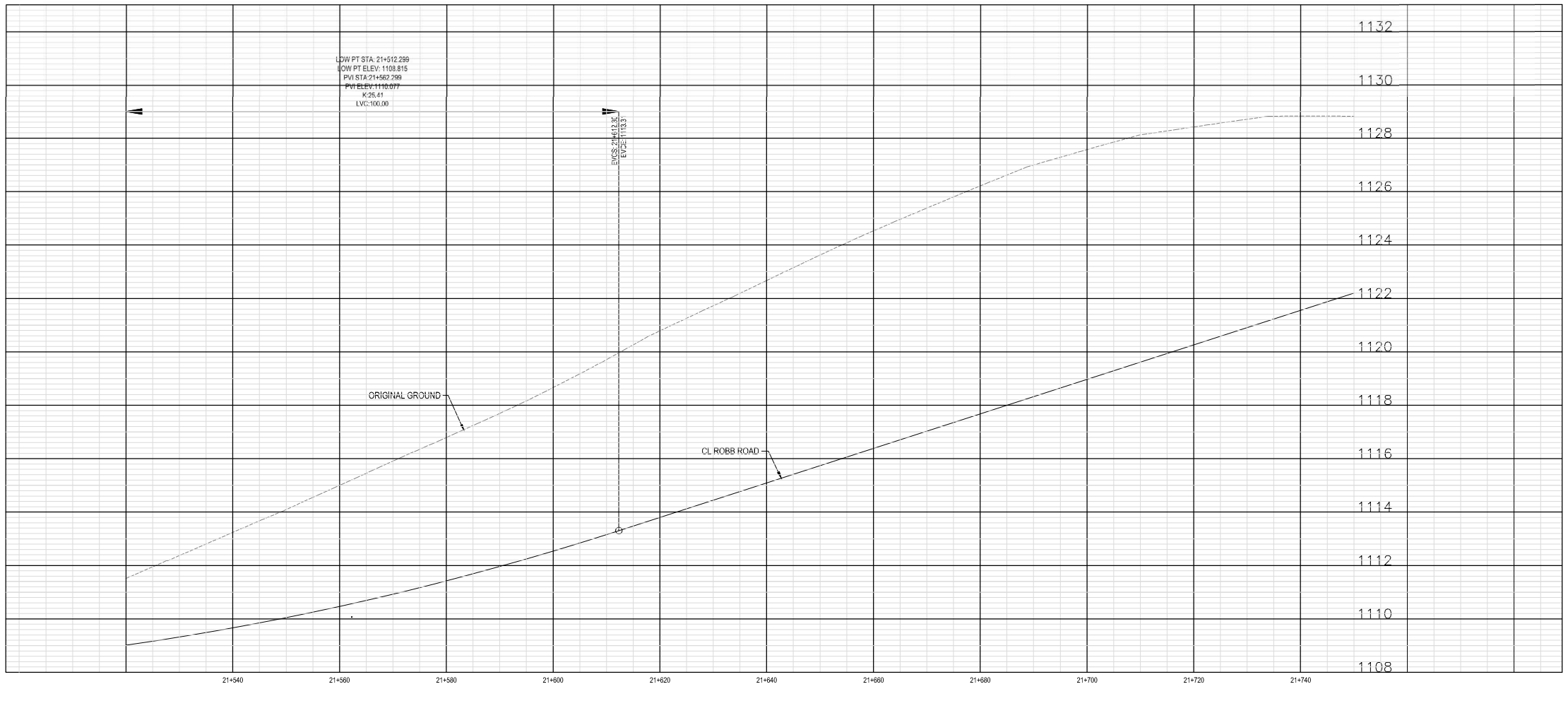
PLAN PROFILE

STA 21+290 TO STA 21+520

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Designed:	
Design Checked: Date:	
Discipline Review: Date:	
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Jack Mason / Jan. 30, 13 / T:\Projects\25600\25611 - Hinton_Robb Road\02_CADD\20_Drafting\d20\3_Drawings\25611_Robb Road.dwg





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REVISIONS

ISL Engineering and Land Services

TOWN OF HINTON

ROBB ROAD

PRELIMINARY DESIGN

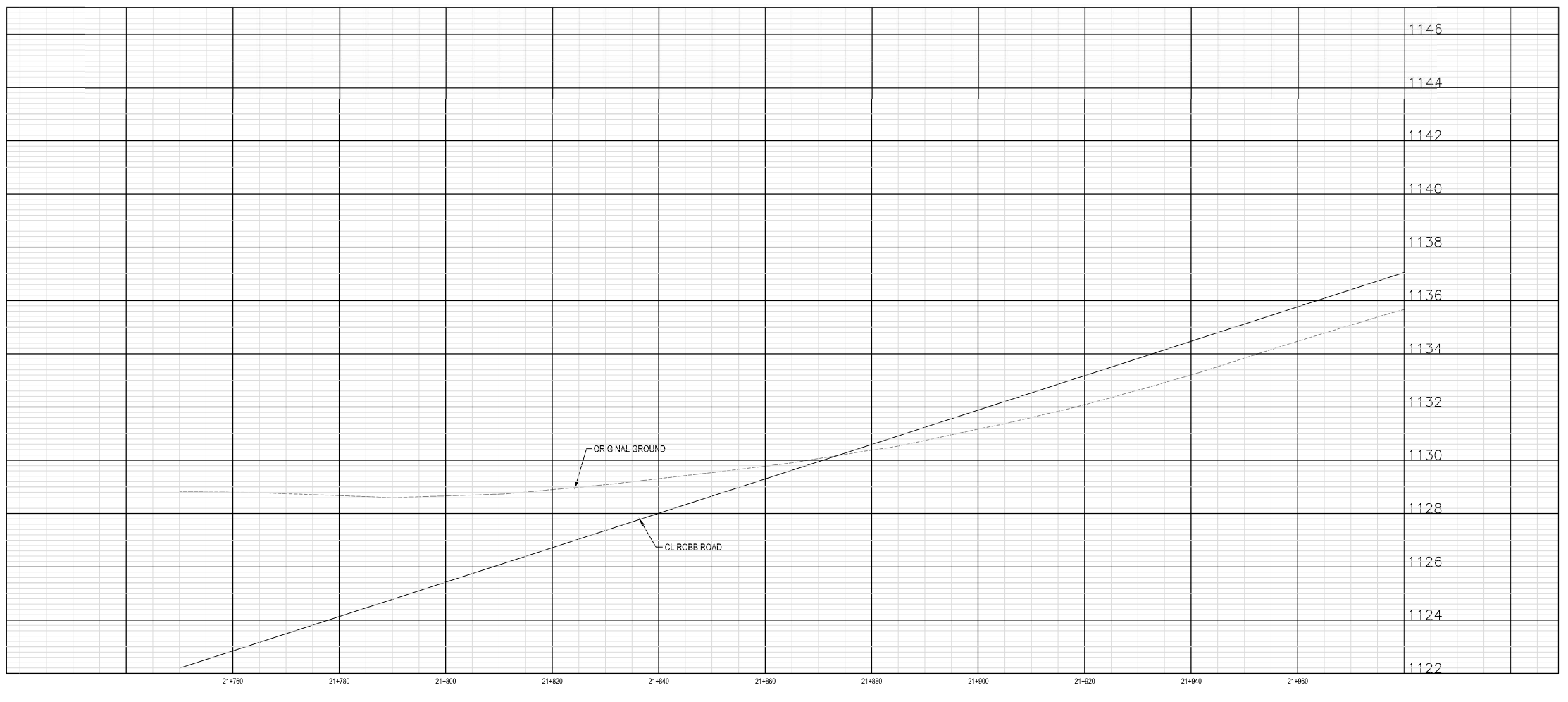
PLAN PROFILE

STA 21+520 TO STA 21+750

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Designed:	
Design Checked: Date:	
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	Revision No.

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REVISIONS

ISL Engineering and Land Services

TOWN OF HINTON

ROBB ROAD

PRELIMINARY DESIGN

PLAN PROFILE

STA 21+750 TO STA 21+980

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Discipline Review: Date:

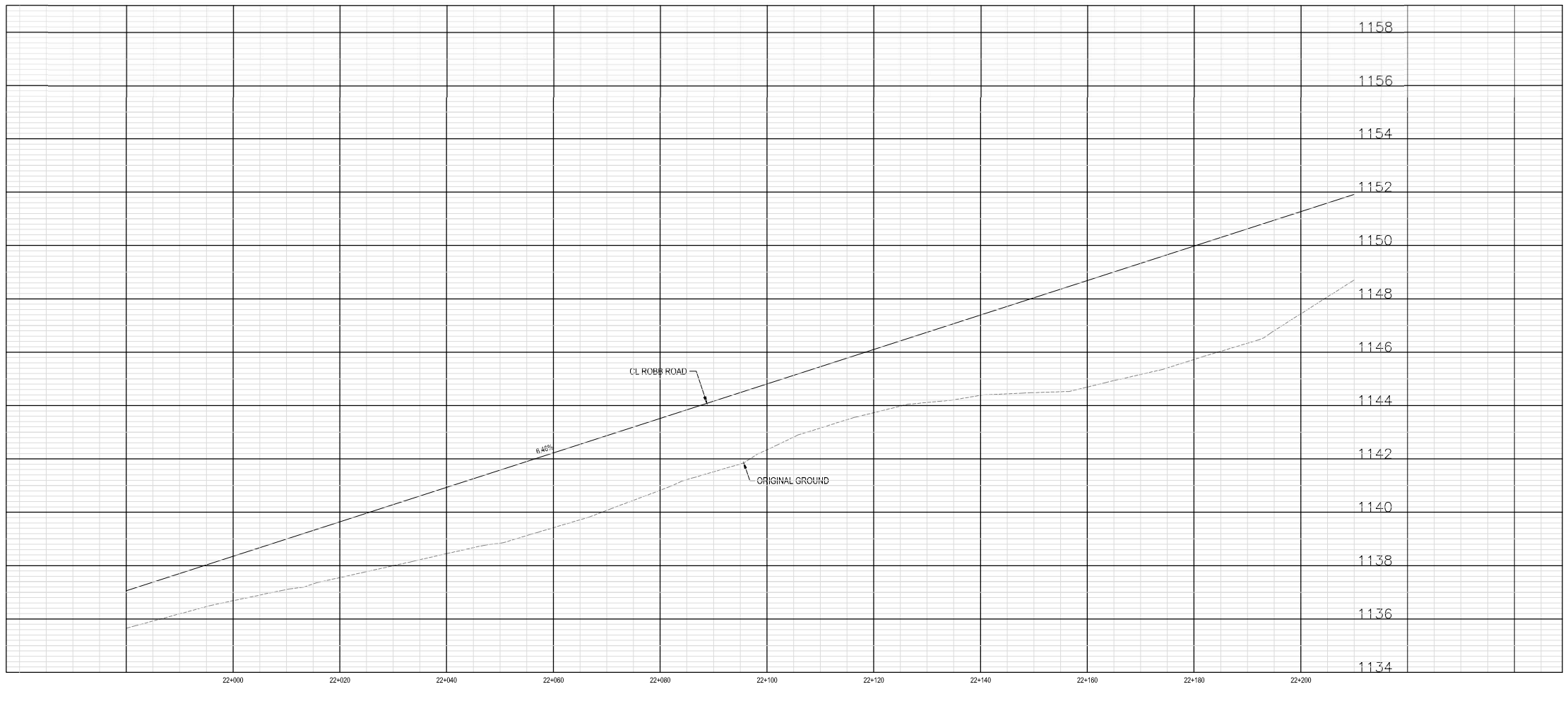
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Scale
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VERT 1:100 0 1 2 3 4m

Sheet No. 8
Revision No.

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ISL Engineering and Land Services

TOWN OF HINTON

ROBB ROAD

PRELIMINARY DESIGN

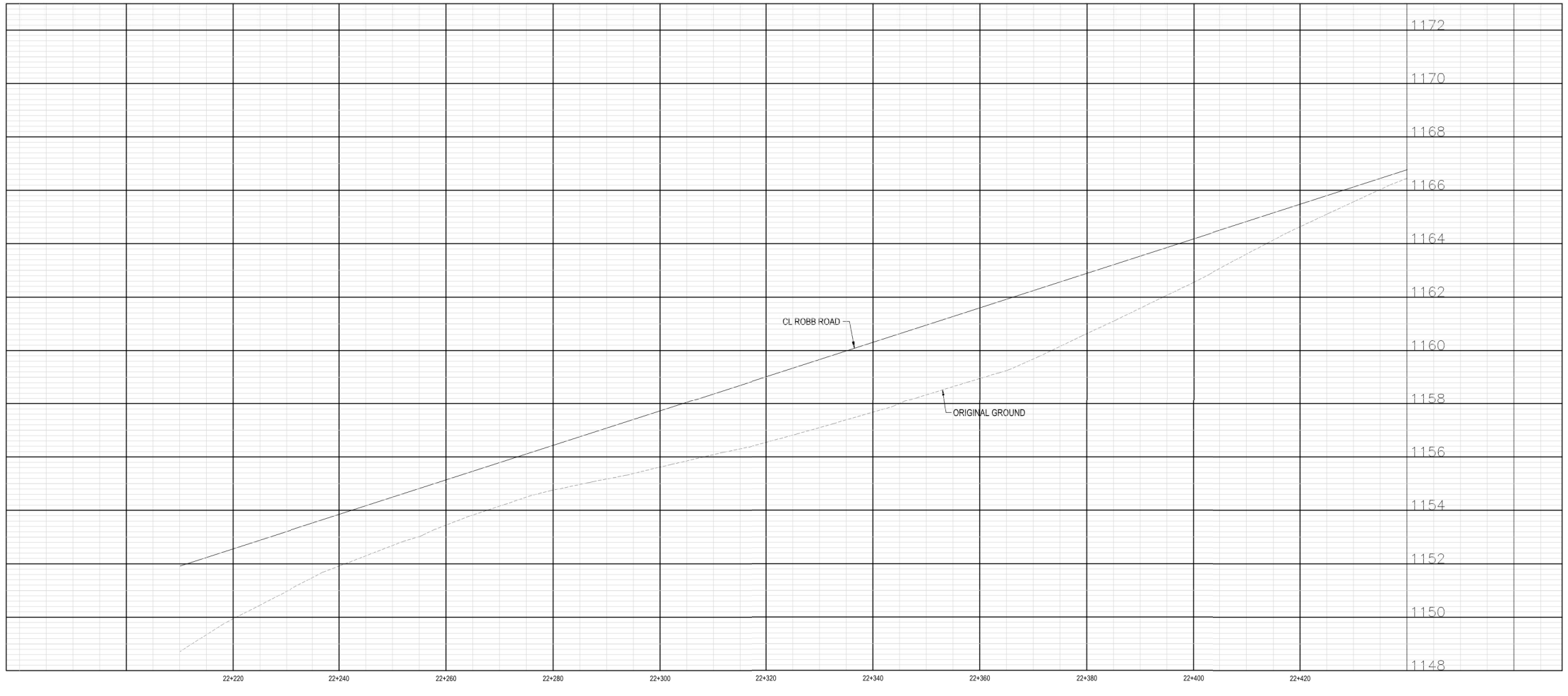
PLAN PROFILE

STA 21+980 TO STA 22+210

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REVISIONS

ISL Engineering and Land Services

TOWN OF HINTON

ROBB ROAD

PRELIMINARY DESIGN
PLAN PROFILE
STA 22+210 TO STA 22+440

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Designed:
Design Checked: Date:
Discipline Review: Date:

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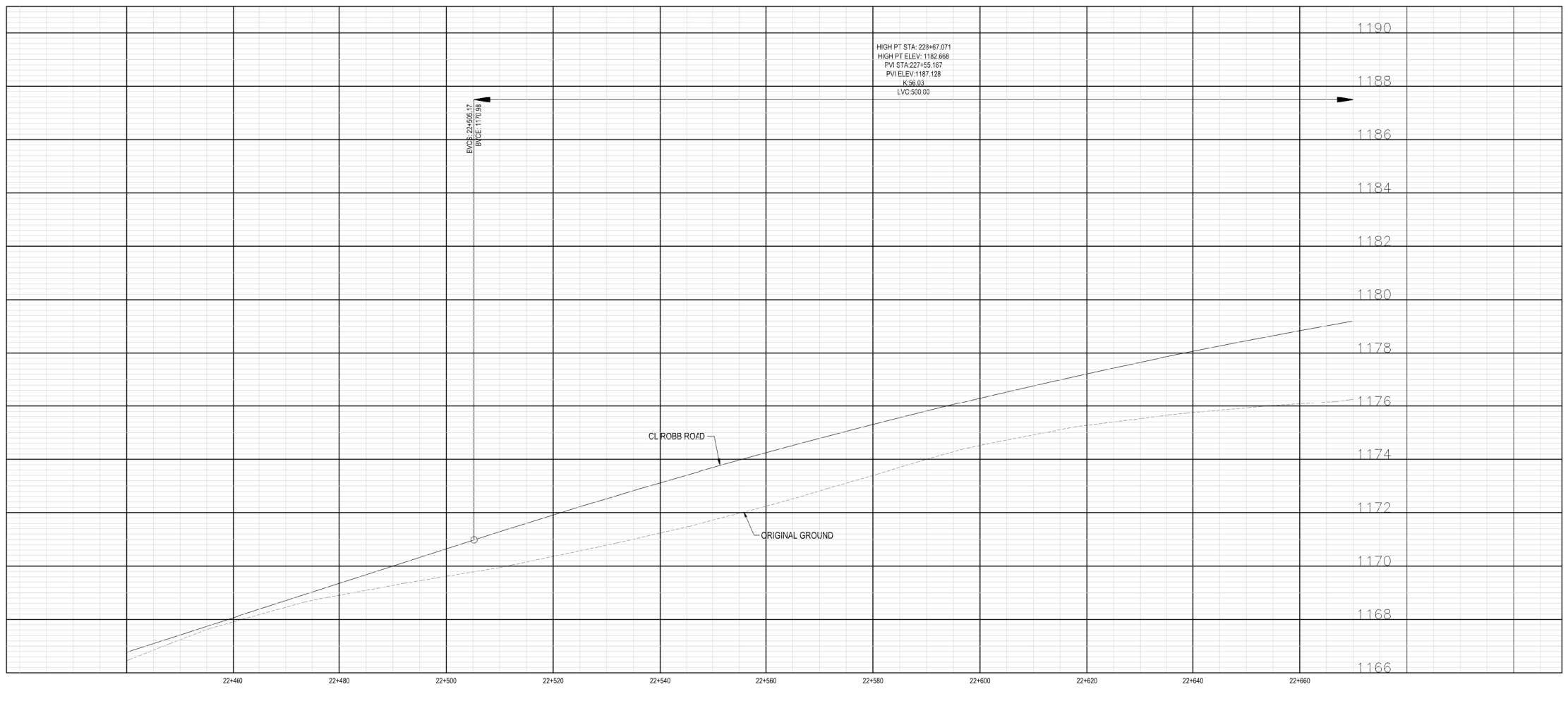
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Sheet No. 10

Revision No.

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REVISIONS

ISL Engineering and Land Services

TOWN OF HINTON

ROBB ROAD

PRELIMINARY DESIGN

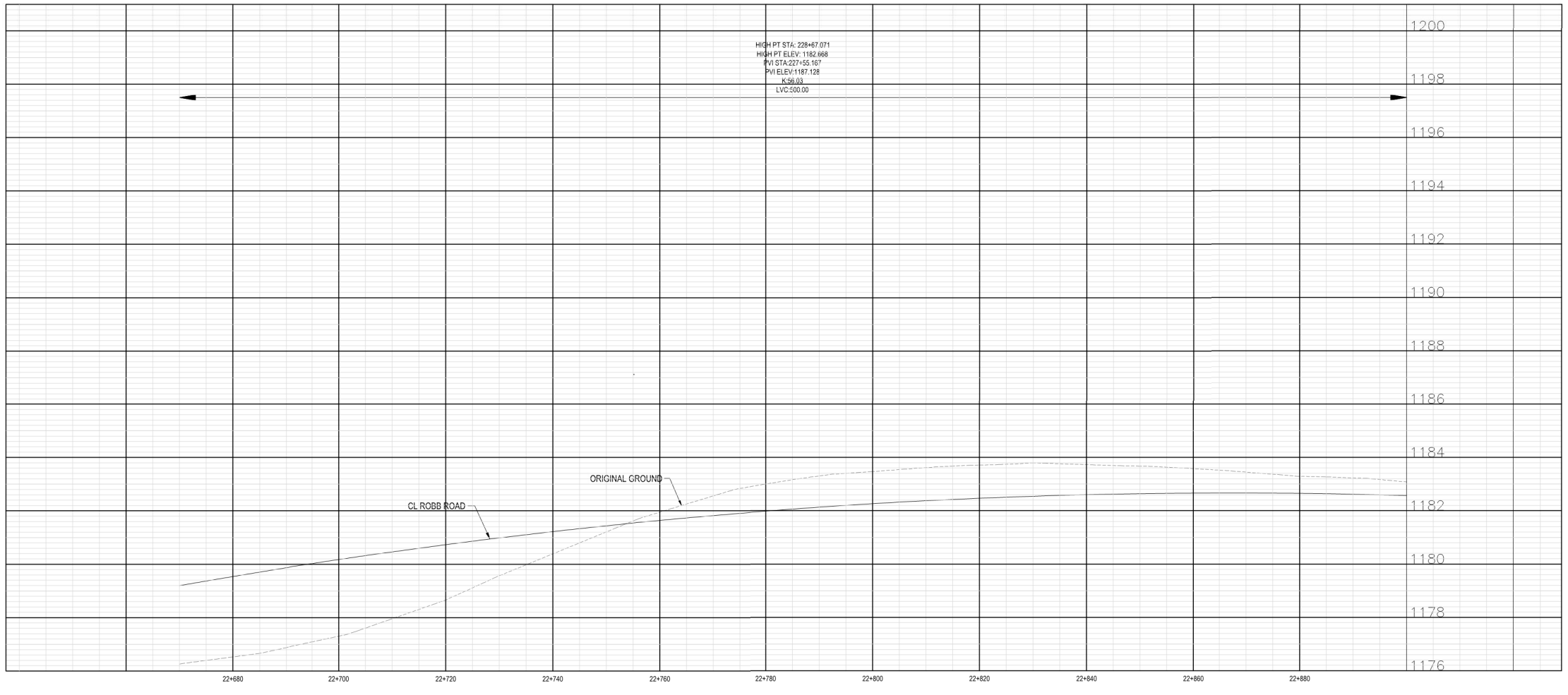
PLAN PROFILE

STA 22+440 TO STA 22+670

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Scale HORZ 1:500 0 5 10 15 20m; VERT 1:100 0 1 2 3 4m	Sheet No. 11 Revision No.

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TOWN OF HINTON

ROBB ROAD

PRELIMINARY DESIGN

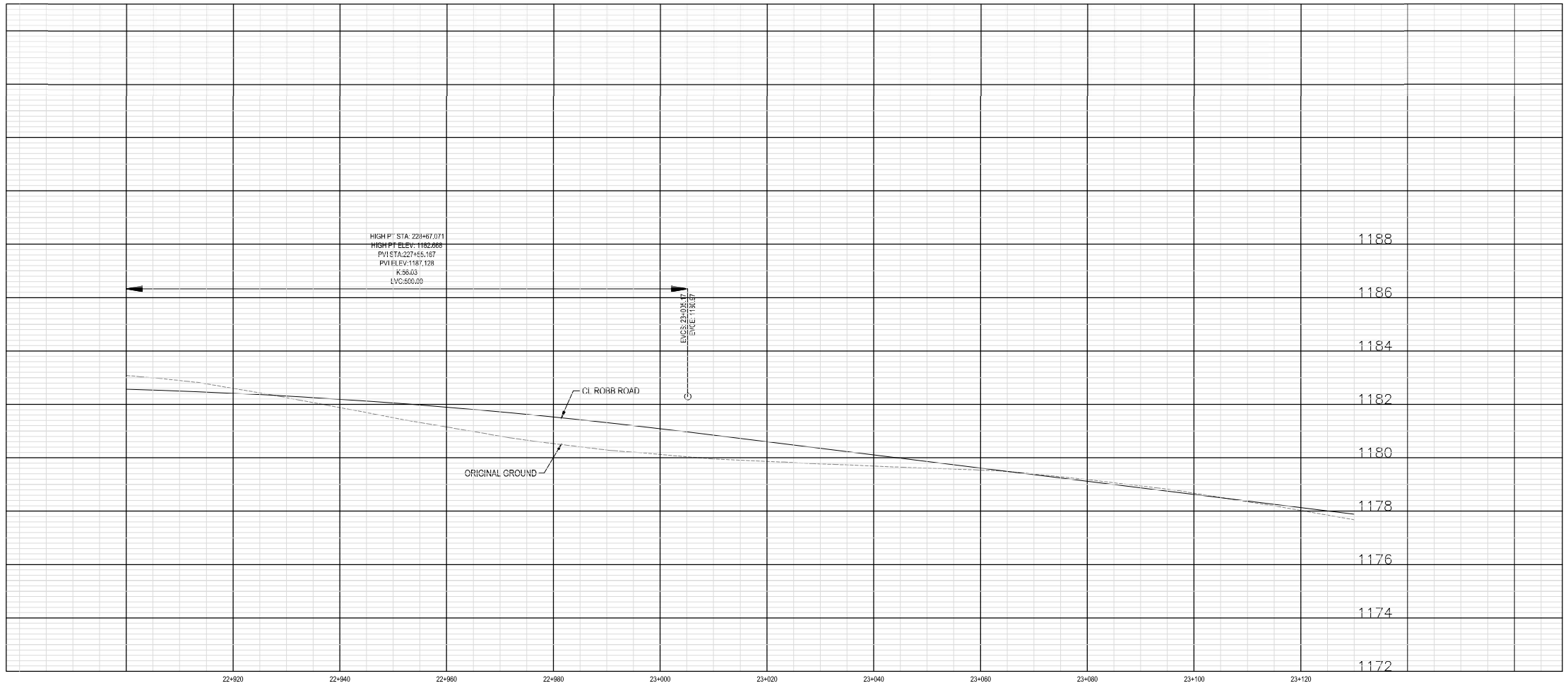
PLAN PROFILE

STA 22+670 TO STA 22+900

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Design Checked: Date:	
Discipline Review: Date:	
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REVISIONS

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TOWN OF HINTON

ROBB ROAD

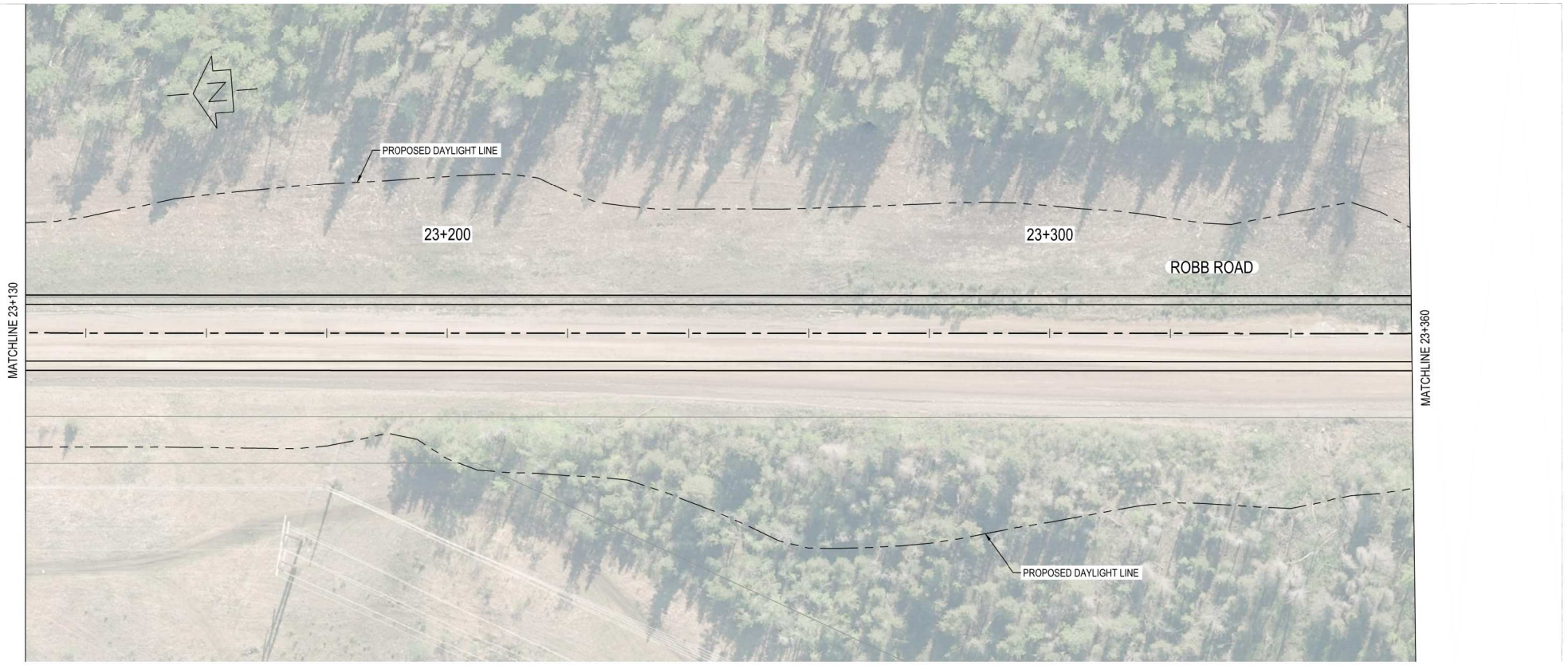
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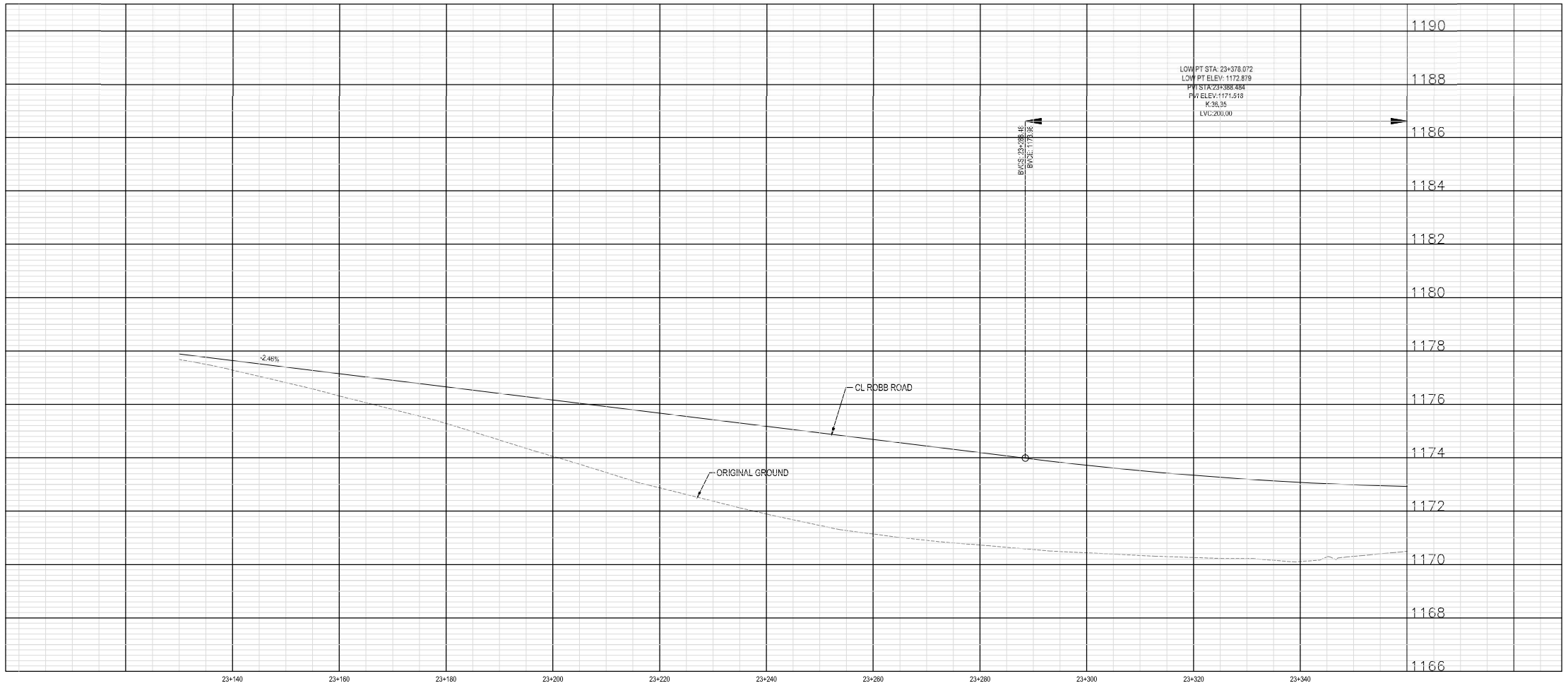
PLAN PROFILE

STA 22+900 TO STA 23+130

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Scale HORZ 1:500 0 5 10 15 20m; VERT 1:100 0 1 2 3 4m	Sheet No. 13 Revision No.

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REVISIONS

ISL Engineering and Land Services

TOWN OF HINTON

ROBB ROAD

PRELIMINARY DESIGN

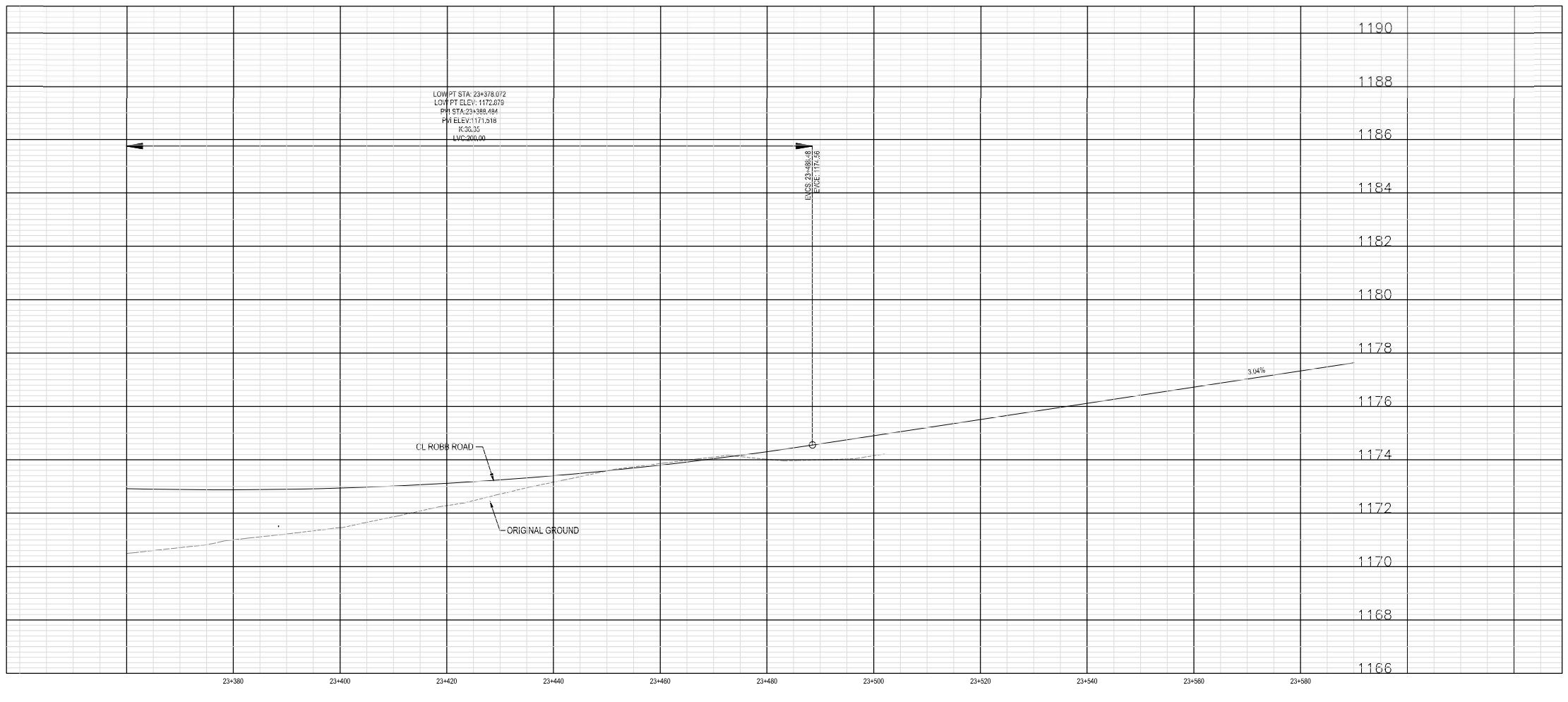
PLAN PROFILE

STA 23+130 TO STA 23+360

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Discipline Review: Date:	
Scale HORZ 1:500 0 5 10 15 20m; VERT 1:100 0 1 2 3 4m	Sheet No. 14 Revision No.

Jack Mason / Jan. 30, 13 / T:\Projects\25600\25611 - Hinton_Robb Road\02_CADD\20_Drafting\d20i3_Drawings\25611_Robb Road.dwg





THE TOWN OF HINTON

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REVISIONS

ISL Engineering and Land Services

TOWN OF HINTON

ROBB ROAD

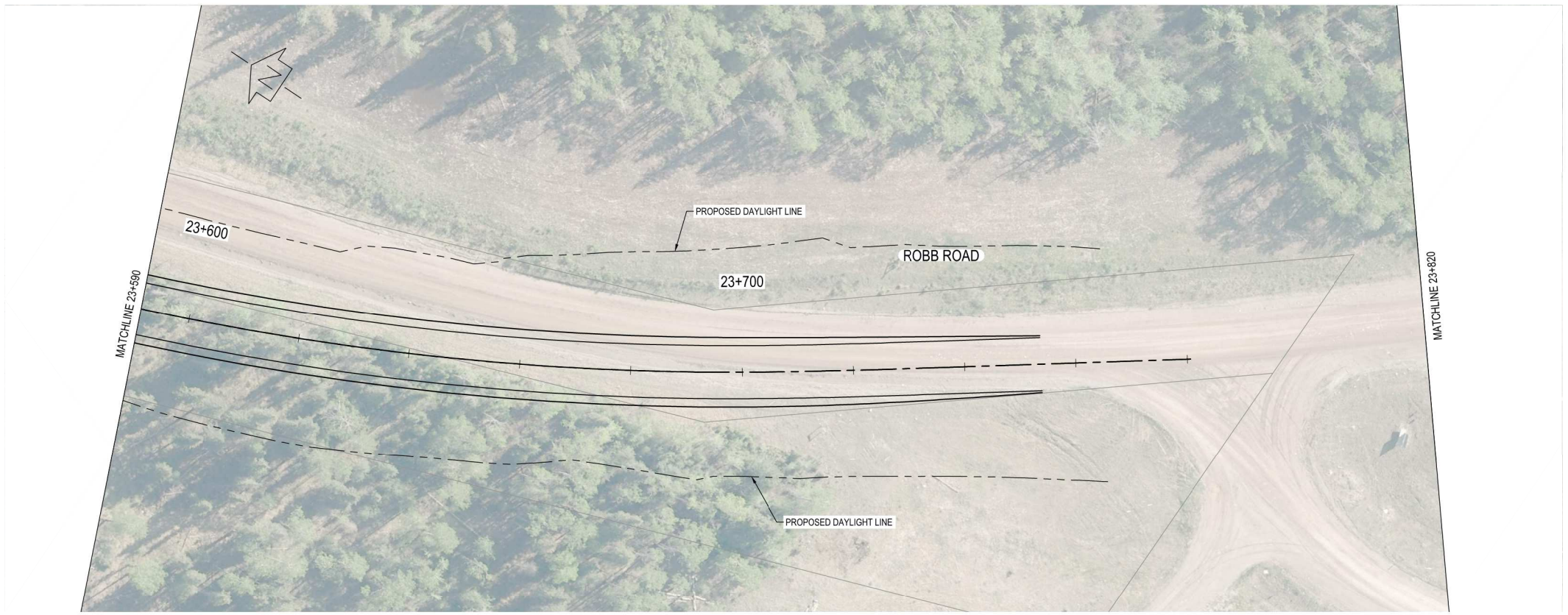
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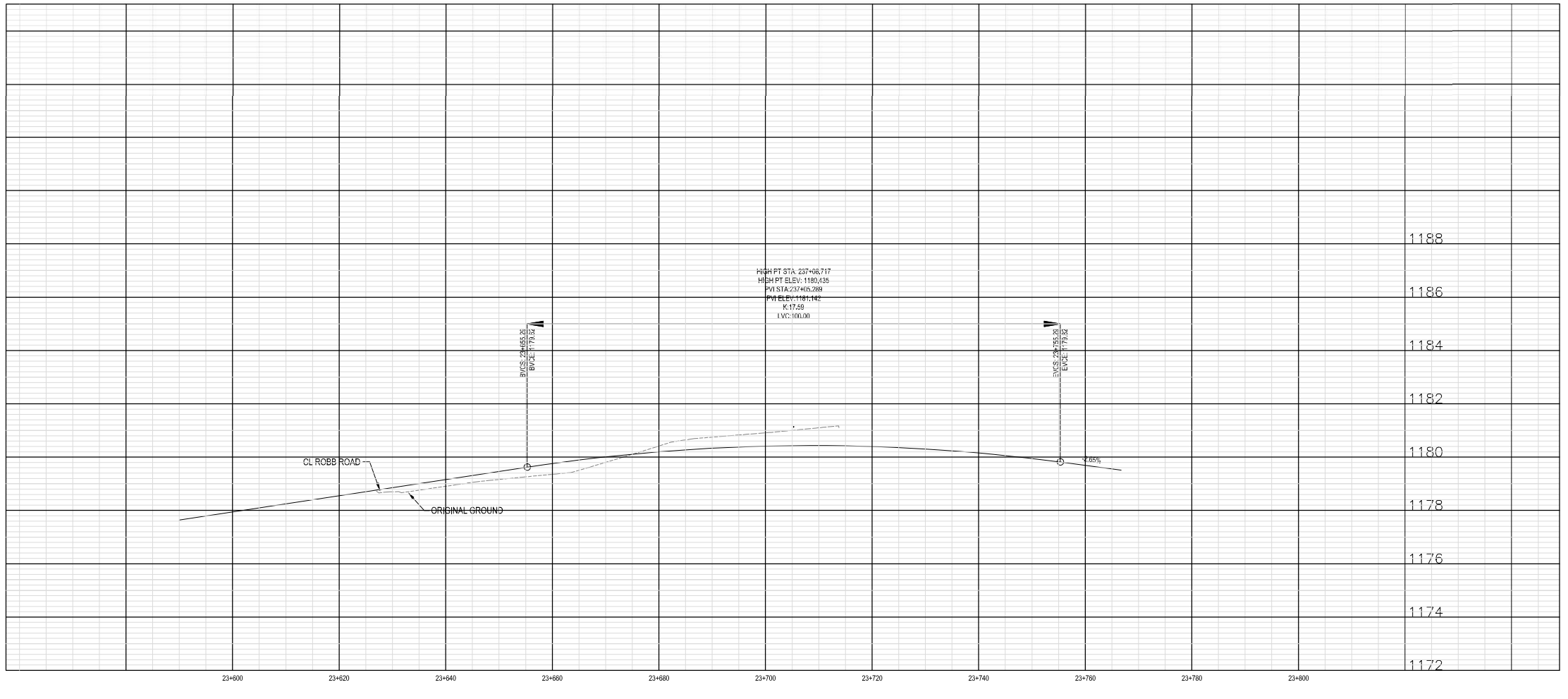
PLAN PROFILE

STA 23+360 TO STA 23+590

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Scale HORZ 1:500 0 5 10 15 20m; VERT 1:100 0 1 2 3 4m	Sheet No. 15 Revision No.

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THE TOWN OF HINTON

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REVISIONS

ISL Engineering and Land Services

TOWN OF HINTON

ROBB ROAD

PRELIMINARY DESIGN

PLAN PROFILE

STA 23+590 TO STA 23+820

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Design Checked: Date:	
Discipline Review: Date:	
Scale HORZ 1:500 0 5 10 15 20m; VERT 1:100 0 1 2 3 4m	Sheet No. 16 Revision No.

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